

# **Test Driven Drupal Development with SimpleTest and PHPUnit**

# opdavies

- Web Developer and Linux System Administrator
- Drupal core contributor, mentor, contrib module maintainer
- Senior Drupal Developer, Appnovation

# Why Test?

- Write better code
- Write less code
- Piece of mind
- Ensure consistency
- Drupal core requirement - <https://www.drupal.org/core/gates#testing>

# Why Not Test?

No time/budget to write tests.

# Core Testing Gate

*New features should be accompanied by automated tests.*

*If the feature does not have an implementation, provide a test implementation.*

*Bug fixes should be accompanied by changes to a test (either modifying an existing test case or adding a new one) that demonstrate the bug.*

– <https://www.drupal.org/core/gates#testing>

# Testing in Drupal

## SimpleTest

- Based on <http://www.SimpleTest.org>
- In D7 core
- \*.test files
- All test classes in one file

# Testing in Drupal

## PHPUnit

- Used in other PHP projects (e.g. Symfony, Laravel)
- In D8 core, but not default
- \*.php files
- One test class per file

# The PHPUnit Initiative

- <https://www.drupal.org/node/2807237>
- D8 core tests to change to PHPUnit
- Deprecate SimpleTest, remove in D9
- "A big chunk of old tests" converted on Feb 21st



# The PHPUnit Initiative

*As part of the PHPUnit initiative **a considerable part of Simpletests will be converted to PHPUnit based browser tests on February 21st 2017**. A backwards compatibility layer has been implemented so that many Simpletests can be converted by just using the new `BrowserTestBase` base class and moving the test file. There is also a script to automatically convert test files in the conversion issue.*

**Developers are encouraged to use `BrowserTestBase` instead of `Simpletest` as of **Drupal 8.3.0****, but both test systems are fully supported during the Drupal 8 release cycle.

*The timeline for the deprecation of Simpletest's `WebTestBase` is under discussion.*

– <https://groups.drupal.org/node/516229>

# Types of Tests

## Unit Tests

- Tests PHP logic
- No database interaction
- Fast to run

# Types of Tests

## Web Tests

- Tests functionality
- Interacts with database
- Slower to run

# Writing Testable Code

- Single responsibility principle
- DRY
- Dependency Injection
- Interfaces

# Test Driven Development (TDD)

- Write a test, see it fail
- Write code until test passes
- Repeat
- Refactor when tests are green

# Writing Tests

```
# example.info
```

```
name = Example
```

```
core = 7.x
```

```
files[] = example.test
```

```
// example.test

class ExampleTestCase extends DrupalWebTestCase {

    public static function getInfo() {
        return array(
            'name' => 'Example tests',
            'description' => 'Web tests for the example module.',
            'group' => 'Example',
        );
    }

}
```



```
class ExampleTestCase extends DrupalWebTestCase {  
  
    ...  
  
    public function testSomething {  
        $this->assertTrue(TRUE);  
    }  
  
}
```

# Creating the World

```
public function setUp() {  
    // Enable any other required modules.  
    parent::setUp(['foo', 'bar']);  
  
    // Anything else we need to do.  
}
```

# Creating the World

```
$this->drupalCreateUser();
```

```
$this->drupalLogin();
```

```
$this->drupalCreateNode();
```

```
$this->drupalLogout();
```

# Assertions

- `assertTrue`
- `assertFalse`
- `assertNull`
- `assertNotNull`
- `assertEquals`

# Assertions

- `assertRaw`
- `assertResponse`
- `assertField`
- `assertFieldById`
- `assertTitle`

# Running Tests

# Testing +

LIST

SETTINGS

## TESTS

Select the test(s) or test group(s) you would like to run, and click *Run tests*.

<input type="checkbox"/>	TEST	DESCRIPTION
<input type="checkbox"/>	▶ Actions	
<input type="checkbox"/>	▶ Aggregator	
<input type="checkbox"/>	▶ AJAX	
<input type="checkbox"/>	▶ Batch API	
<input type="checkbox"/>	▶ Block	
<input type="checkbox"/>	▶ Blog	
<input type="checkbox"/>	▶ Book	
<input type="checkbox"/>	▶ Bootstrap	
<input type="checkbox"/>	▶ Cache	
<input type="checkbox"/>	▶ Collection class	
<input type="checkbox"/>	▶ Color	
<input type="checkbox"/>	▶ Comment	
<input type="checkbox"/>	▶ Comment Hide Subject	
<input type="checkbox"/>	▶ Contact	
<input type="checkbox"/>	▶ Contextual	

[Home](#)

## Running tests ⊕



Processed test 5 of 11 - *Block HTML id.*

45%

**Overall results: 343 passes, 0 fails, 0 exceptions, and 83 debug messages**

- Block HTML id: 16 passes, 0 fails, 0 exceptions, and 5 debug messages
- Blocks not in hidden region: 15 passes, 0 fails, 0 exceptions, and 4 debug messages
- Block rehash: 81 passes, 0 fails, and 0 exceptions
- Block caching: 213 passes, 0 fails, 0 exceptions, and 68 debug messages
- Admin theme block admin accessibility: 18 passes, 0 fails, 0 exceptions, and 6 debug messages



# Test result

 The test run finished in 2 min 19 sec.

## ACTIONS

Filter All (11) Run tests [Return to list](#)

## RESULTS

759 passes, 0 fails, 0 exceptions, and 213 debug messages

▶ ADMIN THEME BLOCK ADMIN ACCESSIBILITY

▶ BLOCK CACHING

▶ BLOCK REHASH

▶ BLOCKS NOT IN HIDDEN REGION

▶ BLOCK HTML ID

▶ BLOCKS IN INVALID REGIONS

▶ BLOCK TEMPLATE SUGGESTIONS

▶ BLOCK FUNCTIONALITY

▶ BLOCK VIEW MODULE DELTA ALTER

10 passes, 0 fails, 0 exceptions, and 0 debug messages

MESSAGE	GROUP	FILENAME	LINE	FUNCTION	STATUS
Created role of name: zu8ORfgK, id: 4	Role	block.test	470	BlockAdminThemeTestCase->testAdminTheme()	✓
Created permissions: administer blocks, administer themes	Role	block.test	470	BlockAdminThemeTestCase->testAdminTheme()	✓
User created with name <i>wLS08m2Z</i> and pass <i>mfvsNsDWQP</i>	User login	block.test	470	BlockAdminThemeTestCase->testAdminTheme()	✓
GET http://drupal7.dev/user returned 200 (7.08 KB).	Browser	block.test	471	BlockAdminThemeTestCase->testAdminTheme()	✓
Valid HTML found on "http://drupal7.dev/user"	Browser	block.test	471	BlockAdminThemeTestCase->testAdminTheme()	✓
<a href="#">Verbose message</a>	Debug	block.test	471	BlockAdminThemeTestCase->testAdminTheme()	⚠
GET http://drupal7.dev/user/2 returned 200 (6.52 KB).	Browser	block.test	471	BlockAdminThemeTestCase->testAdminTheme()	✓
Valid HTML found on "http://drupal7.dev/user/2"	Browser	block.test	471	BlockAdminThemeTestCase->testAdminTheme()	✓
<a href="#">Verbose message</a>	Debug	block.test	471	BlockAdminThemeTestCase->testAdminTheme()	⚠
User <i>wLS08m2Z</i> successfully logged in.	User login	block.test	471	BlockAdminThemeTestCase->testAdminTheme()	✓
GET http://drupal7.dev/admin/structure/block/list/stark returned 403 (6.17 KB).	Browser	block.test	474	BlockAdminThemeTestCase->testAdminTheme()	✓
Valid HTML found on "http://drupal7.dev/admin/structure/block/list/stark"	Browser	block.test	474	BlockAdminThemeTestCase->testAdminTheme()	✓
<a href="#">Verbose message</a>	Debug	block.test	474	BlockAdminThemeTestCase->testAdminTheme()	⚠
The block admin page for a disabled theme can not be accessed	Browser	block.test	475	BlockAdminThemeTestCase->testAdminTheme()	✓
GET http://drupal7.dev/admin/appearance returned 200 (11.65 KB).	Browser	block.test	479	BlockAdminThemeTestCase->testAdminTheme()	✓
Valid HTML found on "http://drupal7.dev/admin/appearance"	Browser	block.test	479	BlockAdminThemeTestCase->testAdminTheme()	✓
<a href="#">Verbose message</a>	Debug	block.test	479	BlockAdminThemeTestCase->testAdminTheme()	⚠
GET http://drupal7.dev/admin/appearance returned 200 (11.65 KB).	Browser	block.test	479	BlockAdminThemeTestCase->testAdminTheme()	✓

# Running SimpleTest From The Command Line

```
# Drupal 7
```

```
$ php scripts/run-tests.sh
```

```
# Drupal 8
```

```
$ php core/scripts/run-tests.sh
```

# Running SimpleTest From The Command Line

`--color`

`--verbose`

`--all`

`--module`

`--class`

`--file`

# Running PHPUnit From The Command Line

```
$ phpunit
```

```
$ phpunit [directory]
```

```
$ phpunit --filter [method]
```

# **Example: Collection Class**

# Collection Class

- [http://dgo.to/collection\\_class](http://dgo.to/collection_class)
- Adds a `Collection` class, based on Laravel's
- Provides helper methods for array methods

```
$collection = collect([1, 2, 3, 4, 5]);  
  
// Returns all items.  
$collection->all();  
  
// Counts the number of items.  
$collection->count();  
  
// Returns the array keys.  
$collection->keys();
```



```
class Collection implements \Countable, \IteratorAggregate {
    public function __construct($items = array()) {
        $this->items = is_array($items) ? $items
            : $this->getArrayableItems($items);
    }

    public function __toString() {
        return $this->toJson();
    }

    ...
}
```

```
public function all() {  
    return $this->items;  
}
```

```
public function count() {  
    return count($this->items);  
}
```

```
public function isEmpty() {  
    return empty($this->items);  
}
```

```
public function first() {  
    return array_shift($this->items);  
}
```

# Testing

```
public function setUp() {
    $this->firstCollection = collect(['foo', 'bar', 'baz']);

    $this->secondCollection = collect([
        array('title' => 'Foo', 'status' => 1),
        array('title' => 'Bar', 'status' => 0),
        array('title' => 'Baz', 'status' => 1)
    ]);

    parent::setUp();
}
```

# Testing

```
public function testCollectFunction() {  
    $this->assertEqual(  
        get_class($this->firstCollection),  
        'Drupal\collection_class\Collection'  
    );  
}
```

# Testing

```
public function testAll() {  
    $this->assertEqual(  
        array('foo', 'bar', 'baz'),  
        $this->firstCollection->all()  
    );  
}
```


# Testing

```
public function testCount() {  
    $this->assertEquals(  
        3,  
        $this->firstCollection->count()  
    );  
}
```

# Testing

```
public function testMerge() {  
    $first = collect(array('a', 'b', 'c'));  
    $second = collect(array('d', 'e', 'f'));  
  
    $this->assertEqual(  
        array('a', 'b', 'c', 'd', 'e', 'f'),  
        $first->merge($second)->all()  
    );  
}
```

# Test result

 The test run finished in 0 sec.

## ACTIONS

Filter All (1) Run tests [Return to list](#)

## RESULTS

22 passes, 0 fails, and 0 exceptions

▶ [COLLECTION CLASS UNIT TESTS](#)



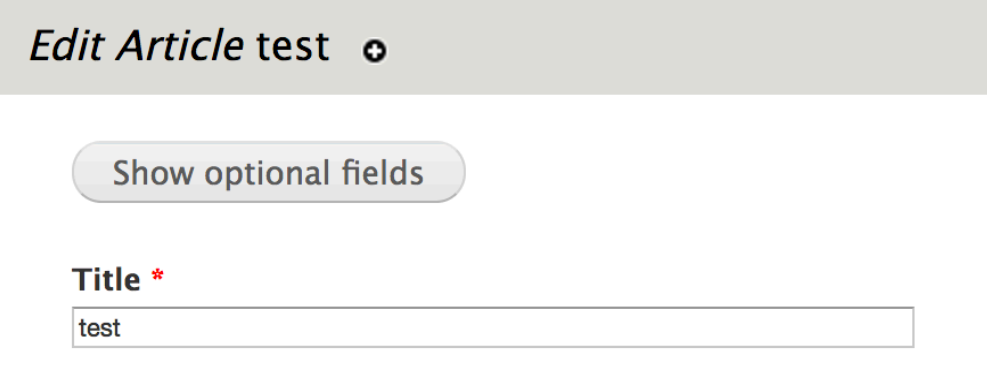
22 passes, 0 fails, and 0 exceptions

MESSAGE	GROUP	FILENAME	LINE	FUNCTION	STATUS
Value 'Collection' is equal to value 'Collection'.	Other	collection_class.test	33	CollectionClassUnitTest->testCollectFunction()	✓
Value array ( 0 => 'foo', 1 => 'bar', 2 => 'baz', ) is equal to value array ( 0 => 'foo', 1 => 'bar', 2 => 'baz', ).	Other	collection_class.test	37	CollectionClassUnitTest->testAll()	✓
Value false is FALSE.	Other	collection_class.test	41	CollectionClassUnitTest->testIsEmpty()	✓
Value true is TRUE.	Other	collection_class.test	43	CollectionClassUnitTest->testIsEmpty()	✓
Value array ( 0 => 0, 1 => 1, 2 => 2, ) is equal to value array ( 0 => 0, 1 => 1, 2 => 2, ).	Other	collection_class.test	47	CollectionClassUnitTest->testKeys()	✓
Value 3 is equal to value 3.	Other	collection_class.test	51	CollectionClassUnitTest->testCount()	✓
Value 'foo' is equal to value 'foo'.	Other	collection_class.test	55	CollectionClassUnitTest->testFirst()	✓
Value 'baz' is equal to value 'baz'.	Other	collection_class.test	59	CollectionClassUnitTest->testLast()	✓
Value ["foo","bar","baz"] is equal to value ["foo","bar","baz"].	Other	collection_class.test	63	CollectionClassUnitTest->testToJson()	✓
Value 'Foo' is equal to value 'Foo'.	Other	collection_class.test	70	CollectionClassUnitTest->{closure}()	✓
Value 'Bar' is equal to value 'Bar'.	Other	collection_class.test	74	CollectionClassUnitTest->{closure}()	✓
Value 'Baz' is equal to value 'Baz'.	Other	collection_class.test	78	CollectionClassUnitTest->{closure}()	✓
Value 2 is equal to value 2	Other	collection_class.test	80	CollectionClassUnitTest-	✓

# **Example: Toggle Optional Fields**

# Toggle Optional Fields

- <http://dgo.to/toggle> optional fields
- Adds a button to toggle optional fields on node forms using form alters
- Possible to override using an custom alter hook
- Uses unit and web tests



The screenshot shows a web form titled "Edit Article test" with a close icon. Below the title is a button labeled "Show optional fields". Underneath the button is a text input field labeled "Title \*" with a red asterisk indicating it is required. The input field contains the text "test".

# Example

```
// Looping through available form elements...

// Only affect fields.
if (!toggle_optional_fields_element_is_field($element_name)) {
    return;
}

$element = &$form[$element_name];

if (isset($overridden_fields[$element_name])) {
    return $element['#access'] = $overridden_fields[$element_name];
}

// If the field is not required, disallow access to hide it.
if (isset($element[LANGUAGE_NONE][0]['#required'])) {
    return $element['#access'] = !empty($element[LANGUAGE_NONE][0]['#required']);
}
```

# What to Test?

- **Functional:** Are the correct fields shown and hidden?
- **Unit:** Is the field name check returning correct results?

# Unit Tests

```
// Returns TRUE or FALSE to indicate if this is a field.  
  
function toggle_optional_fields_element_is_field($name) {  
    if (in_array($name, array('body', 'language'))) {  
        return TRUE;  
    }  
  
    return substr($name, 0, 6) == 'field_';  
}
```


# Unit Tests

```
$this->assertTrue(  
    toggle_optional_fields_element_is_field('field_tags')  
);
```

```
$this->assertTrue(  
    toggle_optional_fields_element_is_field('body')  
);
```

```
$this->assertFalse(  
    toggle_optional_fields_element_is_field('title')  
);
```

# Test result

 The test run finished in 0 sec.

## ACTIONS

Filter All (1) Run tests [Return to list](#)




## RESULTS

3 passes, 0 fails, and 0 exceptions

### ▼ TOGGLE OPTIONAL FIELDS UNIT TESTS

Test the showing and hiding of optional fields on node forms.

3 passes, 0 fails, and 0 exceptions

MESSAGE	GROUP	FILENAME	LINE	FUNCTION	STATUS
Value true is TRUE.	Other	toggle_optional_fields.test	131	ToggleOptionalFieldsUnitTest->testElementNamelsField()	
Value false is FALSE.	Other	toggle_optional_fields.test	132	ToggleOptionalFieldsUnitTest->testElementNamelsField()	
Value true is TRUE.	Other	toggle_optional_fields.test	135	ToggleOptionalFieldsUnitTest->testElementNamelsField()	



# Web Tests

```
public function setUp() {
    parent::setUp();

    $this->drupalLogin(
        $this->drupalCreateUser(array(
            'create article content',
            'create page content'
        )));
};

// Enable toggling on article node forms.
variable_set('toggle_optional_fields_node_types', array('article'));

$this->refreshVariables();
}
```

# Custom Assertions

```
private function assertTagsFieldNotHidden() {  
    $this->assertFieldByName(  
        'field_tags[und]',  
        NULL,  
        t('Tags field visible.')  
    );  
}
```

# Testing Hidden Fields

```
public function testFieldsHiddenByDefault() {  
    variable_set('toggle_optional_fields_hide_by_default', TRUE);  
  
    $this->refreshVariables();  
  
    $this->drupalGet('node/add/article');  
  
    $this->assertShowOptionalFieldsButtonFound();  
    $this->assertHideOptionalFieldsButtonNotFound();  
    $this->assertTagsFieldHidden();  
  
    ...  
}
```

# Testing Hidden Fields

...

```
$this->drupalPost(
    'node/add/article',
    array(),
    t('Show optional fields')
);
```


```
$this->assertHideOptionalFieldsButtonFound();
```

```
$this->assertShowOptionalFieldsButtonNotFound();
```

```
$this->assertTagsFieldNotHidden();
```

```
}
```

## Test result

 The test run finished in 24 sec.

### ACTIONS

Filter All (1) Run tests [Return to list](#)








### RESULTS

68 passes, 0 fails, 0 exceptions, and 16 debug messages

#### ▼ TOGGLE OPTIONAL FIELDS

Test the showing and hiding of optional fields on node forms.

68 passes, 0 fails, 0 exceptions, and 16 debug messages

MESSAGE	GROUP	FILENAME	LINE	FUNCTION	STATUS
Enabled modules: <i>toggle_optional_fields</i> , <i>toggle_optional_fields_tests</i>	Other	toggle_optional_fields.test	20	ToggleOptionalFieldsTest->setUp()	
Created role of name: nHQ9fFZS, id: 4	Role	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	
Created permissions: create article content, create page content	Role	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	
User created with name <i>wSuPLKWT</i> and pass <i>o7qYRL986b</i>	User login	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	
GET http://drupal7.dev/user returned 200 (7.08 KB).	Browser	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	
Valid HTML found on "http://drupal7.dev/user"	Browser	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	
<a href="#">Verbose message</a>	Debug	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	

MESSAGE	GROUP	FILENAME	LINE	FUNCTION	STATUS
Created permissions: create article content, create page content	Role	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	✓
User created with name <i>zBqGcqp</i> and pass <i>hyKBZ6unTj</i>	User login	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	✓
GET http://drupal7.dev/user returned 200 (7.08 KB).	Browser	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	✓
Valid HTML found on "http://drupal7.dev/user"	Browser	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	✓
<a href="#">Verbose message</a>	Debug	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	⚠
GET http://drupal7.dev/user/2 returned 200 (6.97 KB).	Browser	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	✓
Valid HTML found on "http://drupal7.dev/user/2"	Browser	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	✓
<a href="#">Verbose message</a>	Debug	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	⚠
User <i>zBqGcqp</i> successfully logged in.	User login	toggle_optional_fields.test	24	ToggleOptionalFieldsTest->setUp()	✓
Toggling is not enabled for the <i>page</i> content type.	Other	toggle_optional_fields.test	78	ToggleOptionalFieldsTest->testDisabledContentType()	✓
GET http://drupal7.dev/node/add/page returned 200 (11.44 KB).	Browser	toggle_optional_fields.test	81	ToggleOptionalFieldsTest->testDisabledContentType()	✓
Valid HTML found on "http://drupal7.dev/node/add/page"	Browser	toggle_optional_fields.test	81	ToggleOptionalFieldsTest->testDisabledContentType()	✓
<a href="#">Verbose message</a>	Debug	toggle_optional_fields.test	81	ToggleOptionalFieldsTest->testDisabledContentType()	⚠
Hide optional fields button not found.	Other	toggle_optional_fields.test	84	ToggleOptionalFieldsTest->testDisabledContentType()	✓
Show optional fields button not found.	Other	toggle_optional_fields.test	85	ToggleOptionalFieldsTest->testDisabledContentType()	✓

# Take Aways

- Testing can produce better quality code
- Writing tests is an investment
- OK to start small, introduce tests gradually

# Questions?