



CST 8202
WINDOWS
OPERATING
SYSTEMS I



The Professor(s)

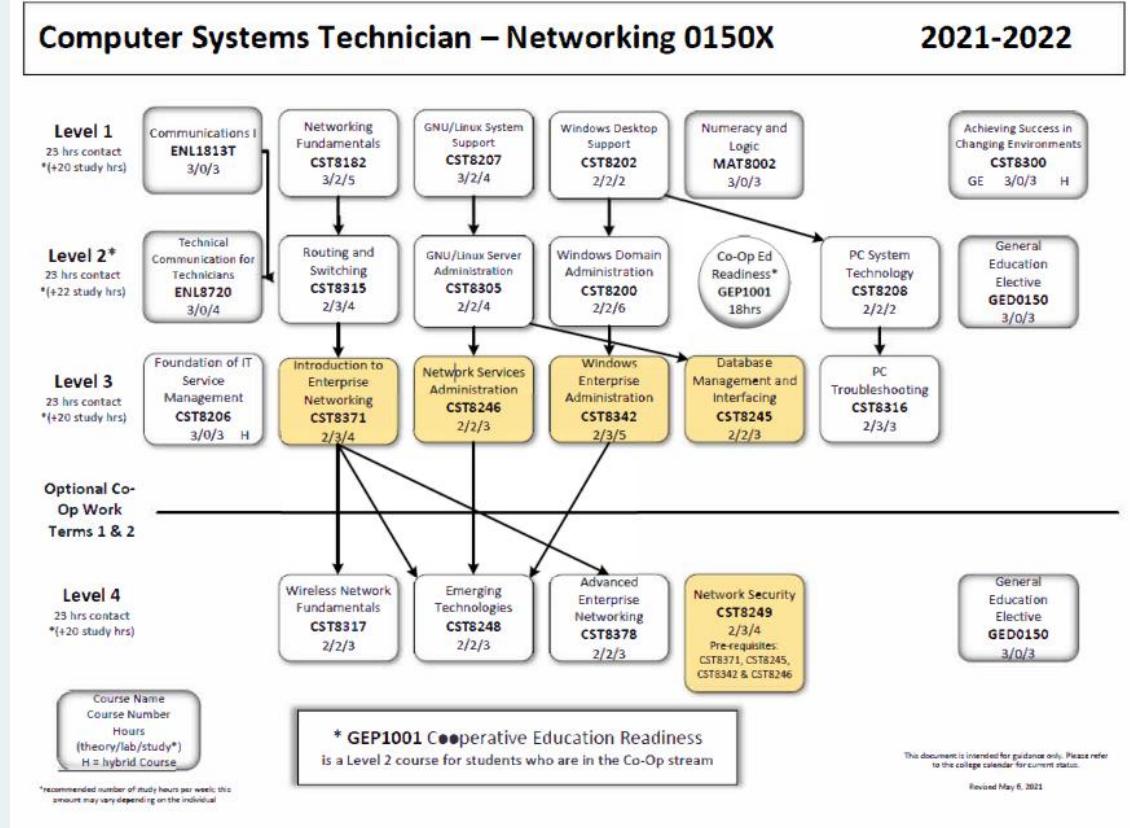
Joseph Odiete

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- Office: T325
- Office Hours: By Appointment via MSTeams
- Emails to me must contain:
 - Your Name
 - Course Code
 - Your College Username

Consider putting the above in your signature block.

- A Detailed Description
- Proper grammar and spelling

Computer Systems Technician - Networking 01SOX



Course Objectives

- Introduction to the Windows Desktop Operating System
- Learn to use some of the core basic commands and perform common system setup and management tasks
- Tasks covered include, but are not limited to:
 - Installing and configuring the operating system
 - Windows scripting with PowerShell
 - The command-line environment
 - Troubleshooting the boot process
 - Customizing and personalizing the operating environment
 - File system security
- Document lab work !!!

Course Tools

- Laptop
 - Must meet course BYOD requirements
- VMware Workstation software
 - Available for download on Digital Resources
- Course Kit (Pickup at Connections Bookstore)
 - Order Number: CST8202
 - Portable hard drive (recommended)
- An Internet Connection

Grading

- Term tests and Quizzes (25%)
 - 10% - Midterm 1
 - 15% - Midterm 2
- Lab marking (40%)
- Skills Based Assessment (SBA) (15%)
- In-lab practical Test & Demos
- Final exam (20%)

Academic Requirements

- Course policy for missed in class tests:
 - At the discretion of the professor, any major assessment that was missed with an acceptable and documented reason will either;
 - A) be added to the weighting of a future assessment, to a MAXIMUM weighting of 50%.
 - B) be addressed with a makeup assessment that may be a different format than the original.
 - Any missed assessment without an acceptable and documented reason will receive a 0 grade.
 - There is no provision for making up missed exams, regardless of the reason.
 - In order to pass the credit course, students must achieve a minimum contribution of:
 - 22.5% from an average of Evaluation Items # 2 and 3 (Midterms Exams & Final Exam)
 - 27.5% from an average of Evaluation Items # 1 and 4 (Lab Activities & Practical Skills Assessment)
 - Achieving a higher mark in one evaluation area can not be used to offset a low mark in the other.



CST8202 LABS

Orientation & Guidelines

Procedures & Policies

- Students' Contribution
- Your Lab Notes
- VMware

Students' Contribution

- Be here
 - Attendance taken
- Be on time
- Be prepared
 - Lab ready, necessary equipment, functioning computer
 - Read lab ahead to understand objectives
- Do your work
 - Keep conversation levels reasonable
 - No Discord, Facebook, Games, etc during lab period
 - No exceptions, no excuses

Your Lab Notes

- Digital submission of Lab Assignments on Brightspace
- Follow guidelines provided
 - Cover Page
 - Proper format & layout (PDF)
 - Correct content
 - Legible
 - Laid out in order of required %Solutions and #Notes
 - Submitted on time
- Be sure to keep after the semester
 - Keep for future use & reference

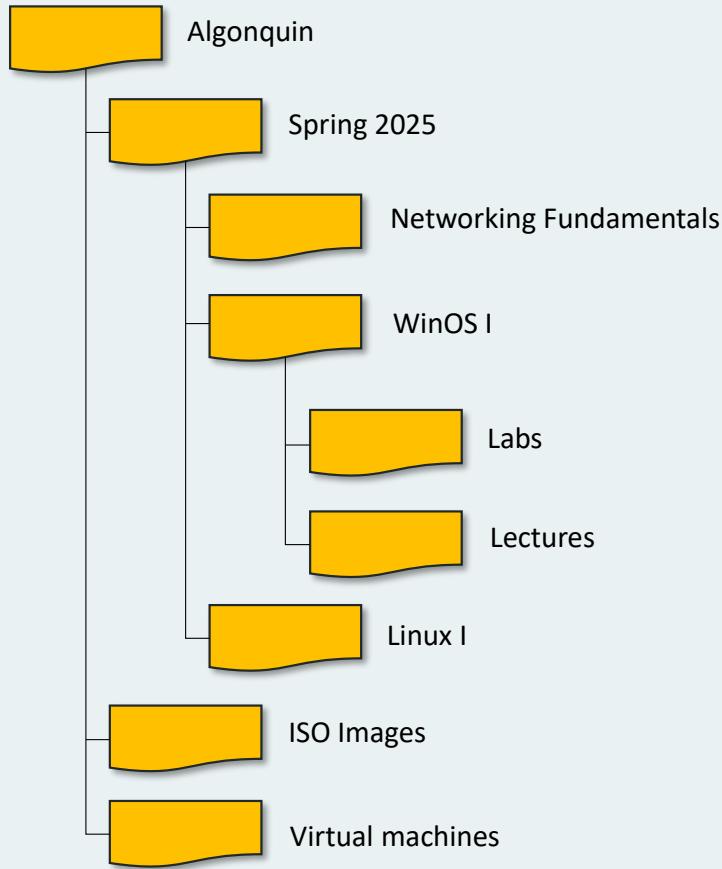
Software

- Microsoft Windows 10/11***
 - Microsoft Media Creation Tool
 - Azure Tools for Education – Sign in with your student login
 - Digital Resources – Log in through Brightspace
- Vmware Workstation
 - Digital Resources – Latest Version
- Microsoft Office
 - Digital Resources – 2016 / 2019
 - LiveAC email – Office 365

Software

- Students can download and use ALL software available
- Activation keys expire from view on Digital Resources after 30 days, KEEP A RECORD!
- Visit ITS in C building or call 5555 to retrieve key if lost
- Also various software available @
<http://cstech.ottawa.ad.algonquincollege.com/drivers.htm>
- Must be at the college or connected by VPN
- VPN available on Self-Service portal:
<https://selfservice.algonquincollege.com>
- Recommend mobile soft token for 2FA

File System Structure

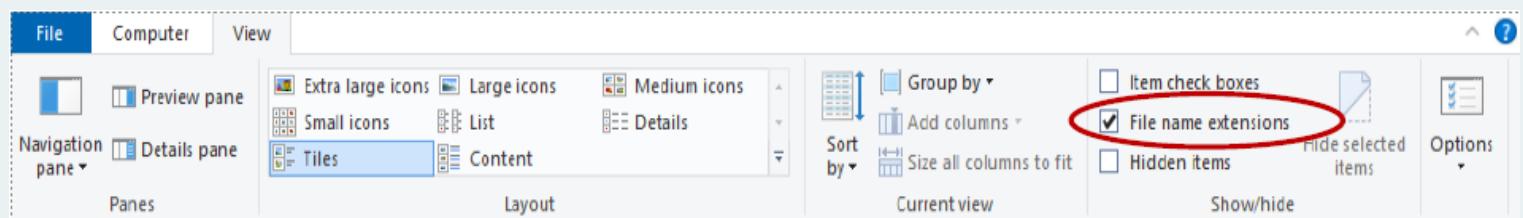


- Useful to make it easier to find files
- Create on “HOST OS” (Your PC, not VM)
- Root of drive
- Do NOT use the Desktop
- Sample file structure:

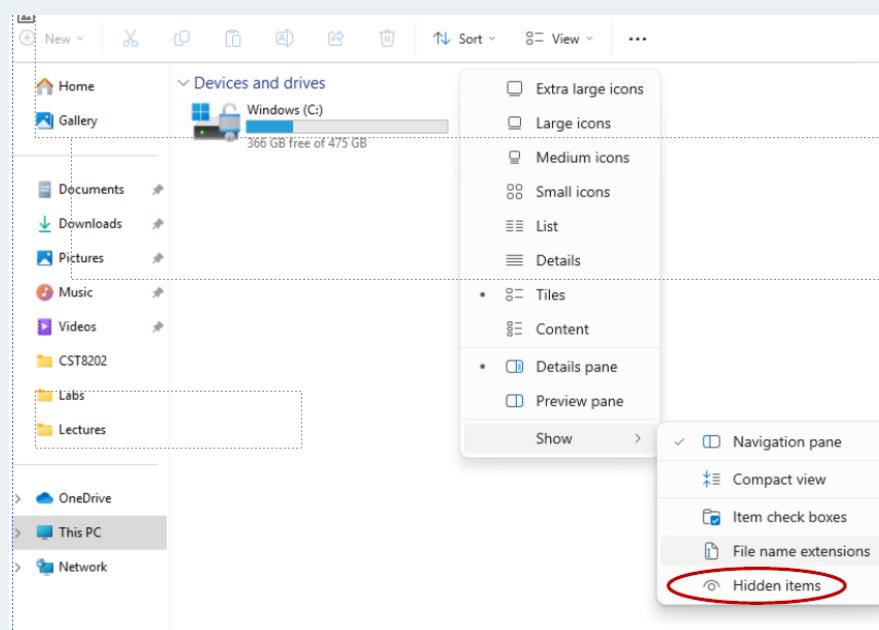
File Extensions

Important to enable viewing show/hide properties for file extensions

Windows 10



Windows 11





CST8202

Virtualization

Virtualization

- Virtualization creates virtual version of physical hardware, OS, or storage.
- Virtualization is software used to simulate hardware.
- It is the fundamental technology that powers cloud computing which delivers computing resources, software or data as a service through the Internet.
- A virtual machine is a software computer that, like a physical computer, runs an operating system and applications.
- It can run the same programs and behave exactly like the original physical machine.

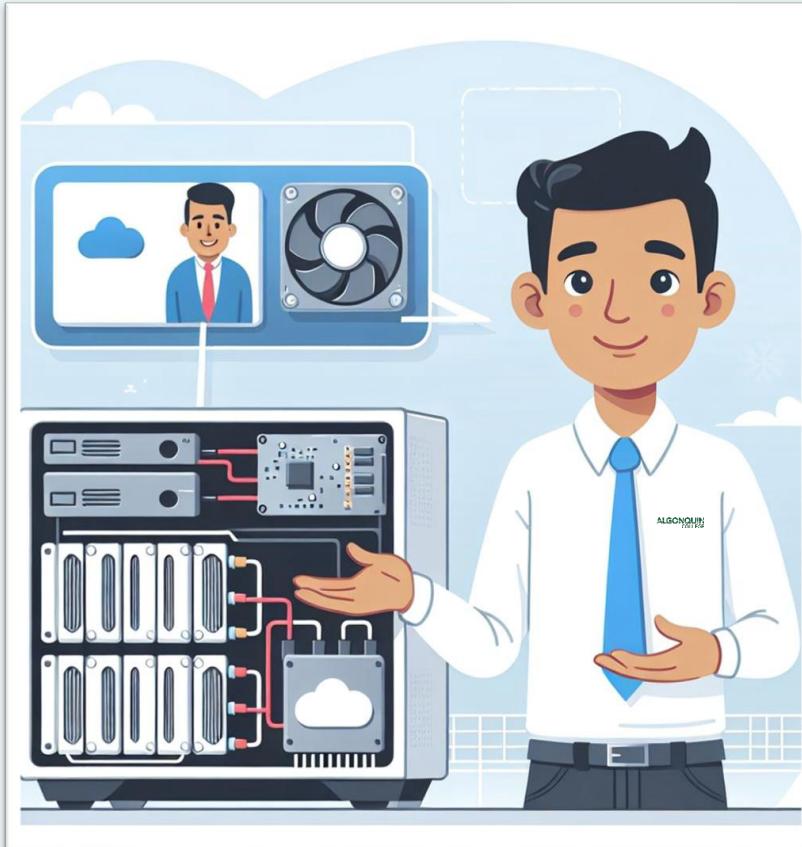
Benefits

- Hardware Independence
- Isolation
- Flexibility
- Resource Optimization

Methods of Virtualization

- There are TWO methods of installing virtualization on a computer system.
 - The first method is to install Type 1 hypervisor software directly on top of the hardware
 - The second method of virtualization (Type 2) is called hosted virtualization

What is a Hypervisor?



- A hypervisor is software, firmware, or hardware that creates and runs virtual machines (VMs). It allows multiple VMs to share the resources of a single physical machine, such as CPU, memory, and storage.
- Each VM operates independently with its own operating system and applications.
- Two types of Hypervisors
 - Type-1 (Bare-metal)
 - Type-2 (Hosted)

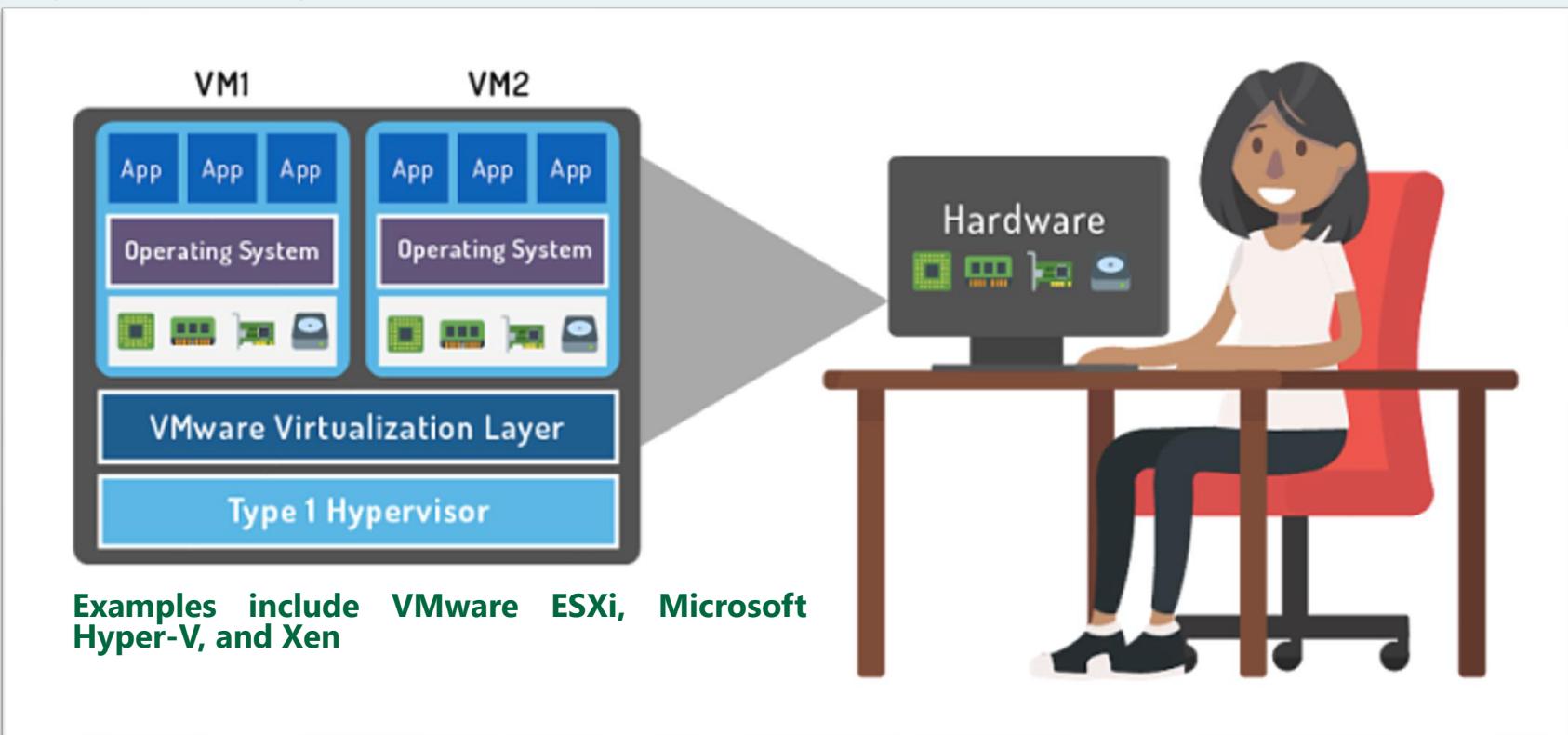
Type 1 Hypervisor (Bare-metal)

- The Type 1 hypervisor sits directly between the hardware and the virtual machine, which has its very own operating system.
- The host hardware (a computer) does not need to be limited to one operating system because it allows the computer to host more than one operating system at a time on one computer as virtual machines.
- One of the highlights of using a bare metal hypervisor is that any problems present in one VM do not affect other VMs running on the hypervisor. This allows the user to run multiple programs all at once on the VMs and multitask without worrying about one of those programs crashing and stopping all the other programs from working.

Type 1 Hypervisor

- This introduces the concept of a management layer
- To make it possible for a user to interact with the bare-metal hypervisor, the hypervisor includes a management program that creates a user interface
- Without this management software, you would just get a black screen when you turn on the computer because there is no OS
- VMware's version of a Type 1 hypervisor is called ESXi and the 'management layer' software is called vCenter

Type 1 Hypervisor



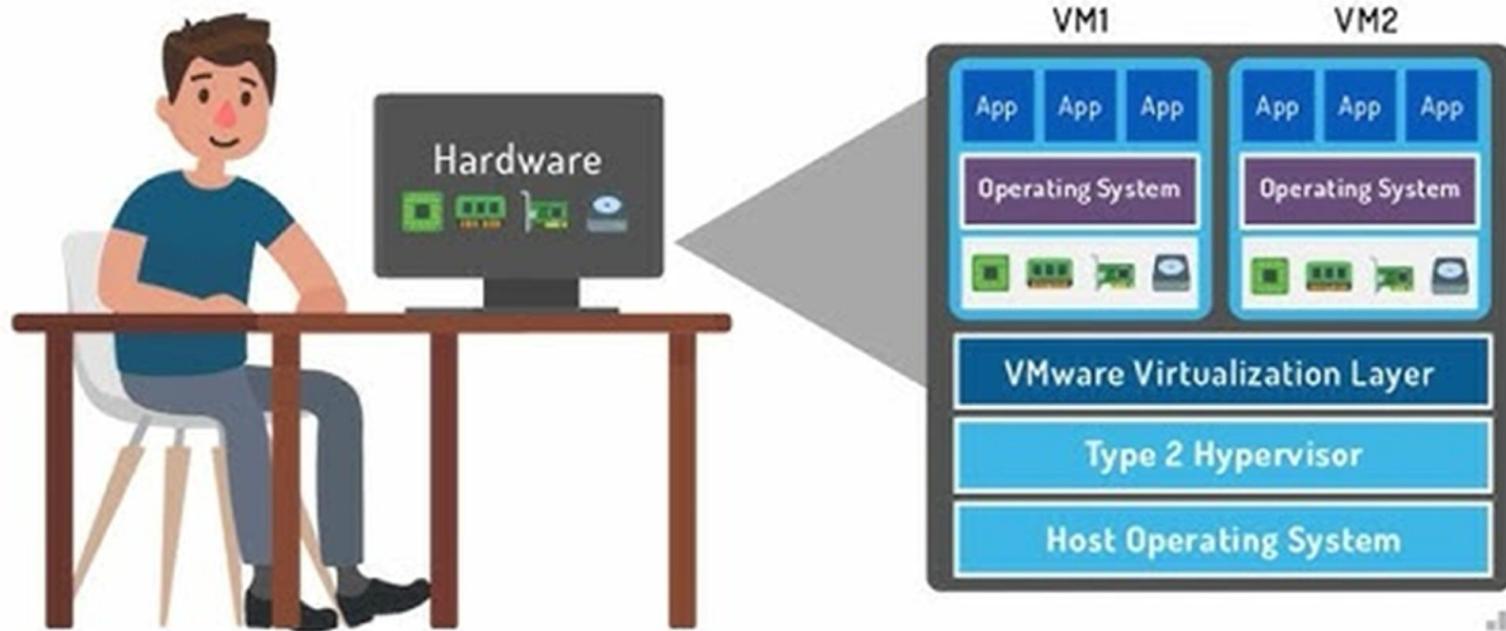
Type 2 Hypervisor (Hosted)

- To set up a computer with hosted virtualization, a Type 2 hypervisor called a hosted hypervisor needs to be installed like any other software application on top of the operating system that already exists, the host OS.
- The hosted (Type 2) hypervisor depends on the host OS to provide direct access to the computer's hardware resources and manage those resources to create virtual machines

Type 2 Hypervisor

- Host OS could be Windows 10/11
- You would install the Type 2 hypervisor directly onto your computer using the standard installation process similar to downloading and installing new application software like a new game or virus protection on your laptop
- The Type 2 hypervisor is very simple to download and gives you the ability to start playing around with virtualization by creating your own virtual machines.
- Although there are a few steps involved before you can launch and use the VM, you don't need to be IT expert to get there.

Type 2 Hypervisor



Examples include VMware Workstation and Oracle VirtualBox



Virtual Machine – Just a bunch of files

- A virtual machine is really just a collection of special files that represent the hard disk(s) and RAM, for example
- One benefit of a virtual compute system rather than a physical one is that it is more easily modifiable and mobile. Once a virtual machine is created in the host, its settings can be adjusted, saved, and even exported to other hosts.
- When a virtual machine is created, it will appear on the host computer as a set of files. It is usually stored in a directory, created by the hypervisor for that specific virtual machine.

Virtual Machine – Just a bunch of files

- A virtual machine end user may never need to know the file names or locations for the virtual machine files because virtual machine file management is performed by the host (VMware hypervisor).
- However, if the user wants to adjust hardware settings or troubleshoot VM issues, some knowledge of VM files is needed
- See Brightspace for information about the files

Virtual Machine – Just a bunch of files

File Type	File name	Description
Log file	<vmname>.log	Keeps a log of the VM's activity and is used in troubleshooting
BIOS file	<vmname>.nvram	This is the file that stores the state of the virtual machine's BIOS
Virtual disk file	<vmname>.vmdk	Stores the contents of the VM's disk drive. A virtual disk is made up of one or more .vmdk files. The number of .vmdk files will depend on the size of the virtual disk.
Snapshot file	<vmname>.vmsd & <vmname>.vmsn	This is a centralized file for storing information and metadata about snapshots.
Suspended state file	<vmname>.vmss	This is the suspended state file, which stores the state of a suspended virtual machine.
Configuration file	<vmname>.vmx	Stores information, such as VM name, BIOS information, guest OS type, and memory size.

VMware

- Allows completion of lab work elsewhere with no modifications
 - Bridging
 - Virtual networks
 - Settings
 - Backup

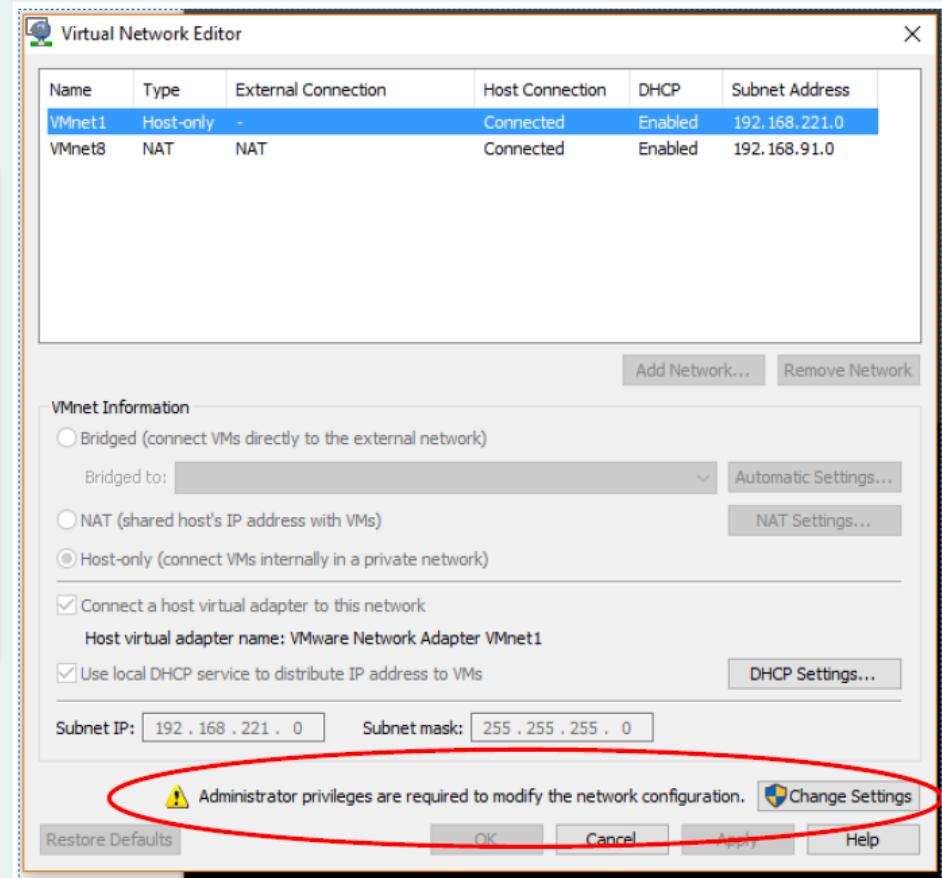
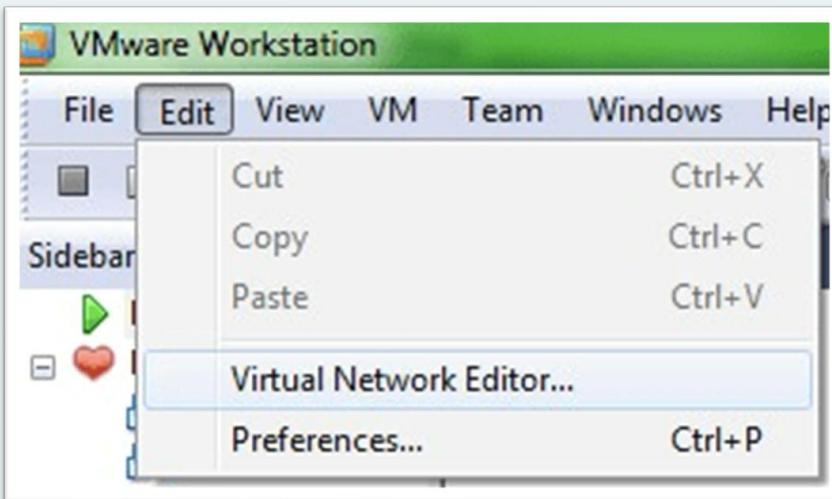


VMware

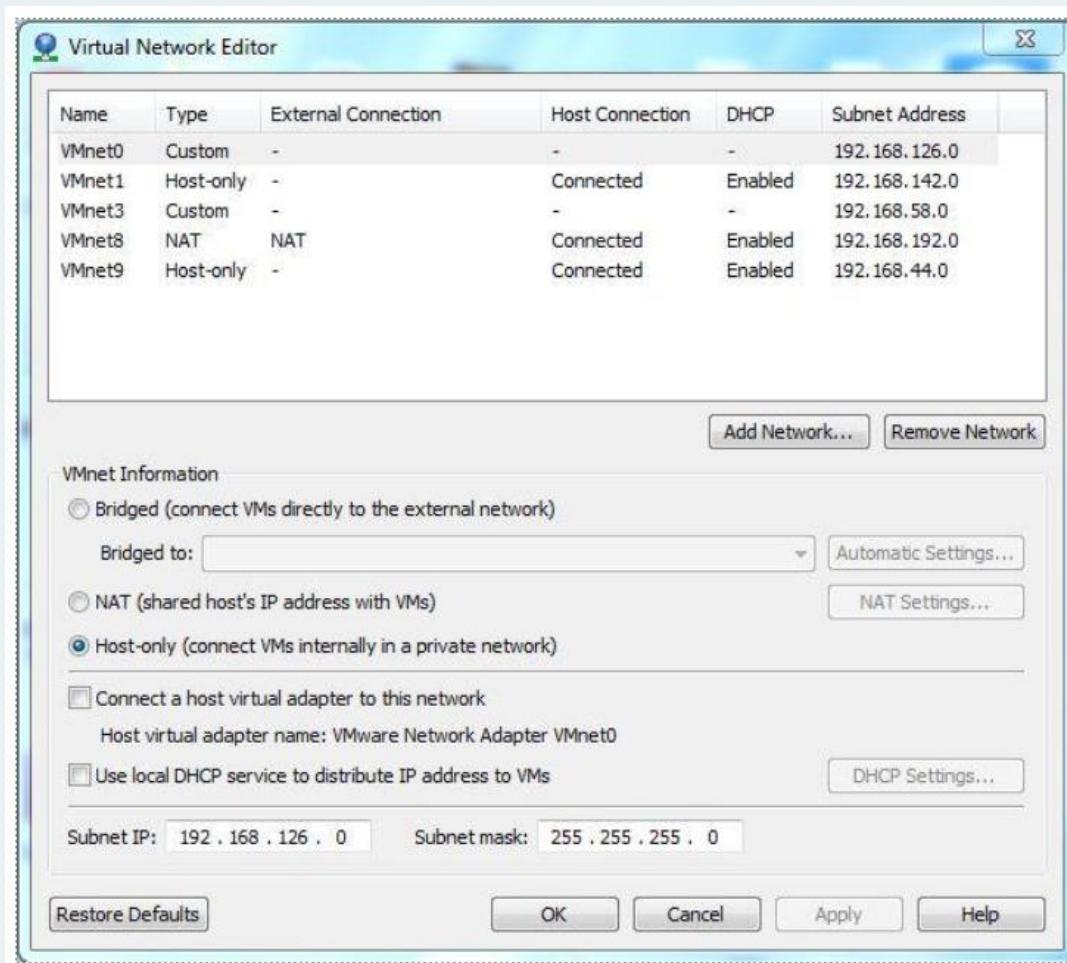


- Create a “real” computer using “virtual” hardware
 - Hard drive
 - Network adapter
 - Video card
- Virtualization used extensively in business and government environments, SAAS (Software As A Service), etc.
- Service providers
 - Web servers, online or cloud storage
 - Office 365
 - Google Stadia

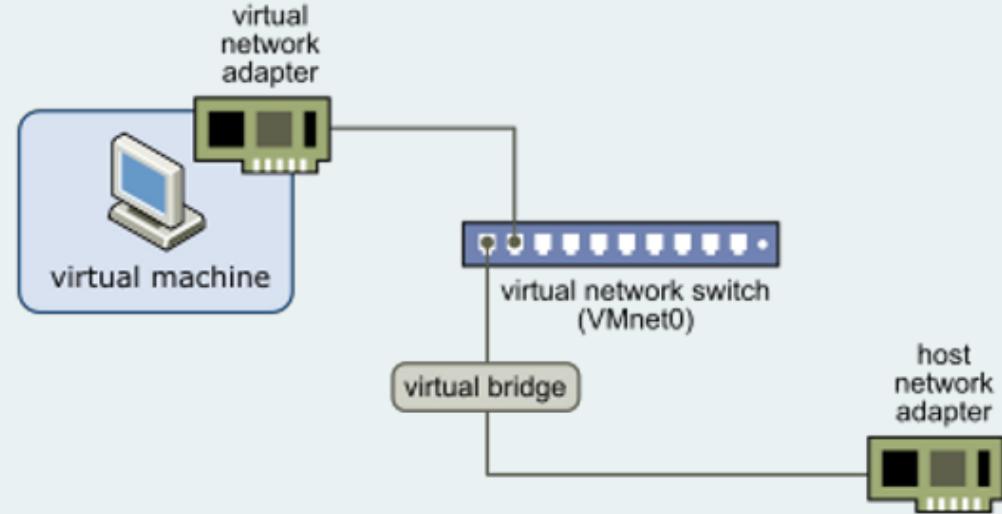
VMware: Virtual Network Editor



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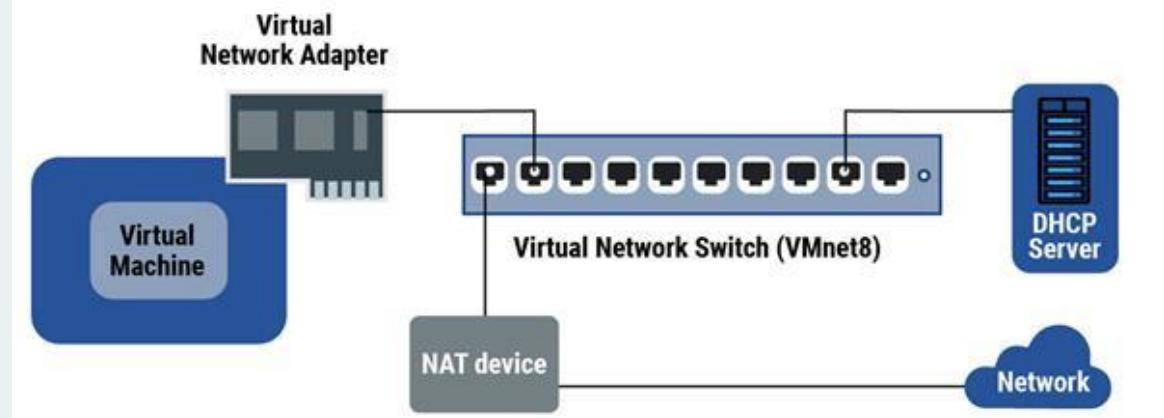


VMware: Bridged Networking



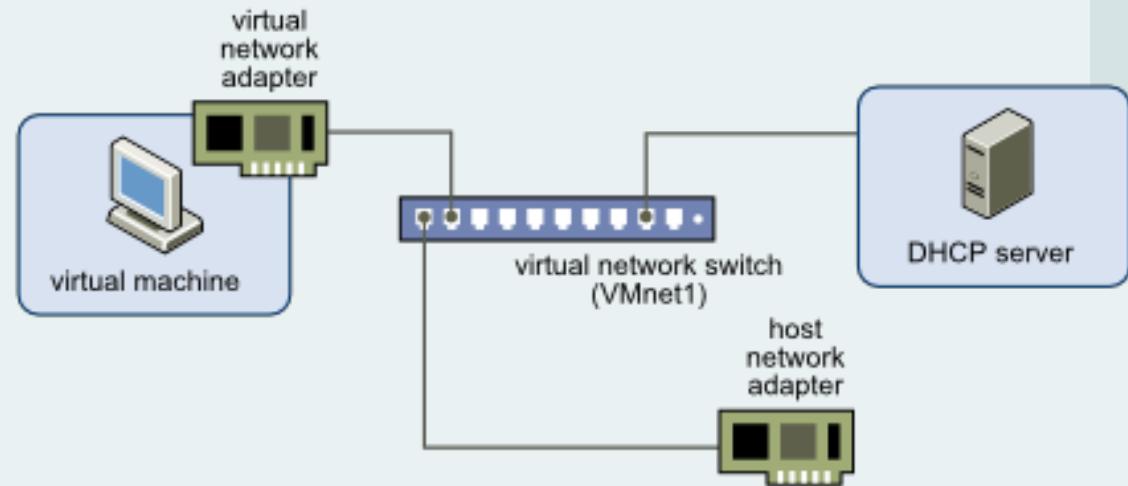
- Bridged networking connects a virtual machine to a network by using the host computer's network adapter
- Bridged networking configures your virtual machine as a unique identity on the network

VMware: NAT Networking



- Network Address Translation
- NAT configures a virtual machine to share the IP and MAC addresses of the host

VMware: Host-only Networking



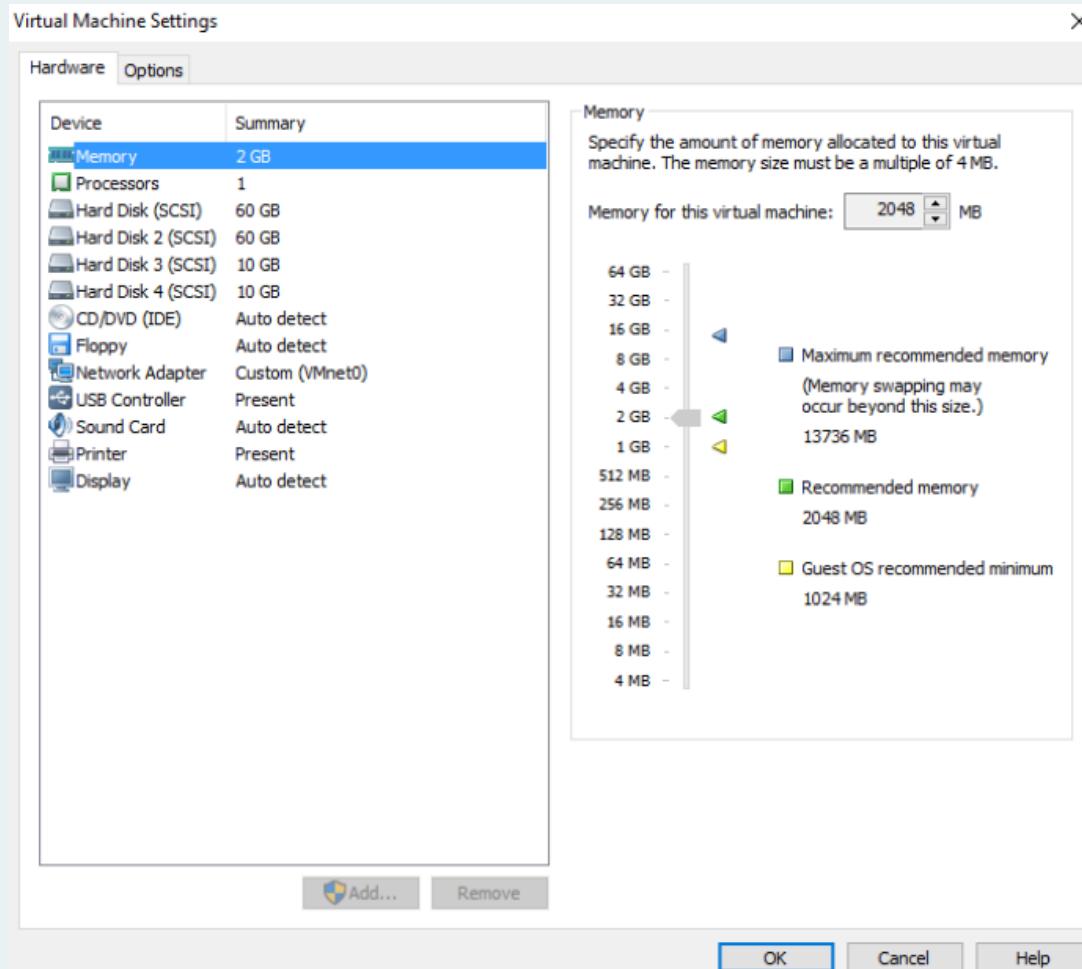
- Host-only networking creates a network that is completely contained within the host computer
- The virtual machines (VMs) and the host system are connected to a private Ethernet network. This network is completely contained within the host system, meaning no external network access is allowed

VMware: Host-only vs Bridged Networking

Host-only networking confines VMs to a private network, while bridged networking allows VMs to be part of the physical network.

Host-only Networking	Bridged Networking
Network Connection State	
Isolation: Creates a private network between the host and the VMs. The VMs can communicate with each other and the host but not with external networks	Direct Connection: Connects the VMs directly to the physical network. Each VM gets its own IP address on the same network as the host
Use Case	
Ideal for testing and development environments where external network access is not required	Suitable for scenarios where VMs need to be accessible from other devices on the same physical network
Configuration	
A virtual network adapter is created on the host, and a virtual DHCP server assigns IP addresses to the VMs	The VM's virtual network adapter acts as a bridge to the physical network adapter, allowing full network connectivity thus VMs get IP addresses from the physical network's DHCP server

What is a Hypervisor?



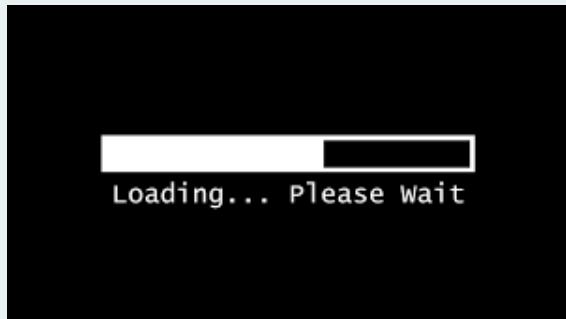
- Configurable settings for:
 - RAM
 - Hard disk
 - Network
 - Display
 - Printer
 - Optical Drive
 - USB ports
 - CPU Cores

Virtual Horsepower

- Virtual machine hardware settings are resources provisioned for the virtual machine to use.
- Provisioning 2GHz of CPU does not immediately use all 2GHz from the Host machine, but it could if the VM requests it.
- Provisioning 8GB of RAM will immediately use 8GB on the Host machine once the VM is powered on.
- Host systems without sufficient resources will not operate efficiently and the VM's will suffer too. (they will become slow)
- Guest OS's (VM's) without sufficient resources will become inefficient but the host may not be affected.

Virtual Horsepower

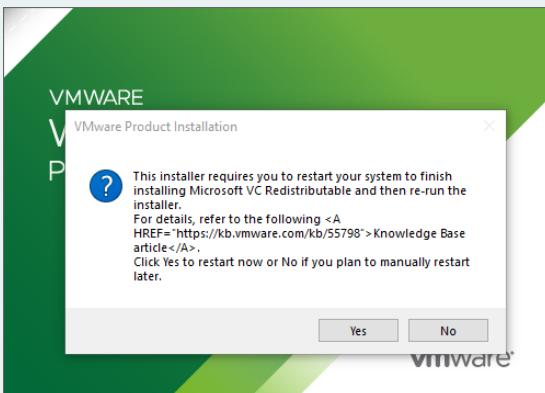
- Virtual Hard Disks are also (usually) dynamically allocated. 60GB virtual disks will be more than enough for a Windows installation but won't use 60GB unless they are full. This is known as **thin provisioning**.
- **Thick provisioning** will allocate all disk space to the VM as soon as the disk file is created.
- Overprovisioning may give you a better VM experience.
- Windows Minimum requirements are for running Windows only, not accounting for doing anything else on the system..
- Overprovisioning host systems can lead to unexpected behavior.



Loading, Please wait. . .

- Think of the usage case for your VM and provision resources accordingly
- Windows 10 Minimum Requirements:
 - 1GHz CPU
 - 2GB RAM
- Windows 11 Minimum Requirements:
 - 1GHz CPU
 - 4GB RAM
- But if you'd like to see the VM boot reasonable time
 - Allocate at least 2 CPU cores
 - Allocate at least 4GB of RAM
 - Up to 50% of the Host machine resources if only running 1 VM

VMWare Error



- Errors will generally display an error code for easy troubleshooting.
- In case your Windows is out of date, you may receive error messages will state that VMWare cannot run on Windows 10. In this case update Windows to the latest stable revision and run the update for VMware.

Thank
you

Questions???

