PIMPRI CHINCHWAD EDUCATION TRUST's.

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

(An Autonomous Institute)

Class : SY BTech **Acad. Yr. 2025-26** **Semester : I**

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Department: Computer Engineering **Division :** A

Course Name : Data Structures and Laboratory

Course Code: BCE23PC02

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Problem Statement:

Develop a program to check whether a given string is a **palindrome** using **stack operations**. A palindrome is a string that reads the same backward as forward, such as *madam*, *racecar*, or *level*. Use stack data structure to compare characters from the beginning and end of the string efficiently.

Source Code :

https://github.com/omkhalane/DSAL-SY-PCCOE/blob/main/lab_assignments/assignment07.cpp

```cpp
#include <bits/stdc++.h>
using namespace std;


int main()
{
    string str;
    // mam,madam,racecar,maam
    // list<char> ll;
    // SLL ll;
    stack<char> st;
```

```
        cout << "Enter string: ";
        getline(cin, str);
        int n = str.size(), i = 0;
        while (i < n / 2)
        {
            st.push(str[i]);
            // cout << st.top()<<endl;
            i++;
        }
        // cout << "out of loop" << endl;
        if (n % 2 != 0)
        {
            i++;
            // cout << str[i] << endl;
        }
        while (i < n)
        {
            // cout << st.top() << " " << str[i]<<endl;
            if (st.top() != str[i])
            {
                cout << "Not a palindrome" << endl;
                return 0;
            }
            st.pop();
            i++;
        }
        cout << "Is Palindrome" << endl;
        return 0;
    }
```

Conclusion:

A **stack** is a linear data structure that follows **LIFO (Last In, First Out)** principle.

- The palindrome check involves pushing the first half of the string characters into the stack.
- Then, the second half of the string is compared with elements popped from the stack one by one.
- If all corresponding characters match, the string is a palindrome.

Time Complexity (TC):

- **O(n)** — Each character of the string is processed once either by push or pop operation.

Space Complexity (SC):

- **O(n/2) ≈ O(n)** — Half of the string's characters are stored in the stack for comparison.