

Software 1

Recitation No. 12: JUnit

June 3, 2006

Software Testing

- **Motivation:**
 - Automatic formal proofs can be impossible
 - Manual proofs are costly
- **Definition:**
 - Running the software on a set of input data
- **Goals:**
 - Finding faults
 - Providing confidence of (probable) correctness and of satisfying all requirements

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Software Testing (cont.)

- **Granularity Levels:**
 - Unit Testing (developers)
 - Integration Testing (QA)
 - System testing
 - User Acceptance Testing
 - Regression Testing
- "Testing is not a phase, but a lifestyle"

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Unit Tests

Two Types:

- **Black-box tests:**
 - assert the contract
 - independence of the implementation
- **Coverage tests (Glass-box tests)**
 - assert each piece of code

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JUnit

- A testing framework for Java programs
- Useful mainly for unit testing
- Integrated with Eclipse
- home-page: <http://www.junit.org>



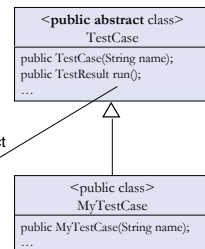
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JUnit Framework

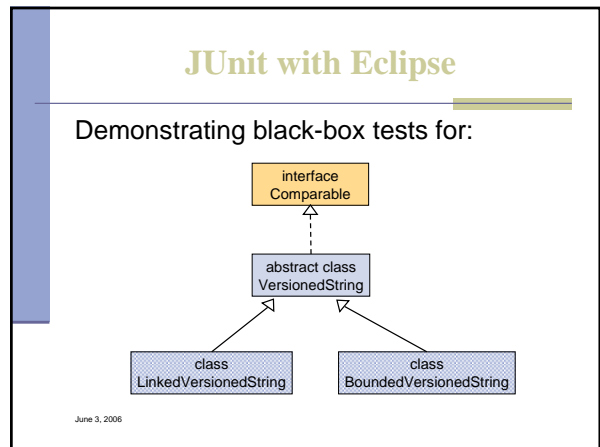
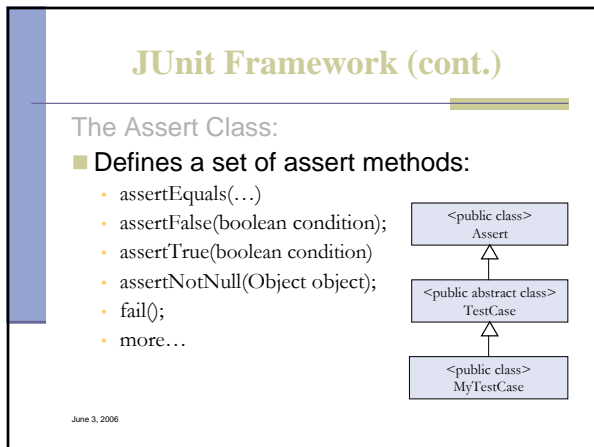
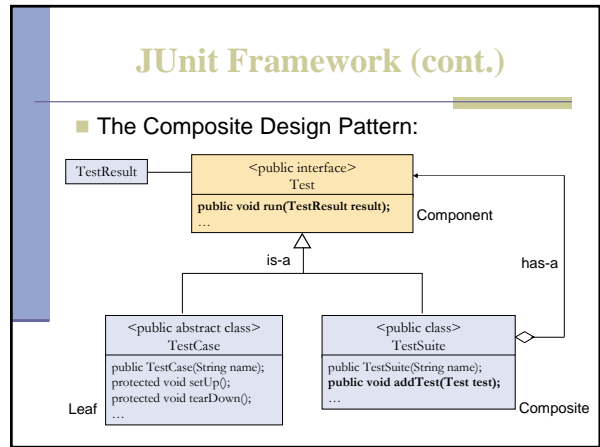
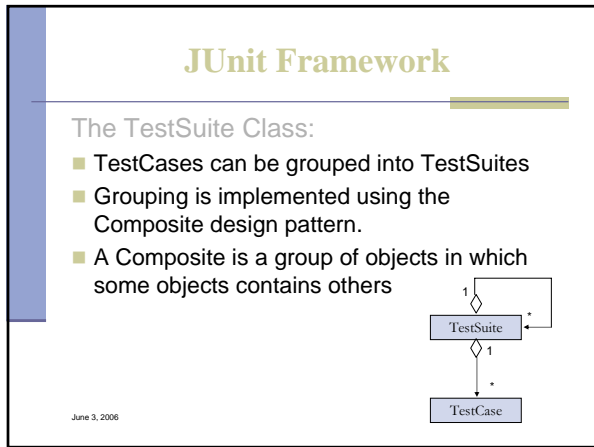
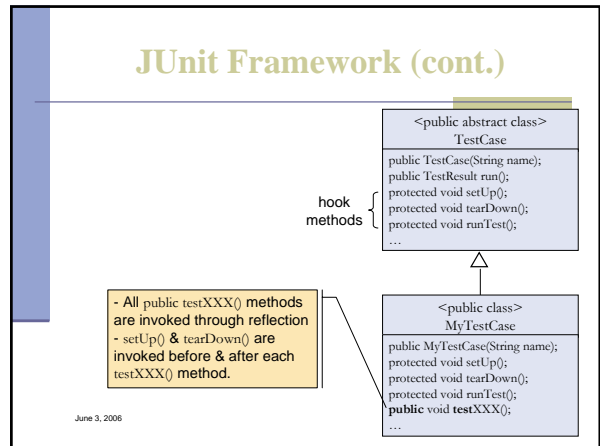
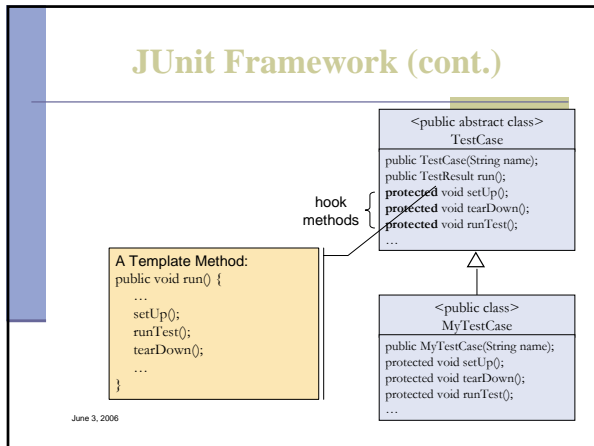
The TestCase Class:

- The fixture to run tests
- A command object.
 - design pattern
 - encapsulates a command as an object

A Template Method
(design pattern)



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JUnit with Eclipse (cont.)

Writing a test case for `LinkedVersionedString`:

- Define a class named `LinkedVersionedStringTest`:
 - Extend `junit.framework.TestCase`
 - Override the `setUp()` and `tearDown()` methods
 - Write `testXXX()` methods with no arguments
 - No need to write a `main()` method

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JUnit with Eclipse (cont.)

■ Black-box tests for `LinkedVersionedString`:

- **Initial State:** `length() == 0`

- `add(String s)`:

Requires: `s != null`

Ensures: `length() = old length() + 1`

`getVersion(length()) = s`

- `int length()`:

Requires: *nothing*

Ensures: `return_value = Number of calls to add() so far`

- `String getVersion(int i)`:

Requires: `0 < i ≤ length()`

Ensures: `return_value != null`

inputs:
`0 < i < length()`
`0 < i = length()`

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