

# **Taking TDD to the Next Level**

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# Recap

**TDD isn't about testing – it's about programming!**

**The red-green-refactor mantra:**

- **write test, write code, refactor (repeat)**

**State verification**

- **setup objects, invoke functionality, assert state**

**Behaviour verification**

- **replace neighbours with mocks, verify interactions**

*switch to IDE and show a simple state-based  
test (order total) and a test with mocks (cart  
and inventory)*

# Tight coupling is bad (doh!)

Creating or referencing concrete implementations is problematic:

- Hard to re-use service
- Hard to extend

Really bad for testability

- Mocks only work if we can substitute collaborators
- Without mocks, where does the test data come from?

***Interface/impl separation improves testability!***

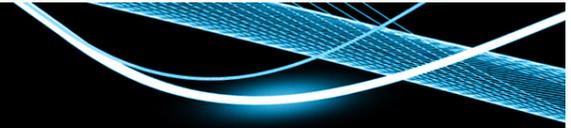
## Why Dependency Injection?

**If we want to substitute the collaborators,  
they must be provided from *outside***

**With Dependency Injection dependent components are  
injected from the outside**

**Components are not concerned with creating dependent  
components**

**Dependency Injection is a a natural fit**



***switch to IDE and show how service locators  
make previous example awkward***

# The return of the stub?

**Dynamic proxy mocks evolved from stub objects**

**Sometimes an interaction is complex and  
it is hard to use dynamic mocks**

**Option 1: Introduce a stub object to record and  
assert state later**

**Option 2: Use composition and avoid issue**

***Better testability = Better design***

*switch to IDE, starting from the problem (order message), show implementation with mock, show implementation with stub, then refactor (extract message factory)*

# Test Doubles

## Mock

- Verify pre-programmed expectations

## Stub

- Provide canned answers and/or recording

## Dummy

- Passed around, never really used

## Fake

- Have working implementation

# How do I test internal methods?

## Make them available!

- Make them public on implementation but do not add to interface

## Subclass with inner class in test!

- Doesn't always work (private, not substitutable, etc)

## Decompose!

- But don't end up writing global functions

*Better testability = Better design*

*switch to IDE, show test of method  
(sendOrderMessage) as public method and  
with subclass in test; then compare to  
decomposed version (message factory)*

## How do I test *this*?!

Sometimes a small bit of code is in the way,  
no matter where we move it.

Remember: We're testing to make our life easier,  
not to achieve 100% coverage!

Isolate that code as much as possible  
and don't write a unit test for it.

We have automated acceptance tests, right?

***Be pragmatic!***

*switch to IDE, show how the code that reads the excel sheet makes testing hard, in service as well as in controller; then introduce the solution: a tiny untested method*

# Object Mother

**Combining DDD and TDD we can write a lot of code without thinking about infrastructure**

**Use an *Object Mother* to create domain objects for the tests**

**This is also *the* place to use reflection to set values on immutable objects**

*switch to IDE, show how most of the test method is object setup, which has re-use potential, move this into an object mother*

# Reference

## **Mocks and Stubs essay**

*[martinfowler.com/articles/mocksArentStubs.html](http://martinfowler.com/articles/mocksArentStubs.html)*

## **Test Double patterns**

*[xunitpatterns.com/Test%20Double%20Patterns.html](http://xunitpatterns.com/Test%20Double%20Patterns.html)*

## **Object Mother pattern**

*[www.xpuniverse.com/2001/pdfs/Testing03.pdf](http://www.xpuniverse.com/2001/pdfs/Testing03.pdf)*

## **Hamcrest**

*[code.google.com/p/hamcrest](http://code.google.com/p/hamcrest)*

## **Mockito**

*[mockito.org](http://mockito.org)*