disjoint set ADT:

- → set u, set v
- → Merge u & v
- → detect cycle.

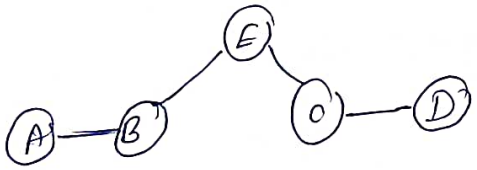
2 operations

- → find
- → union

eg

u v

→ two different graph connect these two by using another vertex called 'E'

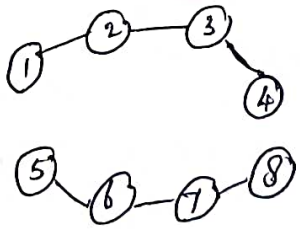


→ New vertex should not belongs to any set.

Eg-1

$S_k = \{1, 2, 3, 4\}$

$V = \{5, 6, 7, 8\}$



→ find '5', its available in set 'v'

→ find '1' " " set 'u'

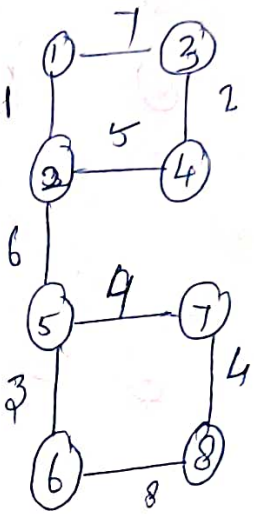
→ Union operation

$u \cap v = \phi$

$u \cup v = \{1, 2, 3, 4, 5, 6, 7, 8\}$ → Connect (4, 8) to perform union.

→ find (4, 8) = its available in one set, we can know that its cycle.

Eg, universal set $u = \{1, 2, 3, 4, 5, 6, 7, 8\}$



Consider edge weight & joint vertices, form set

$S_1 = \{1, 2\}$ weight - 1

Remove 1, 2 from universal set

~~{1, 2, 3, 4, 5, 6, 7, 8}~~

$S_2 = \{3, 4\}$ - 2

$S_3 = \{5, 6\}$ - 3

$S_4 = \{7, 8\}$ - 4

→ Next weight '5' (2,4) is available in set 1 & 2, perform union

$S_1 \cup S_2 = \{1, 2, 3, 4\}$ - S_6

→ weight '6' (2,5), available in S_6 & S_3

S_7: $\{1, 2, 3, 4, 5, 6\}$

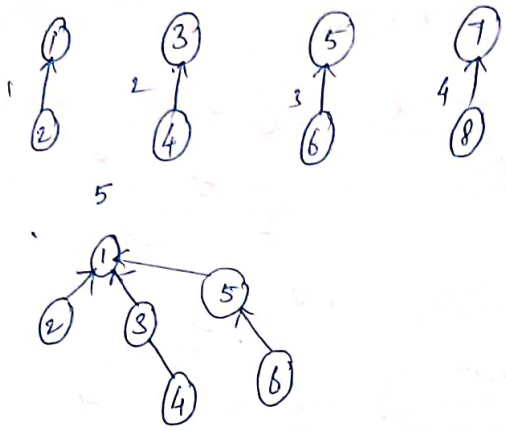
→ '7' (1,3) if we connect this it will form cycle because its available in same set.

→ '8' $\{6, 8\}$, its there is different set perform union

$\{1, 2, 3, 4, 5, 6, 7, 8\}$

→ '9' $\{5, 7\}$ its in same set so it will form cycle.

→ sentinel node.



Dynamic Equivalence Problem:

→ DEP essentially support 3 operations on set of elements.

→ Equivalence relation is defined by 3 operations.

① Make set

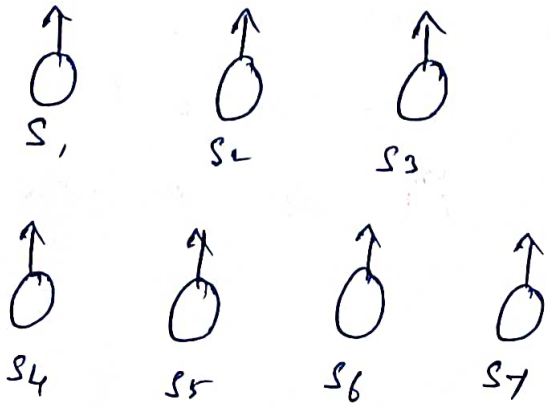
② find

③ Union.

Makeset

→ This operations is used to create a set with element.

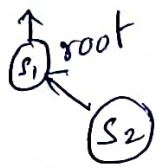
eg.,



Union:

→ which merges two equivalence set, and create new set.

① $S_1 \cup S_2$



a

② a $\cup S_3$

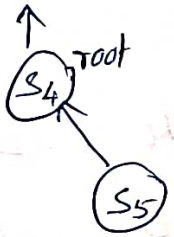
b

Note: Consider S_1 & S_2 having similar set of elements.

→ If the sets having different element, then it makes disjoint.

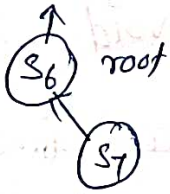
$S_1 \cup S_2 = \phi$

③ $S_4 \cup S_5$



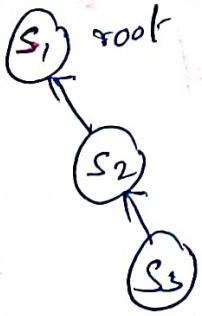
c

④ $S_6 \cup S_7$



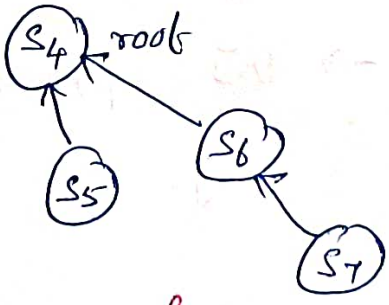
d

⑤ a $\cup$ b



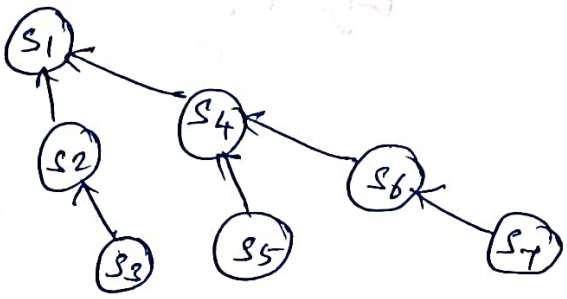
e

⑥ c $\cup$ d



f

⑦ e $\cup$ f



$\{S_1, S_2, S_3\}$ $\{S_1, S_4, S_5\}$ $\{S_1, S_4, S_6, S_7\}$