Problem 1786: Number of Restricted Paths From First to Last Node

Problem Information

Difficulty: Medium
Acceptance Rate: 40.60%
Paid Only: No
Tags: Dynamic Programming, Graph, Topological Sort, Heap (Priority Queue), Shortest Path

Problem Description

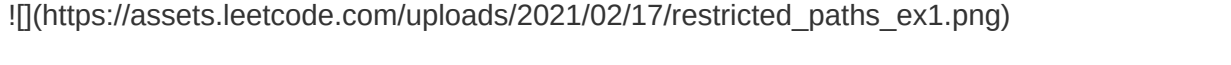
There is an undirected weighted connected graph. You are given a positive integer `n` which denotes that the graph has `n` nodes labeled from `1` to `n`, and an array `edges` where each `edges[i] = [ui, vi, weighti]` denotes that there is an edge between nodes `ui` and `vi` with weight equal to `weighti`.

A path from node `start` to node `end` is a sequence of nodes `[z0, z1, z2, ..., zk]` such that `z0 = start` and `zk = end` and there is an edge between `zi` and `zi+1` where `0 <= i <= k-1`.

The distance of a path is the sum of the weights on the edges of the path. Let `distanceToLastNode(x)` denote the shortest distance of a path between node `n` and node `x`. A **restricted path** is a path that also satisfies that `distanceToLastNode(zi) > distanceToLastNode(zi+1)` where `0 <= i <= k-1`.

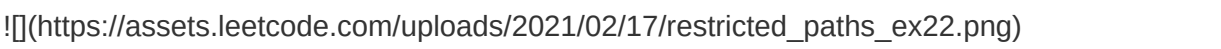
Return _the number of restricted paths from node_ `1` _to node_ `n`. Since that number may be too large, return it **modulo** `109 + 7`.

Example 1:



Input: n = 5, edges = [[1,2,3],[1,3,3],[2,3,1],[1,4,2],[5,2,2],[3,5,1],[5,4,10]] **Output:** 3 **Explanation:** Each circle contains the node number in black and its distanceToLastNode value in blue. The three restricted paths are: 1) 1 --> 2 --> 5 2) 1 --> 2 --> 3 --> 5 3) 1 --> 3 --> 5

Example 2:



Input: n = 7, edges = [[1,3,1],[4,1,2],[7,3,4],[2,5,3],[5,6,1],[6,7,2],[7,5,3],[2,6,4]] **Output:** 1 **Explanation:** Each circle contains the node number in black and its distanceToLastNode value in blue. The only restricted path is 1 --> 3 --> 7.

Constraints:

* `1 <= n <= 2 * 104` * `n - 1 <= edges.length <= 4 * 104` * `edges[i].length == 3` * `1 <= ui, vi <= n` * `ui != vi` * `1 <= weighti <= 105` * There is at most one edge between any two nodes. * There is at least one path between any two nodes.

Code Snippets

C++:

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

}
};
```

Java:

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

}
}
```

Python3:

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