

# Bitwise Operators

## Python

*Computer Programming Python*

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# What is Bitwise operator?

Bitwise operators in Python operate on the binary (bit-level) representation of numbers.

Example:

5 in binary → 0b0101

3 in binary → 0b0011

# Use bitwise operators to manipulate these bits

| Operator        | Name               | Example (5 & 3) | Binary Calculation            | Result |
|-----------------|--------------------|-----------------|-------------------------------|--------|
| <b>&amp;</b>    | AND                | 5 & 3           | 0101 & 0011 = 0001            | 1      |
| <b> </b>        | OR                 | 5   3           | 0101   0011 = 0111            | 7      |
| <b>^</b>        | XOR (exclusive OR) | 5 ^ 3           | 0101 ^ 0011 = 0110            | 6      |
| <b>~</b>        | NOT (inverts bits) | ~5              | ~0101 = 1010 (2's complement) | -6     |
| <b>&lt;&lt;</b> | Left shift         | 5 << 1          | 0101 << 1 = 1010              | 10     |
| <b>&gt;&gt;</b> | Right shift        | 5 >> 1          | 0101 >> 1 = 0010              | 2      |

## Examples in Python

```
a, b = 5, 3 # Binary: 5 = 0101, 3 = 0011
```

```
print(a & b) # AND -> 1
```

```
print(a | b) # OR -> 7
```

```
print(a ^ b) # XOR -> 6
```

```
print(~a) # NOT -> -6
```

```
print(a << 1) # Left Shift -> 10
```

```
print(a >> 1) # Right Shift -> 2
```