Session 1.
Introduction and Lab Setup

Ram N Sangwan

www.rnsangwan.com

Agenda

- Virtualization and Cloud Computing

- Introduction to Virtual Networking and NAT

- Oracle VM Virtual Box

- SSH and Key based authentication

- Import Virtual Machines

- Setting up Networking between Machines

Virtualization - Definition

- Multiple OSes on a single machine
  - Giving an illusion that each OS is running on real HW
  - Virtual Machine Monitor (VMM)
    - Another layer of kernel to virtualize multiple OSes
    - Also called "hypervisor"
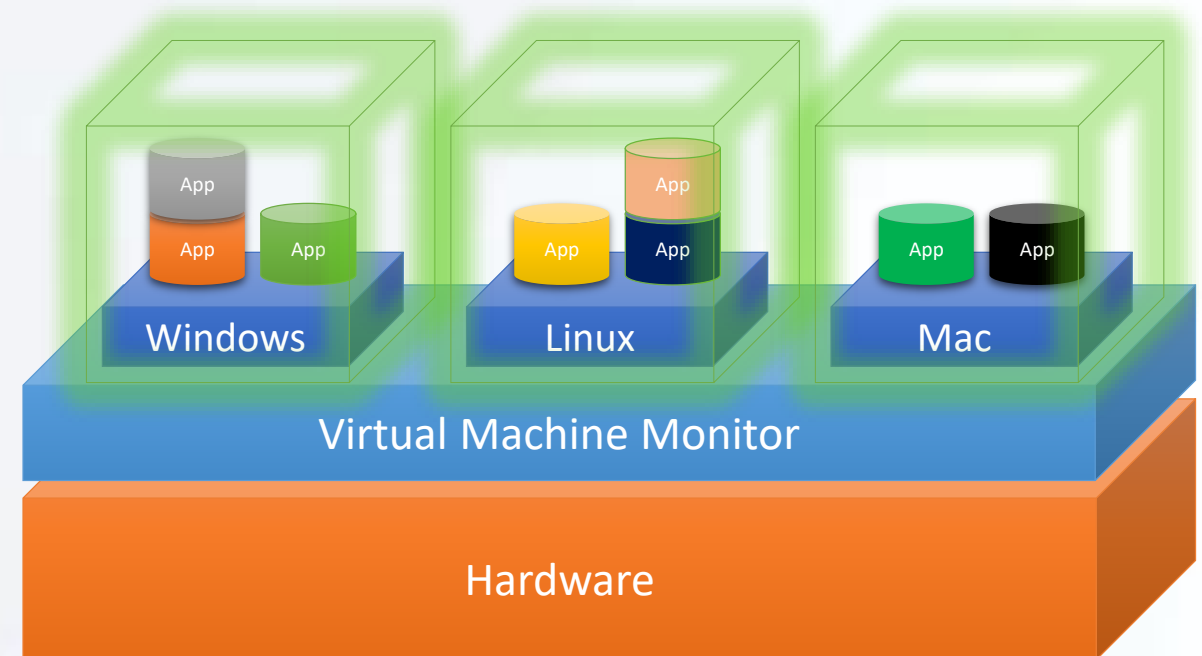
Virtualization and Cloud Computing

- Virtualization is the ability to run "virtual machines" on top of a hypervisor

- A hypervisor provides a uniform abstraction of the underlying physical machine.

- ***Abstraction is the key idea in Service Models of Cloud!***

- Virtualization can make 1 resource act like many, while cloud computing lets different departments (through private cloud) or companies (through a public cloud) access a single pool of automatically provisioned resources.
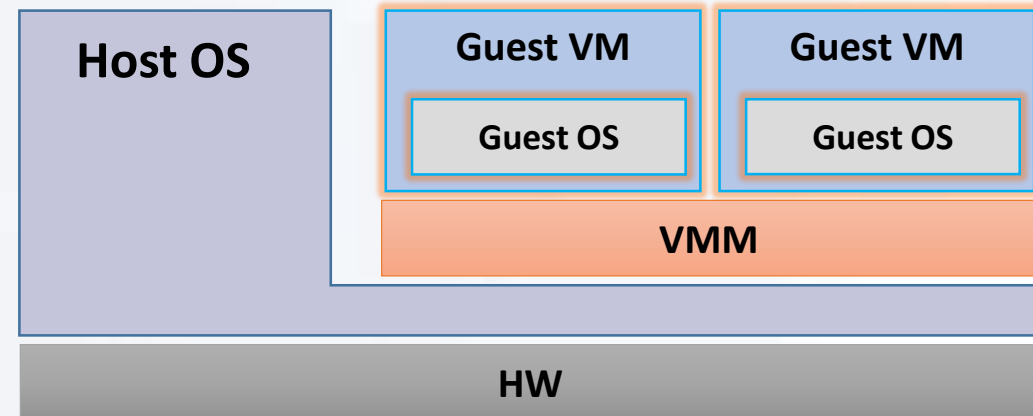
Type-1 vs. Type-2 Virtualization

- Depending on what sits right on HW

Type-1: VMM on HW

Guest VM	Guest VM
Guest OS	Guest OS

VMM

HW
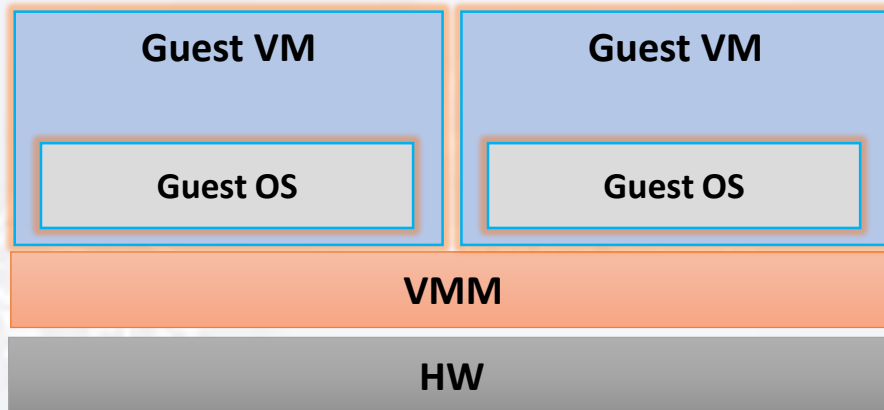
- VMWare - ESX
- Microsoft - HyperV
- Oracle OVM
- Linux - KVM

Type-2: Host OS on HW

Host OS	Guest VM	Guest VM
	Guest OS	Guest OS
	VMM	

HW

- VMWare Workstation
- Oracle - VirtualBox

Virtualization Vs. Cloud Technology

|	**Virtualization**	**Cloud**
Definition	Technology	Methodology
Purpose	Create multiple simulated environments from 1 physical hardware system	Pool and automate virtual resources for on-demand use
Use	Deliver packaged resources to specific users for a specific purpose	Deliver variable resources to groups of users for a variety of purposes
Configuration	Image-based	Template-based
Cost	High capital expenditures (CAPEX), low operating expenses (OPEX)	Private cloud: High CAPEX, low OPEX Public cloud: Low CAPEX, high OPEX
Scalability	Scale up	Scale out

Oracle VM Virtual Box

- Oracle VM VirtualBox is cross-platform virtualization software that allows users to extend their existing computer to run multiple operating systems at the same time.

- Designed for IT professionals and developers,

- Runs on Microsoft Windows, Mac OS X, Linux, and Oracle Solaris syste.

- Ideal for testing, developing, demonstrating, and deploying solutions across multiple platforms on one machine.

Virtual Network Switches

- This is a simple software construction on a host server, that your virtual machines "plug in" to, and direct their traffic through.

- On a Linux host server, the virtual network switch shows up as a network interface.

virtual network switch

Host Server

virtual network switch

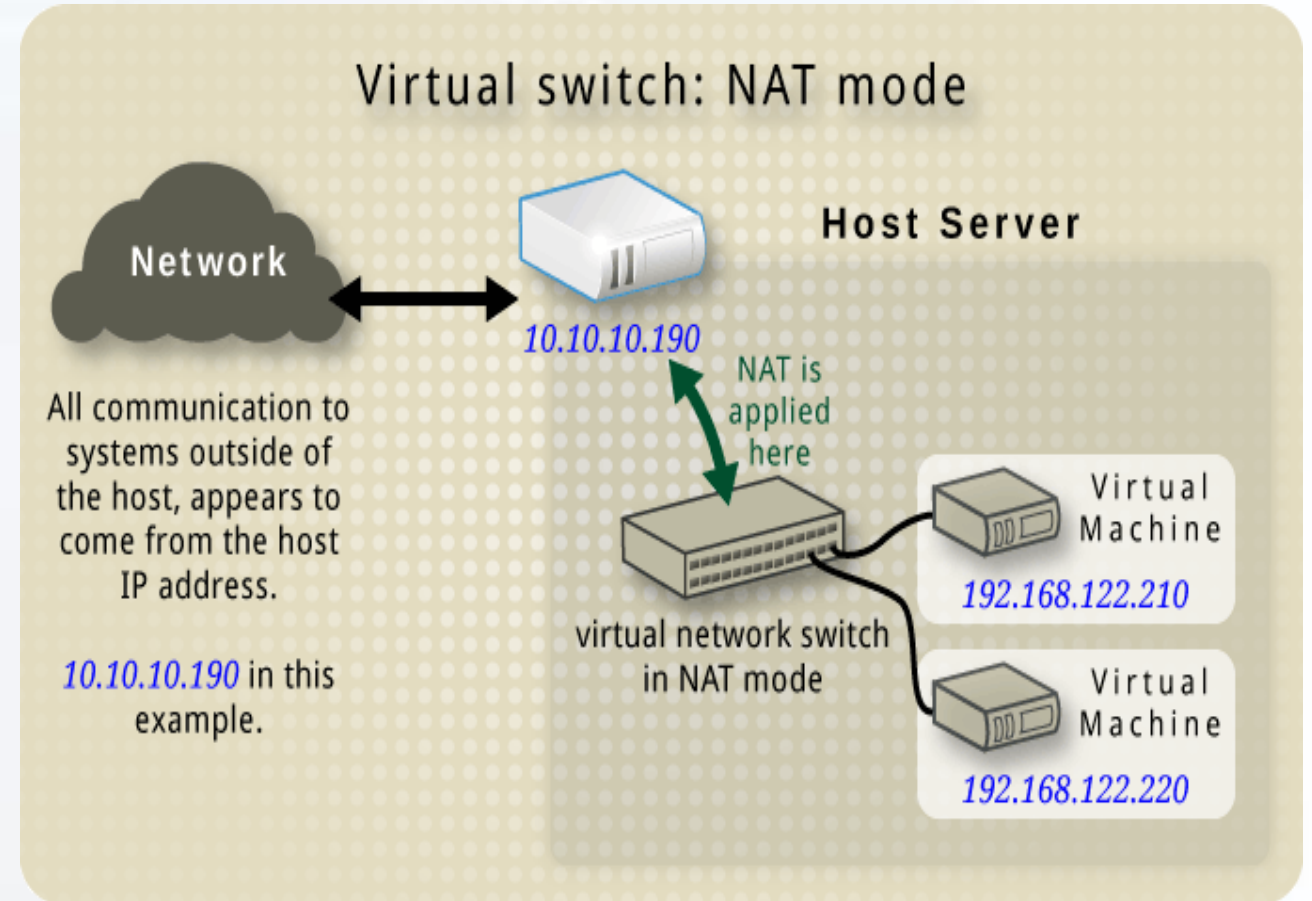Virtual Machine

Virtual Machine
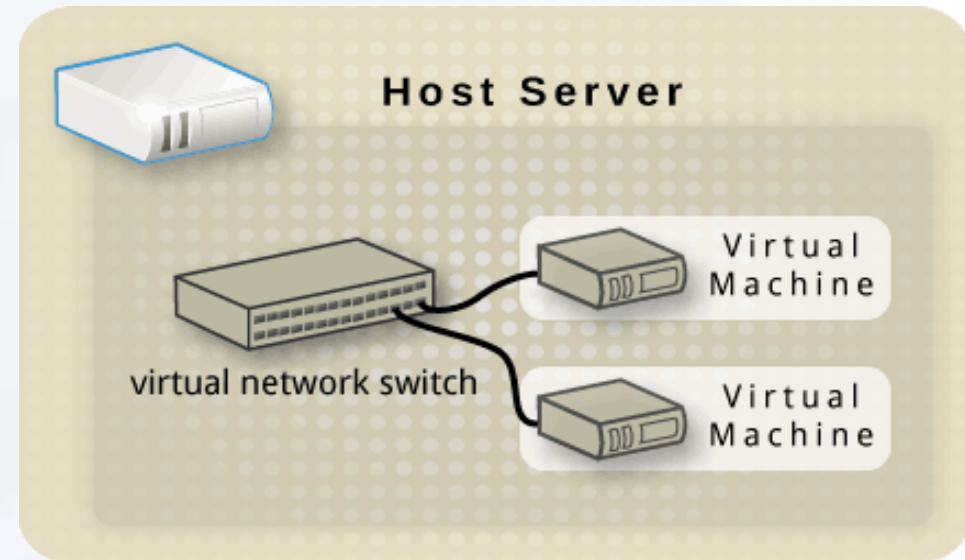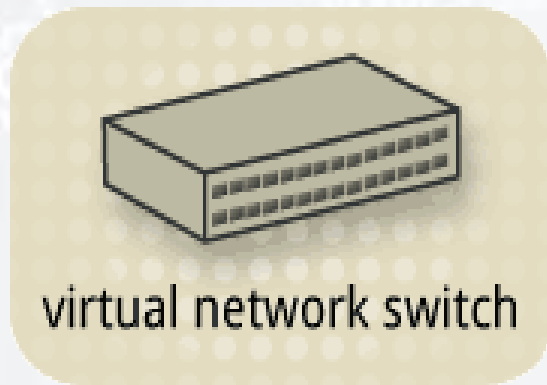
Network Address Translation (NAT)

- Any guests connected through it, use the host IP address for communication to the outside world.

- Computers external to the host can't initiate communications to the guests inside, when the virtual network switch is operating in NAT mode.

Virtual switch: NAT mode

Network

10.10.10.190

Host Server

NAT is applied here

All communication to systems outside of the host, appears to come from the host IP address.

10.10.10.190 in this example.

virtual network switch in NAT mode

Virtual Machine
192.168.122.210

Virtual Machine
192.168.122.220

SSH and Connectivity

- SSH – Secure Shell

- A Network Protocol that allow to access a Server from a client.

  - Putty/ Terminal etc

- When using a Command Line tool to perform SSH connectivity

  - It is not encrypted and hence not secure, especially on public network

  - Network Sniffers can open packets

  - Using Packet Analysis

SSH Keys

- SSH KEYs are based on Public Key Cryptography

- A Cryptographic network Protocol used over an Unsecure Network

- Provides a Secure Channel over an Unsecure / Public Network

- An SSH KEY is a Key Pair (2 Keys)

  - Public Key - sent to server to be authenticated.

  - Private Key – kept at the client.

- Tools to Create SSH Keys

  - Windows – Puttygen (www.putty.org)

  - Unix / Linux – ssh-keygen command

SSH Configuration Commands

ssh   Secure Shell command, ***ssh.*** To make it work with key-based authentication, you need a private key on the client and a public key on the server. Copy the public key file (e.g. ***id_rsa.pub***) to ***~/.ssh/authorized_keys*** of user.

ssh-keygen   A utility that creates private/public key pairs for SSH authentication. The ***ssh-keygen -t keytype*** will create a key pair based on the DSA, ECDSA, or RSA protocol.

ssh-copy-id   A script that copies a public key to a target remote system.

SSH Client Configuration Files

- Systems configured with SSH include configuration files in two different directories.

- For the local system, basic SSH configuration files are stored in the **/etc/ssh** directory.

- The configuration files in each user's home directory under **~/.ssh/**.

- Those files configure how the given user is allowed to connect to remote systems.

SSH Client Configuration Files

- When RSA keys are included, *~/.ssh/* subdirectory includes these files:

  authorized_keys Includes a list of public keys from remote users. The system users and names are listed at the end of each public key copied to this file.

  id_rsa Includes the local private key based on the RSA algorithm.

  id_rsa.pub Includes the local public key for the user based on the RSA algorithm.

  known_hosts Contains the *public host keys* from remote systems.

Import Virtual Machines

1. To import the downloaded VM Image select **File - > Import Appliance**

2. You will get a pop up in which you need to specify the location of the *VM Image*

3. Click on the Folder Option available at the end of the Text Box and select the downloaded VM Image

4. Click Open. In the resulting screen click Next.
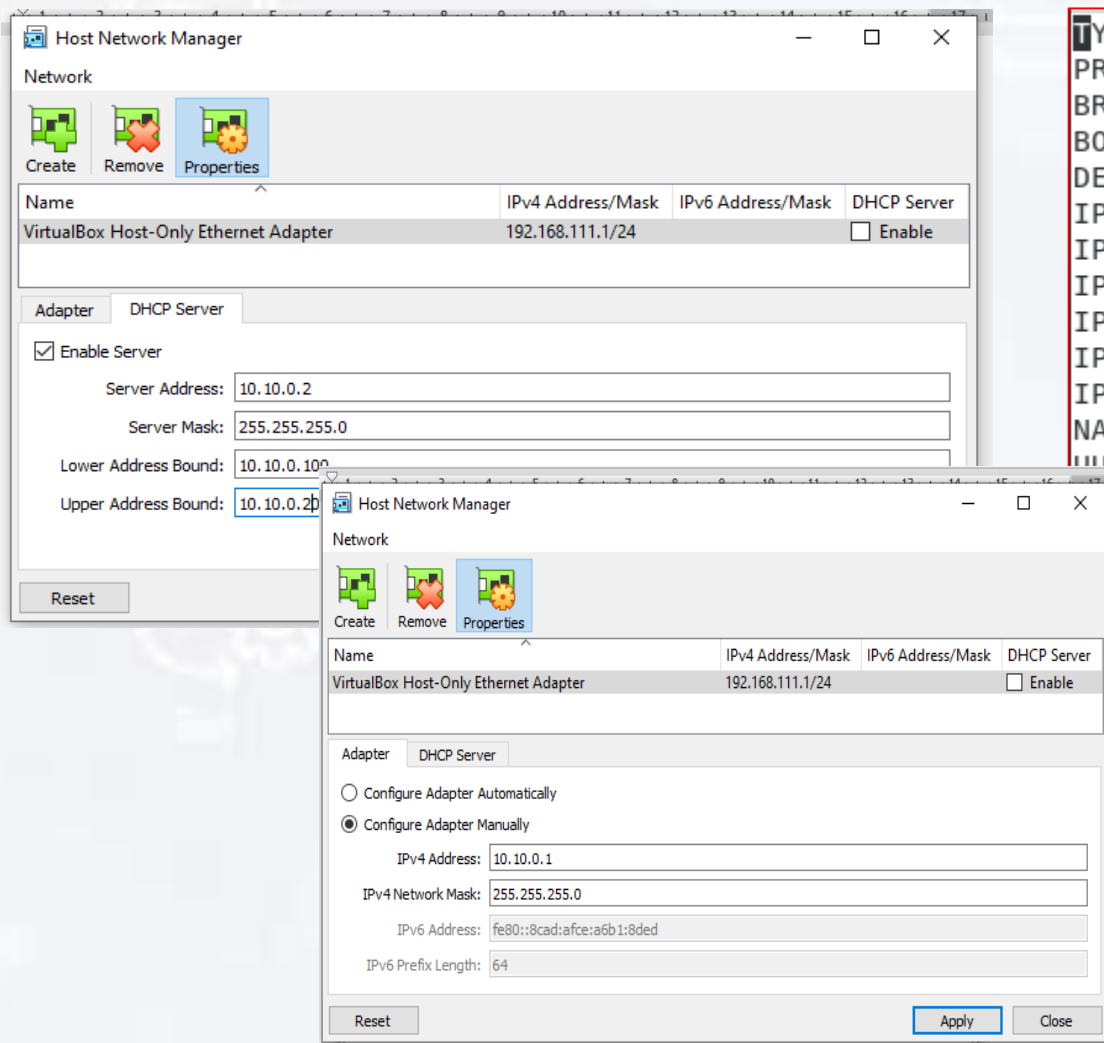
5. Click on **Import**
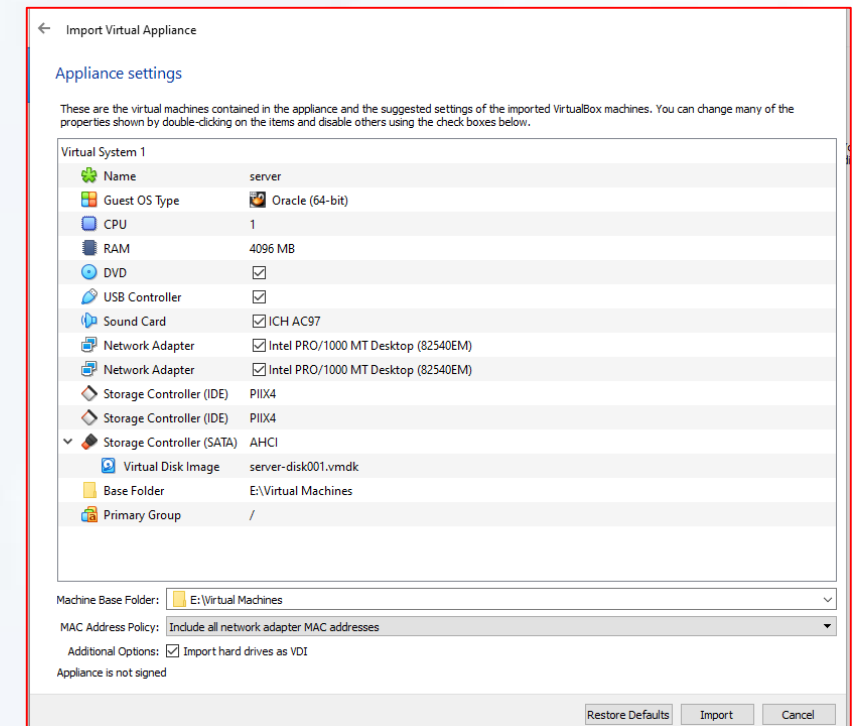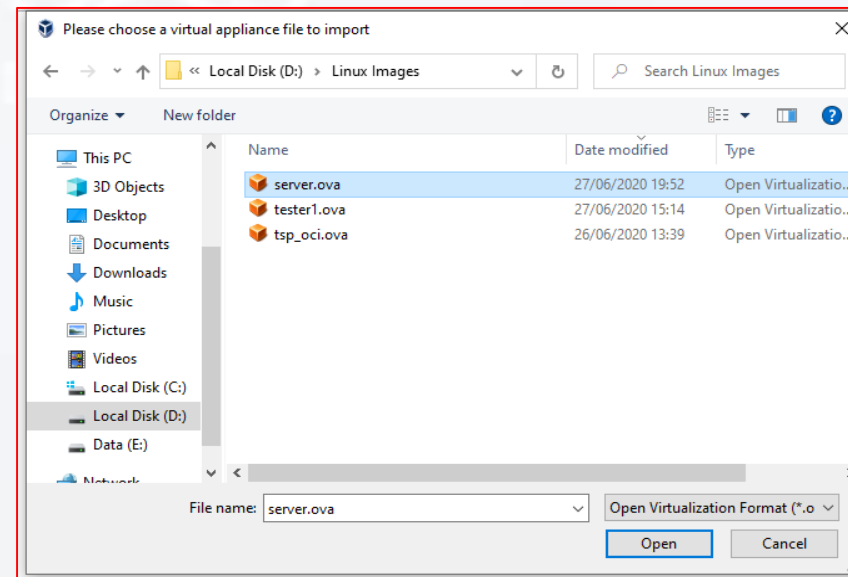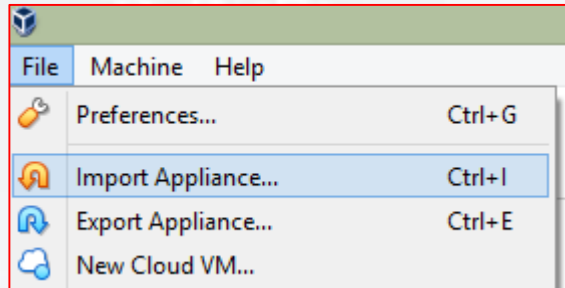
Networking Between VMs

- NAT Adaptor – for Connecting to Internet, OCI and Software Update.

- Host Only Adaptor – for connecting VMs with each other and from Host.

- To setup Host only Adopter
  - In Oracle Virtual Box
    - Click on *File -> Host Network Manager*
    - Click on *Create*
    - Accept Defaults or Enter custom Details as given on next slide.
  - Inside the Virtual Machine
    - Configure Networking with *nmtui* command or manually by editing */etc/sysconfig/network-scripts/ifcfg-enp0s8*
    - Ensure It sustain the reboot
- To setup NAT Adopter (Require only inside Virtual Machine)
  - Configure Networking with *nmtui* command or manually by editing */etc/sysconfig/network-scripts/ifcfg-enp0s3*
  - Ensure It sustain the reboot
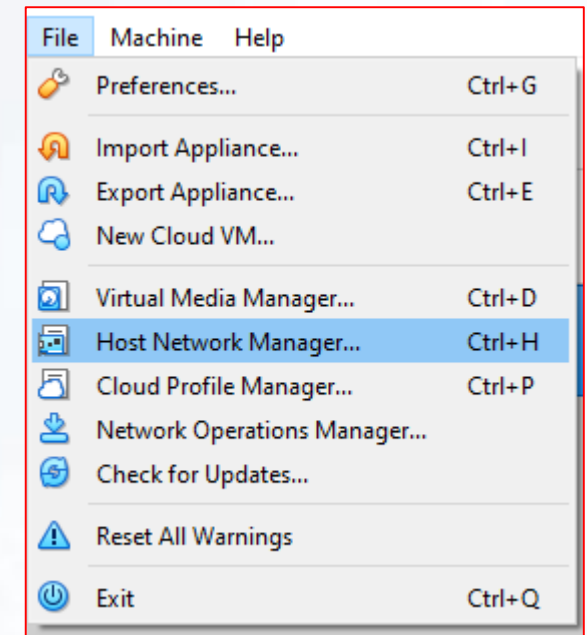
NAT and Host Only Adaptor

Thank You