# 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

Rithi is building a simple text editor that allows users to type characters, undo their typing, and view the current text. She has implemented this text editor using an array-based stack data structure.

She has to develop a basic text editor with the following features:

Type a Character (Push): Users can type a character and add it to the text editor.Undo Typing (Pop): Users can undo their typing by removing the last character they entered from the editor.View Current Text (Display): Users can view the current text in the editor, which is the sequence of characters in the buffer.Exit: Users can exit the text editor application.

Write a program that simulates this text editor's undo feature using a character stack and implements the push, pop and display operations accordingly.

## Input Format

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Push the character onto the stack. If the choice is 1, the following input is a space-separated character, representing the character to be pushed onto the stack.

Choice 2: Pop the character from the stack.

Choice 3: Display the characters in the stack.

Choice 4: Exit the program.

## Output Format

The output displays messages according to the choice and the status of the stack:

1. If the choice is 1, print: "Typed character: <character>" where <character> is the character that was pushed to the stack.
2. If the choice is 2, print: "Undo: Removed character <character>" where <character> is the character that was removed from the stack.
3. If the choice is 2, and if the stack is empty without any characters, print "Text editor buffer is empty. Nothing to undo."
4. If the choice is 3, print: "Current text: <character1> <character2> ... <characterN>" where <character1>, <character2>, ... are the characters in the stack, starting from the last pushed character.
5. If the choice is 3, and there are no characters in the stack, print "Text editor buffer is empty."
6. If the choice is 4, exit the program.
7. If any other choice is entered, print "Invalid choice"

Refer to the sample output for formatting specifications.

## Sample Test Case

Input: 1 H
1 A
3

4
Output: Typed character: H
Typed character: A
Current text: A H

*Answer*

```c
#include<stdio.h>
#include<stdlib.h>
#include<string.h>

#define MAX 100

int st[MAX];
int top=-1;

void push(char e){
    if(top==MAX-1)
    {
        return;
    }
    top++;
    st[top]=e;
    printf("Typed character: %c\n",e);
}

void pop(){
    if(top == -1){
        printf("Text editor buffer is empty.Nothing to undo.\n");
    }else {
        printf("Undo: Removed character %c\n",st[top]);
        top--;
    }
}

void dis(){
    if(top==-1){
        printf("Text editor buffer is empty.\n");
    }else{
        printf("Current text: ");
        for(int i=top;i>=0;i--){
            printf("%c ",st[i]);
        }
```

```
        printf("\n");
    }
}
int main(){
    int c;
    char e;
    do{
        scanf("%d",&c);
        switch(c){
            case 1:
            scanf(" %c",&e);
            push(e);
            break;
            case 2:
            pop();
            break;
            case 3:
            dis();
            break;
            case 4:
            return 0;
            default:
            printf("Invalid choice\n");
        }
    }while(c!=4);
}
```

*Status :* Correct                                    *Marks : 10/10*

2.  Problem Statement

Latha is taking a computer science course and has recently learned about
infix and postfix expressions. She is fascinated by the idea of converting
infix expressions into postfix notation. To practice this concept, she wants
to implement a program that can perform the conversion for her.

Help Latha by designing a program that takes an infix expression as input
and outputs its equivalent postfix notation.

Example

Input:

(3+4)5

Output:

34+5

### Input Format

The input consists of a string, the infix expression to be converted to postfix notation.

### Output Format

The output displays a string, the postfix expression equivalent of the input infix expression.

Refer to the sample output for the formatting specifications.

### Sample Test Case

Input: A+B*C-D/E
Output: ABC*+DE/-

### Answer

```c
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<ctype.h>
int precedence(char op){
    switch(op){
        case '+':
        case '-':
            return 1;
        case '*':
        case '/':
            return 2;
        case '(':
            return  0;
    }
    return -1;
```

```c
}
void infixToPostfix(char infix[],char postfix[]){
    char stack[100];
    int top = -1;
    int j = 0;
    for(int i=0;infix[i] != '\0';i++){
        if(isalnum(infix[i])){
            postfix[j++] = infix[i];
        }else if(infix[i] == '('){
            stack[++top] = infix[i];
        }else if(infix[i] == ')'){
            while(top >= 0 && stack[top] != '('){
                postfix[j++] = stack[top--];
            }
            if(top >= 0 && stack[top]== '('){
                top--;
            }
        }
        else if(infix[i] == '+' || infix[i] == '-' || infix[i] == '*' || infix[i] == '/'){
            while(top >= 0&& precedence(stack[top])>= precedence(infix[i])){
                postfix[j++] = stack[top--];
            }
            stack[++top] = infix[i];
        }
    }
    while(top >= 0){
        postfix[j++] = stack[top--];
    }
    postfix[j] = '\0';
}
int main(){
    char infix[101];
    char postfix[101];
    fgets(infix,sizeof(infix),stdin);
    infix[strcspn(infix, "\n")] = 0;
    infixToPostfix(infix,postfix);
    printf("%s\n",postfix);
    return 0;
}
```

*Status :* Correct                                                    *Marks : 10/10*

## 3. Problem Statement

Siri is a computer science student who loves solving mathematical problems. She recently learned about infix and postfix expressions and was fascinated by how they can be used to evaluate mathematical expressions.

She decided to write a program to convert an infix expression with operators to its postfix form. Help Siri in writing the program.

### Input Format

The input consists of a single line containing an infix expression.

### Output Format

The output prints a single line containing the postfix expression equivalent to the given infix expression.

Refer to the sample output for the formatting specifications.

### Sample Test Case

Input: (2 + 3) * 4
Output: 23+4*

### Answer

```c
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<ctype.h>
int precedence(char op){
   switch(op){
     case '+':
     case '-':
       return 1;
     case '*':
     case '/':
       return 2;
     case '(':
```

```c
        return 0;
    }
    return -1;
}
void infixToPostfix(char infix[],char postfix[]){
    char stack[50];
    int top = -1;
    int j=0;
    for(int i=0;infix[i] != '\0';i++){
        if(isdigit(infix[i])){
            postfix[j++] = infix[i];
        }else if(infix[i]=='('){
            stack[++top]= infix[i];
        }else if(infix[i]== ')'){
            while(top >= 0 && stack[top] != '('){
                postfix[j++] = stack[top--];
            }
            if(top >= 0 && stack[top] == '('){
                top--;
            }
        }
        else if(infix[i] == '+' || infix[i] == '-' || infix[i] == '*'|| infix[i] == '/'){
            while(top >= 0 && precedence(stack[top]) >= precedence(infix[i]))
            {
                postfix[j++] = stack[top--];
            }
            stack[++top] = infix[i];
        }
    }
    while(top >= 0){
        postfix[j++] = stack[top--];
    }
    postfix[j] = '\0';
}
int main(){
char infix[51];
char postfix[51];
fgets(infix,sizeof(infix),stdin);
infix[strcspn(infix,"\n")] = 0;
infixToPostfix(infix,postfix);
printf("%s\n",postfix);
return 0;
```

```
}
```