



A Sweet Test Suite

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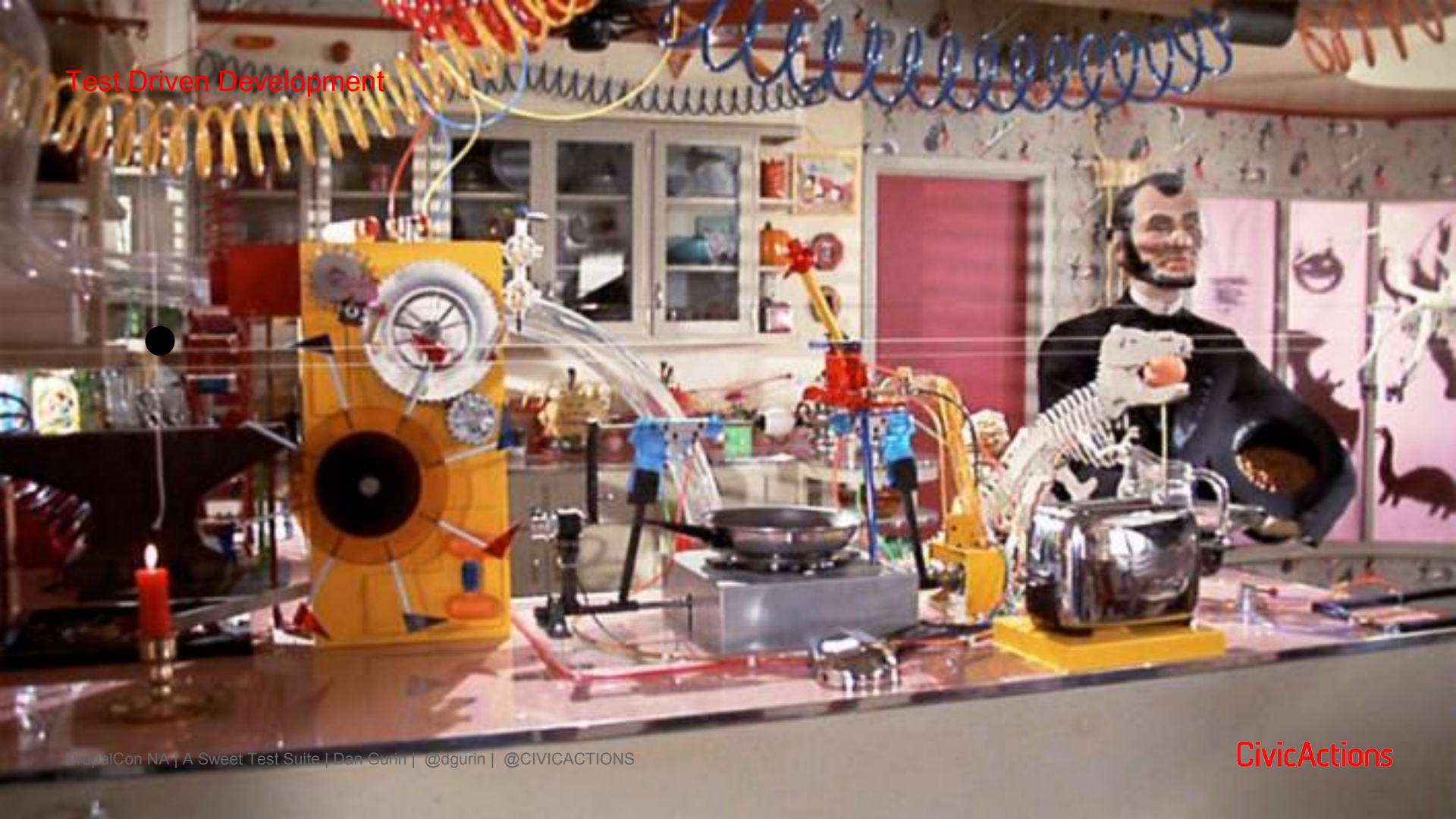


Test Driven Development

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Test Driven Development

Balance

- High quality
- ~~Burn out~~



Test Suites: **1 passed**, 1 total

Tests: **8 passed**, 8 total

Snapshots: 0 total

Time: **5.568s**

Ran all test suites.

Done in 11.20s.

[ExecStack] Done in **01:48** CivicActions

Test Driven Development

1. **Visual Regression Testing**
2. Behavior-Driven Development (BDD) with Behat
3. Unit testing with PHPUnit



Visual Regression Testing

- **Good coverage**
- **Display changes**
- **Great for updates**

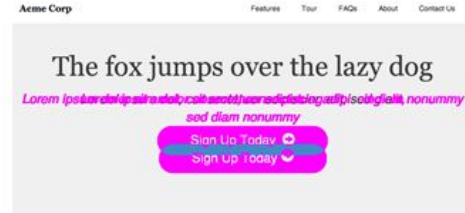
Visual Regression Testing



after

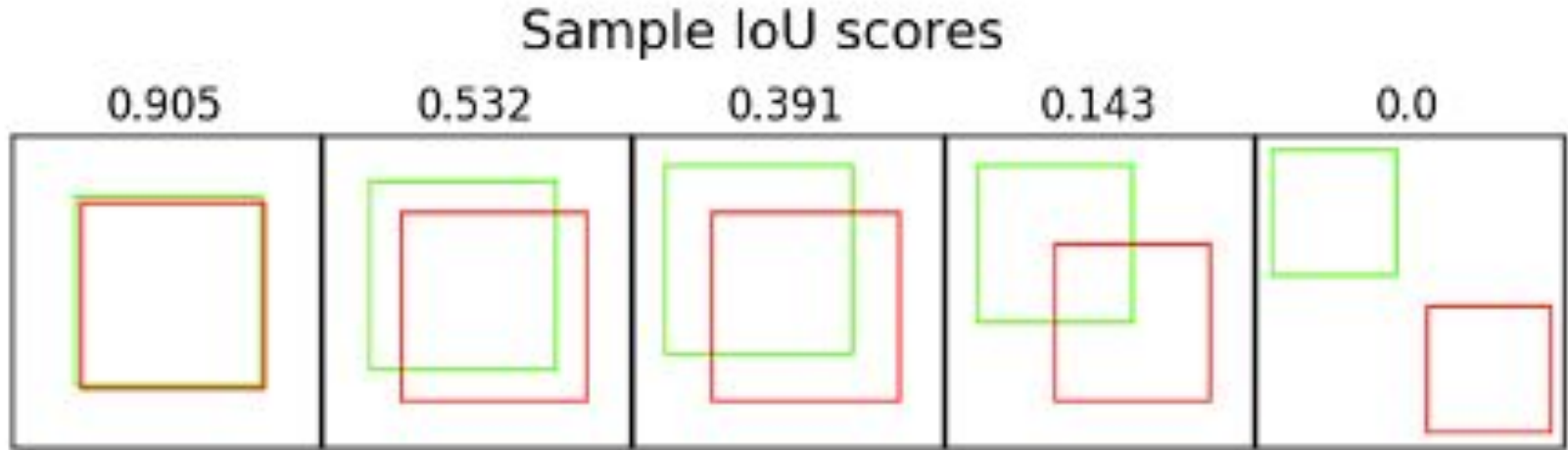


before



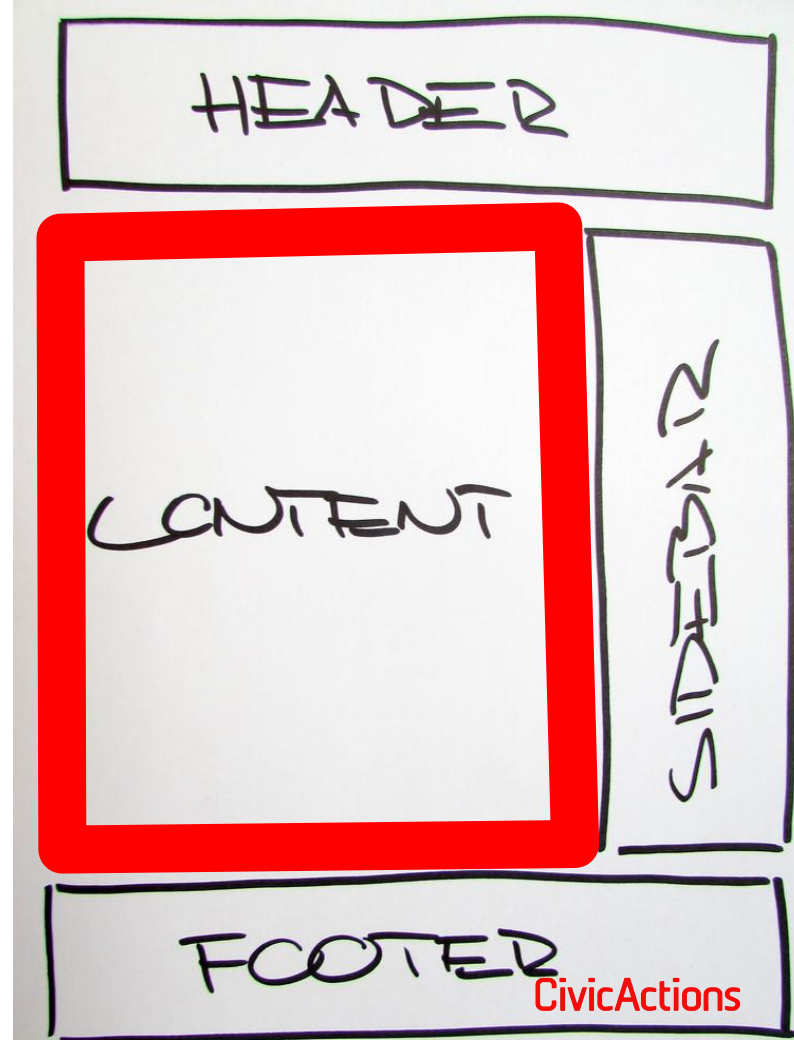
diff

Intersection over Union IoU



Visual Regression Testing with WebdriverCSS

Partial Page Comparison



Test Driven Development

1. Visual Regression
Testing

2. Behavior-Driven
Development (BDD) with
Behat

3. Unit testing with PHPUnit



Behat Drupal Extension

- Plain language
- Common step definitions
- Extensible extension



Feature: Some terse yet descriptive text of what is desired

In order to realize a named business value

As an explicit system actor

I want to gain some beneficial outcome which furthers the goal

Scenario: Some determinable business situation

Given some precondition

And some other precondition

When some action by the actor

And some other action

And yet another action

Then some testable outcome is achieved

And something else we can check happens too

Scenario: A different situation

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...

Tags

- **Driver @api @javascript**
- **Groups @database @form**
- **Hooks**
 - @beforeNodeCreate
 - @AfterScenario

Drivers

Blackbox		No privileges
Drupal	@api	More step definitions
Drush	@api	Can run on a different server

Configuration

- **behat.yml**
default:extensions:Drupal\DrupalExtension
- **api_driver**

Drush

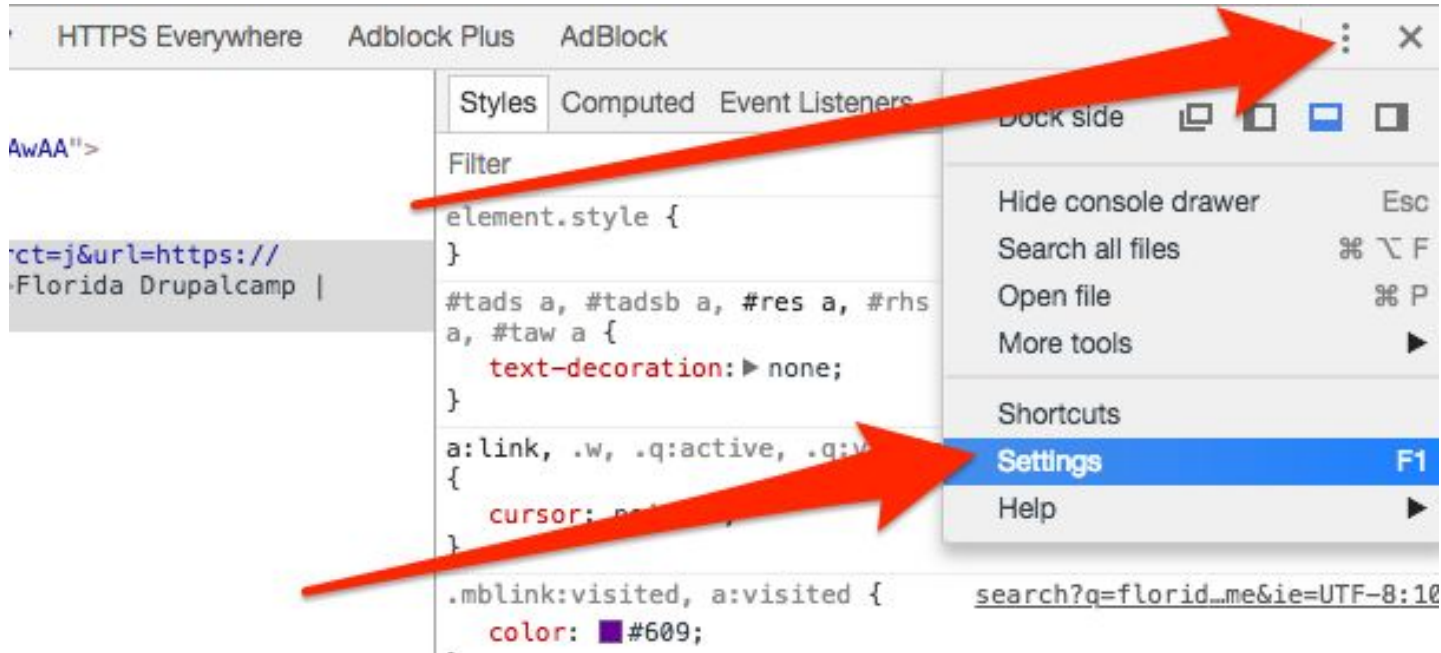
- **SSH**
- **profile:extension:drush:alias:elias**
- **Given I run drush cache-rebuild**
- **behat -p elias**

machine_name *

Machine Name

- Completed by JavaScript
- w/o PhantomJS & @javascript
- incomplete required field

Chrome Dev Tools



Turn off JS

Settings

- Preferences
- Workspace
- Blackboxing
- Devices
- Throttling
- Shortcuts

Preferences

Appearance

- Show What's New after each update
- Show third party URL badges
- Theme:
- Panel layout:
- Enable Ctrl + 1-9 shortcut to switch panels
- Don't show Chrome Data Saver warning
- Disable paused state overlay

Sources

- Search in anonymous and content scripts
- Automatically reveal files in navigator
- Enable JavaScript source maps
- Detect indentation
- Autocompletion
- Bracket matching
- Show whitespace characters:
- Display variable values inline while debugging

Elements

- Color format:
- Show user agent shadow DOM
- Word wrap
- Show HTML comments
- Reveal DOM node on hover
- Show rulers

Network

- Color-code resource types
- Group network log by frame
- Disable cache (while DevTools is open)
- Force ad blocking on this site
- Preserve log
- Enable request blocking

Performance

- Flamechart mouse wheel action:
- Show native functions in JS Profile

Console

- Hide network messages
- Selected context only
- User messages only
- Log XMLHttpRequests
- Show timestamps
- Autocomplete from history
- Group similar
- Enable custom formatters
- Preserve log upon navigation

Extensions

- Link handling:

Persistence

- Enable Local Overrides

Debugger

- Disable JavaScript
- Disable async stack traces

Comments

- # on a line followed by a hashtag
 - Syntax aware editor?
- Control or Command + Slash /
to comment out line(s)**



Background & Tables

- All Scenarios
- Many items

Background:

Given pages:

name	url	
Groups	/groups	
Content	/admin/content/	

Given users:

name	mail	roles	
John	john@example.com	site manager	
Badmin	admin@example.com	site manager	
Gabriel	gabriel@example.com	editor	
Jaz	jaz@example.com	editor	
Katie	katie@example.com	editor	
Martin	martin@example.com	editor	
Celeste	celeste@example.com	editor	

Given groups:

title	author	published	
Group 01	Badmin	Yes	
Group 02	Badmin	Yes	
Group 03	Badmin	No	

And group memberships:

user	group	role on group	membership status	
Gabriel	Group 01	administrator member	Active	
Katie	Group 01	member	Active	
Jaz	Group 01	member	Pending	
Celeste	Group 02	member	Active	

Tables

```
@group admin_11
Scenario Outline: View group role permissions of any group
  Given I am logged in as "John"
  And I am on "Group 01" page
  And I click "Group"
  And I click "Permissions (read-only)"
  Then I should see the list of permissions for "<role name>" role
```

Examples:

role name
non-member
member
administrator member

Contexts

- **Drupal - users, terms, and nodes**
 - DrupalRaw - functionality
- **Mink - regions and forms**
- **Markup - tags, classes, & attributes**
- **Message - notice, warning, & error**
- **Drush - call commands directly**

Custom Contexts


FeatureContext.php file

CustomContext class

- 1. Write the step**
- 2. Run the test (it will fail)**
- 3. Copy the generated snippet**

Custom Contexts

```
--- Drupal\FeatureContext has missing steps. Define them with these snippets:  
  
/**  
 * @Given I am doing something new and exciting  
 */  
public function iAmDoingSomethingNewAndExciting()  
{  
    throw new PendingException();  
}
```



Custom Contexts

```
PHP Fatal error: Class 'Drupal\PendingException' not  
Fatal error: Class 'Drupal\PendingException' not found  
[Testing\Behat] Exit code 255  
[error] Behat tests failed!
```

Custom Contexts

- 1. Delete exception**
- 2. Add code**
- 3. Test again**

Args in Custom Contexts

```
/**
 * @Given I create a webform :arg1
 */
public function iCreateAWebform($arg1)
{
    if (!empty($arg1)) {
        Webform::create(['id' => $arg1])->save();
    }
}
```

Args in Step Definitions

Given I am logged in as a user with the
'Administrator' role

When I create a webform

"a_test_webform"

Custom Contexts

```
/**
 * @Given I edit the current entity
 */
public function iEditTheCurrentEntity()
{
    $currentPath = $this->getSession()->getCurrentUrl();
    $newPath = "{$currentPath}/edit";
    $this->getSession()->visit($newPath);
}
```

Custom Combo

```
/**
 * Saves the current URL into a property.
 *
 * @Then save the current URL
 */
public function saveTheCurrentUrl()
{
    $this->url = $this->getSession()->getCurrentUrl();
}
```

Custom Combo

```
/**
 * Retrieves previously saved URL.
 *
 * @When I go to saved URL
 */
public function iGoToSavedUrl()
{
    $this->getSession()->visit($this->url);
}
```

Debugging

- **Steps**
 - print current url
 - print last response
- **print_r(\$variable);**
- **Screenshots / Page source code**
- **behat :99**

Sub contexts

- **Contrib & Custom projects**
 - **Modules**
 - **Themes**

Contributing

- **Behat Drupal Extension**
- **<https://github.com/Behat/Behat/blob/master/CONTRIBUTING.md>**
- **<http://mink.behat.org/en/latest/contributing.html>**

Test Driven Development

1. Visual Regression Testing
2. Behavior-Driven Development (BDD) with Behat
3. **Unit testing with PHPUnit**



Drupal 8 PHPUnit Suites

<u>Name</u>	<u>Extend</u>	<u>State</u>	<u>Requires</u>
Unit	UnitTestCase	None	Code
Kernel	KernelTestBase	Bootstrapped	Database
Functional	BrowserTestBase	Booted	Webserver
Javascript	JavascriptTestBase	Booted	PhantomJS

Unit

```
use Drupal\Tests\UnitTestCase;
class MySweetTest extends UnitTestCase {
    public function testExample() {
        $this->assertEquals( expected: 1, actual: 1);
    }
}
```

Assertions

- **Equals =**
- **Same ==**
- **True / False**
- **PHPUnit Documentation Appendix A**

<https://phpunit.de/manual/current/en/phpunit-book.html#appendixes.assertions>

Kernel

- **API**
- **Decoupled**
- **Setup**
- **Config**



Enable modules

```
/**  
 * {@inheritdoc}  
 */  
public static $modules = ['webform'];
```

Setup

- **Top of the class**
- **Applies to all test functions**
- **Set up the parent first**

Install DB & Config

- **(Entity) Schema**
- **Configuration**

setUp

```
use Drupal\KernelTests\KernelTestBase;
class TheClassImKernelTesting extends KernelTestBase {
    protected function setUp() {
        parent::setUp();
        $this->installSchema( module: 'webform', [
            'webform_submission',
            'webform_submission_data',
        ]);
        $this->installEntitySchema( entity_type_id: 'node');
        $this->installConfig(['system', 'maillog']);
    }
}
```

Install Fields

- **Get from configuration management**
- **Create n' Save**
 - Storage
 - Field

```
$yml = yaml_parse(file_get_contents( filename: $configPath . "/field.storage.{entityType}.{fieldName}.yml"));  
FieldStorageConfig::create($yml)->save();  
$yml = yaml_parse(file_get_contents( filename: $configPath . "/field.field.{entityType}.{bundle}.{fieldName}.yml"));  
FieldConfig::create($yml)->save();
```


Functional

- Enable modules
- Paths!
- Web assert

Functional Example

```
use Drupal\Tests\BrowserTestBase;  
class MyClassTest extends BrowserTestBase {  
    public function testMyTest() {  
        $this->drupalGet( path: '' ); // Gets homepage.  
        $this->assertSession()->statusCodeEquals(200);  
        $this->assertSession()->linkExists('Blog');  
    }  
}
```

JavaScript Phantom JS

- **executeScript / evaluateScript**
- **switchToFrame**
- **keyDown**
- **resizeWindow**
- **wait**

JavascriptTestBase

- **createScreenshot**
- **getDrupalSettings**

JavaScript Assertions

- **assertJsCondition**
- **assertElement(Not)Visible**

assertSession

- **waitFor**

**AjaxToFinish, Button, Element(Visible),
Field, Link**

- **waitOnAutocomplete**
- **responseContains**
- **isVisible**

Test Doubles

Return a value
without the object



Mock Objects

```
$webform = $this->getMockBuilder( className: 'Drupal\webform\Entity\Webform')
    ->disableOriginalConstructor()
    ->setMethods(['id'])
    ->getMock();
$webform->expects($this->once())
    ->method('id')
    ->will($this->returnValue( value: 'a_test_webform'));

$webformId = $webform->id();
```


Base Classes

- **Common setups**
- **Nested levels**

Traits

- **Code reuse in many classes**
- **Groups sets of methods**
- **Can not be instantiated**

Reflection Trait

Test protected / private methods

```
public function invokeMethod(&$object, $methodName, array $parameters = []) {  
    $reflection = new \ReflectionClass(get_class($object));  
    $method = $reflection->getMethod($methodName);  
    $method->setAccessible(TRUE);  
  
    return $method->invokeArgs($object, $parameters);  
}
```

Trait in action

```
class SubmissionServiceApiTest extends KernelTestBase
{
    use ReflectionTrait;
    function testMcTest() {
        $assembledData = $this->invokeMethod(
            $this->submissionServiceApi,
            'assembleRequestData',
            [$this->request]
        );
    }
}
```

Data Providers

- Run same test with different datasets

```
/**
 * @dataProvider sumProvider
 */
public function testSum($a, $b, $sum) {
    $this->assertEquals($sum, $a + $b);
}

public function sumProvider() {
    return [
        [1, 2, 3],
        [4, 5, 9],
        [7, 8, 9]
    ];
}
```

Named Data Providers

- Named dataset via associative array

```
/**
 * @dataProvider sumProvider
 */
public function testSum($a, $b, $sum) {
    $this->assertEquals($sum, $a + $b);
}

public function sumProvider() {
    return [
        'easy as' => [1, 2, 3],
        'niner' => [4, 5, 9],
        'false' => [7, 8, 9]
    ];
}
```

Debugging

- **print_r(\$whatEver);**
- **Screenshots**
- **Reports**
- **Error/failure messages**

Running tests

- **phpunit --options arguments**
- **blt:tests phpunit**
- **CI**
- **@group**
- **. = pass, E = error, F = Failure**

Happy & Sad Paths

- Test failure as well as success
- `expectException()`
 - Code, Message, MessageRegExp



Open Discussion

Thank you.

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