

Mock : Vers les tests d'intégration

Mocks and Stubs

d'après Martin Fowler –

<http://www.martinfowler.com/articles/mocksArentStubs.html>

Légèrement incrémenté par
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Example – Electronic Store

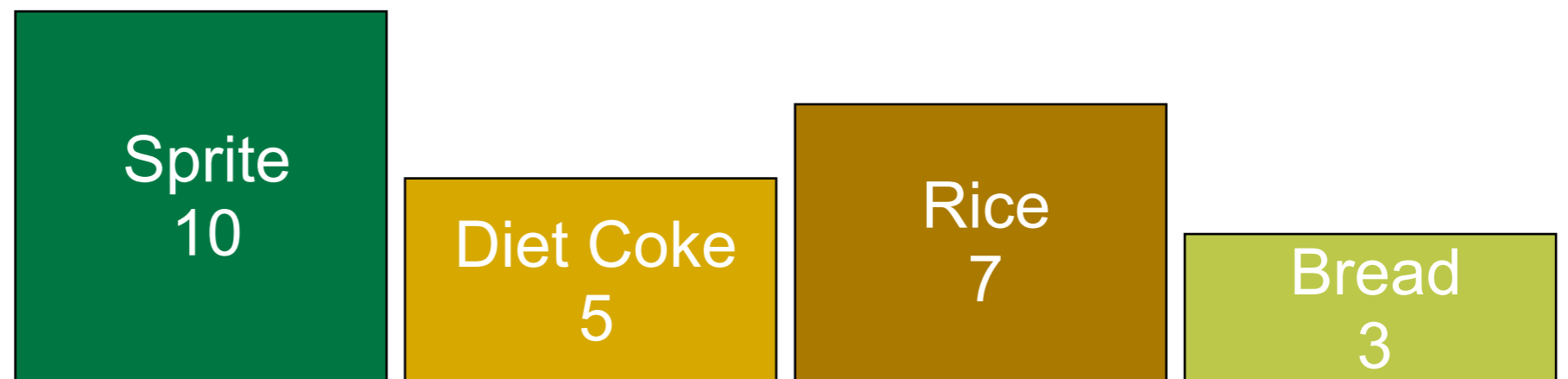
■ Orders and a Warehouse

Order1: Diet Coke - 5

Order2: Diet Coke - 2

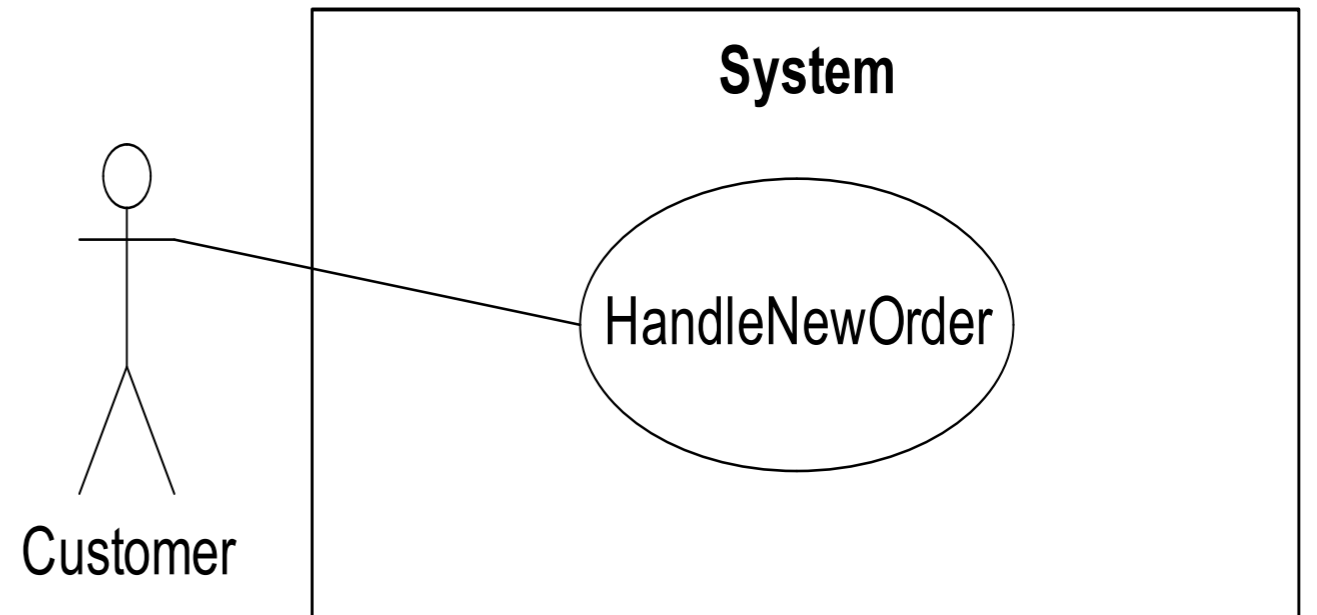
Order3: Sprite - 3

Order4: Bread - 1



Example – Electronic Store

- Use Case Model



- System Sequence

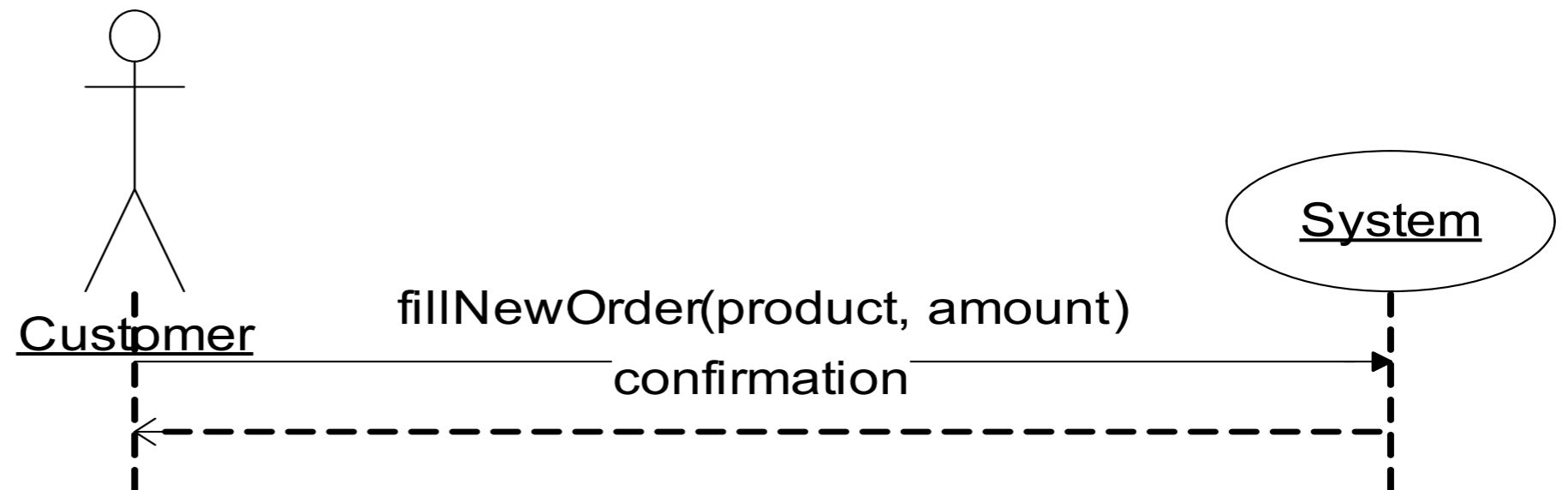


Diagramme de séquence (Conception)

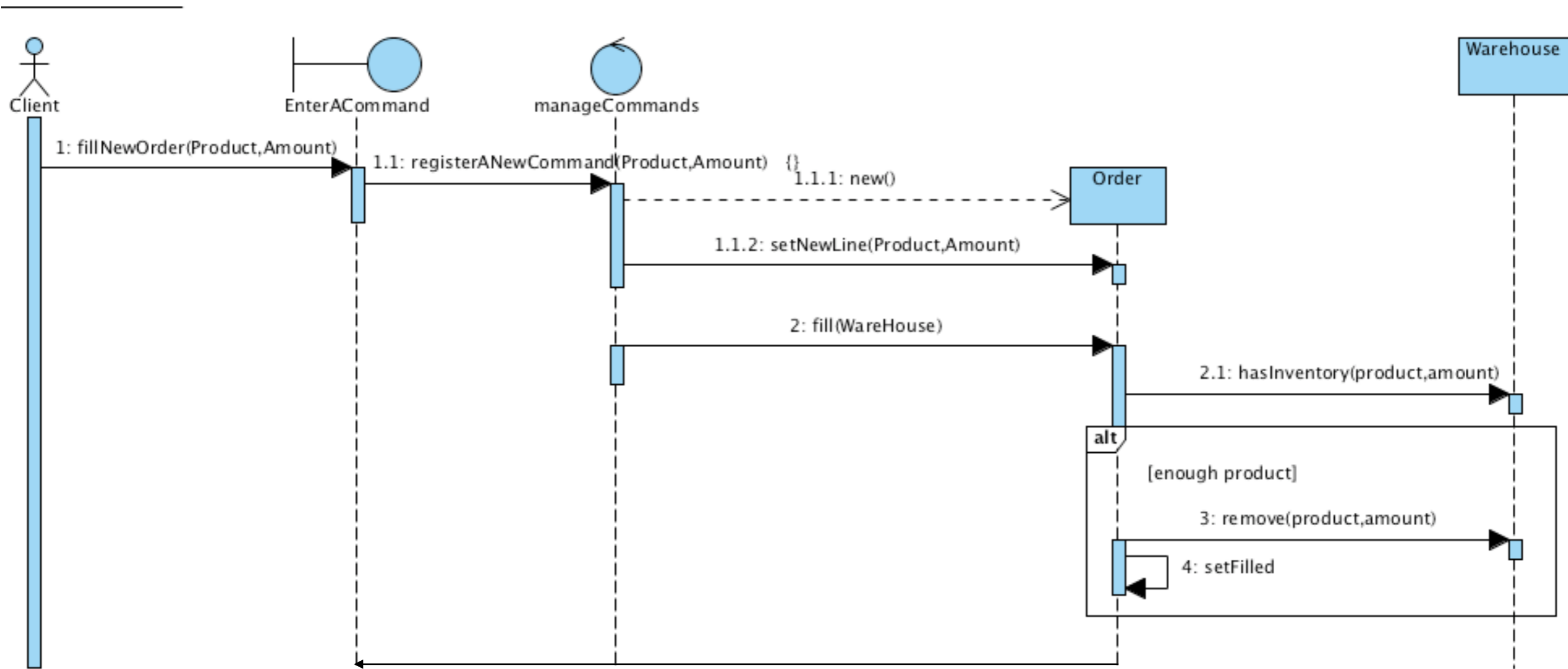
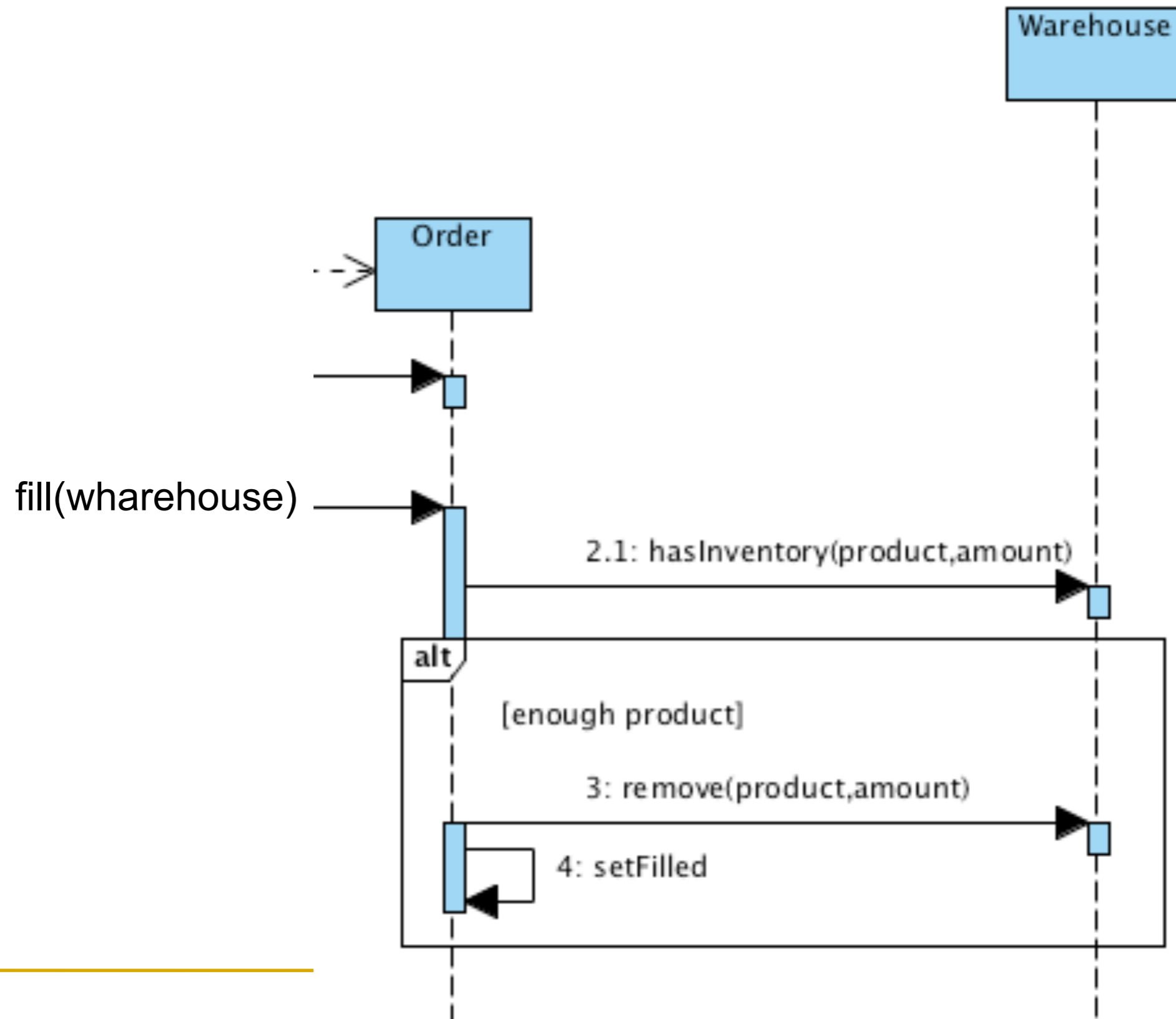
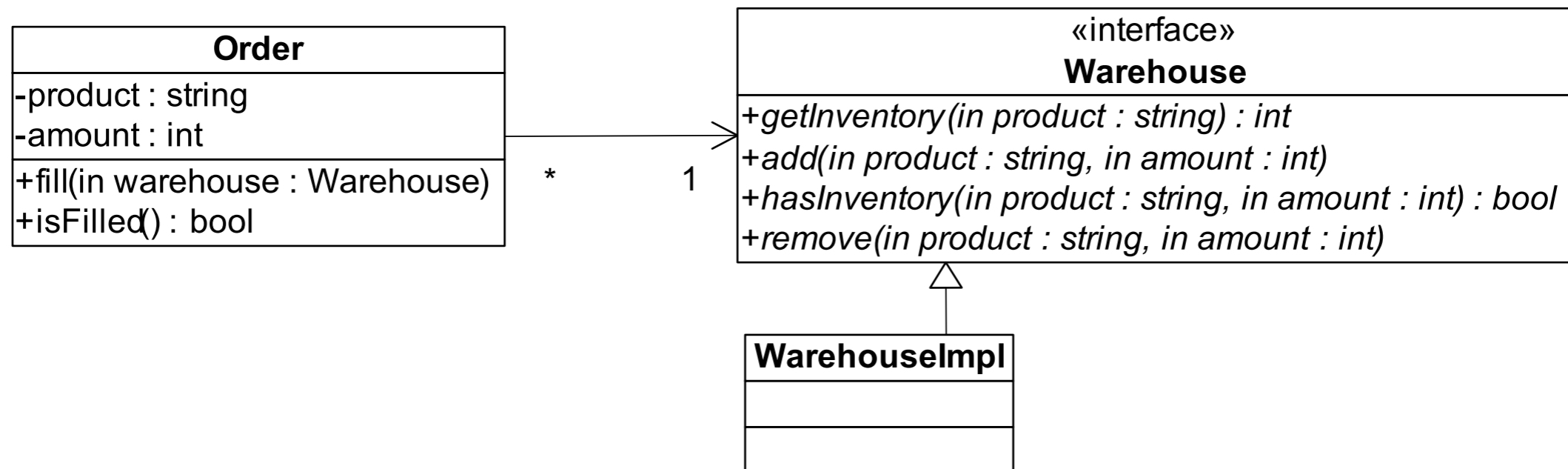


Diagramme de séquence (Conception)

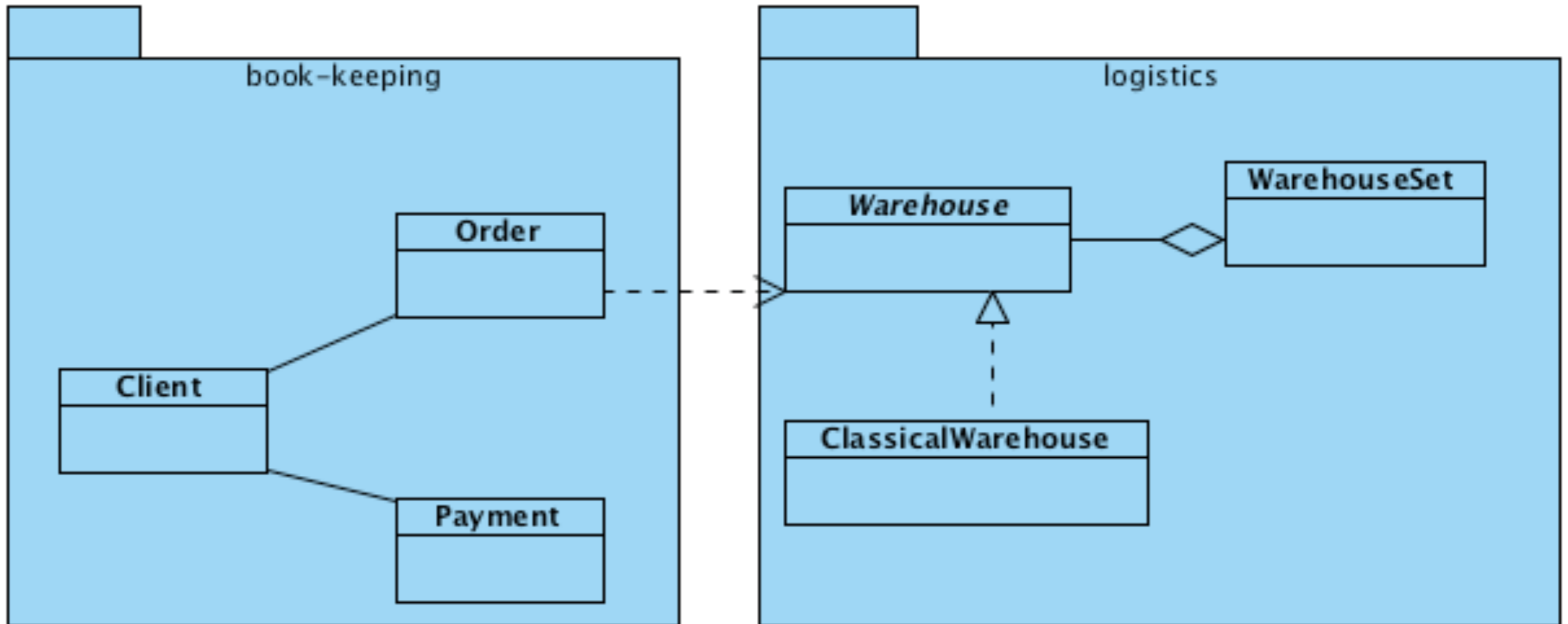


Example – Electronic Store

■ 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 testOrderDoesNotRemovelfNotEnough(){  
        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);  
    }  
    ...  
}
```

Sprite
10

Diet Coke
5

Rice
7

Bread
3

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) { }  
}
```



Package Explorer JUnit x »1

Finished after 0.05 seconds

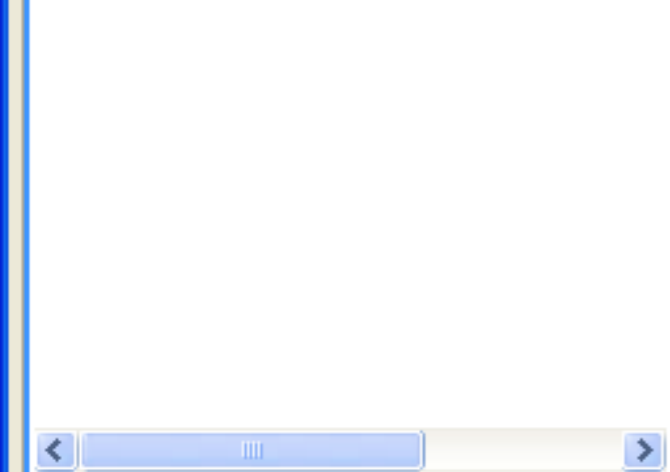


Runs: 2/2 Errors: 0 Failures: 2



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;

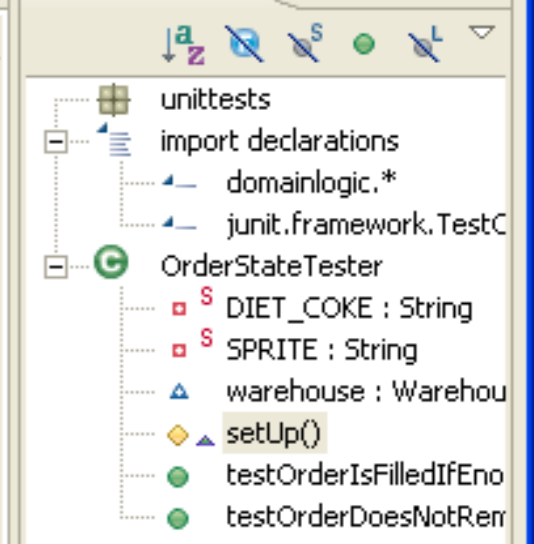
    protected void setUp() throws Exception {
        //Fixture with secondary object(s)
        warehouse = new WarehouseImpl();
        warehouse.add(DIET_COKE, 5);
        warehouse.add(SPRITE, 10);
    }

    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



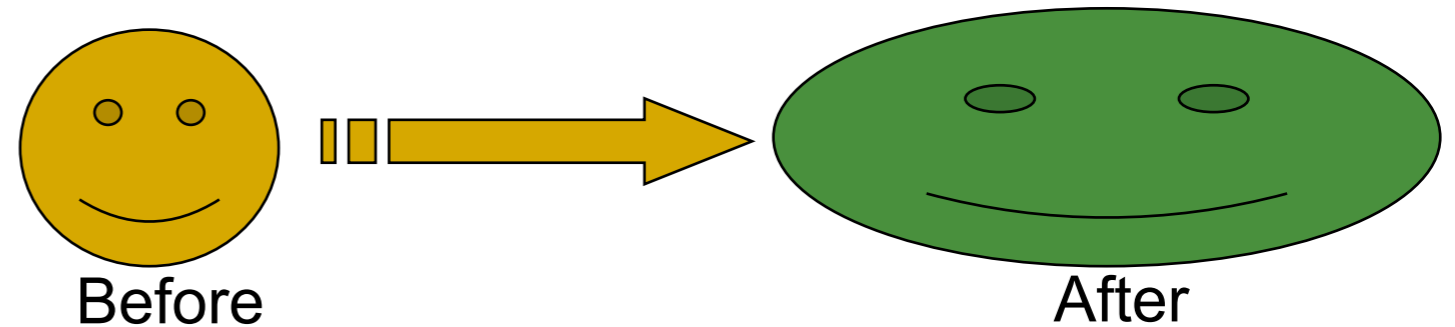
Problems Javadoc Declaration 0 errors, 0 warnings, 0 infos

Description	Resource	In Folder	Location

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
```



"I have not failed, I've just found ten thousand ways that won't work." –
Thomas Edison