Computer Networks Laboratory
CSN-361
Assignment 1 (L1)

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Class: B.Tech CSE 3rd Year

Problem Statements

1. C program in UNIX that creates two children and 2 grandchildren, and print their process IDs
2. C++ program to print MAC address
3. Ping program in C
4. C program to find hostname and IP of the system

Algorithms and Data Structures Used

Question 1:

The problem is visualised as a tree data structure where the parent node is represented by the parent process the child node is represented by the child processes.

When a fork statement is executed by the parent, a child process is created as you'd expect. You could say that the child process also executes the fork statement but returns a 0, the parent, however, returns the pid. All code after the fork statement is executed by both, the parent and the child.

Question 2:

On Linux-based systems the MAC address of an interface is obtained using the ioctl command SIOCGIFHWADDR. The method described here has five steps:

1. Create an ifreq structure for passing data in and out of ioctl.
2. Provide an open socket descriptor.
3. Invoke ioctl.

4. Check the type of the returned hardware address.
5. Extract the hardware address from the ifreq structure.

Question 3:

The algorithm is simply:

1. The ip packet is set up except checksum
2. IP_HDRINCL must be set on the socket so that the kernel does not attempt to automatically add a default ip header to the packet
3. The icmp packet is created also the ip checksum is generated
4. The packet is sent and then we wait for responses

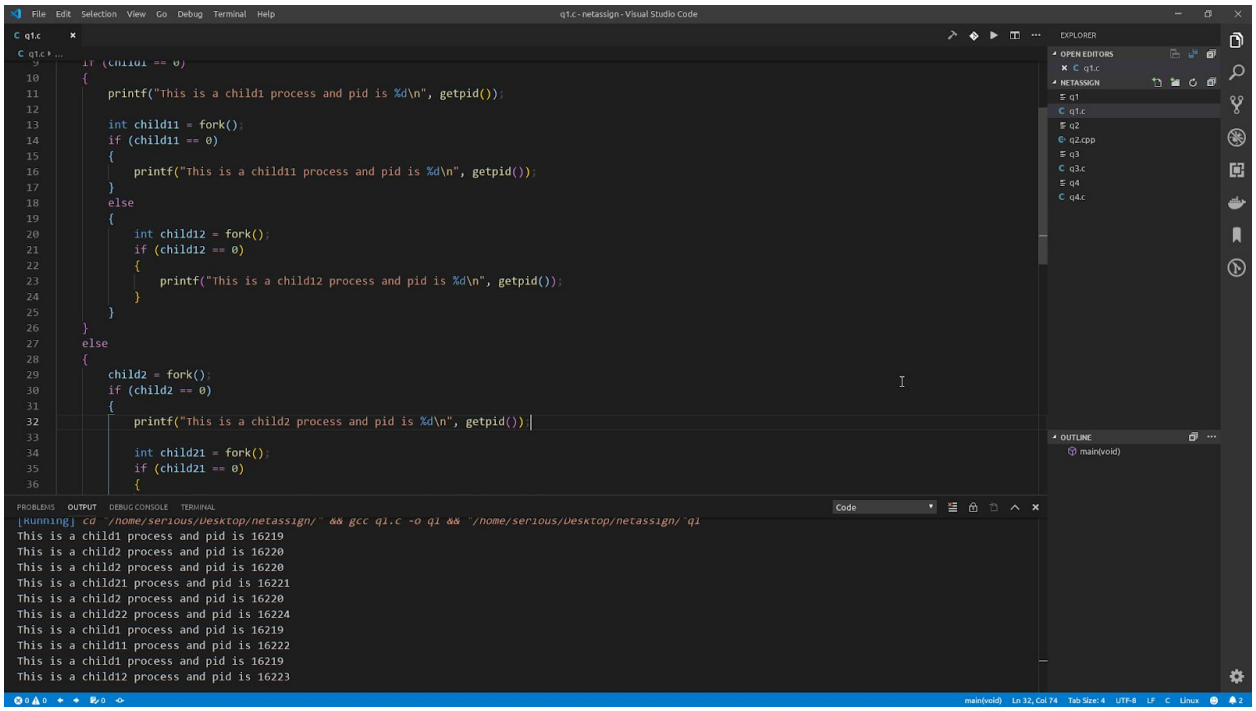
Question 4:

Algorithm is simply:

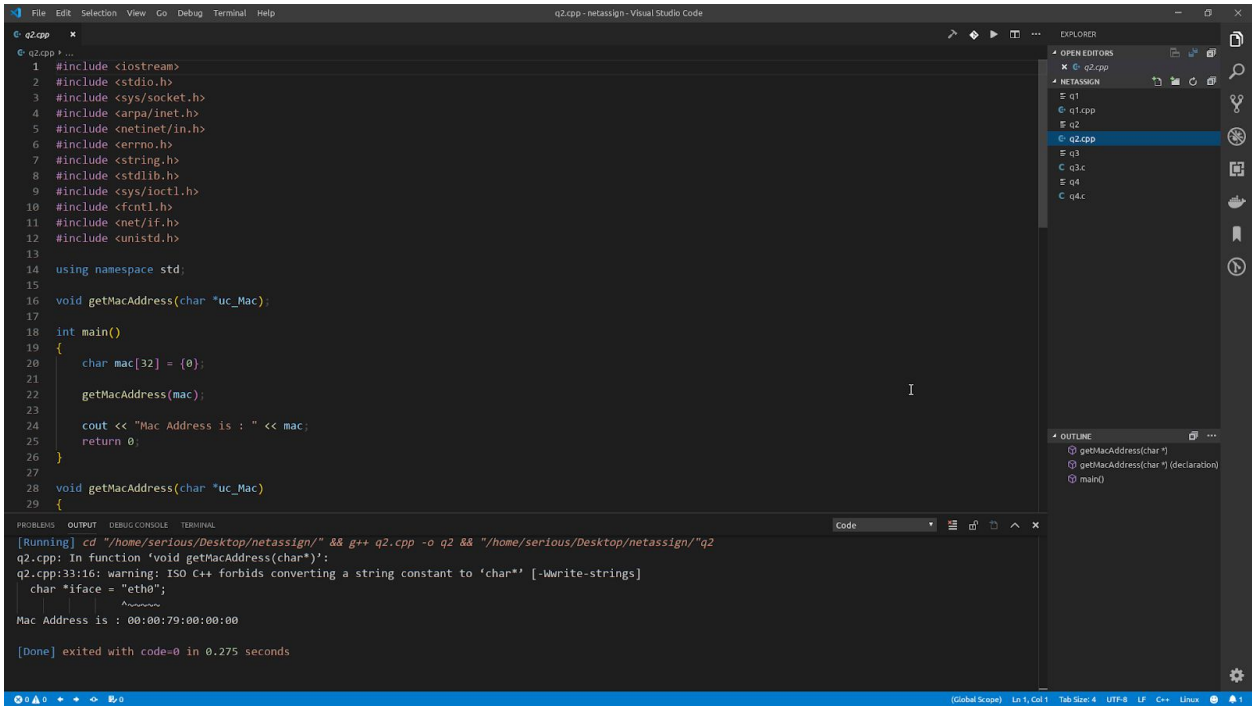
1. Get host name by `gethostname()` in netdb.h
2. Get the host information by `gethostbyid()` in netdb.h
3. Process host information to a formatted string and print the result with the host name.

Snapshots

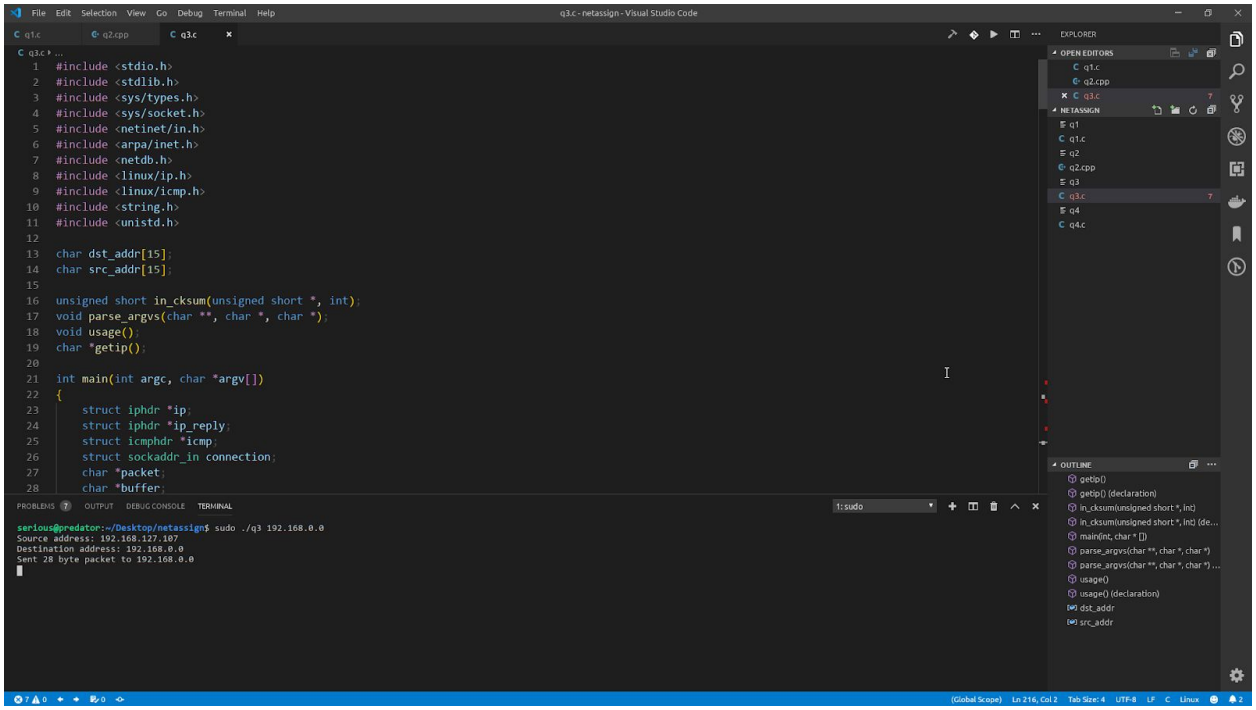
Question1



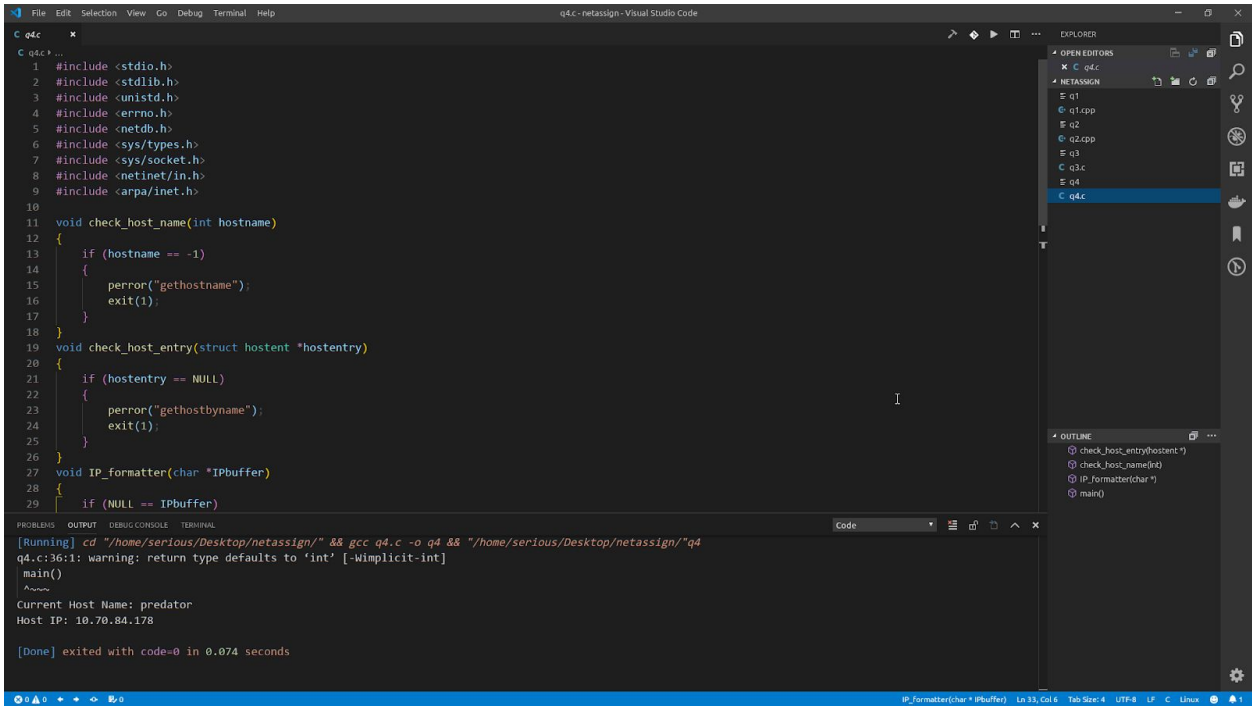
Question 2



Question 3



Question 4


File Edit Selection View Go Debug Terminal Help
q4.c - netassign - Visual Studio Code
q4.c
EXPLORER
OPEN EDITORS
q4.c
NETASSIGN
q1
q1.cpp
q2
q2.cpp
q3
q3.c
q4
q4.c
OUTLINE
check_host_entry(hostent *)
check_host_name(int)
IP_formatter(char *)
main()
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <errno.h>
#include <netdb.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>
void check_host_name(int hostname)
{
if (hostname == -1)
{
perror("gethostname");
exit(1);
}
}
void check_host_entry(struct hostent *hostentry)
{
if (hostentry == NULL)
{
perror("gethostbyname");
exit(1);
}
}
void IP_formatter(char *IPbuffer)
{
if (NULL == IPbuffer)
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Code
[Running] cd "/home/serious/Desktop/netassign/" && gcc q4.c -o q4 && "/home/serious/Desktop/netassign/"q4
q4.c:36:1: warning: return type defaults to 'int' [-Wimplicit-int]
main()
^~~~
Current Host Name: predator
Host IP: 10.70.84.178
[Done] exited with code=0 in 0.074 seconds
IP_formatter(char * IPbuffer) Ln 33, Col 6 Tab Size: 4 UTF-8 LF C Linux