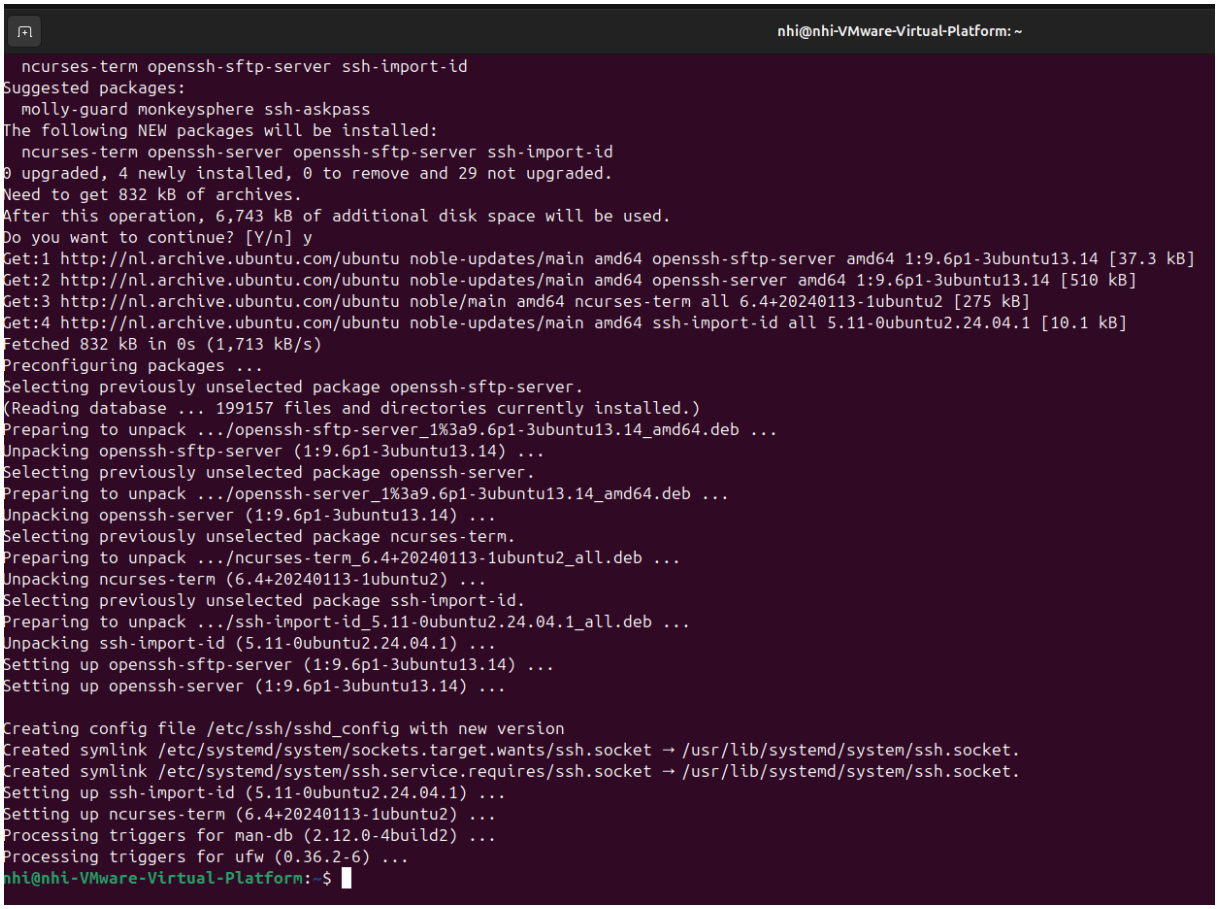
Template Week 6 – Networking

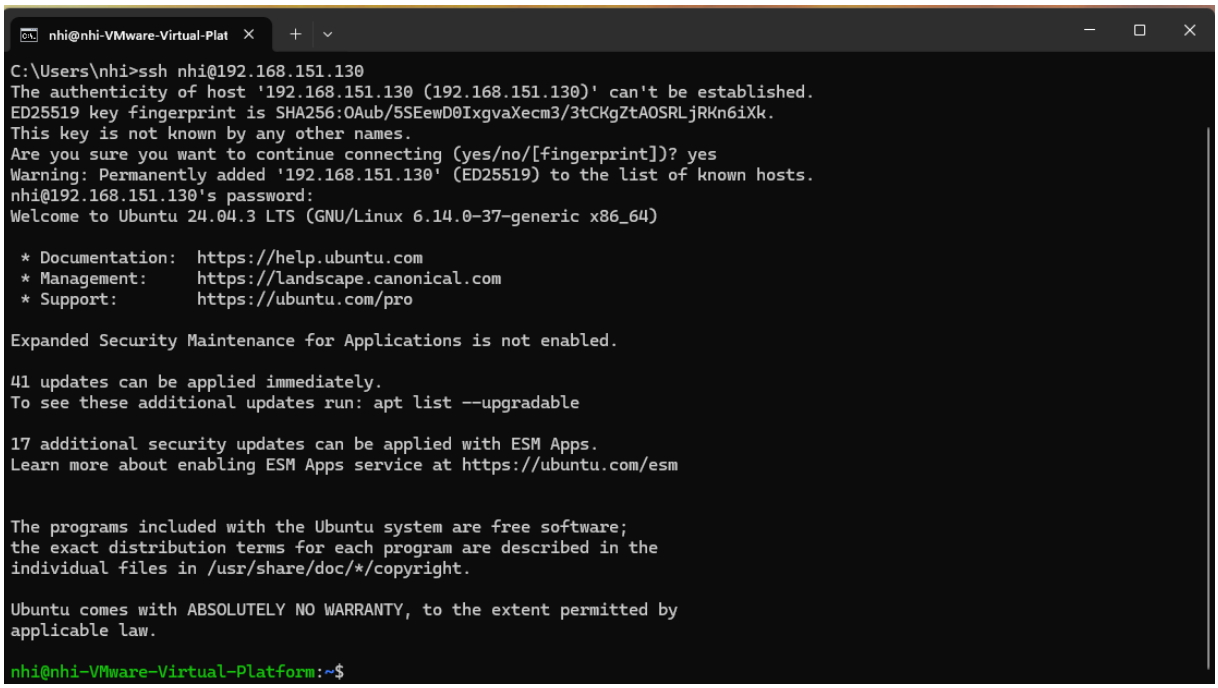
Student number: 591658

Assignment 6.1: Working from home

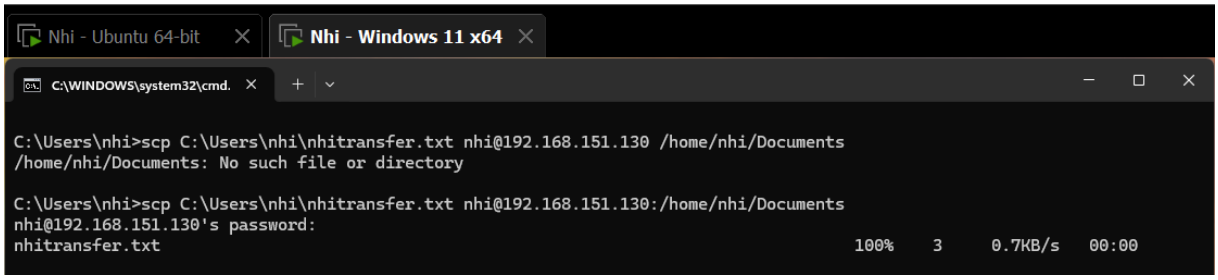
Screenshot installation openssh-server:



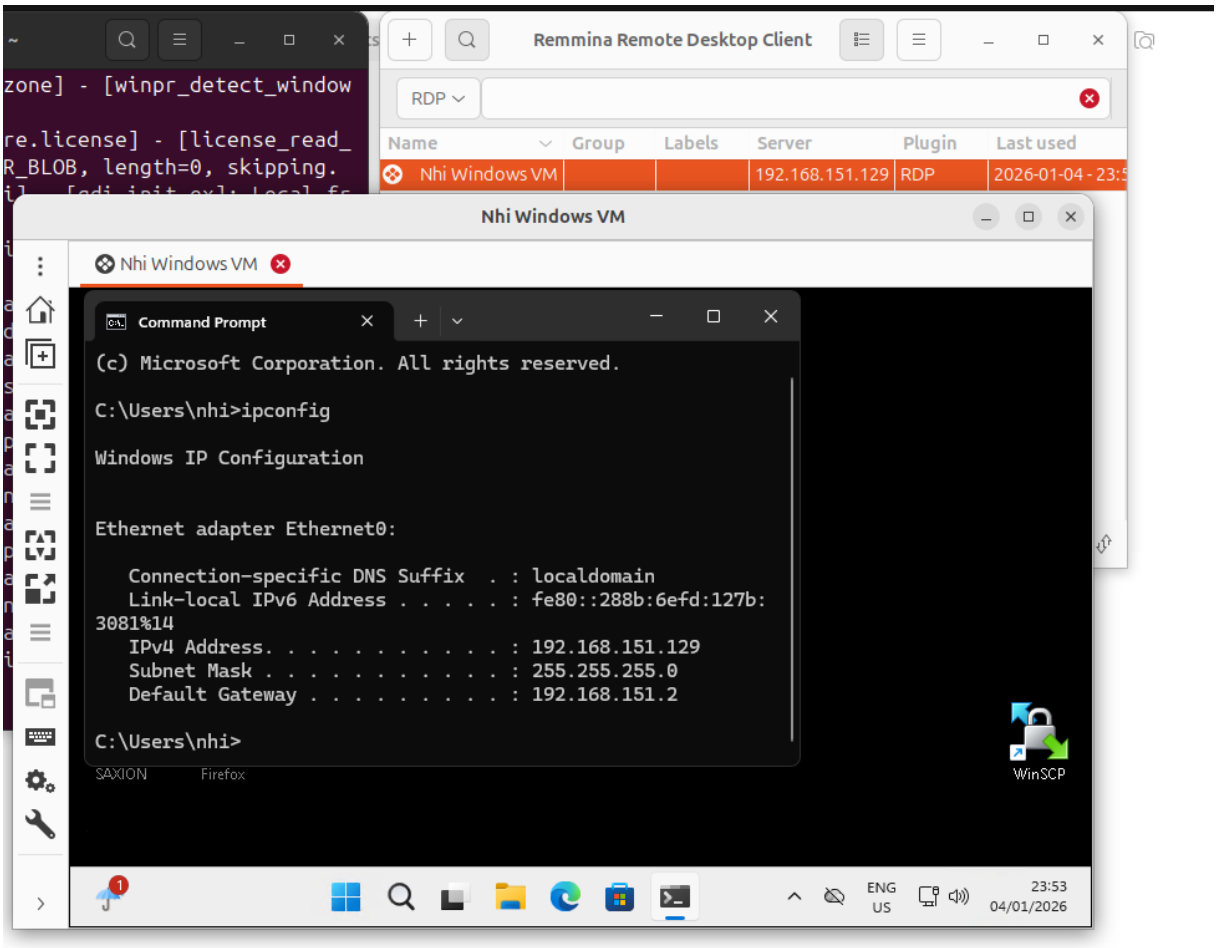
Screenshot successful SSH command execution:



Screenshot successful execution SCP command:



Screenshot remmina:



Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

• amazon.com

```
nhi@nhi-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: 98.87.170.74
Name:   amazon.com
Address: 98.87.170.71
```

• google.com

```
nhi@nhi-VMware-Virtual-Platform:~$ nslookup google.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.179.206
Name:   google.com
Address: 2a00:1450:400e:802::200e
```

• one.one.one.one

```
nhi@nhi-VMware-Virtual-Platform:~$ nslookup one.one.one.one
Server:         127.0.0.53
Address:        127.0.0.53#53

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

• dns.google.com

```
nhi@nhi-VMware-Virtual-Platform:~$ nslookup dns.google.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   dns.google.com
Address: 8.8.4.4
Name:   dns.google.com
Address: 8.8.8.8
Name:   dns.google.com
Address: 2001:4860:4860::8888
Name:   dns.google.com
Address: 2001:4860:4860::8844
```

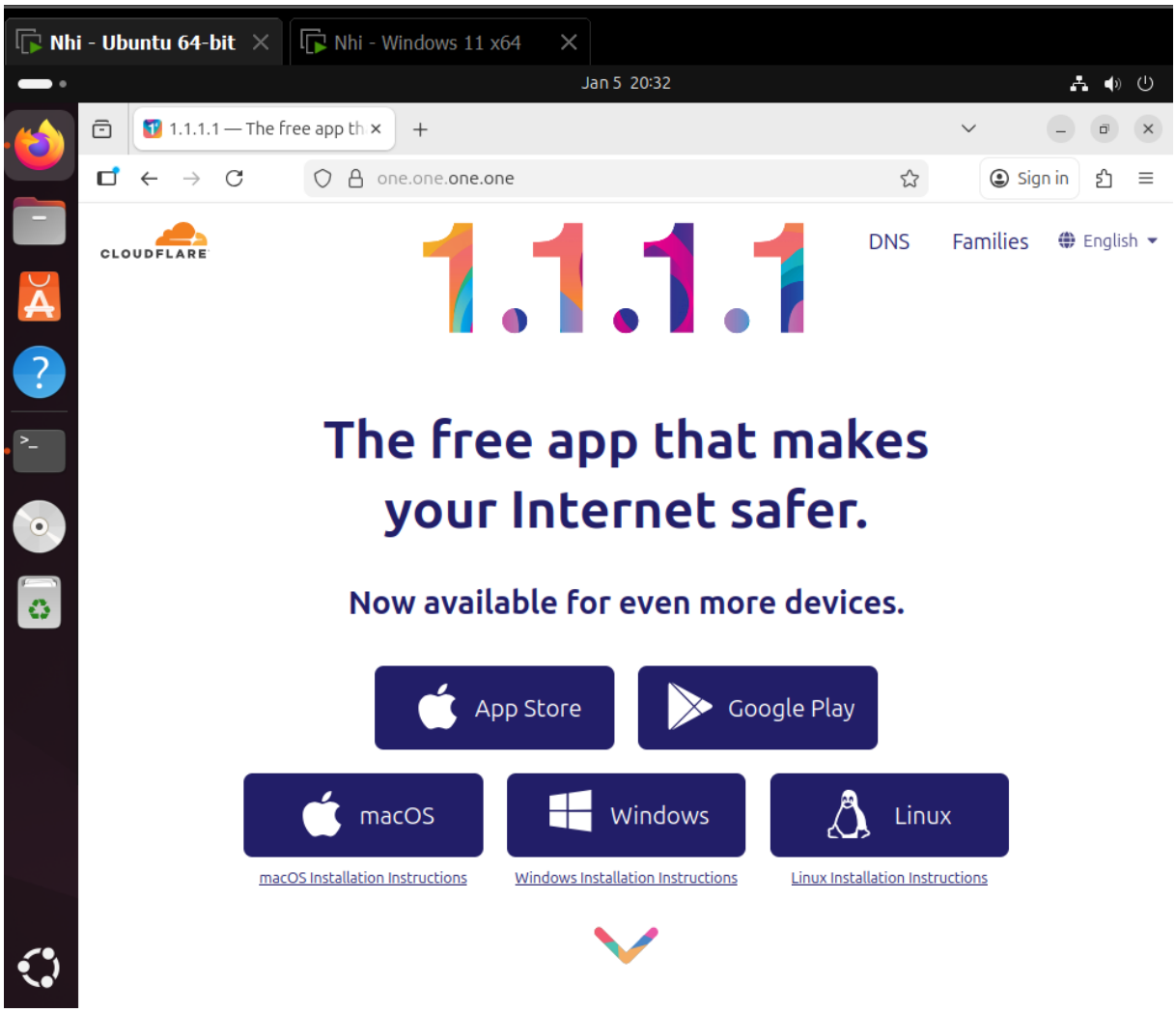
• bol.com

```
nhi@nhi-VMware-Virtual-Platform:~$ nslookup 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

```
nhi@nhi-VMware-Virtual-Platform:~$ nslookup 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?

/25 subnet => 25 bits are used for the network address.

=> 32 – 25 = 7 bits for host addresses.

Number of IP addresses = 2^7 =128

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

Usable host addresses: 128 total – 1 network address – 1 broadcast address = 126

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

```
nhi@nhi-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
```

Explain the above calculation in your own words.

Subnet/25 => 32-25 = 7 bits are used for hot addresses

- ⇨ Subnet mask = 255.255.255.128
  128 = 2^7

Wildcard mask is the invert of subnet mask. Wildcard mask tells the range of possible IP host addresses by listing the bits that can be used for IP host address as 1.

Wildcard mask 0000.0000.0000.0 1111111 => 7 number 1=> 7 bits are used

127 is not the actual range, but the decimal octet of binary 0111 1111

Network address is the first in the range: 192.168.110.128

Broadcast address is the last in the range: 192.168.110.255

The available range for host address = 128 -2 = 126, starting from 192.168.110.129 to 192.168.110.254

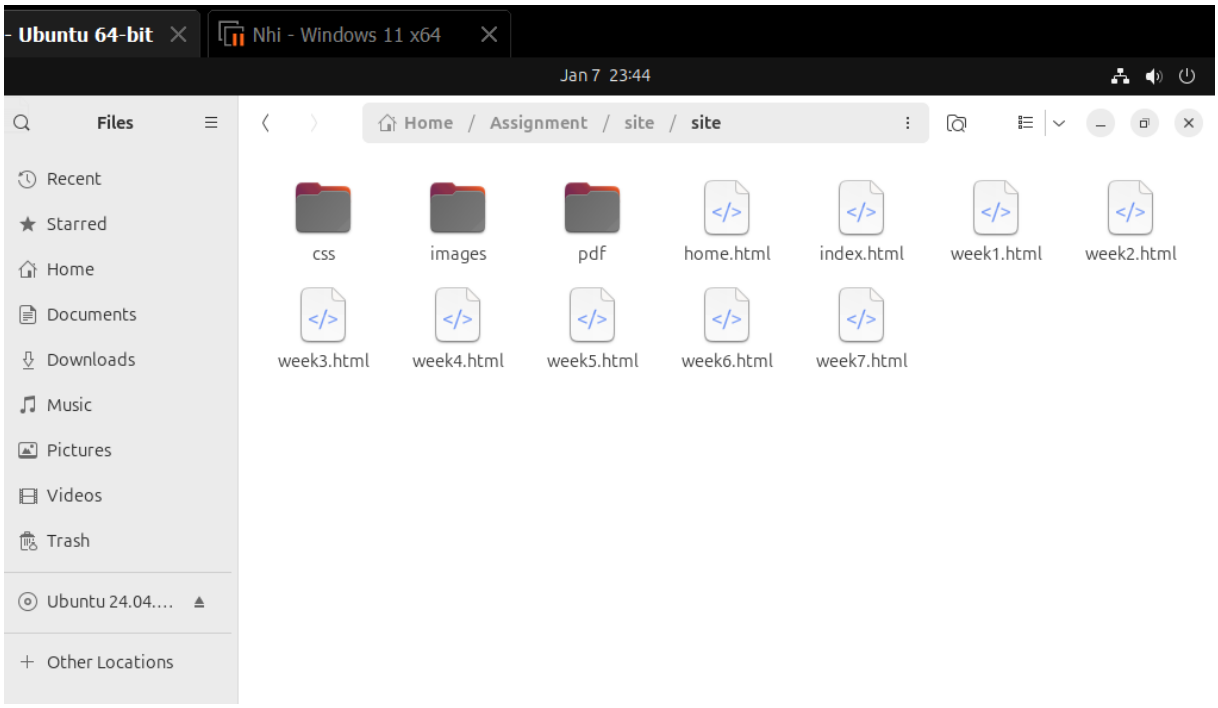
Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

```
nhi@nhi-VMware-Virtual-Platform:~/Assignment/site/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 defa
ult qlen 1000
    link/ether 00:0c:29:46:46:41 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.151.130/24 brd 192.168.151.255 scope global dynamic noprefixroute ens3
3
       valid_lft 956sec preferred_lft 956sec
    inet6 fe80::20c:29ff:fe46:4641/64 scope link
       valid_lft forever preferred_lft forever
```

Screenshot of Site directory contents:

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

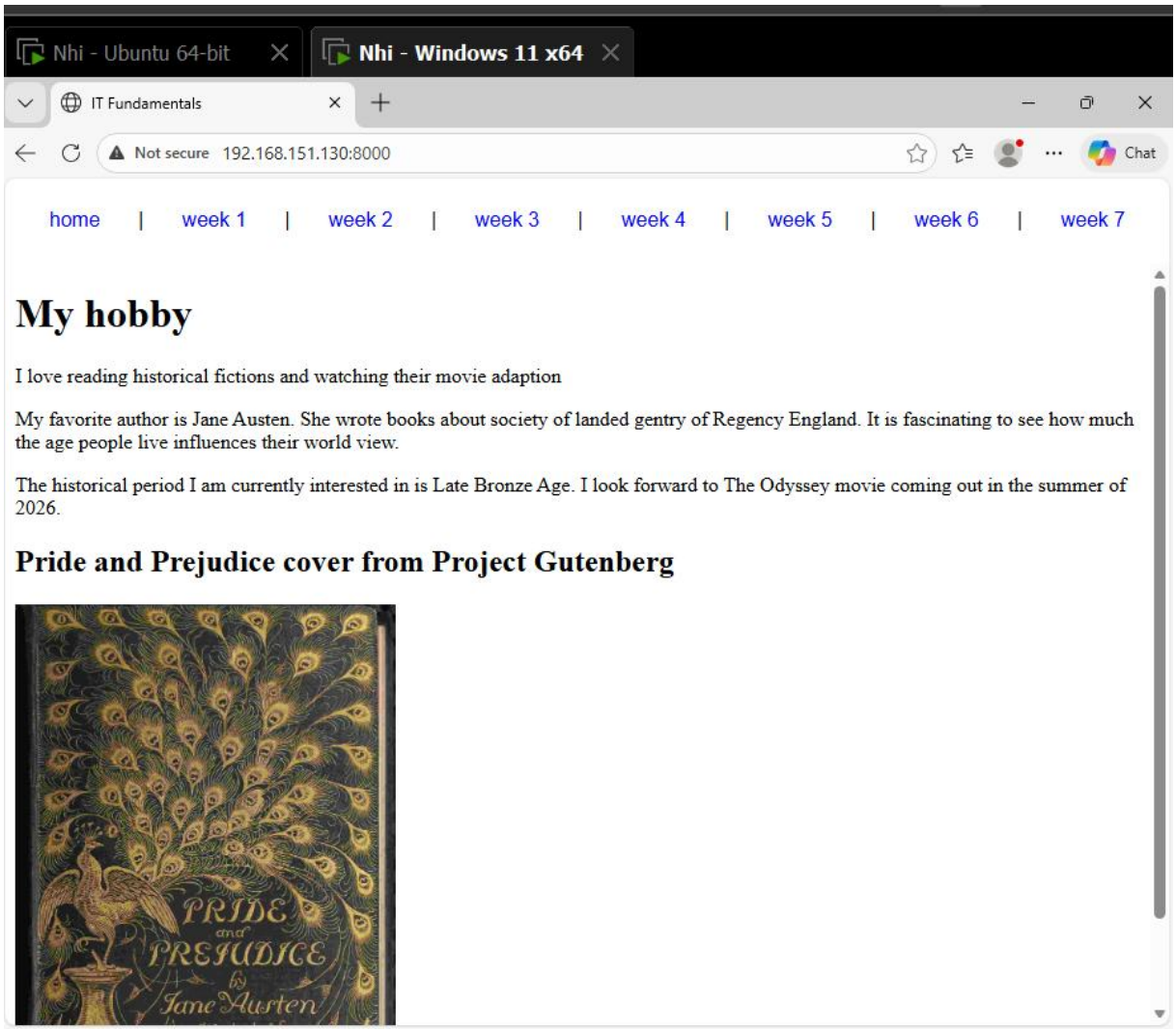



```
nhi@nhi-VMware-Virtual-Platform:~/Assignment$ zip -r site.zip site
  adding: site/ (stored 0%)
  adding: site/site/ (stored 0%)
  adding: site/site/home.html (deflated 42%)
  adding: site/site/week3.html (deflated 37%)
  adding: site/site/week1.html (deflated 37%)
  adding: site/site/week5.html (deflated 37%)
  adding: site/site/pdf/ (stored 0%)
  adding: site/site/pdf/week7.pdf (deflated 11%)
  adding: site/site/pdf/week3.pdf (deflated 11%)
  adding: site/site/pdf/week4.pdf (deflated 11%)
  adding: site/site/pdf/week2.pdf (deflated 11%)
  adding: site/site/pdf/week1.pdf (deflated 10%)
  adding: site/site/pdf/week6.pdf (deflated 10%)
  adding: site/site/pdf/week5.pdf (deflated 11%)
  adding: site/site/css/ (stored 0%)
  adding: site/site/css/mypdfstyle.css (deflated 59%)
  adding: site/site/images/ (stored 0%)
  adding: site/site/images/Pride and Prejudice cover.jpg (deflated 1%)
  adding: site/site/week7.html (deflated 37%)
  adding: site/site/week2.html (deflated 37%)
  adding: site/site/week4.html (deflated 37%)
  adding: site/site/week6.html (deflated 37%)
  adding: site/site/index.html (deflated 62%)
nhi@nhi-VMware-Virtual-Platform:~/Assignment$ ls
 apple2.jpg    email-base64.txt   message.txt   site       site.zip
 blank.txt     email.gif          oldcar       'site 00'
```

Screenshot python3 webserver command:

```
nhi@nhi-VMware-Virtual-Platform:~/Assignment/site/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.151.129 - - [07/Jan/2026 23:24:33] "GET / HTTP/1.1" 200 -
192.168.151.129 - - [07/Jan/2026 23:24:33] "GET /css/mypdfstyle.css HTTP/1.1" 200 -
192.168.151.129 - - [07/Jan/2026 23:24:33] "GET /home.html HTTP/1.1" 200 -
192.168.151.129 - - [07/Jan/2026 23:24:33] "GET /images/Pride%20and%20Prejudice%20cover
.jpg HTTP/1.1" 200 -
192.168.151.129 - - [07/Jan/2026 23:24:33] code 404, message File not found
192.168.151.129 - - [07/Jan/2026 23:24:33] "GET /favicon.ico HTTP/1.1" 404 -
```

Screenshot web browser visits your site



Assignment 6.5: Network segment

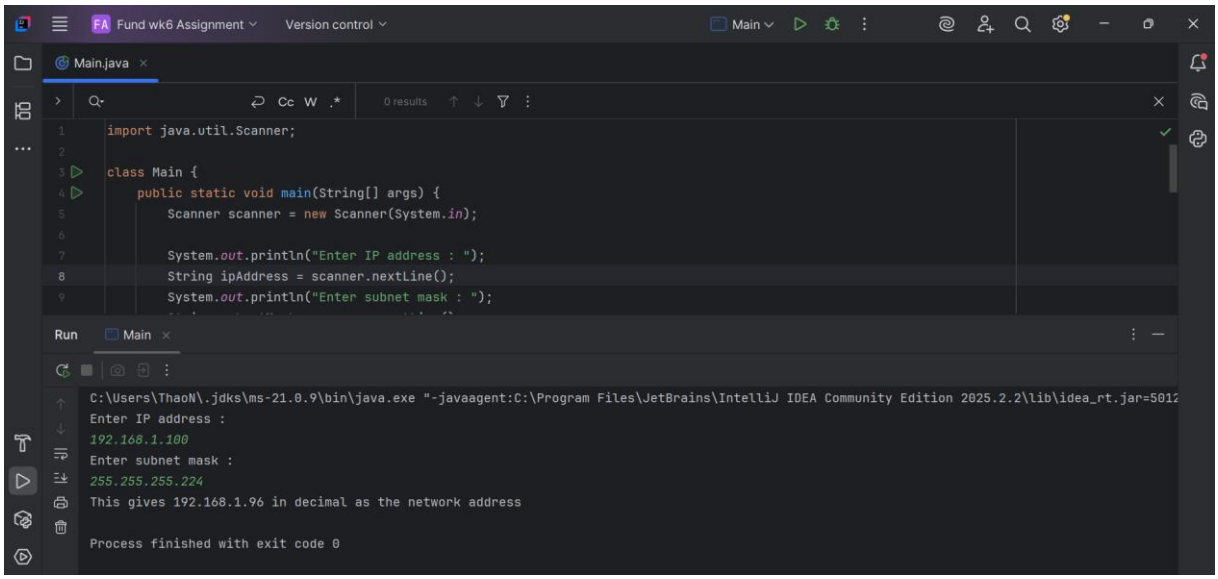
Remember that bitwise java application you've made in week 2? Expand that application so that you can also calculate a network segment as explained in the PowerPoint slides of week 6. Use the bitwise & AND operator. You need to be able to input two Strings. An IP address and a subnet.

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.
```

Paste source code here, with a screenshot of a working application.

```
import java.util.Scanner;

class Main {
  public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);

    System.out.println("Enter IP address : ");
    String ipAddress = scanner.nextLine();
    System.out.println("Enter subnet mask : ");
    String subnetMask = scanner.nextLine();

    String[] ipParts = ipAddress.split("\\.");
    String[] subnetParts = subnetMask.split("\\.");

    int[] network = new int[4];

    for (int i = 0; i < 4; i++) {
      int ip = Integer.parseInt(ipParts[i]);
      int subnet = Integer.parseInt(subnetParts[i]);
      network[i] = ip & subnet;
    }

    String networkAddress = network[0] + "." + network[1] + "." + network[2] + "." + network[3];

    System.out.println("This gives " + networkAddress + " in decimal as the network address");
  }
}
```



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