

Exp.1- APPLICATIONS OF STACK

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Use stack ADT for the following problems.

1. Assume yearly average rainfall data is available for the years 2000 to 2016. For each year rainfall value, find the year with next highest rainfall value.

Ans-

```
#include<stdio.h>
#include<string.h>
#include<conio.h>
struct stack
{
    int arr[17];
    int top=-1;
};
void push(struct stack *a)    //using call by reference
{
    int num;
    scanf("%d",&num);
    a->top+=1;
    a->arr[a->top]=num;
}
int pop(struct stack *a)
{
    a->top=a->top-1;
    return(a->top);
}
```

```

int main()
{
    struct stack b;
    int i,t=1,max,j;
    for(i=0;i<17;i++)
    {
        printf("Enter the rainfall for the %d year to push into the stack : ",2000+i);
        push(&b);
    }
    t=b.top;
    while(t!=-1)
    {
        max=t;
        for(i=t+1;i<17;i++)
        {
            if(b.arr[i]>b.arr[max])
            {
                max=i;
            }
        }
        if(max==t)
        {
            printf("\nThere is no higher rainfall in next years for the year %d\n",2000+t);
        }
        else
        {
            printf ("\nThe highest rainfall in the next years for the year %d is in the year %d\n",2000+t,2000+max);
        }
        t=pop(&b);
    }
    getch();
    return(0); }

```

OUTPUT SCREENSHOT-

The screenshot displays a C++ IDE with two windows. The left window shows the source code for 'rainfall.cpp', and the right window shows the program's output.

Source Code (rainfall.cpp):

```
1 #include<stdio.h>
2 #include<string.h>
3 #include<conio.h>
4
5 struct stack
6 {
7     int arr[17];
8     int top=-1;
9 };
10 void push(struct stack *a) //using call by reference
11 {
12     int num;
13     scanf("%d",&num);
14     a->top++;
15     a->arr[a->top]=num;
16 }
17 int pop(struct stack *a)
18 {
19     a->top=a->top-1;
20     return(a->top);
21 }
22
23 int main()
24 {
25     struct stack b;
26     int i,t=1,max,j;
27     for(i=0;i<17;i++)
28     {
```

Output (rainfall.exe):

```
Enter the rainfall for the 2000 year to push into the stack : 1244
Enter the rainfall for the 2001 year to push into the stack : 1241555
Enter the rainfall for the 2002 year to push into the stack : 1223
Enter the rainfall for the 2003 year to push into the stack : 121
Enter the rainfall for the 2004 year to push into the stack : 1234
Enter the rainfall for the 2005 year to push into the stack : 12414
Enter the rainfall for the 2006 year to push into the stack : 124124
Enter the rainfall for the 2007 year to push into the stack : 12412
Enter the rainfall for the 2008 year to push into the stack : 121
Enter the rainfall for the 2009 year to push into the stack : 123
Enter the rainfall for the 2010 year to push into the stack : 124
Enter the rainfall for the 2011 year to push into the stack : 124
Enter the rainfall for the 2012 year to push into the stack : 121
Enter the rainfall for the 2013 year to push into the stack : 12124
Enter the rainfall for the 2014 year to push into the stack : 121
Enter the rainfall for the 2015 year to push into the stack : 2112
Enter the rainfall for the 2016 year to push into the stack : 1212

There is no higher rainfall in next years for the year 2016
There is no higher rainfall in next years for the year 2015
The highest rainfall in the next years for the year 2014 is in the year 2015
There is no higher rainfall in next years for the year 2013
The highest rainfall in the next years for the year 2012 is in the year 2013
The highest rainfall in the next years for the year 2011 is in the year 2013
The highest rainfall in the next years for the year 2010 is in the year 2013
The highest rainfall in the next years for the year 2009 is in the year 2013
The highest rainfall in the next years for the year 2008 is in the year 2013
There is no higher rainfall in next years for the year 2007
There is no higher rainfall in next years for the year 2006
The highest rainfall in the next years for the year 2005 is in the year 2006
The highest rainfall in the next years for the year 2004 is in the year 2006
The highest rainfall in the next years for the year 2003 is in the year 2006
The highest rainfall in the next years for the year 2002 is in the year 2006
There is no higher rainfall in next years for the year 2001
The highest rainfall in the next years for the year 2000 is in the year 2001
```

Compiler Message:

Line	Col	File	Message
8	10	F:\STUDY\VIT VELLORE\2 SEM\data structures\ex 1 app ...	[Warning] non-static data member initializers only av

Line: 22 Col: 2 Sel: 0 Lines: 58 Length: 884 Insert Done parsing in 0.094 se

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2. Given the arithmetic expression, find the lengths of all the valid sub expressions enclosed by paranthesis.

```
#include<stdio.h>
#include<string.h>
#include<conio.h>
int ctr,i,j,t1,t2,x,m;
char arr[1000];
void push()
{
    int num;
    scanf("%d",&num);
    top+=1;
    arr[top]=num;
}
int pop()
{
    top=top-1;
    return(top);
}
int close(int t1)
{
    ctr=0;
    for(x=t1+1;x<m;x++)
    {
        if(arr[x]==')')
        {
            if(ctr==0) return(x);
            else {
                ctr=ctr-1;}
        }
        else if (arr[x]=='(')
        {
            ctr=ctr+1;}
    }
}
int main()
{
    printf("\n\nEnter the expression ");
    gets(arr);
    m=strlen(arr);
    for(i=0;i<m;i++)
    {
        if(arr[i]=='(')
        {
            t2=close(i);
            for(j=i+1;j<t2;j++)
            {
```

```

        printf("%c",arr[j]);

    }
    printf("\t%d\n",t2-i-1);
}

getch();
return(0);
}

```

OUTPUT SCREENSHOT –

