CMSC 131
Object-Oriented Programming I

Classes Introduction IV

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This material is based on material provided by Ben Bederson, Bonnie Dorr, Fawzi Emad, David Mount, Jan Plane

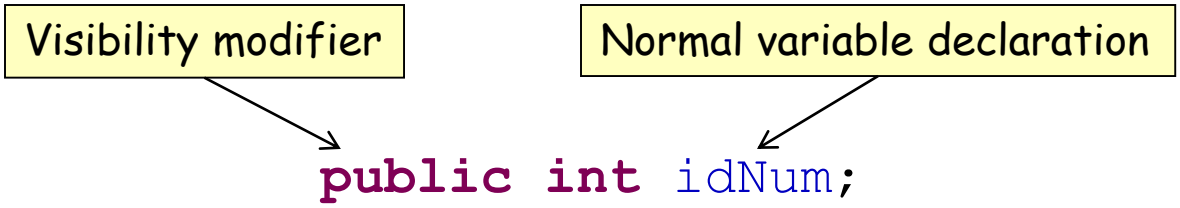
Announcements

- Providing information about quizzes/exams to students that have not taken a quiz/exam is an academic integrity violation. Notice we curve in this course, and you are hurting yourself if you provide information about quizzes. If you see anyone providing information, please contact your instructor immediately. Students that provide information about quizzes will need to meet with Pedram, Nelson, and representatives from the Dept of Computer Science.
- Quiz worksheets are meant to give you an idea of the topics the quiz will cover. The difficulty of a quiz is not based on the worksheet problems. You should practice beyond what the worksheet covers.

Overview

- Instance data
- Static vs. Non-static methods
- Constructors

Anatomy of an Instance Variable Declaration



- We will see later that we can have private as visibility modifier
  - If you don't specify any modifier then it is considered package
- What is the default value?
  - Boolean → false, Number → 0, Reference → null
- **null** → represents "no address"
- These variables (unlike local variables) are visible from all the methods of the class!
- Let's draw a diagram
- **Example:** Person.java

Object Creation

- Once a class is defined, objects based on that class can be created using new: ***new Person()***
- We are "creating an instance of class Person"
- To assign an object to a variable, the variable's type must be the class of the object

Person p = new Person();

- Each object has its own copies of all the instance variables in the class
- Instance variables and methods in an object can be accessed using "." or using setter (mutator) methods

p.age = 12;
p.setAge(12);

Two Types of Methods (Static/NonStatic)

- So far we have seen static methods
- **Static methods can be called** by using the name of the class followed by a period

ClassName.staticMethodName()

- In a class a static method can call another static method without having to specify the class name (what we have been doing in our previous examples)

Two Types of Methods (Static/Non-Static)

- **Non-Static methods** are methods that **need an object** in order for them to be called. They are designed to use the data associated with an object, therefore they **need an object in order to be called**
- Unlike static methods you cannot call a non-static method via the class name. You need to use an object reference

***objectRef*.*nonStaticMethodName*()**

- Static vs. Non-Static methods:
  - **Example:** StaticVsNonStatic.java
- Static methods can only call static methods
- Non-Static methods can call static and non-static methods
- **When to define a method as static?**
  - **When it makes no reference to object data (instance data)!**

Constructors

- Special methods in class definitions to specify how objects are initialized
- Constructor is a bad name
  - They should have been called initializers
  - **new** operator creates the object
- **They have as name the name of the class**
  - **They don't have return type**
- You don't call them; **they are called for you!**
- Possible constructor definition for a Student class

```
public Student(String nameIn, double gpaIn) {
    name = nameIn;
   gpa = gpaIn;
}
```

Constructors

- Can have more than one constructor provided argument lists are different

```
Student (int IdDesired) {
        id = IdDesired;
}
```

- Constructors with no parameters is called the default constructor

```
Student () {
        ...
}
```

- **Example:** Student.java

About Default Constructor

- Important→ If you don't define a constructor you get the default constructor
- If you define any constructor (no matter which one) you will not get the default constructor java provides; you will need to define it yourself.
- **Example:** DefaultConstExampleA.java
- **Example:** DefaultConstExampleB.java