Notes

CSC144 Software Architecture
(Thank you to Marshall Hobson-Ritz)

26 March 2018

- Programs can be written in Java without NetBeans or any other IDE (Integrated Development Environment—some other popular IDEs Eclipse, DrJava, BlueJ, IntelliJ IDEA, and Android Studio)
- Java is a family of technologies—not just a programming language
- all thats needed is an editor, a compiler, and the Java library of classes that have already been written for you (this is the API)
- when you download the Java JDK (Java Development Kit), you get a compiler, an interpreter (the Java Virtual Machine), a program for extracting comments from source code and building a Web site to tell other people how to use your program, a program for packaging your classes for distribution to your customers, and the Java API
- an IDE is essential for large scale programming
- Emacs is a popular context sensitive editor—"context sensitive" means that it has a built-in knowledge of the grammar of Java and other programming languages, and so can match parentheses, color reserved words, and help in other ways
- compilers translate code into a form that can be read and executed by the computer
- the executable form of a program is encoded in a binary format that cannot be read directly by people
- compilation of a file named Vector2D.java produces a file named Vector2D.class
- many compilers translate a program into a computer's native language
- each microprocessor recognizes a finite vocabulary of simple instructions (e.g., add, compare, branch)
- our Java compiler translates what we write into the instructions for the Java Virtual Machine (these instructions are called Java bytecodes)

- the Java Virtual Machine is a program that simulates a computer
- there are Java Virtual Machines for many kinds of computers, so a Java program that we write on one kind of computer can be executed on many kinds of computers
- portability was one of the principal goals of the designers of the Java programming language
- **import** statements tell the compiler where to find the definition of a class
- compiler knows where to find definitions of some very commonly used classes (e.g., Math, String) without the help of **import** statements
- one method in a class can call other methods in the same class
- the use of getter methods to obtain values of instance variables makes it easier to change how a class stores and represents data
- advanced programmers dont repeat work thats already been done—make use of the methods that you have already written (example: the magnitude of a vector is just the square root of the dot product of the vector with itself—if you already have a method for computing dot products, writing a method to compute a magnitude ought to be a piece of cake!)
- our tools can automatically extract text found in the Javadoc comments within our program and copy it into HTML files
- an error in comments can sometimes have serious consequences instead of simply being discourteous—think of how an error in a comment in a program that controls an airplane in flight might lead some programmer in the future to introduce a fatal error into the code!
- Junit is a collection of classes in Java used to test other code
- kinds of testing
  - unit testing—test smallest pieces of the program (classes and methods)
  - module testing
  - system testing
  - ntegration testing
  - alpha testing—have employees test the product
  - beta testing—find customers and give them incentive to test the product
  - regression testing—find an error in the software and fix it, then continue to test for the bug even though its been fixed—misconceptions or problems that led to the error might be repeated in the same way in another place in the program which could result in the same error

- testing can prove the presence of bugs, but no amount of testing can prove the absence of bugs!
- Bézier curves
  - consists of a starting, ending, and two control points
  - curve does not pass through the control points but these points pull the curve towards themselves
  - used to specify the shape of characters in fonts, used in every drawing and computer-aided design program
  - a way to describe a curve with very few numbers
  - they are cubic polynomials (high school math)
  - attractive mathematical properties allow easy manipulation by the artists, engineers, architects, and others who use them