Data Structures Lab

Experiment 4:
Stack Operations

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Contents

1 Aim

To implement the different operations like push, pop and display of the stack data structure in C.

2 Problem Description

Stack is a very commonly used data structure. It's a Last in First Out data structure (LIFO) meaning that the last element to enter the stack will leave first. Some of the popular stack operations are given below.

1. **Push:** Inserts are element into the Stack.
2. **Pop:** Remove the last inserted element. Returns the removed element.
3. **Display:** Prints the stack.

3 Algorithm

3.1 Push

1. Read input element.
2. If size of stack is equal to max, print "Stack Full".
3. else, increment top and assign stack[top] = element.

3.2 Pop

1. if size of stack is 0, print "Stack Empty".
2. else, assign top = top - 1
3. return stack[top+1]

3.3 Display

1. if size of stack is 0, print "Stack Empty".
2. else, run a for loop from i = 0 to i = top.
3. print stack[i].

4 Program Code

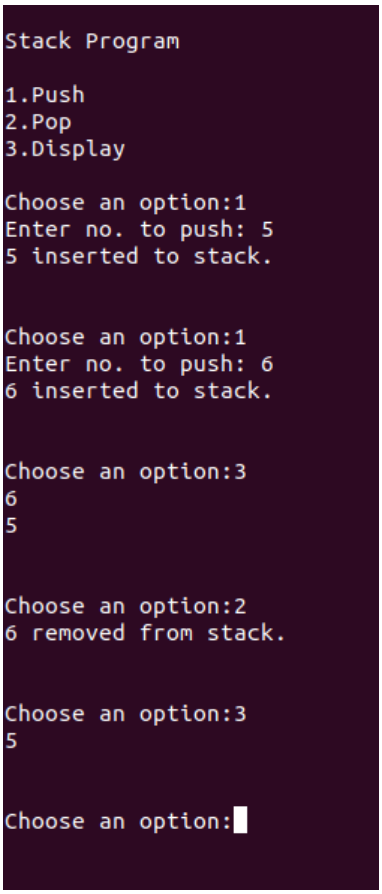
```
#include<stdio.h>
#define MAX_SIZE 4

int arr[MAX_SIZE], n, option, top = -1, i;
char ch;

void main() {
   printf("\nStack Program\n\n1.Push\n2.Pop\n3.Display");
   while(1) {
      printf("\n\nChoose an option:");
      scanf("%d", &option);
      switch(option) {
         case 1:
            if(top == MAX_SIZE-1) {
               printf("Stack Full.\n");
            } else {
               printf("Enter no. to push: ");
               scanf("%d", &n);
               arr[++top] = n;
               printf("%d inserted to stack.\n", n);
            }
            break;
         case 2:
            if(top == -1) {
               printf("Stack Empty.\n");
            } else {
               printf("%d removed from stack.\n", arr[top--]);
            }
            break;
```

```
         case 3:
            if(top == -1) {
               printf("Stack Empty.\n");
            } else {
               for(i = top; i >= 0; i--) {
                  printf("%d\n", arr[i]);
               }
            }
            break;
         default:
            printf("Invalid Option.\n");
      }
   }
}
```

5 Output



6 Result

The stack data structure and its function were implemented in the C language and the output was verified.