

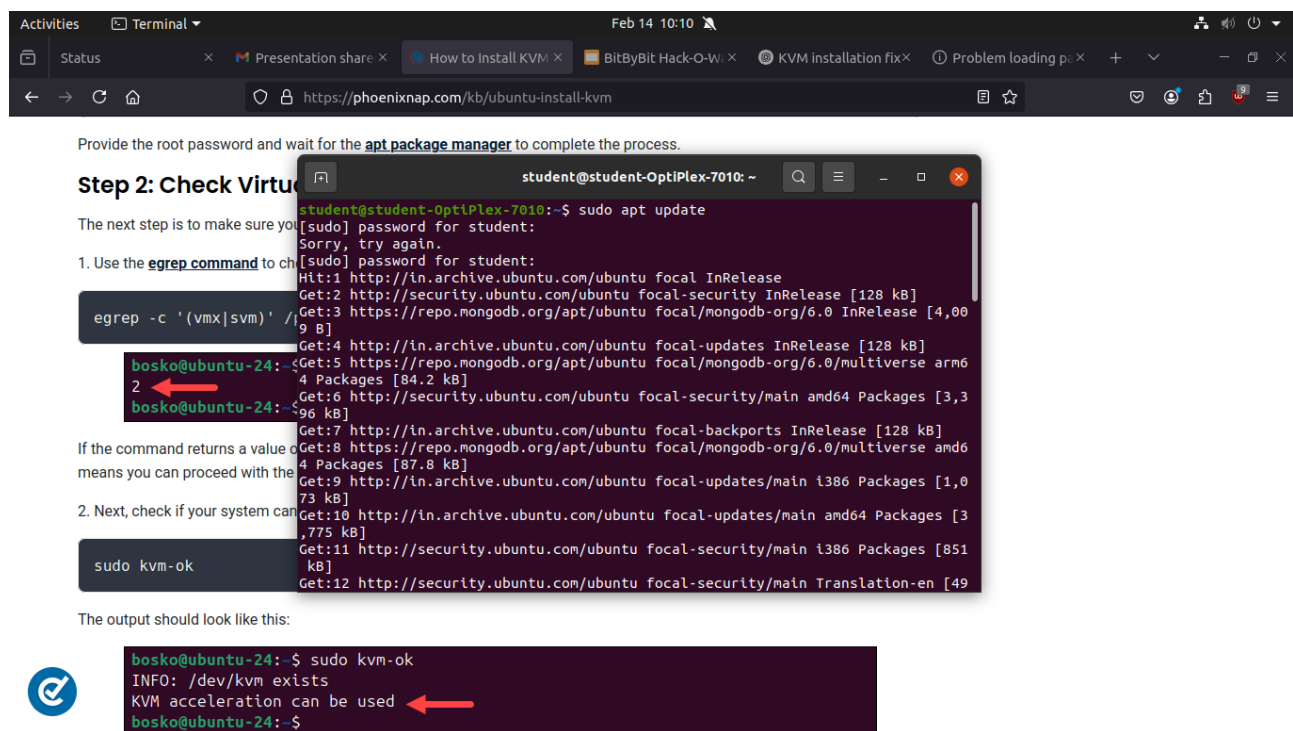
## ASSIGNMENT NO. 2

### Install KVM on Ubuntu

#### Step 1: Update Ubuntu

Run the command below:

```
sudo apt update
```



The screenshot shows a terminal window with the following output:

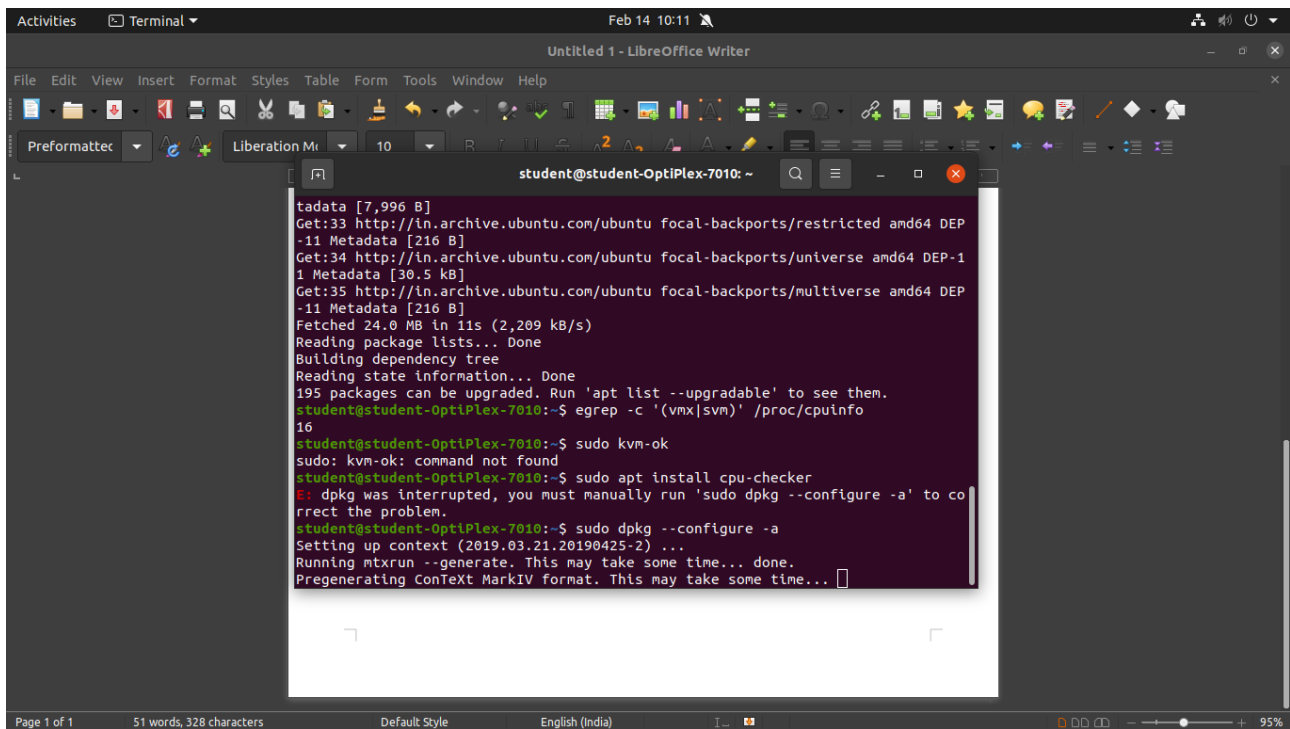
```
student@student-OptiPlex-7010: ~  
student@student-OptiPlex-7010:~$ sudo apt update  
[sudo] password for student:  
Sorry, try again.  
[sudo] password for student:  
Hit:1 http://ln.archive.ubuntu.com/ubuntu focal InRelease  
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [128 kB]  
Get:3 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/6.0 InRelease [4,009 B]  
Get:4 http://ln.archive.ubuntu.com/ubuntu focal-updates InRelease [128 kB]  
Get:5 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/6.0/multiverse arm64 Packages [84.2 kB]  
Get:6 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [3,396 kB]  
Get:7 http://ln.archive.ubuntu.com/ubuntu focal-backports InRelease [128 kB]  
Get:8 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/6.0/multiverse amd64 Packages [87.8 kB]  
Get:9 http://ln.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [1,073 kB]  
Get:10 http://ln.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [3,775 kB]  
Get:11 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [851 kB]  
Get:12 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [49 B]  
2  
bosko@ubuntu-24:~$ sudo kvm-ok  
INFO: /dev/kvm exists  
KVM acceleration can be used  
bosko@ubuntu-24:~$
```

The output of the `egrep -c '(vmx|svm)' /proc/cpuinfo` command is shown as `2`, indicating that KVM acceleration is supported.

#### Step 2: Check Virtualization Support on Ubuntu:

1. Use the [egrep command](#) to check if your [CPU](#) supports hardware virtualization.  
Run the following command:

```
egrep -c '(vmx|svm)' /proc/cpuinfo
```

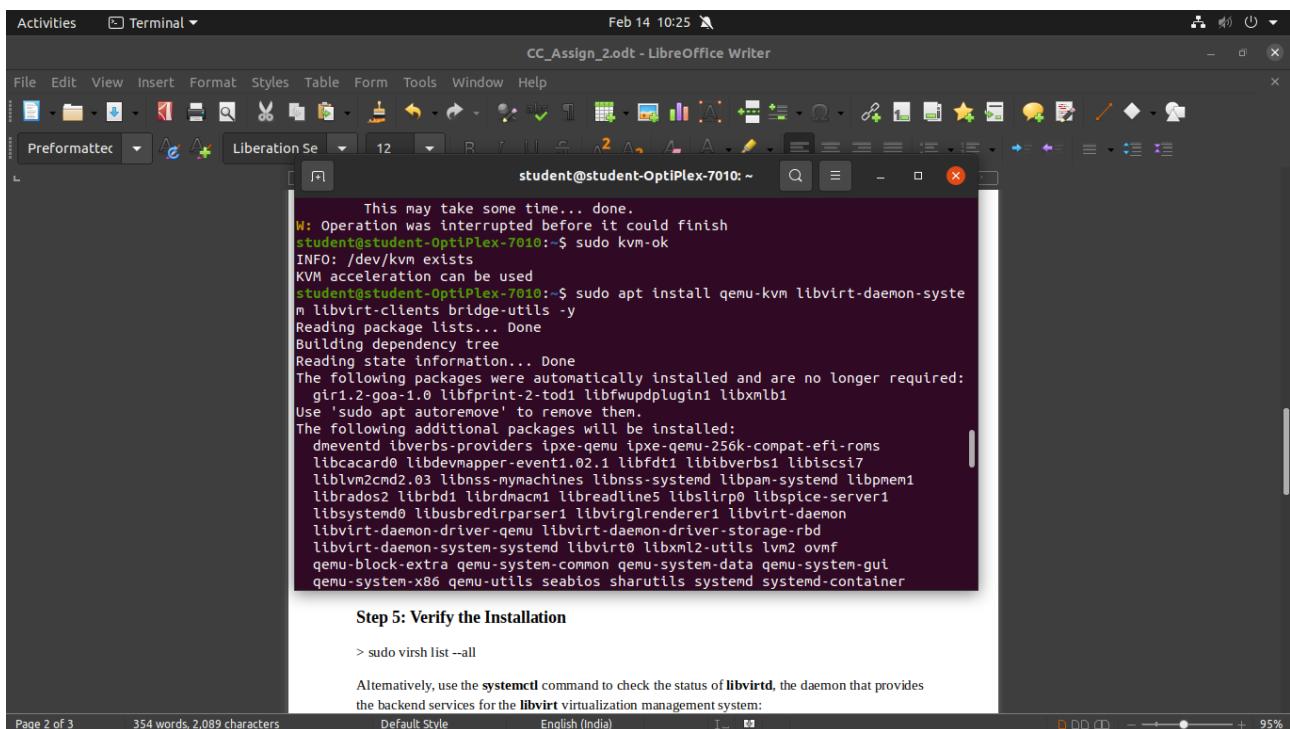


. Next, check if your system can use KVM acceleration:

```
sudo kvm-ok
```

### Step 3: Install KVM Packages

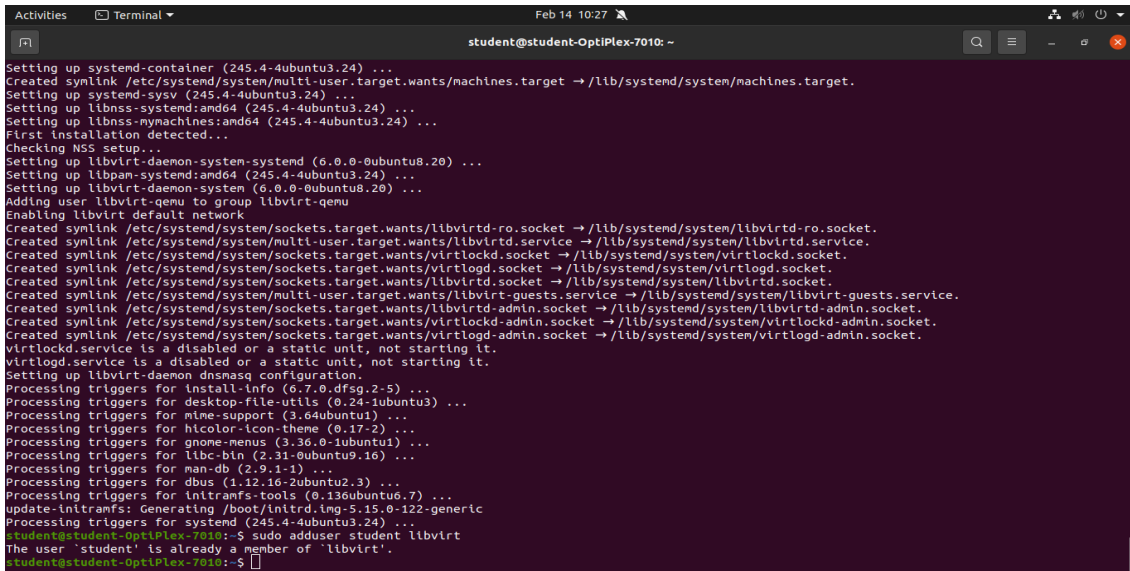
```
sudo apt install qemu-kvm libvirt-daemon-system libvirt-clients bridge-utils -y
```



## Step 4: Authorize Users

### 1. Add the user you want to run the virtual machines to the `libvirt` group:

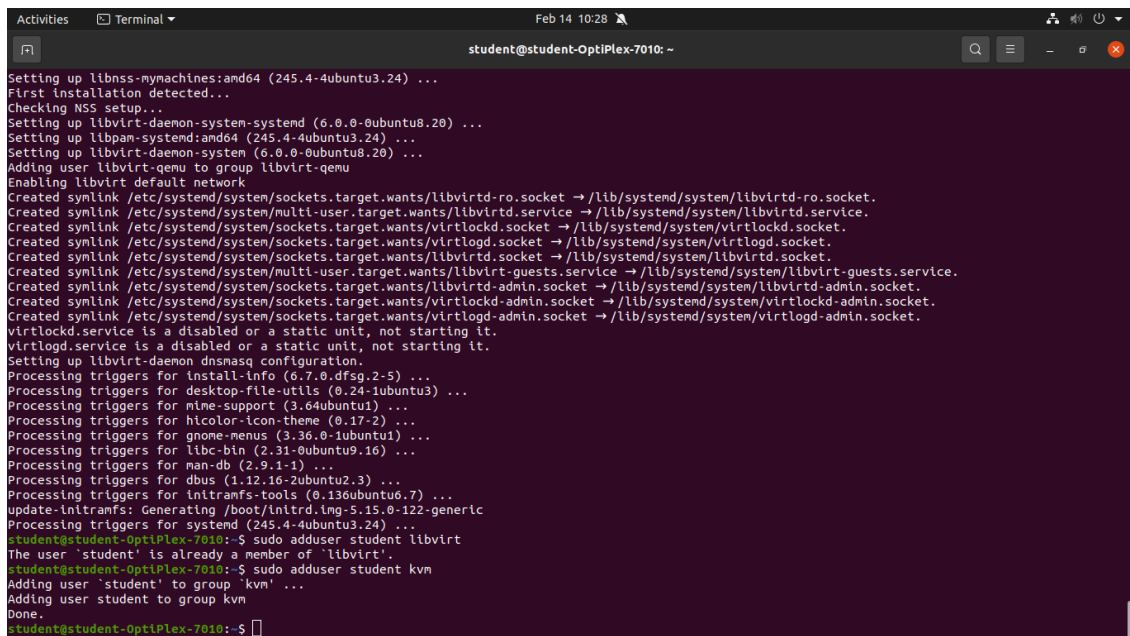
> `sudo adduser [username] libvirt`

A terminal window titled 'student@student-OptiPlex-7010: ~' showing the output of various system configuration commands. The output includes setting up system containers, creating symlinks for system targets, adding the user 'student' to the 'libvirt' group, and enabling the libvirt default network. The user 'student' is confirmed to be a member of the 'libvirt' group.

```
Setting up systemd-container (245.4-4ubuntu3.24) ...
Created symlink /etc/systemd/system/multi-user.target.wants/machines.target → /lib/systemd/system/machines.target.
Setting up systemd-sysv (245.4-4ubuntu3.24) ...
Setting up libnss-systemd:amd64 (245.4-4ubuntu3.24) ...
Setting up libnss-mymachines:amd64 (245.4-4ubuntu3.24) ...
First installation detected...
Checking NSS setup...
Setting up libvirt-daemon-system-systemd (6.0.0-0ubuntu8.20) ...
Setting up libpam-systemd:amd64 (245.4-4ubuntu3.24) ...
Setting up libvirt-daemon-system (6.0.0-0ubuntu8.20) ...
Adding user libvirt-qemu to group libvirt-qemu
Enabling libvirt default network
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd-ro.socket → /lib/systemd/system/libvirtd-ro.socket.
Created symlink /etc/systemd/system/multi-user.target.wants/libvirtd.service → /lib/systemd/system/libvirtd.service.
Created symlink /etc/systemd/system/sockets.target.wants/virtlockd.socket → /lib/systemd/system/virtlockd.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlogd.socket → /lib/systemd/system/virtlogd.socket.
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd.socket → /lib/systemd/system/libvirtd.socket.
Created symlink /etc/systemd/system/multi-user.target.wants/libvirt-guests.service → /lib/systemd/system/libvirt-guests.service.
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd-admin.socket → /lib/systemd/system/libvirtd-admin.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlockd-admin.socket → /lib/systemd/system/virtlockd-admin.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlogd-admin.socket → /lib/systemd/system/virtlogd-admin.socket.
virtlockd.service is a disabled or a static unit, not starting it.
virtlogd.service is a disabled or a static unit, not starting it.
Setting up libvirt-daemon dnsmasq configuration.
Processing triggers for install-info (6.7.0.dfsg.2-5) ...
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.16) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for dbus (1.12.16-2ubuntu2.3) ...
Processing triggers for initramfs-tools (0.136ubuntu6.7) ...
update-initramfs: Generating /boot/initrd.img-5.15.0-122-generic
Processing triggers for systemd (245.4-4ubuntu3.24) ...
student@student-OptiPlex-7010:~$ sudo adduser student libvirt
The user 'student' is already a member of 'libvirt'.
student@student-OptiPlex-7010:~$
```

### 2. Next, do the same for the `kvm` group:

> `sudo adduser [username] kvm`

A terminal window titled 'student@student-OptiPlex-7010: ~' showing the output of the 'sudo adduser student kvm' command. The output indicates that the user 'student' is already a member of the 'libvirt' group and is now being added to the 'kvm' group.

```
Setting up libnss-mymachines:amd64 (245.4-4ubuntu3.24) ...
First installation detected...
Checking NSS setup...
Setting up libvirt-daemon-system-systemd (6.0.0-0ubuntu8.20) ...
Setting up libpam-systemd:amd64 (245.4-4ubuntu3.24) ...
Setting up libvirt-daemon-system (6.0.0-0ubuntu8.20) ...
Adding user libvirt-qemu to group libvirt-qemu
Enabling libvirt default network
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd-ro.socket → /lib/systemd/system/libvirtd-ro.socket.
Created symlink /etc/systemd/system/multi-user.target.wants/libvirtd.service → /lib/systemd/system/libvirtd.service.
Created symlink /etc/systemd/system/sockets.target.wants/virtlockd.socket → /lib/systemd/system/virtlockd.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlogd.socket → /lib/systemd/system/virtlogd.socket.
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd.socket → /lib/systemd/system/libvirtd.socket.
Created symlink /etc/systemd/system/multi-user.target.wants/libvirt-guests.service → /lib/systemd/system/libvirt-guests.service.
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd-admin.socket → /lib/systemd/system/libvirtd-admin.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlockd-admin.socket → /lib/systemd/system/virtlockd-admin.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlogd-admin.socket → /lib/systemd/system/virtlogd-admin.socket.
virtlockd.service is a disabled or a static unit, not starting it.
virtlogd.service is a disabled or a static unit, not starting it.
Setting up libvirt-daemon dnsmasq configuration.
Processing triggers for install-info (6.7.0.dfsg.2-5) ...
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.16) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for dbus (1.12.16-2ubuntu2.3) ...
Processing triggers for initramfs-tools (0.136ubuntu6.7) ...
update-initramfs: Generating /boot/initrd.img-5.15.0-122-generic
Processing triggers for systemd (245.4-4ubuntu3.24) ...
student@student-OptiPlex-7010:~$ sudo adduser student libvirt
The user 'student' is already a member of 'libvirt'.
student@student-OptiPlex-7010:~$ sudo adduser student kvm
Adding user 'student' to group 'kvm' ...
Adding user student to group kvm
Done.
student@student-OptiPlex-7010:~$
```

## Step 5: Verify the Installation

> sudo virsh list --all

```
Activities Terminal Feb 14 10:29 student@student-OptiPlex-7010: ~
Setting up libpam-systemd:amd64 (245.4-4ubuntu3.24) ...
Setting up libvirt-daemon-system (6.0.0-0ubuntu0.20) ...
Adding user libvirt-qemu to group libvirt-qemu
Enabling libvirt default network
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd-ro.socket → /lib/systemd/system/libvirtd-ro.socket.
Created symlink /etc/systemd/system/multi-user.target.wants/libvirtd.service → /lib/systemd/system/libvirtd.service.
Created symlink /etc/systemd/system/sockets.target.wants/virtlockd.socket → /lib/systemd/system/virtlockd.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlogd.socket → /lib/systemd/system/virtlogd.socket.
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd.socket → /lib/systemd/system/libvirtd.socket.
Created symlink /etc/systemd/system/multi-user.target.wants/libvirt-guests.service → /lib/systemd/system/libvirt-guests.service.
Created symlink /etc/systemd/system/sockets.target.wants/libvirtd-admin.socket → /lib/systemd/system/libvirtd-admin.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlockd-admin.socket → /lib/systemd/system/virtlockd-admin.socket.
Created symlink /etc/systemd/system/sockets.target.wants/virtlogd-admin.socket → /lib/systemd/system/virtlogd-admin.socket.
virtlogd.service is a disabled or a static unit, not starting it.
Setting up libvirt-daemon dnsmasq configuration.
Processing triggers for install-info (6.7.0.dfsg.2-5) ...
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.14) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for dbus (1.12.16-2ubuntu2.3) ...
Processing triggers for initramfs-tools (0.136ubuntu6.7) ...
update-initramfs: Generating /boot/initrd.img-5.15.0-122-generic
Processing triggers for systemd (245.4-4ubuntu3.24) ...
student@student-OptiPlex-7010:~$ sudo adduser student libvirt
The user 'student' is already a member of 'libvirt'.
student@student-OptiPlex-7010:~$ sudo adduser student kvm
Adding user 'student' to group 'kvm' ...
Adding user student to group kvm
Done.
student@student-OptiPlex-7010:~$ sudo virsh list --all
Id Name State
-----
student@student-OptiPlex-7010:~$
```

Alternatively, use the **systemctl** command to check the status of **libvirtd**, the daemon that provides the backend services for the **libvirt** virtualization management system:

> sudo systemctl status libvirtd

```
Activities Terminal Feb 14 10:36 student@student-OptiPlex-7010: ~
student@student-OptiPlex-7010:~$ sudo adduser student libvirt
The user 'student' is already a member of 'libvirt'.
student@student-OptiPlex-7010:~$ sudo adduser student kvm
Adding user 'student' to group 'kvm' ...
Adding user student to group kvm
Done.
student@student-OptiPlex-7010:~$ sudo virsh list --all
Id Name State
-----
student@student-OptiPlex-7010:~$ sudo systemctl status libvirtd
● libvirtd.service - Virtualization daemon
   Loaded: loaded (/lib/systemd/system/libvirtd.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2025-02-14 10:26:21 IST; 9min ago
     TriggeredBy: ● libvirtd-ro.socket
                  ● libvirtd-admin.socket
                  ● libvirtd.socket
     Docs: man:libvirtd(8)
           https://libvirt.org
    Main PID: 14203 (libvirtd)
      Tasks: 19 (limit: 32768)
     Memory: 12.9M
    CGroup: /system.slice/libvirtd.service
            └─14203 /usr/sbin/libvirtd
              └─14509 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt_leases
                └─14510 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt_leases

Feb 14 10:26:21 student-OptiPlex-7010 systemd[1]: Started Virtualization daemon.
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq[14509]: started, version 2.90 cachesize 150
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq[14509]: compile time options: IPv6 GNU-getopt DBus no-UBus i18n IDN DHCP DHCPv6 no-Lua TFTP contrack i
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq-dhcp[14509]: DHCP, IP range 192.168.122.2 -- 192.168.122.254, lease time 1h
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq-dhcp[14509]: DHCP, sockets bound exclusively to interface virbr0
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq[14509]: reading /etc/resolv.conf
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq[14509]: using nameserver 127.0.0.53#53
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq[14509]: read /etc/hosts - 8 names
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq[14509]: read /var/lib/libvirt/dnsmasq/default.addnhosts - 0 names
Feb 14 10:26:24 student-OptiPlex-7010 dnsmasq-dhcp[14509]: read /var/lib/libvirt/dnsmasq/default.hostsfile
lines 1-26/26 (END)
```

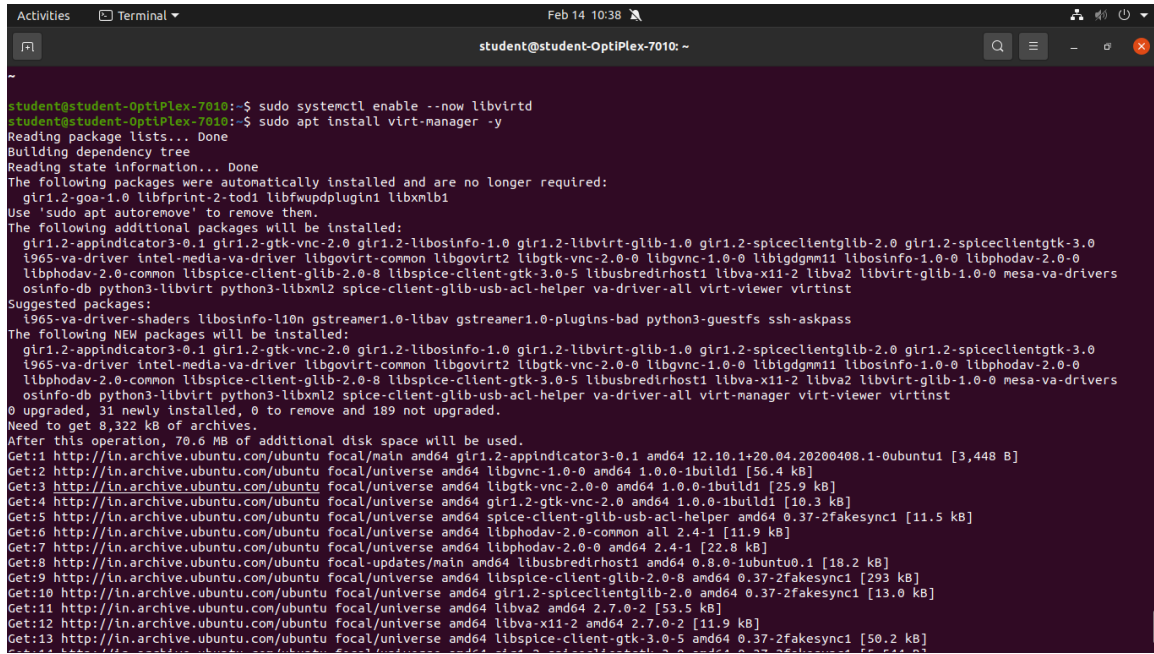
If the virtualization daemon is not active, activate it with the following command:

sudo systemctl enable --now libvirtd

# Create Virtual Machine on Ubuntu

install **virt-manager**, a tool for creating and managing VMs:

>sudo apt install virt-manager -y



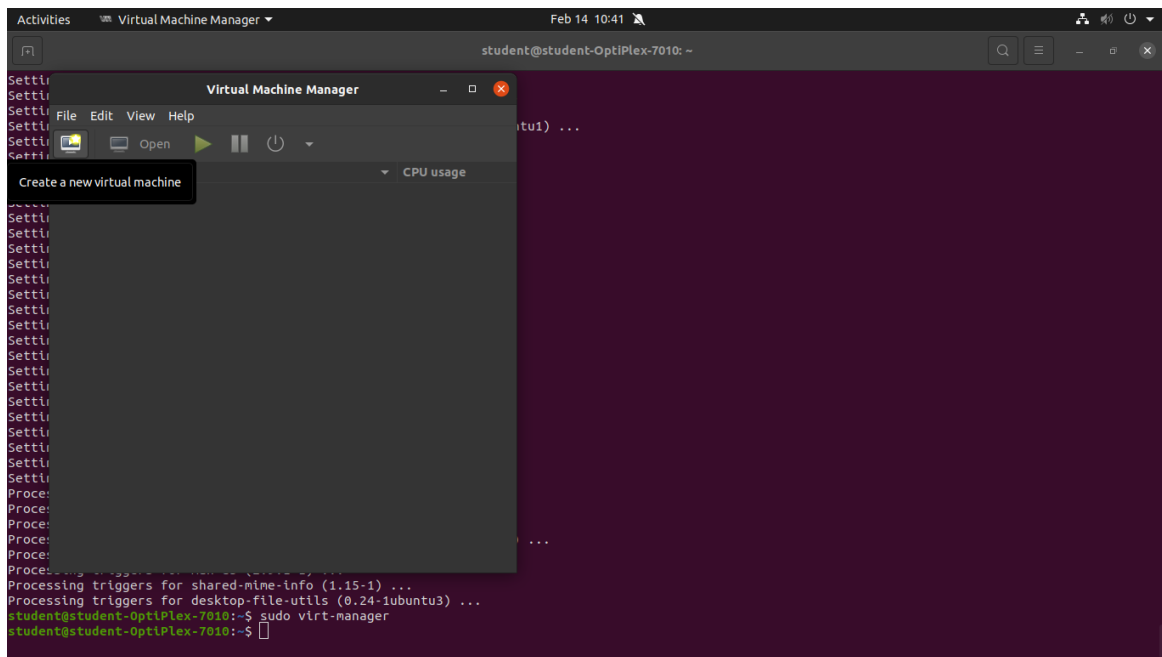
```
student@student-OptiPlex-7010:~$ sudo systemctl enable --now libvirt
student@student-OptiPlex-7010:~$ sudo apt install virt-manager -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  gir1.2-goa-1.0 libfprint-2-tod1 libfwupdplugin1 libxmb1
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  gir1.2-appindicator3-0.1 gir1.2-gtk-vnc-2.0 gir1.2-libosinfo-1.0 gir1.2-libvirt-glib-1.0 gir1.2-spiceclientglib-2.0 gir1.2-spiceclientgtk-3.0
  i965-vd-driver intel-media-vd-driver libgovirt-common libgovirt2 libgtk-vnc-2.0-0 libgvnc-1.0-0 libigdgmm11 libosinfo-1.0-0 libphodav-2.0-0
  libphodav-2.0-common libspice-client-glib-2.0-8 libspice-client-gtk-3.0-5 libusbredirhost1 libva-x11-2 libva2 libvirt-glib-1.0-0 mesa-va-drivers
  osinfo-db python3-libvirt python3-libxml2 spice-client-glib-usb-acl-helper va-driver-all virt-viewer virtinst
Suggested packages:
  i965-va-driver-shaders libosinfo-l10n gstreamer1.0-libav gstreamer1.0-plugins-bad python3-guestfs ssh-askpass
The following NEW packages will be installed:
  gir1.2-appindicator3-0.1 gir1.2-gtk-vnc-2.0 gir1.2-libosinfo-1.0 gir1.2-libvirt-glib-1.0 gir1.2-spiceclientglib-2.0 gir1.2-spiceclientgtk-3.0
  i965-va-driver intel-media-vd-driver libgovirt-common libgovirt2 libgtk-vnc-2.0-0 libgvnc-1.0-0 libigdgmm11 libosinfo-1.0-0 libphodav-2.0-0
  libphodav-2.0-common libspice-client-glib-2.0-8 libspice-client-gtk-3.0-5 libusbredirhost1 libva-x11-2 libva2 libvirt-glib-1.0-0 mesa-va-drivers
  osinfo-db python3-libvirt python3-libxml2 spice-client-glib-usb-acl-helper va-driver-all virt-viewer virtinst
0 upgraded, 31 newly installed, 0 to remove and 189 not upgraded.
Need to get 8,322 kB of archives.
After this operation, 70.6 MB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 gir1.2-appindicator3-0.1 amd64 12.10.1+20.04.20200408.1-0ubuntu1 [3,448 B]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libgvnc-1.0-0 amd64 1.0.0-1build1 [56.4 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libgtk-vnc-2.0-0 amd64 1.0.0-1build1 [25.9 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 gir1.2-gtk-vnc-2.0 amd64 1.0.0-1build1 [10.3 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 spice-client-glib-usb-acl-helper amd64 0.37-2fakesync1 [11.5 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libphodav-2.0-common all 2.4-1 [11.9 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libphodav-2.0-0 amd64 2.4-1 [22.8 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 libusbredirhost1 amd64 0.8.0-1ubuntu0.1 [18.2 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libspice-client-glib-2.0-8 amd64 0.37-2fakesync1 [293 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 gir1.2-spiceclientglib-2.0 amd64 0.37-2fakesync1 [13.0 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libva2 amd64 2.7.0-2 [53.5 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libva-x11-2 amd64 2.7.0-2 [11.9 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libspice-client-gtk-3.0-5 amd64 0.37-2fakesync1 [50.2 kB]
```

## Method 1: Virt Manager GUI

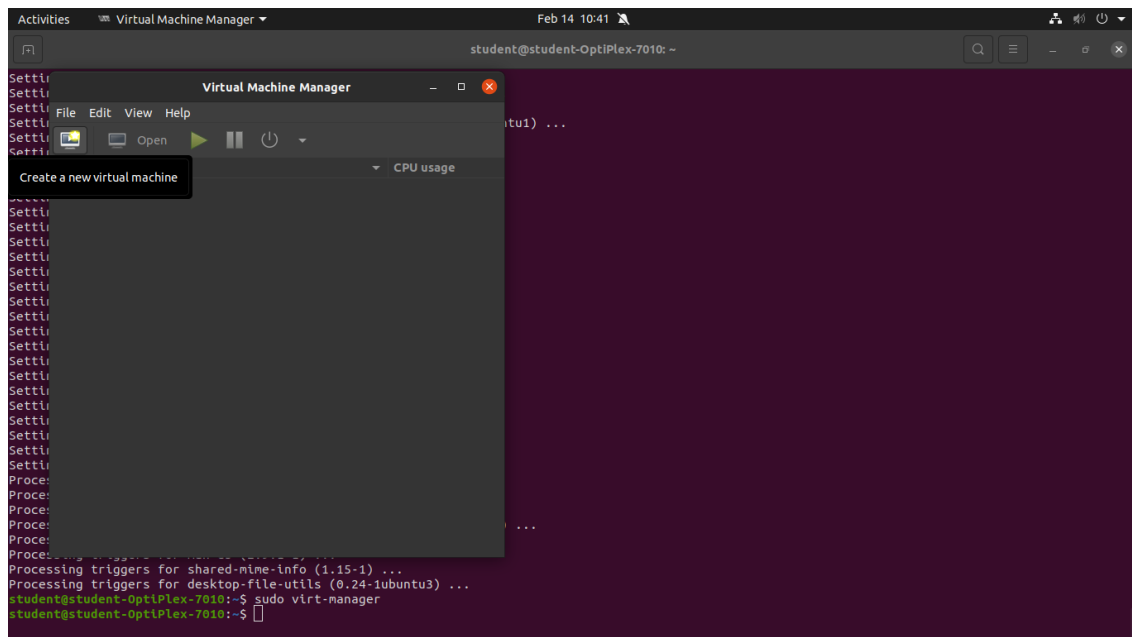
Virt-manager is a [graphical user interface](#) tool for managing virtual machines, allowing users to create, configure, and control VMs using **libvirt**. Follow the steps below:

1. Start **virt-manager** by running the command below:

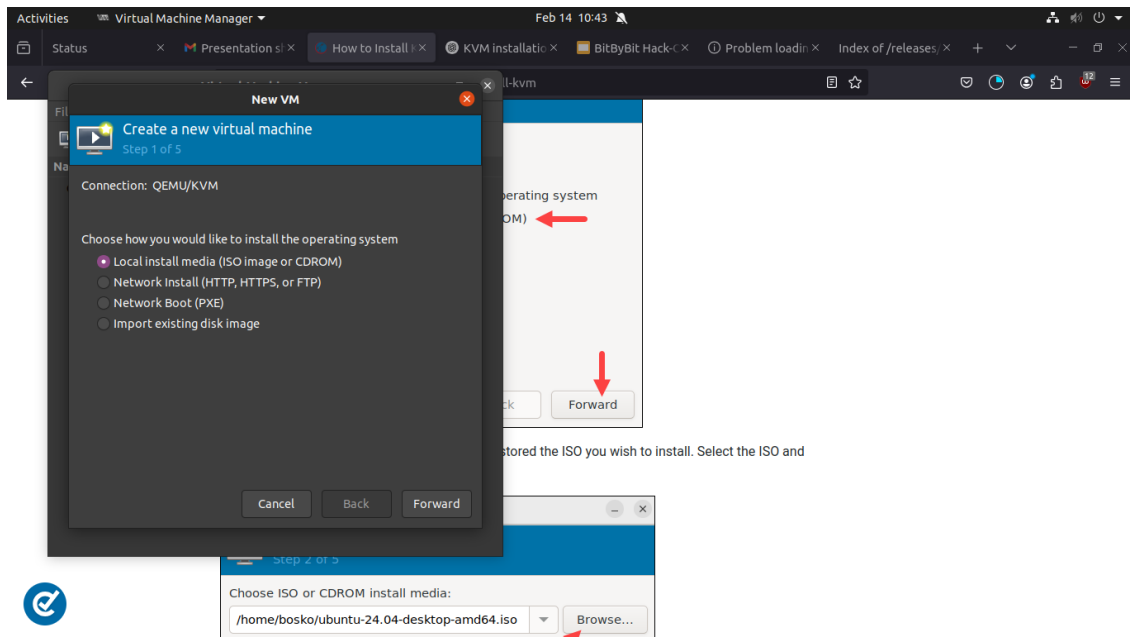
```
sudo virt-manager
```



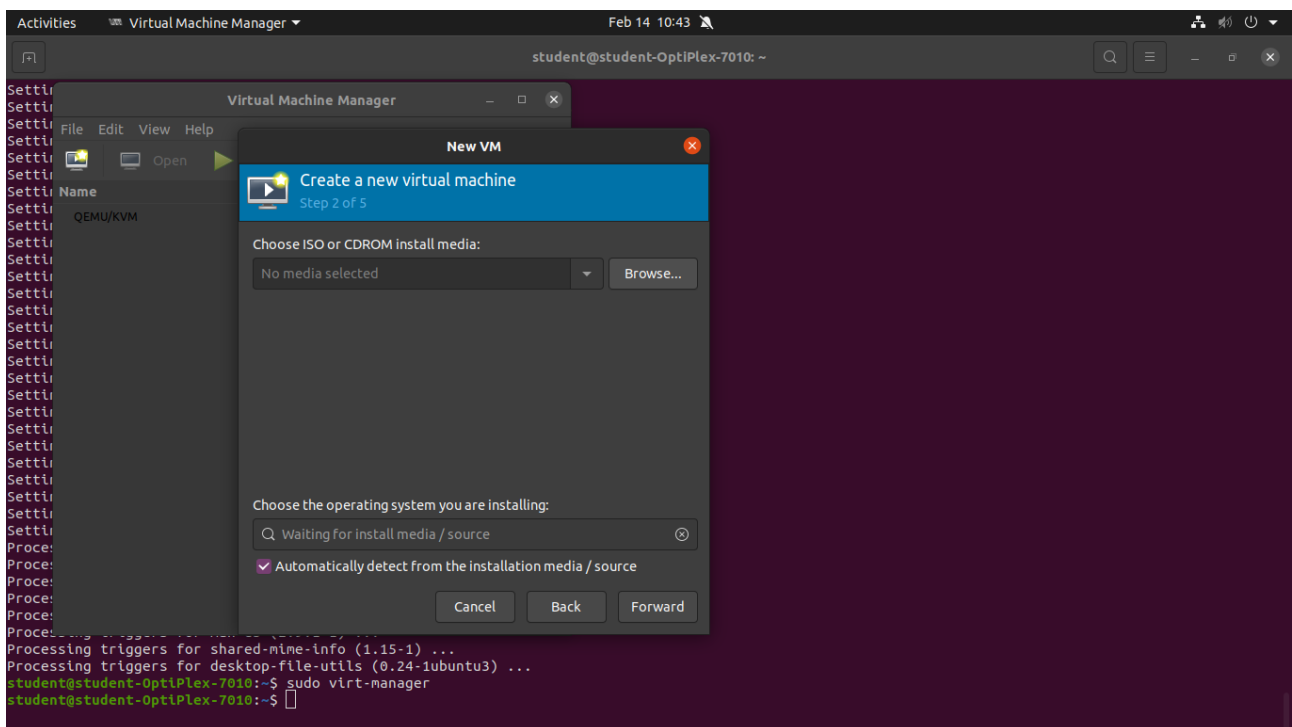
2. In the Virtual Machine Manager window, click the computer icon in the upper-left corner to create a new VM



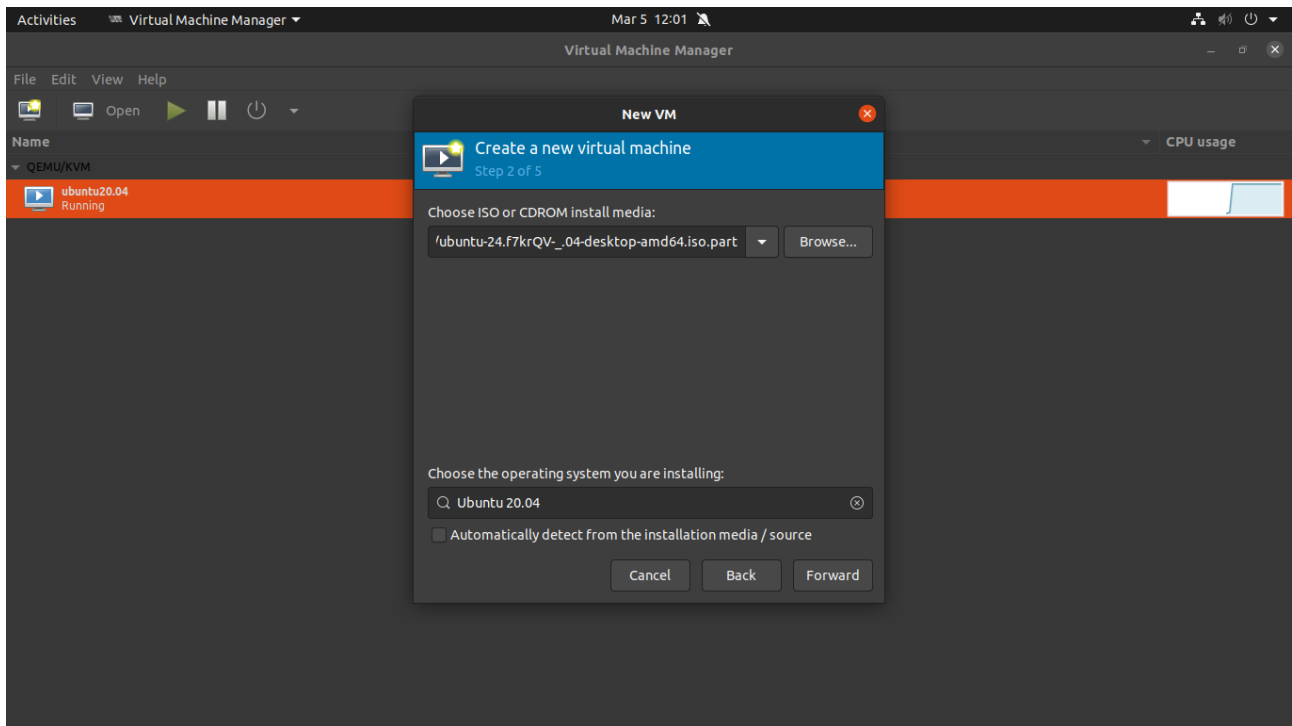
3. Select the option to install the VM using an ISO image and click **Forward**.



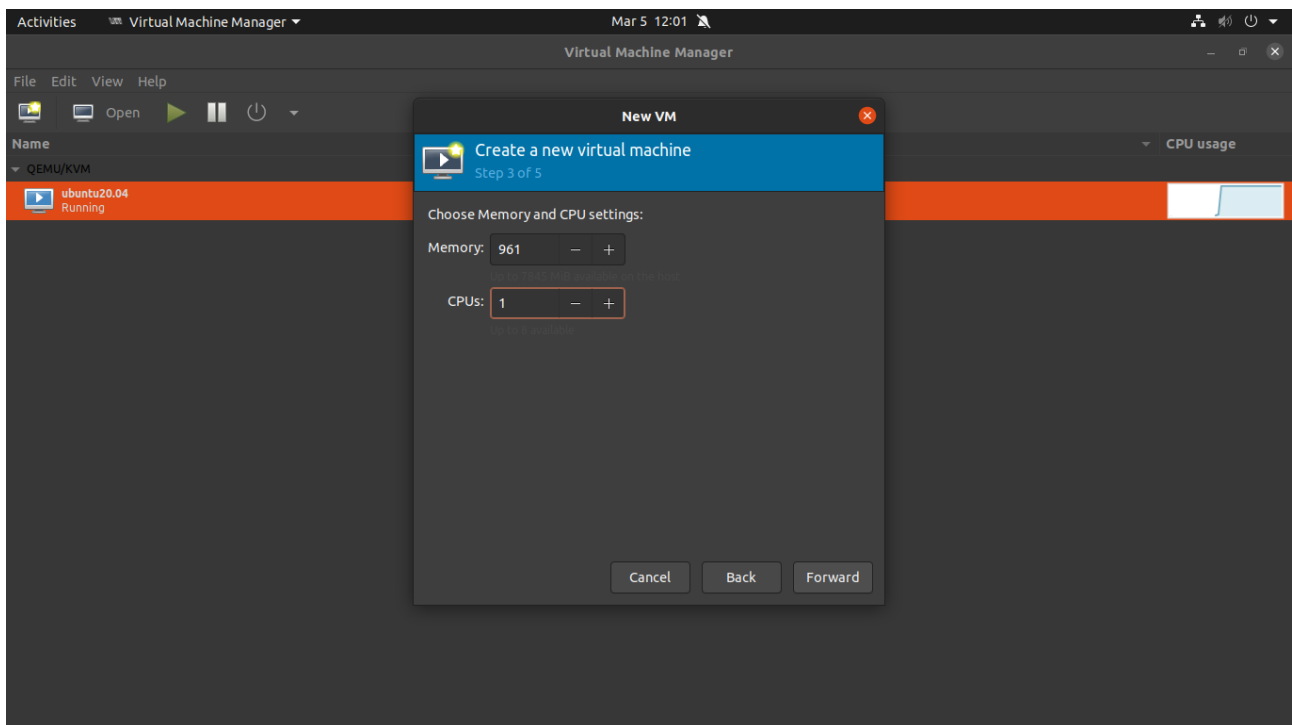
4. In the next dialogue, click **Browse...** and navigate to the path where you stored the ISO you wish to install. Select the ISO and click **Forward** to continue.



5. Enter the amount of RAM and the number of CPUs you wish to allocate to the VM and click **Forward** to proceed to the next step.



6. Allocate sufficient hard disk space to the VM. Click **Forward** to go to the last step.



7. Specify the name for your VM and click **Finish** to complete the setup.



