

# Developing and testing APIs using Postman

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## Overview

[Postman](#), more than a utility, is a collaboration platform for developing APIs.

Normally, it is used as a way to quickly interact with existing APIs without having to code HTTP requests by hand.

It provides support for HTTP based APIs, including REST and GraphQL.

Postman also provides the ability to [write tests](#) and use [Chai](#) assertions, as seen on [these Postman test examples](#).

With Postman, comes also a [built-in \(test\) collection runner](#); it is also possible to execute tests from the outside, using a CLI tool named [Newman](#).

## Concepts

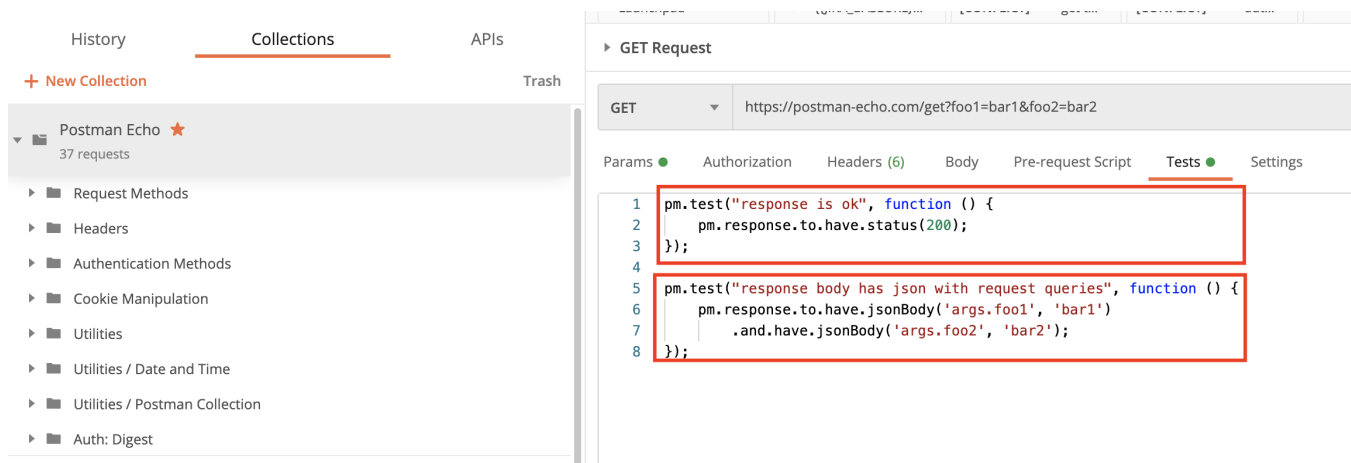
- [request](#): an API request (e.g. HTTP POST on some URL, with some values)
  - [authentication](#): authentication for the API request (e.g. HTTP basic auth, etc); can be defined at multiple levels and inherited
- [collection](#): a way of grouping multiple requests
- [folders within the collection](#): a way to better organize requests within the collection
- [variables](#): can be defined at multiple levels (e.g. global, collection, environment, local, ...)
- [test](#): a test; can be defined at request, folder or collection level
- [pre-request script](#): some code execute before each test; can also be defined at request, folder or collection level
- [environment](#): an abstraction of some test environment that describes a context for running the requests; it consists of one description plus a set of variables with their corresponding values

## Implementing tests

Testing is achieved through the usage of [scripts](#).

Tests can be implemented using Javascript and making use of [Postman APIs/objects](#) assisted by [Chai](#) assertions.

One or more tests can be defined at the request level, or even at the whole collection level.



Pre-request scripts may be useful as a means to initialize some data before the test or to implement some test setup code.

Variables can be defined at multiple levels and can be used to make maintenance easier; the sample applies to authentication, which can also make use of variables.

A test is defined by using "pm.test()".

#### example of a test that looks at the response's HTTP status code

```
pm.test("response is ok", function () {  
    pm.response.to.have.status(200);  
});
```

In Postman, quoting Postman documentation, *the `pm` object encloses all information pertaining to the script being executed and allows one to access a copy of the request being sent or the response received. It also allows one to get and set environment and global variables.*

Therefore, `pm` can be used to access the response, to perform assertions or even to make some requests.

## Integrating with Xray

Integrating with Xray, in order to have visibility of API testing results in Jira, can be done by simply submitting automation results to Xray through the REST API or by using one of the available CI/CD plugins (e.g. for Jenkins).

This can be achieved using Newman and one of its reporters capable of generating a JUnit XML file.

## Requirements

- Postman
- [Newman](#)
- [newman-reporter-junitxray](#) or [newman-reporter-junitfull](#)
- [Xray Test Management Jenkins plugin](#) (optional)

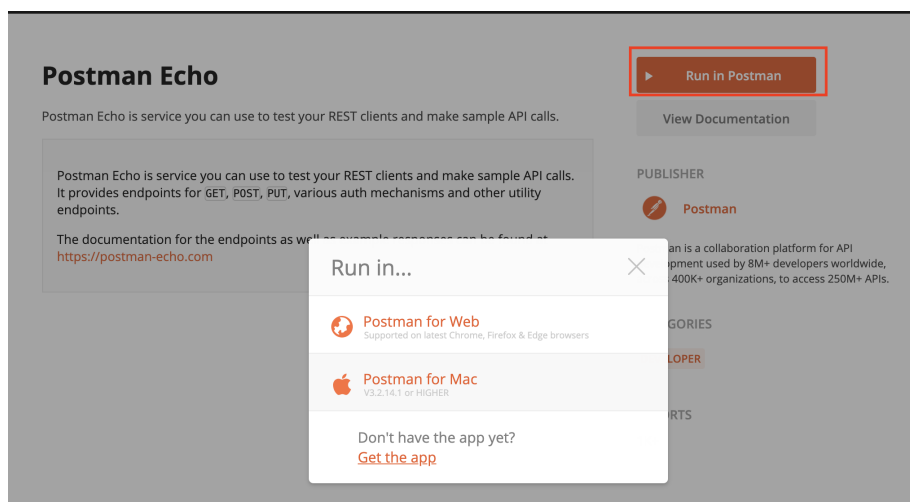
## Example

### Postman Echo API

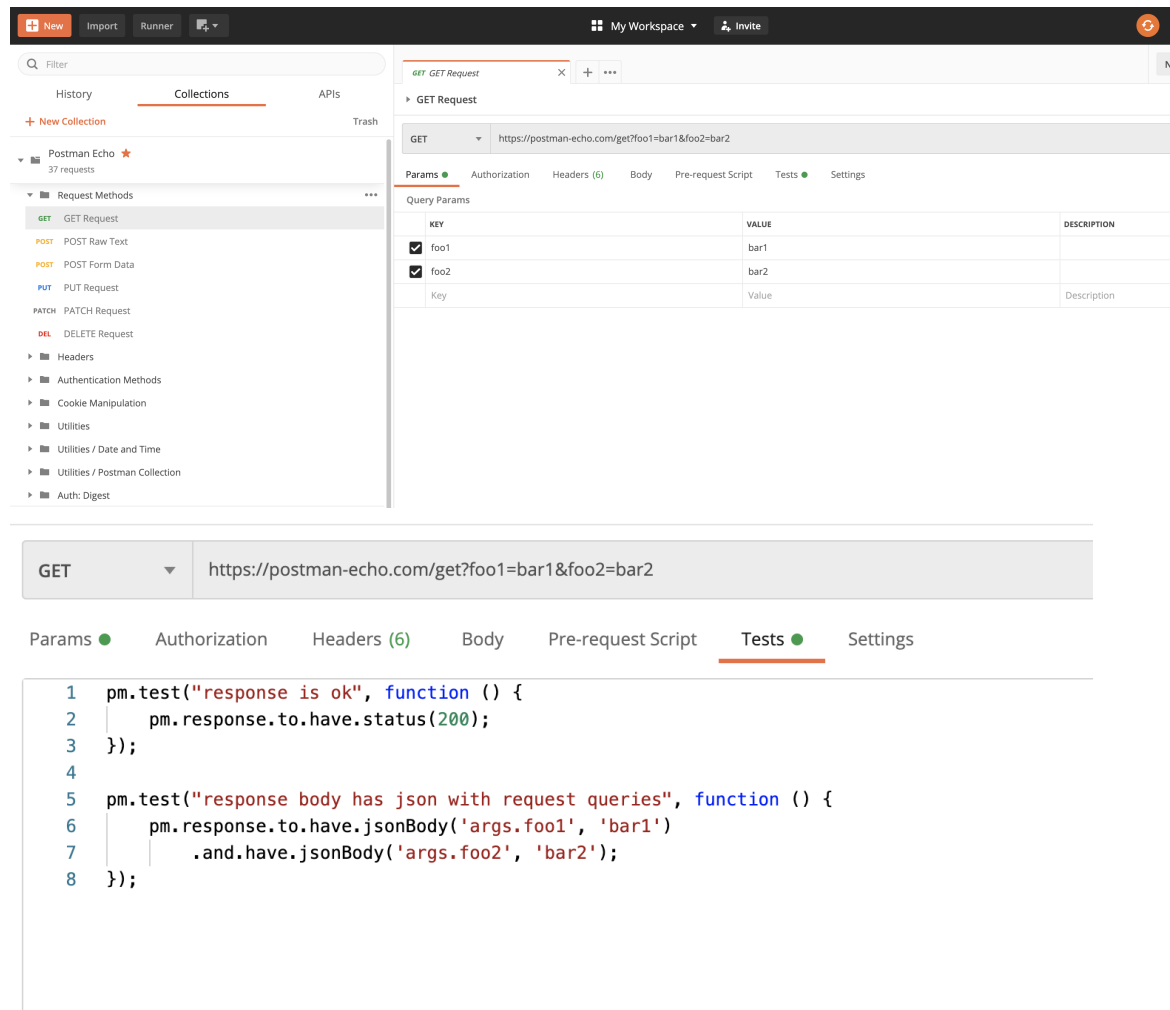
In this example, we're going to use [Postman's sample Echo API](#) as a way to showcase some tests and their integration with Xray.

The Postman Echo API provides a [set of endpoints](#) that we'll exercise.

We start by cloning an [existing Postman collection from a template](#) and importing it to Postman.



The collection contains a request per each endpoint, where each request has one or more tests.



The screenshot displays the Postman web interface. On the left, a sidebar shows a collection named 'Postman Echo' with 37 requests. The 'Request Methods' section is expanded, listing various HTTP methods like GET, POST, PUT, PATCH, and DELETE. The main panel shows a selected 'GET' request to 'https://postman-echo.com/get?foo1=bar1&foo2=bar2'. The 'Params' tab is active, showing a table of query parameters:

KEY	VALUE	DESCRIPTION
<input checked="" type="checkbox"/> foo1	bar1	
<input checked="" type="checkbox"/> foo2	bar2	
Key	Value	Description

Below the request details, the 'Tests' tab is selected, showing a JavaScript test script:

```
1 pm.test("response is ok", function () {
2   pm.response.to.have.status(200);
3 });
4
5 pm.test("response body has json with request queries", function () {
6   pm.response.to.have.jsonBody('args.foo1', 'bar1')
7     .and.have.jsonBody('args.foo2', 'bar2');
8 });
```

In the previous example, we can see two tests: one for validating a successful HTTP request based on the status code and another that checks the response's JSON content.

The collection (or a subset of its tests) can be run using the Collection Runner.

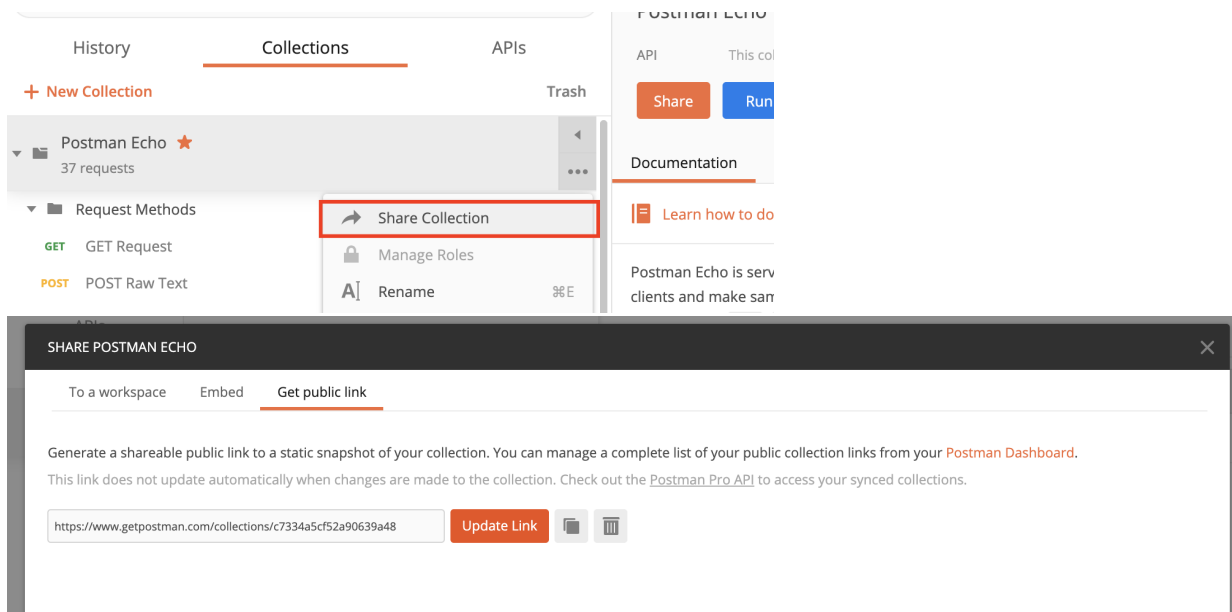
The screenshot displays the Postman interface. At the top, the 'Postman Echo' collection is selected, showing a list of 37 requests categorized by Request Methods (GET, POST, PUT, PATCH, DELETE), Headers, Authentication Methods, Cookie Manipulation, Utilities, and Date/Time. The 'Run' button is highlighted. Below this, the 'Collection Runner' is shown, where the 'Postman Echo' collection is selected, and the 'Run' button is also highlighted. The 'Run Results' tab shows the execution of the collection, with a summary of 83 passed tests and 7 failed tests. The failed tests are listed with their respective error messages, such as 'AssertionError: expected response to have status code 200 but got 404'.

The runner shows the overall count for the number of passed and failed tests. We can also see the assertion error on failed tests; in this case, saving the response (setting the proper flag above) can help us better understand what is happening.

Running the tests can also be done from the command line or from within Jenkins (or any other CI/CD tool). This can be achieved using [Newman](#).

In order to run Newman, we need to provide a path or a URL to our collection.

In this case, we'll obtain a public link to it.



Then we need to decide which Newman reporter to use. Newman provides a built-in JUnit reporter; however, better alternatives exist such as [junitxray](#) or [junitfull](#).

### Which Newman reporter should I use?

The standard Newman junit reporter produces `<testcase>` entries in the JUnit XML report that can be misleading as tests will be identified on the Postman test description, which can be similar between different tests (e.g. "response is ok").

Therefore, two alternative reporters arise: [newman-reporter-junitxray](#) and [newman-reporter-junitfull](#)

"newman-reporter-junitxray" (simply known as "junitxray"), will create `<testcases>` per each request, which in the end will lead to corresponding Test issues in Xray. This means that there won't be explicit visibility for each Postman test on that request, as they will be treated just as one.

"newman-reporter-junitfull" (simply known as "junitfull"), on the other hand, will produce one `<testcase>` per each Postman test, which will lead to the same number of corresponding Test issues in Xray.

If you aim just to have high-level overview of the request, then "junitxray" reporter will be preferable; otherwise, "junitfull" may be a better option.

	junit	junitxray	junitfull
tests	<ul style="list-style-type: none"> <li>40 Tests (one per each PM test name /description)</li> </ul>	<ul style="list-style-type: none"> <li>37 Tests (one per request)</li> </ul>	<ul style="list-style-type: none"> <li>90 Tests (one per each PM test)</li> </ul>
generic definition field	<code>&lt;collection&gt;.&lt;pm_test_description&gt;</code>  "PostmanEcho.response is ok"	<code>&lt;collection&gt;.&lt;request_name&gt;</code>  "PostmanEcho.Object representation"	<code>&lt;folder_path&gt;.&lt;request_name&gt;.&lt;pm_test_description&gt;</code>  "Utilities / Date and Time / Object representation.response is ok"
notes	<ul style="list-style-type: none"> <li>leads to a collision of tests made for different requests</li> <li>ignores folder path, which can lead to the collision of requests having the same name</li> <li>one Test issue per each PM test</li> </ul>	<ul style="list-style-type: none"> <li>ignores folder path, which can lead to the collision of requests having the same name</li> <li>doesn't present the multiple PM tests</li> <li>few Tests, one per each request</li> </ul>	<ul style="list-style-type: none"> <li>can lead to many Test issues</li> <li>one Test issue per each PM test, identified by the full (folder) path of the request</li> </ul>

## Installing Newman and its reporters

```
npm install -g newman
# install one of the following ones
npm install -g newman-reporter-junitxray
npm install -g newman-reporter-junitfull
```

Whenever running Newman, we can specify one or more reporters (if we want to), including a CLI friendly one.

```
newman run https://www.getpostman.com/collections/c7334a5cf52a90639a48 -r 'cli,junitfull,junitxray' --reporter-junitfull-export postman_echo_junitfull.xml --reporter-junitxray-export postman_echo_junitxray.xml -n 1
```

If using Jenkins, we need to configure a build step to execute "newman" command.



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](#)).

The following screenshots show the Jenkins configuration.

We could eventually fill/identify the Test Environment to associate to the Test Execution based on the Postman's Environment being used if it would make sense for us to analyze the results on a per-environment basis.

A screenshot of the 'Post-build Actions' section in Jenkins, specifically the 'Xray: Results Import Task' configuration. The 'Jira Instance' is set to 'xray-vm' and the 'Format' is 'JUnit XML'. Under 'Parameters', there is a checkbox for 'Import to Same Test Execution' which is unchecked. Below it is a note: 'When this option is checked, if you are importing multiple execution report files using a glob expression, the results will be imported to the same Test Execution'. The 'Execution Report File (file path with file name)' field contains 'postman\_echo\*.xml'. Other fields include 'Project Key' (CALC), 'Test Execution Key', 'Test Plan Key', 'Test Environments', 'Revision', and 'Fix Version', all of which are currently empty.

A Test Execution will be created containing results for all tests executed. Actually, in our specific case and only for demonstration purposes, two Test Executions would be created due to the fact that we're generating two JUnit XML files from the different Newman reporters.

Unstructured (i.e. "Generic") Test issues will be auto-provisioned the first time you import the results, based on the identification of the test (see notes for possible Newman reporters above). The "Generic Definition" field on the Test issue is used as a way to uniquely identify the test.



### Please note

Tests will be reused on subsequent result imports as long as you don't change what contributes to the calculation of the test's unique identifier (i. e. "Generic Definition" field); otherwise, new Tests will be auto-provisioned.

Therefore, and depending on the Newman reporter being used, if you change the Postman test description or the folder containing the test, it will lead to new Tests in Jira as Xray will consider them to be new.

In this example, we're looking at the Test Execution (and related Tests) created as a consequence of importing the JUnit XML report produced by the Newman reporter [newman-reporter-junitxray](#).

Calculator / CALC-7871

Execution results - postman\_echo\_junitxray.xml - [1597879559264]

EditCommentAssignMoreStart ProgressResolve IssueClose IssueAdmin

Details

Type:Test Execution  
Priority:Major  
Affects Version/s:None  
Component/s:None  
Labels:None  
Test Environments:None  
Test Plan:None

Status:OPEN (View Workflow)  
Resolution:Unresolved  
Fix Version/s:None

Description

Execution results imported from external source

Tests

+ Add

Overall Execution Status

32 PASS 5 FAIL

Total Tests: 37

Filter(s)

Show 100 entriesColumns

Rank	Key	Summary	Test Type	#Req	#Def	Assignee	Status
1	CALC-7864	Time addition	Generic	0	0	Administrator	PASS
2	CALC-7842	Transform collection from format v1 to v2	Generic	0	0	Administrator	FAIL
3	CALC-7841	Get UTF8 Encoded Response	Generic	0	0	Administrator	PASS
4	CALC-7863	Between timestamps	Generic	0	0	Administrator	PASS
5	CALC-7862	POST Raw Text	Generic	0	0	Administrator	PASS

Within the execution screen details, you can look at the Test Run details which include the duration, overall result, and also any eventual error message.



Export Test as Text

Return to Test Execution

Execute with Exploratory App

Previous

Next

Execution Status **PASS**

Started On: 20/Aug/20 12:26 AM Finished On: 20/Aug/20 12:26 AM

Assignee: Administrator

Versions: -

Executed By: Administrator

Revision: -

Tests -  
environments:

Affected Requirements

None

Comment

Preview Comment

Execution Defects (0)

Create Defect

Create Sub-Task

Add Defects

Execution Evidence (0)

Add Evidence

Execution Details

Test Description

None

Custom Fields

There are no Test Run Custom Fields defined.

Test Details

Test Type: Generic  
Definition: PostmanEcho.Object representation

Results

Context	Output	Duration	Status
TestSuite c8c16569-a771-4ad3-874c-9072351ff79a - Utilities / Date and Time	-	-	PASS





## What would be the results if I used "newman-reporter-junitfull"?

If you would use "newman-reporter-junitfull", you would obtain many more Test issues as seen ahead.

Some of these Tests would have the same Summary as it would be populated from Postman test's description.



Calculator / CALC-7870

### Execution results - postman\_echo\_junitfull.xml - [1597879527362]

Edit Comment Assign More Start Progress Resolve Issue Close Issue Admin

#### Details

Type: Test Execution  
Priority: Major  
Affects Version/s: None  
Component/s: None  
Labels: None  
Test Environments: None  
Test Plan: None  
Status: OPEN (View Workflow)  
Resolution: Unresolved  
Fix Version/s: None

#### Description

Execution results imported from external source

#### Tests

+ Add

Overall Execution Status

82 PASS 8 FAIL

Total Tests: 90

Filter(s)



Show 100 entries

Columns

Rank	Key	Summary	Test Type	#Req	#Def	Assignee	Status
1	CALC-7743	the "foo!" cookie has correct value	Generic	0	0	Administrator	PASS
2	CALC-7820	response is ok	Generic	0	0	Administrator	PASS
3	CALC-7787	response is ok	Generic	0	0	Administrator	PASS
4	CALC-7742	response body has json with form data	Generic	0	0	Administrator	PASS
5	CALC-7786	the "foo!" cookie has correct value	Generic	0	0	Administrator	PASS

Calculator / Test Execution: CALC-7741 / Test: CALC-7790

### response is ok



Export Test as Text

Return to Test Execution

Execute with Exploratory App

Previous

Next

Execution Status: PASS

Started On: 18/Aug/20 12:54 PM Finished On: 18/Aug/20 12:54 PM

Assignee: Administrator  
Executed By: Administrator  
Tests: -  
environments:

#### Affected Requirements

None

Comment Preview Comment

Execution Defects (0) Create Defect Create Sub-Task Add Defects

Execution Evidence (0) Add Evidence

#### Execution Details

##### Test Description

None

##### Custom Fields

There are no Test Run Custom Fields defined.

##### Test Details

Test Type: Generic  
Definition: Utilities / Date and Time / Object representation.response is ok

##### Results

Context	Output	Duration	Status
TestSuite 29 - Object representation	-	96.000 ms	PASS

Tips

- After importing results, you can link Test issues to existing requirements or user stories, so that you can track coverage on real-time directly on them
- You can map Postman's environment to Xray's Test Environment concept on Test Executions if you want to have visibility of the results on a per-environment basis
- Multiple iterations/executions can be linked to an existing Test Plan, whenever importing the results
- If you run the tests multiple times with "newman -n <number\_of\_iterations>" parameter, multiple entries will appear within the Results section of the Test Run execution screen details

## References

- [Postman](#)
- [Postman SDK](#)
- [Postman Echo API](#)
- [Using Newman](#)
- [newman-reporter-junitxray](#)
- [newman-reporter-junitfull](#)
- [Postman Quick Reference Guide](#)