6.092 Introduction to Software Engineering in Java
January (IAP) 2009

6.092: Introduction to Java

1: Variables, Operators, Types

Goal

Learn enough Java to do something useful

Examples:

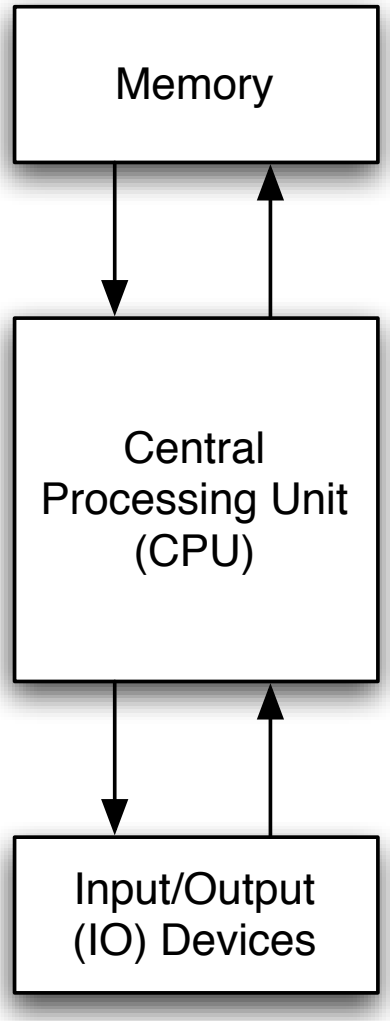
- Simulate a natural/engineering process
- Manipulate PDFs
- Draw pretty graphics

Assignments

- View and submit via Stellar
- Due at 7 PM the next day
- Collaborate with others
- Write your **own** code
- Must submit first assignment (you will be dropped if you don't: big waiting list)

Must submit a "reasonable" attempt for 7/8 assignments to pass

The Computer



CPU Instructions

z = x + y

Read location x

Read location y

Add

Write to location z

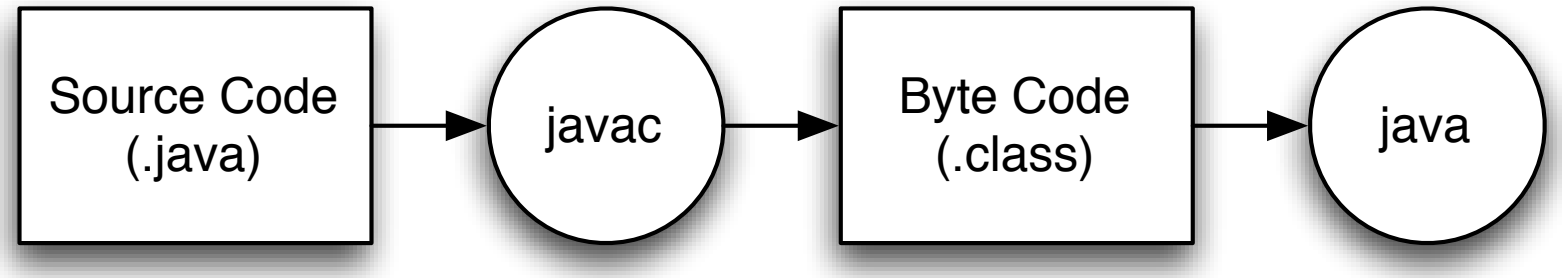
Programming Languages

- Easier to understand than CPU instructions
- Needs to be translated for the CPU to understand it

Java

- “Most popular” language
- Runs on a “virtual machine” (JVM)
- More complex than some (eg. Python)
- Simpler than others (eg. C++)

Compiling Java



First Program

```
class Hello {
    public static void main(String[] arguments) {
        // Program execution begins here
        System.out.println("Hello world.");
    }
}
```

Compile and Run

javac Hello.java

java Hello

Program Structure

```
class CLASSNAME {
    public static void main(String[] arguments) {
        STATEMENTS
    }
}
```

Second Program

```
class Hello2 {
    public static void main(String[] arguments) {
        System.out.println("Hello world.");  // Print once
        System.out.println("Line number 2");  // Again!
    }
}
```

Variables

Named location that stores a value

Form:

TYPE NAME;

Example:

String foo;

Assignment

Use = to give variables a value.

Example:

```
foo = “IAP 6.092”;
```

```
class Hello3 {
    public static void main(String[] arguments) {
        String foo = "IAP 6.092";
        System.out.println(foo);
        foo = "Something else";
        System.out.println(foo);
    }
}
```

Types

Limits a variable to kinds of values

String: plain text (“hello”)

double: Floating-point, “real” valued number
(3.14, -7.0)

String foo = “hello”;

double badPi = 3.14;

Operators

Symbols that perform simple computations

Assignment: =

Addition: +

Subtraction: -

Multiplication: *

Division: /

```
class DoMath {
    public static void main(String[] arguments) {
        double score = 1 + 2 * 3;
        System.out.println(score);
        score = score / 2;
        System.out.println(score);
    }
}
```

```
class DoMath2 {
    public static void main(String[] arguments) {
        double score = 1 + 2 * 3;
        System.out.println(score);
        double copy = score;
        copy = copy / 2;
        System.out.println(copy);
        score = copy;
        System.out.println(score);
    }
}
```

```
class DoMath3 {
    public static void main(String[] arguments) {
        int score;
        score = 1 + 2 * 3;
        System.out.println(score);
        double copy = score;
        copy = copy / 2;
        System.out.println(copy);
        score = (int) copy;
        System.out.println(score);
    }
}
```

Assignment: TempConverter

Convert a temperature from Fahrenheit to Celsius using:

$$C = (5 \div 9) \times (F - 32)$$