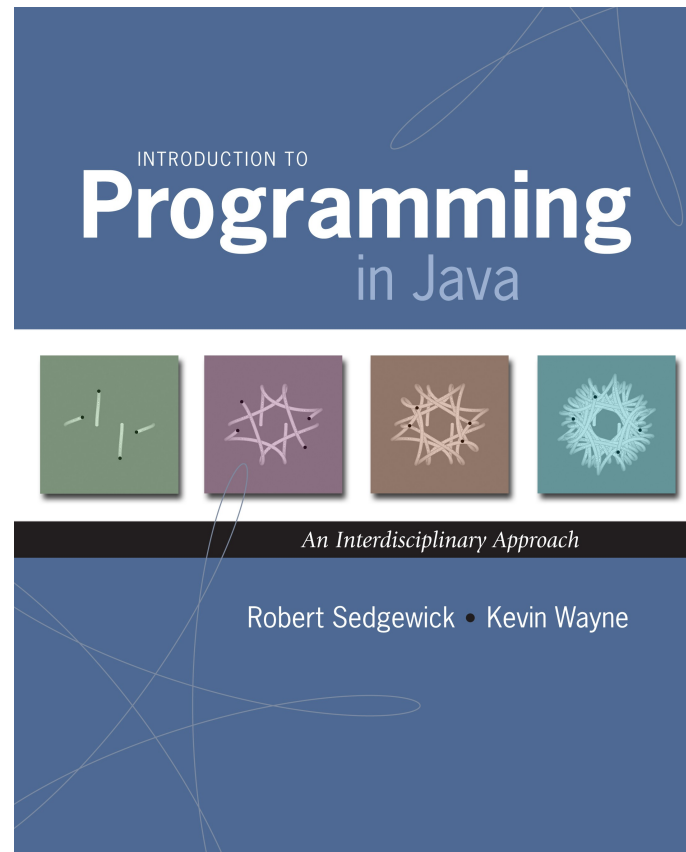


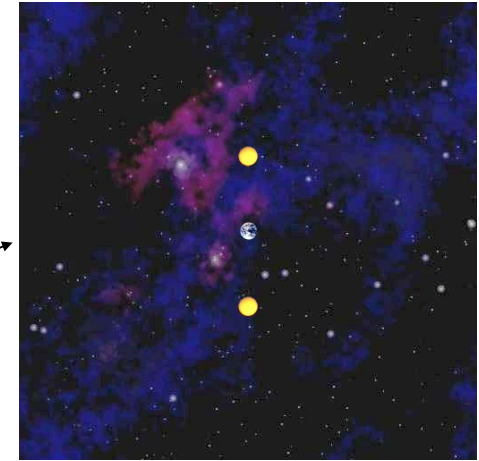
1.1 Your First Program



Why Programming?

Why programming? Need to tell computer what to do.

"Please simulate the motion of N heavenly bodies, subject to Newton's laws of motion and gravity."



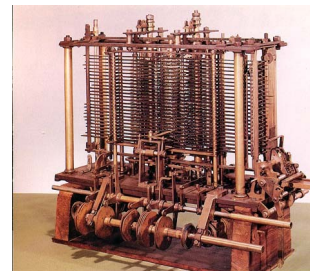
Prepackaged software solutions. Great, they do exactly what you want.



Programming. Enables you to make a computer do **anything** you want.



Ada Lovelace



Analytic Engine

well, almost anything
[stay tuned]

Languages

Machine languages. Tedious and error-prone.

Natural languages. Ambiguous and hard for computer to parse.

Kids Make Nutritious Snacks.

Red Tape Holds Up New Bridge.

Police Squad Helps Dog Bite Victim.

Local High School Dropouts Cut in Half.

[real newspaper headlines, compiled by Rich Pattis]

High-level programming languages. Acceptable tradeoff.

“Instead of imagining that our main task is to instruct a computer what to do, let us concentrate rather on explaining to human beings what we want a computer to do.” – Donald Knuth



Why Program?

Why program?

A natural, satisfying and creative experience.

Enables accomplishments not otherwise possible.

Opens new world of intellectual endeavor.

First challenge. Learn a programming language.

Next question. Which one?



Naive ideal. A single programming language.

Our Choice: Java

Java features.

Widely used.

Widely available.

Embraces full set of modern abstractions.

Variety of automatic checks for mistakes in programs.

Java economy.

Mars rover.

Cell phones.

Blu-ray Disc.

Web servers.

Medical devices.

Supercomputing.

...

↖
\$100 billion,
5 million developers



James Gosling

<http://java.net/jag>

Why Java?

Java features.

Widely used.

Widely available.

Embraces full set of modern abstractions.

Variety of automatic checks for mistakes in programs.

Facts of life.

No perfect language.

We need to choose **some** language.

Our approach.

Minimal subset of Java.

Develop general programming skills that are applicable to many languages.

It's not about the language!

“ There are only two kinds of programming languages: those people always [gripe] about and those nobody uses.”

– Bjarne Stroustrup



A Rich Subset of the Java Language

Built-In Types	
<code>int</code>	<code>double</code>
<code>long</code>	<code>String</code>
<code>char</code>	<code>boolean</code>

System
<code>System.out.println()</code>
<code>System.out.print()</code>
<code>System.out.printf()</code>

Math Library	
<code>Math.sin()</code>	<code>Math.cos()</code>
<code>Math.log()</code>	<code>Math.exp()</code>
<code>Math.sqrt()</code>	<code>Math.pow()</code>
<code>Math.min()</code>	<code>Math.max()</code>
<code>Math.abs()</code>	<code>Math.PI</code>

Flow Control	
<code>if</code>	<code>else</code>
<code>for</code>	<code>while</code>

Parsing
<code>Integer.parseInt()</code>
<code>Double.parseDouble()</code>

Boolean	
<code>true</code>	<code>false</code>
<code> </code>	<code>&&</code>
<code>!</code>	

Punctuation	
<code>{</code>	<code>}</code>
<code>(</code>	<code>)</code>
<code>,</code>	<code>;</code>

Assignment
<code>=</code>

Primitive Numeric Types		
<code>+</code>	<code>-</code>	<code>*</code>
<code>/</code>	<code>%</code>	<code>++</code>
<code>--</code>	<code>></code>	<code><</code>
<code><=</code>	<code>>=</code>	<code>==</code>
<code>!=</code>		

String	
<code>+</code>	<code>""</code>
<code>length()</code>	<code>compareTo()</code>
<code>charAt()</code>	<code>matches()</code>

Arrays
<code>a[i]</code>
<code>new</code>
<code>a.length</code>

Objects	
<code>class</code>	<code>static</code>
<code>public</code>	<code>private</code>
<code>final</code>	<code>toString()</code>
<code>new</code>	<code>main()</code>

Hello, World



Programming in Java

Programming in Java.

Create the program by typing it into a text editor, and save it as `HelloWorld.java`.

```
/*  
 * Prints "Hello, World"  
 * Everyone's first Java program.  
 */  
  
public class HelloWorld {  
    public static void main(String[] args) {  
        System.out.println("Hello, World");  
    }  
}
```

`HelloWorld.java`

Programming in Java

Programming in Java.

Create the program by typing it into a text editor, and
save it as `HelloWorld.java`.

Compile it by typing at the command-line:

```
javac HelloWorld.java.
```

command-line



```
% javac HelloWorld.java
```

(or click the Compile button in DrJava)

This creates a Java bytecode file named: `HelloWorld.class`.

Programming in Java

Programming in Java.

Create the program by typing it into a text editor, and save it as `HelloWorld.java`.

Compile it by typing at the command-line:

```
javac HelloWorld.java.
```

Execute it by typing at the command-line:

```
java HelloWorld.
```

command-line →

```
% javac HelloWorld.java  
  
% java HelloWorld  
Hello, World
```