

10/9/25

Bitwise operators: &, |, ~, >>, <<

Ex: formula:  $i = 2^n$

2<sup>3</sup> 2<sup>2</sup> 2<sup>1</sup> 2<sup>0</sup>  
 4 bit 3 bit 2 bit 1 bit  
 4 bit → 0, 1, 2, 3 (4+2+1)  
 → 0, 1, 2, 3, 4, 5, 6, 7 (8+4+2+1)

Binary language:

for 2<sup>0</sup> we can have below combination

0 → 0  
 1 → 1  
 2<sup>0</sup> 2<sup>0</sup>  
 (2) 0 → Value 2 2 2

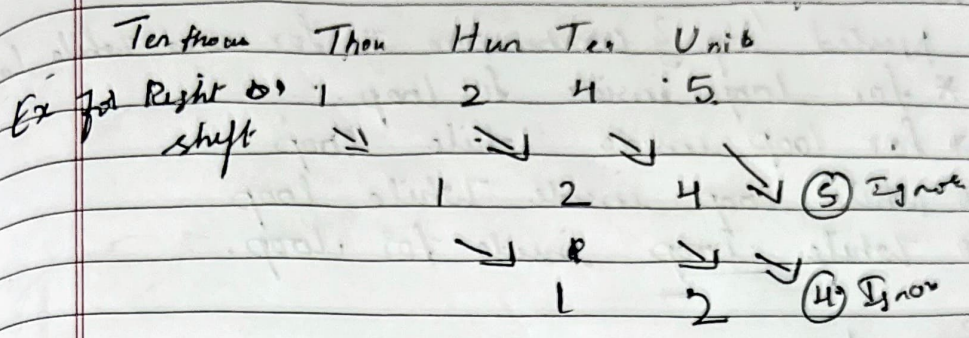
0 0 = 0 0 0 0 = 1  
 0 1 = 1 0 0 1 = 2  
 1 0 = 2 0 1 0 = 3  
 1 1 = 3 0 1 1 = 4  
 1 0 0 1 = 5

2<sup>3</sup> 2<sup>2</sup> 2<sup>1</sup> 2<sup>0</sup>  
 (8) (4) (2) (1)  
 1 1 1 0 = 6  
 1 1 0 1 = 5  
 1 0 1 1 = 4  
 1 0 0 1 = 3  
 1 0 0 0 = 2  
 0 1 1 1 = 7  
 0 1 1 0 = 6  
 0 1 0 1 = 5  
 0 1 0 0 = 4  
 0 0 1 1 = 3  
 0 0 1 0 = 2  
 0 0 0 1 = 1  
 0 0 0 0 = 0

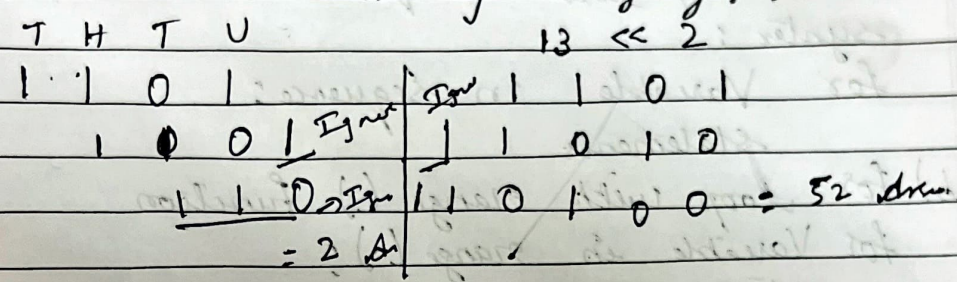
12 ⇒ 1 1 0 0  
 5 ⇒ 0 1 0 1  
 1 ⇒ 0 0 0 1  
 2 ⇒ 0 0 0 1 = 13  
 0 1 0 0 = 4

→ Right shift: Any value we shift from units doesn't have any value. after units there is no place is maths to consider.

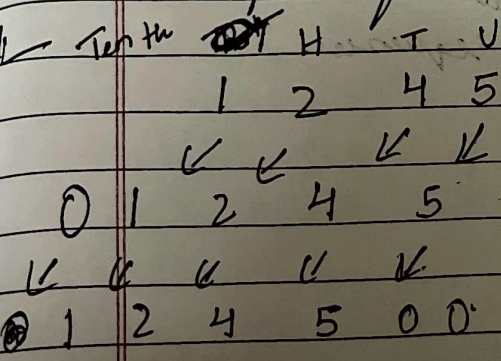
Left shift: Value will increase!



13 >> 2 in binary language:



Example for left shift:



→ Nested if else: syntax:

if (Cond 1) : # outer if

if (Cond 2) : # inner if

Statements of inner if

else:

Statements of inner else

else:

Statements of outer else.