ThoughtWorks®

A Gentle Introduction

TDD IN GO

Practice, libraries and tools for
Test-Driven Development in the Go language

Luciano Ramalho | @standupdev | @ramalhoorg

Repo with examples and slides: https://tgo.li/tddgo

AGENDA

Brief introduction

Coding Dojo (randori style): **`runes`** CLI app

Variations on classic TDD

Overview of tools, techniques and libraries

References for further study

Repo with examples and slides: https://tgo.li/tddgo

ThoughtWorks®

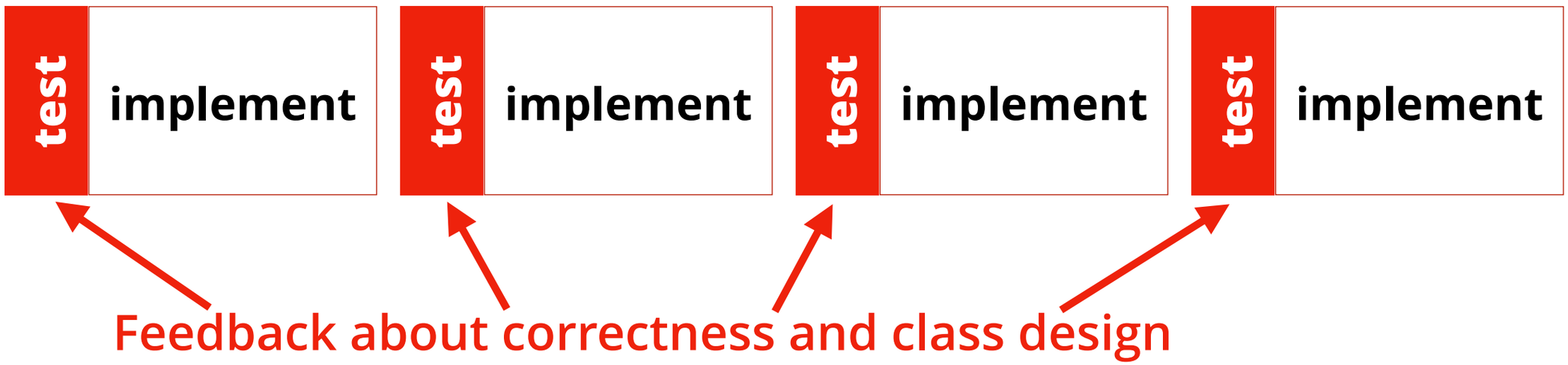
INTRODUCTION

What TDD is all about

TRADITIONAL TESTING

Source: **Test-Driven Development**, by Hugo Corbucci and Mauricio Aniche

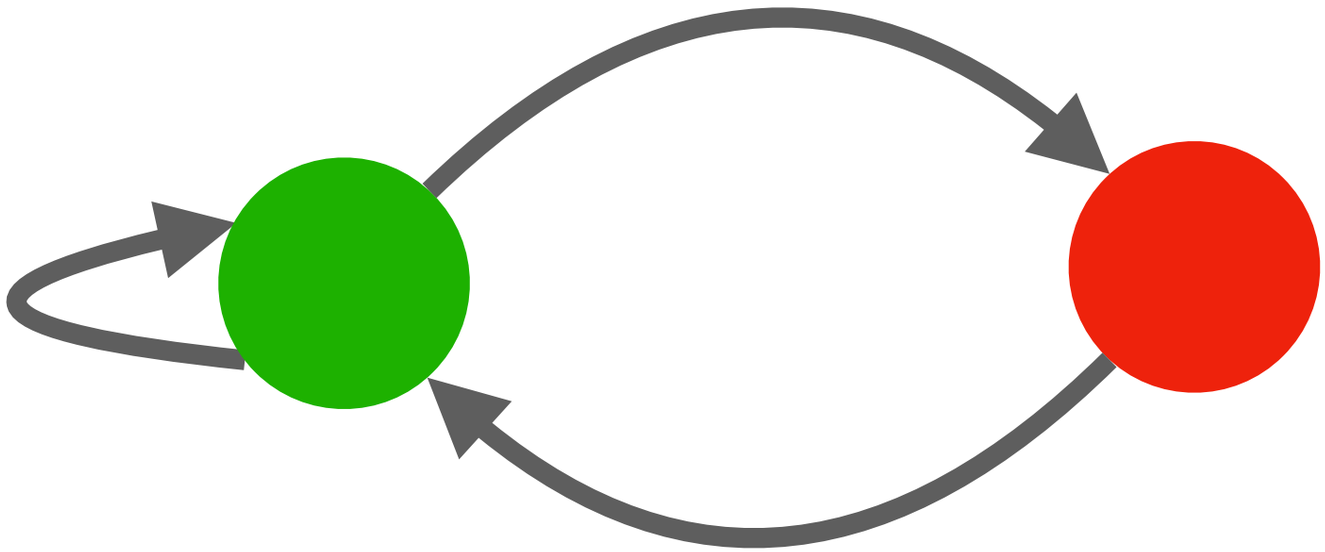
TEST-DRIVEN DEVELOPMENT



Source: **Test-Driven Development**, by Hugo Corbucci and Mauricio Aniche

TDD CYCLE

1. Write the simplest test for next functionality



2. Watch it fail

3. Implement the simplest solution to satisfy the test

4. Refactor to remove data and code duplication

Source: **Test-Driven Development**, by Hugo Corbucci and Mauricio Aniche

TDD BEST PRACTICE: BABY STEPS

Work on small increments.

Time between red/green states measured in minutes, not hours.

At first: practice with the smallest increments you can think.

Like 4L on 4WD: be willing and ready to engage reduced gear when the going gets tough.

TDD BEST PRACTICE: CALL SHOT

Before running test, call out expected outcome.

When pairing, co-pilot should call outcome.

— Test will error out because there's no method named `parseLine`.

— Test will fail because function returns **1**, but the expected result is **42**.

— Test will pass.

Source: **Test-Driven Development**, by Hugo Corbucci and Mauricio Aniche

TDD BEST PRACTICE: IMPROVE FAILING REPORTS

Figure 5.2 *Improving the diagnostics as part of the TDD cycle*

Source: **Growing Object-Oriented Software, Guided by Tests**
by Steve Freeman, Nat Pryce

ThoughtWorks®

CODING DOJO

Let's practice

CODING DOJO: RULES FOR RANDORI SESSION

Rotating pairs of pilot and co-pilot.

After 7 minutes, call volunteer for co-pilot.

When tests are green, audience can make suggestions for refactoring or next test.

When a test is red, audience should only offer suggestions when requested by pair.

OUR GOAL

```
$ runes cat eyes
U+1F638 😸      GRINNING CAT FACE WITH SMILING EYES
U+1F63B 😻      SMILING CAT FACE WITH HEART-SHAPED EYES
U+1F63D 😽      KISSING CAT FACE WITH CLOSED EYES
$
```

SIMPLE EXAMPLE-TEST

```
func Example() {
        main()
        // Output:
        // Please provide one or more words to search.
}
```

TESTING PACKAGE: T TYPE API

testing - GoDoc

https://godoc.org/testing

170%

Search

type PB

- func (pb *PB) Next() bool

type T

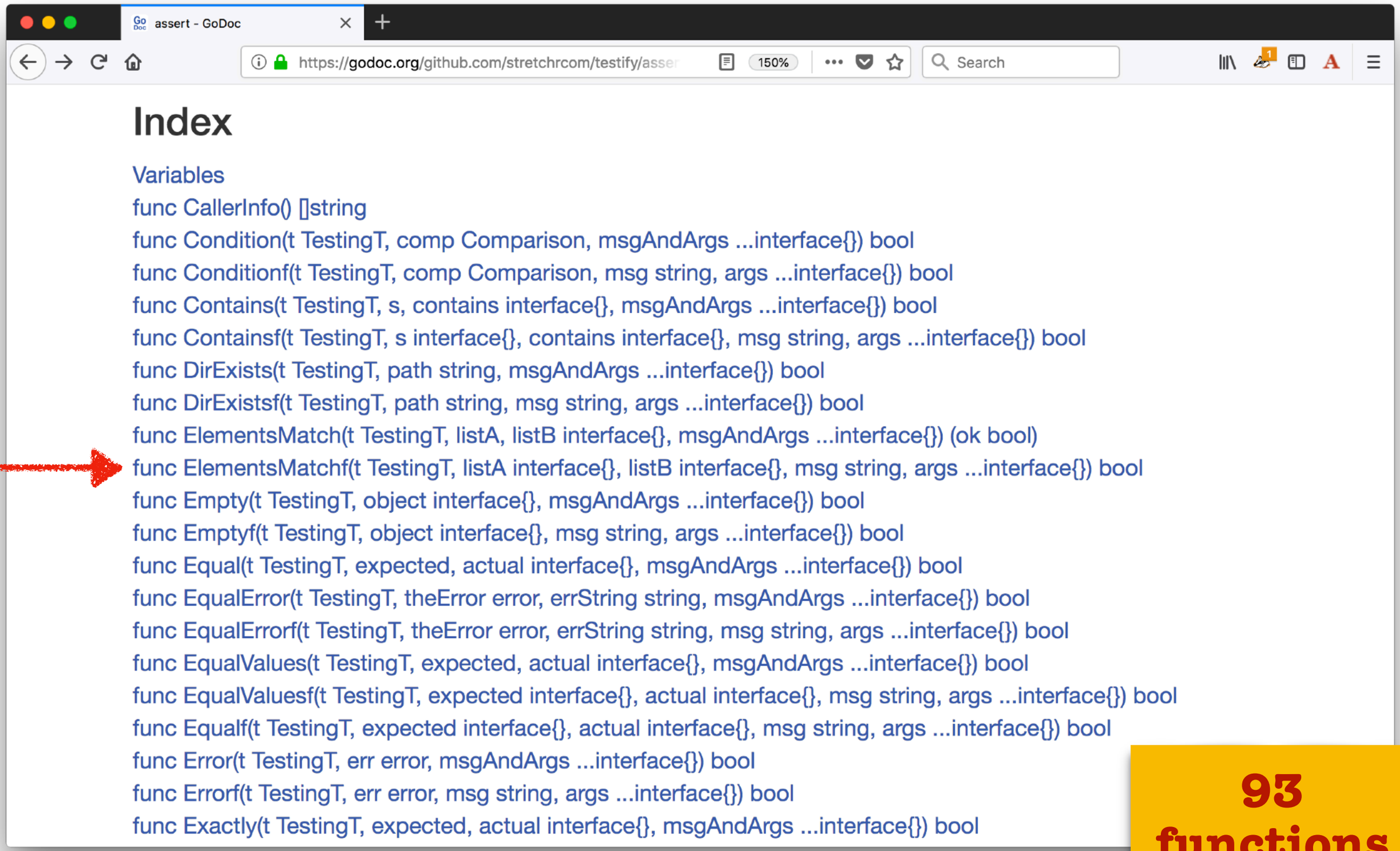
- func (c *T) Error(args ...interface{})
- func (c *T) Errorf(format string, args ...interface{})
- func (c *T) Fail()
- func (c *T) FailNow()
- func (c *T) Failed() bool
- func (c *T) Fatal(args ...interface{})
- func (c *T) Fatalf(format string, args ...interface{})
- func (c *T) Helper()
- func (c *T) Log(args ...interface{})
- func (c *T) Logf(format string, args ...interface{})
- func (c *T) Name() string
- func (t *T) Parallel()
- func (t *T) Run(name string, f func(t *T)) bool
- func (c *T) Skip(args ...interface{})
- func (c *T) SkipNow()
- func (c *T) Skipf(format string, args ...interface{})
- func (c *T) Skipped() bool

type TB

TABLE TEST WITH SUB-TESTS

```go
func TestMake(t *testing.T) {
        testCases := []struct {
                elems   []string
                wantLen int
        }{
                {[]string{}, 0},
                {[]string{"a"}, 1},
                {[]string{"a", "b"}, 2},
                {[]string{"a", "b", "a"}, 2},
        }
        for _, tc := range testCases {
                t.Run(fmt.Sprintf("%v gets %d", tc.elems, tc.wantLen), func(t *testing.T) {
                        s := Make(tc.elems...)
                        assert.Equal(t, tc.wantLen, s.Len())
                })
        }
}
```

PACKAGE TESTIFY: ASSERT SUB-PACKAGE API



93 functions

EXAMPLE-TEST WITH FAKE COMMAND-LINE ARGUMENTS

```
func Example_2WordQuery() { // ❶
        oldArgs := os.Args // ❷
        defer func() { os.Args = oldArgs }()
        os.Args = []string{"", "cat", "smiling"}
        main() // ❸
        // Output:
        // U+1F638    😸    GRINNING CAT FACE WITH SMILING EYES
        // U+1F63A    😺    SMILING CAT FACE WITH OPEN MOUTH
        // U+1F63B    😻    SMILING CAT FACE WITH HEART-SHAPED EYES
}
```

ThoughtWorks®

TOOLS

Libraries and utilities for TDD in Go

LIBRARIES FOR TESTING

Go testing libraries with most Github stars*

5251 ★	stretchr/testify
3685 ★	smartystreets/goconvey
2166 ★	onsi/ginkgo
1452 ★	golang/mock
902 ★	DATA-DOG/go-sqlmock
884 ★	gavv/httpexpect
709 ★	onsi/gomega
575 ★	google/go-cmp
512 ★	franela/goblin
502 ★	h2non/baloo
496 ★	h2non/gock
404 ★	DATA-DOG/godog
387 ★	go-check/check

*Data collected 2018-07-05

ThoughtWorks®

TECHNIQUES

Coding tips

SIMPLE EXAMPLE-TEST USING STRINGER INTERFACE

```
func ExampleMake() {
        w := []string{"beta", "alpha", "gamma", "beta"}
        s := Make(w...)
        fmt.Println(s)
        // Output: Set{alpha beta gamma}
}
```

EXAMPLE-TEST WITH UNORDERED OUTPUT

```
func ExampleSet_Channel() {
        set := MakeFromText("beta alpha delta gamma")
        // iteration order over underlying map is undefined
        for elem := range set.Channel() {
                fmt.Println(elem)
        }
        // Unordered output:
        // alpha
        // beta
        // delta
        // gamma
}
```

TEST WITH FAKE ENVIRONMENT VARIABLE

```
func restore(nameVar, value string, existed bool) {
        if existed {
                os.Setenv(nameVar, value)
        } else {
                os.Unsetenv(nameVar)
        }
}
```

```
func TestGetUCDPath_isSet(t *testing.T) {
        pathBefore, existed := os.LookupEnv("UCD_PATH")
        defer restore("UCD_PATH", pathBefore, existed)
        ucdPath := fmt.Sprintf("./TEST%d-UnicodeData.txt", time.Now().UnixNano())
        os.Setenv("UCD_PATH", ucdPath)
        got := getUCDPath()
        if got != ucdPath {
                t.Errorf("getUCDPath() [set]\nwant: %q; got: %q", ucdPath, got)
        }
}
```

TEST WITH HTTP SERVER DOUBLE

```
func TestFetchUCD(t *testing.T) {
        srv := httptest.NewServer(http.HandlerFunc(
                func(w http.ResponseWriter, r *http.Request) {
                        w.Write([]byte(lines3Dto43))
                }))
        defer srv.Close()

        ucdPath := fmt.Sprintf("./TEST%d-UnicodeData.txt", time.Now().UnixNano())
        done := make(chan bool)                  // ❶
        go fetchUCD(srv.URL, ucdPath, done) // ❷
        _ = <-done                               // ❸
        ucd, err := os.Open(ucdPath)
        if os.IsNotExist(err) {
                t.Errorf("fetchUCD did not save:%v\n%v", ucdPath, err)
        }
        ucd.Close()
        os.Remove(ucdPath)
}
```

SLOW TEST THAT CAN BE SKIPPED

```
func TestOpenUCD_remote(t *testing.T) {
        if testing.Short() { // ❶
                t.Skip("skipped test [-test.short option]") // ❷
        }
        ucdPath := fmt.Sprintf("./TEST%d-UnicodeData.txt", time.Now().UnixNano())
        ucd, err := openUCD(ucdPath)
        if err != nil {
                t.Errorf("openUCD(%q):\n%v", ucdPath, err)
        }
        ucd.Close()
        os.Remove(ucdPath)
}
```

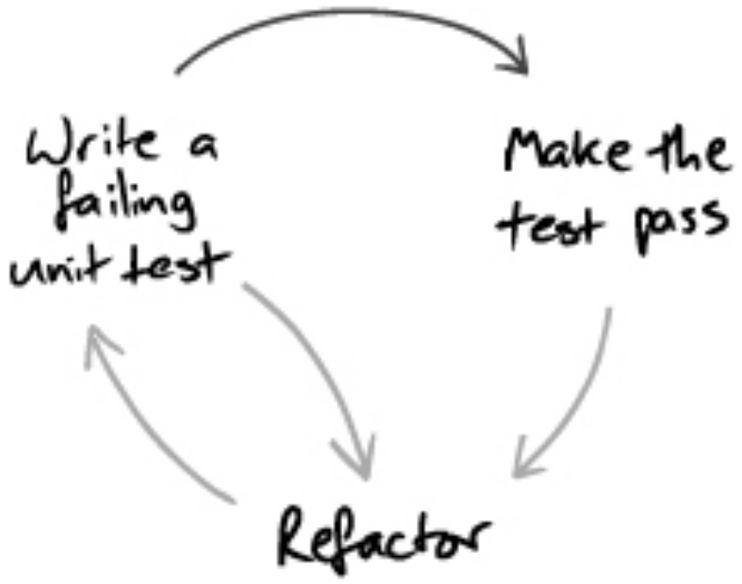
ThoughtWorks®

VARIATIONS

Beyond the classic TDD cycle

TDD CYCLE: REFACTOR AFTER TEST

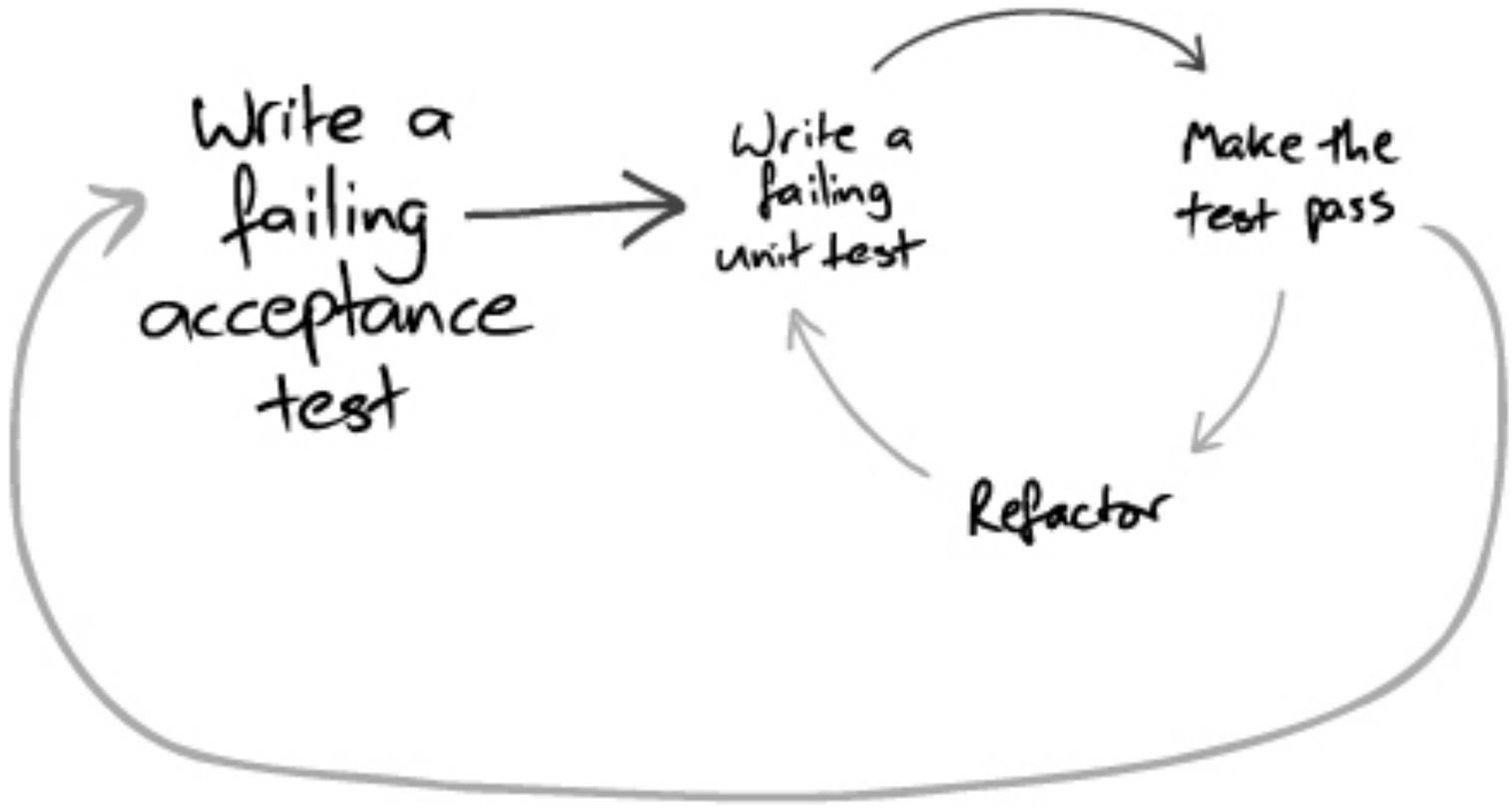
Figure 5.3 *Difficulties writing tests may suggest a need to fix production code*



Source: **Growing Object-Oriented Software, Guided by Tests**
by Steve Freeman, Nat Pryce

TDD CYCLES: MOCKIST STYLE

Figure 5.1 *Each TDD cycle starts with a failing acceptance test*



Source: **Growing Object-Oriented Software, Guided by Tests**
by Steve Freeman, Nat Pryce

TDD STYLES

Chicago style, a.k.a. “classic”

Mostly inside-out: from unit tests to acceptance tests

London style, a.k.a. “mockist”

Mostly outside-in: from acceptance tests to unit tests

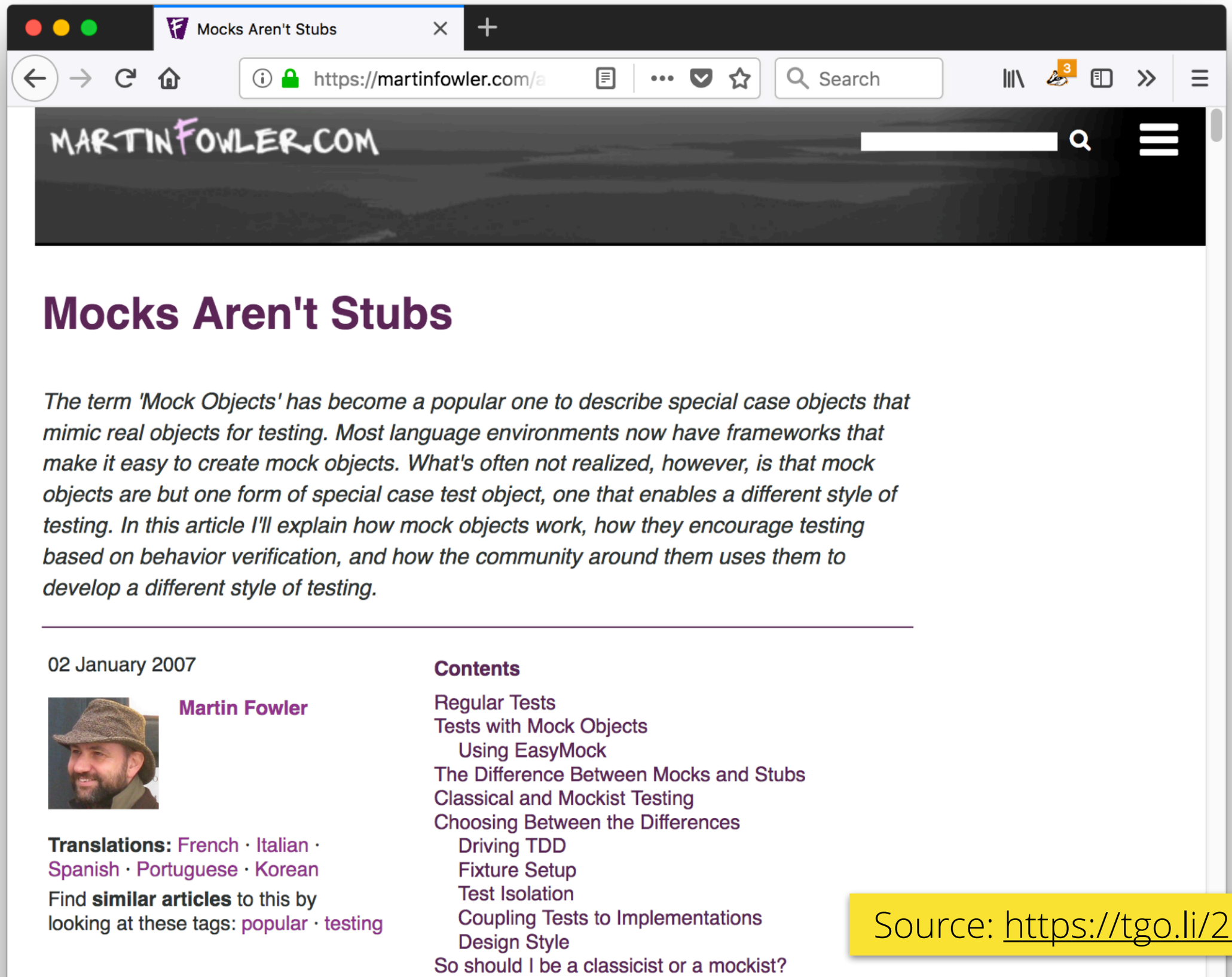
ANDREW GERRAND ON FAKES

"Go eschews mocks and fakes in favour of writing code that takes broad interfaces."

"That's generally how we get around dependency injection frameworks and large mocking frameworks: just by writing code that uses small interfaces. Then we have small fakes like the ResponseRecorder — small fakes that allow us to inspect how they were used. There are frameworks that generate those kinds of fakes — one of them is called Go Mock [...]. They're fine, but I find that on balance the hand-written fakes tend to be easier to reason about, and clearer to see what is going on. That's my personal experience. But I am not an "enterprise" Go programmer so maybe people need that, I don't know. That's my advice."

— Andrew Gerrand in *Testing Techniques* (I/O 2014) https://tgo.li/2upCkek

MARTIN FOWLER ON TDD STYLES



Source: https://tgo.li/2lUqTXv

ThoughtWorks®

REFERENCES

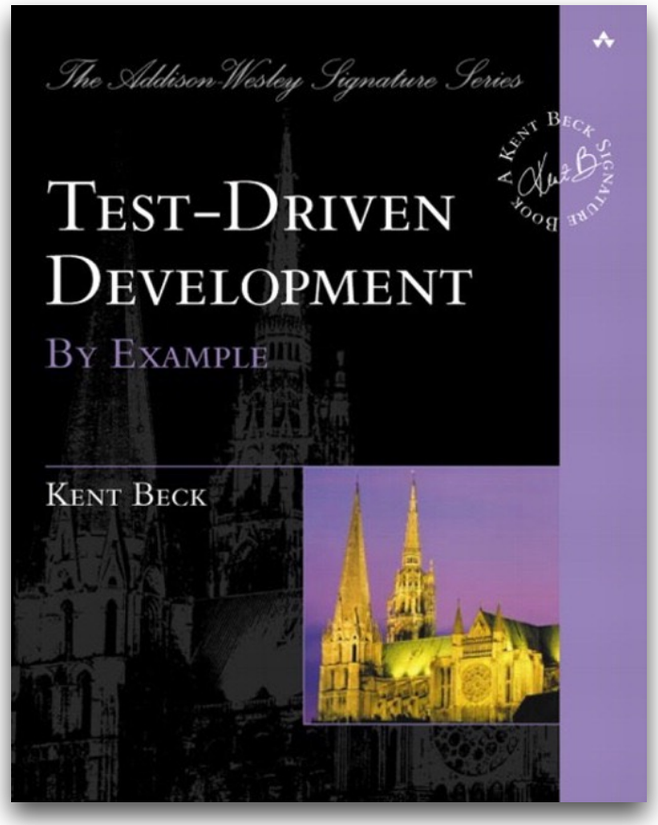
Where to learn more

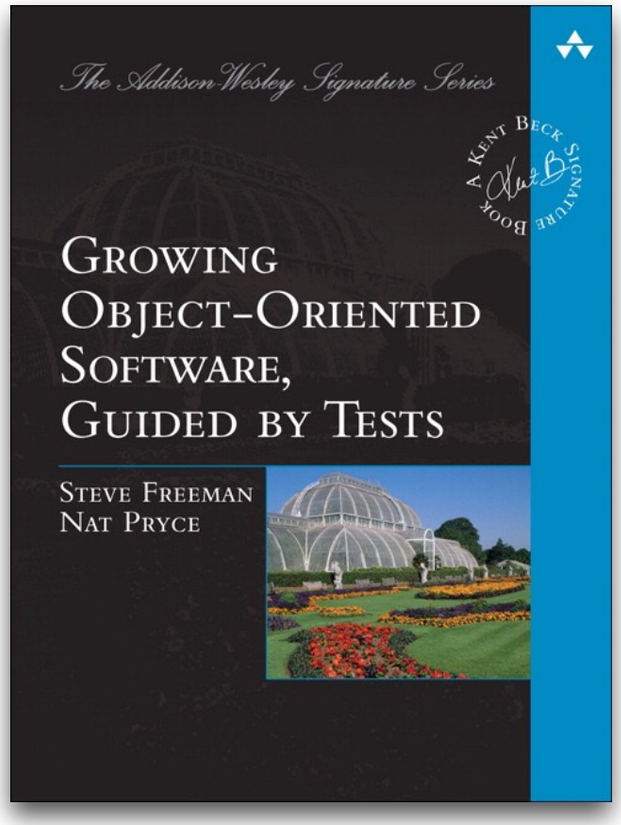
REFERENCES: BOOKS

Kent Beck: **Test Driven Development: By Example** https://tgo.li/2NvBfcX

Steve Freeman, Nat Pryce:
Growing Object-Oriented Software, Guided by Tests https://tgo.li/2tV8QoK

Hugo Corbucci and Mauricio Aniche (book in Portuguese):
Test-Driven Development: Teste e design no mundo real com Ruby
https://tgo.li/2zGSl4N





REFERENCES: POSTS, VIDEOS

Andrew Gerrand [video]
Go Testing Techniques (Google I/O 2014) https://tgo.li/2upCkek

Francesc Campoy [video]
Unit Testing HTTP Servers (justforfunc #16) https://tgo.li/2NSEGdZ

Martin Angers [post]
Lesser-known Features of Go-Test https://tgo.li/2m7ta1E

Martin Fowler [post]
Mocks Aren't Stubs https://tgo.li/2lUqTXv

Martin Fowler, Kent Beck, David Heinemeier Hansson [post + videos]
Is TDD Dead? https://tgo.li/2IWOAYn

Michael Feathers , Steve Freeman [video]
Test Driven Development: Ten Years Later https://tgo.li/2KD2Gnm

THANK YOU

Let's connect!

Luciano Ramalho
@standupdev | @ramalhoorg
luciano.ramalho@thoughtworks.com

ThoughtWorks®