S.No: 17	Exp. Name: ***Write a C program to implement different Operations on Stack using Array representation***	Date:2023-05-22

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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

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);
         }
   }
}
```

```
int arr[STACK_MAX_SIZE], i;
int top = -1;
void push(int x) {
   if(top == STACK_MAX_SIZE - 1) {
      printf("Stack is overflow.\n");
   } else {
      top++;
      arr[top] = x;
      printf("Successfully pushed.\n");
   }
}
void display() {
   if(top == -1) {
      printf("Stack is empty.\n");
   }
   else {
      printf("Elements of the stack are : ");
      for(i=top;i>=0;i--) {
         printf("%d ",arr[i]);
      }
      printf("\n");
   }
}
void pop() {
   if(top == -1) {
      printf("Stack is underflow.\n");
   }
   else {
      printf("Popped value = %d\n",arr[top]);
      top--;
   }
}
void peek() {
   if(top == -1) {
      printf("Stack is underflow.\n");
   }
   else {
      printf("Peek value = %d\n",arr[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