20/7/23

Assignment-02

S. Darwin
192211127

1's & 2's complement:-

These are two methods used to represent signed integers in binary form. They are used to handle negative numbers in computers system and digital circuits.

1's complement:-

In 1's complement representation, to obtain the negative value to positive integer, you invert all the bits (change 0's to 1's and 1's to 0's). To represent positive numbers, the most significant bit (MSB) is used as a sign bit, with 0 indicating a positive number & 1 indicating a negative number.

For example:-

Positive 6 in binary: 00000110

Negative 6 in 1's complement:- 11111001

However, 1's complement has a drawback known as the "one's complement overflow", It occurs because there are two representation of 0. This can lead to issues in arithmetic operations.

2's complement:-

To address the issue of the one's complement overflow, the 2's complement representation is used. In 2's complement, to obtain the negative value of a positive integer, you first invert all the bits and then add 1 to the result. As with 1's complement, the most significant, the most significant bit (MSB) is used as a sign bit.

For example:-

Positive 6 in binary:- 00000110

Negative 6 in 2's complement:- 11111010

The advantage of 2's complement is that it eliminates the dual representation for each integer value. Additionally, arithmetic operation are simpler with 2's complement compared to 1's complement.

To add or subtract numbers in 2's complement, you perform regular binary addition or subtraction while discarding any carry-out from the most significant bit.

This approach handles both positive and negative numbers without the need for any special handling of the sign bit.

In modern computer systems, 2's complement representation is typically used for signed integers due to its efficiency & simplicity in arithmetic operations.