Topics to discuss

Addition and subtraction of binary number.

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Addition of binary numbers

0 + 0 ⟶ 0

0 + 1 ⟶ 1

1 + 0 ⟶ 1

1 + 1 ⟶ 0 (but carry 1)

1 + 1 + 1 ⟶ 1 (but carry 1)

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Q:- Add the binary numbers.

$x = 1\ 0\ 1$

$y = 1\ 0\ 1\ 0$

Ans :

$$\begin{array}{rl} x = 0\ 1\ 0\ 1 & \simeq 5 \\ +\ y = 1\ 0\ 1\ 0 & \simeq 10 \\ \hline 1\ 1\ 1\ 1 & \simeq 15 \end{array}$$

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Q: Add the binary numbers.

$x = 1010$

$y = 1111$

Ans:

$$\begin{array}{rccccc} & & 1 & & 1 & \\ x = & & 1 & 0 & 1 & 0 \quad = 10 \\ y = & & 1 & 1 & 1 & 1 \quad = 15 \\ \hline & 1 & 1 & 0 & 0 & 1 \quad = 25 \end{array}$$

$$\begin{array}{rr} 1 & 1 \\ & 1 \\ + & \\ \hline 1 & 0 \end{array} \qquad \begin{array}{rr} 1 & 1 \\ & 1 \\ & 1 \\ + & \\ \hline 1 & 1 \end{array}$$

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Subtraction of two binary numbers

It can be done by adding 2's complement of 2nd second number to the first number.

eg :- $x - y$

$= x + (-y)$

we know, 2's complement of $y = -y$

step to find 2's complement of binary no.

1) Find 1's complement by flipping all bits.
2) Add 1 in 1's complement.

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Q: Subtract the numbers using binary representation.

$x = 10$ and $y = 5$, 8 bit binary

Ans:- $10 - 5 = ?$

$10 + (-5) = ?$

$10 \rightarrow 00001010$

$5 \rightarrow 00000101$

we need to find 2's complement of 5

$5 \rightarrow 00000101$

1's $\rightarrow 11111010$

2's $\rightarrow 11111011 = -5$

Now,

$10 \rightarrow 00001010$

$-5 \rightarrow 11111011$ +

Ans = 00000101

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