Testing

Stefan KLIKOVITS

Today

- Testing with JUnit

- Test Driven Development (TDD)

- Mocking

What you should know (after)

- Why do we test?

- What levels of testing exist?

- What is a double/mock/stub/fake/spy/… ?

- Coverage (what is it and what does it say?)

Why do we test?

- Testing != Validation

- Increase confidence in our code

- Save time (= money)

- Can we test everything?

Levels of testing?

- Unit

- Integration

- System

- Acceptance

JUnit 4

- @Test

- @Before, @After

- @BeforeClass, @AfterClass

- @Test(timeout = 500)

- @Test(expected = MyException.class)

Maven Quickstart

```
~ $ mvn archetype:generate
-Dfilter=maven-archetype-quickstart
```

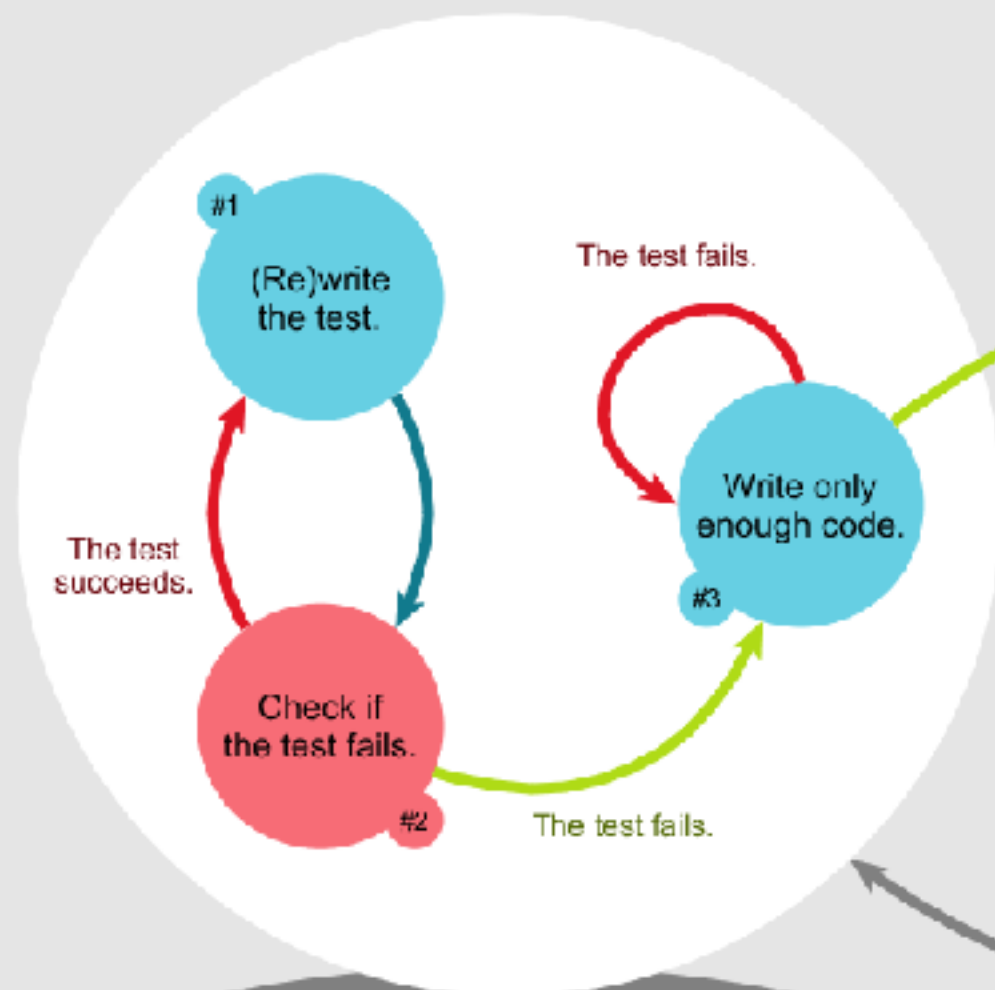- OR: Eclipse…

- PS: switch to JUnit 4.12

Exercise

- Person & PersonValidator
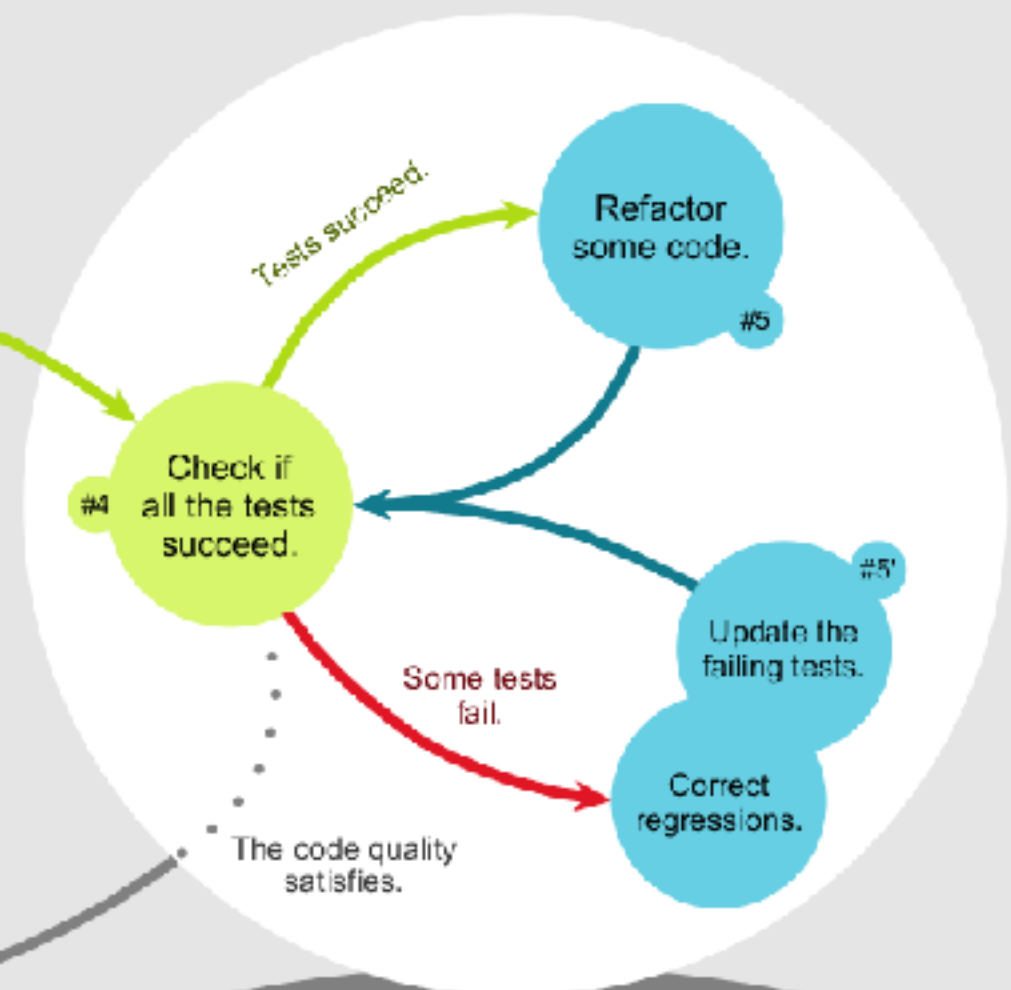
- Validate Name

- Validate Username

TDD

- specify the requirements (tests), then implement

- YAGNI

- when not to TDD?

TEST-FIRST DEVELOPMENT

REFACTORING

#1 (Re)write the test.

The test fails.

The test succeeds.

Tests succeed.

Refactor some code.
#5

The test succeeds.

The test fails.

Write only enough code.
#3

#4 Check if all the tests succeed.

Update the failing tests.
#5'

Check if the test fails.
#2

The test fails.

Some tests fail.

Correct regressions.

The code quality satisfies.

Iterate

focus
Completion of the contract
as defined by the test

focus
Alignment of the design
with known needs

Exercise - e-mail

local-part@domain

Local part:

- ASCII char set

- A-Z a-z 0-9

- !#$%&'*+-/=?^_`{|}~

- Dot (.), not first, not last, no two dots

Domain:

- dot-separated labels

- A-Z a-z

- 63 char max.

- hyphen (not first or last char)

Test doubles ...

- Nobody is an island !

- Dummy, Fake, Stub, Spies, Mocks

- Test interaction with other classes

- Test un-available dependencies

- example with Mockito

Mockito

mockito-core v2.15.0

```java
import static org.mockito.Mockito.*;


MyClass mock = mock(MyClass.class)


when(mock.func()).thenReturn(value)


verify(mock).func()
```

Coverage

- How much testing is "enough"?

- a measure of which parts of the SC are executed

- Function / Branch / Statement / Condition

- MC/DC

- EclEmma / JaCoCo

Example

```
myFunction(int a, int b, int c, int d){

    if (a == 0) {

        print("first condition")

    }

    if((b == 2 || c < 0) && d > 10) {

        print("second condition")

    }

}
```

What you should know (after)

- Why do we test?

- What levels of testing exist?

- What is a double/mock/stub/fake/spy/… ?

- Coverage (what is it and what does it say?)

Exercises, Reading, etc.

! Use Testing in your project (from the start)

+ Learn JUnit + Mocking (now!)

+ What's a mock? What's a stub? What's the difference?
https://martinfowler.com/articles/mocksArentStubs.html

+ Coverage metrics & what they mean

~ How to Misuse Code Coverage - Brian Marick
http://www.exampler.com/testing-com/writings/coverage.pdf

~ TestCoverage
https://martinfowler.com/bliki/TestCoverage.html

/ Gerard Meszaros - XUnit Test Patterns