

Rajalakshmi Engineering College

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 3_CY

Attempt : 1
Total Mark : 30
Marks Obtained : 30

Section 1 : Coding

1. Problem Statement

Suppose you are building a calculator application that allows users to enter mathematical expressions in infix notation. One of the key features of your calculator is the ability to convert the entered expression to postfix notation using a Stack data structure.

Write a function to convert infix notation to postfix notation using a Stack.

Input Format

The input consists of a string, an infix expression that includes only digits(0-9), and operators(+, -, *, /).

Output Format

The output displays the equivalent postfix expression of the given infix expression.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 1+2*3/4-5

Output: 123*4/+5-

Answer

```
// You are using GCC
#include<stdio.h>
#include<stdlib.h>
#include<ctype.h>
#include<string.h>
#define MAX 100
char stack[MAX];
int top=-1;
void push(char c){
    if (top==MAX-1) return;
    stack[++top]=c;
}
char pop(){
    if (top== -1) return '\0';
    return stack[top--];
}
char peek(){
    if (top== -1) return '\0';
    return stack[top];
}
int precedence(char c){
    if(c=='+'|| c=='-') return 1;
    if(c=='*'|| c=='/') return 2;
    return 0;
}
void infixToPosfix(char* infix){
    for(int i=0;infix[i]!='\0';i++){
        char c=infix[i];
        if (isdigit(c)){
            printf("%c",c);
        }
    }
}
```

```

    else if(c=='('){
        push(c);
    }
    else if (c==')'){
        while(top!=-1 && peek()!='('){
            printf("%c",pop());
        }
        pop();
    }
    else if(c=='+'|| c=='-'|| c=='*'||c=='/'){
        while(top!=-1 && precedence(peek())>=precedence(c)){
            printf("%c",pop());
        }
        push(c);
    }
}
while(top!=-1){
    printf("%c",pop());
}
}
int main()
{
    char infix[MAX];
    scanf("%s", infix);
    infixToPosfix(infix);
    return 0;
}

```

Status : Correct

Marks : 10/10

2. Problem Statement

Buvi is working on a project that requires implementing an array-stack data structure with an additional feature to find the minimum element.

Buvi needs to implement a program that simulates a stack with the following functionalities:

Push: Adds an element onto the stack. Pop: Removes the top element from the stack. Find Minimum: Finds the minimum element in the stack.

Buvi's implementation should efficiently handle these operations with a maximum stack size of 20.

Input Format

The first line of input consists of an integer N, representing the number of elements to push onto the stack.

The second line consists of N space-separated integer values, representing the elements to be pushed onto the stack.

Output Format

The first line of output displays "Minimum element in the stack: " followed by the minimum element in the stack after pushing all elements.

The second line displays "Popped element: " followed by the popped element.

The third line displays "Minimum element in the stack after popping: " followed by the minimum element in the stack after popping one element.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 4

5 2 8 1

Output: Minimum element in the stack: 1

Popped element: 1

Minimum element in the stack after popping: 2

Answer

```
// You are using GCC
```

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

```
#define MAX 20
```

```
int stack[MAX];
```

```
int top=-1;
```

```
void push(int value)
```

```
{
```

```
    if (top<MAX-1)
```

```
    {
```

```

        top++;
        stack[top]=value;
    }
}
int pop()
{
    if(top>=0)
    {
        int popped=stack[top];
        top--;
        return popped;
    }
    return -1;
}
int findMin()
{
    int min=stack[0];
    for(int i=1;i<=top;i++)
    {
        if (stack[i]<min)
        {
            min=stack[i];
        }
    }
    return min;
}
int main()
{
    int n,i,popped_element;
    scanf("%d", &n);
    for (i=0;i<n;i++)
    {
        int value;
        scanf("%d", &value);
        push(value);
    }
    printf("Minimum element in the stack: %d\n", findMin());
    popped_element=pop();
    printf("Popped element: %d\n", popped_element);
    if (top>=0)
    {
        printf("Minimum element in the stack after popping: %d\n", findMin());
    }
}

```

```
}  
else  
{  
    printf("Stack is empty after popping.\n");  
}  
return 0;  
}
```

Status : Correct

Marks : 10/10

3. Problem Statement

You are required to implement a stack data structure using a singly linked list that follows the Last In, First Out (LIFO) principle.

The stack should support the following operations: push, pop, display, and peek.

Input Format

The input consists of four space-separated integers N, representing the elements to be pushed onto the stack.

Output Format

The first line of output displays all four elements in a single line separated by a space.

The second line of output is left blank to indicate the pop operation without displaying anything.

The third line of output displays the space separated stack elements in the same line after the pop operation.

The fourth line of output displays the top element of the stack using the peek operation.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 11 22 33 44

Output: 44 33 22 11

33 22 11

33

Answer

// You are using GCC

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

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

```
struct Node {
```

```
    int data;
```

```
    struct Node* next;
```

```
};
```

```
struct Node* top=NULL;
```

```
void push(int value)
```

```
{
```

```
    struct Node* newNode=(struct Node*)malloc(sizeof(struct Node));
```

```
    newNode->data=value;
```

```
    newNode->next=top;
```

```
    top=newNode;
```

```
}
```

```
void pop()
```

```
{
```

```
    if(top!=NULL)
```

```
    {
```

```
        struct Node* temp=top;
```

```
        top=top->next;
```

```
        free(temp);
```

```
    }
```

```
}
```

```
void display()
```

```
{
```

```
    struct Node* temp=top;
```

```
    while(temp!=NULL)
```

```
    {
```

```
        printf("%d ",temp->data);
```

```
        temp=temp->next;
```

```
    }
```

```
    printf("\n");
```

```
}  
void peek()  
{  
    if(top!=NULL)  
    {  
        printf("%d\n",top->data);  
    }  
}  
int main()  
{  
    int n,i,value;  
    for(i=0;i<4;i++)  
    {  
        scanf("%d", &value);  
        push(value);  
    }  
    display();  
    printf("\n");  
    pop();  
    display();  
    peek();  
    return 0;  
}
```

Status : Correct

Marks : 10/10