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What Is Cyclic Redundancy Check (CRC), and It's Role in Checking Error

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With the increase in data transactions over multiple network channels, "data error" has become common. Due to external or internal interferences, the data to be transmitted becomes corrupted or damaged, which leads to the loss of sensitive information.

To overcome such a situation and determine whether our data is damaged or not, error detection

methods are used, one of which we will be discussing in this article on "What is Cyclic Redundancy Check (CRC)?".

What Is a Cyclic Redundancy Check (CRC)?

The CRC is a network method designed to detect errors in the data and information transmitted over the network. This is performed by performing a binary solution on the transmitted data at the sender's side and verifying the same at the receiver's side.

The term CRC is used to describe this method because Check represents the "data verification," Redundancy refers to the "recheck method," and Cyclic points to the "algorithmic formula."

Now that we are aware about CRC, let's look into some terms and conditions related to the CRC method.

CRC Terms and Attributes

As discussed in the previous section, CRC is performed both at the sender and the receiver side. CRC applies the CRC Generator and CRC Checker at the sender and receiver sides, respectively.

The CRC is a complex algorithm derived from the CHECKSUM error detection algorithm, using the MODULO algorithm as the basis of operation. It is based on the value of polynomial coefficients in binary format for performing the calculations.

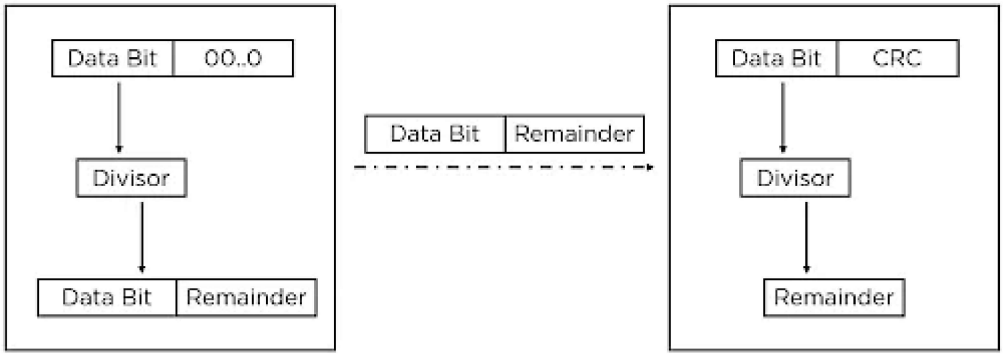
For Example:

For Example:

- x2+x+1 (polynomial equation)
- Converting to binary format-
  - Going through the equation, we have value at the 0th position (x), value at the 1'st position (x), and the 2nd position (x2).
  - So, the binary value will be - [111]
- Similarly for equation, [x2+1], the binary value will be, [101].
- There is no value at the "x" position, so the value is [0].

Moving on, let's look at the working steps of the CRC method.

Working of CRC Method



CRC Working Illustration

To understand the working of the CRC method, we will divide the steps into two parts:

Sender Side (CRC Generator and Modulo Division):

1. The first step is to add the no. of zeroes to the data to be sent, calculated using k-1 (k - is the bits obtained through the polynomial equation.)
2. Applying the Modulo Binary Division to the data bit by applying the XOR and obtaining the remainder from the division
3. The last step is to append the remainder to the end of the data bit and share it with the receiver.

Receiver Side (Checking for errors in the received data):

To check the error, perform the Modulo division again and check whether the remainder is 0 or not,

1. If the remainder is 0, the data bit received is correct, without any errors.
2. If the remainder is not 0, the data received is corrupted during transmission.

Example - The data bit to be sent is [100100], and the polynomial equation is [x3+x2+1].

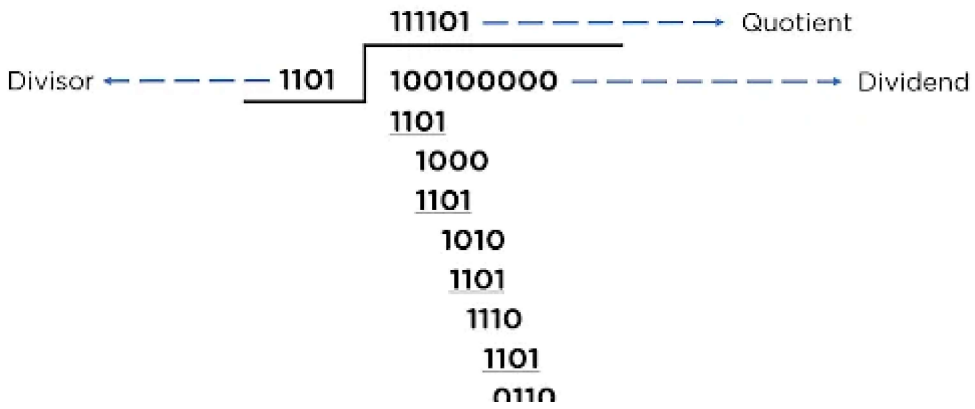
Data bit - 100100

Divisor (k) - 1101 (Using the given polynomial)

Appending Zeros - (k-1) > (4-1) > 3

Dividend - 100100000

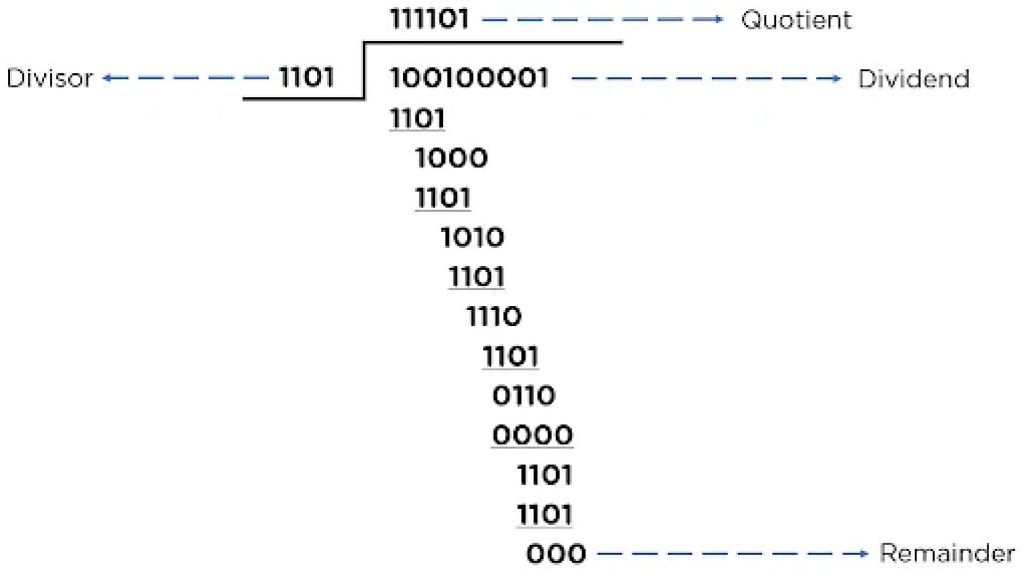
Sender Side:



Now appending the remainder [001] to the data bit and sharing the new data with the receiver.

New Data Bit - [100100001]

Receiver Side:



The Obtained remainder is [000], i.e., zero, which according to the CRC method, concludes that the data is error-free.

With the completion of the working steps, we are completed with this article on "What Is Cyclic Redundancy Check?".

Conclusion

In this article on "What Is Cyclic Redundancy Check (CRC)?", we understood the working of the data redundancy method for checking data error at the recovery side and preventing any corruption from being used.

To gain more insights and information about the topic and its various counterparts, you can refer to Simplilearn's Cyber Security Expert course. After completing this professional course, you will become well versed in working with the CRC method and multiple network algorithms.

If you have any questions about this article on 'What Is Cyclic Redundancy Check?'. Feel free to mention them in the comment section at the bottom of this page. Our expert team will help you solve your queries at the earliest.

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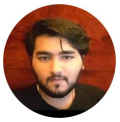

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Anmol is a Research Analyst who aims to become a Data Scientist one day. He enjoys Data Management systems and analysis. You will find him reading a book when he is not working.

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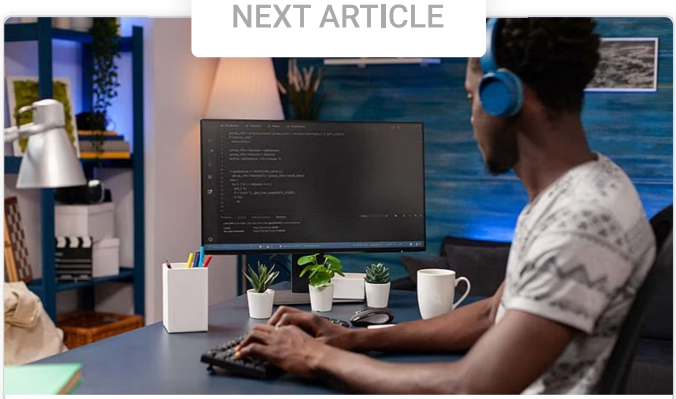

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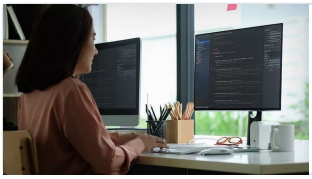

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