Laboratory practice No. 3: Linked List and Array List

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3) Practice for final project defense presentation

1. Time Complexity

	ArrayList	LinkedList
1.1	**O(n)**	**O(n)**
1.2 (The implementation works with both ArrayList and Linked List)	**O(n)**	**O(n)**
1.3 (This exercise uses stack and queue, not lists)	-	-

1.4 Insert Time Complexity: O(1)
     Delete Time Complexity: O(1)

2. Exercise 2.1

This algorithm reads a text written by a user with a Scanner object and enters to a loop making the following for each line read:
A linked list of characters will be created collecting the ordered information of the line read. This algorithm evaluates each character of the line and adds it to the list but if a [is detected, the program starts adding the elements at the beginning of the list and if it finds a], it starts adding the elements at the end of the list. The integer index indicates the program in which place it should add the characters and this index changes depending on the character detected.

After that it uses an auxiliary list that has the same information as the list but in the opposite order so that the characters will be removed and printed in the right order.

3. **2.1.** The complexity is O(n^2)

4. **1.1 :** The complexity is O(n), where n is the size of the List
   1.2.: The complexity is O(n), where n is the size of the List
   1.4.: The Complexity of both things is O(1). The time is constant and independent from any variable.
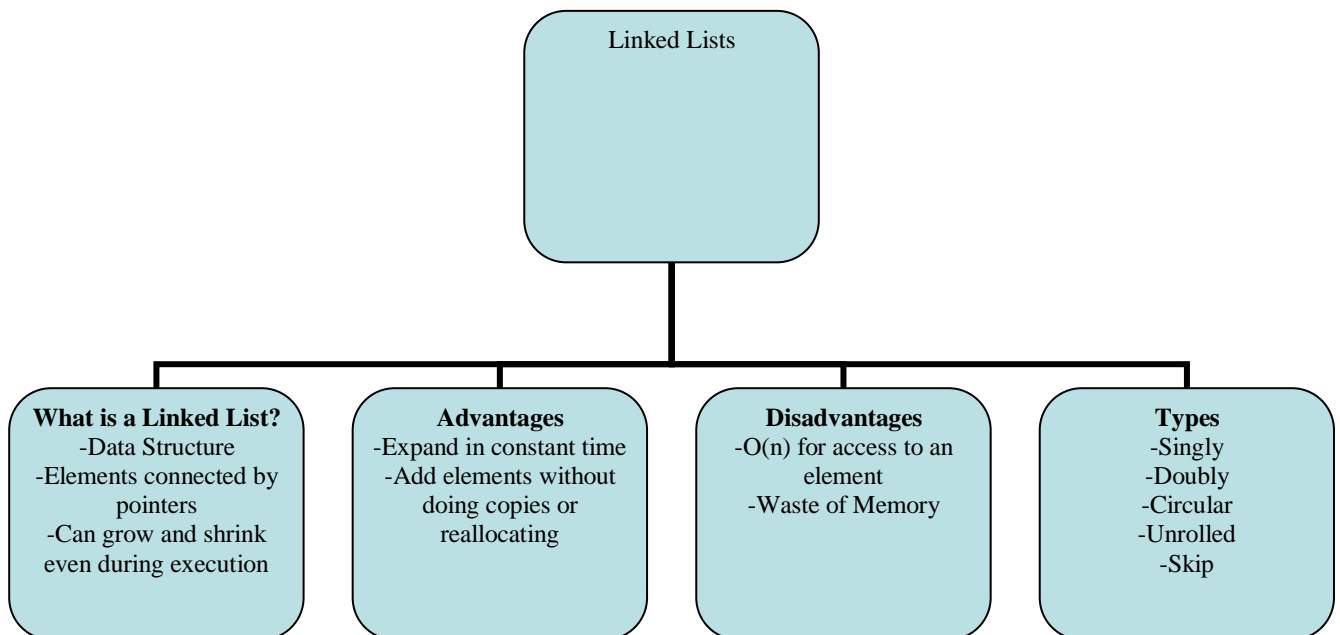
4) Practice for midterms

1. a
2. c
3. a. q!= null
   b. <=
   c. q,remove()

   d. q.remove()
4. a. lista.size()
   b. lista.add(auxiliar.pop)
5. a. auxiliar1.size() > 0, auxiliar2.size() > 0
   b. personas.offer(edad)
6. c
7. c
8. c
9. a. a
   b. 12
   c. O(1)
10. a. d
    b. a
    c. b

5) Recommended reading (optional)

a) Chapter 3: Linked Lists
b) This is one of the most known data structures used to store collections of data. The elements inside a Linked List are connected by pointers and the last element always points to NULL. This way to link elements leads to one of the most important properties of a Linked List, the possibility to be expanded in constant time.
   However, there are other aspects in which using a Linked List might not be the better option. For example, when you have to access to elements using Arraylists is O(1) while using LinkedLists is O(n). Both data structures are very similar but the disadvantages of one of them are de advantages of the other and knowing that might improve the proper use of these data structures.

c) Concept map

Linked Lists

What is a Linked List?	Advantages	Disadvantages	Types
-Data Structure -Elements connected by pointers -Can grow and shrink even during execution	-Expand in constant time -Add elements without doing copies or reallocating	-O(n) for access to an element -Waste of Memory	-Singly -Doubly -Circular -Unrolled -Skip

6) Team work and gradual progress (optional)

    a) Meeting minutes

Date	Time	Description
3.10.18	1 hour	Distribution of the work
7.10.18	1 hour (by phone)	Discussion of part 2 and 1

    b) History of changes of the code

Version	Includes	Left	Status
1.0	1.1 and 2.1	1.2, 1.3, 1.4 2.2	🟥
2.0	1 and 2.1	2.2	🟥
3.0	1 and 2		Complete

    c) History of changes of the report

Version	Includes	Left	Status
1.0	3.1, 3.2, 3.3 (half) 4 (odd numbered excercises) 5	Rest of 3 and 4	🟥
2.0	3.1, 3.2, 3.3 and 5 complete Half of 4	4 (even numbers)	🟥
3.0	Parts 3, 4 and 5		🟩

d. Individual work

Member	Part of the Laboratory	Description
Juliana	1	1.2 and 1.4
	2	2.2
	3	3.1 of 1.2 and 1.4 3.2 of 2.2 3.3 of 1.2 and 1.4
	4	Even excercises (2,4,6,8,10)
	6 and 7	Team work and english
Isabel	1	1.1 and 1.3
	2	2.1
	3	3.1 of 1.1 and 1.3 3.2 of 2.1 3.3 of 1.3 and 1.1
	4	Odd excercises (1,3,5,7,9)
	5	Lecture
	6 and 7	Team work and english

Individual Work

■ Juliana ■ Isabel

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