

Welcome to CS61B!

- Please see the rather extensive information on sections, Covid-19 policy, sections, labs, initial assignments, and the presemester survey on the Spring 2022 CS61B Piazza site.
- Labs start today. In (or preferably before) lab this week, get a CS61B Unix account from <https://inst.eecs.berkeley.edu/webacct>.
- Try logging in remotely to one of the instructional servers (...@*X*.berkeley.edu, where *X* is ashby.cs, derby.cs, cedar.cs, cory.eecs, and others).
- The course homepage (<https://inst.eecs.berkeley.edu/cs61b/sp22>) is our central distribution site for assignments, lecture slides, course policy, and much else.
- Lectures will be recorded and screencast. The recordings should become available in the bCourses Media Gallery sometime after the lecture.

Crowding, etc.

- 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 9 February—28 January if you wish to avoid a fee).
- As you know, Dwinelle will not hold us all, which is why there are both offline and online lectures. Lecture seating is on a first-come-first-seated basis. Definitely not ideal, but we hope that after the first few weeks, those of you who prefer in-person lectures will be able to have it.
- Lectures, etc., will be entirely online for at least the first two weeks, due to the current outbreak.

Texts

- There are two readers currently on-line (see the website).
- Textbook (for first part of the course only) is *Head First Java*. It's kind of silly, but has the necessary material.

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 it's reasonably easy to get full credit: use it as you see fit and *turn it in!* You should 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).

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!

Pandemic Considerations

- It's everyone's responsibility to look out for each other.
- This semester, in particular, this means adhering to certain inconvenient practices mandated by the University.
- These include wearing masks indoors, as well as staying home when sick.
- Please observe the mask mandate; if anyone refuses, I can and will be forced to simply end the day's lecture, and you'll all have to rely on the on-line slides for the material.

Academic Dishonesty

- Sadly, the incidence of academic dishonesty seems to have increased over the years.
- To an extent, this is our fault: the minimum GPA threshold policy for L&S majors puts people under a lot of stress,
- Nevertheless, we can't afford to tolerate cheating. The Course Info tab on the course homepage contains our policy on cheating and the penalties we impose; please read them.
- By keeping up with the course and starting assignments early, you can reduce any perceived need to cheat.
- Also, this course is not curved, so you are not disadvantaged by other people's dishonesty.

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.

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.

Acronyms of Wisdom

DBC

RTFM

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!");
    }
}
```

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.

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,

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).

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’.”

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).

Static

```
/** 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.