

Name	Rohit Ashiwal
Enr. no.	17114064
Dept	CSE
Batch	CS 2
Class	B. Tech. 3rd yr

Lab Assignment 1

This assignment aims to make us familiar with the hardware and software aspects of computer networking and extracting information related to computer networking using C/C++ programs.

Problem Statement 1

Q: 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, the four grandchildren and the parent in this order.

```
r1walz@ar135: ~/Desktop/csn361
File Edit View Search Terminal Help
→ csn361 gcc src/q1.c -o processes
→ csn361 processes
PID of child      : 29234
PID of child      : 29235
PID of grand child : 29236
PID of grand child : 29237
PID of grand child : 29238
PID of grand child : 29239
PID of parent     : 29233
```

The program does not make use of any special data structures, but it has some wrapper functions to provide better help messages in case of failure.

Problem Statement 2

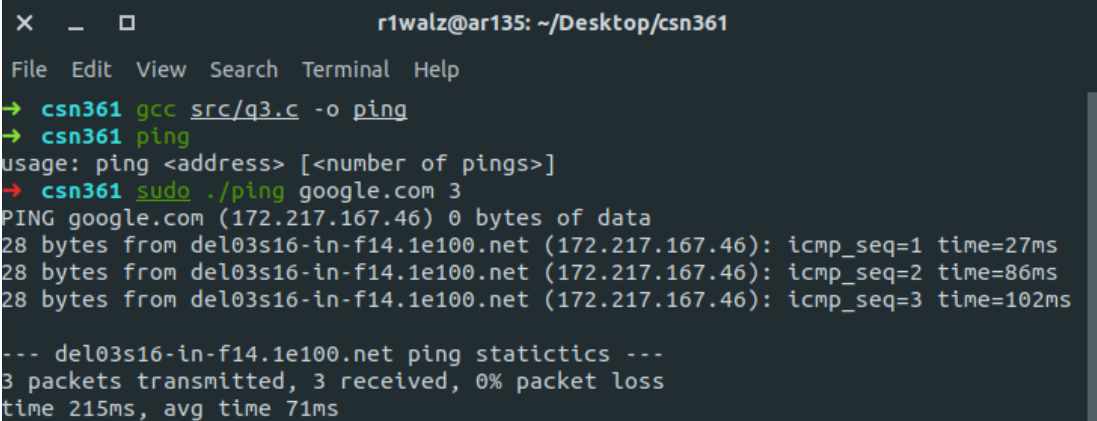
Q: Write a C program to print the MAC address of your computer.

```
r1walz@ar135: ~/Desktop/csn361
File Edit View Search Terminal Help
→ csn361 gcc src/q2.c -o mac
→ csn361 mac
MAC address = 88:d7:f6:22:0d:51
```

The program has two structs (ifreq and ifconf) to keep track of hardware information. As for the algorithm, we are iterating through all the network devices to get the MAC address of the eth interface.

Problem Statement 3

Q: Write your own version of ping program in C language.



```
r1walz@ar135: ~/Desktop/csn361
File Edit View Search Terminal Help
→ csn361 gcc src/q3.c -o ping
→ csn361 ping
usage: ping <address> [<number of pings>]
→ csn361 sudo ./ping google.com 3
PING google.com (172.217.167.46) 0 bytes of data
28 bytes from del03s16-in-f14.1e100.net (172.217.167.46): icmp_seq=1 time=27ms
28 bytes from del03s16-in-f14.1e100.net (172.217.167.46): icmp_seq=2 time=86ms
28 bytes from del03s16-in-f14.1e100.net (172.217.167.46): icmp_seq=3 time=102ms

--- del03s16-in-f14.1e100.net ping statistics ---
3 packets transmitted, 3 received, 0% packet loss
time 215ms, avg time 71ms
```

The program is a bare minimum implementation of the ping command. The program defines / uses the following data structures:

1. struct {
 uint8_t type;
 uint8_t code;
 uint16_t checksum;
 uint32_t data;
} icmp_hdr_t: structure describing the icmp packet that will be echoed to the ping information.
2. struct addrinfo: structure describes address information for use with TCP/IP
3. struct sockaddr_in / sockaddr: structures describing Internet / Generic socket address

Algorithm:

The program first changes the provided address to its numeric equivalent and then starts sending packets until interrupted (through Ctrl + C). The program then prints the statistical information about how many packets were sent / received / lost, total time, average time, etc.

Problem Statement 4

Q: Write a C program to find the host name from IP address.

```

X _ □ r1walz@ar135: ~/Desktop/csn361
File Edit View Search Terminal Help
→ csn361 gcc src/q4.c -o hostname
→ csn361 hostname
usage: hostname <address>...
→ csn361 hostname 127.0.{0,1}.1 ::1
IP Address | Hostname
-----+-----
127.0.0.1 | localhost
127.0.1.1 | ar135
::1 | ip6-localhost

```

The program uses struct addrinfo to describe the resolved address information. We are iterating through each address provided through the CLI, resolving hostname and printing them.