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

Central Processing Unit (CPU)

Memory

Input/Output (IO) Devices
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

Source Code (.java) → javac → Byte Code (.class) → 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:

\textit{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);
    }
}
```java
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);
    }
}
```
```java
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:

$$C = \left(\frac{5}{9}\right) \times (F - 32)$$