Template Week 6 – Networking
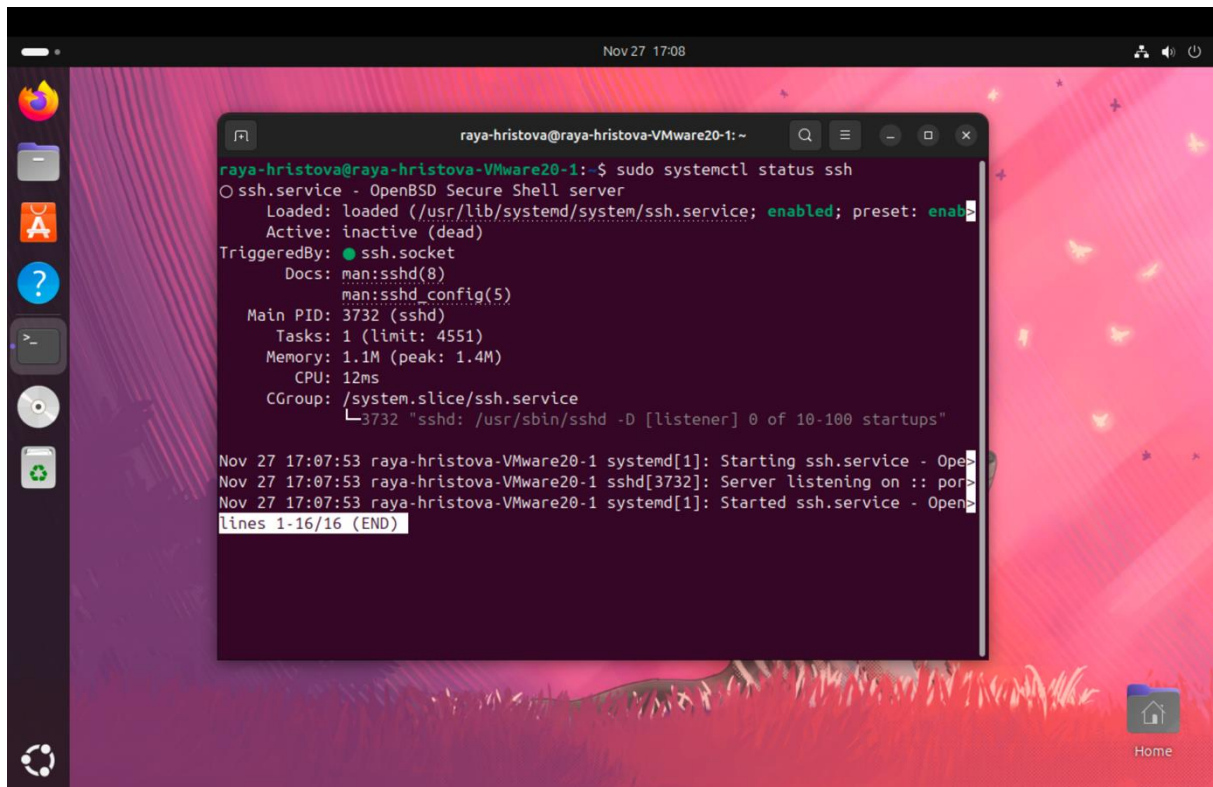
Student number: 561004

Assignment 6.1: Working from home

Screenshot installation openssh-server:

Screenshot successful SSH command execution:

```
                 root id 0:0:0:0:0:0 priority 0 ifcost 0 port 0
                 ipfilter disabled flags 0x0
        member: vmenet1 flags=3<LEARNING,DISCOVER>
                 ifmaxaddr 0 port 23 priority 0 path cost 0
        member: vmenet2 flags=3<LEARNING,DISCOVER>
                 ifmaxaddr 0 port 25 priority 0 path cost 0
        member: vmenet4 flags=3<LEARNING,DISCOVER>
                 ifmaxaddr 0 port 27 priority 0 path cost 0
        nd6 options=201<PERFORMNUD,DAD>
        media: autoselect
        status: active
vmenet2: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
        ether 46:86:f7:30:e7:9b
        media: autoselect
        status: active
vmenet4: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
        ether 6a:68:97:bb:19:e3
        media: autoselect
        status: active
rayathristova@rayas-mbp ~ % clear

[rayathristova@rayas-mbp ~ % ssh raya-hristova@172.16.194.135
The authenticity of host '172.16.194.135 (172.16.194.135)' can't be established.
[ED25519 key fingerprint is SHA256:ppU7uVjakKQ0/IrdqEaMz57fdEcho1G4v4s2hxbiT44.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '172.16.194.135' (ED25519) to the list of known hosts.
raya-hristova@172.16.194.135's password:
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-49-generic aarch64)

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

Expanded Security Maintenance for Applications is not enabled.

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

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


16 updates could not be installed automatically. For more details,
see /var/log/unattended-upgrades/unattended-upgrades.log

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

raya-hristova@raya-hristova-VMware20-1:~$ 
```
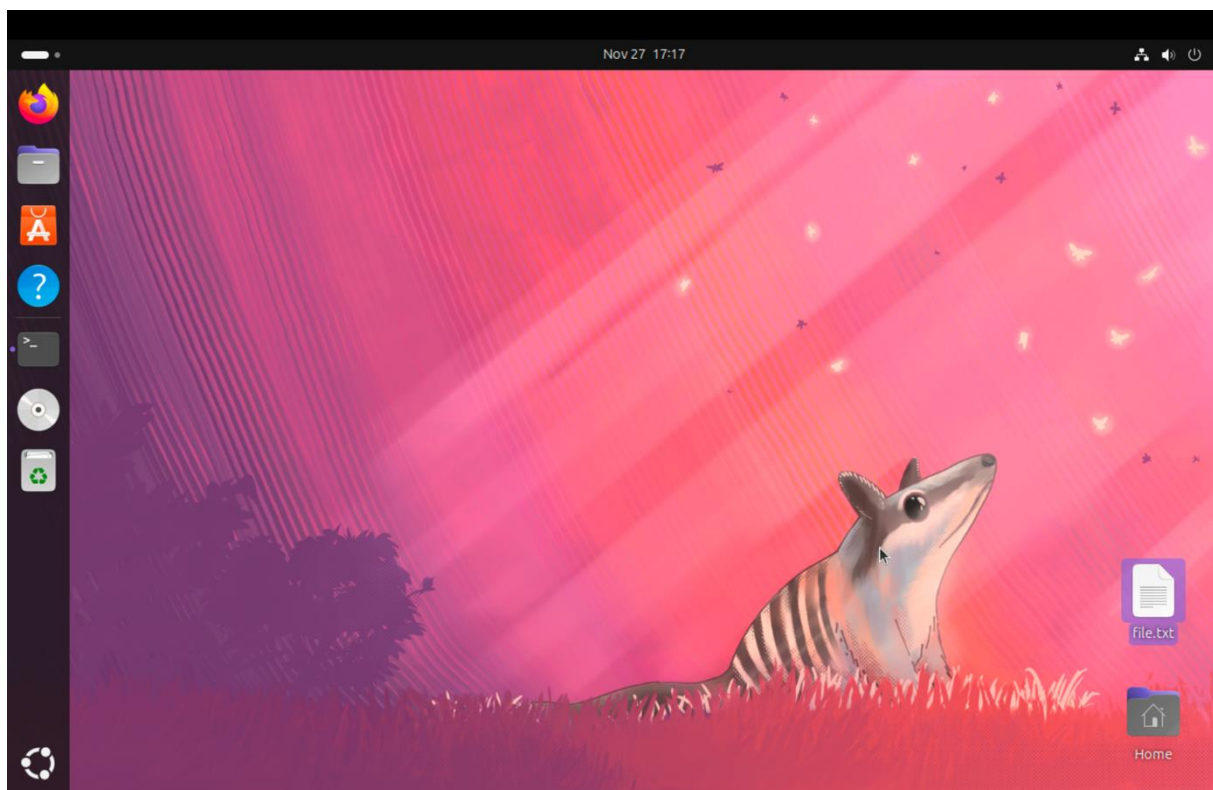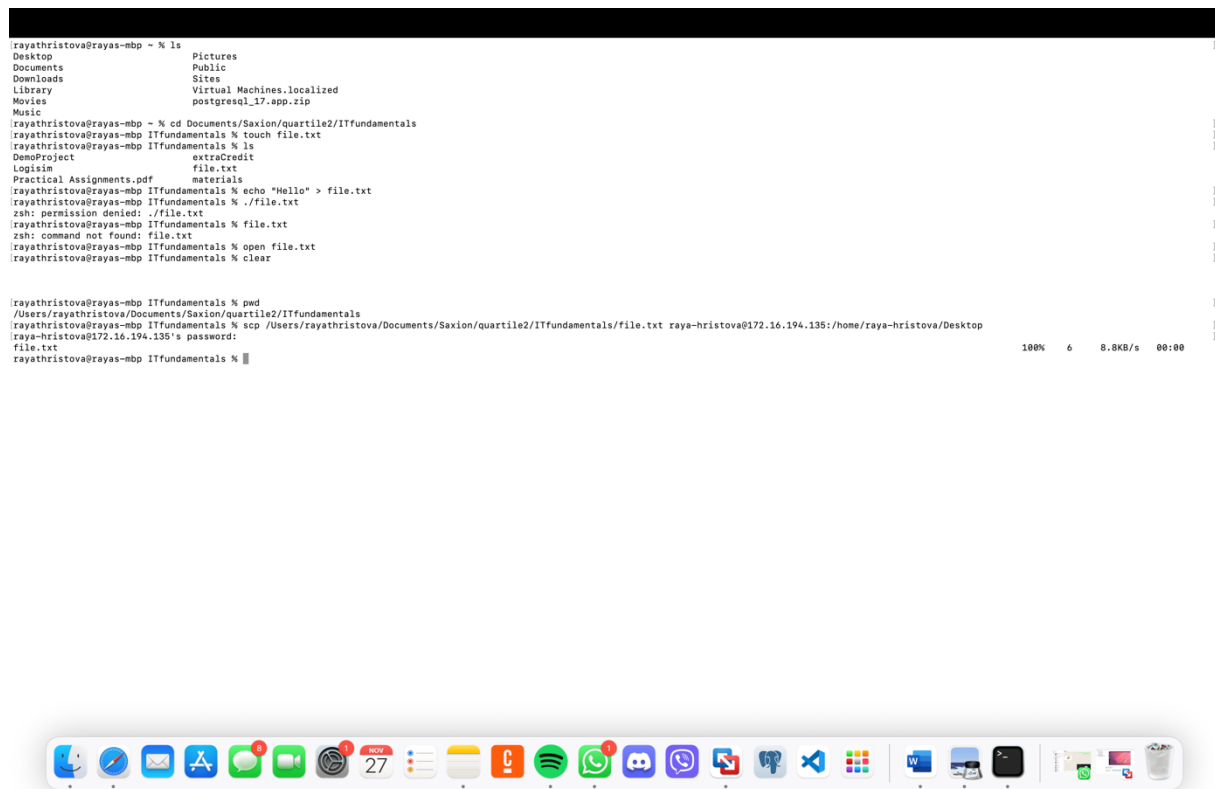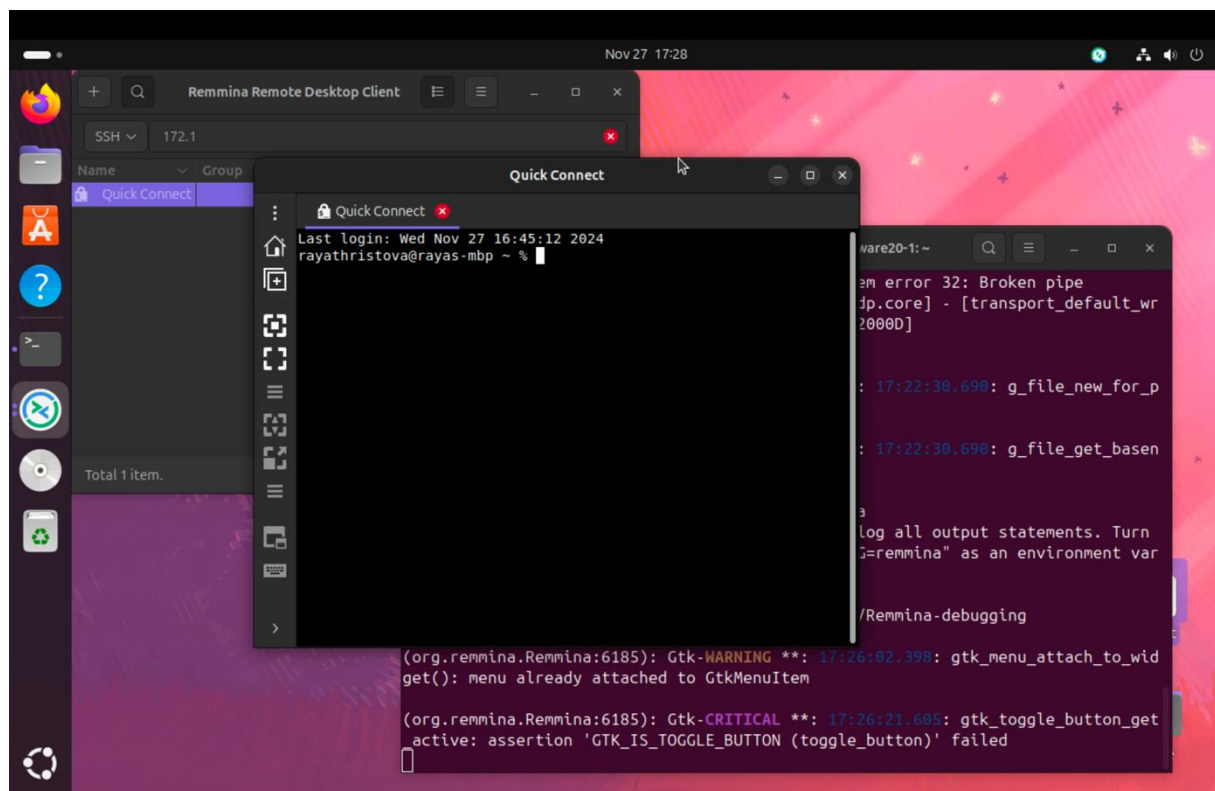
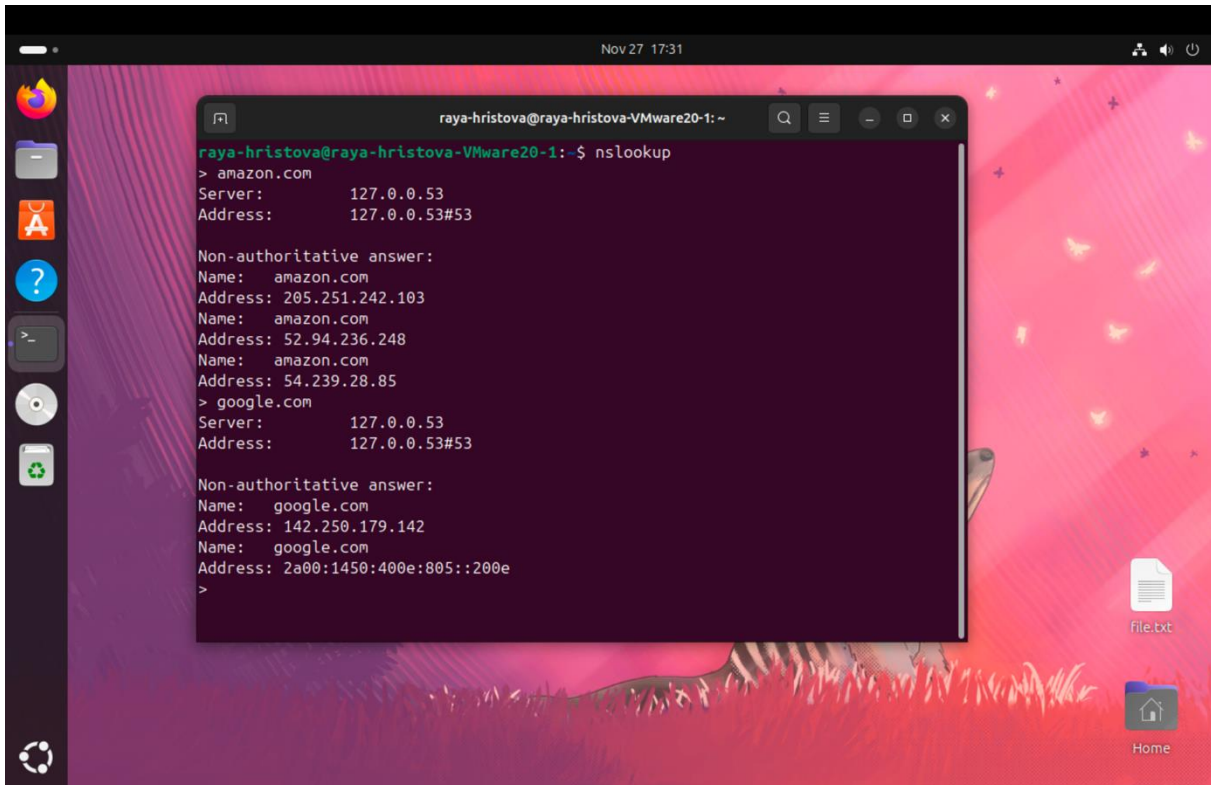Screenshot successful execution SCP command:

```
rayathristova@rayas-mbp ~ % ls
Desktop                    Pictures
Documents                  Public
Downloads                  Sites
Library                    Virtual Machines.localized
Movies                     postgresql_17.app.zip
Music
rayathristova@rayas-mbp ~ % cd Documents/Saxion/quartile2/ITfundamentals
rayathristova@rayas-mbp ITfundamentals % touch file.txt
rayathristova@rayas-mbp ITfundamentals % ls
DemoProject                extraCredit
Logisim                    file.txt
Practical Assignments.pdf  materials
rayathristova@rayas-mbp ITfundamentals % echo "Hello" > file.txt
rayathristova@rayas-mbp ITfundamentals % ./file.txt
zsh: permission denied: ./file.txt
rayathristova@rayas-mbp ITfundamentals % file.txt
zsh: command not found: file.txt
rayathristova@rayas-mbp ITfundamentals % open file.txt
rayathristova@rayas-mbp ITfundamentals % clear


rayathristova@rayas-mbp ITfundamentals % pwd
/Users/rayathristova/Documents/Saxion/quartile2/ITfundamentals
rayathristova@rayas-mbp ITfundamentals % scp /Users/rayathristova/Documents/Saxion/quartile2/ITfundamentals/file.txt raya-hristova@172.16.194.135:/home/raya-hristova/Desktop
raya-hristova@172.16.194.135's password:
file.txt                                                                                          100%    6     8.8KB/s   00:00
rayathristova@rayas-mbp ITfundamentals % 
```

Screenshot remmina:

Connecting Ubuntu to my laptop

Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

Screenshot website visit via IP address:
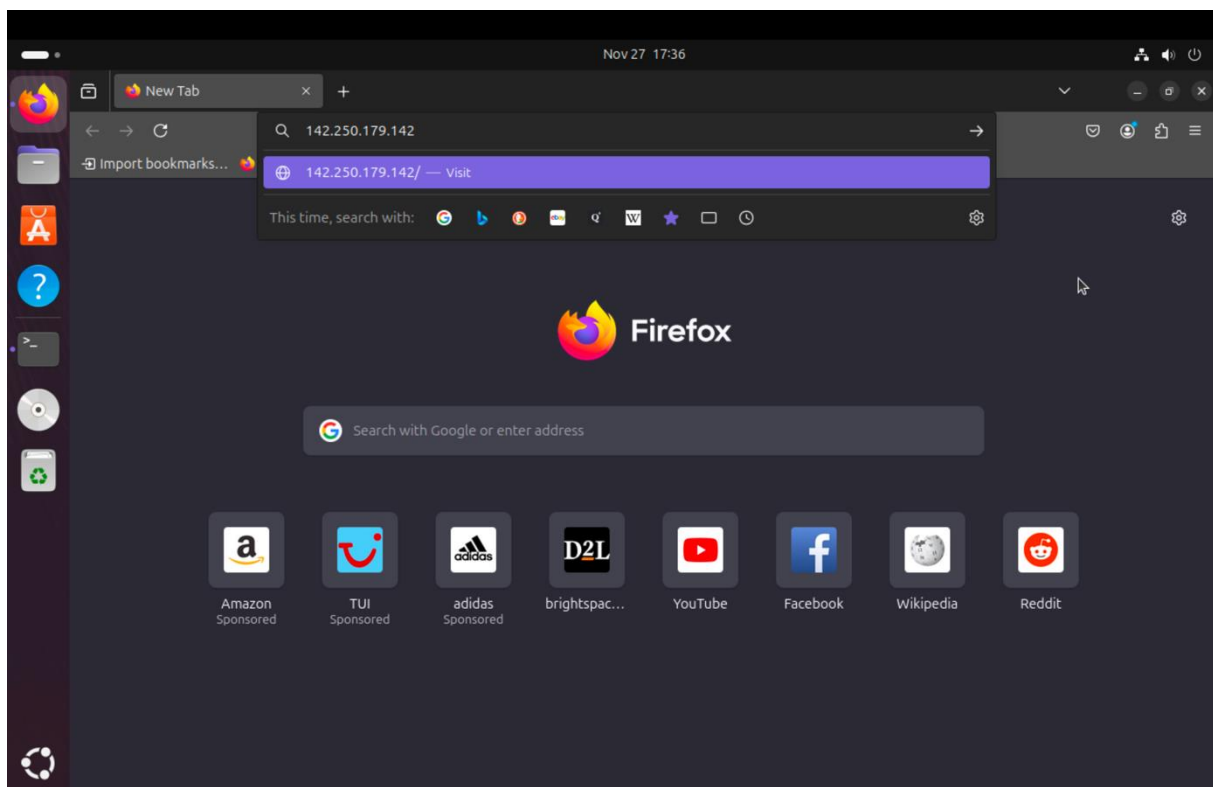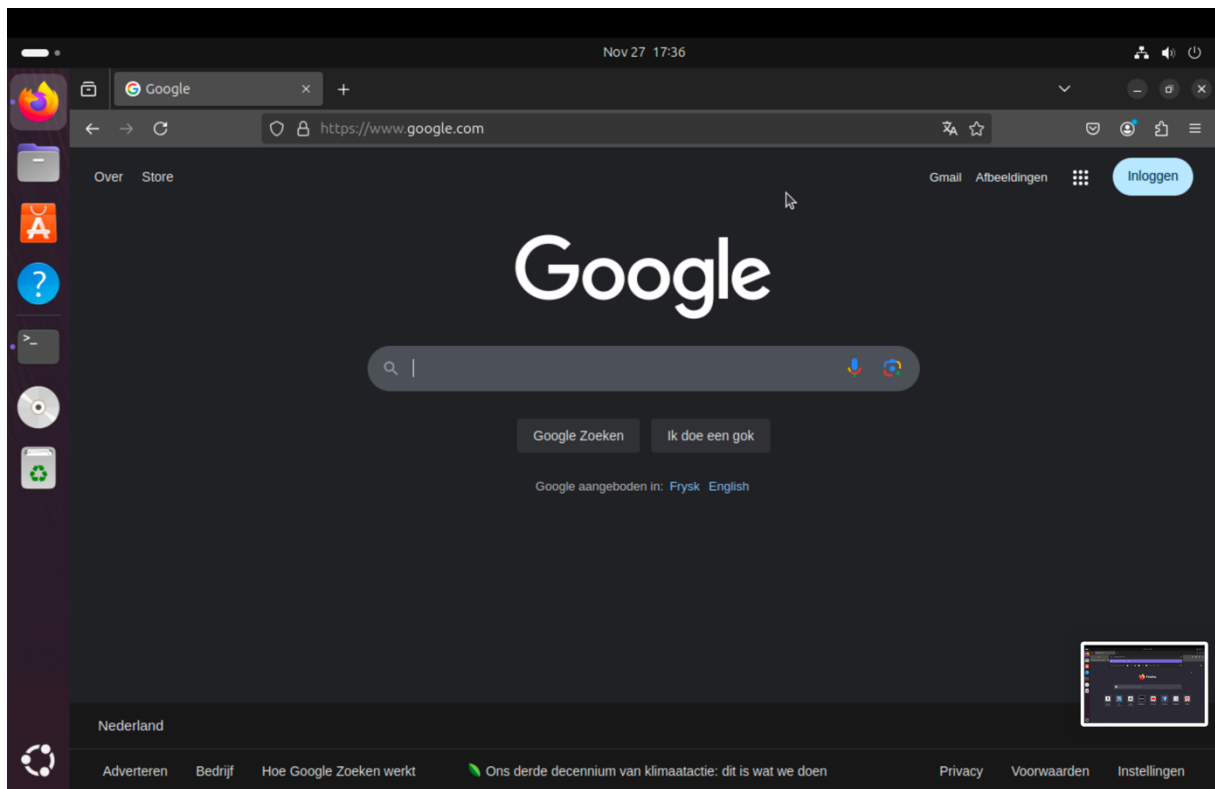
Assignment 6.3: subnetting

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?

From 192.168.100.129 to 192.168.100.255

Check your two previous answers with this calculator:
https://www.calculator.net/ip-subnet-calculator.html

1. Port is 25, IP addresses are 32-bit, meaning there are only 25 bits used and 7 more for hosting.
The number of possible IP addresses is calculated like: $2^7 = 128$.
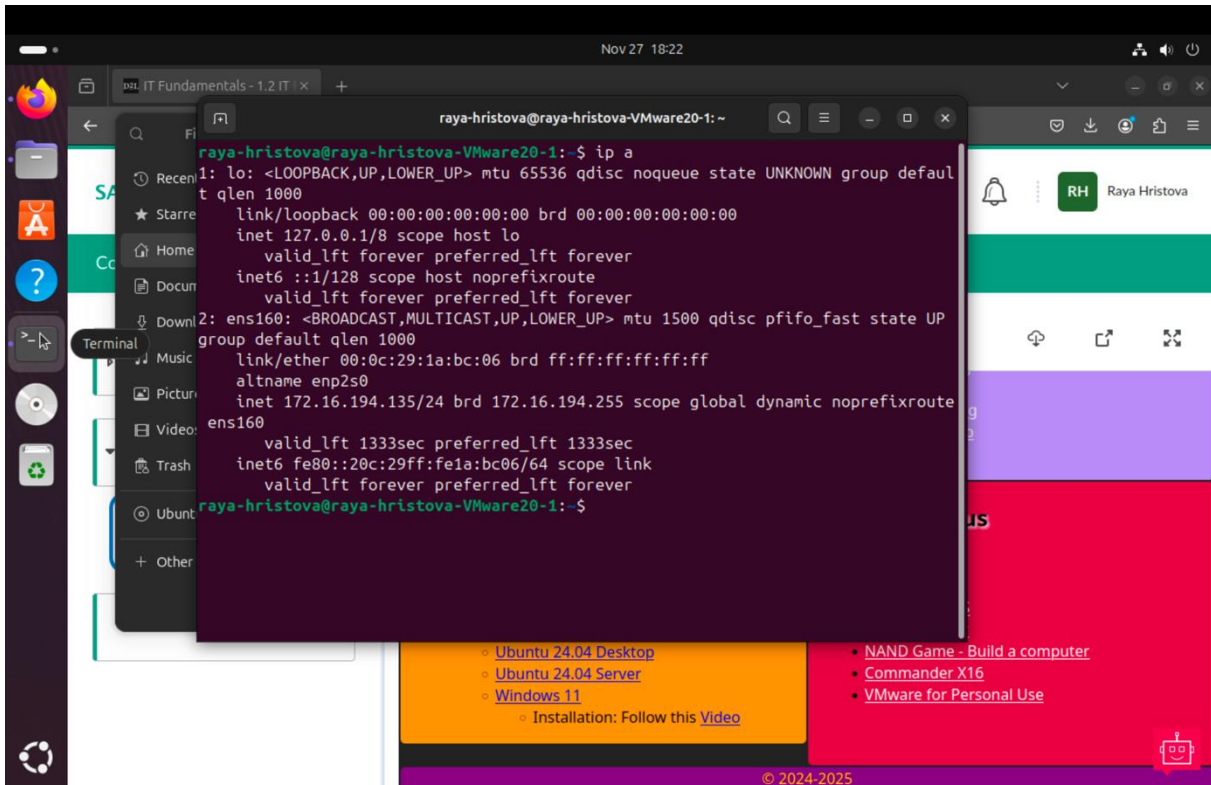
2. The number of the usable IP range is determined from the last number from the IP address (128), so that means there is usable space from 192.168.100.129 to 192.168.100.255

Explain the above calculation in your own words.

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

Screenshot of Site directory contents:

Screenshot python3 webserver command:
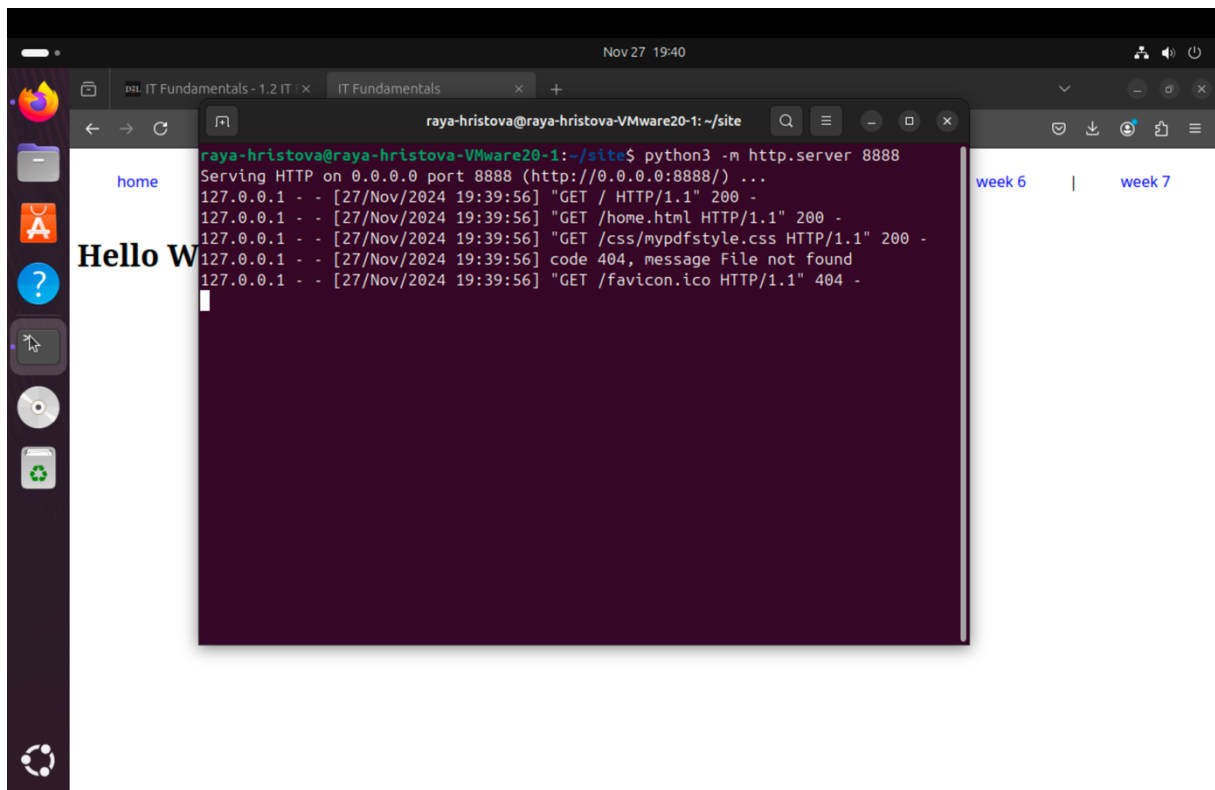
Screenshot web browser visits your site

Ubuntu:
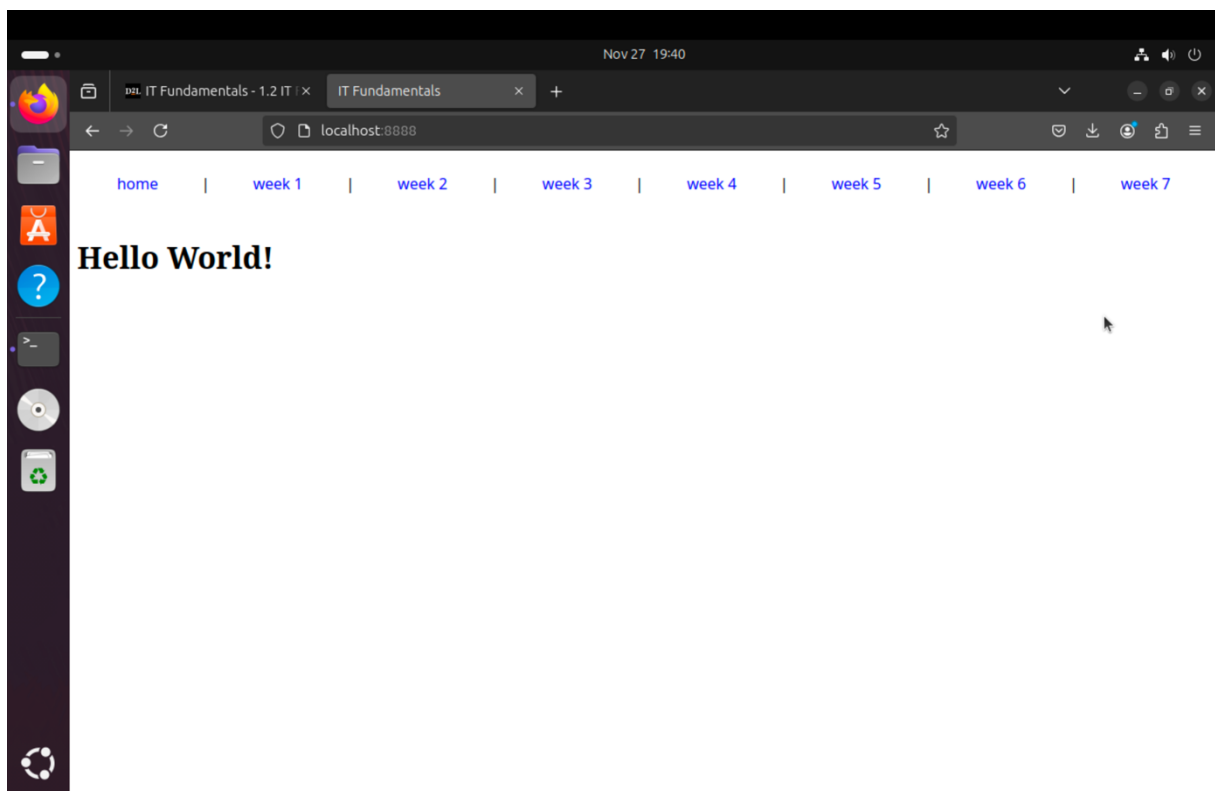
My own laptop:

Bonus point assignment – week 6

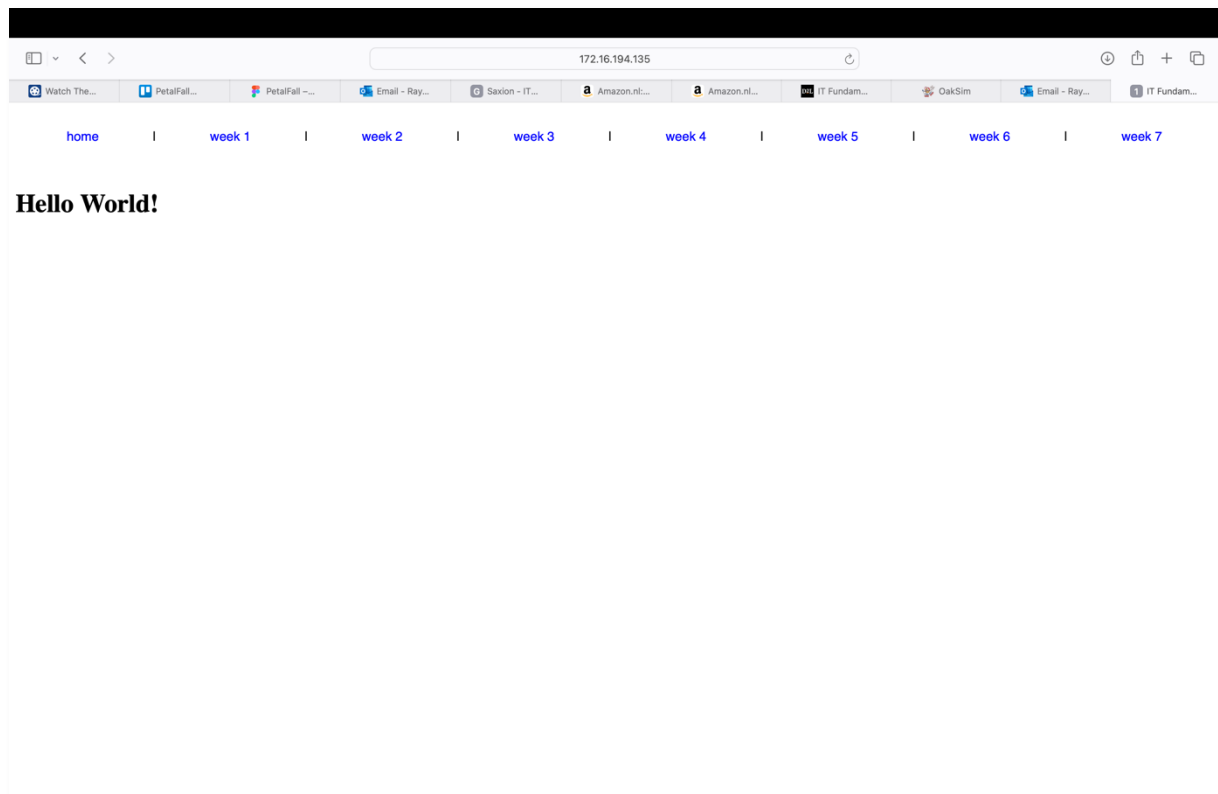Remember that bitwise java application you've made in week 2? Expand that application so that you can also calculate a network segment as explained in the PowerPoint slides of week 6. Use the bitwise & AND operator. You need to be able to input two Strings. An IP address and a subnet.

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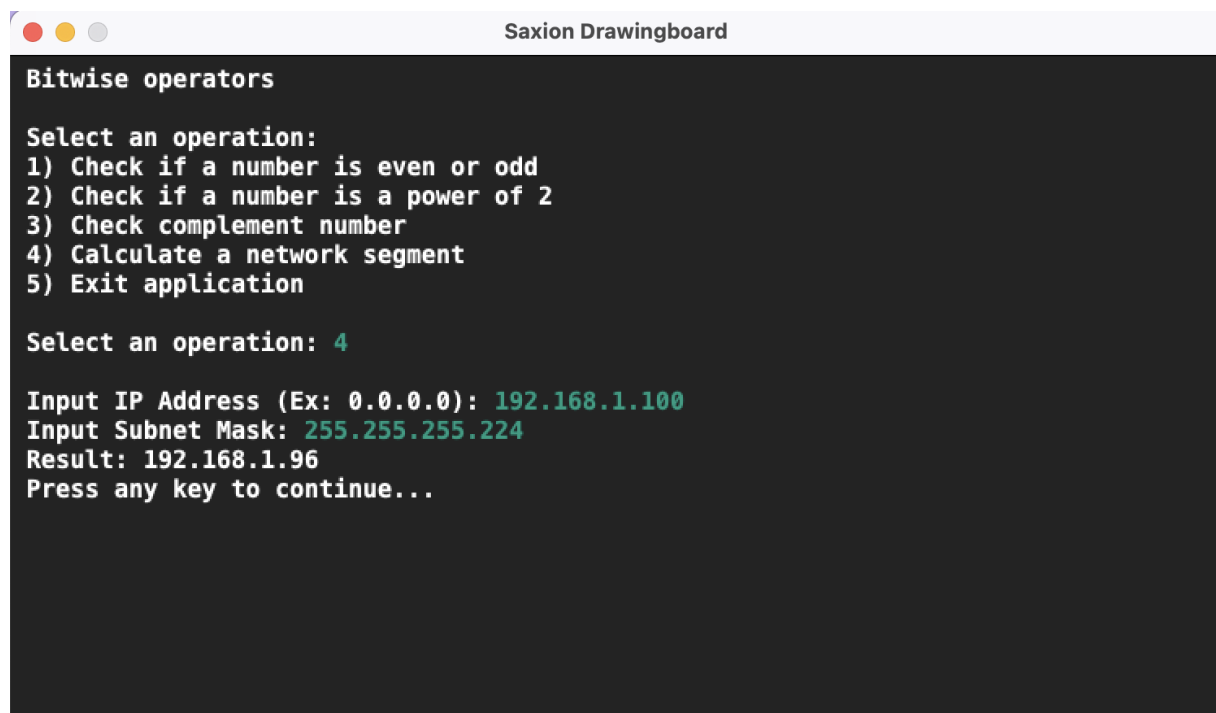
For a /27 subnet, each segment (or subnet) has 32 IP addresses (2^5).
The range of this network segment is from 192.168.1.96 to 192.168.1.127.

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

```java
public void NetworkSegment() {
    SaxionApp.print("Input IP Address (Ex: 0.0.0.0): ");
    String inputIP = SaxionApp.readString();

    SaxionApp.print("Input Subnet Mask: ");
    String inputMask = SaxionApp.readString();

    String[] ip = inputIP.split("\\.");
    String[] mask = inputMask.split("\\.");

    int[] res = new int[4];

    for (int i = 0; i < ip.length; i++) {
        int ipInt = Integer.parseInt(ip[i]);
        int maskInt = Integer.parseInt(mask[i]);

        int resInt = ipInt & maskInt;
        res[i] = resInt;
    }

    SaxionApp.print("Result: ");
    for(int i = 0; i < res.length; i++) {
        if(i < res.length - 1)
            SaxionApp.print(res[i] + ".");
        else
            SaxionApp.print(res[i]);
    }
}
```