GIT Department of Computer Engineering
CSE 222/505 - Spring 2020
Homework #4 Part 2 Report

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PROBLEM SOLUTION APPROACH

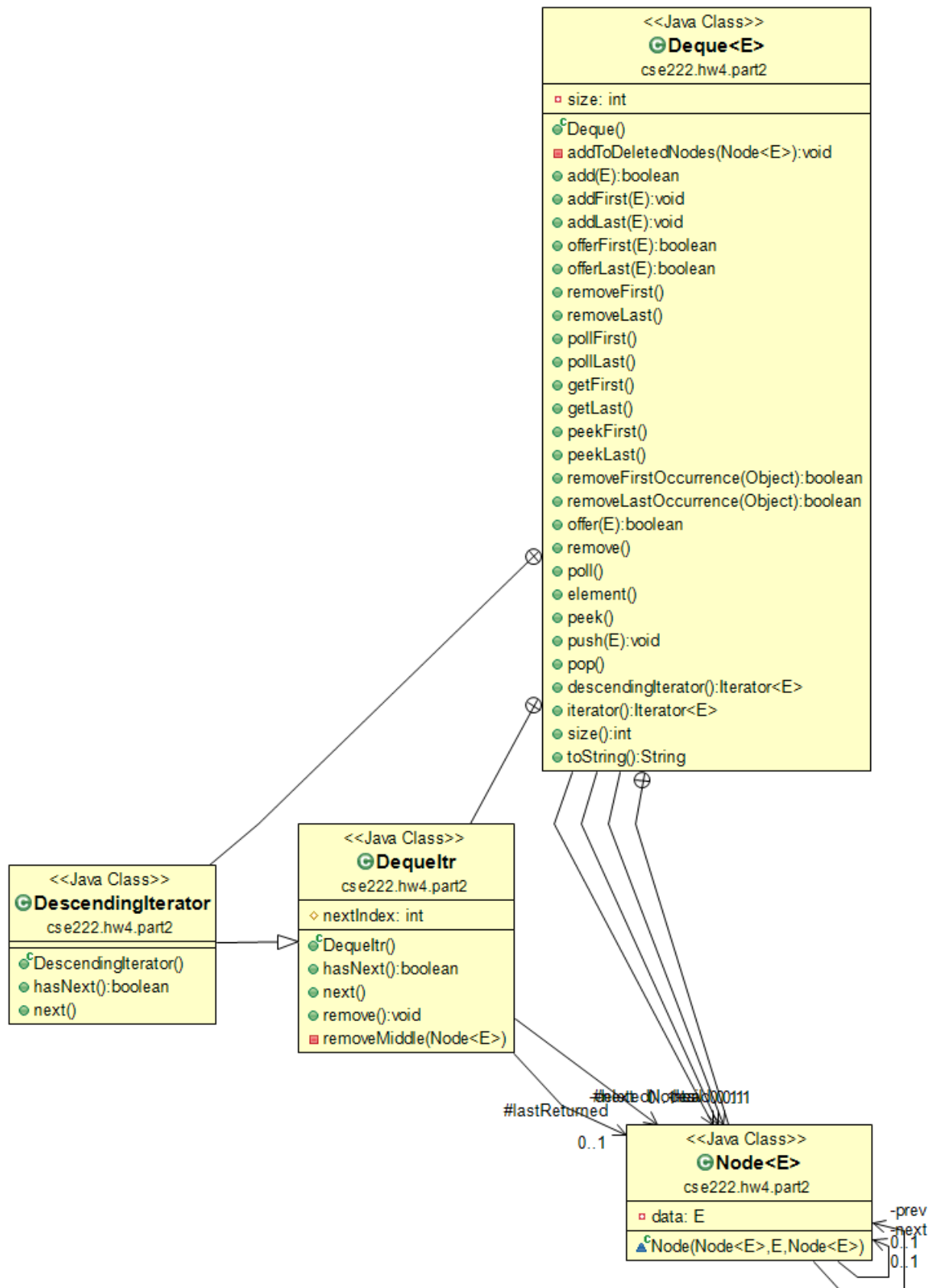Step 1 – I implemented Deque interface and extend AbstractCollection class.

Step 2 – Then create an static inner class named Node which holds generic type data, a node to next , a node to previous

Step 3 – Then create two inner iterator class , one of them implements Iterator inteface (DequeItr) and   the other extends DequeItr class (DescendingIterator)

Step 4 - After, implemented all required methods inherited Iterator interface in DequeItr class and override necessary methods in DescendingIterator class,   I implement all required methods inherited Deque interface and AbstractCollection in Deque class

Step 5 – After implementations, I try to test all functions implemented and overrided.

CLASS DIAGRAM

<<Java Class>> Ⓖ Deque<E>
cse222.hw4.part2

- size: int

- Ⓒ Deque()
- ■ addToDeletedNodes(Node<E>):void
- add(E):boolean
- addFirst(E):void
- addLast(E):void
- offerFirst(E):boolean
- offerLast(E):boolean
- removeFirst()
- removeLast()
- pollFirst()
- pollLast()
- getFirst()
- getLast()
- peekFirst()
- peekLast()
- removeFirstOccurrence(Object):boolean
- removeLastOccurrence(Object):boolean
- offer(E):boolean
- remove()
- poll()
- element()
- peek()
- push(E):void
- pop()
- descendingIterator():Iterator<E>
- iterator():Iterator<E>
- size():int
- toString():String

<<Java Class>> Ⓖ DescendingIterator
cse222.hw4.part2

- Ⓒ DescendingIterator()
- hasNext():boolean
- next()

<<Java Class>> Ⓖ DequeItr
cse222.hw4.part2

- ◇ nextIndex: int

- Ⓒ DequeItr()
- hasNext():boolean
- next()
- remove():void
- ■ removeMiddle(Node<E>)

#deletedNodes000111
#lastReturned
0..1

<<Java Class>> Ⓖ Node<E>
cse222.hw4.part2

- data: E

- Ⓒ Node(Node<E>,E,Node<E>)

-prev
next
0..1
0..1

TEST CASES

TEST ID	Scenario	Test Data	Expected Results	Actual Results	Pass/ Fail
Test01	Created a Deque	Deque constructor	Successfully created	As expected	Pass
Test02	E getFirst() called , when it is empty		Exception throwed	As expected	Pass
Test03	E getLast() called , when it is empty		Exception throwed	As expected	Pass
Test04	E peekFirst() called , when it is empty	Returned: null	Successfully Returned	As expected	Pass
Test05	E peekLast() called , when it is empty	Returned: null	Successfully Returned	As expected	Pass
Test06	E element(), when it is empty		Exception throwed	As expected	Pass
Test07	E peek(),when it is empty	Returned: null	Successfully Returned	As expected	Pass
Test08	E pop(),when it is empty		Exception throwed	As expected	Pass
Test09	E remove() , when it is empty		Exception throwed	As expected	Pass
Test10	E removeFirst() called , when it is empty		Exception throwed	As expected	Pass
Test11	E removeLast() called , when it is empty		Exception throwed	As expected	Pass
Test12	E poll(), when it is empty	Returned: null	Successfully Returned	As expected	Pass
Test13	E pollFirst() called , when it is empty	Returned: null	Successfully Returned	As expected	Pass
Test14	E pollLast() called , when it is empty	Returned: null	Successfully Returned	As expected	Pass
Test15	addFirst(E e) called	e = null	Exception throwed	As expected	Pass
Test16	addFirst(E e) called	e = 15	Successfully added	As expected	Pass
Test17	addLast(E e) called	e = null	Exception throwed	As expected	Pass

Test18	addLast(E e) called	e = 28	Successfully added	As expected	Pass
Test19	boolean add(E e) calls addLast	e = null	Successfully added	As expected	Pass
Test20	boolean add(E e) calls addLast	e = 39 Returned: true	Successfully added	As expected	Pass
Test21	boolean offerFirst(E e) called	e = null	Exception thrown	As expected	Pass
Test22	boolean offerFirst(E e) called	e = 52 Returned: true	Successfully added	As expected	Pass
Test23	boolean offerLast(E e) called	e = null	Exception thrown	As expected	Pass
Test24	boolean offerLast(E e) called	e = 83 Returned: true	Successfully added	As expected	Pass
Test25	E removeFirst() called	Returned: 52	Successfully Removed	As expected	Pass
Test26	E removeLast() called	Returned: 24	Successfully Removed	As expected	Pass
Test27	E pollFirst() called	Returned: 15	Successfully Removed	As expected	Pass
Test28	E pollLast() called	Returned: 17	Successfully Removed	As expected	Pass
Test29	E getFirst() called	Returned: 28	Successfully Returned	As expected	Pass
Test30	E getLast() called	Returned: 78	Successfully Returned	As expected	Pass
Test31	E peekFirst() called	Returned: 28	Successfully Returned	As expected	Pass
Test32	E peekLast() called	Returned: 78	Successfully Returned	As expected	Pass
Test33	boolean removeFirstOccurrence(Object o)	o = null	Exception thrown	As expected	Pass
Test34	boolean removeFirstOccurrence(Object o)	o = 83	Successfully Removed	As expected	Pass
Test35	boolean removeLastOccurrence(Object o)	o = null	Exception thrown	As expected	Pass
Test36	boolean removeLastOccurrence(Object o)	o = 7	Successfully Removed	As expected	Pass
Test37	boolean offer(E e)	e = null	Exception thrown	As expected	Pass
Test38	boolean offer(E e)	e = 78	Successfully Added	As expected	Pass
Test39	E remove()	Returned: 28	Successfully Removed	As expected	Pass
Test40	E poll()	Returned: 39	Successfully Removed	As expected	Pass
Test41	E element()	Returned: 7	Successfully Returned	As expected	Pass
Test42	E peek()	Returned: 7	Successfully Returned	As expected	Pass

Test43	push(E e)	e = null	Exception throwed	As expected	Pass
Test44	push(E e)	e = 31	Successfully Added	As expected	Pass
Test45	E pop()	Returned: 31	Successfully Removed	As expected	Pass
Test46	int size()	Returned: size	Successfully Returned	As expected	Pass

Methods in DequeItr and Iterator<E> iterator() are already used in boolean removeFirstOccurrence(Object o) , methods in DescendingIterator and Iterator<E> descendingIterator() are already used in boolean removeLastOccurrence(Object o)

RUNNING AND RESULTS

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*******TESTING********

TEST01

Deque was created

TEST02 - E getFirst() called , when Deque is empty
java.util.NoSuchElementException

TEST03 - E getLast() called , when Deque is empty
java.util.NoSuchElementException

TEST04 - E peekFirst()  called , when Deque is empty
Returned: null

TEST05 - E peekLast()   called , when Deque is empty
Returned: null

TEST06 - E element() called , when Deque is empty
java.util.NoSuchElementException
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TEST07 - E peek()   called , when Deque is empty
Returned: null

TEST08 - E pop() called , when Deque is empty
java.util.NoSuchElementException

TEST09 - E remove() called , when Deque is empty
java.util.NoSuchElementException

TEST10 - E removeFirst() called , when Deque is empty
java.util.NoSuchElementException

TEST11 - E removeLast() called , when Deque is empty
java.util.NoSuchElementException

TEST12 - E poll()   called , when Deque is empty
Returned: null

TEST13 - E pollFirst()   called , when Deque is empty
Returned: null

TEST14 - E pollLast()   called , when Deque is empty
Returned: null

TEST15 - addFirst(E e) called , when e = null
java.lang.NullPointerException

TEST16 - addFirst(E e) called , when e = 15

 Deque
15,

TEST17 - addLast(E e) called , when e = null
java.lang.NullPointerException

TEST18 - addLast(E e) called , when e = 28

 Deque
15, 28,

TEST19 - add(E e) called , when e = null
java.lang.NullPointerException

TEST20 - add(E e) called , when e = 39

 Deque
15, 28, 39,

TEST21 - offerFirst(E e) called , when e = null
java.lang.NullPointerException

TEST22 - offerFirst(E e) called , when e = 52

 Deque

52, 15, 28, 39,

TEST23 - offerLast(E e) called , when e = null
java.lang.NullPointerException

TEST24 - offerLast(E e) called , when e = 83

 Deque

52, 15, 28, 39, 83,

 Deque

52, 15, 28, 39, 83,

After add some elements (7, 16, 65, 47, 78, 17, 24)

 Deque
52, 15, 28, 39, 83, 7, 16, 65, 7, 47, 78, 17, 24,

TEST25 - E removeFirst() called , Returned: 52

 Deque
15, 28, 39, 83, 7, 16, 65, 7, 47, 78, 17, 24,

Deque
15, 28, 39, 83, 7, 16, 65, 7, 47, 78, 17, 24,

TEST26 - E removeLast() called , Returned: 24

Deque
15, 28, 39, 83, 7, 16, 65, 7, 47, 78, 17,

Deque
15, 28, 39, 83, 7, 16, 65, 7, 47, 78, 17,

TEST27 - E pollFirst() called , Returned: 15

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78, 17,

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78, 17,

TEST28 - E pollLast() called , Returned: 17

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

TEST29 - E getFirst() called , Returned: 28

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

TEST30 - E getLast() called , Returned: 78

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

TEST31 - E peekFirst() called , Returned: 28

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

TEST32 - E peekLast() called , Returned: 78

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

TEST33 - boolean removeFirstOccurrence(Object o) called , when o = null
java.lang.NullPointerException

Deque
28, 39, 83, 7, 16, 65, 7, 47, 78,

TEST34 - boolean removeFirstOccurrence(Object o) called , o = 83 Returned: true

Deque
28, 39, 7, 16, 65, 7, 47, 78,

TEST35 - boolean removeLastOccurrence(Object o) called , when o = null
java.lang.NullPointerException

Deque
28, 39, 7, 16, 65, 7, 47, 78,

TEST36 - boolean removeLastOccurrence(Object o) called , o = 7 Returned: true

Deque
28, 39, 7, 16, 65, 47, 78,

TEST37 - offer(E e) called , when e = null
java.lang.NullPointerException

TEST38 - offer(E e) called , when e = 78

 Deque
28, 39, 7, 16, 65, 47, 78, 78,

 Deque
 28, 39, 7, 16, 65, 47, 78, 78,

 TEST39 - E remove() called , Returned: 28

 Deque
 39, 7, 16, 65, 47, 78, 78,

 Deque
39, 7, 16, 65, 47, 78, 78,

TEST40 - E poll() called , Returned: 39

 Deque
7, 16, 65, 47, 78, 78,

 Deque
 7, 16, 65, 47, 78, 78,

 TEST41- E element() called , Returned: 7

 Deque
 7, 16, 65, 47, 78, 78,

 Deque
 7, 16, 65, 47, 78, 78,

 TEST42 - E peek() called , Returned: 7

 Deque
 7, 16, 65, 47, 78, 78,

TEST43 - push(E e), when e = null
java.lang.NullPointerException

Deque
7, 16, 65, 47, 78, 78,

TEST44 - push(E e), when e = 31 called

Deque
31, 7, 16, 65, 47, 78, 78,

Deque
31, 7, 16, 65, 47, 78, 78,

TEST45 - E pop() called , Returned: 31

Deque
7, 16, 65, 47, 78, 78,

Deque
7, 16, 65, 47, 78, 78,

TEST46 - int size() called , Returned: 6