

S.No: 10

Exp. Name: **Write a C program to implement different Operations on Stack using Array representation**

Date: 2022-08-03

Aim:Write a program to implement **stack** using **arrays**.

Sample Input and Output:

```
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 4
Stack is empty.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 2
Stack is underflow.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 3
Stack is empty.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 5
Stack is underflow.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 1
Enter element : 25
Successfully pushed.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 1
Enter element : 26
Successfully pushed.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 3
Elements of the stack are : 26 25
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 2
Popped value = 26
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 4
Stack is not empty.
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 5
Peek value = 25
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit
Enter your option : 6
```

Source Code:

StackUsingArray.c

```
#include <stdio.h>
#include <stdlib.h>
#define STACK_MAX_SIZE 10
#include "StackOperations.c"

int main() {
    int op, x;
    while(1) {
```

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```
printf("1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit\n");
printf("Enter your option : ");
scanf("%d", &op);
switch(op) {
    case 1:
        printf("Enter element : ");
        scanf("%d", &x);
        push(x);
        break;
    case 2:
        pop();
        break;
    case 3:
        display();
        break;
    case 4:
        isEmpty();
        break;
    case 5:
        peek();
        break;
    case 6:
        exit(0);
}
}
```

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StackOperations.c

```
int arr[STACK_MAX_SIZE];
int top = -1;
void push(int element)
{
    if(top==STACK_MAX_SIZE-1) {
        printf("Stack is overflow.\n");
    }
    else
    {
        top=top+1;
        arr[top]=element;
        printf("Successfully pushed.\n");
    }
}
void pop()
{
    int x;
    if(top<0)
    {
        printf("Stack is underflow.\n");
    }
    else
    {
        x=arr[top];
        top=top-1;
        printf("Popped value = %d\n",x);
    }
}
```

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```

    }
}
void display()
{
    if(top==-1)
    {
        printf("Stack is empty.\n");
    }
    else
    {
        printf("Elements of the stack are : ");
        int index;
        for(index=top;index>=0;index--)
        {
            printf("%d ",arr[index]);
        }
        printf("\n");
    }
}
void isEmpty()
{
    if(top<0)
    {
        printf("Stack is empty.\n");
    }
    else
    {
        printf("Stack is not empty.\n");
    }
}
void peek()
{
    int x;
    if(top<0)
    {
        printf("Stack is underflow.\n");
    }
    else
    {
        x=arr[top];
        printf("Peek value = %d\n",x);
    }
}
}

```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
Enter your option : 1
Enter element : 10
Successfully pushed. 1
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1

Test Case - 1

Enter your option : 1
 Enter element : 20
 Successfully pushed. 1
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
 Enter your option : 1
 Enter element : 30
 Successfully pushed. 3
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 3
 Enter your option : 3
 Elements of the stack are : 30 20 10 5
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 5
 Enter your option : 5
 Peek value = 30 2
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 2
 Enter your option : 2
 Popped value = 30 2
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 2
 Enter your option : 2
 Popped value = 20 3
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 3
 Enter your option : 3
 Elements of the stack are : 10 5
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 5
 Enter your option : 5
 Peek value = 10 4
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 4
 Enter your option : 4
 Stack is not empty. 2
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 2
 Enter your option : 2
 Popped value = 10 3
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 3
 Enter your option : 3
 Stack is empty. 4
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 4
 Enter your option : 4
 Stack is empty. 6
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 6
 Enter your option : 6

Test Case - 2**User Output**

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 4
 Enter your option : 4
 Stack is empty. 2
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 2
 Enter your option : 2
 Stack is underflow. 3
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 3

Test Case - 2

Enter your option : 3
 Stack is empty. 5
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 5
 Enter your option : 5
 Stack is underflow. 1
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
 Enter your option : 1
 Enter element : 25
 Successfully pushed. 1
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
 Enter your option : 1
 Enter element : 26
 Successfully pushed. 3
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 3
 Enter your option : 3
 Elements of the stack are : 26 25 2
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 2
 Enter your option : 2
 Popped value = 26 4
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 4
 Enter your option : 4
 Stack is not empty. 5
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 5
 Enter your option : 5
 Peek value = 25 6
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 6
 Enter your option : 6

Test Case - 3**User Output**

1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
 Enter your option : 1
 Enter element : 11
 Successfully pushed. 1
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
 Enter your option : 1
 Enter element : 12
 Successfully pushed. 1
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
 Enter your option : 1
 Enter element : 13
 Successfully pushed. 1
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
 Enter your option : 1
 Enter element : 14
 Successfully pushed. 1
 1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
 Enter your option : 1
 Enter element : 15

Test Case - 3
Successfully pushed. 1
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
Enter your option : 1
Enter element : 16
Successfully pushed. 1
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
Enter your option : 1
Enter element : 17
Successfully pushed. 1
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
Enter your option : 1
Enter element : 18
Successfully pushed. 1
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
Enter your option : 1
Enter element : 19
Successfully pushed. 1
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
Enter your option : 1
Enter element : 12
Successfully pushed. 1
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 1
Enter your option : 1
Enter element : 13
Stack is overflow. 6
1.Push 2.Pop 3.Display 4.Is Empty 5.Peek 6.Exit 6
Enter your option : 6