Template Week 6 – Networking

Student number:

Assignment 6.1: Working from home

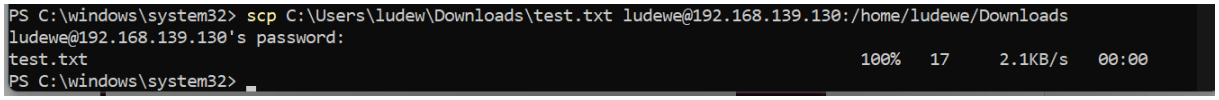
Screenshot installation openssh-server:

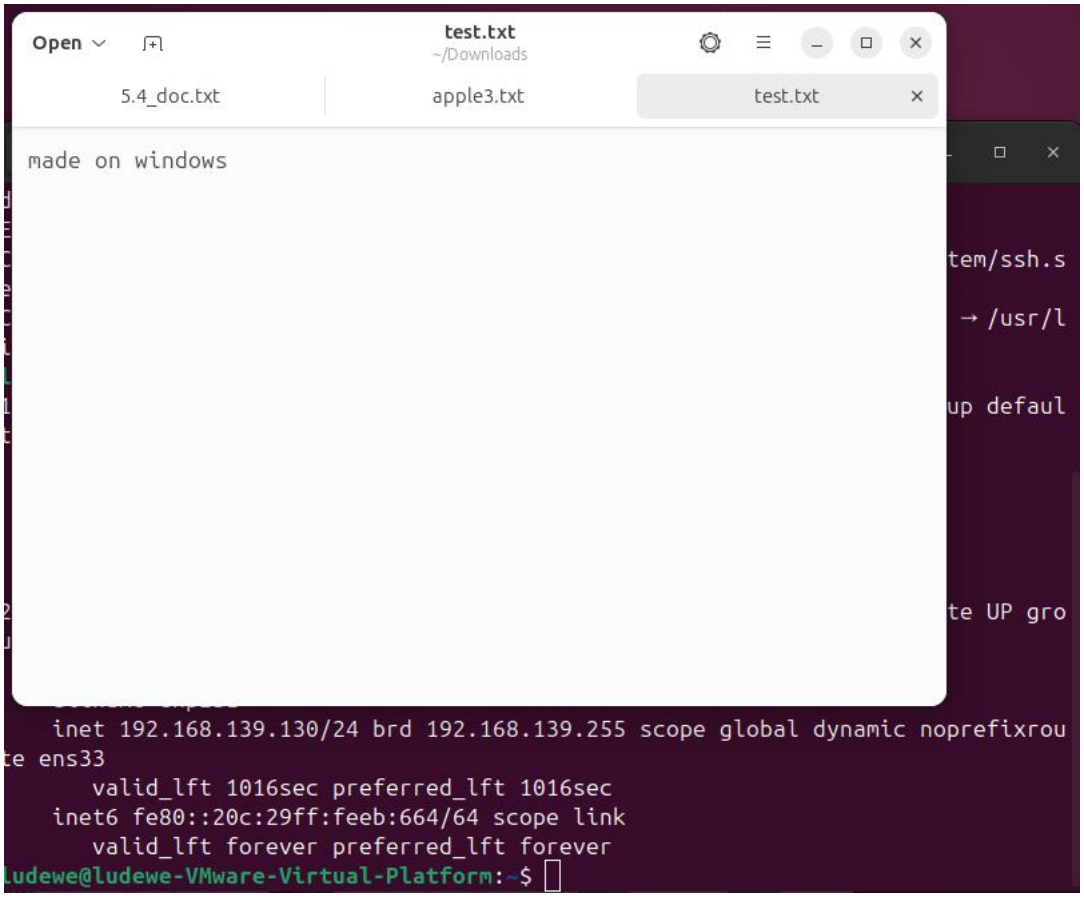
```
ludewe@ludewe-VMware-Virtual-Platform:~$ sudo apt install openssh-server -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
openssh-server is already the newest version (1:9.6p1-3ubuntu13.14).
The following package was automatically installed and is no longer required:
  libllvm19
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 143 not upgraded.
ludewe@ludewe-VMware-Virtual-Platform:~$ sudo systemctl enable --now ssh
Synchronizing state of ssh.service with SysV service script with /usr/lib/system
d/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
Created symlink /etc/systemd/system/sshd.service → /usr/lib/systemd/system/ssh.s
ervice.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /usr/l
ib/systemd/system/ssh.service.
```

Screenshot successful SSH command execution:

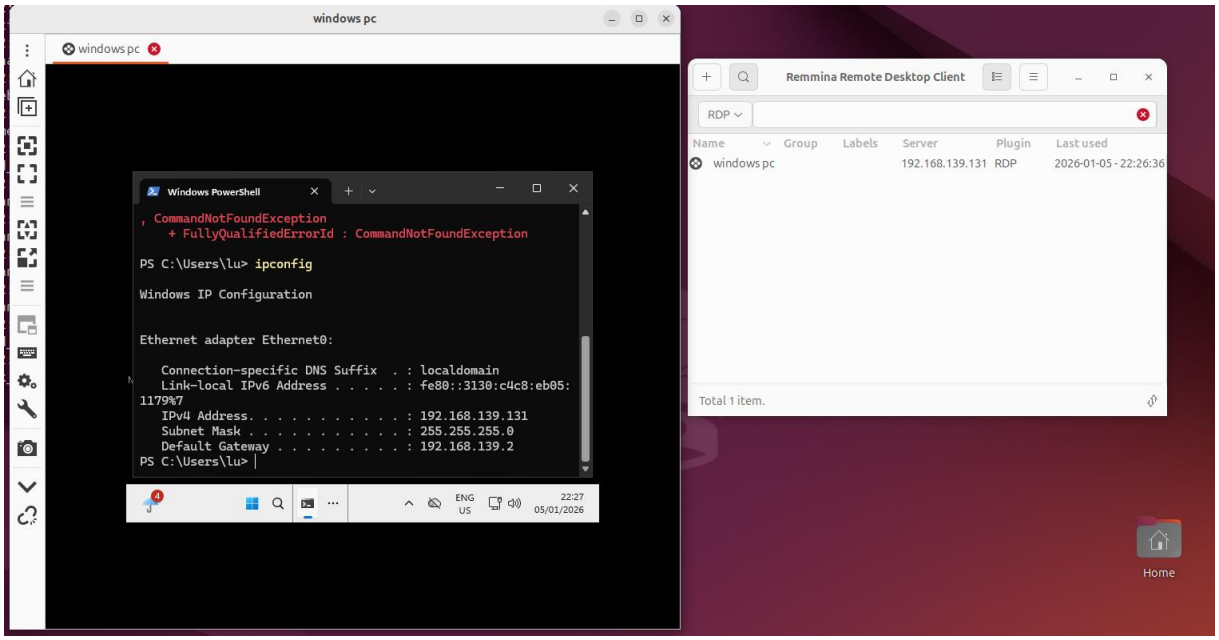
```
ludewe@ludewe-VMware-Vir
ssh: connect to host 192.169.139.130 port 22: Connection timed out
PS C:\Users\ludew> ssh ludewe@192.168.139.130
The authenticity of host '192.168.139.130 (192.168.139.130)' can't be establishe
d.
ED25519 key fingerprint is SHA256:12w5Uwl3LfDJQLYMe5wCcLYjKsBd2FC9RqR6e/GkqHo.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.139.130' (ED25519) to the list of known host
s.
ludewe@192.168.139.130's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-37-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.

143 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

17 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

Last login: Fri Jan  2 15:30:10 2026 from 127.0.0.1
ludewe@ludewe-VMware-Virtual-Platform:~$
```

Screenshot successful execution SCP command:





Screenshot remmina:



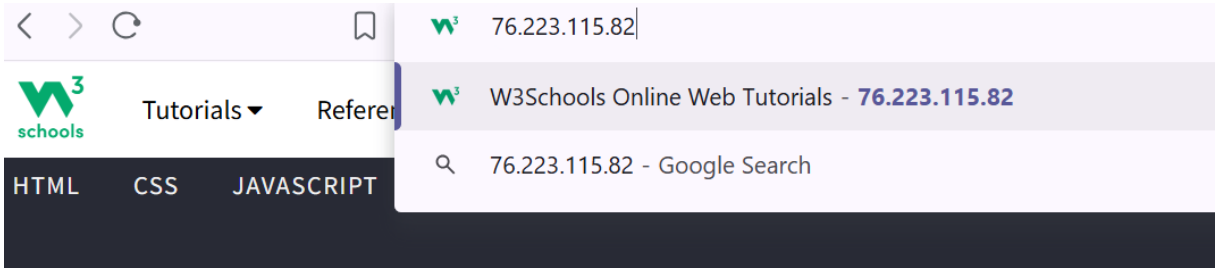
Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

```
ludewe@ludewe-VMware-Virtual-Platform:~$ nslookup
> amazon.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   amazon.com
Address: 98.82.161.185
Name:   amazon.com
Address: 98.87.170.71
Name:   amazon.com
Address: 98.87.170.74
> google.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.179.142
Name:   google.com
Address: 2a00:1450:400e:801::200e
> one.one.one.one
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   one.one.one.one
Address: 1.0.0.1
Name:   one.one.one.one
Address: 1.1.1.1
Name:   one.one.one.one
Address: 2606:4700:4700::1001
Name:   one.one.one.one
Address: 2606:4700:4700::1111
```

```
> dns.google.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   dns.google.com
Address: 8.8.8.8
Name:   dns.google.com
Address: 8.8.4.4
Name:   dns.google.com
Address: 2001:4860:4860::8888
Name:   dns.google.com
Address: 2001:4860:4860::8844
> bol.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   bol.com
Address: 79.170.100.62
> w3schools.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   w3schools.com
Address: 76.223.115.82
Name:   w3schools.com
Address: 13.248.240.135
>
```

Screenshot website visit via IP address:



Assignment 6.3: subnetting

How many IP addresses are in this network configuration 192.168.110.128/25?

128

What is the usable IP range to hand out to the connected computers?

192.168.110.129 - 192.168.110.254

Check your two previous answers with this Linux command: `ipcalc 192.168.110.128/25`

```
ludewe@ludewe-VMware-Virtual-Platform:~$ ipcalc 192.168.110.128/25
Address:   192.168.110.128      11000000.10101000.01101110.1 0000000
Netmask:   255.255.255.128 = 25 11111111.11111111.11111111.1 0000000
Wildcard:  0.0.0.127            00000000.00000000.00000000.0 1111111
=>
Network:   192.168.110.128/25   11000000.10101000.01101110.1 0000000
HostMin:   192.168.110.129      11000000.10101000.01101110.1 0000001
HostMax:   192.168.110.254      11000000.10101000.01101110.1 1111110
Broadcast: 192.168.110.255      11000000.10101000.01101110.1 1111111
Hosts/Net: 126                   Class C, Private Internet

ludewe@ludewe-VMware-Virtual-Platform:~$
```

Explain the above calculation in your own words.

32 – 25 = 7, 2^7 = 128. 128 – 1 broadcast address and 1 network address = 126 usable

Starting at 192.168.110.128 + 126 = 192.168.110.254 max

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

```
ludewe@ludewe-VMware-Virtual-Platform:~/Documents/site$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:eb:06:64 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.139.130/24 brd 192.168.139.255 scope global dynamic noprefixroute ens33
       valid_lft 1249sec preferred_lft 1249sec
    inet6 fe80::20c:29ff:feeb:664/64 scope link
       valid_lft forever preferred_lft forever
ludewe@ludewe-VMware-Virtual-Platform:~/Documents/site$
```

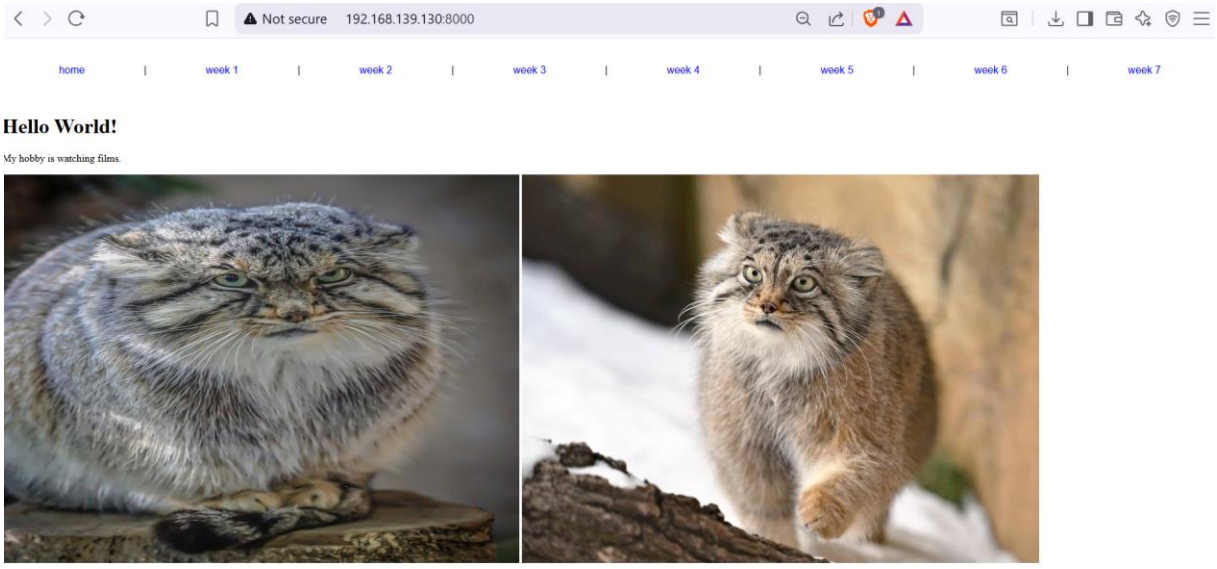
Screenshot of Site directory contents:

```
ludewe@ludewe-VMware-Virtual-Platform:~/Documents/site$ ls
css  home.html  images  index.html  pdf  week1.html  week2.html  week3.html  week4.html  week5.html  week6.html  week7.html
ludewe@ludewe-VMware-Virtual-Platform:~/Documents/site$
```

Screenshot python3 webserver command:

```
ludewe@ludewe-VMware-Virtual-Platform:~/Documents/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.139.1 - - [06/Jan/2026 00:02:25] "GET / HTTP/1.1" 200 -
192.168.139.1 - - [06/Jan/2026 00:02:25] "GET /home.html HTTP/1.1" 200 -
192.168.139.1 - - [06/Jan/2026 00:02:25] "GET /css/mypdfstyle.css HTTP/1.1" 200 -
192.168.139.1 - - [06/Jan/2026 00:02:25] "GET /images/bol.jpg HTTP/1.1" 200 -
192.168.139.1 - - [06/Jan/2026 00:02:25] "GET /images/bol2.jpg HTTP/1.1" 200 -
192.168.139.1 - - [06/Jan/2026 00:02:25] code 404, message File not found
192.168.139.1 - - [06/Jan/2026 00:02:25] "GET /favicon.ico HTTP/1.1" 404 -
^Z
```

Screenshot web browser visits your site



Assignment 6.5: Network segment

Remember that bitwise java application you've made in week 2? Expand that application so that you can also calculate a network segment as explained in the PowerPoint slides of week 6. Use the bitwise & AND operator. You need to be able to input two Strings. An IP address and a subnet.

IP: 192.168.1.100 and subnet: 255.255.255.224 for /27

```
Example: 192.168.1.100/27
Calculate the network segment
IP Address:   11000000.10101000.00000001.01100100
Subnet Mask:  11111111.11111111.11111111.11100000
-----------------------------------------------
Network Addr: 11000000.10101000.00000001.01100000

This gives 192.168.1.96 in decimal as the network address.
```

For a /27 subnet, each segment (or subnet) has 32 IP addresses (2^5).
The range of this network segment is from 192.168.1.96 to 192.168.1.127.

(did not finish on time)

Ready? Save this file and export it as a pdf file with the name: **week6.pdf**