MINOR ASSIGNMENT-12

Socket Programming: TCP & UDP (Networking Communication)

Practical Programming with C (CSE 3544)

Publish on: 24-12-2024 **Submission on:** 28-12-2024
Course Outcome: CO$_6$ **Program Outcome:** PO$_4$ **Learning Level:** L$_5$

Problem Statement:

Experiment with networking communication between client and server using socket API.

Assignment Objectives:

Students will be able learn how to establish communication between different programs (*i.e. processes*) over the network using TCP and UDP based socket programming.

Answer the followings:

1. Write C statements to create an IPV4 socket address structure and fill the structure with family **`AF_INET`**, **`port`**=34567 and **`IP`** address=127.0.0.0.1.

   C Statements

2. Write C statements to declare **two** Internet socket address structure, namely **`servaddr`** and **`cliaddr`** respectively. Read the port and IP address for the structures from the keyboard and display the port and IP address onto the monitor.

   C Statements

3. Determine the output of the following code snippet and write the opening file/socket descriptors that are opened for the process using the command **`$ ls /proc/PID/fd`** in an another terminal.

```
int main(){
 int sockfd,count=0,i;
 printf("PID=%ld\n",(long)getpid());
 for(i=0;i<=9;i++){
   sockfd=socket(AF_INET,SOCK_STREAM,IPPROTO_TCP);
   count=count+1;
   printf("%d ",sockfd);
 }
 printf("\nsocket descriptor count=%d\n",count);
 while(1);
 return 0;
}
```

Output

4. Find out the output of the given code snippet and justify the reason of getting such output (**Hint: look into Host byte order and Network byte order**).

```
int main()
{
 struct sockaddr_in servaddr;
 servaddr.sin_family=AF_INET;
 servaddr.sin_port=htons(16);
 printf("Port given=%d\n",servaddr.sin_port);
 return 0;
}
```

Output

5. Find out the output of the given code snippet.

Output

```
int main()
{
 struct sockaddr_in servaddr;
 servaddr.sin_family=AF_INET;
 servaddr.sin_port=16;
 printf("Port=%d\n",servaddr.sin_port);
 return 0;
}
```

6. Fill out the missing parts of the following code snippet and Determine the output for the given port address as input: 16, 67, 879 respectively.

```
int main()
{
  __________ port;
  printf("Enter a port address:");
  scanf("%____",&port);
  struct sockaddr_in servaddr;
  servaddr.sin_family=AF_INET;
  servaddr.sin_port=htons(port);
  printf("Port=%d\n",htons(servaddr.sin_port));
  return 0;
}
```

Output

7. Develop a TCP based client-server programs to establish a communication between the client program and the server program as:

    - Server: sending data to the client
    - Client: Reading data that has been sent from the server

TCP Server Code here

TCP Client Code here **Specify: input & output**

8. Develop a UDP based client-server programs to establish a communication between the client program and the server program as:
   - Server: sending data to the client
   - Client: Reading data that has been sent from the server

UDP Server Code here

UDP Client Code here **Specify: input & output**