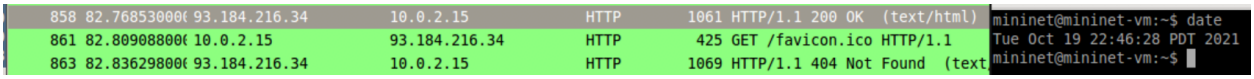
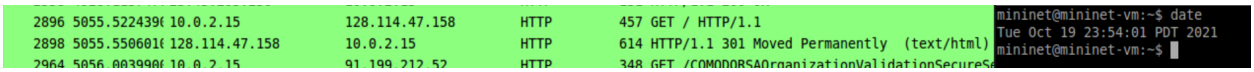
1. HTTP and HTTPS are both internet protocols that are used to transfer data over a network. HTTP stands for Hypertext transfer protocol and HTTPS stands for Hypertext transfer protocol Secure. HTTPS is a secure version of HTTP in that messages sent over the network are encrypted. HTTP messages can be intercepted by people and read as plain english. In HTTPS the messages are encrypted and if they are intercepted the message appears as random characters.

2. The server responded with a status code of 200. The content type is text/html. The message sent was an ok message letting the recipient know that their message was received.



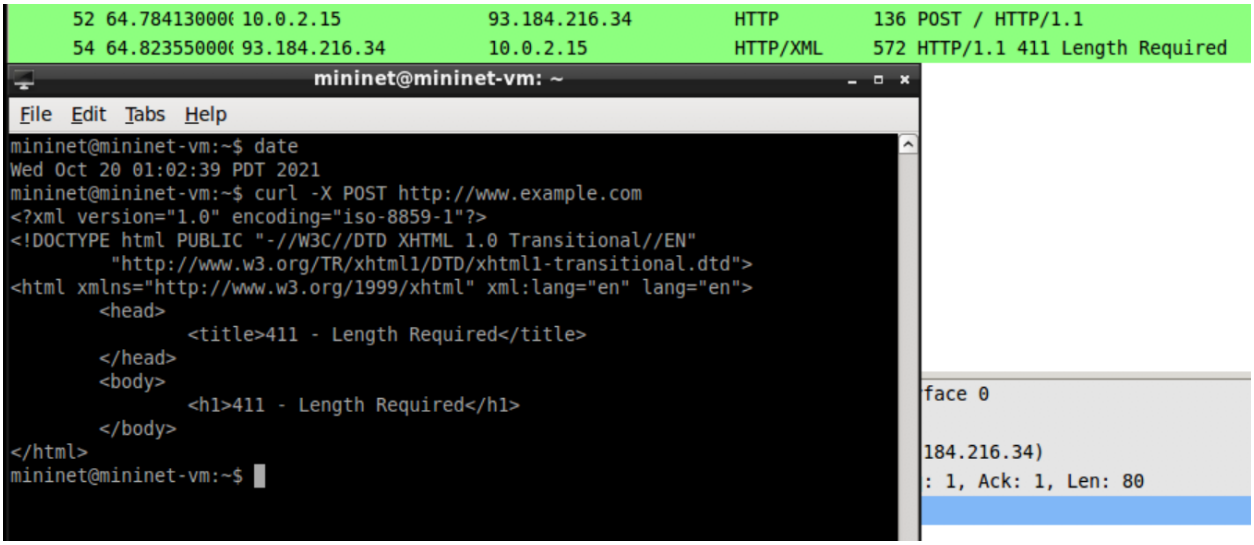

3. The web object is transferred from the server that is hosting the website.

4. The difference in this response is both the status code and message were different. In this case the server responded with a status code 301 and the message moved permanently.

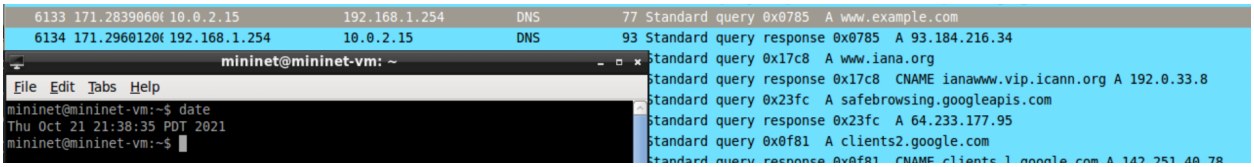



5. In a GET message the parameters for the request are contained within the URL. In a POST message the parameters for the request are contained within the body of the request. One advantage of using GET is that the message can be cached. One disadvantage for GET is it is less secure since it can only contain ASCII characters making it more readable. On advantage of POST is that other forms of data other than ASCII can be sent. One disadvantage of POST is that request cannot be bookmarked or cached.

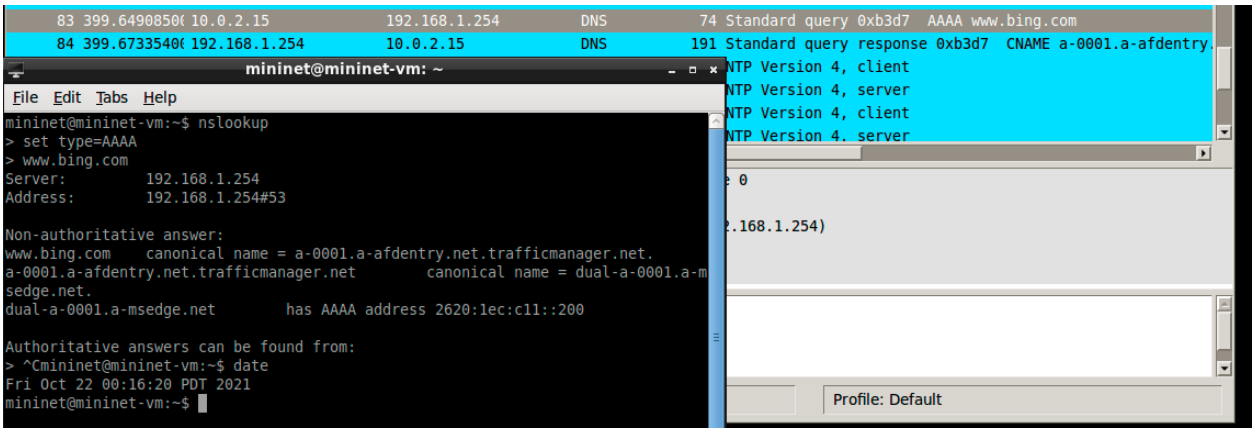
(screenshot for 5)




6. It appears my computer sends a DNS request to some server for the website example.com. I believe the these are the packets that load example.com since the first one is my computer requesting for the url example.com and then the next message is the response from the server.

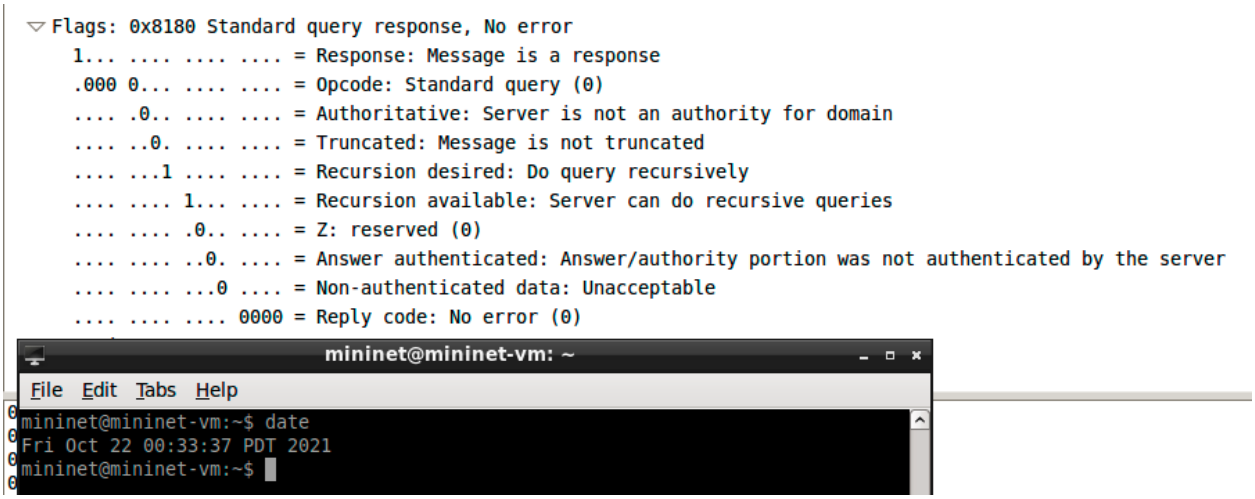


7. From the second screenshot the IPV6 address seems to be 2620:lec:c11::200

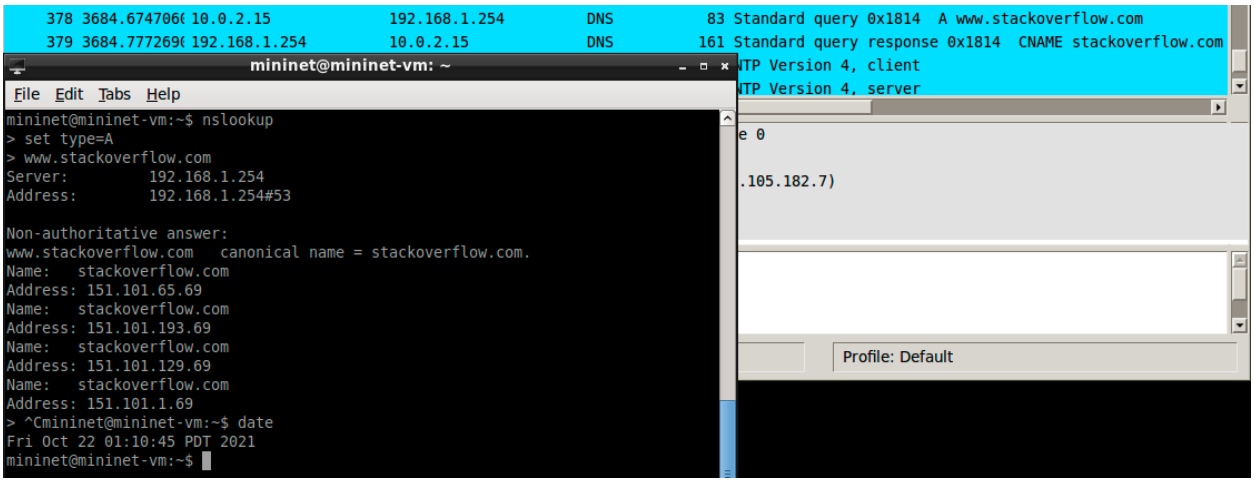



```
▷ www.bing.com: type CNAME, class IN, cname a-0001.a-afdentry.net.trafficmanager.net
▷ a-0001.a-afdentry.net.trafficmanager.net: type CNAME, class IN, cname dual-a-0001.a-msedge.net
▽ dual-a-0001.a-msedge.net: type AAAA, class IN, addr 2620:1ec:c11::200
    Name: dual-a-0001.a-msedge.net
    Type: AAAA (IPv6 address)
    Class: IN (0x0001)
    Time to live: 41 seconds
    Data length: 16
    Addr: 2620:1ec:c11::200
```

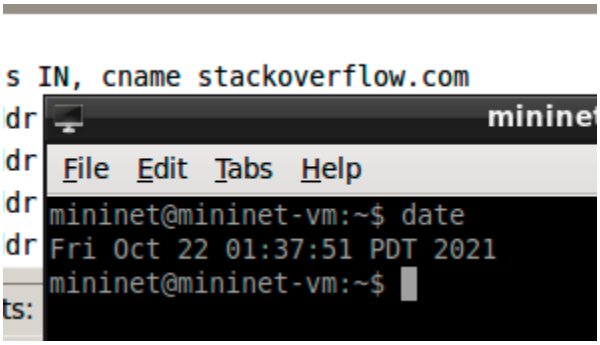
8. Based on the flags of the response it appears that my computer completed the request recursively and not iteratively. This is because in the fflags, there's the line “Recursion desired: Do query recursively” then the next line confirms the use of recursion.



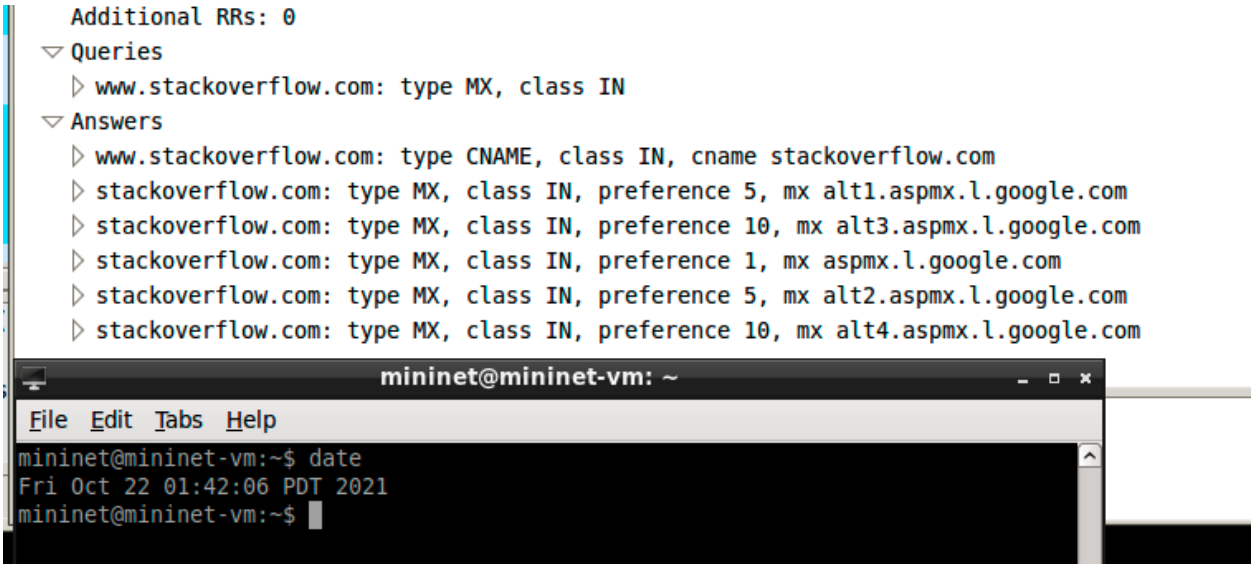
9. I was given 4 ip Adresses: 151.101.665.69, 151.101.193,69, 151.101.129.69, 151.101.1.69.



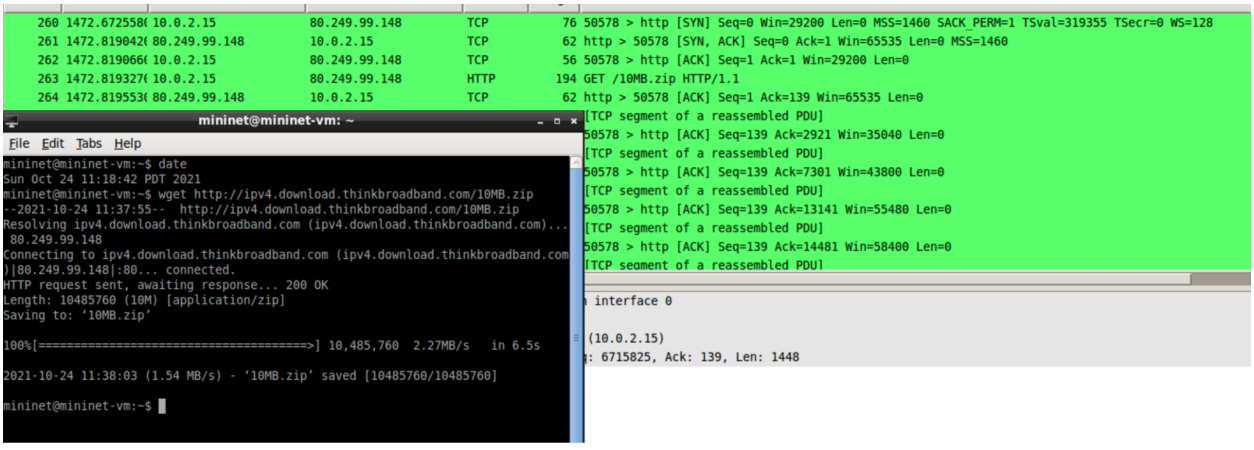

10. The other name for www.stackoverflow.com is indicated by the “cname” part of the response. In the case of this request the cname is stackoverflow.com. The DNS record that identifies the “other name” is a canonical Name Record.



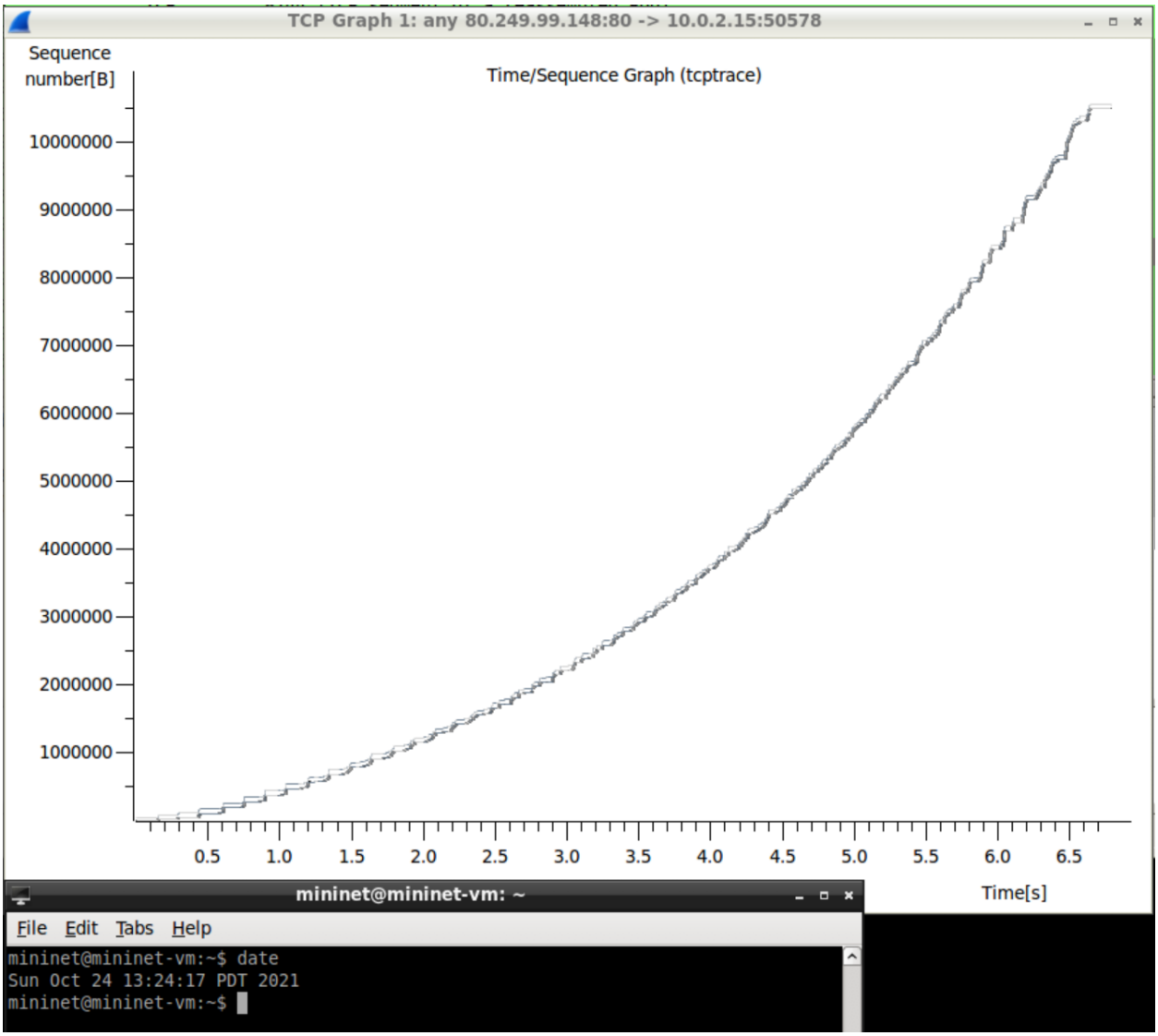
11. The mx records for www.stackoverflow.com are listed in the screenshot below. These are correct since this is the response received from a nslookup with type mx on the corresponding domain. The mail exchange with the highest preference is aspmx.l.google.com.



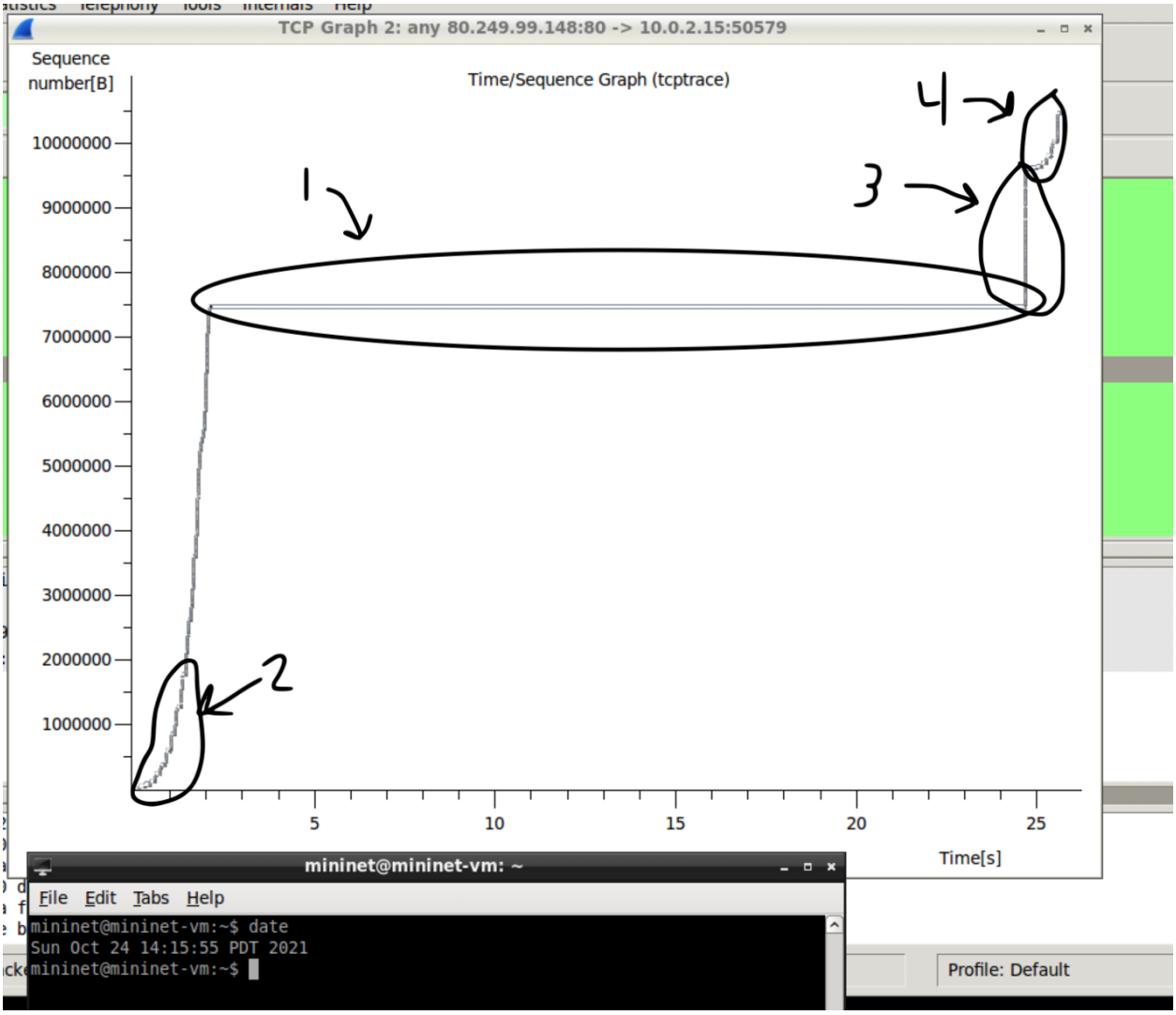

12. My computer advertised a window of 29200, and the server responded with a window size of 65535.



13. This graph is showing the data transmission between the client and the server. Each of the blakc lines going upward represents the data being sent, the gap between each of the data lines is the time between each data transfer, which is one clock cycle.



14. Parts 1-4 denoted on screenshot




14 part 5-8

5. The average throughput with packet loss is 0 and the average throughput without packet loss is roughly 1 megabit per second. There is a large discrepancy between these two because when there is 100% packet loss nothing is being transmitted thus the throughput is 0.

6. If this transfer were to occur with UDP the average throughput without packet loss would be faster since UDP is a faster communication protocol than TCP. With 100% packet loss I would expect the throughput to be the same and also be zero since no data would be transmitted.

7. I would expect the end to end delay to be shorter using UDP with and without packet loss.

8. In regards to TCP I would expect the end to end delay to be longer with and without packet loss.