

Assignment 3: Double Linked List

Overview

This time no graphics --- sorry! Just a data structure. But there's hope! This is a preparation for the next assignment, which will use the data structure for a very exciting application. But for now: a data structure only.

Your task:

You have to write a Double Linked List, with start and end reference.

You can use the single linked list from the course website as help, and extend it by whatever is necessary.

What will you learn:

- how to handle references, references, references...
- to overcome confusion about, yes, references.
- how to write your very own non trivial data structure, that you can use further on.

Remarks:

- this assignment is important to go through by yourself. Copying from other sources is very possible with this assignment, after all you are writing a general data structure that is part of any modern programming language. If you want to copy, just copy JAVA's own LinkedList --- the source is already on your computer. However, copying will harm you substantially: going through the pain of handling references will ease the understanding of all topics following in 2168, if not even in your career.
- It is helpful to look into the JAVA sources --- read and see. But then close the files, and write your own version. Be proud! What you are writing, is on a level that other people get paid for!

Details:

1. Your double linked list project must contain the following:

- A Node class that can store any Object
- A list with methods:
 - insertFirst(data), insertLast(data), insertAt(index, data)
 - removeFirst(), removeLast(), removeAt(index) ---- removing an object from the list should return the object reference.
 - clearList()
 - printAllElements() (assume the objects in your list have a useful "toString" implementation)

2. The List must be DOUBLE LINKED, with START and END reference.

3. Write your own little test routine:

- Add 5 Integer objects (1-5) to the list, using addFirst.
- Add 5 Integer objects (1-5) to the list, using addLast.
- Remove the first element, remove the last element,
- remove the element at position with index 1 (remark: indexing starts with 0).
- five times remove the element at position with index 2.
- Print the list.

It should show "4" "2", which is 42, which is the [Answer to The Ultimate Question of Life, the Universe, and Everything](#)

Then:

- clear the list
- four times addFirst "1"
- insert "2" at index 2
- print the list

It should show "1", "1", "2", "1", "1", which is nothing other than a test of the remaining two methods...

That's it!

This is a 1 week assignment.