Java Program to Implement Circular Doubly Linked List

```
import java.util.Scanner;


/*  Class Node  */

class Node

{

   protected int data;

   protected Node next, prev;


   /* Constructor */

   public Node()

   {

      next = null;

      prev = null;

      data = 0;

   }

   /* Constructor */

   public Node(int d, Node n, Node p)

   {

      data = d;

      next = n;

      prev = p;

   }

   /* Function to set link to next node */

   public void setLinkNext(Node n)
```

```
{
   next = n;
}
/* Function to set link to previous node */
public void setLinkPrev(Node p)
{
   prev = p;
}
/* Funtion to get link to next node */
public Node getLinkNext()
{
   return next;
}
/* Function to get link to previous node */
public Node getLinkPrev()
{
   return prev;
}
/* Function to set data to node */
public void setData(int d)
{
   data = d;
}
/* Function to get data from node */
public int getData()
```

```
    {
        return data;
    }
}

/* Class linkedList */
class linkedList
{
    protected Node start;
    protected Node end ;
    public int size;

    /* Constructor */
    public linkedList()
    {
        start = null;
        end = null;
        size = 0;
    }
    /* Function to check if list is empty */
    public boolean isEmpty()
    {
        return start == null;
    }
    /* Function to get size of list */
```

```
public int getSize()

{

   return size;

}

/* Function to insert element at begining */

public void insertAtStart(int val)

{

   Node nptr = new Node(val, null, null);

   if (start == null)

   {

      nptr.setLinkNext(nptr);

      nptr.setLinkPrev(nptr);

      start = nptr;

      end = start;

   }

   else

   {

      nptr.setLinkPrev(end);

      end.setLinkNext(nptr);

      start.setLinkPrev(nptr);

      nptr.setLinkNext(start);

      start = nptr;

   }

   size++ ;

}
```

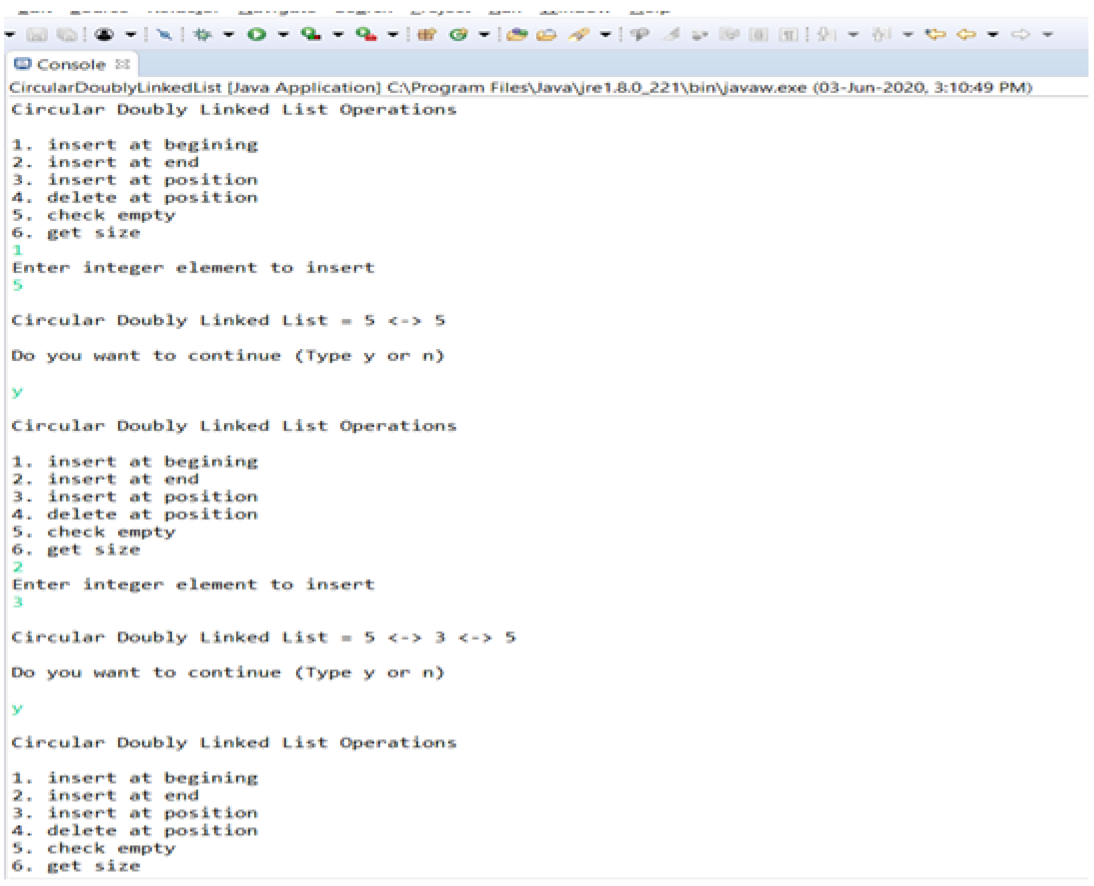
```
/*Function to insert element at end */
public void insertAtEnd(int val)
{
   Node nptr = new Node(val, null, null);
   if (start == null)
   {
      nptr.setLinkNext(nptr);
      nptr.setLinkPrev(nptr);
      start = nptr;
      end = start;
   }
   else
   {
      nptr.setLinkPrev(end);
      end.setLinkNext(nptr);
      start.setLinkPrev(nptr);
      nptr.setLinkNext(start);
      end = nptr;
   }
   size++;
}
/* Function to insert element at position */
public void insertAtPos(int val , int pos)
{
   Node nptr = new Node(val, null, null);
```

```
    if (pos == 1)
    {
        insertAtStart(val);
        return;
    }
    Node ptr = start;
    for (int i = 2; i <= size; i++)
    {
        if (i == pos)
        {
            Node tmp = ptr.getLinkNext();
            ptr.setLinkNext(nptr);
            nptr.setLinkPrev(ptr);
            nptr.setLinkNext(tmp);
            tmp.setLinkPrev(nptr);
        }
        ptr = ptr.getLinkNext();
    }
    size++ ;
}
/* Function to delete node at position  */
public void deleteAtPos(int pos)
{
    if (pos == 1)
    {
```

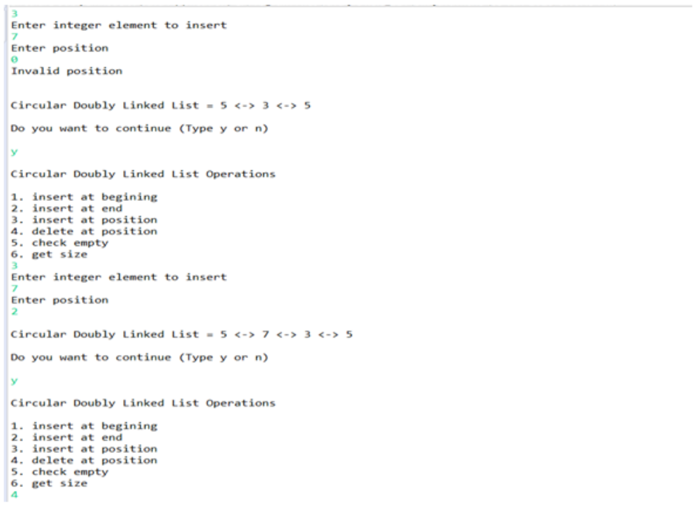
```
    if (size == 1)
    {
        start = null;
        end = null;
        size = 0;
        return;
    }
    start = start.getLinkNext();
    start.setLinkPrev(end);
    end.setLinkNext(start);
    size--;
    return ;
}
if (pos == size)
{
    end = end.getLinkPrev();
    end.setLinkNext(start);
    start.setLinkPrev(end);
    size-- ;
}
Node ptr = start.getLinkNext();
for (int i = 2; i <= size; i++)
{
    if (i == pos)
    {
            Node p = ptr.getLinkPrev();
            Node n = ptr.getLinkNext();

            p.setLinkNext(n);
            n.setLinkPrev(p);
            size-- ;
            return;
        }
        ptr = ptr.getLinkNext();
    }
}
/* Function to display status of list */
public void display()
{
    System.out.print("\nCircular Doubly Linked List = ");
    Node ptr = start;
    if (size == 0)
    {
        System.out.print("empty\n");
        return;
    }
    if (start.getLinkNext() == start)
    {
        System.out.print(start.getData()+ " <-> "+ptr.getData()+ "\n");
        return;
        }
        System.out.print(start.getData()+ " <-> ");
        ptr = start.getLinkNext();
        while (ptr.getLinkNext() != start)
        {
            System.out.print(ptr.getData()+ " <-> ");
            ptr = ptr.getLinkNext();
        }
        System.out.print(ptr.getData()+ " <-> ");
        ptr = ptr.getLinkNext();
        System.out.print(ptr.getData()+ "\n");
    }
}

/* Class CircularDoublyLinkedList */
public class CircularDoublyLinkedList
{
    public static void main(String[] args)
    {
        Scanner scan = new Scanner(System.in);
        /* Creating object of linkedList */
        linkedList list = new linkedList();
        System.out.println("Circular Doubly Linked List Test\n");
        char ch;
        /*  Perform list operations  */
```

```
do

{

    System.out.println("\nCircular Doubly Linked List Operations\n");

    System.out.println("1. insert at begining");

    System.out.println("2. insert at end");

    System.out.println("3. insert at position");

    System.out.println("4. delete at position");

    System.out.println("5. check empty");

    System.out.println("6. get size");


    int choice = scan.nextInt();

    switch (choice)

    {

    case 1 :

        System.out.println("Enter integer element to insert");

        list.insertAtStart( scan.nextInt() );

        break;

    case 2 :

        System.out.println("Enter integer element to insert");

        list.insertAtEnd( scan.nextInt() );

        break;

    case 3 :

        System.out.println("Enter integer element to insert");

        int num = scan.nextInt() ;

        System.out.println("Enter position");
    int pos = scan.nextInt() ;

    if (pos < 1 || pos > list.getSize() )

        System.out.println("Invalid position\n");

    else

        list.insertAtPos(num, pos);

    break;

case 4 :

    System.out.println("Enter position");

    int p = scan.nextInt() ;

    if (p < 1 || p > list.getSize() )

        System.out.println("Invalid position\n");

    else

        list.deleteAtPos(p);

    break;

case 5 :

    System.out.println("Empty status = "+ list.isEmpty());

    break;

case 6 :

    System.out.println("Size = "+ list.getSize() +" \n");

    break;

default :

    System.out.println("Wrong Entry \n ");

    break;

}

/*  Display List  */
```

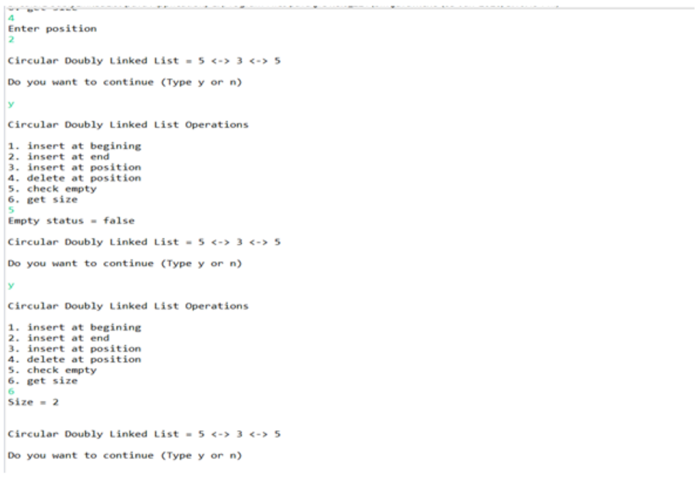
```
            list.display();

            System.out.println("\nDo you want to continue (Type y or n) \n");

            ch = scan.next().charAt(0);

        } while (ch == 'Y'|| ch == 'y');

    }

}
```



```
Console
CircularDoublyLinkedList [Java Application] C:\Program Files\Java\jre1.8.0_221\bin\javaw.exe (03-Jun-2020, 3:10:49 PM)
Circular Doubly Linked List Operations

1. insert at begining
2. insert at end
3. insert at position
4. delete at position
5. check empty
6. get size
1
Enter integer element to insert
5

Circular Doubly Linked List = 5 <-> 5

Do you want to continue (Type y or n)

y
Circular Doubly Linked List Operations

1. insert at begining
2. insert at end
3. insert at position
4. delete at position
5. check empty
6. get size
2
Enter integer element to insert
3

Circular Doubly Linked List = 5 <-> 3 <-> 5

Do you want to continue (Type y or n)

y
Circular Doubly Linked List Operations

1. insert at begining
2. insert at end
3. insert at position
4. delete at position
5. check empty
6. get size
```



```
3
Enter integer element to insert
7
Enter position
0
Invalid position


Circular Doubly Linked List = 5 <-> 3 <-> 5

Do you want to continue (Type y or n)

y

Circular Doubly Linked List Operations

1. insert at begining
2. insert at end
3. insert at position
4. delete at position
5. check empty
6. get size
3
Enter integer element to insert
7
Enter position
2

Circular Doubly Linked List = 5 <-> 7 <-> 3 <-> 5

Do you want to continue (Type y or n)

y

Circular Doubly Linked List Operations

1. insert at begining
2. insert at end
3. insert at position
4. delete at position
5. check empty
6. get size
4
```



```
4
Enter position
2

Circular Doubly Linked List = 5 <-> 3 <-> 5

Do you want to continue (Type y or n)

y

Circular Doubly Linked List Operations

1. insert at begining
2. insert at end
3. insert at position
4. delete at position
5. check empty
6. get size
5
Empty status = false

Circular Doubly Linked List = 5 <-> 3 <-> 5

Do you want to continue (Type y or n)

y

Circular Doubly Linked List Operations

1. insert at begining
2. insert at end
3. insert at position
4. delete at position
5. check empty
6. get size
6
Size = 2


Circular Doubly Linked List = 5 <-> 3 <-> 5

Do you want to continue (Type y or n)
```