Analysis of Kruskal's Algo

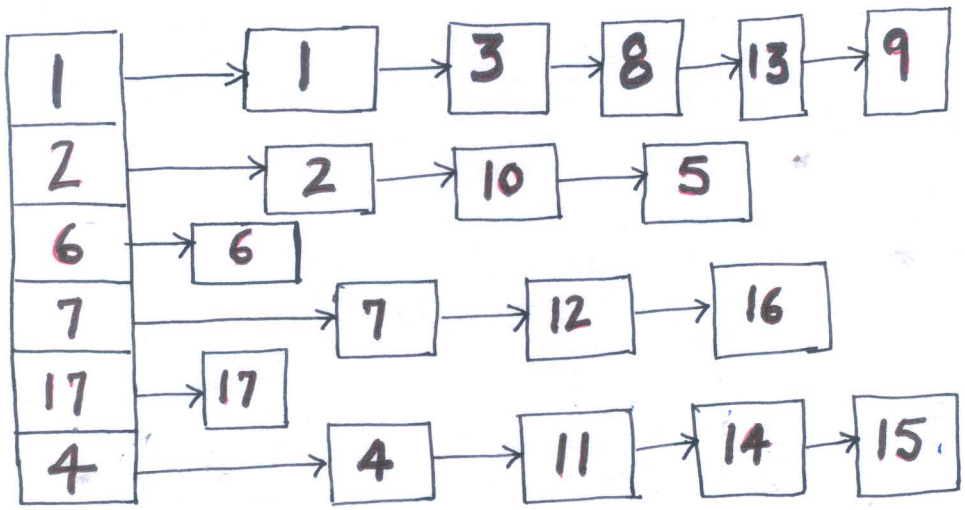
- We make use of

  UNION - FIND ADT

- FIND(i) : Returns the name of the set Containing i.

- Union(x, y) : Merge the sets with the name x and y.

IMPLEMENTATION



ITEMS

1	2	1	4	2	6	7	1	1	2	4	7	1	4	4	7	17
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

SETS

1	2	6	7	17	4
5	3	1	3	1	4

SIZE

Analysis

① Given $G = (V, E)$ s.t $|V| = n$ and $|E| = m$.

② Sort edges : $O(m \cdot \log m)$

③ $\forall (u, v) \in E$, check the Component name of u, v. : $O(m)$

④ Merge Components s.t smaller gets merged into bigger. : $O(n \cdot \log n)$

⑤ Total = ② + ③ + ④

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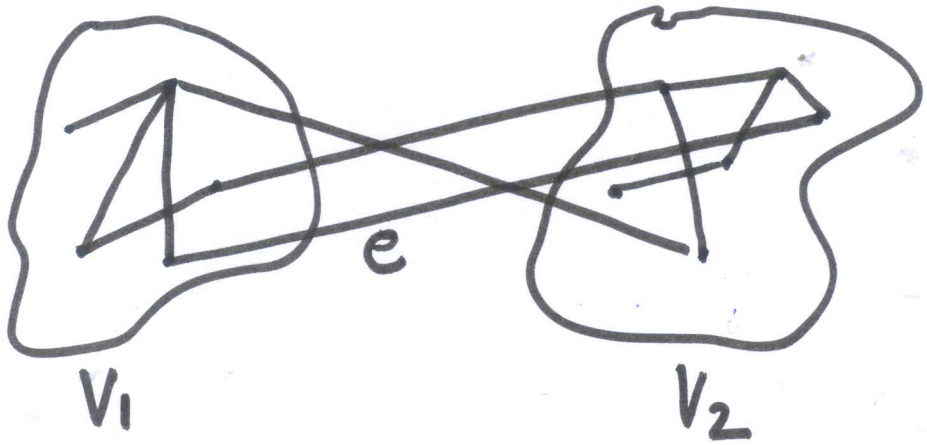
CORRECTNESS THEOREM (4)

Let G be a weighted connected graph, and V_1, V_2 be the partition of the vertices of G into two disjoint non-empty sets. Let e be an edge in G with min weight from among those with one end in V_1 and other in V_2. There is a min spanning tree that has e as one of its edges.

Figure



(1) Let T be the MST

(2) If $e \notin T$, the $T + e$ is cyclic

(3) $\exists f$ in the cycle with one end in V_1 and other in V_2.

(4) $T + e - f$ is a ST

(5) Since $w(e) \leq w(f)$

(6) The weight of the obtained spanning tree is no more than the original spanning tree.