Faculty of Science and Engineering
School of Computing and Information Science

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Module Title: Computer Systems

Element 010-3
Lab Logbook

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Trimester 2. – 2024

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Logbook Activity 1: Number Systems

1. Colour Representation in Digital Media

In digital media, colours are often represented using hexadecimal numbers. Web developers and graphic designers use these codes to specify colours in HTML, CSS, and other design tools.

How It Works:

- Colours are a combination of Red, Green, and Blue (RGB) components.
- Each component can have a value ranging from 0 to 255 in decimal, which translates to 00 to FF in hexadecimal.
- A full colour code is a concatenation of the hex values of these three components.

Example:

The colour white has the maximum value for all components.

- Red: 255 (decimal) → FF (hex)
- Green: 255 (decimal) → FF (hex)
- Blue: 255 (decimal) → FF (hex)
- Colour Code: #FFFFFF

Convert the following RGB decimal values to a hexadecimal colour code and identify the colour.

- Red: 173
- Green: 216
- Blue: 230

Instructions:

1. Convert each component to hexadecimal
2. Combine the hex values
3. Identify the colour

TYAH: Type your answer here

Answer:

Task 1.1. Convert Red component to hexadecimal

	Quotient	Remainder	Hexadecimal
10	173	13	D
16	10	10	A

Red Component in hex	AD

Task 1.2. Convert Green component to hexadecimal

	Quotient	Remainder	Hexadecimal
216	13	8	8
13	0	13	D

Green Component in hex	D8

Task 1.3. Convert Blue component to hexadecimal

	Quotient	Remainder	Hexadecimal
230	14	6	6
14	0	14	E

Blue Component in hex	E6

Task 1.4. Record the hex value for all components

Component	Decimal	Hex
Red	173	AD
Green	216	D8
Blue	230	E6

Task 1.5. Combine the hex values

Colour Code	ADD8E6

Task 1.6. Identify the colour in your own words (using a colour chart and digital tool)

The colour is	Light Blue

2. Number Systems in Networking

Networking relies heavily on number systems for addressing devices. IPv4 addresses are typically represented in decimal, but understanding their binary representation is crucial for subnetting and network configuration.

Task 2: An IPv4 address is given as 192.168.100.10. Convert this IP address into its 32-bit binary form.

Answer:

Task 2.1. Convert each octet into binary, ensuring the result is formatted as an 8-bit binary number (octet format)

	Quotient	Remainder
192	96	0
96	48	0
48	24	0
24	12	0
12	6	0
6	3	0
3	1	1
1	0	1

192 in Binary	11000000

	Quotient	Remainder
168	84	0
84	42	0
12	21	0
21	10	1
10	5	0
5	2	1
2	1	0
1	0	1

168 in Binary	10101000

	Quotient	Remainder
100	50	0
50	25	0
25	12	1
12	6	0
6	3	0
3	1	1
1	0	1

100 in Binary	01100100

	Quotient	Remainder
10	5	0
5	2	1
2	1	0
1	0	1

10 in Binary	00001010

Task 2.2. Result

Binary IP Address:	11000000 • 10101000 • 01100100 • 00001010

3. High-Resolution Image Storage

You are a software engineer working for a company that specialises in cloud-based storage solutions for professional photographers. One of your clients uploads large, high-resolution images from their photoshoots, and they require these images to be stored uncompressed to maintain the original quality for printing purposes.

The client frequently uploads images with the following characteristics:

- Resolution: 1920x1080 pixels
- Colour Depth: 24 bits per pixel (8 bits for each of the red, green, and blue colour channels)
- Compression: None, as they require uncompressed storage for quality preservation

Your task is to calculate the file size of each image in order to estimate the total storage space required if the client uploads one thousand photographs.

Answer:

First, calculate the original size of the image without any compression. Since each pixel is represented by 24 bits and the image has 1920x1080 pixels, use the following process:

Task 3.1. Calculate the Total number of Pixels

1920	×	1080	=	2,073,600	pixels

Task 3.2. Convert Total Bits Required

2,073,600	pixels	×	24	bits/pixel	=	49,766,400	bits

Task 3.3. Convert Bits to Bytes

49,766,400	bits	÷	8	=	6,220,800	bytes	

Task 3.4. Convert Bytes to Megabytes

6,220,800	bytes	÷	1024 x1024	≈	5.93	MB	

Task 3.5. Result

The size of uncompressed image is

5.93	MB

If the client uploads 1,000 images, the total storage required is:

5.93	MB	×	1000	=	5930	MB	5.93	GB	

4. Disk Storage

A solid-state drive (SSD) advertises its capacity as 256 GB. However, your operating system reports the capacity as less than 256 GB. Explain why this discrepancy occurs and calculate the actual capacity reported by the OS.

Answer:

Task 4.1: Manufacturers use IEC standard decimal gigabytes (GB), where

1 GB	=	1,000,000,000 bytes

Task 4.2: Operating systems use IEC standard binary gibibytes (GiB), where

1 GiB	=	1,073,741,824 bytes

Task 4.3: Total Bytes According to Manufacturer

1,073,741,824	×	256	=	256,000,000,000 bytes

Task 4.4: Convert Bytes to GiB

256,000,000,000	÷	1,073,741,824	≈	238.42 GiB

Result:

The operating system reports approximately **238.42** GiB, which explains the discrepancy.

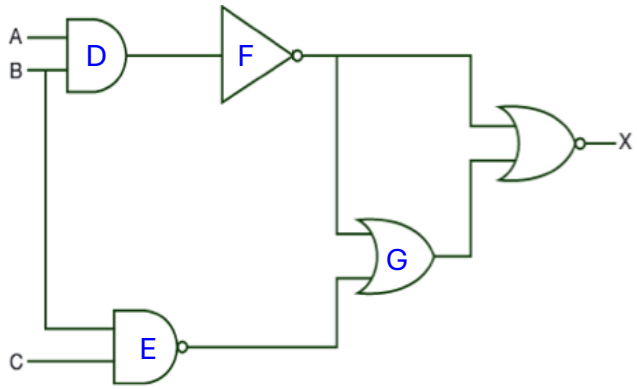
Logbook Activity – 1 Marking Criteria:

Task	Marks
1: Colour Representation in Digital Media (Total: 25 marks)	
Task 1.1: Convert Red component to hexadecimal	5
Task 1.2: Convert Green component to hexadecimal	5
Task 1.3: Convert Blue component to hexadecimal	5
Task 1.4: Record the hex value for all components	3
Task 1.5: Combine the hex values	3
Task 1.6: Identify the colour	4
2: Number Systems in Networking (Total: 25 marks)	
Task 2.1: Convert IP address octets to binary	20
Task 2.2: Combine octets to form 32-bit binary IP address	5
3: High-Resolution Image Storage (Total: 25 marks)	
Task 3.1: Calculate total number of pixels	5
Task 3.2: Convert total bits required	5
Task 3.3: Convert bits to bytes	5
Task 3.4: Convert bytes to megabytes	5
Task 3.5: Calculate total storage for 1,000 images	5
4: Disk Storage (Total: 25 marks)	
Task 4.1: Explain decimal vs binary GB	10
Task 4.2: Convert bytes to GiB	5
Task 4.3: Calculate total bytes according to manufacturer	5
Task 4.4: Calculate actual GiB and explain discrepancy	5
Total Marks	**100**

Logbook activity 2: Logic Gates

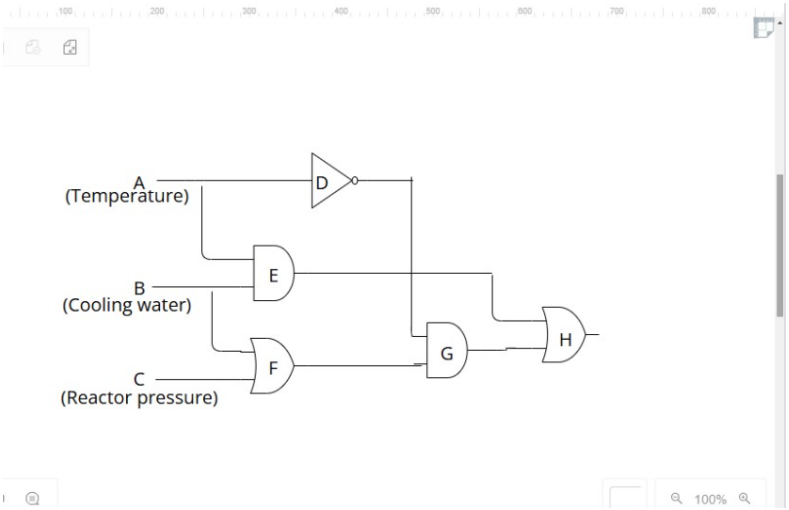
1. Creating truth tables from existing logic diagrams

Complete the truth tables for the following logic diagrams. [40 marks]



A	B	C	D	E	F	G	X
0	0	0	0	0	1	1	1
1	0	0	0	0	1	1	1
0	1	0	0	0	1	1	1
0	0	1	0	0	1	1	1
1	1	0	1	0	0	0	0
1	0	1	0	0	1	1	1
0	1	1	0	1	1	1	1
1	1	1	1	1	0	1	1

2. Creating logic diagrams and truth tables from real-life scenarios



A	*B*	C	D	E	F	G	H
0	0	0	0	1	0	0	0
0	0	1	0	1	1	1	1
0	1	0	0	1	1	1	1
0	1	1	0	1	1	1	1

1	0	0	0	0	0	0	0
1	0	1	0	0	1	0	0
1	1	0	1	0	1	0	1
1	1	1	1	0	1	0	1

3. Value-added work

Additional marks are available if your answers satisfy the following criteria:

- **Question 1.** Are attempted. All intermediate logic gates are labelled, and their outputs added to the truth table. [5 marks]

- **Question 2.** Are attempted. All inputs and outputs in logic diagrams are fully labelled and explained. [5 marks]

Your answers do not necessarily need to be correct to satisfy the above criteria. No “part marks” will be awarded (you will be awarded either 0 or 5 marks per criterion).

Logbook activity 3: Introduction to Packet Tracer

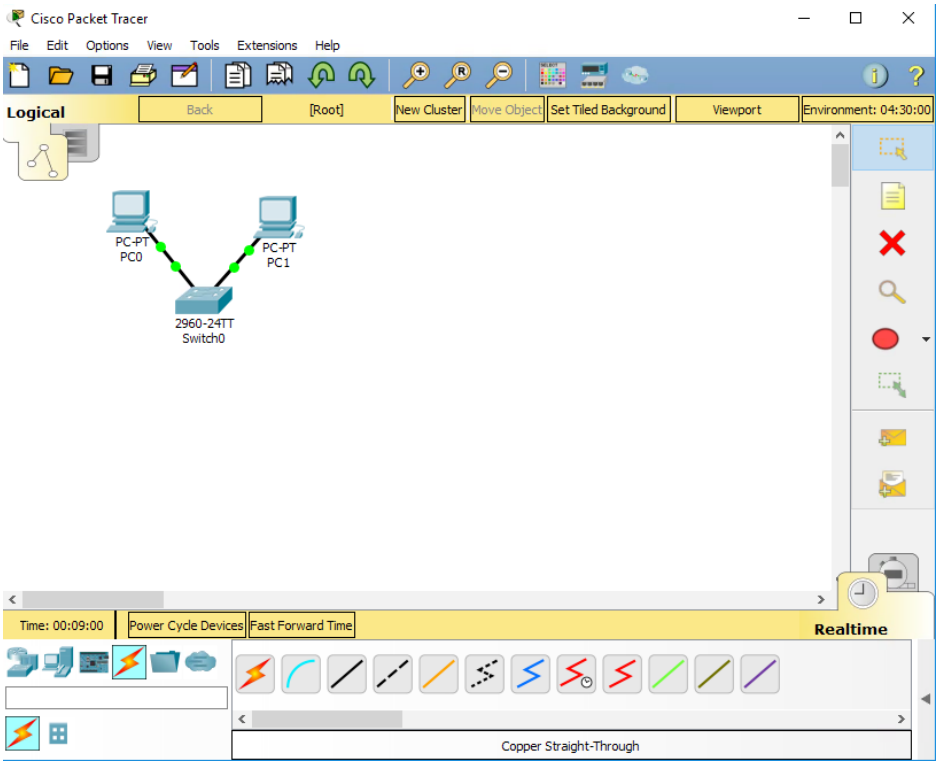
Instruction:

You must provide screenshots and accompanying explanations throughout your work to validate your efforts.

All routers in the topology must be labelled with your SID. For instance, Router0 should be renamed as Router0-X, where "X" is your SID. All screenshots and commands involving routers must clearly display your SID.

Failure to comply with the above requirements will result in a score of zero in this activity.

Task 1. Start a New Packet Tracer activity and connect two PCs and a switch as shown:



Task 1.1. Configure the two PCs Ethernet interfaces with the IP addresses shown and prove that they can communicate by sending ping between them.

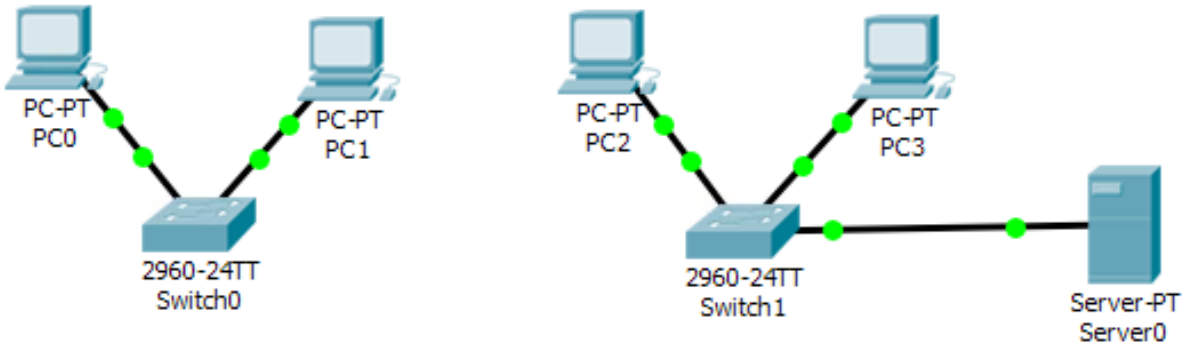
- `PC0` IP Address: `192.168.1.10`
- `PC0` Subnet Mask: `255.255.255.0`
- `PC1` IP Address: `192.168.1.11`
- `PC1` Subnet Mask: `255.255.255.0`
- Ping worked ☒
- MAC Address of `PC0`

`0000.0C7D.68D6`

- MAC Address of `PC1`

050.0F2E.C52D

Task 2. Extend the topology as shown below



Task 2.1. Configure the Ethernet interface on **`Server0`** with

- IP Address: **`192.168.2.254`**
- Subnet mask: **`255.255.255.0`**

Task 2.2. On **`Server0`** configure the DHCP service with

- Default Gateway: **`192.168.2.1`**
- DNS Server: **`192.168.2.254`**
- Start IP Address: **`192.168.2.10`**
- Subnet Mask: **`255.255.255.0`**
- Maximum number of users: **`89`**
- Turn the Service On
- Save the configuration

Task 2.3. Configure **`PC2`** and **`PC3`** to use a DHCP IP configuration.

- What is **`PC2`**
  - i. Default Gateway
  - ii. DNS Server
  - iii. IP Address
  - iv. Subnet Mask

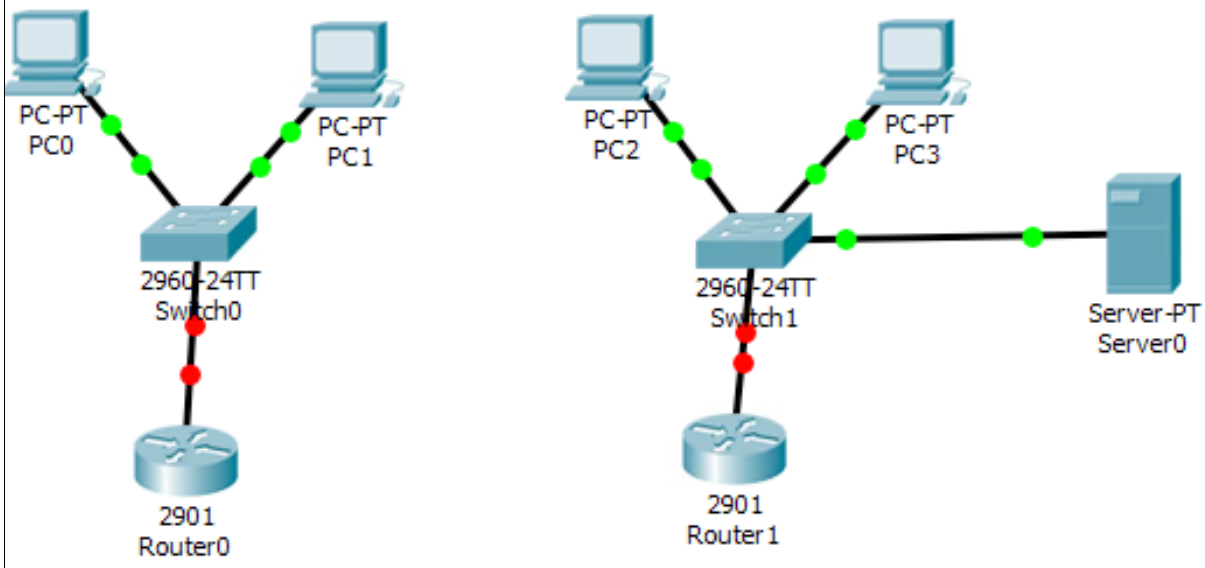
192.168.2.1
192.168.2.254
192.168.2.10
255.255.255.0

- What is **`PC3`**
  - i. Default Gateway
  - ii. DNS Server
  - iii. IP Address
  - iv. Subnet Mask

192.168.2.1
192.168.2.254
192.168.2.11
255.255.255.0

Task 2.4. Check that **`PC2`** can ping **`PC3`** ☒

Task 3. Extend the topology as shown below. Note that the switches are connected to the routers using the Gigabit interfaces and that the lights on the interfaces remain at red.



Task 3.1. Configure the Gigabit interface on **`Router0`** and notice that there is an IOS command window that indicates the commands being executed to perform the configuration. You will learn more about this during the module.

- IP Address: **`192.168.1.1`**
- Subnet Mask: **`255.255.255.0`**
- It is also necessary to change Port Status to: **`On`**
- The interface lights have now turned green: ☒

Task 3.2. Repeat (4.1) with **`Router1`** with

- IP Address: **`192.168.2.1`**
- Subnet Mask: **`255.255.255.0`**
- It is also necessary to change Port Status to: **`On`**
- The interface lights have now turned green: ☒

Task 3.3. **`PC2`** should be able to ping the router interface **`192.168.2.1`** ☒

- If the ipconfig is executed at the command prompt, it should show the Default Gateway as **`192.168.2.1`** ☒
- This is because we set the DHCP server to inform the PC that this was the Default Gateway value (check 3.2 & 3.3)
- Research online and write on your words what is a Default Gateway?

A default gateway is a network device that provide communication between different networks. The most important role of default gateway is to forward packets from the source to other networks.

Task 3.4. Check that **`PC1`** can ping **`192.168.1.1`** ☒

- And that **`ipconfig`** shows the Default Gateway as **`0.0.0.0`** ☒

- This is because we did not manually set the Default Gateway.
- Configure the Default Gateway of **PC1** to **192.168.1.1**. Do not configure the Default Gateway of **PC0** at this point.

Task 4. Complete the topology by connecting the two routers together using a cross-over cable (a dotted one).

- Configure and enable the second Router0 Gigabit interface as
  - IP Address: **192.168.3.1**
  - Subnet Mask: **255.255.255.252**
- Configure and enable the second Router1 Gigabit interface as
  - IP Address: **192.168.3.2**
  - Subnet Mask: **255.255.255.252**
- The lights on the interface between the two routers is now Green ☒

Task 4.1. Select the CLI tab for **Router1**.

- Keep entering exit until the prompt changes to **Router#**
- Ping the other router ☒

Task 4.2. Testing

- **PC0** and **PC1** can communicate ☒
- **PC2** and **PC3** can communicate ☒
- **PC1** can communicate with **Router0** ☒
- **PC3** can communicate with **Router1** ☒
- **Router1** can communicate with **Router0** ☒
- **PC1** can communicate **PC3** ☐

Task 4.3. -10 marks if you ticked the final box. You should get request timed out.

```
C:\>ping 192.168.2.11

Pinging 192.168.2.11 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.2.11:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

Task 4.4. At the **PC1** Command Prompt issue the command **netstat -r**. Copy the information about the active routed in the box below

Route Table:

Interface List
0x1 ..... PT TCP Loopback interface
0x2 ...00 16 6f 0d 88 ec ..... PT Ethernet interface
0x1 ..... PT TCP Loopback interface
0x2 ...00 16 6f 0d 88 ec ..... PT Bluetooth interface

Active Routes:
Network Destination Netmask Gateway Interface Metric
Default Gateway: 192.168.1.11

This is the Routing Table in the PC and should tell you that for any network destination it does not know (**0.0.0.0**) then it will ship the packet to **192.168.1.1** (the Default Gateway) via the **192.168.1.11** (Fast Ethernet) interface.

Task 4.5. On **Router0**, if it shows 'Press **RETURN** to get started' then press **Return**, otherwise enter the command exit until you reach the **Router> prompt**.

- Enter the command **show ip route**.
- Enter the lines displayed after 'Gateway of last resort not set' in the box below

```
192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/0/0
L 192.168.1.1/32 is directly connected, GigabitEthernet0/0/0
S 192.168.2.0/24 [1/0] via 192.168.3.2
192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.3.0/30 is directly connected, GigabitEthernet0/0/1
L 192.168.3.1/32 is directly connected, GigabitEthernet0/0/1
```

Now note the lines starting with 'L'. This means the router only knows about its own Local interfaces. In order for it to pass packets to the other router it must know about it. We are going to set this up manually.

Task 4.6. In the Config tab for **Router0** Click on the Static button under Routing. Enter the following information

- Network **192.168.2.0**
- Mask **255.255.255.0**
- Next Hop **192.168.3.2** (what route to take to get to the destination network)
- Click on **Add**
- Enter the **show ip route** command in **Router0** CLI tab. What is the difference in the Routing Table compared to the previous time?

Task 4.7. Testing

- **PC0** and **PC1** can communicate ☒
- **PC2** and **PC3** can communicate ☒
- **PC1** can communicate with **Router0** ☒
- **PC3** can communicate with **Router1** ☒
- **Router1** can communicate with **Router0** ☒
- **PC1** can communicate **PC3** ☐

Task 4.8. -20 marks if you ticked the final box (you should have learnt from last time). You should get request timed out.

```
C:\>ping 192.168.2.11

Pinging 192.168.2.11 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.2.11:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

Task 4.9. Although **`Router0`** knows how to get to **`192.168.2.0`** network **`Router1`** does not know how to send the response back to **`PC1`**. Configure **`Router1`** with the info below.

- Network: **`192.168.1.0`**
- Mask: **`255.255.255.0`**
- Next Hop: **`192.168.3.1`** (what route to take to get to the destination network)
- Click on Add
- Enter the **`show ip route`** command in **`Router1`** CLI tab. What is the difference in the Routing Table compared to the previous time?

Logbook activity 3: Introduction to Packet Tracer

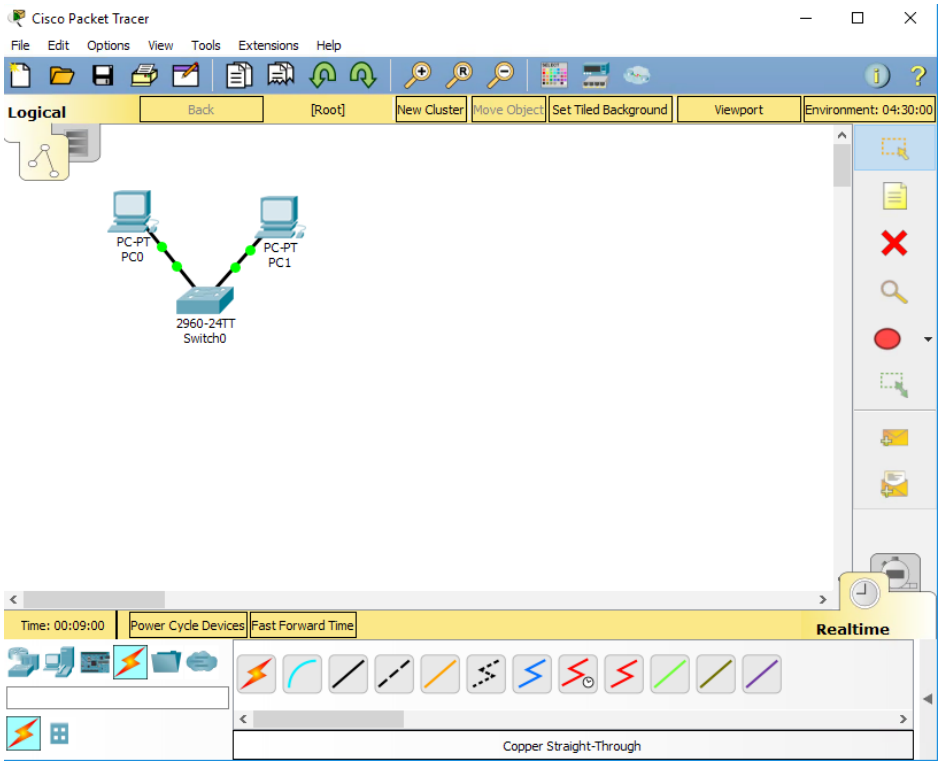
Instruction:

You must provide screenshots and accompanying explanations throughout your work to validate your efforts.

All routers in the topology must be labelled with your SID. For instance, Router0 should be renamed as Router0-X, where "X" is your SID. All screenshots and commands involving routers must clearly display your SID.

Failure to comply with the above requirements will result in a score of zero in this activity.

Task 1. Start a New Packet Tracer activity and connect two PCs and a switch as shown:



Task 1.1. Configure the two PCs Ethernet interfaces with the IP addresses shown and prove that they can communicate by sending ping between them.

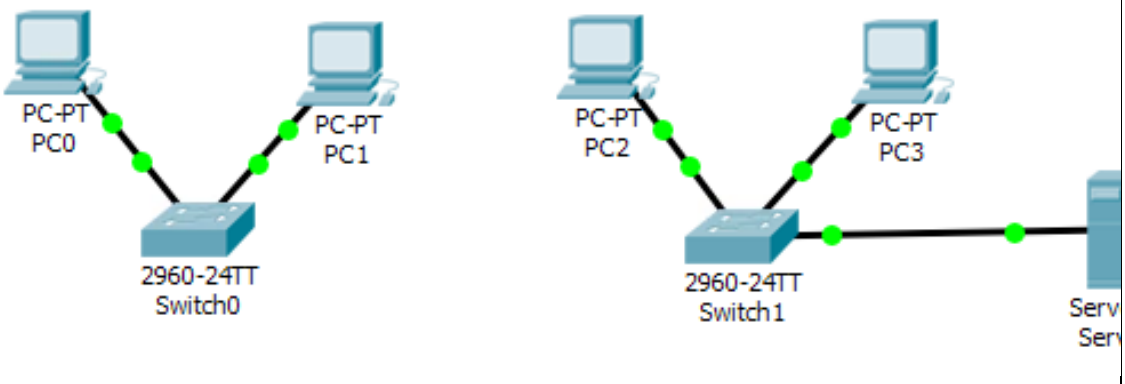
- **PC0** IP Address: `192.168.1.10`
- **PC0** Subnet Mask: `255.255.255.0`
- **PC1** IP Address: `192.168.1.11`
- **PC1** Subnet Mask: `255.255.255.0`
- Ping worked ☒
- MAC Address of **PC0**

`0000.0C7D.68D6`

- MAC Address of **PC1**

050.0F2E.C52D

Task 2. Extend the topology as shown below



Task 2.1. Configure the Ethernet interface on **`Server0`** with

- IP Address: **`192.168.2.254`**
- Subnet mask: **`255.255.255.0`**

Task 2.2. On **`Server0`** configure the DHCP service with

- Default Gateway: **`192.168.2.1`**
- DNS Server: **`192.168.2.254`**
- Start IP Address: **`192.168.2.10`**
- Subnet Mask: **`255.255.255.0`**
- Maximum number of users: **`89`**
- Turn the Service On
- Save the configuration

Task 2.3. Configure **`PC2`** and **`PC3`** to use a DHCP IP configuration.

- What is **`PC2`**
  i. Default Gateway
  ii. DNS Server
  iii. IP Address
  iv. Subnet Mask

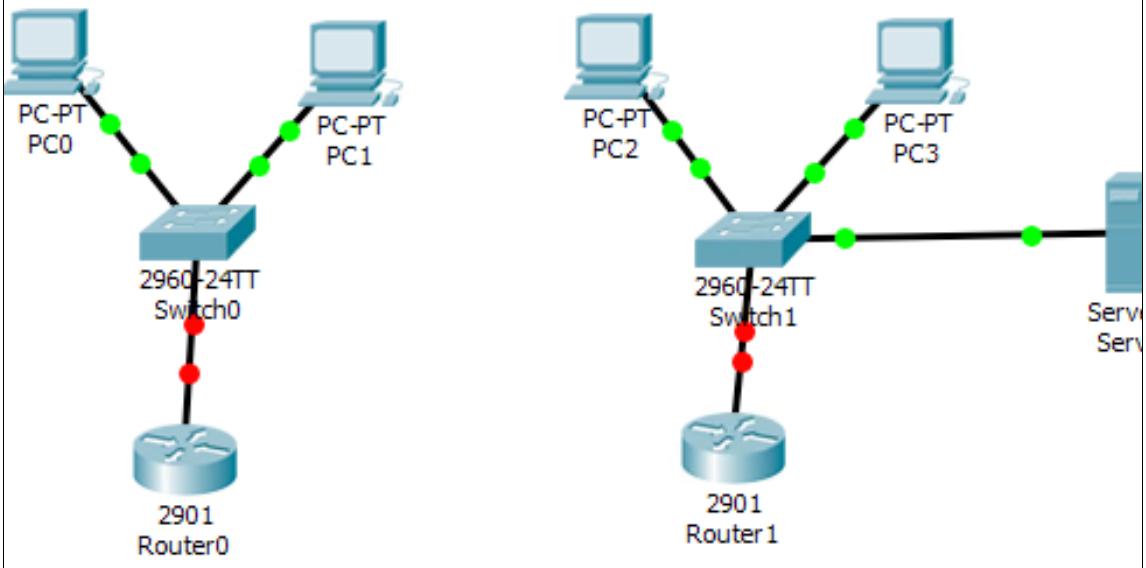
192.168.2.1
192.168.2.254
192.168.2.10
255.255.255.0

- What is **`PC3`**
  i. Default Gateway
  ii. DNS Server
  iii. IP Address
  iv. Subnet Mask

192.168.2.1
192.168.2.254
192.168.2.11
255.255.255.0

Task 2.4. Check that **`PC2`** can ping **`PC3`** ☒

Task 3. Extend the topology as shown below. Note that the switches are connected to the routers using the Gigabit interfaces and that the lights on the interfaces remain at red.



Task 3.1. Configure the Gigabit interface on **`Router0`** and notice that there is an IOS command window that indicates the commands being executed to perform the configuration. You will learn more about this during the module.

- IP Address: **`192.168.1.1`**
- Subnet Mask: **`255.255.255.0`**
- It is also necessary to change Port Status to: **`On`**
- The interface lights have now turned green: ☒

Task 3.2. Repeat (4.1) with **`Router1`** with

- IP Address: **`192.168.2.1`**
- Subnet Mask: **`255.255.255.0`**
- It is also necessary to change Port Status to: **`On`**
- The interface lights have now turned green: ☒

Task 3.3. **`PC2`** should be able to ping the router interface **`192.168.2.1`**

☒

- If the ipconfig is executed at the command prompt, it should show the Default Gateway as **`192.168.2.1`**

☒

- This is because we set the DHCP server to inform the PC that this was the Default Gateway value (check 3.2 & 3.3)
- Research online and write on your words what is a Default Gateway?

Task 3.4. Check that **`PC1`** can ping **`192.168.1.1`**

A default gateway is a network device that provide communication between different networks. The most important role of default gateway is to forward packets from the source to other networks.

☒

- And that **ipconfig** shows the Default Gateway as **0.0.0.0**

☒

- This is because we did not manually set the Default Gateway.
- Configure the Default Gateway of **PC1** to **192.168.1.1**. Do not configure the Default Gateway of **PC0** at this point.

Task 4. Complete the topology by connecting the two routers together using a cross-over cable (a dotted one).

- Configure and enable the second Router0 Gigabit interface as
  - IP Address: **192.168.3.1**
  - Subnet Mask: **255.255.255.252**
- Configure and enable the second Router1 Gigabit interface as
  - IP Address: **192.168.3.2**
  - Subnet Mask: **255.255.255.252**
- The lights on the interface between the two routers is now Green ☒

Task 4.1. Select the CLI tab for **Router1**.

- Keep entering exit until the prompt changes to **Router#**
- Ping the other router ☒

Task 4.2. Testing

- **PC0** and **PC1** can communicate ☒
- **PC2** and **PC3** can communicate ☒
- **PC1** can communicate with **Router0** ☒
- **PC3** can communicate with **Router1** ☒
- **Router1** can communicate with **Router0** ☒
- **PC1** can communicate **PC3** ☐

Task 4.3. -10 marks if you ticked the final box. You should get request timed out.

```
C:\>ping 192.168.2.11

Pinging 192.168.2.11 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.2.11:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

Task 4.4. At the **PC1** Command Prompt issue the command **netstat -r**. Copy the information about the active routed in the box below

Route Table:

Interface List
0x1 ..... PT TCP Loopback interface
0x2 ...00 16 6f 0d 88 ec ..... PT Ethernet interface
0x1 ..... PT TCP Loopback interface
0x2 ...00 16 6f 0d 88 ec ..... PT Bluetooth interface

Active Routes:
Network Destination Netmask Gateway Interface Metric
Default Gateway: 192.168.1.11

This is the Routing Table in the PC and should tell you that for any network destination it does not know (**`0.0.0.0`**) then it will ship the packet to **`192.168.1.1`** (the Default Gateway) via the **`192.168.1.11`** (Fast Ethernet) interface.

Task 4.5. On **`Router0`**, if it shows 'Press **`RETURN`** to get started' then press **`Return`**, otherwise enter the command exit until you reach the **`Router> prompt`**.

- Enter the command **`show ip route`**.
- Enter the lines displayed after 'Gateway of last resort not set' in the box below

192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/0/0
L 192.168.1.1/32 is directly connected, GigabitEthernet0/0/0
S 192.168.2.0/24 [1/0] via 192.168.3.2
192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.3.0/30 is directly connected, GigabitEthernet0/0/1
L 192.168.3.1/32 is directly connected, GigabitEthernet0/0/1

Now note the lines starting with 'L'. This means the router only knows about its own Local interfaces. In order for it to pass packets to the other router it must know about it. We are going to set this up manually.

Task 4.6. In the Config tab for **`Router0`** Click on the Static button under Routing. Enter the following information

- Network **`192.168.2.0`**
- Mask **`255.255.255.0`**
- Next Hop **`192.168.3.2`** (what route to take to get to the destination network)
- Click on **`Add`**
- Enter the **`show ip route`** command in **`Router0`** CLI tab. What is the difference in the Routing Table compared to the previous time?

Task 4.7. Testing

- **PC0** and **PC1** can communicate ☒
- **PC2** and **PC3** can communicate ☒
- **PC1** can communicate with **Router0** ☒
- **PC3** can communicate with **Router1** ☒
- **Router1** can communicate with **Router0** ☒
- **PC1** can communicate **PC3** ☐

Task 4.8. -20 marks if you ticked the final box (you should have learnt from last time). You should get request timed out.

```
C:\>ping 192.168.2.11

Pinging 192.168.2.11 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.2.11:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

Task 4.9. Although **Router0** knows how to get to **192.168.2.0** network **Router1** does not know how to send the response back to **PC1**. Configure **Router1** with the info below.

- Network: **192.168.1.0**
- Mask: **255.255.255.0**
- Next Hop: **192.168.3.1** (what route to take to get to the destination network)
- Click on Add
- Enter the **show ip route** command in **Router1** CLI tab. What is the difference in the Routing Table compared to the previous time?

Task 4.10. Testing

- **PC0** and **PC1** can communicate ☒
- **PC2** and **PC3** can communicate ☒
- **PC1** can communicate with **Router0** ☒
- **PC3** can communicate with **Router1** ☒
- **Router1** can communicate with **Router0** ☒
- **PC1** can communicate with **PC3** ☒
- **PC0** can communicate with **PC2** ☐

Task 4.11. Don't make me give you -30 marks!

Because of a missing route configuration that enables packets to route

- Why did the last test not work?
- What did you do to fix it?

properly across both routers.

It should have configured Router0 to know the path to the 192.168.2.0
And 192.168.1.0

Task 5. Now is time for showing off.

- Add **Server1** to **Switch0**.
- Configure its Ethernet interface so it has a similar IP address to **PC0** & **PC1**
- Enable the Web (HTTP) service
- Check that **PC3** can browse to the Web server
- What are the Quick Links on the server homepage?

Change the title on the server homepage to include your "SID", change the colour of the title (refer to the relevant tutorial), and provide a screenshot from Packet Tracer instead of text.

Task 6. Provide the final screenshot with appropriate labels

Task 4.10. Testing

- **PC0** and **PC1** can communicate ☒
- **PC2** and **PC3** can communicate ☒
- **PC1** can communicate with **Router0** ☒
- **PC3** can communicate with **Router1** ☒
- **Router1** can communicate with **Router0** ☒
- **PC1** can communicate with **PC3** ☒
- **PC0** can communicate with **PC2** ☐

Task 4.11. Don't make me give you -30 marks!

Because of a missing route configuration that enables packets to route properly across both routers.

It should have configured Router0 to know the path to the 192.168.2.0

- Why did the last test not work?
- What did you do to fix it?

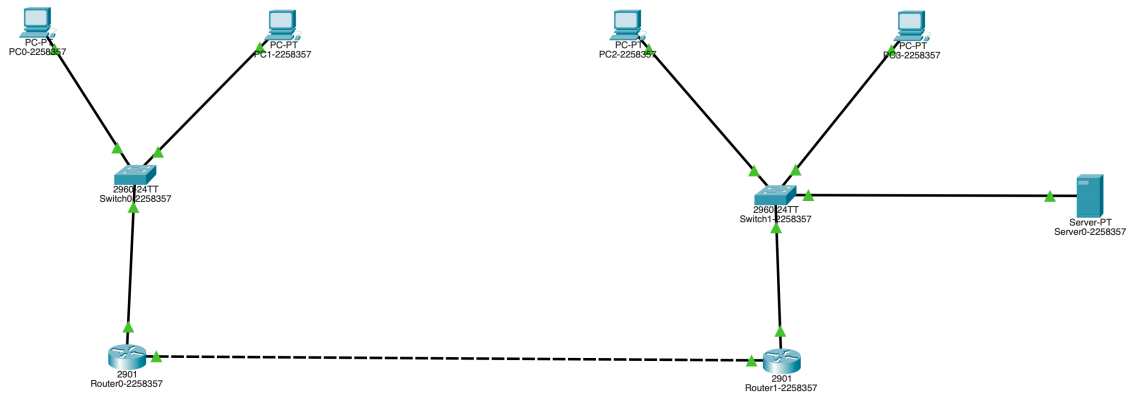
And 192.168.1.0

Task 5. Now is time for showing off.

- Add **`Server1`** to **`Switch0`**.
- Configure its Ethernet interface so it has a similar IP address to **`PC0`** & **`PC1`**
- Enable the Web (HTTP) service
- Check that **`PC3`** can browse to the Web server
- What are the Quick Links on the server homepage?

Change the title on the server homepage to include your "SID", change the colour of the title (refer to the relevant tutorial), and provide a screenshot from Packet Tracer instead of text.

Task 6 Provide the final screeshot with appropriate labes



Logbook activity 4: IPv4 Network Address Calculations

Instruction: Throughout this lab, you are required to provide a clear explanation for each step in the designated explanation box. Use the algorithms discussed during class to calculate relevant network information accurately. Note, failure to include an explanation or providing an insufficient one will result in a mark of zero.

1. Determine whether IP addresses are on same network

a. You are configuring two PCs for your network. PC-A is given an IP address of 192.168.1.18, and PC-B is given an IP address of 192.168.1.27. Both PCs receive a subnet mask of 255.255.255.248. [25 marks]

What is the network address for PC-A?

Answer: 192.168.1.16

What is the network address for PC-B?

Answer: 192.168.1.24

Will these PCs be able to communicate directly with each other?

Answer: PC-A and PC-B can only communicate directly when they have the same network address. However, in this case:

- The network address of PC-A is 192.168.1.16
- The network address of PC-B is 192.168.1.24

Since the network addresses of PC-A and PC-B are different, they will not be able to communicate directly.

What is the highest address that can be given to PC-B that allows it to be on the same network as PC-A?

Answer: 192.168.1.22

EXPLANATION for a:

Network Address for PC-A:

- **IP Address for PC-A:** 192.168.1.18
- **Subnet Mask:** 255.255.255.248

To determine the network address, we perform a bitwise AND between the IP address and the subnet mask.

Step 1: Convert the IP address and subnet mask to binary.

- IP Address of PC-A (192.168.1.18): 11000000.10101000.00000001.00010010
- Subnet Mask (255.255.255.248): 11111111.11111111.11111111.11111000

Step 2: Perform a bitwise AND between the two:

11000000.10101000.00000001.00010010 (PC-A IP)

11111111.11111111.11111111.11111000 (Subnet Mask)

11000000.10101000.00000001.00010000 (Network Address in binary

Network Address for PC-A: 192.168.1.16(in decimal)

Network Address for PC-B:

- **IP Address of PC-B:** 192.168.1.27
- **Subnet Mask:** 255.255.255.248

Step 1: Convert the IP address and subnet mask to binary:

- IP Address of PC-B (192.168.1.27): 11000000.10101000.00000001.00011011
- Subnet Mask (255.255.255.248): 11111111.11111111.11111111.11111000

Step 2: Perform a bitwise AND between the two:

11000000.10101000.00000001.00011011 (PC-B IP)

11111111.11111111.11111111.11111000 (Subnet Mask)

11000000.10101000.00000001.00011000 (Network Address in binary)

Network Address for PC-B: 192.168.1.24(In Decimal)

b. You are configuring two PCs for your network. PC-A is given an IP address of 10.2.0.25, and PC-B is given an IP address of 10.3.0.50. Both PCs receive a subnet mask of 255.255.0.0. [25 marks]

What is the network address for PC-A?

Answer: 10.2.0.0

What is the network address for PC-B?

Answer: 10.3.0.0

Will these PCs be able to communicate directly with each other?

Answer:

What is the lowest address that can be given to PC-B that allows it to be on the same network as PC-A?

Answer: 10.2.0.1

EXPLANATION for b:

Explanation for b:

1. What is the network address for PC-A?

IP address of PC-A: **10.2.0.25**

Subnet mask: **255.255.0.0**

The subnet mask **255.255.0.0** corresponds to **/16**, which means the first 16 bits of the IP address are the network portion, and the remaining bits are for the host portion. To find the network address for PC-A, we perform a bitwise AND between the IP address and the subnet mask.

IP address of PC-A in binary:
10.2.0.25 → 00001010.00000010.00000000.00011001

Subnet mask in binary:
255.255.0.0 → 11111111.11111111.00000000.00000000

Performing the bitwise AND operation between the IP address and subnet mask results in the network address:

Network address:
00001010.00000010.00000000.00000000 → **10.2.0.0**

Thus, the network address for PC-A is **10.2.0.0**.

2. What is the network address for PC-B?

IP address of PC-B: **10.3.0.50**

Subnet mask: **255.255.0.0**

Using the same method, perform a bitwise AND operation between the IP address of PC-B and the subnet mask:

IP address of PC-B in binary:
10.3.0.50 → 00001010.00000011.00000000.00110010

Subnet mask in binary:
255.255.0.0 → 11111111.11111111.00000000.00000000

Performing the bitwise AND:

Network address:
00001010.00000011.00000000.00000000 → **10.3.0.0**

Thus, the network address for PC-B is **10.3.0.0**.

3. Will these PCs be able to communicate directly with each other?

PC-A has the network address **10.2.0.0**, and PC-B has the network address **10.3.0.0**.

Both IP addresses are on different subnets because **10.2.0.0** and **10.3.0.0** are distinct networks (even though they are part of the larger **10.x.x.x** network).

Since they are on different subnets, **PC-A and PC-B will not be able to communicate directly** without a router or routing between the subnets.

Therefore, the answer is: **No, these PCs will not be able to communicate directly**.

4. What is the lowest address that can be given to PC-B that allows it to be on the same network as PC-A?

The network address for PC-A is **10.2.0.0**, and to put PC-B on the same network, its IP address must match this network.

The lowest usable address on the **10.2.0.0** network would be the first available host IP, which is **10.2.0.1** (since **10.2.0.0** is the network address and cannot be assigned to a host).

Thus, the lowesddress that can be given to PC-B to be on the same network as PC-A is **10.2.0.1**.

2. Identify the default gateway address.

a. Your company has a policy to use the first IP address in a network as the default gateway address. A host on the local-area network (LAN) has an IP address of 172.16.140.24 and a subnet mask of 255.255.192.0. [25 marks]

What is the network address for this network?

Answer: **172.16.128.0**

What is the default gateway address for this host?

Answer: **172.16.128.1**

EXPLANATION for a:

In this case, the host on the network has an IP address of **172.16.140.24** and a subnet mask of **255.255.192.0**. The task involves identifying the **network address** for the network and the **default gateway address** for this host, which is specified by your company's policy as the first usable IP address in the network.

Step 1: Convert the subnet mask and IP address to binary

The subnet mask **255.255.192.0** corresponds to:

255.255.192.0 → 11111111.11111111.11000000.00000000 in binary

The IP address **172.16.140.24** corresponds to:

172.16.140.24 → 10101100.00010000.10001100.00011000 in binary

Step 2: Perform bitwise AND operation

To find the network address, we perform a bitwise AND operation between the IP address and the subnet mask. This operation masks the host bits (the bits in the subnet mask that are "0"), leaving only the network portion.

IP address: 10101100.00010000.10001100.00011000

Subnet mask: 11111111.11111111.11000000.00000000

The result of the bitwise AND operation is:

Network address: 10101100.00010000.10000000.00000000, which is **172.16.128.0**

Step 3: Identify the default gateway

The company policy is to assign the **first usable IP address** in the network as the default gateway. The **network address**we found is **172.16.128.0**, and the first usable host address in this network is **172.16.128.1**. Therefore, the **default gateway** for this host is **172.16.128.1**.

b. Your company has a policy to use the first IP address in a network as the default gateway address. You have been instructed to configure a new server with an IP address of 192.168.184.227 and a subnet mask of 255.255.255.248. [25 marks]

What is the network address for this network?

Answer: **192.168.184.224**

What is the default gateway for this server?

Answer: **192.168.184.225**

EXPLANATION for b:

In this scenario, you are tasked with identifying the **network address** and **default gateway** for a server with the IP address **192.168.184.227** and a subnet mask of **255.255.255.248**. The company's policy again uses the first usable IP address in the network as the default gateway.

Step 1: Convert the subnet mask and IP address to binary

The subnet mask **255.255.255.248** corresponds to:

- **255.255.255.248** → 11111111.11111111.11111111.11111000 in binary

The IP address **192.168.184.227** corresponds to:

- **192.168.184.227** → 11000000.10101000.10111000.11100011 in binary

Step 2: Perform bitwise AND operation

To find the network address, we perform a bitwise AND operation between the IP address and the subnet mask. This operation removes the host portion of the IP address, leaving only the network portion.

- **IP address**: 11000000.10101000.10111000.11100011
- **Subnet mask**: 11111111.11111111.11111111.11111000

The result of the bitwise AND operation is:

- **Network address**: 11000000.10101000.10111000.11100000, which is **192.168.184.224**

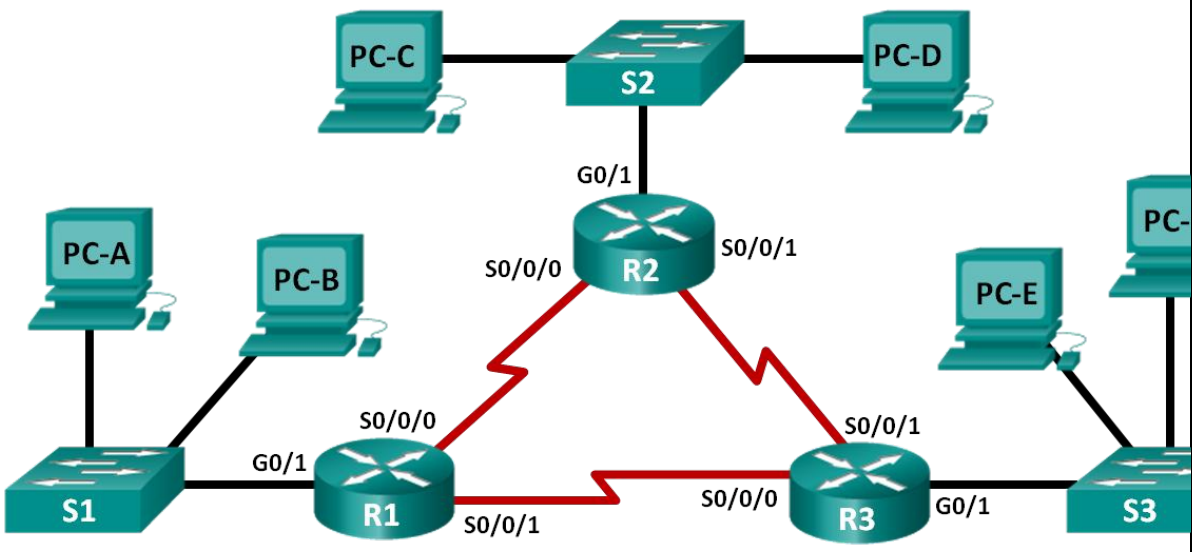
Step 3: Identify the default gateway

The company policy specifies that the **first usable IP address** in the network is the default gateway. The **network address** we found is **192.168.184.224**, and the first usable address is **192.168.184.225**. Therefore, the **default gateway** for this server is **192.168.184.225**.

Logbook activity 5: Subnetting Network Topologies

1. Calculate subnet information

Use the 172.16.5.0/22 network address to provide addresses to the network devices in the following network topology. Also provide an IP address scheme that will accommodate these additional devices. For this topology, assign a subnet to each network.



Step 1: Determine the number of subnets in Network Topology C. [25 marks]

a. How many subnets are there?

b. How many bits should you borrow to create the required number of subnets?

c. How many usable host addresses per subnet are in this addressing scheme?

d. What is the new subnet mask in dotted decimal format?

e. How many subnets are available for future use?

EXPLANATION:

a. **How many subnets are there?**

Looking at the topology, we can identify the following distinct subnets:

- LAN connected to S1
- LAN connected to S2
- LAN connected to S3
- Connection between R1 and R2
- Connection between R2 and R3

- Connection between R1 and R3

Therefore, there are **6 subnets**.

b. **How many bits should you borrow to create the required number of subnets?**

To determine the number of bits to borrow, we need to find the smallest power of 2 that is greater than or equal to the number of subnets.

- 2^2 = 4 (not enough)
- 2^3 = 8 (enough)

Therefore, we need to borrow **3 bits**.

c. **How many usable host addresses per subnet are in this addressing scheme?**

We start with a /22 network, which gives us 10 host bits (32 - 22 = 10). Since we borrow 3 bits for subnetting, we are left with 7 host bits (10 - 3 = 7).

The number of usable host addresses is 2^7 - 2 = 128 - 2 = **126**. We subtract 2 to account for the network address and the broadcast address.

d. **What is the new subnet mask in dotted decimal format?**

We borrowed 3 bits from the host portion of the original /22 mask. This changes the subnet mask to /25.

The dotted decimal representation of a /25 mask is **255.255.255.128**.

e. **How many subnets are available for future use?**

Borrowing 3 bits provides us with 2^3 = 8 subnets. Since we are using 6, we have **2** subnets available for future use.

Step 2: Record the subnet information. [25 marks]

Fill in the following table with the subnet information:

Subnet Number	Subnet Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
0	172.16.5.0	172.16.5.1	172.16.5.126	172.16.5.127
1	172.16.5.128	172.16.5.129	172.16.5.254	172.16.5.255
2	172.16.6.0	172.16.6.1	172.16.6.126	172.16.6.127
3	172.16.6.128	172.16.6.129	172.16.6.254	172.16.6.255

4	172.16.7.0	172.16.7.1	172.16.7.126	172.16.7.127
5	172.16.7.128	172.16.7.129	172.16.7.254	172.16.7.255
6	172.16.8.0	172.16.8.1	172.16.8.126	172.16.8.127
7	172.16.8.128	172.16.8.129	172.16.8.254	172.16.8.255

EXPLANATION:

: This table displays the subnets created from the 172.16.5.0/22 network after borrowing 3 bits. Each row represents a subnet with its network address, usable host address range, and broadcast address. The subnet addresses increment by 128 because each subnet has 128 possible addresses (/25 mask). The first and last usable addresses are important for assigning IP addresses to devices, while the broadcast address is reserved for sending data to all devices within the subnet.

Step 3: Assign addresses to network devices in the subnets. [50 marks]

a. Fill in the following table with IP addresses and subnet masks for the router interfaces:

Device	Interface	IP Address	Subnet Mask
R1	GigabitEthernet 0/1	172.16.5.1	255.255.255.128
	Serial 0/0/0	172.16.6.1	255.255.255.128

	Serial 0/0/1	172.16.7.1	255.255.255.128
R2	GigabitEthernet 0/1	172.16.5.129	255.255.255.128
	Serial 0/0/0	172.16.6.129	255.255.255.128
	Serial 0/0/1	172.16.8.1	255.255.255.128
R3	GigabitEthernet 0/1	172.16.8.129	255.255.255.128
	Serial 0/0/0	172.16.7.129	255.255.255.128
	Serial 0/0/1	172.16.5.2	255.255.255.128

EXPLANATION:

This table shows the IP address and subnet mask assigned to each router interface. The first usable IP address in each subnet is assigned to the corresponding router interface for consistency and easy management. Each interface uses the same subnet mask (255.255.255.128) because they all belong to /25 subnets.

b. Fill in the following table with the IP addresses and subnet masks for devices in the LAN as displayed in topology.

Device	Interface	IP Address	Subnet Mask	Default Gateway
PC-A	NIC	172.16.5.10	255.255.255.128	172.16.5.1
PC-B	NIC	172.16.5.11	255.255.255.128	172.16.5.1

S1	VLAN 1	172.16.5.2	255.255.255.128	172.16.5.1
PC-C	NIC	172.16.5.130	255.255.255.128	172.16.5.129
PC-D	NIC	172.16.5.131	255.255.255.128	172.16.5.129
S2	VLAN 1	172.16.5.132	255.255.255.128	172.16.5.129
PC-E	NIC	172.16.8.130	255.255.255.128	172.16.8.129
PC-F	NIC	172.16.8.131	255.255.255.128	172.16.8.129
S3	VLAN 1	172.16.8.132	255.255.255.128	172.16.8.129

EXPLANATION:

- This table lists the IP addresses, subnet masks, and default gateways for devices in each LAN. IP addresses are assigned within the subnet range, ensuring no conflicts. The switch's VLAN 1 interface is typically assigned the first usable address in the subnet, followed by other devices. The default gateway for each device is the IP address of the router interface connected to that particular LAN. This allows devices to communicate outside their local subnet.

Key Points to Emphasize in Your Explanations:

- **Clarity:** Use clear and concise language to explain the purpose of each table and the information it contains.
- **Subnetting Rationale:** Explain why you chose to borrow 3 bits and how it affects the number of subnets and usable host addresses.
- **Address Allocation:** Describe how you assigned IP addresses to devices within each subnet and why (e.g., avoiding conflicts, using the first usable address for router interfaces).
- **Default Gateway:** Explain the importance of the default gateway and how it enables communication between subnets.
- **Subnet Mask:** Briefly explain the role of the subnet mask in determining the network and host portions of an IP address.

Logbook activity 6: VLSM Design and Implementation Practice

Objectives

Part 1: Examine the Network Requirements

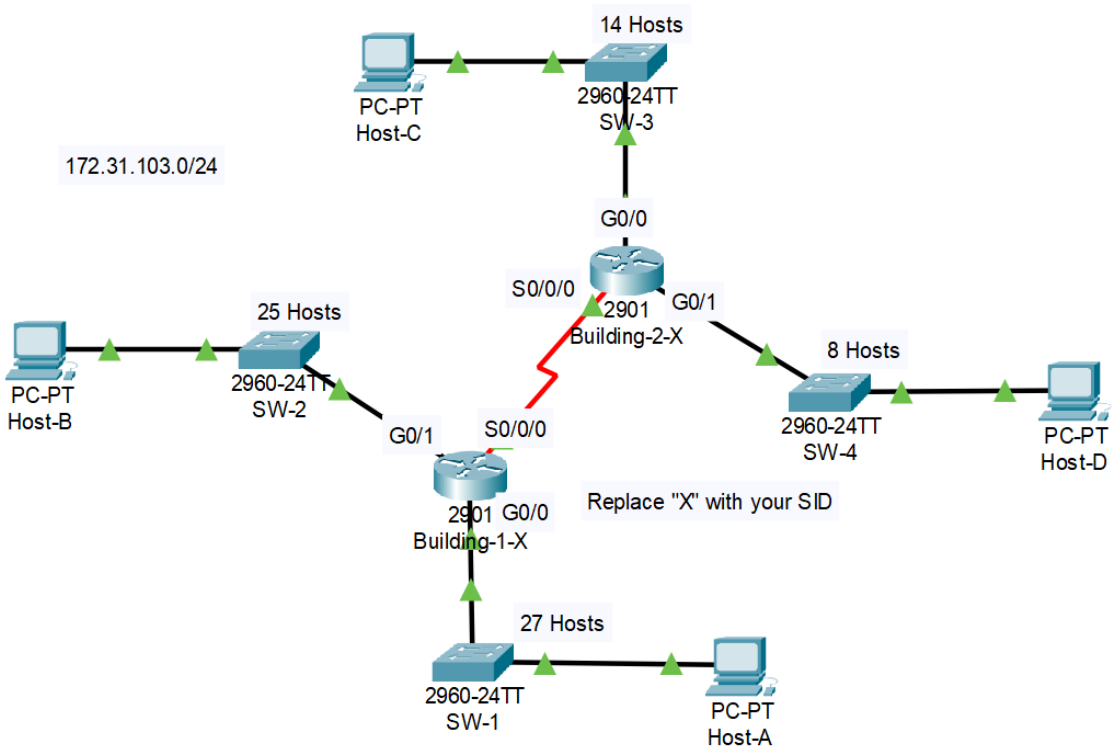
Part 2: Design the VLSM Addressing Scheme

Part 3: Assign IP Addresses to Devices and Verify Connectivity

Background

In this activity, you are given a /24 network address to use to design a VLSM addressing scheme. Based on a set of requirements, you will assign subnets and addressing, configure devices and verify connectivity.
Create the following network topology.

Network Topology:



Instruction: Connect your devices using the interface shown above. Make sure to replace "X" with your SID in the routers named Building-1-X and Building-2-X. The screenshots and commands must clearly display your SID. Ensure you provide a detailed response wherever

there is an "Explanation" box. Failure to complete any of these tasks will result in a mark of zero.

Part 1. Examine the Network Requirements

Step 1. Determine the number of subnets needed.

You will subnet the network address 172.31.103.0/24. The network has the following requirements:

- SW-1 LAN will require [27] host IP addresses
- SW-2 LAN will require [25] host IP addresses
- SW-3 LAN will require [14] host IP addresses
- SW-4 LAN will require [8] host IP addresses

Question:

How many subnets are needed in the network topology?
[5]

Step 2. Determine the subnet mask information for each subnet.

Questions:

a. Which subnet mask will accommodate the number of IP addresses required for SW-1?

[255.255.255.224] or [/27]

How many usable host addresses will this subnet support?
[30]

b. Which subnet mask will accommodate the number of IP addresses required for SW-2?
[255.255.255.224] or [/27]

How many usable host addresses will this subnet support?
[30]

c. Which subnet mask will accommodate the number of IP addresses required for SW-3?

[255.255.255.240] or [/28]

How many usable host addresses will this subnet support?
[14]

d. Which subnet mask will accommodate the number of IP addresses required for SW-4?

[255.255.255.240] or [\28]

How many usable host addresses will this subnet support?
[14]

e. Which subnet mask will accommodate the number of IP addresses required for the connection between Building-1-X and Building-2-X?

[255.255.255.252] or [\30]

Part 2. Design the VLSM Addressing Scheme

Instruction: The addressing across the tables in this part must be consistent. Inconsistencies will result in a mark of zero.

Step 1. Divide the 172.31.103.0/24 network based on the number of hosts per subnet.

Now fill in the following summary table with the VLSM subnet information, list all possible subnets:

VLSM Summary Table:

Subnet Number	Subnet address/CIDR	Subnet Mask	First Usable Host Address	Broadcast Address	Usable Hosts
0	172.31.103.0/27	255.255.255.224	172.31.103.1	172.31.103.31	30
1	172.31.103.32/27	255.255.255.224	172.31.103.33	172.31.103.63	30
2	172.31.103.64/28	255.255.255.240	172.31.103.65	172.31.103.79	14
3	172.31.103.80/28	255.255.255.240	172.31.103.81	172.31.103.95	14
4	172.31.103.96/30	255.255.255.252	172.31.103.97	172.31.103.100	2
5	172.31.103.104/28	255.255.255.240	172.31.103.105	172.31.103.119	14
6	172.31.103.120/28	255.255.255.240	172.31.103.121	172.31.103.135	14
7	172.31.103.136/29	255.255.255.248	172.31.103.137	172.31.103.143	6
8	172.31.103.144/29	255.255.255.248	172.31.103.145	172.31.103.151	6

Explanation:

Subnets are created based on the number of hosts required, starting with the largest.

his design minimizes wasted IP addresses.

Step 2. Document the VLSM subnets.

Complete the **Subnet Table**, listing the subnet descriptions, number of hosts needed, then network address for the subnet, the first usable host address, and the broadcast address. Repeat until all addresses are listed.

a. Use the first subnet to accommodate the largest LAN.

b. Use the second subnet to accommodate the second largest LAN.

c. Use the third subnet to accommodate the third largest LAN.

d. Use the fourth subnet to accommodate the fourth largest LAN.

e. Use the fifth subnet to accommodate the connection between Building-1-X and Building-2-X.

VLSM Subnet Table:

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Broadcast Address
Host-A LAN	27	172.31.103.0/27	172.31.103.1	172.31.103.31
Host-B LAN	25	172.31.103.32/27	172.31.103.33	172.31.103.63
Host-C LAN	14	172.31.103.64/28	172.31.103.65	172.31.103.79
Host-D LAN	8	172.31.103.80/28	172.31.103.81	172.31.103.95
WAN Link	2	172.31.103.96/30	172.31.103.97	172.31.103.100

Explanation:

Largest subnets are assigned to LANs with the most hosts.
The WAN link uses the smallest subnet (/30) as it only needs 2 IP addresses.

Step 3. Document the addressing scheme.

a. Assign the first usable IP addresses to Building-1-X for the two LAN links.

b. Assign the first usable IP addresses to Building-2-X for the two LAN links.

c. Assign the IP addresses to the WAN link.

d. Assign the second usable IP addresses to the switches.

e. Assign the last usable IP addresses to the hosts.

Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
Building-1-X	G0/0	172.31.103.1	255.255.255.224	N/A
	G0/1	172.31.103.33	255.255.255.224	N/A
	S0/0/0	172.31.103.97	255.255.255.252	N/A
Building-2-X	G0/0	172.31.103.65	255.255.255.240	N/A
	G0/1	172.31.103.81	255.255.255.240	N/A
	S0/0/0	172.31.103.98	255.255.255.252	N/A
SW-1	VLAN 1	172.31.103.2	255.255.255.224	172.31.103.1
SW-2	VLAN 1	172.31.103.34	255.255.255.224	172.31.103.33
SW-3	VLAN 1	172.31.103.66	255.255.255.240	172.31.103.65
SW-4	VLAN 1	172.31.103.82	255.255.255.240	172.31.103.81
Host-A	NIC	172.31.103.30	255.255.255.224	172.31.103.2
Host-B	NIC	172.31.103.62	255.255.255.224	172.31.103.34
Host-C	NIC	172.31.103.78	255.255.255.240	172.31.103.66
Host-D	NIC	172.31.103.94	255.255.255.240	172.31.103.82

Explanation:

First usable IP address in each subnet assigned to the router interface.
Second usable IP address assigned to the switch.Last usable IP address assigned to the host.
Default gateway for each host is the IP address of the connected router interface.

Part 3. Assign IP Addresses to Devices and Verify Connectivity

Choose Option 1, if you are using given topology. Choose Option 2, if you are creating your own topology. Use Command Line Interface to configure devices.

Example Configuration:

You have used GUI to configure router before. Now use CLI to configure router. Use below example.
Building-Router:

```
Router>en // User EXEC mode; View-only mode
Router#conf t // Privileged EXEC mode; The user can use this for any
              // monitoring commands and execute configuration and
              // management commands.
Router(config)#int g0/0 // global configuration mode
Router(config-if)#ip add <ip-address> <subnet-mask> // interface
                                                    // configuration
                                                    // mode
Router(config-if)#no shut // enable the interface
Router(config-if)#int g0/1
Router(config-if)#ip add <ip-address> <subnet-mask>
Router(config-if)#no shut
```

To access the switch remotely, an IP address and a subnet mask must be configured on the Switch Virtual Interface (SVI). To configure an SVI on a switch, use the interface vlan 1 global configuration command. Vlan 1 is not an actual physical interface but a virtual one. Next assign an IPv4 address using the **ip address <ip-address> <subnet-mask>** interface configuration command. Finally, enable the virtual interface using the **no shutdown** interface configuration command.

After these commands are configured, the switch has all the IPv4 elements ready for communication over the network.

Note: Similar to a Windows hosts, switches configured with an IPv4 address will typically also need to have a default gateway assigned. This can be done using the **ip default-gateway <ip-address>** global configuration command. The ip-address parameter would be the IPv4 address of the local router on the network. Use the below example to configure switches using CLI
LAN-Switch:

```
Switch>en
Switch#conf t
Switch(config)#int vlan 1
Switch(config-if)#ip add <ip-address> <subnet-mask>
Switch(config-if)#no shut
Switch(config-if)#ip def <default-gateway-address>
```

Implement the following steps to complete the addressing configuration.

Step 1: Configure Building-1-X router LAN and WAN interfaces.

Building-1-X configuration:

```
Please provide the screenshot, and then type in the final commands
minus errors made. Ensure the typed in commands match the corrected
version shown in the screenshot.
```

Step 2: Configure Building-2-X router LAN and WAN interfaces.

Building-2-X configuration:

```
Please provide the screenshot, and then type in the final commands
minus errors made. Ensure the typed in commands match the corrected
version shown in the screenshot.
```

Step 3: Configure SW-1, SW-2, and SW-3 switches including the default gateway.

SW-1 configuration:

```
Please provide the screenshot, and then type in the final commands
minus errors made. Ensure the typed in commands match the corrected
version shown in the screenshot.
```

SW-2 configuration:

Please provide the screenshot, and then type in the final commands minus errors made. Ensure the typed in commands match the corrected version shown in the screenshot.

SW-3 configuration:

Please provide the screenshot, and then type in the final commands minus errors made. Ensure the typed in commands match the corrected version shown in the screenshot.

Step 4: Configure Host-A, Host-B, Host-C, and Host-D, hosts including the default gateway.

Host-A

Please provide the screenshot, and then type in the final commands minus errors made. Ensure the typed in commands match the corrected version shown in the screenshot.

Host-B

Please provide the screenshot, and then type in the final commands minus errors made. Ensure the typed in commands match the corrected version shown in the screenshot.

Host-C

Please provide the screenshot, and then type in the final commands minus errors made. Ensure the typed in commands match the corrected version shown in the screenshot.

Host-D

Please provide the screenshot, and then type in the final commands minus errors made. Ensure the typed in commands match the corrected version shown in the screenshot.

Part 4: Verify connectivity.

Verify connectivity from all hosts. Once all devices are correctly configured, you should be able to ping each IP address listed in the Addressing Table. Provide a screenshot to show your successful test. If the ping fails, explain the reason behind it and describe the steps you took to resolve the issue. Finally, include a screenshot of your complete network topology with all the labels clearly visible (referencing the tutorial session as a guide).

Explanation:

Logbook Activity – 6 Marking Criteria:

Tasks	Subtasks	Description	Criteria for Full Marks	Marks Possible
Part 1: Examine the Network Requirements	Step 1: Determine the number of subnets needed.	Number of subnets needed based on network requirements	Correctly determined the number of subnets needed	5
	Step 2: Determine the subnet mask information for each subnet.	Subnet mask for SW-1, SW-2, SW-3, SW-4	Correctly identified the subnet masks for all LANs	10

Part 2: Design the VLSM Addressing Scheme	Step 1: Divide the given network based on the number of hosts per subnet.	Completed VLSM Summary Table	All entries in the VLSM Summary Table are correct	8
	Step 2: Document the VLSM subnets.	Completed VLSM Subnet Table	All entries in the VLSM Subnet Table are correct	10
	Step 3: Document the addressing scheme.	Completed Addressing Table	All entries in the Addressing Table are correct	14
Part 3: Assign IP Addresses to Devices and Verify Connectivity	Step 1: Configure IP addressing on the Building-1 router LAN and WAN interfaces.	Commands for Building-1 configuration	Correct commands and IP addresses for Building-1	5
	Step 2: Configure IP addressing on the Building-2 router LAN and WAN interfaces.	Commands for Building-2 configuration	Correct commands and IP addresses for Building-2	5
	Step 3: Configure IP addressing on the SW-1, SW-2, and SW-3 switches including the default gateway.	Commands for switches configuration	Correct commands and IP addresses for switches	15
	Step 4: Configure IP addressing on the Host-A, Host-B, Host-C, and Host-D, hosts including the default gateway.	Commands for Hosts configuration	Correct commands and IP addresses for hosts	8
Part 4: Verify Connectivity	N/A	Screenshot showing successful ping tests and explanation	Screenshot verifies that all devices can communicate, with sufficient explanation and appropriate configuration commands	20

Handshake Activities

Instruction: Check Appendix

1. Activate Handshake Account (Week 3)

- Activate their Handshake account.
- Submit a screenshot of their activated Handshake account.

2. Add Interests in Handshake (Week 4)

- Add at least one interest to your Handshake profile.
- Submit a screenshot of the Interests section from Handshake.

3. Attend an Employability Event (Week 4-12)

- Attend an employability event via Handshake.
- Submit a screenshot from Handshake showing the event attended.

Logbook Marking Scheme

Logbook Activity	Marks Possible
1	10%
2	10%
3	20%
4	10%
5	10%
6	25%
Handshake	5%
Overall impression	10%