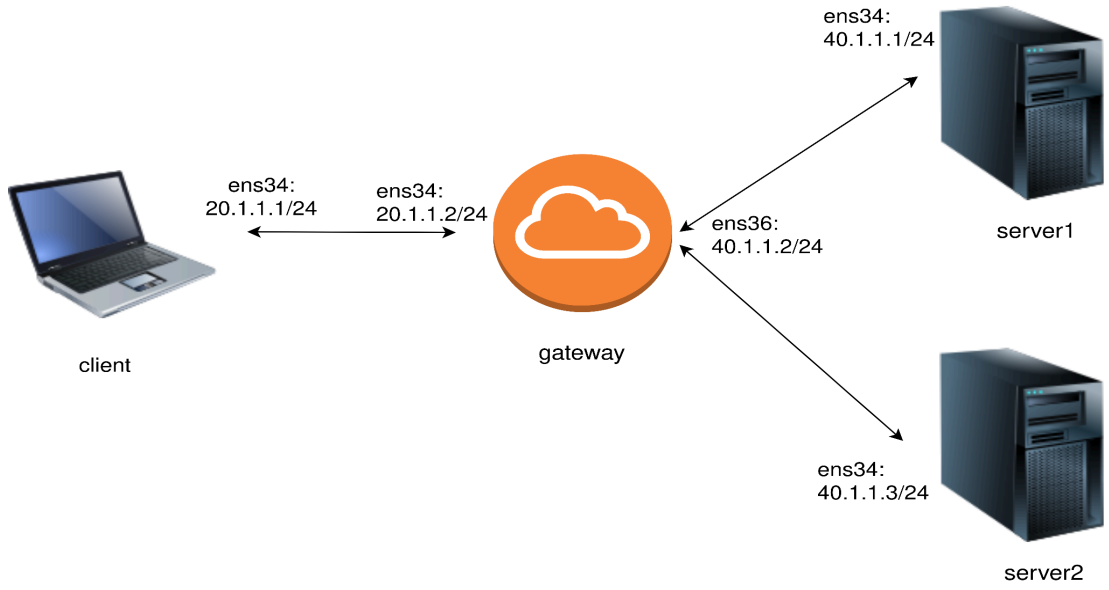
CSE 232: Programming Assignment 3
Using Linux iptables
Due date: Oct 27, 2024
Total: 21 points

Read the following instructions carefully

- For all the observations and explanations, create a single report.
- Attach screenshots in the report.
- Naming Convention: <Roll_No>-Assignment3.zip
- Create a public git repository for the course, and add your report and code (if applicable).
- This is an individual assignment

This assignment allows you to gain hands-on experience with `iptables` for NAT, firewall, port forwarding, and load balancing in a multi-VM environment.



Q.1. Set up four VMs as shown in the figure. Use the same setup for the entire assignment.**[4]**

(a) Configure the IP addresses and routes for all VMs, as shown in the figure **[3]**

(b) Configure VM2 as the gateway such that it can forward the incoming traffic to one of the servers – add forwarding functionality **[1]**

Q.2. Traffic filtering at the gateway VM **[4]**

(a) The gateway must block all traffic (except for ping) destined to the server 40.1.1.1/24. Show that this works; attach the screenshot.**[2]**

(b) The gateway must block only TCP traffic initiated by 20.1.1.1/24. Show that this works; attach the screenshot. **[2]**

Q.3. Use the configuration obtained in Q.2. to solve this question **[5]**

(a) Use "iperf2" tool to test the TCP and UDP bandwidth between 20.1.1.1/24 and 40.1.1.3/24. Attach the screenshot. **[2]**

(b) What is the minimum, average, and maximum RTT (Attach the screenshot) **[3]**

(i) from 20.1.1.1/24 to 40.1.1.1/24

(ii) from 20.1.1.1/24 to 40.1.1.3/24

(iii) Did you find a significant difference between (i) and (ii)? If so, why?

Q.4. Network address translation at the gateway VM **[4]**

(a) Change the source IP address of every packet from 20.1.1.1/24 to 40.1.1.2/24 **[1]**

(b) When the packet response for the packet from step "a" arrives at the gateway, revert the destination IP address to the original. **[1]**

(c) Validate the above by sending traffic and observing the packets at each VM using Wireshark/tcpdump. Attach the screenshot.**[2]**

Q.5. Load balancing at the gateway VM. Attach screenshots **[4]**

(a) Using the information obtained from Q.5.b., balance the traffic from 20.1.1.1/24 to the servers, 40.1.1.1/24 and 40.1.1.3/24. The probability of assigning the packet to the servers is 0.8 and 0.2, i.e., assign a high probability to the server with lower RTT. **[2]**

(b) Test the above configuration using a series of "ping" packets. **[2]**