

Welcome to CS61B!

- Sign up for a lab and discussion section using the SignUpGenius poll, available from the course website. If you can't find a slot, attend any section you can (although you have second priority for seating).
- Labs start today. In (or preferably before) lab this week, get a CS61B Unix account from <https://inst.eecs.berkeley.edu/webacct>.
- Because labs will be crowded, you might want to bring your laptop.
- If you plan to work from home, try logging in remotely to one of the instructional servers (...@X.cs.berkeley.edu, where X is ashby, derby, cedar, gilman, oxford, or solano).
- We'll be using Piazza for notices, on-line discussions, questions.
- General information about the course is on the home page (grading, lateness, cheating policy, etc.).
- Concurrent enrollment students will be processed later.
- Lectures will be screencast.

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Crowding

- If you choose not to take this course please drop it as soon as possible for the benefit of others (the add/drop deadline is 18 September—6 September if you wish to avoid a fee).
- Starting Monday, lectures are in Wheeler. As this won't even hold half of us, feel free to watch Webcasts instead.

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Texts

- There are two readers currently on-line (see the website).
- You could do without printed versions, but might want to print out selected portions for exams (since we don't allow computers in tests).
- Textbook (for first part of the course only) is *Head First Java*. It's kind of silly, but has the necessary material.

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Course Organization I

- You read; we illustrate.
- Labs are important: exercise of programming principles as well as practical dirty details go there. Generally we will give you homework points for doing them.
- Homework is important, but really not graded: use it as you see fit and *turn it in!* You get points for just putting some reasonable effort into it.
- Individual projects are *really* important! Expect to learn a lot. Projects are *not* team efforts (that's for later courses).

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Course Organization II

- Use of tools *is* part of the course. Programming takes place in a *programming environment*:
 - Handles editing, debugging, compilation, archiving versions.
 - Personally, I keep it simple: Emacs + gjdb + make + git, (documented in one of the readers and on-line). But we'll look at IntelliJ in lab.
- Tests are challenging: better to stay on top than to cram.
- Tests, 40%; Projects, 50%; HW, 10%
- Stressed? Tell us!

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Programming, not Java

- Here, we learn *programming*, not Java (or Unix, or Windows, or...)
- Programming principles span many languages
 - Look for connections.
 - Syntax ($x+y$ vs. $(+ \ x \ y)$) is superficial.
 - Java, Python, and Scheme have a lot in common.
- Whether you use GUIs, text interfaces, or embedded systems, important ideas are the same.

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For next time

- Please read Chapter 1 of *Head First Java*, plus §1.1-1.9 of the on-line book *A Java Reference*, available on the class website.
- This is an overview of most of Java's features.
- We'll start looking at examples on Friday.
- Always remember the questions that come up when you read something we assign:
 - Who knows? We might have made a mistake.
 - Feel free to ask at the start of lectures, by email, or by Piazza.

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Acronyms of Wisdom

DBC

RTFM

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A Quick Tour through the First Program

In Python, we would write

```
# Traditional first program
print("Hello, world")
```

But in Java,

```
/** Traditional first program.
 * @author P. N. Hilfinger */
public class Hello {
    /** Print greeting. ARGS is ignored. */
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

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Commentary

```
/** Traditional first program.
 * @author P. N. Hilfinger */
public class Hello {
    /** Print greeting. ARGS is ignored. */
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- Java comments can either start with `/**` and go to the end of the line (like `#` in Python), or they can extend over any number of lines, bracketed by `/*` and `*/`.
- I don't use the `/**` comments, except for things that are supposed to be replaced, and our style checks will flag them.
- The second, multiline kind of comment includes those that start with `/**`, which are called *documentation comments* or *doc comments*.
- Documentation comments are just comments, having no effect, but various tools interpret them as providing documentation for the things that follow them. They're generally a good idea and our style checks require them.

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Classes

```
/** Traditional first program.
 * @author P. N. Hilfinger */
public class Hello {
    /** Print greeting. ARGS is ignored. */
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- Every function and variable in Java is contained in some *class*.
- These are like Python's classes, but with (of course) numerous differences in detail.
- All classes, in turn, belong to some *package*. The `Hello` class belongs to the *anonymous package*.
- We'll see named packages later,

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Methods (Functions)

```
/** Traditional first program.
 * @author P. N. Hilfinger */
public class Hello {
    /** Print greeting. ARGS is ignored. */
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- Function headers in Java contain more information than those in Python. They specify the *types* of values *returned* by the function and taken as *parameters* to the functions.
- The "type" `void` has no possible values; the `main` function here returns nothing. The type `String` is like Python's `str`. The trailing `[]` means *array of*. Arrays are like Python lists, except that their size is fixed once created.
- Hence, `main` takes a list of strings and returns nothing.
- Functions named "main" and defined like the example above are special: they are what get called when one runs a Java program (in Python, the main function is essentially anonymous).

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Selection

```
/** Traditional first program.
 * @author P. N. Hilfinger */
public class Hello {
    /** Print greeting. ARGS is ignored. */
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- As in Python, $\mathcal{E}.N$ means "the thing named N that is in or that applies to the thing identified (or computed) by \mathcal{E} ."
- Thus "System.out" means "the variable named 'out' that is found in the class named 'System'."
- Likewise, "System.out.println" means "the method named 'println' that applies to the object referenced by the value of variable 'System.out'."

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Access

```
/** Traditional first program.
 * @author P. N. Hilfinger */
public class Hello {
    /** Print greeting. ARGS is ignored. */
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- Every declared entity in Java has *access permissions* indicating what pieces of code may mention it.
- In particular, *public* classes, methods, and variables may be referred to anywhere else in the program.
- We sometimes refer to them as *exported* from their class (for methods or variables) or package (for classes).

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Access

```
/** Traditional first program.
 * @author P. N. Hilfinger */
public class Hello {
    /** Print greeting. ARGS is ignored. */
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- Static methods and variables are "one-of" things.
- A static method is just like an ordinary Python function (outside of any class) or a function in a Python class that is annotated `@staticmethod`.
- A static variable is like a Python variable defined outside of any class or a variable selected from a class, as opposed to from a class instance.
- Other variables are local variables (in functions) or instance variables (in classes), and these are as in Python.

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