

# DSU $\rightarrow$ Disjoint Set Union

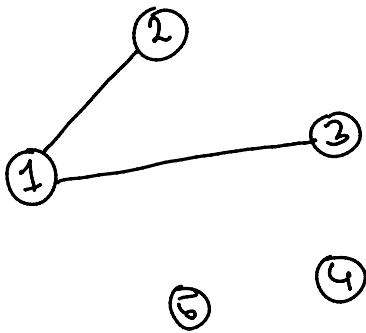
DFS / BFS

i)  $update(u, v)$

connects  $u$  and  $v$  

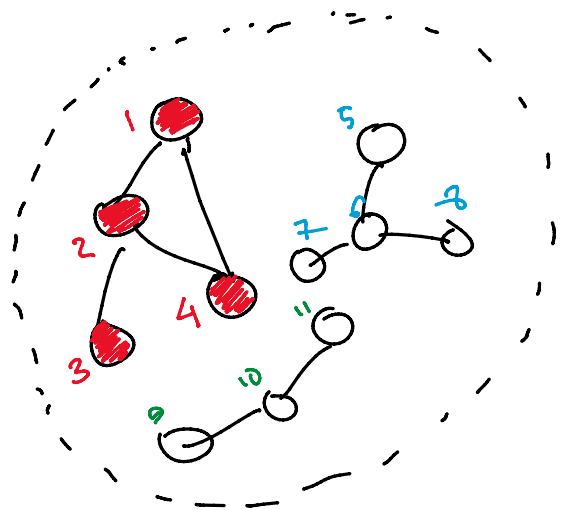
ii)  $query(u, v) \begin{cases} \rightarrow 1 \\ \rightarrow 0 \end{cases}$

$u$  and  $v$ , both in same component  
otherwise



$update(1, 2)$   
 $update(1, 3)$   
 $query(2, 3) \rightarrow 1$   
 $query(3, 5) \rightarrow 0$

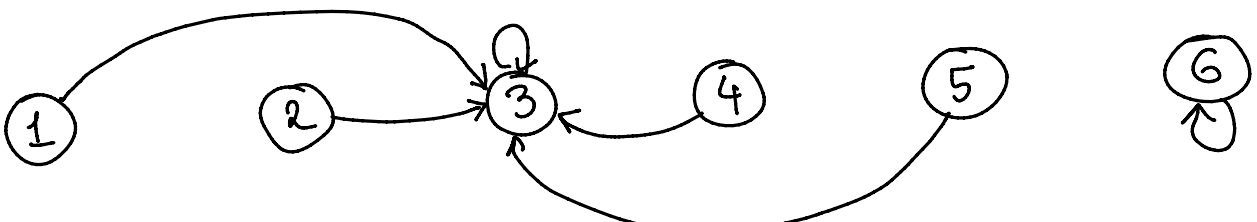
1 3  $\checkmark$   
1 4  $\checkmark$   
2 4  $\checkmark$   
2 5  $\checkmark$



— 0 —

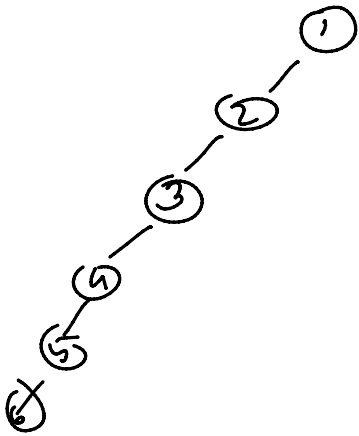
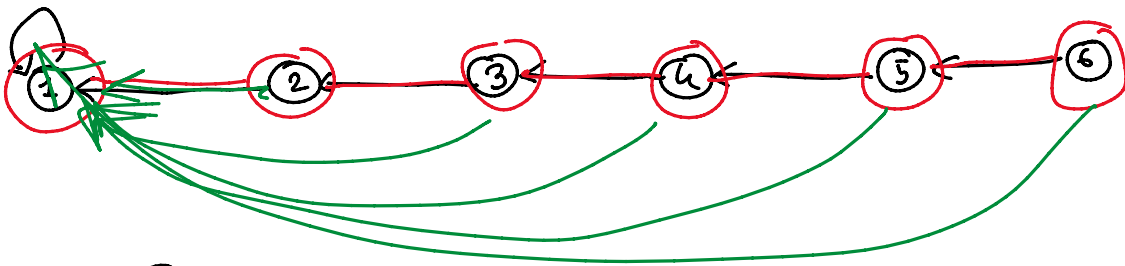
$\pi(1) = 3$   
 $\pi(2) = 3$   
 $\pi(3) = 3$   
 $\pi(4) = 3$   
 $\pi(5) = 3$   
 $\pi(6) = 6$

Path compression



$$\pi(5) = 3 \quad (1)$$

$$\pi(6) = 6$$

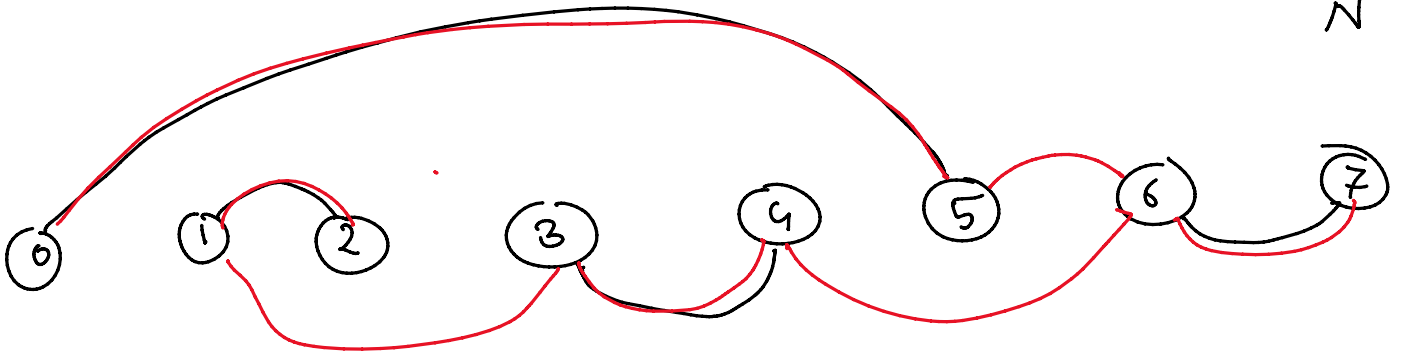


$$N = 10^5 \quad S_a = q_1 + q_2 + q_3 + q_4 + \dots + q_Q$$

$$Q = 10^5$$

$$S_a \approx 5N$$

$$\frac{5N}{N} = 5$$



0	0	0	0	6
0	0	0	0	0
0	0	0	1	0
0	0	1	1	0
0	1	0	0	0

00	01	02
00	11	12
20	21	22

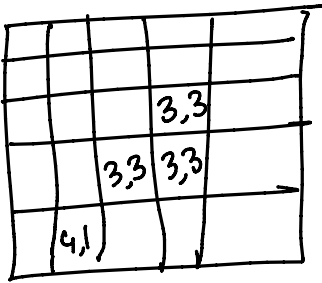
$$(1 \times 3) + 0 = 3$$

00	01	02	10	11	12	20	21	22
0	1	2	3	4	5	6	7	8

0 1 0 0 0



(-1)



count = 4 2

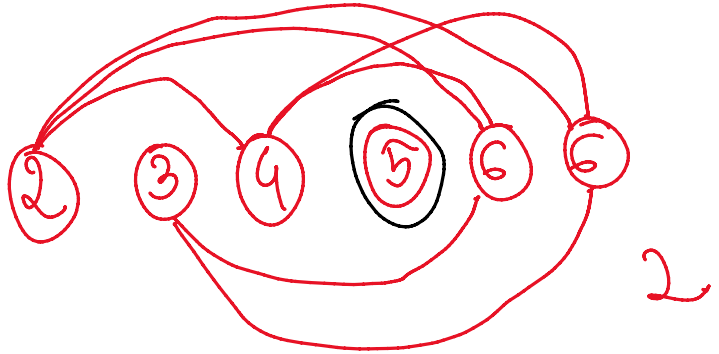
(x, y)

$$x \times C + y$$

0 1 2 3 4 5 6 7 8

2, 1

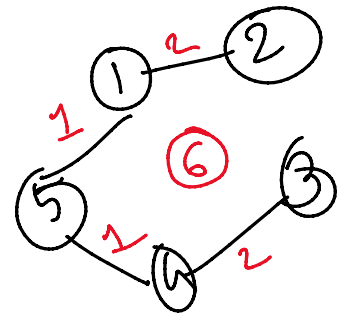
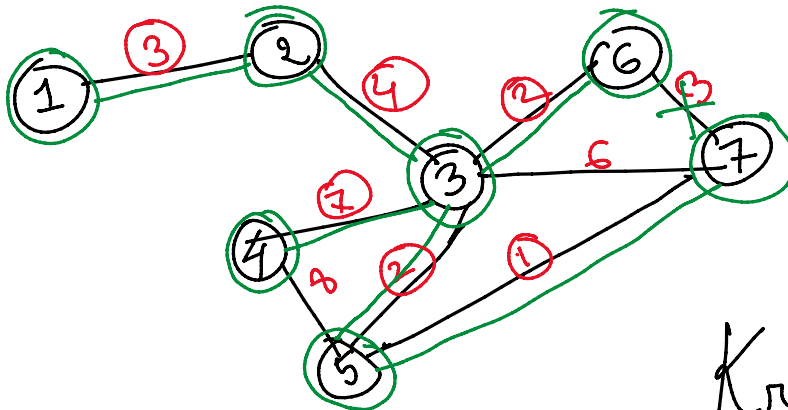
$$2 \times 3 + 1$$



- o -

MST

6



Kruskal Algo

↳ MST