ThoughtWorks®

TDD IN AN IoT WORLD

Charles Korn

IoT?

What is TDD?

Test-driven development

Test-driven ~~development~~

Test-driven design

It’s not just about testing your code

It’s also about designing your code to be testable

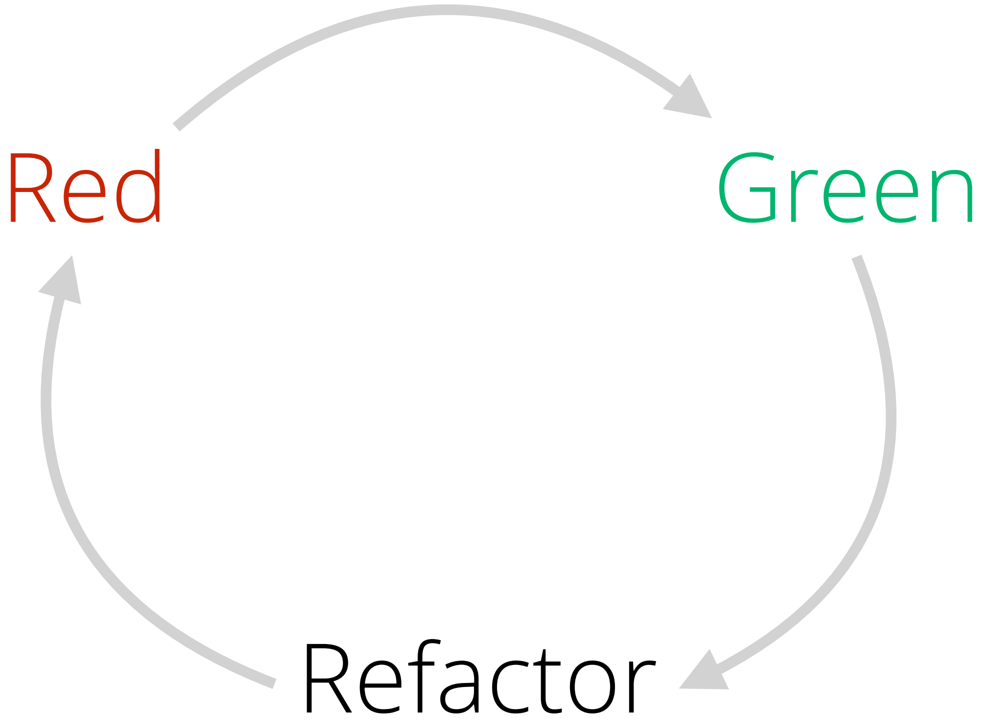
CODE THAT IS DESIGNED TO BE EASY TO TEST

Image credit: weedist.com

Code that is easy to test is:
small
simple
has a single responsibility

Clean code is:
small
simple
has a single responsibility

But how?



Red

Green

Refactor

Image credits: unicornsrule.com and Nicolò Bertoncin

Development environment

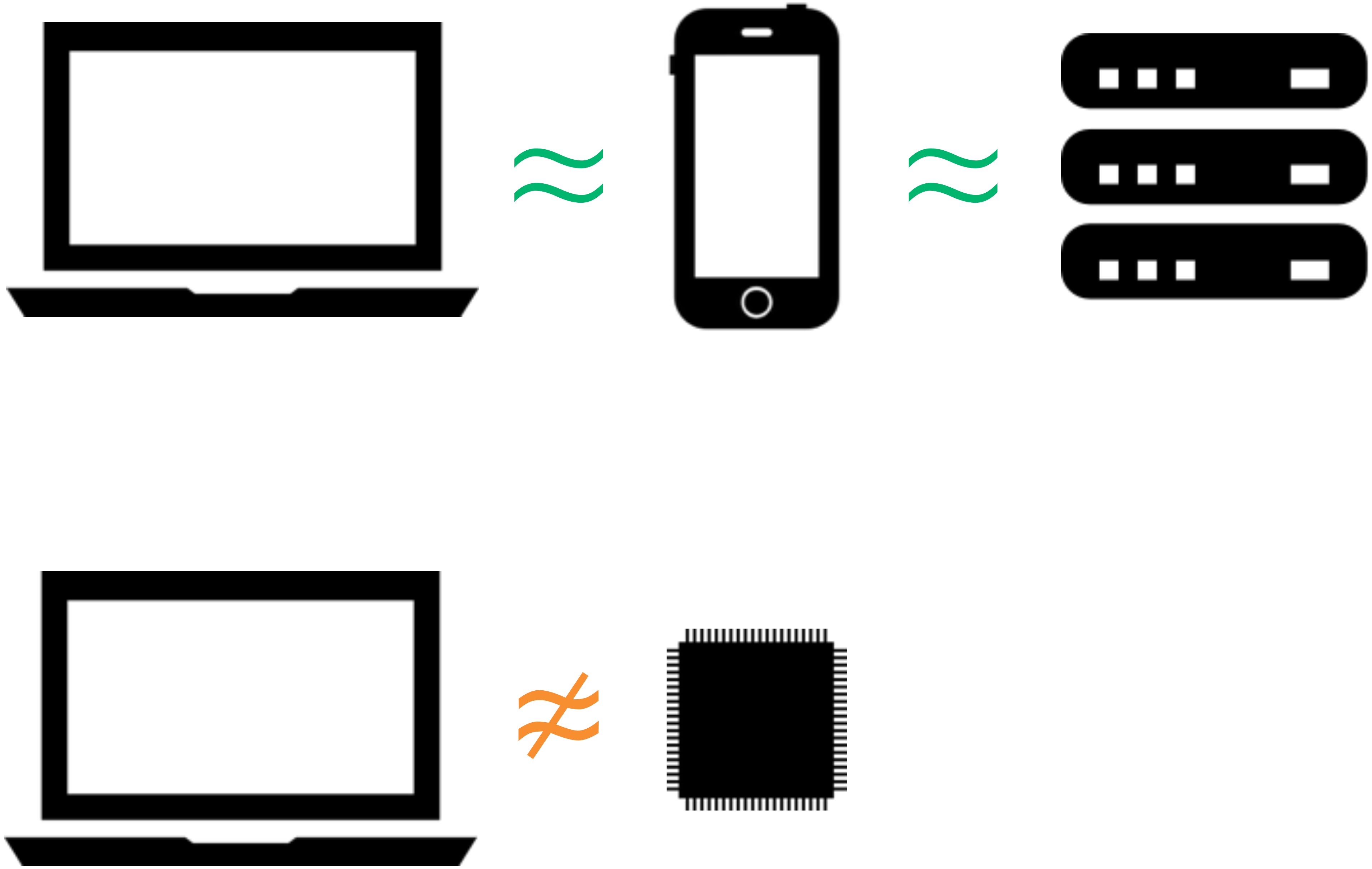
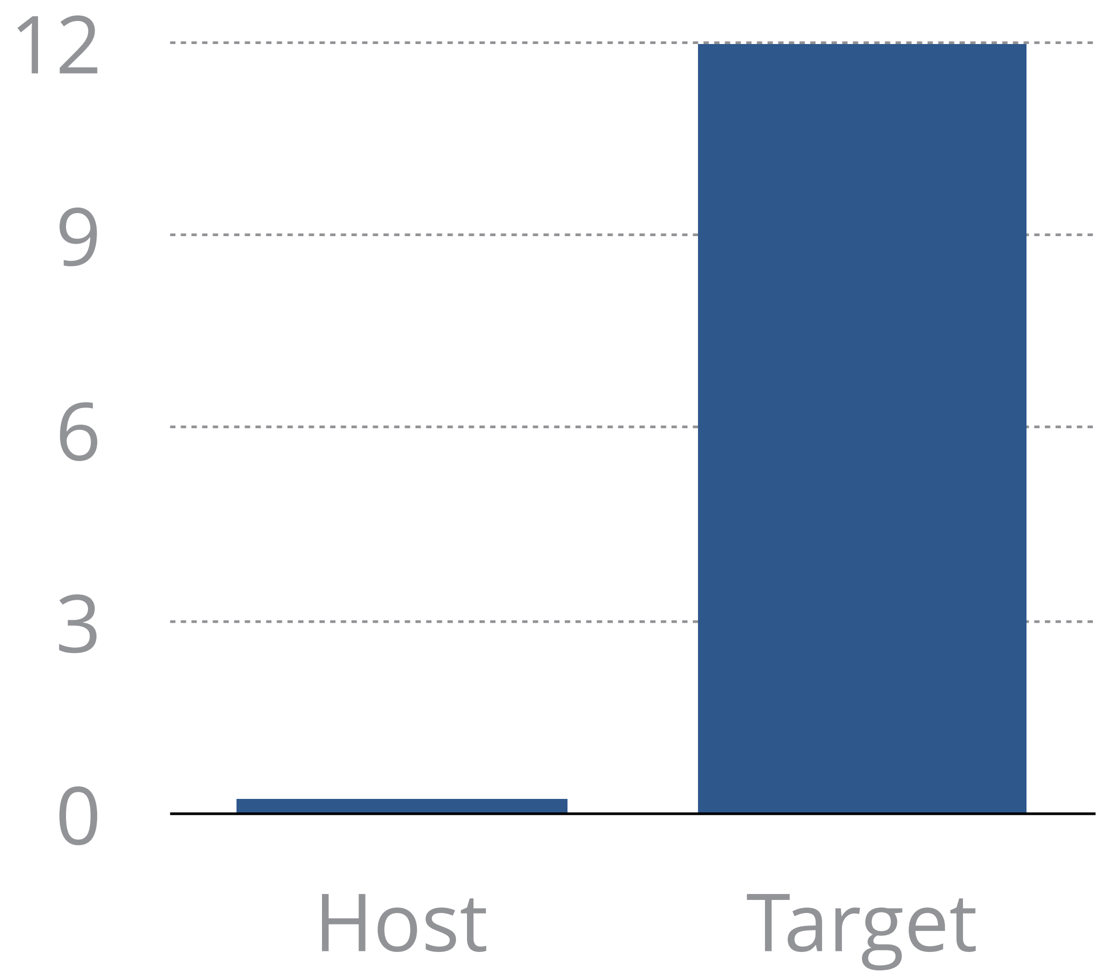


Image credits: Michael Bundscherer, Kevin Kwok, Nicolò Bertoncin, Rflor

Hardware constraints

Long write-run-debug cycle


12
9
6
3
0
Host
Target

Might not have target hardware

Development and production environment differences

Hardware constraints

Long write-run-debug cycle

Target hardware availability

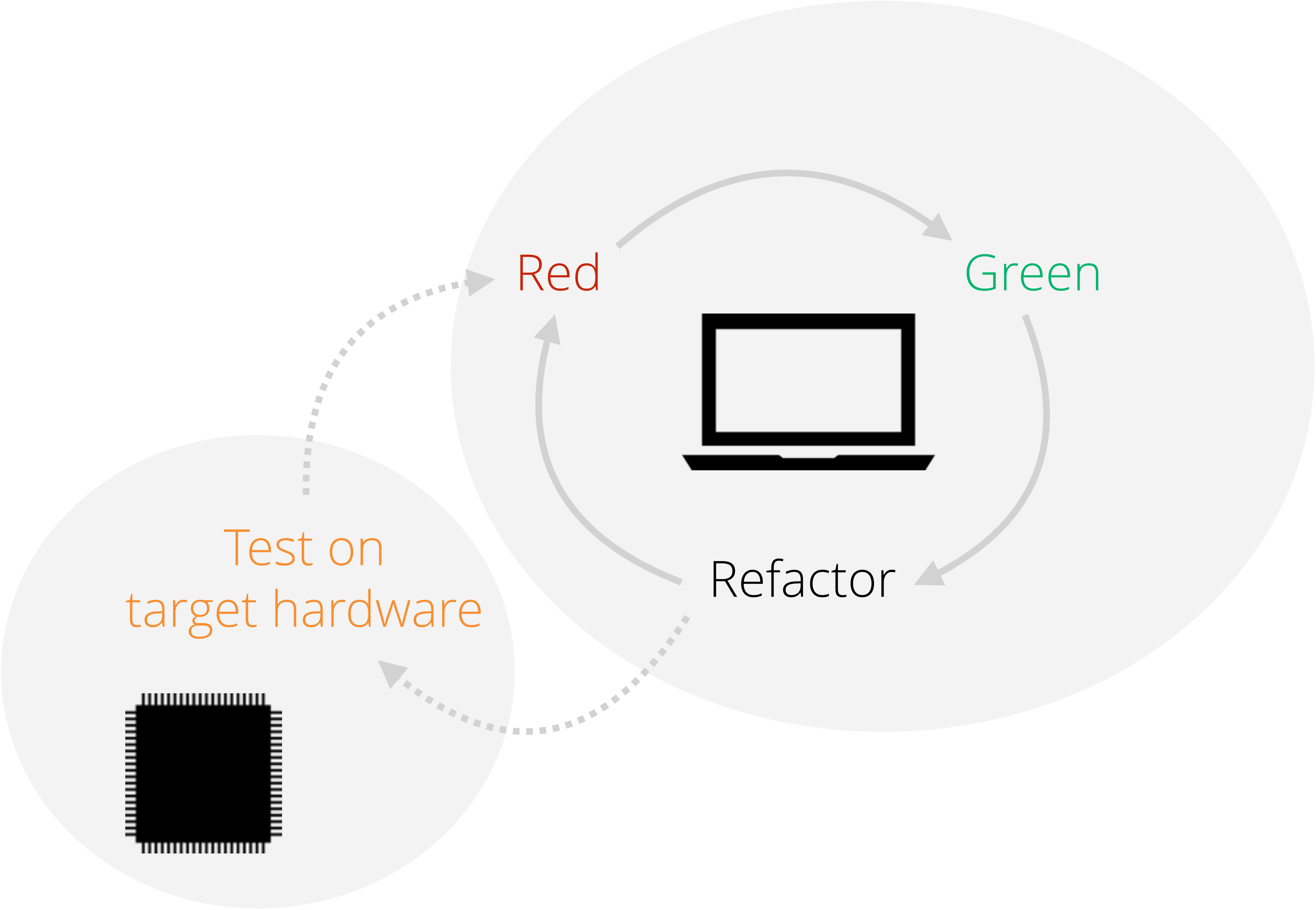
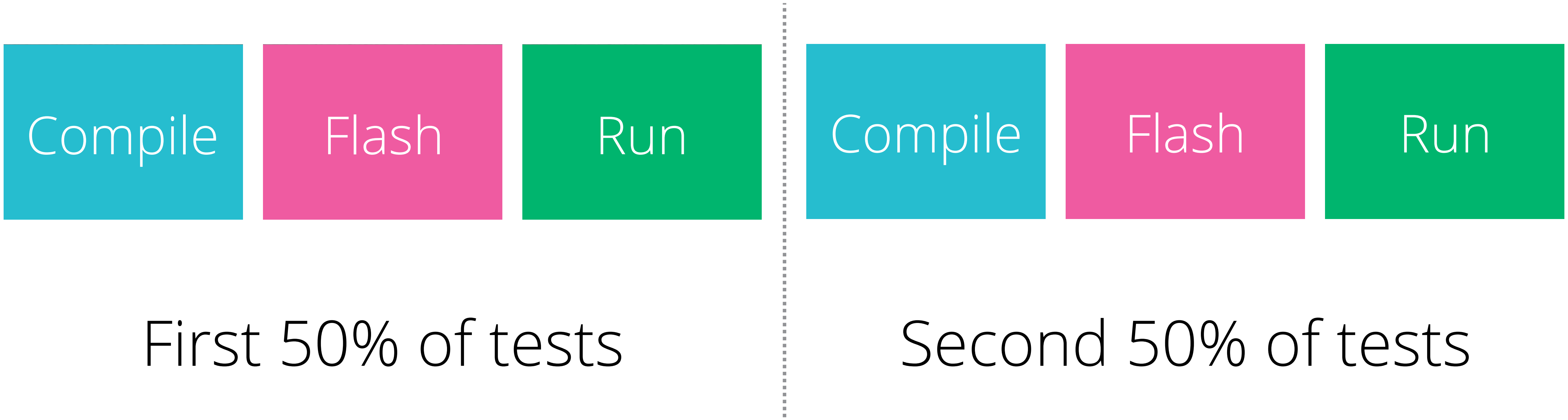


Image credits: Kevin Kwok and Nicolò Bertoncin



Compile

Flash

Run

Compile

Flash

Run

First 50% of tests

Second 50% of tests

Lots of low-level interactions with hardware

Avoid direct interactions with hardware

(or: use good abstractions)

```
PINA |= (1 << LED_PIN)
```

or

```
turnOn(LED_PIN)
```

```
expect(PINA & 0x04 == 1)
```

or

```
expect(getState(LED_PIN) == ON)
```

Performance concerns

Image credit: scmp.com

IT’S A TRAP!

Image credit: Lucasfilm

Know what ‘good enough’ looks like

Know why it’s required

Have a repeatable way to measure it

The tests can help you

C and C++

Image credit: memecenter.com

Link-time fakes

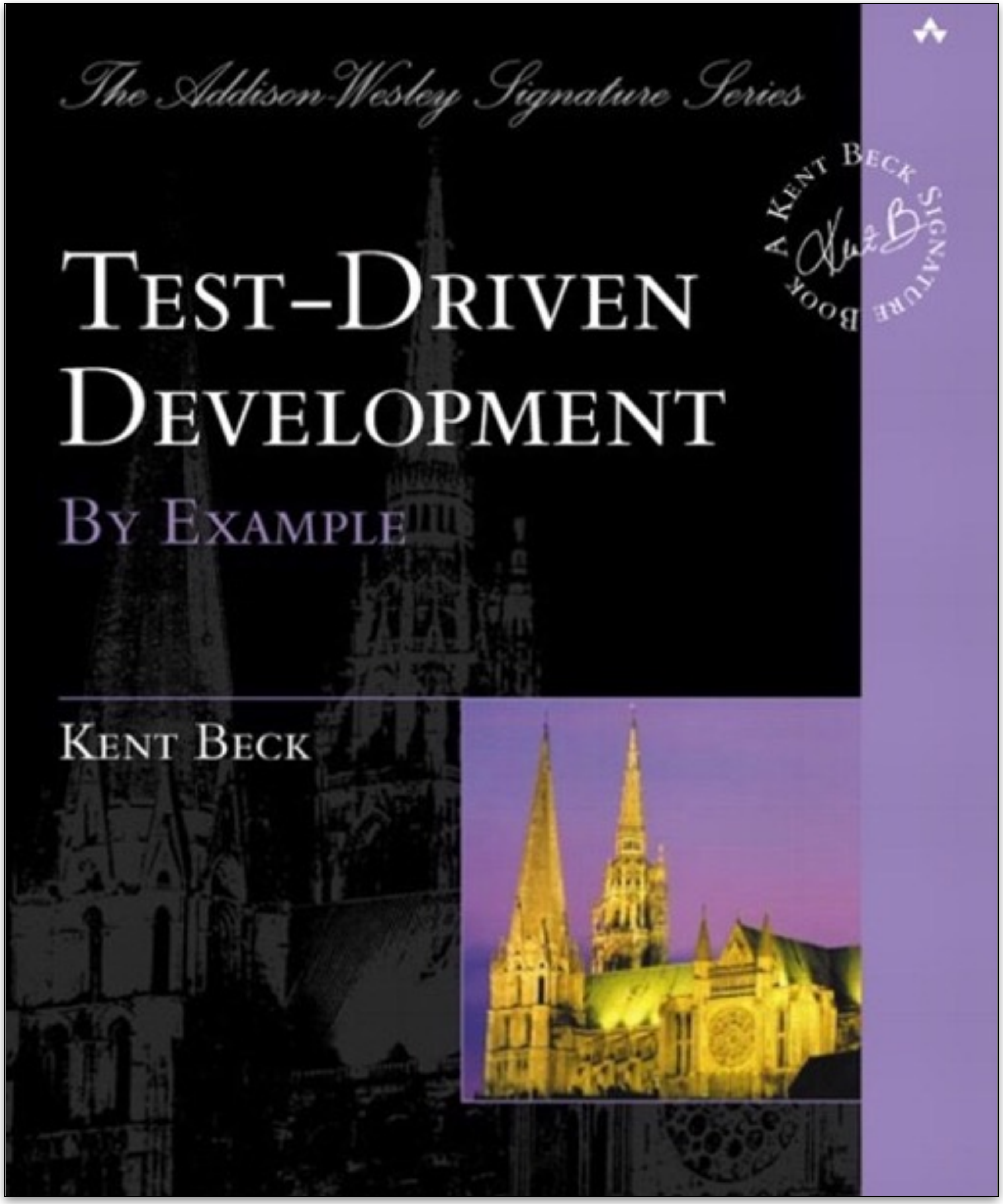
Function pointers

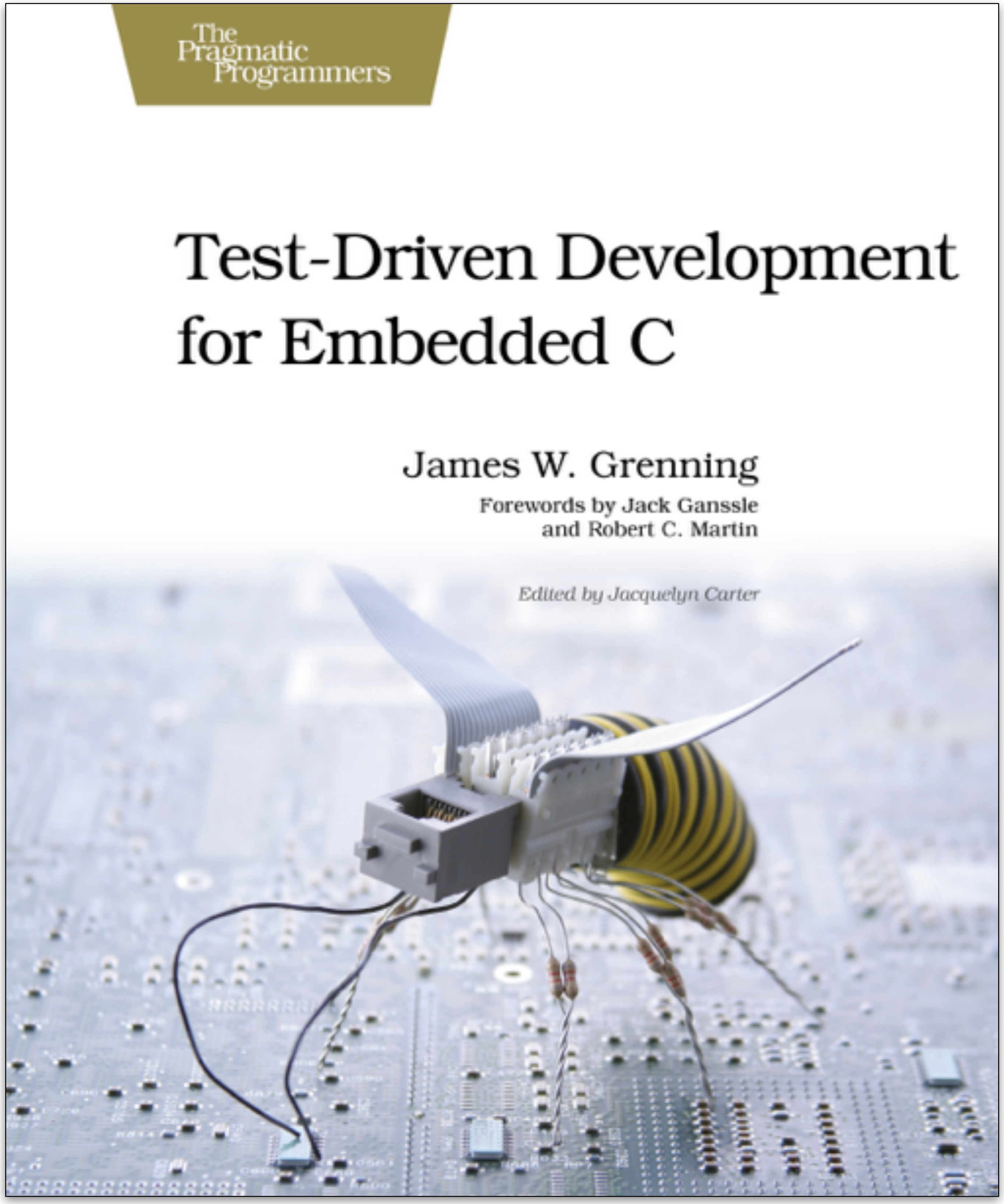
Virtual classes

Image credit: XKCD

Go forth and TDD

Before I go…


The Addison-Wesley Signature Series
A Kent Beck Signature Book
Test-Driven Development
By Example
Kent Beck



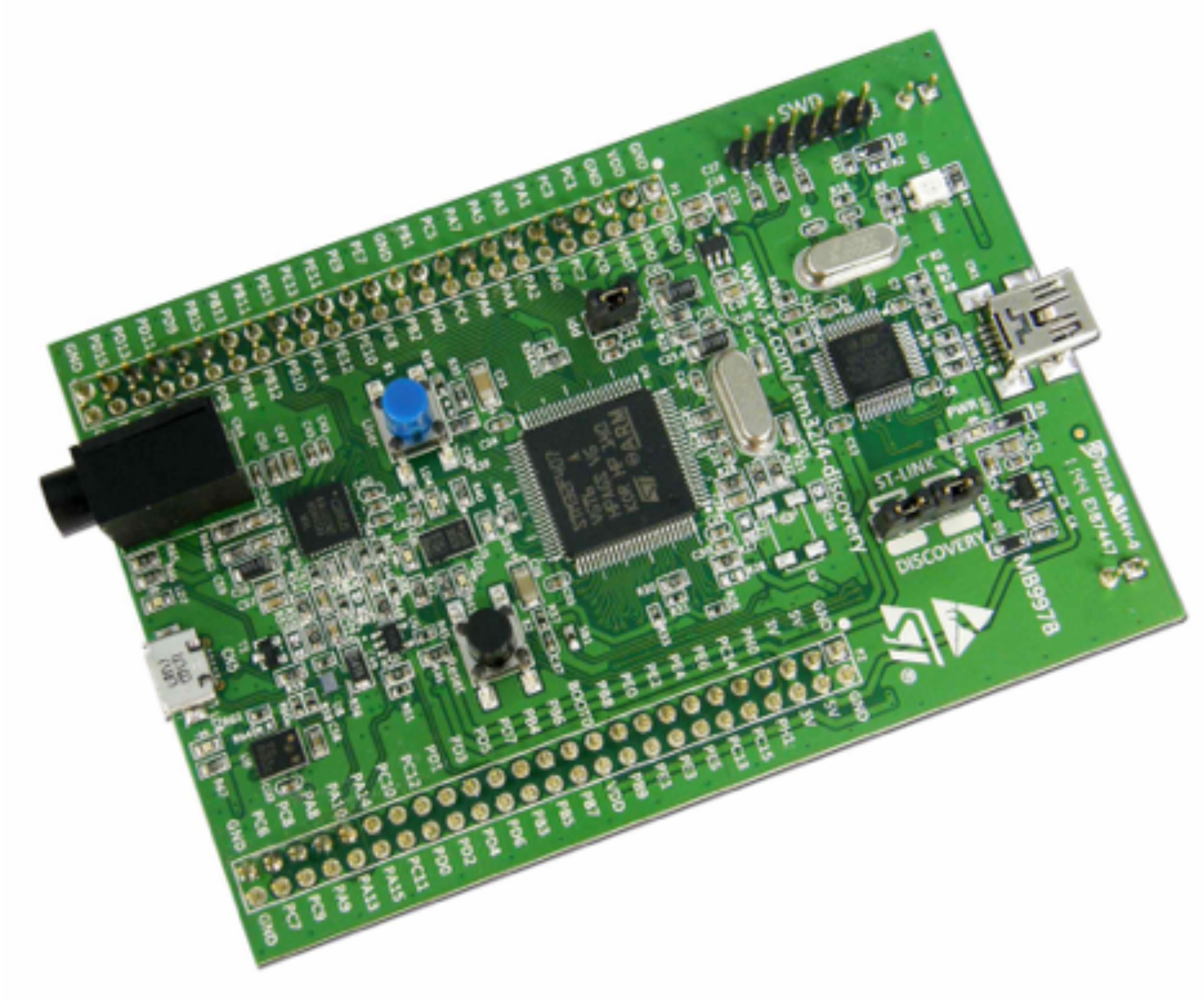
The Pragmatic Programmers

Test-Driven Development for Embedded C

James W. Grenning

Forewords by Jack Ganssle
and Robert C. Martin

Edited by Jacquelyn Carter



https://github.com/charleskorn/stm32f4-project-template

Image credit: blog.tkjelectronics.dk

TDD for circuit design

THANK YOU

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