LINUX DYNAMIC ROUTING WITH OSPF

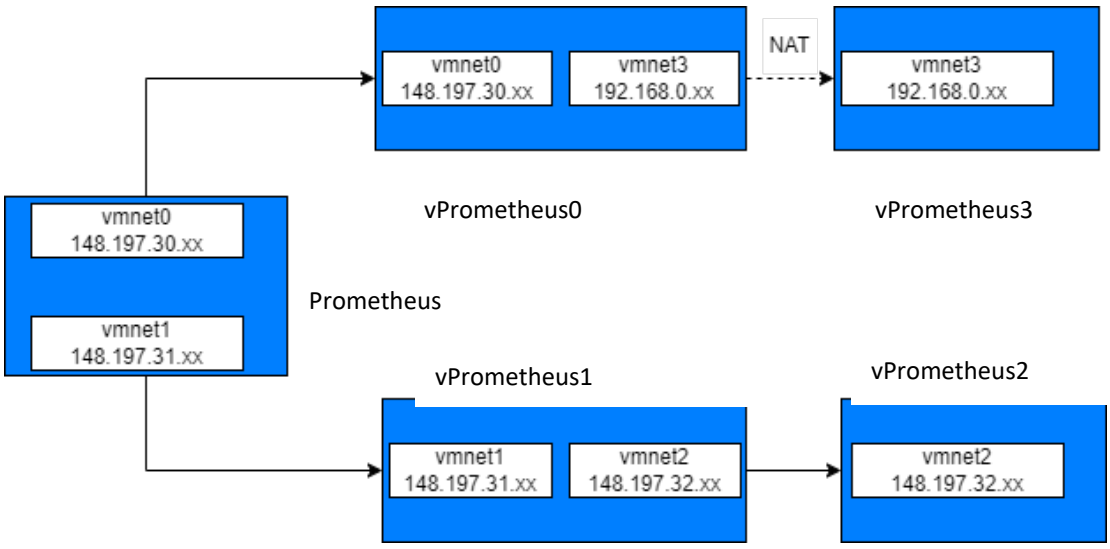
INTRODUCTION

FRRouting (FRR) is a free and open-source Internet routing protocol suite for Linux and Unix platforms. It implements BGP, OSPF, RIP, IS-IS, PIM, LDP, BFD, Babel, PBR, OpenFabric and VRRP, with alpha support for EIGRP and NHRP.

FRR has its roots in the Quagga project. In fact, it was started by many long-time Quagga developers who combined their efforts to improve on Quagga's well-established foundation in order to create the best routing protocol stack available.

NETWORK STRUCTURE

We will be using our existing VM structure to do this and if you take on the Bonus Round Task you will be adding one more VM behind vP0.



INSTALLATION ON PROMETHEUS

- Make sure you have internet on by pinging google.com
- Install FRR: **yum -y install frr**
- Edit the FRR daemon configuration file: gedit /etc/frr/daemons. This file lists all the available routing protocols. Find the line for the protocol you are going to use (ospfd in this case) and change the value to **yes**
- Download the frr.conf file from Moodle and edit to match your network environment. Save the file to /etc/frr/ folder
- Enable IP forwarding. This is necessary to turn any linux machine into a "router":
  /sbin/sysctl -w net.ipv4.ip_forward=1
- Allow the firewall to receive/forward packets:
  firewall-cmd --permanent --zone=public --set-target ACCEPT
- Reload the firewall daemon: **firewall-cmd --reload**
- Restart and enable the frr service: **systemctl restart frr; systemctl enable frr**

TESTING ON PROMETHEUS

- Check the routing table: **watch route -n**. Explain the contents on the table.
- Check ospf neighbour adjacency
  Enter the router terminal: **vtysh**
  Check ospf neighbour: **show ip ospf neighbour**
  Check opsf routes: **show ip ospf route**
  What do these mean?
- Now try pinging two or more hops away from each machine e.g vP0 to vP1 and vice versa, Prometheus to vP2 and vice versa and vP2 to vP0 and vice versa. What's different?

INSTALLATION ON VPROMETHEUS1

For vP2 to have access to the .28 network and the internet, vP1 also needs to be a router. This allows it to route between the .32 network and the .31 network. It also then propagates the .28 routes learned from Prometheus on to vP2.

- Repeat the same steps from above
- Also, test in the same way as above.
- Confirm that you can ping between all machines and all machines can reach the internet.

BONUS ROUND: NETWORK ADDRESS TRANSLATION (NAT)

NATing is a network protocol that allows multiple devices share the same IP address. Each of these devices' IP addresses are translated into one single IP address (that of the router). This conserves public IP addresses and adds a layer of security to the network.

- Clone vPrometheus0 i.e. make a copy of it and rename it to vPrometheus3.
- Add our custom vmnet interfaces to the new VM and assign it to vmnet3.
- Also add a second interface to vPrometheus0 by running fix-vmnet-dev and assign it to vmnet3.
- Now, research how to do NAT on Linux and implement this for some extra marks.