Problem 3613: Minimize Maximum Component Cost

Problem Information

Difficulty: Medium
Acceptance Rate: 43.16%
Paid Only: No
Tags: Binary Search, Union Find, Graph, Sorting

Problem Description

You are given an undirected connected graph with `n` nodes labeled from 0 to `n - 1` and a 2D integer array `edges` where `edges[i] = [ui, vi, wi]` denotes an undirected edge between node `ui` and node `vi` with weight `wi`, and an integer `k`.

You are allowed to remove any number of edges from the graph such that the resulting graph has **at most** `k` connected components.

The **cost** of a component is defined as the **maximum** edge weight in that component. If a component has no edges, its cost is 0.

Return the **minimum** possible value of the **maximum** cost among all components **after such removals**.

Example 1:

Input: n = 5, edges = [[0,1,4],[1,2,3],[1,3,2],[3,4,6]], k = 2

Output: 4

Explanation:

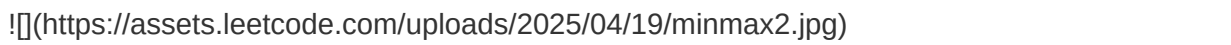
* Remove the edge between nodes 3 and 4 (weight 6). * The resulting components have costs of 0 and 4, so the overall maximum cost is 4.

Example 2:

Input: n = 4, edges = [[0,1,5],[1,2,5],[2,3,5]], k = 1

Output: 5

Explanation:



* No edge can be removed, since allowing only one component (`k = 1`) requires the graph to stay fully connected. * That single component's cost equals its largest edge weight, which is 5.

Constraints:

* `1 <= n <= 5 * 104` * `0 <= edges.length <= 105` * `edges[i].length == 3` * `0 <= ui, vi < n` * `1 <= wi <= 106` * `1 <= k <= n` * The input graph is connected.

Code Snippets

C++:

```
class Solution {
public:
int minCost(int n, vector<vector<int>>& edges, int k) {

}
};
```

Java:

```
class Solution {
public int minCost(int n, int[][] edges, int k) {

}
}
```

Python3:

```
class Solution:
def minCost(self, n: int, edges: List[List[int]], k: int) -> int:
```