S.No: 18	Exp. Name: ***Write a C program to implement different Operations on Stack using Array representation***	Date:2023-06-16

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2022-2026-CSE-B

Sasi Institute of Technology and Engineering (Autonomous)

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) {
      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);
      }
   }
}
```

StackOperations.c

```
#define size 10
int stack[size];
int top=-1;
void push(int x)
{
   if(top>=size-1)
   {
      printf("Stack is overflow.\n");
   }
   else
   {
      top++;
      stack[top]=x;
      printf("Successfully pushed.\n");
   }
}
int pop()
{
   if(top<0)
   {
      printf("Stack is underflow.\n");
   }
   else
   {
      printf("Popped value = %d\n",stack[top]);
```


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

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
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
```