Today’s topic:

- Designing classes
- Chapter 5: Class design guidelines
Modeling the Real World

- A goal of OO Design is to model the *real world*.
  
  - *This allows the systems that we build to be similar to how people actually think about the system.*
    - A top-down procedural approach, requires a designer to think of the data and procedures *separately*.
    - The OO Design similar to how we design *other* systems. (Buildings, cars, and other types of engineering).

Objects working together

- A class will interact with other classes.
  - Sometimes it will *provide* a service for another object.
  - Sometimes it will *request* a service from another object.

- Objects should be designed with *reuse* in mind.
  - A goal is to make a class as *flexible* as possible,
  - You don’t want to provide *unnecessary* functionality, but the design should *allow* for future enhancements.
How to decide what classes to create?

- **A common mistake of a novice OO developer is to create too few classes.**

- The ones they do create tend to be large and contain many different procedures and instance variables.

- The class methods themselves tend to be long and complex.

A good OO Design will contain:

- Many little specialized classes, each containing a cohesive set of data and methods.

- Class methods will be short (broken down into sub methods).
How to identify classes

- A class represents a *single* concept or object.

- The components of a class should be *cohesive* and all the data and methods fit together with each other.

- This is another way of saying, not to make a large class that does it all.

Simple Class Methods

- Methods should be *simple* enough to write with a *small* amount of code.

- Some OO developers will even give a limit, say 15 or 20 lines.

- If you are writing a method and it seems too long or complex to follow, *break* it apart into *multiple* methods.
Minimize Side Affects

- A side effect of a method is an externally observable change in the data state.

- All mutator (setter) methods will change an instance variable as a side effect.

- Sometimes other will as well, recall the grow() method in our rectangle class.

Let the User Interface Classes do I/O

- This example mutates the System.out object.

  ```java
  public void printBalance() // Not recommended
  {
    System.out.println("The balance is now "+ balance);
  }
  ```

- This is also a side effect to be avoided.

- The I/O and user interface should be done by presentation objects (recall the n-tier design).