Circular Queue | Set 2 (Circular Linked List Implementation)

Prerequisite – Circular Singly Linked List

We have discussed basics and how to implement circular queue using array in set 1.
Circular Queue | Set 1 (Introduction and Array Implementation)

In this post another method of circular queue implementation is discussed, using Circular Singly Linked List.

Operations on Circular Queue:

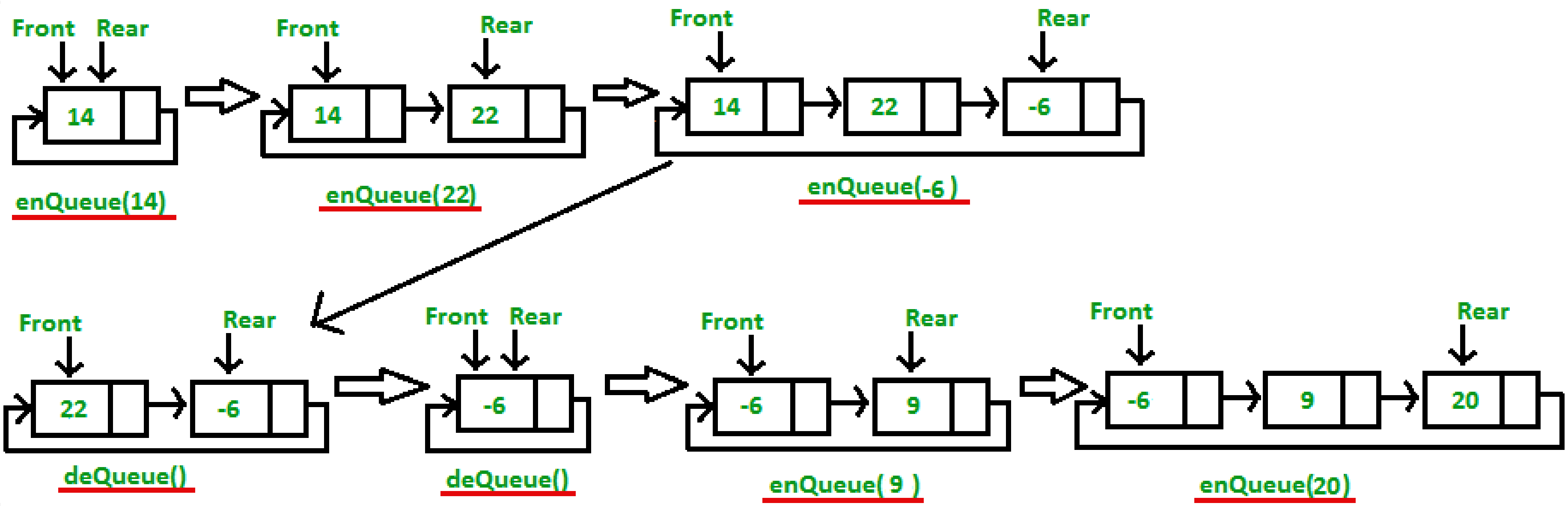
- **Front:**Get the front item from queue.
- **Rear:** Get the last item from queue.
- **enQueue(value)** This function is used to insert an element into the circular queue. In a circular queue, the new element is always inserted at Rear position.

  Steps:

  1. Create a new node dynamically and insert value into it.
  2. Check if front==NULL, if it is true then front = rear = (newly created node)
  3. If it is false then rare=(newly created node) and rear node always contains the address of the front node.
- **deQueue()** This function is used to delete an element from the circular queue. In a queue, the element is always deleted from front position.

  Steps:

  1. Check whether queue is empty or not means front == NULL.
  2. If it is empty then display Queue is empty. If queue is not empty then step 3



Recommended: Please try your approach on *{IDE}* first, before moving on to the solution.

```
// C or C++ program for insertion and
// deletion in Circular Queue
#include <bits/stdc++.h>
using namespace std;

// Structure of a Node
struct Node
{
    int data;
    struct Node* link;
};

struct Queue
{
    struct Node *front, *rear;
};

// Function to create Circular queue
void enQueue(Queue *q, int value)
{
    struct Node *temp = new Node;
```

```
    else
        q->rear->link = temp;

    q->rear = temp;
    q->rear->link = q->front;
}

// Function to delete element from Circular Queue
int deQueue(Queue *q)
{
    if (q->front == NULL)
    {
        printf ("Queue is empty");
        return INT_MIN;
    }

    // If this is the last node to be deleted
    int value; // Value to be dequeued
    if (q->front == q->rear)
    {
        value = q->front->data;
        free(q->front);
        q->front = NULL;
        q->rear = NULL;
    }
    else  // There are more than one nodes
    {
        struct Node *temp = q->front;
        value = temp->data;
        q->front = q->front->link;
        q->rear->link= q->front;
        free(temp);
    }

    return value ;
}

// Function displaying the elements of Circular Queue
void displayQueue(struct Queue *q)
{
    struct Node *temp = q->front;
    printf("\nElements in Circular Queue are: ");
    while (temp->link != q->front)
    {
        printf("%d ", temp->data);
        temp = temp->link;
    }
    printf("%d", temp->data);
}
```

```
{
    // Create a queue and initialize front and rear
    Queue *q = new Queue;
    q->front = q->rear = NULL;

    // Inserting elements in Circular Queue
    enQueue(q, 14);
    enQueue(q, 22);
    enQueue(q, 6);

    // Display elements present in Circular Queue
    displayQueue(q);

    // Deleting elements from Circular Queue
    printf("\nDeleted value = %d", deQueue(q));
    printf("\nDeleted value = %d", deQueue(q));

    // Remaining elements in Circular Queue
    displayQueue(q);

    enQueue(q, 9);
    enQueue(q, 20);
    displayQueue(q);

    return 0;
}
```

Run on IDE

Output:

```
Elements in Circular Queue are: 14 22 6
Deleted value = 14
Deleted value = 22
Elements in Circular Queue are: 6
Elements in Circular Queue are: 6 9 20
```

Time Complexity: Time complexity of enQueue(), deQueue() operation is O(1) as there is no loop in any of the operation.

Note : In case of linked list implementation, a queue can be easily implemented without being circular. However in case of array implementation, we need a circular queue to save space.

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Linked Lists Queue

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