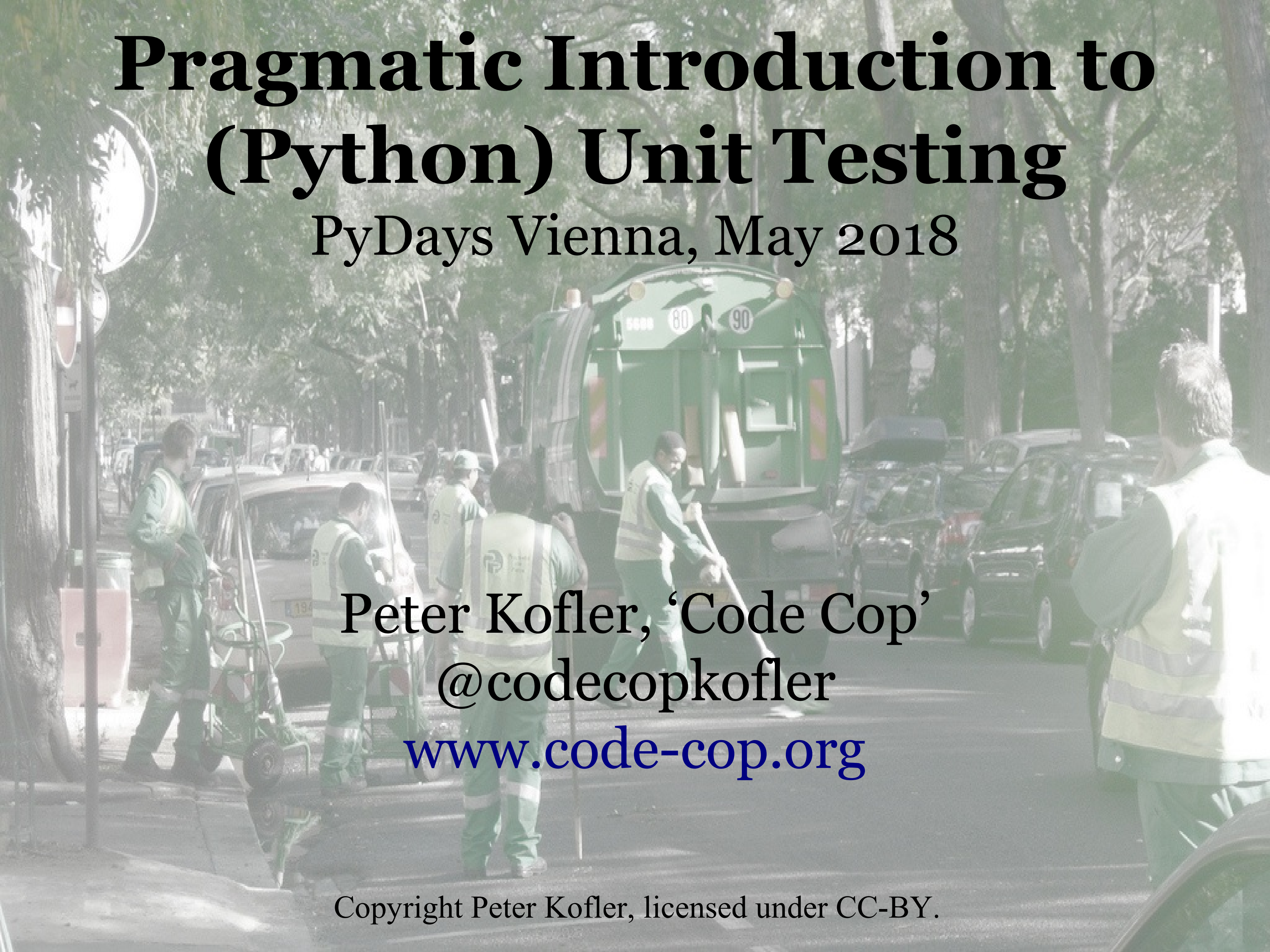


Pragmatic Introduction to (Python) Unit Testing

PyDays Vienna, May 2018

Peter Kofler, ‘Code Cop’
@codecopkofler
www.code-cop.org

Peter Kofler

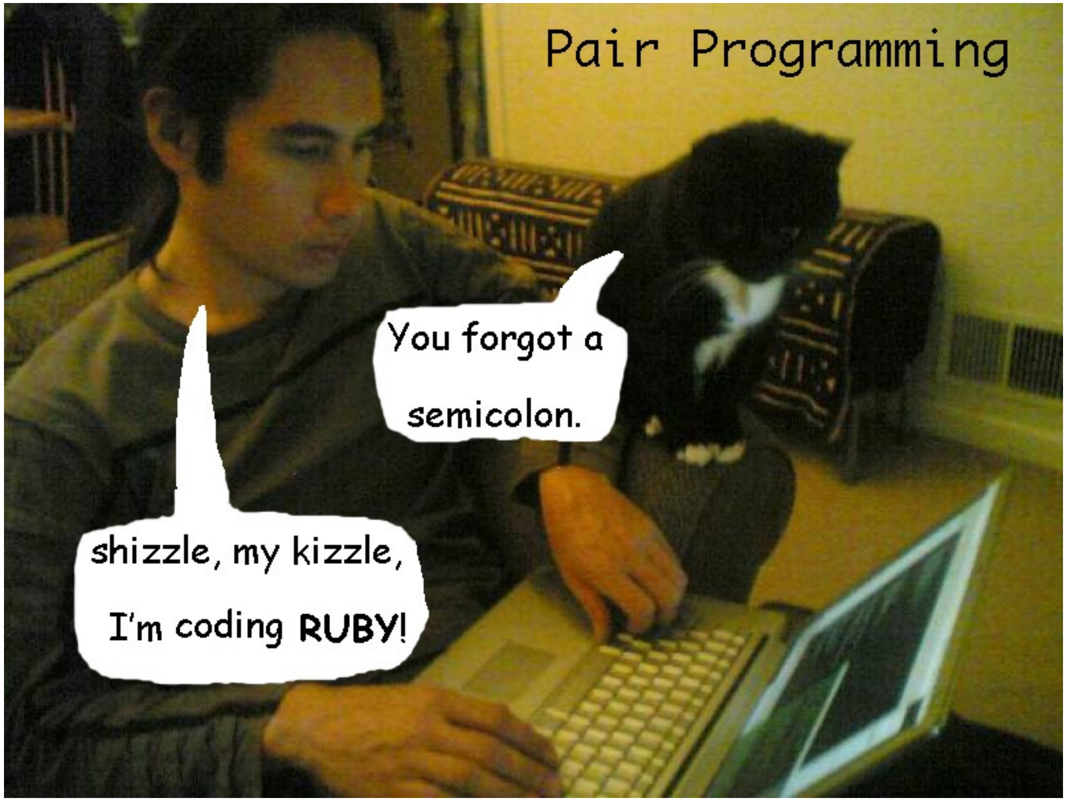
- Ph.D. (Appl. Math.)
- Professional Software Developer for 15+ years
- “fanatic about code quality”
- I help development teams

I help development teams with

- Professionalism
- Quality and Productivity
- Continuous Improvement

Mentoring

- Pair Programming
- Programming Workshops
- Deliberate Practice, e.g. Coding Dojos



Developing Quality Software Developers

Agenda

- Unit Testing
- Coding (Writing Tests)
- Break?
- Coding (Moar Tests)
- Retrospective

Quick Poll

- Who has heard of `unittest`? (xUnit)
- Who has never written a unit test?
- Who has written a few?
- Who writes unit tests every day?
- Who does TDD?

We Make Mistakes

- at least I do… ☺
- number of bugs proportional LoC
  - 7 bugs per 1.000 LoC
  - 1 bug per 10.000 LoC in critical software
- Assume you have lots of bugs.

TESTING

I FIND YOUR LACK OF TESTS DISTURBING.

What is a Unit Test?

Unit Test (Micro Test)

- code written by a developer
- tests an individual unit
    - isolate each part
- shows that the individual part is correct
- sort of living documentation

What is a Unit (of Work)?

- single logical functional use case
- invoked by some public interface
  - a single method,
  - a whole class or
  - multiple classes
- with one single logical purpose

What is it made of?

Test Class

- **unit test** tests the functionality of a unit
- for various inputs and outputs
- usually a single test (class/script)

```
class GreeterTestCase
                (unittest.TestCase):
```

contains all test cases for `Foo`

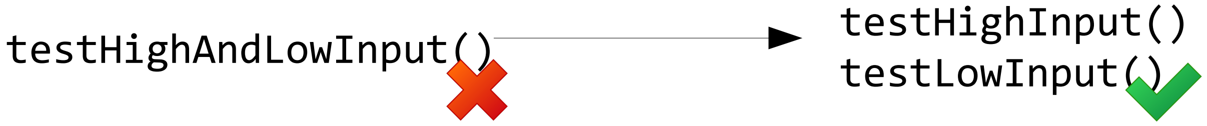
Test Methods

- a **test case** tests the response of a single method to a particular set of inputs
- multiple test cases for a single method
- test methods should be short, simple
- tests without test methods are pointless

```
def test_hello_name(self):
```

Only one aspect/feature

- tests work best with lots of small tests
- tests only fail because of one reason
- more than 1 assert in test
  → split into multiple tests



testHighAndLowInput() ✗ → testHighInput()
testLowInput() ✓

- 1 test case – 1 method – 1 assertion

Assertions

- no output from your tests!
- check expectations programmatically
- e.g. `self.assertEqual`,
  `self.assertTrue`, ...
- test method without assert is pointless
- test runner reports failure on each test
  → **Regression Testing**

Fixtures

- sets up data needed to run tests
- functions

```
def setUp(self):,
def tearDown(self):
```

- Note: Test data is more likely to be wrong than the tested code!

A Unit Test should …

Focus on Behaviour

- e.g. requirements are behaviour
- names from (problem) domain
- full sentences
  (long, descriptive test method names)
- (expected behaviour **should**)
- separation per business module

Consist of 3 Simple Steps

- Prepare Input – **A**rrange
- Call Method – **A**ct
- Check Output – **A**ssert
- Use in form of **Given-When-Then**

- No conditional logic (→ more test cases)
- No loops (→ parametrized test)

Test Code Quality
must be equal
Prod. Code Quality

Try it yourself

Coding Dojo Mindset

- Safe place outside work
- We are here to learn
- Need to slow down
- Focus on doing it right
- Collaborative Game

Assignment

- Find a pair.
- Get https://bitbucket.org/pkofler/python-unittest-koans
- Run `run_tests` - should see no tests
- Go through the test code
  - assertions commented/ incomplete
  - uncomment the assertions
  - and complete them making tests pass

→Practice

Closing Circle

- What did you learn today?
- What surprised you today?
- What will you do differently in the future?

Peter Kofler

@codecopkofler

www.code-cop.org

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