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Title of Program:	Stacks & Queues: Double ended Queues
Objective:	1. EnqueueFront 2. EnqueueRea 3. DequeueFront 4. DequeueRear 5. PeekFront 6. PeekRear 7. Display

CODE:

```
import java.util.Scanner;

class DQNode {
    int data;
    DQNode right;
    DQNode left;

    public DQNode(int d) {
        data = d;
        right = null;
        left = null;
    }
} // end of dequeue

class DQue {
    DQNode front;
    DQNode rear;

    public DQue() {
        front = null;
        rear = null;
    }

    void EnqueueFront(int data) {
        DQNode x = new DQNode(data);
        if (front == null) {
            front = x;
            rear = x;
        } else {
            x.right = front;
```

```
            front.left = x;
            front = x;
        }
    }

    void EnqueueRear(int data) {
        DQNode x = new DQNode(data);
        if (front == null) {
            front = x;
            rear = x;
        } else {
            x.left = rear;
            rear.right = x;
            rear = x;
        }
    } // end of Enqueue

    public void DequeueFront() {
        if (front == null) {
            System.out.println("Queue UnderFlow !!!");
        } else {
            System.out.println("Element Removed: " + front.data);
            if (front == rear) {
                front = null;
                rear = null;
            } else {
                front = front.right;
                front.left = null;
            }
        }
    }

    // DequeueRear
    public void DequeueRear() {
        System.out.println("Element Removed: " + rear.data);
        if (front == null) {
            System.out.println("Queue UnderFlow !!!");
        } else {
            if (front == rear) {
                front = null;
                rear = null;
            } else {
                rear = rear.left;
                rear.right = null;
            }
        }
    }

    // PeekFront
```

```
    public void PeekFront() {
        if (front == null) {
            System.out.println("Queue UnderFlow !!!");
        } else {
            System.out.println(front.data);
        }
    }

    // PeekRear
    public void PeekRear() {
        if (front == null) {
            System.out.println("Queue UnderFlow !!!");
        } else {
            System.out.println(rear.data);
        }
    }

    // Display
    public void Display() {
        if (front == null) {
            System.out.println("Queue UnderFlow !!!");
        } else {
            DQNode tmp = front;
            while (tmp != null) {
                System.out.print(tmp.data + " | " + " ");
                tmp = tmp.right;
            }
            System.out.println("");

        }
    }
}// end of DQue

class DQueue {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        DQue d = new DQue();
        char ch;
        do {
            System.out.print("\033[H\033[2J");
            System.out.flush();
            System.out.println("\n\t**********Double Ended Queue**********");
            System.out.println("1. Enqueue Front");
            System.out.println("2. Enqueue Rear");
            System.out.println("3. Dequeue Front");
            System.out.println("4. Dequeue Rear");
            System.out.println("5. Peek Front");
            System.out.println("6. Peek Rear");
            System.out.println("7. Display");
```

```
            System.out.print("Enter your Choice: ");
            int choice = sc.nextInt();
            switch (choice) {
                case 1:
                    System.out.println("You selected Enqueue Front.");
                    System.out.println("Enter the Value: ");
                    int val = sc.nextInt();
                    d.EnqueueFront(val);
                    break;
                case 2:
                    System.out.println("You selected Enqueue Rear.");
                    System.out.println("Enter the Value: ");
                    int val1 = sc.nextInt();
                    d.EnqueueRear(val1);
                    break;
                case 3:
                    System.out.println("You selected Dequeue Front.");
                    d.DequeueFront();
                    d.Display();
                    break;
                case 4:
                    System.out.println("You selected Dequeue Rear.");
                    d.DequeueRear();
                    d.Display();
                    break;
                case 5:
                    System.out.println("You selected Peek Front. ");
                    d.PeekFront();
                    break;
                case 6:
                    System.out.println("You selected Peek Rear.");
                    d.PeekRear();
                    break;
                case 7:
                    System.out.println("You selected Display.");
                    d.Display();
                    break;
                default:
                    System.out.println("Incorrect Choice !!!");
                    break;

            }
            System.out.print("Do you want to countinue(y/n): ");
            ch = sc.next().charAt(0);
        } while (ch == 'y' || ch == 'Y');// end of do while
    }// end of main
} // end of DQueue
```

OUTPUT:

Enqueue front and rear

```
         **********Double Ended Queue************
1. Enqueue Front
2. Enqueue Rear
3. Dequeue Front
4. Dequeue Rear
5. Peek Front
6. Peek Rear
7. Display
Enter your Choice: 1
You selected Enqueue Front.
Enter the Value:
50
Do you want to countinue(y/n): y

         **********Double Ended Queue************
1. Enqueue Front
2. Enqueue Rear
3. Dequeue Front
4. Dequeue Rear
5. Peek Front
6. Peek Rear
7. Display
Enter your Choice: 7
You selected Display.
50 |  20 |  50 |
Do you want to countinue(y/n):
```

Peek Front and rear

```
         **********Double Ended Queue************
1. Enqueue Front
2. Enqueue Rear
3. Dequeue Front
4. Dequeue Rear
5. Peek Front
6. Peek Rear
7. Display
Enter your Choice: 5
You selected Peek Front.
50
Do you want to countinue(y/n): y

         **********Double Ended Queue************
1. Enqueue Front
2. Enqueue Rear
3. Dequeue Front
4. Dequeue Rear
5. Peek Front
6. Peek Rear
7. Display
Enter your Choice: 6
You selected Peek Rear.
50
Do you want to countinue(y/n):
```

Dequeue front and rear:

```
          **********Double Ended Queue************
1. Enqueue Front
2. Enqueue Rear
3. Dequeue Front
4. Dequeue Rear
5. Peek Front
6. Peek Rear
7. Display
Enter your Choice: 3
You selected Dequeue Front.
Element Removed: 50
20 |  50 |
Do you want to countinue(y/n): y

          **********Double Ended Queue************
1. Enqueue Front
2. Enqueue Rear
3. Dequeue Front
4. Dequeue Rear
5. Peek Front
6. Peek Rear
7. Display
Enter your Choice: 4
You selected Dequeue Rear.
Element Removed: 50
20 |
Do you want to countinue(y/n): D
```