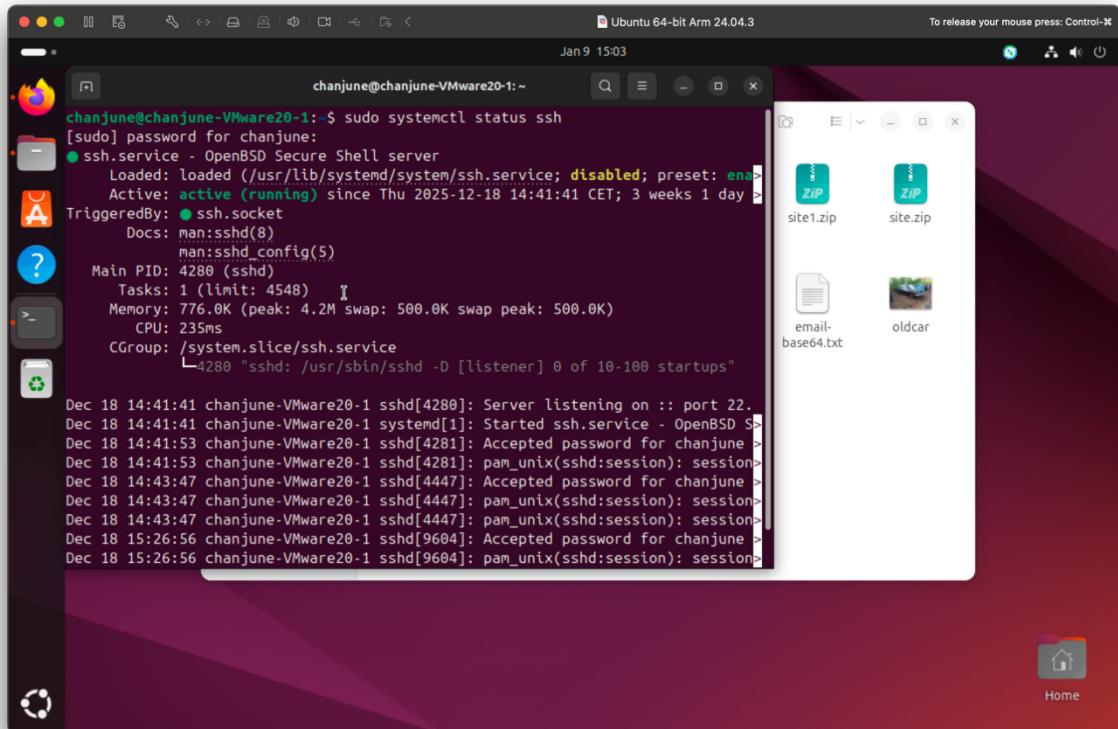


Template Week 6 – Networking

Student number: 590190

Assignment 6.1: Working from home

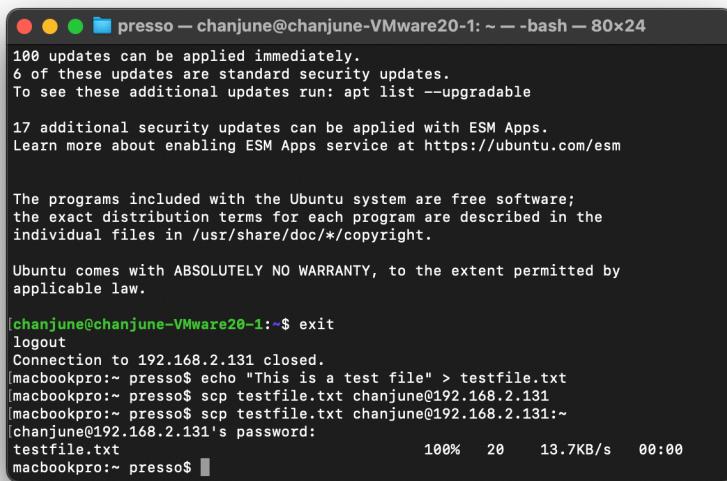
Screenshot installation openssh-server:



Screenshot successful SSH command execution:

```
presso — chanjune@chanjune-VMware20-1:~— ssh chanjune@192.168....  
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-37-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.  
  
100 updates can be applied immediately.  
6 of these updates are standard security updates.  
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  
  
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.  
chanjune@chanjune-VMware20-1:~$
```

Screenshot successful execution SCP command:



```
presso — chanjune@chanjune-VMware20-1: ~ -- bash -- 80x24
100 updates can be applied immediately.
6 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

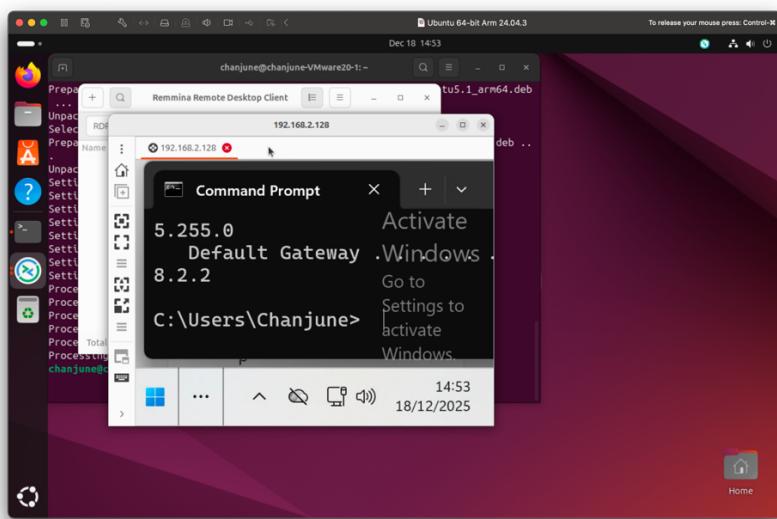
17 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

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.

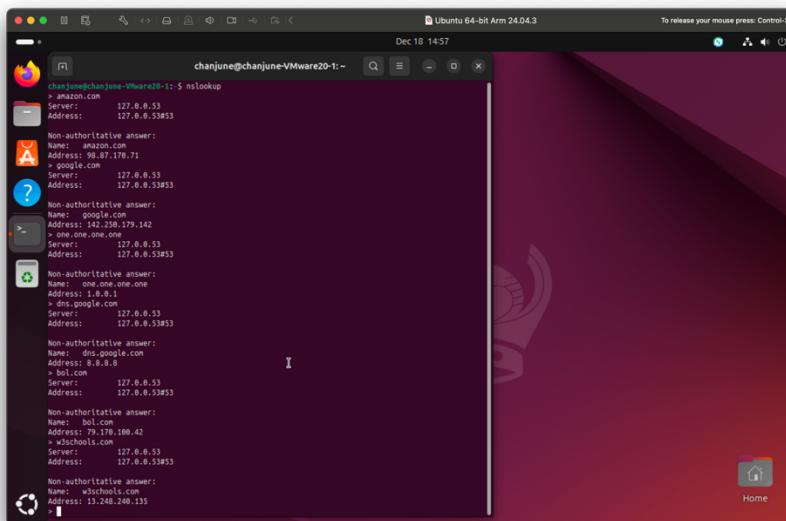
[chanjune@chanjune-VMware20-1:~$ exit
logout
Connection to 192.168.2.131 closed.
[macbookpro:~ presso$ echo "This is a test file" > testfile.txt
[macbookpro:~ presso$ scp testfile.txt chanjune@192.168.2.131
[macbookpro:~ presso$ scp testfile.txt chanjune@192.168.2.131:~
[chanjune@192.168.2.131's password:
testfile.txt                      100%   20   13.7KB/s  00:00
macbookpro:~ presso$ ]
```

Screenshot remmina:



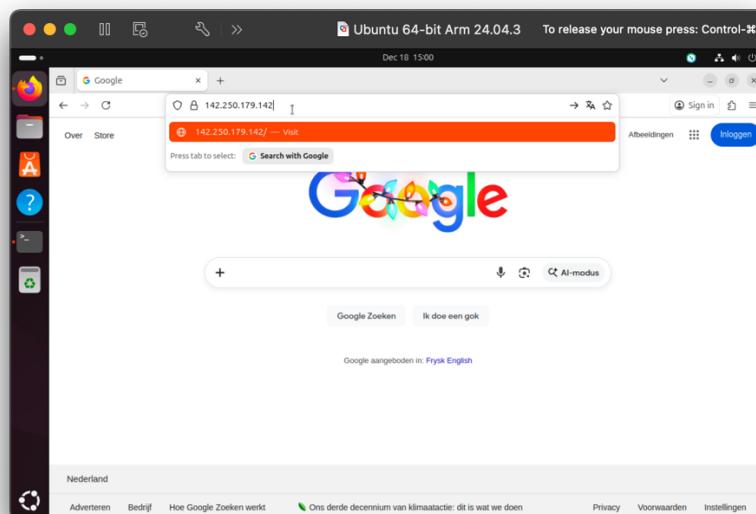
Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:



```
chanjune@chanjune-VMware20-1:~$ nslookup
... amazon.com
Name:    amazon.com
Address: 127.0.0.53
...
Non-authoritative answer:
Name:    amazon.com
Address: 98.87.178.71
...
Name:    google.com
Address: 142.250.179.142
...
Name:    one.one.one
Address: 1.0.0.1
...
Name:    dns.google.com
Address: 127.0.0.53
...
Non-authoritative answer:
Name:    bol.com
Address: 8.8.8.8
...
Name:    bol.com
Address: 99.178.100.42
...
Name:    w3schools.com
Address: 127.0.0.53
...
Non-authoritative answer:
Name:    w3schools.com
Address: 13.248.248.135
```

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 -> The subnet mask is 25, which means 25 bits are used for the network and 7 bits are remaining for hosts ($32 - 25 = 7$). The total number of IP addresses is calculated 2^7 as which equals 128.
- What is the usable IP range to distribute to the connected computers?
- 192.168.110.129 ~ 192.168.110.254
- 192.168.110.128 (Network ID) , 192.168.110.255 (Broadcast address) : They cannot be assigned to computers.
- Check your two previous answers with this Linux command: `ipcalc`

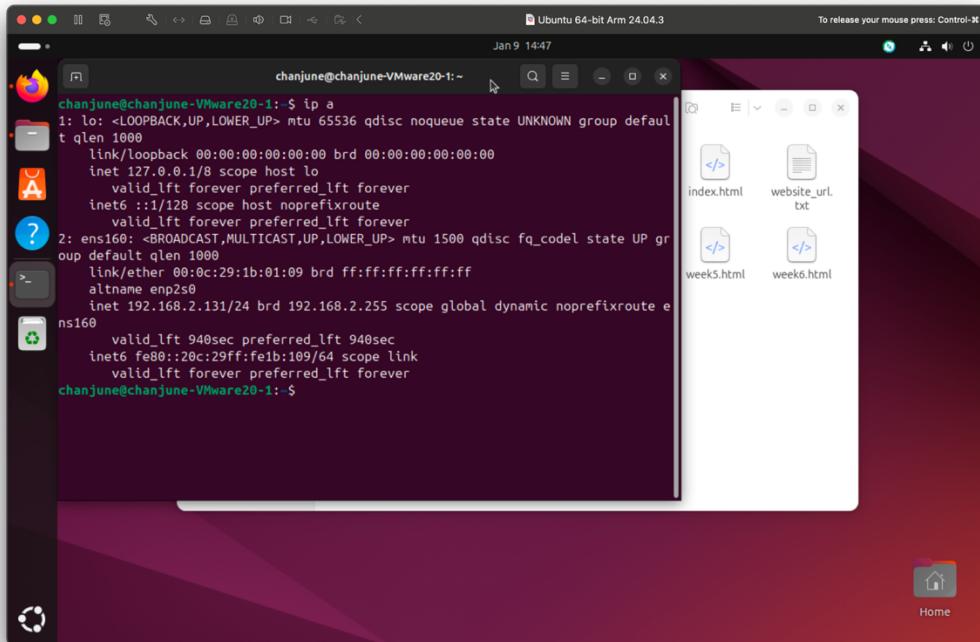
`192.168.110.128/25`

```
chanjune@chanjune-VirtualBox:~$ ipcalc 192.168.110.128/25
0 upgraded, 0 newly installed, 0 to remove and 123 not upgraded.
Need to get 24.5 kB of archives.
After this operation, 72.7 kB of additional disk space will be used.
Get:1 http://ports.ubuntu.com/ubuntu-ports noble/universe arm64 ipcalc all 0.51-1 [24.5 kB]
Fetched 24.5 kB in 0s (56.6 kB/s)
Selecting previously unselected package ipcalc.
Reading database ... 2199 files and directories currently installed.
Preparing to unpack .../archives/ipcalc_0.51-1_all.deb ...
Unpacking ipcalc (0.51-1) ...
Setting up ipcalc (0.51-1) ...
Processing triggers for man-db (2.12.0-4hould2) ...
chanjune@chanjune-VirtualBox:~$ ipcalc 192.168.110.128/25
A-----+
          192.168.110.128      11000000.10101000.01101110.1 00000000
          Mask: 255.255.255.128 = 25 11111111.11111111.11111111.1 00000000
          Broadcast: 192.168.110.255 11000000.10101000.01101110.1 11111111
          Hosts/Net: 126 00000000.00000000.00000000.01111111
          Network: 192.168.110.128/25 11000000.10101000.01101110.I 00000000
          HostMin: 192.168.110.129 11000000.10101000.01101110.I 00000001
          HostMax: 192.168.110.254 11000000.10101000.01101110.I 11111110
          Broadcast: 192.168.110.255 11000000.10101000.01101110.I 11111111
          Hosts/Net: 126 Class C, Private Internet
chanjune@chanjune-VirtualBox:~$
```

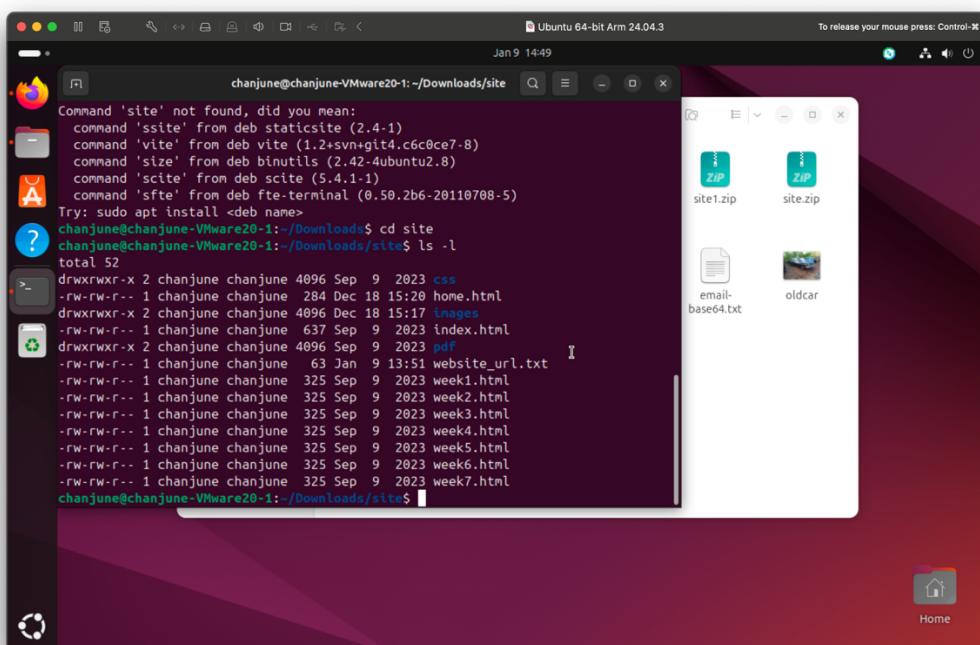
- Explain the above calculation in your own words.
- The subnet mask is /25, which means 25 bits are used for the network ID and the remaining 7 bits ($32 - 25 = 7$) are for host addresses. Calculating 2^7 gives us a total of 128 IP addresses in this subnet.
- The block starts at the Network ID (192.168.110.128) and ends at the Broadcast Address (192.168.110.255). Since these two addresses are reserved, we subtract them from the total count (128 - 2), resulting in 126 usable IP addresses for computers. The usable range is therefore 192.168.110.129 to 192.168.110.254.

Assignment 6.4: HTML

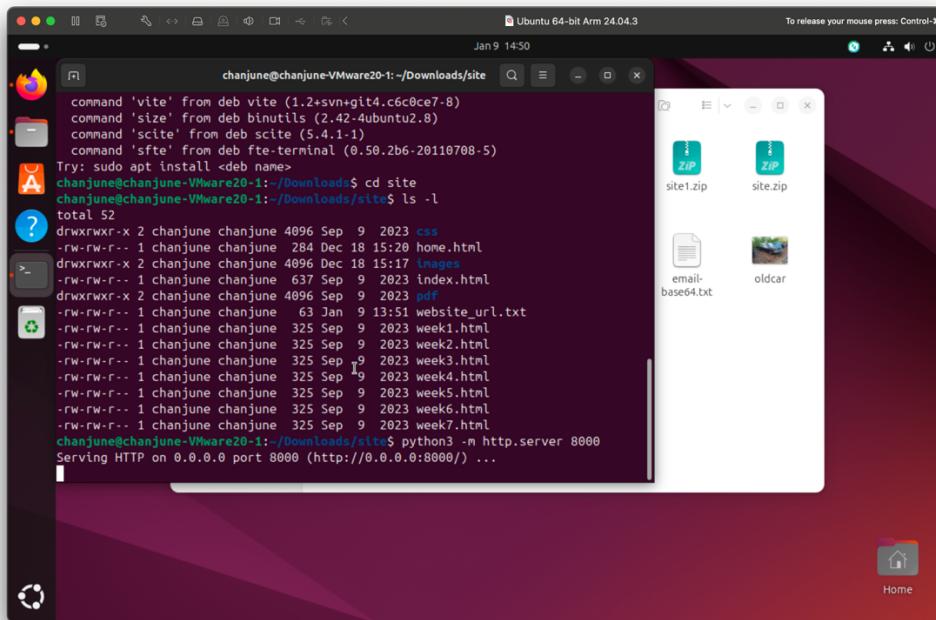
Screenshot IP address Ubuntu VM:



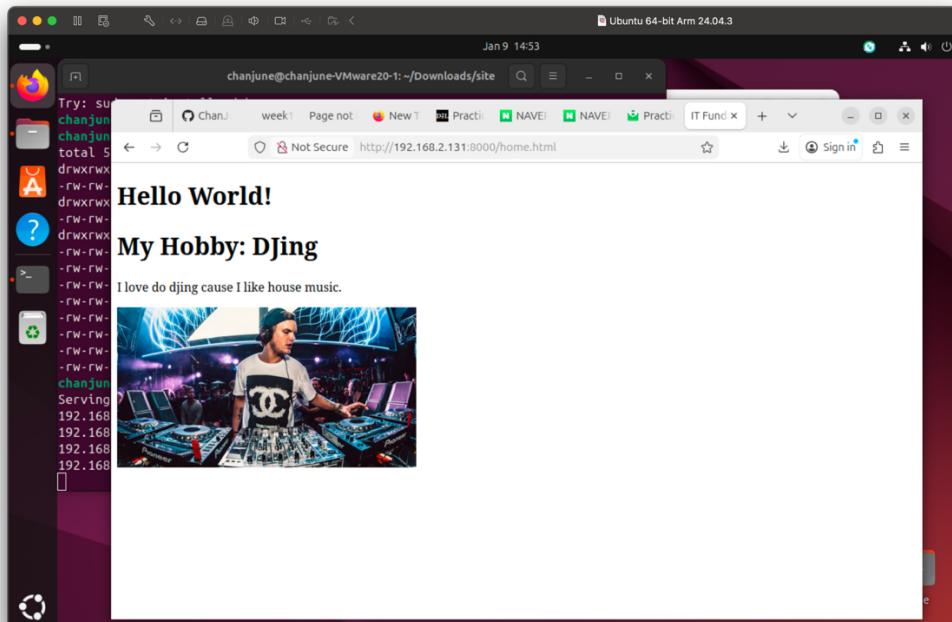
Screenshot of Site directory contents:



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

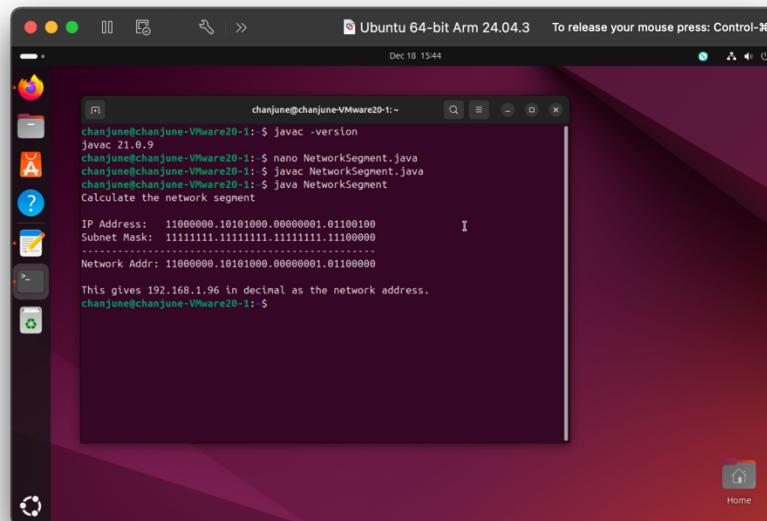
Network Addr: 11000000.10101000.00000001.01100000

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.



The screenshot shows a terminal window on an Ubuntu 64-bit Arm 24.04.3 desktop environment. The terminal title is "Ubuntu 64-bit Arm 24.04.3 To release your mouse press: Control-⌘". The date and time "Dec 18 15:44" are displayed at the top. The terminal content is as follows:

```
chanjune@chanjune-VMware20-1:~$ javac -version
javac 21.8.9
chanjune@chanjune-VMware20-1:~$ nano NetworkSegment.java
chanjune@chanjune-VMware20-1:~$ javac NetworkSegment.java
chanjune@chanjune-VMware20-1:~$ java NetworkSegment
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.
chanjune@chanjune-VMware20-1:~$
```

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