Name: KAMCHE YANN ARNAUD

Matricule : FE21A208

Department: Computer Engineering

Level: 300

Task: Implement a queue using array

1. CODE

```c
/* IMPLEMENTATION OF QUEUE
Using Arrays
10/20/2022
*/

#include<stdio.h>
#include<stdlib.h>
#include<conio.h>
#define MAX_SIZE 100

int A[MAX_SIZE];
int front = -1;
int rear = -1;
int result;

void Create(int Queue_Size)
{
    int A[Queue_Size];
    return;
}
//Queue is Full
void Queue_Full()
{
        printf("Error: QUEUE OVERFLOW\n");
        return;
```

```c
}


//Queue is Empty
void Queue_Empty()
{
            printf("Error: QUEUE EMPTY\n");

            return;

}


/*Enqueue inserts an element into the queue

Elements are inserted from the rear.

The are three conditions to check in this case, which are:

      - Is the queue full, if yes display the state of the queue being 'FULL'

      - Is there only one element, if yes, both the front and the rear will
automatically

            acquire the index of the first position in the queue.

      - Are there more than one element, if yes, increment the rear in a
modulo fashion and insert an element

*/
void Enqueue(int max_size, int element)
{
      int index;

      index = (rear + 1)%max_size;

            if (index == front)

                  Queue_Full();

          else if (front == -1 && rear == -1)

                  rear = front = 0;

            else

                  rear = (++rear) % max_size;


      A[rear] = element;

      return;

}
```

```
/*Dequeue removes or pops an element out of the queue

Elements are removed from the front

There are three conditions to check in this case, which are:

      - Is the queue empty, if yes, display the state of the queue being
'EMPTY'

      - Is there only one element in the queue, if yes, both the rear and the
front

            will acquire the null index(-1), signifying that the queue is
empty

      - Are there more than one element in the queue, increment the front.
*/


int Dequeue(int max_size)
{

      int index;

      index =  front;

      if(front == -1)

            return 0;

      else if(front == rear)

            front = rear = -1;

      else

            front = (front + 1)% max_size;

      return A[index];


}


//Display: Prints the content of the queue


void Display(int max_size)
{

            int i;

            i = front;

            if( front == -1 )

                  Queue_Empty();
```

```c
        else
        {
                printf("Queue:  ");
                do
                {
                        printf("%d ", A[i]);
                        i = (i+1)%max_size;
                }while ( i != rear);

                printf("\n");
        }
        return;
}


//headOfQueue: Displays the element at the front of the queue

int headOfQueue()
{
    if(front == -1)
            return 0;
    else
            return A[front];
}


//endOfQueue: Displays the element at the rear of the queue

int endOfQueue()
{
    if(rear == -1)
            return 0;
    else
            return A[rear];
}
```

```c
//sizeOfQueue: Displays the size of the Queue

int sizeOfQueue()
{
    if( front ==-1 || rear == -1)
        return 0;
    else if(front < rear)
        return rear - front +1;
    else
        return front - rear+ 1;
}


void statusOfQueue(int size)
{
    int index;
    index = (rear + 1)%size;
    if(front == -1)
        Queue_Empty();
    else if (index == front)
        Queue_Full();
    else
        printf("STATUS: Not Empty");
    return;
}


int main()
{
    int Queue_Size, choice, num;
    system("color 2");
    printf("Enter the size of your Queue: ");
    scanf("%d", &Queue_Size);
```

```c
    Create(Queue_Size);

    printf("1. Enqueue\n");
    printf("2. Dequeue\n ");
    printf("3. Head of queue\n");
    printf("4. End of queue\n");
    printf("5. Display Queue\n");
    printf("6. Size of queue\n");
    printf("7. Status of queue\n");
    options:
        printf("\nChoose the operation to be performed with your list: ");
    scanf("%d", &choice);

        while(choice == 1|| choice == 2|| choice == 3|| choice == 4 || choice == 5 || choice == 6 || choice == 7)
    {

        while(choice==1)
            {
                printf("Enter a number: ");
                scanf("%d", &num);
                Enqueue(Queue_Size, num);
                goto options;
            }

        while(choice == 2){
            result = Dequeue(Queue_Size);
            if(result == 0 )
                printf("Queue is empty");
            else
                printf("%d", result);
            goto options;
        }
```

```c
while(choice == 3){
        result = headOfQueue();
        if(result == 0)
                printf("No Element at the front");
        else
                printf("%d", result);
        goto options;
}


while(choice == 4){
        result = endOfQueue();
        if(result == 0)
                printf("No Element at the end");
        else
                printf("%d", result);
        goto options;
}


while(choice == 5){
        Display(Queue_Size);
        goto options;
}

        while(choice == 6){
        result= sizeOfQueue();
        if(result == 0)
                printf("Queue is empty");
        else
                printf("%d", result);
        goto options;
}
        while(choice == 7){
```
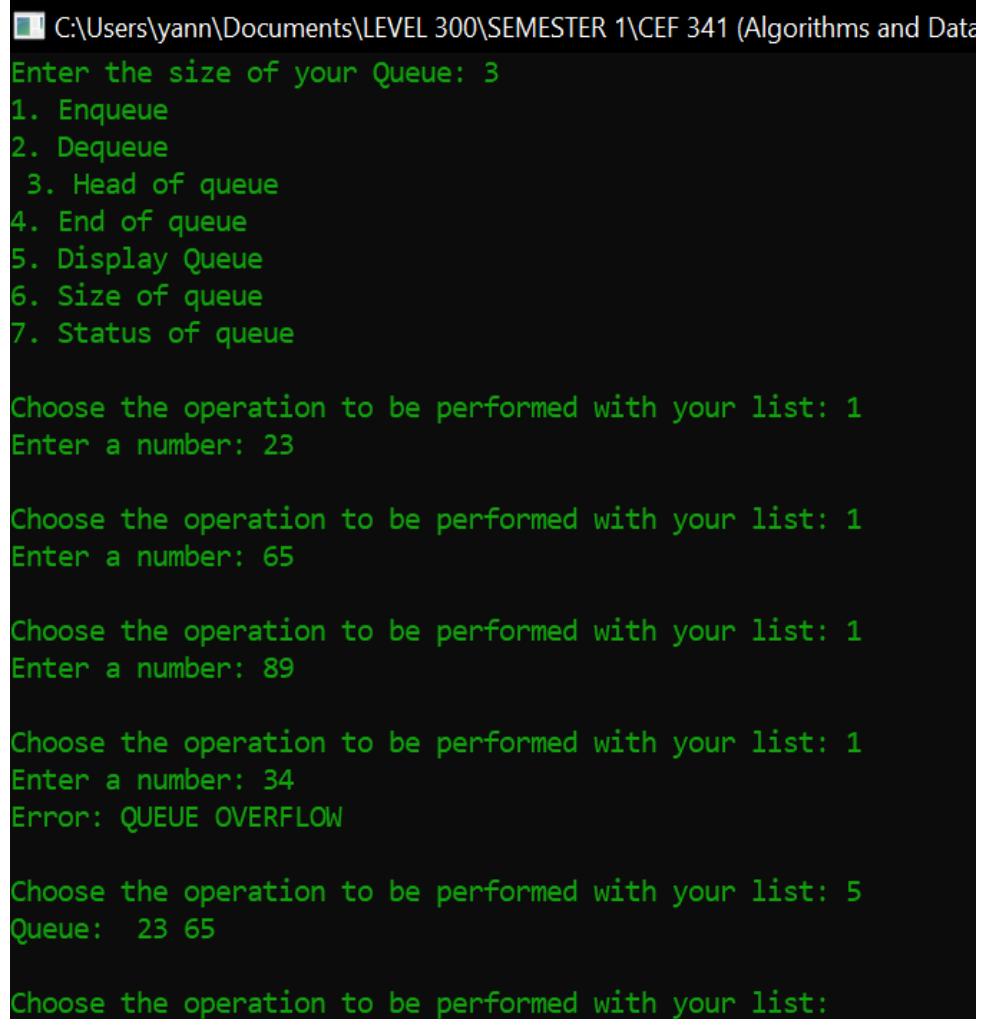
```
                    statusOfQueue(Queue_Size);

                    goto options;

              }

      }


return 0;

}
```

1. <u>COMPILATION RESULTS</u>

   I)   <u>ENQUEUE OPERATION</u>

II) DEQUEUE OPERATION

```
C:\Users\yann\Documents\LEVEL 300\SEMESTER 1\CEF 341 (Algorithms and
Enter the size of your Queue: 4
1. Enqueue
2. Dequeue
 3. Head of queue
4. End of queue
5. Display Queue
6. Size of queue
7. Status of queue

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 56

Choose the operation to be performed with your list: 1
Enter a number: 87

Choose the operation to be performed with your list: 1
Enter a number: 45

Choose the operation to be performed with your list: 5
Queue:  23 56 87

Choose the operation to be performed with your list: 2
23
Choose the operation to be performed with your list: 2
56
Choose the operation to be performed with your list: 2
87
Choose the operation to be performed with your list: 2
45
Choose the operation to be performed with your list: 2
Queue is empty
Choose the operation to be performed with your list: _
```

III) DISPLAY QUEUE

```
C:\Users\yann\Documents\LEVEL 300\SEMESTER 1\CEF 341 (Algorithms and
Enter the size of your Queue: 4
1. Enqueue
2. Dequeue
 3. Head of queue
4. End of queue
5. Display Queue
6. Size of queue
7. Status of queue

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 56

Choose the operation to be performed with your list: 1
Enter a number: 78

Choose the operation to be performed with your list: 1
Enter a number: 765

Choose the operation to be performed with your list: 1
Enter a number: 23
Error: QUEUE OVERFLOW

Choose the operation to be performed with your list: 5
Queue:  23 56 78

Choose the operation to be performed with your list: _
```

IV) <u>HEAD OF QUEUE</u>

```
C:\Users\yann\Documents\LEVEL 300\SEMESTER 1\CEF 341 (Algorithms and
Enter the size of your Queue: 3
1. Enqueue
2. Dequeue
 3. Head of queue
4. End of queue
5. Display Queue
6. Size of queue
7. Status of queue

Choose the operation to be performed with your list: 1
Enter a number: 34

Choose the operation to be performed with your list: 1
Enter a number: 67

Choose the operation to be performed with your list: 1
Enter a number: 89

Choose the operation to be performed with your list: 1
Enter a number: 654
Error: QUEUE OVERFLOW

Choose the operation to be performed with your list: 3
34
Choose the operation to be performed with your list: 2
34
Choose the operation to be performed with your list: 3
67
Choose the operation to be performed with your list: 5
Queue:   67

Choose the operation to be performed with your list: 2
67
Choose the operation to be performed with your list: 3
654
Choose the operation to be performed with your list: 2
654
Choose the operation to be performed with your list: 3
No Element at the front
Choose the operation to be performed with your list:
```

V) <u>END OF QUEUE</u>

```
C:\Users\yann\Documents\LEVEL 300\SEMESTER 1\CEF 341 (Algorithms and
Enter the size of your Queue: 3
1. Enqueue
2. Dequeue
 3. Head of queue
4. End of queue
5. Display Queue
6. Size of queue
7. Status of queue

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 34

Choose the operation to be performed with your list: 1
Enter a number: 67

Choose the operation to be performed with your list: 4
67
Choose the operation to be performed with your list: 2
23
Choose the operation to be performed with your list: 4
67
Choose the operation to be performed with your list: 2
34
Choose the operation to be performed with your list: 4
67
Choose the operation to be performed with your list: 2
67
Choose the operation to be performed with your list: 4
No Element at the end
Choose the operation to be performed with your list: _
```

VI) DISPLAY QUEUE

```
Select C:\Users\yann\Documents\LEVEL 300\SEMESTER 1\CEF 341 (Alge
Enter the size of your Queue: 3
1. Enqueue
2. Dequeue
 3. Head of queue
4. End of queue
5. Display Queue
6. Size of queue
7. Status of queue

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 45

Choose the operation to be performed with your list: 1
Enter a number: 67

Choose the operation to be performed with your list: 5
Queue:  23 45

Choose the operation to be performed with your list: 1
Enter a number: 23
Error: QUEUE OVERFLOW

Choose the operation to be performed with your list:
```

VII) SIZE OF QUEUE

```
C:\Users\yann\Documents\LEVEL 300\SEMESTER 1\CEF 341 (Algorithms a
 3. Head of queue
4. End of queue
5. Display Queue
6. Size of queue
7. Status of queue

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 45

Choose the operation to be performed with your list: 1
Enter a number: 67

Choose the operation to be performed with your list: 6
3
Choose the operation to be performed with your list: 2
23
Choose the operation to be performed with your list: 6
2
Choose the operation to be performed with your list: 2
45
Choose the operation to be performed with your list: 6
1
Choose the operation to be performed with your list: 2
67
Choose the operation to be performed with your list: 6
Queue is empty
Choose the operation to be performed with your list:
```

VIII) <u>STATUS OF QUEUE</u>

```
C:\Users\yann\Documents\LEVEL 300\SEMESTER 1\CEF 341 (Algorithms
5. Display Queue
6. Size of queue
7. Status of queue

Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 34

Choose the operation to be performed with your list: 2
23
Choose the operation to be performed with your list: 2
34
Choose the operation to be performed with your list: 2
Queue is empty
Choose the operation to be performed with your list: 1
Enter a number: 23

Choose the operation to be performed with your list: 1
Enter a number: 45

Choose the operation to be performed with your list: 1
Enter a number: 67

Choose the operation to be performed with your list: 1
Enter a number: 67
Error: QUEUE OVERFLOW

Choose the operation to be performed with your list:
```