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Computer Network – Lab Assignment 1

Unit : Error Control Algorithm

Question:

Write a C program to implement CRC algorithm using Client Server Communication.

Server.c

```
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<sys/types.h>
#include<sys/socket.h>
#include<netinet/in.h>

int main()
{

int socket_server , clientsocketfd, bindstatus;

socket_server = socket(AF_INET , SOCK_STREAM , 0);

struct sockaddr_in serveraddress , clientaddress;
serveraddress.sin_family = AF_INET;
serveraddress.sin_port = htons(9000);
serveraddress.sin_addr.s_addr = INADDR_ANY;

bindstatus = bind( socket_server ,
                  (struct sockaddr *)&serveraddress ,
                  sizeof(serveraddress)
                  );

if (bindstatus<0)
{
    printf("Binding Failed\n");
}
else
{
    printf("Binding is successful\n");
}
```

```

listen(socket_server , 10);
printf("Send reply to the client\n");

int cliaddlen = sizeof(clientaddress);
clientsocketfd = accept(socket_server ,
                        (struct sockaddr *)&clientaddress,
                        &cliaddlen );

char data1[100],crc_g[100];
read(clientsocketfd , data1 , 100);
read(clientsocketfd , crc_g, 100);

int n, length_data1;
n = strlen(crc_g);//Length of CRC Generator
length_data1 = strlen(data1);//Length of encoded data(data1)

//Bitwise XOR division in Receiver side
for(int i=0; i<=(length_data1-n);)
{
    for (int j=0 ; j<n; j++)
    {
        data1[i+j] = data1[i+j]==crc_g[j] ? '0' : '1';
    }
    while(i<length_data1 && data1[i]!='1')
    {
        i++;
    }
}

//Check if there is Error or Not and Print message accordingly
printf("\n\nFinal Answer is %s",data1);
printf("\n\nMessage is sent to the client.");

for(int i=0;i<length_data1;i++)
{
    if (data1[i]=='1')
    {
        char msg[256] = "Error in Communication! Can't proceed further:(";
        write(clientsocketfd , msg , sizeof(msg));
        break;
    }
}

```



```

if(connectionstatus == -1)
{
    printf("There was an error in the connection with server:( Try again!\n");
}

    char data[100], crc_g[100];

    printf("\n\tEnter Data  : ");
    scanf("%s",&data);
    printf("\n\tEnter CRC-G : ");
    scanf("%s",&crc_g);

    int n , length_data, length_new_data;
    char new_data[100];

    n = strlen(crc_g);//Length of CRC Generator
    length_data = strlen(data);//Length of Data

    strcat(new_data , data);

    //Append n-1 Zeros
    for(int i=1; i<=n-1; i++)
    {
        strcat(new_data , "0");
    }

    length_new_data = strlen(new_data);//Length of encoded data(data1)

    //Bitwise XOR Division in Sender side
    for(int i=0; i<=(length_new_data-n);)
    {
        for (int j=0 ; j<n; j++)
        {
            new_data[i+j] = new_data[i+j]==crc_g[j] ? '0' : '1';
        }
        while(i<length_new_data && new_data[i]!='1')
        {
            i++;
        }
    }

    //Now append last 3 bits to original data and proceed
    strncpy(new_data , &new_data[length_new_data - n +1] ,n);
    new_data[n]='\0';

```

```

char data1[100];
strcat(data1,data);
strcat(data1,new_data);
printf("\n\nData to be send to receiver is %s ",data1);

//Asking user to introduce error or not
printf("\n\nWant to introduce error in data1 before sending to receiver?
\nENTER 1 : for YES\nENTER 2 : for NO");
int choice;
int x;
printf("\n\tEnter Choice : ");
scanf("%d",&choice);

if(choice==1)
{
    printf("\n\n\tEnter the position of the bit to be change: ");
    scanf("%d" , &x);

    if(x<=length_new_data)
    {
        if(data1[x] == '1')
        {
            data1[x] = '0';
        }
        else
        {
            data1[x] = '1';
        }
    }

    printf("\n\n\tPROCESSING CHNAGED DATA...");

}
if(choice==2)
{
    printf("\n\n\tPROCESSING...");
}

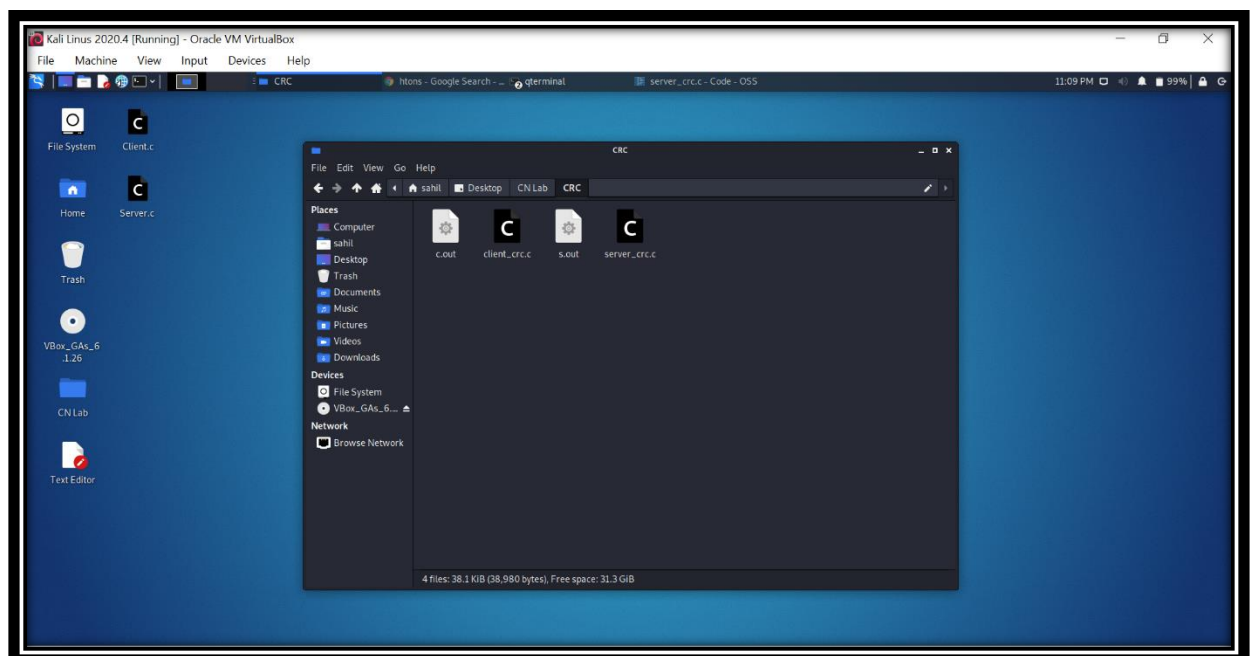
printf("\n");
write(socket_client, data1 , 100);
write(socket_client, crc_g , 100);
printf("\n");

char msg[256];
read(socket_client , msg , 256);
printf("\nMessage from the server is : %s",msg);
printf("\n");

```

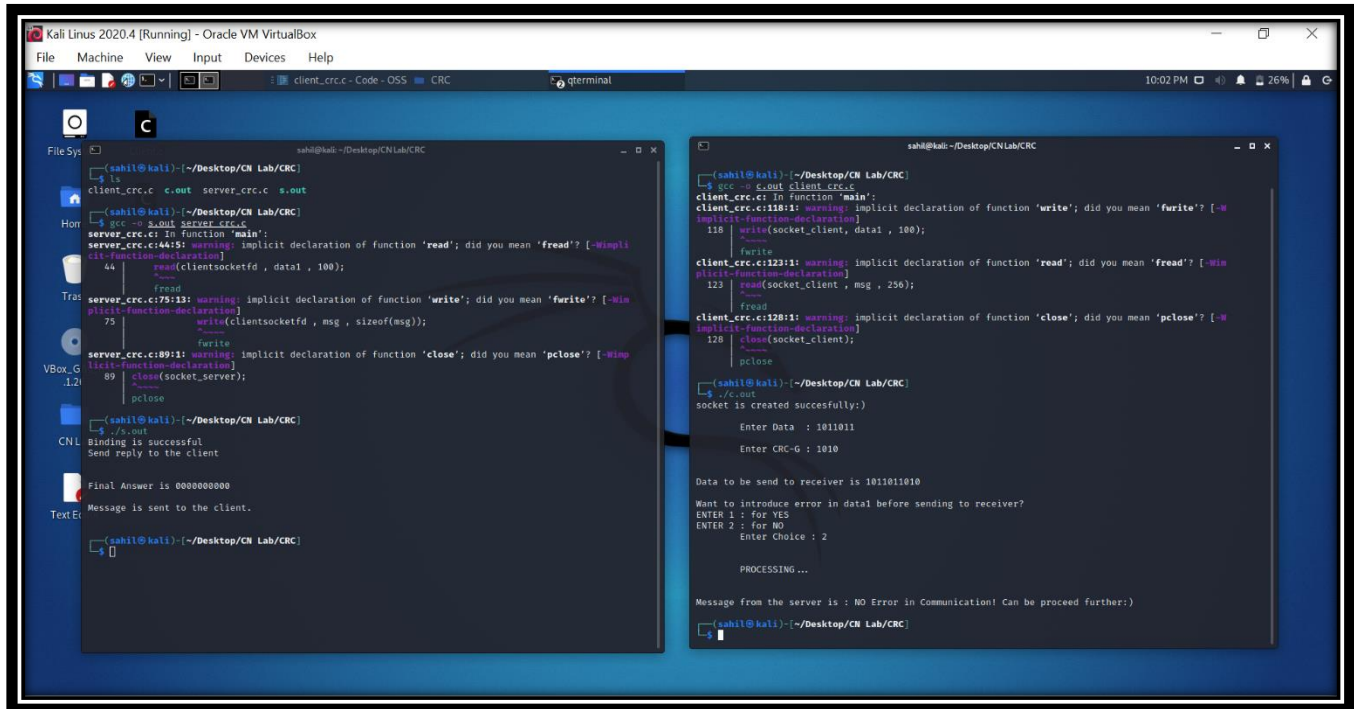
```
close(socket_client);  
  
return 0;  
  
}
```

File:



WITHOUT ERROR

Compiling and executing server.c and client.c



```
(sahil@kali) ~/Desktop/CN Lab/CRC
$ ls
client_crc.c  c.out  server_crc.c  s.out
(sahil@kali) ~/Desktop/CN Lab/CRC
$ gcc -o s.out server_crc.c
server_crc.c: In function 'main':
server_crc.c:44:15: warning: implicit declaration of function 'read'; did you mean 'fread'? [-Wimplicit-function-declaration]
44 | read(clientsocketfd, data1, 100);
   |       ^
server_crc.c:75:13: warning: implicit declaration of function 'write'; did you mean 'fwrite'? [-Wimplicit-function-declaration]
75 | write(clientsocketfd, msg, sizeof(msg));
   |     ^
server_crc.c:89:11: warning: implicit declaration of function 'close'; did you mean 'pclose'? [-Wimplicit-function-declaration]
89 | close(socket_server);
   |     ^
(sahil@kali) ~/Desktop/CN Lab/CRC
$ ./s.out
Binding is successful
Send reply to the client
Final Answer is 0000000000
Message is sent to the client.
(sahil@kali) ~/Desktop/CN Lab/CRC

(sahil@kali) ~/Desktop/CN Lab/CRC
$ gcc -o c.out client_crc.c
client_crc.c: In function 'main':
client_crc.c:118:11: warning: implicit declaration of function 'write'; did you mean 'fwrite'? [-Wimplicit-function-declaration]
118 | write(socket_client, data1, 100);
     |     ^
client_crc.c:123:11: warning: implicit declaration of function 'read'; did you mean 'fread'? [-Wimplicit-function-declaration]
123 | read(socket_client, msg, 256);
     |     ^
client_crc.c:128:11: warning: implicit declaration of function 'close'; did you mean 'pclose'? [-Wimplicit-function-declaration]
128 | close(socket_client);
     |     ^
(sahil@kali) ~/Desktop/CN Lab/CRC
$ ./c.out
socket is created successfully:
Enter Data : 1011011
Enter CRC-G : 1010

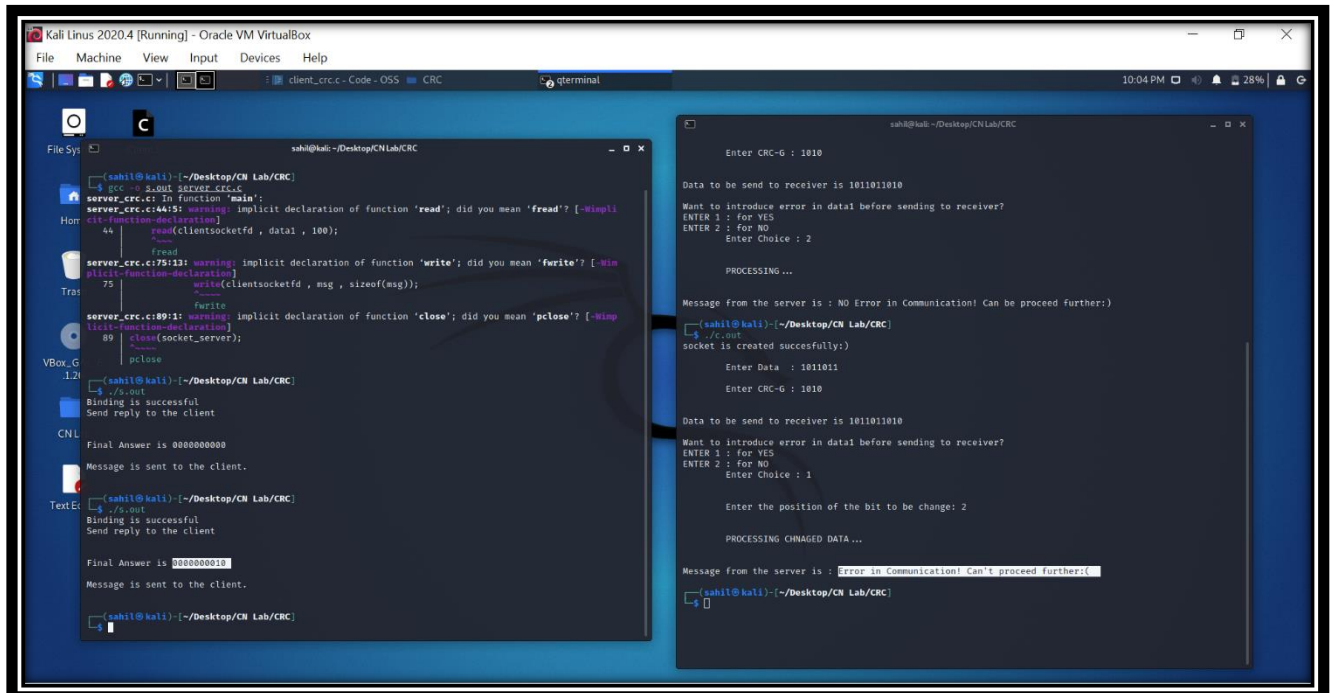
Data to be send to receiver is 1011011010
Want to introduce error in data1 before sending to receiver?
ENTER 1 : for YES
ENTER 2 : for NO
Enter Choice : 2

PROCESSING ...

Message from the server is : NO Error in Communication! Can be proceed further:)
(sahil@kali) ~/Desktop/CN Lab/CRC
```

WITH ERROR

Compiling and executing server.c and client.c



```
(sahil@kali) ~/Desktop/CN Lab/CRC
$ gcc -o s.out server_crc.c
server_crc.c: In function 'main':
server_crc.c:44:15: warning: implicit declaration of function 'read'; did you mean 'fread'? [-Wimplicit-function-declaration]
44 | read(clientsocketfd, data1, 100);
   |       ^
server_crc.c:75:13: warning: implicit declaration of function 'write'; did you mean 'fwrite'? [-Wimplicit-function-declaration]
75 | write(clientsocketfd, msg, sizeof(msg));
   |     ^
server_crc.c:89:11: warning: implicit declaration of function 'close'; did you mean 'pclose'? [-Wimplicit-function-declaration]
89 | close(socket_server);
   |     ^
(sahil@kali) ~/Desktop/CN Lab/CRC
$ ./s.out
Binding is successful
Send reply to the client
Final Answer is 0000000000
Message is sent to the client.
(sahil@kali) ~/Desktop/CN Lab/CRC

(sahil@kali) ~/Desktop/CN Lab/CRC
$ gcc -o c.out client_crc.c
client_crc.c: In function 'main':
client_crc.c:118:11: warning: implicit declaration of function 'write'; did you mean 'fwrite'? [-Wimplicit-function-declaration]
118 | write(socket_client, data1, 100);
     |     ^
client_crc.c:123:11: warning: implicit declaration of function 'read'; did you mean 'fread'? [-Wimplicit-function-declaration]
123 | read(socket_client, msg, 256);
     |     ^
client_crc.c:128:11: warning: implicit declaration of function 'close'; did you mean 'pclose'? [-Wimplicit-function-declaration]
128 | close(socket_client);
     |     ^
(sahil@kali) ~/Desktop/CN Lab/CRC
$ ./c.out
socket is created successfully:
Enter Data : 1011011
Enter CRC-G : 1010

Data to be send to receiver is 1011011010
Want to introduce error in data1 before sending to receiver?
ENTER 1 : for YES
ENTER 2 : for NO
Enter Choice : 1

Enter the position of the bit to be change: 2

PROCESSING CHANGED DATA ...

Message from the server is : Error in Communication! Can't proceed further:)
(sahil@kali) ~/Desktop/CN Lab/CRC
```