# EE363 Fall 2012

Monday, September 3, 2012
Liskov Review - Shapes and Interfaces
Introduction to JUnit

# Liskov Substitution Principle

- "Subtypes must be substitutable for their base types"

  What is wanted here is something like the following substitution property: If for each object $o_1$ of type *S* there is an object $o_2$ of type *T* such that for all programs *P* defined in terms of *T*, the behavior of *P* is unchanged when $o_1$ is substituted for $o_2$ then *S* is a subtype of *T*. (Barbara Liskov, 1988)

- Behavioral sub-typing to guarantee semantic, not just syntactic, correctness

# Liskov Violation

- Let's code up these classes, and then prove there's a Liskov violation...

- To show a Liskov violation, I have to create a program written for Rectangle, that breaks when I substitute in a Square (or visa-versa).

# Coding Demo

- (Record it...)
- Step 1: Rectangle and Square classes
- Step 2: Let's test it!
  - JUnit unit testing

# Why JUnit?

- Writing a "main" method to test our code is very restrictive.
  - It generally represents ONE path through the code per user-input.
  - We can change it, but then we change the test.
- Using JUnit, we can build suites of repeatable tests.
  - As our code changes, grows, so does our test suite.
  - If we ever break anything, we'll know right away!

# Java Interfaces

- To "solve" the LSP violation in shapes, we must:
  - Abstract out a common interface
  - Make the types siblings, rather than parent-child.
  - Write our code to the interface instead.

# Java Interface

- An “interface” is the ultimate abstract base class.
  - In C++ terms, it is a abstract class with only public, pure virtual methods defined
  - Other types can “implement” an interface

# Interfaces and LSP

- Note: You can never violate LSP by implementing an interface!
- Interfaces by definition have no behavior
- Therefore, you're not change a base class' behavior by implementing it.

# Back to the Code...

- Let's do this for Shapes, and fix/extend our tests...

# Demo will be posted...

- Video of today's demo will be posted to the Podcast shortly (takes about an hour to edit and render)

https://itunes.apple.com/us/podcast/ee363-fall-2012/id555856941

# Homework 2

- Homework 2 is posted to the website: http://www.timfanelli.com/category/ee363
- Due before class on Friday, Sept 7