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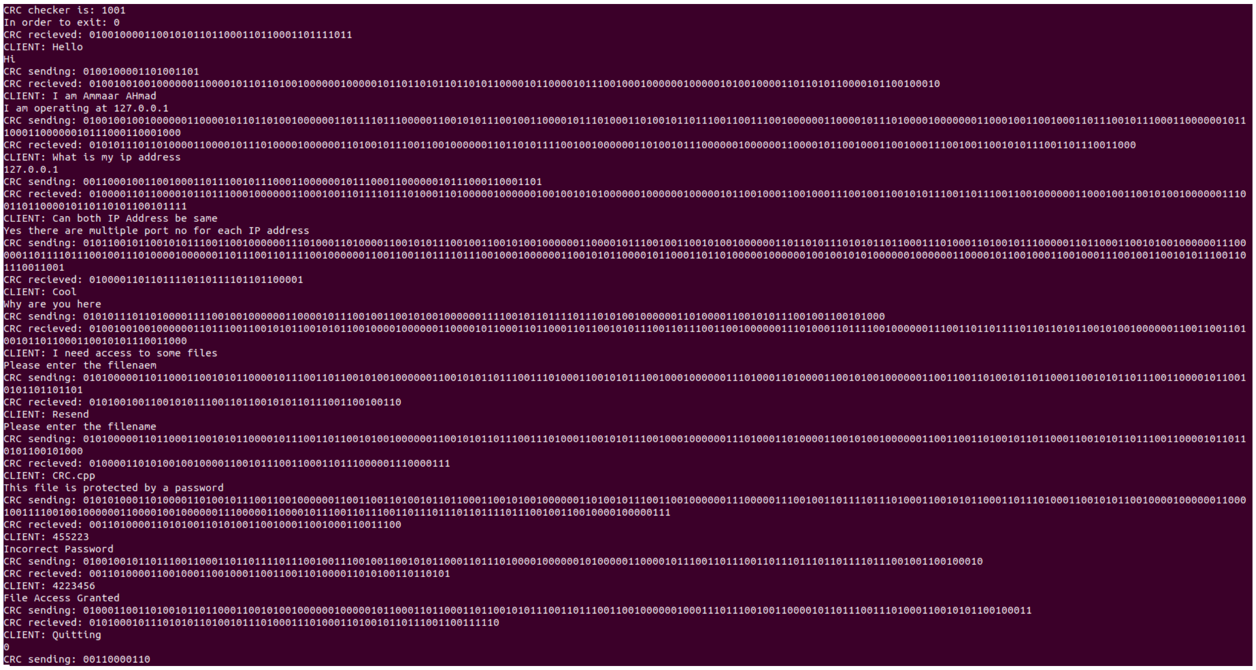
1. **Error detection using CRC checker**
   Filename: CRC.cpp
   Compile: g++ CRC.cpp -o CRC
   Run: ./CRC

```
(base) ammaar@ammaar-Aspire-A715-75G:~/Desktop/CS359 LAB/1801CS08_Assignment7$ g
++ CRC.cpp
(base) ammaar@ammaar-Aspire-A715-75G:~/Desktop/CS359 LAB/1801CS08_Assignment7$ .
/a.out
Enter the binary CRC checker
10001
Enter the binary string
1010001
Encoded string: 10100010100
Enter the bits to be flipped
15
No error: Remainder = 0000
(base) ammaar@ammaar-Aspire-A715-75G:~/Desktop/CS359 LAB/1801CS08_Assignment7$
```

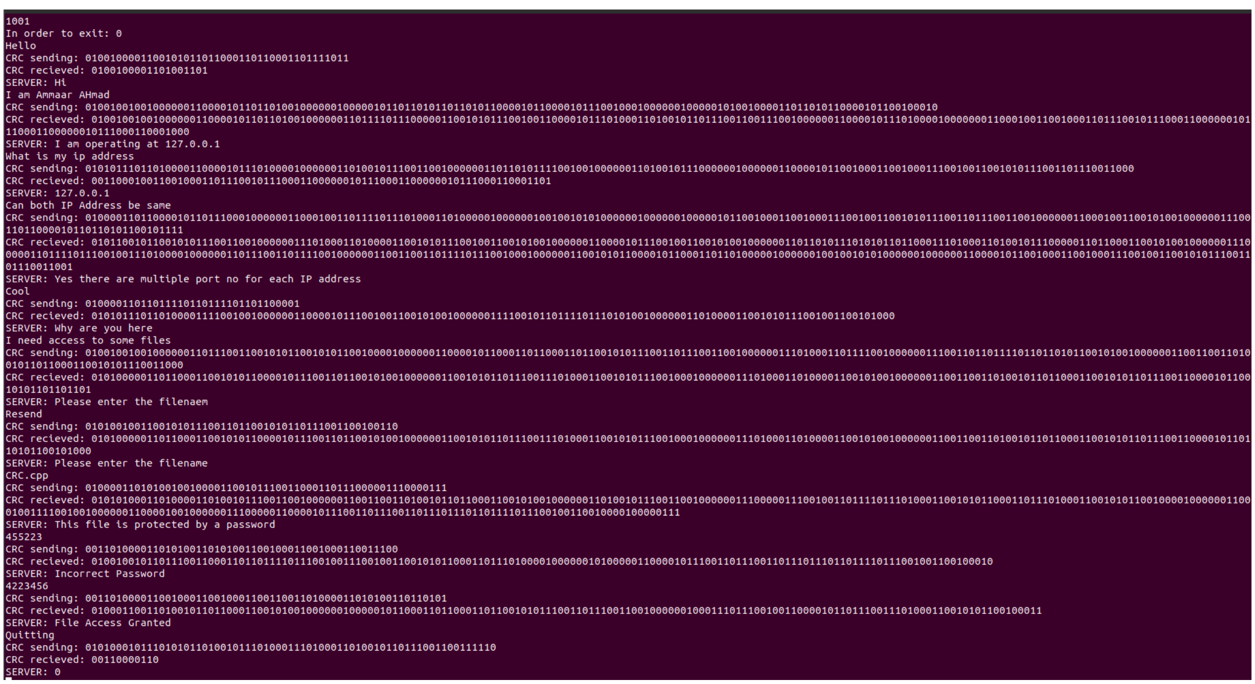
2. **Client and Server sending and receiving message encoded by CRC.**

   Server Program (This should be run first)
   Filename: server.cpp
   Compile: g++ server.cpp -o server
   Run: ./server

   Client Program(In another terminal)
   Filename: client.cpp
   Compile: g++ client.cpp -o client
   Run: ./client



```
CRC checker is: 1001
In order to exit: 0
CRC recieved: 01001000011001010110110001101100011011111011
CLIENT: Hello
Hi
CRC sending: 0100100001101001101
CRC recieved: 01001001001000000110000101101101001000000100000101101101011011010110000101100001011100100010000001000001010010000110101011000010110010001 0
CLIENT: I am Ammaar AHmad
I am operating at 127.0.0.1
CRC sending: 0100100100100000011000010110110100100000011011110111000000110010101110010011000010111010001101001011011100110011100100000011000010111010000100000001100010011001000110111001011100011000000101110001100000000101110001100010000
CRC recieved: 0101011101101000011000010111010000100000011010010111001100100000011011010111100100100000011010010111000000100000011000010110010001100100011100100110010101110011011100110011000
CLIENT: What is my ip address
127.0.0.1
CRC sending: 0011000100110010001101110010111000110000000101110001100000001011100011000110 1
CRC recieved: 010000110110000101101110001000000110001001101111011101000110100000100000010010010101000000100000010000010110010001100100011100100110010101110011011100110010000001100010011001010010000001110011011000010110110101100101111
CLIENT: Can both IP Address be same
Yes there are multiple port no for each IP address
CRC sending: 01011001011001010111001100100000011101000110100001100101011100100110010100100000011000010111001001100101001000000110110101110101011011000111010001101001011100000110110001100101001000000111000001101111011100100111010000100000011011100110111100100000011001100110111101110010001000000110010101100001011000110110100000100000010010010101000000100000011000010110010001100100011100100110010101110011011100111110011001
CRC recieved: 01000011011011110110111101101100001
CLIENT: Cool
Why are you here
CRC sending: 01010111011010000111100100100000011000010111001001100101001000000111100101101111011101010010000001101000011001010111001001100101000
CRC recieved: 010010010010000001101110011001010110010101100100001000000110000101100011011000110110010101110011011100110010000001110100011011110010000001110011011011110110110101100101001000000110011001101001011011000110010101110011000
CLIENT: I need access to some files
Please enter the filenaem
CRC sending: 01010000011011000110010101100001011100110110010100100000011001010110111001110100011001010111001000100000011101000110100001100101001000000110011001101001011011000110010101101110011000010110010101101101101
CRC recieved: 0101001001100101011100110110010101101110011001 00110
CLIENT: Resend
Please enter the filename
CRC sending: 01010000011011000110010101100001011100110110010100100000011001010110111001110100011001010111001000100000011101000110100001100101001000000110011001101001011011000110010101101110011000010110110101100101000
CRC recieved: 010000110101001001000011001011100110001101110000011100001 11
CLIENT: CRC.cpp
This file is protected by a password
CRC sending: 0101010001101000011010010111001100100000011001100110100101101100011001010010000001101001011100110010000001110000011100100110111101110100011001010110001101110100011001010110010000100000011000100111100100100000011000010010000001110000011000010111001101110011011101110110111101110010011001000000100000111
CRC recieved: 00110100001101010011010100110010001100100011001100
CLIENT: 455223
Incorrect Password
CRC sending: 010010010110111001100011011011110111001001110010011001010110001101110100001000000101000001100001011100110111001101110111011011110111001001100100010
CRC recieved: 0011010000110010001100100011001100110100001101010011 0110101
CLIENT: 4223456
File Access Granted
CRC sending: 0100011001101001011011000110010100100000010000010110001101100011011001010111001101110011001000000100011101110010011000010110111001110100011001010110010001 1
CRC recieved: 0101000101110101011010010111010001110100011010010110111001100111110
CLIENT: Quitting
0
CRC sending: 00110000110
```



```
1001
In order to exit: 0
Hello
CRC sending: 01001000011001010110110001101100011011111011
CRC recieved: 0100100001101001101
SERVER: Hi
I am Ammaar AHmad
CRC sending: 010010010010000001100001011011010010000001000001011011010110110101100001011000010111001000100000010000010100100001101101011000010110010001 0
CRC recieved: 0100100100100000011000010110110100100000011011110111000000110010101110010011000010111010001101001011011100110011100100000011000010111010000100000001100010011001000110111001011100011000000101110001100000000101110001100010000
SERVER: I am operating at 127.0.0.1
What is my ip address
CRC sending: 0101011101101000011000010111010000100000011010010111001100100000011011010111100100100000011010010111000000100000011000010110010001100100011100100110010101110011011100110011000
CRC recieved: 0011000100110010001101110010111000110000000101110001100000001011100011000110 1
SERVER: 127.0.0.1
Can both IP Address be same
CRC sending: 010000110110000101101110001000000110001001101111011101000110100000100000010010010101000000100000010000010110010001100100011100100110010101110011011100110010000001100010011001010010000001110011011000010110110101100101111
CRC recieved: 01011001011001010111001100100000011101000110100001100101011100100110010100100000011000010111001001100101001000000110110101110101011011000111010001101001011100000110110001100101001000000111000001101111011100100111010000100000011011100110111100100000011001100110111101110010001000000110010101100001011000110110100000100000010010010101000000100000011000010110010001100100011100100110010101110011011100111110011001
SERVER: Yes there are multiple port no for each IP address
Cool
CRC sending: 01000011011011110110111101101100001
CRC recieved: 01010111011010000111100100100000011000010111001001100101001000000111100101101111011101010010000001101000011001010111001001100101000
SERVER: Why are you here
I need access to some files
CRC sending: 010010010010000001101110011001010110010101100100001000000110000101100011011000110110010101110011011100110010000001110100011011110010000001110011011011110110110101100101001000000110011001101001011011000110010101110011000
CRC recieved: 01010000011011000110010101100001011100110110010100100000011001010110111001110100011001010111001000100000011101000110100001100101001000000110011001101001011011000110010101101110011000010110010101101101101
SERVER: Please enter the filenaem
Resend
CRC sending: 0101001001100101011100110110010101101110011001 00110
CRC recieved: 01010000011011000110010101100001011100110110010100100000011001010110111001110100011001010111001000100000011101000110100001100101001000000110011001101001011011000110010101101110011000010110110101100101000
SERVER: Please enter the filename
CRC.cpp
CRC sending: 010000110101001001000011001011100110001101110000011100001 11
CRC recieved: 0101010001101000011010010111001100100000011001100110100101101100011001010010000001101001011100110010000001110000011100100110111101110100011001010110001101110100011001010110010000100000011000100111100100100000011000010010000001110000011000010111001101110011011101110110111101110010011001000000100000111
SERVER: This file is protected by a password
455223
CRC sending: 00110100001101010011010100110010001100100011001100
CRC recieved: 010010010110111001100011011011110111001001110010011001010110001101110100001000000101000001100001011100110111001101110111011011110111001001100100010
SERVER: Incorrect Password
4223456
CRC sending: 0011010000110010001100100011001100110100001101010011 0110101
CRC recieved: 0100011001101001011011000110010100100000010000010110001101100011011001010111001101110011001000000100011101110010011000010110111001110100011001010110010001 1
SERVER: File Access Granted
Quitting
CRC sending: 0101000101110101011010010111010001110100011010010110111001100111110
CRC recieved: 00110000110
SERVER: 0
```

Assumption: Client send the CRC checker first followed by Initial message
This is one - one conversation

3. Wireshark Capture of packets transfer.
Condition: Keep Wifi or any internet connection off