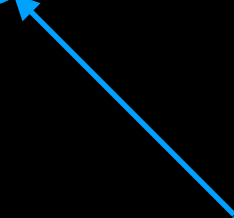
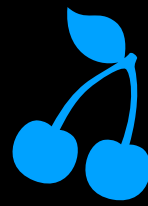
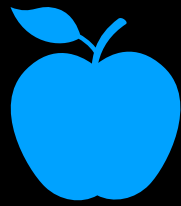
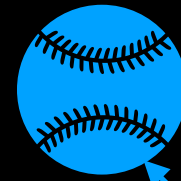


union

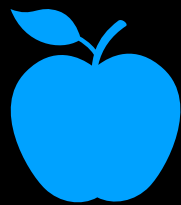
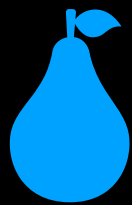




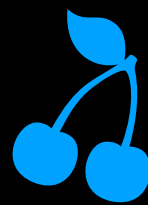
union -> union(网球, 排球)



网球和排球是一类

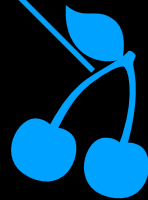
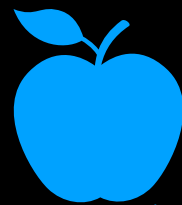
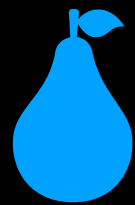


union(篮球, 网球)



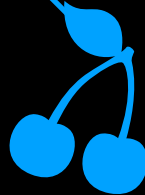
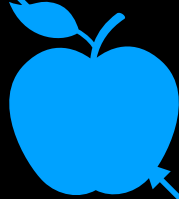
篮球, 网球和排球都是一类

union(苹果, 樱桃)

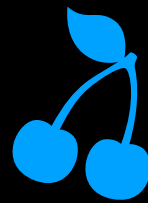
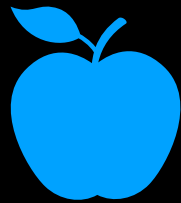


苹果和樱桃是一类

union(梨, 苹果)



梨, 苹果和樱桃都是一类



0

1

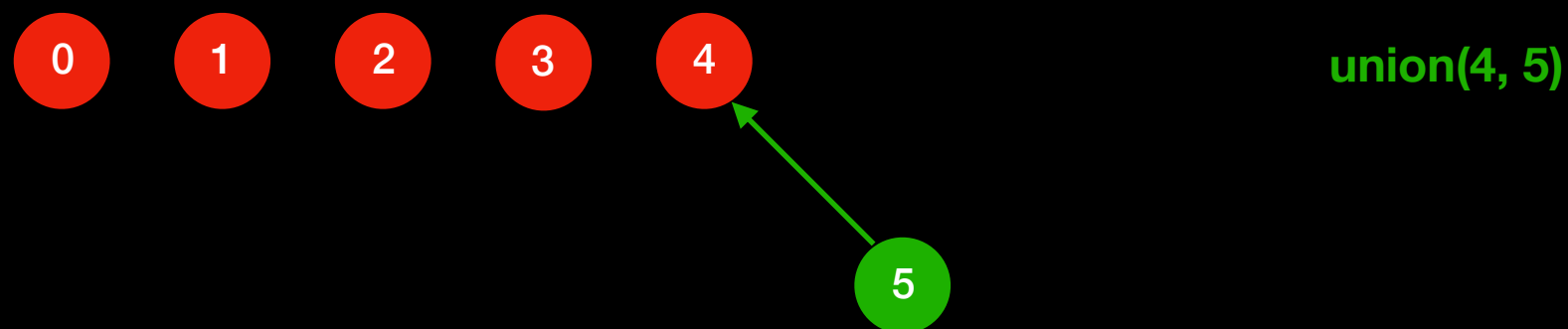
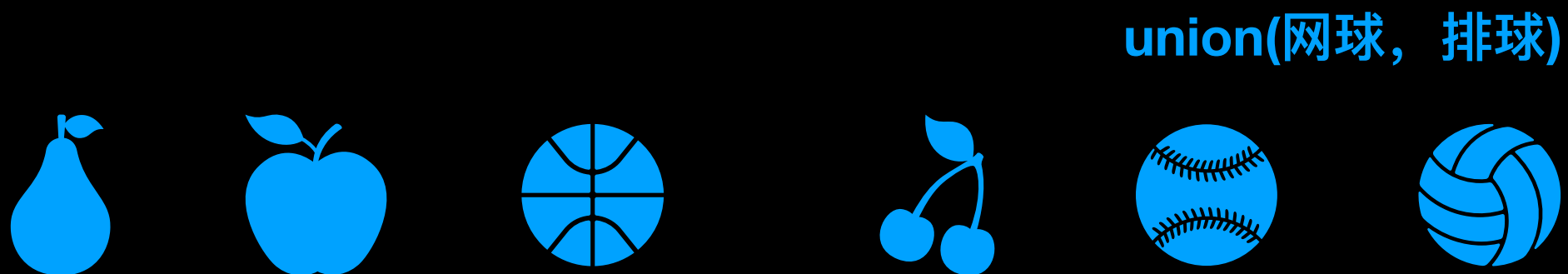
2

3

4

5

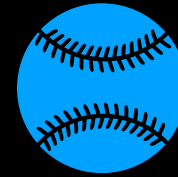
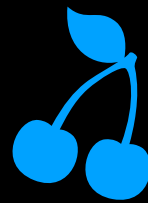
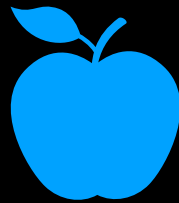
[-1, -1, -1, -1, -1, -1]



[-1, -1, -1, -1, -1, 4]

$s[5] = 4$
节点5的父亲是节点4

union(篮球, 网球)



0

1

2

3

union(2, 4)

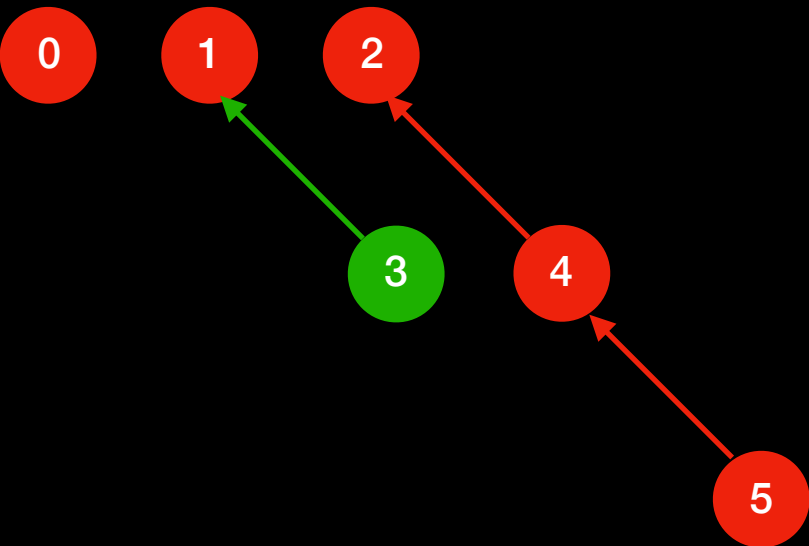
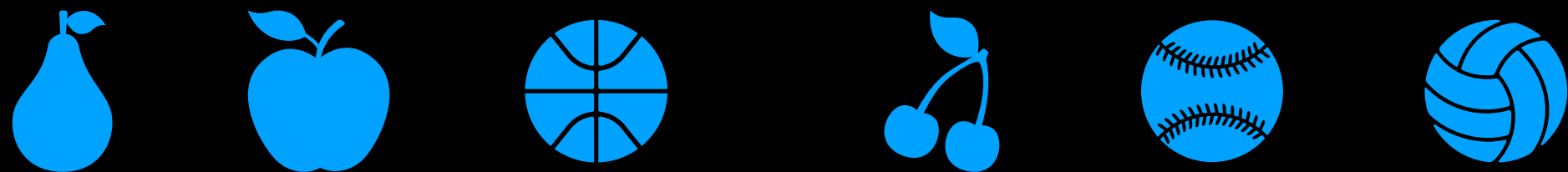
4

5

[-1, -1, -1, -1, 2, 4]

s[4] = 2
节点4的父亲是节点2

union(苹果, 樱桃)

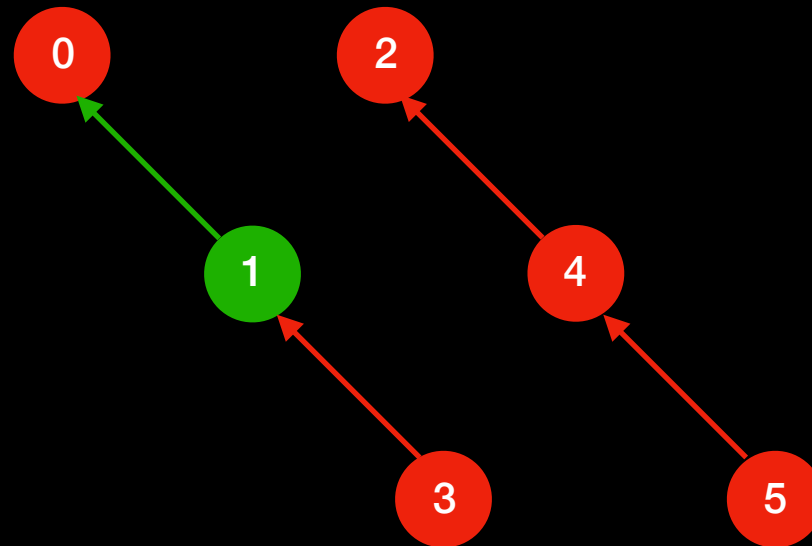
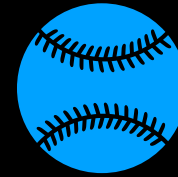
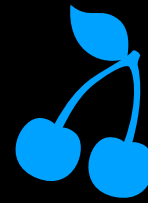
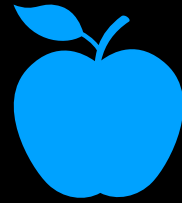
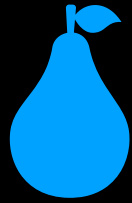


union(1, 3)

[-1, -1, -1, 1, 2, 4]

s[3] = 1
节点3的父亲是节点1

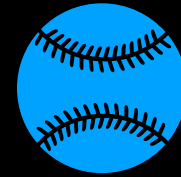
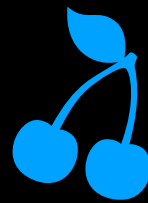
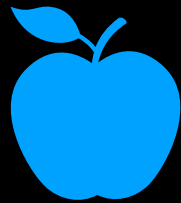
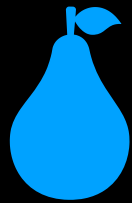
union(梨, 苹果)



union(0, 1)

[-1, 0, -1, 1, 2, 4]

$s[1] = 0$
节点1的父亲是节点0



0

2

1

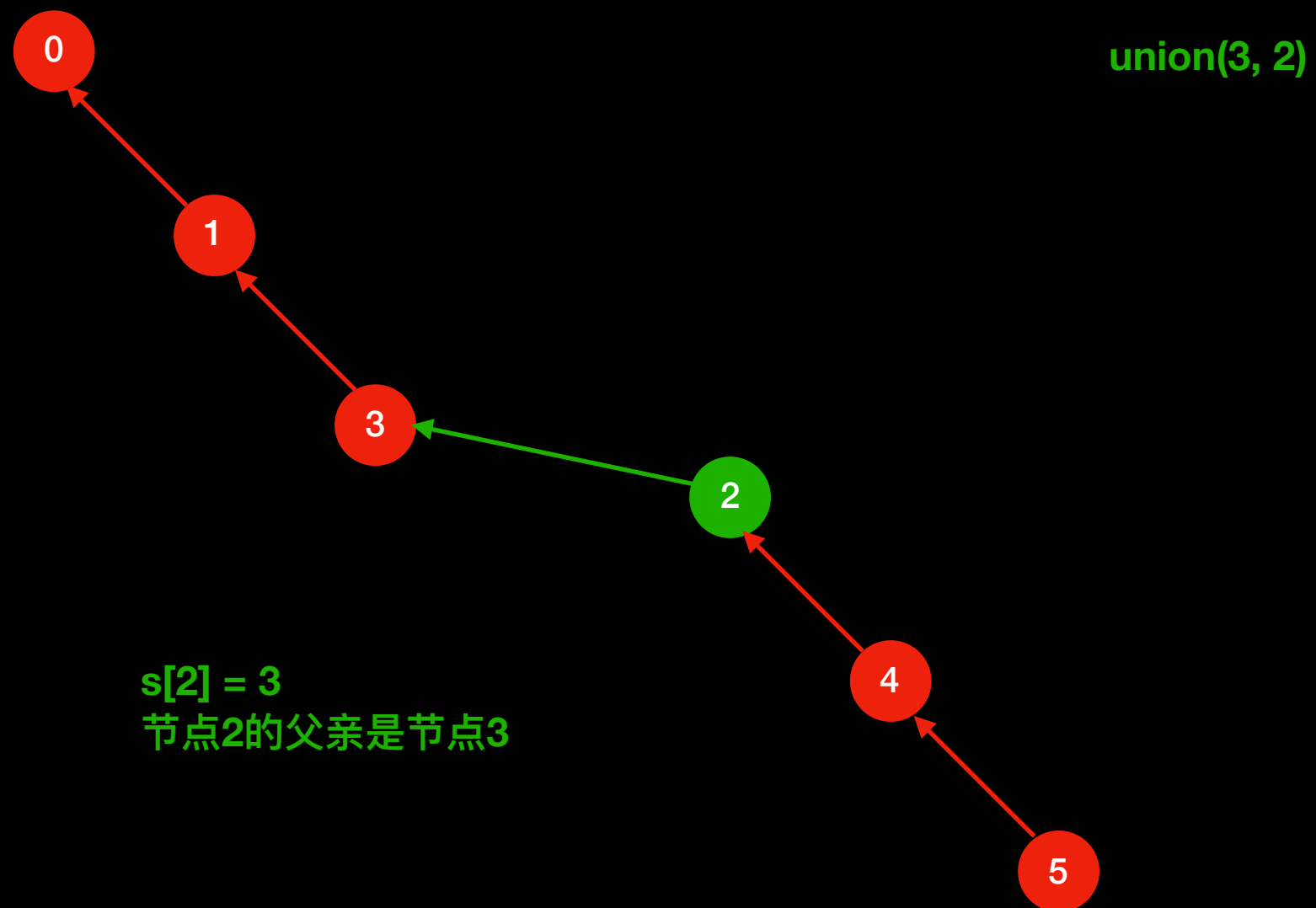
4

3

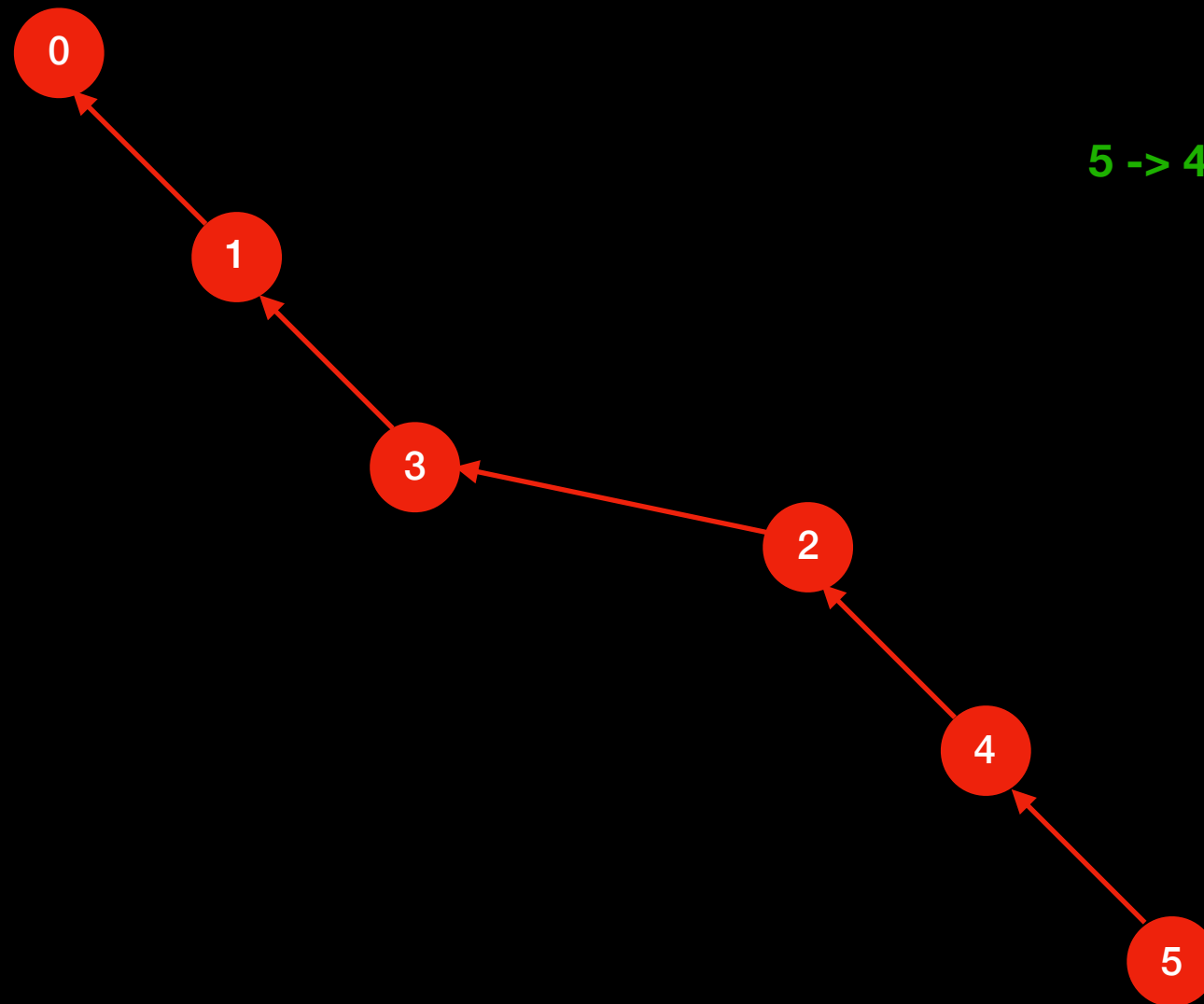
5

[-1, 0, -1, 1, 2, 4]

[-1, 0, 3, 1, 2, 4]



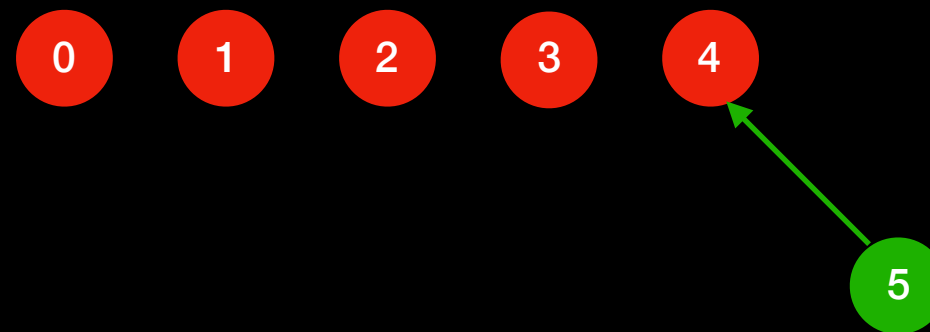
[-1, 0, 3, 1, 2, 4]



find(5)

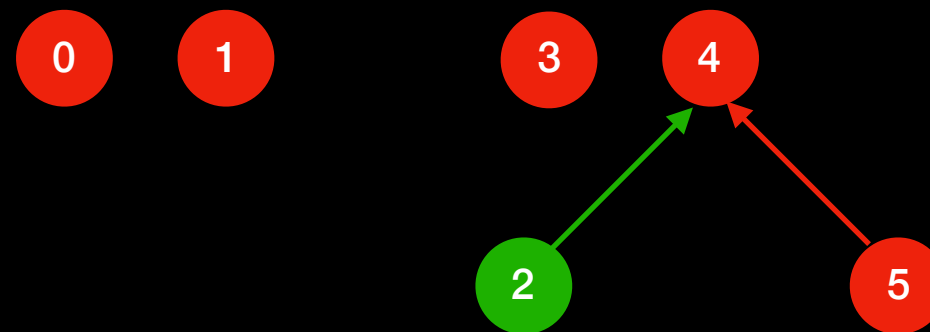
5 -> 4 -> 2 -> 3 -> 1 -> 0

								
Parent	[	0,	1,	2,	3,	4,	5]
Rank	[	1,	1,	1,	1,	1,	1]



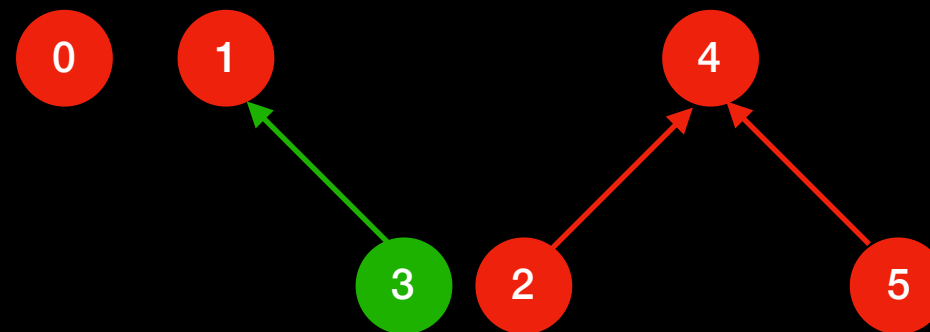
$\text{union}(4, 5)$

Parent	[	0,	1,	2,	3,	4,	4	]	$s[5] = 4$ 节点5的父亲是节点4
Rank	[	1,	1,	1,	1,	2,	1	]	层级加一



union(2, 4)

Parent	[	0,	1,	4,	3,	4,	4	]	$s[2] = 4$ 节点2的父亲是节点4
Rank	[	1,	1,	1,	1,	2,	1	]	$1 < 2$, 节点2指向节点 4



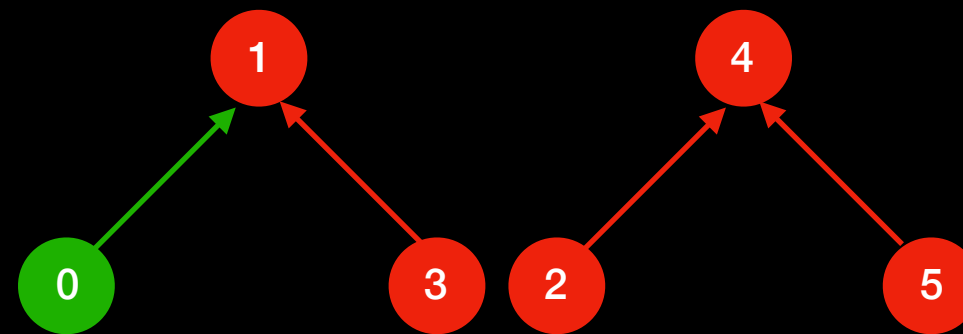
union(1, 3)

Parent [0, 1, 4, 1, 4, 4]

s[3] = 1
节点3的父亲是节点1

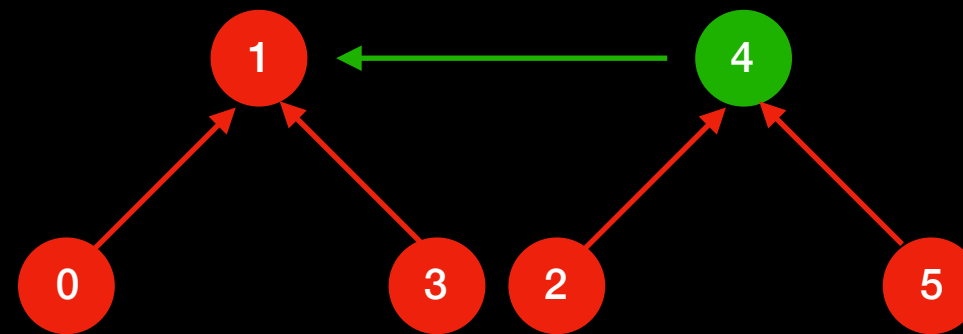
Rank [1, 2, 1, 1, 2, 1]

层级加一



`union(0, 1)`

Parent	[1, 1, 4, 1, 4, 4]	$s[0] = 1$ 节点0的父亲是节点1
Rank	[1, 2, 1, 1, 2, 1]	$1 < 2$, 节点0指向节点1



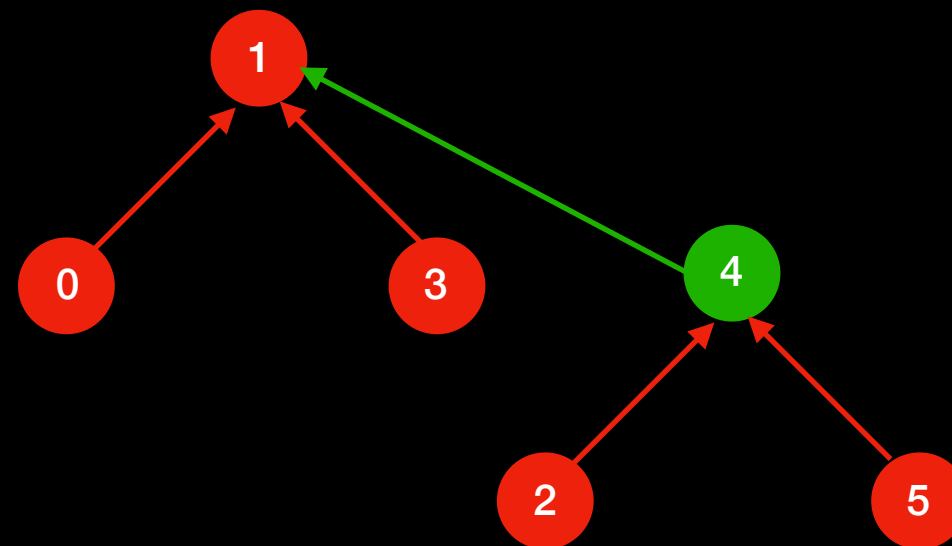
union(3, 2)

Parent [1, 1, 4, 1, 1, 4]

s[4] = 1
节点0的父亲是节点1

Rank [1, 3, 1, 1, 2, 1]

节点4指向节点1



$\text{union}(3, 2) \Leftrightarrow \text{union}(1, 4)$

Parent

[1, 1, 4, 1, 1, 4]

$s[4] = 1$
节点0的父亲是节点1

Rank

[1, 3, 1, 1, 2, 1]

节点4指向节点1