

ENERO 31

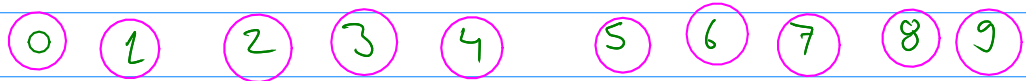
Union Find

¿Que es?

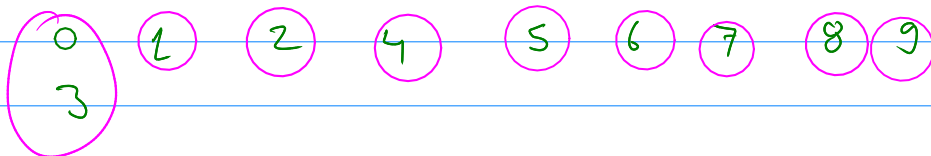
Es una estructura de datos que nos permite **unir** conjuntos disjuntos y **saber** si dos elementos pertenecen al mismo conjunto. \hookrightarrow find

Idea (10 conjuntos disjuntos)

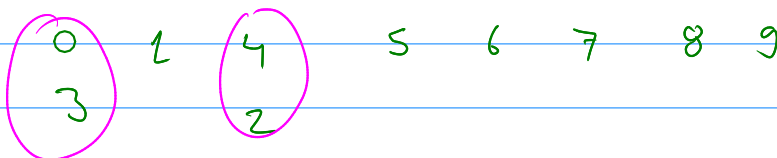
init



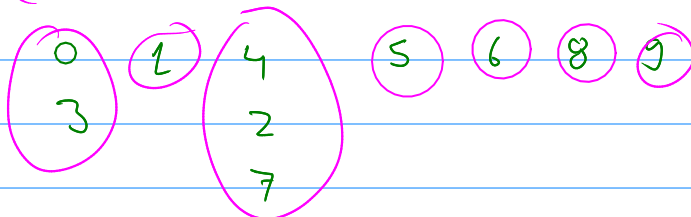
unir (0,3)



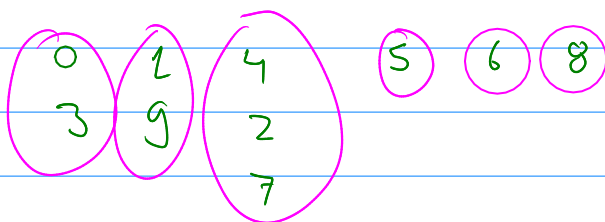
unir (4,2)



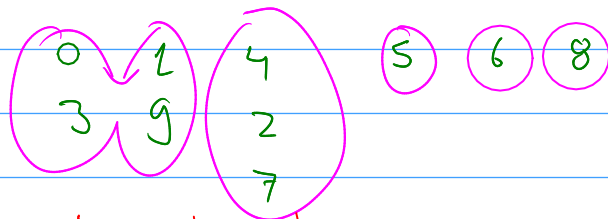
unir (2,7)



unir (1,9)



unir (3, 9)



¿Cómo lo implementamos?

① init

	0	1	2	3	4	5	6	7	8	9
rep	0	1	2	3	4	5	6	7	8	9
rank	0	0	0	0	0	0	0	0	0	0

0 1 2 3 4 5 6 7 8 9

① unir(0, 3)

	0	1	2	3	4	5	6	7	8	9
rep	0	1	2	0	4	5	6	7	8	9
rank	1	0	0	0	0	0	0	0	0	0

0 1 2 4 5 6 7 8 9
4
3

unir (4, 2)

	0	1	2	3	4	5	6	7	8	9
rep	0	1	4	0	4	5	6	7	8	9
rank	1	0	0	0	1	0	0	0	0	0

0 1 4 5 6 7 8 9
4 4
3 2

unir(2,7)

	0	1	2	3	4	5	6	7	8	9
rep	0	1	4	0	4	5	6	4	8	9
	0	1	2	3	4	5	6	7	8	9
rank	1	0	0	0	1	0	0	0	0	0

0 1 4 5 6 8 9
 4
 3 2 7

unir(1,9)

	0	1	2	3	4	5	6	7	8	9
rep	0	1	4	0	4	5	6	4	8	1
	0	1	2	3	4	5	6	7	8	9
rank	1	1	0	0	1	0	0	0	0	0

0 1 4 5 6 8
 4
 3 1 2 7

unir(3,9)

	0	1	2	3	4	5	6	7	8	9
rep	0	0	4	0	4	5	6	4	8	1
	0	1	2	3	4	5	6	7	8	9
rank	2	1	0	0	1	0	0	0	0	0

0 4 5 6 8
 4
 3 1 2 7

unir(9,0)

	0	1	2	3	4	5	6	7	8	9
rep	0	0	4	0	4	5	6	4	8	0
	0	1	2	3	4	5	6	7	8	9
rank	2	1	0	0	1	0	0	0	0	0

0 4 5 6 8
 4
 3 1 2 7

Pseudocódigo

init (N)

```
for (i = 0; i < N; i++)  
    rep[i] = i  
    rank[i] = 0
```

find (x) $O(\log N)$

```
if (rep[x] == x)  
    return x  
return rep[x] = find(rep[x])
```

union(x, y) $O(\log N)$

```
x = find(x), y = find(y)  
if (x != y)  
    if (rank[x] >= rank[y])  $x \leftarrow y$   
        rep[y] = x  
        if (rank[x] == rank[y])  
            rank[x]++  
    else  
        rep[x] = y  $y \leftarrow x$ 
```