Topics to discuss

Properties of Bitwise operators.

- Commutative Property
- Associative Property
- AND , OR , XOR Property.
- Left shift and right shift property.

Commutative Property

1) $a \ \& \ b = b \ \& \ a$

2) $a \mid b = b \mid a$

3) $a \ \hat{} \ b = b \ \hat{} \ a$

Associative Property

1) $a \,\&\, b \,\&\, c = b \,\&\, a \,\&\, c = c \,\&\, a \,\&\, b$

2) $a \mid b \mid c = b \mid a \mid c = c \mid a \mid b$

3) $a \wedge b \wedge c = b \wedge a \wedge c = c \wedge a \wedge b$

AND Property

1) $a \ \& \ a = a$

2) $a \ \& \ 0 = 0$

3) $a \ \& \ 1 = \begin{cases} 0 & \text{, when last bit is unset} \\ 1 & \text{, when last bit is set.} \end{cases}$

$a = 1101$
$\quad\ 0001$
$\overline{1 = 0001}$

$a = 1100$
$\quad\ 0001$
$\overline{0 = 0000}$

4) least significant bit = $a \ \& \ 1$

OR Property

1) $a \mid a = a$

2) $a \mid 0 = a$

XOR Property

1) $a \wedge a = 0$

2) $a \wedge 0 = a$

Left shift property :

$$x << i = x \times 2^i$$

Right shift property :

$$x >> i = \frac{x}{2^i}$$

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