

CLOUD COMPUTING

LAB 1, 2 & 3

Computer Engineering
Badal Parmar
18BCP011
Div. 2

AIM:

- To Install and configure VMware Workstation Pro for creating the Virtual Machine.
- Exploring VMWare Workstation Pro to create the virtual Machines

- 1. Create Three or more Virtual Machine and assign resources.**
- 2. Install two or more Guest Operating Systems on all the VMs.**
- 3. Run simple applications or programs on all the VMs.**

INSTALLATION OF VMWare:

VMware Workstation Pro is the industry-standard desktop hypervisor for running virtual machines on Linux or Windows PCs.

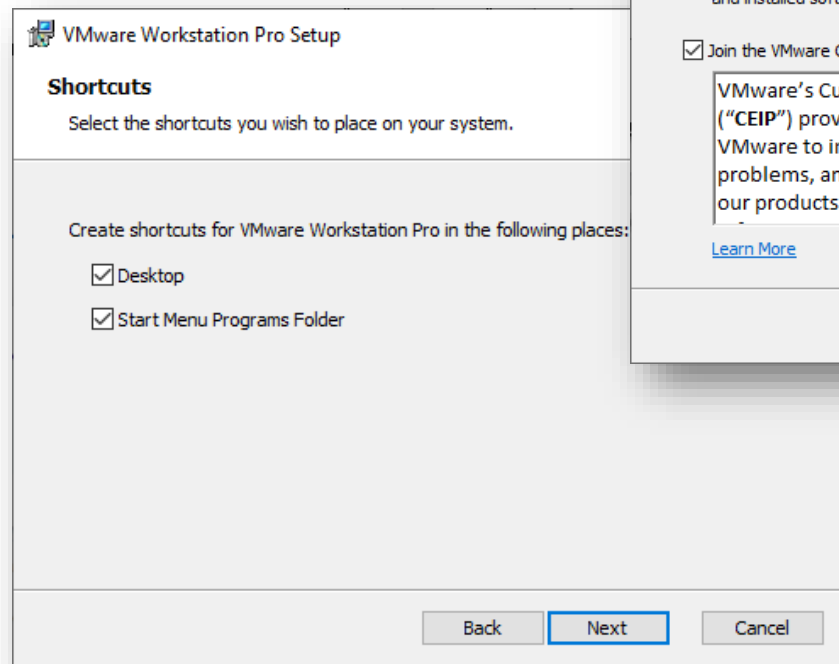
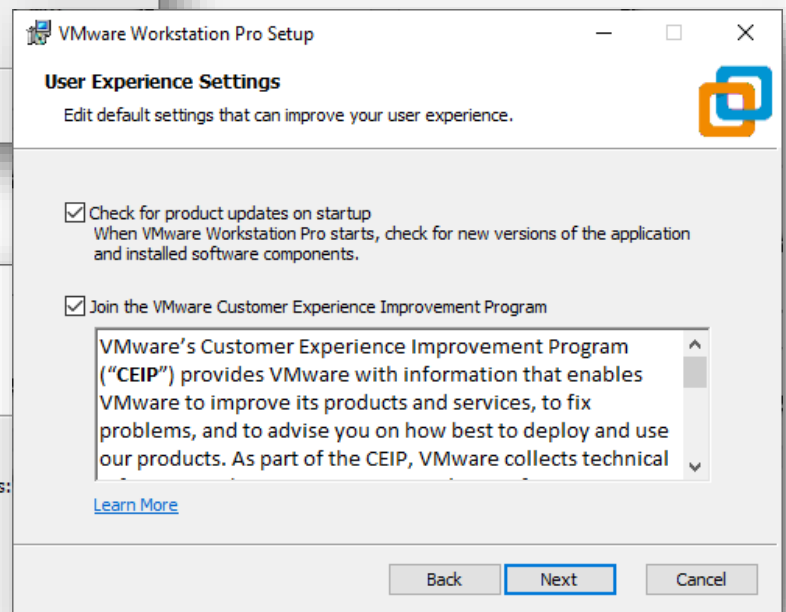
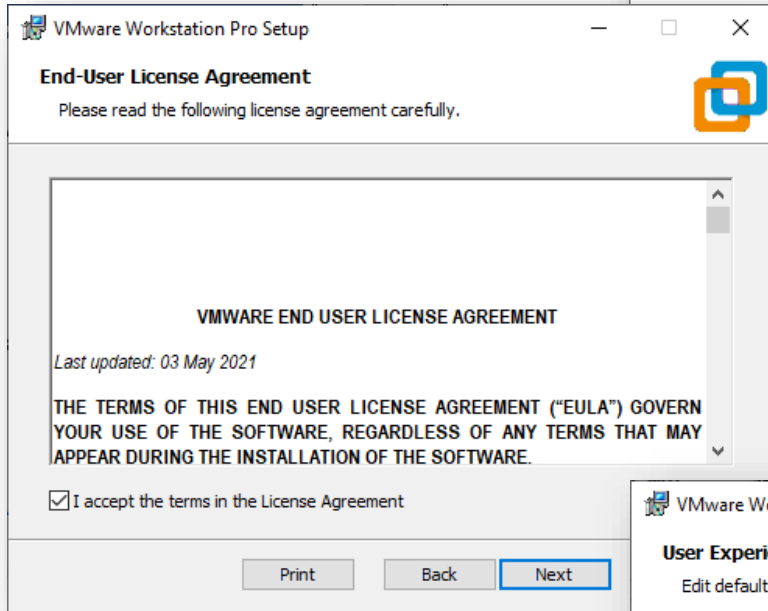
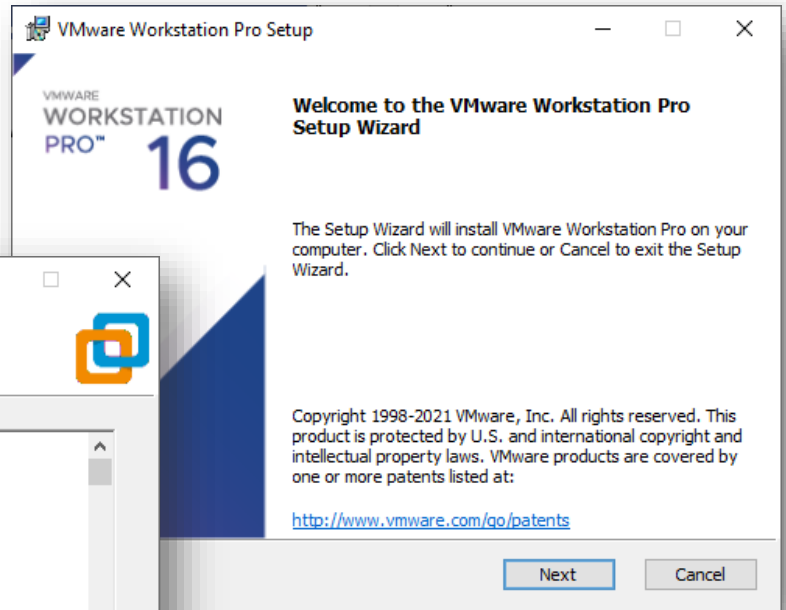
INSTALLATION STEPS:

1. Download VMware Workstation Pro from the website

→ Website Link: <https://www.vmware.com/in/products/workstationpro/workstation-proevaluation.html>

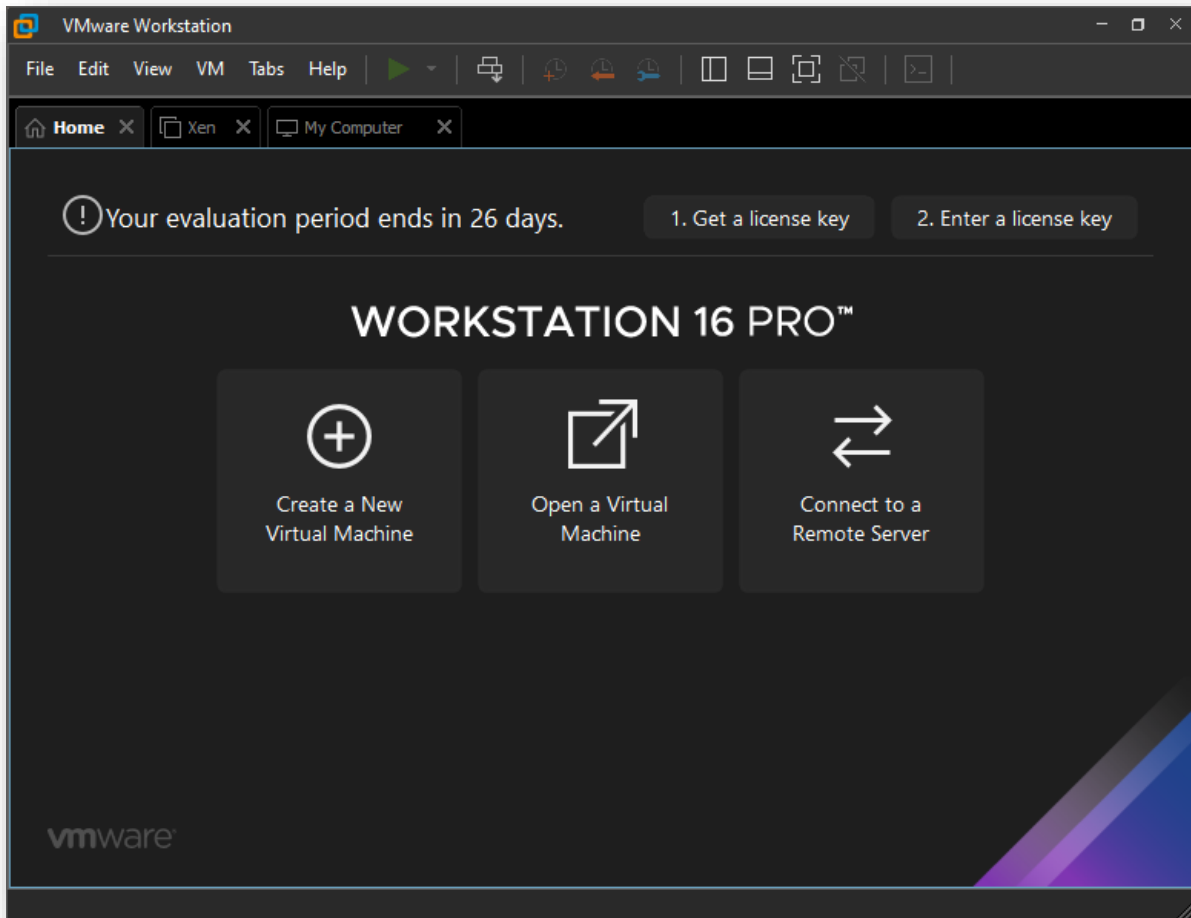


- Click on Workstation 16 Pro for Windows for the download to begin and open the file once downloaded and then click Next.
- Click on I accept the terms in License Agreement



- Click on Next and Next and finally click the Install button for the Installation to Begin

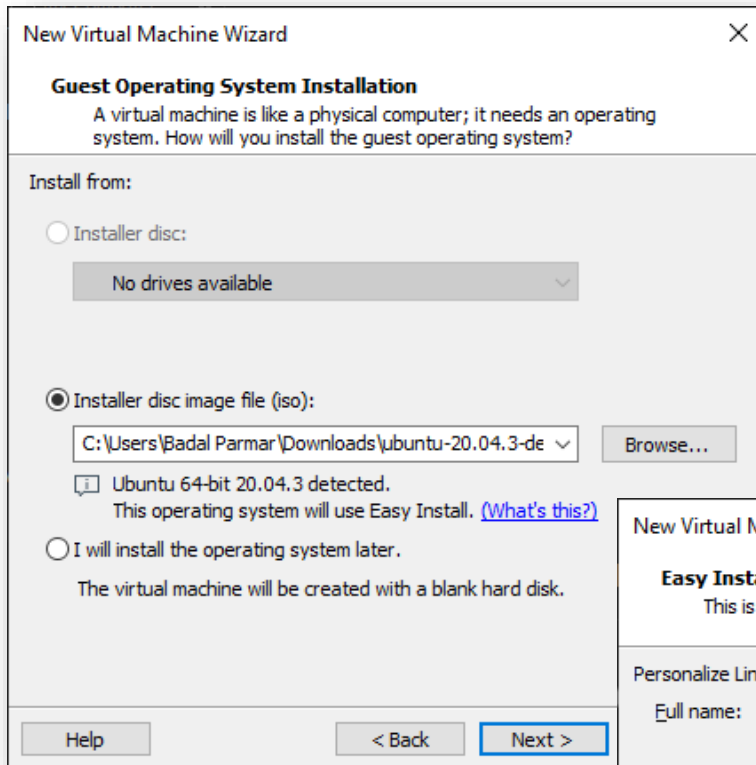
5. VMware Workstation interface will pop up and is ready to run, create a Virtual Machine to create your very first project.



6. Click on Create a New Virtual Machine to create a New Virtual Machine in VMware Workstation Pro and then further click on the **Typical (recommended)** part.



1. Ubuntu as Operating System in VMWare:



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:
No drives available

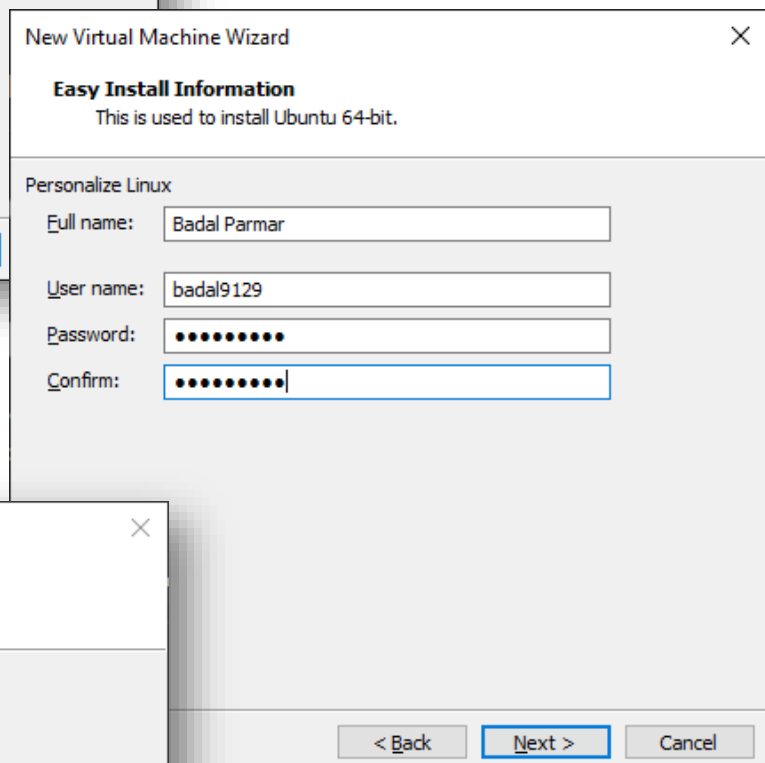
☒ Installer disc image file (iso):
C:\Users\Badal Parmar\Downloads\ubuntu-20.04.3-de [Browse...]
Ubuntu 64-bit 20.04.3 detected.
This operating system will use Easy Install. [\(What's this?\)](#)

☐ I will install the operating system later.
The virtual machine will be created with a blank hard disk.

Help < Back Next >

⇒ Click on the Installer Disc file (iso) and then select **Ubuntu ISO Image** from the system/laptop from the Browse Button.

Enter the personal details including Username, Password and Full Name.



New Virtual Machine Wizard

Easy Install Information
This is used to install Ubuntu 64-bit.

Personalize Linux

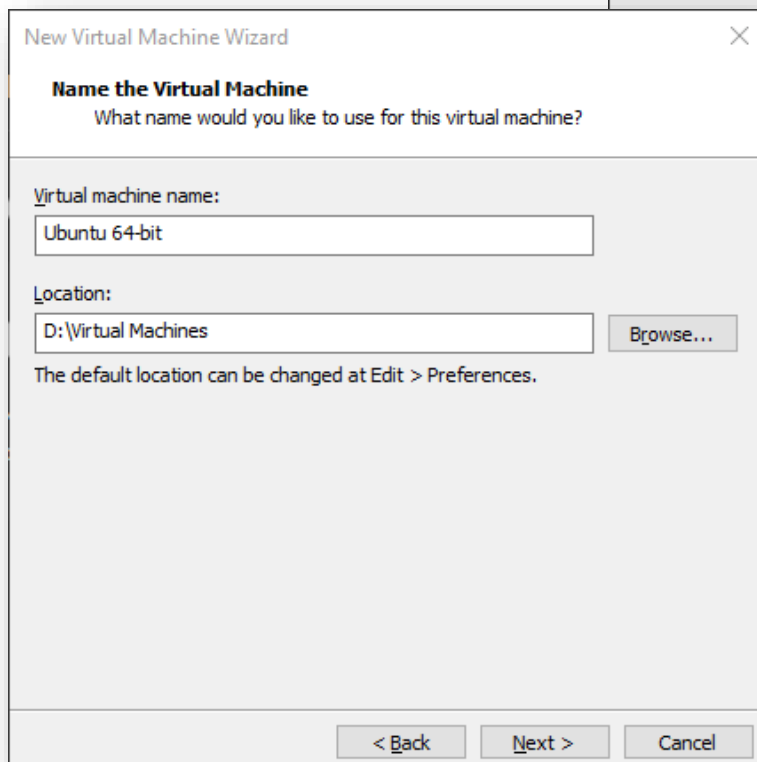
Full name: Badal Parmar

User name: badal9129

Password: [masked]

Confirm: [masked]

< Back Next > Cancel



New Virtual Machine Wizard

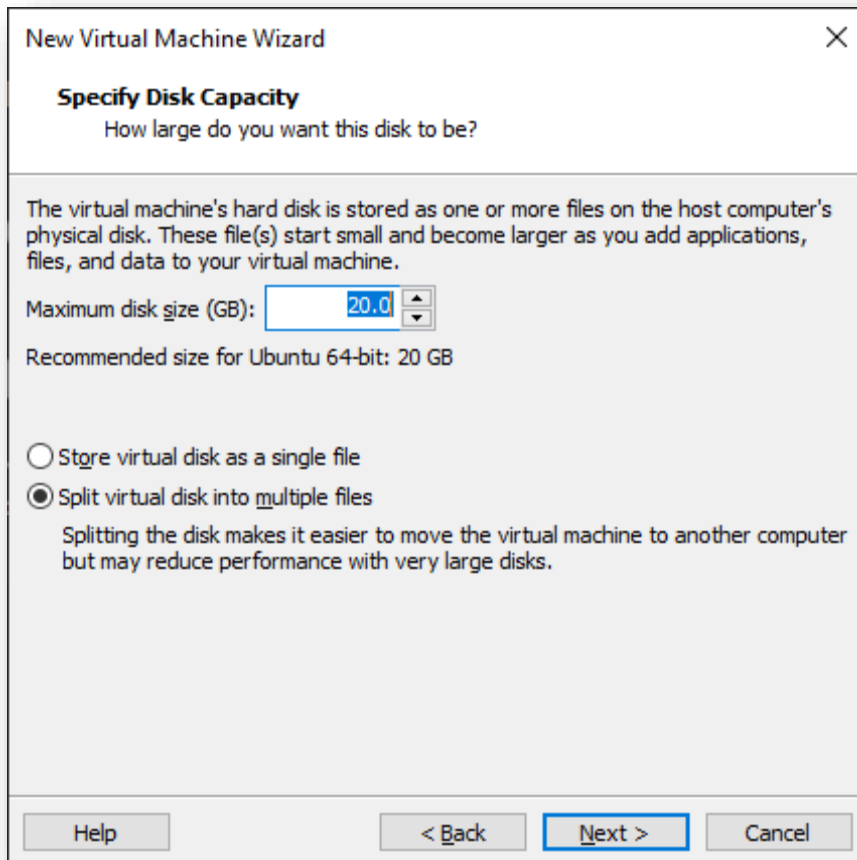
Name the Virtual Machine
What name would you like to use for this virtual machine?

Virtual machine name:
Ubuntu 64-bit

Location:
D:\Virtual Machines [Browse...]
The default location can be changed at Edit > Preferences.

< Back Next > Cancel

⇒ Name the Virtual Machine as Ubuntu and Click on next button.



New Virtual Machine Wizard

Specify Disk Capacity
How large do you want this disk to be?

The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine.

Maximum disk size (GB):

Recommended size for Ubuntu 64-bit: 20 GB

☐ Store virtual disk as a single file

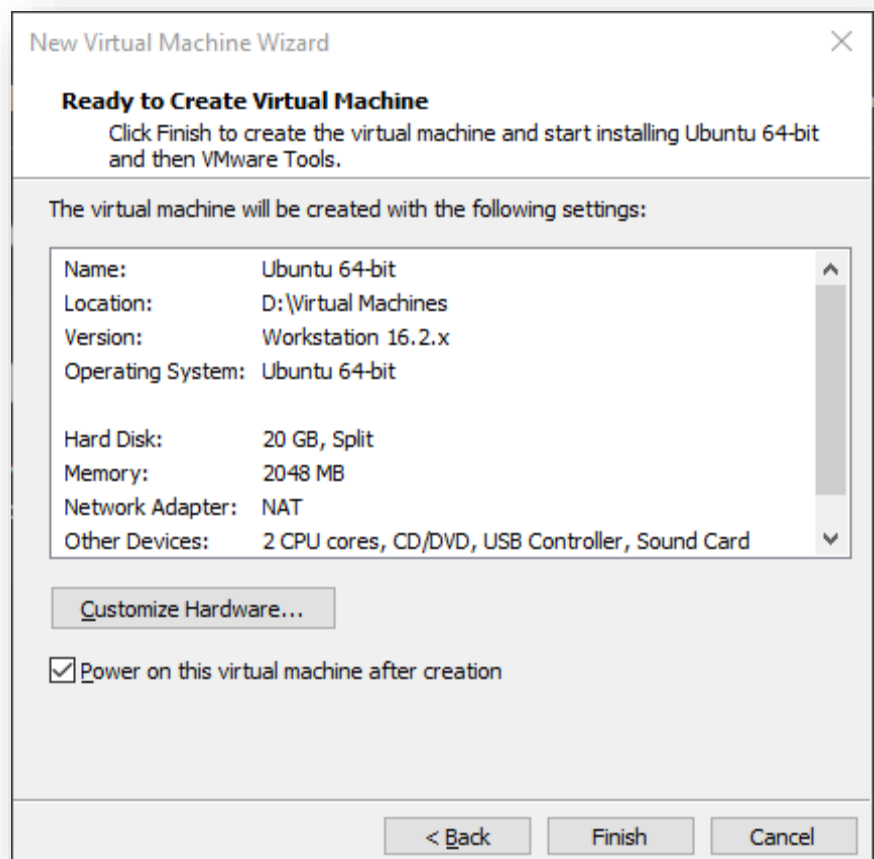
☒ Split virtual disk into multiple files

Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.

Help < Back Next > Cancel

⇒ **For Ubuntu Operating System installation, let the default settings remain on the current page and then Click Next**

⇒ **Click on Finish button**



New Virtual Machine Wizard

Ready to Create Virtual Machine
Click Finish to create the virtual machine and start installing Ubuntu 64-bit and then VMware Tools.

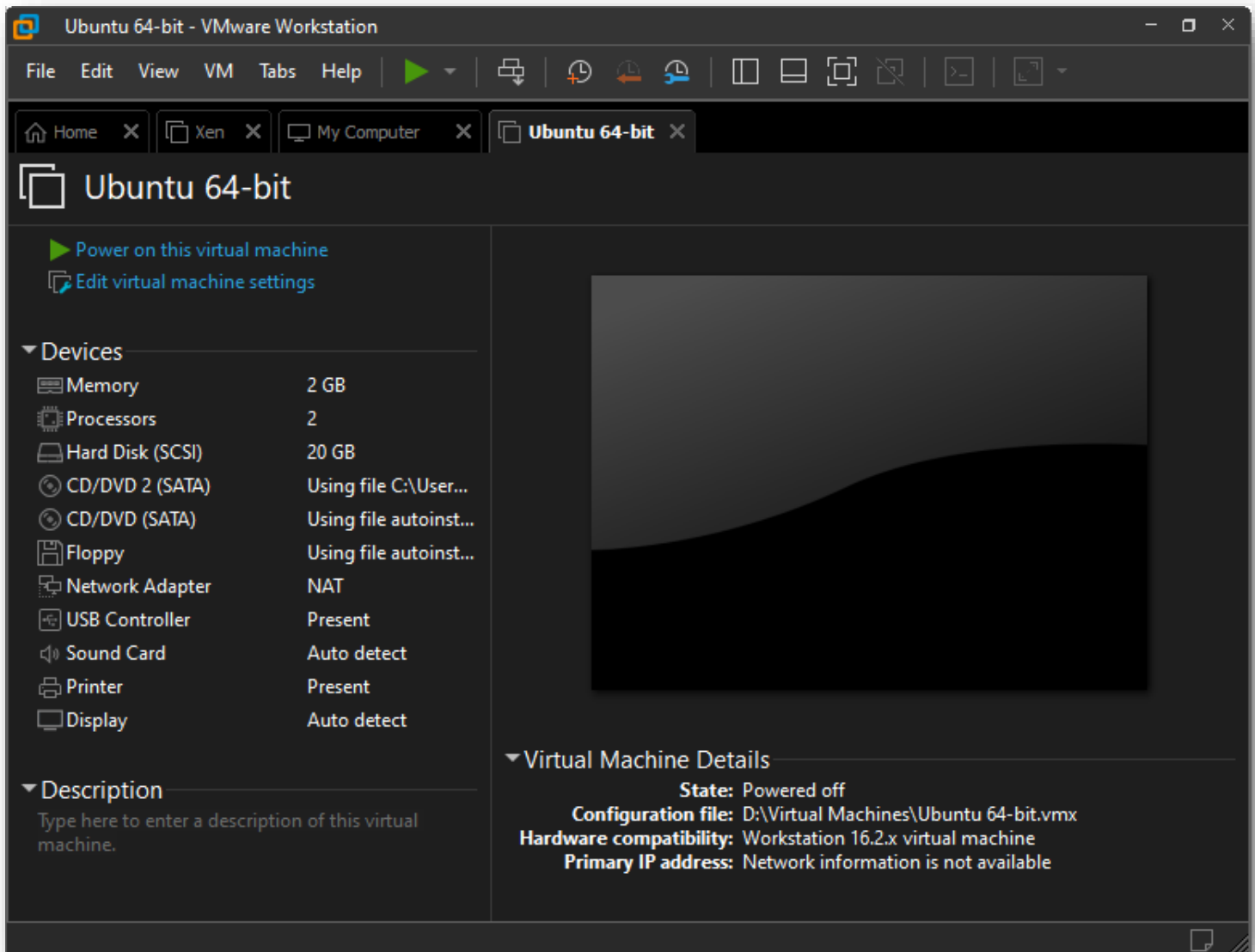
The virtual machine will be created with the following settings:

Name:	Ubuntu 64-bit
Location:	D:\Virtual Machines
Version:	Workstation 16.2.x
Operating System:	Ubuntu 64-bit
Hard Disk:	20 GB, Split
Memory:	2048 MB
Network Adapter:	NAT
Other Devices:	2 CPU cores, CD/DVD, USB Controller, Sound Card

Customize Hardware...

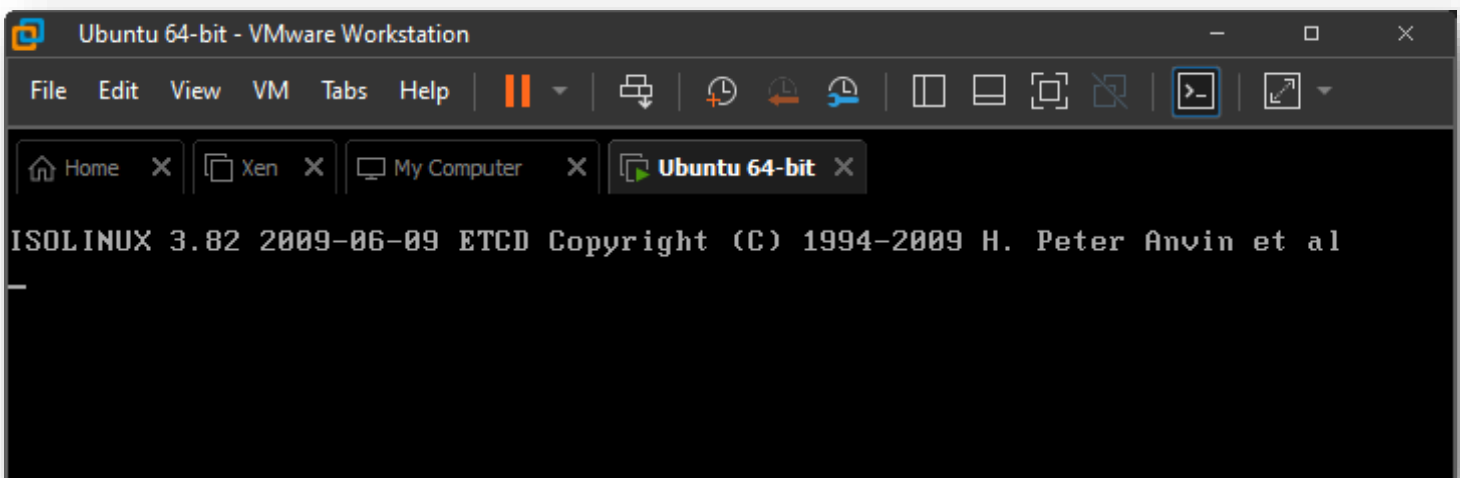
☒ Power on this virtual machine after creation

< Back Finish Cancel



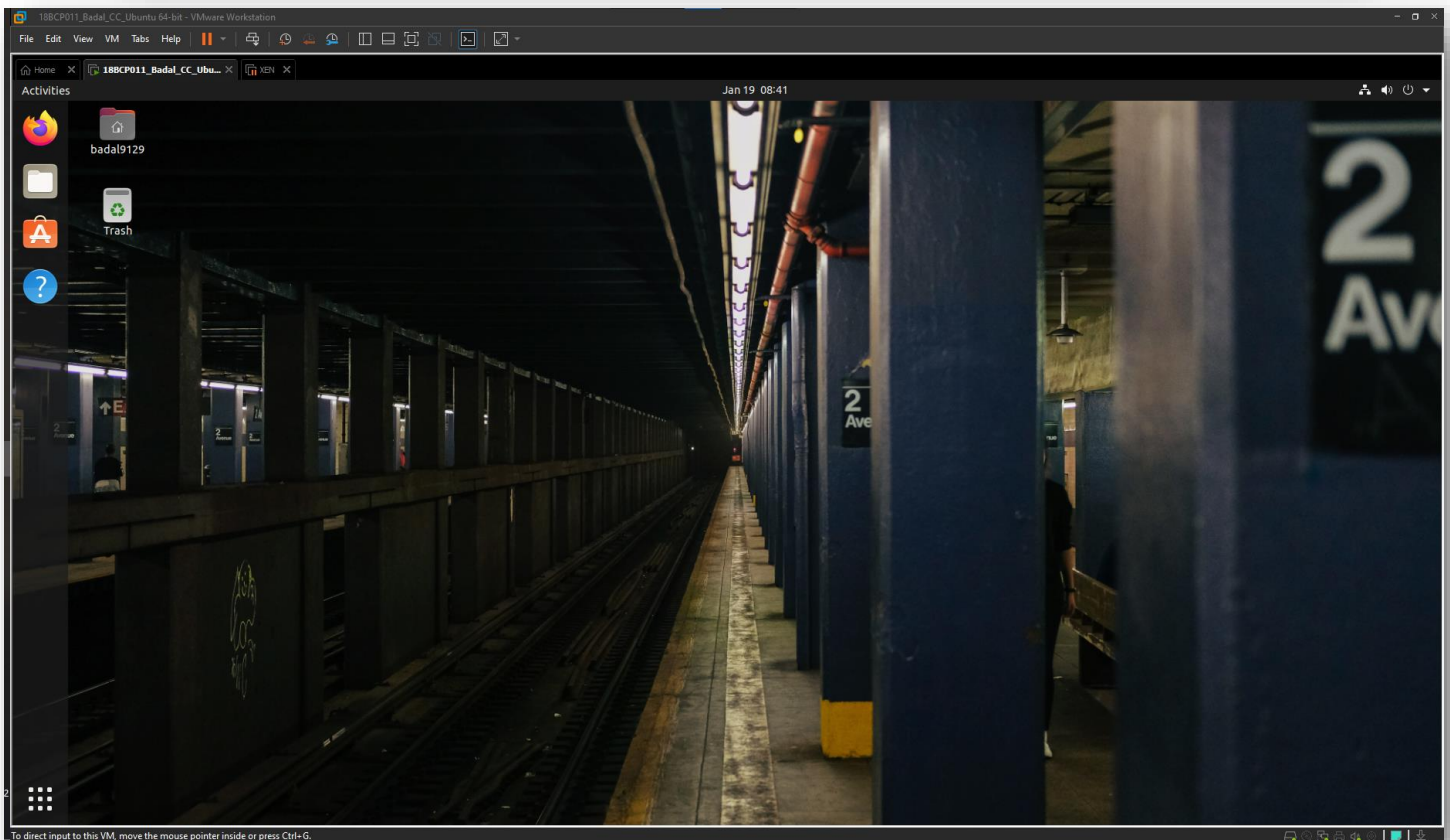
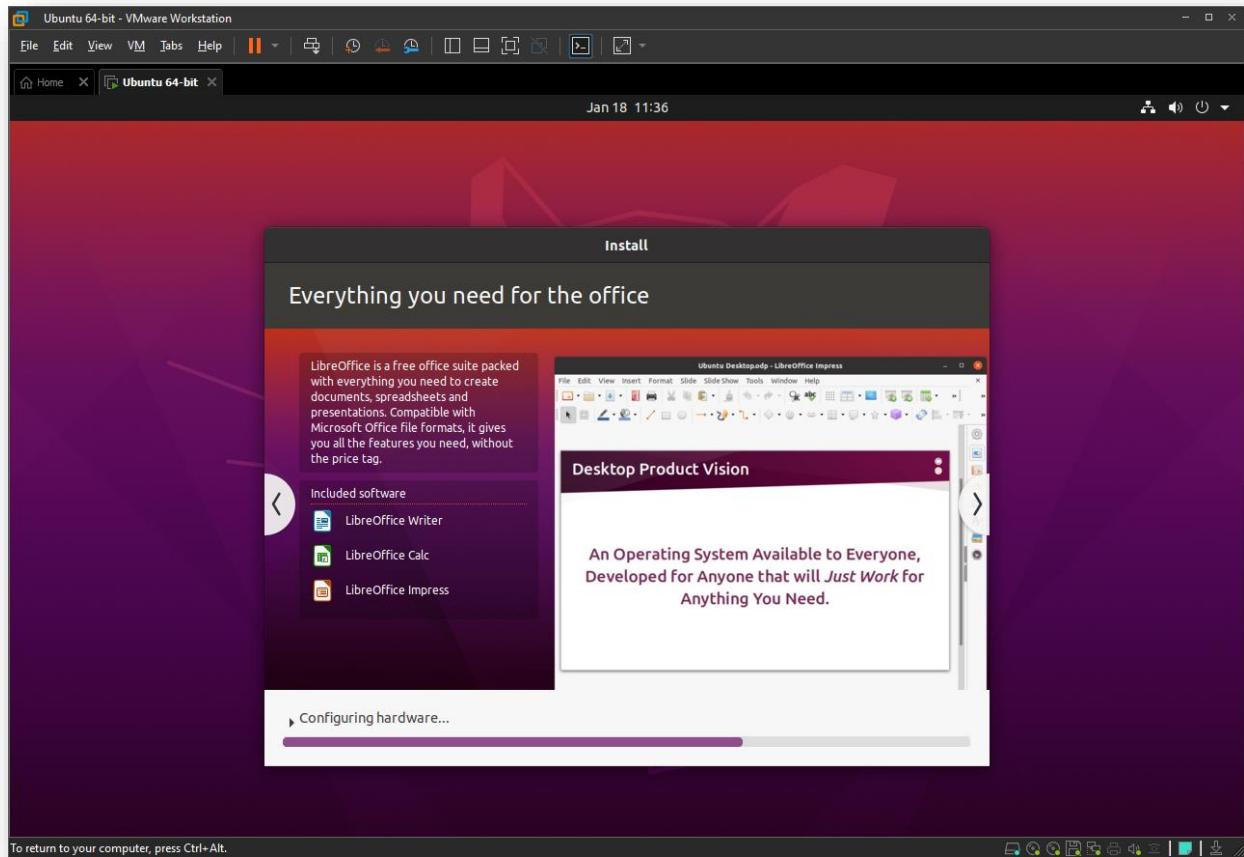
⇒ Virtual Machine for **Ubuntu Operating System** is now created as shown in the above image and then click on **Power on this virtual machine** option to turn on the **Virtual Machine**.

⇒ Ubuntu will start and the screen will be visible as shown in the image below.



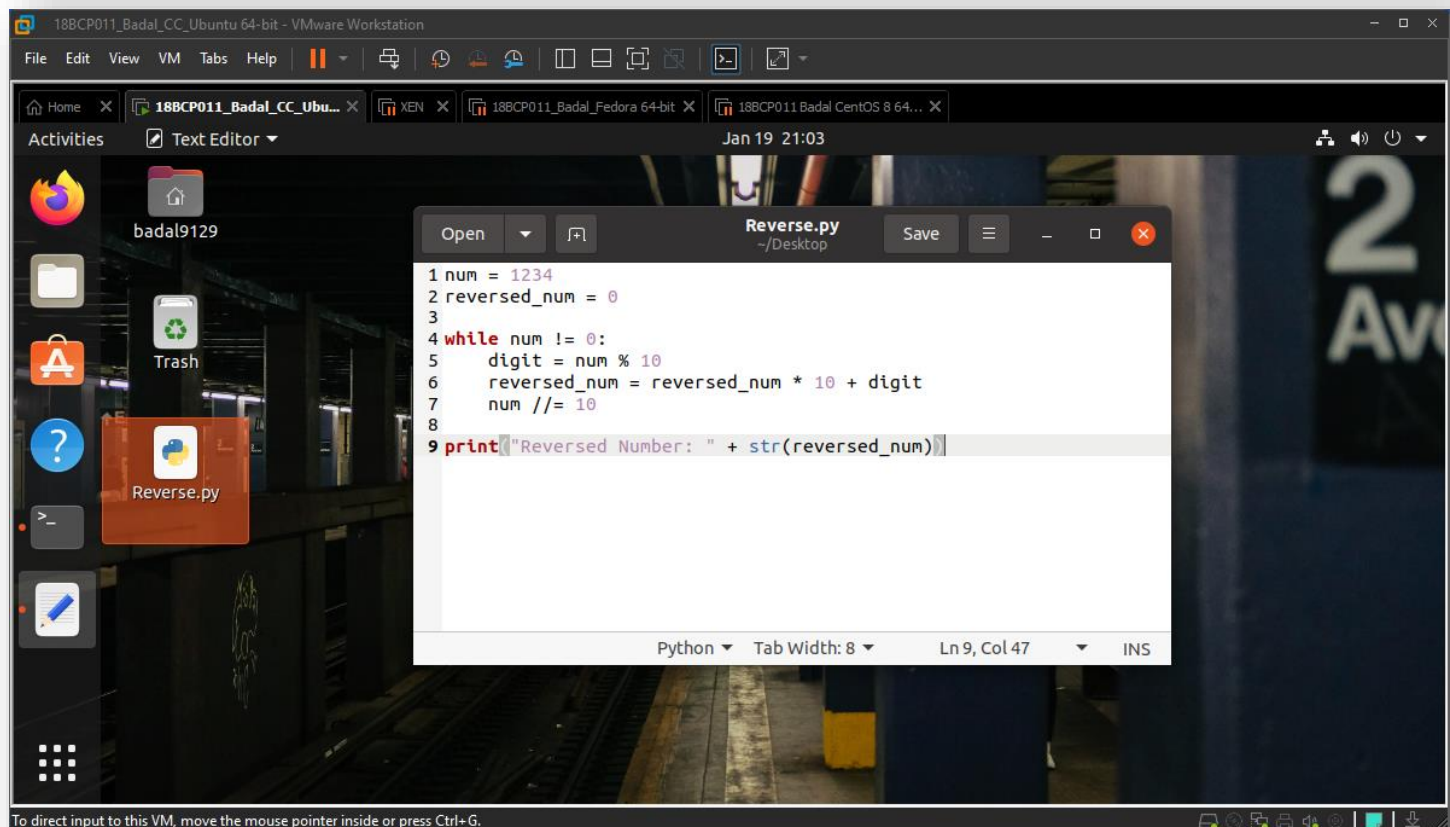
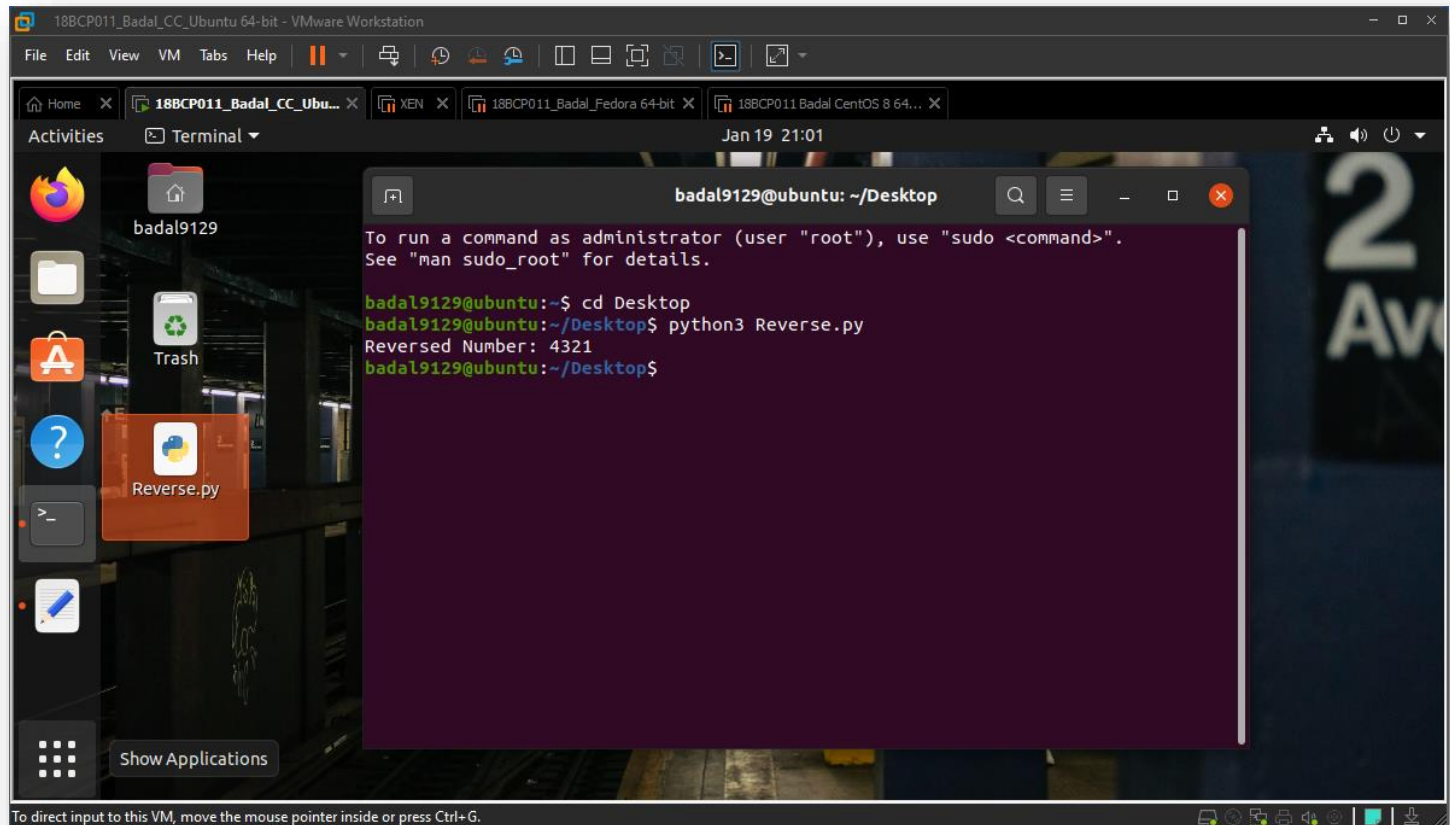
⇒ User Interface of Ubuntu 64-bit will be display as shown in the figures below

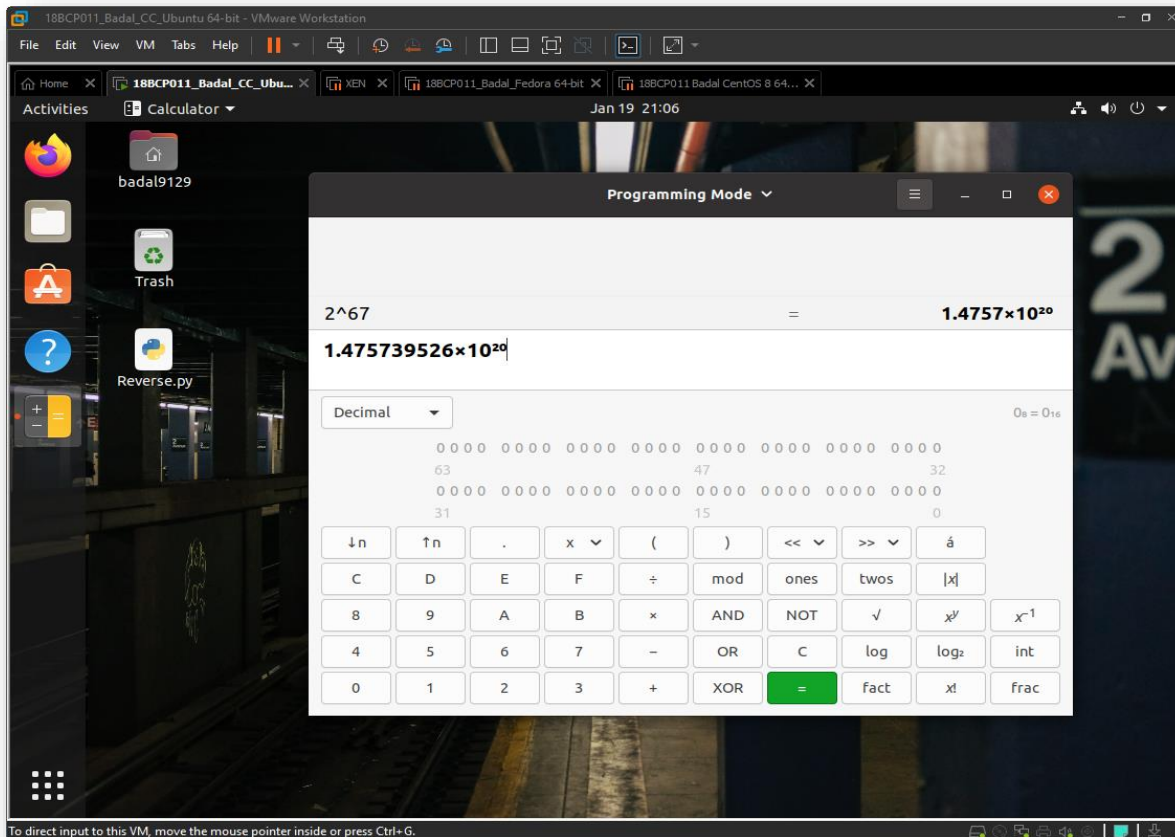
- Figure 1 displays the configuring of Ubuntu 64 bit.
- Figure 2 displays the UI of **18BCP011_Badal_CC_Ubuntu 64-bit**.



Running Simple Applications/Programs in Ubuntu Virtual Machine.

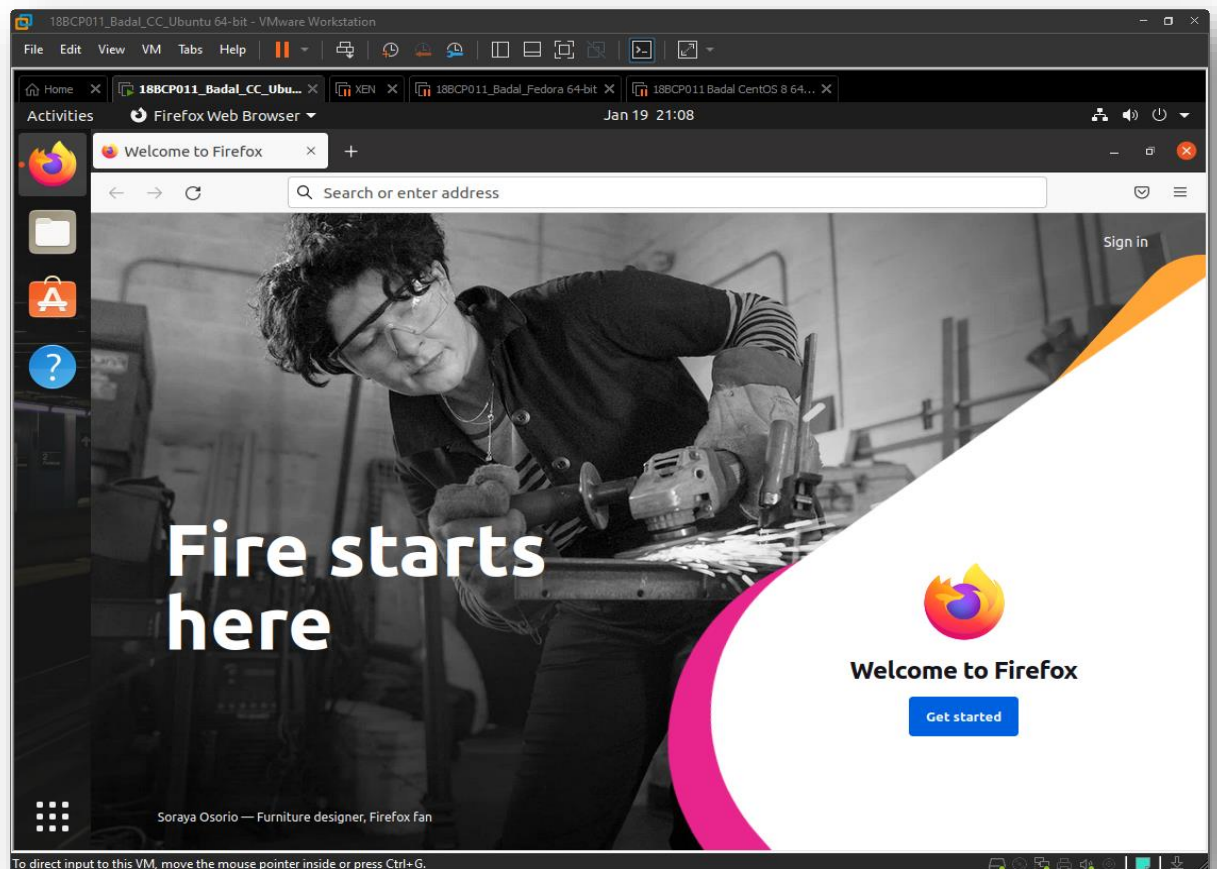
⇒ Figure below shows the Text Editor & Terminal running python code for reversing a number.



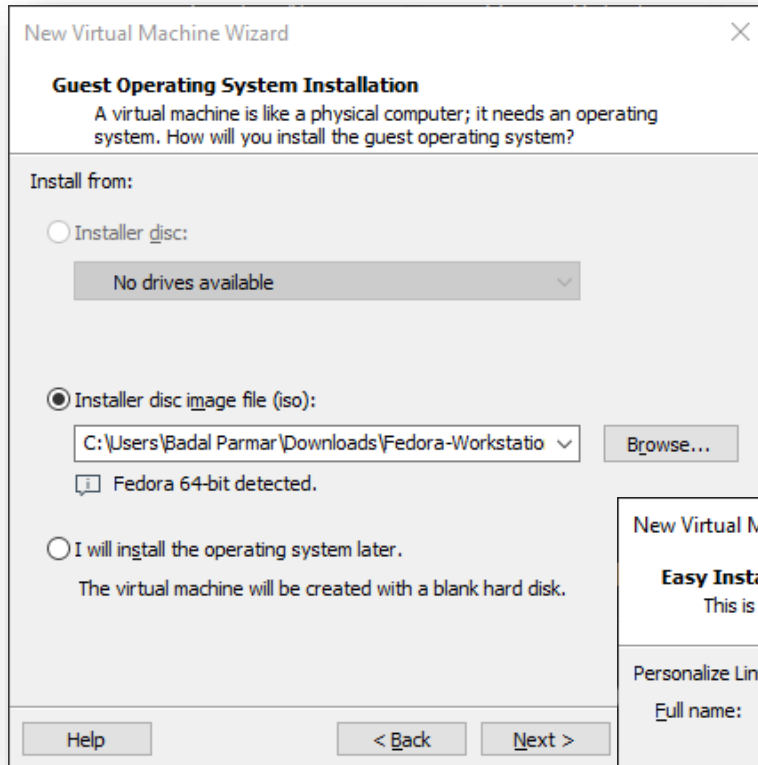


⇒ **Figure 1. Shows the working of Calculator in Programming mode in Ubuntu Virtual Machine.**

⇒ **Figure 2. Shows the UI of Firefox beginning page in Ubuntu Virtual Machine.**



2. Fedora-OS as Operating System in VMWare:



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:

No drives available

☒ Installer disc image file (iso):

C:\Users\Badal Parmar\Downloads\Fedora-Workstation
Browse...

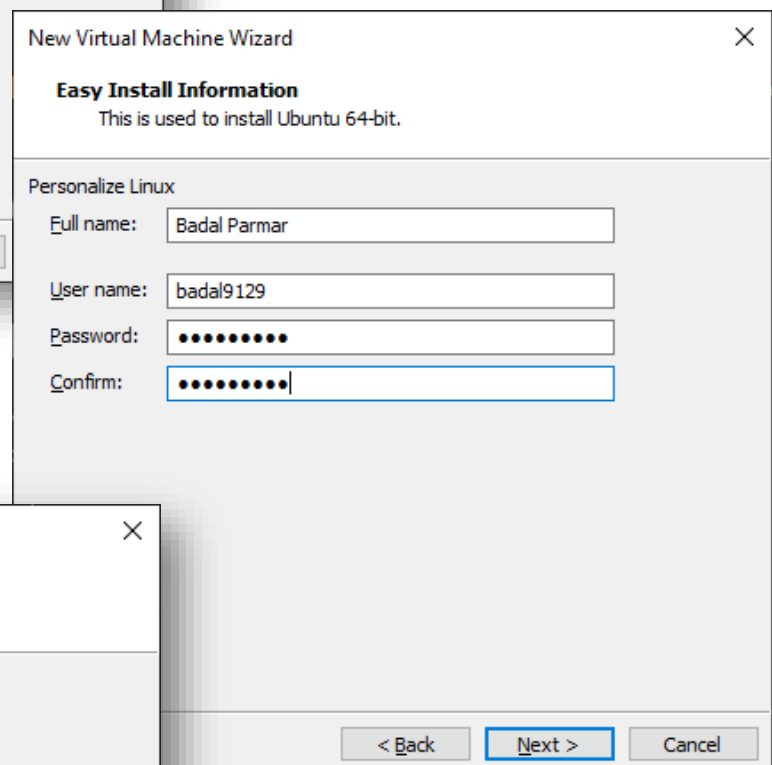
Fedora 64-bit detected.

☐ I will install the operating system later.
The virtual machine will be created with a blank hard disk.

Help < Back Next >

⇒ Click on the Installer Disc file (iso) and then select **Fedora-OS 64-bit ISO Image** from the system/laptop from the Browse Button.

Enter the personal details including Username, Password and Full Name.



New Virtual Machine Wizard

Easy Install Information
This is used to install Ubuntu 64-bit.

Personalize Linux

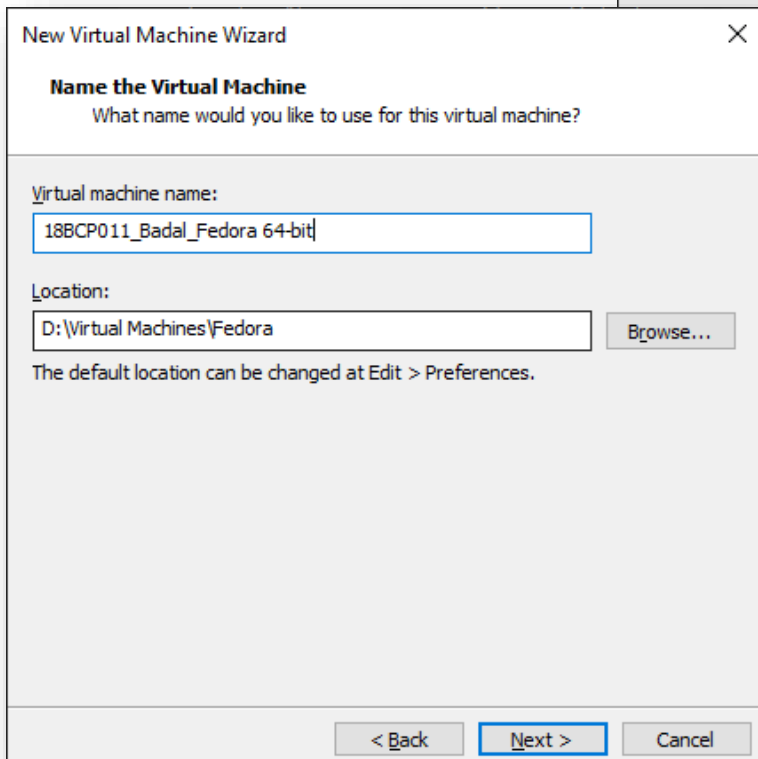
Full name: Badal Parmar

User name: badal9129

Password:

Confirm:

< Back Next > Cancel



New Virtual Machine Wizard

Name the Virtual Machine
What name would you like to use for this virtual machine?

Virtual machine name:

18BCP011_Badal_Fedora 64-bit

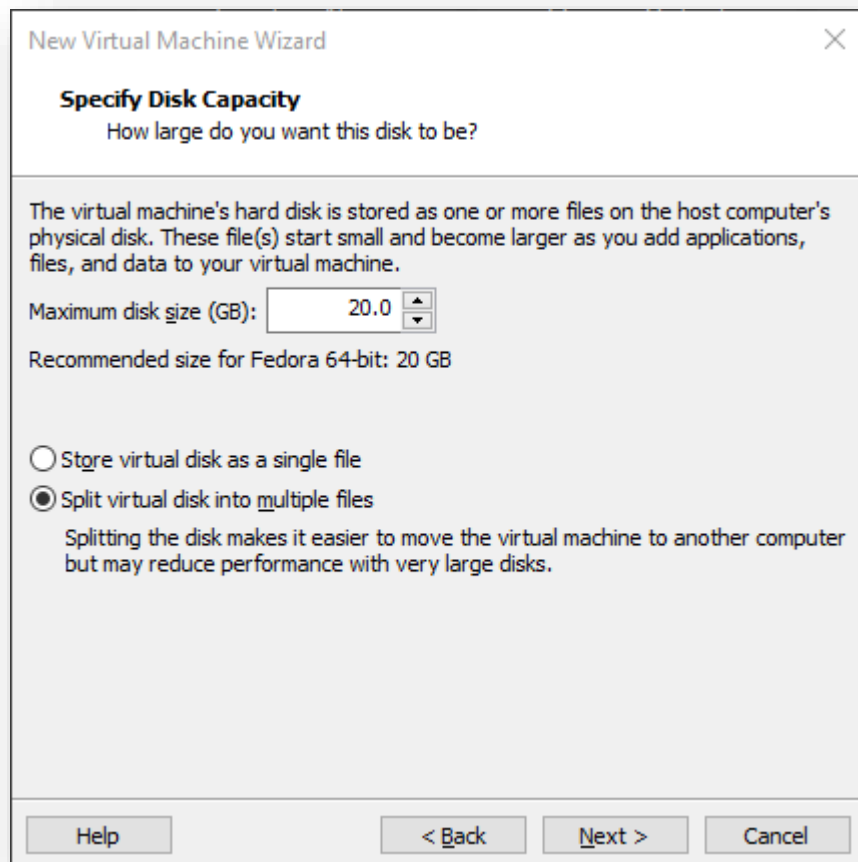
Location:

D:\Virtual Machines\Fedora
Browse...

The default location can be changed at Edit > Preferences.

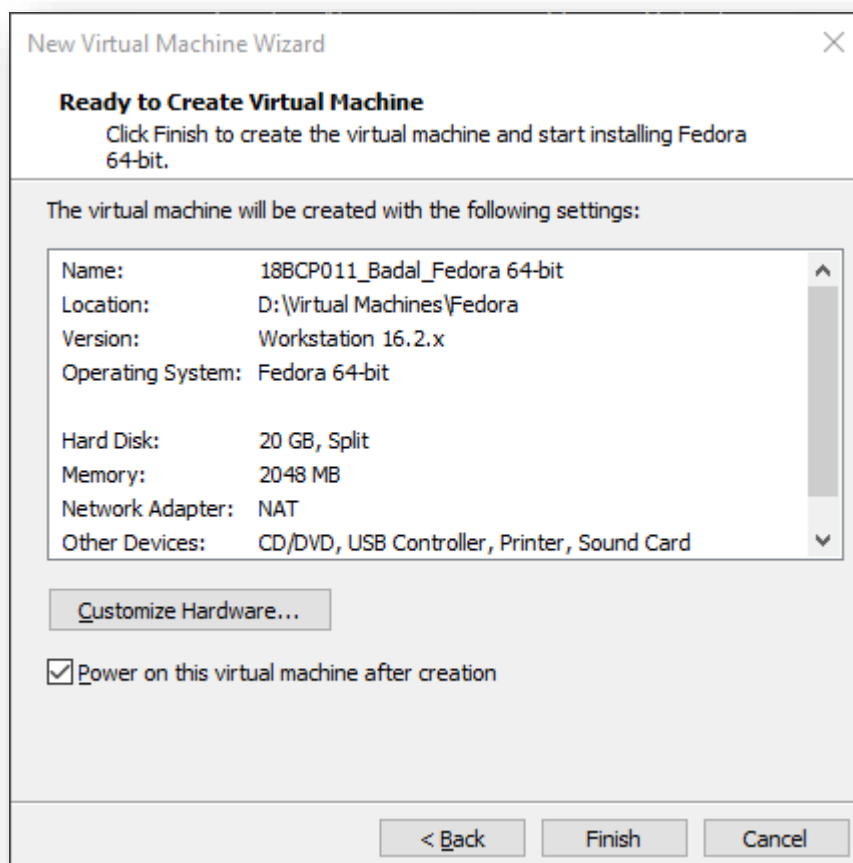
< Back Next > Cancel

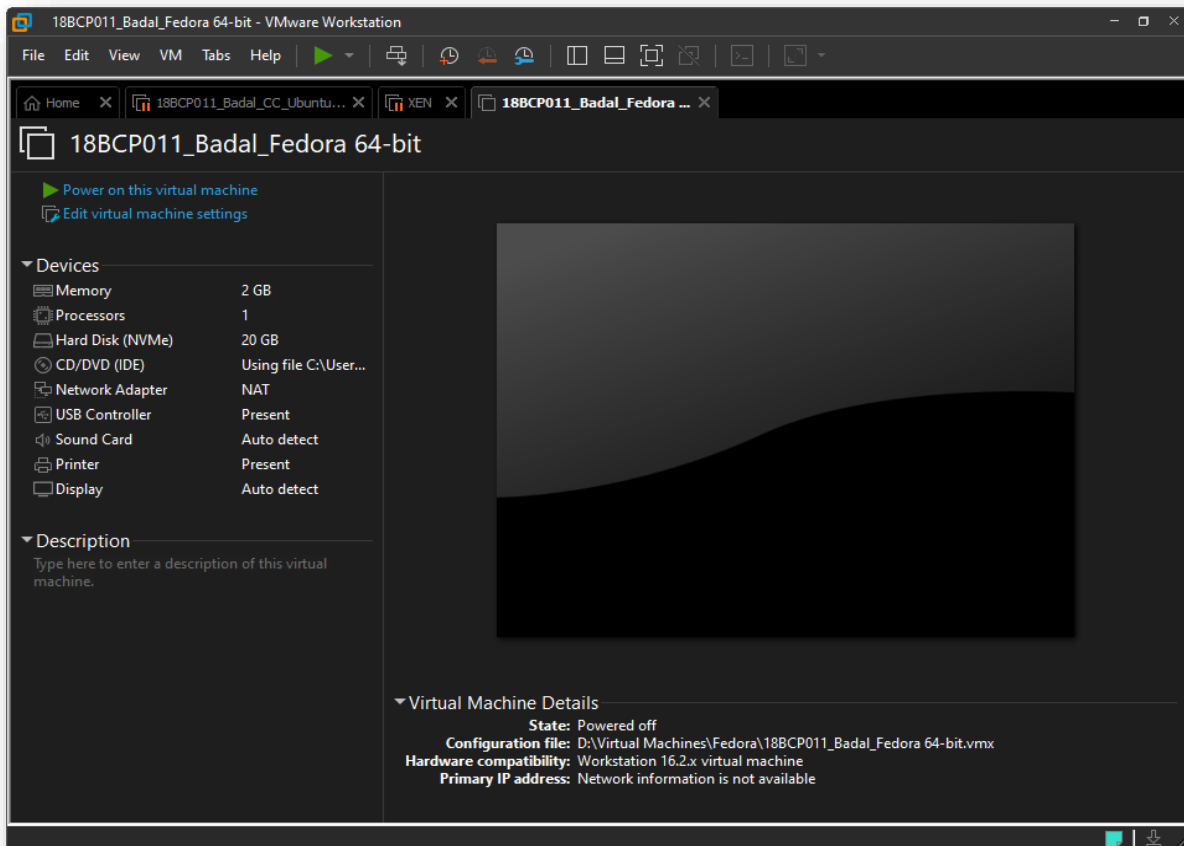
⇒ Name the Virtual Machine as Ubuntu and Click on next button.



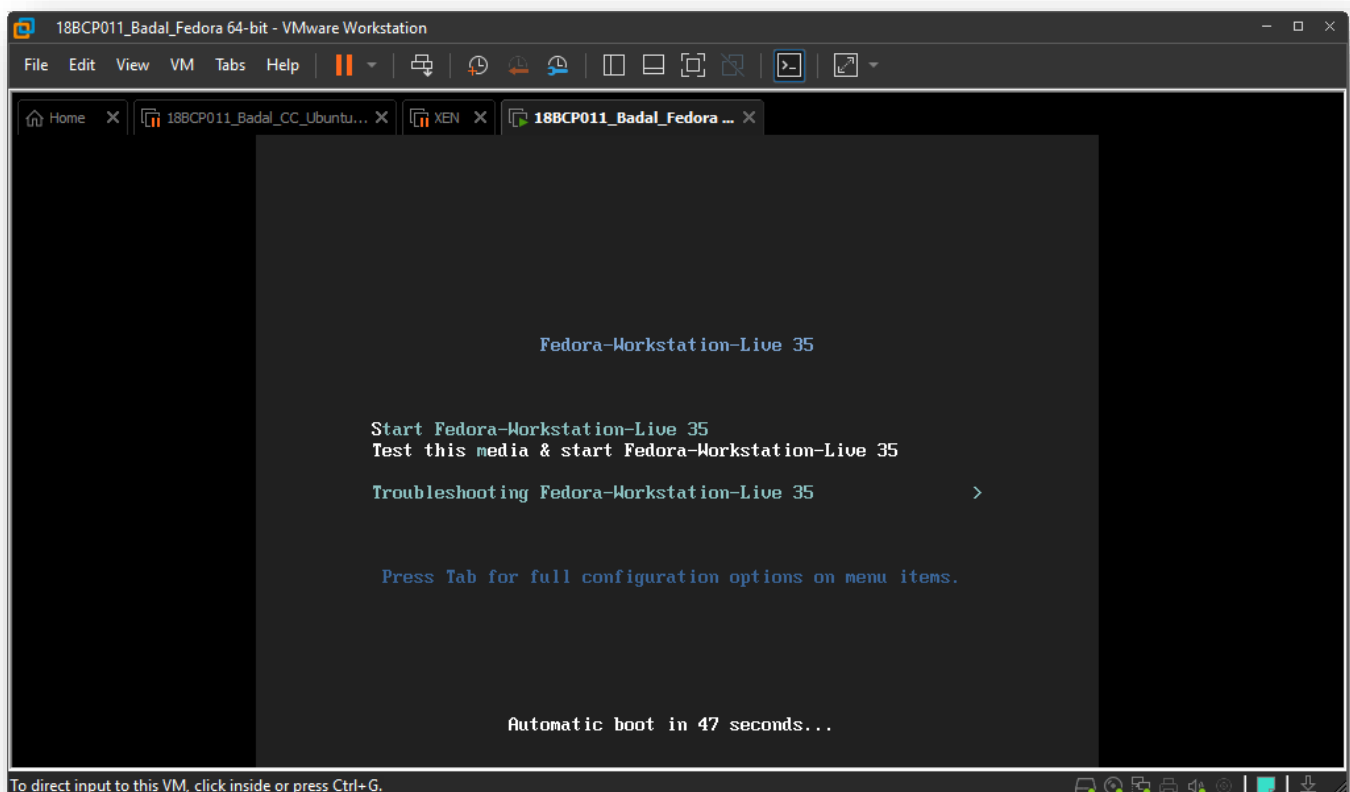
⇒ **For Fedora 64-bit Operating System installation, let the default settings remain on the current page and then Click Next**

⇒ **Click on Finish button**



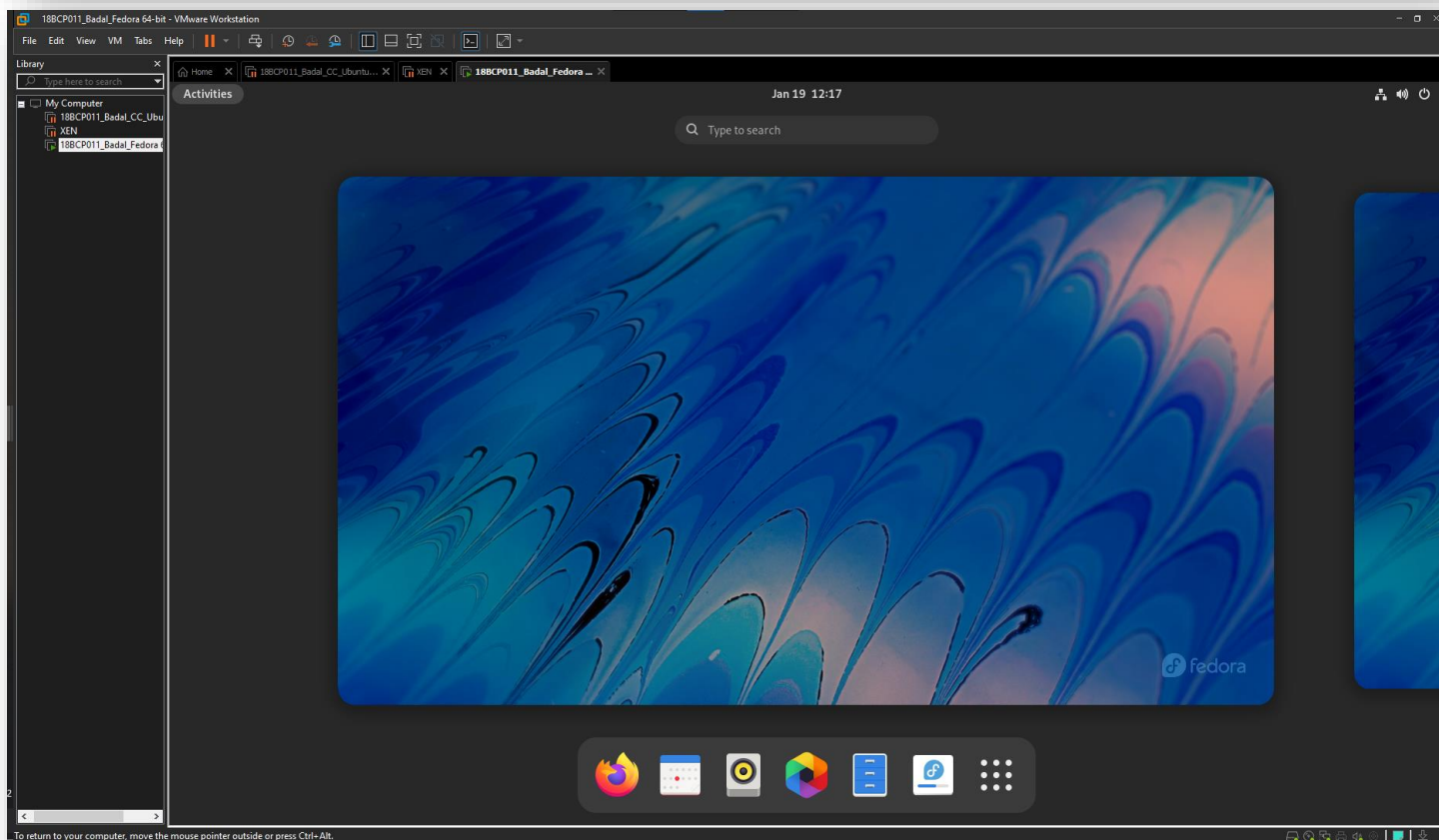
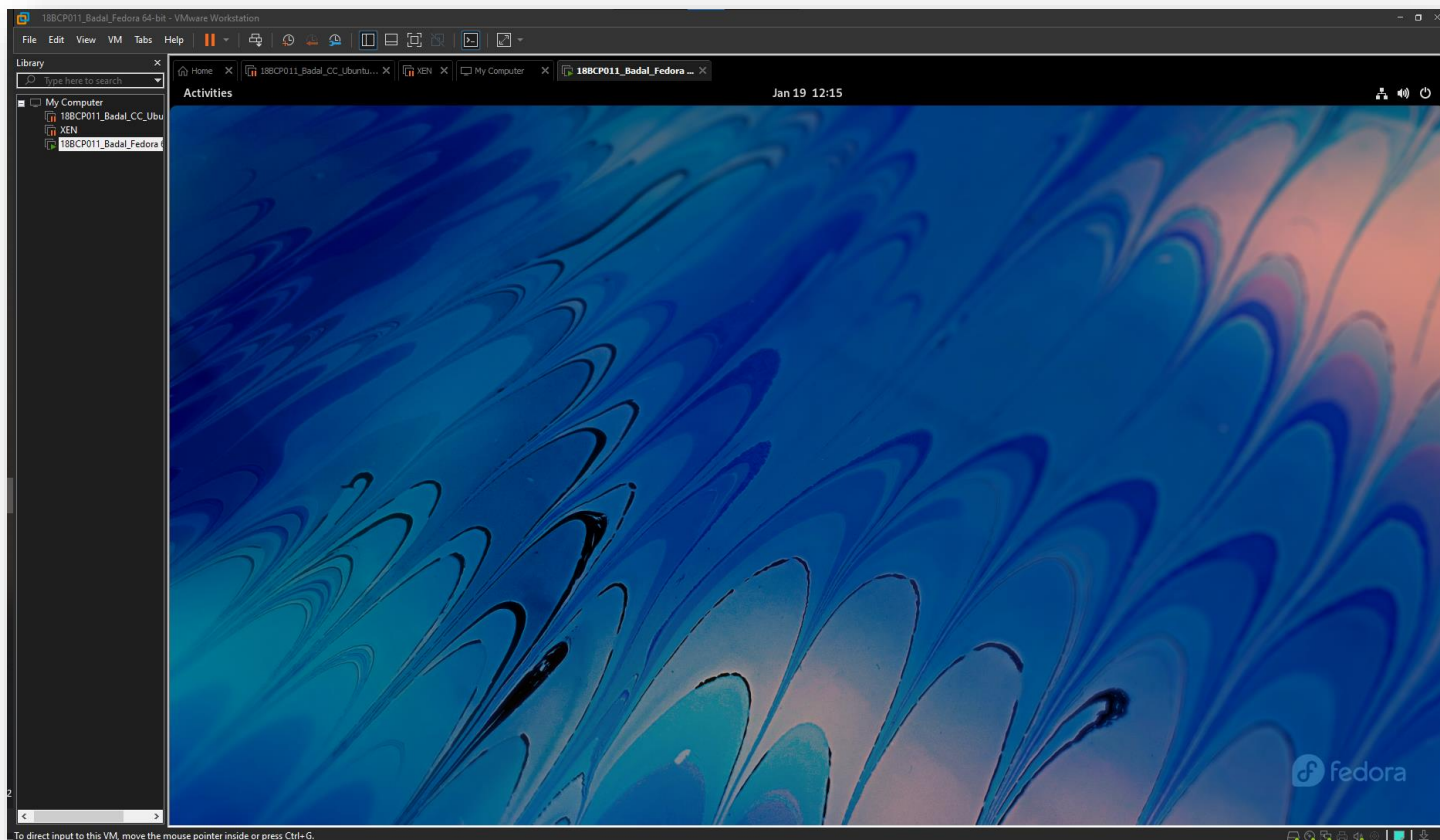


- ⇒ Virtual Machine for **Fedora Operating System** is now created as shown in the above image and then click on **Power on this virtual machine** option to turn on the **Virtual Machine**.
- ⇒ Fedora will start and the screen will be visible as shown in the image below.



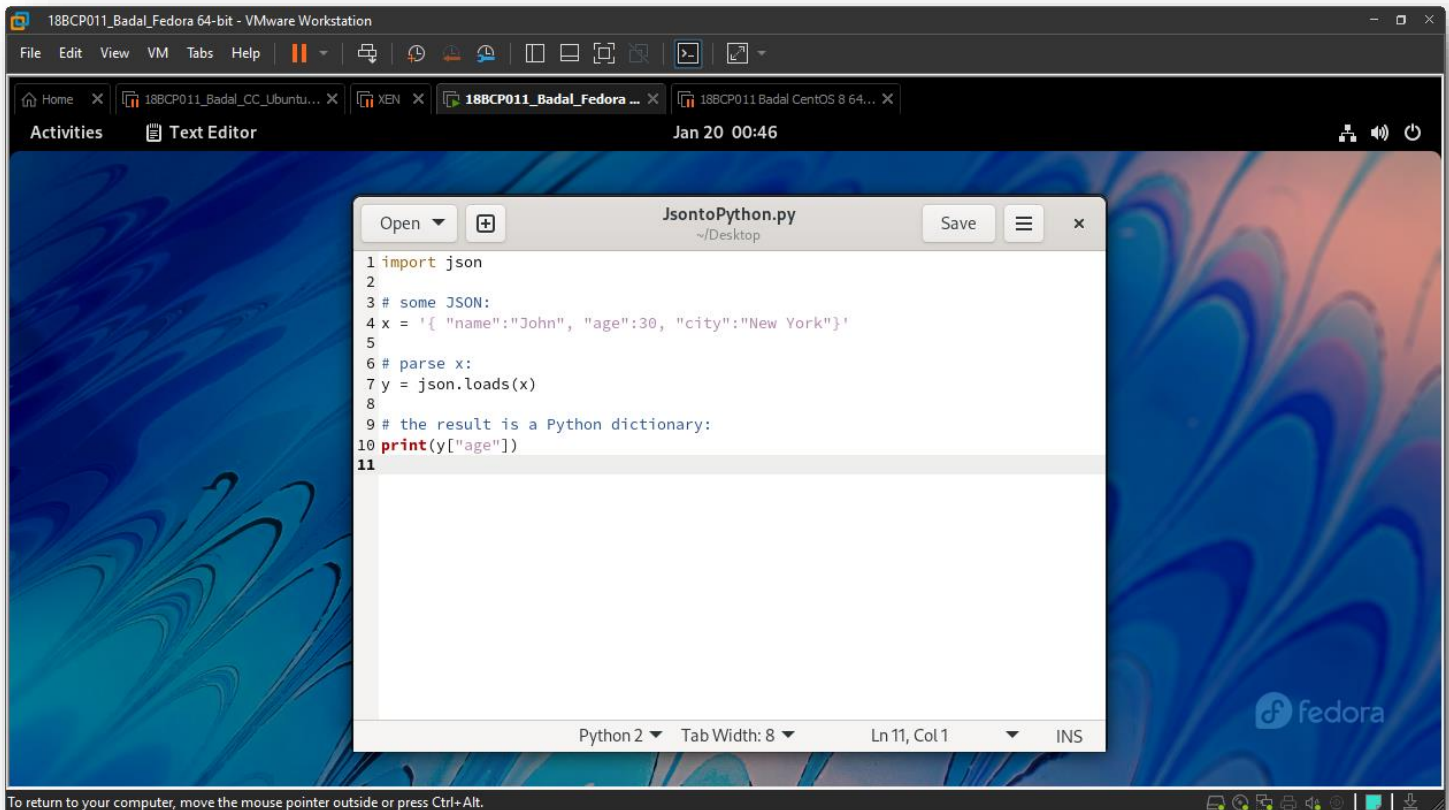
⇒ User Interface of Fedora 64-bit will be display as shown in the figures below

- Figure 1 displays the configuring of Fedora 64 bit.
- Figure 2 displays the UI of **18BCP011_Badal_CC_Fedora 64-bit**.



Running Simple Applications/Programs in Fedora-OS Virtual Machine.

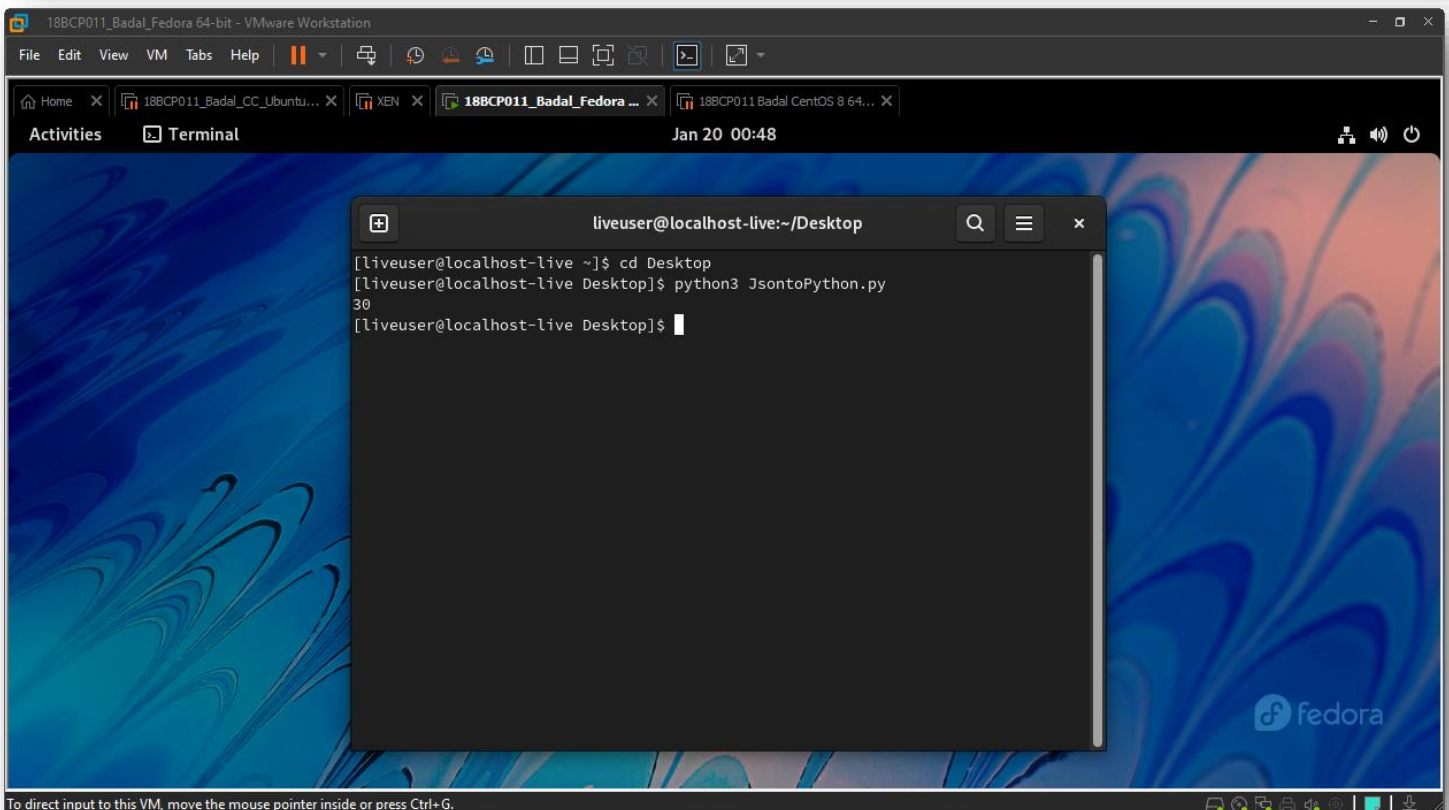
⇒ Figure below shows the Text Editor & Terminal running python code for Json to Python.



The screenshot shows a VMware Workstation window titled "18BCP011_Badal_Fedora 64-bit - VMware Workstation". The desktop environment is Fedora Linux, with a blue and red marbled background. The top panel shows the "Activities" menu and the "Text Editor" application. The text editor window, titled "JsontoPython.py", contains the following Python code:

```
1 import json
2
3 # some JSON:
4 x = '{ "name":"John", "age":30, "city":"New York"}'
5
6 # parse x:
7 y = json.loads(x)
8
9 # the result is a Python dictionary:
10 print(y["age"])
11
```

The status bar at the bottom of the text editor indicates "Python 2", "Tab Width: 8", "Ln 11, Col 1", and "INS". A message at the bottom of the VM window reads: "To return to your computer, move the mouse pointer outside or press Ctrl+Alt."

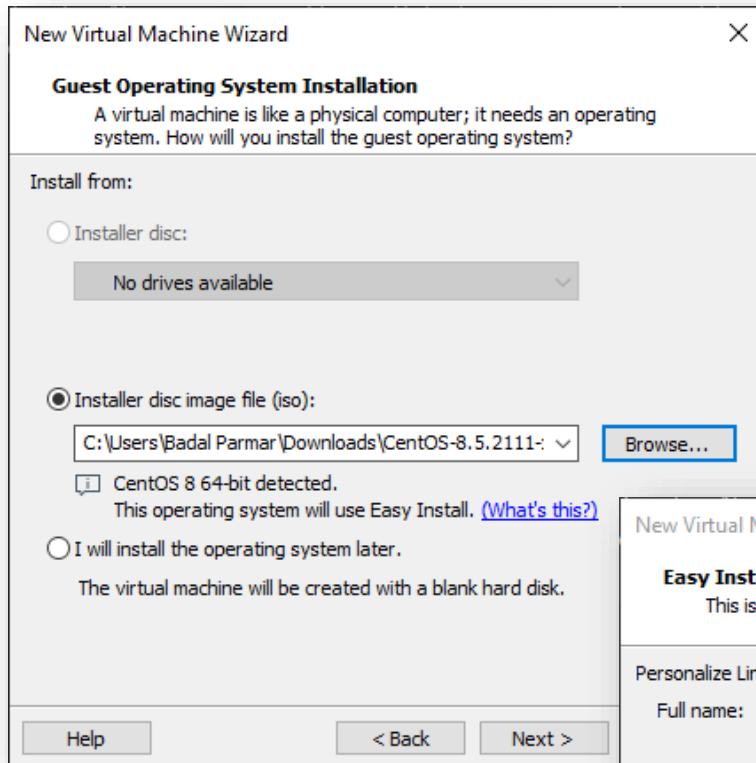


The screenshot shows the same Fedora VM desktop, but now the "Terminal" application is open. The terminal window, titled "liveuser@localhost-live:~/Desktop", displays the following commands and output:

```
[liveuser@localhost-live ~]$ cd Desktop
[liveuser@localhost-live Desktop]$ python3 JsontoPython.py
30
[liveuser@localhost-live Desktop]$
```

The status bar at the bottom of the VM window reads: "To direct input to this VM, move the mouse pointer inside or press Ctrl+G."

3. CentOS as Operating System in VMWare:



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:
No drives available

☒ Installer disc image file (iso):
C:\Users\Badal Parmar\Downloads\CentOS-8.5.2111-... Browse...

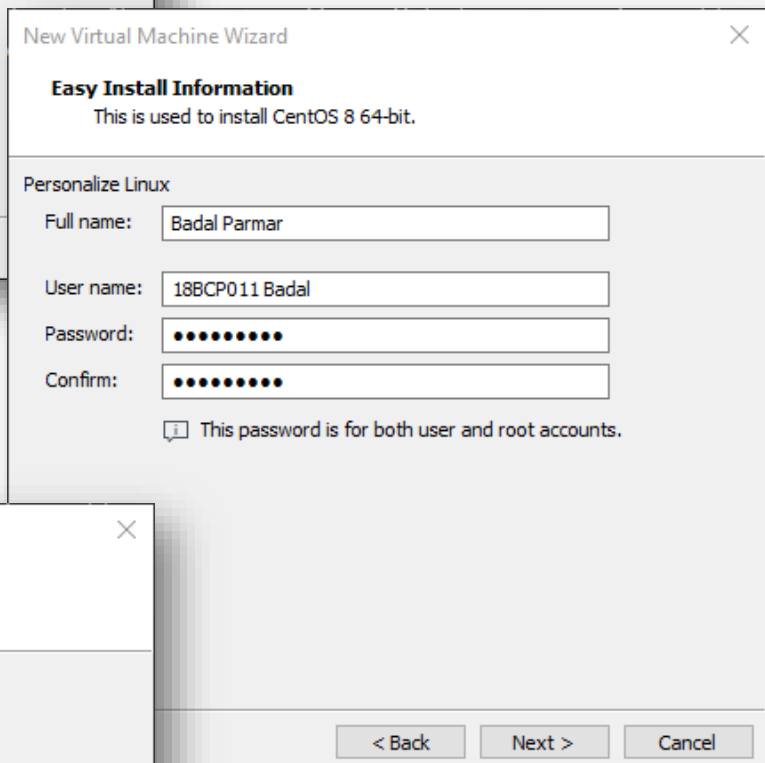
☐ CentOS 8 64-bit detected.
This operating system will use Easy Install. [\(What's this?\)](#)

☐ I will install the operating system later.
The virtual machine will be created with a blank hard disk.

Help < Back Next >

⇒ Click on the Installer Disc file (iso) and then select **Cent-OS ISO Image** from the system/laptop from the Browse Button.

Enter the personal details including Username, Password and Full Name.



New Virtual Machine Wizard

Easy Install Information
This is used to install CentOS 8 64-bit.

Personalize Linux

Full name: Badal Parmar

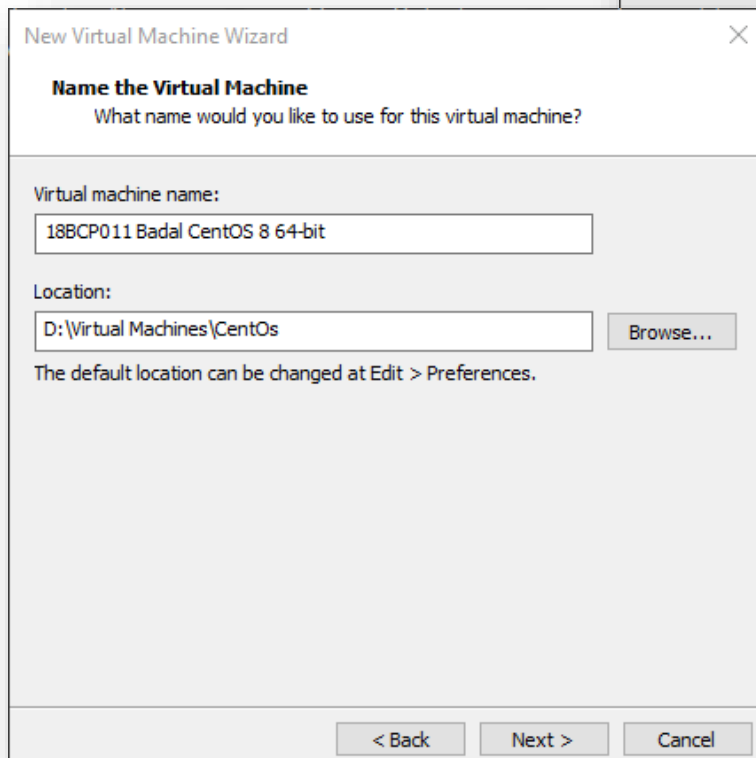
User name: 18BCP011 Badal

Password:

Confirm:

☐ This password is for both user and root accounts.

< Back Next > Cancel



New Virtual Machine Wizard

Name the Virtual Machine
What name would you like to use for this virtual machine?

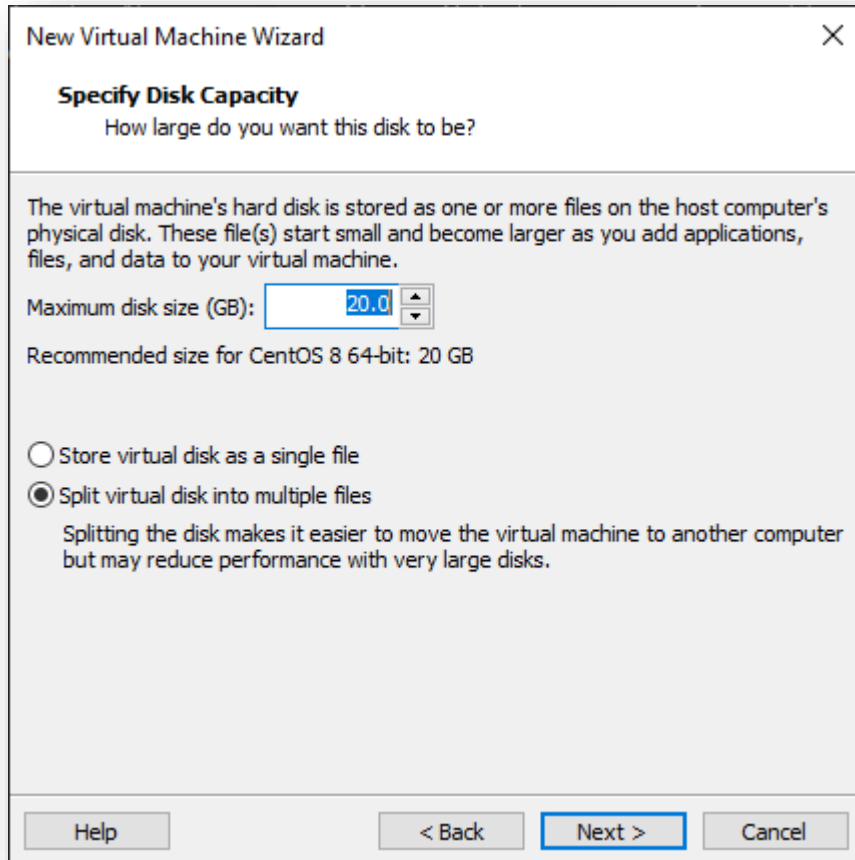
Virtual machine name:
18BCP011 Badal CentOS 8 64-bit

Location:
D:\Virtual Machines\CentOs Browse...

The default location can be changed at Edit > Preferences.

< Back Next > Cancel

⇒ Name the Virtual Machine as 18BCP011 BadalCentOS and Click on next button.



New Virtual Machine Wizard

Specify Disk Capacity
How large do you want this disk to be?

The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine.

Maximum disk size (GB):

Recommended size for CentOS 8 64-bit: 20 GB

☐ Store virtual disk as a single file

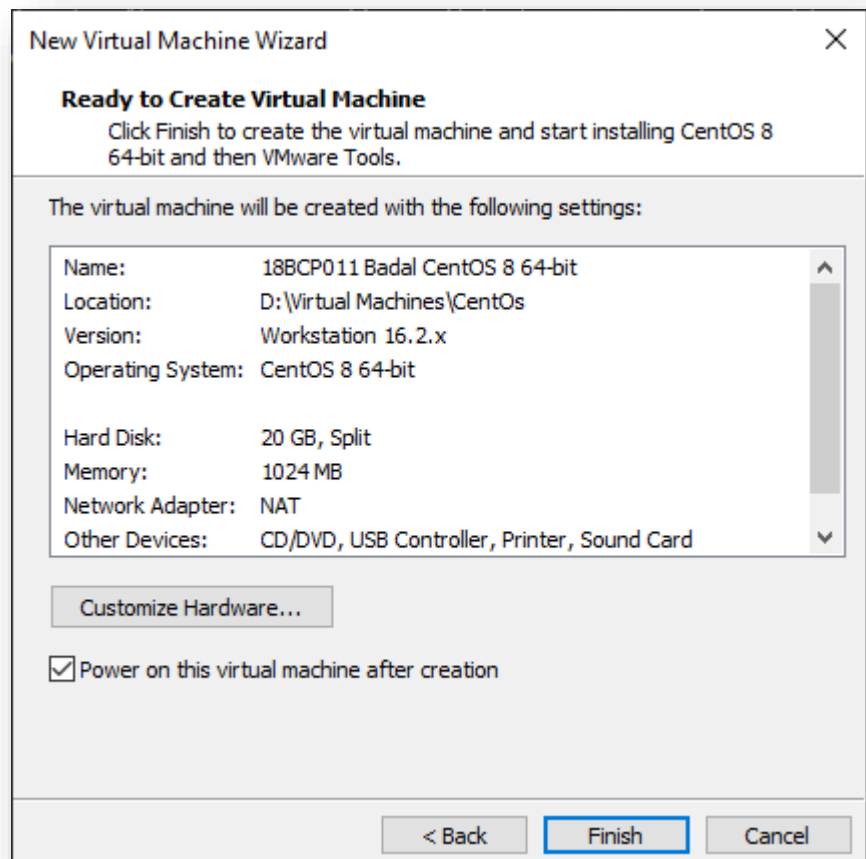
☒ Split virtual disk into multiple files

Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.

Help < Back Next > Cancel

⇒ **For Cent Operating System installation, let the default settings remain on the current page and then Click Next**

⇒ **Click on Finish button**



New Virtual Machine Wizard

Ready to Create Virtual Machine
Click Finish to create the virtual machine and start installing CentOS 8 64-bit and then VMware Tools.

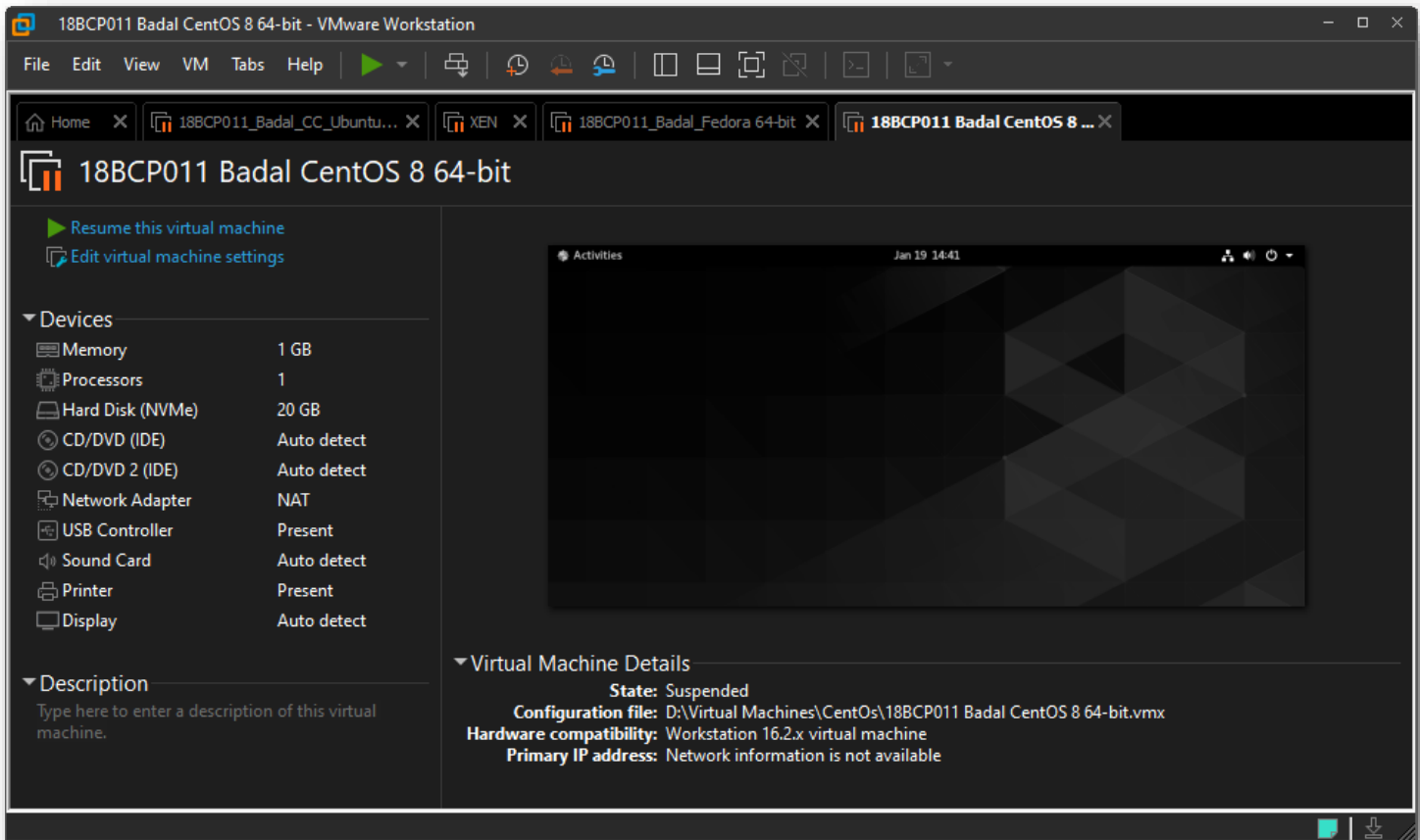
The virtual machine will be created with the following settings:

Name:	18BCP011 Badal CentOS 8 64-bit
Location:	D:\Virtual Machines\CentOs
Version:	Workstation 16.2.x
Operating System:	CentOS 8 64-bit
Hard Disk:	20 GB, Split
Memory:	1024 MB
Network Adapter:	NAT
Other Devices:	CD/DVD, USB Controller, Printer, Sound Card

Customize Hardware...

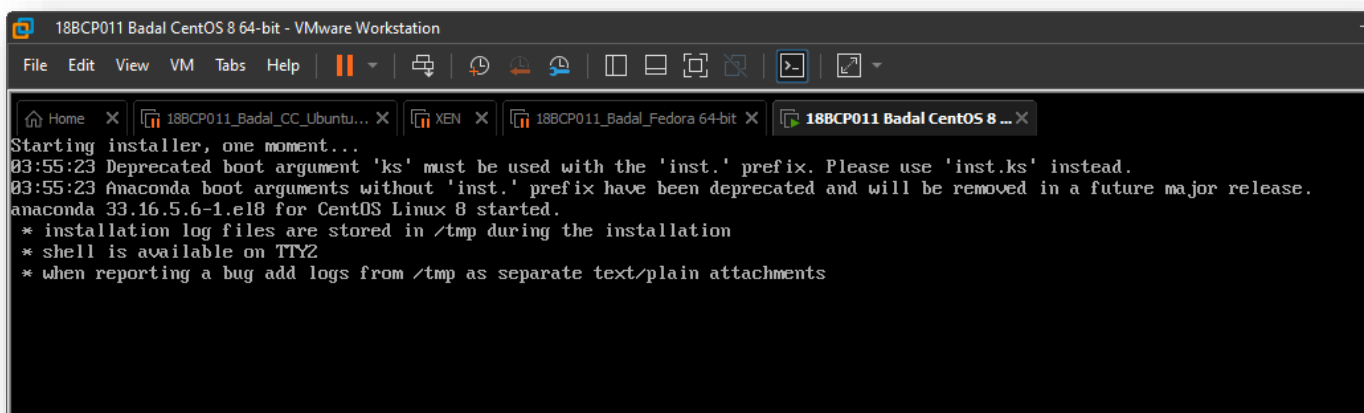
☒ Power on this virtual machine after creation

< Back Finish Cancel



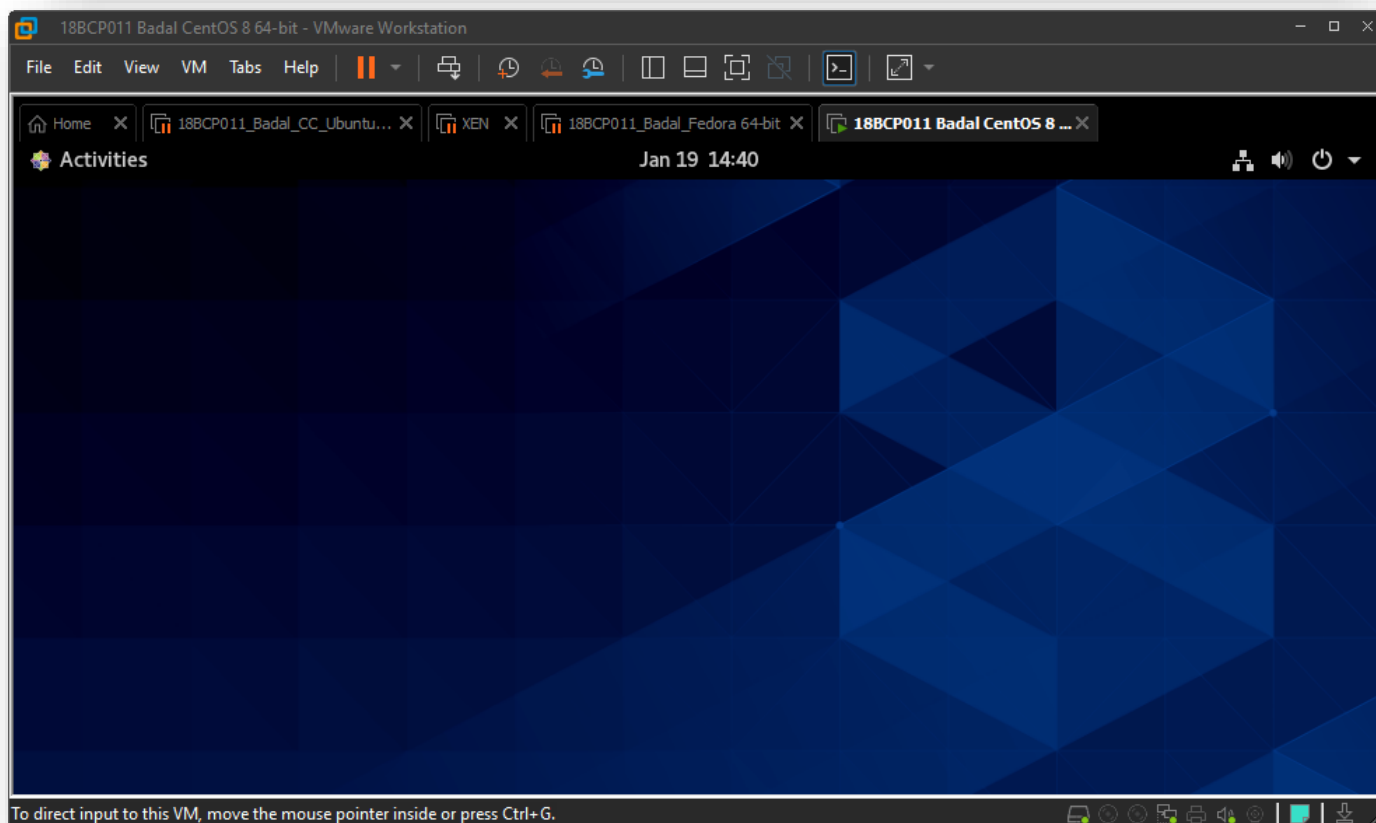
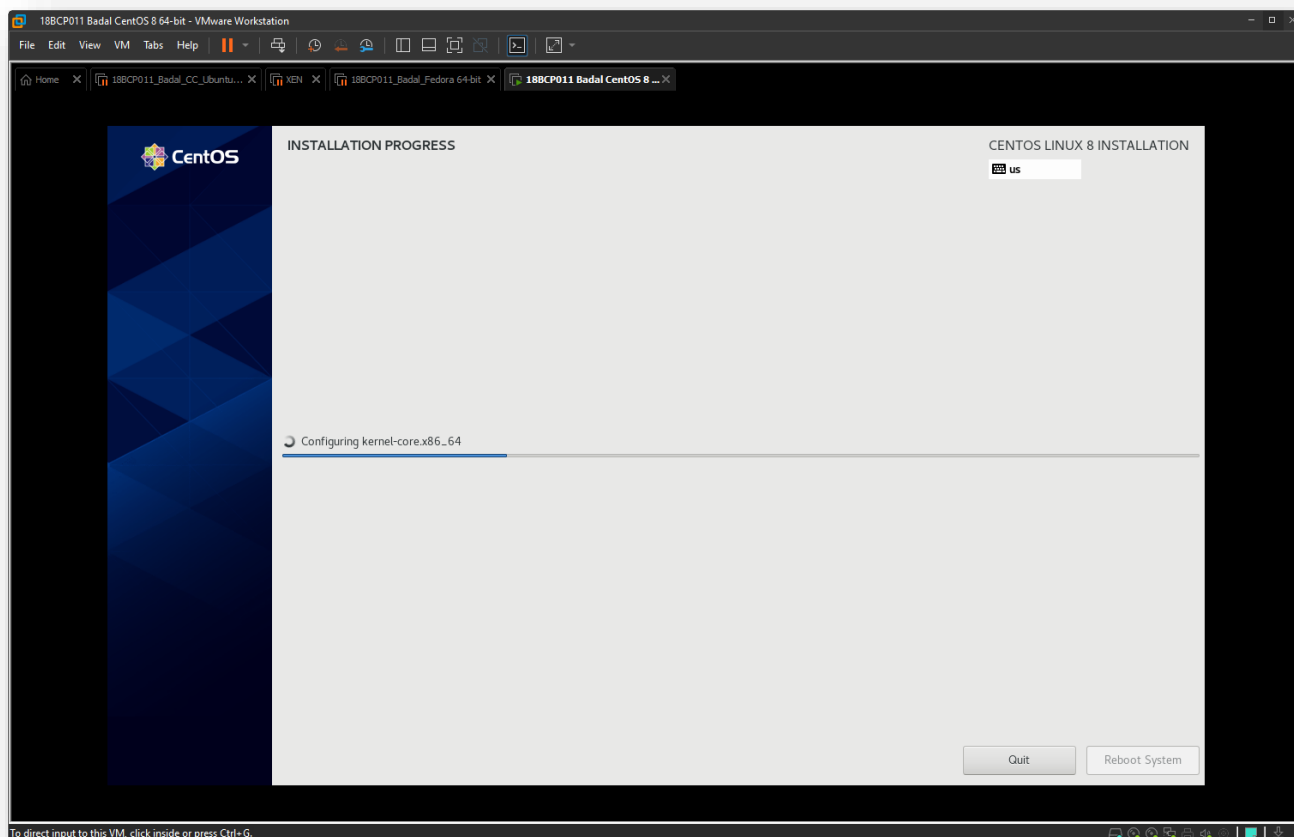
⇒ Virtual Machine for **Cent Operating System** is now created as shown in the above image and then click on **Power on this virtual machine** option to turn on the **Virtual Machine**.

⇒ CentOS will start and the screen will be visible as shown in the image below.



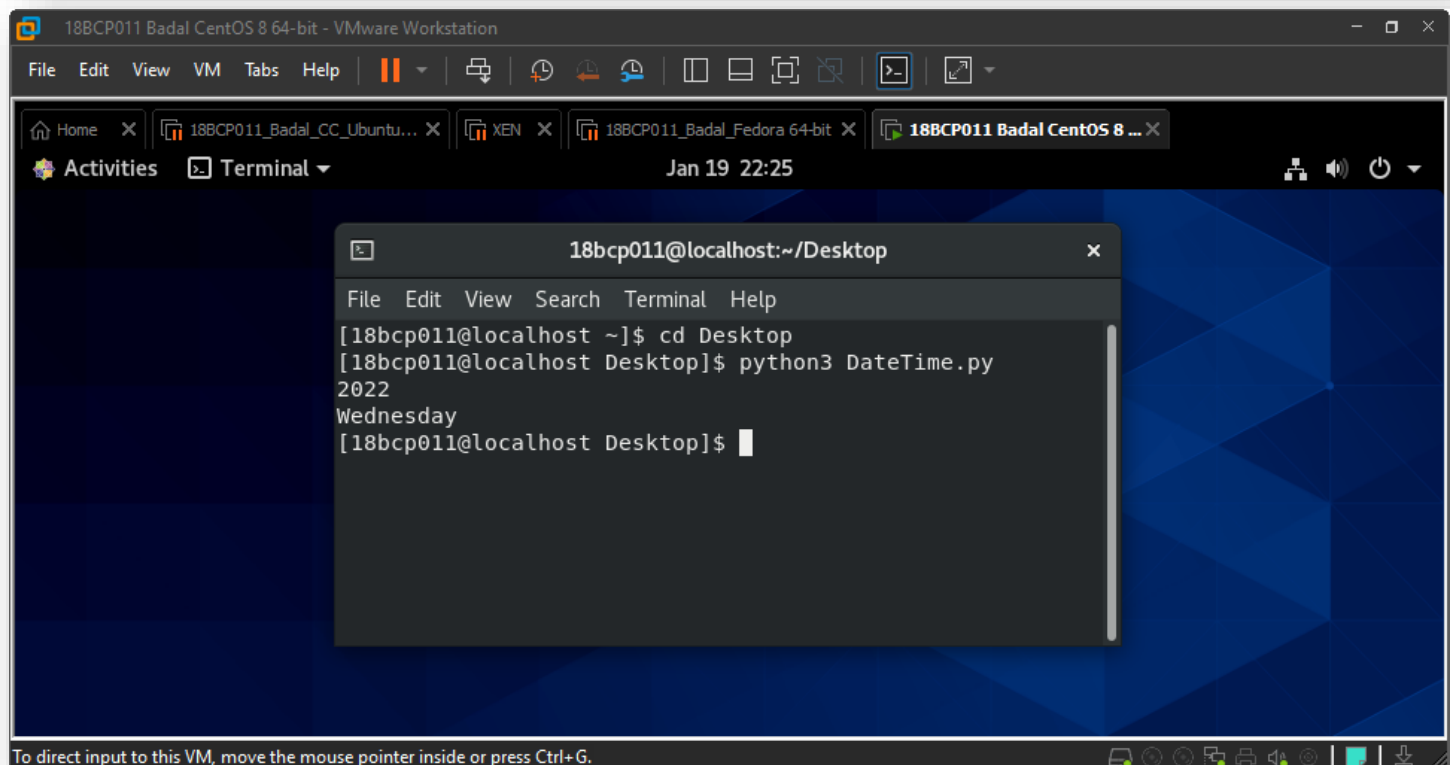
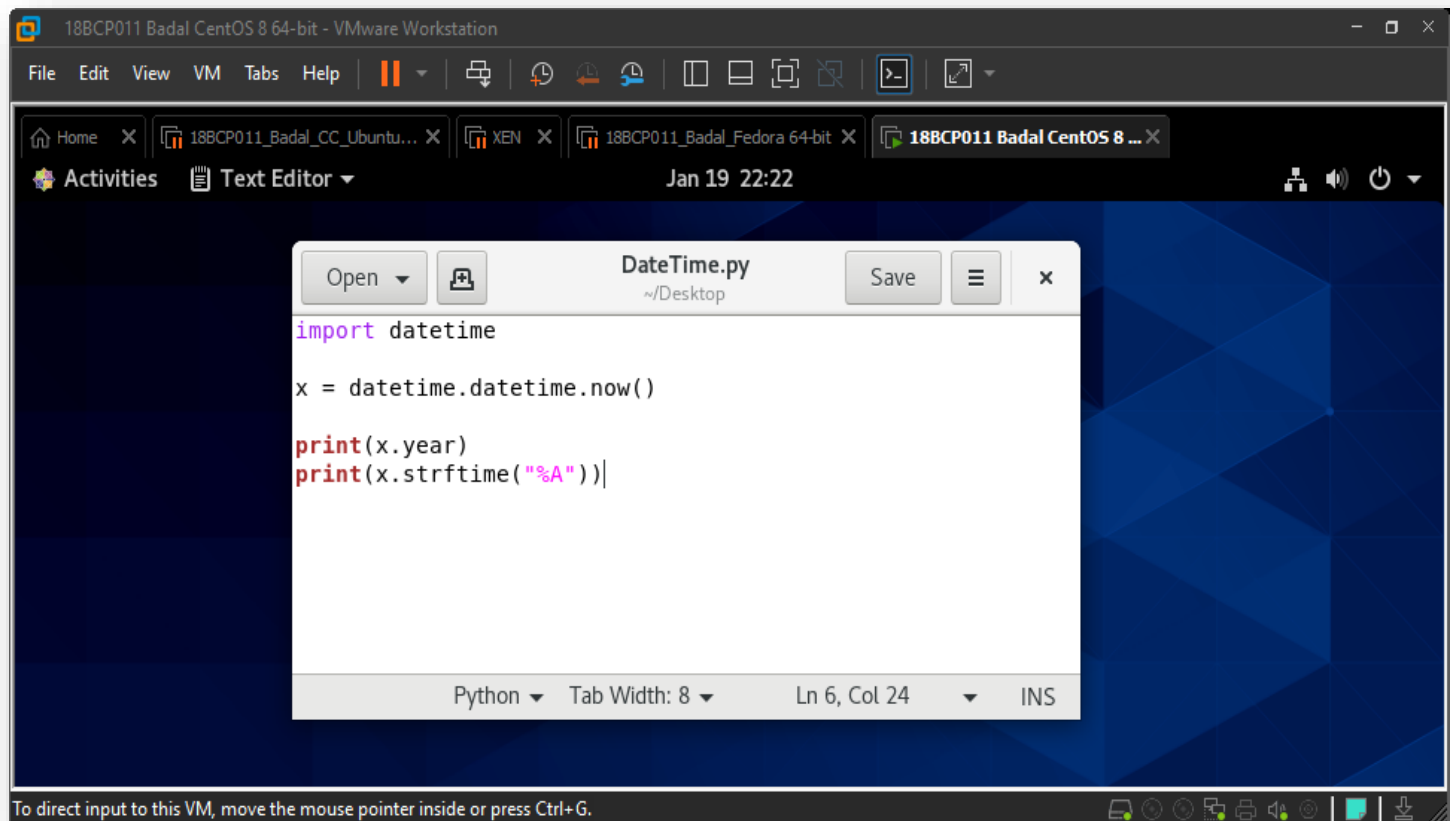
⇒ User Interface of Fedora 64-bit will be display as shown in the figures below

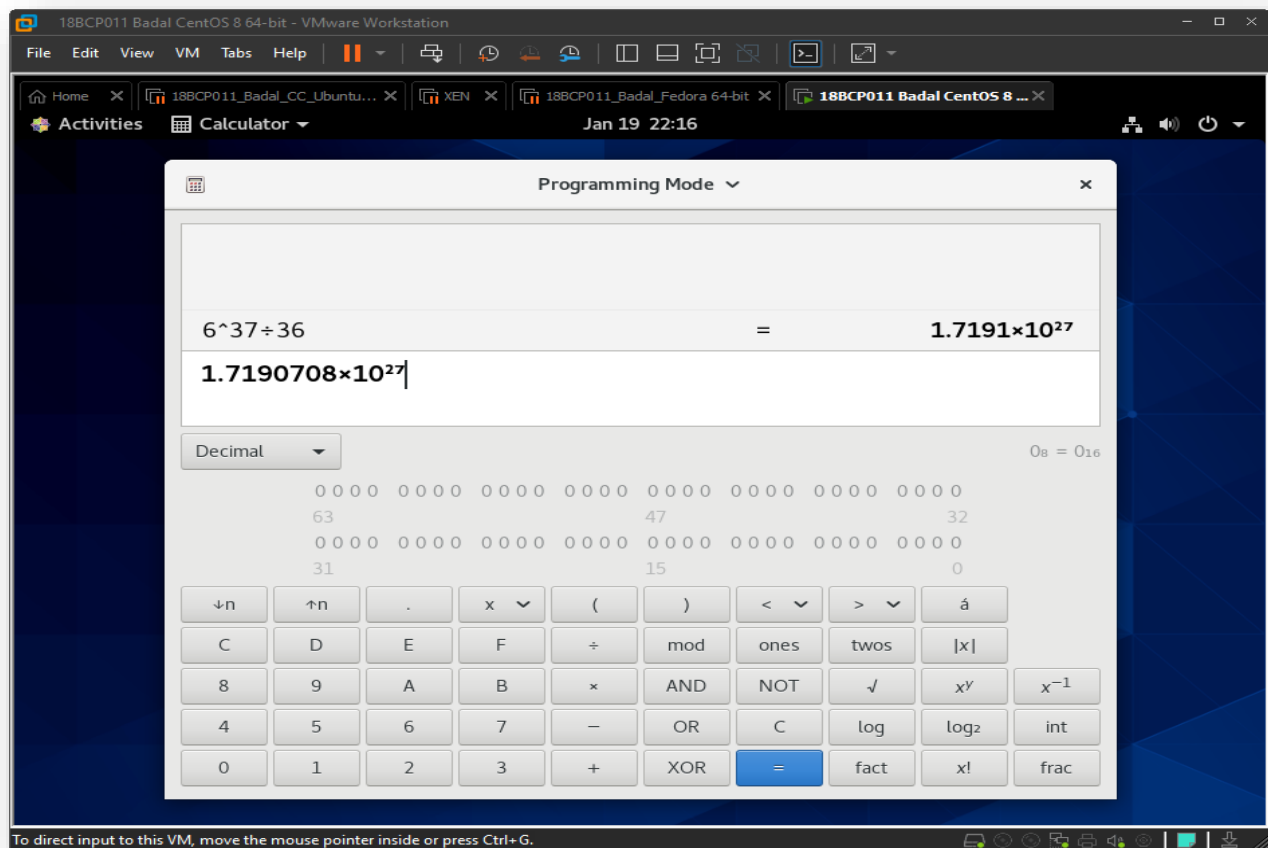
- Figure 1 displays the Configuring of CentOS.
- Figure 2 displays the UI of **18BCP011_Badal_CentOS**.



Running Simple Applications/Programs in CentOS Virtual Machine.

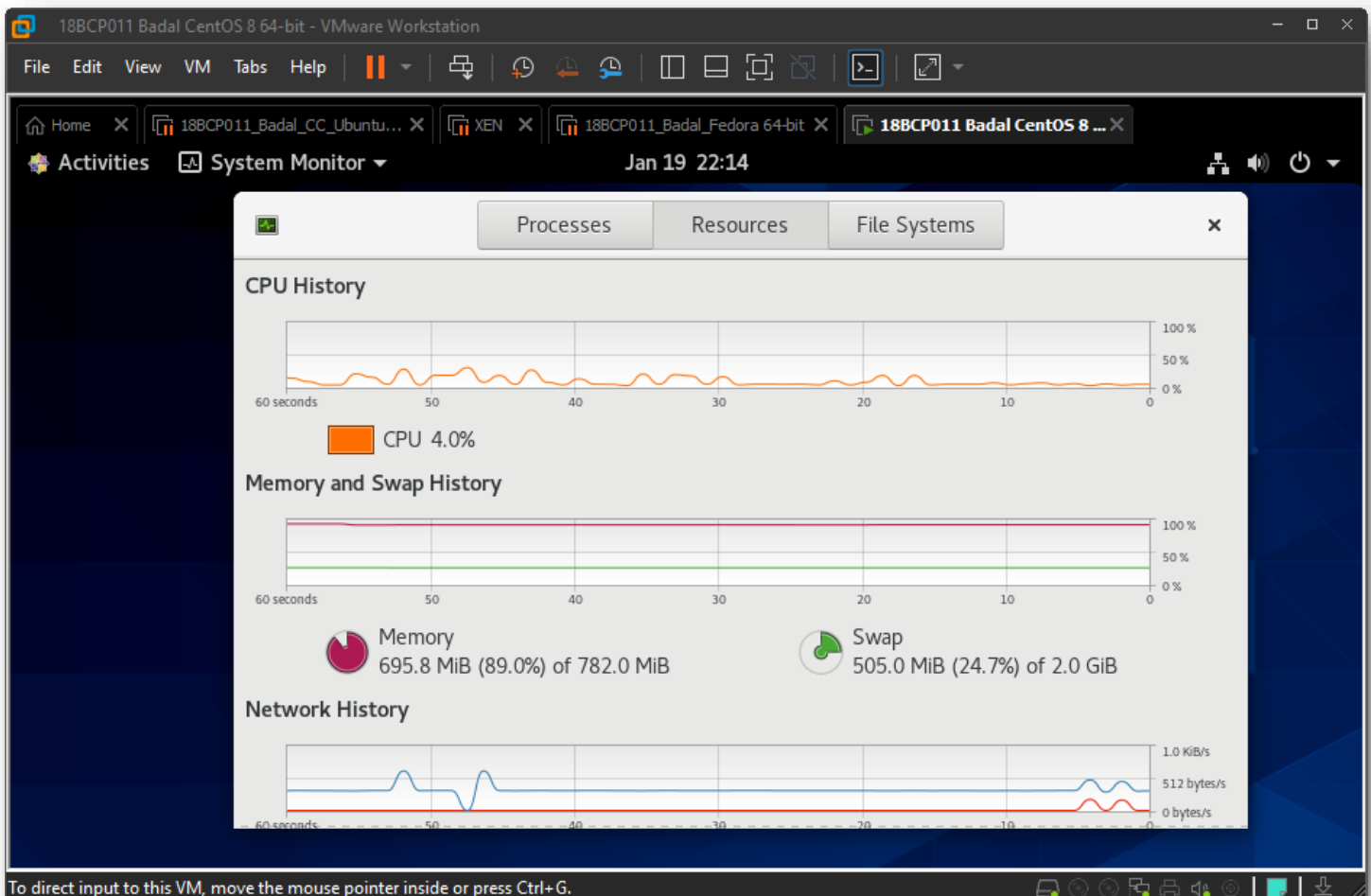
⇒ Figure below shows the Text Editor & Terminal running python code for DateTime.





⇒ **Figure 1. Shows the working of Calculator in Programming mode in CentOS Virtual Machine.**

⇒ **Figure 2. Shows the UI of System Monitor in CentOS Virtual Machine.**

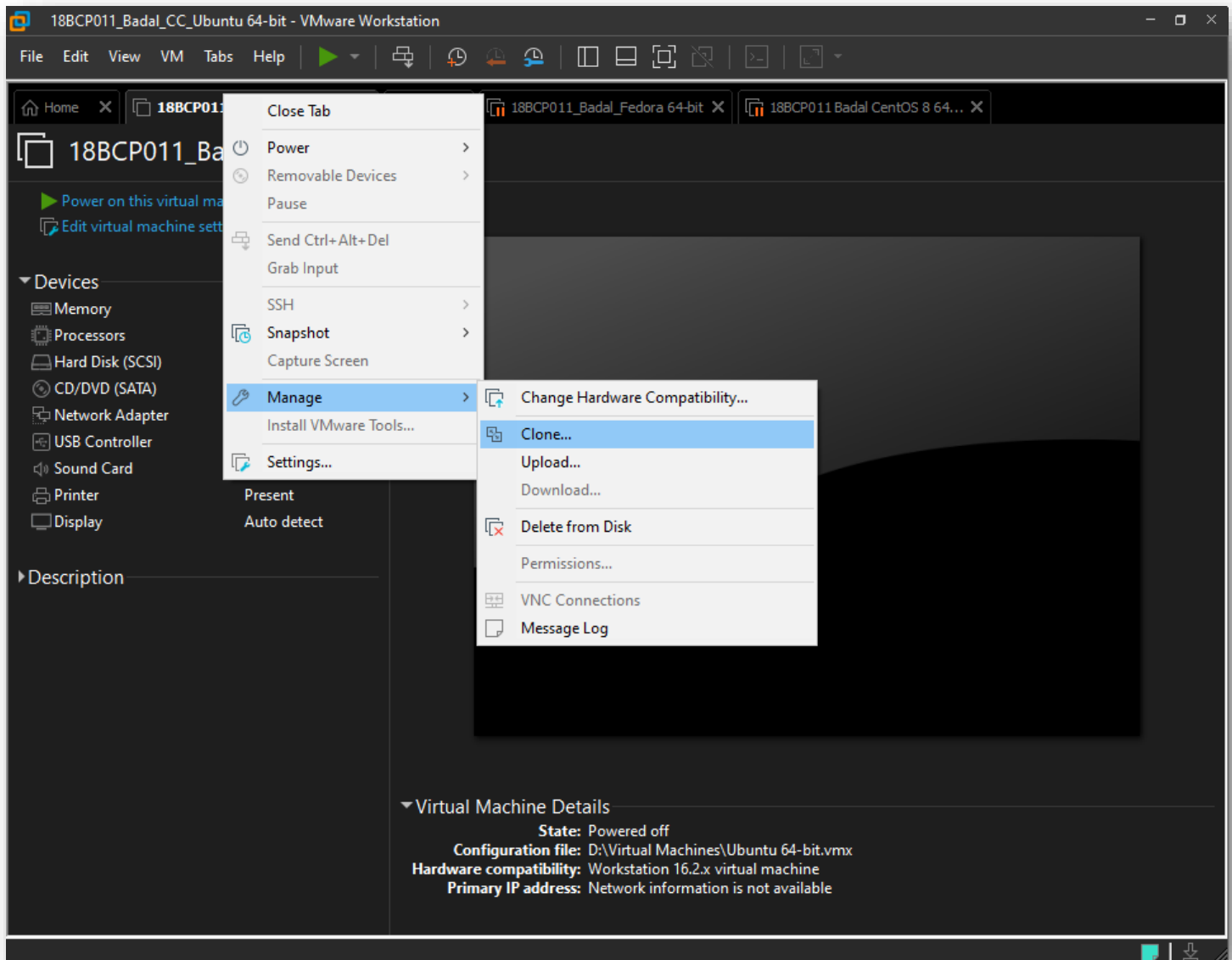


CLONING OF UBUNTU VIRTUAL MACHINE

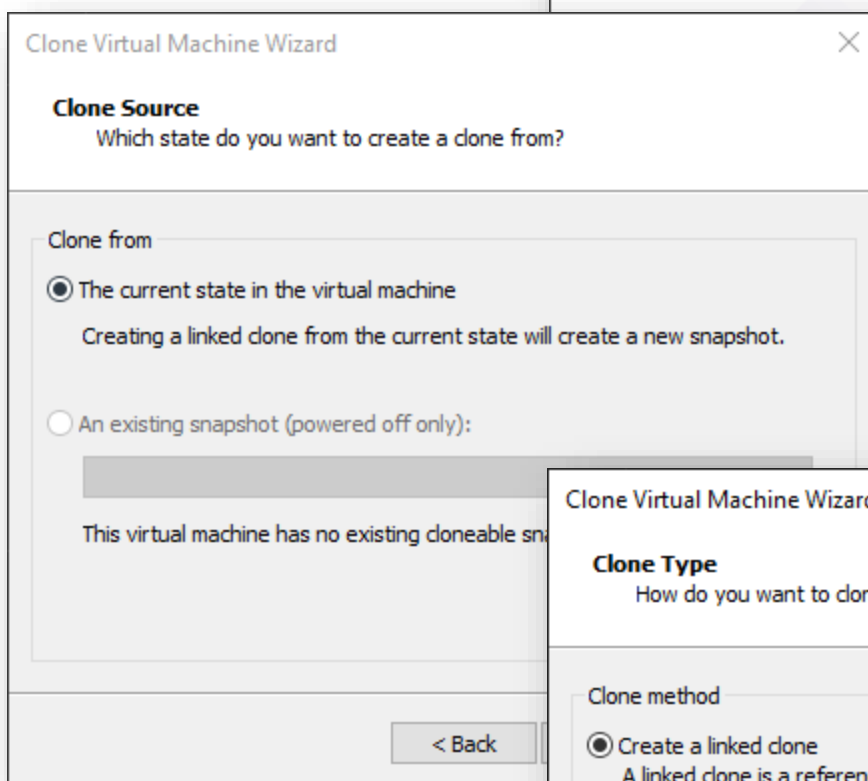
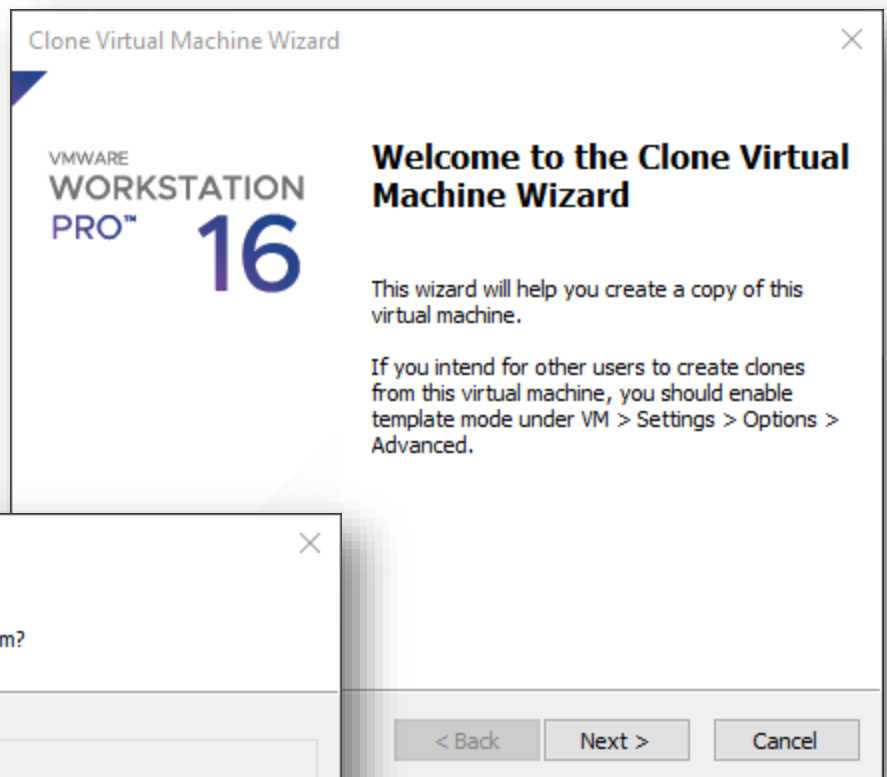
Steps for Cloning a Virtual Machine in VMWare Workstation:

1. Right Click on the Virtual Machine one want to Clone.
2. Click on Manage → Clone
3. A dialog box will pop-up for Cloning of Virtual Machine.
4. Click Next and follow the steps accordingly for Cloning of Virtual Machine

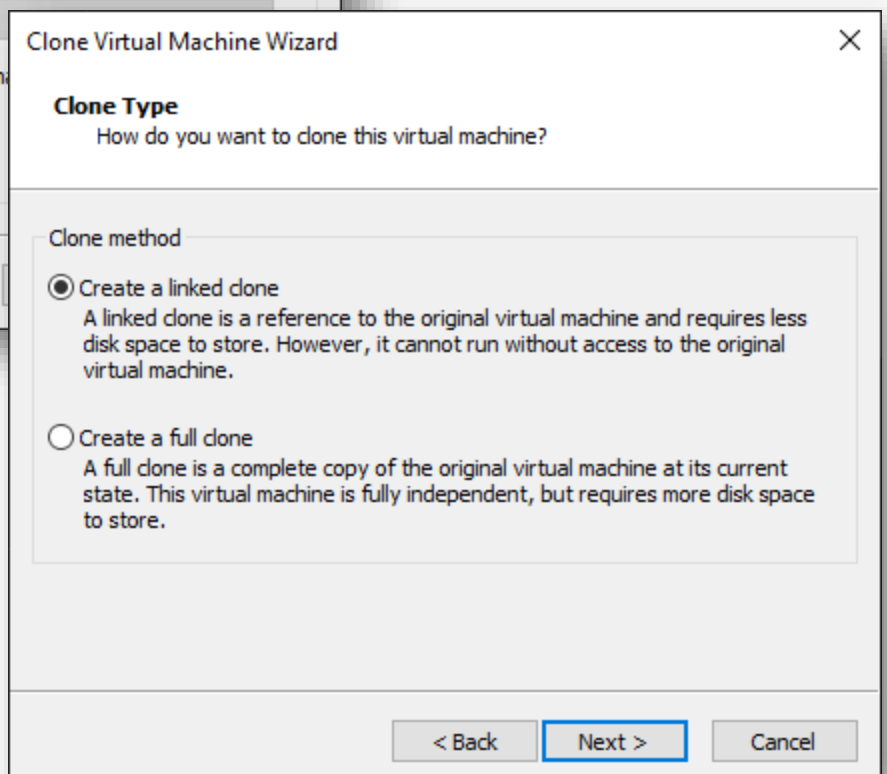
***Note: Machine should be in Power Off Mode and not suspended or pause state for Cloning.**

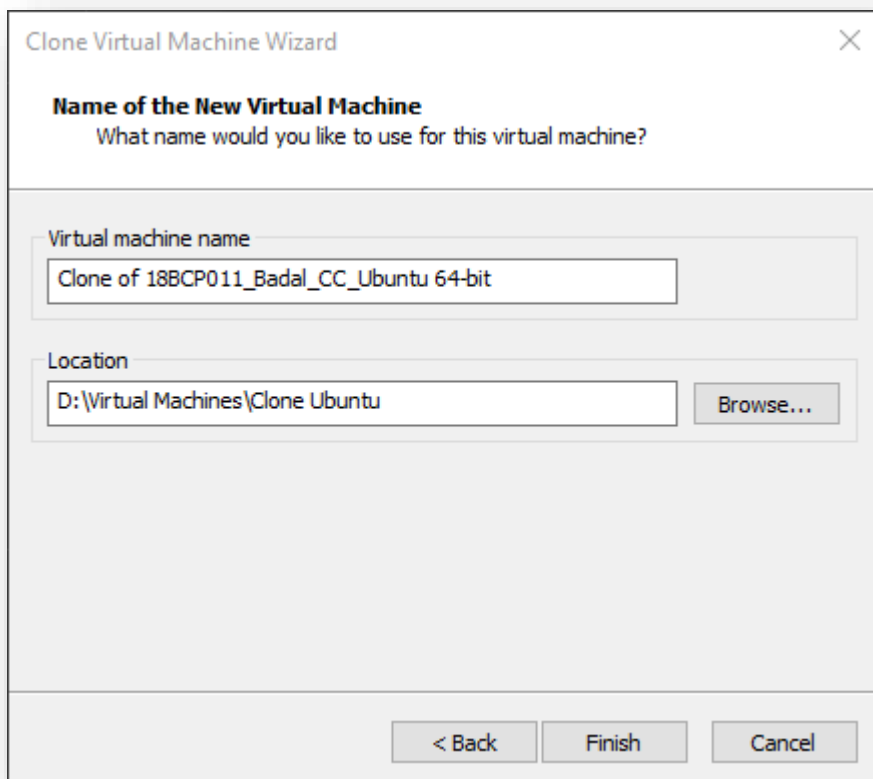


- ⇒ When the Clone Virtual Machine Wizard opens click on the Next button for further cloning.
- ⇒ Select “The current state in the Virtual Machine” option.



- ⇒ Click on “Create a Linked Clone” option for create a linked clone of Virtual Machine





The image shows a Windows-style dialog box titled "Clone Virtual Machine Wizard" with a close button (X) in the top right corner. The main heading is "Name of the New Virtual Machine" followed by the question "What name would you like to use for this virtual machine?". Below this, there are two input fields. The first is labeled "Virtual machine name" and contains the text "Clone of 18BCP011_Badal_CC_Ubuntu 64-bit". The second is labeled "Location" and contains the path "D:\Virtual Machines\Clone Ubuntu", with a "Browse..." button to its right. At the bottom of the dialog, there are three buttons: "< Back", "Finish", and "Cancel".

Clone Virtual Machine Wizard

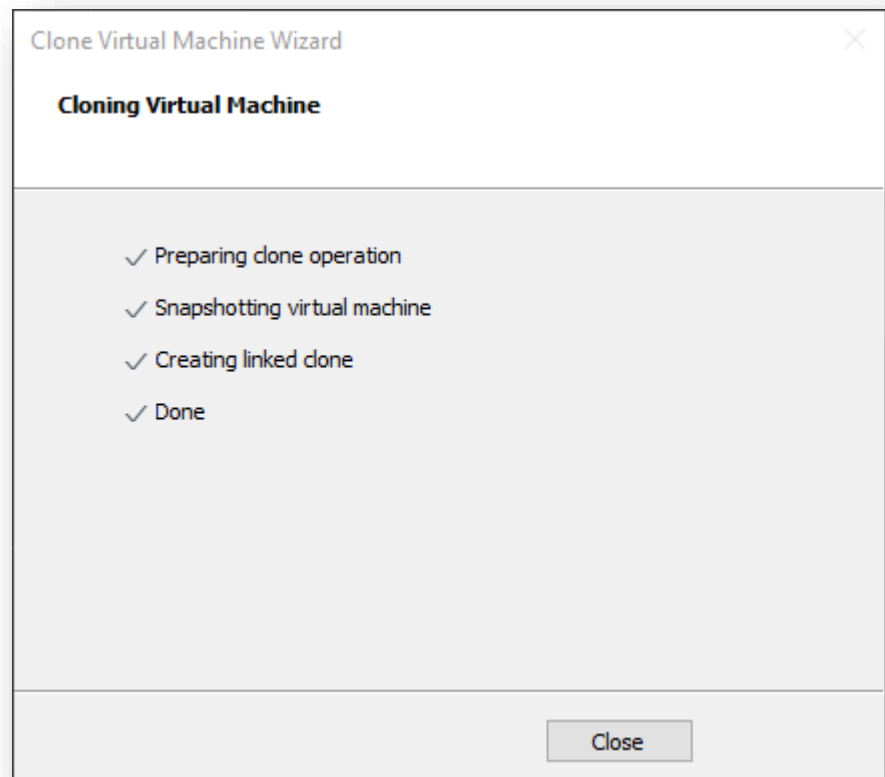
Name of the New Virtual Machine
What name would you like to use for this virtual machine?

Virtual machine name
Clone of 18BCP011_Badal_CC_Ubuntu 64-bit

Location
D:\Virtual Machines\Clone Ubuntu Browse...

< Back Finish Cancel

- ⇒ When the Clone Virtual Machine Wizard opens name the Virtual Machine and assign the Location path for the same. Click on Finish Button to complete the cloning.
- ⇒ Cloning of Virtual Machine will complete in a while, click on the Close button.



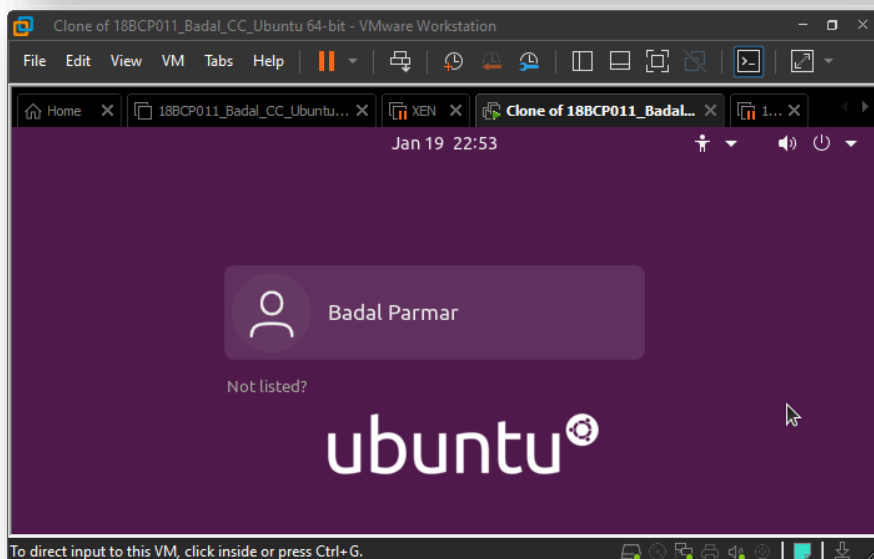
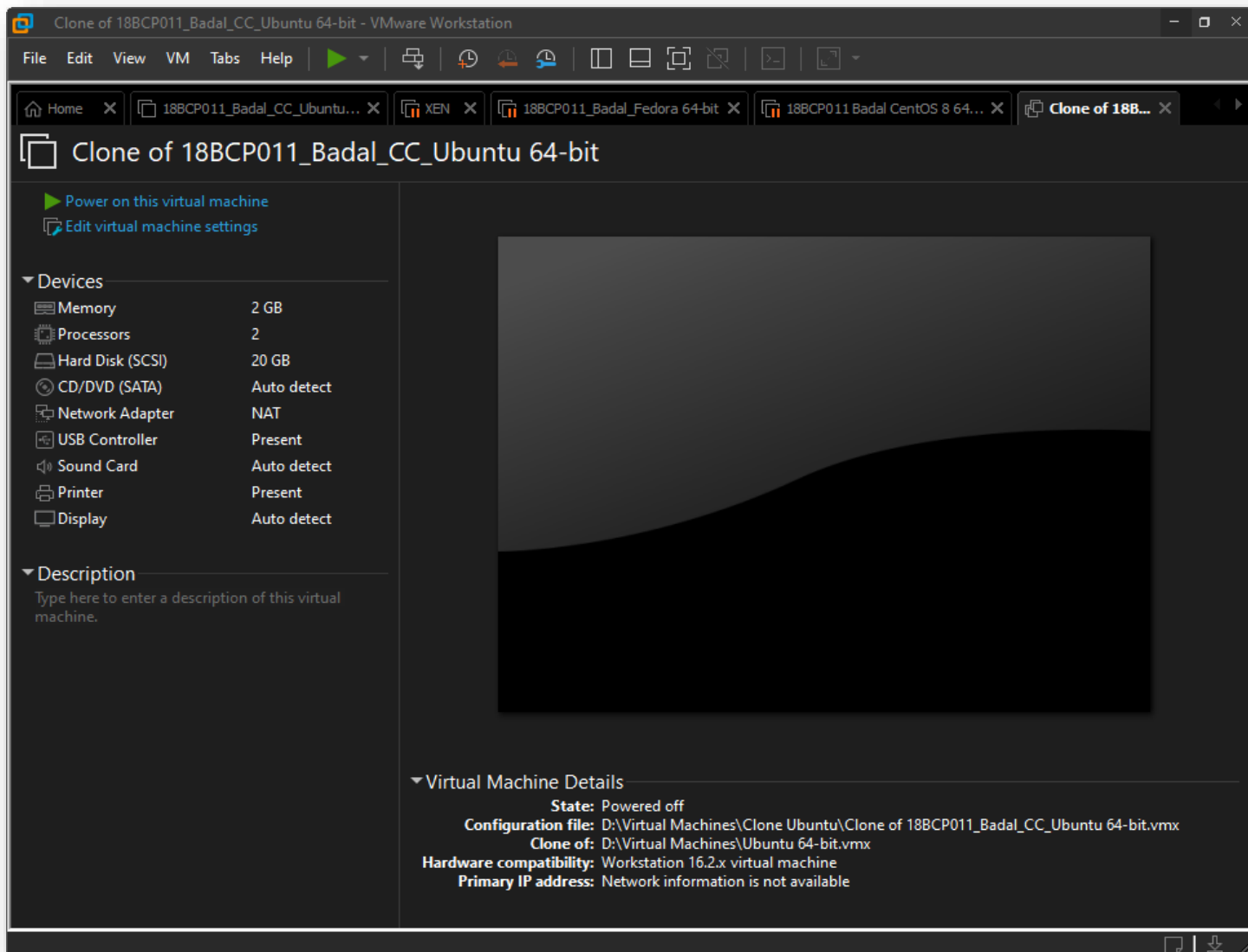
The image shows the same "Clone Virtual Machine Wizard" dialog box, but now it displays a progress list under the heading "Cloning Virtual Machine". The list contains four items, each with a checkmark: "Preparing clone operation", "Snapshotting virtual machine", "Creating linked clone", and "Done". A "Close" button is located at the bottom right of the dialog.

Clone Virtual Machine Wizard

Cloning Virtual Machine

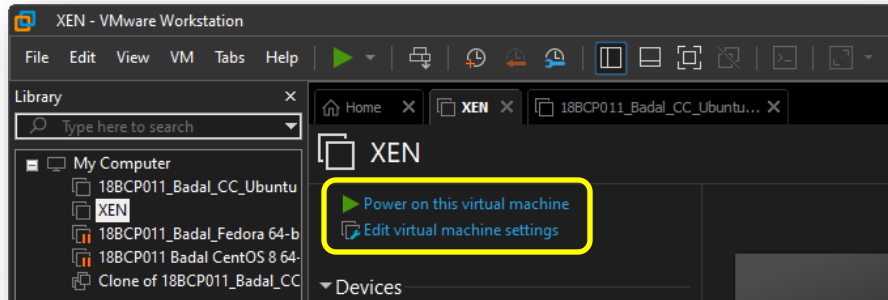
- ✓ Preparing clone operation
- ✓ Snapshotting virtual machine
- ✓ Creating linked clone
- ✓ Done

Close

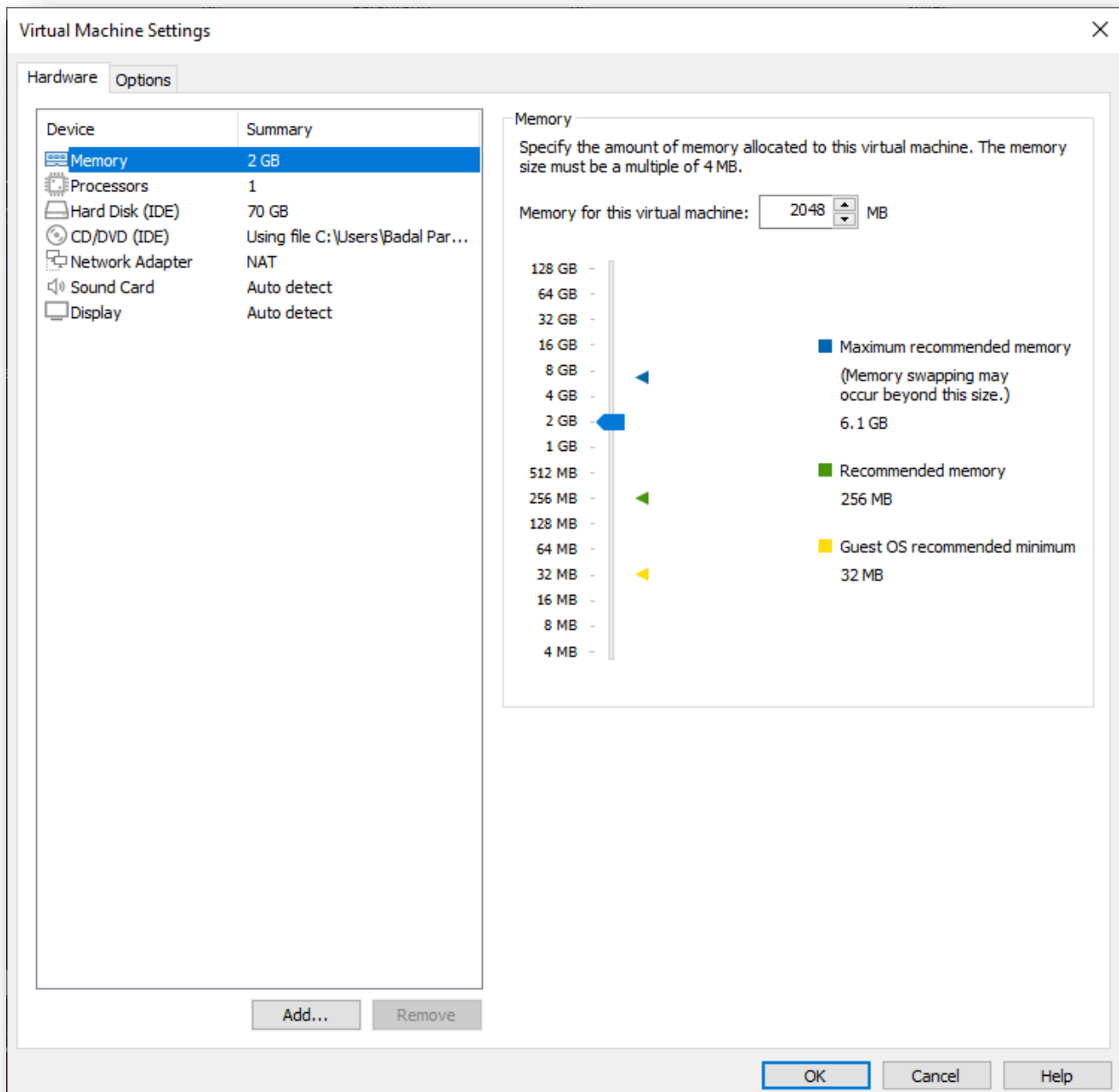


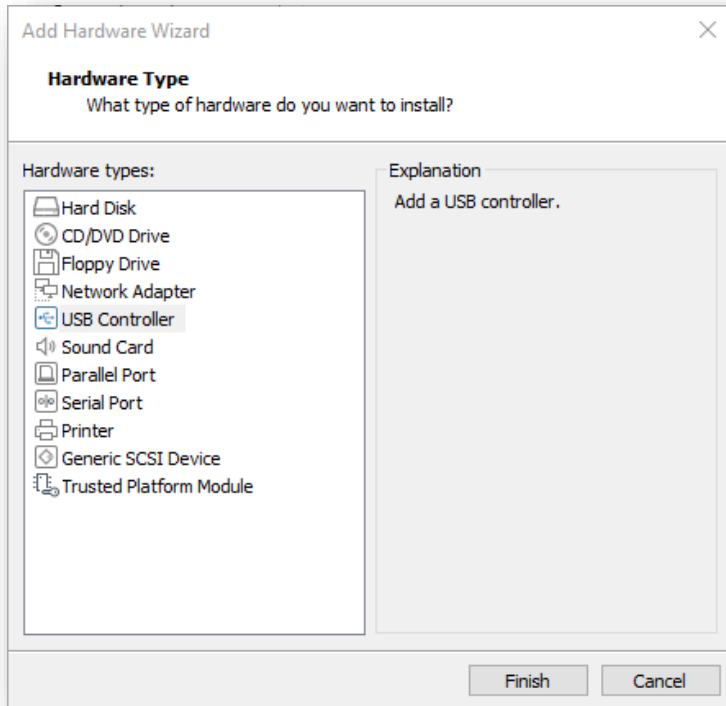
- ⇒ After Cloning "**Clone of 18BCP011_Badal_CC_Ubuntu 64-bit**" will be created, power on the the Virtual Machine.
- ⇒ Virtual Machine will turned on and the login credentials will be same as the previous Ubuntu Virtual Machine.

ADDING USB CONTROLLER TO VIRTUAL MACHINE

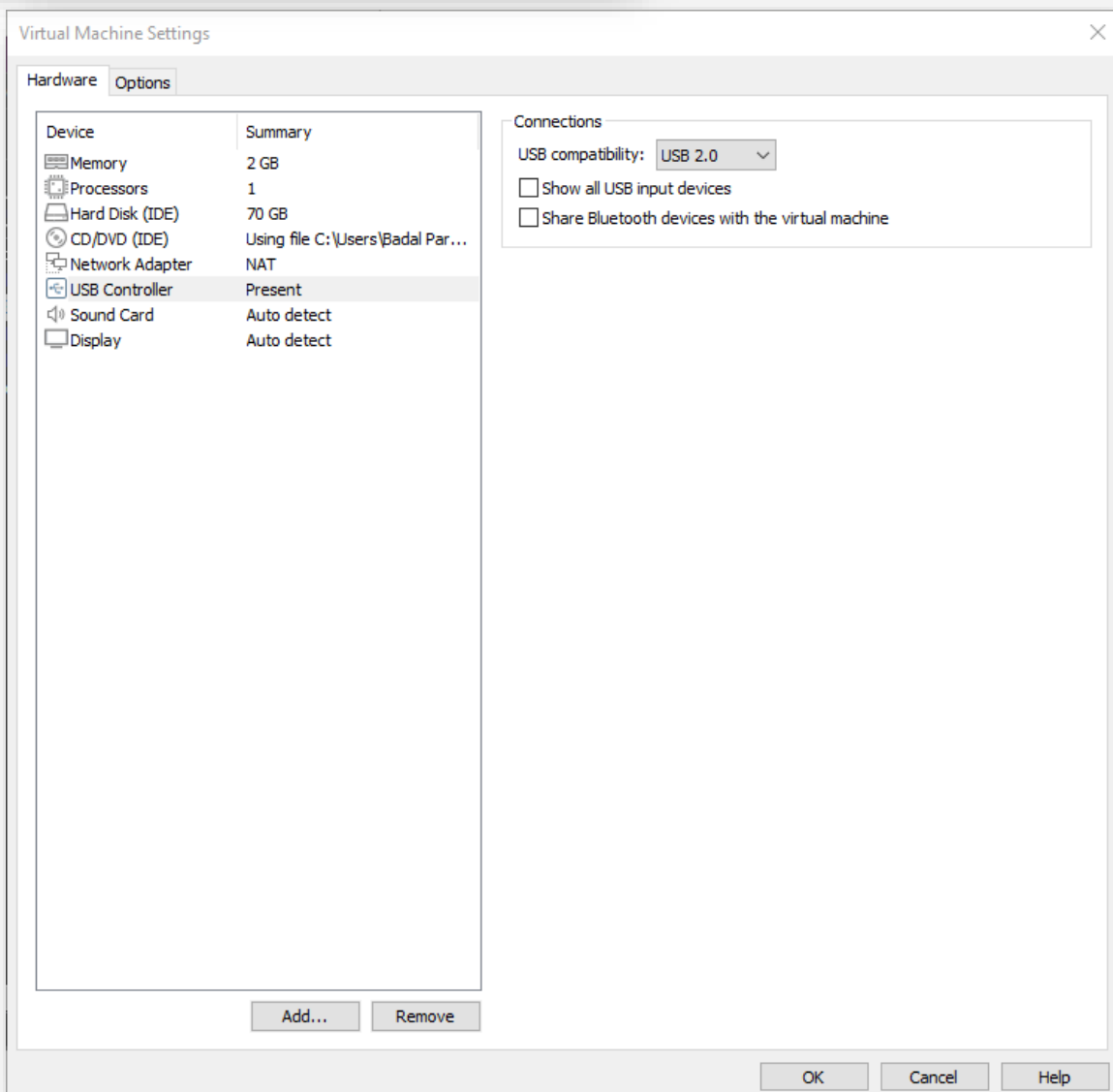


- ⇒ Power off the Virtual Machine and click on **“Edit Virtual Machine Settings”** to open Virtual Machine Settings.
- ⇒ Click on Add. Button to open **“Add Hardware”** Dialog box

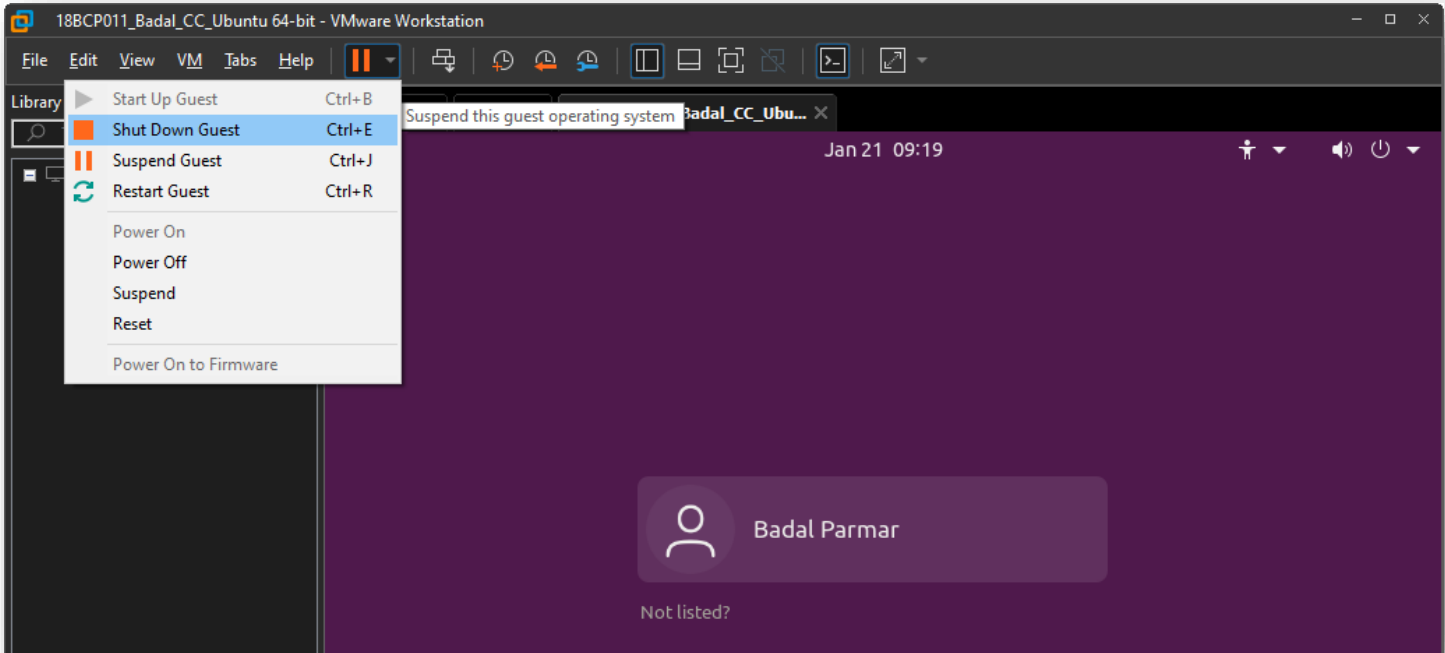




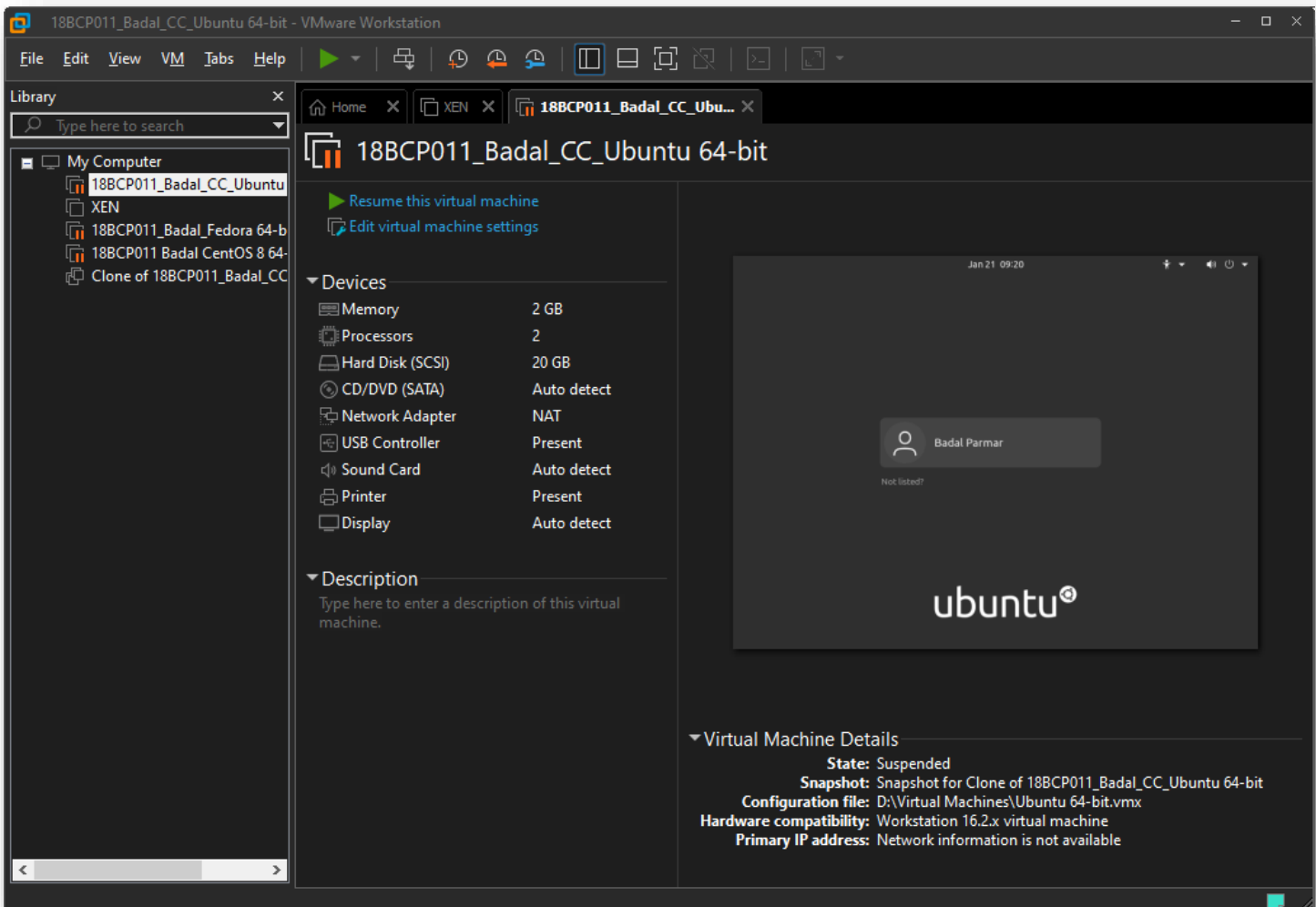
- ⇒ After clicking on Add button, “**Add Hardware Wizard**” dialog box will pop-up click on “**USB Controller**” to add USB controller to Virtual Machine.
- ⇒ Click “**Finish**” to add hardware to the machine.
- ⇒ USB Controller will be added as shown in the figure below.



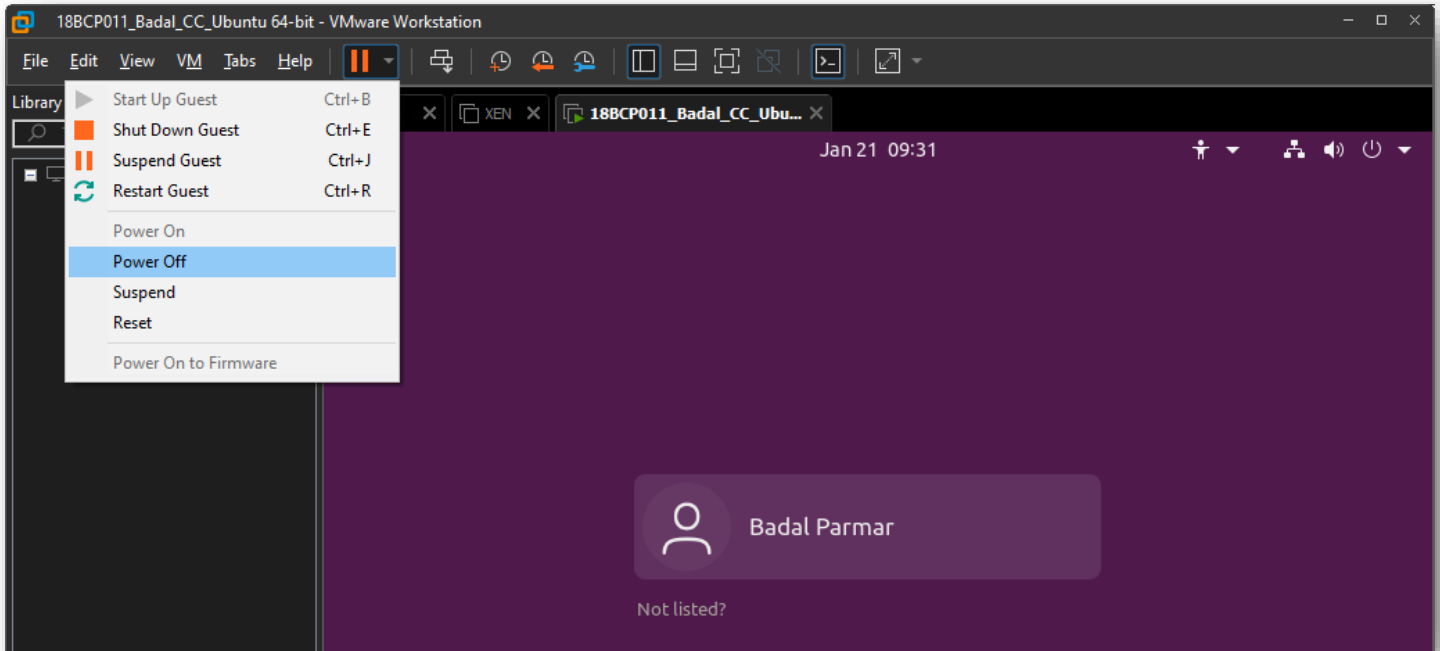
Closing Virtual Machines (a. Soft Power off/Suspend and Resume VM)



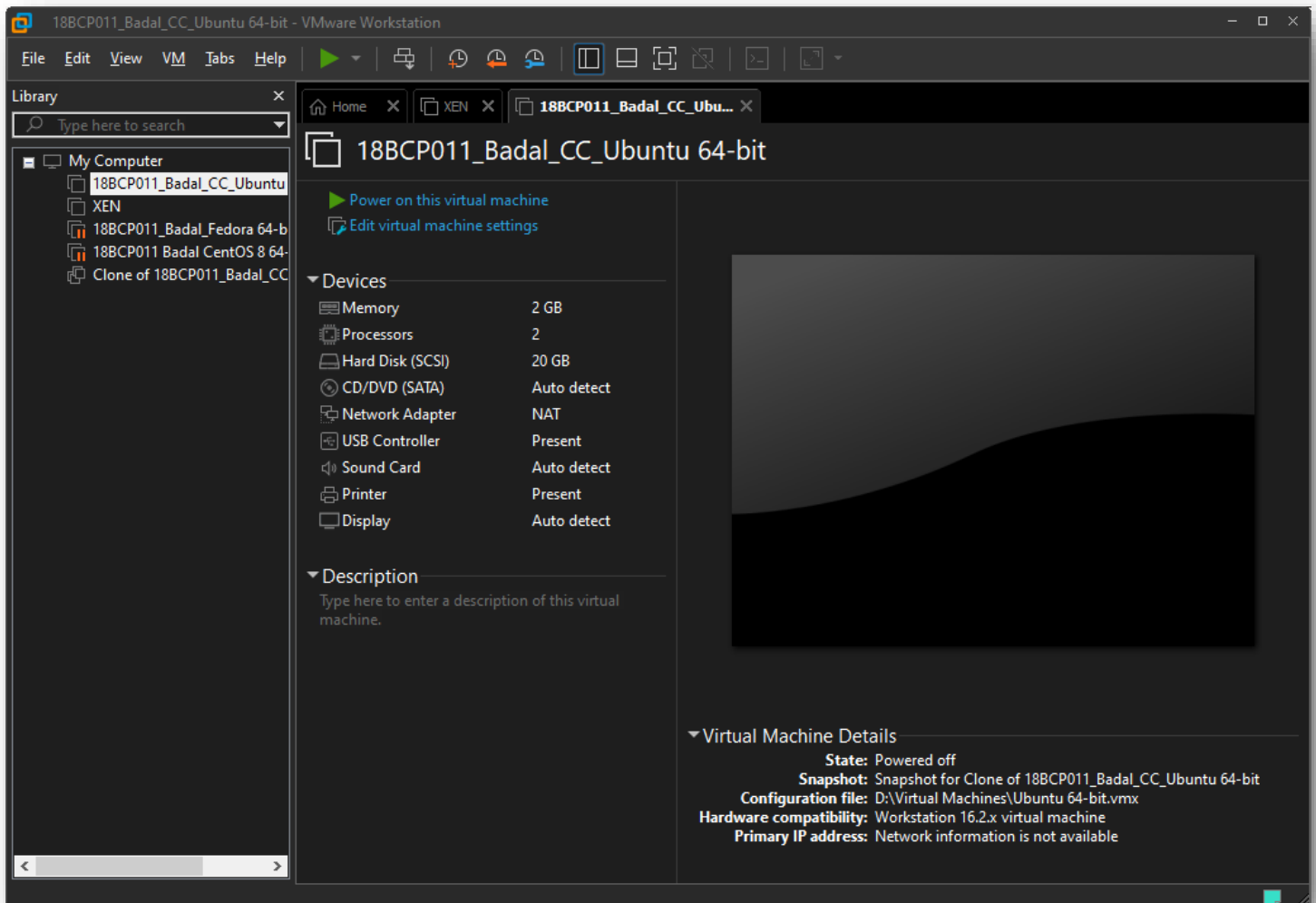
- ⇒ For Soft Power Off, Click on small arrow and select “Shut Down Guest” Option for Shut down the Virtual Machine.
- ⇒ The Virtual Machine will shut down as shown in the figure below.



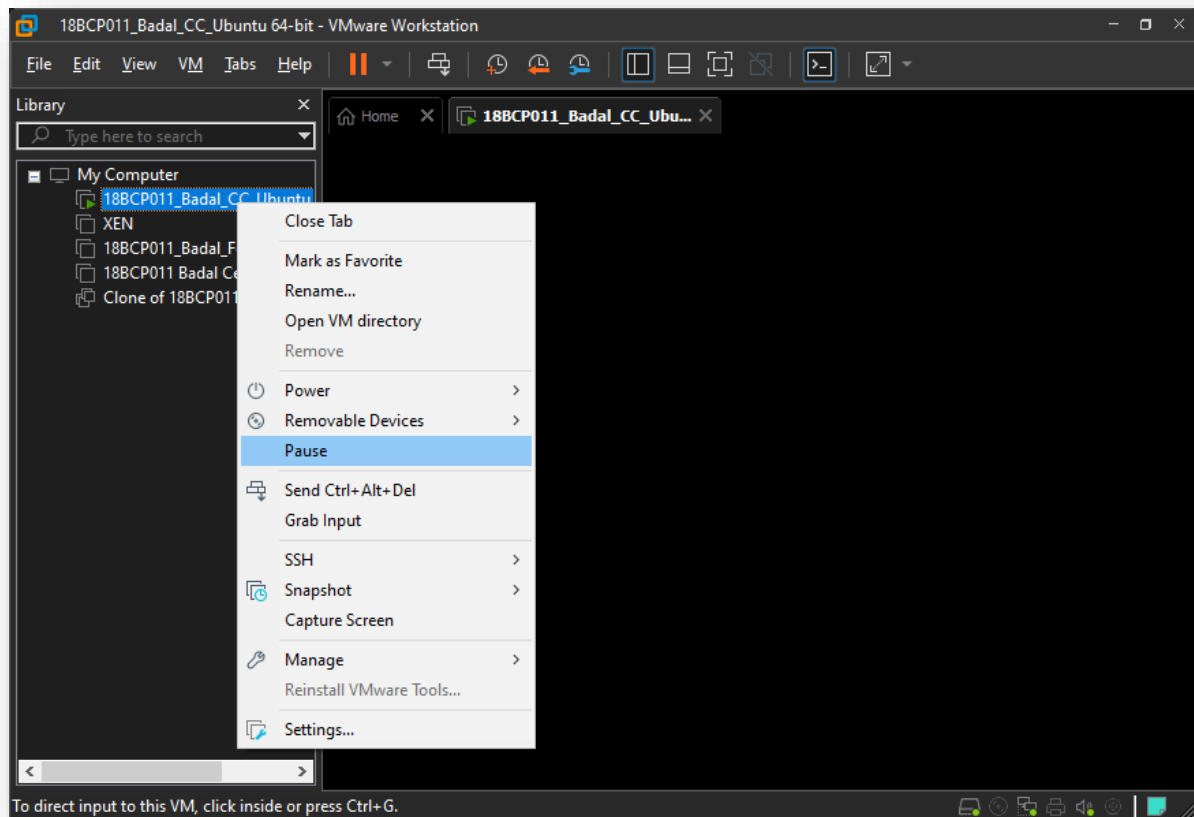
Closing Virtual Machines (b. Power Off/Hard Suspend and Turn On VM)



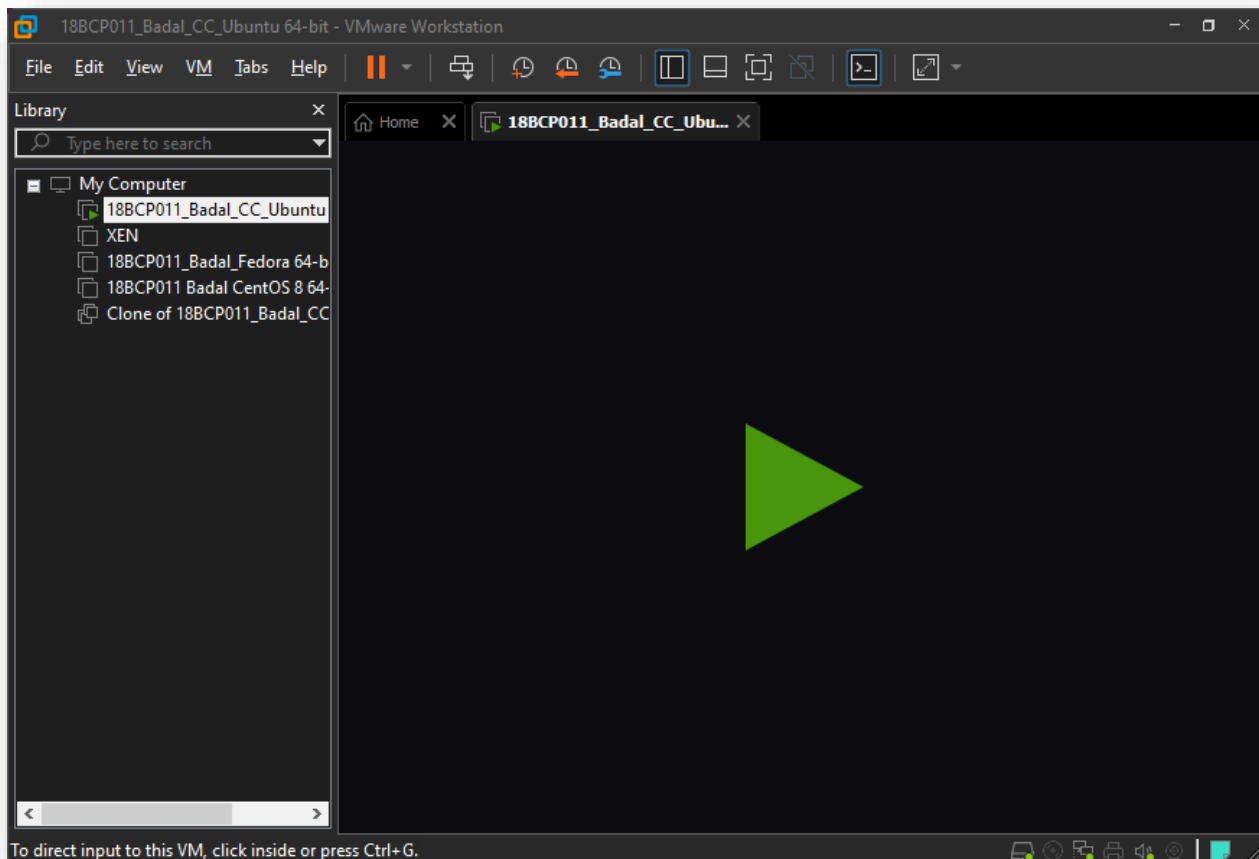
- ⇒ For Hard Power Off, Click on small arrow and select “Power Off” Option for Power Off/Shut down the Virtual Machine.
- ⇒ The Virtual Machine will Power Off as shown in the figure below.



Closing Virtual Machines (c. Pause and Resume Virtual Machine)



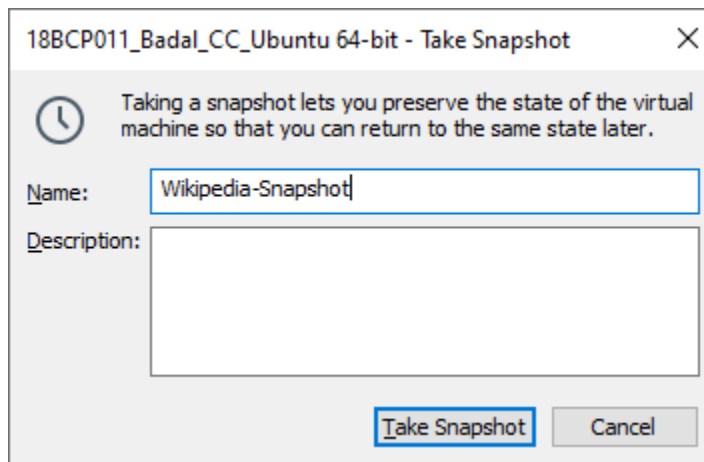
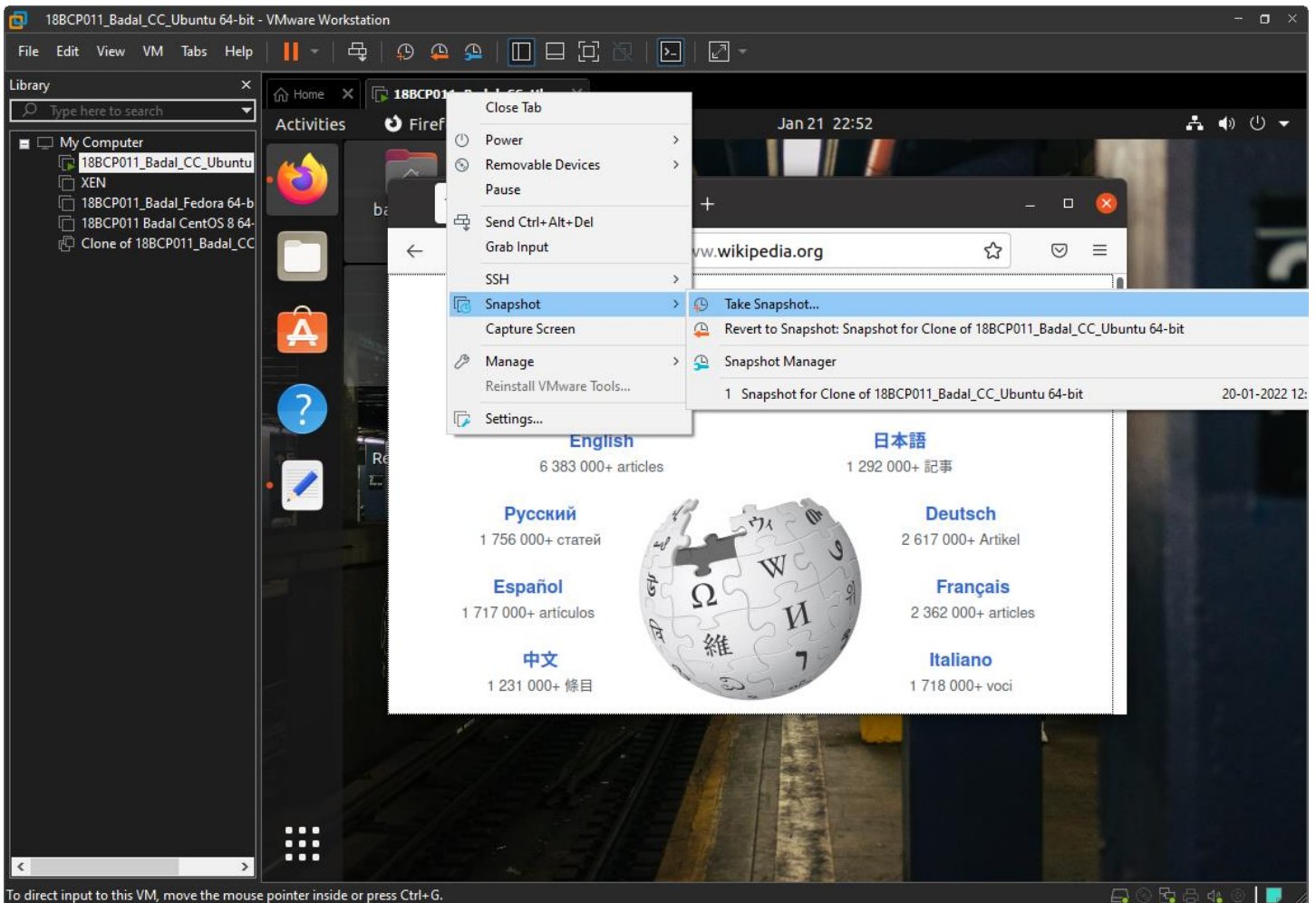
- ⇒ For Hard Power Off, Click on small arrow and select "Power Off" Option for Power Off/Shut down the Virtual Machine.
- ⇒ The Virtual Machine will Power Off as shown in the figure below.



Closing Virtual Machines (d. Snapshot the Virtual Machine)

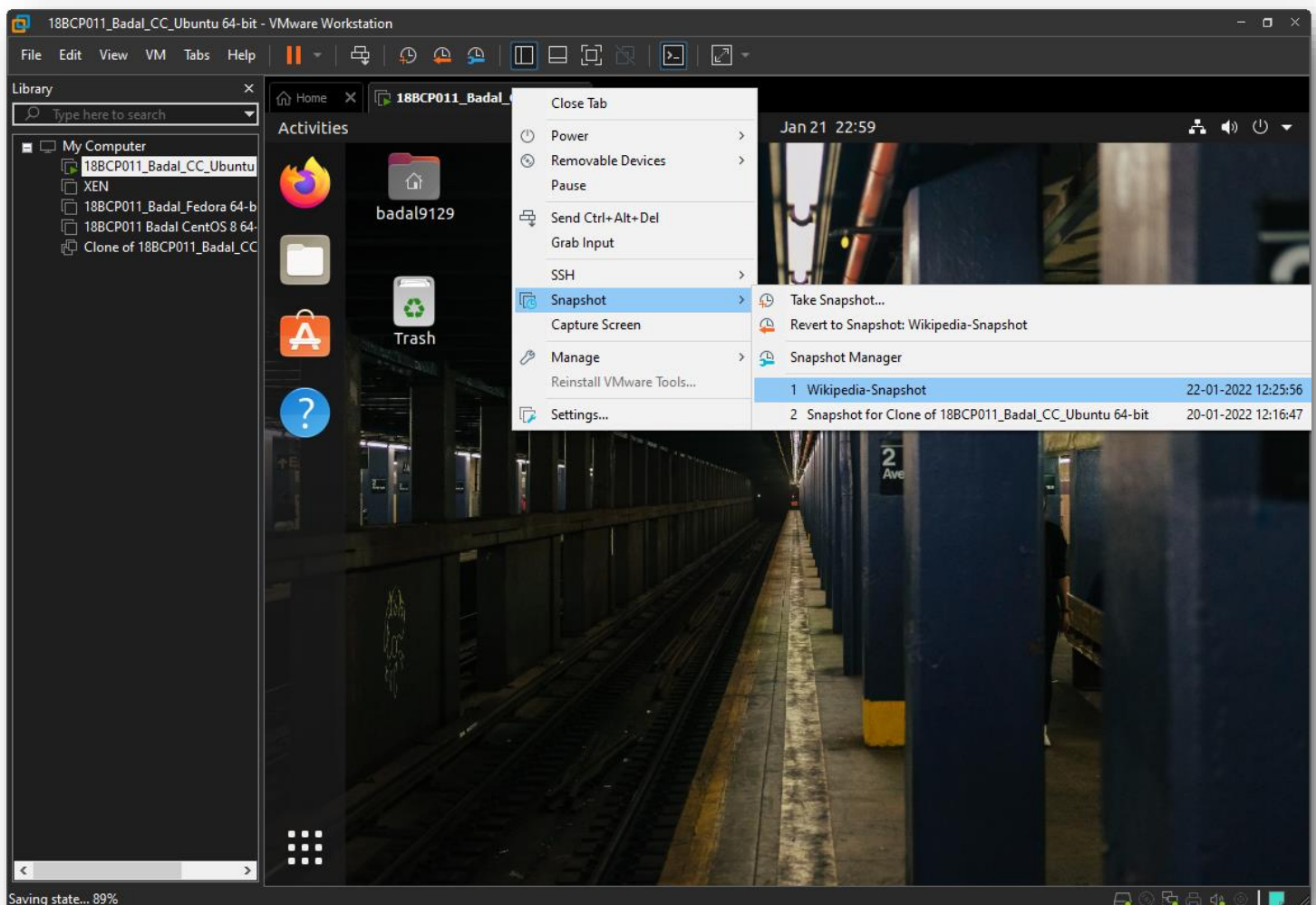
⇒ Steps for Snapshotting a Virtual Machine

1. **Power On** a virtual machine lets say **Ubuntu** as shown in the Figure 1. below.
2. Open any **Sevices/Application** and **run any program** till the point you wanna **Snapshot the Virtual Machine**.
3. **Right Click** on the Virtual Machine and **Select Snapshot** option as shown in the Figure 2 below.
4. The **Snapshot of the Virtual Machine** will be done and VM can be recovered to this state at any point of time



⇒ Once the Snapshot is taken it can be seen and access by Right Clicking VM → Snapshot → (Snapshot Taken)

⇒ On Clicking the Existing Snapshot the Virtual Machine will get back to Checkpoint State.



- Snapshot can be taken directly by clicking on the icons marked in the above figure.



⇒ To take snapshot of Existing Virtual Machine.



⇒ Revert Back to the Snapshot taken previously



⇒ To Manage the snapshots of Virtual Machine.

DELETING THE VIRTUAL MACHINE

⇒ Steps for Deleting a Virtual Machine from Disk

1. Right Click on the Virtual Machine one wanna delete/remove.
2. Scroll Down toward Remove Option
3. On Clicking the Remove option, Remove VM dialog box will pop-up
4. Finally, the Remove option will delete the Virtual Machine as shown in the snapshot below.

