INTRODUCTION TO COMPLEX SYSTEMS, JAVA, MVN, AND GIT

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1 Introduction

This is a program developed in Java in conjunction with Apache Maven and Git which calculates the mean and standard deviation given a text file of n real numbers.

2 Objectives

1. To Understand the basics of maven and git via command line.

2. To Recognize and implement a Linked List in order to manage collections of data.

3. To Implement basic statistical operations like the mean and the standard deviation and identify its importance.

3 Definitions

- **Linked List:** A linked list is a linear data structure, in which the elements are not stored at contiguous memory locations. The elements in a linked list are linked using pointers as shown in the below image: [1]
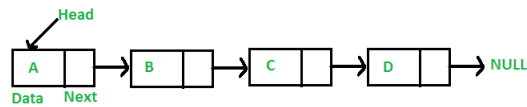

Figure 1: Graphic representation of a Linked list

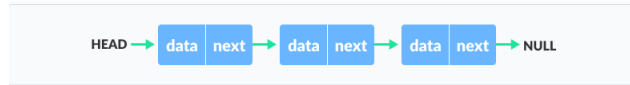- **Singly Linked List:** It is the most common. Each node has data and a pointer to the next node. [2]

Figure 2: Singly Linked List Representation

- **Doubly Linked List:** We add a pointer to the previous node in a doubly-linked list. Thus, we can go in either direction: forward or backward. [2]

Figure 3: Doubly Linked List Representation

- **Circular Linked List:** A circular linked list is a variation of a linked list in which the last element is linked to the first element. This forms a circular loop. [2]
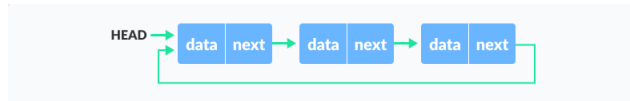

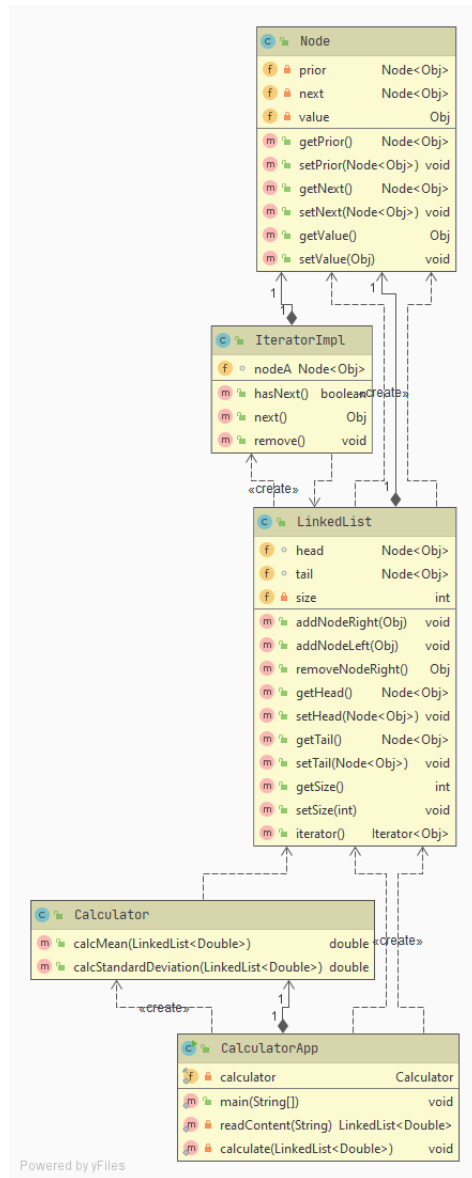Figure 4: Circular Linked List Representation

4 Design of this project

Figure 5: Class Diagram of the design

5 Setting up this project

Requisites

- Apache Maven

- Java 8

- git

Steps to run this project locally

1. Clone this repository:

   ```
   git clone https://github.com/JohanS11/Taller1Arep.git
   ```

2. Build the project with maven:

   ```
   cd Taller1Arep && mvn package
   ```

3. Execute the project with maven:

   ```
   mvn exec:java −Dexec.mainClass=''edu.escuelaing.arep.calculator.app.
   CalculatorApp" −Dexec.args='' DataTest\\DataSet.txt"
   ```

NOTE: In order to test with another text file you have to add it to the folder "DataTest" and modify the below command with the name of the txt file: -Dexec.args="DataTest *yourtextfile.txt*"
(The values have to be separated by comma)

6 Conclusion

I have recovered some knowledge about tools like maven, git, Java and algorithms as well. In the same way I have identified some utilities from the Linked Lists.

References

[1] **Linked list data structure. https://www.geeksforgeeks.org/data-structures/linked-list/singlyLinkedList. Accessed on 2020-08-09.**

[2] **Types of linked list - singly linked, doubly linked and circular. https://www.programiz.com/dsa/linked-list-typessingly. Accessed on 2020-08-09.**