Module 1 Day 16

Test-Driven Development

What makes an application?

- Program Data
  - ✓ Variables & .NET Data Types
  - ✓ Arrays
  - ✓ More Collections (list, dictionary, stack, queue)
  - ✓ Classes and objects (OOP)
- Program Logic
  - ✓ Statements and expressions
  - ✓ Conditional logic (if)
  - ✓ Repeating logic (for, foreach, do, while)
  - ✓ Methods (functions / procedures)
  - ✓ Classes and objects (OOP)
  - ❑ Frameworks (MVC)
- Input / Output
  - User
    - ✓ Console read / write
    - ❑ HTML / CSS
    - ❑ Front-end frameworks (HTML / CSS / JavaScript)
  - Storage
    - ❑ File I/O
    - ❑ Relational database
    - ❑ APIs

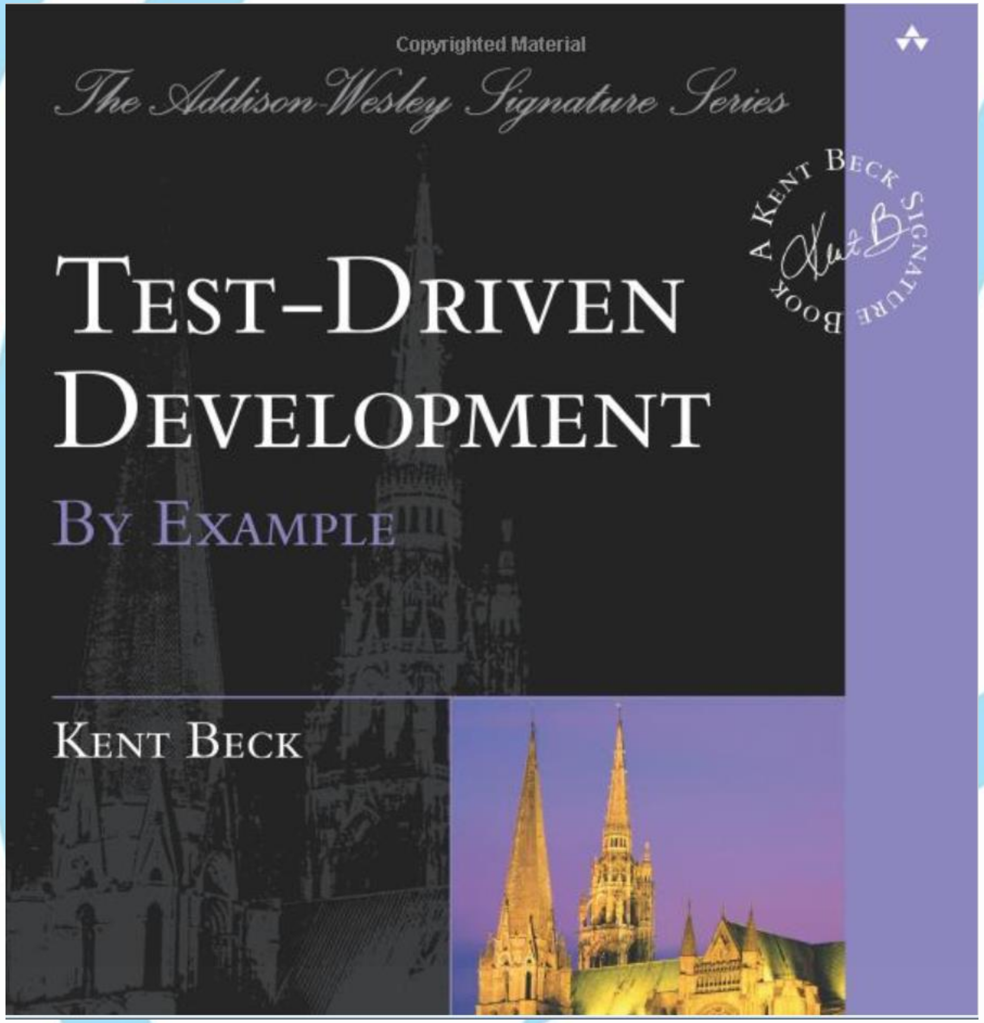
What is Test-Driven Development?

- A software development process
- Very short development cycle
- Tests are written ***before*** the code-under-test
- Code is then written to make the test pass
  - As little code as necessary
- Code is re-factored as needed, and re-tested
- More tests are added, which will "strengthen" the code
- And so on…highly iterative

https://en.wikipedia.org/wiki/Test-driven_development

Test-Driven Development By Example

Kent Beck



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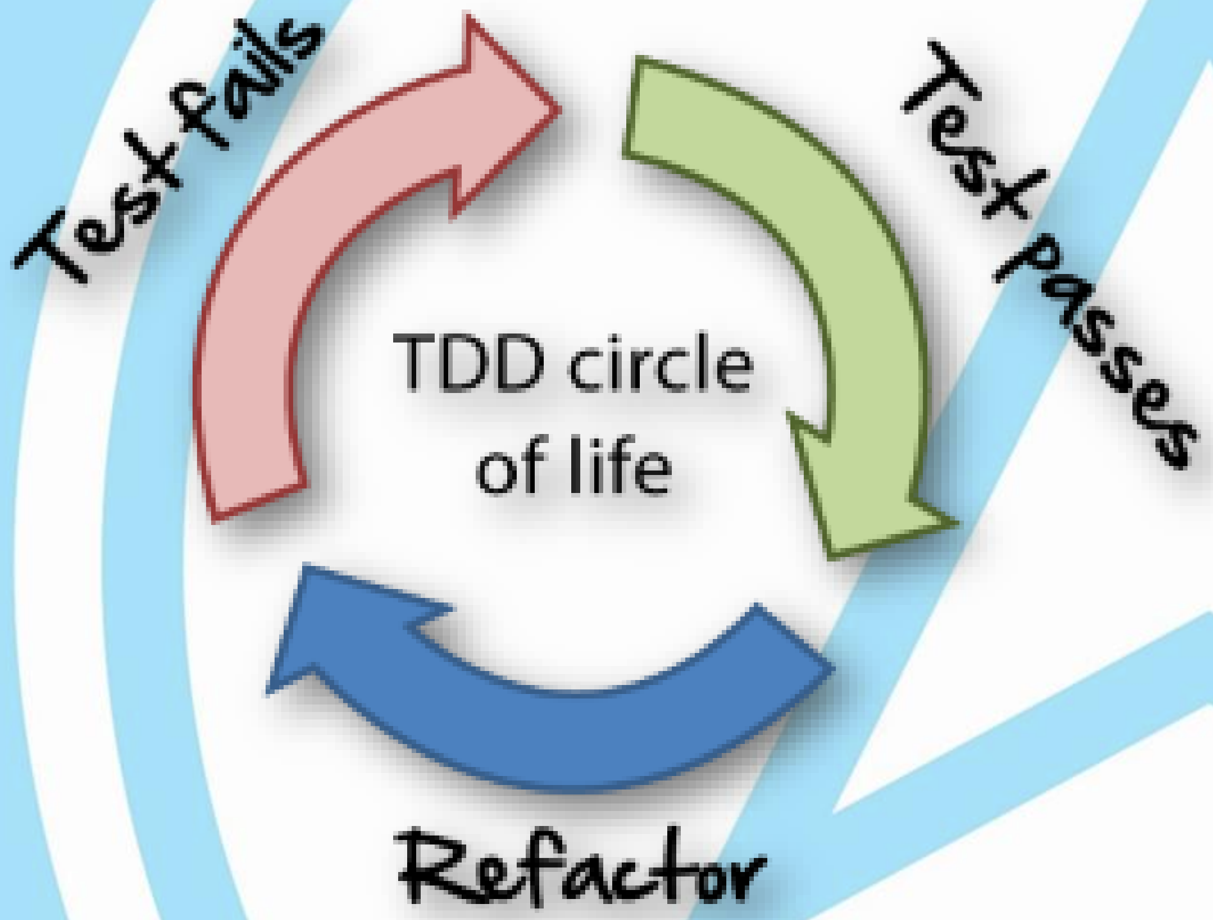
TEST-DRIVEN DEVELOPMENT

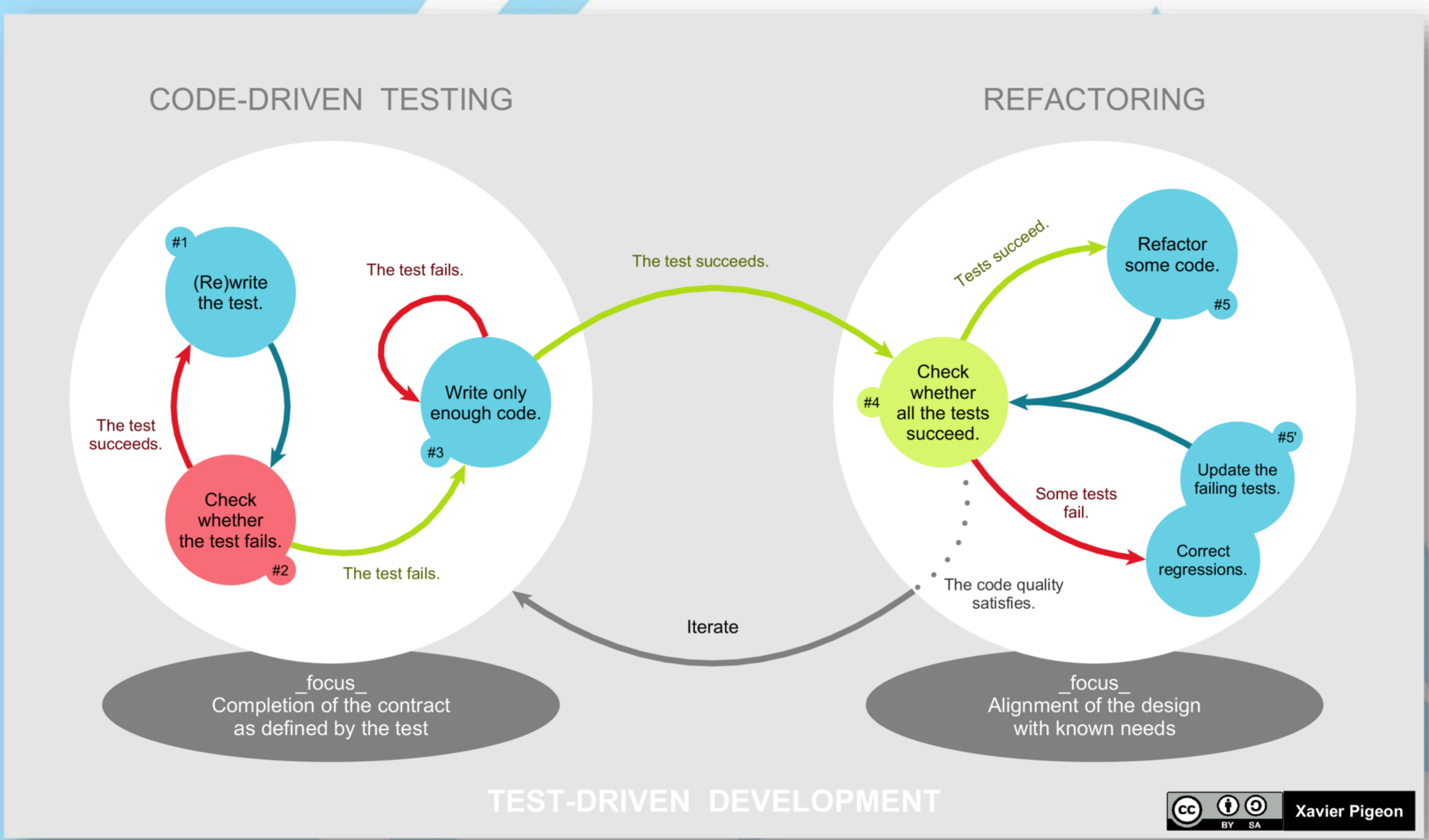
BY EXAMPLE

KENT BECK

TDD Circle of Life: Red-Green-Refactor



TDD Lifecycle



TDD Benefits

- Forces programmer to focus on requirements
- More tests are written
  - Uh, that is, tests are written
- Higher code coverage
- No more code is written than is needed (YAGNI)
  - You Ain't Gonna Need It
- In other ways it’s the same as traditional unit testing
  - Code developer is test developer
  - Still must think of edge cases
  - Same tools can apply
  - Same best practices (A-A-A, independent, isolated, targeted)

Mike’s slightly-informed opinion: It’s all about re-factoring with confidence

A Strategy for TDD

1. Create a list of tests needed
2. Write a test (start with the simplest test)
3. Run the test to see it fail *in the way you expect*
4. Write enough code to make the test build
5. Write enough code to make that test pass (possibly by faking it)
6. Generalize the code if possible, by eliminating code duplication or reducing dependencies
7. Go back to step 2

Refactoring

- Eliminate duplicate code
- Extract a method by breaking down long difficult methods
- Extract complex operations to variables
- Introduce constants for magic numbers
- Simplify conditional expressions
- https://www.martinfowler.com/articles/workflowsOfRefactoring/
- https://martinfowler.com/books/refactoring.html