

PIC 20A

Introduction

David Hyde
UCLA Mathematics

Last edited: March 29, 2020

Prerequisites

From PIC10a, you should know

- ▶ variables,
- ▶ flow control,
- ▶ functions, and
- ▶ classes.

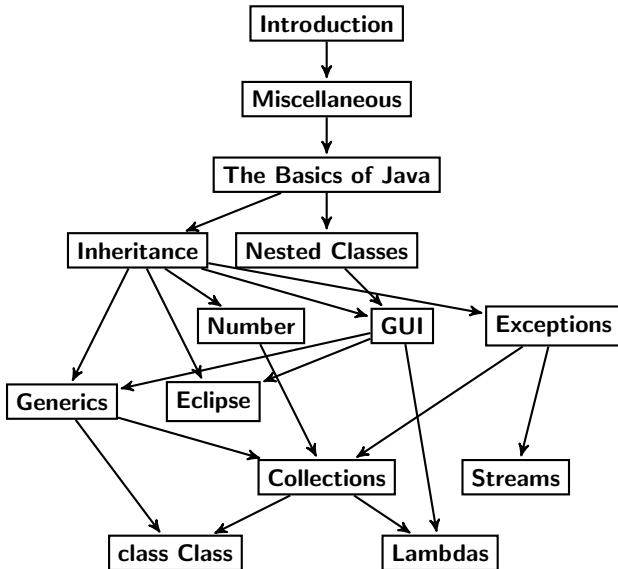
Fluency in these concepts is essential.

Learning objectives

In this class, you will learn

- ▶ the Java language
- ▶ inheritance, and polymorphism
- ▶ graphical user interface (GUI)
- ▶ exceptions
- ▶ I/O
- ▶ data structures,
- ▶ a few other topics.

Lecture dependency



Textbook

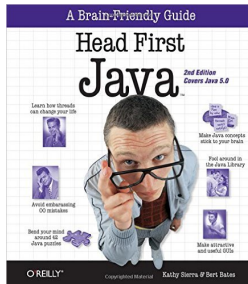
Optional textbook: *Head First Java, 2nd Edition* by Sierra & Bates.

<https://www.amazon.com/Head-First-Java-Kathy-Sierra/dp/0596009208>

UCLA students can get a free electronic copy.

<http://proquest.safaribooksonline.com/0596009208>

The lecture slides should be self-contained, but the textbook can provide a different perspective.



Course grades

Your course grade will be based on

- ▶ 6 hw assignments. The assignments are not of equal weight. 45% of the total grade.
- ▶ 1 Midterm 20% of the total grade.
- ▶ 1 Final. 35% of the total grade.

The work flow of Java

In Java the work flow is:

1. Write source code as `.java` file.
2. Compile with `javac` and get `.class` file.
3. Execute `.class` with `java`

Text editor

To write code, you need a text editor. Reasonable options include Notepad++ (Windows), Xcode (MacOS), Emacs, and Vim.

Installing Java

To compile code written in Java, you need `javac`. To execute a compiled Java program, you need `java`. Find them from:

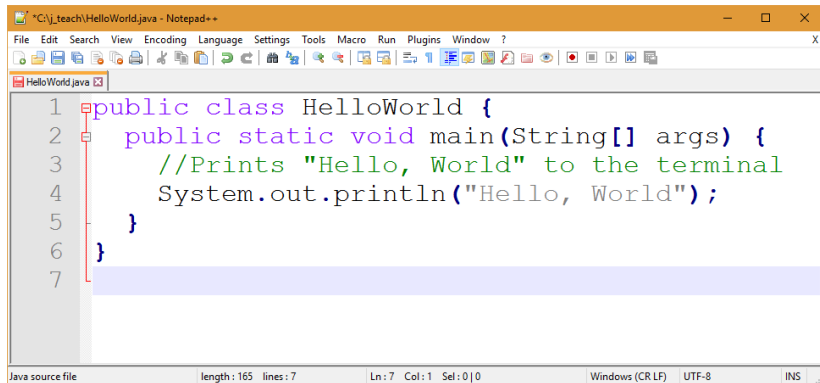
<http://www.oracle.com/technetwork/java/javase/downloads/index.html>

Hello world program

```
public class HelloWorld {  
    public static void main(String[] args) {  
        //Prints "Hello, World" to the terminal  
        System.out.println("Hello, World");  
    }  
}
```

Hello world program

Write this program and save as HelloWorld.java



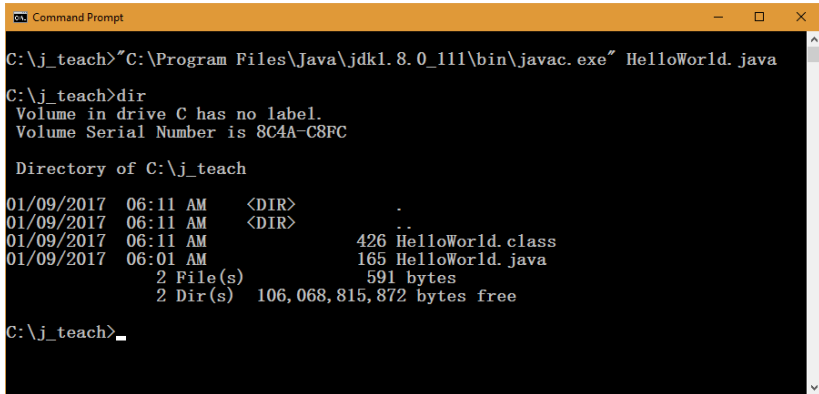
The screenshot shows a Notepad++ window titled "C:\j_teach\HelloWorld.java - Notepad++". The menu bar includes File, Edit, Search, View, Encoding, Language, Settings, Tools, Macro, Run, Plugins, Window, and ?. The toolbar contains various icons for file operations and editing. The text area shows the following Java code:

```
1 public class HelloWorld {  
2     public static void main(String[] args) {  
3         //Prints "Hello, World" to the terminal  
4         System.out.println("Hello, World");  
5     }  
6 }  
7
```

The status bar at the bottom displays: Java source file, length: 165 lines: 7, Ln: 7 Col: 1 Sel: 0|0, Windows (CR LF), UTF-8, and INS.

Compiling with javac

Use the Java compiler javac



```
Command Prompt

C:\j_teach>"C:\Program Files\Java\jdk1.8.0_111\bin\javac.exe" HelloWorld.java

C:\j_teach>dir
Volume in drive C has no label.
Volume Serial Number is 8C4A-C8FC

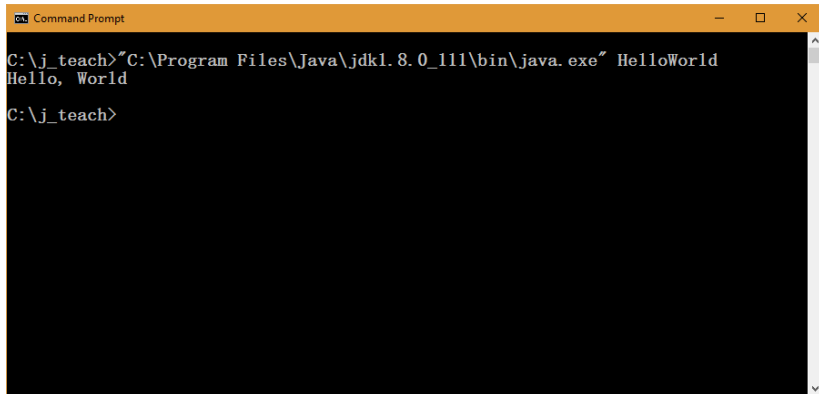
Directory of C:\j_teach

01/09/2017  06:11 AM    <DIR>          .
01/09/2017  06:11 AM    <DIR>          ..
01/09/2017  06:11 AM                426 HelloWorld.class
01/09/2017  06:01 AM                165 HelloWorld.java
                2 File(s)                591 bytes
                2 Dir(s)  106,068,815,872 bytes free

C:\j_teach>_
```

Running java program

Use the Java interpreter java

A screenshot of a Windows Command Prompt window. The title bar is orange and reads "Command Prompt". The window has standard Windows window controls (minimize, maximize, close) on the right. The command prompt shows the following text:
C:\j_teach>"C:\Program Files\Java\jdk1.8.0_111\bin\java.exe" HelloWorld
Hello, World
C:\j_teach>
The text is white on a black background. A vertical scrollbar is visible on the right side of the command prompt area.

IDEs

An integrated development environment (IDE) integrate and provide a text editor, a compiler, and other tools as a single program. MS Visual studio is an IDE for C++ (and other languages) on Windows. Eclipse and Netbeans are popular IDEs for Java.

However, some argue (and I agree) that beginners shouldn't use IDEs, as IDEs create an unnecessary mystery to the compilation process. We will revisit IDEs later.

Hello world program

```
public class HelloWorld {  
    public static void main(String[] args) {  
        //Prints "Hello, World" to the terminal  
        System.out.println("Hello, World");  
    }  
}
```

In Java, everything is within a class. Even the main function must be a member function of a class.