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Team #: 21

Application Activity: Vectors with Object oriented programming

Learning objectives

- Explain the purpose of certain modifiers
- Implement methods of a class
- Compare two specifications for a class

The problem

You are working for MathWorks on a new 2-dimensional physics simulator for physics students. You have decided to use object-oriented programming, but there are still many design decisions you have to make.

Question: What is the best design for vectors?

You have two potential designs for a Vector class: VectorA and VectorB (see files). Your main job as a team is to decide which one to move forward with.

How to go about making your decision...

1. Split up your team into two. HalfA is in charge of filling in VectorA and HalfB is in charge of filling in VectorB.
2. Use pair programming. For each Half (A or B), have the following roles
 - a. 1 typist: types code into an IntelliJ editor. Should take dictation from the guides rather than going alone.
 - b. 1-2 guides: telling the typist what to type, looking up any needed documentation (e.g., how do you normalize a vector? how do you do square roots in Java?)
 - c. 1 note-taker: taking notes on important patterns you notice about the Vector (A or B) class and its methods.
3. Once both Half's are finished, present your notes to the other Half
4. What is *similar* between VectorA and VectorB? What is *different*?

Team Answer:

similar: Both java files are using simple Vector algebra and theorems. Using addition, Subtraction, Magnitude, and many similar functions.

different: Both java files are very different on how they store and reuse their instances. In B, there are getters because the variable instances are private, not final. Therefore, we can change the instances of the Vectors and change the Vectors themselves. While in A, we can have many different instances of a vector without changing the Vector itself.

5. As a team, decide whether to go with VectorA or VectorB. Then, write 3-5 sentences of justification.

Team decision (A or B):

Team has decided on A. But this decision is variable.

Team justification:

With the two different programs, one focusing on allotting data and keeping older Vectors, versus changing older Vectors and not creating new Vectors, it is a hard decision where we don't know what we are using these programs for. Depending on our implementation of these programs to other programs, either one can be used, but without the knowledge of if we need to use older Vectors, our decision can vary. We decided that VectorA would be best, for most cases, but once again, we don't know how this program will be implemented.

What your team will report out in class

- Everyone will report simultaneously: team decision
- Be ready for presenting aloud: team justification

What your team will submit

- One copy of this document with answers filled into the bolded blanks
- One copy of the finished VectorA.java and VectorB.java. Both need to run successfully.