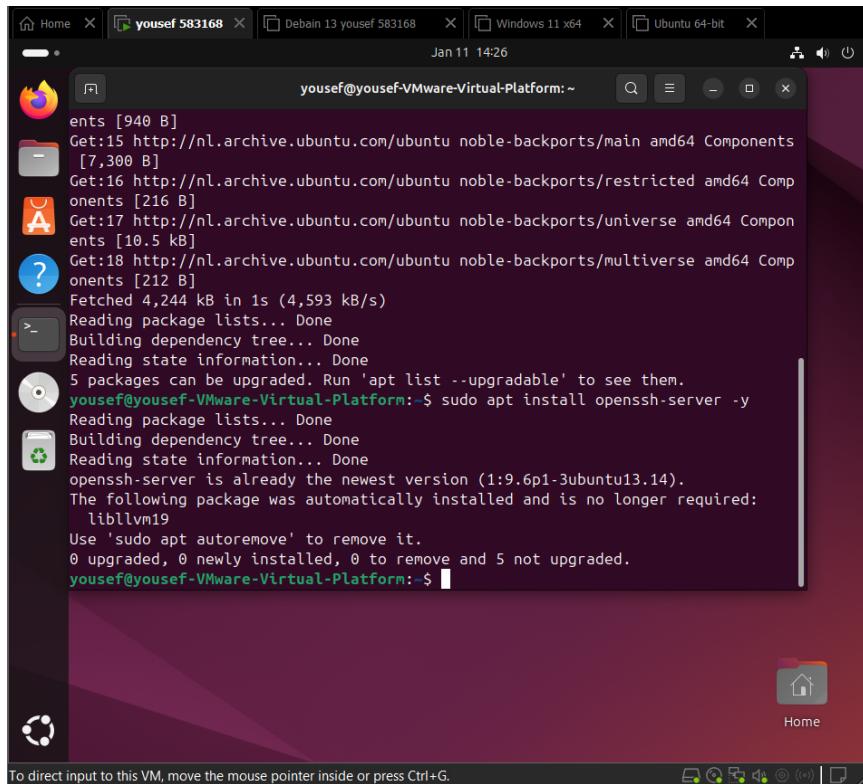


Template Week 6 – Networking

Student number: 583168

Assignment 6.1: Working from home

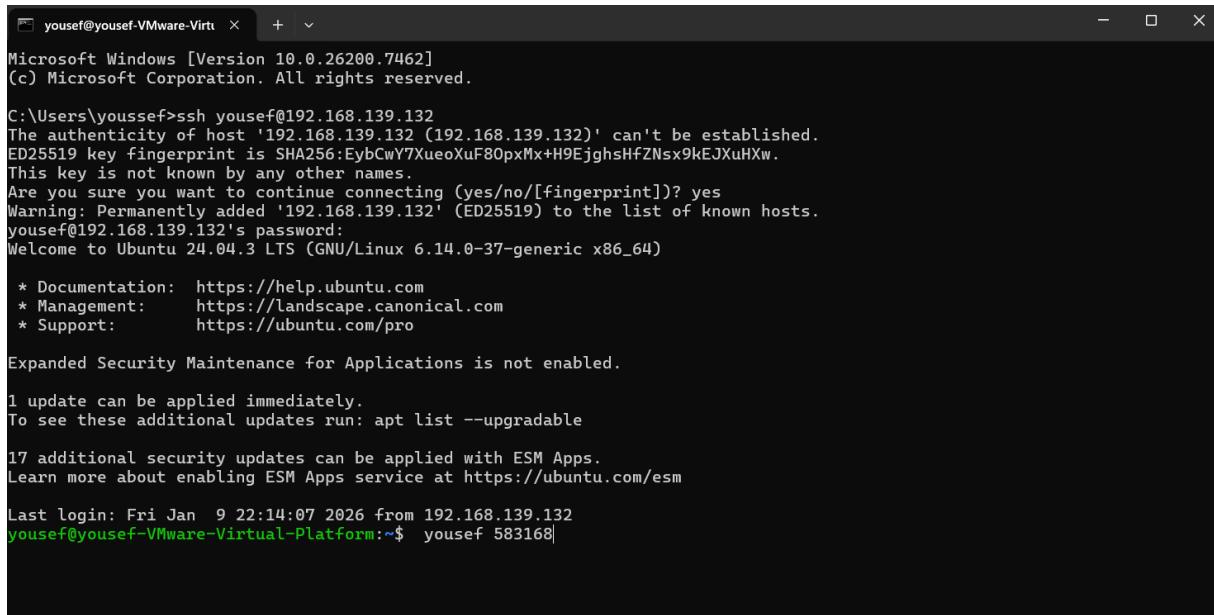
Screenshot installation openssh-server:



The screenshot shows a terminal window titled "yousef@yousef-VMware-Virtual-Platform:~". The terminal displays the output of an apt update command followed by the sudo apt install openssh-server -y command. The output indicates that the package is already at its newest version and no upgrades are available.

```
yousef@yousef-VMware-Virtual-Platform:~$ apt update  
yousef@yousef-VMware-Virtual-Platform:~$ sudo apt install openssh-server -y  
yousef@yousef-VMware-Virtual-Platform:~$
```

Screenshot successful SSH command execution:



```
yousef@yousef-VMware-Virtu + | Microsoft Windows [Version 10.0.26200.7462]
(c) Microsoft Corporation. All rights reserved.

C:\Users\youssef>ssh yousef@192.168.139.132
The authenticity of host '192.168.139.132 (192.168.139.132)' can't be established.
ED25519 key fingerprint is SHA256:EbCwY7XueoXuF80pxMx+H9EjghshfZNsx9kEJXuHXw.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.139.132' (ED25519) to the list of known hosts.
yousef@192.168.139.132'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

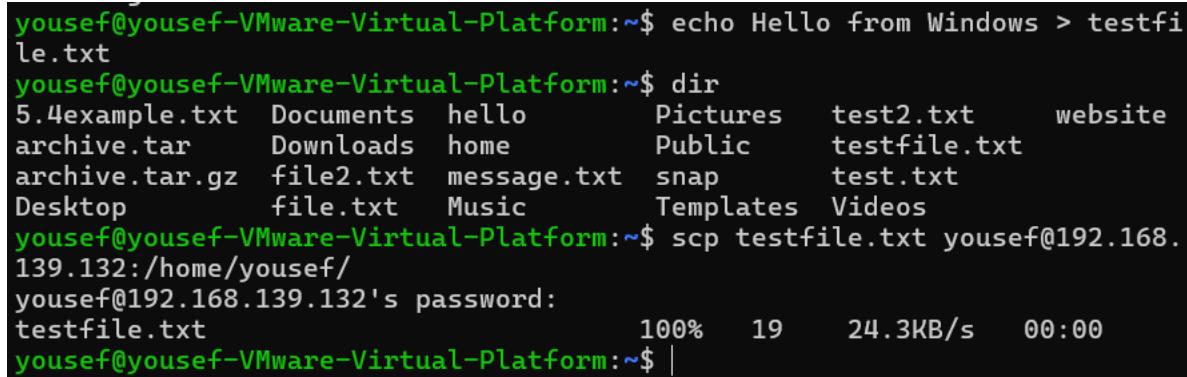
Expanded Security Maintenance for Applications is not enabled.

1 update 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

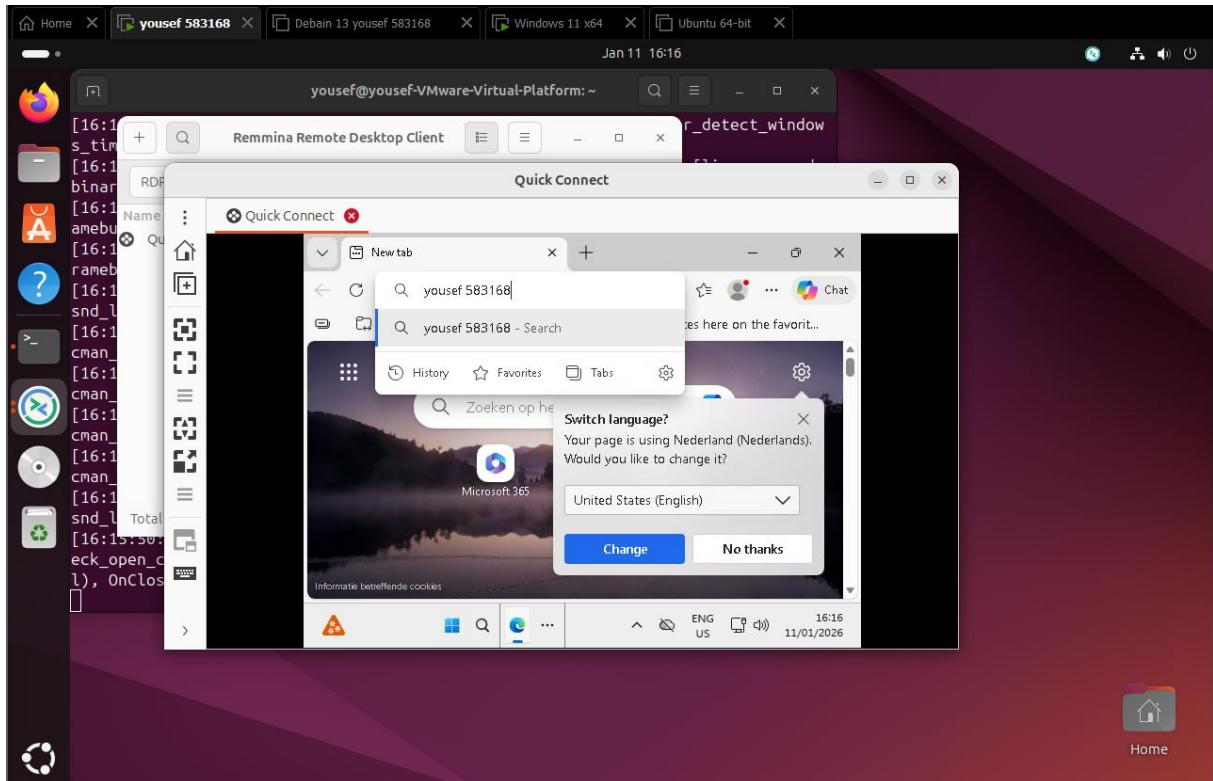
Last login: Fri Jan  9 22:14:07 2026 from 192.168.139.132
yousef@yousef-VMware-Virtual-Platform:~$ yousef 583168
```

Screenshot successful execution SCP command:



```
yousef@yousef-VMware-Virtual-Platform:~$ echo Hello from Windows > testfile.txt
yousef@yousef-VMware-Virtual-Platform:~$ dir
5.4example.txt  Documents  hello      Pictures  test2.txt    website
archive.tar     Downloads   home      Public     testfile.txt
archive.tar.gz  file2.txt  message.txt snap      test.txt
Desktop        file.txt   Music     Templates  Videos
yousef@yousef-VMware-Virtual-Platform:~$ scp testfile.txt yousef@192.168.139.132:/home/yousef/
yousef@192.168.139.132's password:
testfile.txt                                              100%   19      24.3KB/s   00:00
yousef@yousef-VMware-Virtual-Platform:~$ |
```

Screenshot remmina:



Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

A screenshot of a Linux desktop environment showing a terminal window. The terminal window has a dark background and contains the following text:

```
yousef@yousef-VMware-Virtual-Platform:~$ nslookup  
>  
>  
> yousef 583168
```

The terminal window is titled "yousef@yousef-VMware-Virtual-Platform: ~". The desktop interface includes a dock with icons for Home, yousef 583168, Debain 13 yousef 583168, Windows 11 x64, and Ubuntu 64-bit. The date and time at the top right indicate "Jan 11 16:28".

Screenshot website visit via IP address:

The screenshot shows a terminal window titled "yousef@yousef-VMware-Virtual-Platform: ~". The window displays two sets of DNS resolution results. The first set, under "Non-authoritative answer:", shows entries for "one.one.one.one" and "dns.google.com". The second set, also under "Non-authoritative answer:", shows multiple entries for "dns.google.com" with various addresses. The terminal interface includes a sidebar with icons for file operations like copy, paste, and search.

```
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::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
```

```
Home | yousef 583168 | Debain 13 yousef 583168 | Windows 11 x64 | Ubuntu 64-bit | Jan 11 16:34 | 🔍 | ⌂ | X
```

```
yousef@yousef-VMware-Virtual-Platform:~
```

```
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: 13.248.240.135  
Name: w3schools.com  
Address: 76.223.115.82  
> [REDACTED]
```

```
Home | yousef 583168 | Debain 13 yousef 583168 | Windows 11 x64 | Ubuntu 64-bit | Jan 11 16:34 | 🔍 | ⌂ | X
```

```
yousef@yousef-VMware-Virtual-Platform:~
```

```
Non-authoritative answer:  
Name: amazon.com  
Address: 98.87.170.74  
Name: amazon.com  
Address: 98.87.170.71  
Name: amazon.com  
Address: 98.82.161.185  
> google.com  
Server: 127.0.0.53  
Address: 127.0.0.53#53  
  
Non-authoritative answer:  
Name: google.com  
Address: 142.251.39.142  
Name: google.com  
Address: 2a00:1450:400e:804::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: 1.1.1.1
```

Assignment 6.3: subnetting

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

/25 means 25 bits for the network, leaving 7 bits for the host as $32-25=7$

$2^7 = 128$ ip addresses

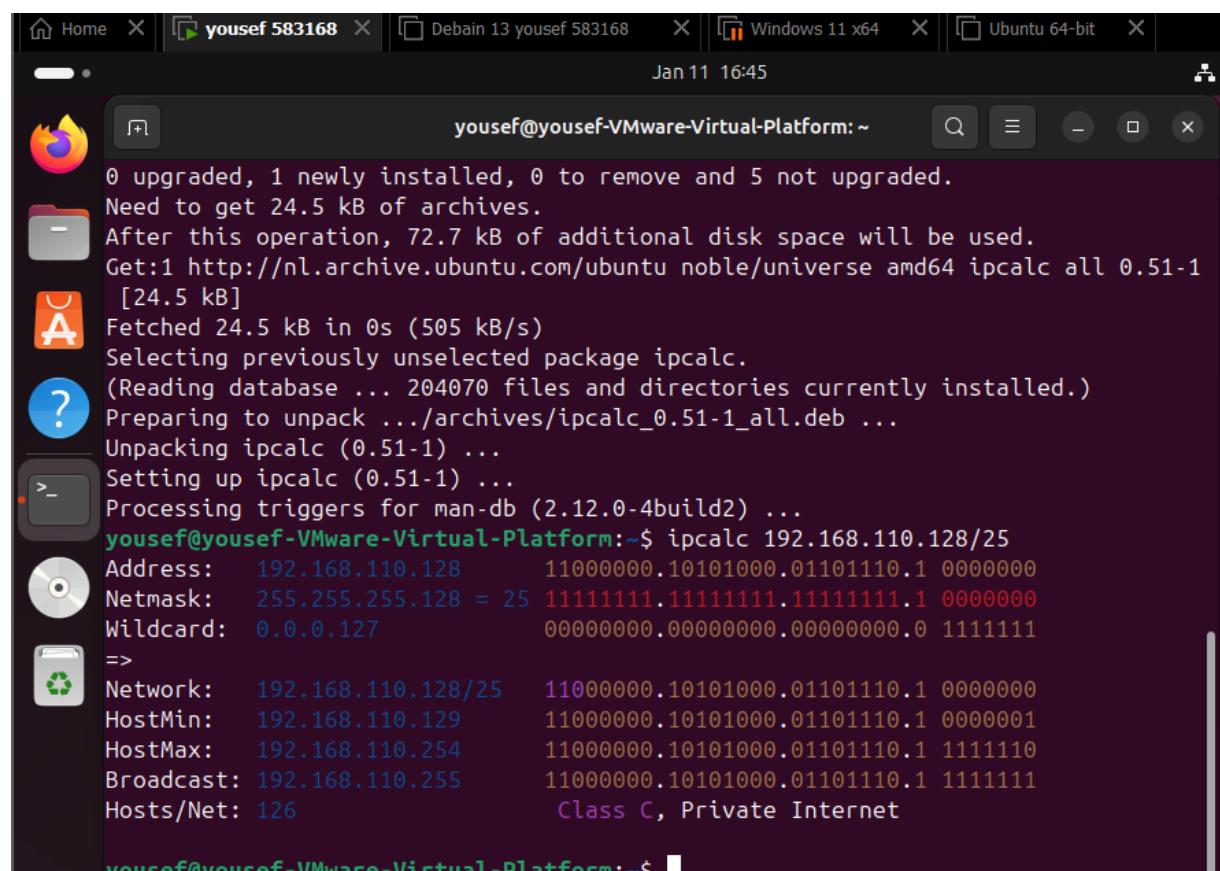
What is the usable IP range to hand out to the connected computers?

The first address is the network address 192.168.110.128 (not usable)

The **last address** is the broadcast address 192.168.110.255 (not usable)

Usable IP addresses = addresses in between

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



```
yousef@yousef-Virtual-Platform:~$ ipcalc 192.168.110.128/25
Address: 192.168.110.128      11000000.10101000.01101110.1 00000000
Netmask: 255.255.255.128 = 25 11111111.11111111.11111111.1 00000000
Wildcard: 0.0.0.127          00000000.00000000.00000000.0 11111111
=>
Network: 192.168.110.128/25 11000000.10101000.01101110.1 00000000
HostMin: 192.168.110.129    11000000.10101000.01101110.1 00000001
HostMax: 192.168.110.254    11000000.10101000.01101110.1 11111110
Broadcast: 192.168.110.255  11000000.10101000.01101110.1 11111111
Hosts/Net: 126               Class C, Private Internet
```

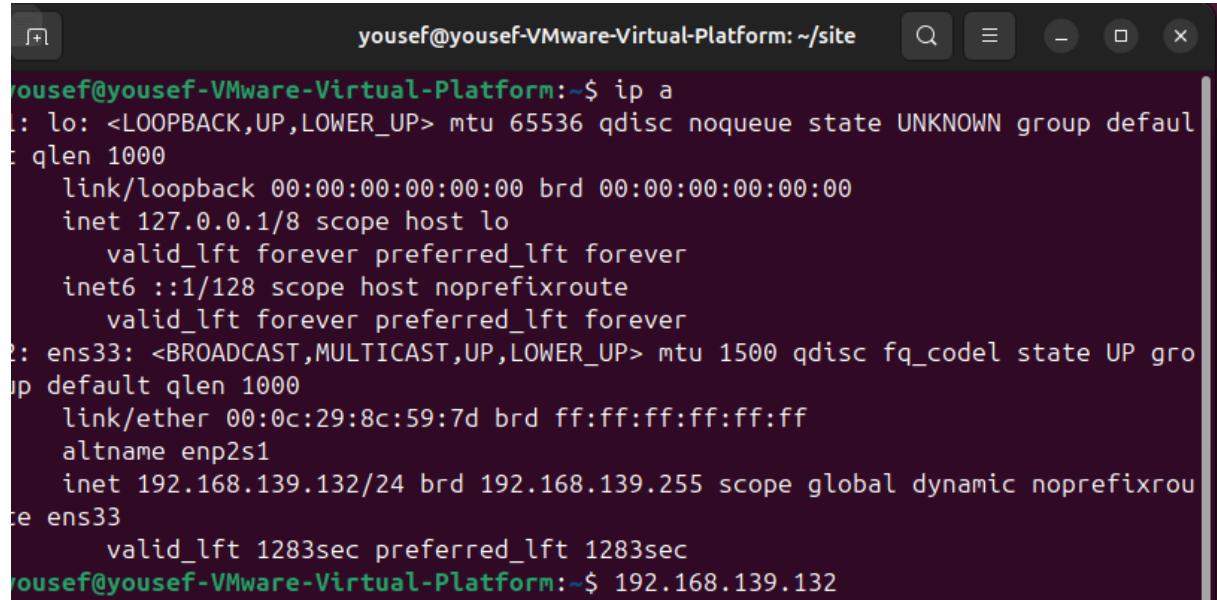
Explain the above calculation in your own words.

The network 192.168.110.128/25 has 25 bits for the network and 7 bits for hosts, giving $2^7 = 128$ IP addresses. The first (192.168.110.128) is the network address, the last (192.168.110.255) is the

broadcast address, so the usable IPs are 192.168.110.129–192.168.110.254. This can be checked with ipcalc 192.168.110.128/25

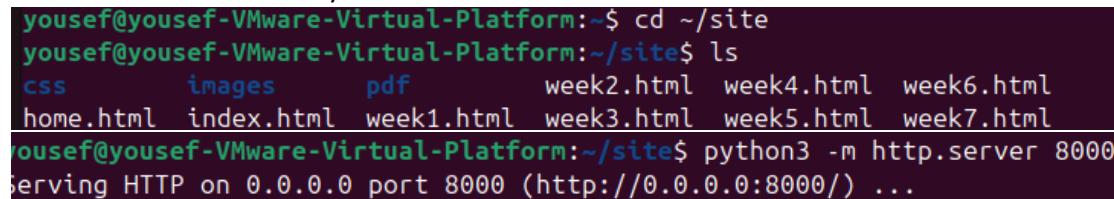
Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:



```
yousef@yousef-VMware-Virtual-Platform: ~$ 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:29:8c:59:7d brd ff:ff:ff:ff:ff:ff
        altname enp2s1
        inet 192.168.139.132/24 brd 192.168.139.255 scope global dynamic noprefixroute
            valid_lft 1283sec preferred_lft 1283sec
yousef@yousef-VMware-Virtual-Platform: ~$ 192.168.139.132
```

Screenshot of Site directory contents:



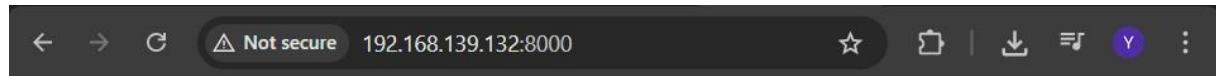
```
yousef@yousef-VMware-Virtual-Platform: ~$ cd ~/site
yousef@yousef-VMware-Virtual-Platform:~/site$ ls
css      images      pdf      week2.html  week4.html  week6.html
home.html index.html week1.html  week3.html  week5.html  week7.html
yousef@yousef-VMware-Virtual-Platform:~/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
```

Screenshot python3 webserver command:



```
yousef@yousef-VMware-Virtual-Platform:~/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
```

Screenshot web browser visits your site



[home](#) | [week 1](#) | [week 2](#) | [week 3](#) | [week 4](#) | [week 5](#) | [week 6](#) | [week 7](#)

My Favorite Hobbies

My favorite hobbies are basketball and football. I played basketball for my highschool team in lebanon where we won competitions against other highschool teams. I also played football for my local team in lebanon and even won competitions for U18 nationwide

Basketball



Football



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 sc = new Scanner(System.in);  
  
        boolean running = true;  
  
  
        while (running) {  
  
            System.out.println("Select an option:");  
  
            System.out.println("1. Is number odd?");  
  
            System.out.println("2. Is number a power of 2?");  
  
            System.out.println("3. Two's complement of number");  
  
            System.out.println("4. Calculate network segment");  
  
            System.out.println("5. Exit");  
  
            System.out.print("Enter your choice (1-5): ");  
  
            int choice = sc.nextInt();  
  
            sc.nextLine();  
  
  
            switch (choice) {  
  
                case 1:  
  
                    System.out.print("Enter an integer: ");  
  
                    int num1 = sc.nextInt();  
  
                    if ((num1 & 1) == 1){  
  
                        System.out.println(num1 + " is odd.");  
  
                    } else {  
  
                }  
            }  
        }  
    }  
}
```

```
        System.out.println(num1 + " is even.");
    }
    break;

case 2:
    System.out.print("Enter an integer: ");
    int num2 = sc.nextInt();
    if (num2 > 0 && (num2 & (num2 - 1)) == 0) {
        System.out.println(num2 + " is a power of 2.");
    } else {
        System.out.println(num2 + " is NOT a power of 2.");
    }
    break;
```

```
case 3:
    System.out.print("Enter an integer: ");
    int num3 = sc.nextInt();
    int twos = ~num3 + 1;
    System.out.println("Two's complement of " + num3 + " is " + twos);
    break;
```

```
case 4:
    System.out.print("Enter IP address (e.g., 192.168.1.100): ");
    String ipStr = sc.nextLine();
    System.out.print("Enter subnet mask (e.g., 255.255.255.224): ");
    String subnetStr = sc.nextLine();

    String[] ipParts = ipStr.split("\\.");
    String[] subnetParts = subnetStr.split("\\.");
    int[] ip = new int[4];
    int[] subnet = new int[4];
```

```

int[] network = new int[4];

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

System.out.println("Network Address: " + network[0] + "." + network[1] + "." + network[2]
+ "." + network[3]);

int hostBits = 0;
for (int i = 0; i < 4; i++) {
    hostBits += Integer.bitCount(~subnet[i] & 0xFF);
}
int numAddresses = (int) Math.pow(2, hostBits);
int lastAddr = network[3] + numAddresses - 1;

System.out.println("Address range: " + network[0] + "." + network[1] + "." + network[2] +
"." + network[3]
+ " to " + network[0] + "." + network[1] + "." + network[2] + "." + lastAddr);

break;

case 5:
    running = false;
    System.out.println("Exiting program.");
    break;

default:
    System.out.println("Invalid choice! Please enter 1-5.");
}

```

```
        System.out.println();  
    }  
  
    sc.close();  
}  
}
```

```
C:\Users\youssef\.jdks\openjdk-24.0.2+12-54\bin\java.exe "-javaagent:C:\Program Files\IntelliJ IDEA Community Edition 2025.2.1\lib\idea_rt.jar" -Dfile.encoding=UTF-8  
Select an option:  
1. Is number odd?  
2. Is number a power of 2?  
3. Two's complement of number  
4. Calculate network segment  
5. Exit  
Enter your choice (1-5): 4  
Enter IP address (e.g., 192.168.1.100): 192.168.1.1  
Enter subnet mask (e.g., 255.255.255.224): 255.255.255.0  
Network Address: 192.168.1.0  
Address range: 192.168.1.0 to 192.168.1.255  
  
Select an option:  
1. Is number odd?  
2. Is number a power of 2?  
3. Two's complement of number  
4. Calculate network segment  
5. Exit  
Enter your choice (1-5):
```

Ready? Save this file and export it as a pdf file with the name: [week6.pdf](#)