The testing framework you've been dreaming of

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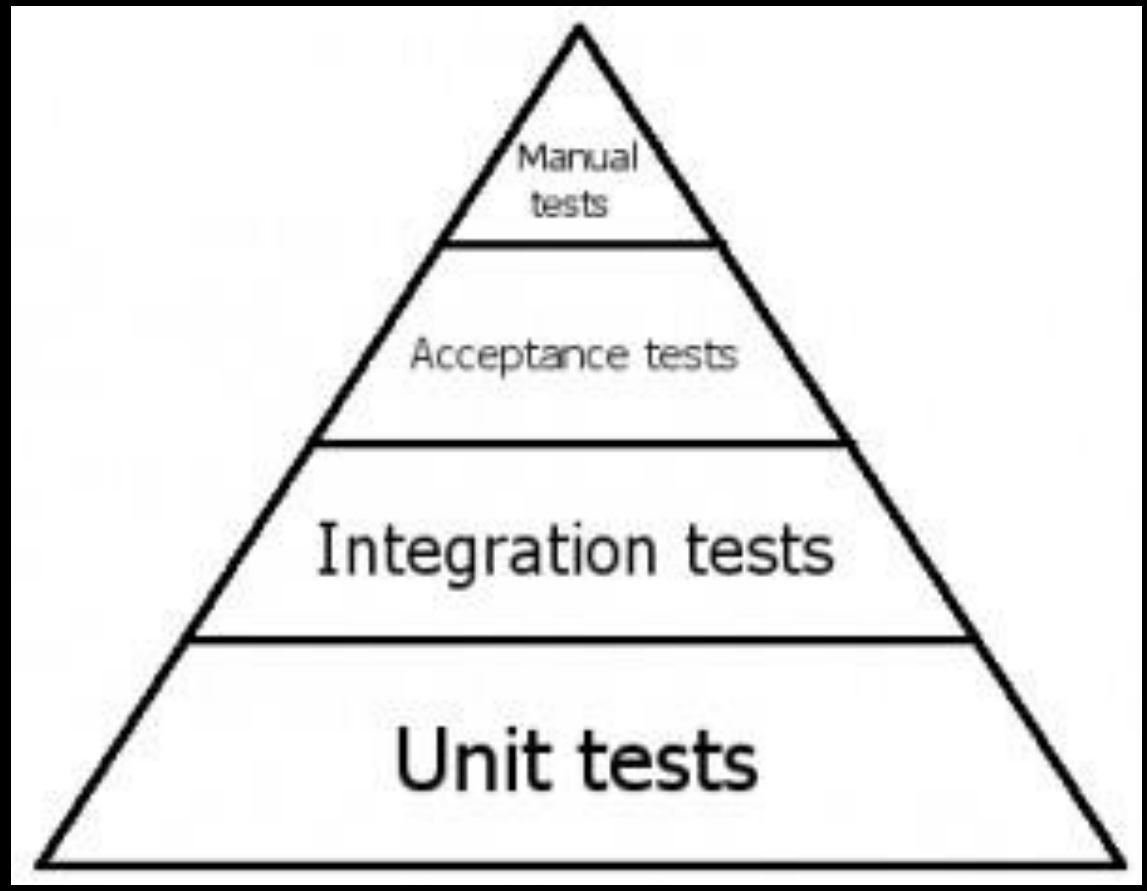
Agenda

- About unit testing
- Ready, Set, Go
- The power of assert
- Catching exceptions
- Fixtures and other features
- Advanced stuff
- Even more advanced stuff

About Unit Testing

- Kent Beck's sUnit
- Junit
- Python's unittest
- Py.test
- Hypothesis



Ready, Set, Go: No Boilerplate

- Installation

```
pip install -U pytest
```

- Writing a test (in test_something.py):

```
def test_something():
    assert twice(3) == 6
    with raises(ValueError):
        math.sqrt(-2)
```

- Running tests:

```
py.test
```

Example Run: Success

```
# py.test *.py --doctest-module --cov --cov-report=term-missing --pep8 --durations=6
================================= test session starts ==================================
platform linux -- Python 3.4.3, pytest-2.9.1, py-1.4.31, pluggy-0.3.1
rootdir: /home/pytest-examples, inifile:
plugins: pep8-1.0.6, cov-2.2.1
collected 121 items

example1.py ..
test_example1.py ..........................................................................................................
------------------ coverage: platform linux, python 3.4.3-final-0 --------------------
Name               Stmts   Miss Branch BrPart    Cover   Missing
-------------------------------------------------------------------
example1.py          104      0     62      0   100.0%
test_example1.py     212      0      4      0   100.0%
-------------------------------------------------------------------
TOTAL                316      0     66      0   100.0%

============================== slowest 6 test durations ================================
4.57s setup    test_example1.py::test_smtp1
1.15s call     test_example1.py
0.47s call     example1.py
0.24s call     test_example1.py::test_smtp2
0.23s call     test_example1.py::test_smtp1
0.11s call     example1.py::example1.to_datetime
============================== 121 passed in 8.33 seconds ==============================
```

Example Run: Failures

```
...
==================================== FAILURES ====================================
_____________________________________ test_upper _____________________________________
    def test_upper():
>       assert 'foo'.upper() == 'foo'
E       assert 'FOO' == 'foo'
E         - FOO
E         + foo

test_example1.py:71: AssertionError
_____________________________________ test_split _____________________________________
    def test_split():
        s = 'hello world'
>       assert s.split() == ['hello', 'world', 'with', 'error']
E       assert ['hello', 'world'] == ['hello', 'world', 'with', 'error']
E         Right contains more items, first extra item: 'with'
E         Use -v to get the full diff

test_example1.py:87: AssertionError
======================== 2 failed, 119 passed in 10.24 seconds ========================
```

Failures (closer look)

```
def test_upper():
>   assert 'foo'.upper() == 'foo'
E   assert 'FOO' == 'foo'
E     - FOO
E     + foo

def test_split():
    s = 'hello world'
>   assert s.split() == ['hello', 'world', ‘err']
E   assert ['hello', 'world'] == ['hello', 'world', 'err']
E     Right contains more items, first extra item: 'err'
E     Use -v to get the full diff
```

The Power of Assert (1)

```
# self.assertEquals(dbl(3), 6)
assert twice(3) == 6

# self.assertTrue('FOO'.isupper())
assert 'FOO'.isupper()

# self.assertFalse('foo'.isupper())
assert not 'foo'.isupper()
```

The Power of Assert (2)

```
# self.assertIs(type(dbl(3)), int)
assert type(twice(3)) is int

# self.assertIsNot(type(dbl(3)), str)
assert type(twice(3)) is not str

# self.assertIsNone(foo(3))
assert foo(3) is None

# self.assertIsNotNone(dbl(3))
assert twice(3) is not None
```

The Power of Assert (3)

```
# self.assertIn(dbl(3), [2, 4, 6])
assert twice(3) in [2, 4, 6]

# self.assertNotIn(dbl(3), [1, 2, 3])
assert twice(3) not in [1, 2, 3]

# self.assertIsInstance(foo(3), int)
assert isinstance(foo(3), int)

# self.assertNotIsInstance(foo(3), str)
assert not isinstance(foo(3), str)
```

The Power of Assert (4)

```
# self.assertAlmostEqual(dbl(3.00000001), 6)
assert round(twice(3.00000001) - 6) == 0

# self.assertNotAlmostEqual(dbl(3.01), 6)
assert round(twice(3.01) - 6) != 0

# self.assertGreater(foo(3), 5)
assert foo(3) > 5

# assertGreaterEqual, assertLess, assertLessEqual
```

Verifying exceptions

```
def test_raising_exceptions():
    with raises(ValueError):
        raise_exceptions_example(1)
    ...
```

Advanced Tests Invocations

```
py.test --failed-first --durations=8 -x
py.test -k something
py.test --pdb --cov
py.test --tb=long -showlocals
py.test -n 8
```

Fixtures: Definition

- Scope: module, class, method, function, session

```
@fixture(scope="module")
def smtp(request):
    _smtp = smtplib.SMTP("mail.eligur.com")
    def fin():
        _smtp.close()
    request.addfinalizer(fin)
    return _smtp
```

Fixtures: Usage

```
def test_smtp(smtp):
    response, msg = smtp.noop()
    assert response == 250
    assert msg.lower() == 'ok‘

def test_smtp2(smtp):
    response, msg = smtp.ehlo()
    assert response == 250
    assert msg.lower()[0] == 'server208.com'
```

Parametrize Tests

```
@pytest.mark.parametrize('obj', [
    '2008-01-31',
    '2008_1_31',
    '2008/01/31',
    '2008.1.31',
    '31/Jan/2008',
])
def test_to_date(obj):  # ymd
    assert to_date(obj) == date(2008, 1, 31)
```

Skipping Tests

```
slow = pytest.mark.skipif(
    not pytest.config.getoption("--runslow"),
    reason="need --runslow option to run"
)

@slow
def test_func_slow():
    ...
```

- Can also be simply skipped…

Expected Failures

```
@pytest.mark.xfail
def test_new_feature():
    ...
```

- Allow conditional
- When test will pass it will be marked **XPASS**

Plugins (a taste of)

- Coverage
- PEP8
- Django
- Twisted
- Flask
- Hypothesis
- Xdist
- Flakes
- Catchlog
- Mock

http://pypi.python.org/pypi?%3Aaction=search&term=pytest-&submit=search

Legacy and CI support

- Support CI, including post-process of test reports:

```
py.test --junitxml=path # Jenkins, Hudson
py.test --resultlog=path # PyPy-test
py.test --pastebin=all # bpaste.net
```

- Genscript
- cx_freeze
- Support Tox and virtualenv
- Support unittest automatically (collect + run)
- Support doctest, nose and PEP8

```
py.test --doctest-modules --pep8
```

More...

- monkeypatch, tmpdir
- Capturing stdout / stderr / logs
- Incremental testing (test steps)
- Integration with non-Python tests
- Configuration files

```
conftest.py
pytest.ini
.converagerc
```

Thank You!