

DELIVERABLE D2.4¹



UNIT TESTING

Distributed and automated unit testing mechanism for Scratchpads code completed and available.

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Combination of Collaborative Project and Coordination and Support Action

Virtual Biodiversity Research and Access Network for Taxonomy

Grant Agreement No: 261532

Project Co-ordinator: Dr Vince Smith

Project Homepage: <http://vbrant.eu/>

Duration of Project: 36 months

Start Date: Dec 2010

End Date: Nov 2013

Introduction

This document represents the work carried out in meeting this deliverable. The work was carried out by members of the Scratchpads Team at the NHM⁵. This deliverable will ensure that the Scratchpads are a stable and consistent enterprise level product, and will enable us to more easily review and include software contributed from additional sources. Here we are building on the work of the Drupal community, and specifically on the Simpletest⁶ and Selenium⁷ modules.

Description of work

Creation of additional tests

We were able to build on the foundational work of Milestone M2.16⁸, and create a number of additional tests for the Scratchpads. We have built into the Scratchpads three different types of tests.

Unit Tests

These test the individual functions within a module. If a function expects input X and returns output Y, then the unit tests ensure that the functions always return the correct value of Y for specific inputs of X. These tests can be very quick to write, although it is necessary to put considerable thought into the different values of X and the expected output Y.

Web Tests

These test combinations of functions, and how they work together to create web pages. A web test is able to check how Scratchpads pages are rendered, by checking for the presence of elements or text on the pages. These are the most useful tests for the Scratchpads project, as they allow us to check whether additional modules, or code-changes, affect how Scratchpads' features work.

Selenium Tests

Selenium tests are very similar to the web tests, but they use the Selenium web browser automation tool⁹. This allows us, like the web tests, to check the structure of a web page but also allows us to interact much more with the web page. We are able to test how Javascript elements on a page work, for example whether clicking a plus button expand the desired section of the page. Selenium also allows us to check the rendering of a page by different web browsers, allowing us to check the Scratchpads in both Mozilla Firefox¹⁰ and Google Chrome¹¹.

The additional tests we have created in the process of meeting this deliverable are each associated with a specific Scratchpads module. This means that the tests can be run on any Drupal website, not specifically a Scratchpads website. A project external to the Scratchpads is therefore able to download parts of the Scratchpads, and take advantage of the included tests that we have written.

5 Natural History Museum, London – <http://www.nhm.ac.uk/>

6 <https://drupal.org/project/simpletest>

7 <https://drupal.org/project/selenium>

8 <http://vbrant.eu/content/m216-localised-unit-testing-mechanism>

9 <http://www.seleniumhq.org/>

10 <http://www.mozilla.org/en-US/firefox/>

11 <https://www.google.com/intl/en/chrome/>

Selenium server

The Selenium web browser automation tool is capable of running on any operating system, however we took the decision not to include it on any of our existing servers, as it would complicate their installation and could potentially hog vital resources. This meant creating an additional machine for hosting the Selenium server. This new machine is a very basic installation of Ubuntu hosted on the NHM's Virtual Machine infrastructure., with Firefox and Google Chrome installed from standard Ubuntu packages, and Selenium 2.33.0 installed simply by downloading and running the Jar file from the Selenium web page. To simplify the server installation, Xvfb¹² was installed, rather than a full Ubuntu desktop installation. The server is only available within the NHM, but has been configured so that projects other than the Scratchpads can take advantage of it.

Testing site

The screenshot shows the front page of the Scratchpads Quality Assurance Site. The page features the Scratchpads logo and the text 'biodiversity online'. A navigation bar includes a 'Home' button and the text 'Scratchpads home'. The main content area is divided into two columns. The left column, titled 'Latest test results', contains a table with the following data:

| Status | Count |
|------------|-------|
| Passes | 73834 |
| Fails | 0 |
| Exceptions | 913 |

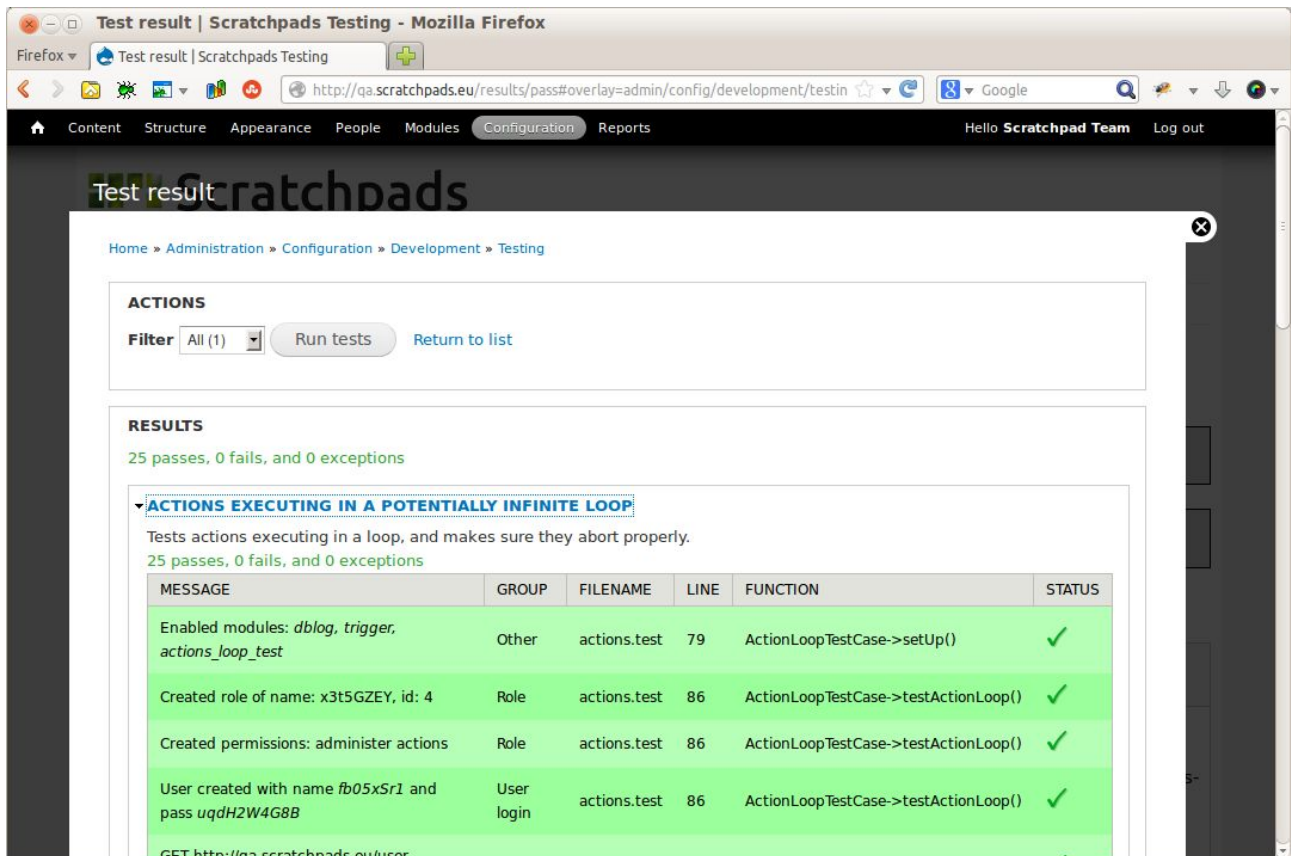
Below the table, it states 'Last test run: Fri, 2013-11-22 11:21'. The right column contains a paragraph explaining that the site is a Scratchpads resource provided by the team at the Natural History Museum, London, and describes the automated testing process using Selenium and Drupal's core Testing framework. It also provides instructions on how to view failed tests and re-run them if logged in.

Screenshot 1: Scratchpads Quality Assurance Site front page, showing the time of the most recent test run, and the number of passes, fails and exceptions of all of the tests.

The decision was made to create a very basic web site that would become the home of the Scratchpads project's testing processes. The website URL is <http://qa.scratchpads.eu/>, the QA being an acronym for Quality Assurance. Screenshot 1 displays the website as a standard user would see it. A standard user is able to see when the most recent tests were run, and is able to browse through the list of tests that have passed, failed or created a PHP exception. The passes, fails or exceptions of each of the tests can also be displayed. If a member of the Scratchpads Team is logged into the site, when browsing the tests, they are also able to see the full test results.

¹² <http://en.wikipedia.org/wiki/Xvfb>

Screenshot 2 displays one of the basic tests that has been run, and also shows how the user can easily re-run the test.



Screenshot 2: Logged in user viewing a successful test run, with the option to re-run the test.

The testing site is currently hosted on one of our application servers, which allows us to ensure that changes in the application server environment (such as version of Apache or PHP) do not affect how the Scratchpads work. Tests are automatically run once a week on any new code committed to the Scratchpads Git repository. A digest email of any test fails is sent to the Scratchpads Team, which should allow them to review and potentially fix their code before it is included in a full Scratchpads release.

Remarks

The process of writing tests is not a quick and easy process, so time must be set aside in future projects specifically for this task. It must be demonstrated to key stakeholders, including end users and funding agencies, that there is a clear benefit to the time spent creating software tests. This should be apparent in the stability and reliability of the software being produced, and the marked reduction in the numbers of bugs introduced into the software with each new release.

Without the work of the Drupal community, and specifically the work on the Simpletests module, this work would have been close to impossible.