

Disjoint Set Union

Disjoint Set Union



Also known as **Union Find**.



This data structure provides an interface of **3 operations** :

- **MAKE_SET**
- **UNION_SETS**
- **FIND_SET**



Set : collection of elements that are related to each other in a particular way

DSU on Graphs



We are given several **nodes**, each of which is a separate set.



For each incoming **edge**, combine the sets of the two nodes belong to.



Thus, each set is a collection of nodes reachable from each other.



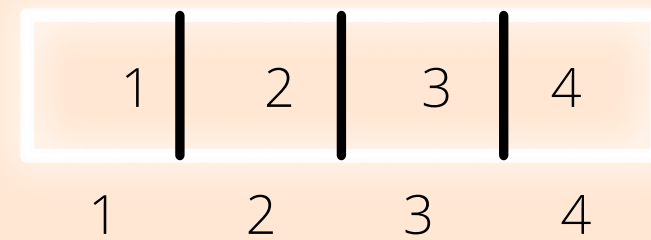
We will store the sets in the form of trees: each tree will correspond to one set. And the root of the tree will be the representative/leader of the set.

Representation of a Set

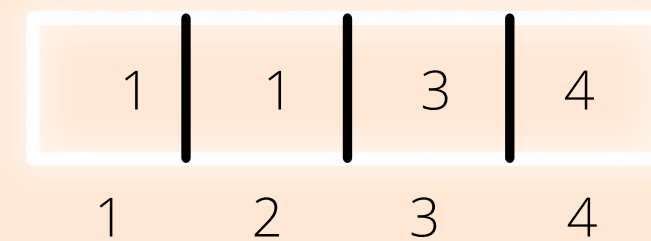
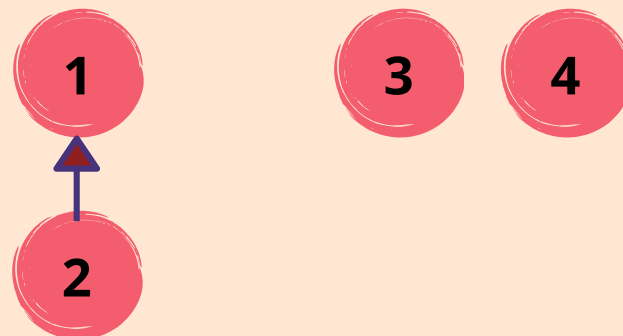
Tree

Parent array

Initial Graph - 4 nodes



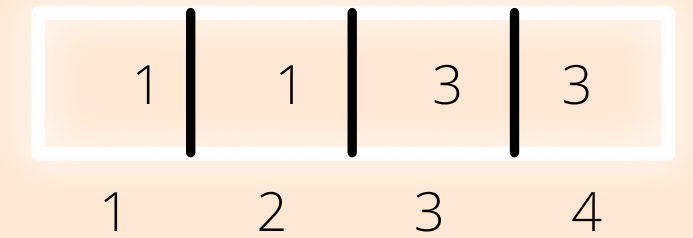
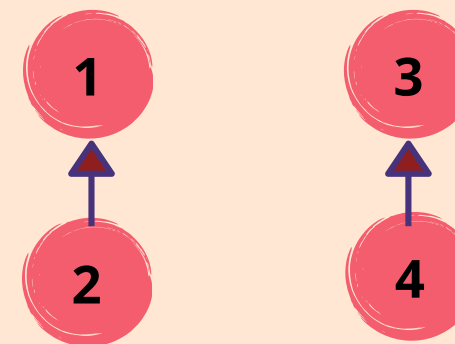
Edge (1, 2) \rightarrow UNION_SETS (1, 2)



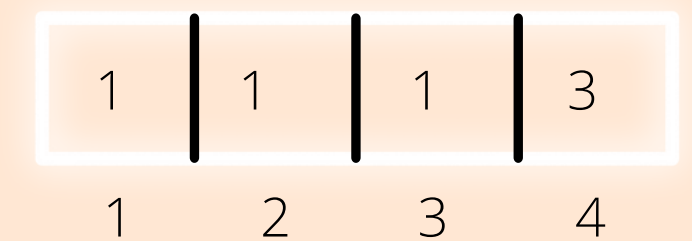
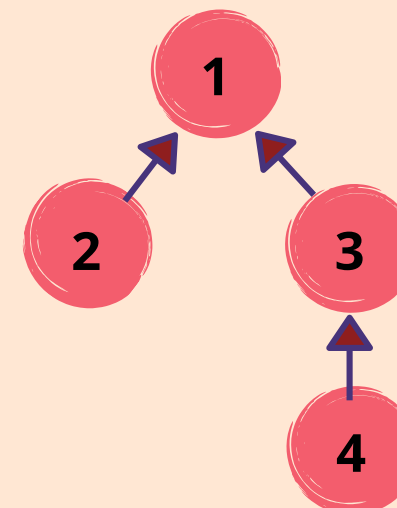
Tree

Parent array

Edge (3, 4) \rightarrow UNION_SETS (3, 4)



Edge (2, 4) \rightarrow UNION_SETS (2, 4)



Code



Basic Implementation



Optimised Implementation

Question -

1. Are the two nodes reachable from each other?
2. Number of connected components in a graph

Homework

DSU on Grid based graphs