Topics to discuss

Bitwise Operator Part 1

- Bitwise AND
- Bitwise OR
- Bitwise XOR
- Bitwise NOT

Bitwise AND (&) Operator

AND operator is denoted by &.

→ If both bits are 1, it gives 1 else it gives 0.

Table

a	b	a & b
0	0	0
0	1	0
1	0	0
1	1	1

Bitwise OR(|) Operators

It is denoted by '|' symbol.

If either of bits is 1, it gives 1 else 0.

Table

a	b	a & b
0	0	0
0	1	1
1	0	1
1	1	1

Bitwise Complement / NOT (~ / !)

0 → 1
1 → 0

It is denoted by ~ or !

It gives 1's complement of the bit.

Table

a	b	~a	~b
0	0	1	1
0	1	1	0
1	0	0	1
1	1	0	0

Bitwise XOR (^) Operator

(Adding without carry)

It is denoted by '^' symbol.

If bits are different, it gives 1 else 0.

Table

a	b	a ^ b
0	0	0
0	1	1
1	0	1
1	1	0

Summary Table

a	b	a&b	a|b	a^b	~a	~b
0	0	0	0	0	1	1
0	1	0	1	1	1	0
1	0	0	1	1	0	1
1	1	1	1	0	0	0

Examples : $x = 4$ $y = 5$, find $x \& y$, $x | y$, $x \hat{} y$, $\sim x$, $\sim y$

Solution : $x = (4)_{10} = 100$

$y = (5)_{10} = 101$

① $x \& y$ =
$$\begin{array}{r} 100 \\ 101 \\ \hline 100 \end{array} = 4$$

② $x | y$ =
$$\begin{array}{r} 100 \\ 101 \\ \hline 101 \end{array} = 5$$

③ $x \hat{} y$ =
$$\begin{array}{r} 100 \\ 101 \\ \hline 001 \end{array} = 1$$

④ $\sim x = \ldots 011$ (32 bit)

$\sim x = 11111 \ldots\ldots 011$

⑤ $\sim y = 11111 \ldots\ldots 010$

$\sim x = 11111\ldots011$

$= -2^{31} + (2^{30} + 2^{29} + \ldots + 2^2 + 2^1 + 2^0) - 2^2$

$= -2^{31} + (2^{31} - 1) - 2^2$

$= -1 - 4 = -5$

$\sim y = 1111\ldots010$

$= -2^{31} + (2^{31} - 1) - 2^0 - 2^2$

$= -1 - 1 - 4$

$= -6$

Follow Now

Start Practicing

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