Disjoint Set

Union Find Set

Previous Problem

Kruskal’s algorithm

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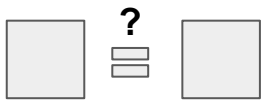
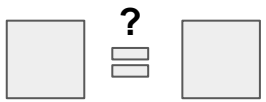
- Find out (quickly) if two nodes were in the same group

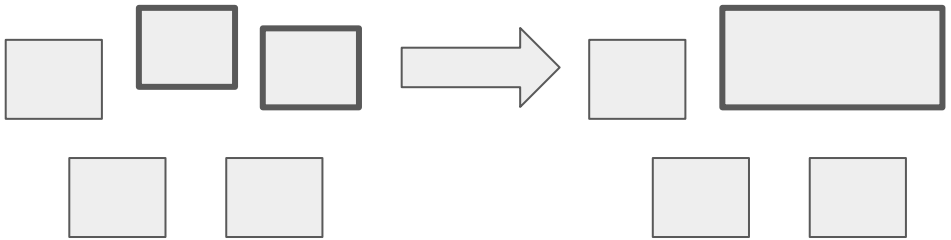


Previous Problem

Kruskal's algorithm

- Find out (quickly) if two nodes were in the same group
- Merge (quickly) two groups





Simple Idea

Let 1 node represent each the group to which they belong.

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Give nodes a way to find their representative.

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Give nodes a way to find their representative.

When merging two groups update the representative for one of the groups.

Simple Merge

```
Merge( node_a, node_b )
    Let rep_a be representative of node_a
    Let rep_b be representative of node_a
    For each Node curNode in nodeSet
        If rep_b is the representative of curNode
            Set representative of curNode to rep_a
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SLOW

“Forest” Idea

Store groups as rooted Trees

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- Each node stores a parent

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BALANCE the trees

“Forest” Idea

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BALANCE the trees

- Like the AVL

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- Only change the root of the shorter tree

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Ensures log(N) depth

Path Compression

When finding the representative (root) compress the path.

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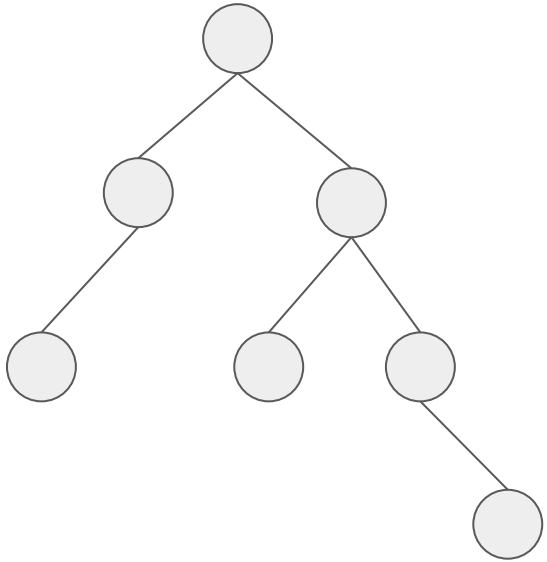

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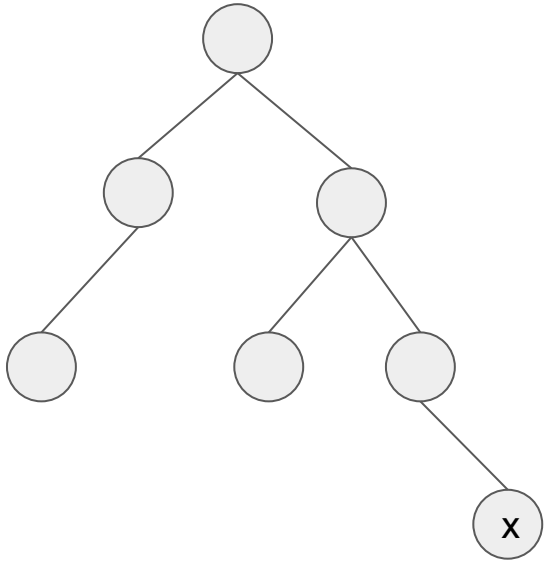

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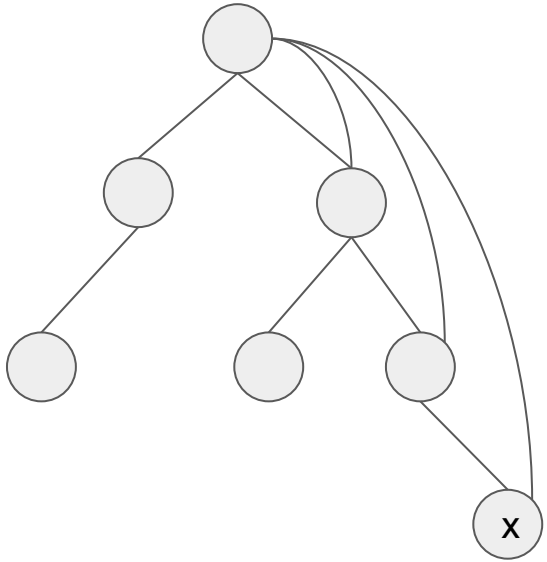

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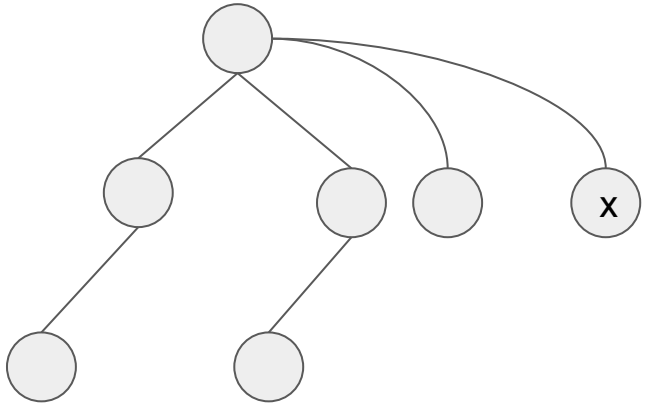

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Note this is not 1/Ackerman's(N)