

WIA1002/WIB1002 Data Structures

Instruction: Submit your solutions for all the questions in one zip file named Lab6-*yourName-yourMatricNum*.zip to Spectrum before next Thursday (22nd March 2018). You should submit the project folder for each question.

Lab 6: Linked List

Question 1

- 1) Write the generic Node class consisting of two components of a node (i.e.: element, next), with a default construct and a constructor that accepts an item assigned to the initially declared element variable.
- 2) Write a class called MyLinkedList. The class should have the following :
 - a. Default constructor
 - b. Nodes for head and tail
- 3) Implement the following methods from tutorial in this class:
 - a. `public void addFirst(E e)`
 - b. `public void addLast(E e)`
 - c. `public void add(int index, E e)`
 - d. `public E removeFirst()`
 - e. `public E removeLast()`
 - f. `public E remove(int index)`
- 4) Expand the MyLinkedList by implementing the following methods:

Methods	Description
<code>public void add(E e)</code>	Return nothing, but adds an element to the list
<code>public boolean contains(E e)</code>	Return true if list contains the element e
<code>public E get(int index)</code>	Return element at the specified index
<code>public E getFirst()</code>	Return the value of the first item
<code>public E getLast()</code>	Return the value of the last item
<code>public int indexOf(E e)</code>	Return the index of the head matching element in this list. Return -1 of no match
<code>public int lastIndexOf(E e)</code>	Return the index of the last matching element in this list. Return -1 of no match
<code>public E set(int index, E e)</code>	Replace the element at the specified position in this list with the specified element

<code>public void clear()</code>	Clear the list
<code>public void print()</code>	Print all the elements in the list
<code>public void reverse()</code>	Print all elements in reverse order

- 5) Write a test program called TestLinkedList that creates a list from MyLinkedList class. Using the methods in (3) and (4), do the following:
- Append the following : a, b, c, d, e
 - Print all the elements in the list.
 - Reverse all the elements in the list.
 - Retrieve the number of elements in the list.
 - Retrieve the first and last value.
 - Delete the middle value.
 - Retrieve the index location for the second and third value.
 - Checks if the list has the value 'c'.
 - Replace the items individually with the following: h,e,l,l,o.

Question 2

A method called `getMiddleValue()` returns the value of the middle element of a linked list. The method signature is given as follows :

```
public E getMiddleValue()
```

Write the codes for the `getMiddleValue()`.