Design Engineering of Computer Systems
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Lecture 36 (Week 5, Tutorial 1)
Network Debugging Tools

Hi, everyone. In this video, we will learn about various network debugging tools.

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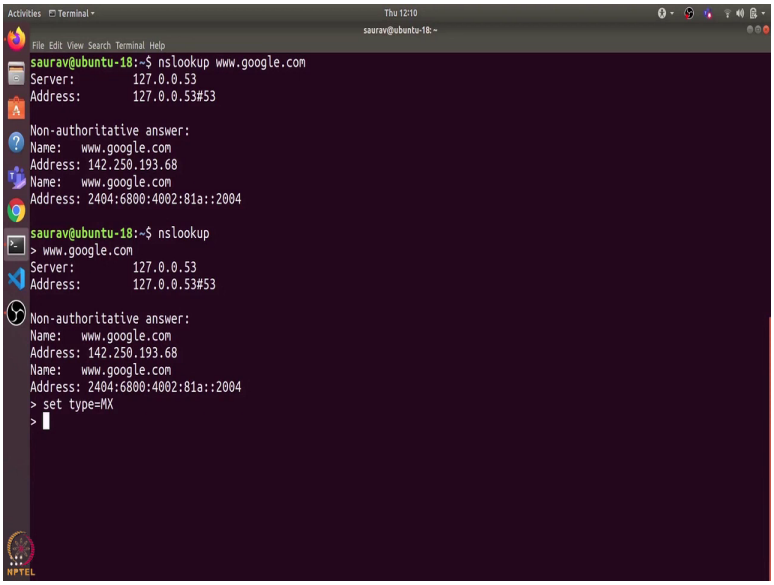

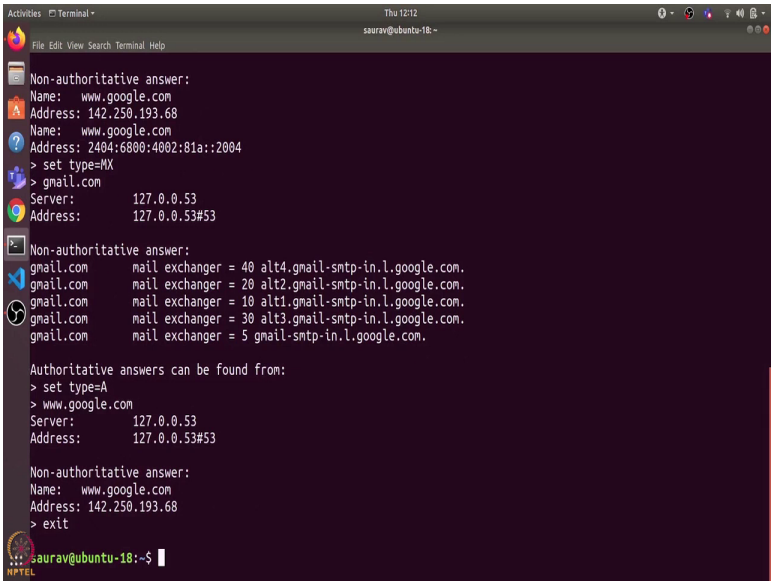

So, let us open a terminal and I will start with nslookup. So, nslookup is used to find out the IP address which is linked to various URLs. So, whenever our computer accesses a website, then

first it needs to resolve it to an IP address so that it can add that IP address to the packet headers. So, using nslookup we can find out whether it is able to resolve these names or not.

So, let us say I want to find out the IP address of Google.com. So, I will type nslookup Google.com. And it shows me the name server that is used to find out this particular mapping and it shows me both the addresses, one is the IPv4 address and other is IPv6 address and it shows me non-authoritative answer, which means that this particular server is not responsible for this mapping, but it knows this mapping because it was cashed there. So, it might have resolved this Google.com earlier, so it knows that this is the particular mapping.

We can also run this nslookup command in interactive mode. So, we can just type nslookup and press enter and again we can type out various URLs to find out their IP addresses. Another thing that we can find out using nslookup is the addresses for various mail servers. So, for that we need to change the type. So, I will set the type to mail exchange and now I can write various domain names and then it will give me the exchange servers for those domain names.

So, let us find out the mail servers for gmail.com. So, again it gives me these addresses. So, these are various mail exchange servers that are used for the gmail.com domain name. So, we can set the type again to type equal to A and that will again give us the IP addresses. So, we can exit this mode using exit. So, that was about nslookup.

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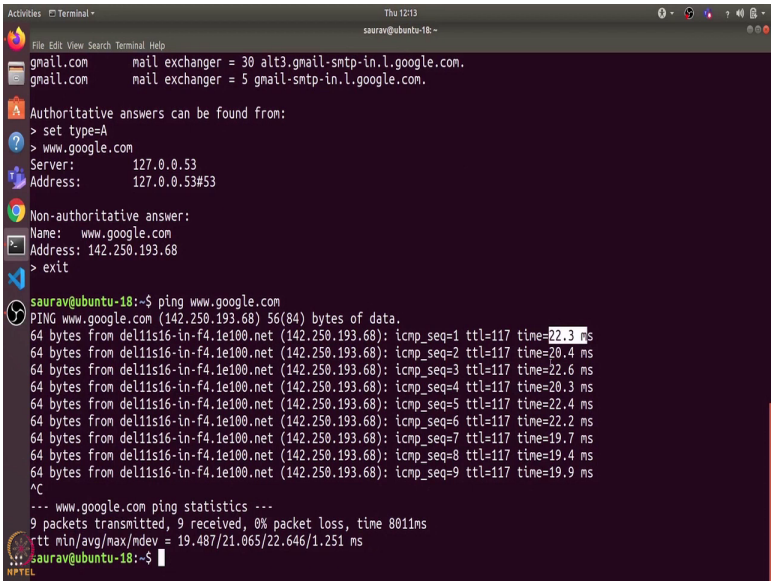

So, the next tool that we are going to discuss is ping tool. So, ping is a very useful command. It lets us find out whether our computer is connected to the Internet, whether it is able to send packets to a server successfully or not. So, I can type out the website URL and it will send packets to this particular server and see its response.

So, here you can see that it is, it keeps sending various icmp packets. You can stop it using control plus c. And it shows that it transmitted nine packets and it got back all the nine packets from the server, so there was 0 percent packet close. And here it shows a round trip time for sending this echo packets. So, we can see that it is able to send packets to Google.com successfully and it shows us the various minimum, average, maximum etc. for this round trip time.

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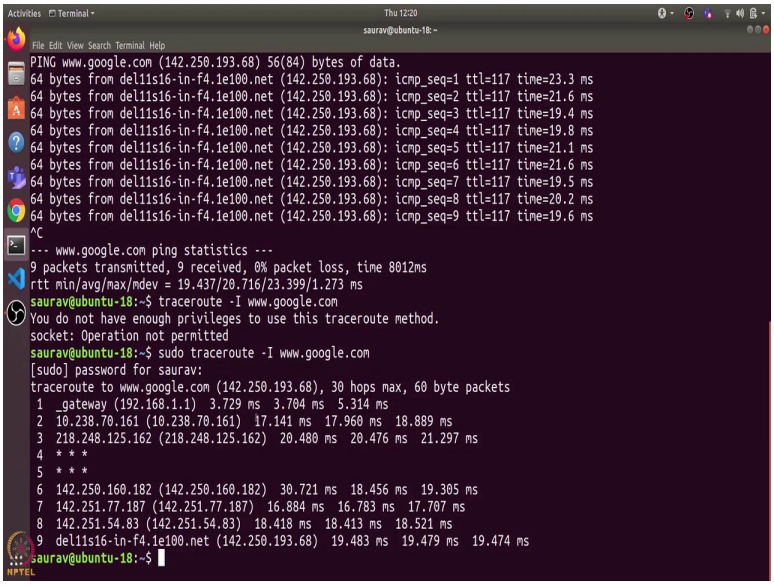

So, let us move on to the traceroute command. The traceroute command is used to show us the route that is taken by the data packets to reach a particular server. So, whenever it sends some packets to let us say the Google servers, then it needs to first pass through various routers and then finally the packet reaches the Google server. So, the traceroute command is used to find out the addresses for each of those routers that are there in the path and also it shows us the roundtrip time to each router.

So, how can we use the traceroute command? So, I will write traceroute www.Google.com and I will give it minus I flag to use icmp packets. So, I need to use sudo. So, here it shows us the IP

address of each of the router that it found in its path before finally reaching the Google server and it also shows us three roundtrip times. So, it sends three packets to each of the router and finds out what is the roundtrip time. So, these times are pretty consistent.

And the final roundtrip time to reach the destination server matches approximately the same with what we found out in the ping command. So, here it shows stars for these two routers which means that they might not be configured to reply to this icmp packets. So, that is all the information that we get from the traceroute command.

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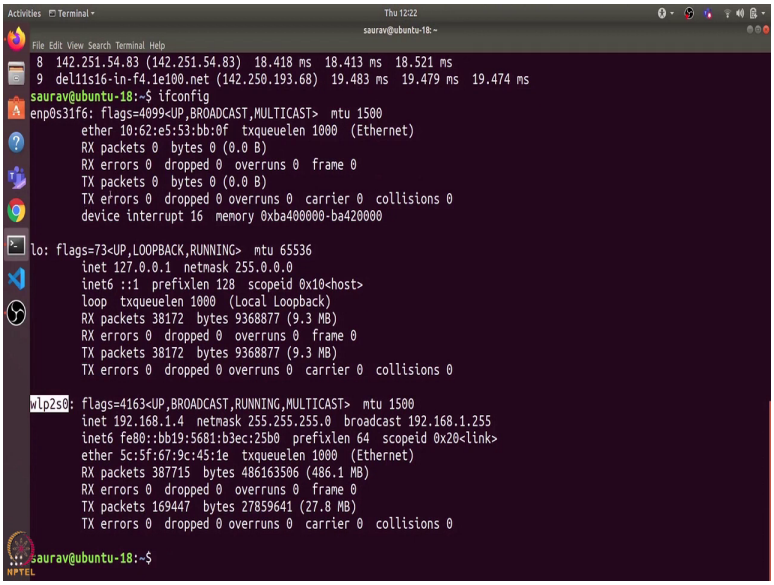

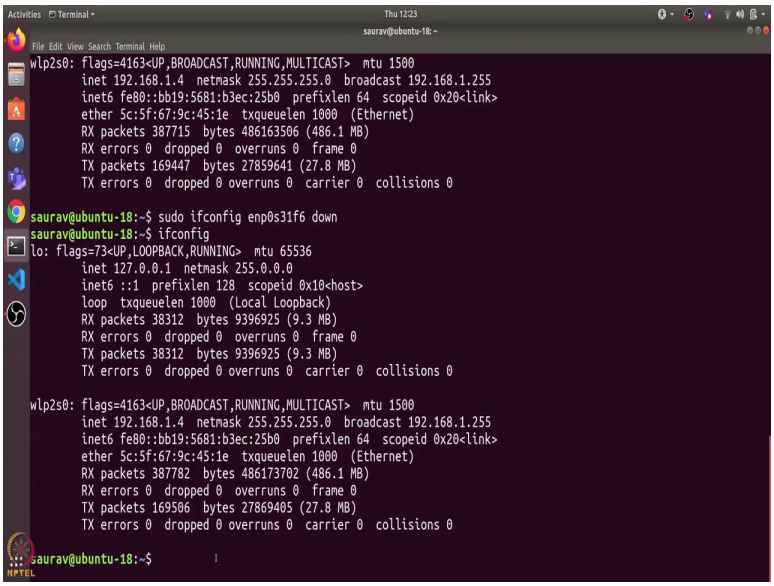

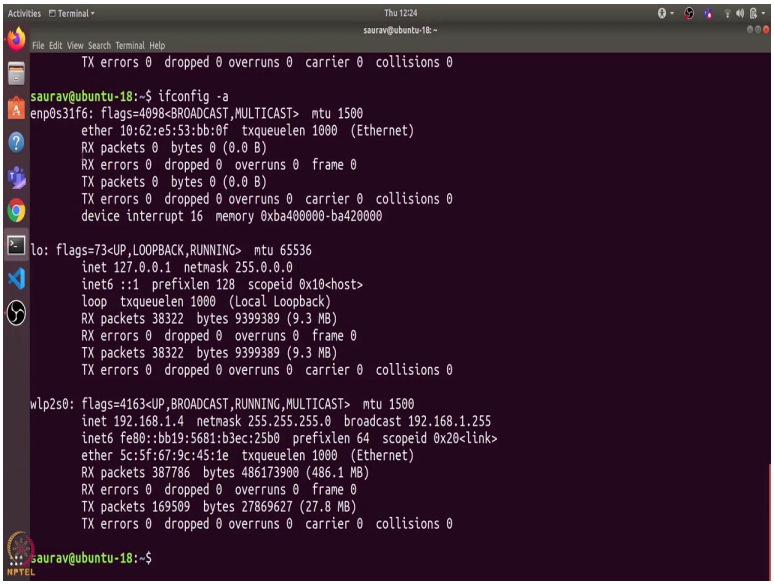

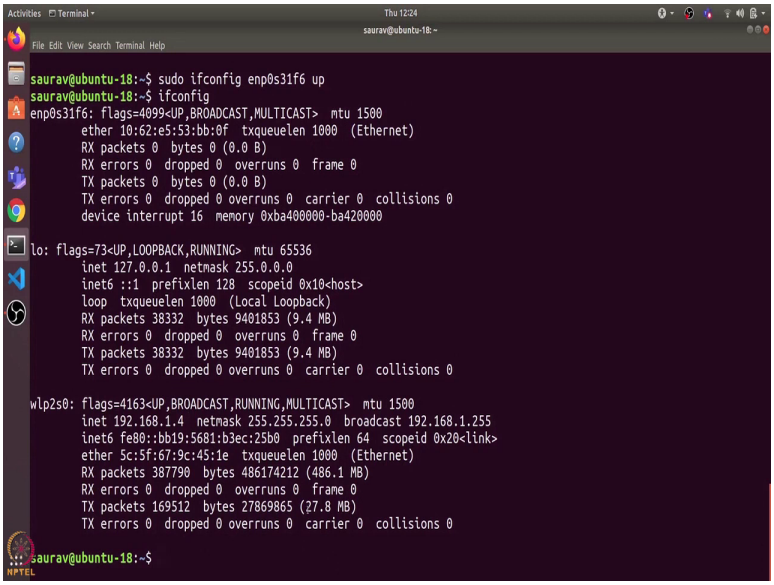

So, the final command that we will cover is ifconfig. The ifconfig command is used to list all the interfaces which are up in our computer. So, if I just type ifconfig and press enter, it shows me that there are three interfaces. This is the Ethernet interface, then the loop back interface and this is for the wifi. So, here if we see that the Ethernet is not running, because I am currently using wifi network. So, here it is running. And we can also see some transmitted and received packets here.

So, let us go through what all information it shows. So, it shows me this interface is up and we can broadcast or multicast and it is running. Then it shows me the maximum transmission unit. And what is this mean. This means that 1,500 bytes is the maximum packet size that you can

send using this interface. Then it shows me the IPv4 address and the IPv6 address which are linked to this interface. And some other details such as queue length and the received packets, received bytes or the transmitted packets or transmitted bytes.

We can use ifconfig to turn any interface up or down. So, let us say I want to shut down this Ethernet interface. I can write ifconfig enp0s31f6 down and I need to use pseudo. So, this will turn it down. So, now, if I type ifconfig, then it will list only two interfaces, because only these two interfaces are up. And how can I see all the interfaces, I can use ifconfig -a flag to see all the interfaces. And I can turn it up again using the same command. So, I will just change down to up. And now it will show me all the interfaces again.

Also, we can change various IP address or the netmask etc. of any interface using ifconfig command if you want to do so. So, those are some of the network debugging tools. If you want to go in detail about any of the tool you can see the man page of any of this. So, let us say we open the man page of nslookup, so here it lists various options that we can use with this command. Similarly, you can go through man page of any command. So, that is it for this video. Thanks and have a nice day.