

Python Bitwise Operators

* Operators are used to perform operations on values and variables. These are the symbols that carry out arithmetic and logical computations.

Bitwise Operators.

Operator	Description
&	Bitwise AND
	Bitwise OR
~	Bitwise NOT
^	Bitwise XOR
>>	Bitwise right shift
<<	Bitwise left shift

* python bitwise operators work only on integers.

Bitwise AND Operator:

* Returns 1 if both the bits are 1 else 0.

Example:-

$$a = 10 = 1010 \text{ (Binary)}$$
$$b = 4 = 0100 \text{ (Binary)}$$

$$a \& b = \begin{array}{r} 1010 \\ \& \\ 0100 \end{array}$$

$$= 0000$$

$$= 0 \text{ (Decimal)}$$

$$\boxed{\begin{array}{l} 1+0=0 \\ 0+1=0 \\ 0+0=0 \\ 1+1=1 \end{array}}$$

Bitwise OR Operator:-

* Returns 1 if ~~both~~ either of the bit is 1 else 0.

Example:-

$$a = 10 = 1010 \text{ (Binary)}$$
$$b = 4 = 0100 \text{ (Binary)}$$

$$a | b = \begin{array}{r} 1010 \\ | \\ 0100 \end{array}$$

$$= 1110$$

$$= 14 \text{ (Decimal)}$$

$$\boxed{\begin{array}{l} 1+0=1 \\ 0+1=1 \\ 1+1=1 \\ 0+0=0 \end{array}}$$

Bitwise not operator :-

* Returns one's complement of the number.

Example:-

$$a = 10 = 1010 \text{ (Binary)}$$

$$-a = -1010$$

$$= -(1010 + 1)$$

$$= -(1011)$$

$$= -11 \text{ (Decimal)}$$

Bitwise X-OR operator :-

* Returns 1 if one of the bit is 1 and other is 0 else returns false.

Example:-

$$a = 10 = 1010 \text{ (Binary)}$$

$$b = 4 = 0100 \text{ (Binary)}$$

$$a \oplus b = 1010$$

$$\begin{array}{r} 1 \\ 0100 \\ \hline \end{array}$$

$$= 1110$$

$$= 14 \text{ (Decimal)}$$

Shift Operators

These Operators are used to shift the bits of a number left or right thereby multiplying or dividing the number by two respectively.

Bitwise right shift Operator :-

shifts the bits of the number to the right and fills 0 on voids left as a result. Similar effect as of dividing the number with some power of two.

Example :

$$a = 10$$

$$a \gg 1 = 5$$

Bitwise left shift Operator :-

shifts the bits of the number to the left and fills 0 on voids as a result. Similar effect as of multiplying the number with some power of two.

Example :

$$a = 5 = 0000 \ 0101 \rightarrow 0000 \ 1010 = 10$$

$$b = -10 = 1111 \ 0110 \rightarrow 0001 \ 0100 = 20$$

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