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**Level: 300**

**Task: Implement a stack using array**

### **1. CODE**

```
/*STACK IMPLEMENTATION
```

```
Using Arrays
```

```
10/20/2022
```

```
*/
```

```
#include<stdio.h>
```

```
#include<conio.h>
```

```
#include<stdlib.h>
```

```
#define MAX_SIZE 100
```

```
int A[MAX_SIZE];
```

```
int top = -1; // Top iterates through the overall array
```

```
int result;
```

```
//Create function
```

```
void Create(int Size_List)
```

```
{
```

```
    int A[Size_List];
```

```
    return;
```

```
}
```

```
/*Push function: Inserts an element into the stack
```

```
If the stack is full(Overflow), 'Push' will not succeed
```

```
*/
```

```

void Push(int max_size, int element)
{
    if( top == max_size - 1)
    {
        printf("Error: STACK OVERFLOW");
        return;
    }

    A[++top] = element; //We use pre-increment operator. Incrementation
will take place first.
}

```

/\*Pop functions removes an element from the array  
If the array is empty, an error is displayed

```

*/
int Pop()
{
    int pop;
    pop = top;
    if( top == -1)
        return 0;
    else
        --top;
        return A[pop];
}

```

//sizeofStack function returns the size of the task

```

int sizeofStack()
{

```

```

        int size;
        size = top;
        return ++size;
    }

/*TOP fuction returns data at top index*/

int TopOfStack()
{
    if(top == -1)
        return 0;
    else
        return A[top];
}

/*Display fuction dispalys the content of the stack*/

void Display()
{
    int i;

    if (top == -1)
        printf("Stack is Empty");
    else
    {
        printf("Stack: ");
        for(i = 0; i<= top; i++)
            printf("%d ", A[i]);
        printf("\n");
    }
}

```

```

//
void Status_Stack(int size)
{
    if(top== -1)
    {
        printf("STATUS: Empty\n");
        return;
    }
    else if (top == size - 1)
    {
        printf("STATUS: FULL\n");
        return;
    }
    else
    {
        printf("STATUS: Not Empty\n");
        return;
    }
}

int main()

{
    system("color 2");
    int choice, num, Size_List;
    printf("Enter the size of your List: ");
    scanf("%d", &Size_List);

    Create(Size_List);
    printf("1. Push\n");
    printf("2. Pop\n ");
}

```

```

printf("3. Display Element at the Top of your list\n");
printf("4. Display your list\n");
printf("5. Status of stack\n");
printf("6. Size of stack\n");
options:
    printf("\nChoose the operation to be performed with your list:
");
    scanf("%d", &choice);

    while(choice == 1|| choice == 2|| choice == 3|| choice == 4 || choice
== 5 || choice == 6)
    {

        while(choice==1)
        {
            printf("Enter a number: ");
            scanf("%d", &num);
            Push(Size_List, num);
            goto options;
        }

        while(choice == 2)
        {
            result = Pop();
            if (result == 0)
                printf("Empty");
            else
                printf("%d", result);
            goto options;
        }

        while(choice == 3)

```

```

{
    result = TopOfStack();
    if (result == 0)
        printf("Empty");
    else
        printf("%d", TopOfStack());
    goto options;
}

while(choice == 4)
{
    Display(Size_List);
    goto options;
}
while(choice == 5){
    Status_Stack(Size_List);
    goto options;
}
while(choice == 6){
    result = sizeOfStack();
    if (result == 0)
        printf("Empty");
    else
        printf("%d", sizeOfStack());
    goto options;
}
}
return 0;
}

```

## 2. COMPILATION RESULTS

### I) PUSH OPERATION

```
C:\Users\yann\Documents\C Programs\Stack_Implementation_array.exe
Enter the size of your List: 5
1. Push
2. Pop
3. Display Element at the Top of your list
4. Display your list
5. Status of stack
6. Size of stack

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 67

Choose the operation to be performed with your list: 1
Enter a number: 89

Choose the operation to be performed with your list: 1
Enter a number: 43

Choose the operation to be performed with your list: 1
Enter a number: 98

Choose the operation to be performed with your list: 4
Stack: 23 67 89 43 98

Choose the operation to be performed with your list:
```

### II) POP OPERATION

```
C:\Users\yann\Documents\C Programs\Stack_Implementation_array.exe
Enter the size of your List: 3
1. Push
2. Pop
3. Display Element at the Top of your list
4. Display your list
5. Status of stack
6. Size of stack

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 67

Choose the operation to be performed with your list: 1
Enter a number: 89

Choose the operation to be performed with your list: 4
Stack: 23 67 89

Choose the operation to be performed with your list: 2
89
Choose the operation to be performed with your list: 2
67
Choose the operation to be performed with your list: 2
23
Choose the operation to be performed with your list: 4
Stack is Empty
Choose the operation to be performed with your list:
```

### III) Size of stack

```
C:\Users\yann\Documents\C Programs\Stack_Implementation_array.exe
Enter the size of your List: 5
1. Push
2. Pop
3. Display Element at the Top of your list
4. Display your list
5. Status of stack
6. Size of stack

Choose the operation to be performed with your list: 1
Enter a number: 12

Choose the operation to be performed with your list: 1
Enter a number: 65

Choose the operation to be performed with your list: 1
Enter a number: 76

Choose the operation to be performed with your list: 6
3
Choose the operation to be performed with your list: 1
Enter a number: 56

Choose the operation to be performed with your list: 6
4
Choose the operation to be performed with your list: 4
Stack: 12 65 76 56

Choose the operation to be performed with your list: 2
56
Choose the operation to be performed with your list: 6
3
Choose the operation to be performed with your list: 4
Stack: 12 65 76

Choose the operation to be performed with your list: _
```

### IV) Top of stack

```
C:\Users\yann\Documents\C Programs\Stack_Implementation_array.exe
1. Push
2. Pop
3. Display Element at the Top of your list
4. Display your list
5. Status of stack
6. Size of stack

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 67

Choose the operation to be performed with your list: 1
Enter a number: 78

Choose the operation to be performed with your list: 4
Stack: 23 67 78

Choose the operation to be performed with your list: 3
78
Choose the operation to be performed with your list: 1
Enter a number: 21

Choose the operation to be performed with your list: 4
Stack: 23 67 78 21

Choose the operation to be performed with your list: 3
21
Choose the operation to be performed with your list: _
```



## V) Display stack

```
C:\Users\yann\Documents\C Programs\Stack_Implementation_array.exe
Enter the size of your List: 4
1. Push
2. Pop
3. Display Element at the Top of your list
4. Display your list
5. Status of stack
6. Size of stack

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 56

Choose the operation to be performed with your list: 1
Enter a number: 78

Choose the operation to be performed with your list: 4
Stack: 23 56 78

Choose the operation to be performed with your list: 1
Enter a number: 100

Choose the operation to be performed with your list: 1
Enter a number: 45
Error: STACK OVERFLOW
Choose the operation to be performed with your list: 4
Stack: 23 56 78 100

Choose the operation to be performed with your list: _
```

## VI) Status of stack

```
C:\Users\yann\Documents\C Programs\Stack_Implementation_array.exe
3. Display Element at the Top of your list
4. Display your list
5. Status of stack
6. Size of stack

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 78

Choose the operation to be performed with your list: 5
STATUS: Not Empty

Choose the operation to be performed with your list: 1
Enter a number: 567

Choose the operation to be performed with your list: 5
STATUS: FULL

Choose the operation to be performed with your list: 2
567
Choose the operation to be performed with your list: 2
78
Choose the operation to be performed with your list: 2
23
Choose the operation to be performed with your list: 5
STATUS: Empty

Choose the operation to be performed with your list:
```