

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 arr[STACK_MAX_SIZE];
int top=-1;
void push(int x)
{
    if(top==10-1)
    {
        printf("Stack is overflow.\n");
    }
    else
    {
        top++;
        arr[top]=x;
        printf("Successfully pushed.\n");
    }
}
void pop()
{
    if(top== -1)
    {
        printf("Stack is underflow.\n");
    }
    else
    {
        printf("Popped value = %d\n",arr[top]);
    }
}

```

```

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