# INDIAN INSTITUTE OF TECHNOLOGY
# BHUBANESWAR


## Cloud Computing

## M.Tech CSE ( 2021 -2023)

## Assignment - 1

**Submitted to:-**

**Dr. Padmalochan Bera**

**Assistant Professor(CSE)**

**Submitted by:-**

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**Roll no-21CS06012**

**Aim:**

1. Implement virtualization using Oracle's Virtual Box and VMWare.

2. Run webserver in a created VM, which stores, retrieves, and delivers objects in webpages to the clients/users based on requests.

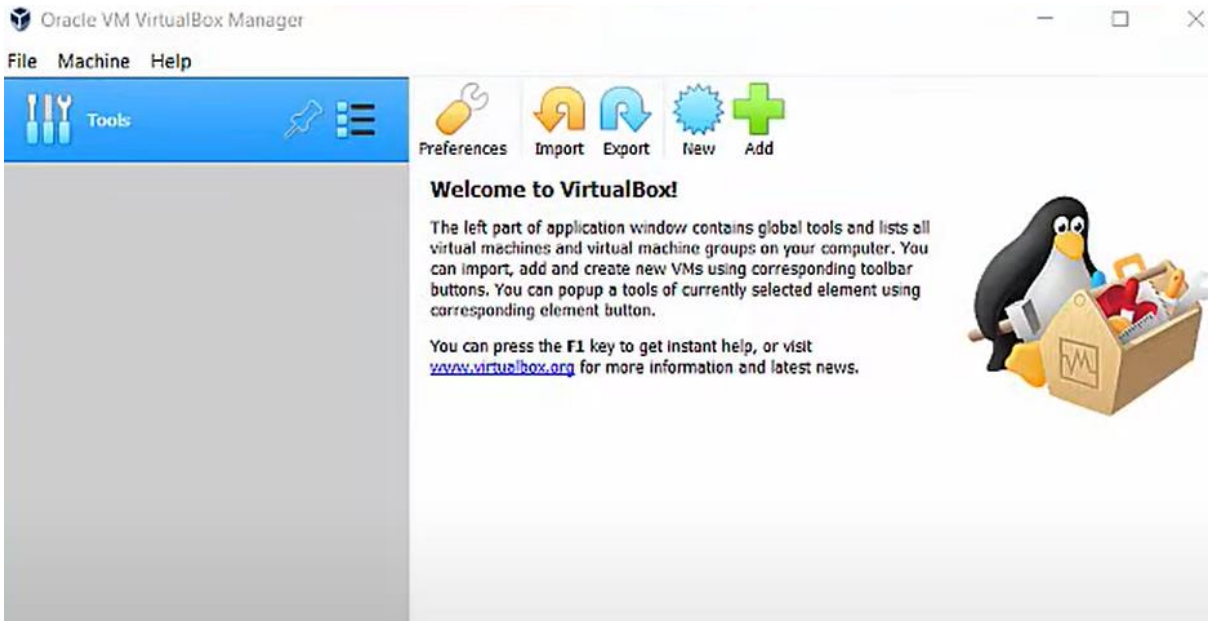
3. Create two VMs in VBox and establish communication between the created VMs. Use pipe/socket

4. Test migration service in VBox, VMWare, and Xen platform.

5. Test migration service in VBox, VMWare, and Xen platform. 5. Create an application using Hadoop Map/Reduce to count the frequency of each word, number of 1-letter words, 2-letter words,...k-letter words in a file.

Q.1 **Implement virtualization using Oracle's Virtual Box and VMWare**.

- Install Oracle VM virtual box 6.1.32 in my window 11 system.

- After installing Vbox then I install mint as guest OS in Virtual Box. I am attaching Some of the screenshots of my process while installing mint os in vbox.

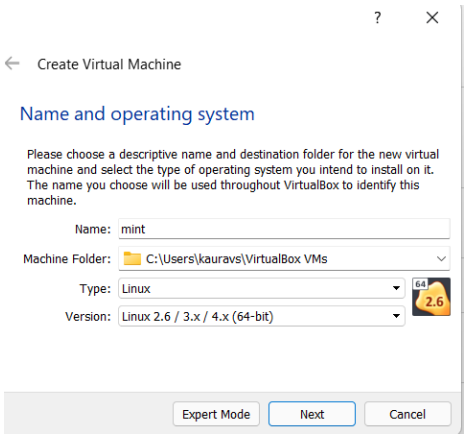



Figure I Enter name and machine folder path

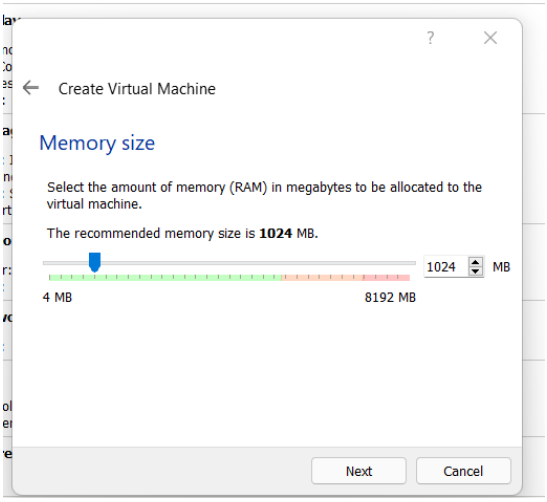



Figure i ASSIGN RAM TO GUEST OS AND

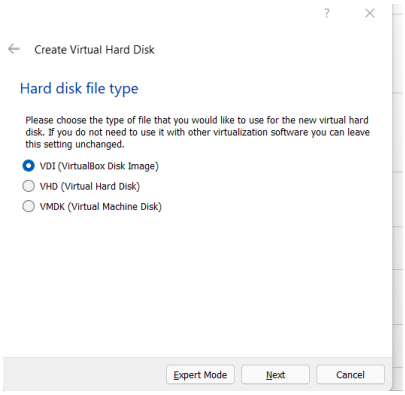



Figure ii SELECT THE HARD DISK FILE TYPE

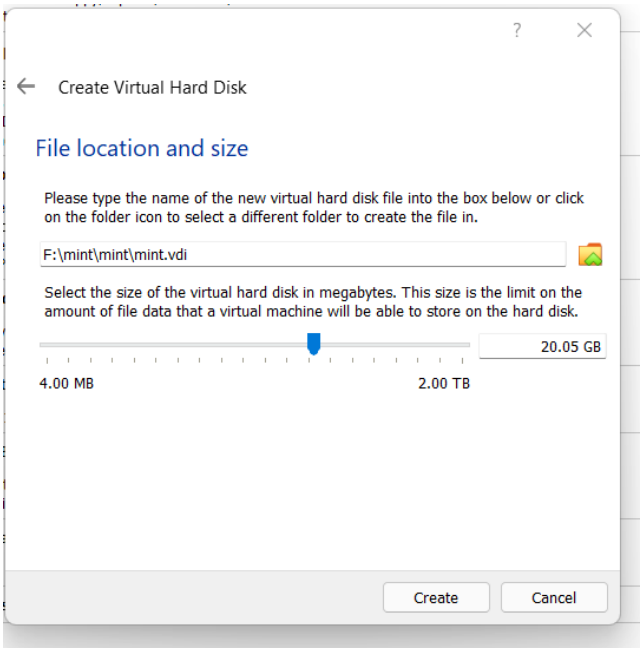



Figure iii ALLOCATE 20GB DISK SPACE TO MINT

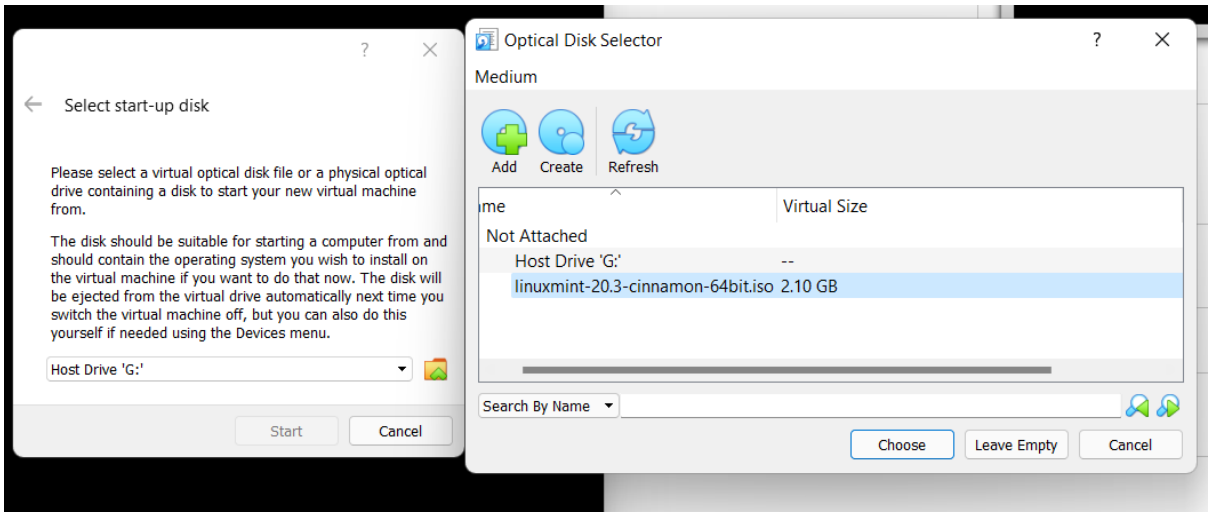



Figure iv SELECT ISO STARTUP FILE

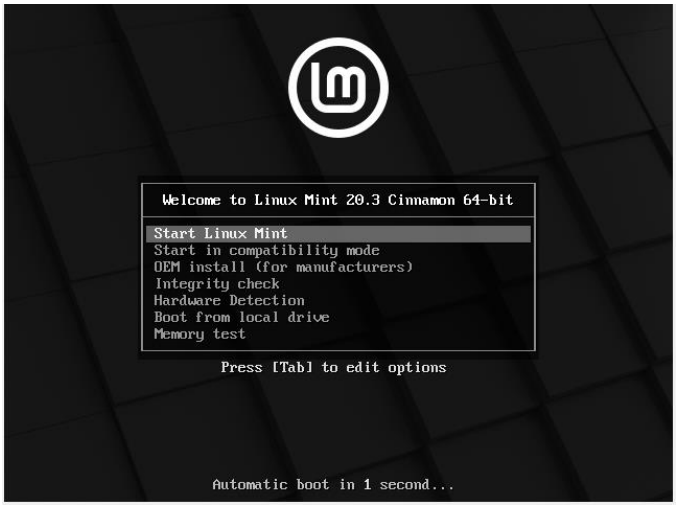



Figure v start Linux mint

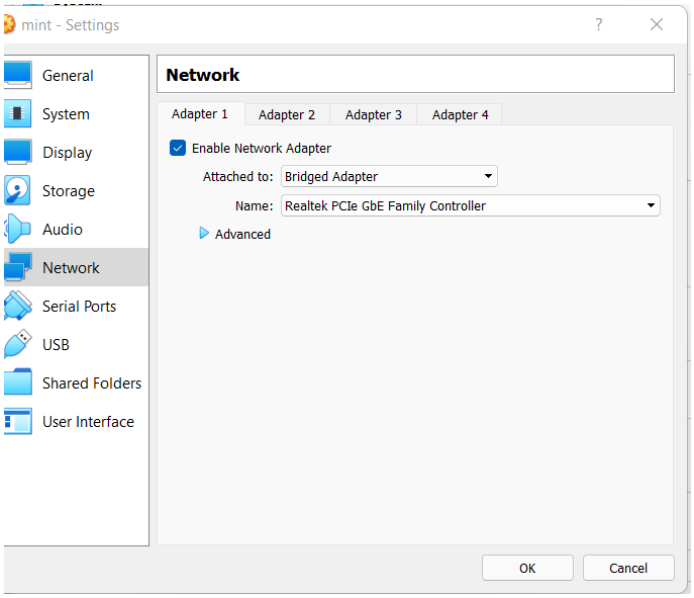

Figure vi  Setup complete

## Q.2 ) Run webserver in a created VM, which stores, retrieves, and delivers objects in webpages to the clients/users based on requests.

We need to run a webserver on the created virtual machine instance such that the web resources are easily accessible by other virtual instances and the host machine too. To configure that we need to create a communication network between the VMs and the host OS. Fortunately, VirtualBox allows us to use virtual network adapters in the created instances.

Before running a web server first we have to make some changes in setting in order to establish communication between the os.

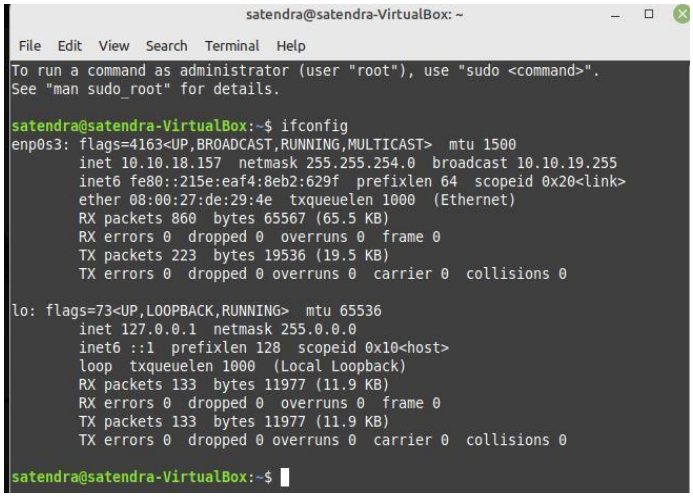
- Set the network adapter as Bridge:
  **Settings > Network > Adapter 1 (*Enable Network Adapter*) > Attached to: (*Bridge Adapter*) > OK**



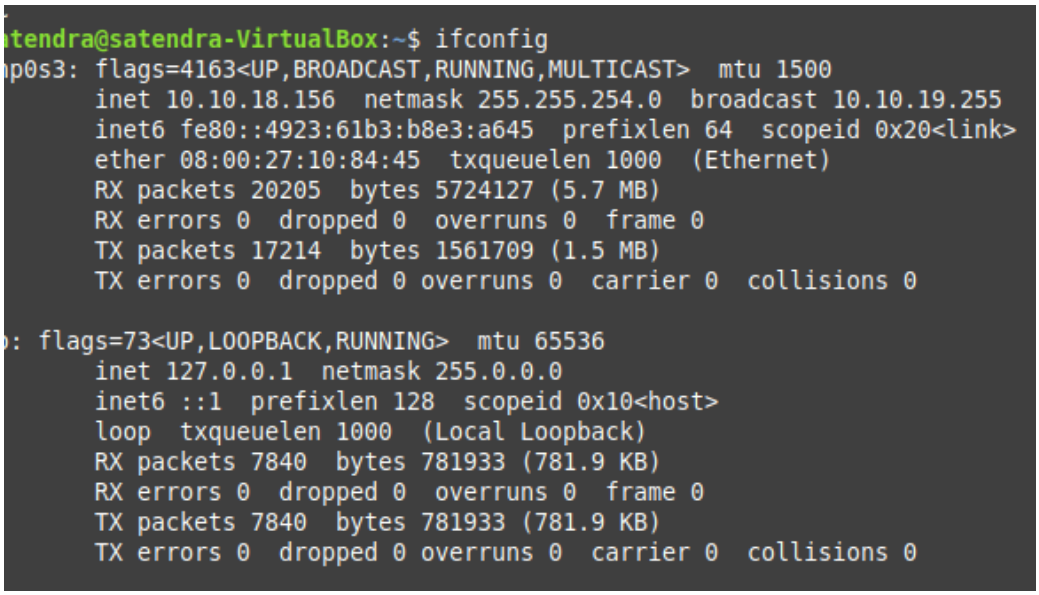

We will be using Bridged Adapter since we aim to host a web server on an instance of a VM and allow it to be accessed by all the devices connected on the local network to which the host device is connected.

We will be using apache2 to run a webserver on the guest OS. We are going to use a template web server since our primary focus is on communication between VMs.

- After that, we will find ip address of both the guest OS.
  **< ifconfig >**

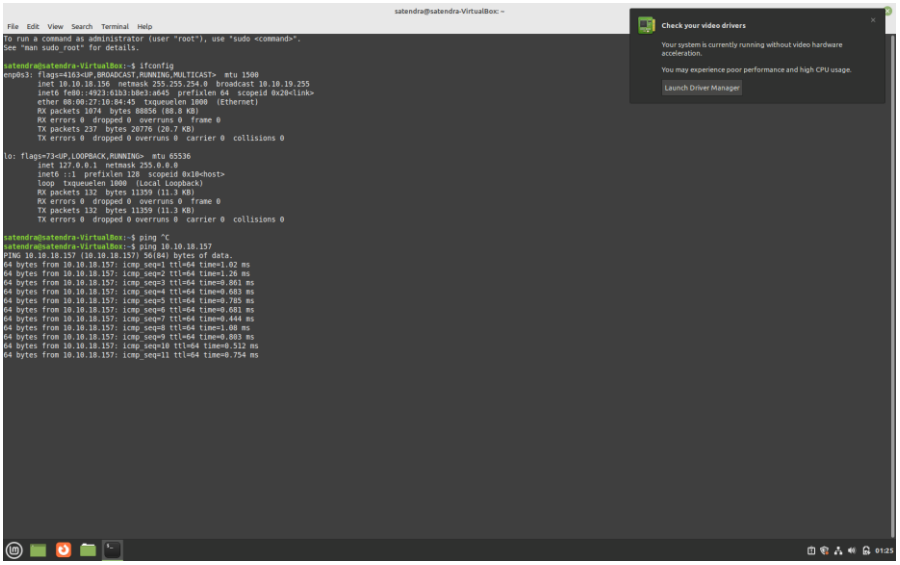



- Ip address of mint os in vbox is 10:10:18:157
- Similarly, ip address of clone mint OS is 10:10:18:156



- Ping command is used for checking the network connectivity among host/server and host.

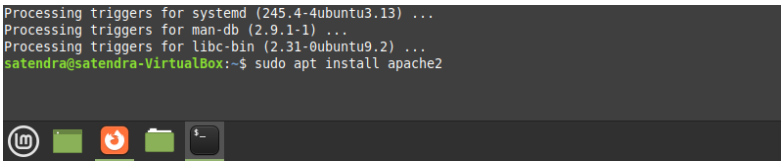
  **< ping 10.10.18.157 >**




So our server is running on mint. We can now easily access the webpage from another VM and the host OS.

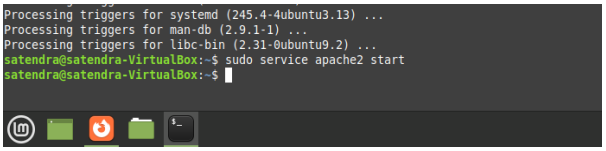
- Now I install apache2 run the server on mint.

  **<sudo apt install apache2>**



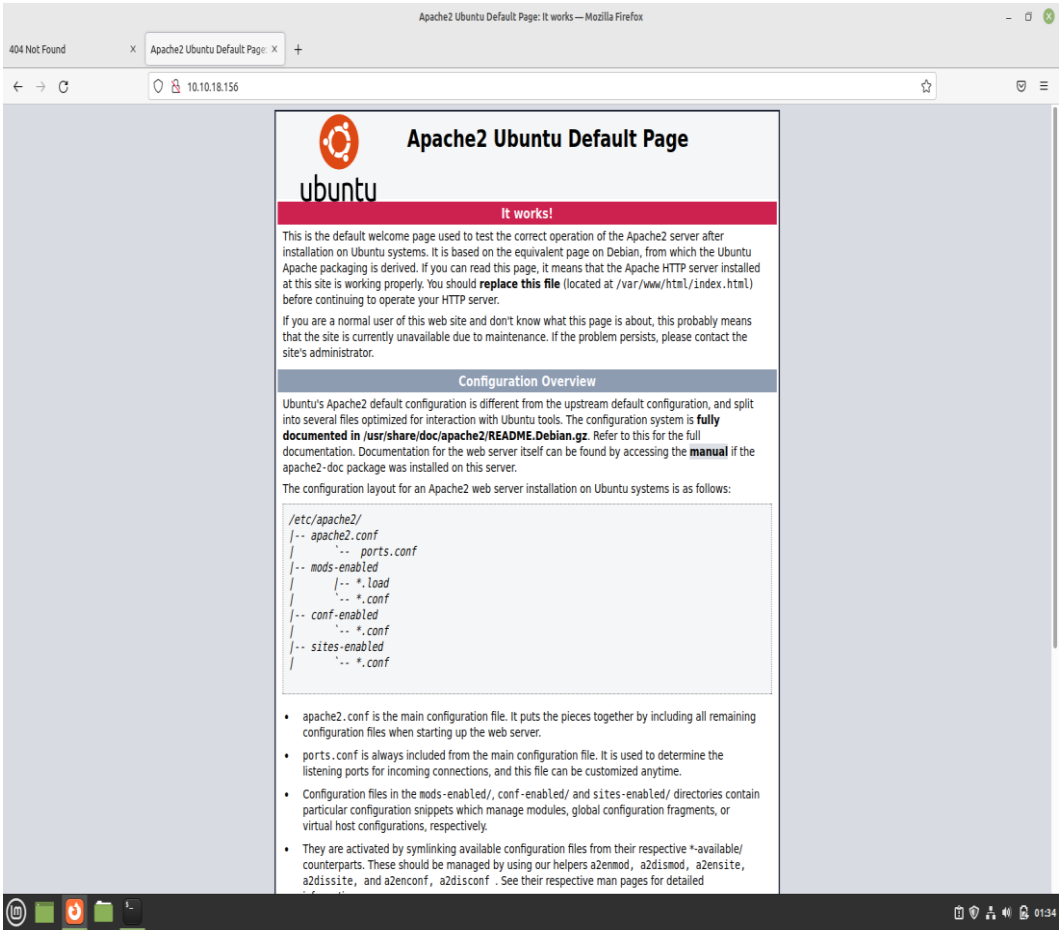

- Start apache server in mint OS.

  **<sudo service apache2 start>**



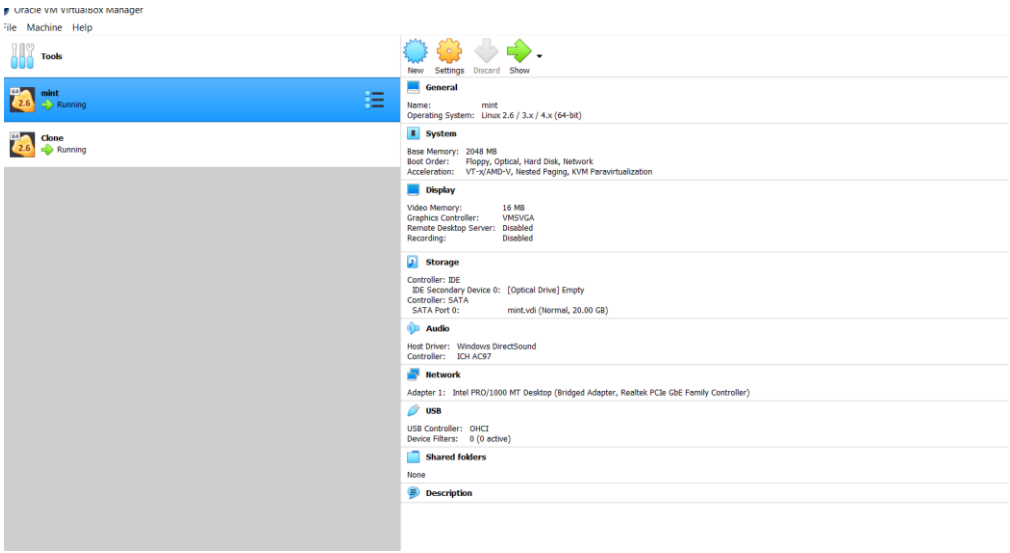

- We easily access the server from other and host os.

- Now we can access the Apache default page

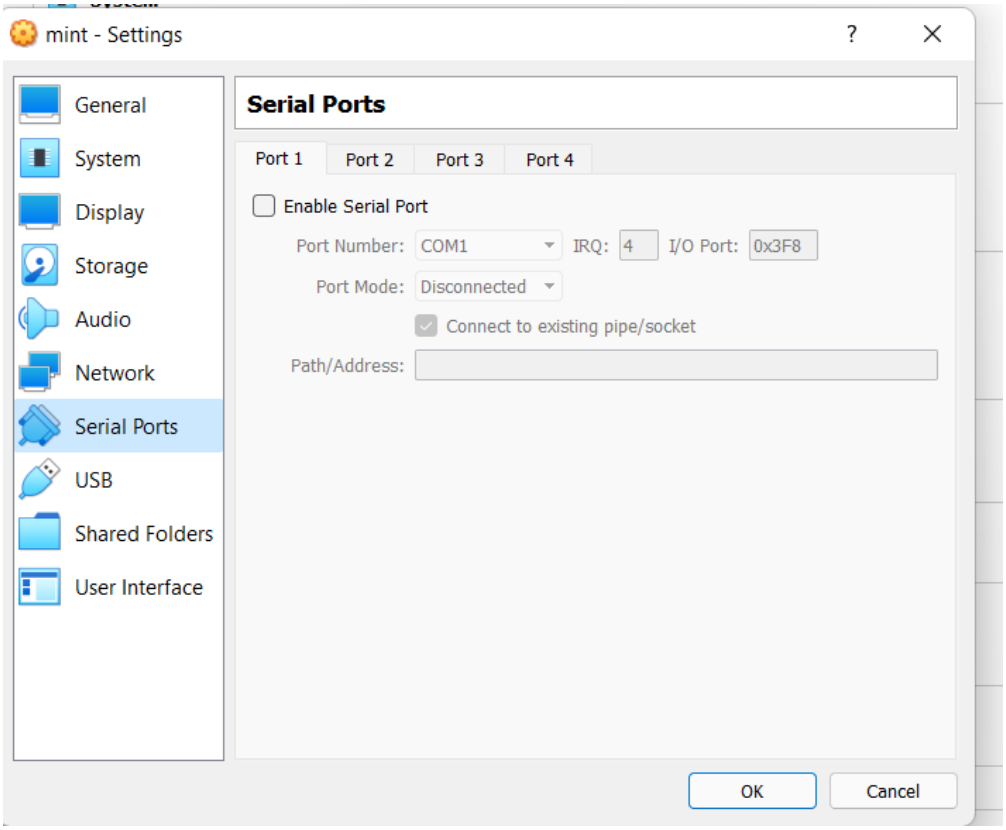


**Q.3) Create two VMs in VBox and establish communication between the created VMs.(Use pipe/socket)**

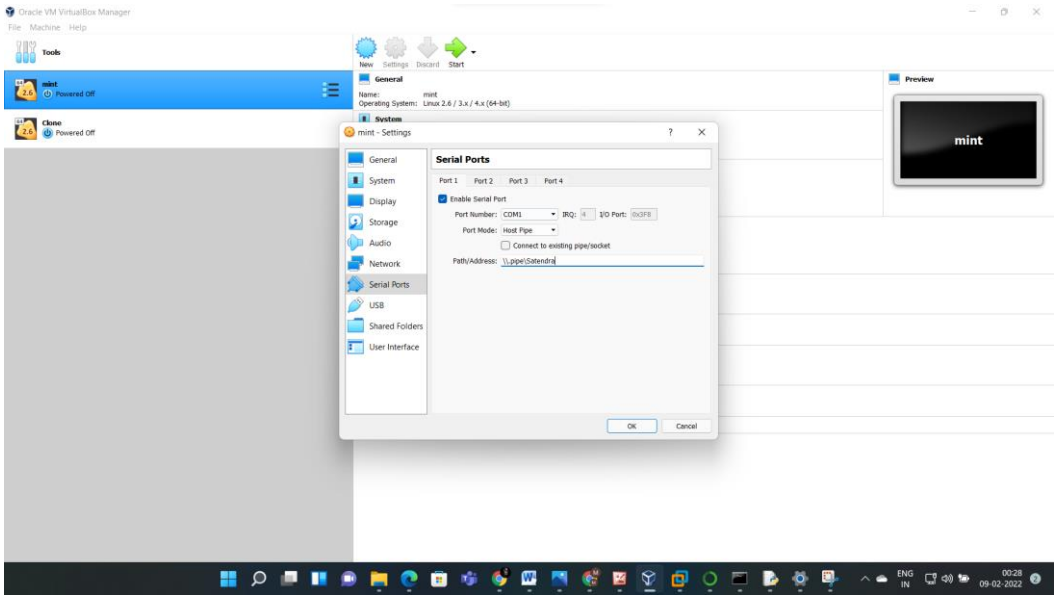
- We have created 2 VMs named mint and clone.



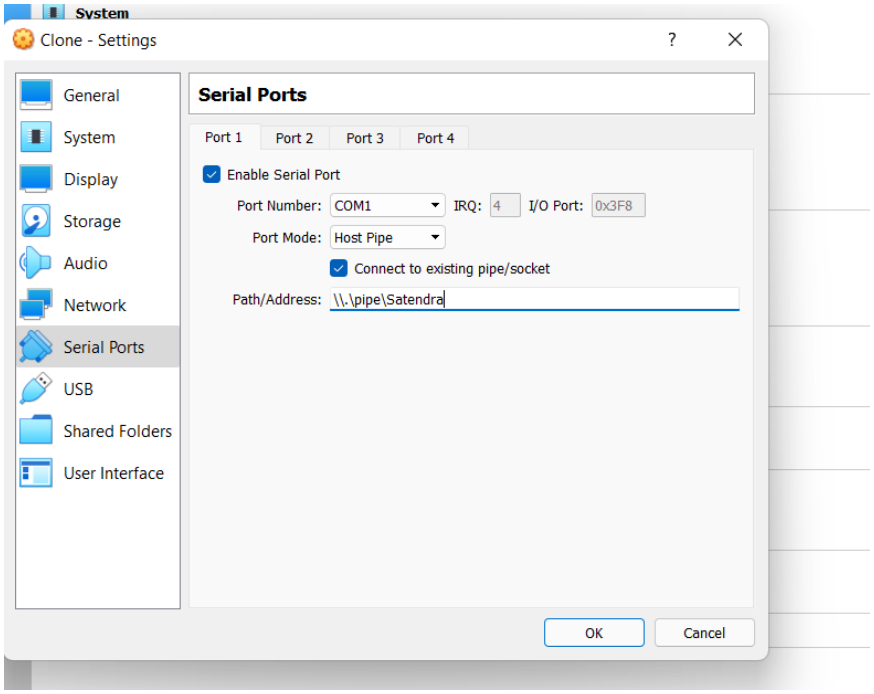

- Select any 1 VM, say mint, and go to settings.



- Go to the Serial Ports tab from the right panel then choose port1. Choose the port number from the drop-down list. There are 4 options (COM1, COM2, COM3, and COM4).
- Select Host Pipe from the Port Mode drop-down.

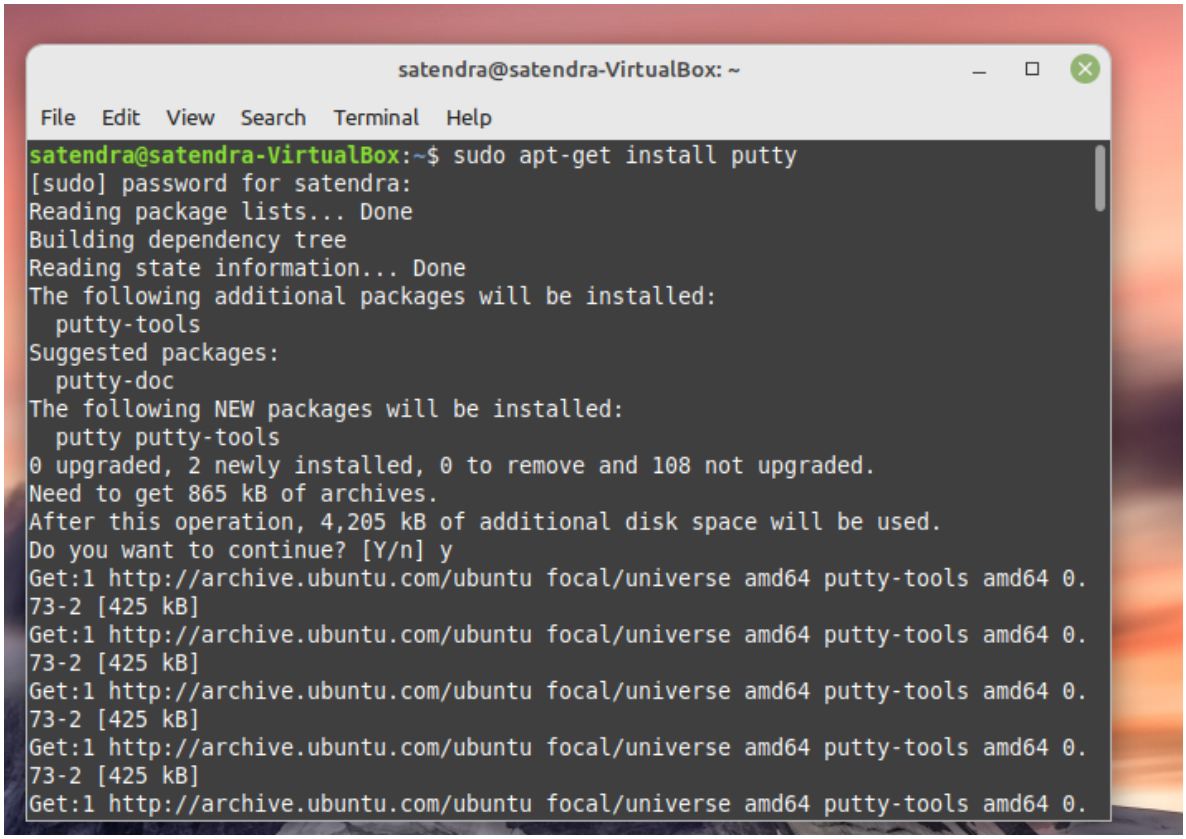



- Enter the Path/Address – This is the pipe name that is created at the host machine. The name format is \\.\pipe\
- Example: \\.\pipe\satendra




- Select the other VM and repeat the above steps for this also.

- Install the putty software.

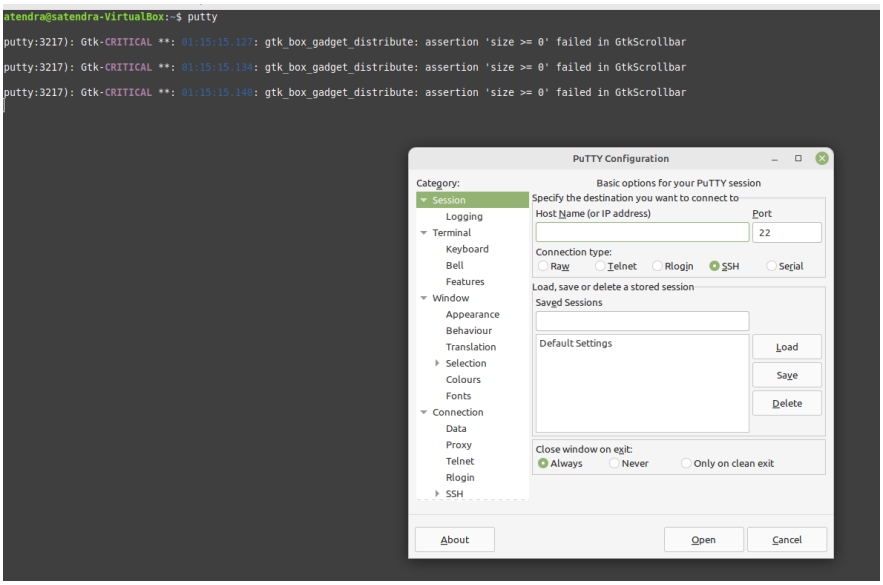



- Open putty by running command putty in the terminal.

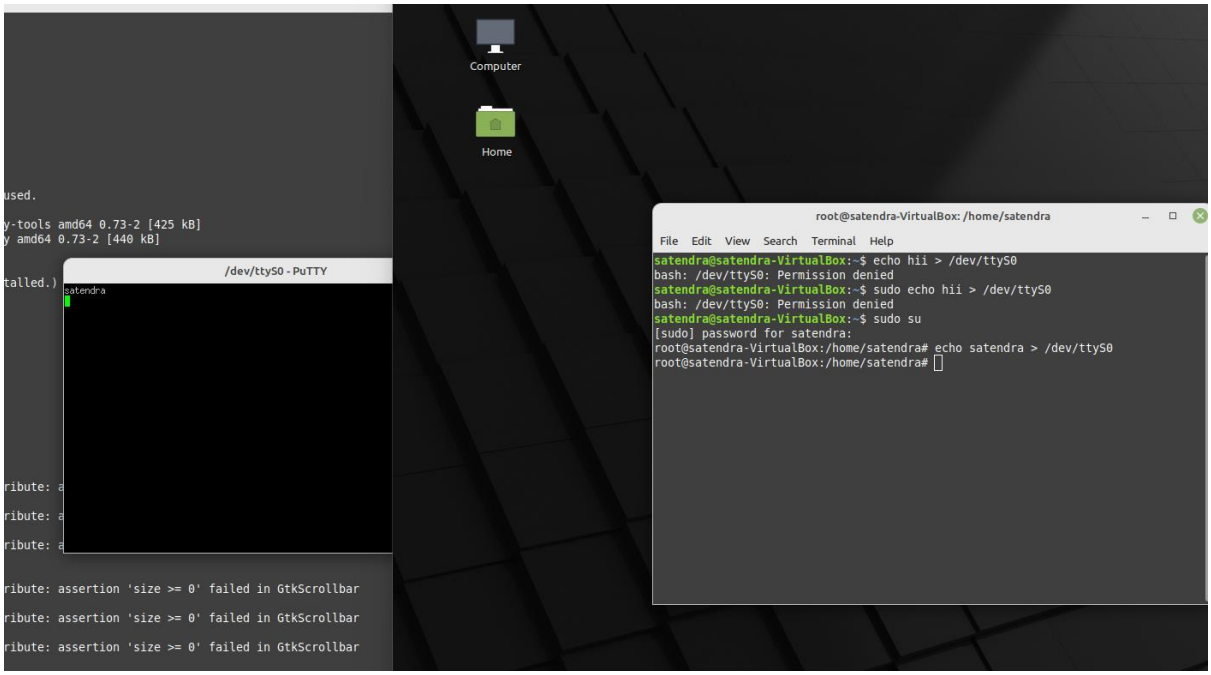
- In the Putty window, select Session from the right panel.

- Go to serial from the radio button and enter the Serial Line (format - /dev/ttyS). Here the num is decided based on the port number (COM) which we have selected in the settings. The num in /dev/ttyS is 1 less than nums. Also, this naming convention is for Linux-based systems. For windows, we use the serial line as \\.\pipe\COM

- Click on Open to open the receiver window



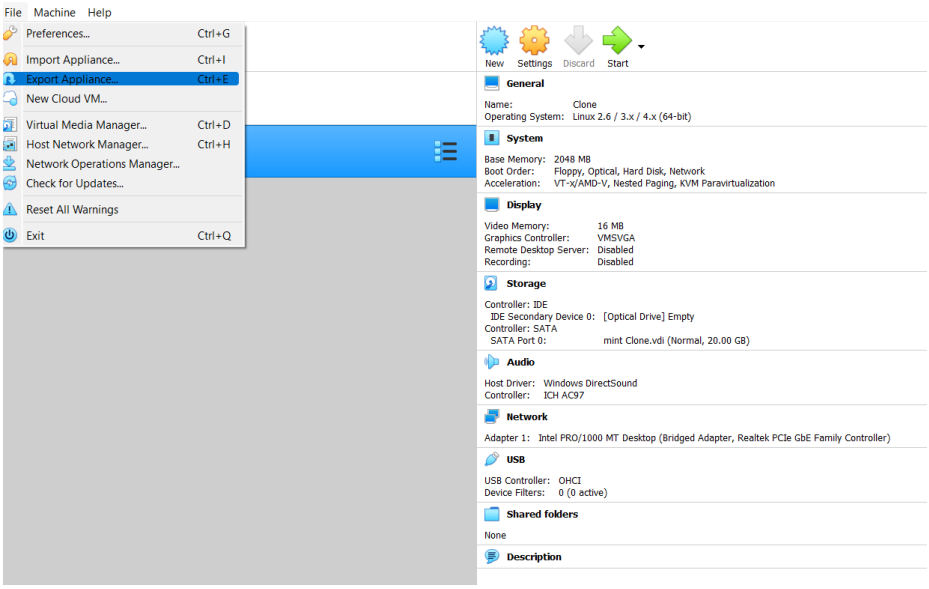

- From the MINT OS, send any message to /dev/ttyS0 (as it was configured to COM 1). Example: echo ‘satendra’ > /dev/ttyS0 You will see the message printed in the receiver window of the putty.



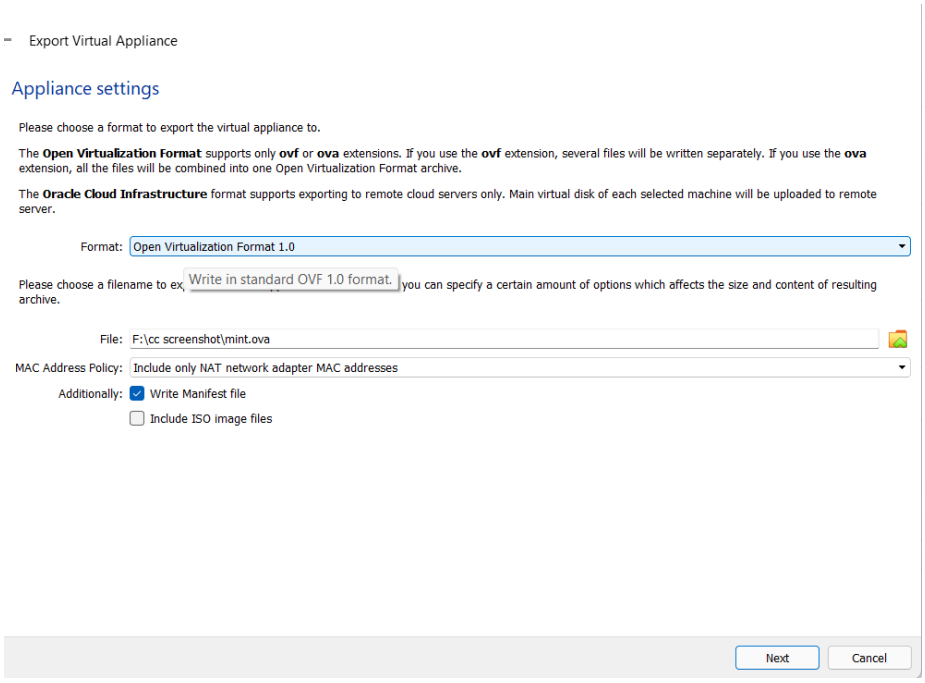
## Q.4) Test migration service in VBox, VMWare and Xen platform.

In this scenario, we will be migrating a VBOX virtual machine to VMware. We need to perform the following steps.

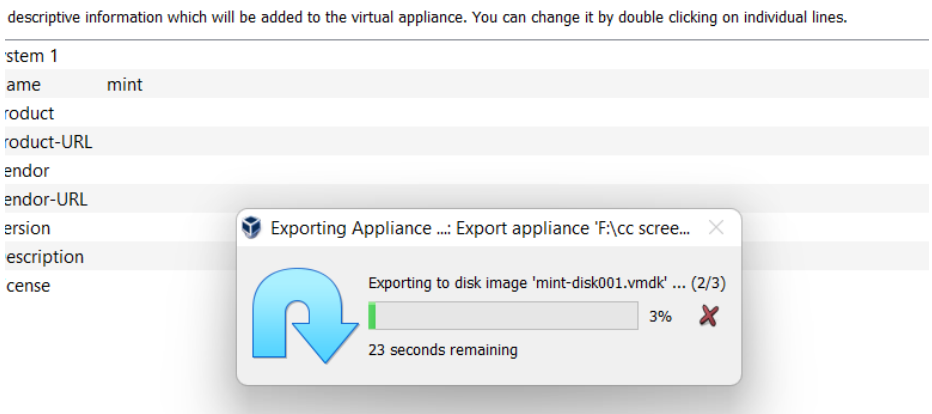
- Power off the virtual machine in VirtualBox.
- Click on File > Export Appliance.




- Select one or more VMs to export, and click **Next**.
- Select a **Format** & provide a location to store the `.ova` file.

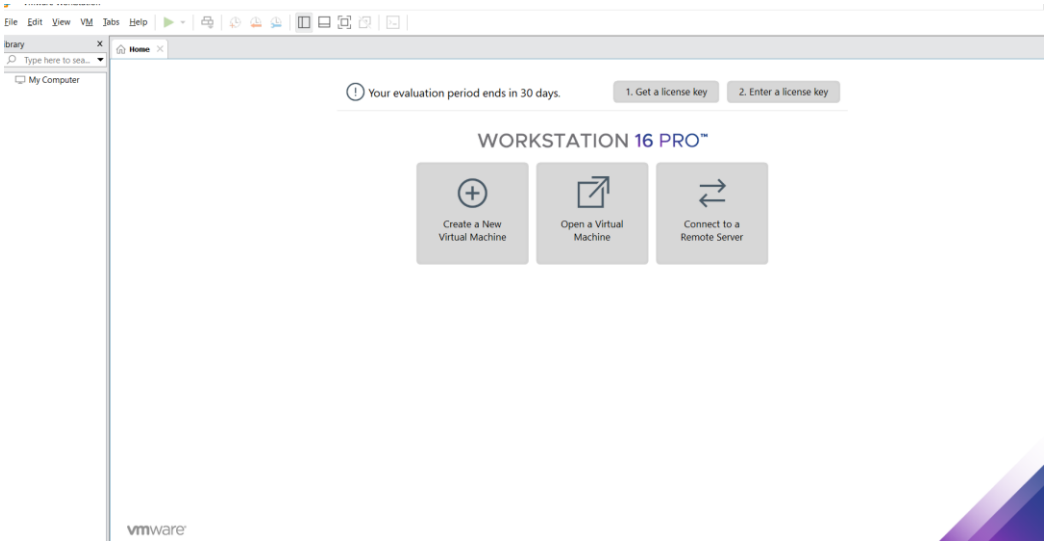


- Click **Export** to begin the export process

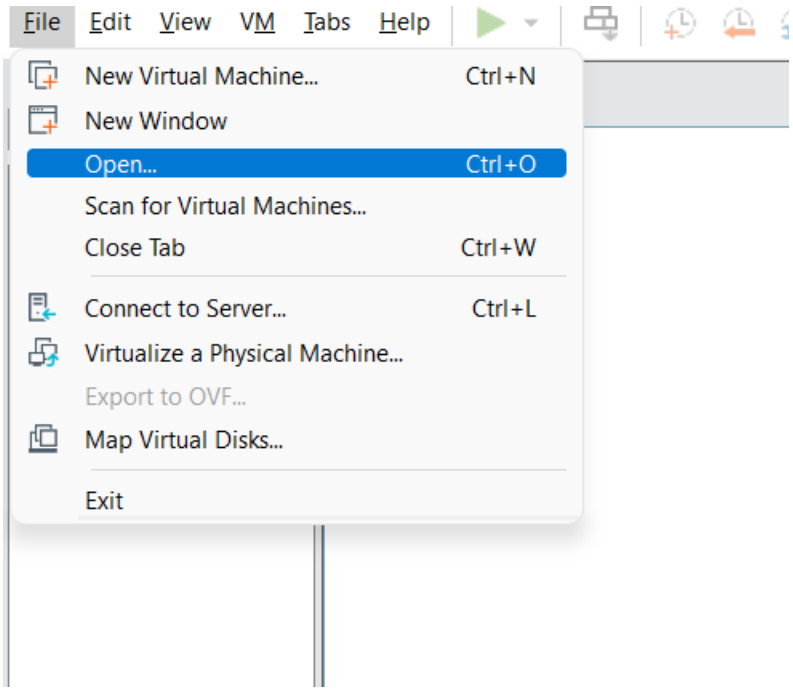



- After the export completes, import the `.ova` file in VMware Workstation.

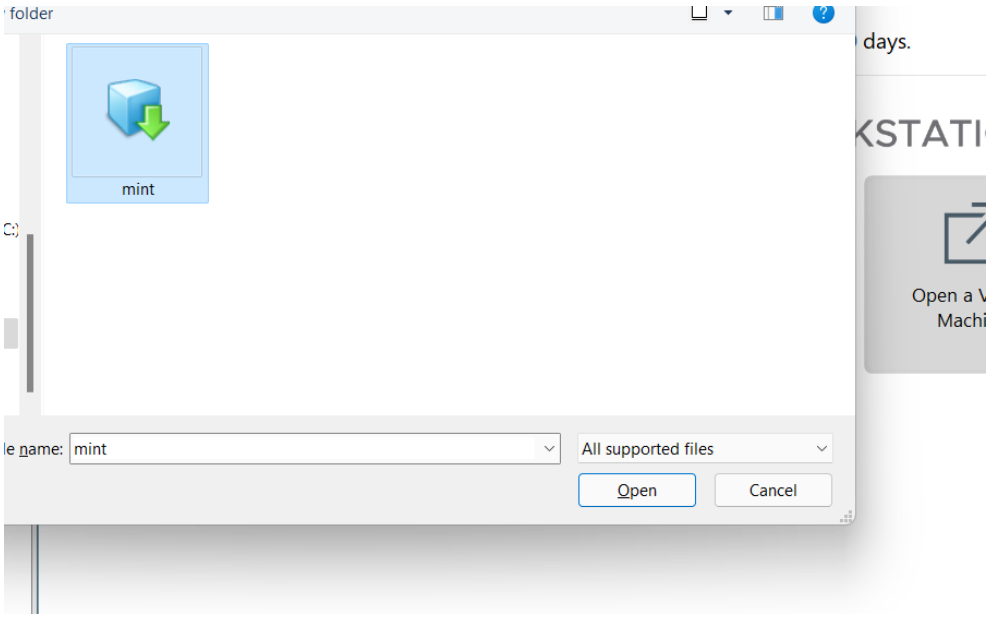
- Start VMware and go to the file section.



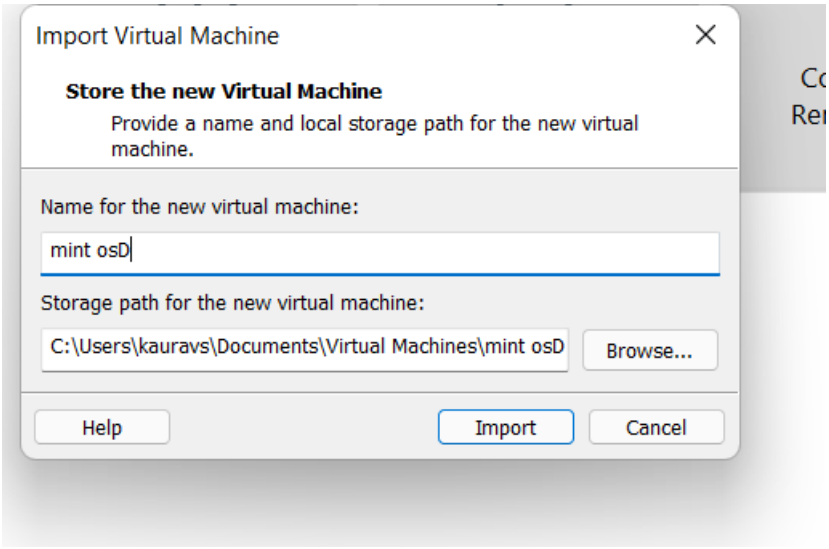

- Go to the file section and open the .ova file.




- Select .ova file.



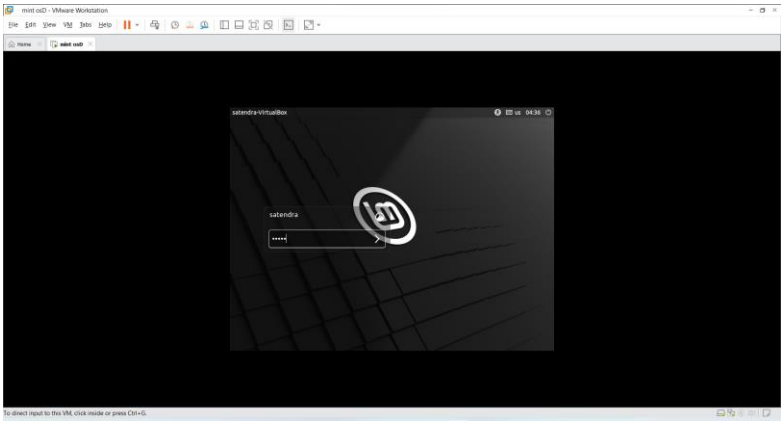

- Enter the guest OS name.

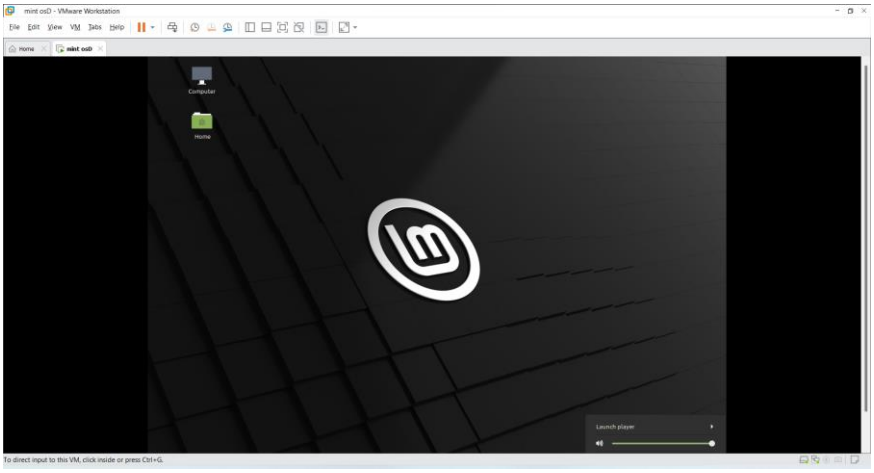



- Import the OS in VMware workstation.


- After that, we successfully imported MINT OS into VMware.


- Open Guest os in VMware.


mint osD - VMware Workstation
File Edit View VM Tabs Help
satendra-VirtualBox
satendra
To direct input to this VM, click inside or press Ctrl+G.

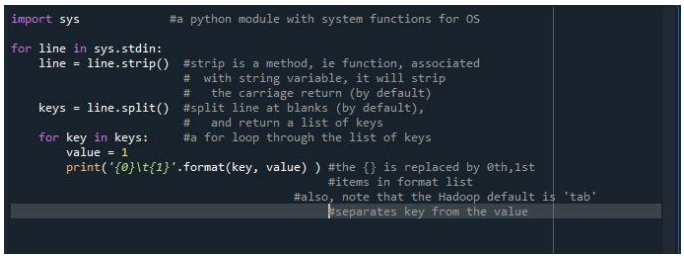

mint osD - VMware Workstation
File Edit View VM Tabs Help
Home
mint osD
Computer
Home
Launch player
To direct input to this VM, click inside or press Ctrl+G.

**Q.5) Create an application using Hadoop Map/Reduce to count frequency of each word, number of 1-letter words, 2-letter words,…k-letter words in a file.**

Two implement frequency of word of different lengths we are using two concepts-

i. Mapper
ii. Reducer

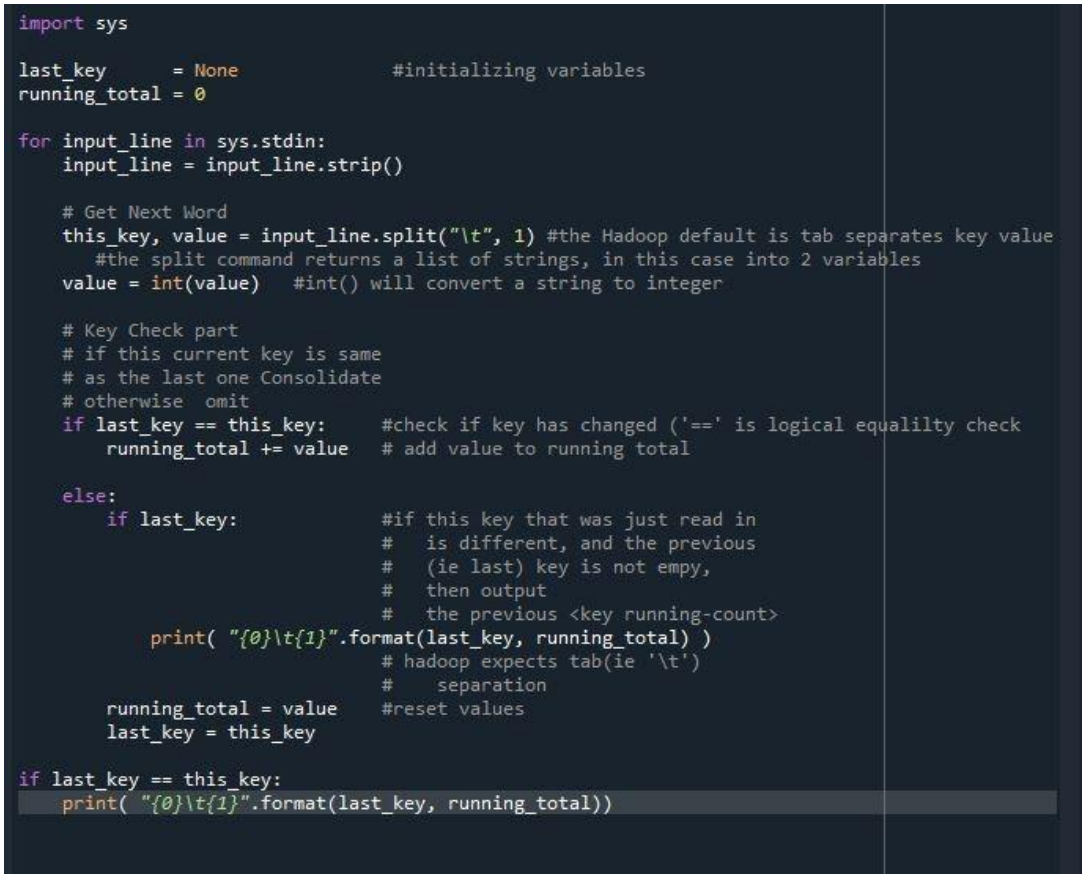
- Mapper



```
import sys            #a python module with system functions for OS

for line in sys.stdin:
    line = line.strip()  #strip is a method, ie function, associated
                         #  with string variable, it will strip
                         #   the carriage return (by default)
    keys = line.split()  #split line at blanks (by default),
                         #   and return a list of keys
    for key in keys:     #a for loop through the list of keys
        value = 1
        print('{0}\t{1}'.format(key, value) ) #the {} is replaced by 0th,1st
                                              #items in format list
                                    #also, note that the Hadoop default is 'tab'
                                         #separates key from the value
```

- **Reducer**



```
import sys

last_key      = None             #initializing variables
running_total = 0

for input_line in sys.stdin:
    input_line = input_line.strip()

    # Get Next Word
    this_key, value = input_line.split("\t", 1) #the Hadoop default is tab separates key value
       #the split command returns a list of strings, in this case into 2 variables
    value = int(value)   #int() will convert a string to integer

    # Key Check part
    # if this current key is same
    # as the last one Consolidate
    # otherwise  omit
    if last_key == this_key:     #check if key has changed ('==' is logical equalilty check
        running_total += value   # add value to running total

    else:
        if last_key:             #if this key that was just read in
                                 #   is different, and the previous
                                 #   (ie last) key is not empy,
                                 #   then output
                                 #   the previous <key running-count>
            print( "{0}\t{1}".format(last_key, running_total) )
                                 # hadoop expects tab(ie '\t')
                                 #    separation
        running_total = value    #reset values
        last_key = this_key

if last_key == this_key:
    print( "{0}\t{1}".format(last_key, running_total))
```

In the above word count problem, I'm using the test file as – **" satendra cloud "**

So after applying the mapper and reducer technique we can solve the counting word frequency of the word.