Vellore Institute of Technology
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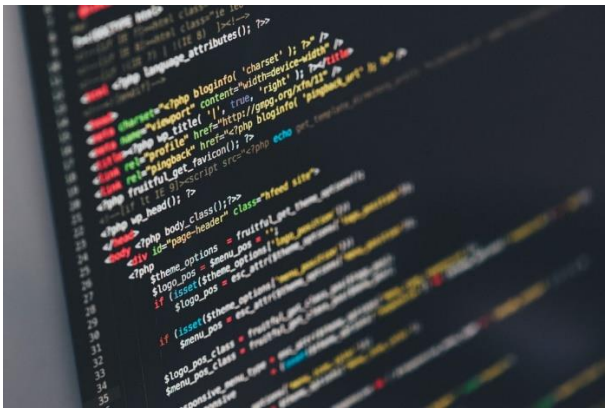
LAB MID TERM

CSE2011 – DATA STRUCTURES AND ALGORITHMS LAB



(B.Tech. CSE Specialisation in Bioinformatics)

WINTER SEMESTER 2020-2021

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VIT – A Place to Learn; A Chance to Grow

Q1) Write a program to implement LIFO data structure removing duplicate elements while entering using static implementation.

CODE

```
#include <iostream>
using namespace std;

int stack[100], top = -1, MAXSIZE, choice;

bool isEmpty();
bool isFull();
bool duplicateFound(int);
void pop();
void push();
void displayStack();

int main()
{
    cout << "Enter number of elements in stack ? " << endl;
    cin >> MAXSIZE;
    cout << "*****************************" << endl;
    cout << "1. PUSH" << endl
         << "2. POP" << endl
         << "3. DISPLAY" << endl
         << "4. EXIT" << endl;
    cout << "*****************************" << endl;
    while (choice != 4)
    {
        cout << "Enter your choice ? " << endl;
        cin >> choice;
        switch (choice)
        {
        case 1:
            push();
            break;
        case 2:
            pop();
            break;
        case 3:
            displayStack();
```

```
            break;
        case 4:
            cout << "Exiting..." << endl;
            break;
        default:
            cout << "Invalid choice!!" << endl;
        }
    }
    return 0;
}

bool isEmpty()
{
    if (top == -1)
    {
        return true;
    }
    else
    {
        return false;
    }
}

bool isFull()
{
    if (top == MAXSIZE - 1)
    {
        return true;
    }
    else
    {
        return false;
    }
}

bool duplicateFound(int x)
{
    for (int i = top; i >= 0; i--)
    {
        if (stack[i] == x)
        {
            return true;
```

```
        }
    }
    return false;
}

void pop()
{
    if (isEmpty())
    {
        cout << "Stack Underflow" << endl;
    }
    else
    {
        top = top - 1;
    }
}

void push()
{
    int data;
    cout << "Enter data to be pushed: " << endl;
    cin >> data;
    if (isFull())
    {
        cout << "Stack Overflow" << endl;
    }
    else if (duplicateFound(data))
    {
        cout << "Duplicate Found, Element not inserted." << endl;
    }
    else
    {
        top = top + 1;
        stack[top] = data;
        cout << "Element inserted Successfully!!" << endl;
    }
}

void displayStack()
{
    if (isEmpty())
    {
```

```
        cout << "Nothing to Display, Stack is empty" << endl;
    }
    else
    {
        cout << "Elements of Stack->" << endl;
        for (int i = top; i >= 0; i--)
        {
            cout << stack[i] << endl;
        }
    }
}
```

OUTPUT IN TEXT FORMAT

Windows PowerShell

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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\VIT Semester\Winter Semester 2020\DSA\Lab\MTT> cd "e:\VIT Semester\Winter Semester 2020\DSA\Lab\MTT\Programs\" ; if ($?) { g++ mttQ1.cpp -o mttQ1 } ; if ($?) { .\mttQ1 }

Enter number of elements in stack ?

5

****

1. PUSH

2. POP

3. DISPLAY

4. EXIT

****

Enter your choice ?

1

Enter data to be pushed:

6

Element inserted Successfully!!

Enter your choice ?

1

Enter data to be pushed:

6

Duplicate Found, Element not inserted.

Enter your choice ?

3

Elements of Stack->

6

Enter your choice ?

1

Enter data to be pushed:

9

Element inserted Successfully!!

Enter your choice ?

1

Enter data to be pushed:

15

Element inserted Successfully!!

Enter your choice ?

1

Enter data to be pushed:

9

Duplicate Found, Element not inserted.

```
Enter your choice ?
3
Elements of Stack->
15
9
6
Enter your choice ?
1
Enter data to be pushed:
26
Element inserted Successfully!!
Enter your choice ?
1
Enter data to be pushed:
45
Element inserted Successfully!!
Enter your choice ?
1
Enter data to be pushed:
99
Stack Overflow
Enter your choice ?
2
Enter your choice ?
2
Enter your choice ?
3
```

Elements of Stack->

15

9

6

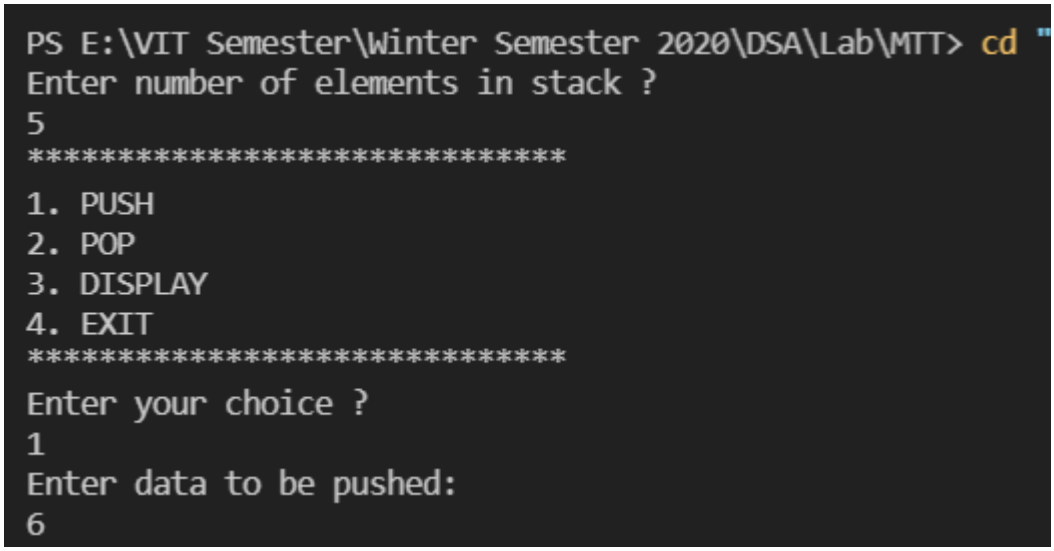
Enter your choice ?

4

Exiting...

PS E:\VIT Semester\Winter Semester 2020\DSA\Lab\MTT\Programs>

OUTPUT IN IMAGE FORMAT



```
Enter data to be pushed:
6
Element inserted Successfully!!
Enter your choice ?
1
Enter data to be pushed:
6
Duplicate Found, Element not inserted.
```

```
Enter your choice ?
3
Elements of Stack->
6
Enter your choice ?
1
Enter data to be pushed:
9
Element inserted Successfully!!
Enter your choice ?
1
Enter data to be pushed:
15
Element inserted Successfully!!
```

```
Enter your choice ?
1
Enter data to be pushed:
9
Duplicate Found, Element not inserted.
Enter your choice ?
3
Elements of Stack->
15
9
6
Enter your choice ?
1
Enter data to be pushed:
26
Element inserted Successfully!!
```

```
Enter your choice ?
1
Enter data to be pushed:
45
Element inserted Successfully!!
Enter your choice ?
1
Enter data to be pushed:
99
Stack Overflow
```

```
Enter your choice ?
2
Enter your choice ?
2
Enter your choice ?
3
Elements of Stack->
15
9
6
Enter your choice ?
4
Exiting...
PS E:\VIT Semester\Winter Semester 2020\DSA\Lab\MTT\Programs>
```

Q2) Write a program to perform binary search for an element in a character array.

CODE

```
// Binary search of an element in character array
#include <stdio.h>
#include <iostream>
#include <string.h>
#include <vector>

using namespace std;

template <class T>
class Searching
{
    T arr[100];
    int n; // Number of elements in array
    T search;

public:
    void get()
    {
        int i;
        cout << "Enter the number of elements in array" << endl;
        cin >> n;
        cout << "Enter the elements of array" << endl;
        for (i = 0; i < n; i++)
        {
            cin >> arr[i];
        }
    }
    int search_in_arr()
    {
        cout << "Enter the element to be searched" << endl;
        cin >> search;
        int midpos;
        int l = 0, h = n - 1;
        while (l <= h)
        {
            midpos = (l + h) / 2;
            if (arr[midpos] == search)
```

```
            {
                cout << "Element is found at " << midpos + 1 << endl
;
                return 1;
            }
            else if (arr[midpos] > search)
            {
                h = midpos - 1;
            }
            else
            {
                l = midpos + 1;
            }
        }
        return 0;
    }
};

int main()
{
    int a;
    Searching<char> s;
    s.get();
    a = s.search_in_arr();
    if (a == 0)
    {
        cout << "Element not found in array" << endl;
    }
    return 1;
}
```

OUTPUT IN TEXT FORMAT

```
Windows PowerShell
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PS E:\VIT Semester\Winter Semester 2020\DSA\Lab\MTT> cd "e:\VIT Semester\Winter Semester 2020\DSA\Lab\MTT\" ; if ($?) { g++ mttQ2.cpp -o mttQ2 } ; if ($?) { .\mttQ2 }
Enter the number of elements in array
4
Enter the elements of array
a
b
d
k
Enter the element to be searched
d
Element is found at 3
PS E:\VIT Semester\Winter Semester 2020\DSA\Lab\MTT>
```

OUTPUT IN IMAGE FORMAT