GOVERNMENT POLYTECHNIC, AHMEDABAD

COMPUTER ENGINEERING DEPARTMENT

Affiliated To

Gujarat Technological University, Ahmedabad

Micro project Report

D. E. Second Year (Semester– III)

Sub: Data Structure and Algorithms (4330704)

Government Polytechnic, Ahmedabad
Computer Engineering Department

CERTIFICATE

This is to certify that

Sr. No.	Enrollment No.	Name
1	Nagwadiya Tarun Pravinbhai	206170307221
2	Prakhar N. Parikh	216170307037
3	Chelaramani Pratham K.	216170307006

Of **Third** semester of Diploma in Computer Engineering of Government Polytechnic, Ahmedabad has completed the Micro-Project satisfactorily in Subject **Data Structure and Algorithms (4330704)** for the academic year **2022-2023** as prescribed in the curriculum.

Lecturer,
Computer Engg. Dept.,
Government Polytechnic, Ahmedabad

HOD
Computer Engg. Dept.,
Government Polytechnic,
Ahmedabad

RUBRICS FOR MICRO-PROJECT ASSESMENT

Parameters	Allocated Marks	High	Medium	Low
Problem Analysis and Solution(R1)	8	Problem is Properly Analysed and Solved	Problem is Properly Analysed but Partially Solved	Problem is Properly Analysed but not Solved.
		8 Marks	5 Marks	2 Marks
Viva Voce(R2)	2	Student Answered All The Viva Voce Questions	Student Answered Only A Few Viva Voce Questions	Student Did Not Answer Any Viva Voce Questions
		2 Marks	1 Marks	0 Marks

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5. References if any

Enrollment Number	Student Name	Marks(R1)	Marks(R2)	Total Marks
206170307221	Nagwadiya Tarun Pravinbhai			
216170307006	Chelaramani Pratham K.			
216170307037	Prakhar N. Parikh			
Name and Sign of Faculty :				

1

Description of the problem

1) Arithmetic Expression Evaluator using Stack method (GUI) - Python

- This is a GUI (Graphical User Interface) software.
- It evaluates the given infix or postfix expressions and displays the answer.
- It uses the popular GUI framework 'Tkinter' also know as 'Tk/Tcl' which is a part of the 'Standard Python Library'.
- For sake of simplicity and code management, the code is divided into 2 parts : 1) Custom module for actual processing and calculation 2) Program for GUI

2) Person Queue Record Maintainer – C++

- This programs maintains a queue of persons using the 'Simple Queue' data structure.
- The user can add, remove or search a person in the queue.
- Such program can be used to keep the count of persons at ticket counters or food courts.

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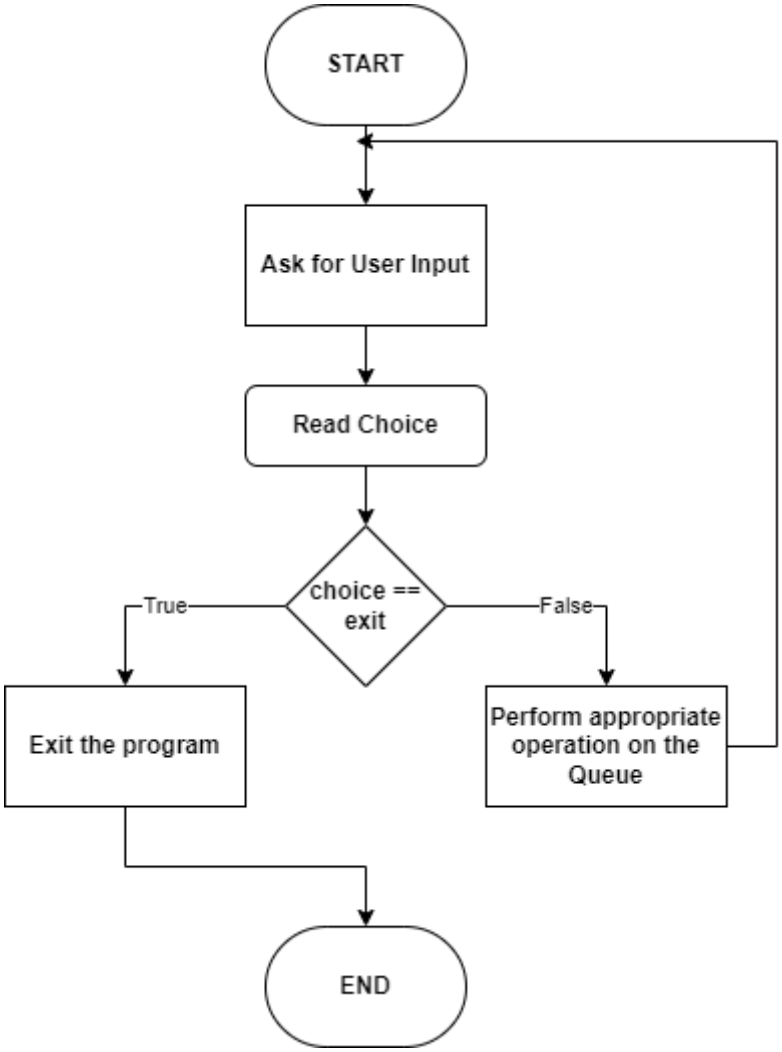
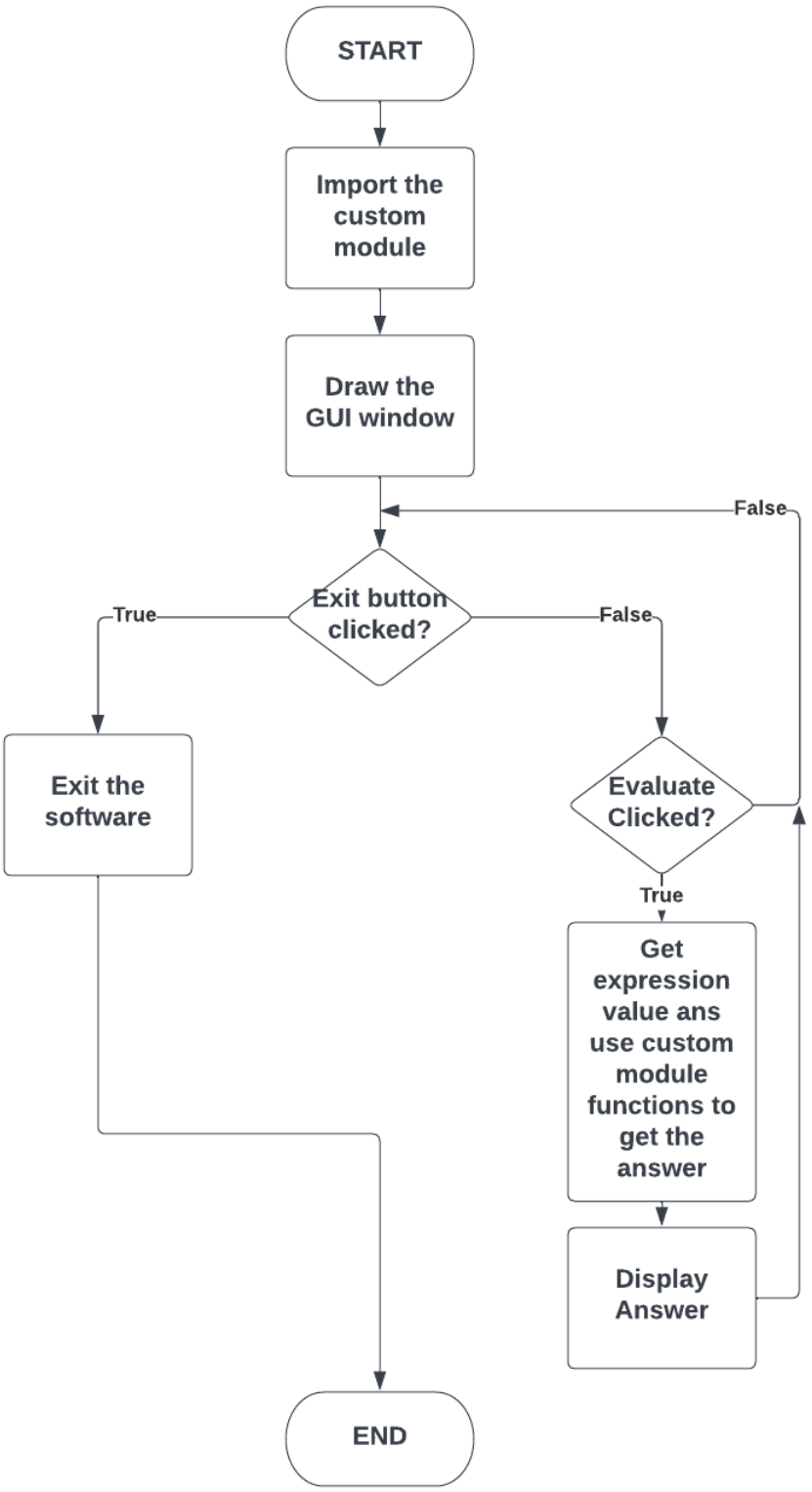
Solution of problem in terms of flowchart

1) Person Queue Record Maintainer



2) Arithmetic Expression Evaluator



3

Solution of problem in terms of coding

1) Arithmetic Expression Evaluator

i) Custom Evaluation Module

```
def evaluate_postfix(expression):
    stack = []

    expression = expression.split(" ")
    for character in expression:
        if character not in ['+', '-', '*', '/']:
            stack.append(character)
        else:
            operand1 = int(stack.pop(len(stack) - 1))
            operand2 = int(stack.pop(len(stack) - 1))
            result = 0
            if character == '+':
                result = operand2 + operand1
                stack.append(result)
            elif character == '-':
                result = operand2 - operand1
                stack.append(result)
            elif character == '*':
                result = operand2 * operand1
                stack.append(result)
            elif character == '/':
                result = operand2 // operand1
                stack.append(result)

    return stack[0]
```

```
def evaluate_prefix(expression):
    stack = []

    expression = reversed(expression.split(" "))
    for character in expression:
        if character not in ['+', '-', '*', '/']:
            stack.append(character)
        else:
            operand2 = int(stack.pop(len(stack) - 1))
            operand1 = int(stack.pop(len(stack) - 1))
            result = 0
            if character == '+':
                result = operand2 + operand1
                stack.append(result)
            elif character == '-':
                result = operand2 - operand1
                stack.append(result)
            elif character == '*':
                result = operand2 * operand1
                stack.append(result)
            elif character == '/':
                result = operand2 // operand1
                stack.append(result)

    return stack[0]
```

ii) Main Software

```
from tkinter import *
import arithmatic_evaluators

def evaluate_clicked(expression_entry, type_var, ans_label):
    if type_var.get() == 1:
        calculate_prefix(expression_entry.get(), ans_label)
    elif type_var.get() == 2:
        calculate_postfix(expression_entry.get(), ans_label)

def calculate_prefix(expression, ans_label):
    result = "Answer : " +
str(arithmatic_evaluators.evaluate_prefix(expression))
    ans_label.configure(text=result)
    ans_label.update()

def calculate_postfix(expression, ans_label):
```

```
    result = "Answer : " +
str(arithmatic_evaluators.evaluate_postfix(expression))
    ans_label.configure(text=result)
    ans_label.update()

if __name__ == '__main__':
    root = Tk()

    root.geometry("750x450")
    root.title("Arithmetic Expression Evaluator")
    root.configure(background="yellow")

    title_label = Label(root, text="Welcome to the arithmetic expression
evaluator", font=("Ariel", 20, "bold"))
    title_label.configure(background="yellow")
    title_label.configure(foreground="blue")
    title_label.place(x=50, y=20)

    info_label = Label(root, text="Please enter your expression",
font=("Ariel", 20, "bold"))
    info_label.configure(background="yellow")
    info_label.configure(foreground="red")
    info_label.place(x=170, y=100)

    note_label = Label(root, text="Note : Please enter the values space
seperated. For eg. 9 + 12 - 123", font=("Ariel", 12, "bold"))
    note_label.configure(background="yellow")
    note_label.configure(foreground="red")
    note_label.place(x=110, y=130)

    expression_entry = Entry(root, font=("Ariel", 15, "bold"))
    expression_entry.place(x=190, y=170, width=350)

    type_var = IntVar()
    prefix_button = Radiobutton(root, text="Prefix", variable=type_var,
value=1, font=("Ariel", 15, "bold"))
    prefix_button.configure(background="yellow")
    prefix_button.place(x=200, y=200)

    postfix_button = Radiobutton(root, text="Postfix", variable=type_var,
value=2, font=("Ariel", 15, "bold"))
    postfix_button.configure(background="yellow")
    postfix_button.place(x=400, y=200)

    evaluate_button = Button(root, text="Evaluate!", font=("Ariel", 15,
"bold"), command=lambda : evaluate_clicked(expression_entry, type_var,
ans_label))
    evaluate_button.configure(background="red")
```

```
    evaluate_button.configure(foreground="white")
    evaluate_button.place(x=300, y=250)

    ans_label = Label(root, text="", font=("Ariel", 20, "bold"),
anchor="center")
    ans_label.configure(background="yellow")
    ans_label.configure(foreground="red")
    ans_label.place(x=0, y=300, width=750)

    credits_label1 = Label(root, text="Developed by : Prakhar Parikh",
font=("Ariel", 14, "bold"))
    credits_label1.configure(background="yellow")
    credits_label1.configure(foreground="blue")
    credits_label1.place(x=200, y=350)
    credits_label2 = Label(root, text="Tarun Nagwadia", font=("Ariel", 14,
"bold"))
    credits_label2.configure(background="yellow")
    credits_label2.configure(foreground="blue")
    credits_label2.place(x=340, y=380)
    credits_label3 = Label(root, text="Pratham Chelaramani", font=("Ariel",
14, "bold"))
    credits_label3.configure(background="yellow")
    credits_label3.configure(foreground="blue")
    credits_label3.place(x=345, y=410)

    root.mainloop()
```

2) Person Queue Record Maintainer

```
#include<iostream>
#include<conio.h>
#include<stdlib.h>
#include<string>

#define MAX 10

using namespace std;

void queue_insert();
void queue_delete();
void display();
void queue_search();
string queue_array[MAX];
int rear = - 1;
```

```
int front = - 1;

int main()
{
    int choice;
    while (1)
    {
        cout << "1.Add person to queue \n";
        cout << "2.Delete person from queue \n";
        cout << "3.Display all person in queue \n";
        cout << "4.Search for a person in queue \n";
        cout << "5.Quit \n\n";
        cout << "Enter your choice : ";
        cin >> choice;
        cout << "\n\n";
        switch (choice)
        {
            case 1:
                queue_insert();
                cout << "\n\nPress any key to continue...";
                getch();
                system("cls");
                break;
            case 2:
                queue_delete();
                cout << "\n\nPress any key to continue...";
                getch();
                system("cls");
                break;
            case 3:
                display();
                cout << "\n\nPress any key to continue...";
                getch();
                system("cls");
                break;
            case 4:
                queue_search();
                cout << "\n\nPress any key to continue...";
                getch();
                system("cls");
                break;
            case 5:
                exit(1);
            default:
                cout << "Wrong choice \n";
                cout << "\n\nPress any key to continue...";
                getch();
                system("cls");
```

```
        }
    }
    return 0;
}

void queue_insert()
{
    string add_item;
    if (rear == MAX - 1)
    cout << "Queue Overflow \n";
    else
    {
        if (front == - 1)
        /*If queue is initially empty */
        front = 0;
        cout << "Insert the element in queue : ";
        cin >> add_item;
        rear = rear + 1;
        queue_array[rear] = add_item;
        cout << "\nElement inserted!";
    }
} /* End of queue_insert() */

void queue_delete()
{
    if (front == - 1 || front > rear)
    {
        cout << "Queue Underflow \n";
        return ;
    }
    else
    {
        cout << "Element deleted from queue is : " << queue_array[front] <<
endl;
        front = front + 1;
        if(front == rear){
            front = -1;
            rear = -1;
        }
    }
}

void display()
{
    cout << "The queue is : ";
    for (int i = front; i <= rear; i++)
        cout << queue_array[i] << " ";
    cout << "\n";
```

```
}

void queue_search()
{
    cout << "Enter name of person you want to search : ";
    string person;
    cin >> person;
    cout << endl;
    for (int i = front; i <= rear; i++){
        if(queue_array[i] == person){
            cout << "Person is waiting at position : " << i+1 << endl;
            goto finish;
        }
    }
    cout << "Person is not in the queue" << endl;
    finish:
    cout << "";
}
```

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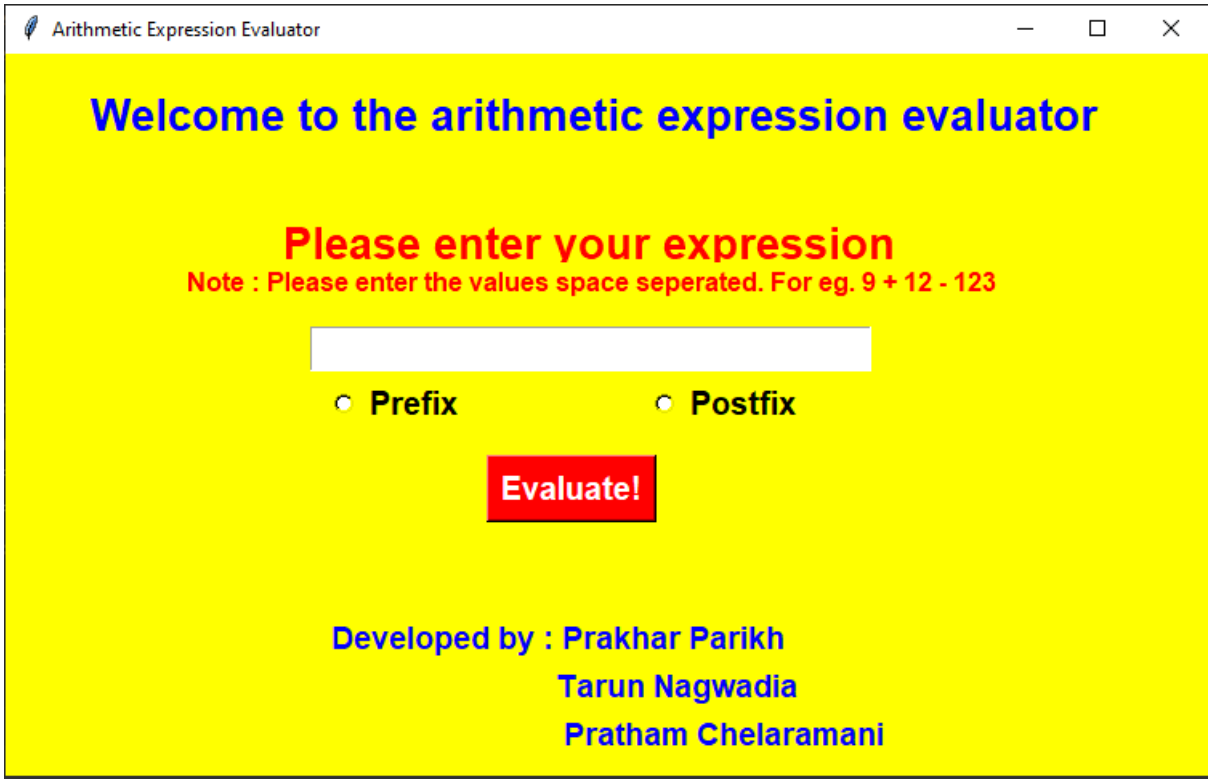
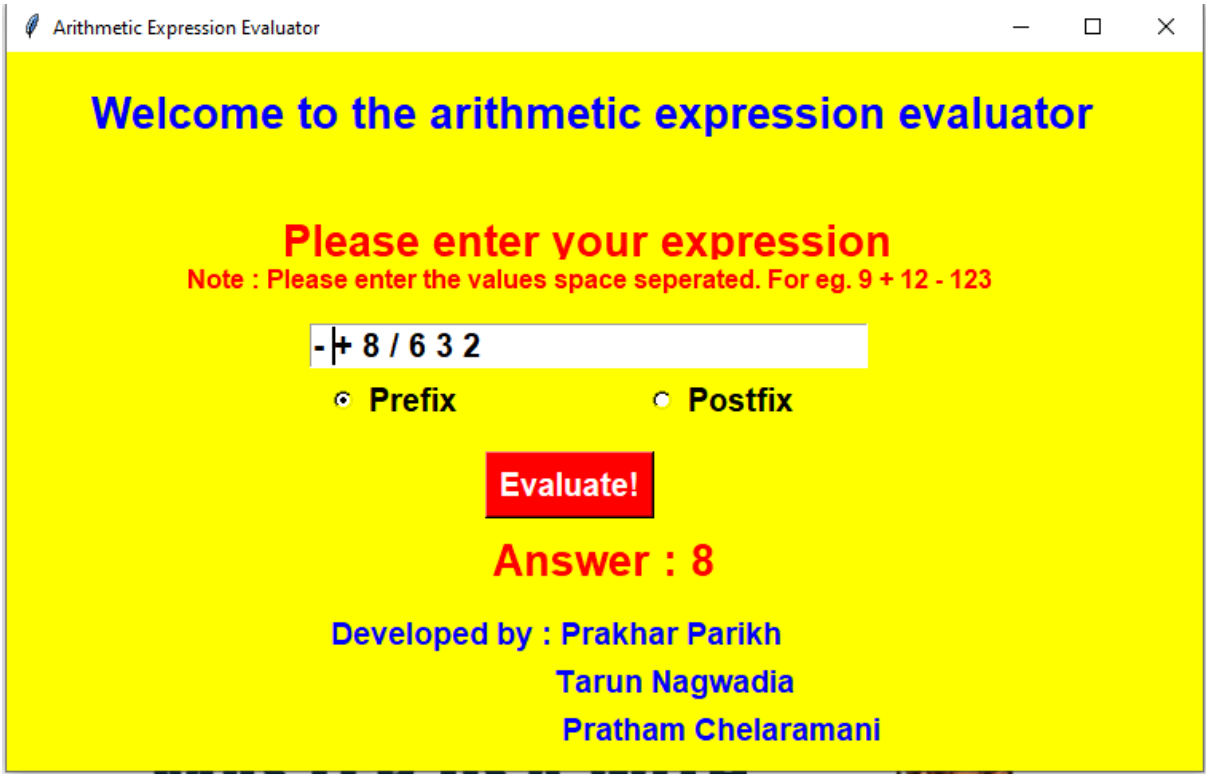
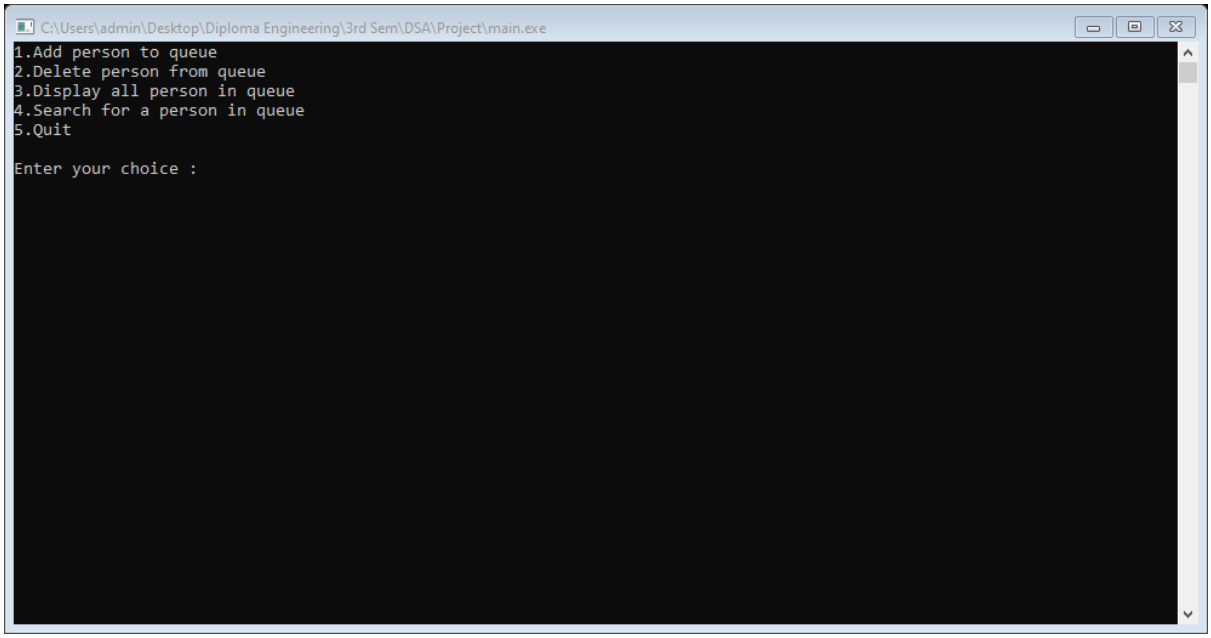
Screenshots

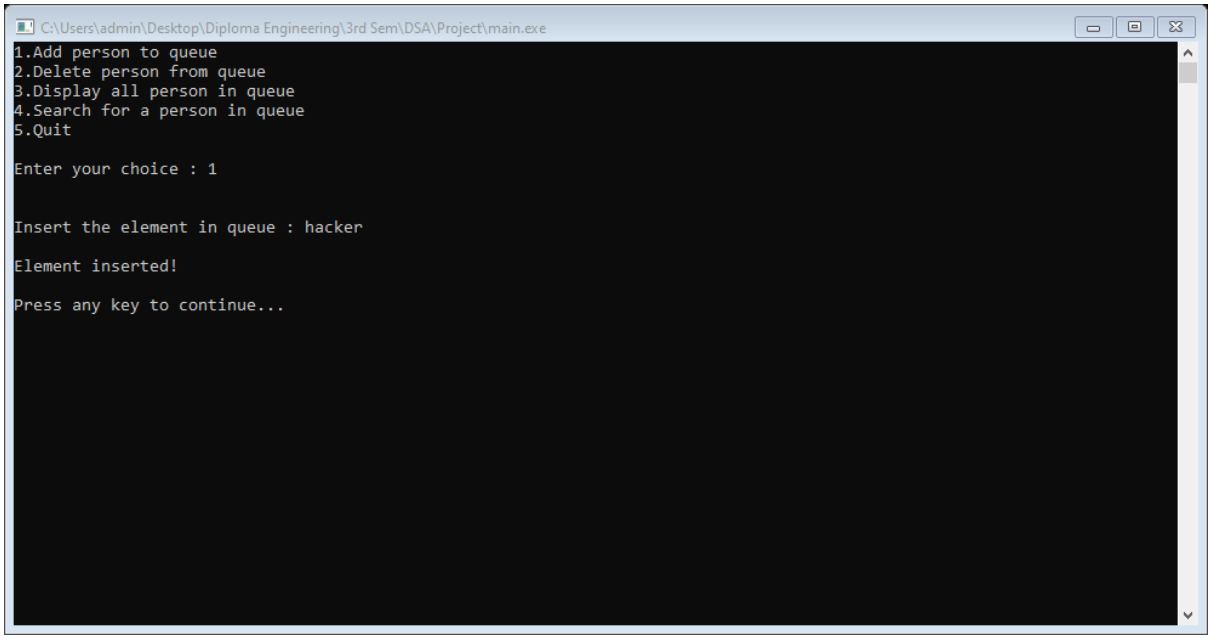
1) Arithmetic Expression Evaluator

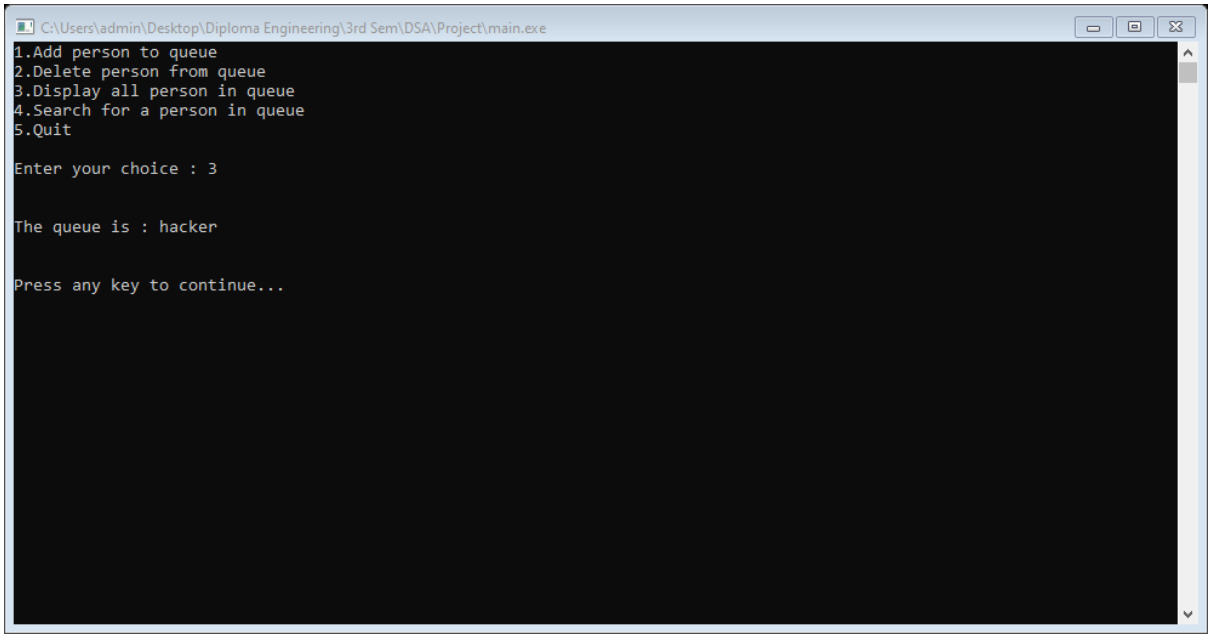


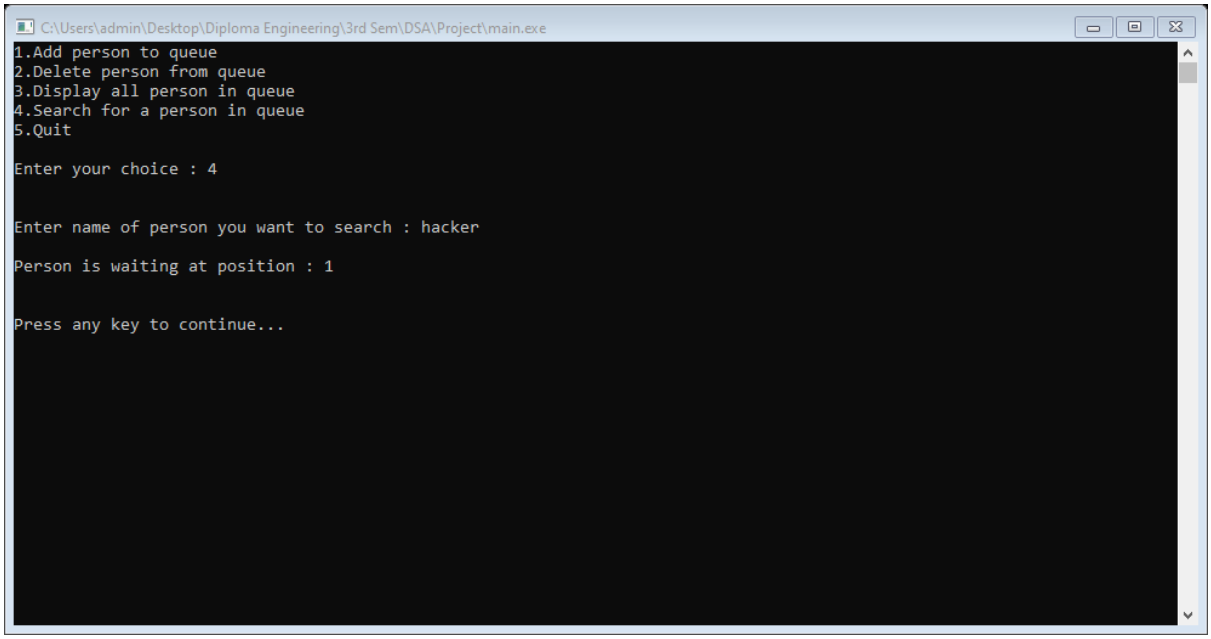


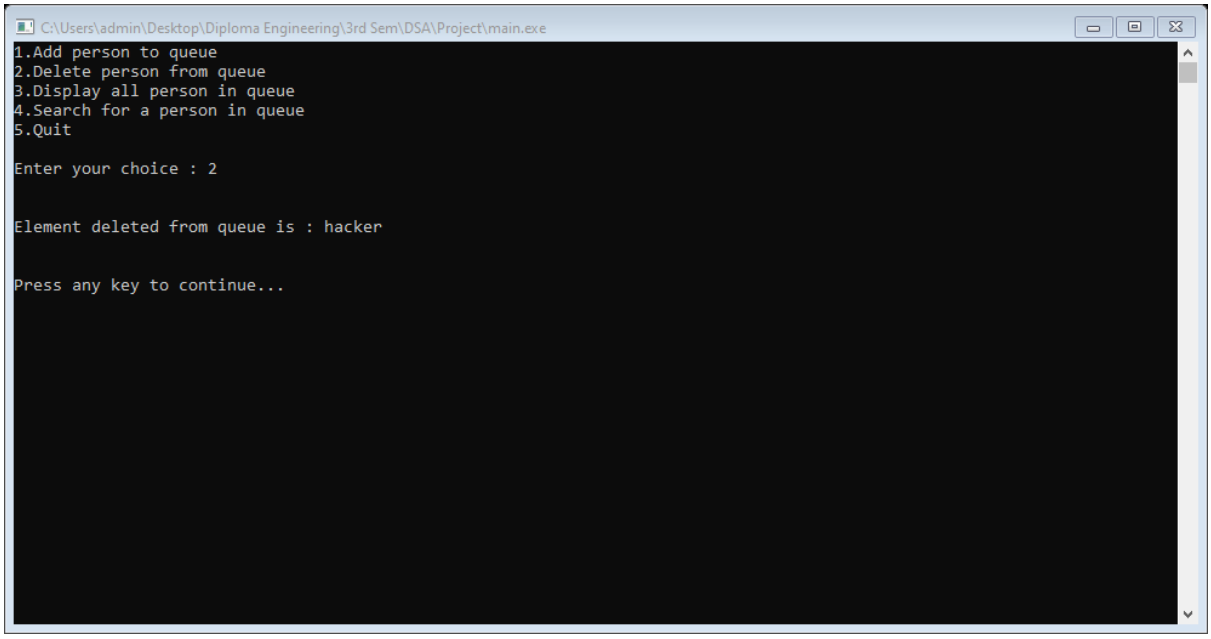
2) Person Queue Record Maintainer




C:\Users\admin\Desktop\Diploma Engineering\3rd Sem\DSA\Project\main.exe
1.Add person to queue
2.Delete person from queue
3.Display all person in queue
4.Search for a person in queue
5.Quit
Enter your choice : 1
Insert the element in queue : hacker
Element inserted!
Press any key to continue...


C:\Users\admin\Desktop\Diploma Engineering\3rd Sem\DSA\Project\main.exe
1.Add person to queue
2.Delete person from queue
3.Display all person in queue
4.Search for a person in queue
5.Quit
Enter your choice : 3
The queue is : hacker
Press any key to continue...


C:\Users\admin\Desktop\Diploma Engineering\3rd Sem\DSA\Project\main.exe
1.Add person to queue
2.Delete person from queue
3.Display all person in queue
4.Search for a person in queue
5.Quit
Enter your choice : 4
Enter name of person you want to search : hacker
Person is waiting at position : 1
Press any key to continue...


C:\Users\admin\Desktop\Diploma Engineering\3rd Sem\DSA\Project\main.exe
1.Add person to queue
2.Delete person from queue
3.Display all person in queue
4.Search for a person in queue
5.Quit
Enter your choice : 2
Element deleted from queue is : hacker
Press any key to continue...