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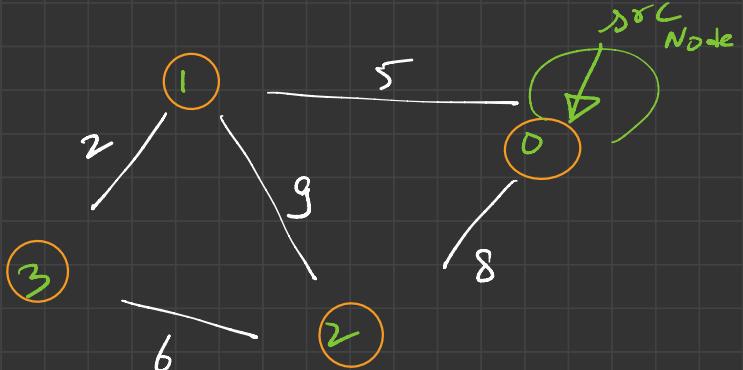
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# Dijkstra's Shortest Path



adj list

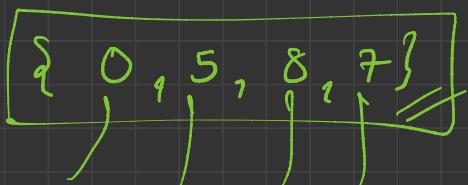
$0 \rightarrow [1, 5], [2, 8]$

$1 \rightarrow [0, 5], [2, 9], [3, 2]$

$2 \rightarrow [0, 8], [1, 9], [3, 6]$

$3 \rightarrow [1, 2], [2, 6]$

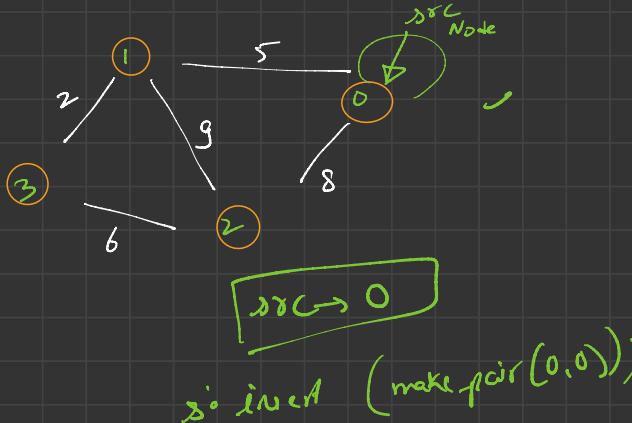
$0 \rightarrow 0 \rightarrow 0$   
 $0 \rightarrow 1 \rightarrow 2$   
 $0 \rightarrow 2 \rightarrow 8$   
 $0 \rightarrow 3 \rightarrow 7$



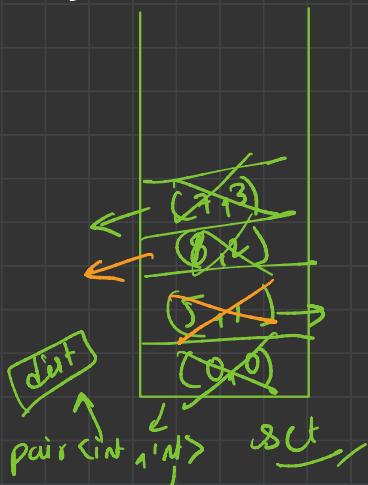
✓ adj list

0 → [1, 5], [2, 8]  
1 → [0, 5], [2, 9] [3, 7]  
2 → [0, 8], [1, 9] [3, 6]  
3 → [1, 2], [2, 6]

approach:



D  
priority queue  
set



top → (0, 0) → topNode

nodeDistance

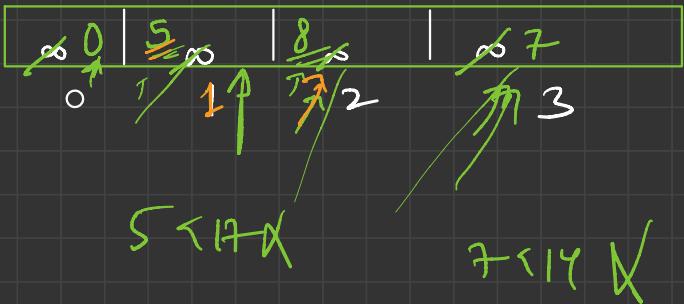
top → (5, 1) → topNode

nodeDistance

dist

(dist, node)

INT\_MAX



node

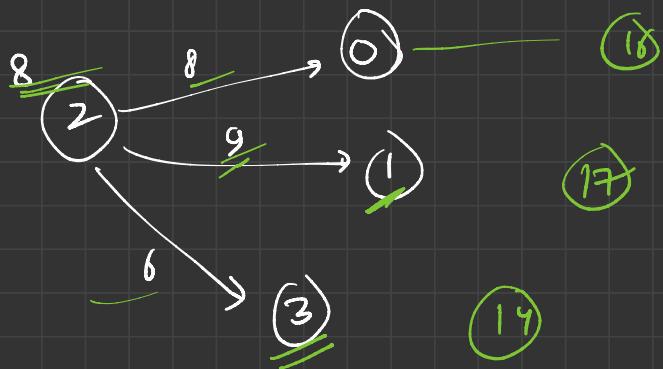
top  $\rightarrow (7, 3)$  top Node

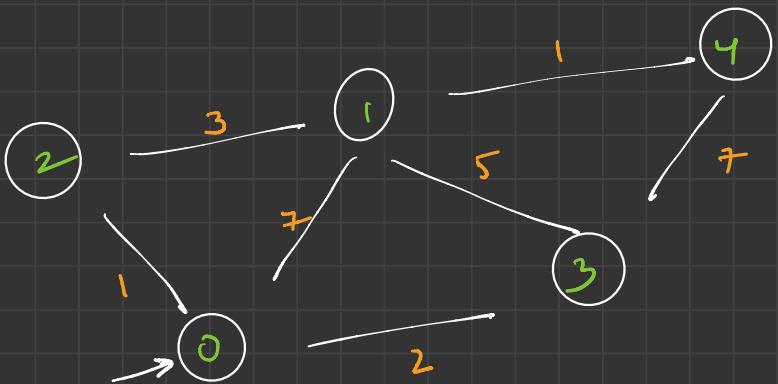
Node Distance

top  $\rightarrow (8, 2)$  top Node

Node Distance

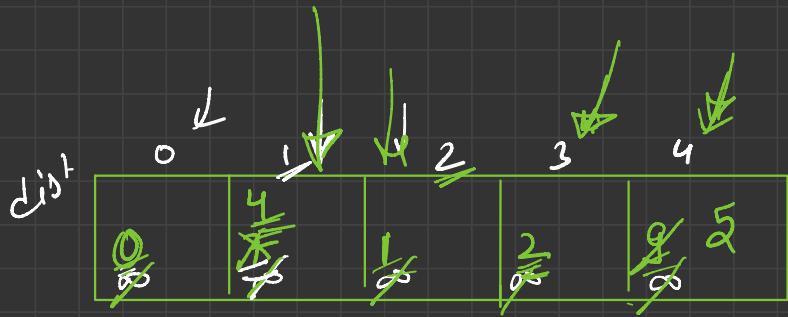
0	1	5	8	7
0	1	2	3	





$\text{src} \rightarrow 0$   
 $\text{dist}[\text{src}] = 0$

$\rightarrow \text{insert}(\text{make\_pair}(0, \text{src}))$



adj

$0 \rightarrow [1, 3], [2, 1], [3, 2]$

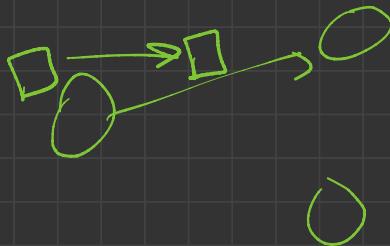
$1 \rightarrow [0, 2], [2, 3], [3, 5]$   
 $[4, 1]$

$2 \rightarrow [0, 1], [1, 3]$

$3 \rightarrow [0, 2], [1, 5], [4, 7]$

$4 \rightarrow [1, 1], [3, 7]$

$\text{dist} \rightarrow \{0, 4, 1, 2, 5\}$



$$T \cdot C \rightarrow O(E \log V)$$

$\downarrow$        $\downarrow$   
copy      vertex

$$S \cdot C \rightarrow O(N + \Sigma)$$

linear













