Testing web applications using Cypress

What you'll learn

- Define tests using Cypress
- Run the test and push the test report to Xray
- Validate in Jira that the test results are available

Source-code for this tutorial

- code is available in GitHub

Overview

Cypress is a JavaScript based testing framework for test automation. Cypress is often compared to Selenium, but it is different; unlike Selenium that is executed outside of the browser Cypress is executed within it, in the same run loop as your application.

Cypress runs in a NodeJS server process that allows Cypress and the NodeJS server to constantly communicate, synchronize, and perform tasks on behalf of each other. This provides Cypress the ability to respond to the application's events in real time, and at the same time work outside of the browser for tasks that require a higher privilege.

Prerequisites

For this example we will use Cypress to write tests that aim to validate the Cypress todo example.

We will need:

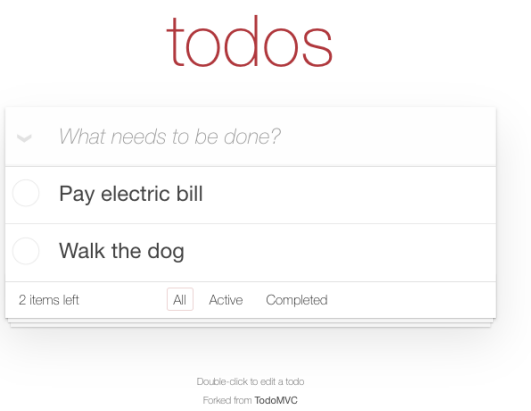
- Access to a Cypress todo example site that we aim to test
- Cypress installed in your machine

To start using the Cypress please follow the Get Started documentation.

The tests consists in validating the operations over todo's elements of the Cypress todo example, for that we have defined several tests to:

- Validate that we can add new todo items;
- Validate that we can check an item as completed;
- Validate that we can filter for completed/uncompleted tasks;
- Validate that we can delete all completed tasks.

The target web application is a simple "todos" made available by Cypress.



Each of these tests will have a series of actions and validations to check that the desired behavior is happening as we can see below:

todo.cy.js

```
describe('example to-do app', () => {
  beforeEach(() => {
    cy.visit(Cypress.config('baseUrl'))
  })

  it('can add new todo items', () => {
    const newItem = 'Feed the cat'
    cy.get('[data-test=new-todo]').type(`${newItem}{enter}`)

    cy.get('.todo-list li')
      .should('have.length', 3)
      .last()
      .should('have.text', newItem)
  })

  it('can check an item as completed', () => {
    cy.contains('Pay electric bill')
      .parent()
      .find('input[type=checkbox]')
      .check()

    cy.contains('Pay electric bill')
      .parents('li')
      .should('have.class', 'completed')
  })

  context('with a checked task', () => {
    beforeEach(() => {
      cy.contains('Pay electric bill')
        .parent()
        .find('input[type=checkbox]')
        .check()
    })

    it('can filter for uncompleted tasks', () => {
      cy.contains('Active').click()

      cy.get('.todo-list li')
        .should('have.length', 1)
        .first()
        .should('have.text', 'Walk the dog')

      cy.contains('Pay electric bill').should('not.exist')
    })

    it('can filter for completed tasks', () => {
      cy.contains('Completed').click()

      cy.get('.todo-list li')
        .should('have.length', 1)
        .first()
        .should('have.text', 'Pay electric bill')

      cy.contains('Walk the dog').should('not.exist')
    })

    it('can delete all completed tasks', () => {
      cy.contains('Clear completed').click()

      cy.get('.todo-list li')
        .should('have.length', 1)
        .should('not.have.text', 'Pay electric bill')

      cy.contains('Clear completed').should('not.exist')
    })
  })
})
```

The tests are simple but let's look into two diferences that allow a little more control, the first one is the possibility to use hooks like *`beforeEach`* to, as the name implies, execute some operations before each test execution. In this example we are accessing the target page before each test avoiding repeating this instruction in each test.

beforeEach

```
...
beforeEach(() => {
  cy.visit('https://example.cypress.io/todo')
})
...
```

The other one helps in the test organization and have a direct effect on how the results will be written in the result file, in our case we are using *`context`* (but we could use *`describe`* or *`specify`*). This will group the tests beneath into the same testsuite.

context

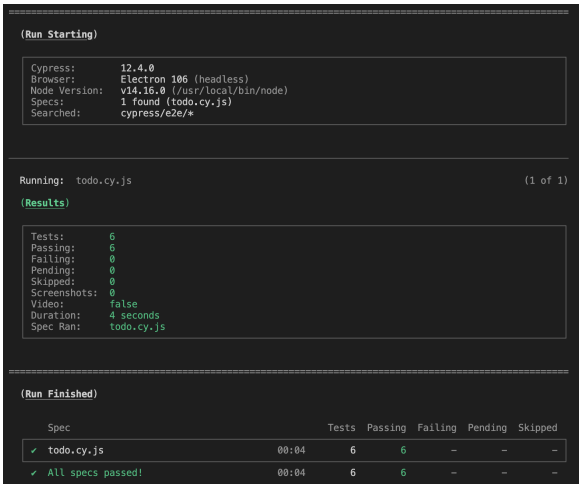
```
...
  context('with a checked task', () => {
...
```

These tests are defined to validate the application ability to manage todo's by accessing the Cypress todo example and performing operations that will generate an expected output.

Once the code is implemented it can be executed with the following command:

```
npx cypress run
```

The results are immediately available in the terminal.



In this example, all tests have succeed, as seen in the previous terminal screenshot. It generates the following JUnit XML report.

Junit Report

```
<?xml version="1.0" encoding="UTF-8"?>
<testsuites name="Mocha Tests" time="4.404" tests="6" failures="0">
  <testsuite name="Root Suite" timestamp="2023-01-30T17:46:57" tests="0"
file="cypress/e2e/todo.cy.js" time="0.000" failures="0">
  </testsuite>
  <testsuite name="example to-do app" timestamp="2023-01-30T17:46:57"
tests="3" time="0.000" failures="0">
    <testcase name="example to-do app displays two todo items by default"
time="0.842" classname="displays two todo items by default">
    </testcase>
    <testcase name="example to-do app can add new todo items" time="0.477"
classname="can add new todo items">
    </testcase>
    <testcase name="example to-do app can check off an item as completed"
time="0.267" classname="can check off an item as completed">
    </testcase>
  </testsuite>
  <testsuite name="with a checked task" timestamp="2023-01-30T17:47:00"
tests="3" time="1.060" failures="0">
    <testcase name="example to-do app with a checked task can filter for
uncompleted tasks" time="0.345" classname="can filter for uncompleted
tasks">
    </testcase>
    <testcase name="example to-do app with a checked task can filter for
completed tasks" time="0.350" classname="can filter for completed tasks">
    </testcase>
    <testcase name="example to-do app with a checked task can delete all
completed tasks" time="0.341" classname="can delete all completed tasks">
    </testcase>
  </testsuite>
</testsuites>
```

Notes:

- You can invoke Cypress locally and use it to assist you to write and execute tests with: *`npx cypress open`*
- Use *`cypress.config.js`* to define configuration values such as taking screenshots, recordings or the reporter to use (more info here).
- Different parameters can be used in the command line (more info here)
- We are using JUnit reporter but others are available (more info here)

Integrating with Xray

As we saw in the previous example, where we are producing JUnit reports with the test results. It is now a matter of importing those results to your Jira instance; this can be done by simply submitting automation results to Xray through the REST API, by using one of the available CI/CD plugins (e.g. for Jenkins), or using the Jira interface to do so.

API

API

Once you have the report file available you can upload it to Xray through a request to the REST API endpoint for JUnit, and for that the first step is to follow the instructions in v1 or v2 (depending on your usage) to obtain the token we will be using in the subsequent requests.

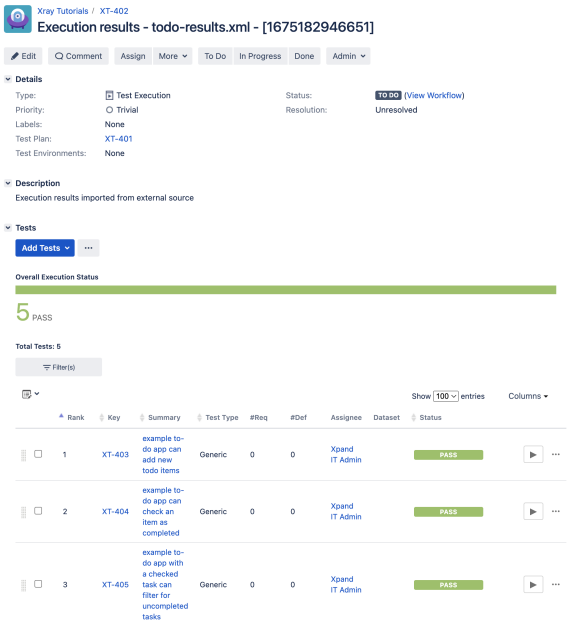
JUnit XML results

We will use the API request with the definition of some common fields on the Test Execution, such as the target project, project version, etc.

In the first version of the API, the authentication used a login and password (not the token that is used in Cloud).

```
curl -H "Content-Type: multipart/form-data" -u admin:admin -F "file=@todo-results.xml" 'http://<LOCAL_JIRA_INSTANCE>/rest/raven/2.0/import/execution/junit?projectKey=XT&testPlanKey=XT-401'
```

With this command we are creating a new Test Execution in the referred Test Plan with a generic summary and six tests with a summary based on the test name.

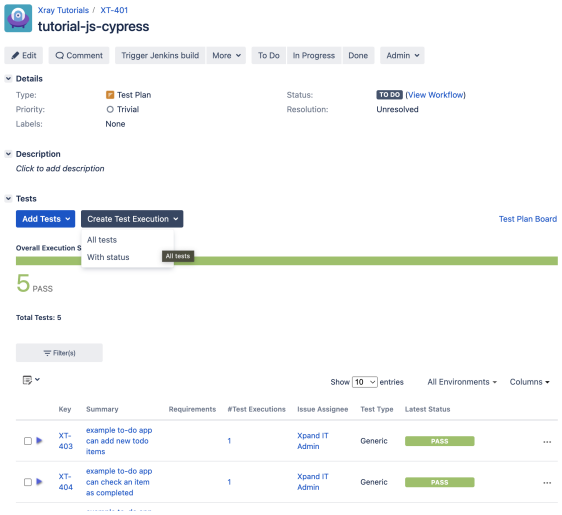


Jira UI

Jira UI

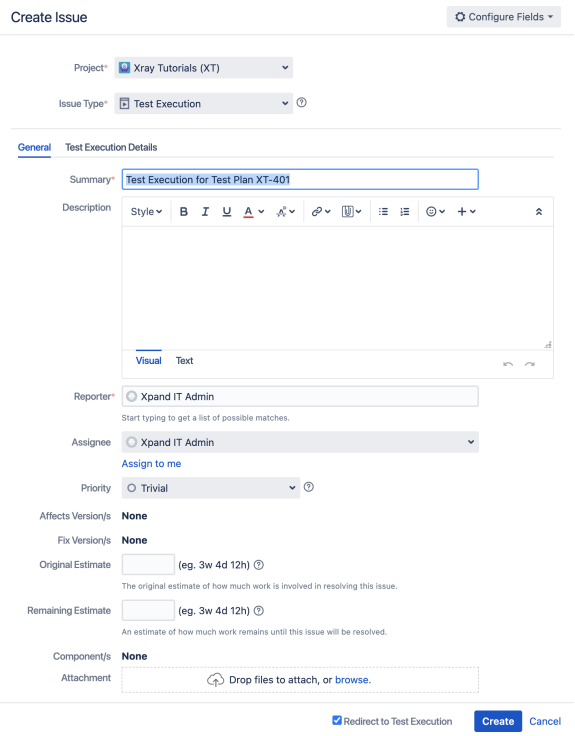
1

Create a Test Execution linked to the Test Plan that you have.



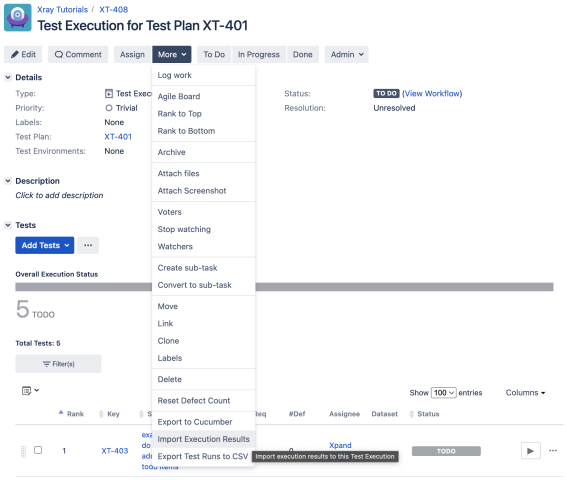
2

Fill in the necessary fields and press "*Create*"



3

Open the Test Execution and import the JUnit report

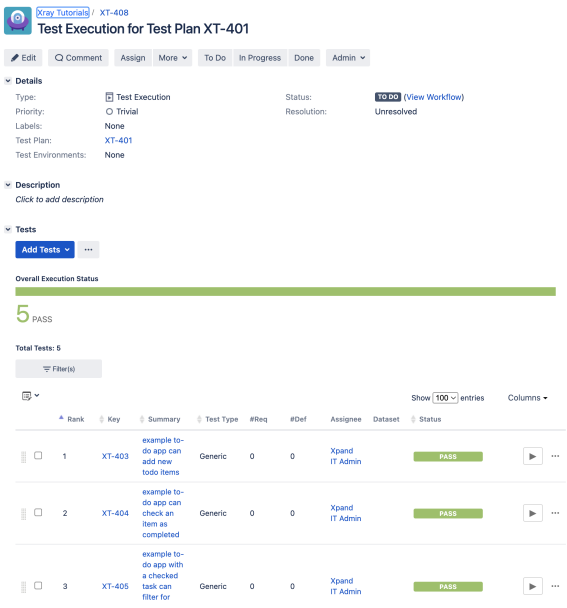


4

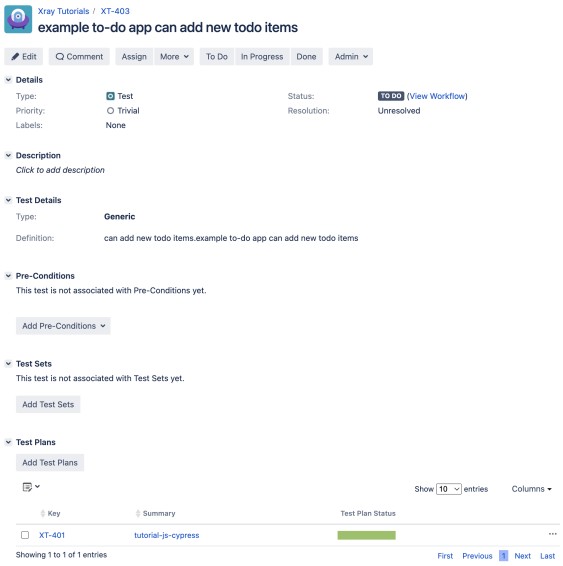
Choose the results file and press *"Import"*

5

The Test Execution is now updated with the test results imported

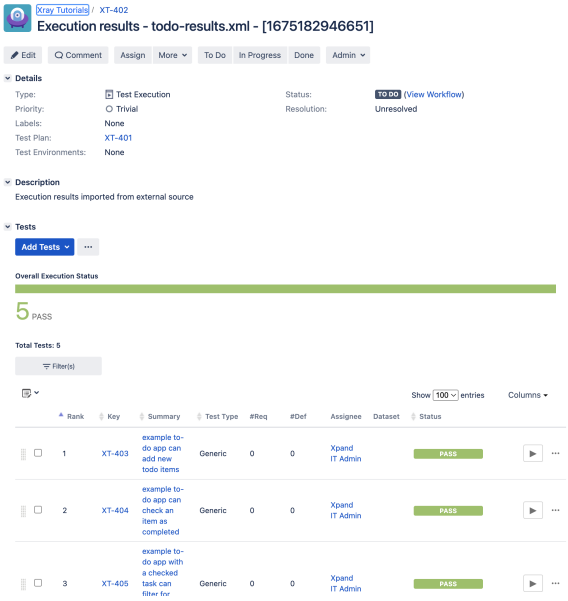


Tests implemented using Cypress will have a corresponding Test entity in Xray. Once results are uploaded, Test issues corresponding to the Cypress tests are auto-provisioned, unless they already exist.

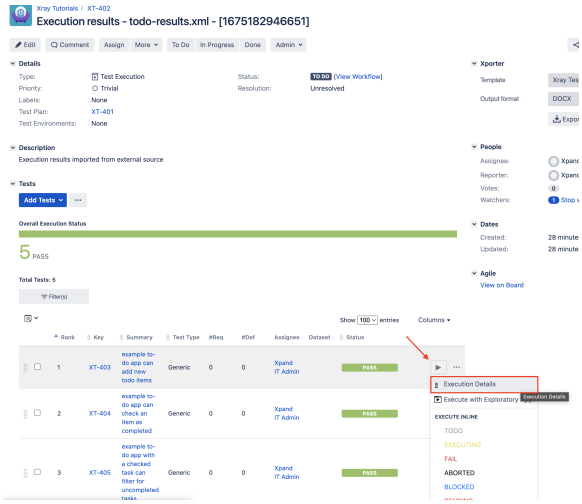


Xray uses a concatenation of the suite name and the test name as the the unique identifier for the test.

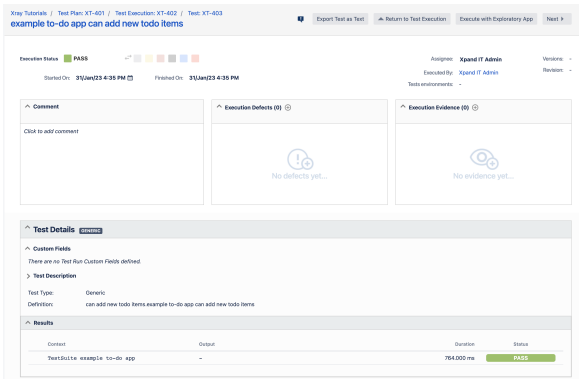
In Xray, results are stored in a Test Execution, usually a new one. The Test Execution contains a Test Run per each test that was executed using Cypress.



Detailed results, including logs and exceptions reported during execution of the test, can be seen on the execution screen details of each Test Run, accessible through the *Execution details*:



As we can see here:



Tips

- after results are imported, in Jira Tests can be linked to existing requirements/user stories, so you can track the impacts on their coverage.
- results from multiple builds can be linked to an existing Test Plan, to facilitate the analysis of test result trends across builds.
- results can be associated with a Test Environment, in case you want to analyze coverage and test results by that environment later on. A Test Environment can be a testing stage (e.g. dev, staging, preprod, prod) or a identifier of the device/application used to interact with the system (e.g. browser, mobile OS).

References

- https://www.cypress.io/
- https://docs.cypress.io/guides/overview/why-cypress