Testing using Robot Framework integration in Python or Java

Overview

Robot Framework is a tool used by teams adopting ATDD (Acceptance Test Driven Development).

Broadly speaking, it can be used to automate acceptance “test cases” (i.e. scripts) no matter the moment you decide to do so or the practices your team follows even though it's preferable to do it at the start, involving the whole team in order to pursue shared understanding.

In this article, we will specify some tests using Robot Framework and see how we can have visibility of the corresponding results in Jira, using Xray.

This tutorial explores the specific integration Xray provides for Robot Framework XML reports.

Common requirements

- Robot Framework
- SeleniumLibrary
- Java (if using the Java variant of the "Robot Framework")

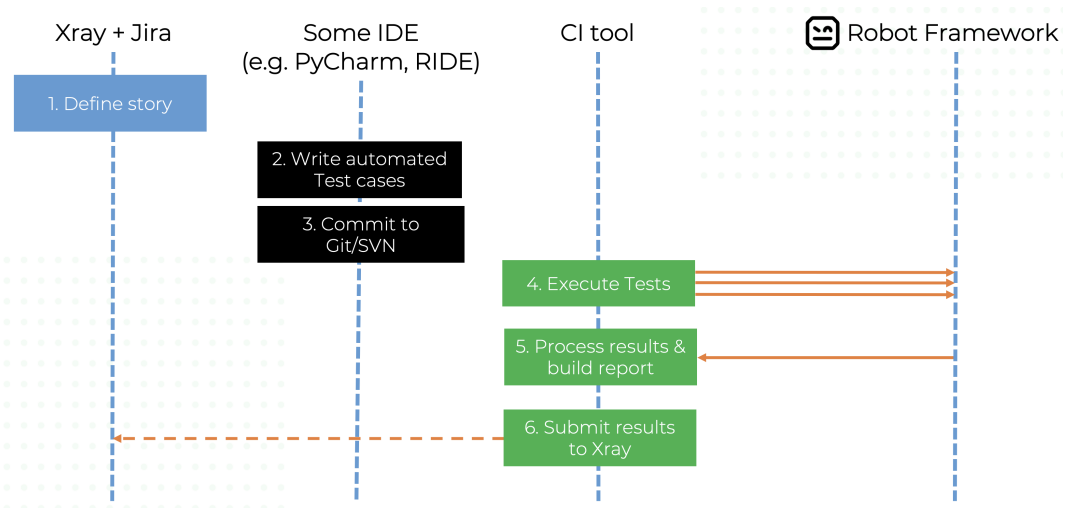
Examples

The full ATDD workflow

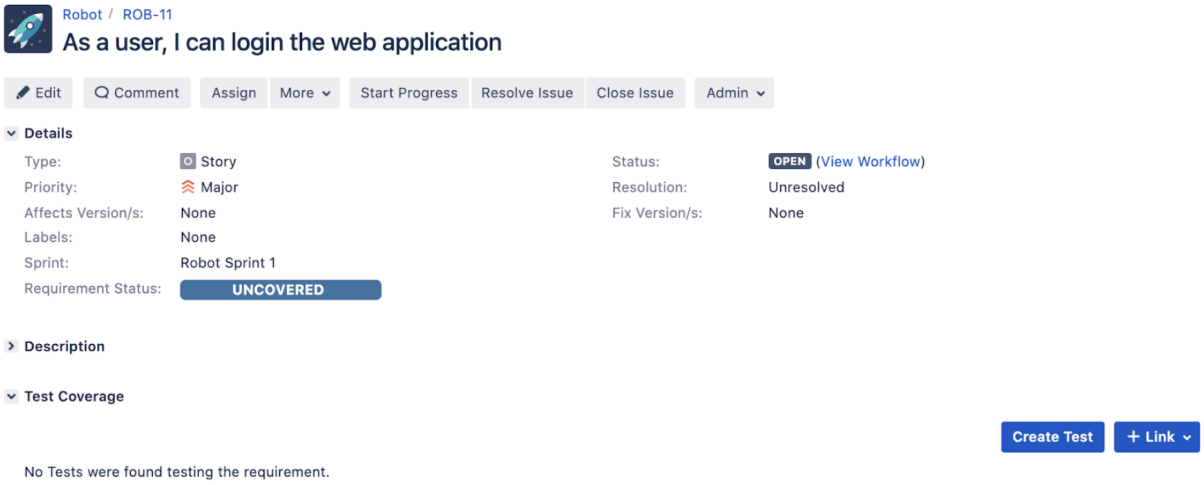
In this example we're going to validate a dummy website (provided in the GitHub repository), checking for valid and invalid logins.

> You may find the full source for this example in this GitHub repository, which corresponds in essence to previous work by Pekka Klärck from the Robot Framework Foundation.

If the team is adopting ATDD and working collaboratively in order to have a shared understanding of what is going to be developed, why and some concrete examples of usage, then the flow would be something similar to the following diagram.

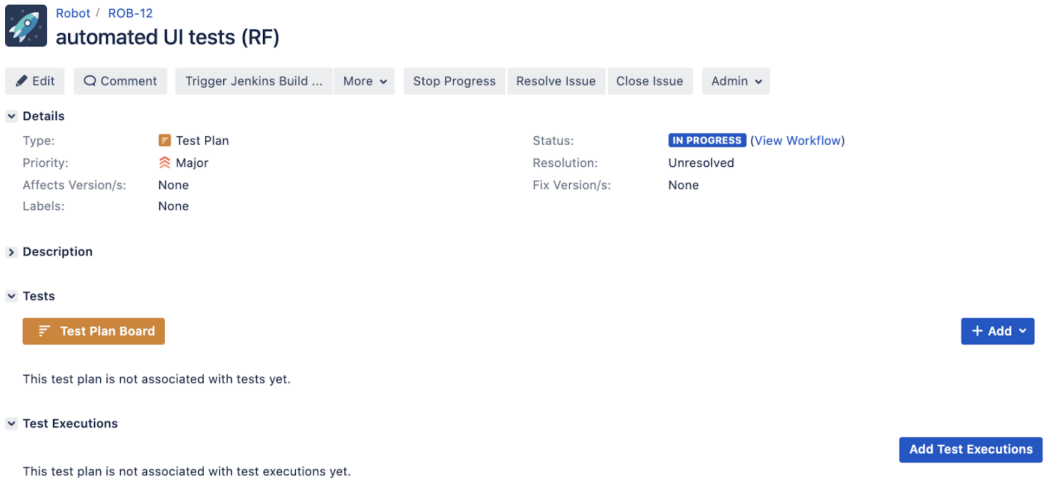


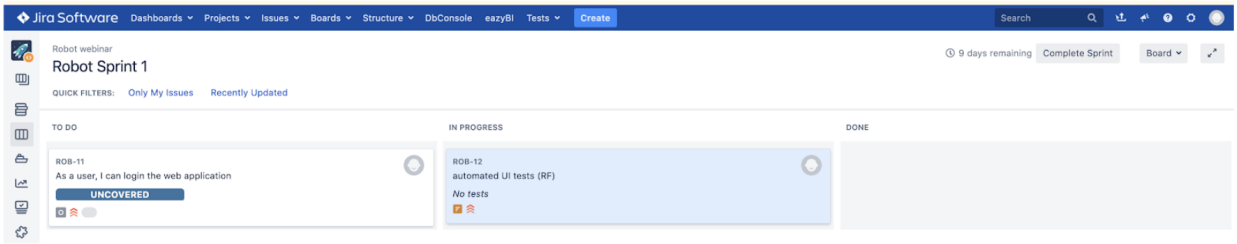
All starts with a user story or some sort of “requirement” that you wish to validate. This is materialized as a Jira issue and identified by the corresponding issue key (e.g. ROB-11).



We can promptly check that it is “UNCOVERED” (i.e. that it has no tests covering it, no matter their type/approach).

A Test Plan can be created to define the scope of the testing that we aim to perform, group, and consolidate the corresponding results. Besides the user story, we may also add the Test Plan to the Board and assign it explicitly to a sprint. This will increase visibility of testing progress and help closing the gap between dev<>testers.





A tester/SDET could simply focus on implementing the automated test cases:

- The tester would write one or more test suites and corresponding test cases, using his/her favorite tool/IDE
- Each test case could be linked to the corresponding requirement/user story in Jira by adding its key as a tag
- Tests could then be run locally, or from the CI pipeline
- Unique, non-duplicating, Test entities would be auto-provisioned in Xray, corresponding to each test case; tester could also, optionally, enforce the result to an existing Test entity by specifying its issue key as a tag

Let's take the following .robot file as an example, which acts as a suite containing one test case.

login_tests/valid_login.robot

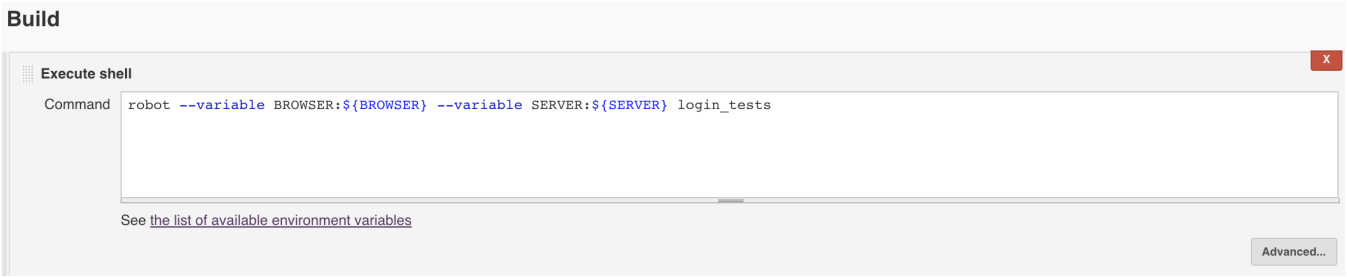
```
*** Settings ***
Documentation     A test suite with a single test for valid login.
...
...               This test has a workflow that is created using keywords in
...               the imported resource file.
Resource          resource.robot

*** Test Cases ***
Valid Login
    [Tags]  ROB-11  UI
    Open Browser To Login Page
    Input Username    demo
    Input Password    mode
    Submit Credentials
    Welcome Page Should Be Open
    [Teardown]    Close Browser
```

The previous Robot file uses a common resource that contains some generic variables and some reusable "keywords" (i.e., steps).

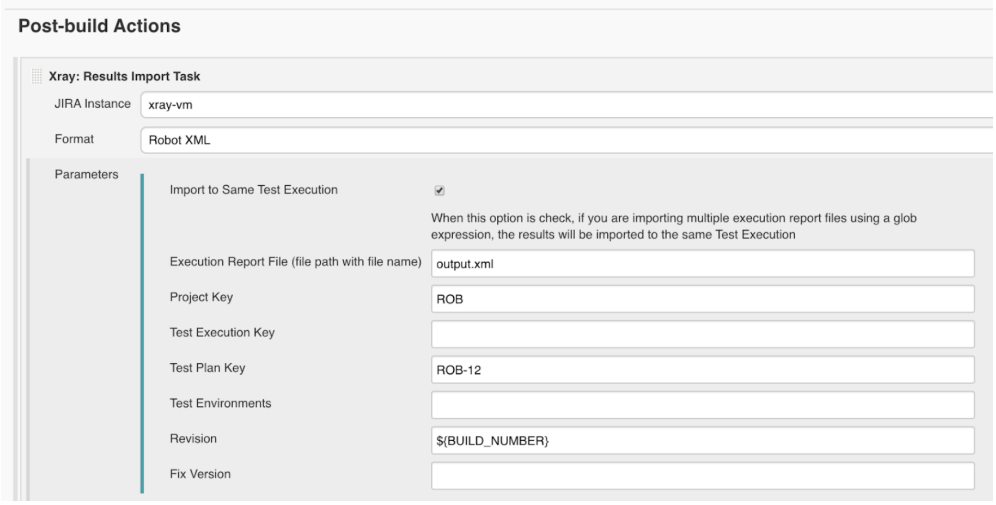
login_tests/resource.robot

```
*** Settings ***
Documentation     A resource file with reusable keywords and variables.
...
...               The system specific keywords created here form our own
...               domain specific language. They utilize keywords provided
...               by the imported SeleniumLibrary.
Library           SeleniumLibrary        run_on_failure=Capture Page Screenshot
screenshot_root_directory=EMBED

*** Variables ***
${SERVER}         192.168.56.1:7272
${BROWSER}        Firefox
${DELAY}          0
${VALID USER}     demo
${VALID PASSWORD}    mode
${LOGIN URL}      http://${SERVER}/
${WELCOME URL}    http://${SERVER}/welcome.html
${ERROR URL}      http://${SERVER}/error.html

*** Keywords ***
Open Browser To Login Page
    Open Browser    ${LOGIN URL}    ${BROWSER}
    Maximize Browser Window
    Set Selenium Speed    ${DELAY}
    Login Page Should Be Open

Login Page Should Be Open
    Title Should Be    Login Page

Go To Login Page
    Go To    ${LOGIN URL}
    Login Page Should Be Open

Input Username
    [Arguments]    ${username}
    Input Text    username_field    ${username}

Input Password
    [Arguments]    ${password}
    Input Text    password_field    ${password}

Submit Credentials
    Click Button    login_button

Welcome Page Should Be Open
    Location Should Be    ${WELCOME URL}
    Title Should Be    Welcome Page
```

Running the tests can be done from the command line or from within Jenkins (or any other CI tool); this will produce a XML based report (e.g. output.xml).



Importing results is as easy as submitting them to the REST API with a POST request (e.g. curl), or by using one of the CI plugins available for free (e.g. Xray Jenkins plugin).



Examples of running tests from the command line

Running tests is primarily done using the "robot" utility which provides many options that allow you to define which tests to run, the output directory and more.

You may also specify some variables and their values.

Next follows some different usage examples.

If you're using Python:

```
robot -d output --variable BROWSER:Firefox login_tests
```

If you're using Java:

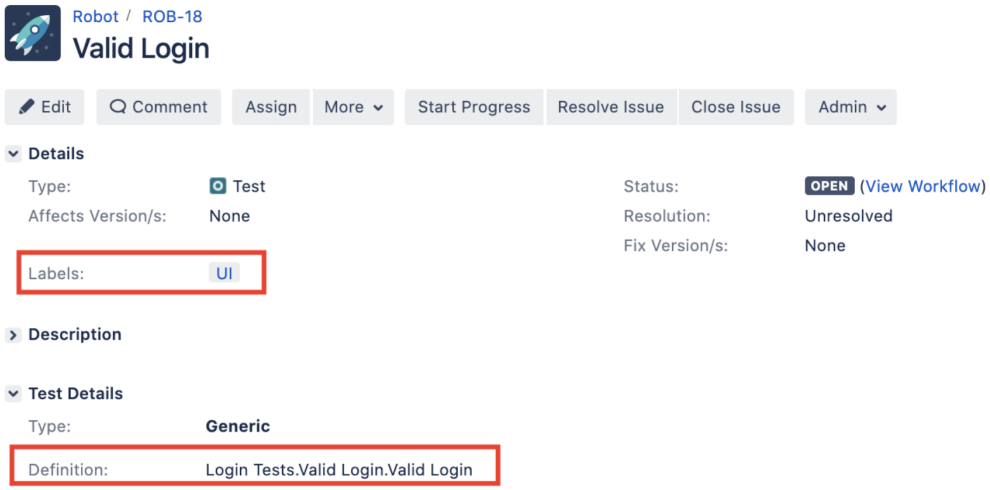
```
java -jar robotframework-3.0.jar login_tests
```

An unstructured (i.e. "Generic") Test issue will be auto-provisioned the first time you import the results, based on the name of the test case and of the corresponding test suites.

If you maintain the test case name and the respective test suites, the Test will be reused on subsequent result imports. You may always enforce the results to be reported against an existing Test, if you wish so: just specify its issue key as a tag.

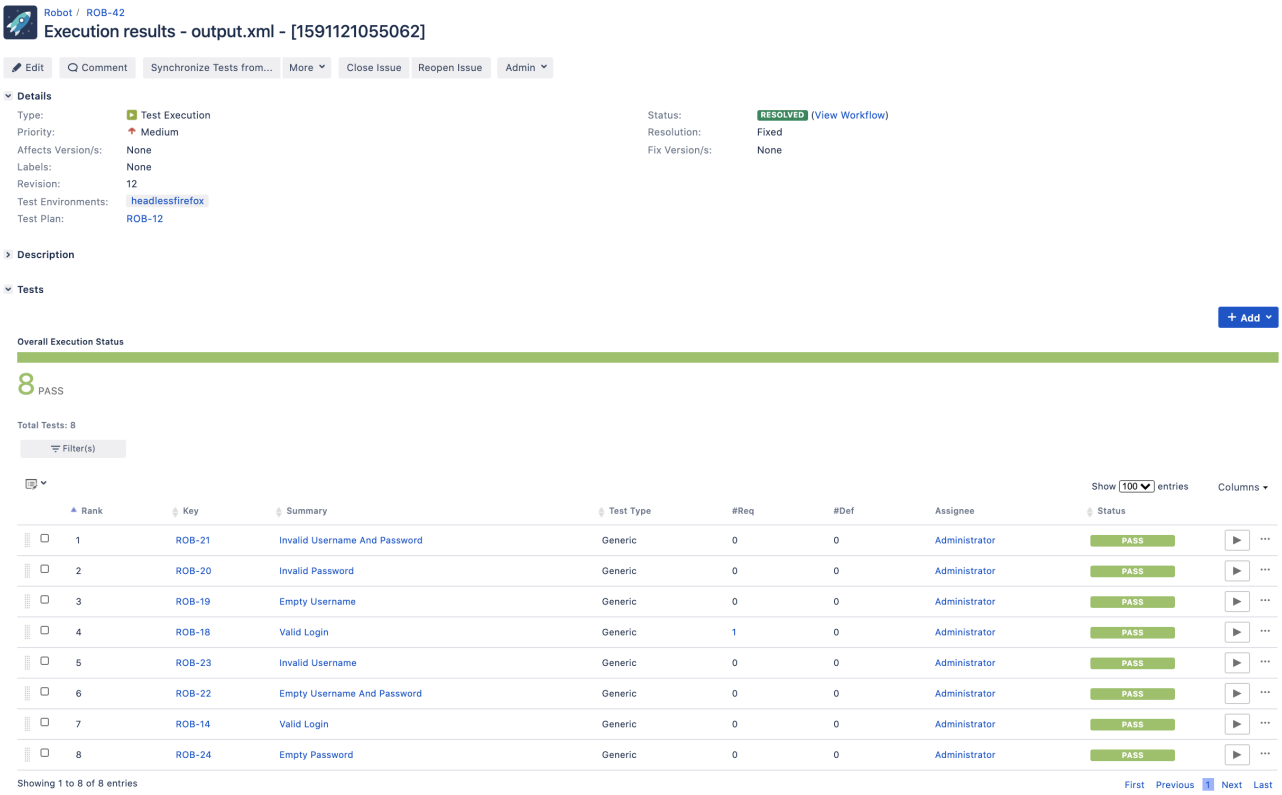
Tags can also be used to cover an existing requirement/user story (e.g. “ROB-11”): when a requirement issue key is given, a link between the test and the requirement is created during the results import process.

Otherwise, tags are mapped as labels on the corresponding Test issue.

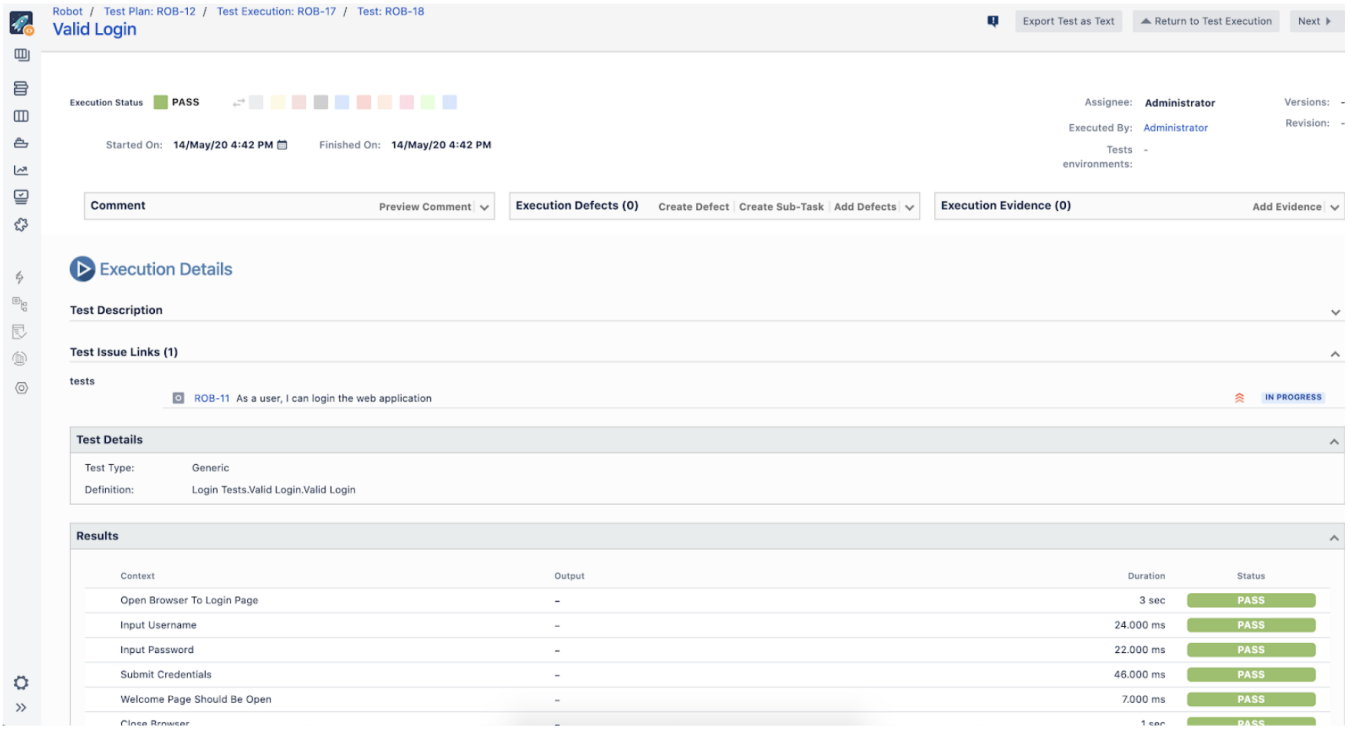


> **Please note**
>
> Note that Robot Framework considers the base folder of the project as the first test suite. The way you run your tests also affects Robot's XML; so, if you execute the file from somewhere else or you execute the file directly by passing it as an argument, the test suite's information will potentially be different.

A Test Execution will be created containing results for all test cases executed. In this case, you can see that it is also linked back to an existing Test Plan where you can track the consolidated results from multiple "iterations" (i.e. Test Executions).



Within the execution screen details, accessible from each row, you can look at the Test Run details which include the overall result and also specifics about each keyword, including duration and status.



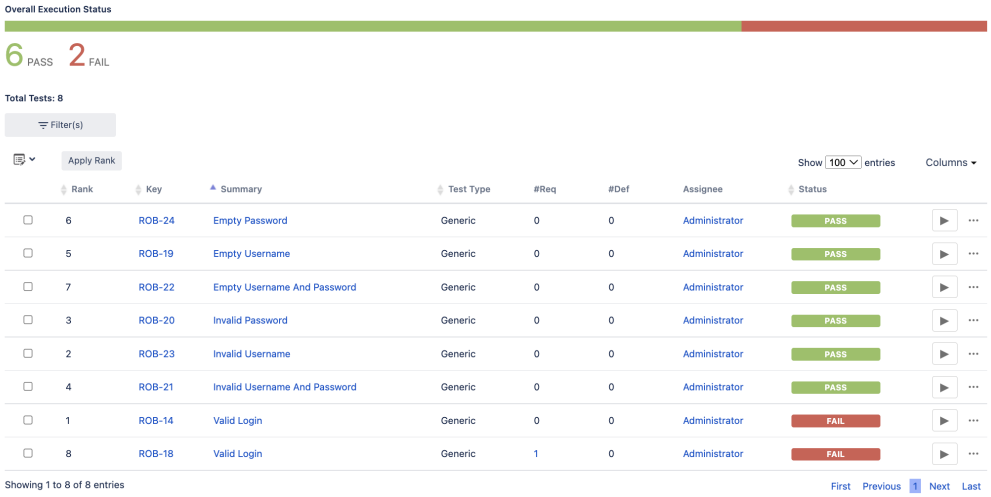
Attaching screenshots

Attaching screenshots at the step level is possible by using the SeleniumLibrary RF library. A configuration must be provided to embed the screenshots on the output.xml report; it can also be configured to take screenshots automatically on failed steps.

Example of including and initializing the SeleniumLibrary:

```
Library SeleniumLibrary run_on_failure=Capture Page Screenshot screenshot_root_directory=EMBED
```

In the GitHub repository, there's a buggy web server implementation. If tests are run against it, two of them will fail (i.e., the ones related with valid login).



After importing the generated test report, we can see the screenshot in the Test Run details, in this case on the failed step.

Robot / Test Plan: ROB-12 / Test Execution: ROB-56 / Test: ROB-14

Valid Login

Export Test as Text | Return to Test Execution | Execute with Exploratory App | Next

There are no Test Run Custom Fields defined.

Test Description

Test Type: Generic

Definition: Login Tests.Gherkin Login.Valid Login

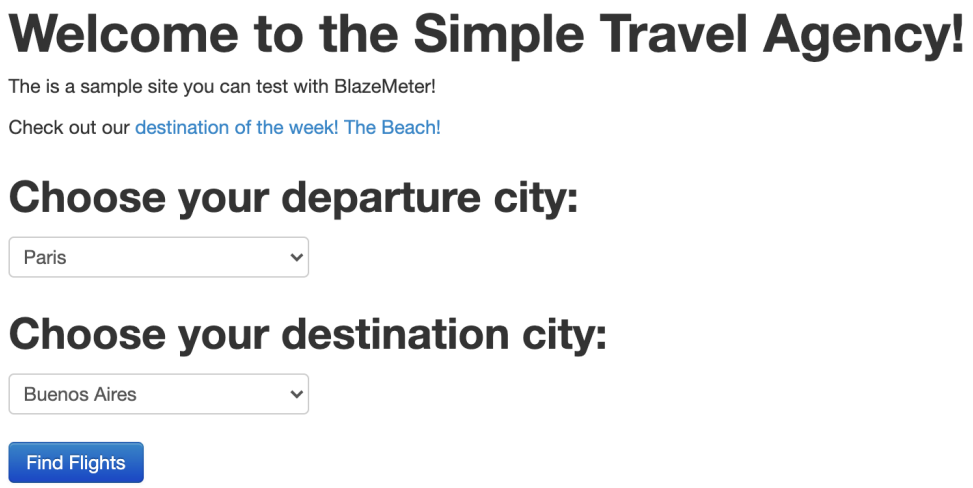
Results

Context	Output	Duration	Status
Given browser is opened to login page	-	3 sec	PASS
Open Browser To Login Page	-	3 sec	PASS
Open Browser	Firefox driver log is always forced to to: /Users/smsf/exps/robot_webdemo/WebDemo/geckodriver-1.log	3 sec	PASS
Maximize Browser Window	-	606.000 ms	PASS
Set Selenium Speed	-	-	PASS
Login Page Should Be Open	-	3.000 ms	PASS
Title Should Be	Page title is 'Login Page'.	2.000 ms	PASS
When user "demo" logs in with password "mode"	-	106.000 ms	PASS
Input Username	-	34.000 ms	PASS
Input Text	Typing text 'demo' into text field 'username_field'.	34.000 ms	PASS
Input Password	-	22.000 ms	PASS
Input Text	Typing text 'mode' into text field 'password_field'.	20.000 ms	PASS
Submit Credentials	-	50.000 ms	PASS
Click Button	Clicking button 'login_button'.	50.000 ms	PASS
Then welcome page should be open	-	151.000 ms	FAIL
Location Should Be	Location should have been 'http://192.168.56.1:7272/welcome.html' but was 'http://192.168.56.1:7272/error.html'.	151.000 ms	FAIL
Capture Page Screenshot		145.000 ms	PASS
Close Browser	-	516.000 ms	PASS

Running tests in parallel, against different environments

In this distinct and more evolved example we're going to run tests in parallel using "pabot"; we'll also take advantage of the Test Environments concept provided by Xray.

This example uses a fake travel agency site (kindly provided by BlazeMeter) as the testing target.



We have two tests that use low-level keywords (note: this is not a good practice; it's just for simplicity) and one of those keywords is defined within a SeleniumLibrary plugin (i.e. it extends the keywords provided by SeleniumLibrary).

search_flights.robot

```
*** Settings ***
Library  SeleniumLibrary    plugins=${CURDIR}/MyPlugin.py
Library  Collections

Suite Setup     Open browser    ${URL}   ${BROWSER}
Suite Teardown  Close All Browsers


*** Variables ***
${URL}          http://blazedemo.com/
${BROWSER}      Chrome
@{allowed_destinations}  Buenos Aires   Rome    London  Berlin  New York    Dublin  Cairo

*** Test Cases ***
The search page presents valid options for searching
    [Tags]    1
    Go To    ${URL}
    Title Should Be     BlazeDemo
    Element Should Be Visible    css:input[type='submit']
    Wait Until Element Is Enabled    css:input[type='submit']
    Wait Until Element Is Clickable    input[type='submit']
    ${values}=  Get List Items    xpath://select[@name='fromPort']   values=True
    Log  ${values}
    ${allowed_departures}=  Create List  Paris  Philadelphia  Boston  Portland  San Diego  Mexico City  São
Paolo
    Lists Should Be Equal    ${allowed_departures}   ${values}
    ${values}=  Get List Items    xpath://select[@name='toPort']   values=True
    Log  ${values}
    Should Be Equal    ${allowed_destinations}   ${values}


The user can search for flights
    [Tags]         search_flights
    Go to    ${URL}
    Select From List By Value   xpath://select[@name='fromPort']  Paris
    Select From List by Value   xpath://select[@name='toPort']    London
    Click Button    css:input[type='submit']
    @{flights}=  Get WebElements    css:table[class='table']>tbody tr
    Should Not Be Empty     ${flights}
```

MyPlugin.py

```
from robot.api import logger

from SeleniumLibrary.base import LibraryComponent, keyword
from SeleniumLibrary.locators import ElementFinder

from selenium.webdriver.support.ui import WebDriverWait
from selenium.webdriver.support.expected_conditions import presence_of_element_located
from selenium.webdriver.support.expected_conditions import element_to_be_clickable
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.by import By

class MyPlugin(LibraryComponent):

    def __init__(self, ctx):
        LibraryComponent.__init__(self, ctx)

    @keyword
    def wait_until_element_is_clickable(self, selector):
        """Adding new keyword: Wait Until Element Is Clickable."""
        self.info('Wait Until Element Is Clickable')
        wait = WebDriverWait(self.driver, 10)

        my_elem = self.element_finder.find("css:"+selector)
        print(my_elem)
        first_result = wait.until(element_to_be_clickable((By.CSS_SELECTOR, selector)))
        return first_result
```

Running the tests in parallel is possible using pabot.

Tests can be parallelized in different ways; we'll split them for running on a test basis.

We can also specify some variables; in this case, we'll use it to specify the "BROWSER" variable which is passed to the SeleniumLibrary.

chromebrowser.txt

```
--variable BROWSER:Chrome
```

```
pabot  --argumentfile1 ffbrowser.txt --argumentfile2 chromebrowser.txt --argumentfile3 headlessffbrowser.txt --
argumentfile4 safaribrowser.txt --testlevelsplit 0_basic/search_flights.robot
```

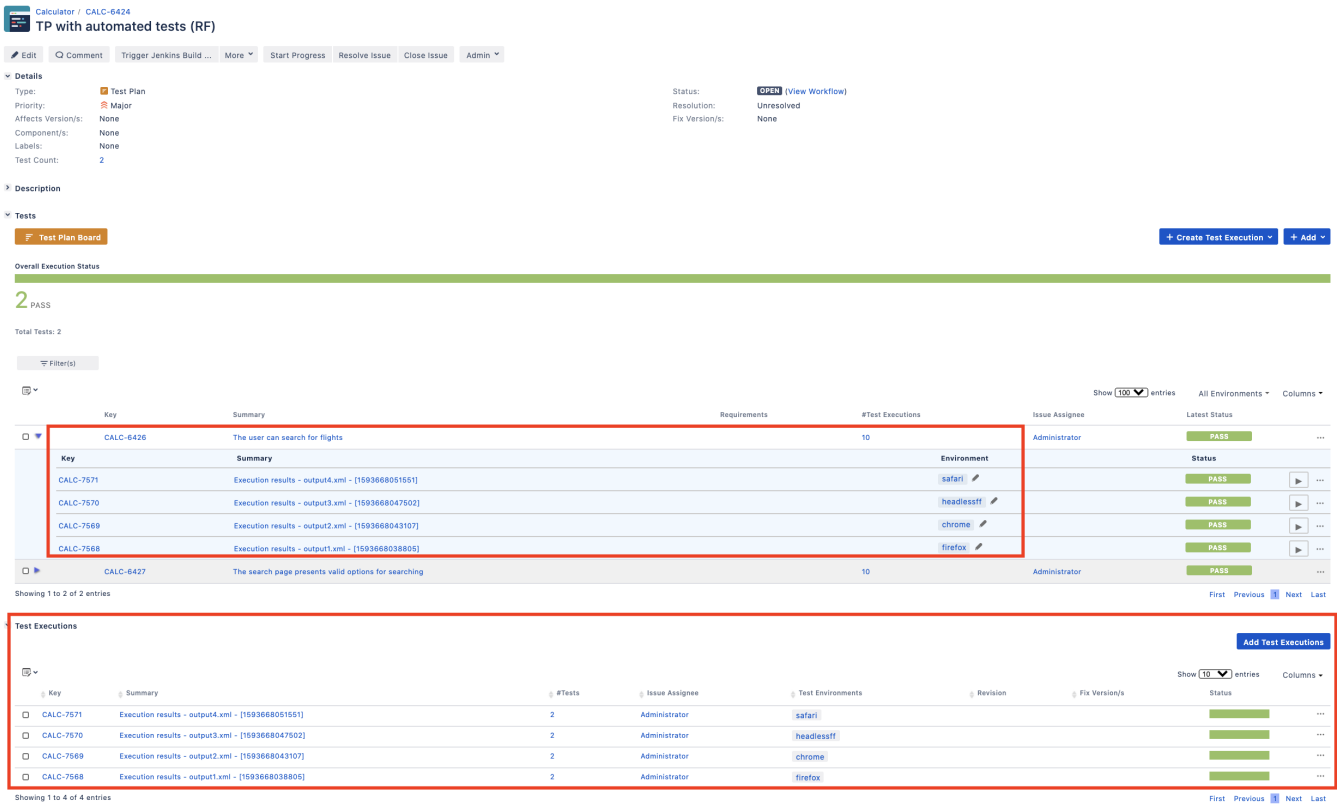
Running these tests will produce a report per each "argumentfileX" parameter (i.e. per each browser). We can then submit those to Xray (e.g. using "curl" and the REST API), and assign it to distinct Test Executions where each one is in turn assigned to a specific Test Environment identifying the browser.

run_parallel_and_import.sh

```
#!/bin/bash

BROWSERS=(firefox chrome headlessff safari)
PROJECT=CALC
TESTPLAN=CALC-6424

i=1
for browser in ${BROWSERS[@]}; do
 curl -H "Content-Type: multipart/form-data" -u admin:admin -F "file=@pabot_results/output$i.xml"
"http://jiraserver.example.com/rest/raven/1.0/import/execution/robot?
projectKey=$PROJECT&testPlanKey=$TESTPLAN&testEnvironments=$browser"
 i=$((i+1))
done
```

In Xray, at the Test Plan-level we can see the consolidated results and for each test case we may drill-down and see all the runs performed and in which environment/browser.

In this case, we have the total of 4 Test Executions (i.e. for safari, headlessff, chrome, firefox).

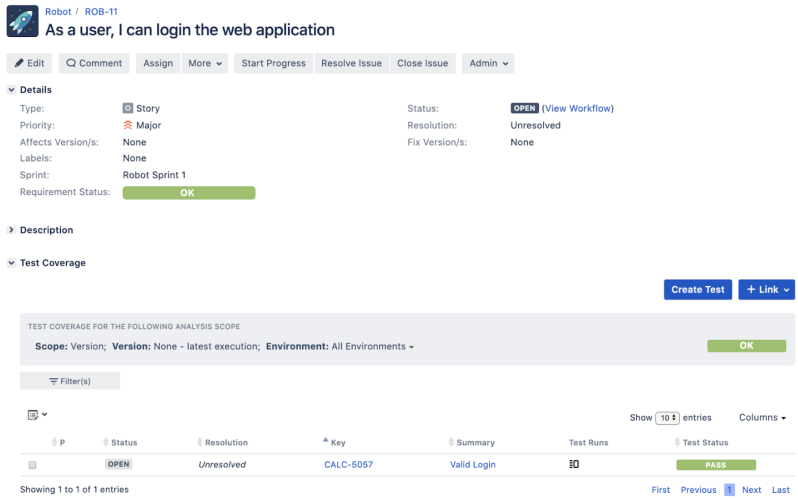


Tracking automation results

Besides tracking automation results on the Test Execution issues themselves, it's also possible to track in different places so the team gets fully aware of them.

On the user story issue screen

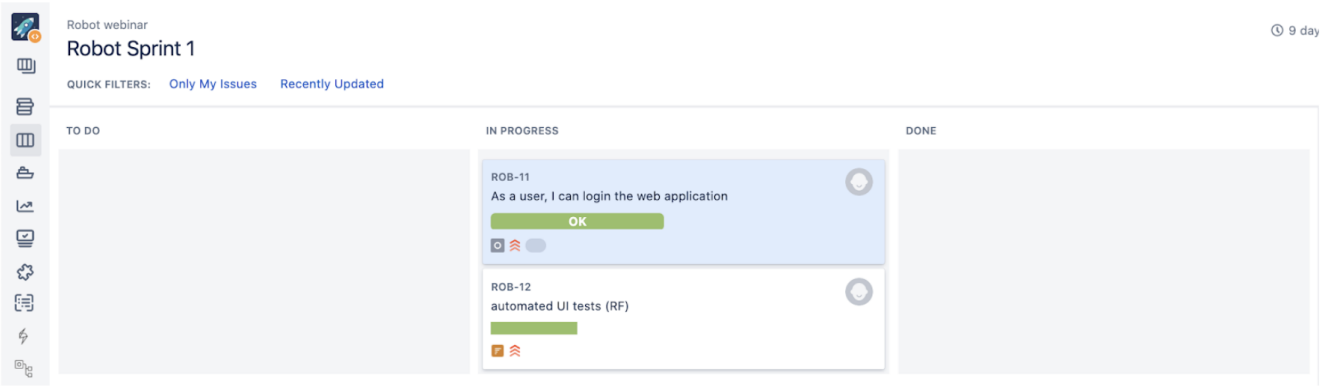
Right from within the user story issue screen, we now see one test (i.e. automated script) covering it. We can also see its latest result and how it impacts the overall coverage calculation for the user story; if the user story shows as “OK”, you know that all tests covering it passed, accordingly with the latest results obtained for each one of them.



On the Agile Board

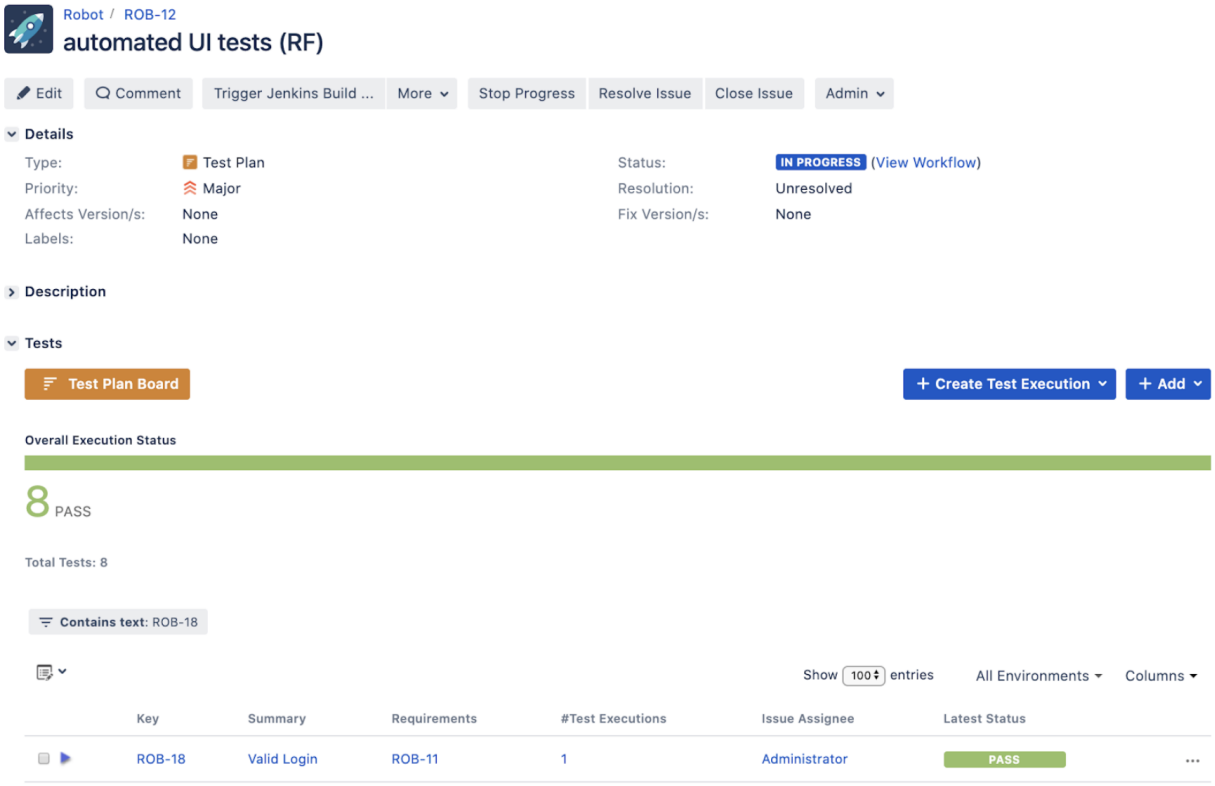
On Agile Boards (e.g. Scrum boards), we can now assess the coverage of our user story taking into account the testing results.

We may also track the overall Test Plan consolidated progress on the Test Plan issue related card. Note that we could include Test Executions in the board if we wish so; however, in CI scenarios that could be counterproductive.



On the Test Plan

At the Test Plan-level, the entity that defines the scope of testing and tracks its progress, we can quickly assess the latest consolidated test results (i.e. the latest result obtained for each Test being tracked).



References

- Robot Framework
- Awesome Robot Framework (curated list of resources)
- Code used in the first example
- Integration capabilities that Xray provides for Robot Framework XML reports
- pabot