

# **Computer Network**

## **Laboratory**

### **Assignment 1**

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**Enrollment Number:** 17114004

**Class:** 3rd year, B.Tech CSE

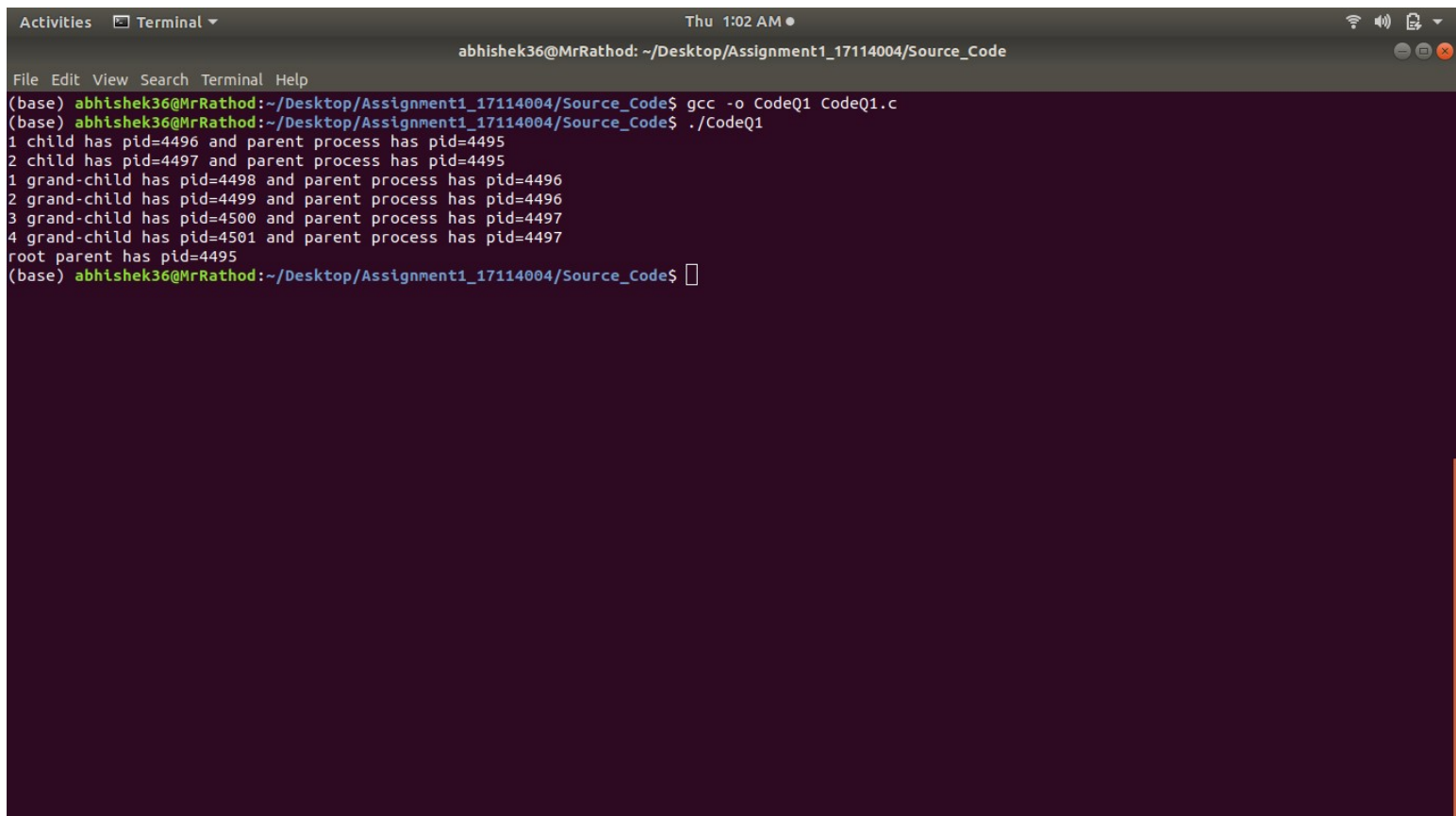
**Problem Statement 1:** Write a C program in the UNIX system that creates two children and four grandchildren (two for each child). The program should then print the process-IDs of the two children, four grandchildren and the parent in this order.

### **Algorithms used :**

Brute Force.

No specific data structures were used.

### **Screenshot :-**



```
Activities Terminal ▾ Thu 1:02 AM ●
abhishek36@MrRathod: ~/Desktop/Assignment1_17114004/Source_Code

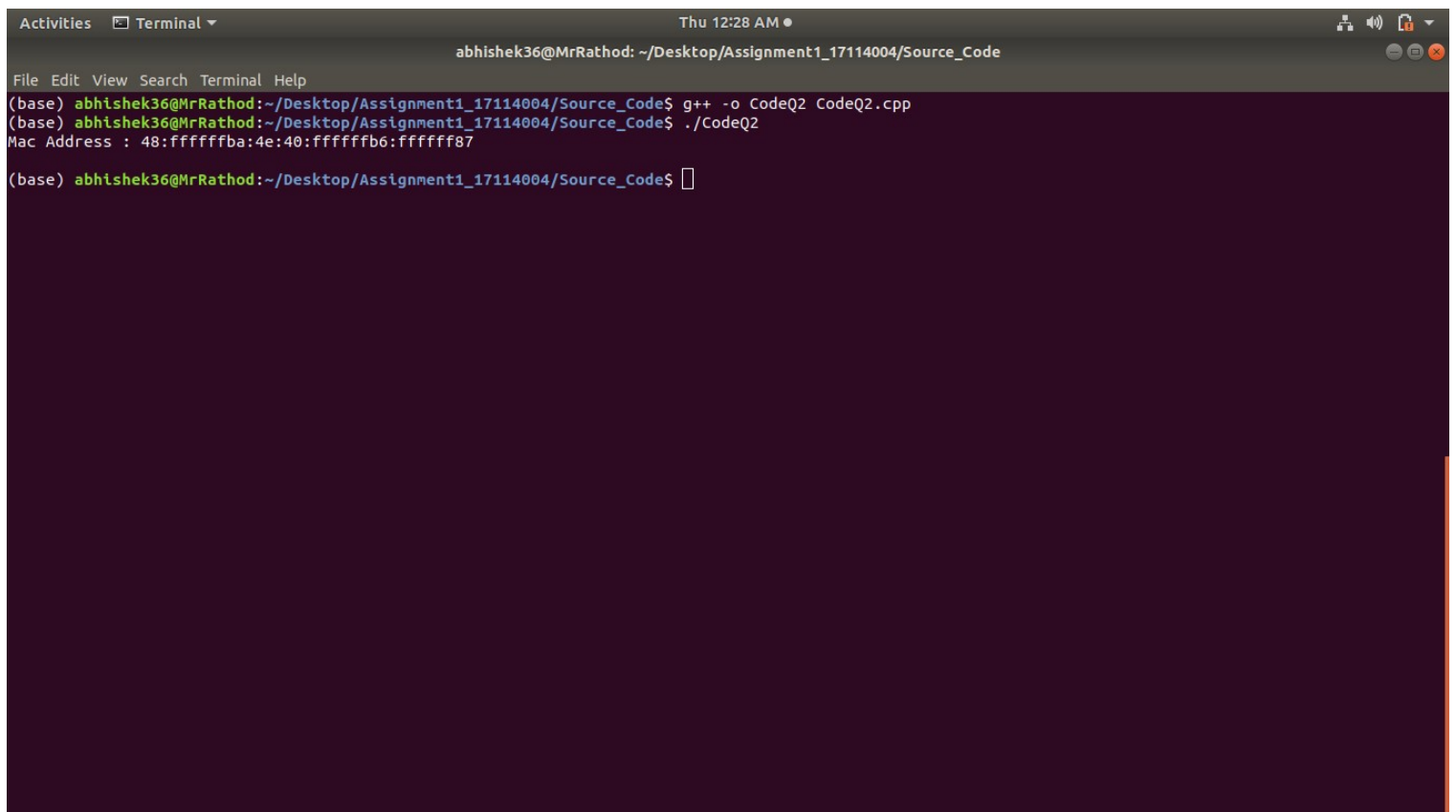
File Edit View Search Terminal Help
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$ gcc -o CodeQ1 CodeQ1.c
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$ ./CodeQ1
1 child has pid=4496 and parent process has pid=4495
2 child has pid=4497 and parent process has pid=4495
1 grand-child has pid=4498 and parent process has pid=4496
2 grand-child has pid=4499 and parent process has pid=4496
3 grand-child has pid=4500 and parent process has pid=4497
4 grand-child has pid=4501 and parent process has pid=4497
root parent has pid=4495
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$
```

**Problem Statement 2:** Write a C++ program to print the MAC address of your computer.

## Algorithms :

- 1) **ioctl:** It is Input-Output Control Command. It has the function to make device-specific system calls.
- 2) **socket:** It creates the socket for getting the address.

## Screenshot :

A screenshot of a Linux terminal window. The title bar shows 'Activities', 'Terminal', and the time 'Thu 12:28 AM'. The terminal content shows a user named 'abhishek36@MrRathod' in the directory '~/Desktop/Assignment1\_17114004/Source\_Code'. The user runs 'g++ -o CodeQ2 CodeQ2.cpp' and then './CodeQ2'. The output is 'Mac Address : 48:fffffba:4e:40:fffffb6:fffffb7'.

```
abhishek36@MrRathod: ~/Desktop/Assignment1_17114004/Source_Code
File Edit View Search Terminal Help
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$ g++ -o CodeQ2 CodeQ2.cpp
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$ ./CodeQ2
Mac Address : 48:fffffba:4e:40:fffffb6:fffffb7
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$
```

## **Data Structures :**

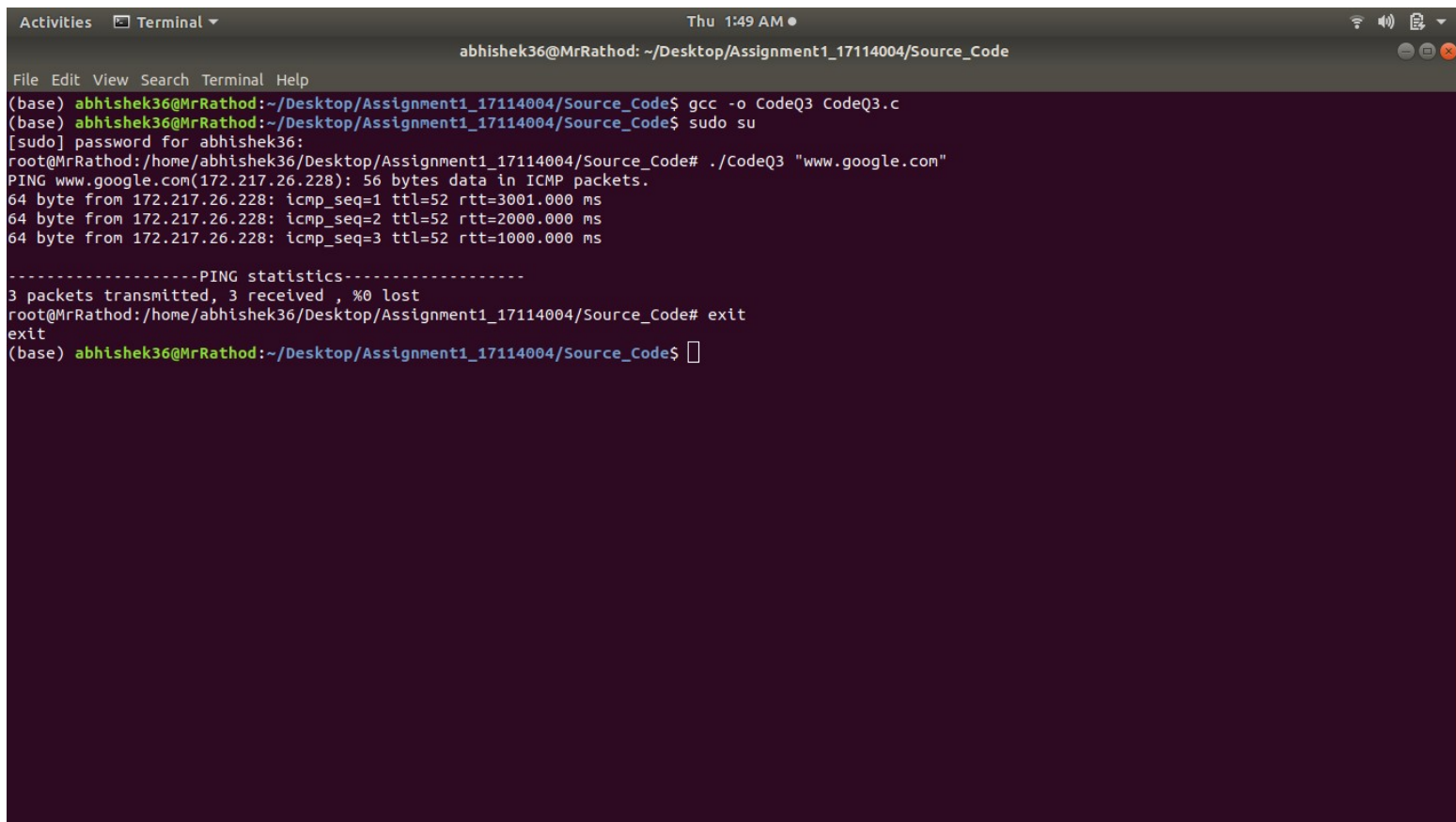
- 1) **ifreq:** It is a C++ struct to store the mac address.
- 2) **SIOCGIFHWADDR:** It is the code to request the hardware address through the ioctl command.

**Problem Statement 3:** Write your own version of ping program in C language.

## **Algorithms/Functions :**

- 1) **gethostbyname:** Gives the IP address of the host.
- 2) **socket:** Creates a socket of AF\_INET address family.
- 3) **getpid:** returns the process id of the process.
- 4) **in\_cksum:** code to calculate the checksum.
- 5) **inet\_addr:** for proper conversion of the IP address returned.
- 6) **FD\_ZERO:** clear an fdset.
- 7) **FD\_SET:** add a socket descriptor to the fdset.
- 8) **select:** select return values from different sockets without multithreading.
- 9) **sendto:** To send the data to the opened socket to the specified IP address.
- 10) **recvfrom:** To receive the data from the socket.
- 11) **gettimeofday:** In order to calculate the ping time.

## Screenshot :



```
Activities  Terminal  Thu 1:49 AM  abhishek36@MrRathod: ~/Desktop/Assignment1_17114004/Source_Code
File Edit View Search Terminal Help
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$ gcc -o CodeQ3 CodeQ3.c
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$ sudo su
[sudo] password for abhishek36:
root@MrRathod:/home/abhishek36/Desktop/Assignment1_17114004/Source_Code# ./CodeQ3 "www.google.com"
PING www.google.com(172.217.26.228): 56 bytes data in ICMP packets.
64 byte from 172.217.26.228: icmp_seq=1 ttl=52 rtt=3001.000 ms
64 byte from 172.217.26.228: icmp_seq=2 ttl=52 rtt=2000.000 ms
64 byte from 172.217.26.228: icmp_seq=3 ttl=52 rtt=1000.000 ms

-----PING statistics-----
3 packets transmitted, 3 received , %0 lost
root@MrRathod:/home/abhishek36/Desktop/Assignment1_17114004/Source_Code# exit
exit
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$
```

## Data Structures :

- 1) **hostent**: to store data about a specific host
- 2) **sock\_addr\_in**: to specify a transport address and port for the AF\_INET address family.
- 3) **ip**: An IP header.
- 4) **icmp**: An icmp header.
- 5) **timeval**: It checks time interval for the socket.

**Problem Statement 4:** Write a C program to find the host name and the IP address of your computer.

### **Algorithms/Functions :**

**1) gethostname:** Given the character array and its size as parameter, it stores the hostname into the array and returns an integer which confirms if the method has completed successfully.

**2) gethostbyname:** It returns a pointer which points to the struct hostent which holds the information about host-name .

**3) inet\_ntoa:** It returns the string format of the form which has dots-and-numbers, of the IP address. It takes in the parameters in the struct in\_addr type.

**Screenshot:**

```
Activities Terminal ▾ Wed 11:31 PM ●
abhishek36@MrRathod: ~/Desktop/Assignment1_17114004/Source_Code

File Edit View Search Terminal Help
(base) abhishek36@MrRathod:~$ cd Desktop/Assignment1_17114004/Source_Code/
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$ gcc -o CodeQ4 CodeQ4.c
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$ ./CodeQ4
Hostname is : MrRathod
Host IP is : 127.0.1.1
(base) abhishek36@MrRathod:~/Desktop/Assignment1_17114004/Source_Code$
```

## Data Structures :

- 1) **hostent**: It stores the return value of `gethostbyname()`, i.e., pointer to the information of the hostname.
- 2) **in\_addr**: It stores the internet address.