Experiment no 3:Evaluation of postfix Expression using stack ADT

Aim: Implementation of Evaluation of Postfix Expression using stack ADT

Objective:

1) Understand the use of stack
2) Understand importing an ADT in an application program
3) Understand the instantiation of stack ADT in an application Program
4) Understand how the member function of an ADT are accessed in an application program

Theory:

Prefix and Postfix expressions can be evaluated faster in comparison to an infix expression because we don't need to process any brackets or follow the operator precedence rule. In postfix and prefix expressions whichever operator comes before will be evaluated first, irrespective of its priority. Also, there are no brackets in these expressions. As long as we can guarantee that a valid prefix or postfix expression is used, it can be evaluated with correctness.

Algorithm:

Step 1: If a character is an operand push it to Stack

Step 2: If the character is an operator

Pop two elements from the Stack.

Operate on these elements according to the operator, and push the result back to the Stack

Step 3: Step 1 and 2 will be repeated until the end has reached.

Step 4: The Result is stored at the top of the Stack,

return it

Step 5: End

Code :

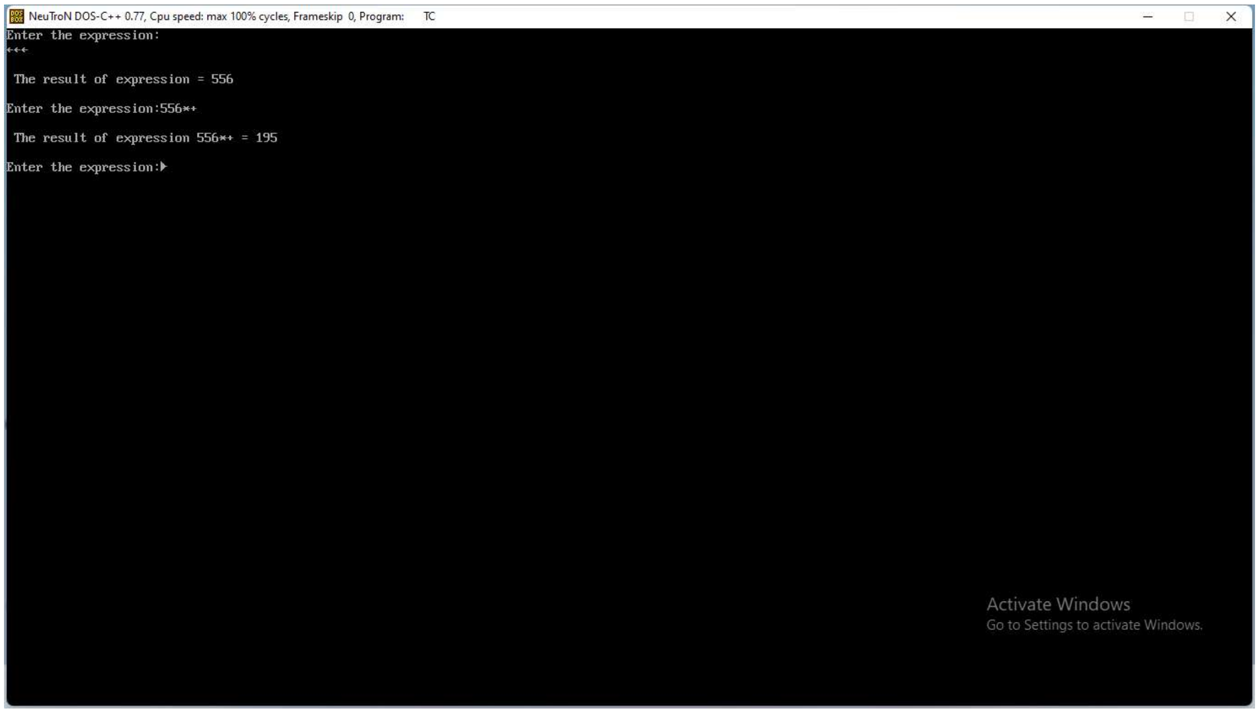
```
#include<stdio.h>
int stack[20];
int top = -1;

void push(int x)
{
    stack[++top] = x;
}

int pop()
{
    return stack[top--];
}

int main()
{
    char exp[20];
    char *e;
    int n1,n2,n3,num;
    printf("Enter the expression :: ");
    scanf("%s",exp);
    e = exp;
    while(*e != '\0')
    {
        if(isdigit(*e))
        {
            num = *e - 48;
            push(num);
        }
        else
        {
            n1 = pop();
            n2 = pop();
            switch(*e)
            {
            case '+':
                {
                    n3 = n1 + n2;
                    break;
                }
                case '-':
                {
                    n3 = n2 - n1;
                    break;
                }
                case '*':
                {
                    n3 = n1 * n2;
                    break;
                }
                case '/':
                {
                    n3 = n2 / n1;
                    break;
                }
                }
                push(n3);
            }
            e++;
        }
        printf("\nThe result of expression %s  =  %d\n\n",exp,pop());
        return 0;
}
```

Output:



NeuTroN DOS-C++ 0.77, Cpu speed: max 100% cycles, Frameskip 0, Program: TC

```
Enter the expression:
←←←

 The result of expression = 556

Enter the expression:556*+

 The result of expression 556*+ = 195

Enter the expression:▶
```

Activate Windows
Go to Settings to activate Windows.

Conclusion :

To evaluate a postfix expression we can use a stack. Iterate the expression from left to right and keep on storing the operands into a stack. Once an operator is received, pop the two topmost elements and evaluate them and push the result in the stack again.