Assignment 1 – Programming Linear Algebra Software Design Document

CS2300 Section 3 Spring 2023

Cameron Johnson

Project Description

This assignment is a review of prior programming experience, implementing 2D arrays (matrices) and manipulating them through manipulation and addition. These matrices will then be printed out into their own files.

Approach

I will create a method for each matrix to be created, and within each method will be the code responsible for creating that matrix the way it needs to be created. Each matrix will be made in the “double” data type. This is done because there is one method that uses decimal values, and if every other matrix is of the int data type, this matrix would not be allowed to be used as an argument for the methods used in this program, which will be described below.

I will then make a method that takes two matrices and adds them together. This method will be called in main, using two matrices to be added together as arguments. This method will then add the two matrices together, and return a new matrix that is the product of the given matrices being added together.

There will then be a method that takes two matrices and multiplies them together. This method will be called in main, using two matrices to be added together as arguments. This method will then multiply the two matrices together, and return a new matrix that is the product of the given matrices being multiplied together.

The final method will be a simple method that prints a given matrix to a file, and names the file using a string that is passed through when calling the method in main. The matrix will be iterated through, with each value in the matrix being printed out into the file created in the method. Once this method is done iterating through the matrix, it will output in the console where the file is stored.

In main, the three methods above will be called wherever applicable. If two matrices cannot be added together or multiplied, they will not be used to call the given argument.

Detailed Design

Programming Language

I will be using Java for this assignment. Java is the language I have the most comfort using, as it has practically been the only language I’ve coded in. The IDE I will be using is Eclipse, as it’s the only Java IDE I’ve used.

Modules

I believe that I will be doing each piece of the assignment in its own method. Makes my main method cleaner, though many methods will be used.

The addition and multiplication of the matrices will be done in their own method, and so will the process of printing each matrix to their files. This will save me space in main as I’ll be able to create the process for multiplying/adding matrices and printing them out once each, and then pass through any matrices needed without having to recreate the process over and over for each matrix.

Flowcharts

This is the very first flowchart I have made for code. Hopefully this provides the idea of what I am going for. None of the methods outside of main interact with each other. They each simply take what’s passed in from main, returns a value to be stored in a variable in main, and then another method takes that variable in main and does what it needs to do with it.

Timeline

Description automatically generated with low confidence

Key Data Structures

2D arrays I think? I’m not entirely sure if that’s a data structure in itself but that’s all that I’m really using in this assignment.

Test Description

There were no input files for this assignment. Every matrix was created from scratch, manipulated, and printed to their own files.