TASK: Virtual Box Installation and Configuration

IIIT-Hyderabad

PGCSEDS

Task: To download and install virtual box and VM's for inter-communication design study.

System Requirements:

- Laptop or a PC with minimum 8GB ram and 250 or above Hard-disk.
- Virtualization and other features (Hyper-V) enabled.
- Good Internet connectivity.

Downloading the Software:

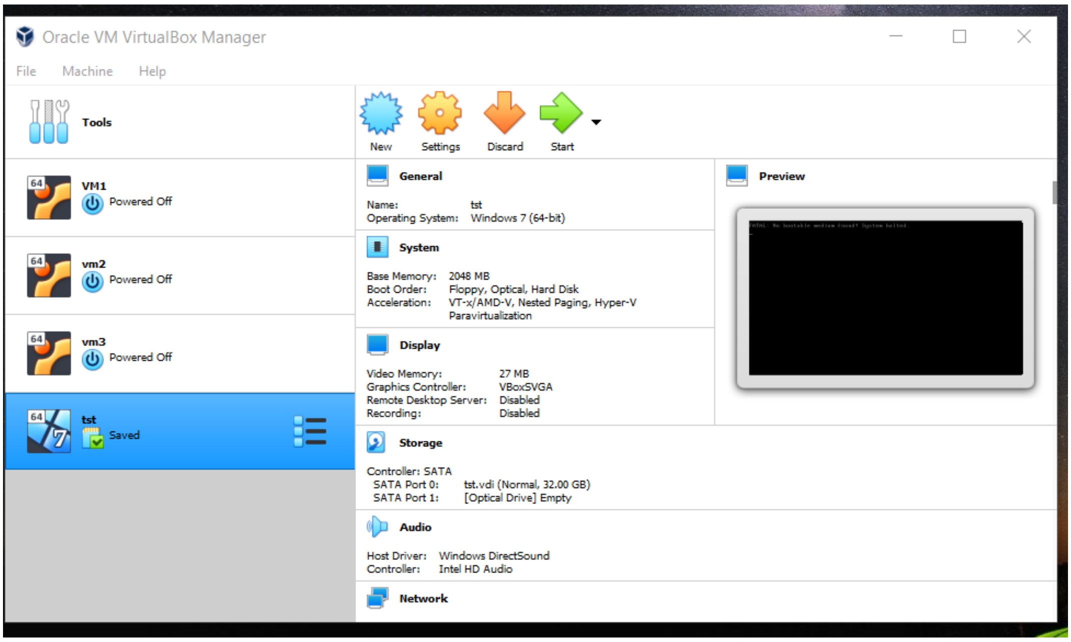
- It is required to download the virtual box software for both windows and Linux users.
- For Windows based installation and setup: Oracle VM VirtualBox
- For Linux based Installation and setup: Linux Downloads – Oracle VM VirtualBox (Please check the appropriate OS installed on your machine and then select the download options).

Downloading the ISO (Uncompressed Disk Image File format)

- This is a mandatory to download the disk image file, which by default would be Ubuntu 18.04.5 LTS desktop version. Link: Ubuntu 18.04.5 LTS (Bionic Beaver) (64-bit PC (AMD64) desktop image).
- This a common step for both Windows and Linux based OS.

Installation Steps for Windows:

- Download the setup file from the given above link: Oracle VM VirtualBox
- Run the file and complete the initial setup of the software.
- After Installation, open the Virtual Box.



Name: tst
Operating System: Windows 7 (64-bit)

Base Memory: 2048 MB
Boot Order: Floppy, Optical, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging, Hyper-V Paravirtualization

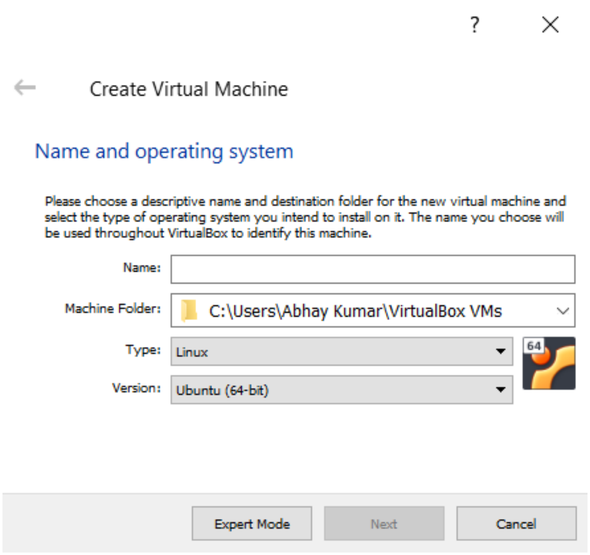
Video Memory: 27 MB
Graphics Controller: VBoxSVGA
Remote Desktop Server: Disabled
Recording: Disabled

Controller: SATA
SATA Port 0: tst.vdi (Normal, 32.00 GB)
SATA Port 1: [Optical Drive] Empty

Host Driver: Windows DirectSound
Controller: Intel HD Audio

- Under VM VirtualBox Manager, click on the New where you can name the OS as vm1 or any.

- Then, select the Type of OS and the Version of the OS.



Create Virtual Machine

Name and operating system

Please choose a descriptive name and destination folder for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.

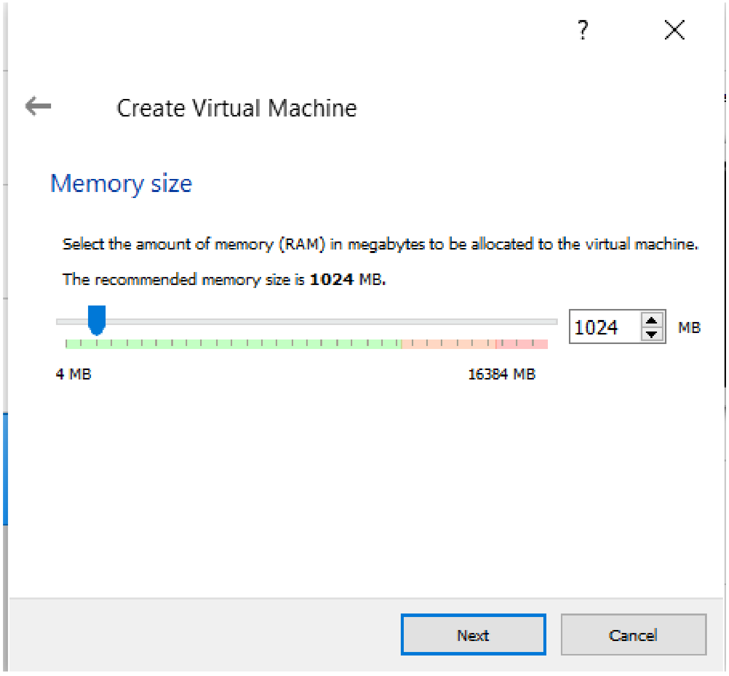
Name:

Machine Folder: C:\Users\Abhay Kumar\VirtualBox VMs

Type: Linux

Version: Ubuntu (64-bit)

- Select the desired memory size as per your requirement.



Create Virtual Machine

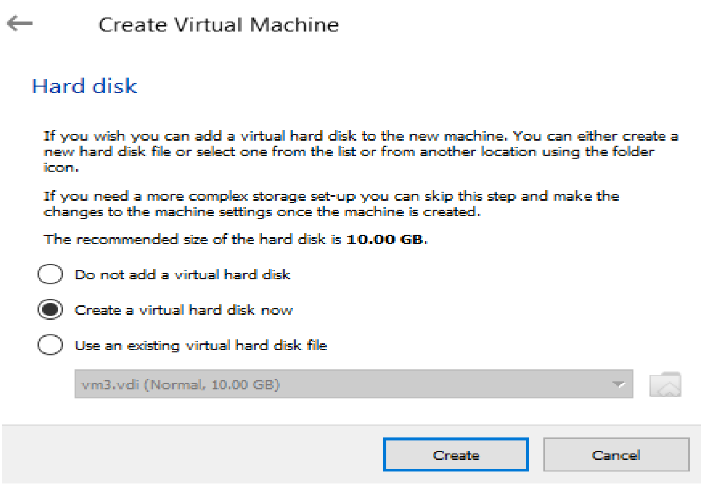
Memory size

Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.

The recommended memory size is **1024** MB.

1024 MB

- Select the hard-disk as mentioned below and click next



Create Virtual Machine

Hard disk

If you wish you can add a virtual hard disk to the new machine. You can either create a new hard disk file or select one from the list or from another location using the folder icon.

If you need a more complex storage set-up you can skip this step and make the changes to the machine settings once the machine is created.

The recommended size of the hard disk is **10.00 GB**.

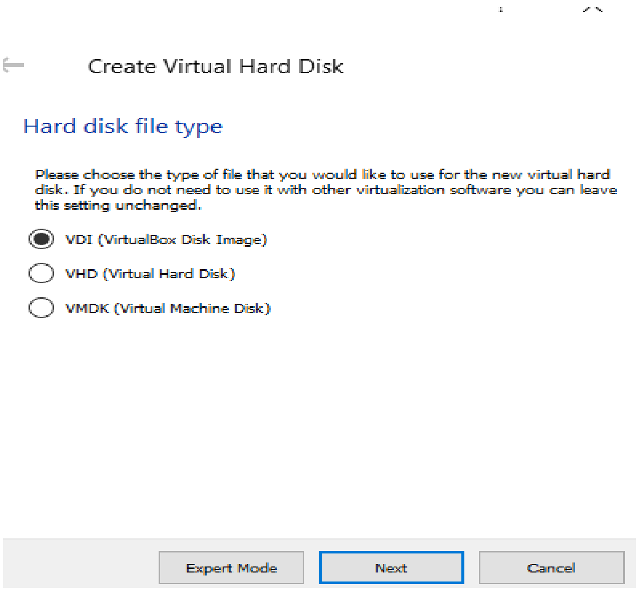
○ Do not add a virtual hard disk

● Create a virtual hard disk now

○ Use an existing virtual hard disk file

vm3.vdi (Normal, 10.00 GB)

- Use hard disk file type as VDI and click next



Create Virtual Hard Disk

Hard disk file type

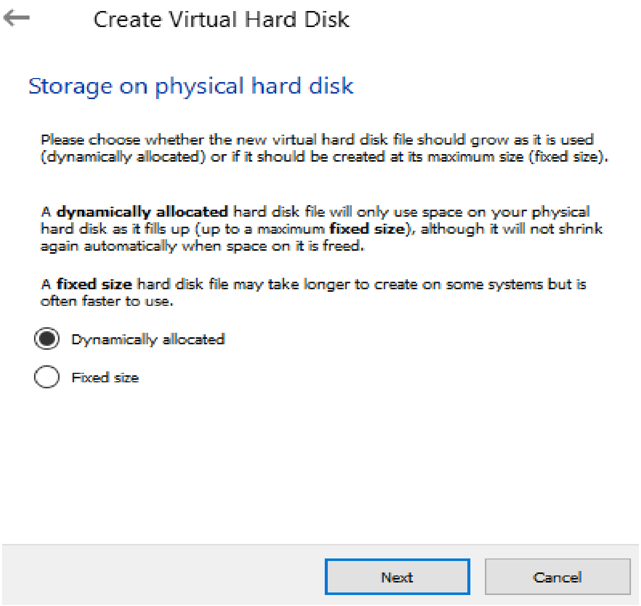
Please choose the type of file that you would like to use for the new virtual hard disk. If you do not need to use it with other virtualization software you can leave this setting unchanged.

● VDI (VirtualBox Disk Image)

○ VHD (Virtual Hard Disk)

○ VMDK (Virtual Machine Disk)

- Storage option and next (no changes, use default configuration)



Create Virtual Hard Disk

Storage on physical hard disk

Please choose whether the new virtual hard disk file should grow as it is used (dynamically allocated) or if it should be created at its maximum size (fixed size).

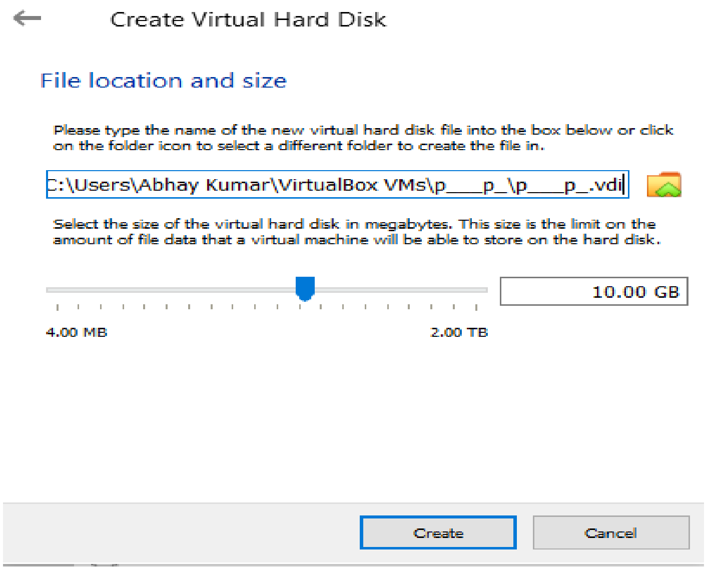
A **dynamically allocated** hard disk file will only use space on your physical hard disk as it fills up (up to a maximum **fixed size**), although it will not shrink again automatically when space on it is freed.

A **fixed size** hard disk file may take longer to create on some systems but is often faster to use.

● Dynamically allocated

○ Fixed size

- Ensure the location of the virtual machine that is newly being created.



Create Virtual Hard Disk

File location and size

Please type the name of the new virtual hard disk file into the box below or click on the folder icon to select a different folder to create the file in.

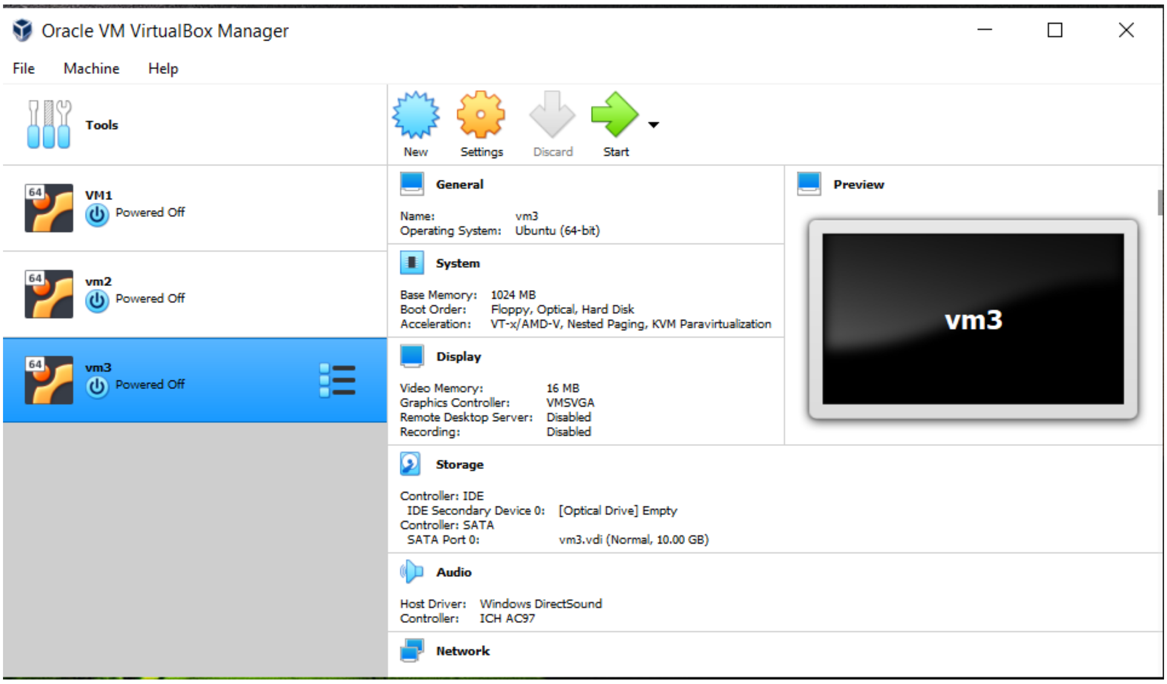
:\Users\Abhay Kumar\VirtualBox VMs\p___p_\p___p_.vdi

Select the size of the virtual hard disk in megabytes. This size is the limit on the amount of file data that a virtual machine will be able to store on the hard disk.

10.00 GB

- This finishes the configuration of the Virtual Machine.

Final Output:



General

Name: vm3
Operating System: Ubuntu (64-bit)

System

Base Memory: 1024 MB
Boot Order: Floppy, Optical, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging, KVM Paravirtualization

Display

Video Memory: 16 MB
Graphics Controller: VMSVGA
Remote Desktop Server: Disabled
Recording: Disabled

Storage

Controller: IDE
IDE Secondary Device 0: [Optical Drive] Empty
Controller: SATA
SATA Port 0: vm3.vdi (Normal, 10.00 GB)

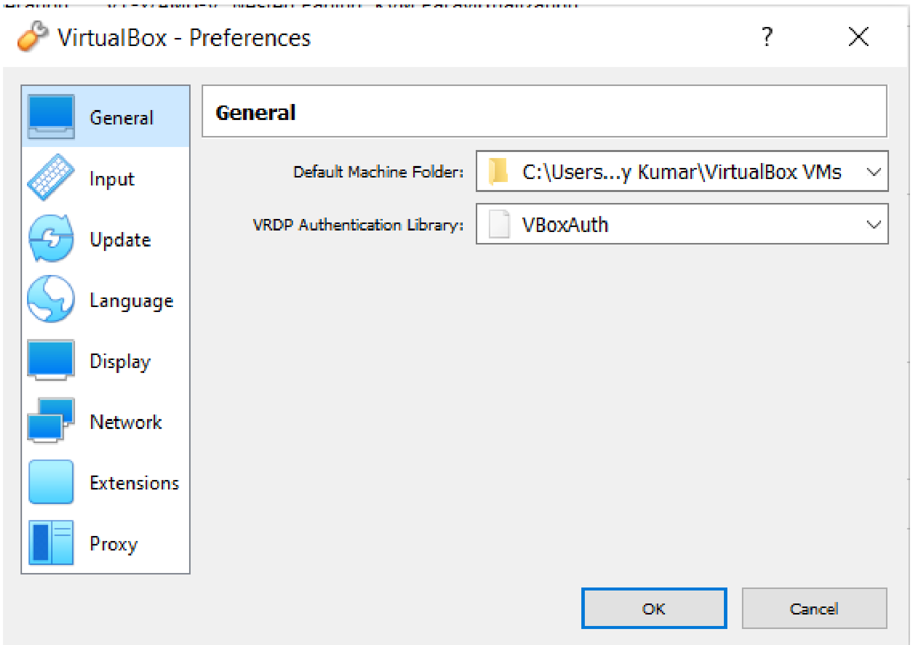
Audio

Host Driver: Windows DirectSound
Controller: ICH AC97

Network

Part II:

- After configuration, please go the file section -> Preferences -> Network.

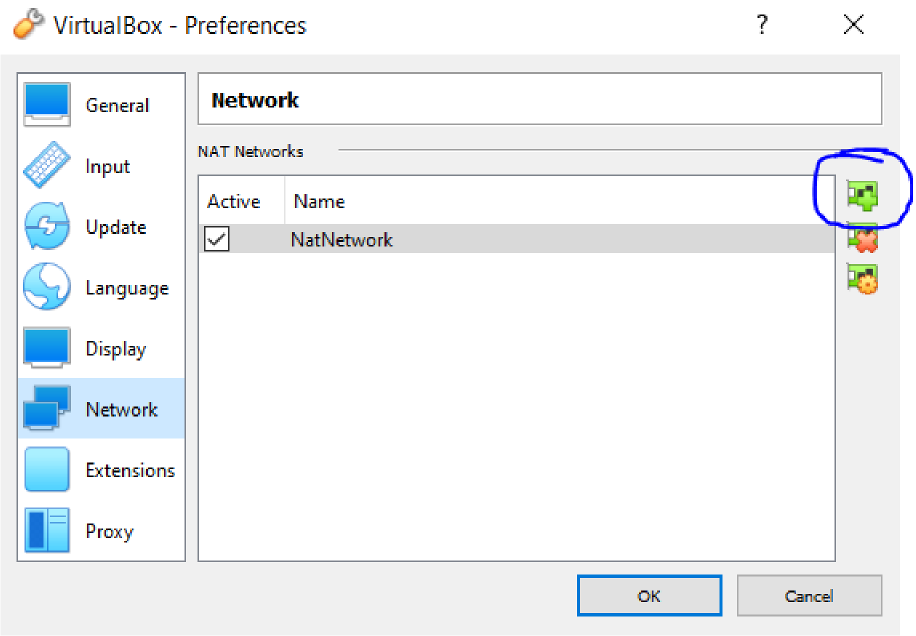


General

Default Machine Folder: C:\Users...y Kumar\VirtualBox VMs

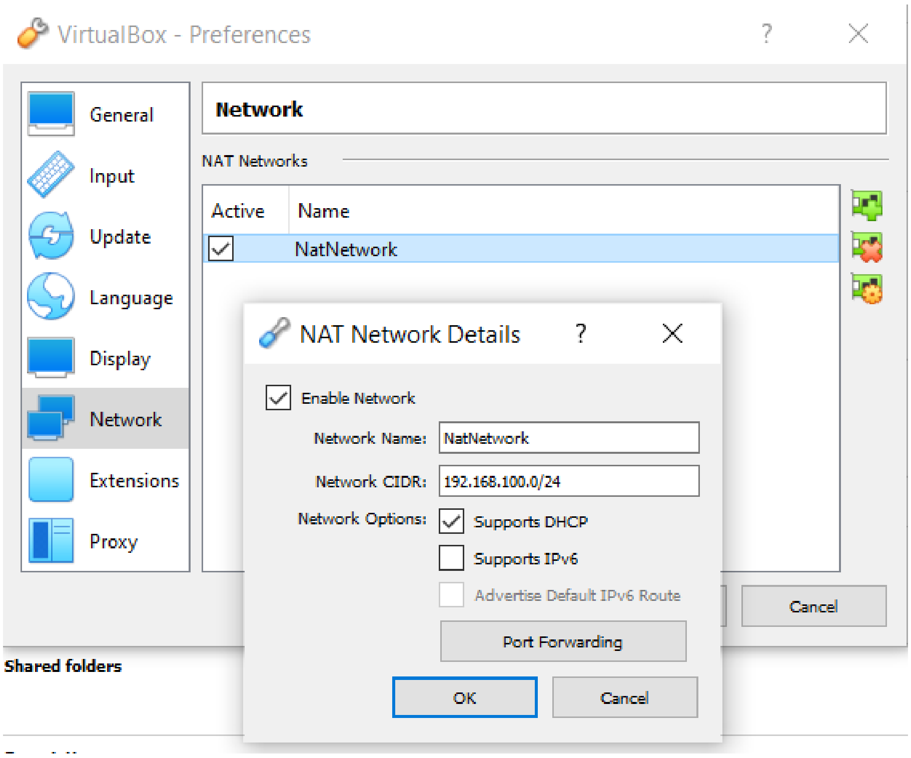
VRDP Authentication Library: VBoxAuth

- Under Network click on the add network.



Active	Name
☑	NatNetwork

- Click on the NAT Network created, and edit the Network CIDR to 192.168.100.0/24. (This would assign your Virtual Machines in the range as per the network CIDR).



Active	Name
☑	NatNetwork

☑ Enable Network

Network Name: NatNetwork

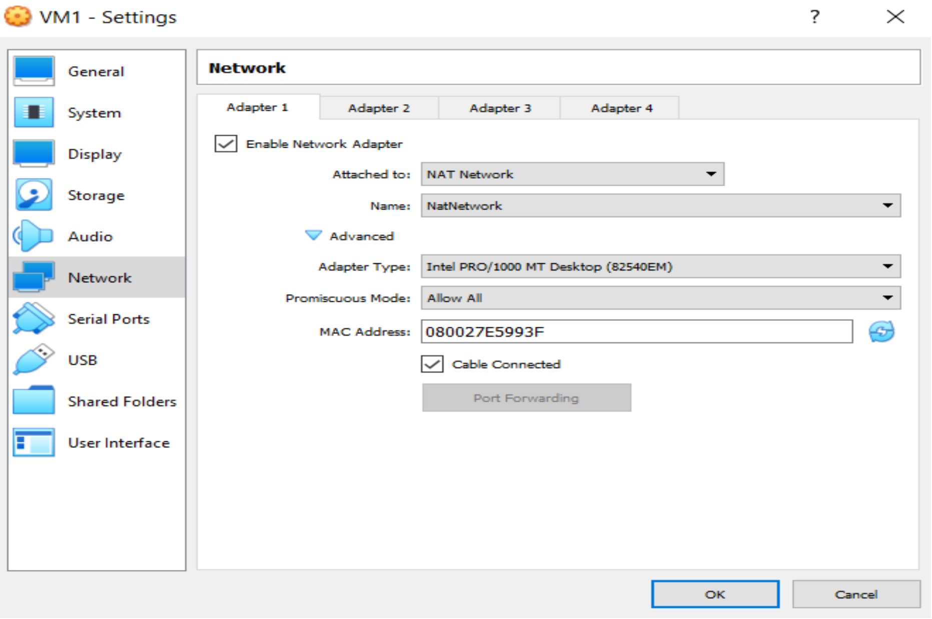
Network CIDR: 192.168.100.0/24

Network Options: ☑ Supports DHCP

□ Supports IPv6

□ Advertise Default IPv6 Route

- Select on the newly created VM and click on the settings -> Under Settings, left hand -> Find Network -> Under Network -> Select the Adapter to NAT Network. By default, the newly created NAT Network will be detected and then later click Ok.



Network

☑ Enable Network Adapter

Attached to: NAT Network

Name: NatNetwork

Advanced

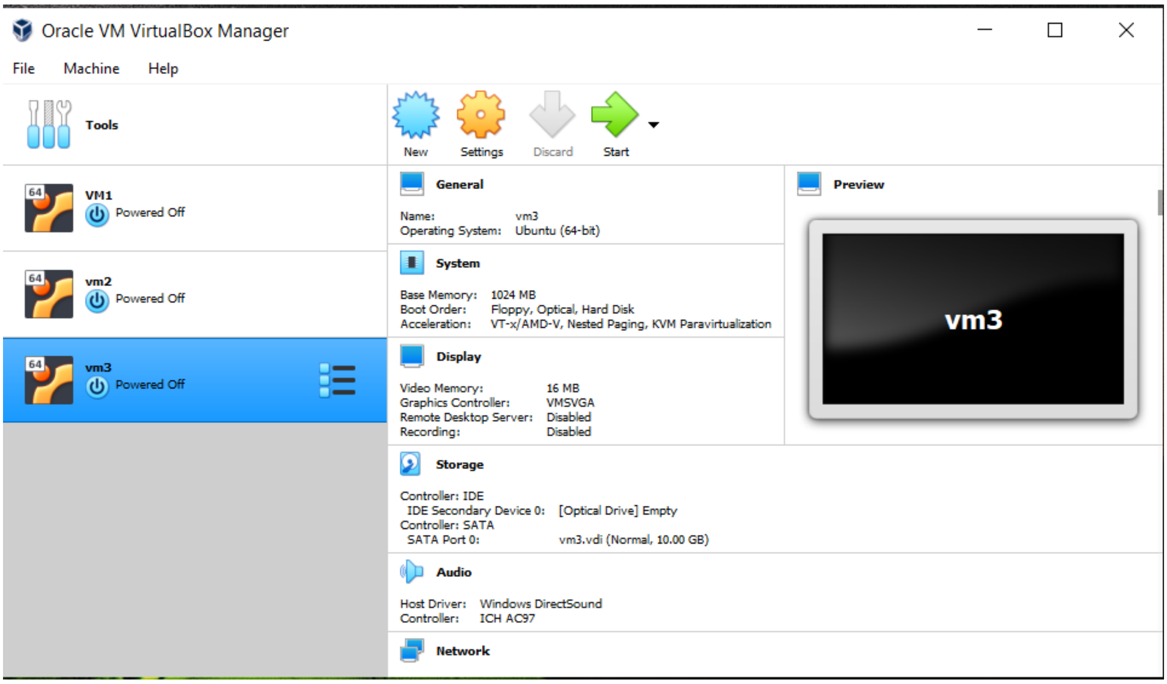
Adapter Type: Intel PRO/1000 MT Desktop (82540EM)

Promiscuous Mode: Allow All

MAC Address: 080027E5993F

☑ Cable Connected

- Under advanced, please change the Promiscuous mode to Allow All, to configure the IP automatically which would help communicate between the desired VM's and then Click OK.



General

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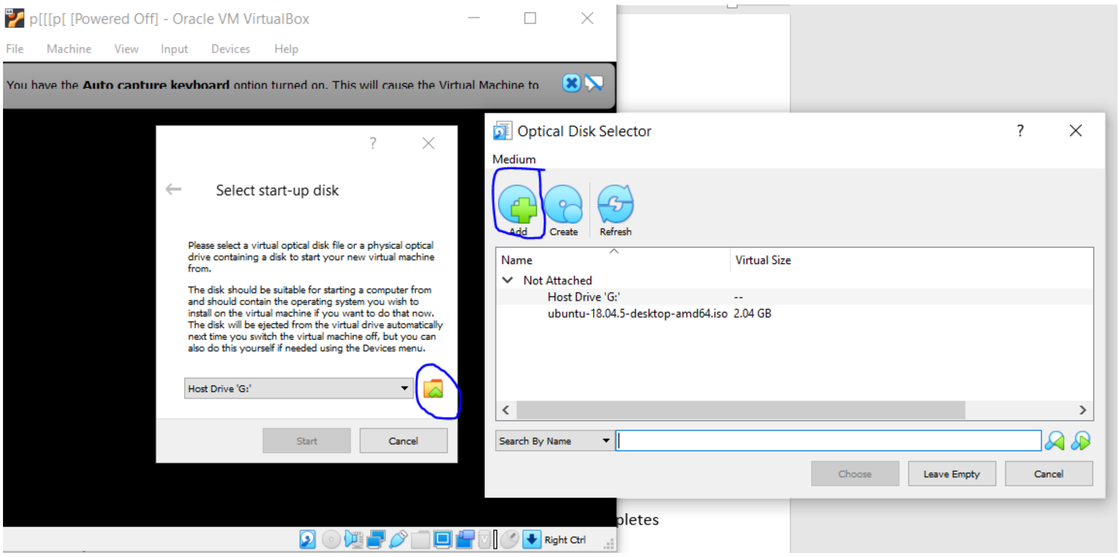
Audio

Host Driver: Windows DirectSound
Controller: ICH AC97

Network

- Next under the manager, use the green arrow (Start) the vm you wish to use.
- You will be rendered a window where you need to give the location of the downloaded disk image file, which will help setup and start-up the OS on the VM. (Linux has to be installed as mentioned in the above sections).



You have the **Auto capture keyboard** option turned on. This will cause the Virtual Machine to

Select start-up disk

Please select a virtual optical disk file or a physical optical drive containing a disk to start your new virtual machine from.

The disk should be suitable for starting a computer from and should contain the operating system you wish to install on the virtual machine if you want to do that now. The disk will be ejected from the virtual drive automatically next time you switch the virtual machine off, but you can also do this yourself if needed using the Devices menu.

Host Drive 'G:'

Name	Virtual Size
Not Attached	
Host Drive 'G:'	--
ubuntu-18.04.5-desktop-amd64.iso	2.04 GB

- Please follow the instructions and then restart the VM
  - Note: This procedure would be taking 10-20 minutes, be patient till the process completes successfully.
- Once the restart of OS on the VM, you are now ready to use the VM.

Run and Test of the VM.

- Once the VM starts, please login using your credentials as per the details have mentioned while the installation of the Linux based OS.
- Use the following commands to get the IP details for the newly created VM's.
  - **Command 1:** sudo apt update (Update the software).
  - **Command 2:** sudo apt install net-tools (Installs the required net packages in the VM)
  - **Command 3:** ifconfig (Gives the details of the VM internet connectivity with IP address)

Installation of Virtual Box on the Linux based Operating Systems:

System Requirements:

- Laptop or a PC with minimum 8GB ram and 250 or above Hard-disk.
- Virtualization and other features (Hyper-V) enabled.
- Good Internet connectivity.

Downloading the Software:

- For Linux based Installation and setup: Linux Downloads – Oracle VM VirtualBox (Please check the appropriate OS installed on your machine and then select the download options).

Installation and Setup:

- After the download, run the downloaded file using software updates and get the virtual box installed on the Linux based operating system.
- Also, it can be downloaded using the command line interface from Ubuntu repositories. Commands are:
  - Command 1 : sudo apt update
  - Command 2: sudo apt install virtualbox virtualbox-ext-pack

That's it ! You have successfully installed VirtualBox on your laptop/machine, you can start using it. Refer Link : How to Install VirtualBox on Ubuntu 20.04 | Linuxize (optional)

- Next, follow the same steps as mentioned in the above section “Installation steps of the Windows”.
- Once complete, you can run the virtual machine as per the requirements.

Run and Test of the VM.

- Once the VM starts, please login using your credentials as per the details have mentioned while the installation of the Linux based OS.
- Use the following commands to get the IP details for the newly created VM’s.
    - o **Command 1:** sudo apt update (Update the software).
    - o **Command 2:** sudo apt install net-tools (Installs the required net packages in the VM)
    - o **Command 3:** ifconfig (Gives the details of the VM internet connectivity with IP address)

Python, Flask based web application on the Virtual Machine.

- After the VM is completely setup, create a folder of your choice and follow the commands to deploy the web application.

Objective:

1. **Setup a python environment**
2. **Install the flask package.**
3. **Run a web-based application and deploy in the other Virtual Machines.**

Installation of Python3 and its packages:

- Please follow the below commands, if there is any difficulty in installing the python packages.
    - o Command 1: sudo apt update
    - o Command 2: sudo apt install software-properties-common
    - o Command 3: sudo add-apt-repository ppa:deadsnakes/ppa
    - o Command 4: sudo apt install python3.9
- Verification of the installation was successful.
    - o Command: python3.9 –version

That’s it. Python 3.9 is installed on your Ubuntu, and you can start using it.

Setup and configuration:

- To set up a Python 3 virtual environment, navigate to your project folder on your terminal and type the following command:
    - **o** Command: python3 -m venv venv

This will create a new virtual environment named venv using the version of Python 3 that you have installed on your system. Next, you need to activate the virtual environment by sourcing the activation script:

- o Command: source venv/bin/activate

After executing this command, your prompt will change to indicate that you’re now operating from within the virtual environment.

The next file to look at is requirements.txt. Since Flask is the only dependency of this project, that’s all you need to specify:

- o Command 1: sudo apt-get install vim
- o Command 2: vim requirements.txt
- o Under requirements.txt -> Flask==1.1.2

If your app has other dependencies, then you'll need to add them to your requirements.txt file as well.

After you successfully set up and activate your virtual environment, you're ready to install Flask:

- Command: python3 -m pip install -r requirements.txt

This command fetches all packages listed in requirements.txt from PyPI and installs them in your virtual environment. In this case, the only package installed will be Flask.

Wait for the installation to complete, then open up main.py and add the following lines of code to the file:

```
from flask import Flask
app = Flask(__name__)
@app.route("/")
def index():
   return "Congratulations, it's a web app!"
if __name __ == “__main__”:
   app.run(host=”0.0.0.0”, port=5000, debug=True)
```

You can now start Flask's development server and interact with your Python app in your browser. To do so, you need to run the Python script that starts the Flask app by typing the following command:

- Command: python3 main.py

Flask starts up the development server, and your terminal will display output similar to the text shown below:

```
Serving Flask app "main" (lazy loading)
 * Environment: production
   WARNING: This is a development server.
   Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
 * Running on http://<ip-address>:5000/ (Press CTRL+C to quit)
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: <random generated>
```

Installation and usage of Multiple Virtual Machine:

Virtual machine 1 (vm1): This virtual machine can be used for the execution of the sample code as described above.

Virtual Machine 2 (vm2): This machine can be used to render the output of the tasks that are being performed on the Virtual Machine 1 (vm1).

Services that run on Virtual Machine 1 (vm1): (Development)

- This virtual machine will be exclusively used for developing and executing of the sample python based application as described in the previous sections.

- This machine would also have mongodb services configured which later is used to create and integrate with the flask-based application. Detailed setup and configuration information are available at abhaymehtre/Mongodb-with-Flask-Web-Application (github.com)

Services that run on Virtual Machine 2 (vm2) (Deployment and Delivery)

- This virtual machine will be used only for the execution purpose and also to analyse the connectivity between two machines connected to each other.

Note :

- You need to follow the installation steps for all the VM machine you create as per the details mentioned in the section "**Installation Steps for Windows:**" and "**Python, Flask based web application on the Virtual Machine.**"
- If you have an linux based system/machine please follow the initial steps from the section **Installation of Virtual Box on the Linux based Operating Systems, then follow the similar steps as mentioned in the installation steps of windows.**
- The Virtual Machine 1 will have the flask-based app developed and deployed using the ip address mentioned in previous section. You can also refer to the github repository, for the mongodb and flsk integration. Link : abhaymehtre/Mongodb-with-Flask-Web-Application (github.com)
- The Result or the execution part of the web application can be rendered using the ip address obtained after running the flask application on the virtual machine 2.