Problem 3607: Power Grid Maintenance

Problem Information

Difficulty: Medium
Acceptance Rate: 56.80%
Paid Only: No
Tags: Array, Hash Table, Depth-First Search, Breadth-First Search, Union Find, Graph, Heap (Priority Queue), Ordered Set

Problem Description

You are given an integer `c` representing `c` power stations, each with a unique identifier `id` from 1 to `c` (1■based indexing).

These stations are interconnected via `n` **bidirectional** cables, represented by a 2D array `connections`, where each element `connections[i] = [ui, vi]` indicates a connection between station `ui` and station `vi`. Stations that are directly or indirectly connected form a **power grid**.

Initially, **all** stations are online (operational).

You are also given a 2D array `queries`, where each query is one of the following _two_ types:

* `[1, x]`: A maintenance check is requested for station `x`. If station `x` is online, it resolves the check by itself. If station `x` is offline, the check is resolved by the operational station with the smallest `id` in the same **power grid** as `x`. If **no** **operational** station _exists_ in that grid, return -1.

* `[2, x]`: Station `x` goes offline (i.e., it becomes non-operational).

Return an array of integers representing the results of each query of type `[1, x]` in the **order** they appear.

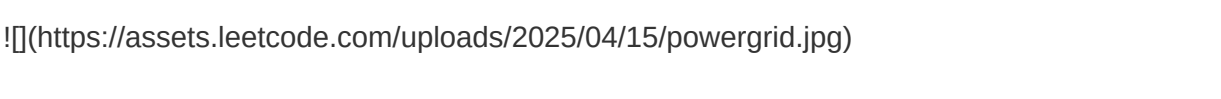
Note: The power grid preserves its structure; an offline (non■operational) node remains part of its grid and taking it offline does not alter connectivity.

Example 1:

Input: c = 5, connections = [[1,2],[2,3],[3,4],[4,5]], queries = [[1,3],[2,1],[1,1],[2,2],[1,2]]

Output: [3,2,3]

Explanation:



* Initially, all stations `{1, 2, 3, 4, 5}` are online and form a single power grid. * Query `[1,3]`: Station 3 is online, so the maintenance check is resolved by station 3. * Query `[2,1]`: Station 1 goes offline. The remaining online stations are `{2, 3, 4, 5}`. * Query `[1,1]`: Station 1 is offline, so the check is resolved by the operational station with the smallest `id` among `{2, 3, 4, 5}`, which is station 2. * Query `[2,2]`: Station 2 goes offline. The remaining online stations are `{3, 4, 5}`. * Query `[1,2]`: Station 2 is offline, so the check is resolved by the operational station with the smallest `id` among `{3, 4, 5}`, which is station 3.

Example 2:

Input: c = 3, connections = [], queries = [[1,1],[2,1],[1,1]]

Output: [1,-1]

Explanation:

* There are no connections, so each station is its own isolated grid. * Query `[1,1]`: Station 1 is online in its isolated grid, so the maintenance check is resolved by station 1. * Query `[2,1]`: Station 1 goes offline. * Query `[1,1]`: Station 1 is offline and there are no other stations in its grid, so the result is -1.

Constraints:

* `1 <= c <= 105` * `0 <= n == connections.length <= min(105, c * (c - 1) / 2)` * `connections[i].length == 2` * `1 <= ui, vi <= c` * `ui != vi` * `1 <= queries.length <= 2 * 105` * `queries[i].length == 2` * `queries[i][0]` is either 1 or 2. * `1 <= queries[i][1] <= c`

Code Snippets

C++:

```
class Solution {
public:
vector<int> processQueries(int c, vector<vector<int>>& connections,
vector<vector<int>>& queries) {

}
};
```

Java:

```
class Solution {
public int[] processQueries(int c, int[][] connections, int[][] queries) {

}
}
```

Python3:

```
class Solution:
def processQueries(self, c: int, connections: List[List[int]], queries:
List[List[int]]) -> List[int]:
```