

Programming in the Real World

Ceçi n'est pas une Java

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

The ACM Libraries

- Throughout this class we've been using the ACM libraries.
 - `acm.program.*`
 - `ConsoleProgram`, `GraphicsProgram`, etc.
 - `acm.graphics.*`
 - `GOval`, `GRect`, etc.
 - `acm.util.*`
 - `RandomGenerator`
 - `ErrorException`

The ACM Libraries

- The ACM libraries exist to simplify many common Java techniques.
- However, the ACM libraries aren't widely used outside of CS106A.
- Good news: The topics from the latter half of the quarter (file reading, arrays, **ArrayList**, **HashMap**, interactors, etc.) use only standard Java.
- We do need to cover a few last-minute details of the Java language.

“Hello, World” Without the ACM

Starting up the Program

- In standard Java, program execution begins inside a method called

```
public static void main(String[] args)
```
- The ACM libraries contain this method in the **Program** class.
- When you're not using the ACM libraries, you will have to implement this method yourself.

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What About Windows?

Steps to Create a Window

- Create a new **JFrame**, which actually represents the window object.
- Add any components or interactors to the frame as you normally would.
- Set the size of the window by calling
`frame.setSize(width, height)`
- Tell Java to quit when we close the program by calling
`frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE)`
- Show the window by calling
`frame.setVisible(true)`

What about Graphics?

- You can create components that can display graphics by extending JComponent and writing

```
public void paintComponent(Graphics g)
```
- You can then call methods to draw on the window when the window is resized or moved.
- Note: not object-oriented.

`static` Methods

- A **static method** is a method that's specific to a *class*, rather than *instances* of that class.
- Examples:
 - `Character.isLetter`
 - `RandomGenerator.getInstance`
- Because the method is specific to the class rather than any instance, there is no receiver object.

`public static void main`

- Because `main` is `static`, there is no instance of your class that it operates relative to.
- Common technique: Have `main` create an instance of the class and work from there.
- This is done automatically by the ACM libraries.

How are you supposed to remember all these methods?

<http://docs.oracle.com/javase/7/docs/api/>

Going Beyond Java

Why Java?

- In CS106A, we've used the Java programming language for many reasons:
 - **Programmer-friendliness**: most common mistakes cause exceptions, which give lots of info about the bug.
 - **Historical reasons**: Java was developed by Sun Microsystems, which was started here at Stanford.
 - **Library support**: The ACM libraries make it easy to do write impressive programs quickly.

Other Programming Languages

- Java is a very popular programming language, but it is not the only language.
- Different languages are suited to different tasks and each have their tradeoffs.
- **You are not handicapped by not seeing these other languages.** The fundamentals of programming (variables, methods, etc.) are the same in most programming languages, though you will have to learn some new syntax.

Learning New Languages

- If you are interested in / have to learn a new programming language, how best to get started?
- In all seriousness, **Google** is a great resource for getting started with a language.
- Coursera / Udacity / EdX offer some classes on particular programming techniques and languages.

Building a Website

Modern Website Design

- What goes in to designing a modern website like Facebook, Google, Amazon, etc.?
- What technologies and skills are required?



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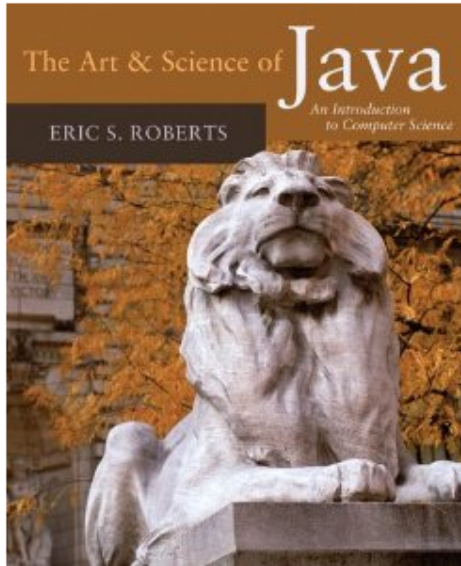
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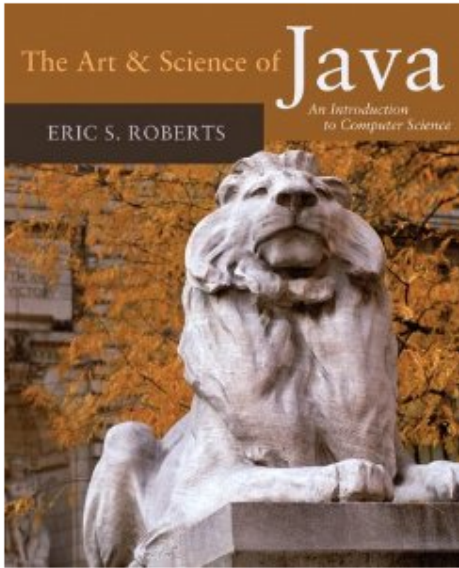
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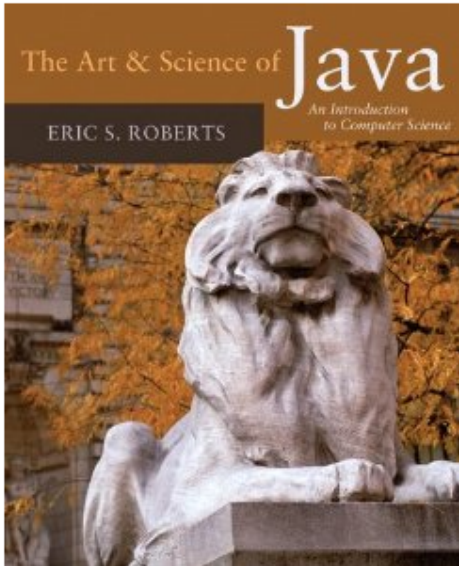
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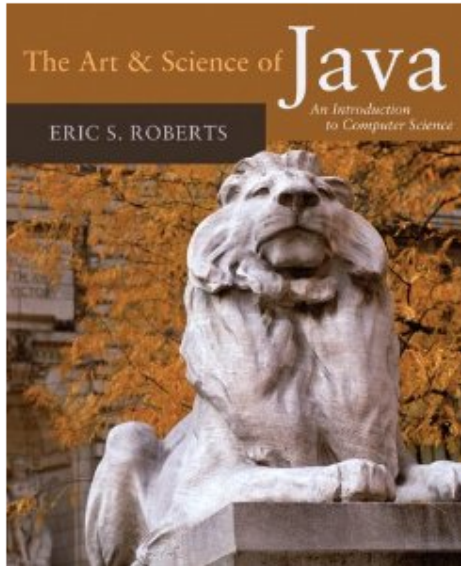
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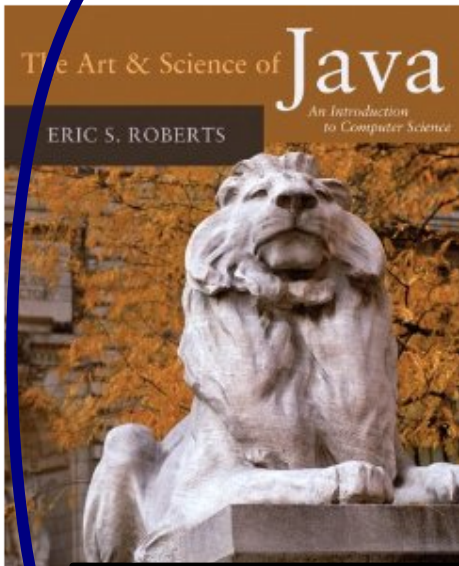
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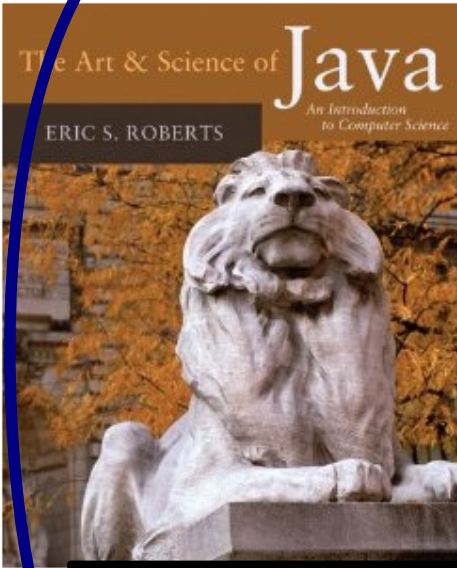
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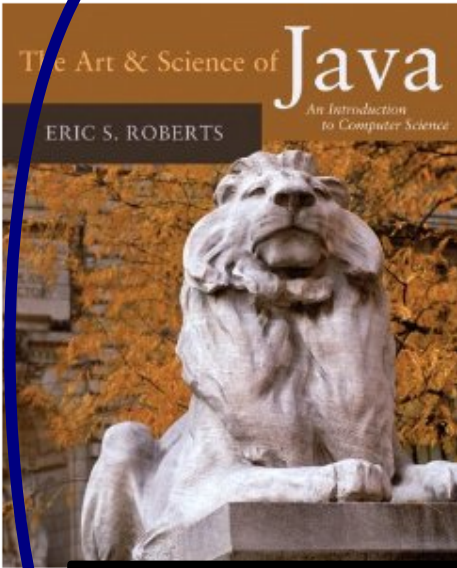
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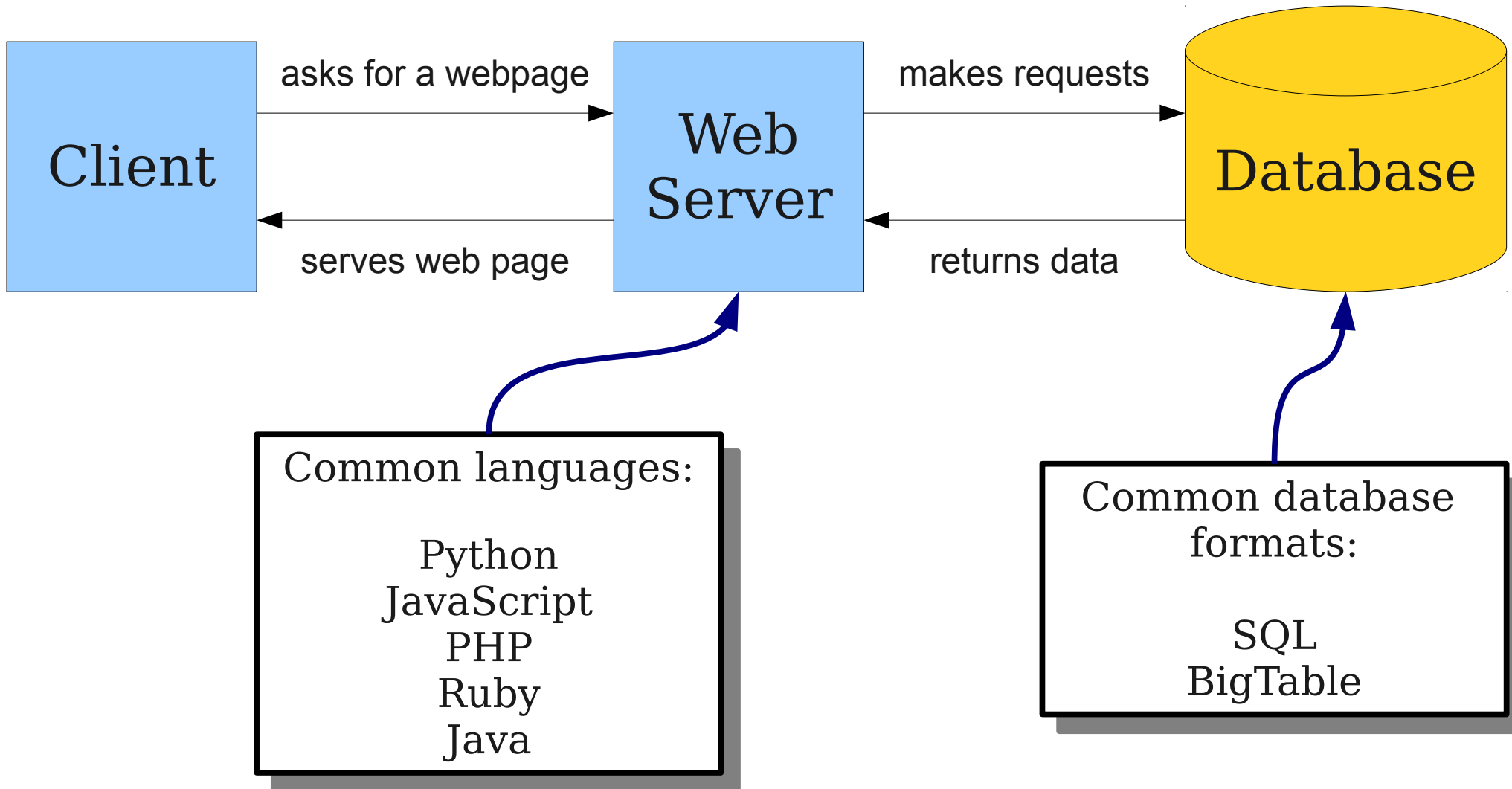
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Website Back-Ends



Technologies Involved

- **Browser:**
 - HTML/CSS: Describe the layout of the page, page content, color schemes, etc.
 - JavaScript: Respond to mouse clicks, generate dynamic content, etc.
- **Web Server:**
 - PHP / Python / Java / Ruby / etc.: Receive web requests and generate content, etc.
 - MySQL / BigTable / etc.: Store data persistently, retrieve data, etc.

Next Time

- **Where to Go from Here**
 - Course recap.
 - What comes after CS106A?
 - *Plus a little treat...*