1

CS/IS 160

Programming and Problem Solving II

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Objectives

- administrative info
- course introduction
- Java programming language
- Java development environments
- Hello World Java program

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Administrative info

- **Lectures:** Mon. 15:00 (P09)
  Wed. 15:00 (125)
- **Labs:** Wed. 17:00 (S11 Lab)
- **Book:** Deitel & Deitel, Java: How to Program

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Class grading scheme

- in-class exams: 30% (midterm 20%, 2 mini tests 10%)
- 10 graded lab exercises & mini project: 20%
- final exam: 50%

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CS/IS 160 – Syllabus

- Compiling and running Java programs
- Selection and iteration
- Implementing methods
- Arrays (1D, 2D, and n-dimensional)
- Classes and objects
- Extending classes with inheritance
- Abstraction, interfaces, and polymorphism
- Exceptions
- Collections and generics
- Graphics and event-driven programs

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Why Java?

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Why Java? (Programming language rankings)

Feb 2015	Feb 2014	Change	Programming Language	Ratings	Change
1	1		C	16.488%	-1.85%
2	2		Java	15.345%	-1.97%
3	4	▲	C++	6.612%	-0.28%
4	3	▼	Objective-C	6.024%	-5.32%
5	5		C#	5.738%	-0.71%
6	9	▲	JavaScript	3.514%	+1.58%
7	6	▼	PHP	3.170%	-1.05%
8	8		Python	2.882%	+0.72%
9	10	▲	Visual Basic .NET	2.026%	+0.23%
10	-	⇈	Visual Basic	1.718%	+1.72%

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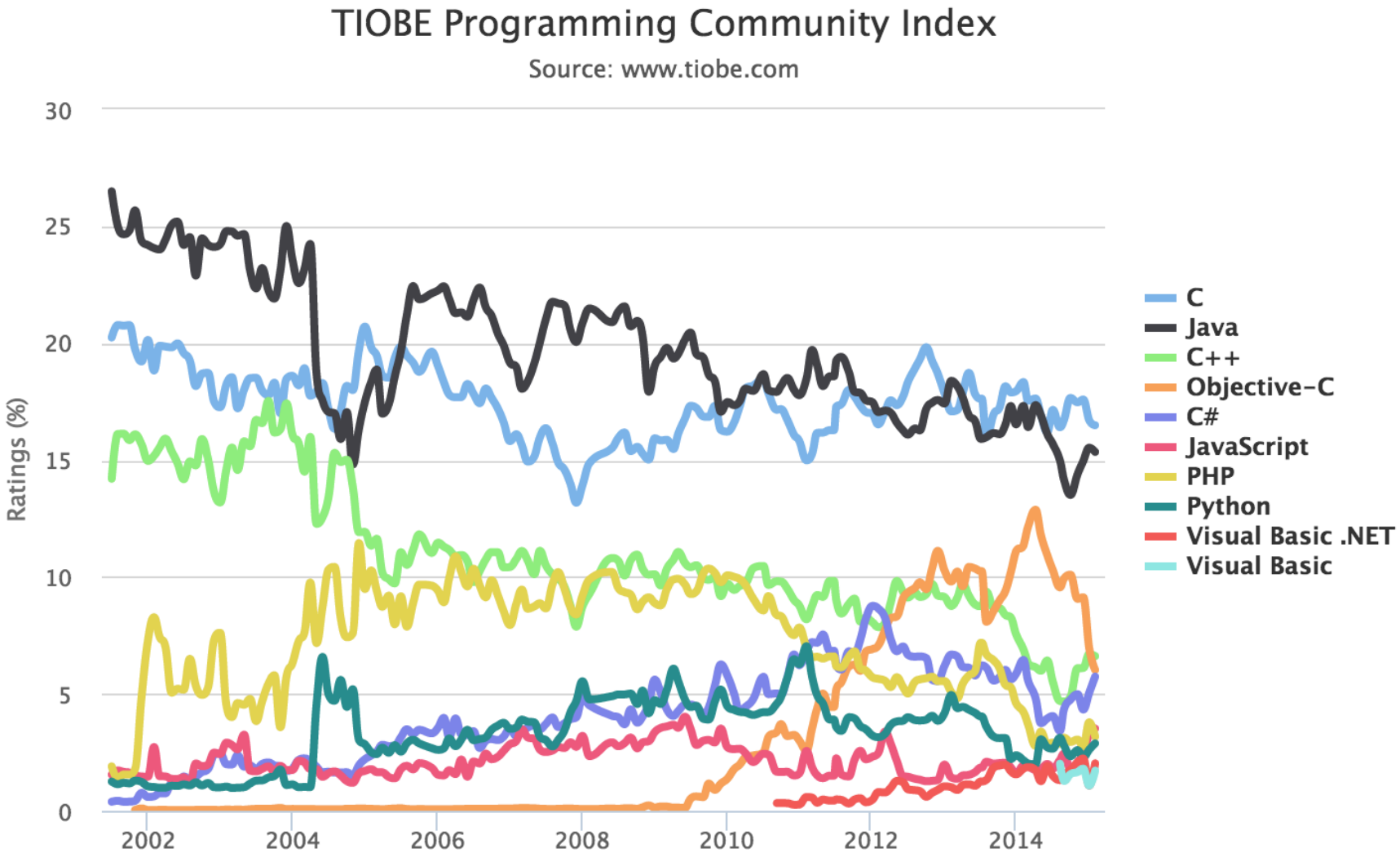
Long term trends



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Smartphone and tablet programming

- Google Android development

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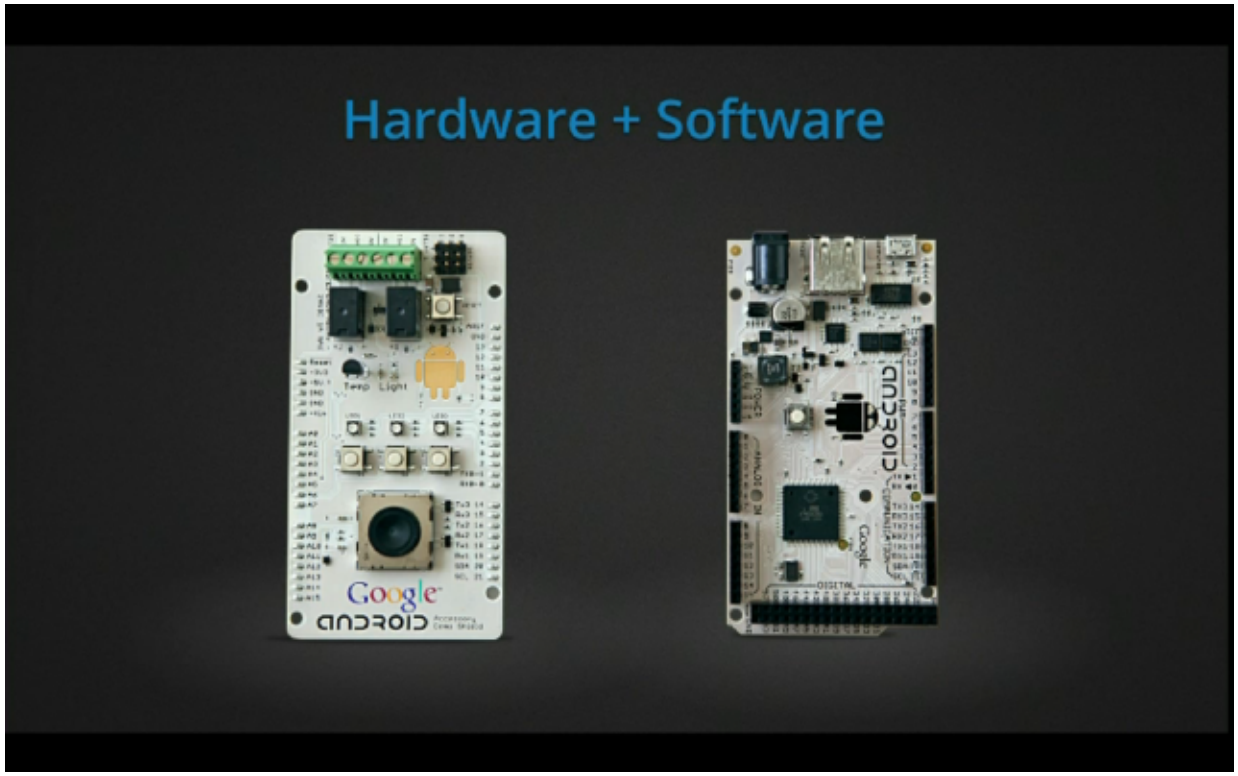
Embedded device programming

– **Google Android development**



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Embedded device programming

- **Java Micro Edition programming**

Java + Blu-ray Disc™: Delivering pristine picture resolution

Cloudy with a Chance of Meatballs

Without Blu-ray Disc, your HDTV is just a TV

Blu-ray Disc is maximizing your high-def entertainment experience with outstanding advanced content delivery capabilities powered by Oracle's Java Micro Edition technology. Blu-ray Disc is a feast for your

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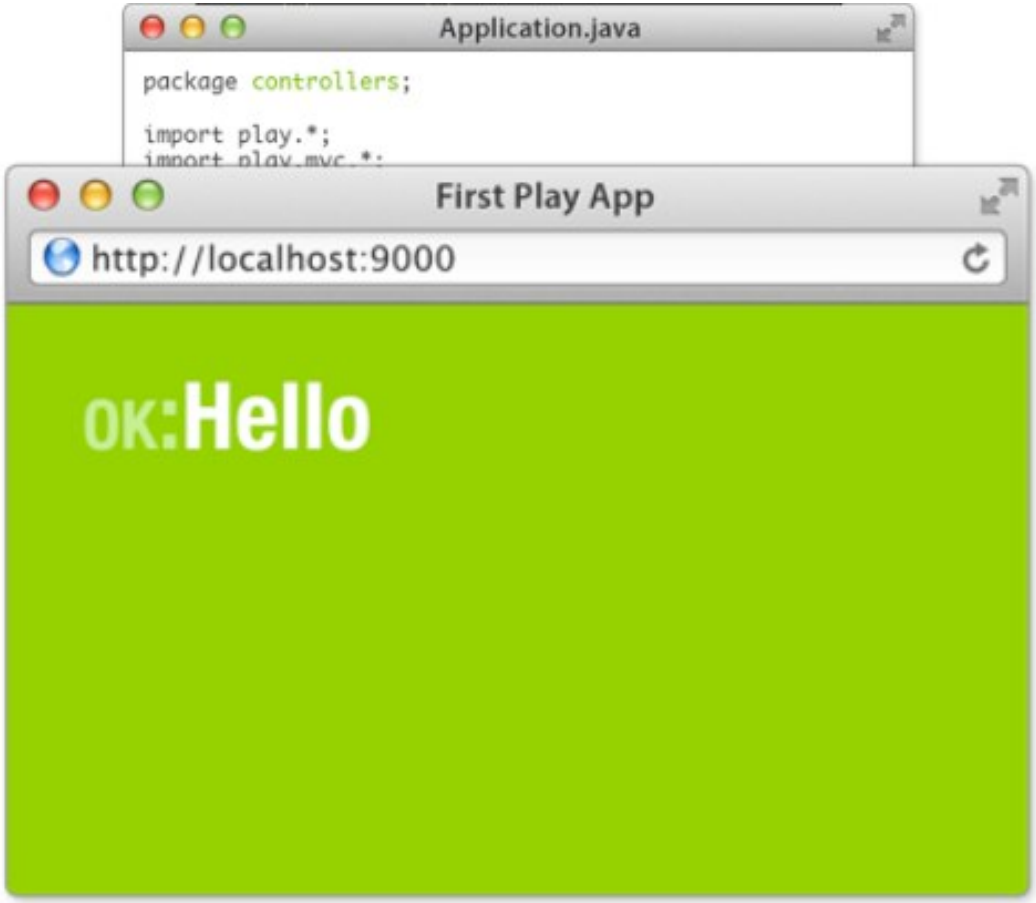
Web programming

– **Web application frameworks (Play, Spring, …)**



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CS/IS 160 – What we hope to learn about

- Java programming language (like modern C/C++)
- Focus on object-oriented programming (OOP)
- Learn about inheritance, polymorphism, etc.

- Graphical user interface (GUI) programming
- Web programming
- Mobile programming

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Chapter 1 Introduction

- **Java Standard Edition (Java SE)**
- **implementation called Java Development Kit (JDK)**

- **Java Enterprise Edition (Java EE) geared toward large-scale distributed applications and web applications**

- **http://java.com/en/**

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History of Java

- **Java (first official release in May 1995)**
  - **James Gosling at Sun**
  - **Originally for intelligent consumer-electronic devices**
  - **Then used for creating web pages with dynamic content**
  - **Now also used to:**
    - **Develop large-scale enterprise applications**
    - **Enhance web server functionality**
    - **Provide applications for consumer devices (cell phones, etc.)**

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Java Features

- **Computer machine platform independent (JVM)**
- **Object oriented (lots of libraries / packages)**
- **Backward compatible (version 1.x)**

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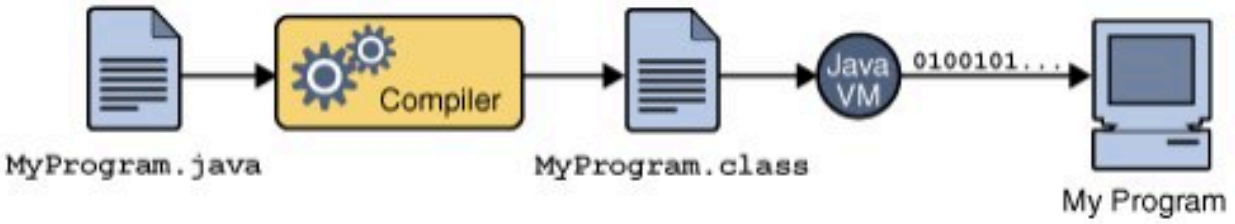
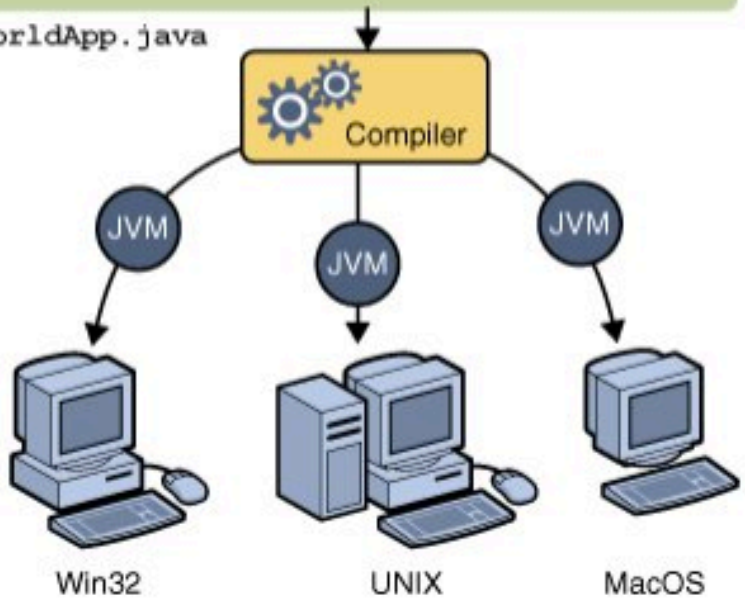
Computer Platform Independent



Java Program

```
class HelloWorldApp {
     public static void main(String[] args) {
          System.out.println("Hello World!");
     }
}
```

HelloWorldApp.java



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Program Modules in Java (Java API)

- **Java Application Programming Interface (API)**
  - **Also known as the Java Class Library**
  - **Contains predefined methods and classes**
  - **Related classes are organized into packages**
  - **Includes methods for:**
    - **mathematics**
    - **string/character manipulations**
    - **input/output**
    - **databases**
    - **networking**
    - **file processing and more**

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Java Class Libraries

- **Java programs consist of classes**
  - **Include methods that perform tasks**
- **To use Java effectively, you must know**
  - **Java programming language**
  - **Extensive class libraries**

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Typical Java Development Environment

- **Java programs go through five phases**
  - **Edit**
    - **Programmer writes program using an editor; stores program on disk with the `.java` file name extension**
  - **Compile**
    - **Use javac (the Java compiler) to create bytecodes from source code program; bytecodes stored in `.class` files**
  - **Load**
    - **Class loader reads bytecodes from `.class` files into memory**
  - **Verify**
    - **Bytecode verifier examines bytecodes to ensure that they are valid and do not violate security restrictions**
  - **Execute**
    - **Java Virtual Machine (JVM) uses a combination of interpretation and just-in-time compilation to translate bytecodes into machine language**

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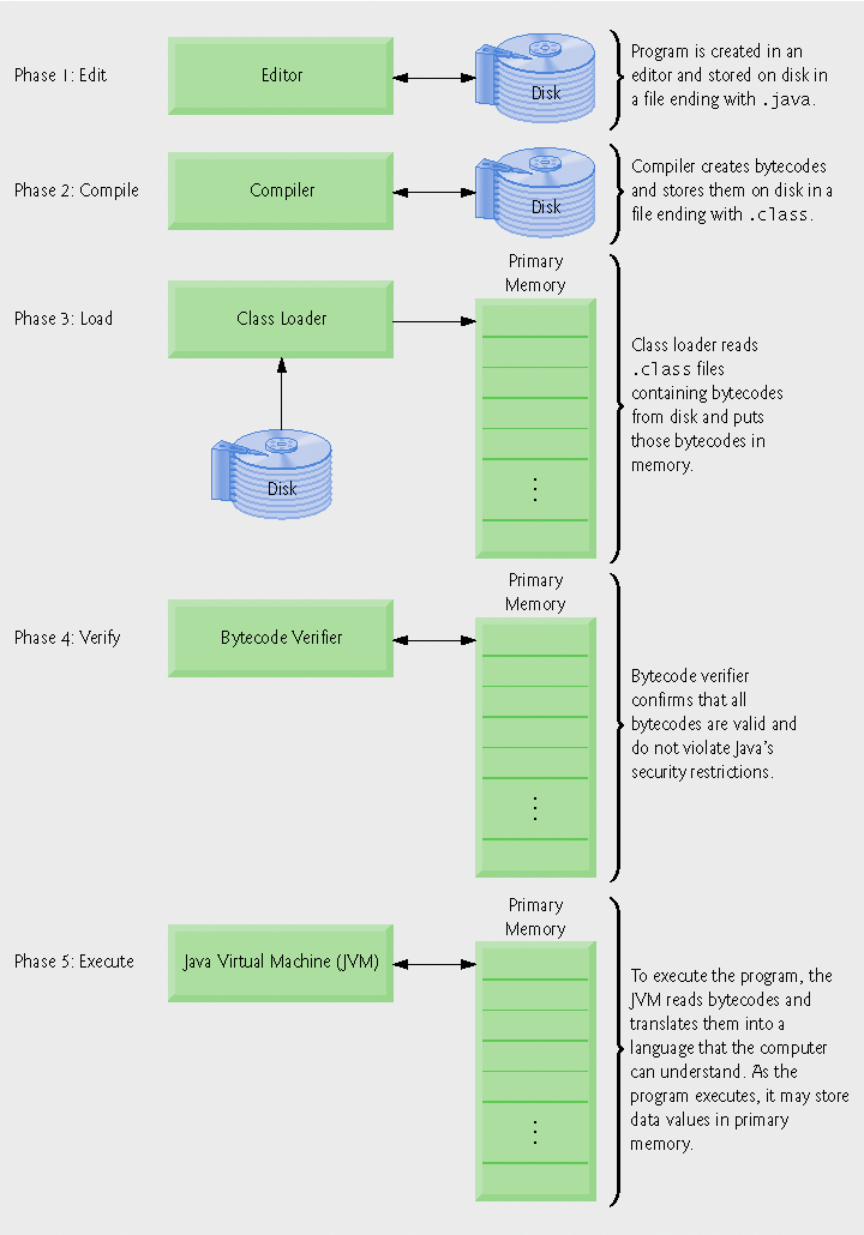

Fig. 1.1 | Typical Java development environment.

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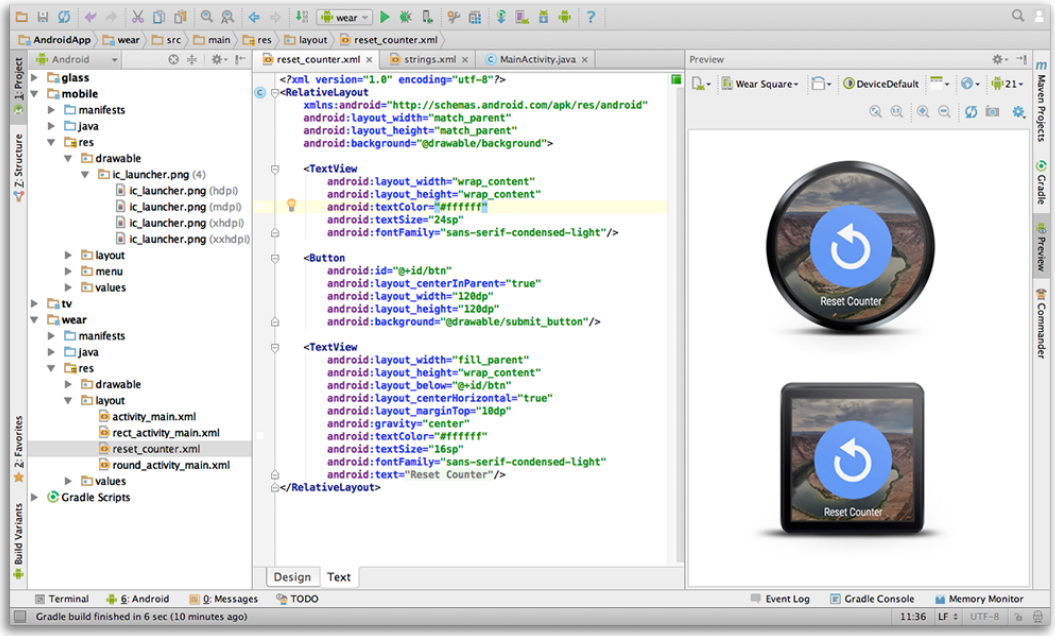
Java developer tools

- **IDE: Eclipse, IntelliJ IDEA, NetBeans, BlueJ, …**
- **Android: Android Studio**



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Eclipse IDE

- **Popular Java IDE**
  - **Written mostly in Java (so runs on any Java platform)**
  - **Free and open-source software**
  - **Initially developed by IBM**
  - **Many different configurations (Android ADT, Spring, …)**

- **https://www.eclipse.org/downloads/**

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Demo – Eclipse IDE

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Demo – Simple Java Programs

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