

## Q1

Please See Readme for more Details about Q1.

## Q2.

# INTRODUCTION-

The question asked us to implement CRC (Cyclic Redundancy check) in C language. CRC algorithm is used to detect errors which can happen during transmission of messages in a network. In such a scenario, errors are difficult to detect because a client does not have the original message with it which was sent by the server.

# WHAT DOES THE CODE DO?

In the given code the server generates a string consisting of a sequence of bits randomly. This CRC algorithm is applied on this string. The original string along with the remainders obtained from the division process of the algorithm are sent to the client. When the client receives the above information, it applies the binary modulo 2 division to the received string and finds the remainder. If the string is transmitted correctly, the remainder is 0. If the remainder obtained was not zero, then it means that there was some error in transmission.

This algorithm is applied to the string in parts of 8 (each byte). When error is detected in a particular byte we can ask the server to resend only that byte instead of resending the complete string.

# ALGORITHM PSEUDO CODE-

```
Def bin_mod_2(input,key)-
    temp=input
    for i in [1..len(key)-1]:
        temp.add(0)
    remainder = perform_division(temp,key)
    input=input+remainder
    return input

// server side
Def CRC(input,key)-
    for i in range(len(input)-7):-
        resultstring+=bin_mod_2(input[i:i+8],key)
    send(resultstring)

// client side (for checking)
Def CRC(input,key)-
    for i in range(len(input)-7):-
        remainder=perform_division(input[i:i+8],key)
```

```

if(remainder is 0) -
    print("no error in byte number i")
else-
    print("error in byte number i")

```

## PARAMETERS-

Divisor used = "11001" length = 5

## CONCLUSION-

The client is able to detect errors in transmission by using CRC algorithm.

### Q3

#### ifconfig

```

enp1s0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether 3c:2c:30:c9:0e:df txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 29429 bytes 3051358 (3.0 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 29429 bytes 3051358 (3.0 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.29.171 netmask 255.255.255.0 broadcast 192.168.29.255
    inet6 fe80::3d4:7cb0:d2e9:5718 prefixlen 64 scopeid 0x20<link>
    inet6 2405:201:5001:2116:f54d:e28b:6ba6:4e22 prefixlen 64 scopeid 0x0
<global>
    inet6 2405:201:5001:2116:e426:a55e:ea15:ae1e prefixlen 64 scopeid 0x0
<global>
    ether 28:3a:4d:08:c1:8f txqueuelen 1000 (Ethernet)
    RX packets 1260974 bytes 1440773606 (1.4 GB)
    RX errors 0 dropped 653 overruns 0 frame 0
    TX packets 477128 bytes 137714933 (137.7 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

The ifconfig command shows both private IP as well as the public IP address, whereas the iplocation2.com shows only the public IP address. There are two IP address formats, IPv4 and IPv6. IPv4 is a 32-bit address whereas IPv6 is a 128-bit address.

**Traceroute [www.iitmandi.ac.in](http://www.iitmandi.ac.in)**

```
traceroute to www.titmandi.ac.in (204.197.248.190), 30 hops max, 60 byte packets
 1  reliance.reliance (192.168.29.1)  5.654 ms  5.537 ms  5.498 ms
 2  10.17.224.1 (10.17.224.1)  5.560 ms  5.785 ms  5.751 ms
 3  172.17.107.216 (172.17.107.216)  6.975 ms  10.931 ms  10.897 ms
 4  172.26.68.2 (172.26.68.2)  10.766 ms  10.730 ms  10.698 ms
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  103.198.140.62 (103.198.140.62)  '-7'  52.855 ms * *
11  49.45.4.103 (49.45.4.103)  '-9'  264.400 ms 49.45.4.85 (49.45.4.85)  '-9'  271.496 ms *
12  103.198.140.17 (103.198.140.17)  '-10'  262.098 ms 103.198.140.89 (103.198.140.89)  '-10'  260.026 ms 103.198.140.17 (103.198.140.17)  '-10'  276.183 ms
13  be4844.ccr41.lax05.atlas.cogentco.com (38.104.84.209)  '-10'  268.925 ms be4918.ccr41.lax05.atlas.cogentco.com (38.104.85.57)  '-10'  258.058 ms 260.324 ms
14  be3243.ccr41.lax01.atlas.cogentco.com (154.54.27.117)  '-11'  260.262 ms be3359.ccr42.lax01.atlas.cogentco.com (154.54.3.69)  '-11'  254.906 ms 253.885 ms
15  be2931.ccr31.phx01.atlas.cogentco.com (154.54.44.85)  '-12'  270.514 ms 269.286 ms be2932.ccr32.phx01.atlas.cogentco.com (154.54.45.161)  '-12'  271.083 ms
16  be2930.ccr21.elp01.atlas.cogentco.com (154.54.42.78)  '-13'  293.172 ms 288.999 ms be2929.ccr21.elp01.atlas.cogentco.com (154.54.42.66)  '-13'  313.370 ms
17  be2928.ccr42.lah01.atlas.cogentco.com (154.54.30.161)  '-14'  313.279 ms 313.221 ms 313.167 ms
18  be2690.ccr42.atl01.atlas.cogentco.com (154.54.28.129)  '-14'  313.084 ms be2687.ccr41.atl01.atlas.cogentco.com (154.54.28.69)  '-14'  313.059 ms 312.976 ms
19  be3370.agr21.atl01.atlas.cogentco.com (154.54.7.54)  '-15'  312.952 ms be3373.agr22.atl01.atlas.cogentco.com (154.54.44.78)  '-16'  312.872 ms be3370.agr21.atl01.atlas.cogentco.com (154.54.7.54)  '-15'  312.820 ms
20  te0-0-1-3.nr11.b000122-0.atl01.atlas.cogentco.com (154.24.31.30)  '-17'  312.767 ms te0-0-1-0.nr11.b000122-0.atl01.atlas.cogentco.com (154.24.31.26)  '-17'  312.715 ms 312.663 ms
21  te0-0-2-0.nr11.b000122-15.atl01.atlas.cogentco.com (154.24.53.206)  '-17'  312.588 ms te0-0-2-3.nr11.b000122-15.atl01.atlas.cogentco.com (154.24.53.210)  '-18'  280.945 ms te0-0-2-0.nr11.b000122-15.atl01.atlas.cogentco.com (154.24.53.206)  '-17'  447.410 ms
22  38.140.168.146 (38.140.168.146)  '-18'  383.527 ms 383.476 ms 382.878 ms
23  border2.ae2-bbnet2.acs.pnap.net (64.94.0.93)  '-18'  383.226 ms 383.204 ms border2.ae1-bbnet1.acs.pnap.net (64.94.0.5)  '-18'  383.280 ms
24  knowhost-3.satedge1.acs.pnap.net (64.94.2.46)  '-19'  383.142 ms knowhost-3.satedge2.acs.pnap.net (64.94.3.94)  '-20'  383.204 ms knowhost-3.satedge1.acs.pnap.net (64.94.2.46)  '-19'  383.182 ms
25  acs-ric1-cr1.privatesystems.net (64.74.203.241)  '-21'  383.062 ms acs-ric10-cr2.privatesystems.net (64.74.203.242)  '-20'  383.040 ms acs-ric1-cr1.privatesystems.net (64.74.203.241)  '-21'  383.019 ms
26  v236-ga.privatesystems.net (64.74.201.36)  '-22'  382.997 ms 383.073 ms 374.085 ms
27  * * *
28  * * *
29  * * *
30  * * *
```

IP	Geographical Location
192.168.1.1	Private IP Class C
10.17.224.1	Private IP Class A
172.17.107.216	Private IP Class B
172.26.68.2	Private IP Class B
103.198.140.62	Singapore
49.45.4.103	Mumbai
49.45.4.85	Mumbai
103.198.140.17	Singapore
38.104.84.209	California
38.104.85.57	California
154.54.27.117	California
154.54.44.85	Arizona
154.54.42.78	El Paso
154.54.30.161	Houston
154.54.28.129	Atlanta

154.54.7.54	Atlanta
154.24.31.30	Atlanta
154.24.53.206	Atlanta
154.24.53.210	Atlanta
38.140.168.146	Atlanta
64.94.0.93	Americus
64.74.203.241	Atlanta
64.74.201.36	Atlanta