EX-1.15

Title :

Find intervals of every large group (3 or more consecutive identical characters) in a string.

Aim:

To design and implement a Python program to identify intervals of large groups of the same character (length ≥ 3) in a given string.

Procedure:

1. Read input string `s`.
2. Initialize variables to track the start index of the current group.
3. Traverse through the string `s`:
    - When the current character changes or the end of the string is reached, determine the length of the current group.
    - If the current group length is 3 or more, save the interval `[start, end]`.
    - Update start index to current position.
4. After traversal, output the list of intervals for all large groups sorted by increasing start index.

Algorithm:

1. Start
2. Read string `s`.
3. Initialize `start = 0`, result list `res = []`.
4. For `i` in range `1` to length of `s`:
    - If `s[i] != s[i-1]` or `i == len(s)`:
        - Compute length `l = i - start`
        - If `l >= 3`: append `[start, i-1]` to `res`
        - Update `start = i`
5. Return `res`.
6. Stop

Input:

abbxxxxzzy

abc

Output:

[[3, 6]]

[]

Program :

```
def largeGroupPositions(s):
    res = []
    start = 0

    for i in range(1, len(s) + 1):
        # When character changed or end of string reached
        if i == len(s) or s[i] != s[i - 1]:
            length = i - start
            if length >= 3:
                res.append([start, i - 1])
            start = i
    return res
s = input("Enter the string: ")

result = largeGroupPositions(s)
print(result)
```

Performance Analysis:

Time Complexity: O(n)

Space Complexity: O(k)

program output:

```
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def large_group_positions(s):
    result = []
    start = 0
    n = len(s)

    for i in range(1, n + 1):
        if i == n or s[i] != s[i - 1]:
            length = i - start
            if length >= 3:
                result.append([start, i - 1])
            start = i
    return result

s = input("Enter the string: ")

output = large_group_positions(s)
print("Intervals of large groups:", output)
```

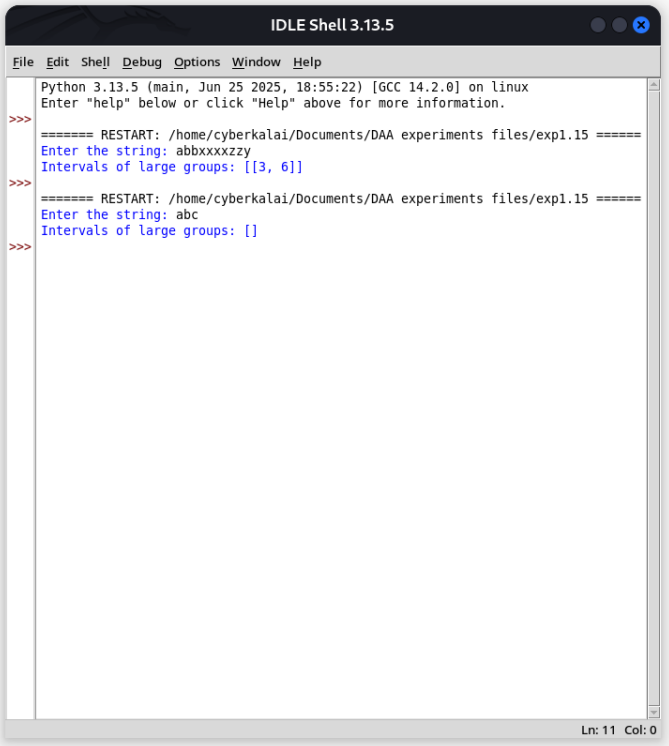

Result :

Thus the given program Large Groups Identification is executed and got output successfully.