Simple Java

The “Hello World” Program

One of the important influences on the design of Java was the C programming language, which was developed at Bell Labs in the early 1970s. The primary reference manual for C was written by Brian Kernighan and Dennis Ritchie. On the first page of their book, the authors suggest that the first step in learning any language is to write a simple program that prints the message “hello, world” on the display. That advice remains sound today.

1.1 Getting Started

The only way to learn a new programming language is to write programs in it. The first program to write is the same for all languages: Print the words

```
#include <stdio.h>
main() {
    printf("hello, world");
}
```

Evolution of Computer Languages

The 2002 ACM Turing Award

The most prestigious prize in computer science, the ACM Turing Award, was given in 2002 to two Norwegian computing pioneers, who developed the first object-oriented programming language in 1967.

Systems of Classification

In the mid-18th century, the Scandinavian botanist Carl Linnaeus revolutionized the study of biology by developing a new system for classifying plants and animals in a way that revealed their structural relationships and paved the way for Darwin’s theory of evolution a century later.

Linnaeus’s great contribution was to recognize that organisms fit into a hierarchical classification scheme in which the placement of individual species within the hierarchy reflects their anatomical similarities.

Biological Class Hierarchy

Classification of the red ant

```
   Kingdom  | Plants  | Animals
   Phylum   | Arthropoda | Invertebrata | Chordata
   Class    | Arachnida | Arachnida   | Chordata
   Order    | Araneae   | Araneae     | Arachnida
   Family   | Formicidae | Formicidae | Hymenoptera
   Genus    | Iridomyrmex | Iridomyrmex | Hymenoptera
   Species  | purpureus  | purpureus   | Iridomyrmex
```

Every red ant is also an animal, an arthropod, and an insect, as well as the other superclasses in the chain.
Instances vs. Patterns

In thinking about any classification scheme—biological or otherwise—it is important to draw a distinction between the category defined by a particular class and specific instances of that class. In the most recent example, the designation *Iridomyrmex purpureus* is not itself an ant, but rather a class of ant. There can be (and usually are) many ants, each of which is an individual of that class.

Each of these fire ants is an *instance* of the general category encompassing all ants of its class. Each instance is of the species *purpureus*, the genus *Iridomyrmex*, the family *Formicidae* (which makes it an ant), and so on. Thus, each ant is not only an ant, but also an insect, an arthropod, and an animal.

The Program Hierarchy

Java class hierarchies are similar to the biological class hierarchy from the previous slide. This diagram shows the hierarchy formed by the classes in the `acm.program` package:

```
import acm.program.*;
public class HelloProgram extends ConsoleProgram {
    public void run() {
        println("hello, world");
    }
}
```

Hello World as a Console Program

```
Hello World as a Dialog Program

import acm.program.*;
public class HelloProgram extends DialogProgram {
    public void run() {
        println("hello, world");
    }
}
```

Hello World as a Dialog Program

```
Hello World as a Graphics Program

import acm.graphics.*;
import acm.program.*;
public class HelloProgram extends GraphicsProgram {
    public void run() {
        add(new GLabel("hello, world", 100, 75));
    }
}
```

Hello World as a Graphics Program

```
The Java Coordinate System

- Creating a `JLabel` at a particular x and y position means that the baseline of the first character in the label appears at that point, as follows:

- Positions and distances in a graphics program are measured in terms of *pixels*, which are the individual dots that cover the screen.

- Unlike traditional mathematics, Java defines the *origin* of the coordinate system to be in the upper left corner. Values for the x coordinate increase as you move rightward across the screen; y coordinate values increase as you move downward.
```