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Roll No: 83

1. Prerequisites

- Ubuntu system
- Sudo/root access

2. Install Required Packages

Open terminal and run:

`sudo apt update`

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

- `qemu-kvm`: KVM hypervisor
- `libvirt-daemon-system` & `libvirt-clients`: For managing VMs with `libvirtd`
- `bridge-utils`: To manage network bridges
- `virt-manager`: GUI to manage VMs

3. Enable and Start libvirtd

`sudo systemctl enable libvirtd`

`sudo systemctl start libvirtd`

`sudo systemctl status libvirtd`

Check libvirt is active.

4. Add User to libvirt and kvm Groups

`sudo usermod -aG libvirt $(whoami)`

`sudo usermod -aG kvm $(whoami)`

Logout and login again or reboot for group changes to take effect.

5. Create a Network Bridge on the Host

You need to bridge your physical network interface (e.g., `eth0` or `enp3s0`) to a new bridge interface (e.g., `br0`).

For Ubuntu 18.04/20.04 using netplan:

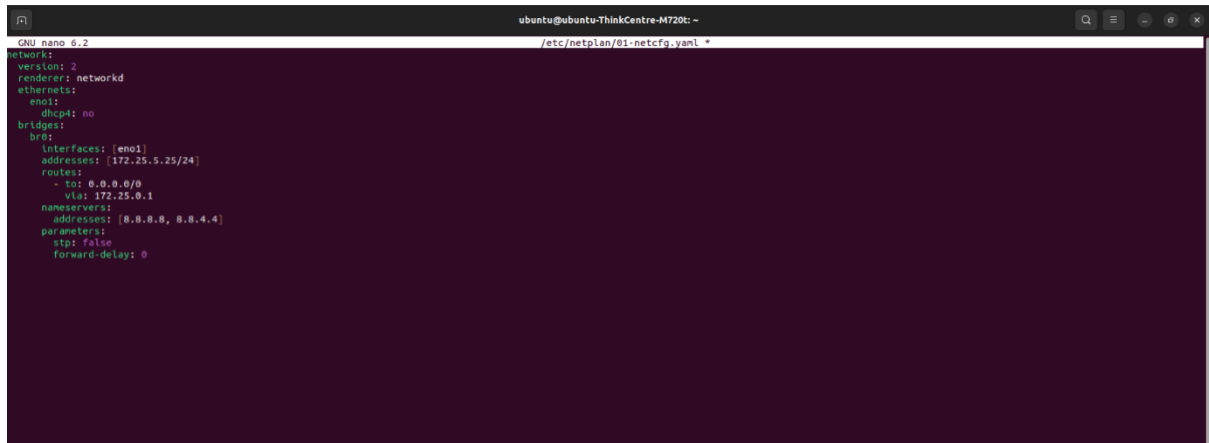
Check your current interface name:

`ip link`

Assuming your interface is `enp3s0`, create or edit netplan config:

`sudo nano /etc/netplan/01-netcfg.yaml`

Replace with:



```
GNU nano 6.2 /etc/netplan/01-netcfg.yaml
network:
  version: 2
  renderer: networkd
  ethernets:
    eno1:
      dhcp4: no
  bridges:
    br0:
      interfaces: [eno1]
      addresses: [172.25.5.25/24]
      routes:
        - to: 0.0.0.0/0
          via: 172.25.0.1
      nameservers:
        addresses: [8.8.8.8, 8.8.4.4]
      parameters:
        stp: false
        forward-delay: 0
```

Save and apply changes:

`sudo netplan apply`

Check bridge is up:

`ip addr show br0`

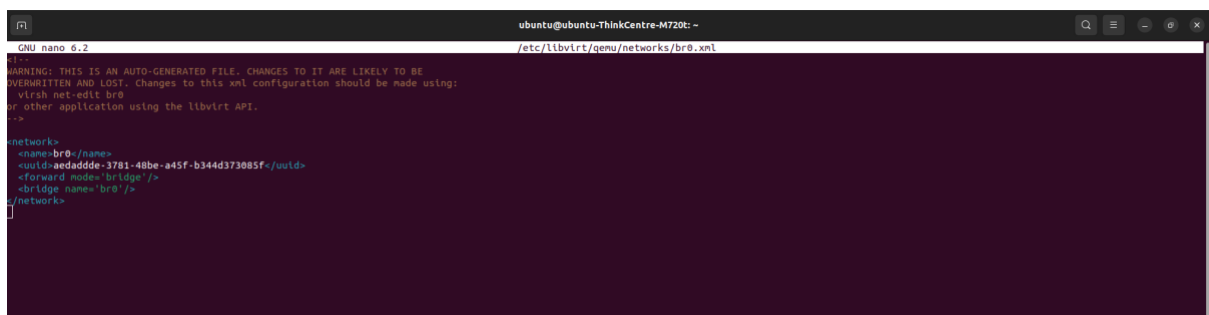
br0 should have your IP address, and enp3s0 should be without IP.

6. Configure libvirt to Use the Bridge

Create a bridge network XML file for libvirt.

`sudo nano /etc/libvirt/qemu/networks/br0.xml`

Paste:



```
GNU nano 6.2 /etc/libvirt/qemu/networks/br0.xml
WARNING: THIS IS AN AUTO-GENERATED FILE. CHANGES TO IT ARE LIKELY TO BE
OVERWRITTEN AND LOST. Changes to this xml configuration should be made using:
virsh net-edit br0
or other application using the libvirt API.
--
<network>
  <name>br0</name>
  <uuid>aedaddde-3781-48be-a45f-b344d373085f</uuid>
  <forward mode='bridge' />
  <bridge name='br' />
</network>
```

Define and start the network:

`sudo virsh net-define /etc/libvirt/qemu/networks/br0.xml`

`sudo virsh net-start br0`

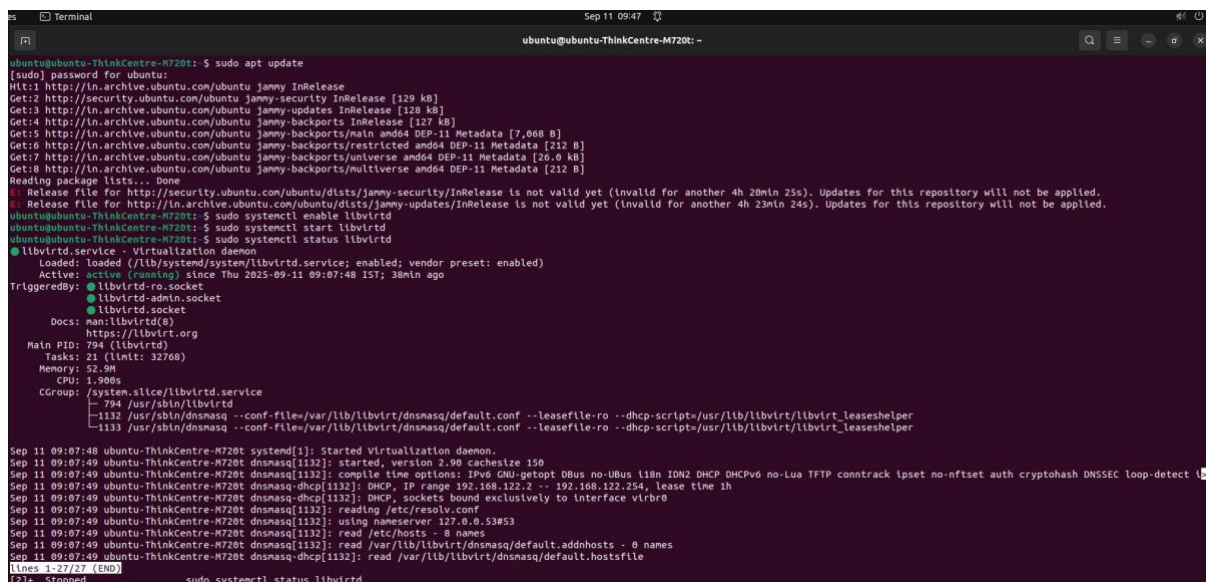
`sudo virsh net-autostart br0`

7. Create Virtual Machine Using virt-manager

1. Run:
virt-manager
2. Create a new VM with desired OS ISO.
3. Under "Network selection," choose "Specify shared device name" and enter br0.
4. For paravirtualization support, set **Firmware** to **UEFI** (optional) and CPU model to **host-passthrough** in VM settings.
5. Under "Performance" tab, select **VirtIO** for network and disk devices (paravirtualized drivers).
6. Complete VM installation.

8. Verify VM Network & Internet Access

- Start VM.
- Check IP inside VM using:
ip addr show
- Ping outside network
- Open a browser inside VM to verify internet.



```
ubuntu@ubuntu-ThinkCentre-M720t: ~$ sudo apt update
[sudo] password for ubuntu:
Hit:1 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease [127 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu jammy-backports/main amd64 DEP-11 Metadata [7,868 B]
Get:6 http://in.archive.ubuntu.com/ubuntu jammy-backports/restricted amd64 DEP-11 Metadata [212 B]
Get:7 http://in.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 DEP-11 Metadata [26.0 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu jammy-backports/multiverse amd64 DEP-11 Metadata [212 B]
Reading package lists... Done
! Release file for http://security.ubuntu.com/ubuntu/dists/jammy-security/InRelease is not valid yet (invalid for another 4h 20min 25s). Updates for this repository will not be applied.
! Release file for http://in.archive.ubuntu.com/ubuntu/dists/jammy-updates/InRelease is not valid yet (invalid for another 4h 23min 24s). Updates for this repository will not be applied.
ubuntu@ubuntu-ThinkCentre-M720t: ~$ sudo systemctl enable libvirt
ubuntu@ubuntu-ThinkCentre-M720t: ~$ sudo systemctl start libvirt
ubuntu@ubuntu-ThinkCentre-M720t: ~$ sudo systemctl status libvirt
● libvirt.service - Virtualization daemon
   Loaded: loaded (/lib/systemd/system/libvirt.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2025-09-11 09:07:48 IST; 38min ago
     TriggeredBy: ● libvirt-ro.socket
                  ● libvirt-admin.socket
                  ● libvirt.socket
    Docs: man:libvirt(8)
          https://libvirt.org
   Main PID: 794 (libvirt)
     Tasks: 21 (limit: 32768)
    Memory: 52.9M
       CPU: 1.900s
   CGroup: /system.slice/libvirt.service
           └─ 794 /usr/sbin/libvirt
              └─ 1132 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt_leaseshelper
              └─ 1133 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt_leaseshelper

Sep 11 09:07:48 ubuntu-ThinkCentre-M720t systemd[1]: Started Virtualization daemon.
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq[1132]: started, version 2.90 cachesize 150
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq[1132]: compile time options: IPset GNU-getopt DBus no-UBus libn IDN2 DHCP DHCPv6 no-Lua TFTP contrack ipset no-nftset auth cryptohash DNSSEC loop-detect
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq-dhcp[1132]: DHCP, IP range 192.168.122.2 -- 192.168.122.254, lease time 1h
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq-dhcp[1132]: DHCP, sockets bound exclusively to interface vifbr0
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq[1132]: reading /etc/resolv.conf
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq[1132]: using nameserver 127.0.0.53#53
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq[1132]: read /etc/hosts - 8 names
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq[1132]: read /var/lib/libvirt/dnsmasq/default.addnhosts - 0 names
Sep 11 09:07:49 ubuntu-ThinkCentre-M720t dnsmasq-dhcp[1132]: read /var/lib/libvirt/dnsmasq/default.hostsfile
[lines 142/122 (END)]
[2]+  Stopped                  sudo systemctl status libvirt
```

```

ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo systemctl status libvirt
● libvirt.service - Virtualization daemon
   Loaded: loaded (/lib/systemd/system/libvirt.service; enabled; vendor preset: enabled)
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                └─ 1133 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt_leaseshelper

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lines 1-27/27 (END)
[2]+  Stopped                  sudo systemctl status libvirt
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo usermod -aG libvirt $(whoami)
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo usermod -aG kvm $(whoami)
ubuntu@ubuntu-ThinkCentre-M720t:~$ ip link
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: eno1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel master br0 state UP mode DEFAULT group default qlen 1000
    link/ether 00:d8:61:93:a6:a5 brd ff:ff:ff:ff:ff:ff
    altname enp0s31f6
3: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN mode DEFAULT group default qlen 1000
    link/ether 52:54:00:9f:d7:0c brd ff:ff:ff:ff:ff:ff
9: br0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP mode DEFAULT group default qlen 1000
    link/ether de:df:e8:46:59:54 brd ff:ff:ff:ff:ff:ff
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo nano /etc/netplan/01-netcfg.yaml

```

```

CPU: 1.900s
CGroup: /system.slice/libvirt.service
        └─ 794 /usr/sbin/libvirt
           └─ 1132 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt_leaseshelper
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    link/ether de:df:e8:46:59:54 brd ff:ff:ff:ff:ff:ff
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo nano /etc/netplan/01-netcfg.yaml
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo chmod 600 /etc/netplan/01-netcfg.yaml
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo netplan apply
ubuntu@ubuntu-ThinkCentre-M720t:~$ ip addr show br0
10: br0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default qlen 1000
    link/ether de:df:e8:46:59:54 brd ff:ff:ff:ff:ff:ff
    inet 172.25.5.25/24 brd 172.25.5.255 scope global noprefixroute br0
        valid_lft forever preferred_lft forever
    inet6 fe80::dcdf:e8ff:fe46:5954/64 scope link
        valid_lft forever preferred_lft forever
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo nano /etc/libvirt/qemu/networks/br0.xml
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo virsh net-define /etc/libvirt/qemu/networks/br0.xml
Network br0 defined from /etc/libvirt/qemu/networks/br0.xml

ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo virsh net-start br0
error: Failed to start network br0
error: Requested operation is not valid: network is already active

ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo virsh net-stop br0
error: unknown command: 'net-stop'
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo virsh net-autostart br0
Network br0 marked as autostarted

ubuntu@ubuntu-ThinkCentre-M720t:~$ virt-manager

```

```
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo systemctl start libvirt
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo systemctl status libvirt
● libvirt.service - Virtualization daemon
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   Active: active (running) since Thu 2025-09-11 09:07:48 IST; 38min ago
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                  ● libvirt-admin.socket
                  ● libvirt.socket
      Docs: man:libvirtd(8)
            https://libvirt.org
    Main PID: 794 (libvirtd)
       Tasks: 21 (limit: 32768)
      Memory: 52.9M
         CPU: 1.900s
      CGroup: /system.slice/libvirt.service
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lines 1-27/27 (END)
[2]+ Stopped sudo systemctl status libvirt
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo usermod -s libvirtd $(whoami)
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo usermod -s /bin/bash $(whoami)
ubuntu@ubuntu-ThinkCentre-M720t:~$ ip link
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: eno1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel master br0 state UP mode DEFAULT group default qlen 1000
    link/ether 00:d8:61:93:a0:a5 brd ff:ff:ff:ff:ff:ff
    altname enp331f6
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10: br0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default qlen 1000
    link/ether dc:df:e8:46:59:54 brd ff:ff:ff:ff:ff:ff
    inet 172.25.5.25/24 brd 172.25.5.255 scope global noprefixroute br0
        valid_lft forever preferred_lft forever
    inet6 fe80::dcdf:e8ff:fe46:5954/64 scope link
        valid_lft forever preferred_lft forever
ubuntu@ubuntu-ThinkCentre-M720t:~$ sudo nano /etc/libvirt/qemu/networks/br0.xml
```

