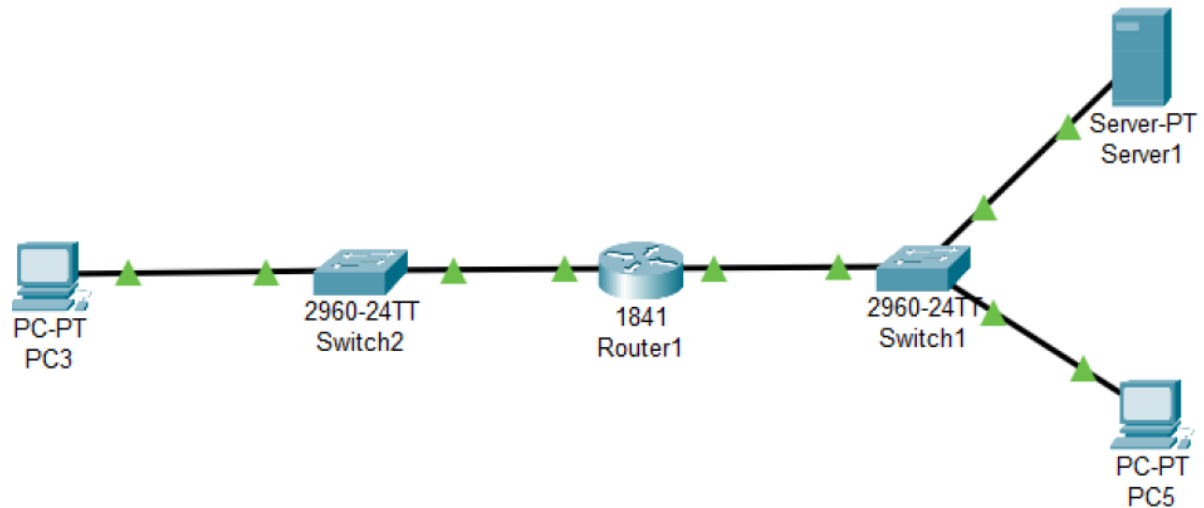# Coursework Portfolio 2
Sandbox Application

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Network diagram

Instructions:

Gateway Router:

- Router1> enable

- Router1# configure terminal

- Router1(config)# interface fastethernet 0/0

- Router1(config-if)# ip address 192.168.40.1 255.0.0.0

- Router1(config-if)# no shutdown

- Router1(config-if)# exit

- Router1(config)# interface serial 0/1

- Router1(config-if)# ip address 192.168.140.1 255.0.0.0

- Router1(config-if)# no shutdown

- Router1(config-if)# exit

Desktop (PC):

Instructions:

- Click the pc and open it to go to the desktop >IP configuration>change to static>set IP address.
- Set all pc for this
- Ping 192.168.40.1

```
cyber@cyber:~$ ping 192.168.40.2
PING 192.168.40.2 (192.168.40.2) 56(84) bytes of data.
64 bytes from 192.168.40.2: icmp_seq=1 ttl=64 time=1.17 ms
64 bytes from 192.168.40.2: icmp_seq=2 ttl=64 time=0.734 ms
64 bytes from 192.168.40.2: icmp_seq=3 ttl=64 time=1.11 ms
64 bytes from 192.168.40.2: icmp_seq=4 ttl=64 time=1.03 ms
64 bytes from 192.168.40.2: icmp_seq=5 ttl=64 time=0.984 ms
^C
--- 192.168.40.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4008ms
rtt min/avg/max/mdev = 0.734/1.007/1.172/0.151 ms
```
Screenshot

Application server:

Instructions:

Click the application server and open it to go to the desktop >IP configuration > change to static >set IP address.

Click the application server and open it to go to the service> click HTTP> turn on HTTP and HTTPS > add HTML page in application server.

Click the application server and open it to go to the desktop >web browser >type IP address 192.168.140.2

IP address table

Device	Role	IP address	Subnet mask
Desktop VM (ubuntu desktop)	Management	192.168.40.2	255.255.255.0
Gateway router VM (enp0s3) (ubuntu server)	Internet access	10.0.0.16	255.255.255.0
Gateway router VM (enp0s8) (ubuntu server)	Subnet 01 – Internal Network	192.168.40.1	255.255.255.0
gateway router VM (enp0s9) (ubuntu server)	Subnet 02 – Internal Network	192.168.140.1	255.255.255.0
Application server VM (Bitname)	Server	192.168.140.2	255.255.255.0

Git pages lab report

Configuration Steps:
You need to create three VM Machine's for this Project.
•   Download the Virtual Box (VM) and install in your PC.

Download the three OS for project. Ubuntu Desktop (.iso format) or our Desktop OS like (Kali Linux, Windows, etc..,).

Ubuntu Server OS (.iso format).

Application Server in Bitnami WordPress (.ova format).

Add three OS in Virtual Box.

Ubuntu Server OS Configuration Steps:
Step 1: Create a New Virtual Machine (VM) for Ubuntu Server
•   Open VirtualBox.

•   Click on new to create a new virtual machine.

•   Name the VM (e.g., Ubuntu Server).

•   Select the type as Linux and the version as Ubuntu (64-bit).

•   Allocate memory (RAM) for the VM (e.g., 2048 MB or higher based on your system's capacity).

•   Choose to create a virtual hard disk now and set a sufficient disk size (e.g., 10 GB).

•   Click Create.

Step 2: Configure the Network Interfaces
You need two network interfaces on the Ubuntu Server VM to act as a router between the two subnets.
- Go to Settings of your new VM.

- Select Network.

- **Adapter 1:** Set to Internal Network (name it differently, e.g., intnet). This will be for Subnet 1. Click the Advanced tab and set the adapter type to PCnet-FAST III or another supported type. Note: Within the ubuntu server terminal, this card will typically have a network adapter name of enp0s8.

- **Adapter 2:** Enable this adapter and set it to another Internal Network (name it differently, e.g., intnet1). This will be for Subnet 2. Within the ubuntu server terminal, this card will typically have a network adapter name of enp0s9.

- **Adapter 3:** Set to NAT. Note: Within the ubuntu server terminal, this card will typically have a network adapter name of enp0s3. Its IP address will be assigned via DHCP. It will be used to provide access to the internet via the host computer.

Step 3: Install Ubuntu Server
- Start the VM and select the Ubuntu Server ISO as the boot disk.

- Go through the installation process:

- Set your time zone, keyboard layout, etc.

- Create a user account and set a strong password.

- When asked, select the option to install OpenSSH Server (to enable remote access later if needed).

- Complete the installation, then reboot the VM.

Step 4: Configure Static IPs on the Network Interfaces
After installation, you'll need to assign static IP addresses to both network interfaces (each in different subnets).
- Log in to the Ubuntu Server VM.

Edit the network configuration file: sudo nano /etc/netplan/00-installer-config.yaml

Type this code.

```
enp0s3:
    addresses:  [192.168.40.1/24]
    dhcp4: false

enp0s8:
     addresses: [192.168.140.1/24]
     dchp: false
enp0s9:
    dhcp: true

version: 2
```

Save it (CTRL + X) type (yes) and enter.
Apply the network changes sudo netplan apply

ip a

Step 5: Enable IP Forwarding
To allow routing between the two subnets, you need to enable IP forwarding.
•   Open the sysctl configuration file: sudo nano /etc/sysctl.conf
•
•   Uncomment the line (or add it if not present): net.ipv4.ip_forward=1
•
•   Apply the changes:
•   sudo sysctl -p

Step 6: Set Up IPTables for Routing
You may also want to configure iptables to ensure packets are forwarded between the subnets.
•   Configure iptables to allow forwarding:

•   sudo iptables -A FORWARD -i enp0s3 -o enp0s8 -j ACCEPT

•   sudo iptables -A FORWARD -i enp0s8 -o enp0s3 -j ACCEPT

•   To make the changes permanent, you can save the iptables rules:

- sudo apt install iptables-persistent

- sudo netfilter-persistent save

- sudo netfilter-persistent reload

Ubuntu OS Configuration Steps:
Step: Installing Ubuntu Desktop in VM
To create a virtual machine and install a GUI-based OS from an ISO file

• Launch VirtualBox

• Click "New" to create a new machine

• Fill in the details as requested so that the new machine is:

• Named "Ubuntu Desktop"

• The ISO named "ubuntu-24.04.1-desktop-amd64.iso" is selected

• The checkbox for "Skip Unattended Installation" is checked

• Click "Next". Now ensure the machine has:

• 2048mb of Base Memory

• Two processors

• Click "Next". Create a Virtual Hard Disk for the machine. This will need to be a minimum of 25GB.

• Click "Next". Verify your settings are as above and click "Finish".

• Click "Start" to boot your virtual machine

• Select "Try or Install Ubuntu"

• Click "Install Ubuntu"

• You need to create an Ubuntu account and click a Restart Now.

Step 2: Configure the Network Interfaces
You need one network interfaces on the Ubuntu Desktop VM.
• Go to Settings of your new VM.

• Select Network.

• **Adapter 1:** Set to Internal Network (name it differently, e.g., intnet).

• Open Ubuntu desktop in VM and login.

• Go to the settings > Network> enp0s3 setting> IPV4 > IPV4 Method change to (Manual)> Add address =192.168.40.2, Add netmask =255.255.255.0 or 24, Add gateway =192.168.40.1

• Apply

• Disconnect the Network and connect.

Bitnami Web Application Configuration Step:
To create a Bitnami virtual machine using VirtualBox
Step 1: Install Bitnami Application in VM.
- Click "File" then "Import appliance".

- Navigate to the file named "bitnami-wordpress-6.3.1-r0-debian-11-amd64.ova".

- Click "Open".

- Click "Next".

- Click "Finish".

- Click "Start" to launch the machine.

- The first-time log in details is displayed on-screen. You will be required to reset the password on your first log in.

- Close the Bitnami.

Step 2: Configure the Network Interfaces
- Go to Settings of your new VM.

- Select Network.

- Adapter 1: Set to Internal Network (name it differently, e.g., intnet1).

- Open Bitnami Application in VM and login.

Type the code sudo nano /etc/network/interfaces

auto enp0s3

Save it (CTRL + X) type (yes) and enter.

sudo ifdown enp0s3 && sudo ifup enp0s3

sudo systemctl restart networking

ip a

iface enp0s3 inet static
address 192.168.140.2
netmask 255.255.255.0
gateway 192.168.140.1

1. Functional Test Results

Evidence that all VMs can communicate as per the design (e.g., ping results, screenshots of application access).

Screenshots for Functional Test Results:
Ubuntu Server OS:
⬚.   Network IP configuration For Ubuntu Server.

```
bitnami@debian:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 100
0
    link/ether 08:00:27:68:44:eb brd ff:ff:ff:ff:ff:ff
    inet 192.168.140.2/24 brd 192.168.140.255 scope global enp0s3
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe68:44eb/64 scope link
       valid_lft forever preferred_lft forever
bitnami@debian:~$
bitnami@debian:~$
```

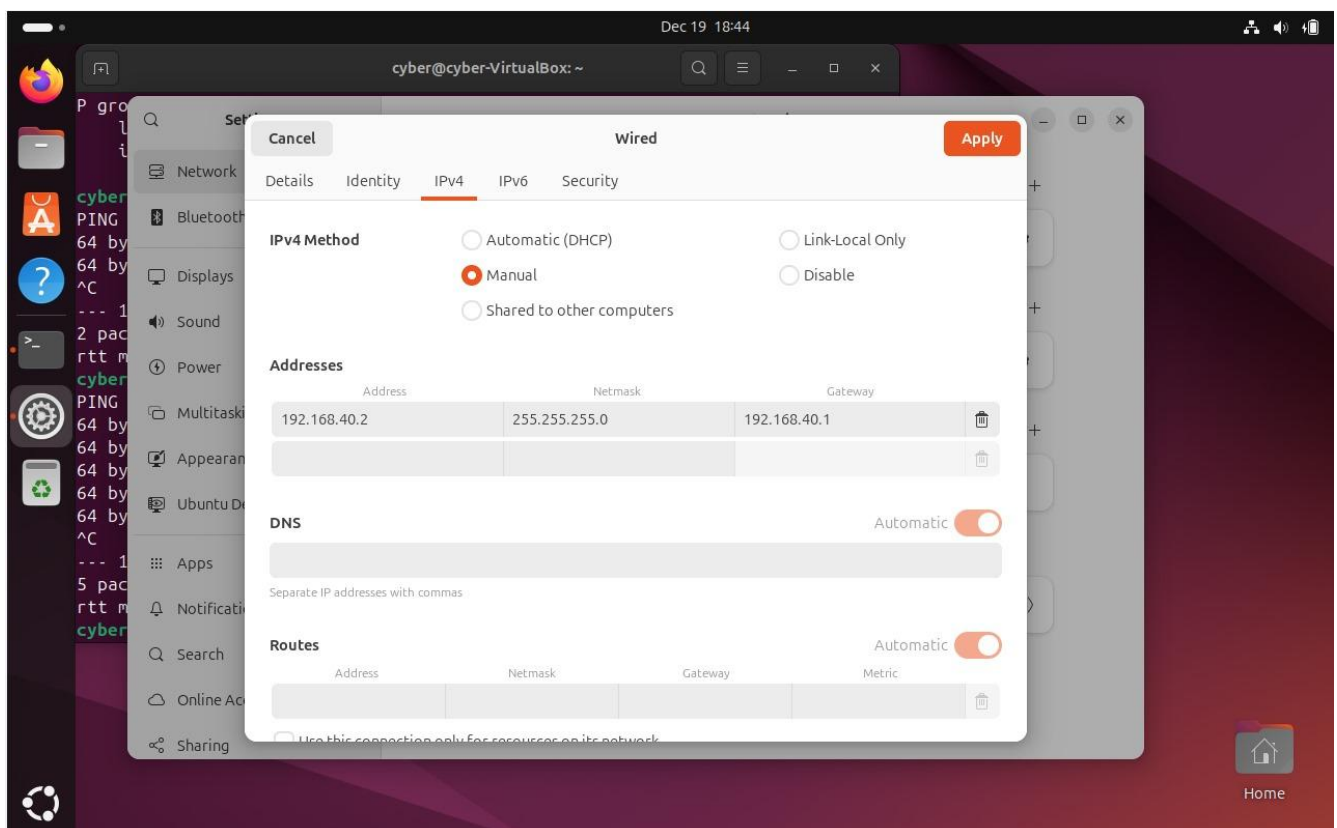Ping Ubuntu Server to Ubuntu Desktop Using IP address 192.168.40.2.

```
cyber@cyber:~$ ping 192.168.40.2
PING 192.168.40.2 (192.168.40.2) 56(84) bytes of data.
64 bytes from 192.168.40.2: icmp_seq=1 ttl=64 time=1.17 ms
64 bytes from 192.168.40.2: icmp_seq=2 ttl=64 time=0.734 ms
64 bytes from 192.168.40.2: icmp_seq=3 ttl=64 time=1.11 ms
64 bytes from 192.168.40.2: icmp_seq=4 ttl=64 time=1.03 ms
64 bytes from 192.168.40.2: icmp_seq=5 ttl=64 time=0.984 ms
^C
--- 192.168.40.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4008ms
rtt min/avg/max/mdev = 0.734/1.007/1.172/0.151 ms
```

Ping Ubuntu Server to Bitnami Application Server Using IP address 192.168.140.2


```
cyber@cyber:~$ ping 192.168.140.2
PING 192.168.140.2 (192.168.140.2) 56(84) bytes of data.
64 bytes from 192.168.140.2: icmp_seq=1 ttl=64 time=1.18 ms
64 bytes from 192.168.140.2: icmp_seq=2 ttl=64 time=1.12 ms
64 bytes from 192.168.140.2: icmp_seq=3 ttl=64 time=0.850 ms
64 bytes from 192.168.140.2: icmp_seq=4 ttl=64 time=0.955 ms
^C
--- 192.168.140.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3003ms
rtt min/avg/max/mdev = 0.850/1.027/1.184/0.132 ms
cyber@cyber:~$
```

Ubuntu Desktop OS:

Network IP configuration For Ubuntu Desktop.

Ping Ubuntu Desktop to Ubuntu Server Using IP address 192.168.40.1


```
cyber@cyber-VirtualBox:~$ ping 192.168.40.1
PING 192.168.40.1 (192.168.40.1) 56(84) bytes of data.
64 bytes from 192.168.40.1: icmp_seq=1 ttl=64 time=2.57 ms
64 bytes from 192.168.40.1: icmp_seq=2 ttl=64 time=1.37 ms
64 bytes from 192.168.40.1: icmp_seq=3 ttl=64 time=1.25 ms
64 bytes from 192.168.40.1: icmp_seq=4 ttl=64 time=1.01 ms
64 bytes from 192.168.40.1: icmp_seq=5 ttl=64 time=1.23 ms
64 bytes from 192.168.40.1: icmp_seq=6 ttl=64 time=1.01 ms
^C
--- 192.168.40.1 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5007ms
rtt min/avg/max/mdev = 1.005/1.406/2.573/0.538 ms
cyber@cyber-VirtualBox:~$
```

Bitnami Application Server:

Network IP configuration For Bitnami Application Server.


```
bitnami@debian:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 100
0
    link/ether 08:00:27:68:44:eb brd ff:ff:ff:ff:ff:ff
    inet 192.168.140.2/24 brd 192.168.140.255 scope global enp0s3
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe68:44eb/64 scope link
       valid_lft forever preferred_lft forever
bitnami@debian:~$
bitnami@debian:~$
```

Ping Bitnami Application Server to Ubuntu Server Using IP address 192.168.140.1.

```
bitnami@debian:~$ ping 192.168.140.1
PING 192.168.140.1 (192.168.140.1) 56(84) bytes of data.
64 bytes from 192.168.140.1: icmp_seq=1 ttl=64 time=2.37 ms
64 bytes from 192.168.140.1: icmp_seq=2 ttl=64 time=0.903 ms
64 bytes from 192.168.140.1: icmp_seq=3 ttl=64 time=0.904 ms
64 bytes from 192.168.140.1: icmp_seq=4 ttl=64 time=1.05 ms
^C
--- 192.168.140.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3018ms
rtt min/avg/max/mdev = 0.903/1.307/2.368/0.615 ms
bitnami@debian:~$ _
```

Screen Recording:

https://www.youtube.com/watch?v=4G-hqTQn14g