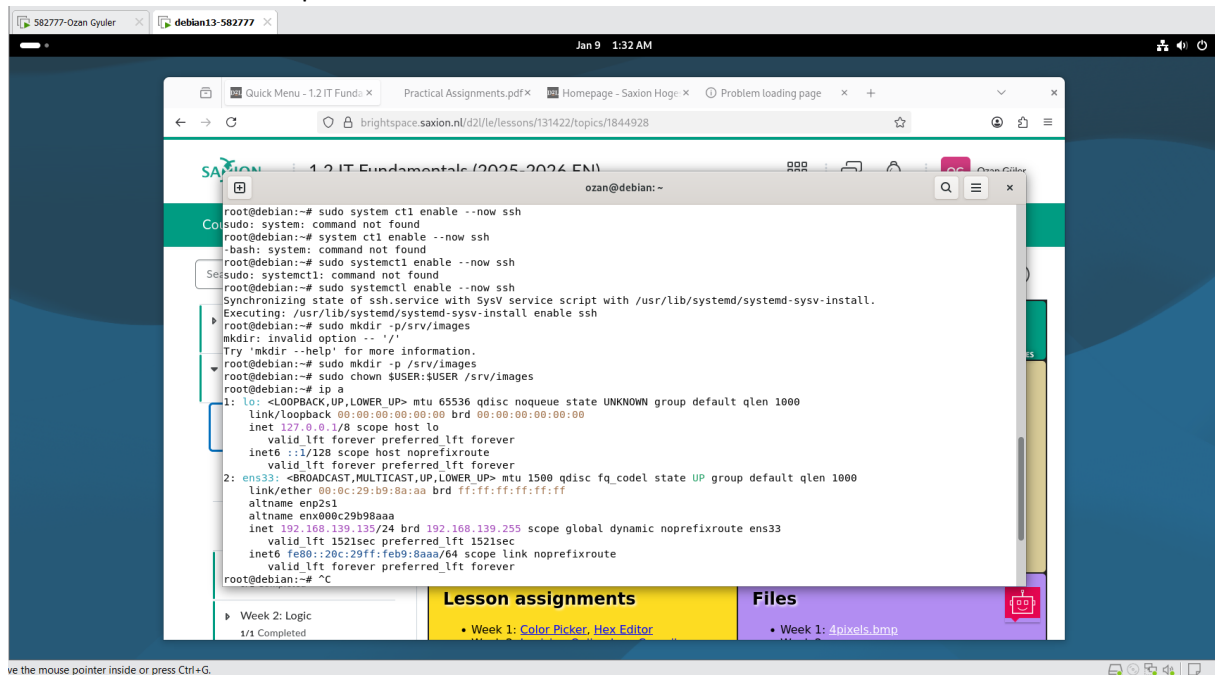


# Template Week 6 – Networking

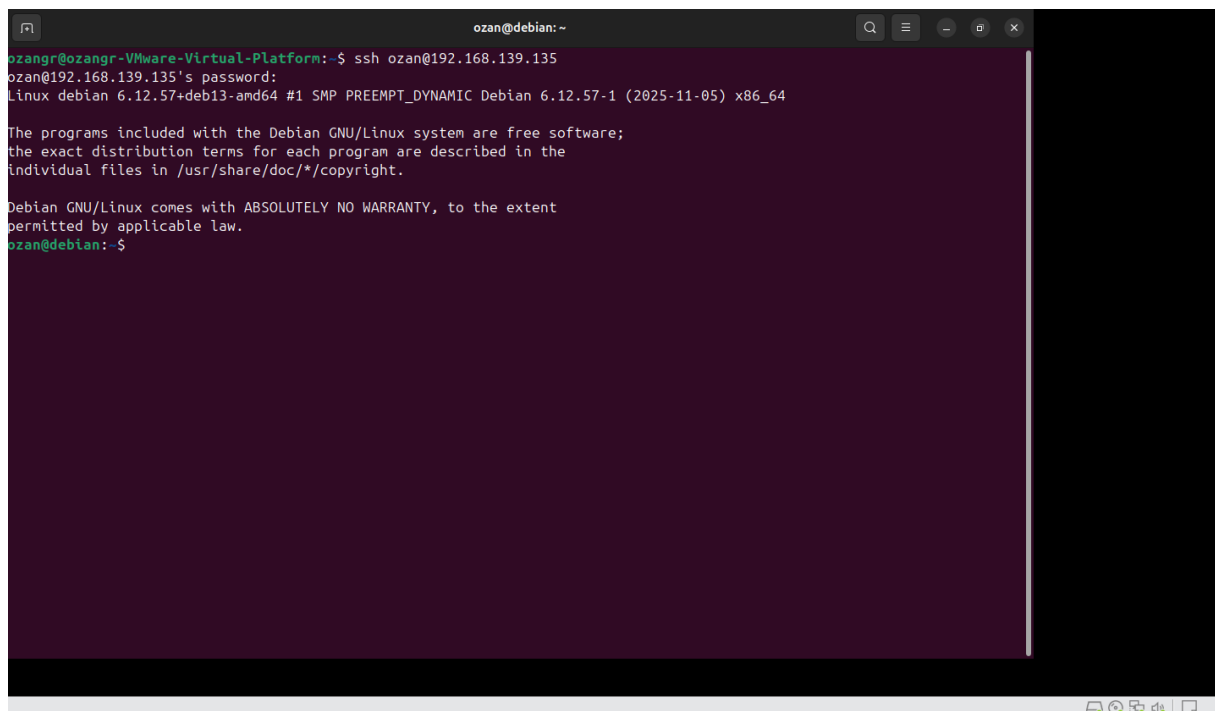
Student number:

## Assignment 6.1: Working from home

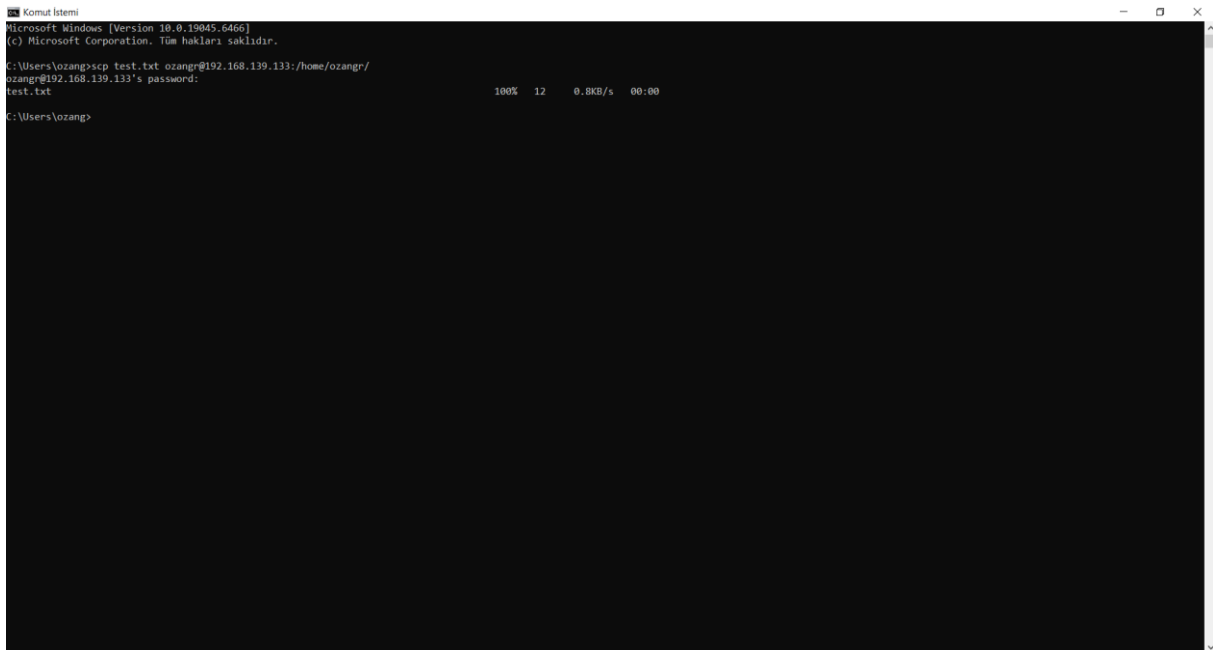
Screenshot installation openssh-server:



Screenshot successful SSH command execution:



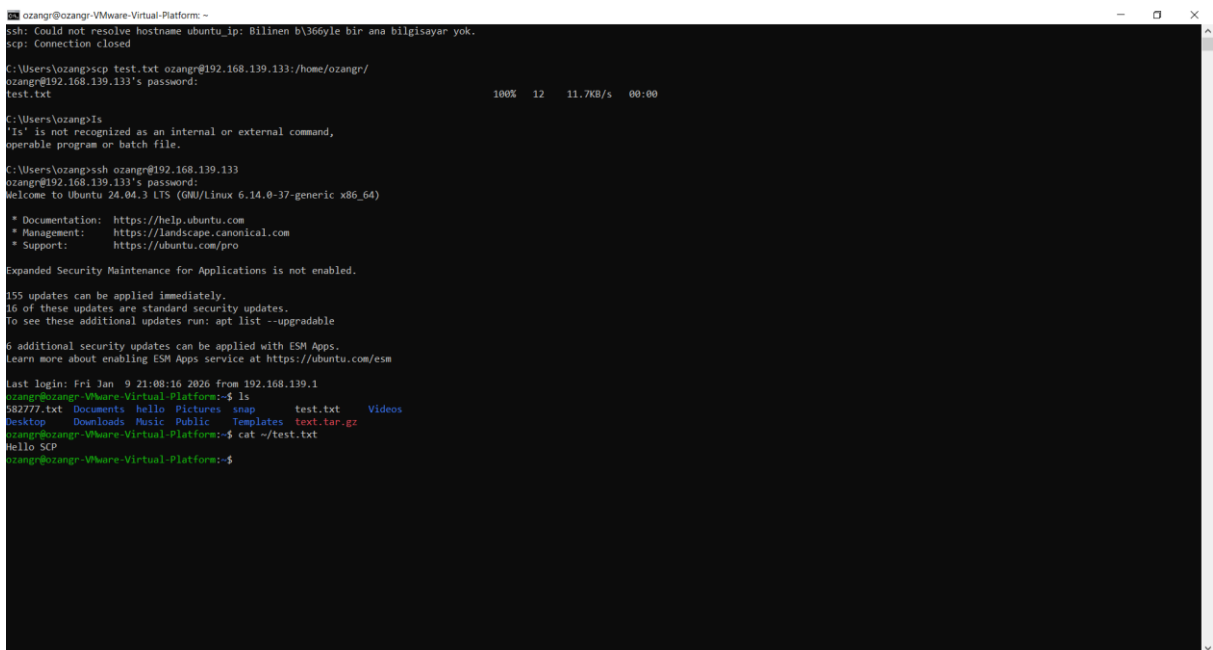
Screenshot successful execution SCP command:



```
Komut İstemi
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. Tüm hakları saklıdır.

C:\Users\ozang>scp test.txt ozang@192.168.139.133:/home/ozang/
ozang@192.168.139.133's password:
test.txt
100% 12 0.8KB/s 00:00

C:\Users\ozang>
```



```
ozang@ozang-VMware-Virtual-Platform -
ssh: Could not resolve hostname ubuntu_ip: Bilinen b\366yle bir ana bilgisayar yok.
scp: Connection closed

C:\Users\ozang>scp test.txt ozang@192.168.139.133:/home/ozang/
ozang@192.168.139.133's password:
test.txt
100% 12 11.7KB/s 00:00

C:\Users\ozang>ls
'ls' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\ozang>ssh ozang@192.168.139.133
ozang@192.168.139.133'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

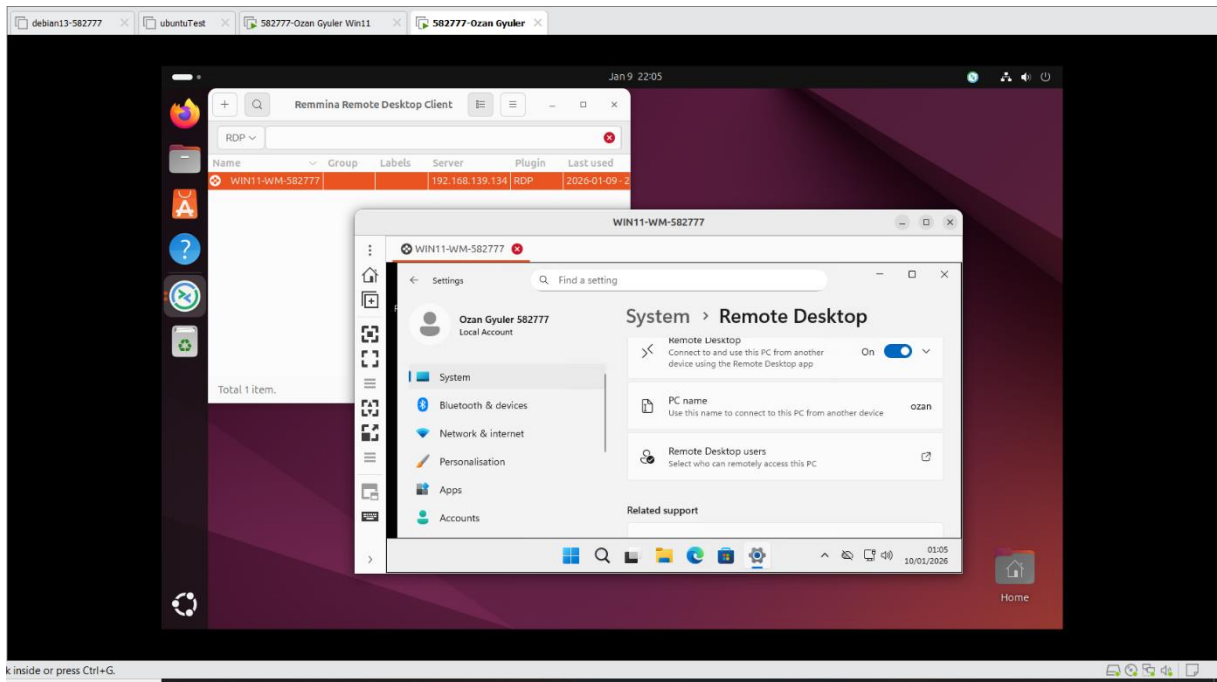
Expanded Security Maintenance for Applications is not enabled.

155 updates can be applied immediately.
16 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

6 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 21:08:16 2026 from 192.168.139.1
ozang@ozang-VMware-Virtual-Platform:~$ ls
582777.txt Documents hello Pictures snap test.txt Videos
Desktop Downloads Music Public Templates text.tar.gz
ozang@ozang-VMware-Virtual-Platform:~$ cat ~/test.txt
Hello SCP
ozang@ozang-VMware-Virtual-Platform:~$
```

Screenshot remmina:



## Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

```
Komut İstemi - nslookup
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. Tüm hakları saklıdır.

C:\Users\ozang>nslookup
Default Server: UnKnown
Address: 172.20.10.1

> amazon.com
Server: UnKnown
Address: 172.20.10.1

Non-authoritative answer:
Name: amazon.com
Addresses: 98.87.170.74
          98.87.170.71
          98.82.161.185

> google.com
Server: UnKnown
Address: 172.20.10.1

Non-authoritative answer:
Name: google.com
Addresses: 2a00:1450:400e:805:200e
          172.217.23.206

> one.one.one.one
Server: UnKnown
Address: 172.20.10.1

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

> dns.google.com
Server: UnKnown
Address: 172.20.10.1

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

> bol.com
Server: UnKnown

Komut İstemi - nslookup
> bol.com
Server: UnKnown
Address: 172.20.10.1

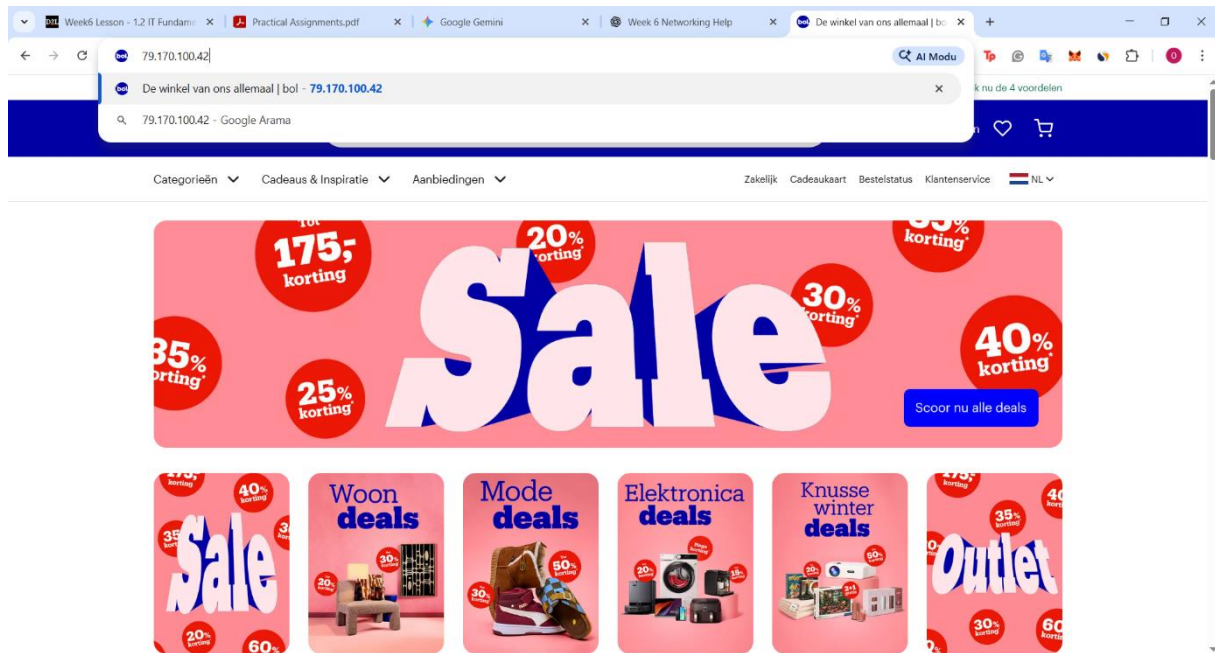
Non-authoritative answer:
Name: bol.com
Address: 79.170.100.62

> w3schools.com
Server: UnKnown
Address: 172.20.10.1

Non-authoritative answer:
Name: w3schools.com
Addresses: 13.248.240.135
          76.223.115.82

>
```

Screenshot website visit via IP address:



### Assignment 6.3: subnetting

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

In total 128 ips.

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`

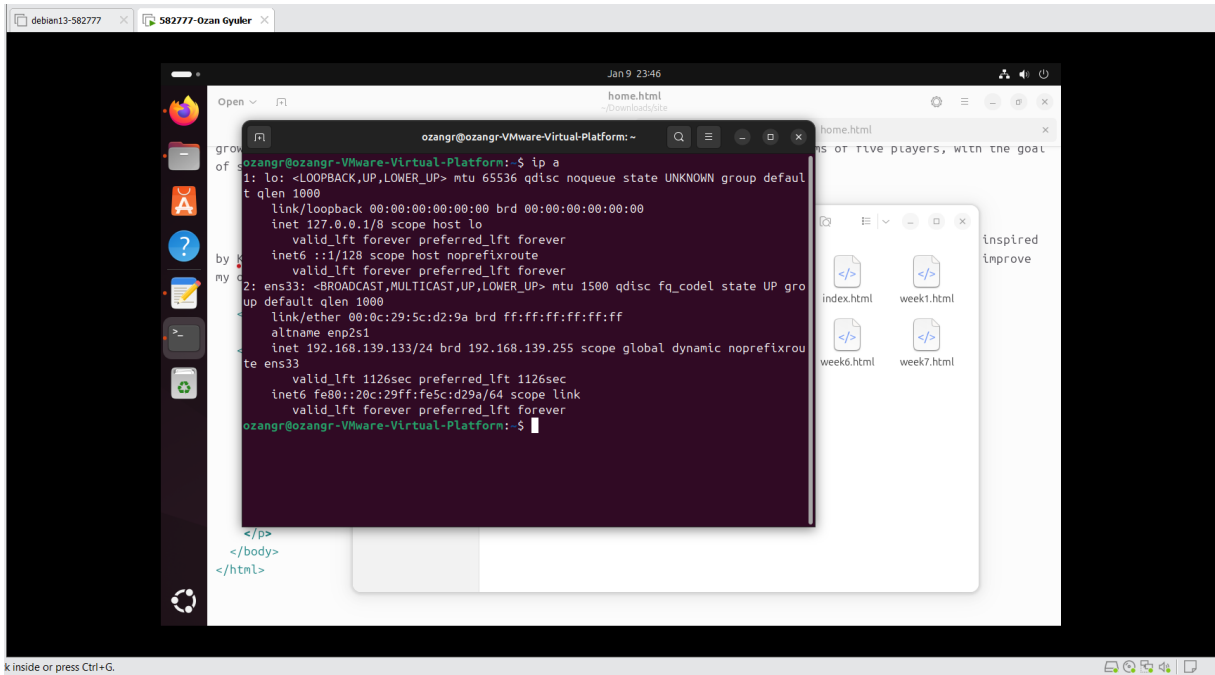
Explain the above calculation in your own words.

A /25 subnet uses 25 bits for the network, leaving 7 bits for hosts.

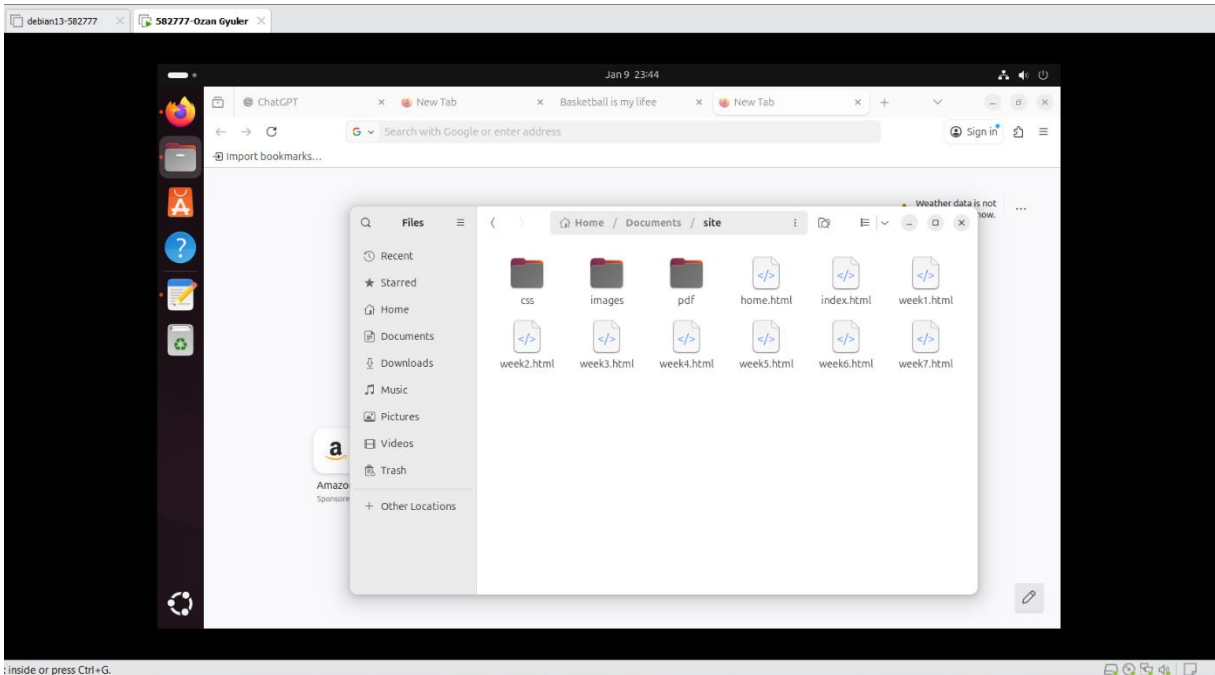
$2^7 - 2 = 126$  usable hosts.

### Assignment 6.4: HTML

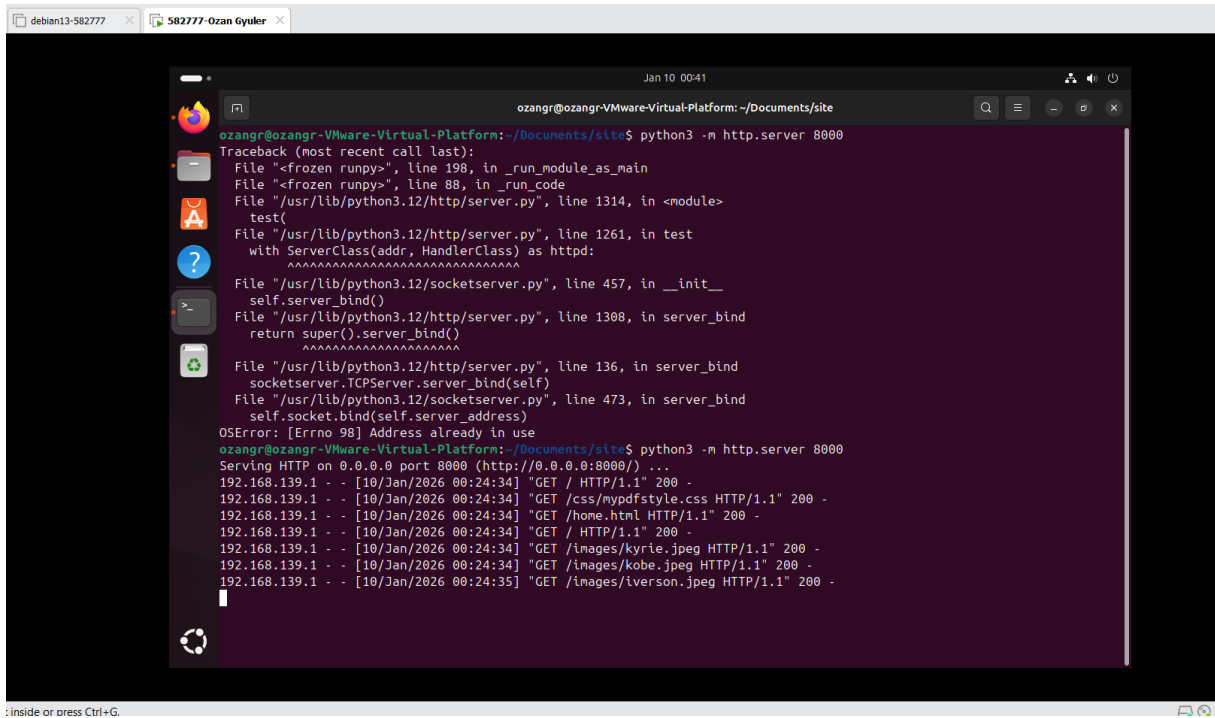
Screenshot IP address Ubuntu VM:



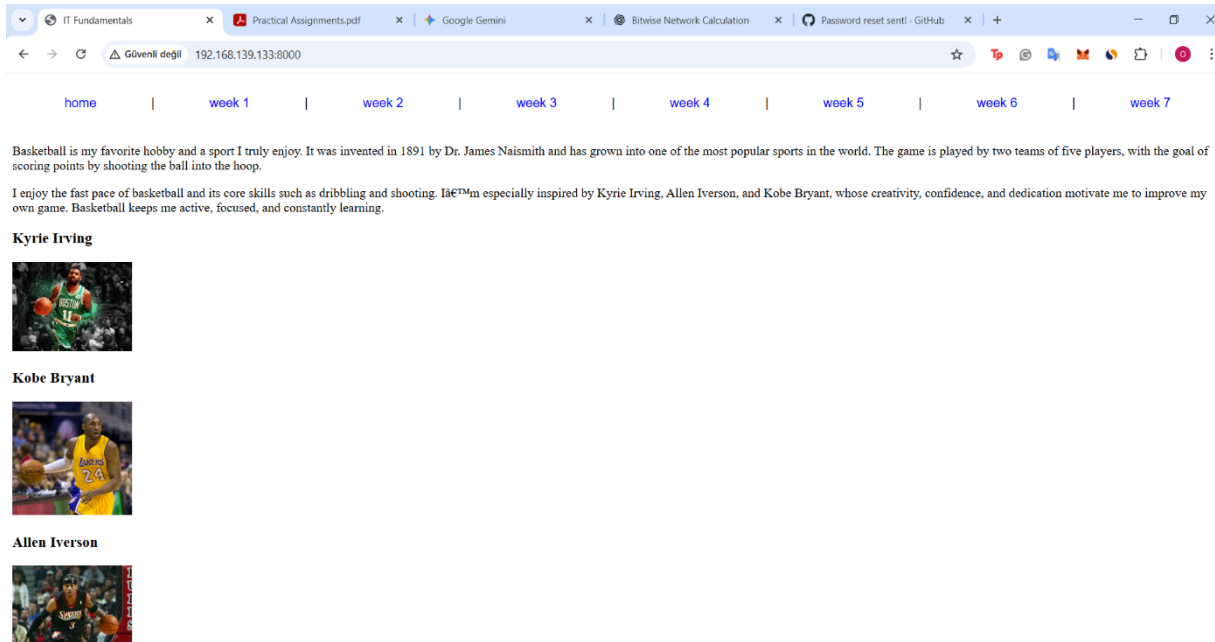
Screenshot of Site directory contents:



Screenshot python3 webserver command:



## 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 nl.saxion.app.SaxionApp;
```

```
import java.awt.Color;
```

```
public class NetworkCalculator implements Runnable {
```

```
    public static void main(String[] args) {
```

```
        SaxionApp.start(new NetworkCalculator());
```

```
    }
```

```
    public void run() {
```

```
        SaxionApp.println("--- Network Calculator ---", Color.CYAN);
```

```
        // Interactive Inputs
```

```
        SaxionApp.print("Enter IP Address (e.g., 192.168.1.100): ");
```

```
        String ipAddress = SaxionApp.readString();
```

```
        SaxionApp.print("Enter Subnet Mask (e.g., 255.255.255.0): ");
```

```
        String subnetMask = SaxionApp.readString();
```

```

// Data Processing
int[] ip = parseAddress(ipAddress);
int[] subnet = parseAddress(subnetMask);
int[] network = calculateNetwork(ip, subnet);

// Visualizing the Result
SaxionApp.clear();
SaxionApp.println("Calculation Results:", Color.CYAN);
SaxionApp.println("-----");

SaxionApp.print("IP Address:  ");
SaxionApp.println(toBinary(ip), Color.GREEN);

SaxionApp.print("Subnet Mask:  ");
SaxionApp.println(toBinary(subnet), Color.YELLOW);

SaxionApp.println("-----");

SaxionApp.print("Network Address: ");
SaxionApp.println(toBinary(network), Color.MAGENTA);

SaxionApp.println("");
SaxionApp.println("Network (Decimal): " + toDecimal(network), Color.WHITE);

// Subnet calculations
int blockSize = 256 - subnet[3];
int networkStart = network[3];
int networkEnd = networkStart + blockSize - 1;

SaxionApp.println("Subnet Size:  " + blockSize + " addresses");

```

```

SaxionApp.println("Usable Range:  " +
    network[0] + "." + network[1] + "." + network[2] + "." + networkStart + " - " +
    network[0] + "." + network[1] + "." + network[2] + "." + networkEnd);
}

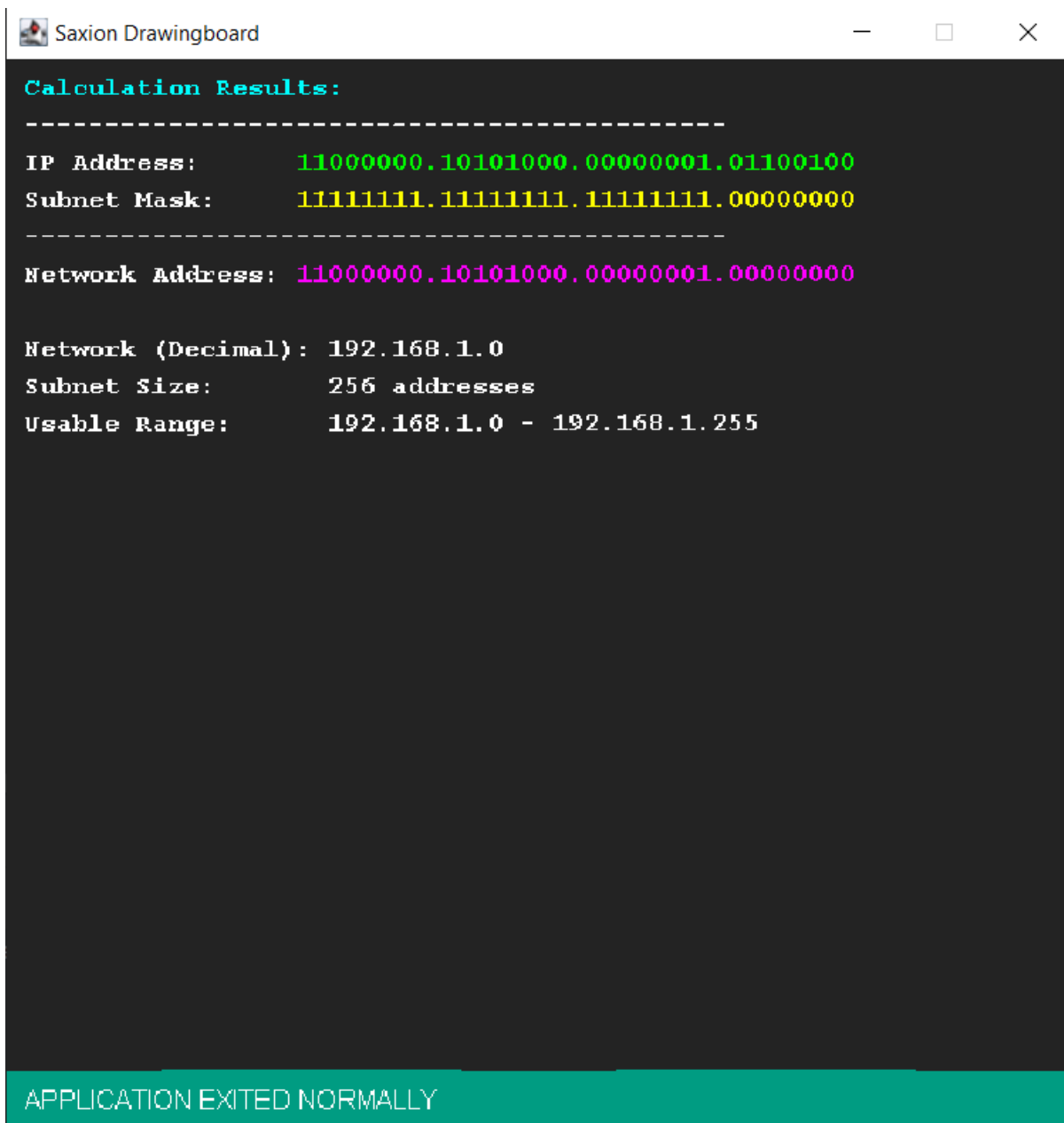
private int[] calculateNetwork(int[] ip, int[] subnet) {
    int[] network = new int[4];
    for (int i = 0; i < 4; i++) {
        network[i] = ip[i] & subnet[i];
    }
    return network;
}

private int[] parseAddress(String address) {
    String[] parts = address.split("\\.");
    int[] result = new int[4];
    for (int i = 0; i < 4; i++) {
        result[i] = Integer.parseInt(parts[i].trim());
    }
    return result;
}

private String toBinary(int[] address) {
    StringBuilder binary = new StringBuilder();
    for (int i = 0; i < address.length; i++) {
        binary.append(String.format("%8s", Integer.toBinaryString(address[i])).replace(' ', '0'));
        if (i < address.length - 1) binary.append(".");
    }
    return binary.toString();
}

```

```
private String toDecimal(int[] address) {  
    return address[0] + "." + address[1] + "." + address[2] + "." + address[3];  
}  
}
```



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