

19108/23

ASSIGNMENT - 2

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1. Explain 1's Compliment Number System ?

Sol:

In the one's compliment number system negative numbers are represented by taking the bitwise complement (inverting) of the positive numbers binary representation. The bitwise complement means flipping all the bits, changing of 0's to 1's And 1's to 0's.

Ex: Suppose to represent the decimal number 5 using four bits in the one's complement system.

- * Represent the absolute value of the number in binary is 0101.
- * Take the bitwise complement (invert all the bits)
: 0101 (original) \rightarrow 1010 (complement)
- * The result is 1010. Since the most significant bit (left most bit) is 1. This indicates a negative number.

One's complement number system is symmetric meaning if you take the one's complement of a number and then take the one's complement of the result you will get back the original number.

Eg: Take the one's complement of 5 - (1010):
1010 (original) \rightarrow 0101 (complement)

Take the one's complement of 0101:
0101 (complement) \rightarrow 1010 (original) - 5.

Despite its symmetry one's complement has some drawbacks, especially when performing arithmetic operations like ADD And SUB.

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Q. Explain 2's Complement Number System?

A)

The two's Complement Number system is a method used to represent both positive and negative integers in binary form. It is the most commonly used representation for signed integers in digital computing systems due to its simplicity and efficiency in arithmetic operations.

→ In the two's complement system, the most significant Bit (MSB) is used as the sign bit, where 0 represents a positive number and 1 represents a negative number. The remaining bits represent the magnitude of number in standard binary form.

→ The System revolves on the concept of taking the complement of a number and then adding 1 to obtain negative representation.

→ To represent a positive number in two's compliment

* Convert the positive decimal number to its binary representation using the standard binary conversion rules.

- * If needed, pad the binary number with leading zero to match the desired bit size.
- * The binary representation is now the two's complement representation of the positive number.
 - Eg: The binary representations of 5 is 00000101 so, the two's complement of 5 is 00000101
 - To represent Negative Number in two's complement
- * Take the absolute Value of the decimal number.
- * Convert the positive decimal number to its, binary representation using the standard binary conversion rules.
- * If needed pad the binary number with leading zeroes to match the desired bit size.
- * Invert all the bits of the binary number.
- * Add "1" to the resulting binary number.