Mocks and Stubs

d'après Martin Fowler –
http://www.martinfowler.com/articles/mocksArentStubs.html

Légèrement incrémenté par
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Example – Electronic Store

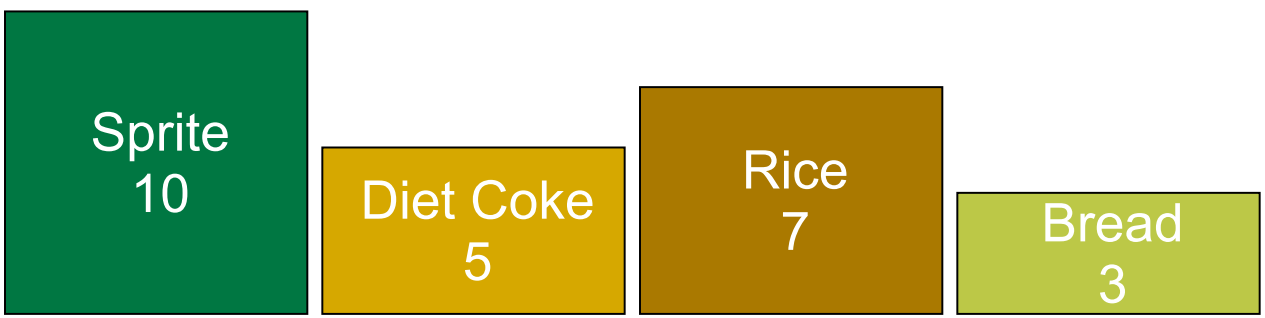
- *Orders* and a *Warehouse*

Order1: Diet Coke - 5

Order2: Diet Coke - 2

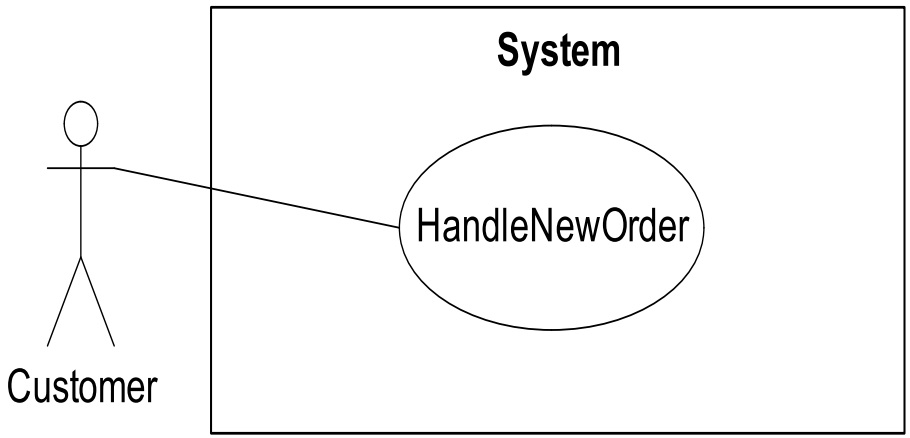
Order3: Sprite - 3

Order4: Bread - 1



Example – Electronic Store

- Use Case Model



- System Sequence

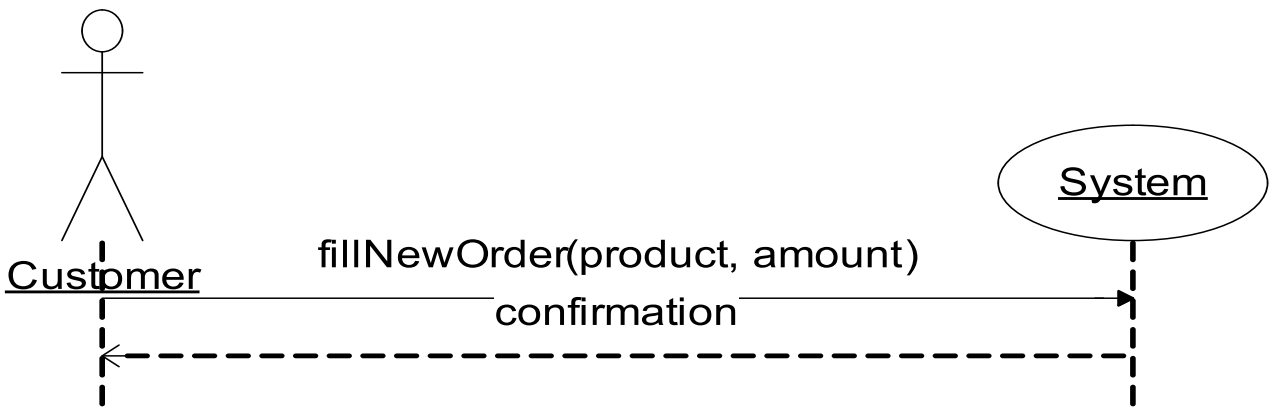


Diagramme de séquence (Conception)

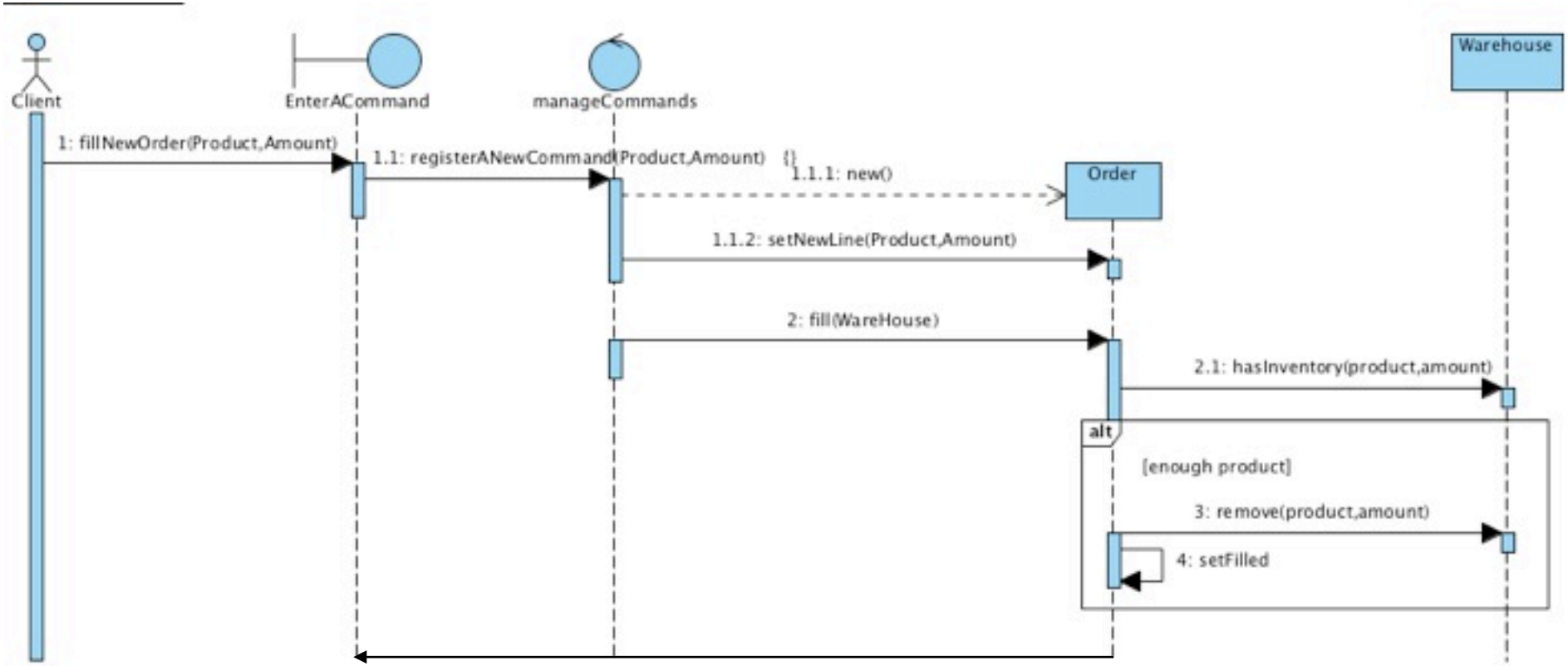
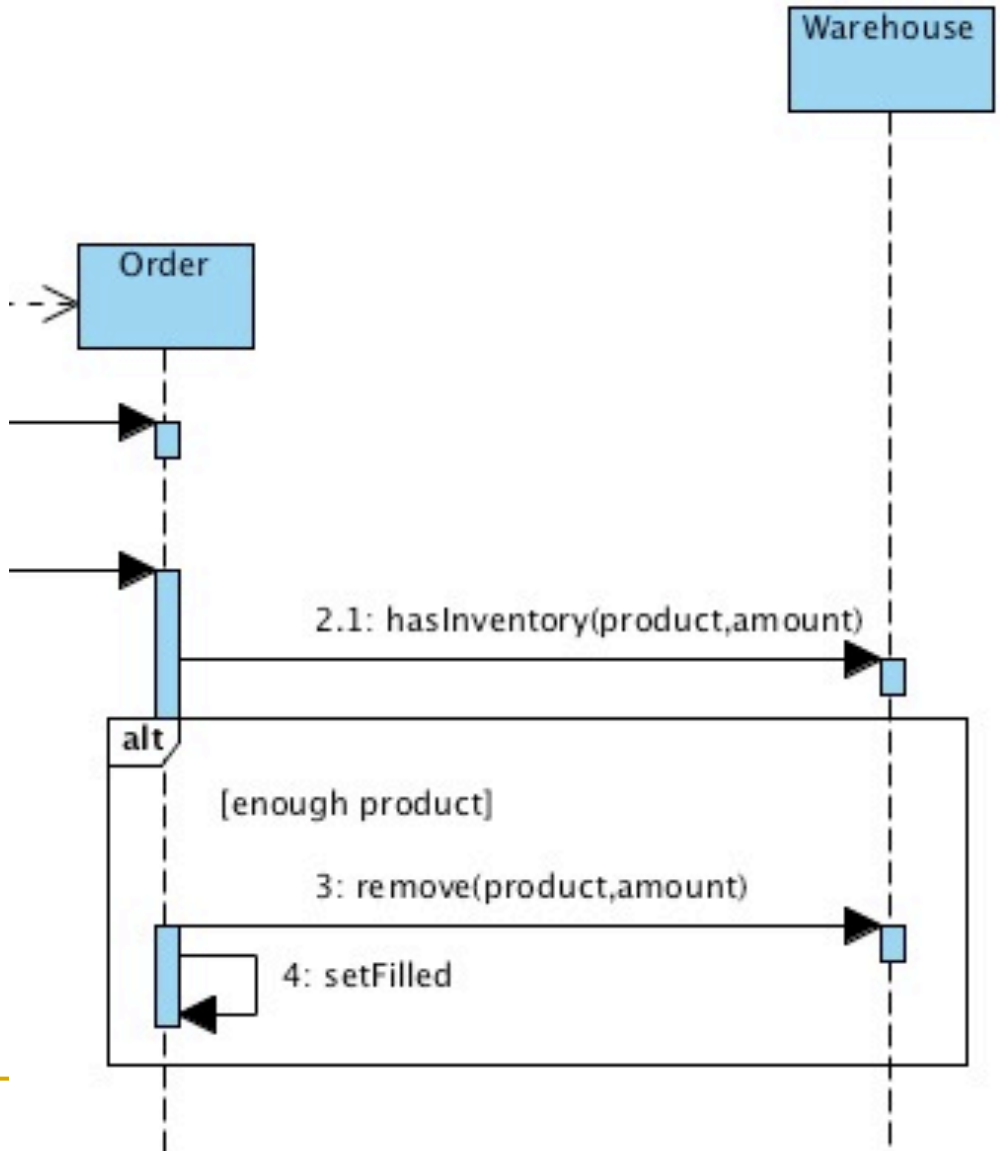
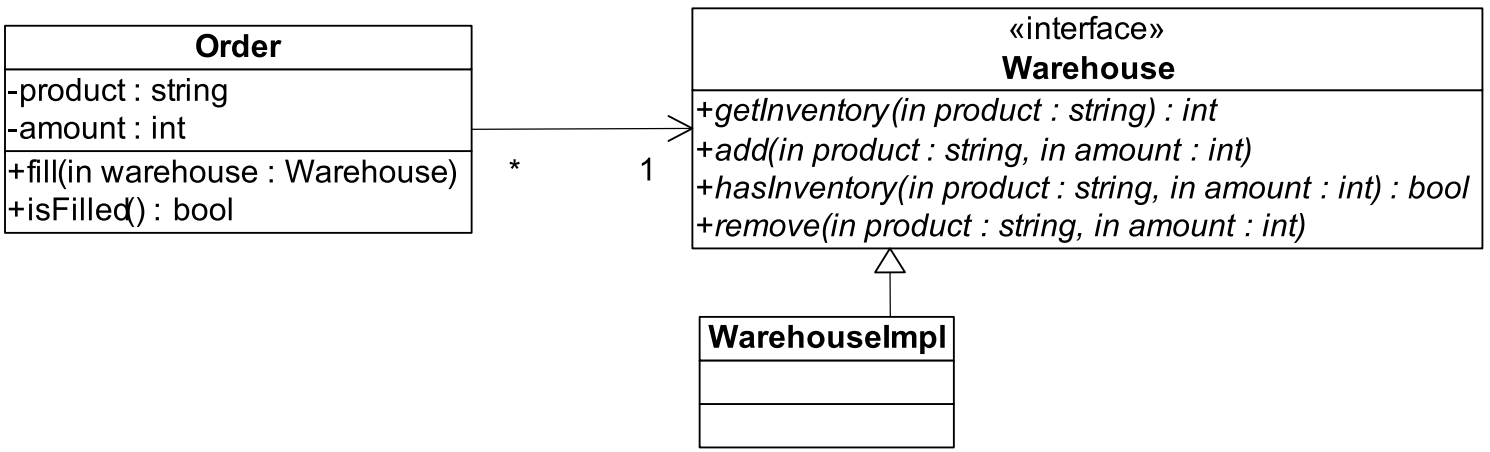


Diagramme de séquence (Conception)

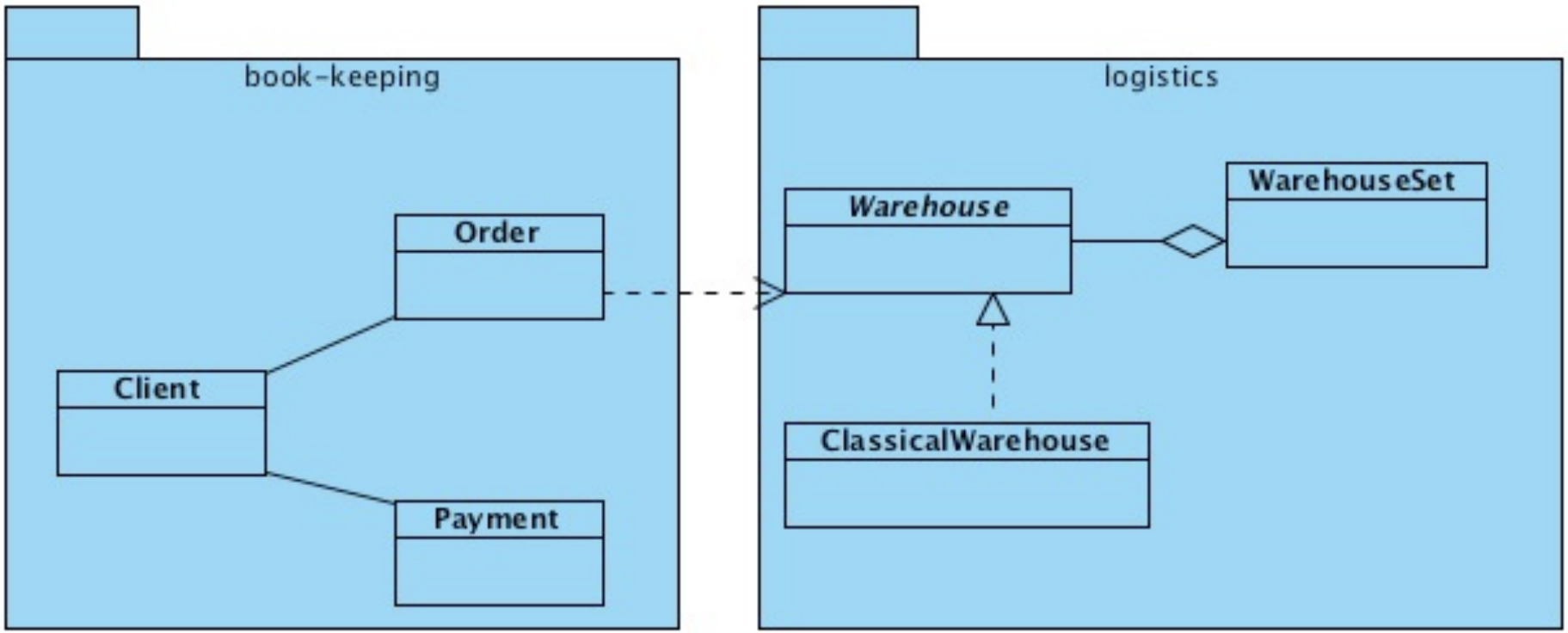


Example – Electronic Store

- Domain Model



Packages & Séparation des responsabilités



Example – Electronic Store

- Testing the **Order** class

.....

```
public class Order {
        …
        public Order(String product, int i) {
                this.product = product;
                this.amount = i;
                this.isFilled = false;
        }

        public void fill(Warehouse warehouse) {
                if (warehouse.hasInventory(product,amount)) {
                        warehouse.remove(product,amount);
                        isFilled = true;
                }
        }

        public boolean isFilled() {
                return isFilled;
        }
}
```

Example – Electronic Store

- Testing the **Order** class

```
public class OrderStateTester extends TestCase {
        …
        public void testOrderIsFilledIfEnoughInWarehouse(){
                Order order = new Order(DIET_COKE,5);
                order.fill(warehouse);
                // Primary object test
                assertTrue(order.isFilled());
                // Secondary object test(s)
                assertEquals(0,warehouse.getInventory(DIET_COKE));
        }

        public void testOrderDoesNotRemoveIfNotEnough(){
                Order order = new Order(SPRITE,11);
                order.fill(warehouse);
                // Primary object test
                assertFalse(order.isFilled());
                // Secondary object test(s)
                assertEquals(10, warehouse.getInventory(SPRITE));
        }
```

Example – Electronic Store

- Testing the **Order** class:

```
public class OrderStateTester extends TestCase {
        private static String DIET_COKE = "Diet Coke";
        private static String SPRITE = "Sprite";
        Warehouse warehouse;

        protected void setUp() throws Exception {
                //Fixture with secondary object(s)
                warehouse = new WarehouseImpl();
                warehouse.add(DIET_COKE,5);
                warehouse.add(SPRITE,10);
        }
        …
```

Example – Electronic Store

Stub

- Using a *stub* to run the tests -
  - Stubs return canned data to methods calls:

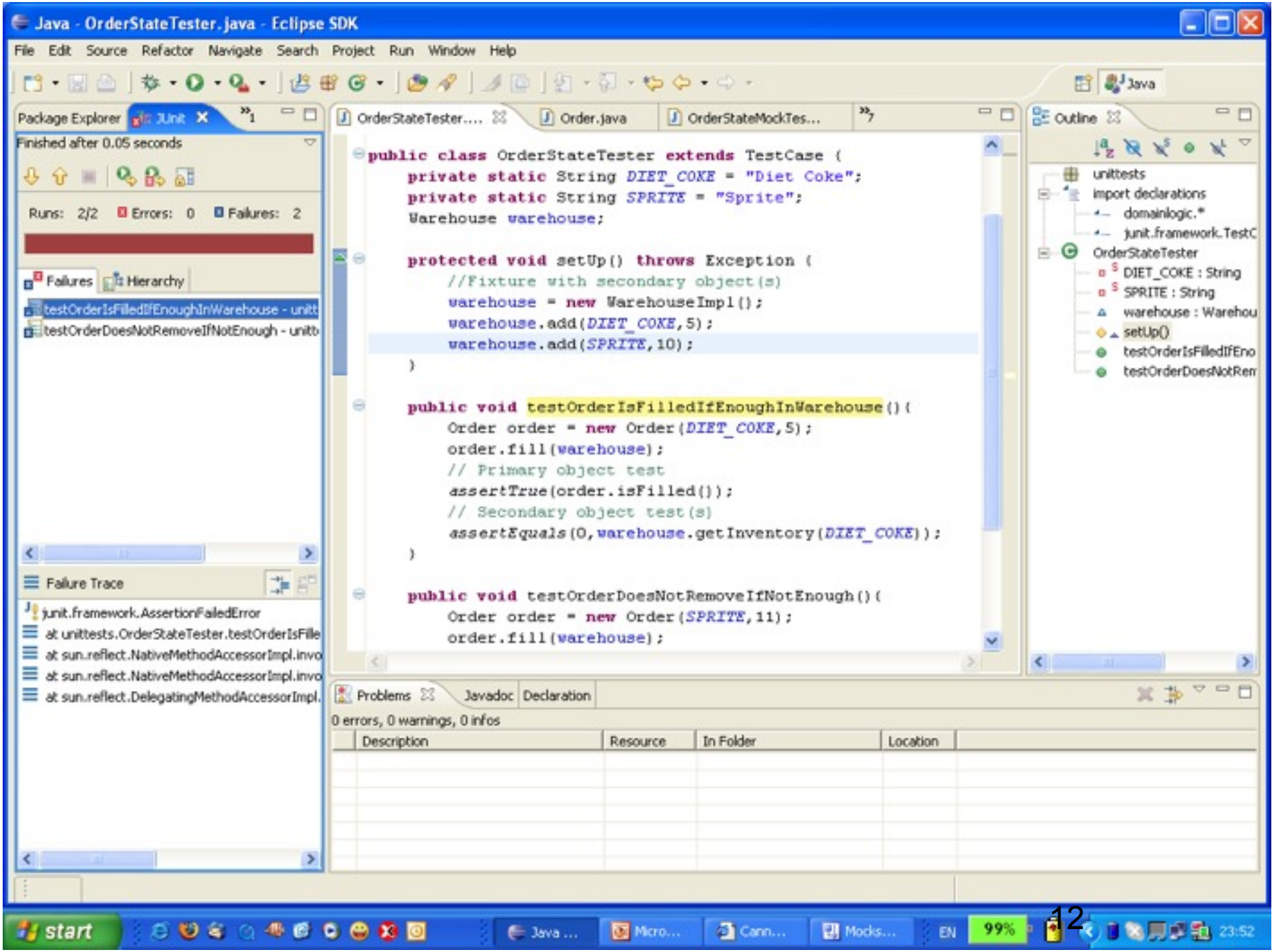
```
public class WarehouseImpl implements Warehouse {

        public void add(String product, int i) {}

        public int getInventory(String product) {
                return 0;
        }

        public boolean hasInventory(String product) {
                return false;
        }

        public void remove(String product, int i) {}
}
```

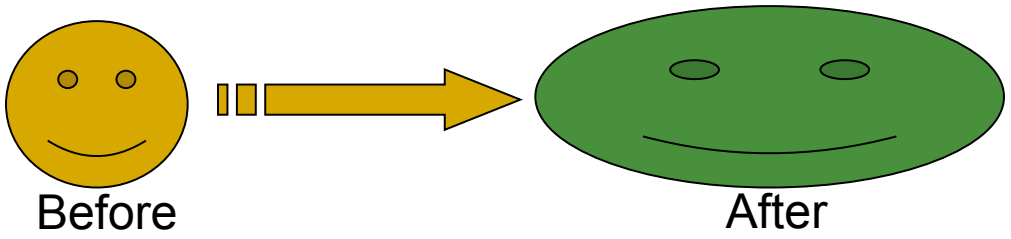

Java - OrderStateTester.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer JUnit
Finished after 0.05 seconds
Runs: 2/2 Errors: 0 Failures: 2
Failures Hierarchy
testOrderIsFilledIfEnoughInWarehouse - unitt
testOrderDoesNotRemoveIfNotEnough - unitt
Failure Trace
junit.framework.AssertionFailedError
at unittests.OrderStateTester.testOrderIsFille
at sun.reflect.NativeMethodAccessorImpl.invo
at sun.reflect.NativeMethodAccessorImpl.invo
at sun.reflect.DelegatingMethodAccessorImpl.
OrderStateTester.... Order.java OrderStateMockTes...
public class OrderStateTester extends TestCase {
private static String DIET_COKE = "Diet Coke";
private static String SPRITE = "Sprite";
Warehouse warehouse;
protected void setUp() throws Exception {
//Fixture with secondary object(s)
warehouse = new WarehouseImpl();
warehouse.add(DIET_COKE,5);
warehouse.add(SPRITE,10);
}
public void testOrderIsFilledIfEnoughInWarehouse(){
Order order = new Order(DIET_COKE,5);
order.fill(warehouse);
// Primary object test
assertTrue(order.isFilled());
// Secondary object test(s)
assertEquals(0,warehouse.getInventory(DIET_COKE));
}
public void testOrderDoesNotRemoveIfNotEnough(){
Order order = new Order(SPRITE,11);
order.fill(warehouse);
Outline
unittests
import declarations
domainlogic.*
junit.framework.TestC
OrderStateTester
DIET_COKE : String
SPRITE : String
warehouse : Warehou
setUp()
testOrderIsFilledIfEno
testOrderDoesNotRem
Problems Javadoc Declaration
0 errors, 0 warnings, 0 infos
Description Resource In Folder Location
start
Java ... Micro... Cann... Mocks...
EN 99%
23:52

Example – Electronic Store

- The tests fail since the stub object – **warehouse** (secondary) misses the required functionality
- Remember: the intension is to test the behavior of the primary object - **Order**, all other objects are tested in their own corresponding tests.

- The test is only *State-Based*
  - E.g., was the *remove()* method invoked? Other methods of the warehouse object?

Example – Electronic Store



- State Based tests:
  - All objects involved must be created – **complex fixture**
  - After the primary object was “kicked” with the behavior that is being tested, the **result** is evaluated against:
    - The primary object
    - All secondary objects
  - If the test fails, its source might be fuzzy between the primary and the secondary objects
  - No interaction is being tested!
- A possible solution – *Mock* objects

Example – Electronic Store

- Tests basés sur les interactions
  - Les tests doivent vérifier quelles méthodes ont été appelées sur les objets secondaires.
  - Tous les objets secondaires sont remplacés par des «mocks»
  - => spécification des interfaces des objets secondaires
  - Test en Isolation: Les Bugs détectés dans les tests sont uniquement liés aux objets primaires
  - Fortement couplés avec la mise en œuvre => peuvent interférer avec la refactorisation

Using EasyMock

- Define only the interface of the Mock object:

```
public interface Warehouse {

        void add(String product, int i);
        int getInventory(String product);
        boolean hasInventory(String product,int amount);
        void remove(String product, int i);
}
```

Using EasyMock

- Create the Mock object:

```
protected void setUp() throws Exception {
        //Fixture with secondary object(s)
        mock = createMock(Warehouse.class);
}
```

You need to :

- Add the EasyMock jar file (easymock.jar) from this directory to your classpath
- *import static org.easymock.EasyMock.*;*

Using EasyMock

```
public void fill(Warehouse warehouse) {
    if (warehouse.hasInventory(product,amount)) {
        warehouse.remove(product,amount)
        isFilled = true;
```

- Running tests with expectations:

```
public void testOrderIsFilledIfEnoughInWarehouse(){
    //Expectations
    expect(mock.hasInventory(DIET_COKE,5)).andReturn(true);
    mock.remove(DIET_COKE,5);
    replay(mock);

    Order order = new Order(DIET_COKE,5);
    order.fill(mock);
    // Primary object test
    assertTrue(order.isFilled());

    // Secondary object test(s)
    verify(mock);
}
```

Using EasyMock

- Verifying Behavior
  - If the method is not called on the Mock Object

```
public void testDemo(){
        mock.remove("cola",2);
        replay(mock);

        verify(mock);
}
```

```
java.lang.AssertionError:
  Expectation failure on verify:
    remove("cola", 2): expected: 1, actual: 0
```

Using EasyMock

- Verifying Behavior
  - If the method is not called on the Mock Object

```
public void testDemo(){
        mock.remove("cola",2);
        replay(mock);
        Order order = new Order(SPRITE,11);
        order.fill(mock);
        verify(mock);
}
```

```
java.lang.AssertionError:
  Unexpected method call hasInventory("Sprite", 11):
    remove("cola", 2): expected: 1, actual: 0
```