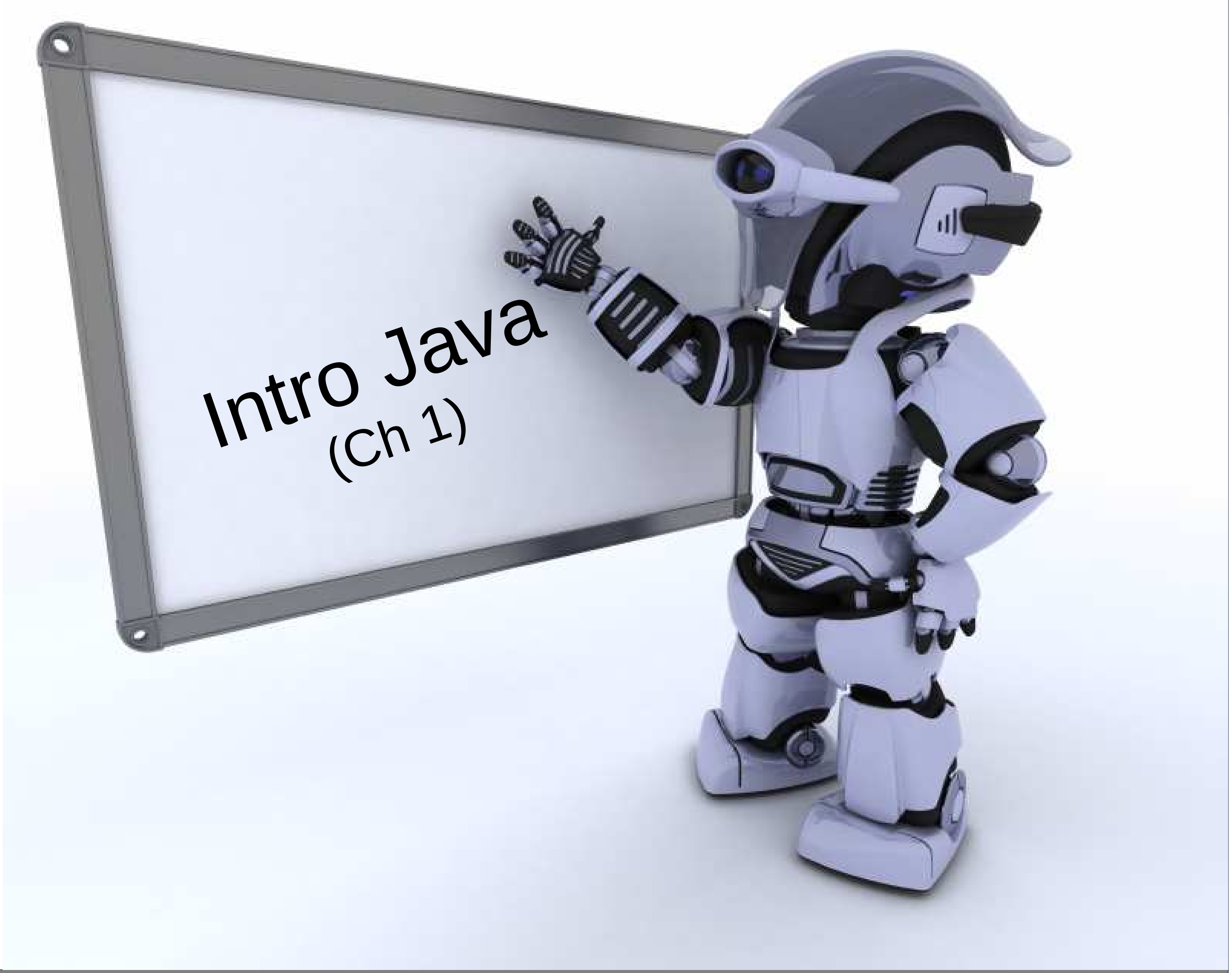
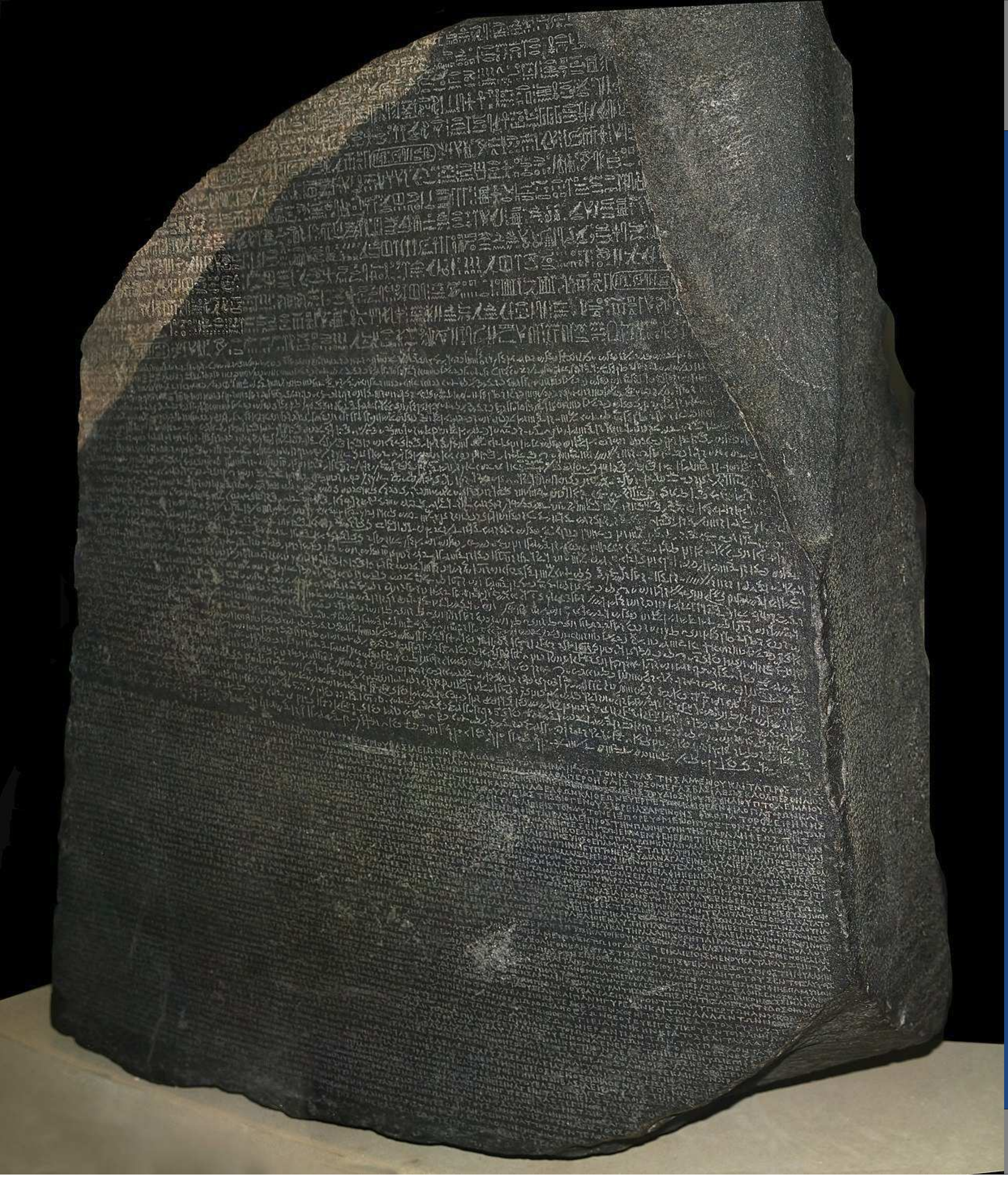


Intro Java

(Ch 1)



What is this?
Why do we care?

One Name

- Use this to..
  - All objects are accessed by references.
  - References are like pointers but
    Java automatically dereferences when needed.
- Give each idea one name
  - Name field and constructor parameters the same.
  - Ex: name both numStudents, vs using each of:
    - studentCount
    - numStudents
    - n
    - numberStds

```
public class Course {
   private int numStudents;

   public Course(int numStudents) {
      this.numStudents = numStudents;
   }
}
```

Pass by value

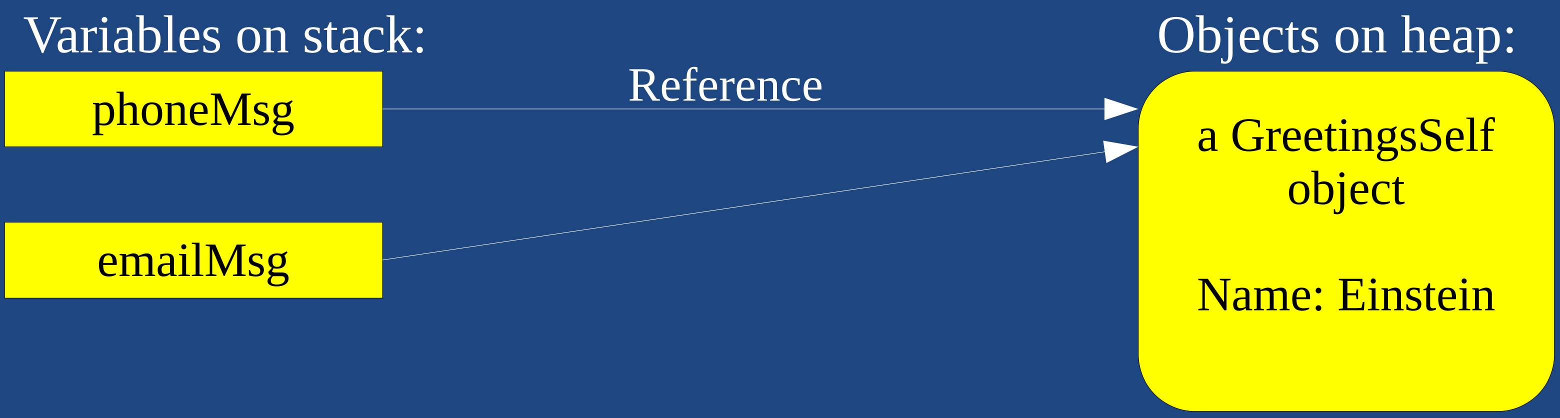
- Java uses pass by value
  - Passing a primitive type passes its value.
  - Passing an object passes (by value)..
- What this means
  - When passed a primitive type, changes inside a method have no effect outside the method.
  - When passed an object, you *can* modify its state.
  - You *cannot* change..

Multiple Object Reference

- = on an **<u>object</u> reference**..
- Example

```java
GreetingsSelf phoneMsg = new GreetingsSelf("Einstein");
GreetingsSelf emailMsg = phoneMsg;

emailMsg.setName("Albert");
```



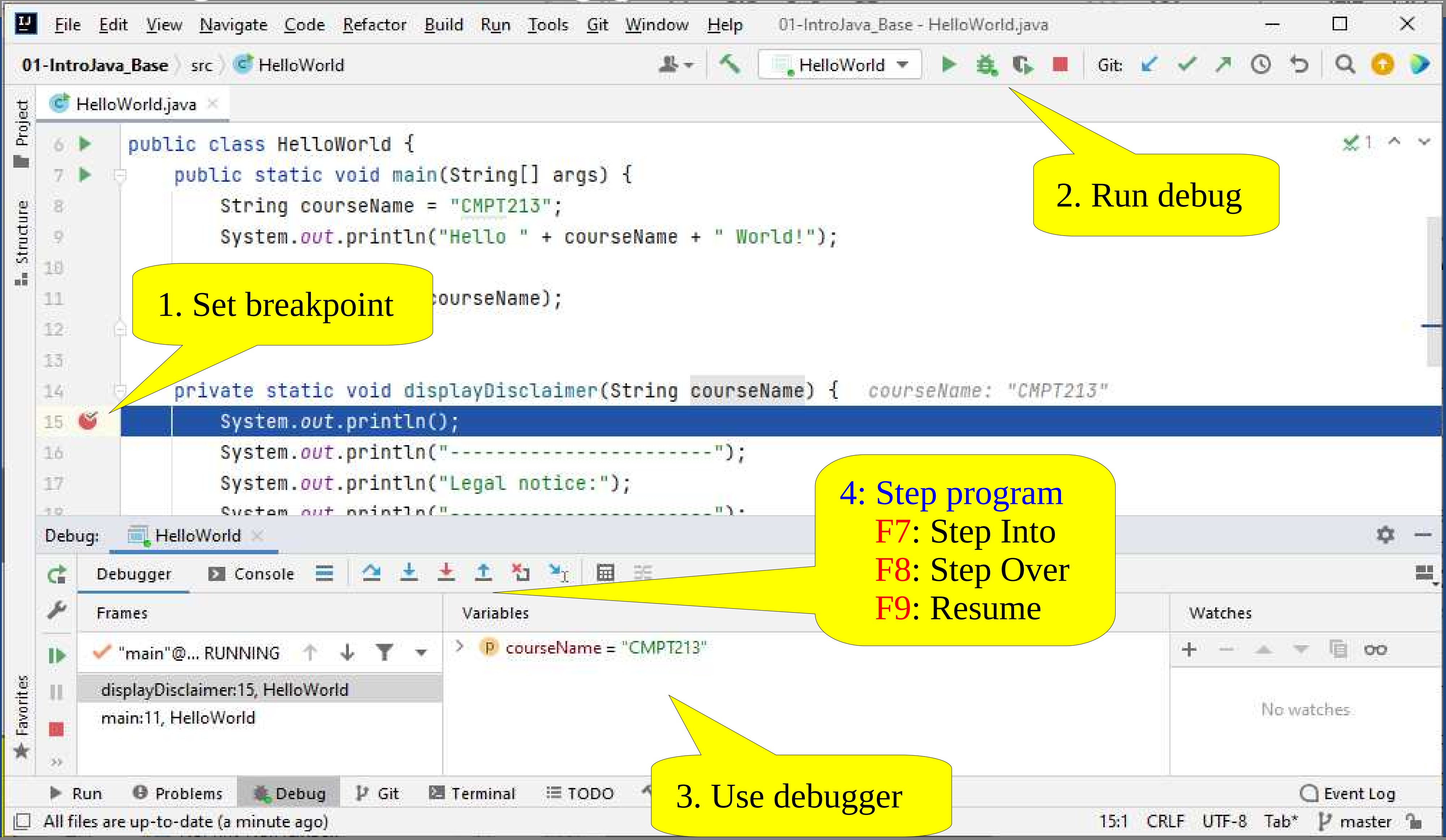
- Automatic Garbage Collection
  - Objects with no references to them are automatically deleted.

Comments

- JavaDoc:
  commenting syntax used to generate documentation.
  - on a class: above a class to describe purpose of class
  - on a method: above a method (or field) to explain it
    - Suggest only using for API methods:
      stable interface and requires solid documentation for external users.
- Commenting Rules (this course):
  RULE 1:..

  RULE 2: Name fields, methods, and parameters well so ..

Integrated Debugger



```java
public class HelloWorld {
    public static void main(String[] args) {
        String courseName = "CMPT213";
        System.out.println("Hello " + courseName + " World!");

        ...courseName);

    private static void displayDisclaimer(String courseName) {   courseName: "CMPT213"
        System.out.println();
        System.out.println("----------------------");
        System.out.println("Legal notice:");
```

Frames:
- "main"@... RUNNING
- displayDisclaimer:15, HelloWorld
- main:11, HelloWorld

Variables:
- courseName = "CMPT213"

Watches: No watches

All files are up-to-date (a minute ago)

1. Set breakpoint

2. Run debug

3. Use debugger

4: Step program
- F7: Step Into
- F8: Step Over
- F9: Resume

What is the most over-used key word in C-based languages?

Static!

Static

- Static method
  - Can be called on the class (no object required).
  - Also called..
- Static field
  - Shared by all instances of the class.
  - Also called..
  - Often used for constants:
    `public static final int DAYS_PER_WEEK = 7;`
- Static local
  - Not supported in Java.

Static: What fails to compile?

```java
public class StaticFun {
    public static final int TARGET_NUM_HATS = 10;
    private static int countNumMade = 0;
    private int favNum = 0;
    public static void main(String[] args) {

        // WHICH OF THESE 4 LINES GIVES A COMPILE TIME ERROR?
        changeFavNum(42);
        displayInfo();
        favNum = 10;
        countNumMade = 9;

    }
    private void changeFavNum(int i) {
        favNum = TARGET_NUM_HATS + i;
        displayInfo();
    }
    private static void displayInfo() {
        System.out.println("TARGET_NUM_HATTS: " + TARGET_NUM_HATS);
        System.out.println("countNumMade:     " + countNumMade);
        System.out.println("favNum:           " + favNum);
    }
}
```

Static Factory Method

- Static Factory Method
  - A..
  - Like a constructor, but more flexible:
    can give it a..
  - A common..
- Example
  - In Pizza class:

```
public static Pizza makePizzaFromFile(File file) {
    // Open file and read in values
    // Create new Pizza object
    // Return the Pizza
}
```

Classes, Strings, Collections,

toString()

- All Java objects have a toString() method
  - All classes inherit from Object, which implements toString()
- Returns a String object which..
  - Used for **debugging**,..
  - Recommended format:

```
@Override
public String toString() {
    return getClass().getName()
        + " [daField1=" + daField2
        + ", daField2=" + daField2 + "]";
}
```

@Override Annotation: method overrides a base class's method. (optional)

getClass().getName() returns class name of current object.

..

String Demo

```
static void demoStringConcat() {
    String guess1 = "hello " + 42;
    String guess2 = "hello " + 4 + 2;
    String guess3 = 42 + "hello";
    String guess4 = 4 + 2 + "hello";
    String guess5 = new Integer(42).toString();
}


static void demoStringToNumber() {
    String myInput = "42";
    int theValue = Integer.parseInt(myInput);


    // Current date/time to string
    Date now = new Date();
    String msg = "Currently " + now;
    System.out.println(msg);


    // Demo bad conversion
    int oops = Integer.parseInt("Oops");
}
```

What does each String hold?

Also have:
Double.parseDouble(...)
Boolean.parseBoolean(...)
Long.parseLong(...)

Date.toString() gives:
`Thu Jan 16 13:49:46 PST 2054`

Date in java.util.Date

Throws NumberFormatException

Immutable

- Strings are Immutable
  Once created,..
  - To “change” a string,..
- Example

```
String msg = "H";
msg = msg + "i";
msg += '!';
int count = msg.length();
```

Creates 3 strings;
2 for garbage collection:..

- Java does not support overloaded operators in general, except for + and += on Strings.
  - String still immutable, even with +=

Comparing Strings

- Compare strings using..

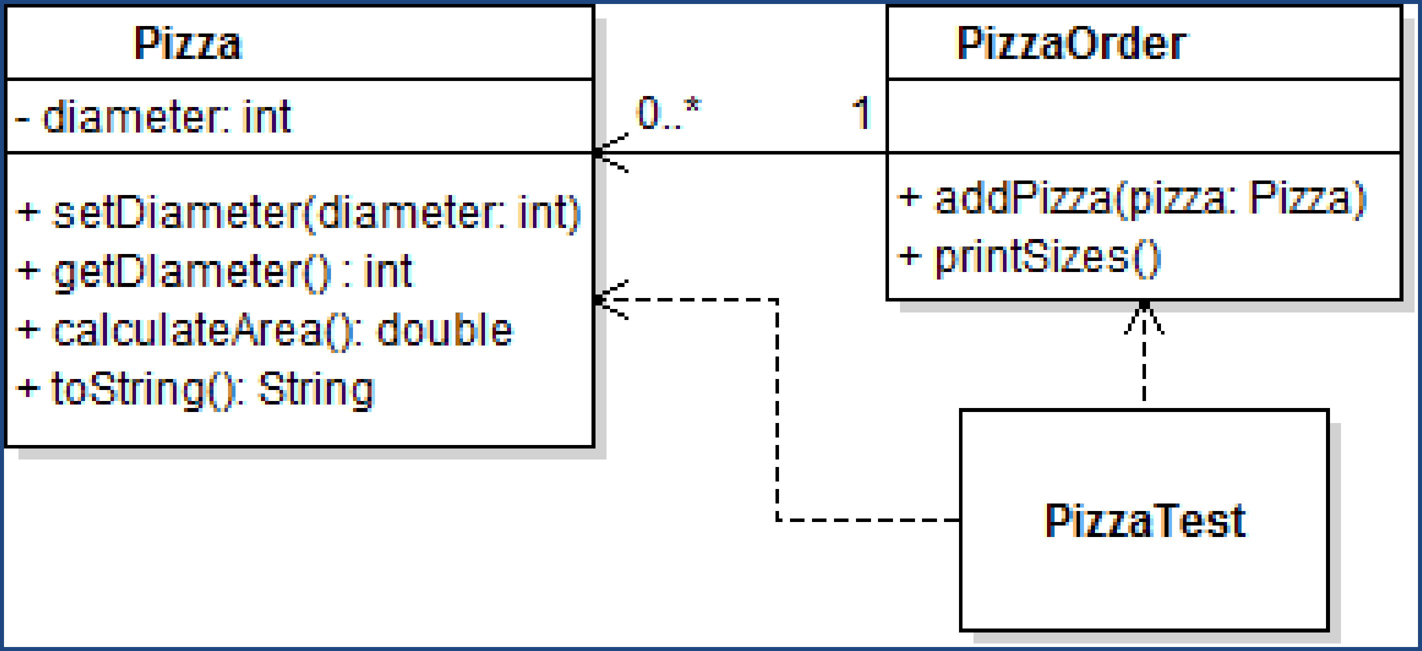
```
String password = getDaUsersPassword();
if (password.equals(“12345”)) {
    System.out.println(“The air-shield opens.”);
}
```

- Don't use ==
  - == compares the..

```
if (password == yourGuess) {
    String msg = “Wow! The program stores the ”
        + “password and your guess at the same ”
        + “memory location! Crazy!”;
    System.out.println(msg);
}
```

UML

- We will create the following classes in this section of the slides.



List and ArrayList

- Generic: works with..
- Java includes many generic Collections.
  - ArrayList implements the List interface and is backed by an array (fast), and dynamically resizes.

```
List<Hat> hats = new ArrayList<>();
hats.add(new Hat("Blue"));
for(Hat hat: hats) {
    ...
}
```

Don't need to put <Hat>, the type, because already specified on left-side.

- Collections...
  - To store primitives, use built in..
    Integer, Long, Double, etc.
- Why List and ArrayList?
  - Design Principle: ..

When is your code done?

Coding Standards

Clean Code

- Correct Code
  - Implements the requirements.
  - Has no (few) bugs.
- Clean Code
  -
  - Conforms to..
  -
  -
- Professionals write clean code.

Coding Standard

- Course (and most companies) has a coding standard
  (See web page)
  - Your code *must* conform to this style guide.
  - Each assignment may mention some specifics.
  - Different than textbook:
    - K&R style bracket placement
    - Always include { }, even on one-line if/else
    - List fields before methods
- Activity
  - Read Coding Standard.
  - Go through the Person class and clean it up.

Summary

- Use one clear name for an idea.
- References to objects, everything pass-by-value.
- Static makes class methods and class data.
  - Static Factory Method for nameable constructor.
- String: Immutable class for working with all strings.
- Show classes with UML class diagram.
- Coding standard enforced for clean code.