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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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

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


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

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
```