Intro to Java
Python and Java

• Python and Java are both object-oriented languages
  – Conceptually, the languages are very similar
  – The syntax, however, is quite different, and Java syntax is much more verbose
  – More verbose also means explicit, so it is also a good thing
  – A lot of the transition from Python to Java has to do with learning new syntax

• Java and Python are both popular languages
  – For technical reasons, Java can be much faster than Python
  – Compilation is one of them (more later)
Installing Java

• In order to use Java, you need to first install the Java runtime environment (JRE)

• Download the Java Development Kit (JDK)
  – This includes the JRE

• In this class we will be using Java 8
  – There are multiple subversions – any one of them is fine
Structure of a Java program

- A program, or **project**, consists of one or more **packages**
  - Package = directory = folder
- A package contains one or more **classes**
- A class contains one or more **fields** and **methods**
  - A method contains **declarations** and **statements**
- We’ll do a quick example today
  - A more thorough overview next time

Project:

- packages
  - classes
    - fields
    - methods
      - declarations
      - statements
Eclipse

- Eclipse is one of the two main IDEs for Java development
  - The other one is IntelliJ
  - In this class, we’ll work with Eclipse, so please use it
  - Projects built in IntelliJ are not easily ported into Eclipse

- Makes it very easy to write well-formatted Java with good style
  - Compiles on the fly, provides autocomplete suggestions, fixes some simple bugs
  - Overall, Eclipse greatly speeds up Java programming

- Getting Eclipse
  - Go to www.eclipse.org
  - Latest version is called Oxygen
  - Set the workspace folder
Java and Eclipse

• A workspace is where Eclipse keeps projects

• When you use Eclipse to create a project (a single “program”), it creates a directory with that name in your workspace

• Within the project, you next create a package

• Finally, you create a class in that package

• For the simplest program, you need only a single package, and only one (or a very few) classes
Simple program outline

```
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello World");
        printHello();
    }
    public static void printHello() {
        System.out.println("Hello World");
    }
}
```

• Notes:
  – The class name (**HelloWorld**) must begin with a capital
  – **main** and **printHello** are methods (the name **main** is special; the name **printHello** isn’t)
• Eclipse example: HelloWorld.java
Java program outline cont’d

• Statements end in a semicolon
  – New lines do not mean anything in Java
  – Can have the entire program on one line (bad style obviously)

• Indentation doesn’t matter
  – Indentation is a question of style in Java, unlike Python
  – More about style next time
Java is a compiled language

- **compiler** is a program that converts your program to machine code (binary)
  - It first converts it to Java bytecode actually (makes Java portable)
  - While doing so, it inspects your program for all kinds of errors such as syntax errors, type errors, non-existing functions
- Your program will not run if it is not compiled!
- Eclipse hides this from you a little bit (because it compiles on the fly) but it’s very important
  - Eclipse will help you fix some compilation problems but not all
  - In the first few days, compiling will be as hard as writing your program
- Compiled languages have many advantages over scripting languages
  - Can optimize your code under the hood
  - Can catch some types of bugs (e.g., using the same variable name twice)
  - Scripting languages are better for quick prototyping