

Data Structures and Algorithms

Lab Report

Lab07



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Class	Data Structures and Algorithms CSC211 (BCE-3B)
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In Lab Tasks

Task:1

Convert the following iterative function to a recursive one.

Solution:

The code is shown below,

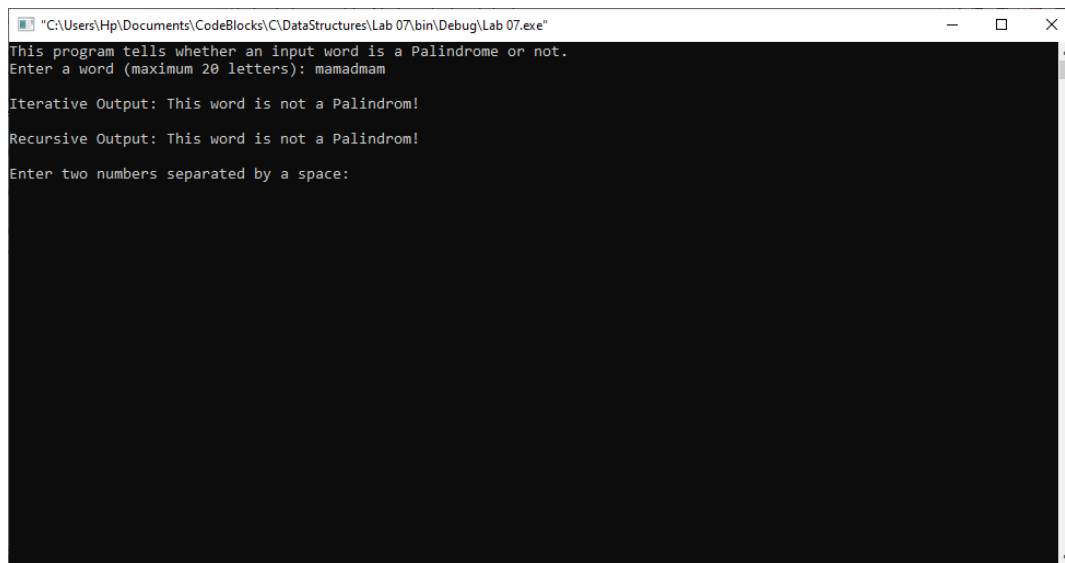
Code:

```
bool test_palindrome_rec(char * test_word, int size)
{
    /** Complete this function **/

    if ((* (test_word+iiii)) != (* (test_word+size-1)))
    {
        return(false);
    }
    else
    {
        if (size != ((firstlength/2)+1))
        {
            iiii++;
            size--;
            test_palindrome_rec(test_word, size);
        }
    }
    return(true);

    /// You may change the prototype of the function to include more arguments.
}
```

The Result of the following code is attached below:



```
"C:\Users\Hp\Documents\CodeBlocks\C\DataStructures\Lab 07\bin\Debug\Lab 07.exe"
This program tells whether an input word is a Palindrome or not.
Enter a word (maximum 20 letters): mamadmam

Iterative Output: This word is not a Palindrom!
Recursive Output: This word is not a Palindrom!
Enter two numbers separated by a space:
```

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Task:2

Convert the following recursive function to iterative one.

$$\text{GCD}(a, b) = \begin{cases} b, & \text{if } b \text{ divides } a \\ \text{GCD}(b, a \bmod b), & \text{otherwise} \end{cases}$$

Solution:

The code is shown below,

```

int GCD_itr(int x, int y)
{
    /** Complete this function **/
    int f;
    if (x<y)
    {
        f=x;
        x=y;
        y=f;
    }
    int rem1;
    rem1 = x%y;

    if(rem1==0)
        return y;
    else
    {
        int rem2;
        rem2=(x/y);
        while (rem2>1)
        {
            rem2=x/y;
            x=y;
            y=rem2;
        }
        if(rem2!=0)
            return y;
        return x;
    }
}

```

The Result of the following code is attached below:

The screenshot shows a Windows command prompt window titled "C:\Users\Hp\Documents\CodeBlocks\C\DataStructures\Lab 07\bin\Debug\Lab 07.exe". The output of the program is as follows:

```

This program tells whether an input word is a Palindrome or not.
Enter a word (maximum 20 letters): mamadmam

Iterative Output: This word is not a Palindrom!
Recursive Output: This word is not a Palindrom!

Enter two numbers separated by a space: 7 7

Recursive Output: GCD of 7 and 7 = 7
Iterative Output: GCD of 7 and 7 = 7
Process returned 0 (0x0)   execution time : 47.242 s
Press any key to continue.

```

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Post Lab Task.

Task 3:

Write a program to reverse a string using recursion.

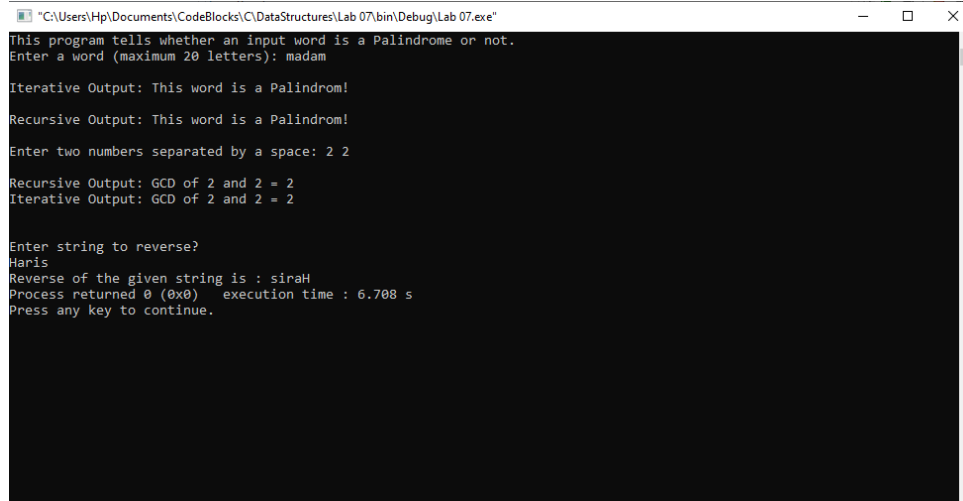
Solution

The code is shown below,

```
void swap(char *x, char *y)
{
    char temp = *x;
    *x = *y;
    *y = temp;
}

void reverse(char str[], int l, int h)
{
    if (l < h)
    {
        swap(&str[l], &str[h]);
        reverse(str, l + 1, h - 1);
    }
}
```

The Result of the following code is attached below:



```
"C:\Users\Hp\Documents\CodeBlocks\C\DataStructures\Lab 07\bin\Debug\Lab 07.exe"
This program tells whether an input word is a Palindrome or not.
Enter a word (maximum 20 letters): madam

Iterative Output: This word is a Palindrom!
Recursive Output: This word is a Palindrom!

Enter two numbers separated by a space: 2 2

Recursive Output: GCD of 2 and 2 = 2
Iterative Output: GCD of 2 and 2 = 2

Enter string to reverse?
Haris
Reverse of the given string is : siraH
Process returned 0 (0x0)   execution time : 6.708 s
Press any key to continue.
```

THE END