

True and True = True — Boolean  
1 and 1 = 1

5 and 2  
↓ bitwise and

5 = 1 0 1  
—  
3 bit , 2 = 1 0  
—  
2 bit = 010

1 0 1 and 0 1 0 = 0 0 0  
5 and 2 = 0

$P \wedge Q \rightarrow \text{Boolean}$

$X \wedge Y \rightarrow \text{bitwise}$

angka desimal :  $0, 1, 2, 3, \dots, 9$  (<sub>10</sub>)

binary : 1, 0 (<sub>2</sub>)

Hexadecimal : Basis 16

Decimal  $\rightarrow$  Binary

Mod basis

5  $\rightarrow$  Binary

$$\begin{aligned} 5 \bmod 2 &= 1 \\ 2 \bmod 2 &= 0 \\ 1 \bmod 2 &= 1 \end{aligned}$$

$$101 = 000001_2 \quad 1010 \bmod 2 \rightarrow \text{stop}$$

$$5 = \square \square 5$$

$$\begin{aligned} 5_{10} &= 101_2 \sim 5 = -5 - 1 \\ \sim 5 &= 010 \\ \sim 5 &= 2 \end{aligned}$$

## \* Bitwise And

$$x \& 1 = 0 \quad (\times \text{ genap})$$

$$x \& 1 = 1 \quad (\times \text{ ganjil})$$

$$x \& (2^k - 1) = 0 \quad (\times \text{ habis dibagi } 2^k)$$

For 100%

$$x = 5 - x \& 1 = 1 - x = 0$$

$P$  and  $Q \rightarrow \text{True}$  - jika dan hanya  
↓ bit      ↓ bit      jika keduanya  
bit      bit      True

$$\dots \times 0 = 0 \quad \text{bit terakhir}$$

$$P \& 0 = 0$$

$$x \& 1 = x$$

..... bit terakhir  $\times$   $0000 \underline{1}$   
 $= 0000 \dots \underline{1}$

$x = 1 \rightarrow$   
 $x = 0 \rightarrow$   $x$  ganjil  
 $x$  genap

## \* Bitwise OR

$x \text{ or } y =$  Menentukan apakah ada "1" di dalam bit  $x$  atau  $y$

\* Bitwise  $x = AP$   $y = Ang$

$x \text{ or } y = (x \wedge \neg y) \vee (\neg x \wedge y)$

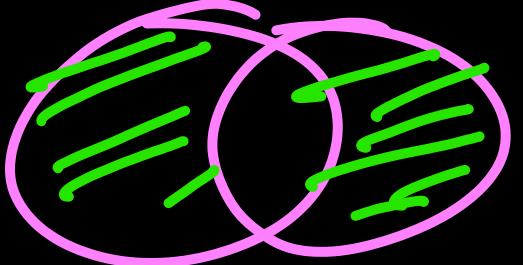


Diagram illustrating the logical operation of Bitwise OR. It shows two sets of bits represented by overlapping circles. The left circle contains four bits (1100), and the right circle contains three bits (011). The intersection of the two sets is shaded pink, representing the result of the AND operation ( $\wedge$ ). The final result is obtained by taking the OR of the ANDed set with the NOT of the other set ( $\vee (\neg x \wedge y)$ ).

$$\cancel{x} \text{ xor } \cancel{x} = 0$$

$$x \text{ xor } y = (x \otimes !y) \mid (y \otimes !x)$$

↗ cek apakah salah satu  
 antara x dan y Mengandung  
 Terat Sam



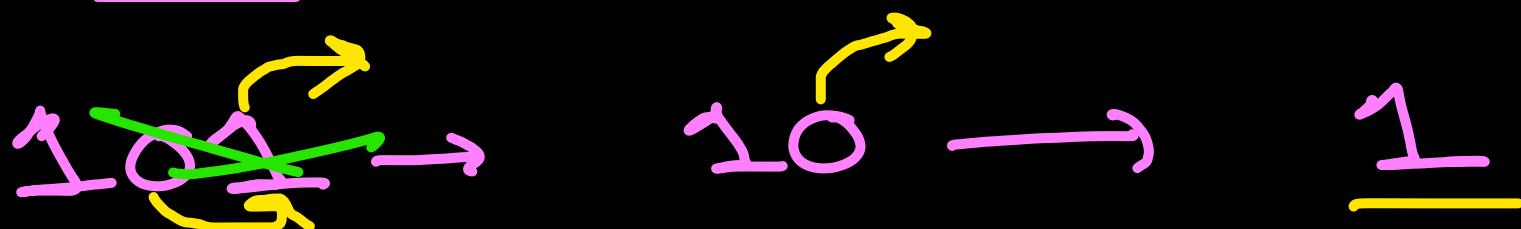
[ 1, 2, 3, 4, 5 ]  
 sum [ l ... r ]

## \* Bitwise Not

$$\begin{aligned}\sim x &= \underline{\underline{-x - 1}} \\ &= -(x + 1)\end{aligned}$$

## \* Bit Shifting

$x \gg y$ ,  $5 \gg 2$



y bit terakhir x hilang / buang

$$5 \gg 2 = 1$$

$$x \ll y - 5 \ll 2$$

$$101 \rightarrow 10100 = \underline{20}$$

$x \ll y \rightarrow$  tambahkan sebanyak  
y bit "0" pada  
bit x

$$\begin{array}{r} 000101 \\ \downarrow \\ 001\underline{0}10 \\ \rightarrow 010100 \end{array}$$

$$x \gg y = \lfloor \frac{x}{2^y} \rfloor$$

$$x \ll y = x * 2^y$$

$$5 \gg 2 = 1 = \left\lfloor \frac{5}{2^2} \right\rfloor$$

$$5 \ll 2 = 20 = 5 * 2^2 \\ = 20$$

$$\frac{k=1, 2, 3, 4, 5}{}$$

$$N \otimes (2^k - 1) = \circ$$

$$N \otimes (N+1)$$

n=2000

$$[1, 2, 3, 4, 5, \dots, 2000]$$

n=2001

$$[1, 2, 3, 4, 5, \dots, 2000, 1]$$

$N > 2000 \rightarrow$  masih ada ( $\underline{A_i} = A_j$ )

$$(1 \text{ xor } 2) * (1 \text{ xor } 3) * (1 \text{ xor } 4) * \dots$$

$$* (1 \text{ xor } 2000) * (1 \text{ xor } 1)$$

$N > 2000 \rightarrow$  hasil kali = 0

$N \leq 2000 \rightarrow$  brute force  $\rightarrow O(N^2) = 10^6$

$$(a + b) \bmod n = ((a \bmod n) + (b \bmod n))$$

$$(a * b) \bmod n = ((a \bmod n) * (b \bmod n)) \bmod n$$

decimal : 0, 1, 2, 3, ..., 9 (base 10)  
binary : 0, 1 (base 2)

\* bagi 2

$$5_{10} = 101_2$$

$$7 = 111$$

$$\begin{array}{r} 5 \xrightarrow{\text{mod } 2} 1 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 2 \xrightarrow{\text{mod } 2} 0 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \xrightarrow{\text{mod } 2} 1 \\ \hline \end{array}$$

0 mod 2 → STOP

$$101$$

$$7 \xrightarrow{\text{mod } 2} 1$$

$$3 \xrightarrow{\text{mod } 2} 1$$

$$1 \xrightarrow{\text{mod } 2} 1$$

$$1 = 1$$

$$2 = 10$$

$$3 = 11$$

$$4 = 100$$

$$5 = 101$$

$$[1, 2, 3] \rightarrow [3, 2, 1]$$

$$\text{sum}[3, 1] = \text{sum}[1, 3]$$

$[1, 2, 3, 4, 5]$

$$\text{sum}[1 \dots 1] = 1 + 2 = 3$$

$$\begin{aligned}\text{sum}[1 \dots 3] &= 1 + 2 + 3 \\ &= \text{sum}[1 \dots 2] + 3\end{aligned}$$

$$\text{prefix}[n] = \text{sum}[1 \dots n]$$

$$\text{prefix}[n] = \text{prefix}[n-1] + \text{arr}[n]$$

$\text{sum}[l \dots r]$

$[1, 2, 3, 4, 5, 6]$

$$\text{sum}[1 \dots 4] = 1 + 2 + 3 + 4$$

$$\text{sum}[3 \dots 4] = 3 + 4$$

$$\begin{aligned} \text{sum}[3 \dots 4] &= \cancel{1+2+3+4} - \cancel{(1+2)} \\ &= \text{sum}[1 \dots 4] - \text{sum}[1 \dots 2] \end{aligned}$$

$$\text{sum}[L \dots R] = \text{sum}[1 \dots R] - \text{sum}[1 \dots L-1]$$

$$\text{sum}[1 \dots N] = \text{pref}[N]$$

$$\text{sum}[L \dots R] = \text{pref}[R] + \text{pref}[L-1]$$





























