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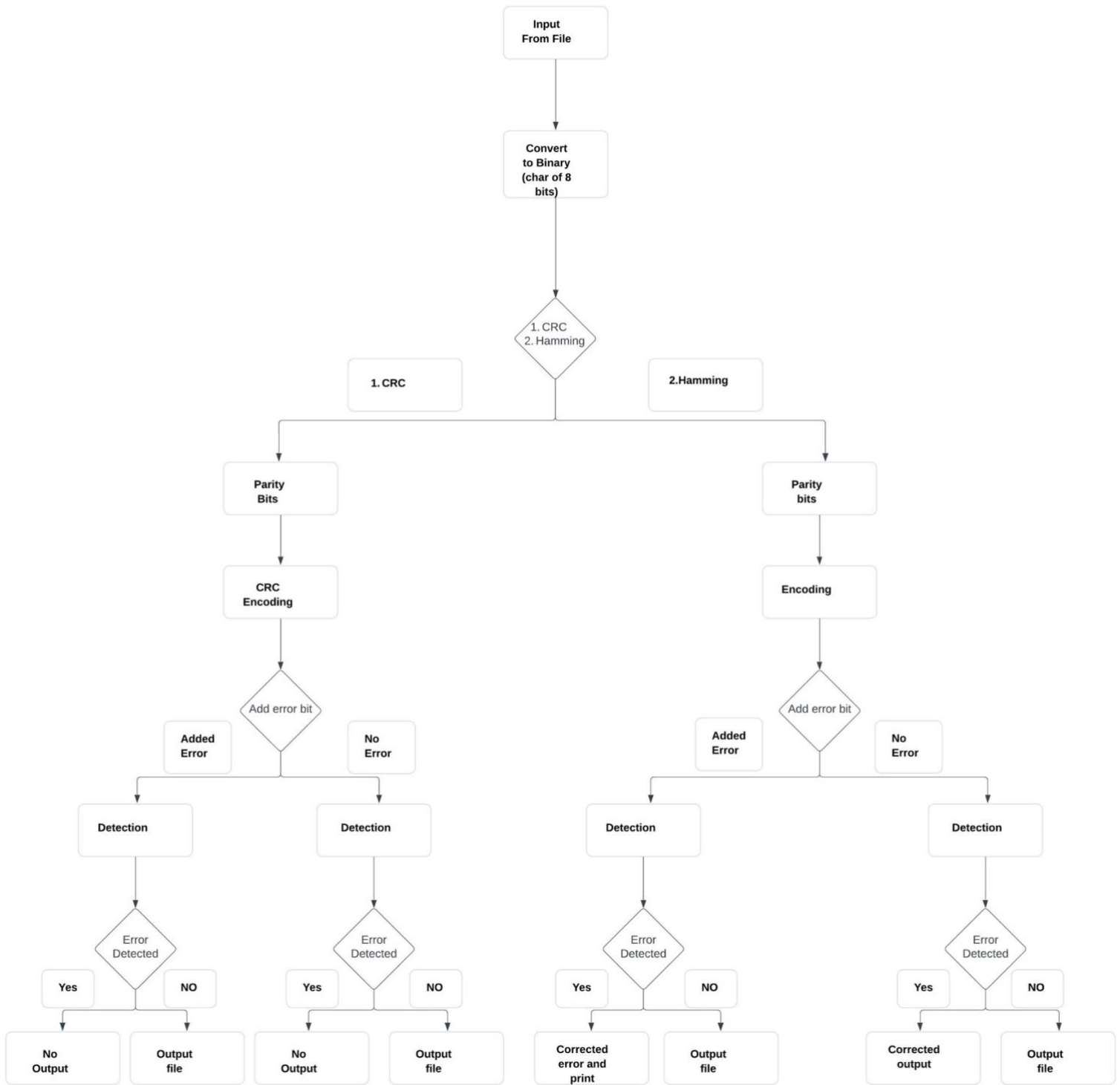
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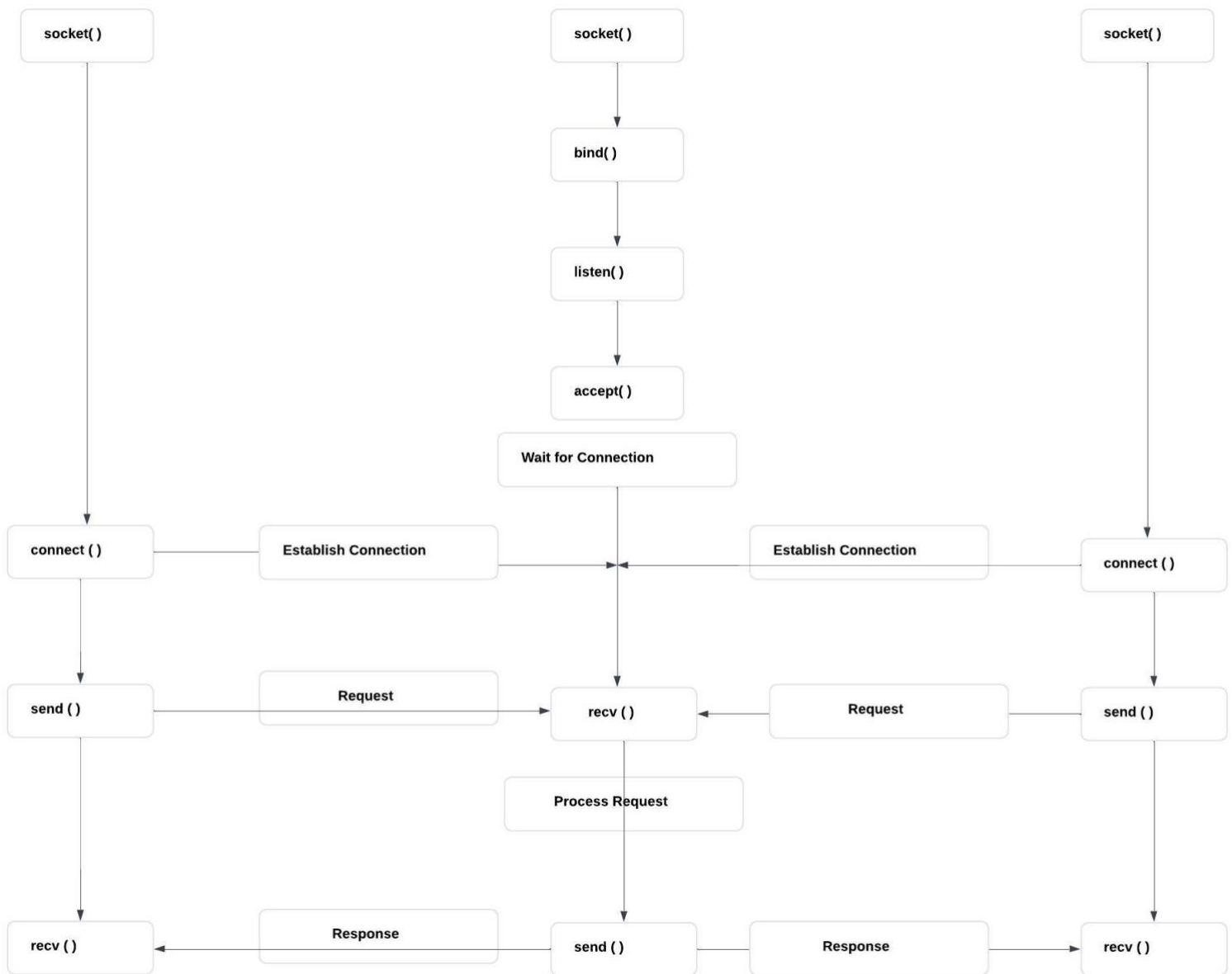
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System Documentation

i. High-level data flow diagram for CRC and Hamming



ii. High-level data flow diagram for Client/Server Application



iii. List or routines and their brief description

a) `#include<sys/wait.h>` :

Used to implement wait while using fork processes

b) `pipe()` :

Creates a pipe that can be used for inter-process communication

c) `fork()` :

It is a system used to create parent and child processes.

iv. Implementation Details

Server to client communication established with multiple clients chat system. It includes encode and decode system. It store the output in the files. CRC and hamming will take user inputs for detection and correction accordingly. Client Server makes socket communication and uses threads top handle multiple clients at a time which helps building the chat system where clients communicate to each other with respect to their socket ids.

Test Documentation

i) How you tested your program

Source code represents the part of process that contains the programming language itself. You may use a text editor to write your source code file. A compiler will be used to produce a machine representation of your source code. Such representation may show your code as hexadecimal or binary formats. The resulting hexadecimal code will contain combinations of numbers such 1 3 5 8 2 4 6 9 12 21 13 31 14 41 15 51 16 61 17 71 18 81 19 91 100 or combinations of characters and numbers such as 1A3B4C0DEFA, for example.

Joke:

McAfee-Question: Is Windows a virus?

No, Windows is not a virus. Here's what viruses do:

- 1. They replicate quickly-okay, Windows does that.**
- 2. Viruses use up valuable system resources, slowing down the system as they do so-okay, Windows does that.**
- 3. Viruses will, from time to time, trash your hard disk-okay, Windows does that too.**
- 4. Viruses are usually carried, unknown to the user, along with valuable programs and systems. Sign... Windows does that, too.**
- 5. Viruses will occasionally make the user suspect their system is too slow (see 2.) and the user will buy new hardware. Yup, that's with Windows, too.**

Until now it seems Windows is a virus but there are fundamental differences: Viruses are well supported by their authors, are running on most systems, their program code is fast, compact and efficient and they tend to become more sophisticated as they mature.

So, Windows is not a virus. It's a bug.

- ii) List of your test sets including the results obtained by each set**
- iii) Source code represents the part of process that contains the programming**
- iv) language itself. You may use a text editor to write your source code file. A compiler will be used**
- v) to produce a machine representation of your source code. Such**
- vi) representation may show your code as hexadecimal or**
- vii) binary formats. The resulting hexadecimal code will contain combinations of numbers such 1 3 5**

viii) 8 2 4 6 9 12 21 13 31 14 41 15 51 16 61 17 71 18 81 19 91 100 or

ix) combinations of characters and numbers such as 1A3B4C0DEFA, for example.

x) Joke:

xi) McAfee-Question: Is Windows a virus?

xii) No, Windows is not a virus. Here's what viruses do:

xiii) 1. They replicate quickly-okay, Windows does that.

xiv) 2. Viruses use up valuable system resources, slowing down the system as they do so-okay,

xv) Windows does that.

xvi) 3. Viruses will, from time to time, trash your hard disk-okay, Windows does that too.

xvii) 4. Viruses are usually carried, unknown to the user, along with valuable programs and

xviii) systems. Sign... Windows does that, too.

xix) 5. Viruses will occasionally make the user suspect their system is too slow (see 2.) and the

xx) user will buy new hardware. Yup, that's with Windows, too.

xxi) Until now it seems Windows is a virus but there are fundamental differences:

xxii) Viruses are well supported by their authors, are running on most systems, their program

xxiii) code is fast, compact and efficient and they tend to become more sophisticated as they

xxiv) mature.

xxv) So, Windows is not a virus. It's a bug.

User Documentation

i) How to run your program

All the required files are in the '*CSI500_Project2_SravyaVaddi.zip*' folder.

1. Open system terminal
2. Give the following commands :
gcc crc_hamming.c -o crc_hamming
./crc_hamming
gcc server.c -o server
./server
gcc client.c -o client
./client

If the execution of ./server looks incomplete or quits directly change the port value in both server.c and client.c files to its next value.

ii) Describe any parameters

Encode and Decode tag values are missed in the execution.

Outputs:

```
kishoremuchintala@Kishores-MBP OS % ./crc_hamming
```

Joke:

McAfee-Question: Is Windows a virus?

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1. They replicate quickly-okay, Windows does that.
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So, Windows is not a virus. It's a bug.

```
Padded :010010100110111101101011011001010011101000001010010011010110001101000001011001100110010101100101001011010101000
1011101010110010101110011011101000110100101101111011011000111010001000000100100101110011001000000101011101101001011011
1001100100011011110111011101110011001000000110000100100000011101100110100101110010011101010111001100111110000101001001
1100110111100101100001000000101011101101001011011100110010001101111011101110011001000000110100101110011001000000110
111001101111011101000010000001100001001000000111011001101001011100100111010101110011001000000100100001100101011
10010011001010010011101110011001000000111011101101000011000010111010000100000011101100110100101110010011101010111001101
10010101110011001000000110010001101111001110100000101000110001001011100010000001010001101000110010101111001001000000
11100100110010101110000011011000110100101100011011000010111010001100101001000000111000101110101011010010110001101101011
01101100011110010010110101101111011010110000101111001001011000010000001010111011010010110111001100100011011110111011
1011100110010000001100100011011110110010101110011001000000111010001101000011000010111010000101000110010001011
1000100000010101100110100101110010011101010111001101100101011100110010000001110101011100101001000000111010101110
000001000000111011001100001011011000111010101100001011000110010100100000011100110111100101110011011101000110
01010110110100100000011100100110010101110011011011110111010101110010011000110110010101110011001011000010000001110011011
011000110111101110111011010010110111001100100000011001000110111101110111011100010000001110100011010000110010100
1000000111001101111001011100110111010001100101011101100100000011101000110100001100101011110010
```


CRC Outputs:

```
01101100001000000111001101110101110000011100000110111101110010011101001100100001000000110001001110010010000
00111010001101000011001010110100101110010001000000110000101101010111010001101111011100100111001100101100001000
0001100001011100100110010100100000011100100111010101110011011100110010010111001100110010000001101110110111000100
00001011010101111011100110111010000100000011100110111001101110100011001010111001100110001000000111
01000101000001100101011010011100100010000001110000011001001101110110011001100110000101011000011011
01111011001000110010100100000011001011100110010000001100110011000010110011011100001011000010000001100011011011101
101101011100000110000101100011011101000010000001100010111001100100001000000110010101100110011001011000110
1101001011001010111001110100001000000110000101101110011001000010000001110100011010000110010101110010010000001110100
0110010101101110011001000010000001110100010111100100000011000100110010101100011011011101101100101001000000110110
1011011110110010011001010010000001110011011101110110000011010000110100011100110110100011010000110110000101101
000110010101100100001000000110000101110011001000000111010001101000011001010111001000010110100010111010001110
101011001001100101001011100000101010011011100110000100000010101110100101100110011001000110111011101110111
0011001000000110100011100110010000001101110011011101110100001000000110001001000000111011001100010111001001101011
100110010111000100000010010010111010001001110111001100100000011000010010000001100010011101010110011100000101000
00000000000000000000000000000000
Please provide 1 for CRC and 2 for Hamming:1
Your crc_checksum encoding is:
010010011011101101101101101001101100000101001001101011000110100000101100110011001010110010100010111010
1011001010111001101110100001101000110100010000001001001011100110010000001010110110100101101110011001
00011011110111011101110011001000000110000100100000011101100110100101110010011101011100110011111000010100100111001101
11100101100010000001010111011001011011100110010001101110111011100110010000001010001110011001000000011011100110
1111011101000010000001100001001000000111011001101001011100100111001011100110010111000100000010010000110010101110010011
001010010011101110011001000000110111011001000001101100110100101110011010010111001101110011011100110110010101
110011001000000110010001101111001110100000101000110001001011100010000001010100011010000110010111100100100000011100100
11001010111000001101100011010011000110110000101110001100100100010000001110001011101011010010110001101101011011001100
011110010010101011101110110110110000101110010010110000100000010101110110100101101110011001000110111011101110011001
10010000001100100011011101100101011100110010000001110100011010000110000101110100001011000010110001000110001000
00010101100101001011100100111010101110011011001010010011001100100100100000011101010111000000110010111000000100
000011011001100001011100011010101100001011000100110110001100100110000001100010111000110001000100101100
110100100000011100100110010101110011011011011011001001100011011001011100110010110000100000011001101101100011
0111101110111011011001011100110010000001100100011011101110111001110000100000011010001101000110010000001
110011011100101110011011101000110010101110110010000001100001011100110010000001101000110100011001000000
110010001101110010000001110011011011100101100110111011001011100001011100100101100000010100101110110100101101110
011001000110111011101110111001100100000011001000110111011001011100110010000001101000110100001100001011101000010111
000001010001100110010111000100000010101100110100101110010011100110110010111001100100000111011101101001011011
```

```
1111011011110010000001110011011100011011110111011100100000010100001110011011001010110010100100000011001000101110001
01001001000000110000101101110011001000010000001110100011010000110010100001010011101010111001101100101011100100010000001
11011101101001011011000110110000100000011000100111010101110010010000011011100110010101110111001000001101000011000010
1110010011001000111011101100010111001001100101011100010000001011001011101010111000000101100001000000111010001101000
0110000101110100000000000000000000001110011001000000110110110010111010001101000001010111011010010110111
001100100010111101101110111001100110000100000011101000110111011100101110000101001010111001110100011010
01011011000010000001101110011011101110011001000000110100101110100001000000111001101100101011001010111001100100
00001010111011010010110111001100100011011101110111001100100000011010010111001100100000011001100110
100101110010011101010111001100100000011000100111010001100100000011010001101000011001001100100000011
00001011100100110010100100000011001100110101011100110010001100001011011001010111001110100011000010110110000
1000000110010001101001011001100110011001100100101110111001100001101100110011001100110011001100110011001100
1101001011100100111010111100110110010101110011001000000110000101110010011001001000000110111011001010110110001101100
0010000001110011011101011100000111000001101111011100100111010001100101011001000010000001100100111001001000000111010
00110100000110010101101001011100100010000001100001011101010111010001101000011011101110010011100110010110000100000011000
0101110010011001010010000001110010111010111001101110011010010111001100110010000001101111011100010000001101
10101111101110011001101100001000000111001011110010111001100101011101011100110011000010000001101000110
100001100101011010001110010001000000111000001110010011011101110011001100100110000101000110110111011
00100011001010010000001101001011100110010000001100110011000010111001101110100001011001101110110101
11000001100001011000110111010000100000011000010111001100100001000000110010101100110011001100110100101
11001010111001110100001000000110000101101110011001000010000001110100011010000110010111001001000000111010001100101
011011100110010000100000011101000110111100100000110001001100101110111011011011011001001000000110110110111
10111001001100101001000000111001101110111011100000110100001101000110100011010000110110000101110100011001
01011001000010000001100001011100110010000001101000110100001100101011100100001011101000011011000111010101110
01001100101001011100000101001010011011100101100001000000101110110100101100110010001101110111011100110010
000001101001011100110010000001101110011011101101000010000001100001001000000111011001101001011100110011001
0111000100000010010011110100001001110111001100100000011000010010000001100110011010010111001100110011001
11001010000001010010
```

Would you like to insert an error bit 1) Yes or 2) No:1

Error bit inserted at position 4:

Error in data

Return Status from CRC is : 0%

kishoremuchintala@Kishores-MBP OS %



[illegible]

Hamming Outputs :

```

1010110011010010111001001110101011100110110010101110011001000000110000101110010011001010010000001101110110010101101100
011011000010000000111001011011010101110000011100000110111011010011101000110010101101000100000
0011100001010000110010101100101110010001000001100001011101011010001100110011001100001000
000110000101110010011001010000001100100111010101110011011001010010110110011001100100000010111101101110001001
0000101101010101111011100101110100001000000111001101110010111001000110010101101011001100101100001000000111
01000110100001010010101101001111001000100000011100000110010011011101100110110010000100001011011000001001100001001
01111011001000110011001000000110010111001100100000011001011000001110010111000001010000100000010110111011101
101101011100000110000101100011011101000010000001100010110111001100100001000001100101100110011001100101011000110
110100101100101011100111010000100000011000010111011001100100001000000110100011001011100100100000011101001
0110010101101110011001000010000001110100010111001000000110001001100101011000110111011011001001000000101101
10110111011100100011001010010000001100110110111011100000110100001101000110110100011010001101100001011101
00011001010110010000100000011000010110011001000000111001001101000011001011100100001011101000011011100001110
1011110010011001010010111000001010010101101110011001100100000110000100100000011000100111010110011100101110000101000
0011001000000110100101110011001000001101110011011101110100001000000110001001000000110110011010010111001001110101011
10011001011100010000001001001011101000010011101110011001000000110000100100000011000100111010110011100101110000101000
00000000000000000000000000000000
Please provide 1 for CRC and 2 for Hamming:2
parity bits :13
pp0p100p1010011p011110110101101p10010100111010000010100101101p11000110100000101100110011001010110010100101101010001
01110101p01100101011100110111010001101001011011110110111000111010001000000100100101110011001000000101011101101001011011
1001100100010111p10111011101100110010000001100001010000000110110011010011100100011010101110010011101000110100101
11001101111000101100010100001000000101110101001011011100110011001100100000010100111001110010100000011
01110011011110111010000100000011000p01001000000111011001101001011100100111010101110011001011100010000001001000011001010
1110010011001010010011101110011001000000111011101101000011000010111010000100000011011001100100111010101100111
011001010110011001000000110010001101110011011000001010001100100010010010000001100010111010101100101100101100111
1101101100011110010001011010111011010110110000101110010010110000100p0000010111011010010110111001100100011011110111
011101110011001100100000110010001111011100101110011001000000111010001011100001011100000101110000011000110010001
0111000100000010101100101110010111001011100110010100101011100110010000001101010111001101001001000000111010101
1100000010000001110110011000010110110001110101011000010110001001100100101100010011100101110010111001011101000
110010101101010010000001110010011001011100110111001110111011011100110011000110001100011100011000000001110011
011011000110111101101110101001010110011001100100000011001000110111011011101101110010000000111010001101000110010
1001000000011100110111100101110011001010110110100100000110000101110011001000000111010011010001100101110
010010000011001000011100110010000011001101111001011011011101101101101101100101100000101101011101101
010110111100110010001101110110111011100110010000001100100011011101101110110111001000000111010001101000110010
100100000011100110111100101110011001010110110100100000110000101110011001000000111010011010001100101110
0100100000110010000111001100100000110011011110010110110111011011011011011001011100100000101101011101101
0101101111001100100011011101101110111001100100000011001000110111011001011100110010000001110100011010000100001011

```

```
010000001100001011100100110010100100000011100100111010110111001101110011010010110111001100111001000000110111101101110
0010000000110110101101111011100110111010000100000011100110111100101110011011101000110010110110001010000
001110100011010000110010101100111100100000001110000110111101100110000110000110000110000110000110000
11011011110110010000110010100100000011010010111001100100000011100110111011000011000010000001100011011011
111011011010111000001100001011000110111010000100000011000010110111001100100001000000110010101100110011001100110010010110
0011011010010110010101101110011101000010000001100001011011100110010000100000011101000110100001100101011100100100000011
1010001100101011011100110010000100000011101000110111001000000110001001100101011000110110110110110010100100000001
101101011011101110010011001010010000001100110110111101100000110100001101001101101101100011011000011011000011
1110100011001011001000010000001100001011100110010000001110100110100001100101011100100001010011010110000011101100
01110101011100100110010100101110000010100101001101101111001011000010000001010111011010010110111001100100011011110111011
10111001100100000011010010111001100100000011011100110111011010000100000011000010010000001101100110100101110010011101
0111100110010111000100000010010010111010000100110110011001100100001100001001000000110001001110101011001110010011101
010
```

Would you like to insert an error bit 1) Yes or 2) No:1

```
Provide a bit position to manipulate and generate error: 9
```

Before Manipulation: 0

After Manupation: 1

```
parity bits :13
```

[illegible]

```
01100011011000010000001110011011101011100000110000011011110111001001110100011001010110010000100000011000100111100100
10000001110100011010000110010101101001011100100010000001100001011101010111010001101000011011110111001001110011001011000
010000001100001011100100110010100100000011100100111010101110011011001101001011011100110011001000000110111101101110
001000000110110101101111011100110111010000100000011100110111100101110011011101000110010101101101110011001011000010000
00111010001101000011001010110100101110010001000000111000001110010011011110110011011100100110000010110110100001010011000
11011011110110010001100101001000000110100101110011001000000110011001100001011100110111010000101100001000000110001101101
1110110110101110000011000010111001101101000010000001100001011100110010000100000011001010110011001100110011010010110
00110110100101100101011100111010000100000011000010110111001100100001000000111010001101000011001010111100100100000011
101000110010101101110011001000010000001110100011011110010000001100010011001010110001101111011101101101011001010010000001
101101011011110111001001100101001000000110011011011110111000001101000011001011100110111010001101100011011000010
111010001100101011001000010000001100001011100110010000001110100011010000110010101111001000010100110110110000101110100
01110101011100100110010100101110000010100101001101101111001011000010000001010111011010010110111001100100011011110111011
10111001100100000011010010111001100100000011011100110111101110100001000000110000100100000011101100110100101110010011101
01011100110010111001000000100100101110100001001110111001100100000011000010010000001100010011101011001110010111000001
010
Bit :9 is Manipulated
```

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So, Windows is not a virus. It's a bug.



kishoremuchintala@Kishores-MBP OS %

```
10100101101110011001000110111101110111001100101100001000000111010001101111011110010111000001010010101011011100
111010001101001011011000010000001101110011011101110011001000000110100101101000010000001110011011001010110010101101101
01110011001000000101011101101001011011100110010001101110111011100110010000001101001011100110010000001100010010000
0011101100110100101110010011101010111001100100000011001001110101011101000010000001110100011010000110010101110010011001
0100100000011000010111001001100101001000000110011001110101011100110010000110000101101101100101011011100111010001100
001011011000010000001100100011010010110011001100110010101110011000110010101110011000110110011001110100000
10100101011001100100111001101001110010101110011001001000000110000101110010011001010010000000111011101100101011
01100011011000010000001110011011101010111000001110000011011110111001001110100011001010110010000100000011000100111100100
100000011101000110100001100101011101001011100100010000001100001011101010111010001101110111001001110011001011000
010000001100001011100100110010100100000011100100111010101110011011001101001011011100110011001000000110111101101110
001000000110110101111011100110111010000100000011100110111100101110011011101000110010101110011001011000010000
00111010000110100001100101011101001011100100010000001110000011100100110111101100110111001100110011001100011000
11011011110110010001100101001000000110100101110011001000000110011001100001011100110111010000101100001101101
111011011010111000001100001011000110111010000100000011000010111001100100001000000110010101100110011010010110
0011011010010110010101110011101000010000001100001011100110010000100000011101000110100001100101011100100100000011
101000110010101110011001000010000001110100011011110010000001100010011001010110001101110111011011001010010000001
10110101101111011100100110010100100000011001101110111000001101000110100011001011100110110011011000010
111010001100101110010000100000011000010111001100100000011010001101000011001010111100100001010011011000010
0111010101110010011001010010111000001010010100110110111001011000010000001010111011010010110111001100100011011110111011
10111001100100000011010010111001100100000011011100110111011010000100000011000010010000001101100110100101110010011101
010111001100101110001000000100100101110100001001110111001100100000011000010010000001100010011101011001110010111000001
010
```

Would you like to insert an error bit 1) Yes or 2) No:2

Opted for NO ERROR INSERTION

parity bits :13

```
pp0p100p10011p01111011010110p1001010011101000001010010011010p110001101000001011001100110010101001010101010001
01110101p01100101011100110111010001101001011011110110111000111010001000000100100101110011001000000101011101101001011011
10011001000110111p0111011101110011001000000110000100100000011101100110100101110010011101010111001100111111000010100100
1110011011110010110000100000010101110110100110111001100100011011101110111001100100000011010010111001100100000011
0111001101111011010000100000011000p01011000000111011001101001011100111010011101001110011001110001000000101000011001010
1110010011001010010011101110011001000000111011101100001100001011101000010000001110110011010010111001001110101110011
01100101011100110010000001100100011011110011010000101000110000100100011001000110010101110010010000
```

Client/Server Outputs :

```
server.c
66 if (strcmp(data, "LOGIN") == 0){
67     }
68 }
69 }
70 return NULL;
71 }
72 }
73 }
74 int main() {

kishore@kishore-VirtualBox: ~/Downloads/OS(1)/OS
kishore@kishore-VirtualBox:~/Downloads/OS(1)/OS$ ./client
Connection established .....
Message from client 1 : here i am
LOGIN_LIST
Client 1 is at socket 4.
MSG 1 here i am

kishore@kishore-VirtualBox:~/Downloads/OS(1)/OS$ ./client
Connection established .....
LOGIN_LIST
Client 2 is at socket 5.
MSG 2 here i am
Message from client 2 : here i am

server.c: In function 'doNetworking':
server.c:61:79: warning: '%s' directive output may
23 bytes into a region of size between 966 and 976
61 | fprintf(buffer, sizeof(char) * 1000, "Message
d,data);
|
server.c:61:13: note: 'sprintf' output between 26 and 1059 bytes into a destina
tion of size 1000
61 | sprintf(buffer, sizeof(char) * 1000, "Message from client
%d : %s", clientid,data);
|

kishore@kishore-VirtualBox:~/Downloads/OS(1)/OS$ gcc client.c -o client
kishore@kishore-VirtualBox:~/Downloads/OS(1)/OS$ ./server
Server started listening on port 8080 .....
Client 1 connected.
Client 2 connected.

here i am
here i am
```