CS1101 Programming and Problem Solving

Dr. Gina Bai

Fall 2022

Logistics

MLK Day
- Monday, Jan 16
- NO CLASS

- **HW0–A**, **HW0–B** on Brightspace > First Week
  - Due: Today, at 11:59 pm
- **PA00-A** and **PA00-B** on zyBook > Chap 11
  - Due: Thursday, Jan 19, at 11:59pm
- **ZY-1** and **ZY-2A** on zyBook > Assignments
  - Due: Saturday, Jan 21, at 11:59pm

Recap – HelloWorld.java

- Class – A program
  - Method – A named group of statements
    - Statement – An instruction to be executed

```
public class HelloWorld {

    public static void main(String[] args) {

        System.out.println("Hello World!");
    }
}
```

Recap – Basics of Java

Q: Identifiers cannot start with a _____?

A. Uppercase letter
B. Lowercase letter
C. Underscore symbol
D. Digit
E. None of above

Recap – Basics of Java

1. A(n) **program** is a collection of statements written in a programming language.
2. A(n) **algorithm** is a step-by-step list of instructions for solving a problem and is independent of any programming language.
3. A(n) **compiler** translates Java source code to bytecode.
4. A(n) **main** method is required for an executable Java program.
5. A line that begins with // is a(n) **comment**
6. True/False: A .class file is executable with JVM. **True**

Print Statements

System.out.**println**(“TEXT”);

- Print “TEXT”, and the cursor **moves to the next line** at the console

System.out.**print**(“TEXT”);

- Print “TEXT”, the cursor **remains at the end** of that text in the console

Q: What does `System.out.println()` print?
A blank line of output

Q: What's the exact output for this?

```
public class PrintDemo {
    public static void main(String[] args) {
        System.out.print("Hello");
        System.out.println("!");
        System.out.println();
        System.out.println("This is");
        System.out.print(" CS1101" + ".");
    }
}
```

String Concatenation with + symbol

```
$ javac PrintDemo.java
$ java PrintDemo
Hello!

This is
 CS1101.
```

Debugging

zyBook Chap 1.7, 2.18

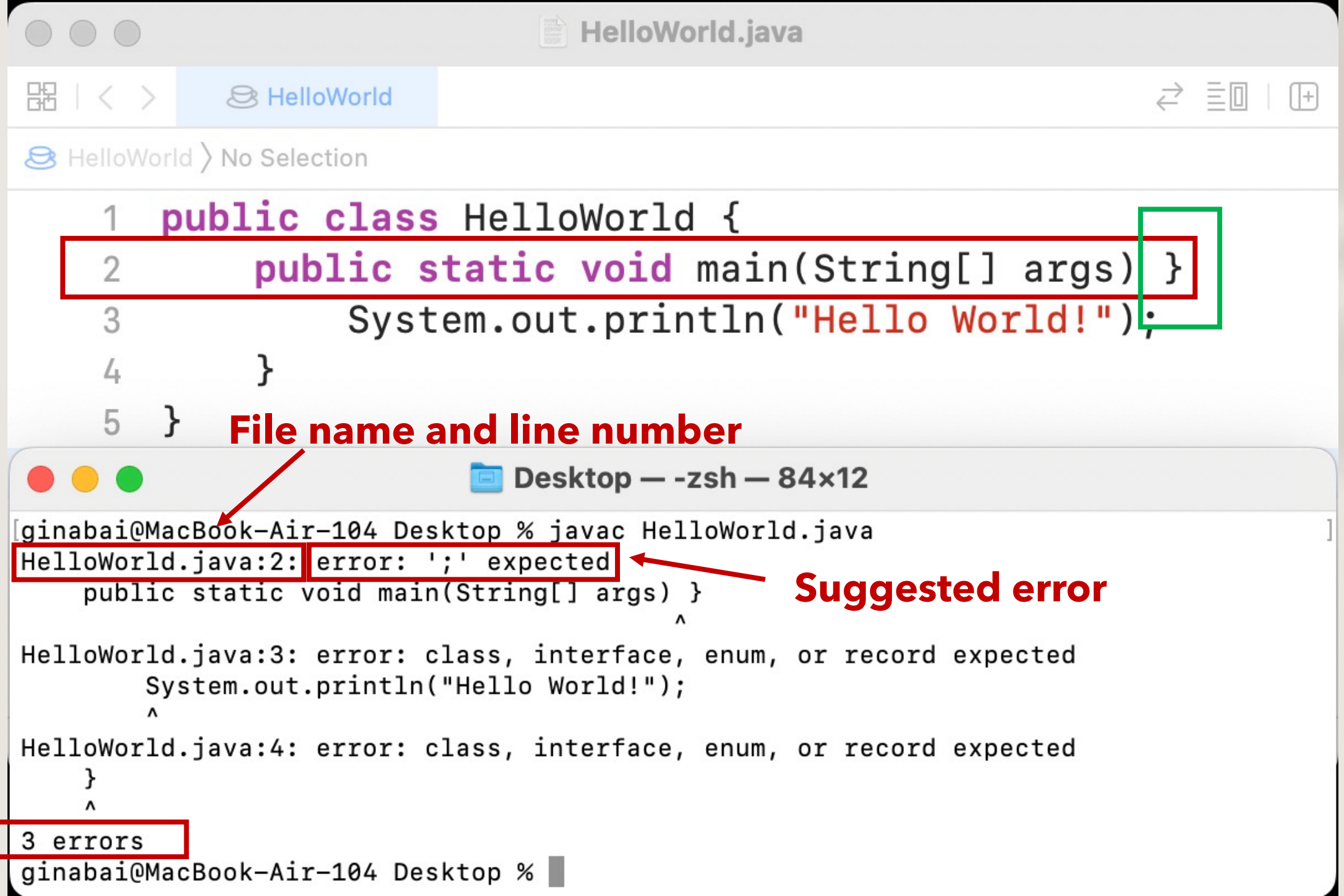
Debugging & Strategies

- Debug code → Examine the code to figure out what went wrong, and remove errors from the code

- Do not make random or extensive changes to the program!
- Think before you change anything
- Figure out *why* it went wrong

Reacting to Errors

- Always address the **first error** listed in the compiler output before addressing the other errors.
- Always recompile after making changes to code because fixing one error will often fix other errors as well.


HelloWorld.java
HelloWorld
HelloWorld 〉 No Selection
1 public class HelloWorld {
2 public static void main(String[] args) }
3 System.out.println("Hello World!");
4 }
5 }
File name and line number
Desktop — -zsh — 84×12
ginabai@MacBook-Air-104 Desktop % javac HelloWorld.java
HelloWorld.java:2: error: ';' expected
public static void main(String[] args) }
^
HelloWorld.java:3: error: class, interface, enum, or record expected
System.out.println("Hello World!");
^
HelloWorld.java:4: error: class, interface, enum, or record expected
}
^
3 errors
ginabai@MacBook-Air-104 Desktop %
Suggested error

Program Errors

zyBook 1.7

Three Types of Program Errors

- Syntax Errors / Compilation Errors
  - The code does not compile
- Runtime Errors
  - The code compiles, does not run
- Logic Errors
  - The compiles and runs, but the output is not correct

Syntax Errors / Compilation Errors

- A grammatical mistake in a program
- **Caught by** the **compiler**
- Examples:
  - Missing semicolon
  - Missing or mismatching curly braces
  - Missing keyword
  - Misspelling a keyword or identifier
  - Incorrect class name (mismatches the file name)

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

```
$ javac HelloWorld.java
HelloWorld.java:3: error: ';' expected
        System.out.println("Hello World!")
                                           ^
1 error
```

Runtime Errors

- The program is grammatically correct and hence can be compiled, but the program cannot be run
- Examples
  - Missing main method
  - Incorrect spelling for main
  - Dividing by 0

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

```
$ javac HelloWorld.java
$ java HelloWorld
Error: Main method not found in class HelloWorld,
please define the main method as:
   public static void main(String[] args)
or a JavaFX application class must extend
javafx.application.Application
```

Logic Errors

- The program compiles and runs but it does not perform the task it is intended to perform
- Strategy → Test programs thoroughly!

```
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("2 + 3 = " + 2 * 3);
    }
}
```

```
$ javac HelloWorld.java
$ java HelloWorld
2 + 3 = 6
```

Data Types

zyBooks Chap 2.5, 2.6, 2.7, 2.8

Basics

What is a data type?

- A name for a category of data values are related

Why do we care about data types?

- Java is “strongly typed”, which means that each piece of data that we use has a specific type

Data Types in Java

Java supports two types of data

- Primitive data (8 types)
- Objects, consist of fields and methods

Primitive Data Types

Type	Supported Number Range
byte	whole numbers from -128 to 127
short	whole numbers from -32,768 to 32,767
int	**whole numbers from -2,147,483,648 to 2,147,483,647**
long	whole numbers from -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
float	Sufficient for storing 6 to 7 decimal digits
double	**(default) Sufficient for storing 15 decimal digits**
char	**A single character/letter or ASCII values**
boolean	**true / false**

Q: What primitive data type would you use to store…

1. whether a restaurant is open?
2. a person's middle initial?
3. the number of students in class?
4. cost of a meal?
5. distance to campus?
6. the number of siblings a person has?
7. whether you pass a course?
8. your grade in a class?