

1168. Optimize Water Distribution in a Village Premium

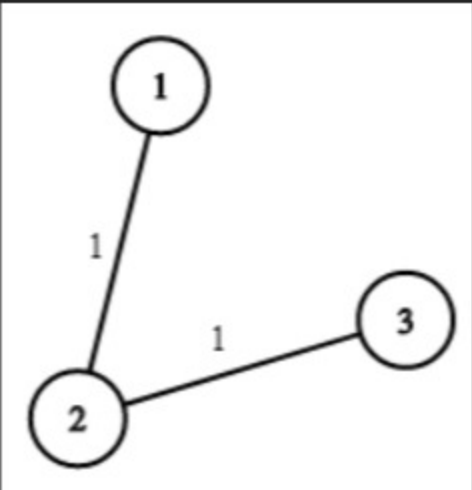
Hard Topics Companies Hint

There are n houses in a village. We want to supply water for all the houses by building wells and laying pipes.

For each house i , we can either build a well inside it directly with cost $wells[i - 1]$ (note the -1 due to **0-indexing**), or pipe in water from another well to it. The costs to lay pipes between houses are given by the array `pipes` where each `pipes[j] = [house1j, house2j, costj]` represents the cost to connect `house1j` and `house2j` together using a pipe. Connections are bidirectional, and there could be multiple valid connections between the same two houses with different costs.

Return *the minimum total cost to supply water to all houses*.

Example 1:



Input: `n = 3, wells = [1,2,2], pipes = [[1,2,1],[2,3,1]]`
Output: `3`
Explanation: The image shows the costs of connecting houses using pipes. The best strategy is to build a well in the first house with cost 1 and connect the other houses to it with cost 2 so the total cost is 3.

Example 2:

Input: `n = 2, wells = [1,1], pipes = [[1,2,1],[1,2,2]]`
Output: `2`
Explanation: We can supply water with cost two using one of the three options:
Option 1:
- Build a well inside house 1 with cost 1.
- Build a well inside house 2 with cost 1.
The total cost will be 2.
Option 2:
- Build a well inside house 1 with cost 1.
- Connect house 2 with house 1 with cost 1.
The total cost will be 2.
Option 3:
- Build a well inside house 2 with cost 1.
- Connect house 1 with house 2 with cost 1.
The total cost will be 2.
Note that we can connect houses 1 and 2 with cost 1 or with cost 2 but we will always choose **the cheapest option**.

Constraints:

- $2 \leq n \leq 10^4$
- `wells.length == n`
- $0 \leq wells[i] \leq 10^5$
- $1 \leq pipes.length \leq 10^4$
- `pipes[j].length == 3`
- $1 \leq house1_j, house2_j \leq n$
- $0 \leq cost_j \leq 10^5$
- `house1j != house2j`

Seen this question in a real interview before? 1/5

Yes No

Accepted 51K | Submissions 78.5K | Acceptance Rate 64.9%

Topics

Union FindGraphHeap (Priority Queue)Minimum Spanning Tree

Companies

0 - 6 months

Google 2

Hint 1

What if we model this problem as a graph problem?

Hint 2

A house is a node and a pipe is a weighted edge.

Hint 3

How to represent building wells in the graph model?

Hint 4

Add a virtual node, connect it to houses with edges weighted by the costs to build wells in these houses.

Hint 5

The problem is now reduced to a Minimum Spanning Tree problem.

Discussion (17)