**5. Longest Palindromic Substring: -**

Medium Accepted: 2.7M Submissions: 8.1M Acceptance Rate: 33.0%

Given a string s, return *the longest*

*palindromic*

*substring*

 in s.

**Example 1:**

**Input:** s = "babad"

**Output:** "bab"

**Explanation:** "aba" is also a valid answer.

**Example 2:**

**Input:** s = "cbbd"

**Output:** "bb"

**Constraints:**

* 1 <= s.length <= 1000
* s consist of only digits and English letters.

**Code: -**

class Solution {

public:

    string longestPalindrome(string s) {

        int n = s.size();

        // auxillary space creation and filling

        vector<char> str(2\*n + 1, '#');

        vector<int> lpss(2\*n + 1, 0);

        for(int i = 0; i < n; ++i)

            str[2\*i + 1] = s[i];

        // actual Manacher's Algorithm

        int center = 0, right = 0, curmirror, newleft, newright;

        int maxlength = 0, maxlengthcenter = center;

        for(int i = 0; i < str.size(); ++i){

            curmirror = center - (i - center);

            if(i < right)

                lpss[i] = min(lpss[curmirror], right - i);

            // for new pallindrome (large/same) center at 'i'

            newleft = (i - lpss[i]) - 1;

            newright = (i + lpss[i]) + 1;

            while(0 <= newleft and newright < str.size() and str[newleft] == str[newright]){

                --newleft;

                ++newright;

                ++lpss[i];

            }

            if(maxlength < lpss[i]){

                maxlength = lpss[i];

                maxlengthcenter = i;

            }

            if(right < i + lpss[i]){

                center = i;

                right = i + lpss[i];

            }

        }

        // forming actual answer string

        string ans = "";

        int i = maxlengthcenter, j = maxlengthcenter;

        cout << "(" << maxlength << "," << maxlengthcenter << ")";

        while(0 <= i and j < str.size() and maxlengthcenter - i <= maxlength){

            if(j != i and str[i] != '#')

                ans = str[i] + ans + str[j];

            else if(str[i] != '#')

                ans += str[i];

            --i;

            ++j;

        }

        return ans;

    }

};

**T.C: - O(N)**

**S.C: - O(N)**