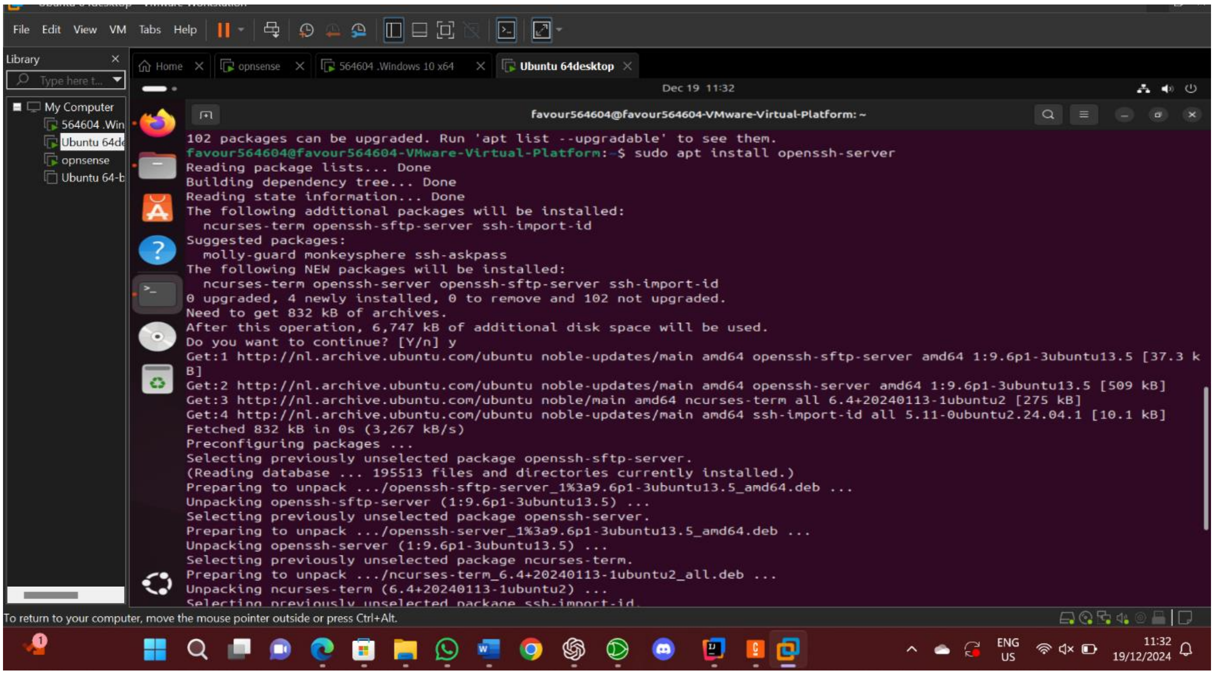
Template Week 6 – Networking

Student number:564604

Assignment 6.1: Working from home

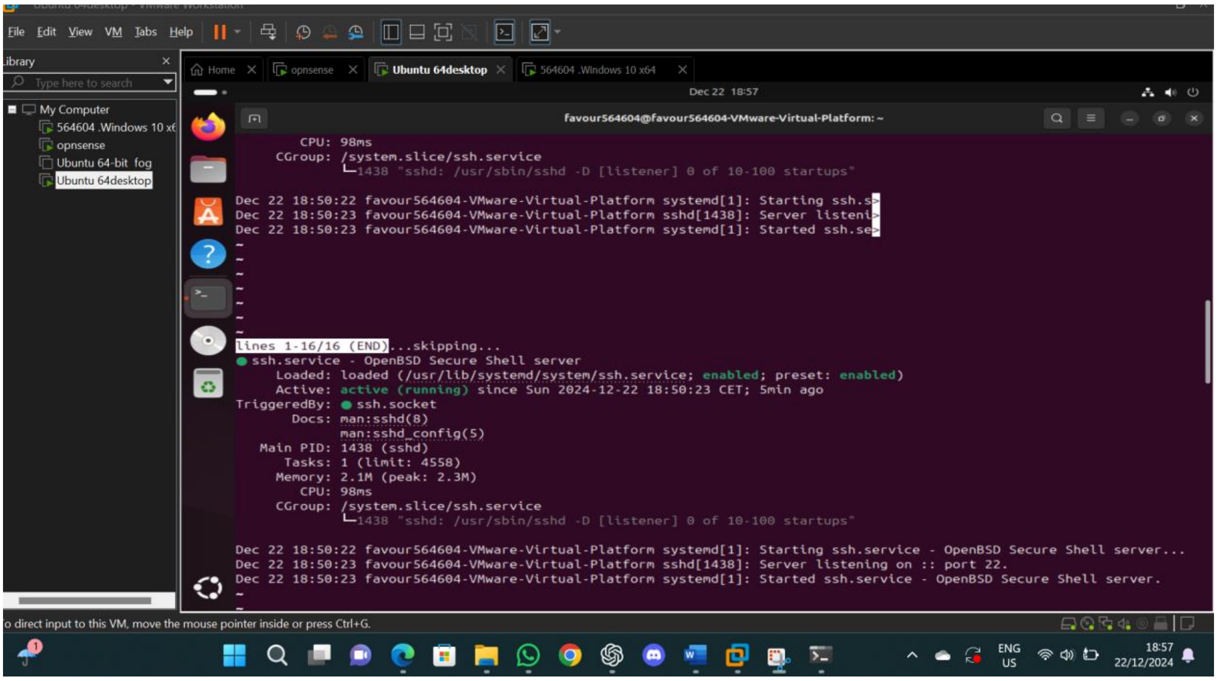
Screenshot installation openssh-server:



File Edit View VM Tabs Help
Library
My Computer
564604 .Win
Ubuntu 64de
opnsense
Ubuntu 64-b
Home
opnsense
564604 .Windows 10 x64
Ubuntu 64desktop
Dec 19 11:32
favour564604@favour564604-VMware-Virtual-Platform: ~
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.
ENG
US
11:32
19/12/2024

```
102 packages can be upgraded. Run 'apt list --upgradable' to see them.
favour564604@favour564604-VMware-Virtual-Platform:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 102 not upgraded.
Need to get 832 kB of archives.
After this operation, 6,747 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://nl.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-sftp-server amd64 1:9.6p1-3ubuntu13.5 [37.3 k
B]
Get:2 http://nl.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-server amd64 1:9.6p1-3ubuntu13.5 [509 kB]
Get:3 http://nl.archive.ubuntu.com/ubuntu noble/main amd64 ncurses-term all 6.4+20240113-1ubuntu2 [275 kB]
Get:4 http://nl.archive.ubuntu.com/ubuntu noble-updates/main amd64 ssh-import-id all 5.11-0ubuntu2.24.04.1 [10.1 kB]
Fetched 832 kB in 0s (3,267 kB/s)
Preconfiguring packages ...
Selecting previously unselected package openssh-sftp-server.
(Reading database ... 195513 files and directories currently installed.)
Preparing to unpack .../openssh-sftp-server_1%3a9.6p1-3ubuntu13.5_amd64.deb ...
Unpacking openssh-sftp-server (1:9.6p1-3ubuntu13.5) ...
Selecting previously unselected package openssh-server.
Preparing to unpack .../openssh-server_1%3a9.6p1-3ubuntu13.5_amd64.deb ...
Unpacking openssh-server (1:9.6p1-3ubuntu13.5) ...
Selecting previously unselected package ncurses-term.
Preparing to unpack .../ncurses-term_6.4+20240113-1ubuntu2_all.deb ...
Unpacking ncurses-term (6.4+20240113-1ubuntu2) ...
Selecting previously unselected package ssh-import-id.
```

Screenshot successful SSH command execution:



```
          CPU: 98ms
       CGroup: /system.slice/ssh.service
               └─1438 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Dec 22 18:50:22 favour564604-VMware-Virtual-Platform systemd[1]: Starting ssh.s>
Dec 22 18:50:23 favour564604-VMware-Virtual-Platform sshd[1438]: Server listeni>
Dec 22 18:50:23 favour564604-VMware-Virtual-Platform systemd[1]: Started ssh.se>
~
~
~
~
~
~
~
lines 1-16/16 (END)...skipping...
● ssh.service - OpenBSD Secure Shell server
     Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: enabled)
     Active: active (running) since Sun 2024-12-22 18:50:23 CET; 5min ago
TriggeredBy: ● ssh.socket
       Docs: man:sshd(8)
             man:sshd_config(5)
   Main PID: 1438 (sshd)
      Tasks: 1 (limit: 4558)
     Memory: 2.1M (peak: 2.3M)
        CPU: 98ms
     CGroup: /system.slice/ssh.service
             └─1438 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Dec 22 18:50:22 favour564604-VMware-Virtual-Platform systemd[1]: Starting ssh.service - OpenBSD Secure Shell server...
Dec 22 18:50:23 favour564604-VMware-Virtual-Platform sshd[1438]: Server listening on :: port 22.
Dec 22 18:50:23 favour564604-VMware-Virtual-Platform systemd[1]: Started ssh.service - OpenBSD Secure Shell server.
~
~
```

Screenshot successful execution SCP command:

Screenshot remmina:

Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

Screenshot websites visit via IP address:

Assignment 6.3: subnetting

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

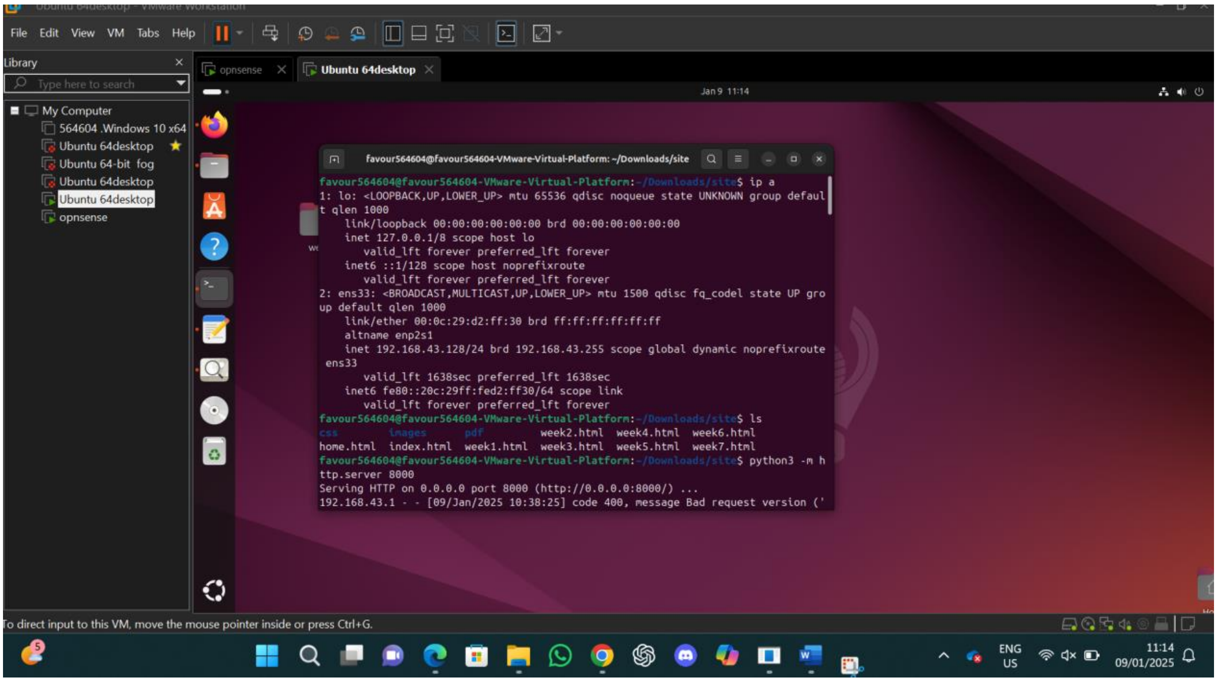
What is the usable IP range to hand out to the connected computers?

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

Explain the above calculation in your own words.

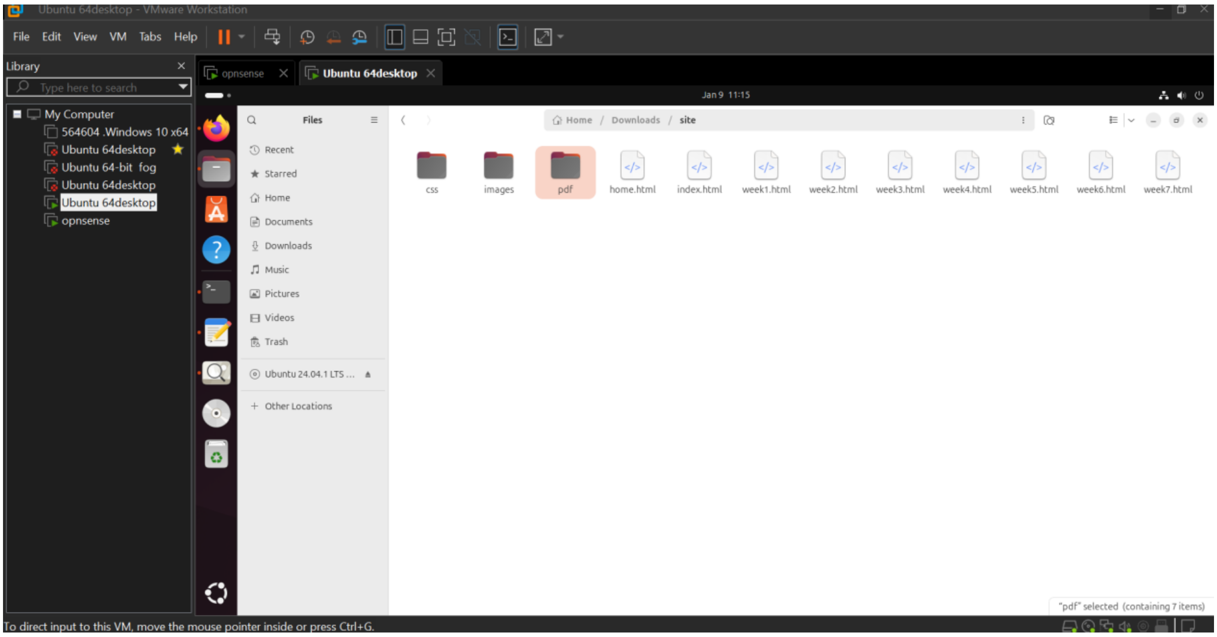
Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:



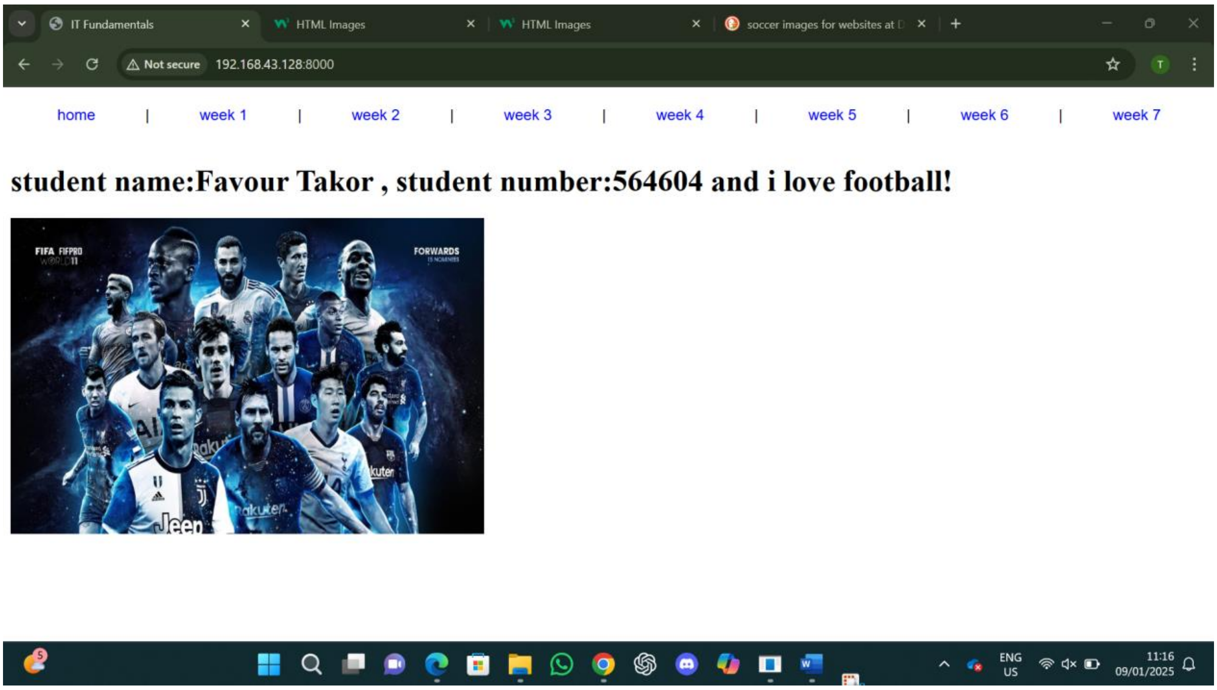
```
favour564604@favour564604-VMware-Virtual-Platform:~/Downloads/site$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft 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 gro
up default qlen 1000
    link/ether 00:0c:29:d2:ff:30 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.43.128/24 brd 192.168.43.255 scope global dynamic noprefixroute
 ens33
       valid_lft 1638sec preferred_lft 1638sec
    inet6 fe80::20c:29ff:fed2:ff30/64 scope link
       valid_lft forever preferred_lft forever
favour564604@favour564604-VMware-Virtual-Platform:~/Downloads/site$ ls
css         images      pdf         week2.html  week4.html  week6.html
home.html   index.html  week1.html  week3.html  week5.html  week7.html
favour564604@favour564604-VMware-Virtual-Platform:~/Downloads/site$ python3 -m h
ttp.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.43.1 - - [09/Jan/2025 10:38:25] code 400, message Bad request version ('
```

Screenshot of Site directory contents:



Screenshot python3 webserver command:

Screenshot web browser visits your site



student name:Favour Takor , student number:564604 and i love football!

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.
```

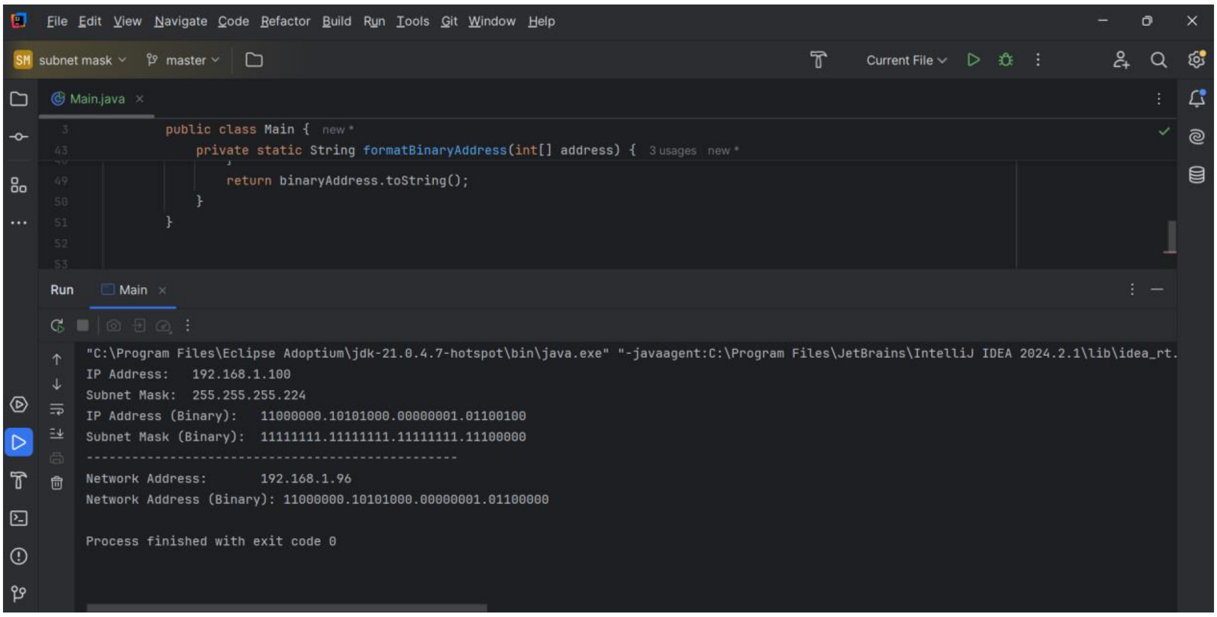
Paste source code here, with a screenshot of a working application.

source code:

```
public class Main {
```

```java
public static void main(String[] args) {
    String ipAddress = "192.168.1.100";
    String subnetMask = "255.255.255.224"; // /27 subnet mask (11100000 in the last octet)

    System.out.println("IP Address:   " + ipAddress);
    System.out.println("Subnet Mask:  " + subnetMask);

    int[] ip = parseAddress(ipAddress);
    int[] subnet = parseAddress(subnetMask);
    int[] networkAddress = calculateNetworkAddress(ip, subnet);

    System.out.println("IP Address (Binary):   " + formatBinaryAddress(ip));
    System.out.println("Subnet Mask (Binary):  " + formatBinaryAddress(subnet));
    System.out.println("------------------------------------------------");
    System.out.println("Network Address:        " + formatAddress(networkAddress));
    System.out.println("Network Address (Binary): " + formatBinaryAddress(networkAddress));
}

private static 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]);
    return result;
}

private static int[] calculateNetworkAddress(int[] ip, int[] subnet) {
    int[] networkAddress = new int[4];
    for (int i = 0; i < 4; i++) networkAddress[i] = ip[i] & subnet[i];
    return networkAddress;
}
```

```
    private static String formatAddress(int[] address) {
        return String.join(".",
            String.valueOf(address[0]),
            String.valueOf(address[1]),
            String.valueOf(address[2]),
            String.valueOf(address[3]));
    }

    private static String formatBinaryAddress(int[] address) {
        StringBuilder binaryAddress = new StringBuilder();
        for (int i = 0; i < address.length; i++) {
            binaryAddress.append(String.format("%08d",
Integer.parseInt(Integer.toBinaryString(address[i]))));
            if (i < address.length - 1) binaryAddress.append(".");
        }
        return binaryAddress.toString();
    }
}
```



File Edit View Navigate Code Refactor Build Run Tools Git Window Help
SM subnet mask
master
Current File
Main.java
Run
Main
3 usages
new *

```
public class Main {
    private static String formatBinaryAddress(int[] address) {
            return binaryAddress.toString();
        }
    }
```

```
"C:\Program Files\Eclipse Adoptium\jdk-21.0.4.7-hotspot\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2024.2.1\lib\idea_rt.
IP Address:   192.168.1.100
Subnet Mask:  255.255.255.224
IP Address (Binary):   11000000.10101000.00000001.01100100
Subnet Mask (Binary):  11111111.11111111.11111111.11100000
------------------------------------------------
Network Address:       192.168.1.96
Network Address (Binary): 11000000.10101000.00000001.01100000

Process finished with exit code 0
```

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