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Assignment II: Network Setup & Routing

CS3006D Computer Networks

CSED NIT Calicut

Group Submission: **Already done in Assignment I**

Recorded Video Submission Due date: **26/02/2022 00:00 Hrs**

Online Quiz for Assignment I & II: **27/02/2022 10:00 Hrs**

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This assignment must be done in a group. The size of the group is three or less. Pre-recorded Video has to be submitted for demonstration, followed by an Online Quiz, where the questions relating to the assignment will be asked. There is no written material to be returned with this assessment.

After completing this assignment, you will be able to setup your own network, using the concepts of classfull addressing and classless addressing with help of subnetting and supernetting of IP address ranges. You would be also understanding the concepts of using static and dynamic routing protocols.

For this lab, you will be using three laptops of your group members OR Single Laptop with network architecture given in Appendix I, due to Lockdown. In each of these laptop, you should be hosing two VMs, where the first VM would be having two virtual NIC cards, and one of that would be in a bridged mode with the host NIC card and the second would be connected to a virtual switch. The first VM has to be Linux PC (Flavour & version depends upon exercise). The second VM could be Linux or Windows (depends upon your host configuration).

What you will do

Network Diagram is given in Appendix I. There are four different networks in this setup, and each network uses a router to communicate to the other network. You could use the IP range of 172.16.20.64/26 and has to subnet it to four different network having subnet mask of 255.255.255.240.

Your aim is to setup and configure the routers, so that all the systems will communicate between each other.

HINT: Router have two Legs (NIC Cards), and is used to interconnect machines between different networks.

TASK I

Setup the router in all three laptop using using Redhat Linux 9 available from

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http://archive.download.redhat.com/pub/redhat/linux/9/en/iso/i386/

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It is an old version of linux which has 3 CDs for full installation. Please do a full installation of Linux VM using all three CDs. RAM could be allocated to 256 MB.

1. Configure static routes in all three Linux VMs so that, all the systems communicate between each other. Note down the routing table in each machine. Check whether all systems are able to communicate between each other.
2. Remove static routes and enable routing service in Linux using RIP, so that it becomes a router. Compare the routing table generated automatically to that which you have given manually.

Do you feel any issues with the routing messages that is being exchanged between systems? What is the version of RIP protocol?

Shutdown and save the VM. The each Linux Router VM and its host name should be named with First name of one of the group members. Example if one of the group members name is Arun Krishnan his VM name and Host name should be "Arun_RHL9_Task01".

Record the video of static router configuration and dynamic router configuration. Keep it for future reference, submission and has to be produced once requested at time of evaluation.

TASK II

Allocate required amount of RAM for VMs to install **any version of Linux Operating System** with min RAM, (should support Zebra), and download install and configure Zebra in these Linux machines to convert it to a working router
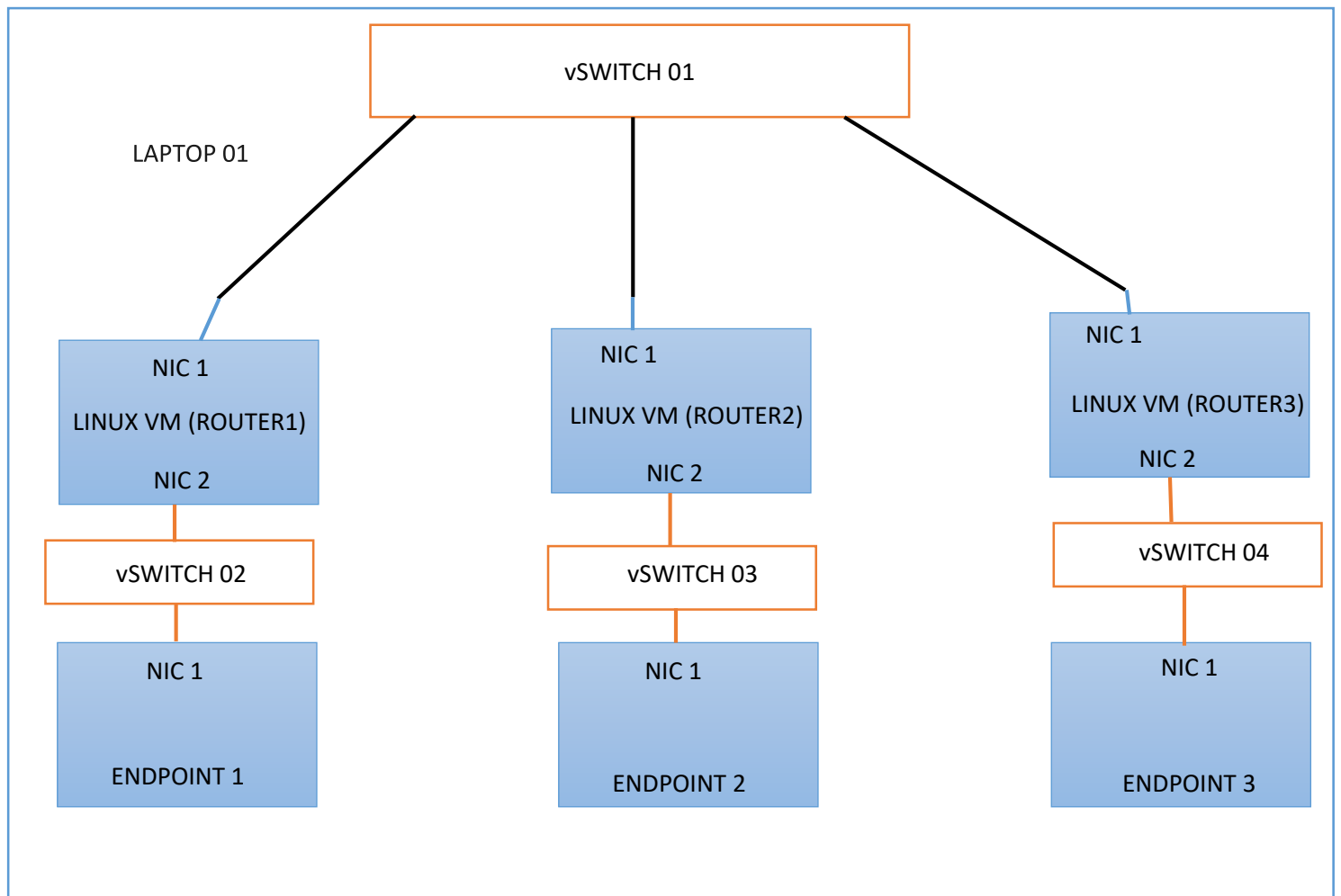
1. You should set up RIP routing with Zebra. Check the routing tables and the routing messages that is being exchanged between systems. What is the difference between the previous setup in task I?
2. You should set up OSPF routing with Zebra. Check the routing table and the routing messages is being exchanged between systems? Is there any difference?
3. **Only for those who are interested,** they could reconfigure the network to use Prefix Routing, and use Zebra / Quagga to configure BGP. Understand how BGP Routing is different from RIP and OSPF? What would modification that you have to do to the IP Address/Subnet and it range for Prefix Routing?

The same naming format has to be used for VMs. Record the configuration video for submission and keep it for future reference and has to be produced once requested at time of evaluation.
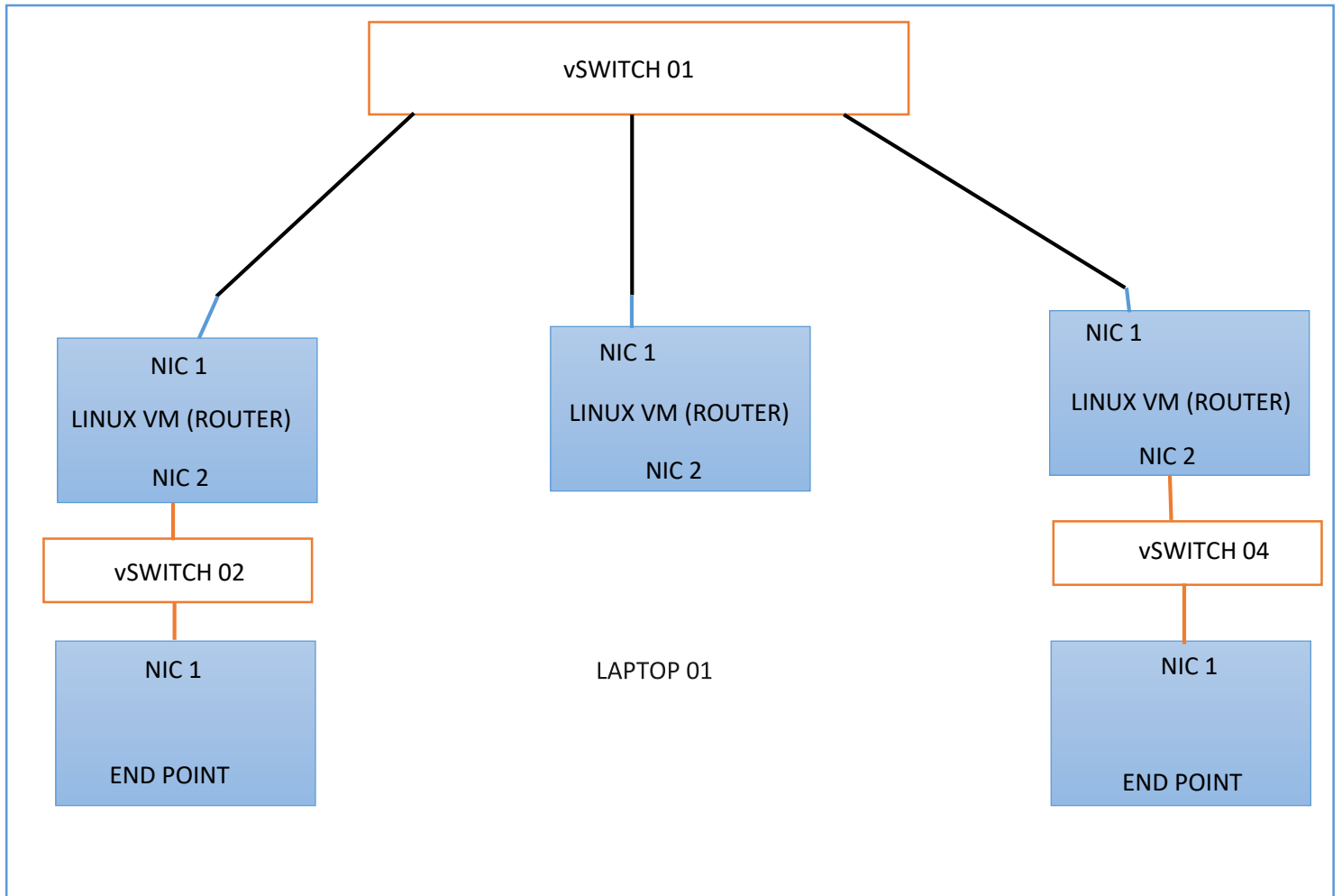
Reference:

1. http://www.cs.virginia.edu/~cs458/material/zebra-manual-Sept2002.pdf
2. http://www.cs.virginia.edu/~cs458/material/Redbook-ibm-tcpip-Chp4.pdf
3. http://cayfer.bilkent.edu.tr/~cayfer/zebra/zebra.html

APPENDIX I: (Network Diagram:Optimised for Single Laptop with 4.5 GB RAM or more)

LAPTOP 01

| vSWITCH 01 |

NIC 1
LINUX VM (ROUTER1)
NIC 2

NIC 1
LINUX VM (ROUTER2)
NIC 2

NIC 1
LINUX VM (ROUTER3)
NIC 2

| vSWITCH 02 |

| vSWITCH 03 |

| vSWITCH 04 |

NIC 1

ENDPOINT 1

NIC 1

ENDPOINT 2

NIC 1

ENDPOINT 3

APPENDIX II: (Network Diagram: Optimised for Average RAM Single Laptop)

APPENDIX III (Network Diagram: Optimised for Low RAM Single Laptop)

vSWITCH 01

NIC 1

LINUX VM (ROUTER)

NIC 2

NIC 1

LINUX VM (ROUTER)

NIC 2

NIC 1

LINUX VM (ROUTER)

NIC 2

vSWITCH 02

NIC 1

END POINT
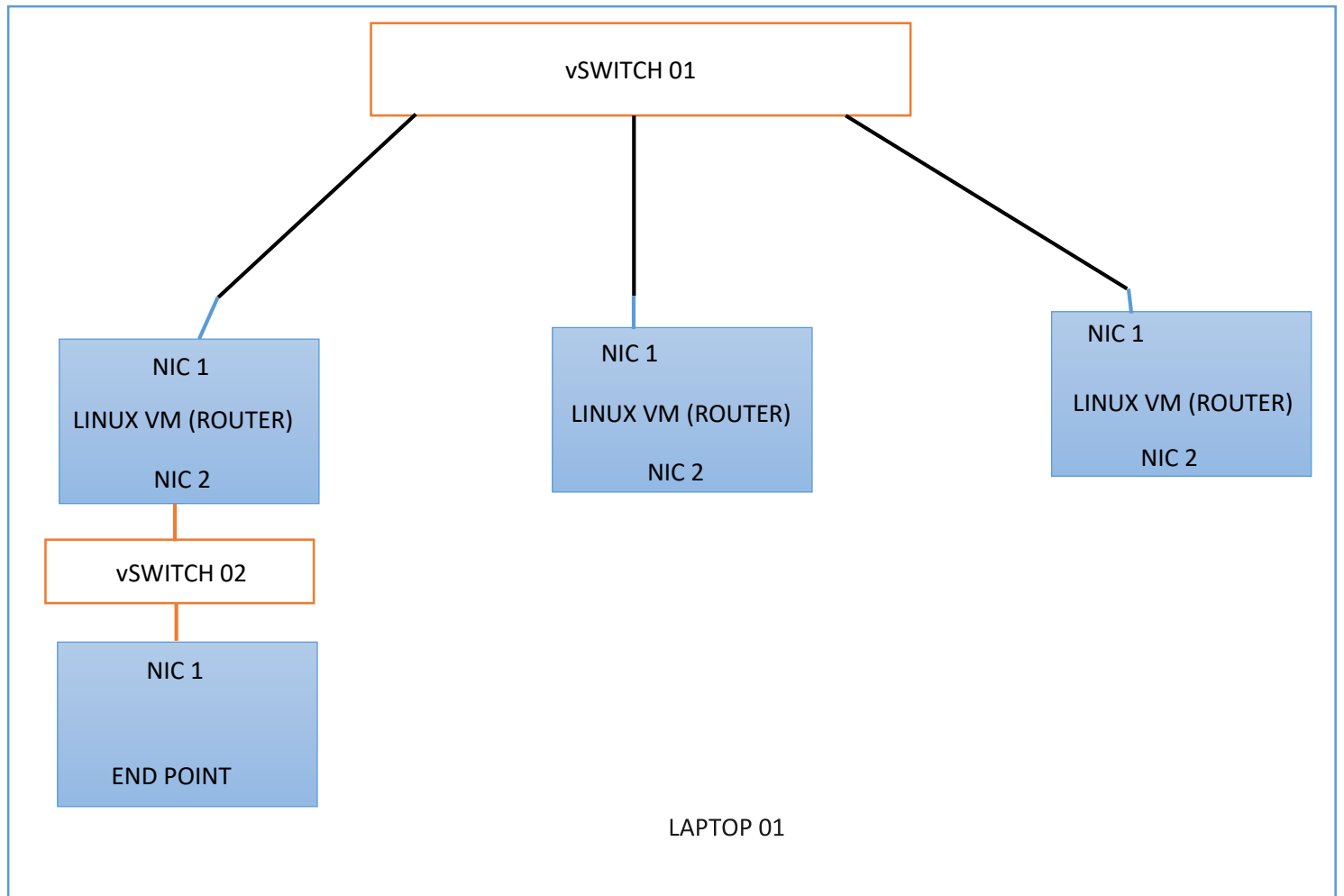
LAPTOP 01

APPENDIX IV (Actual Network Diagram: with three Laptops)

SWITCH / WIFI ACCESS POINT

HOST1 NIC

NIC 1

LINUX VM (ROUTER)

NIC 2

vSWITCH

NIC 1

END POINT

LAPTOP 01

HOST2 NIC

NIC 1

LINUX VM (ROUTER)

NIC 2

vSWITCH

NIC 1

END POINT

LAPTOP 02

HOST3 NIC

NIC 1

LINUX VM (ROUTER)

NIC 2

vSWITCH

NIC 1

END POINT

LAPTOP 03