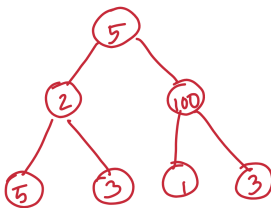


set  $\rightarrow$  insert  $\rightarrow O(\log N)$   
erase  
find

set  $\rightarrow$  random access  
নাঃ

BINARY TREE



45

BST

$\lfloor \log_2(n) \rfloor + 1$  BST

$7_{10} \rightarrow 111_2$

Self balancing BST  $O(N)$

- AVL Tree
- Red Black Tree
- Treap

SET



$$n \rightarrow \lfloor \log_k(n) \rfloor + 1$$

500, 131, 10, -5, 3

[2]  $\rightarrow$  500, 131, 10, -5, 3  
f(5) = 2



- [1]  $\rightarrow$  131
- [2]  $\rightarrow$  500, -5
- [5]  $\rightarrow$  10
- [4]  $\rightarrow$  3

Heap

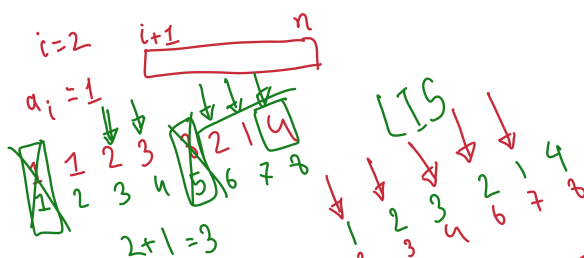
Red Black Tree

Hash Table

Set  
Map

unordered.....

multiset  
multimap



$$1+2=3$$

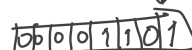
অংশ  
বিট

12, 14, 16

Bitwise Trick

int, long long

int a = 13



$2^0 = 1$   
 $2^1 = 10$   
 $2^2 = 100$   
 $2^3 = 1000$   
 $2^4 = 10000$

$$A \oplus 1 = 1$$

$00001101$   
 $\&$   
 $00001100$   
 $00001000$

$00001101$   
 $\&$   
 $01001101$

int a = 13  
int v = 8  
 $(a \& v) == v$

$$n = n | (1 \ll p)$$

$$n = n \wedge (1 \ll p)$$

$n = 4$  ?  
 $0 \sim (2^4 - 1)$

xvxv  
ABCD

ABD 1101

0  $\rightarrow$  0000  
1  $\rightarrow$  0001  
2  $\rightarrow$  0010  
3  $\rightarrow$  0011  
4  $\rightarrow$  0100  
5  $\rightarrow$  0101  
6  $\rightarrow$  0110  
7  $\rightarrow$  0111  
8  $\rightarrow$  1000  
9  $\rightarrow$  1001  
10  $\rightarrow$  1010  
11  $\rightarrow$  1011  
12  $\rightarrow$  1100  
13  $\rightarrow$  1101  
14  $\rightarrow$  1110  
15  $\rightarrow$  1111