Assignment

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Branch: BE-CSE **Section/Group: 22BCS_IOT-614 B**
Semester: 06 **Date of Performance: 07/04/2025**
Subject: Advanced Programming **Subject code: 22CSP-351**

1. **Problem: Set Matrix Zeroes:** Given an m x n matrix, if an element is 0, set its entire row and column to 0.

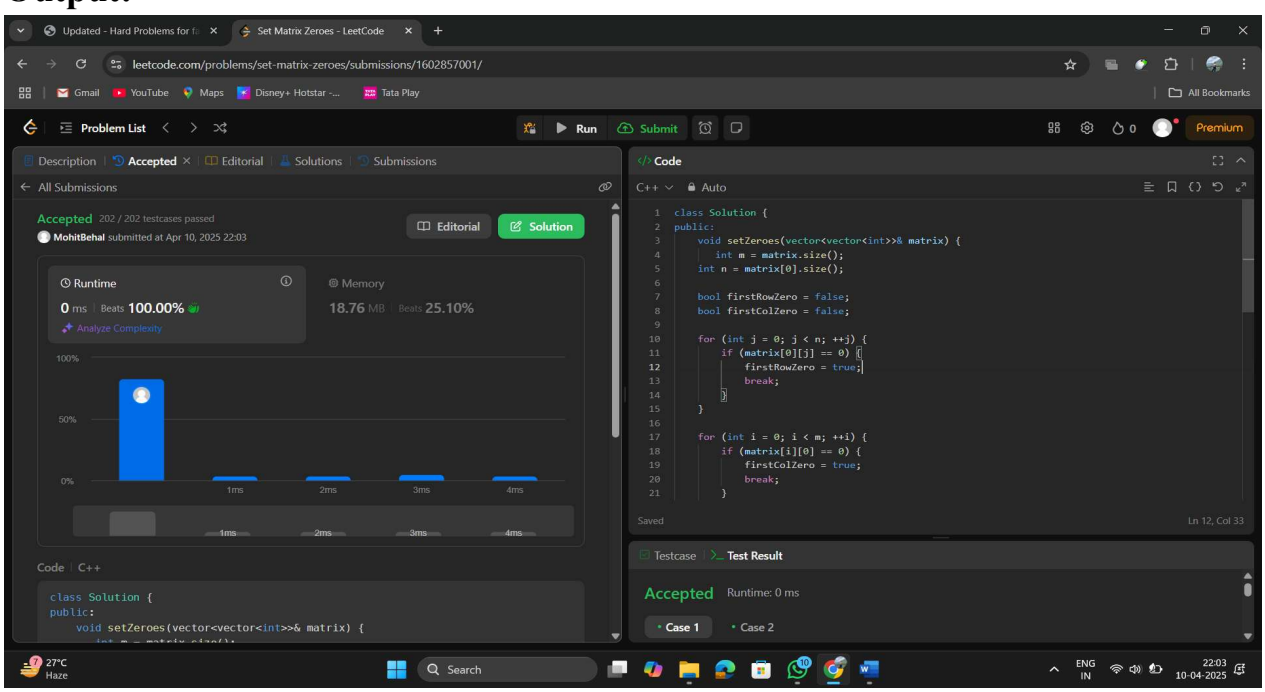
Code:

```
class Solution {
public:
    void setZeroes(vector<vector<int>>& matrix) {
      int m = matrix.size();
    int n = matrix[0].size();

    bool firstRowZero = false;
    bool firstColZero = false;
    for (int j = 0; j < n; ++j) {
        if (matrix[0][j] == 0) {
            firstRowZero = true;
            break;
        }
    }
    for (int i = 0; i < m; ++i) {
        if (matrix[i][0] == 0) {
            firstColZero = true;
            break;
        }
    }
    for (int i = 1; i < m; ++i) {
        for (int j = 1; j < n; ++j) {
            if (matrix[i][j] == 0) {
                matrix[i][0] = 0;
                matrix[0][j] = 0;
            }
```

```
        }
    }
    for (int i = 1; i < m; ++i) {
        for (int j = 1; j < n; ++j) {
            if (matrix[i][0] == 0 || matrix[0][j] == 0) {
                matrix[i][j] = 0;
            }
        }
    }
    if (firstRowZero) {
        for (int j = 0; j < n; ++j) {
            matrix[0][j] = 0;
        }
    }
    if (firstColZero) {
        for (int i = 0; i < m; ++i) {
            matrix[i][0] = 0;
        }
    }
    }
};
```

Output:



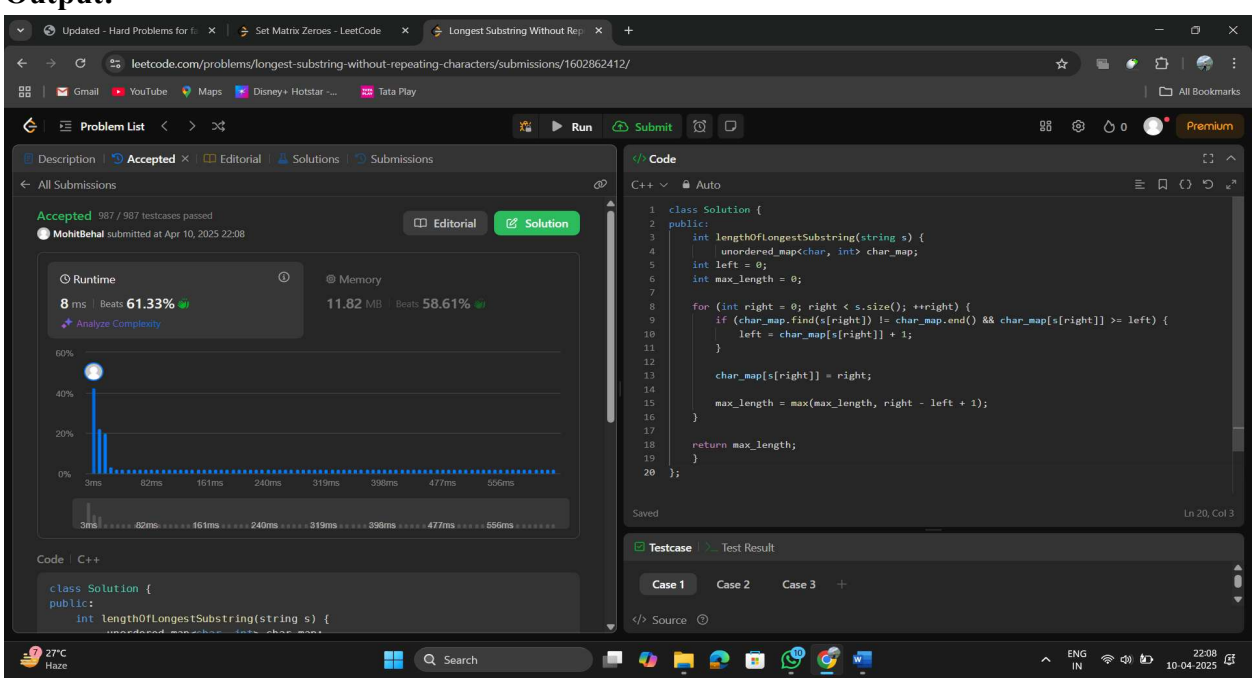
2. **Problem: Longest Substring Without Repeating Characters:** Given a string s, find the length of the longest substring that does not contain any repeating characters.

Code:

```
class Solution {
public:
   int lengthOfLongestSubstring(string s) {
       unordered_map<char, int> char_map;
   int left = 0;
   int max_length = 0;

   for (int right = 0; right < s.size(); ++right) {
      if (char_map.find(s[right]) != char_map.end() && char_map[s[right]] >= left) {
         left = char_map[s[right]] + 1;
      }
      char_map[s[right]] = right;
      max_length = max(max_length, right - left + 1);
   }
   return max_length;
   }
};
```

Output:



3. **Problem: Reverse Linked List II:** Given the head of a singly linked list and two integers left and right, reverse the nodes of the list from position left to right.

Code:

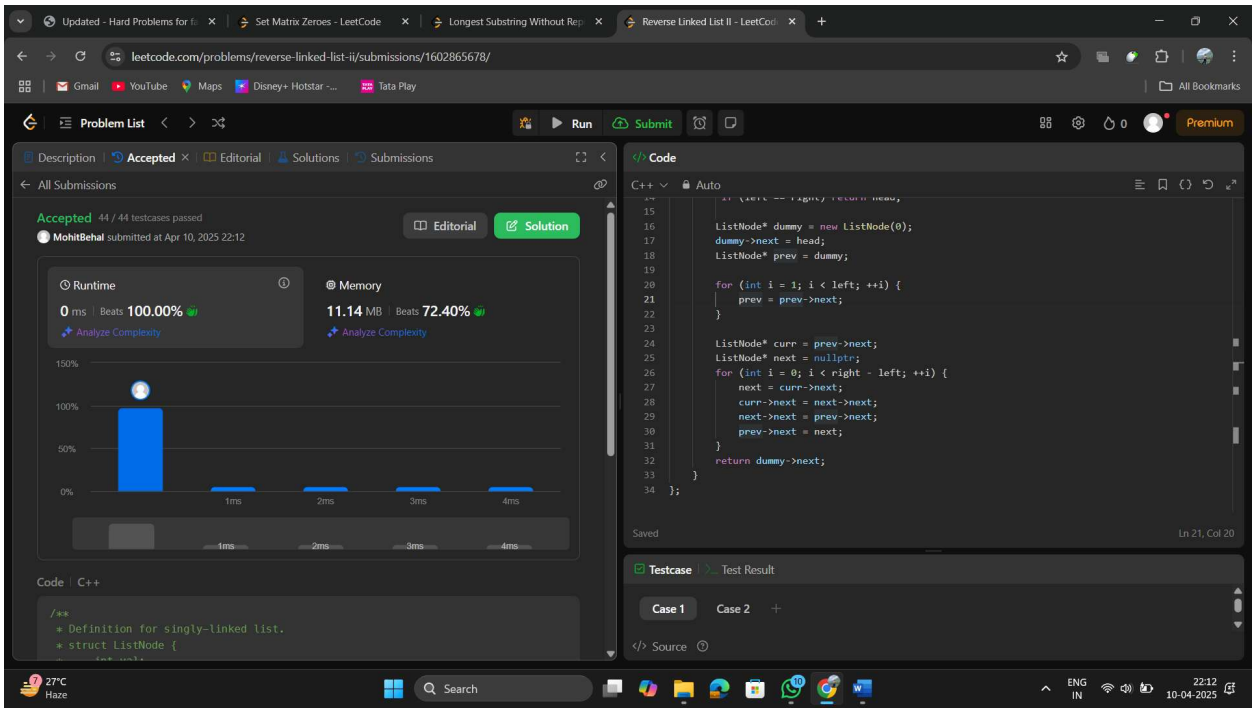
```
class Solution {
public:
   ListNode* reverseBetween(ListNode* head, int left, int right) {
       if (left == right) return head;

      ListNode* dummy = new ListNode(0);
      dummy->next = head;
      ListNode* prev = dummy;

      for (int i = 1; i < left; ++i) {
         prev = prev->next;
      }

      ListNode* curr = prev->next;
      ListNode* next = nullptr;
      for (int i = 0; i < right - left; ++i) {
         next = curr->next;
         curr->next = next->next;
         next->next = prev->next;
         prev->next = next;
      }
      return dummy->next;
   }
};
```

Output:



4. **Problem: Detect a Cycle in a Linked List:** Given the head of a linked list, determine whether the linked list contains a cycle. A cycle occurs if a node's next pointer points to a previous node in the list.

Code:

```
class Solution {
public:
   bool hasCycle(ListNode *head) {
       if (!head || !head->next) return false;

      ListNode *slow = head, *fast = head;

      while (fast && fast->next) {
         slow = slow->next;
         fast = fast->next->next;

         if (slow == fast) {
            return true;
         }
```

```
        }
        return false;
    }
};
```

Output: