PIMPRI CHINCHWAD EDUCATION TRUST's.

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

(An Autonomous Institute)

S.Y. B. TECH **Year:** 2024 – 25 **Semester:** I

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Department: Computer Engineering **Division:** C (C1)

Course: Data Structures Laboratory **Course Code:** BCE23PC02

Date:

Assignment No -8

Aim: Write a program to convert infix expression to postfix, infix expression to prefix and evaluation of postfix and prefix expression.

a. Implement a restaurant waitlist system using the queue data structure. Restaurant waitlist provide following facility:

a. Add Party to Waitlist

b. Seat Party

c. Display Waitlist

- **Source Code :**

```
#include <iostream>
using namespace std;

#define MAX 100

int precedence(char op) {
   if (op == '+' || op == '-') return 1;
   if (op == '*' || op == '/') return 2;
   return 0;
}

string infixToPostfix(string infix) {
   char stack[MAX];
   int top = -1;
   string postfix;

   for (char token : infix) {
      if (isalnum(token)) {
         postfix += token;
```

```
        } else if (token == '(') {
            stack[++top] = token;
        } else if (token == ')') {
            while (top != -1 && stack[top] != '(') {
                postfix += stack[top--];
            }
            top--;
        } else {
            while (top != -1 && precedence(token) <= precedence(stack[top])) {
                postfix += stack[top--];
            }
            stack[++top] = token;
        }
    }

    while (top != -1) {
        postfix += stack[top--];
    }

    return postfix;
}

string infixToPrefix(string infix) {
    string reversedInfix;
    for (int i = infix.length() - 1; i >= 0; i--) {
        if (infix[i] == '(') {
            reversedInfix += ')';
        } else if (infix[i] == ')') {
            reversedInfix += '(';
        } else {
            reversedInfix += infix[i];
        }
    }

    string postfix = infixToPostfix(reversedInfix);
    string prefix;

    for (int i = postfix.length() - 1; i >= 0; i--) {
        prefix += postfix[i];
    }

    return prefix;
}

int evaluatePostfix(string postfix) {
    int stack[MAX];
    int top = -1;
```

```
    for (char token : postfix) {
        if (token >= '0' && token <= '9') {
            stack[++top] = token - '0';
        } else {
            int operand2 = stack[top--];
            int operand1 = stack[top--];
            switch (token) {
                case '+': stack[++top] = operand1 + operand2; break;
                case '-': stack[++top] = operand1 - operand2; break;
                case '*': stack[++top] = operand1 * operand2; break;
                case '/': stack[++top] = operand1 / operand2; break;
            }
        }
    }

    return stack[top];
}

int evaluatePrefix(string prefix) {
    int stack[MAX];
    int top = -1;

    for (int i = prefix.length() - 1; i >= 0; i--) {
        char token = prefix[i];
        if (token >= '0' && token <= '9') {
            stack[++top] = token - '0';
        } else {
            int operand1 = stack[top--];
            int operand2 = stack[top--];
            switch (token) {
                case '+': stack[++top] = operand1 + operand2; break;
                case '-': stack[++top] = operand1 - operand2; break;
                case '*': stack[++top] = operand1 * operand2; break;
                case '/': stack[++top] = operand1 / operand2; break;
            }
        }
    }

    return stack[top];
}

int main() {
    string infix, postfix, prefix;

    cout << "Enter infix expression: ";
    cin >> infix;

    postfix = infixToPostfix(infix);
```

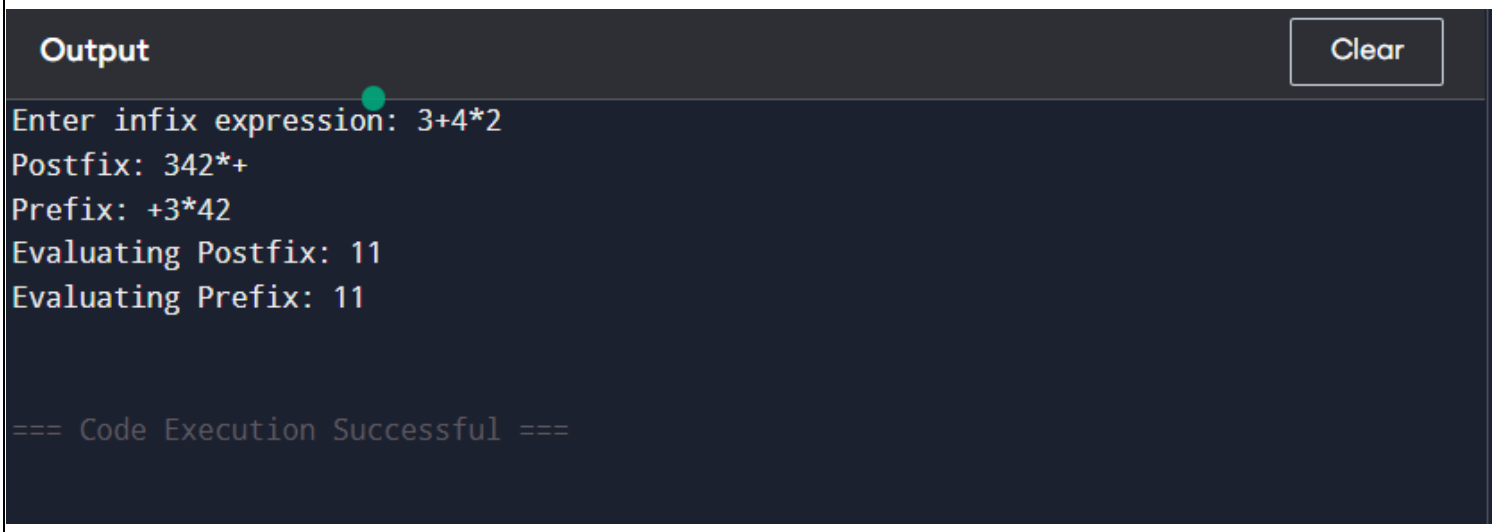
```
prefix = infixToPrefix(infix);

cout << "Postfix: " << postfix << endl;
cout << "Prefix: " << prefix << endl;

cout << "Evaluating Postfix: " << evaluatePostfix(postfix) << endl;
cout << "Evaluating Prefix: " << evaluatePrefix(prefix) << endl;

return 0;
```

Screen Shot of Output :



Conclusion: we studied stack applications to convert infix expressions to postfix and prefix, and to evaluate them using a stack.