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PHP ODESSA CONF

CONSTRUCTING A TEST PYRAMID

BECAUSE YOUR TESTS NEED ARCHITECTURE TOO

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ABOUT ME

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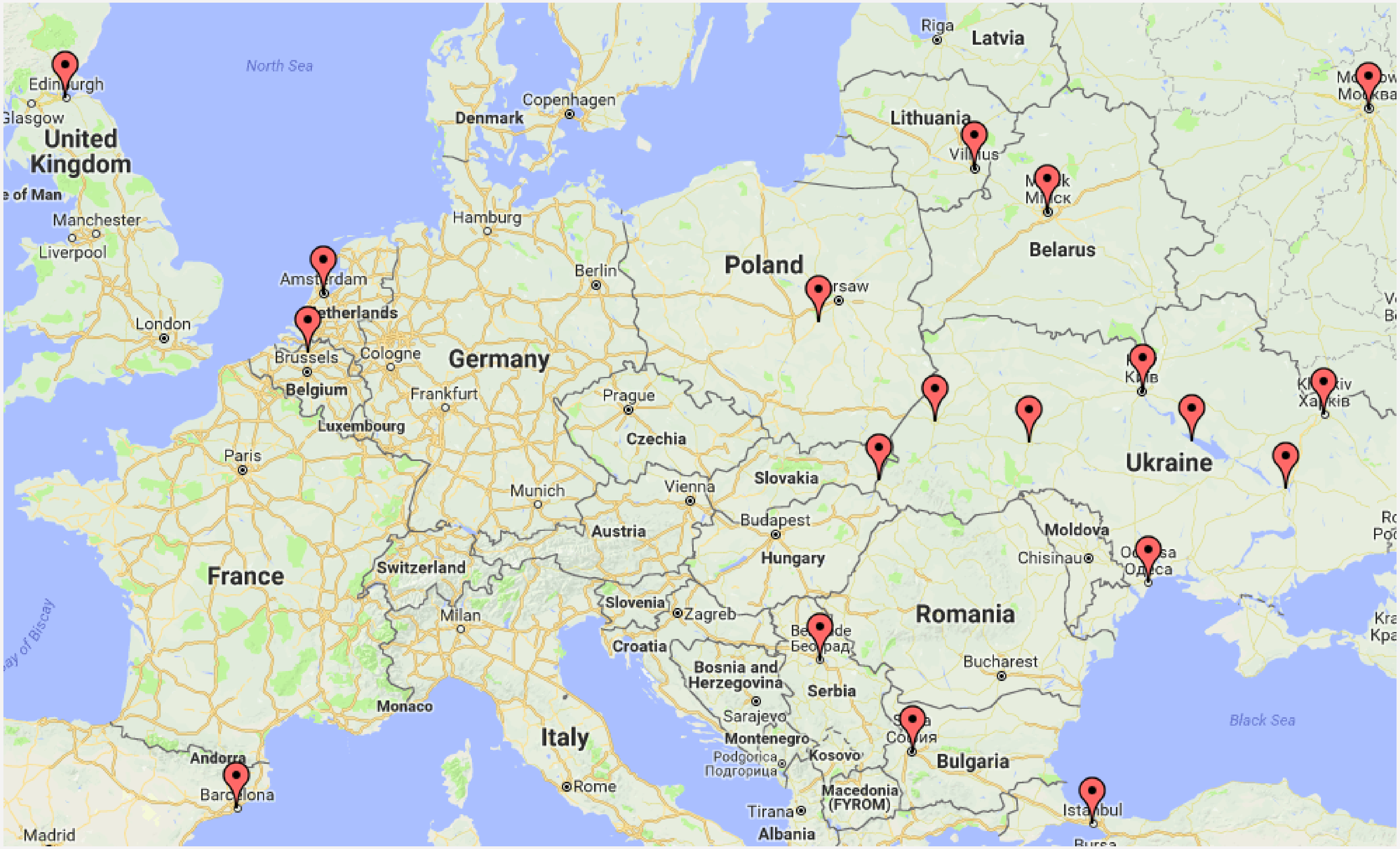
- Web developer from Kyiv, Ukraine
- Lead developer of **Codeception** testing framework
- Also author of CodeceptJS, Robo and others
- Tech **Consultant**, CTO at SDCLabs

OPEN SOURCE LOVER & CONFERENCE SPEAKER



TESTING BUSINESS EXPECTATIONS

WHY DO WE TEST

- To ensure software works as expected
- To discover bugs in software (before users)
- To measure performance
- To seek for security issues

WHAT TESTS WE CAN AUTOMATE

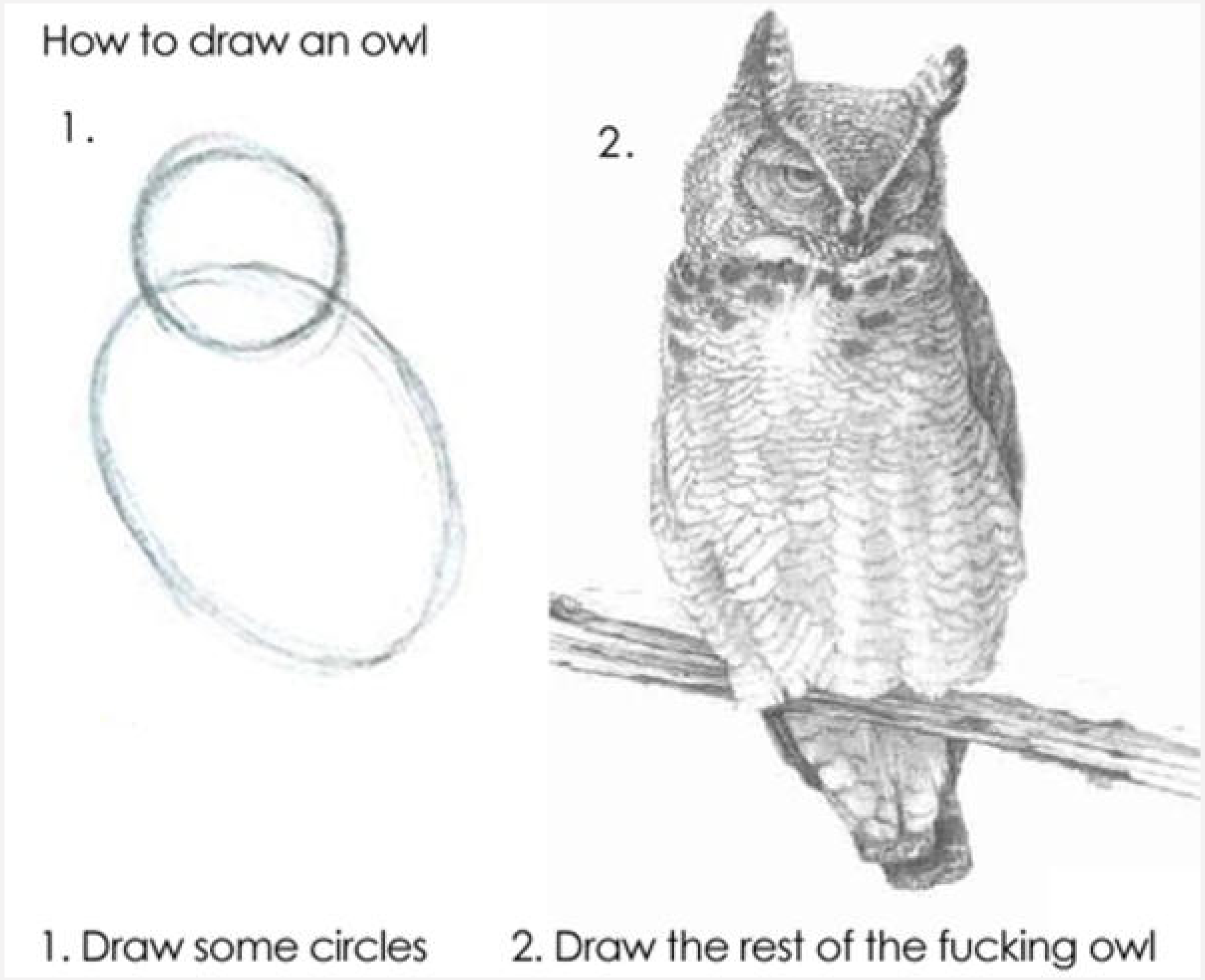
- To ensure software works as expected
- ~~To discover bugs in software (before users)~~
- To measure performance
- ~~To seek for security issues~~

We automate tests to execute them at any time

AUTOMATED TESTING

- To establish trust
- For constant changes
- To stabilize current codebase

TESTING IS TOLD US TO BE LIKE THIS:



We talk about how to test but we don't say

WHAT TO TEST

PRIORITY FIRST

- Crucial **business scenarios**
- Security cases
- Algorithms, functions with complex logic
- Everything that is hard to test manually

TESTS SHOULD BE

- Independent - not affect each other
- Atomic - concentrated on one feature

START WITH GENERAL

```
Feature: customer registration

Background:
  Given I am unregistered customer

Scenario: registering successfully
  When I register
  Then I should be registered
```

ADD DETAILS

```
Scenario: registering successfully
  When I register with
    | Name       | davert              |
    | Email      | davert@sdclabs.com  |
    | Password   | 123456              |

  Then I should be registered
  And I receive confirmation email
```

QUALITIES OF A TEST

1. Readability
2. Stability
3. Speed

READABILITY

- TEST SHOULD BE EASY TO FOLLOW
- TEST SHOULD BE SIMPLE TO UPDATE
- CODE CAN BE REUSED TO TEST SIMILAR CASES

```
$request = $this->getRequest()
    ->setRequestUri('/user/profile/1')
    ->setParams(array('user_id'=>1));

$controller = $this->getMock(
    'UserController',
    array('render'),
    array($request, $response, $request->getParams())
);
$controller->expects($this->once())
         ->method('render')
         ->will($this->returnValue(true));

$this->assertTrue($controller->profileAction());
$this->assertTrue($controller->view->user_id == 1);
```

STABILITY

- TEST SHOULD BE STABLE BY EXECUTION
- TEST SHOULD BE STABLE TO CHANGES

```
$mock = $this->getMock('Client', array('getInputFilter'));
$mock->expects($this->once()) // is it important?
    ->method('getInputFilter') // hardcoded method name
    ->will($this->returnValue($preparedFilterObject));

$formFactory = $this->getMock('Symfony\Component\Form\FormFactoryInterfa
$formFactory
    ->expects($this->once())
    ->method('create')
    ->will($this->returnValue($form))
```

Codeception + WebDriver

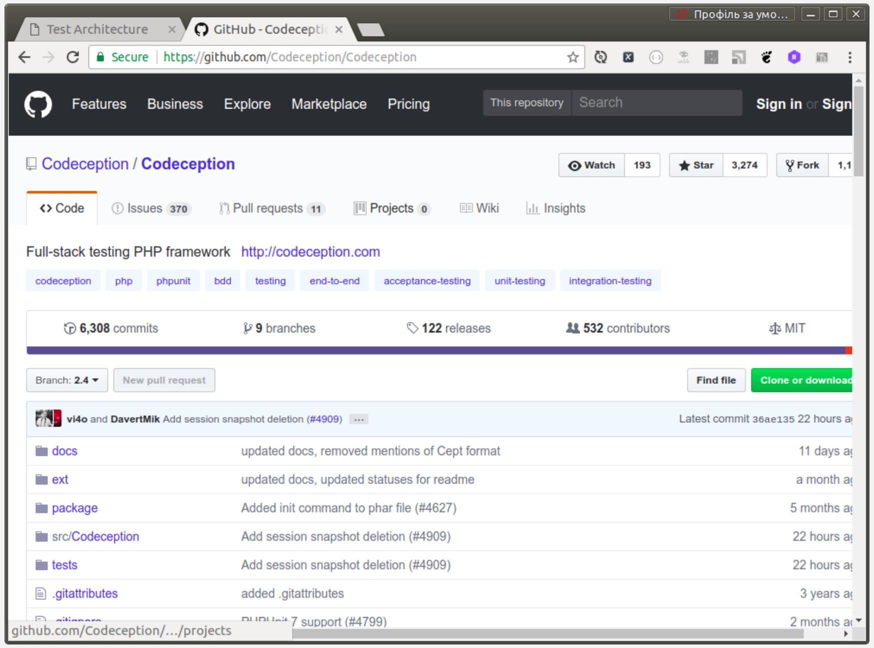
```
// what if HTML changes?
$I->click('//body/div[3]/p[1]/div[2]/div/span');

// what if browser will render it longer?
$I->wait(1);
```

HOW TO WRITE STABLE TESTS

- Don't mix specification with implementation
- Use interfaces for tests
- Focus on result, not on the path

Blogpost: Expectation vs Implementation

INTERFACES???



Codeception / Codeception

Full-stack testing PHP framework http://codeception.com

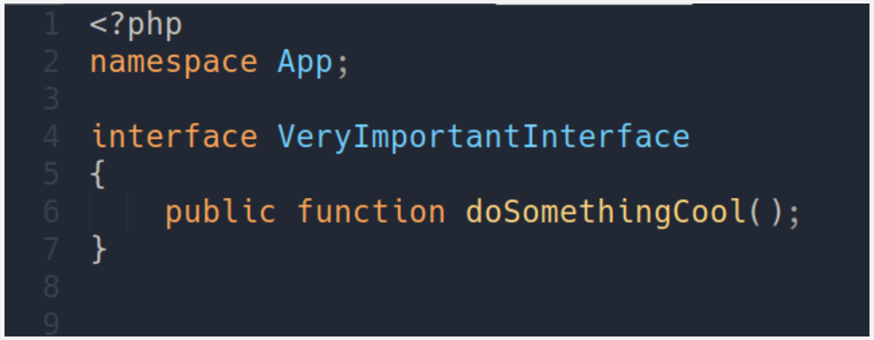
codeception php phpunit bdd testing end-to-end acceptance-testing unit-testing integration-testing

6,308 commits 9 branches 122 releases 532 contributors MIT

vi4o and DavertMik Add session snapshot deletion (#4909) … Latest commit 36ae135 22 hours a

docs	updated docs, removed mentions of Cept format	11 days ag
ext	updated docs, updated statuses for readme	a month ag
package	Added init command to phar file (#4627)	5 months ag
src/Codeception	Add session snapshot deletion (#4909)	22 hours ag
tests	Add session snapshot deletion (#4909)	22 hours ag
.gitattributes	added .gitattributes	3 years ag
.gitignore	PHPUnit 7 support (#4799)	2 months ag

github.com/Codeception/.../projects



```php
<?php
namespace App;

interface VeryImportantInterface
{
    public function doSomethingCool();
}
```

WHAT ARE INTERFACES

- Interface define rules to get things done
- Interfaces considered stable
- Interface is not just a keyword

5 STAGES OF INTERFACE CHANGE

POKER FACE
FFFFFF
FFFFFF
FFFFFF
FFFFFF
FUUU
UUUU
UUUU
UUUU
UUUU
UUUU
Okay
denial
anger
bargaining
depression
acceptance

ANCHOR TESTS TO STABLE PARTS:

- Web Interface
- Public API (REST, GraphQL, SOAP)
- PHP Interfaces
- Public Methods in Domain

CONSIDER WHAT IS STABLE FOR YOU

CAN WE TEST PRIVATE METHODS?

- **Technically**: yes
- **Ideally**: no
- **Practically**: yes, if you consider them stable

FOCUS ON RESULT

- Will the test have to duplicate exactly the application code?
- Will assertions in the test duplicate any behavior covered by library code?
- Is this detail important, or is it only an internal concern?

Blogpost: The Right Way To Test React Components

SPEED

- **FOR ONE TEST CASE:**
    - fast enough for instant feedback
    - < 20 s
- **FOR ALL TESTS**
    - should be run on CI
    - easy to split into parallel processes
    - < 20 min

QUESTIONS TO BE ASKED

- Should we sacrifice readability for speed?
- If so, why do you develop in PHP and not in C?

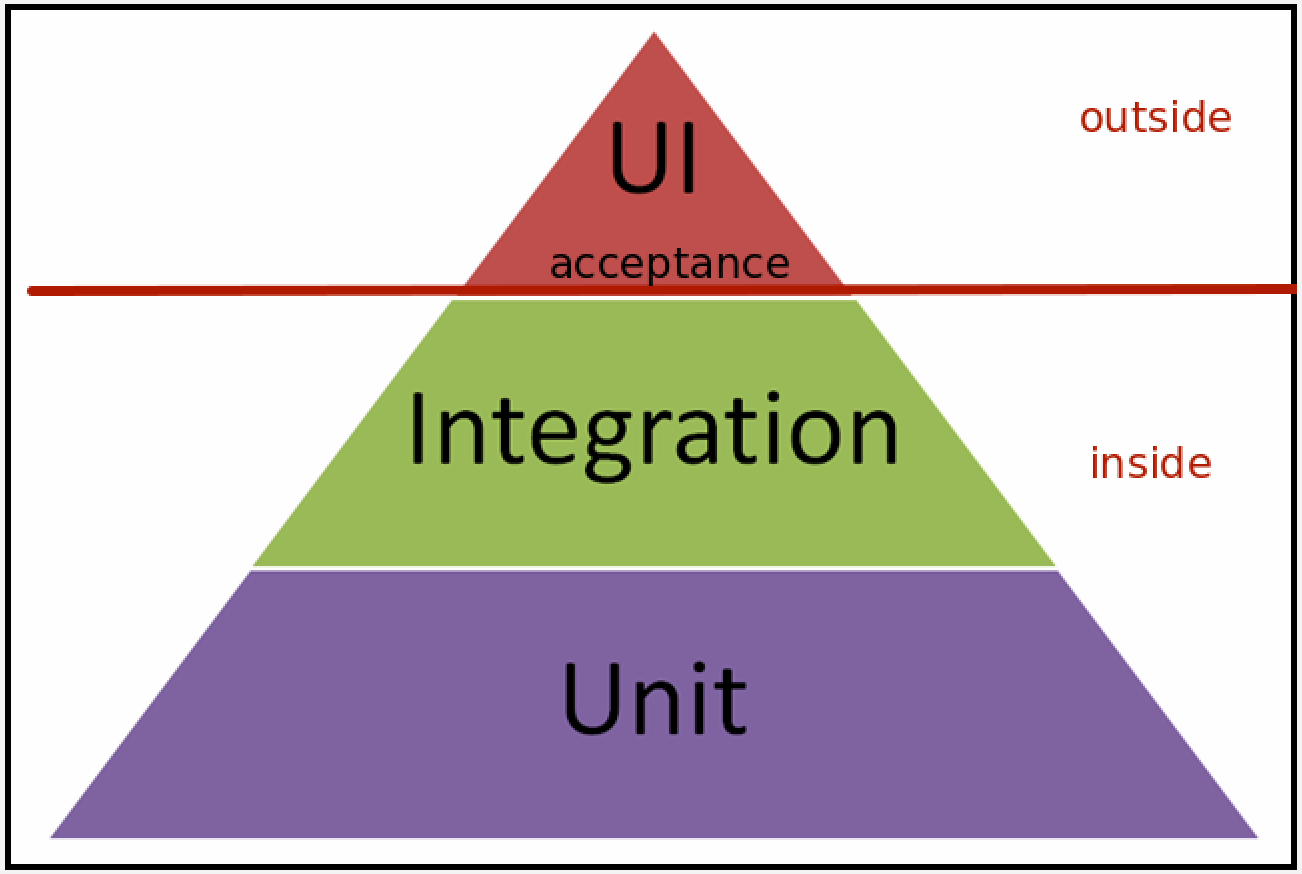
Think how you can test a feature with minimal effort

TEST INFRASTRUCTURE

Let's talk about implementation

OUTER AND INNER TESTING

- **Outer**: test from the public interface
- **Inner**: test from the source code


UI
acceptance
outside
Integration
inside
Unit

TEST TYPES

- Outer
  - Acceptance: Browser-based UI tests
  - Characterization: CURL-based request/response
- Inner
  - Functional: Request/response emulation
  - Integration: Service with its dependencies
  - Unit: Service in pure isolation

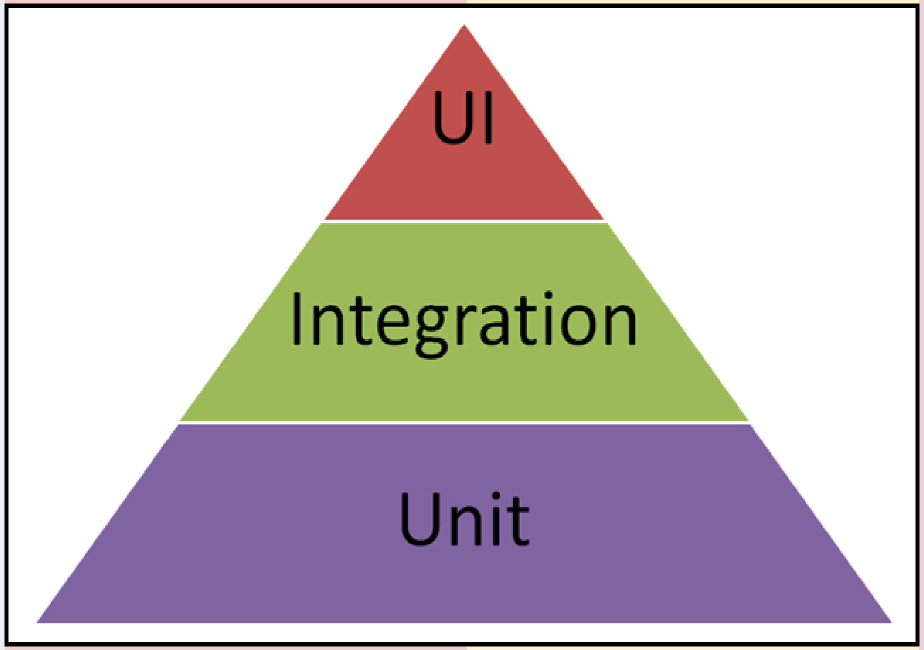
Know Pros and Cons

Stability to Changes

Wide Coverage

Invest into Infrastructure

Speed of Development

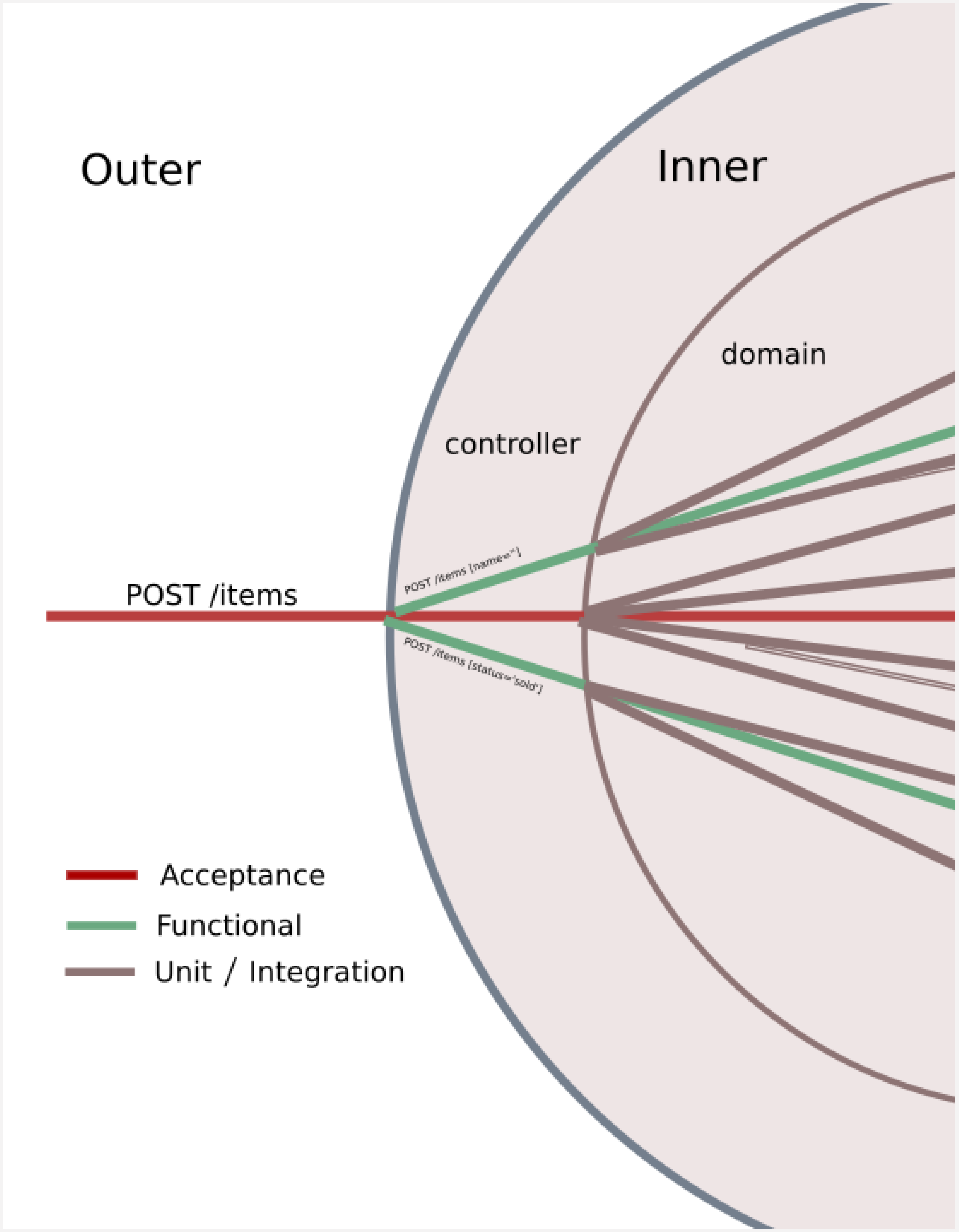


Stability of Execution

Detailed Coverage

Invest into Architecture

Speed of Execution


Outer
Inner
domain
controller
POST /items
POST /items [name=""]
POST /items [status='sold']
Acceptance
Functional
Unit / Integration

HOW TO BUILD TEST ARCHITECTURE?

WHAT TO TEST

- Write down specifications
- Choose specifications which should be tested
- Write examples for specification
- Choose the testing layer

The more specific example we need to test the more detailed layer we choose.

ACCEPTANCE VS FUNCTIONAL VS UNIT

1. Choose a testing layer where test would be
   - Readable
   - Stable
   - Fast enough
2. Write a test
3. Repeat
4. Refactor!

UNIT VS INTEGRATION TESTS

- Unit Tests for
  - pure functions
  - algorithms
  - complex data
  - dozen execution paths
- Integration tests for
  - everything else

MOCKS

- Are dangerous:
  - Affect readability
  - Affect stability
- Should be used for
  - Async services
  - 3rd-party services
  - Remote services

Even you can write a unit test with mocks it doesn't mean you should

TDD || !TDD

- Is a team choice
- Hard to start (nothing is stable)
- Use TDD to discover specifications
- Plays nicely with outer and inner testing

BDD || !BDD

- Writing tests in English is not about BDD at all
- BDD has its cost
- Use BDD when non-technical mates involved
    - *(when management is actually going to read your tests)*

TEST ARCHITECTURE TEMPLATES

NEW PROJECT. HOW TO TEST?

- Domain Layer should have unit / integration tests
- Application layer should have integration / functional tests
- UI should have acceptance tests with positive scenarios

EARLY STAGES STARTUP. HOW TO TEST?

- Uncertainty Problem:
  - We don't have strict requirements
  - We can do pivot any day
  - We are unsure of EVERYTHING 😨
- Solution:
  - Test only when you stabilize the code
  - Start with Public API, Domain Logic

LEGACY PROJECT. HOW TO TEST?

- Detect the critical parts of a system
- Write acceptance tests for them
- Refactor old code
- Cover the new code with unit tests

CONCLUSIONS

- Discover what to test
- Find a suitable level of testing
- Write readable+stable+fast tests!

QUESTIONS!

... or holywars 😇

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