**Lab Guide**

Exploring the RPA APIs

Nigel T. Crowther

Hands-on Lab

Version 1.0 for General Availability



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# Introduction

In this lab you will **explore the RPA APIs**. You will learn how to:

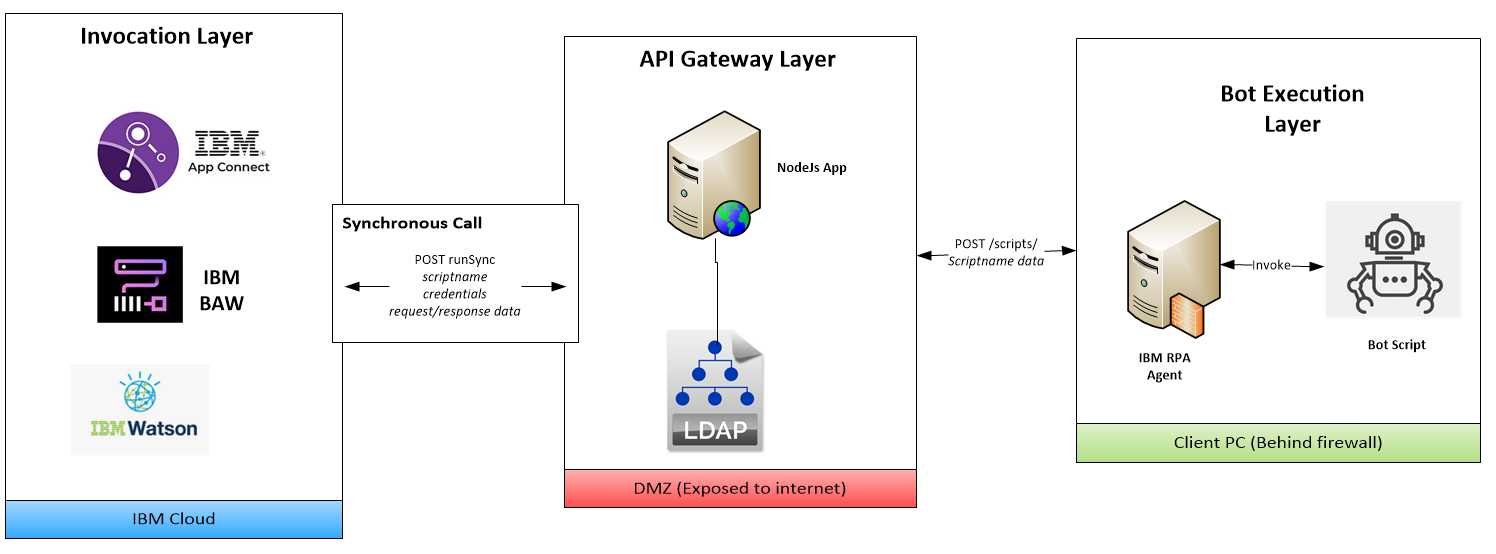
* Apply tools such as PowerShell, *curl* and *SoapUI* to test the RPA API
* Generate an *OpenApi* specification to integrate your bot to the modern world.
* Test the API using *Java* and *Junit*.

The lab is based on the IBM RPA API documentation here:

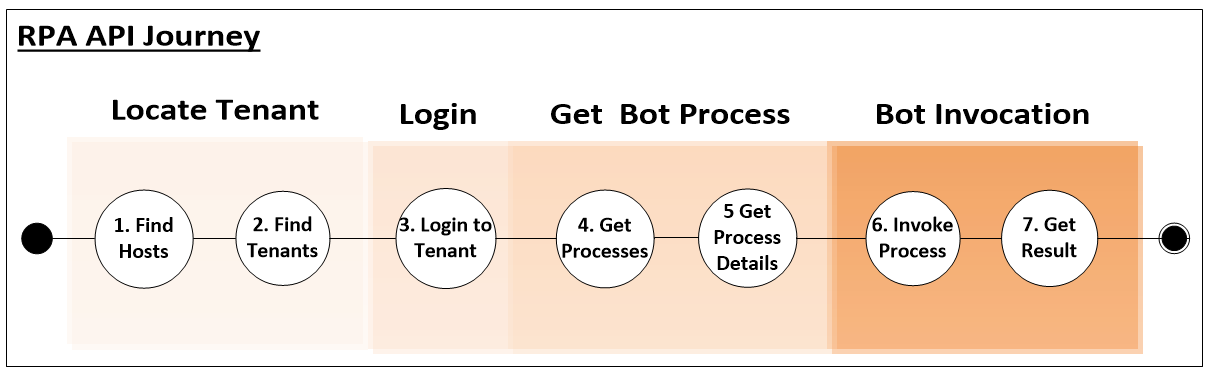
[**https://ww****w.ibm.com/docs/en/rpa/21.0?topic=automation-rpa-api-reference**](https://www.ibm.com/docs/en/rpa/21.0?topic=automation-rpa-api-reference)

# The RPA API Overview

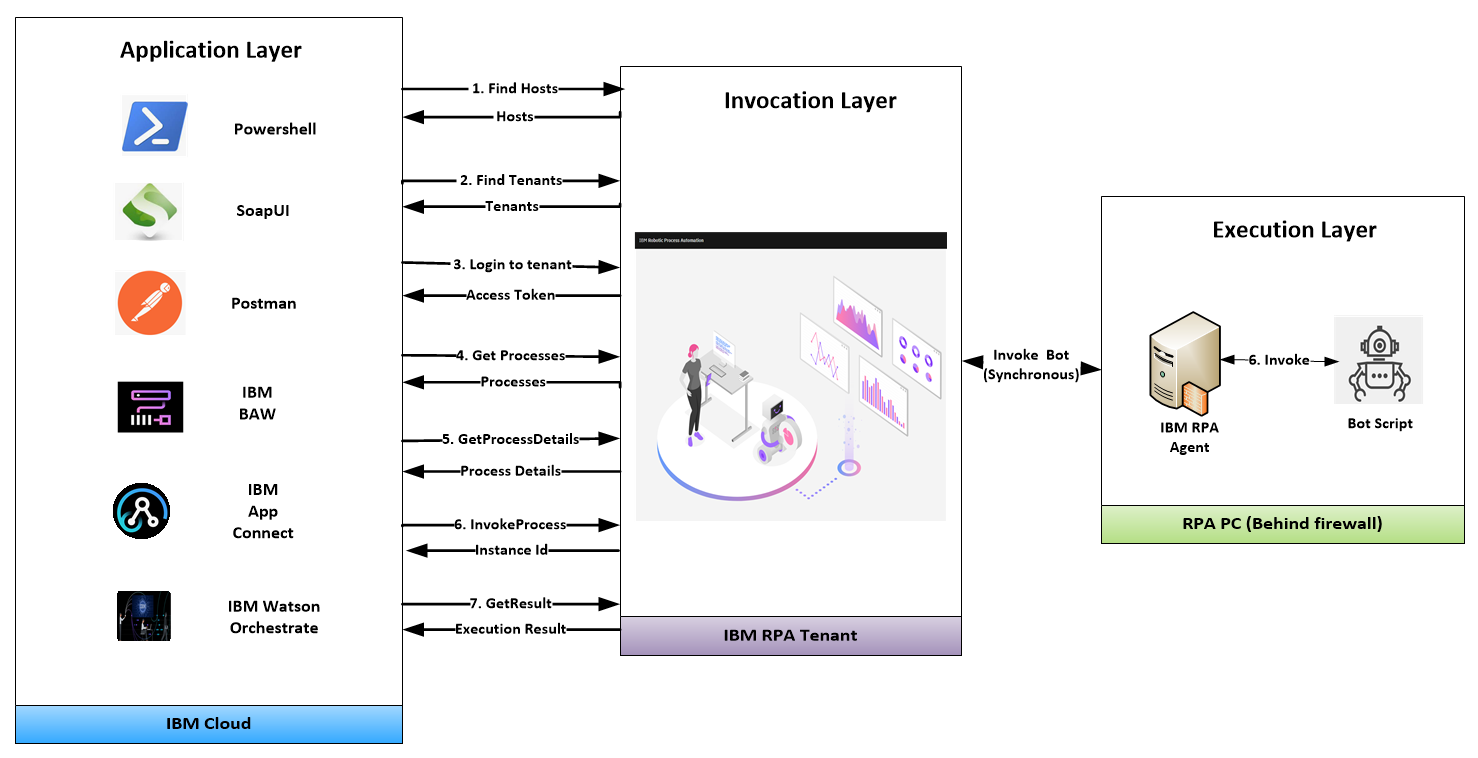
In IBM RPA there are two ways to run a bot; synchronously and asynchronously. For synchronous invocation, you invoke an API on an RPA agent and wait for your bot to run. There is no authentication or built-in security. If you need to add security, you add it yourself as shown in the diagram below. The RPA synchronous API is depicted in the rightmost box and you would add an optional gateway layer shown in the middle box. The invocation would be made from external applications, shown in the left box. See below:



For asynchronous invocation, security and authentication are built in. You follow an API journey on the RPA tenant. The journey starts with authentication and ends with retrieving the bot asynchronous result. The following diagram describes each step:



The API is invoked against the RPA tenant. The tenant authenticates the caller, locates the process in which the bot resides and then permits invocation of the bot. The tenant finds the designated computer and then invokes the internal synchronous API to run the bot. The full interaction is depicted below:



You will explore this API flow in the next steps.

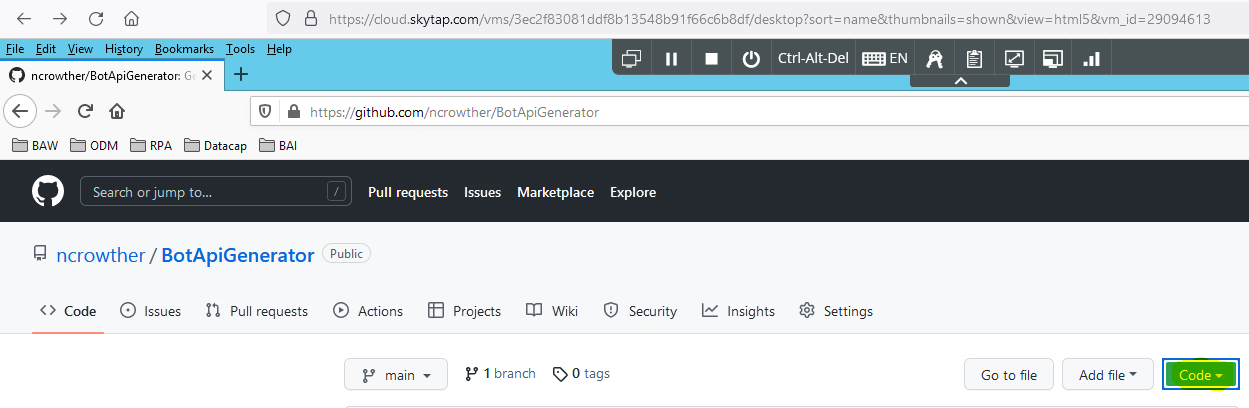
## Prerequisites

### Download Lab Materials

The prerequisite material for this lab is stored in **Github**. Using a browser, navigate to the folder:

<https://github.com/ncrowther/BotApiGenerator>

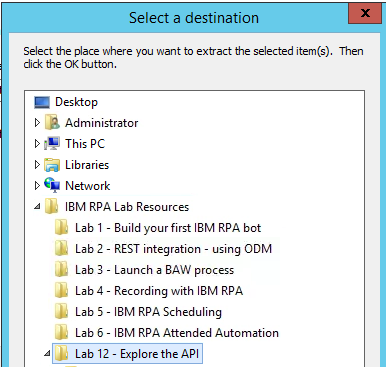
You should see the following:



Click on the  button, and then *Download Zip*. Save the file. Once downloaded, right-click the zip and select *extract all….* Extract the zip to a local folder. If using the Skytap image, create the folder below and extract the contents:

C:\Users\Administrator\Desktop\IBM RPA Lab Resources\Lab 12 – Explore the API

See below:



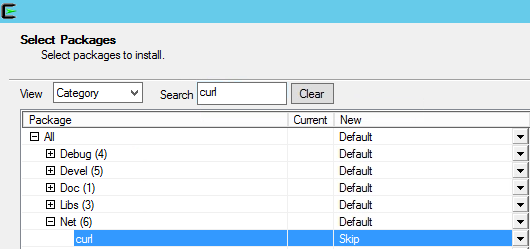
### Download Cygwin

Using a browser, download and run:

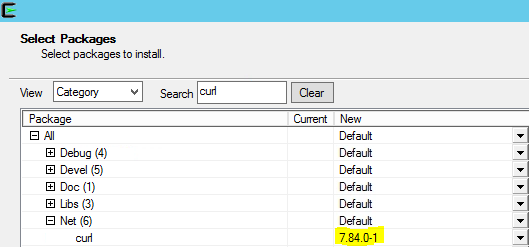
<https://www.cygwin.com/setup-x86_64.exe>

Use default installation settings. When it comes to selecting a download site, select your most local server.

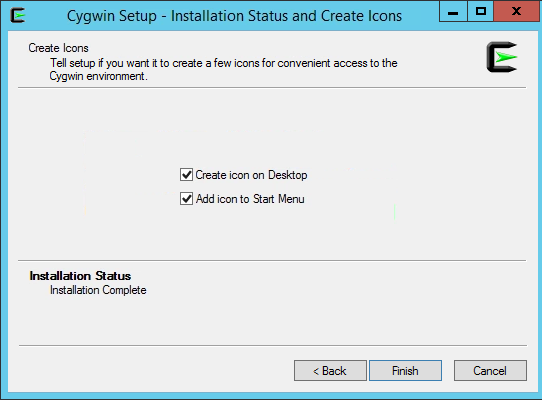
When selecting packages, enter **curl** as the search criteria and expand the package tree. You should see the following:



Curl is in *Skip* state which means it won’t be installed by default. Change ‘Skip’ to the latest version as highlighted below.



Now click *Next* and continue pressing defaults until the installation window starts. After a minute you should see this:



Press Finish. The install is complete!

### Optional - Download SoapUI

This step is not required if you are using the Skytap image.

You can download an open source version of SoapUI from the following location:

<https://www.soapui.org/downloads/soapui/>

Click on *Download SoapUI Open Source*.

Save the zip, extract and install the software using the default settings.

### Optional - Download Eclipse IDE

This step is not required if you are using the Skytap image.

You can download Eclipse from the following location:

<https://www.eclipse.org/downloads/>

# Exploring the RPA API

## Create a bot process

**IMPORTANT**. To start your exploration, you need to create a bot process. Please follow steps **2.1 to 2.5** in this lab:

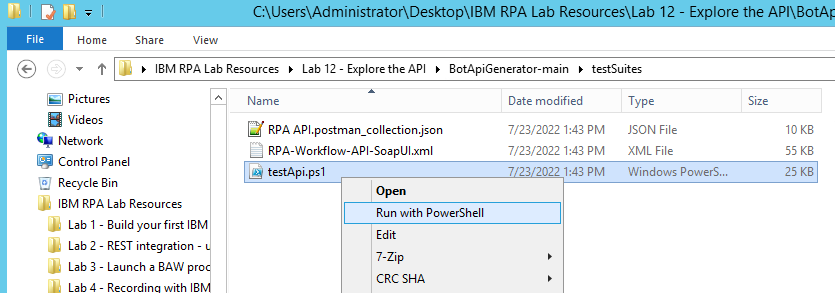
<https://github.com/juseljuk/IBM-RPA-Toolkit-for-BAW/blob/master/downloads/Using%20IBM%20RPA%20with%20IBM%20BAW%201_1.pdf>

## Test the RPA API from PowerShell

Navigate to the Folder in which you unzipped the GitHub Repo in the pre-requisites step:

C:\Users\Administrator\Desktop\IBM RPA Lab Resources\Lab 12 – Explore the API\BotApiGenerator-main

Within the *testsuites* folder, Right-click *testApi.ps1* and select *Run with PowerShell*:

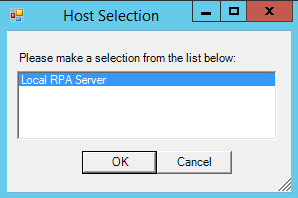


Ignore the security warning and press *Open*. A series of dialog boxes should appear. Let’s follow the steps.

### Step 1 – Host Selection

If you are running the Skytap image you will not be able to see your SaaS tenants. Press OK when the message “*Unable to find SaaS tenants*” appears.

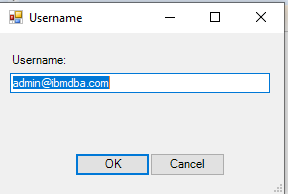
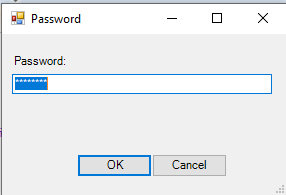
Select *Local RPA Server*



**Tip:** You need to select it so that it turns blue as shown above.

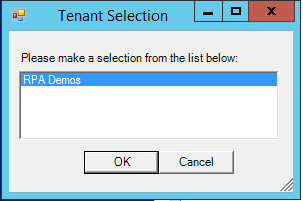
### Step 2 – Enter your tenant credentials

If you are using the Skytap image the username and password are set as default values. IF you are using your own tenant, these will be your tenant credentials.

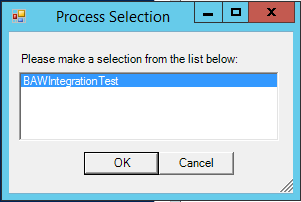
### Step 3 – Select the tenant

Select tenant. If you are running within the Skytap image you only have one option. Select *RPA Demos:*



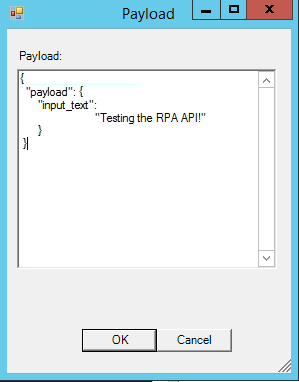
### Step 4 – Select the process

Select the process you defined in the earlier step:



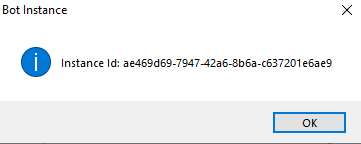
### Step 5 – Edit the payload

The payload will be generated from the bot input parameters. You can modify the input value if you wish:



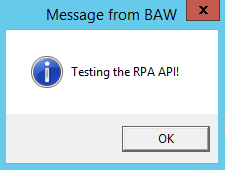
### Step 6 - Run the bot

The bot runs and a dialog box appears showing the instance id of the running process

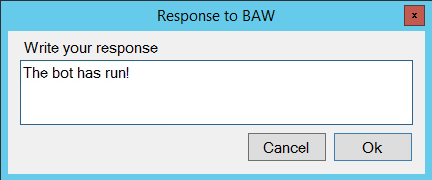


### Step 7 – View the Result

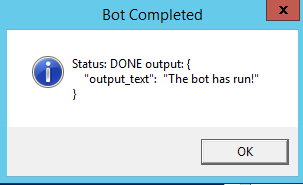
After a second, the bot runs, and you will see the following message:



Click OK and type your response:



The bot may take several seconds to run, in which case it will either be in *new* or *processing* state. When completed, the state will have a status of *done* and you will see the following dialog:



Press OK to finish.

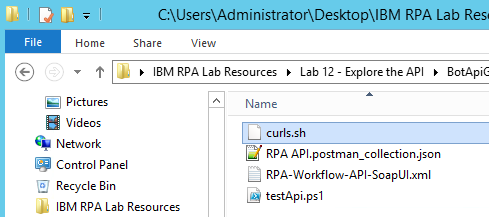
Congratulations, you have run your first bot using PowerShell to drive the asynchronous API!

Next you will view the actual RPA API commands executed.

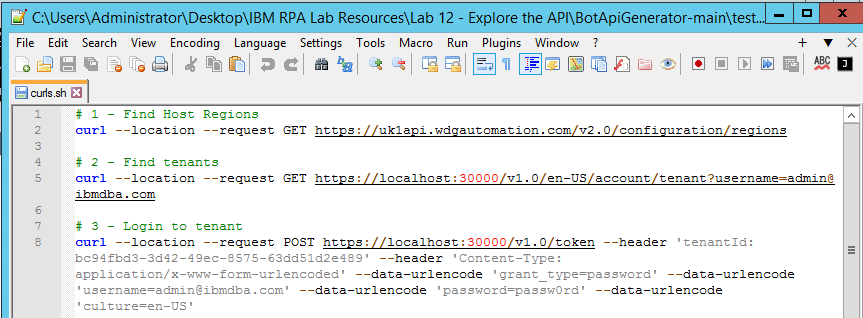
### View the RPA API Curl

In this section you will use curl to call the RPA API. Curl is the de facto tool to test APIs.

Navigate to the directory in which you ran PowerShell. Right click *curls.sh* and edit using *Notepad++.*



You will see the curl executed in the previous step.



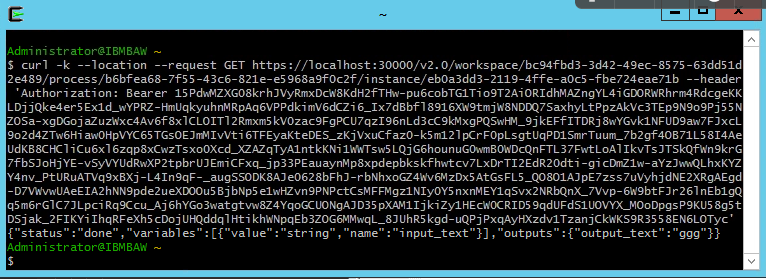
### Run curl

From the desktop, open



A Unix terminal should appear.

Paste each curl command into the terminal and hit return. Examine the result of each command to verify it is working. Finally, your terminal should look like this:



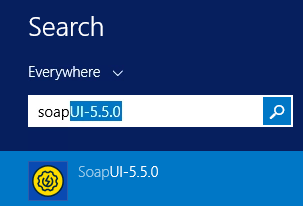
Congratulations, you have run a bot using curl!

## Testing the API from SoapUI

Curl is great for initial testing of your bot, but it is not great for building test suites. SoapUI is an open-source tool that makes it much easier to build such suites. In this section you will apply SoapUI to test the async RPA API.

### Open SoapUI

Find Soap UI and run it:



Once open, close the splash screen and click the *Import* button.

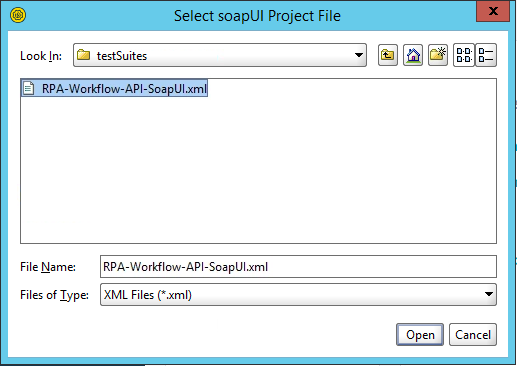


Navigate to folder:

C:\Users\Administrator\Desktop\IBM RPA Lab Resources\Lab 12 - API\BotApiGenerator-main\testSuites

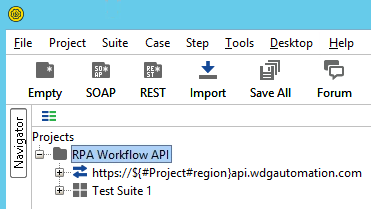
**Note**: This location may vary depending on where you downloaded your lab in step 2.1.1

Select *RPA-Workflow-API-SoapUI.xml* and press *Open*:



Ignore the version warning.

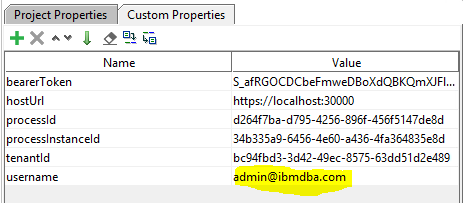
Verify the file is imported:



### Setting Project Variables

**Note:** If you are using Skytap you can skip this step as the variables have been pre-configured.

The test suite retrieves information from project variables. Click on the project *RPA Workflow API* and select *custom properties* tab.



You can edit these variables to your own tenant and processes. The two key variables are *username* and *hostURL*.

The default for *username* is

[admin@ibmdba.com](mailto:admin@ibmdba.com).

If you are not using Skytap, you need to set this to your RPA user.

The default for *hostURL* is

<https://ibmbaw:30000>

If you are not using Skytap, you will need to set this to your RPA server. If you are using SaaS, you can use the tenant below:

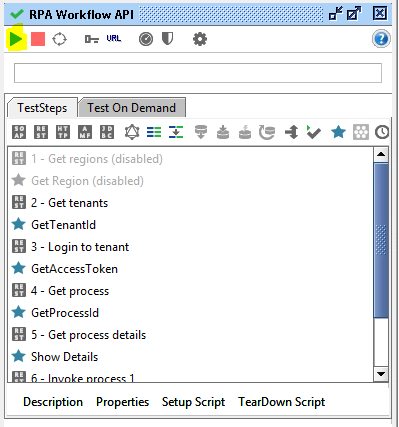
<https://us1api.wdgautomation.com>

### Run the test suite

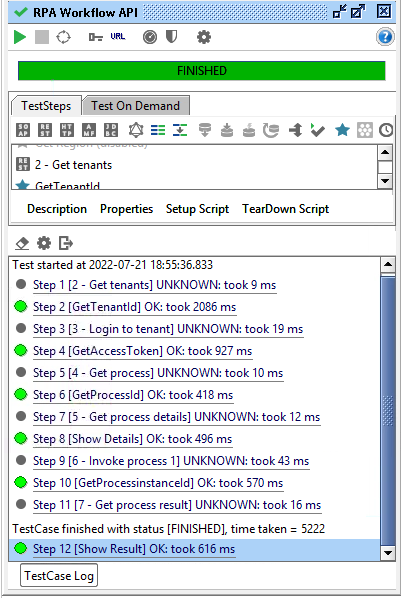
In the Projects tree, navigate to *Test Steps*. See below:



Double-click *Test steps* to open the *RPA Workflow API* test runner. Click *Run* to invoke the RPA API test suite. See below:

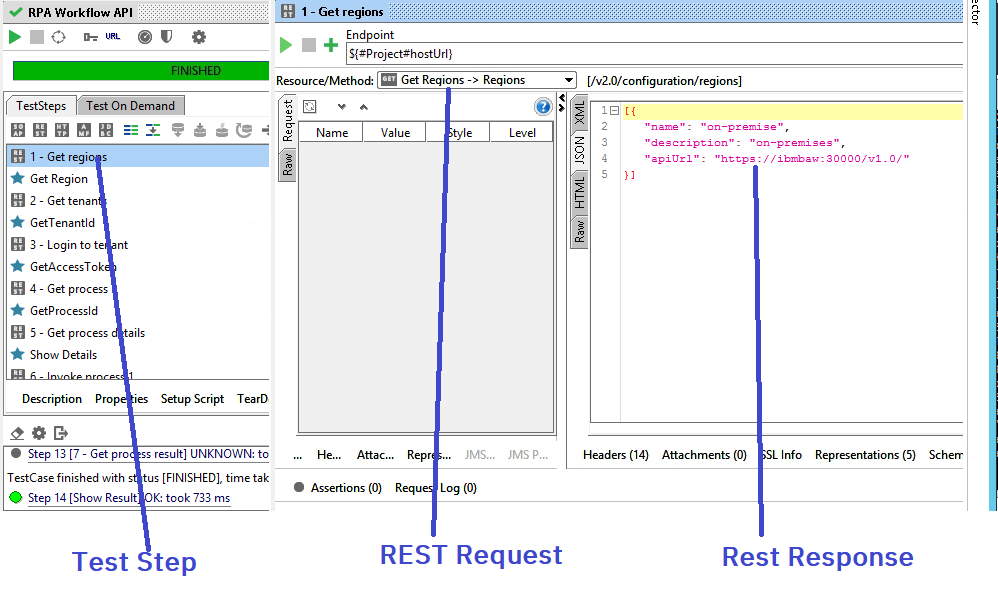


When running, you will be prompted for a series of dialog boxes showing you the API journey. When complete, you should see the following:



### Examine the test suite flow.

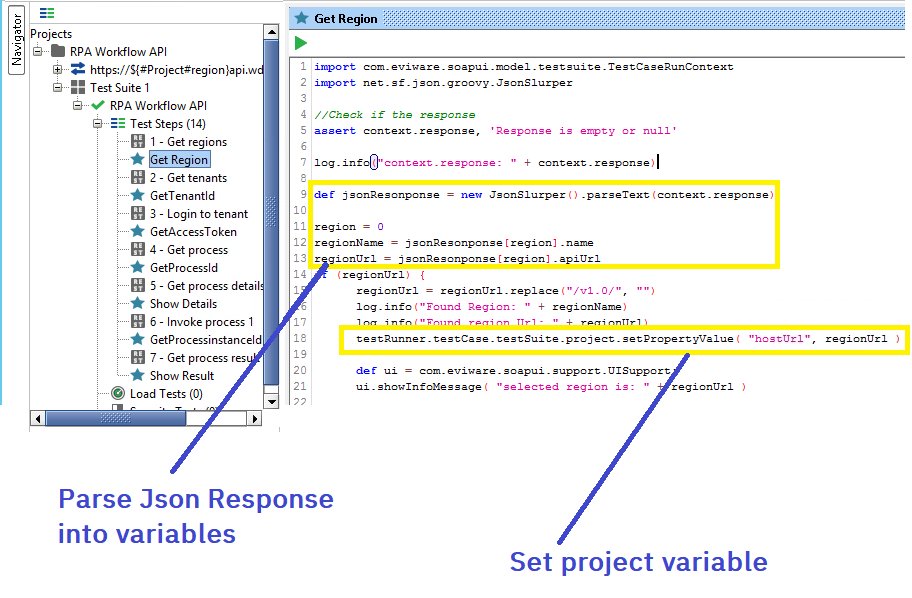
The SoapUI test suite orchestrates the flow of execution by setting variables in one step and reading them in the next. You can verify this by double-clicking **step 1 – Get Regions:**



You can see the invocation request in the center panel and the invocation result on the right panel.

**Tip:** The result is JSON, so you need to select the JSON tab on the right panel.

Now select the next step, . This step is written in *Groovy Script*. It parses the JSON response from previous step and sets a project variable to be used in the next step. See below:



Now follow the remainder of the suite to see the full API journey.

## Generating an Open API Specification

Up until now you used the raw REST RPA API. But there is a better way! Modern applications allow API integration through the *OpenAPI* specification.

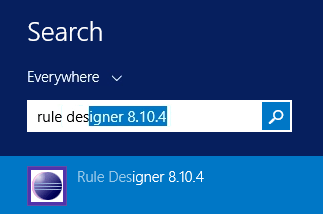
The advantages of using OpenAPI are:

* It’s a universal API definition language understood by most modern applications
* It can be easily understood by humans in tools such as <https://editor.swagger.io/>
* The definition language is rigorous, so avoids the creation of sloppy APIs.

Let’s go ahead and generate an OpenAPI spec for the bot you created.

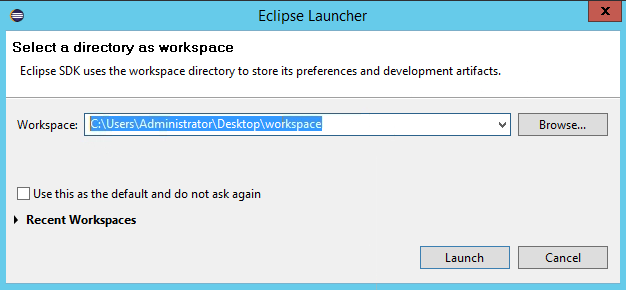
### Start Eclipse

If you are running in the Skyap image, you can access Eclipse by running **Rule Designer**. Search for *Rule Designer* in the Windows search and then double click to start.



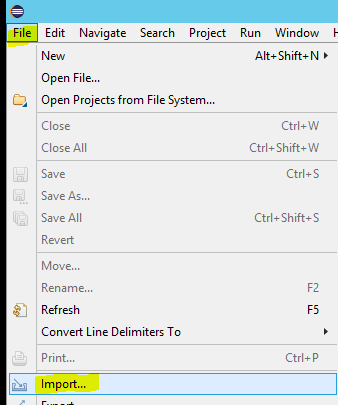
Create a workspace, for example:

C:\Users\Administrator\Desktop\workspace

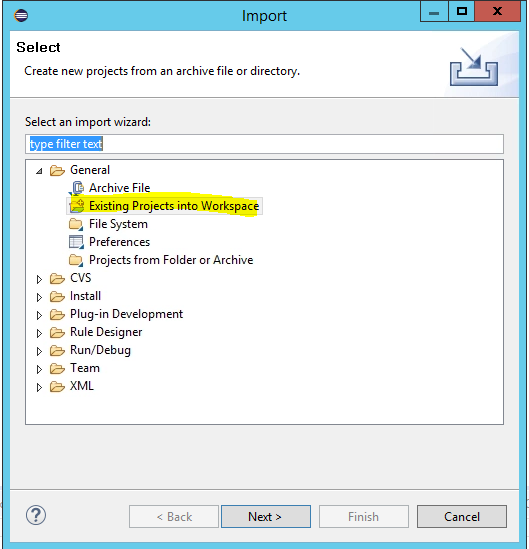


Press *Launch*.

Once Eclipser is open, select *File->Import:*



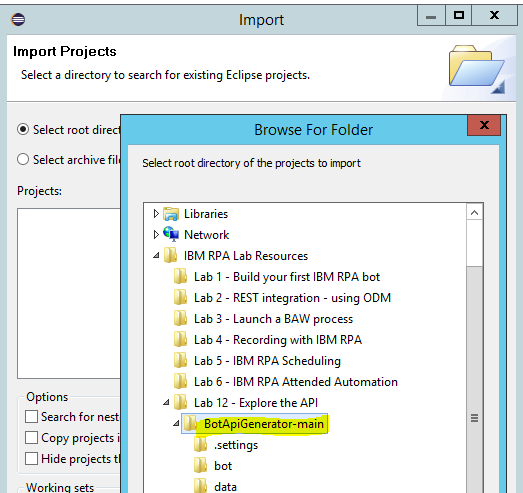
Select *General->Existing Projects into Workspace*:



Press *Next*. Select the folder

C:\Users\Administrator\Desktop\IBM RPA Lab Resources\Lab 12 - API\BotApiGenerator-main

**Note**: This location may vary depending on where you downloaded your lab in step 2.1.1



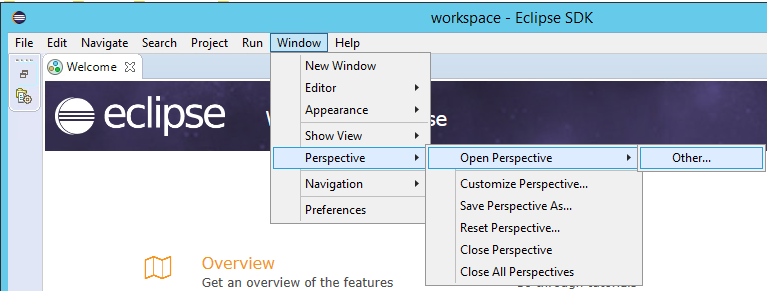
Press *Finish.*

Select *BotApiGenerator* and then press Finish:

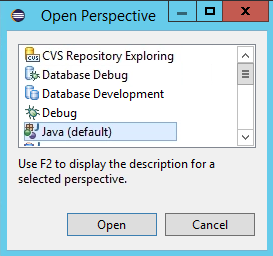


**Set the perspective to Java**

Navigate to Window->Perspective->Open Perspective->Other

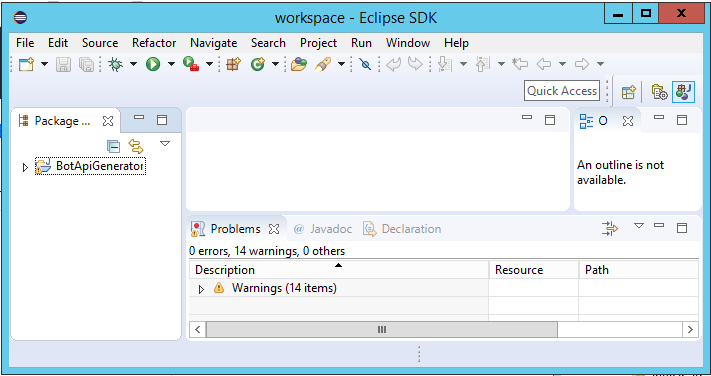
****

Then choose *Java (default):*

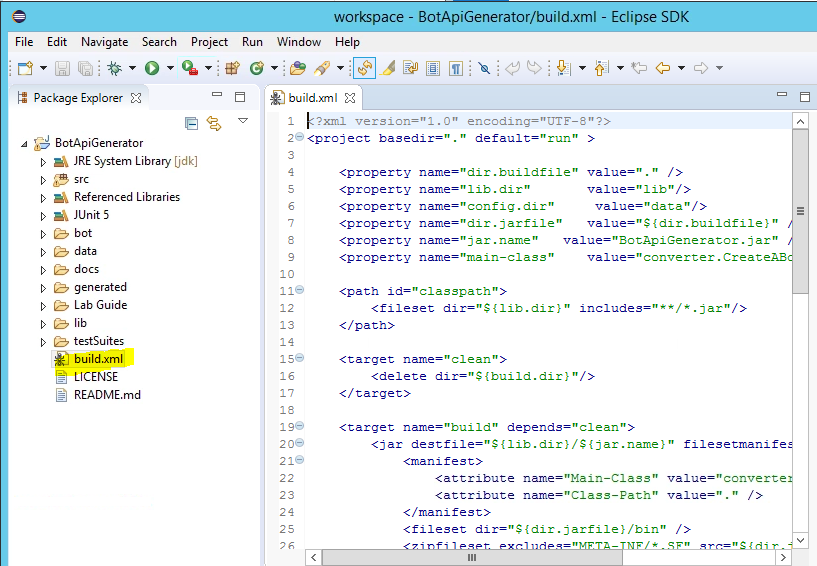


Press *Open*.

Close the *Welcome* tab. You should see this:



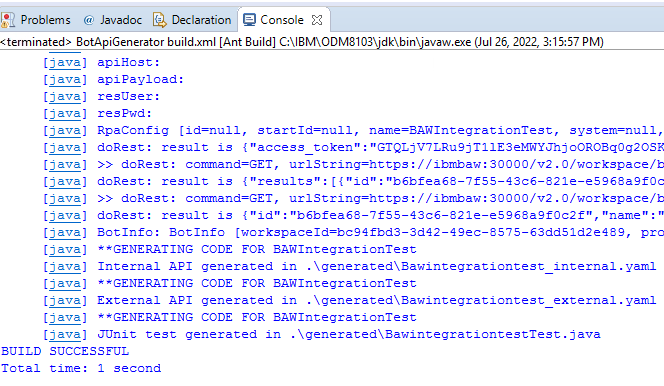
Expand the Package hierarchy on the left until you find *build.xml*. Double-click to open. You should see this:



Execute the *build.xml* by selecting the *External Tools* icon , then select *Run As->Ant Build*.

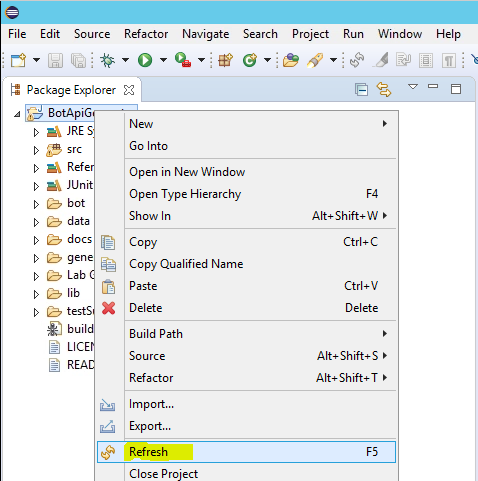


This runs the API generator. You should see the following output in the Console:

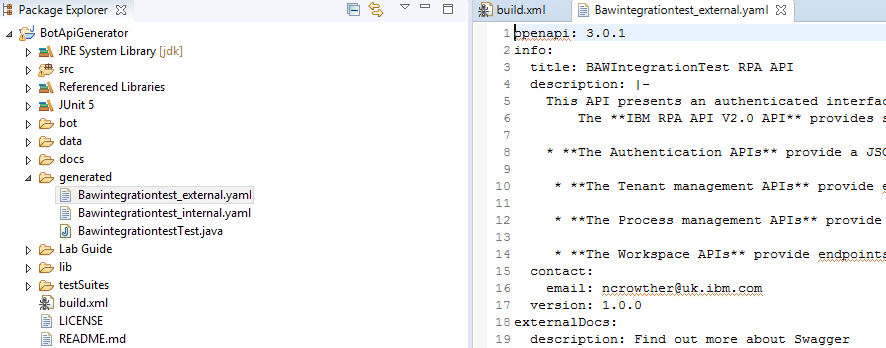


**Tip:** If you see an error, it could be that the name of your process does not match that defined in the *data/config.json.* Edit this file to match your system.

Refresh the *BotApiGenerator* folder by hitting F5, or selecting the Refresh menu option:



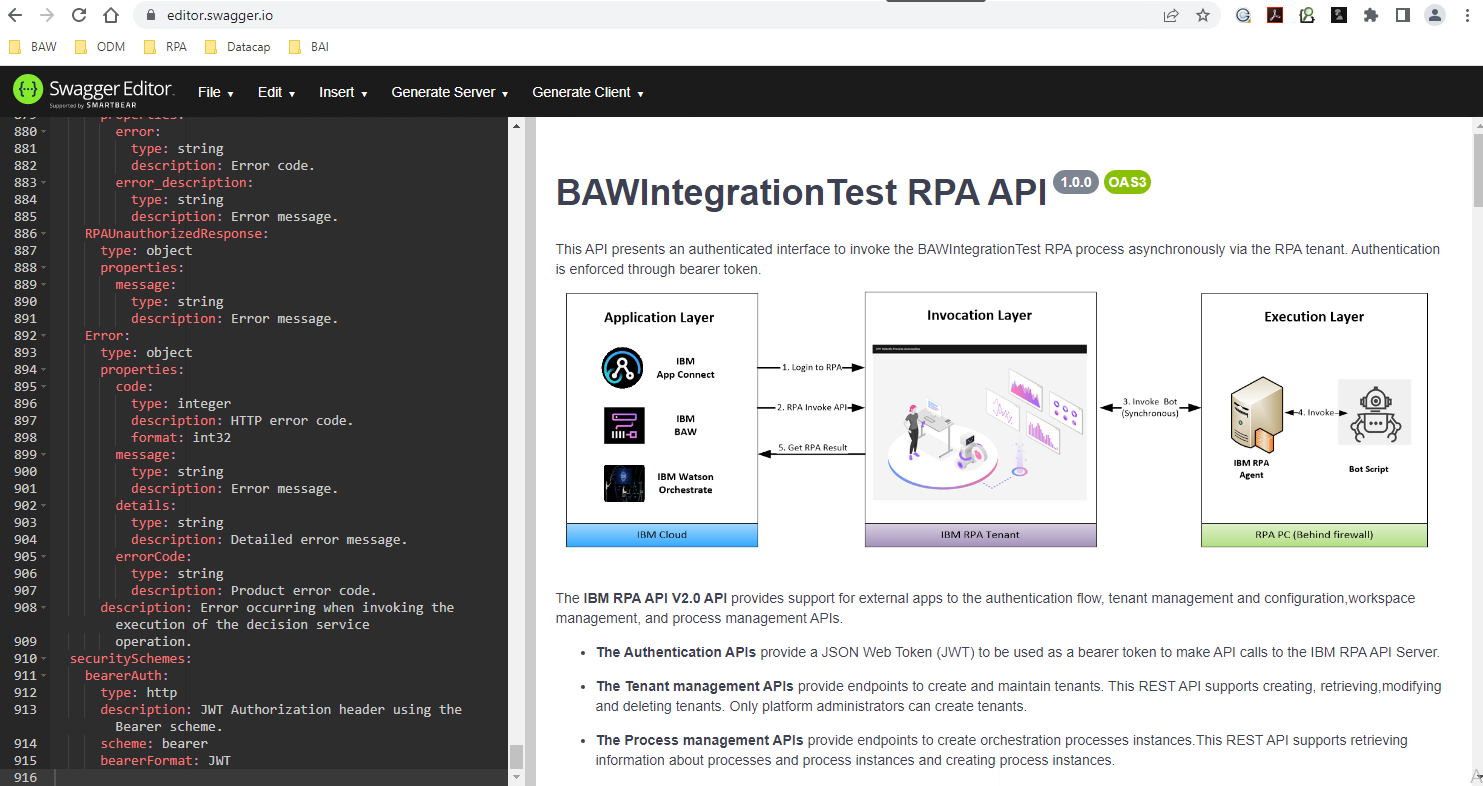
Open g*enerated/Bawintegrationtest\_external.yaml:*



The contents of this file contain a generated OpenAPI specification to run your bot asynchronously. Copy the contents of the entire file into the clipboard (Ctrl-A , Ctrl-C).

Open URL: <https://editor.swagger.io/>

Paste into the left panel. You should see the Open API specification for your bot:

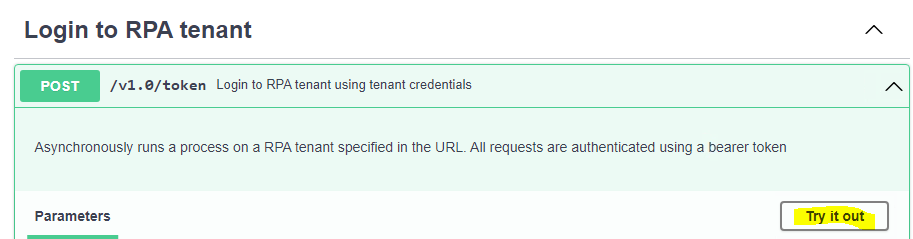


Take a moment to explore the API.

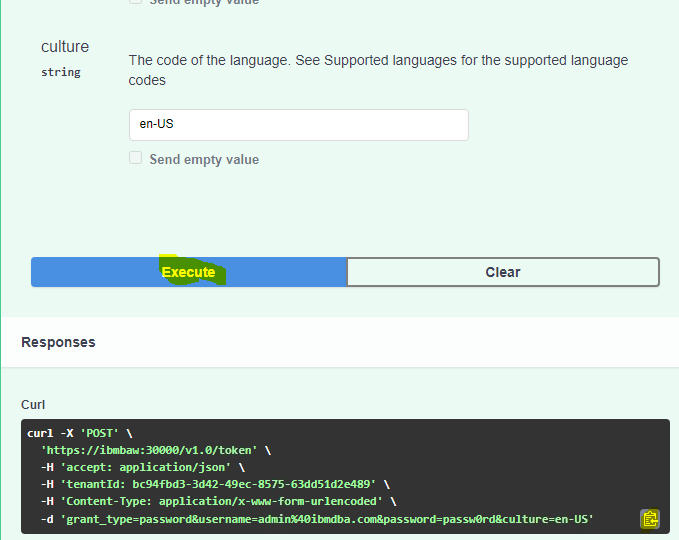
### Optional - Test OpenApi using curl

If you don’t want to test the generated OpenAPI with curl you can skip this step.

Navigate to *Login to RPA tenant* in the Swagger Editor:



Expand the command. Press “*try it out*”. Then press *Execute*. See below:

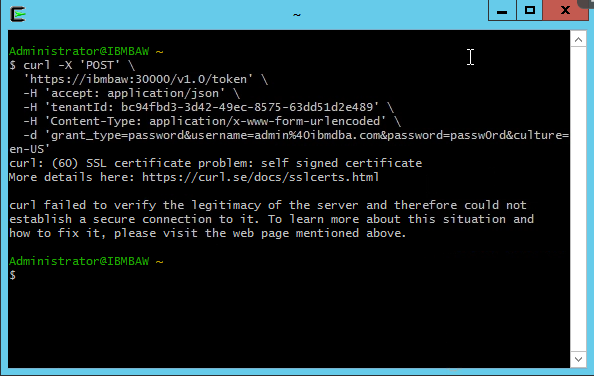


Copy the generated curl using the clipboard icon.

From the desktop, open a Unix terminal:



Paste the curl command into the terminal and hit return. If you are using Skytap, then you will see the following error:

La

This is not a problem! In Skytap you can ignore certificate errors by adding the **-k** (lowercase) flag to the beginning of the curl command as shown below:

curl **-k** -X 'POST' 'https://ibmbaw:30000/v1.0/token' -H 'accept: application/json' -H 'tenantId: bc94fbd3-3d42-49ec-8575-63dd51d2e489' -H 'Content-Type: application/x-www-form-urlencoded' -d 'grant\_type=password&username=admin%40ibmdba.com&password=passw0rd&culture=en-US'

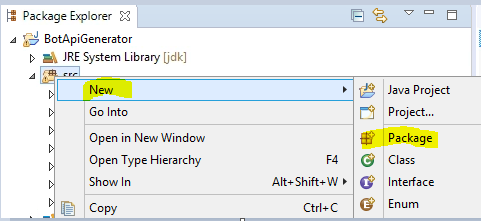
Now the curl should run successfully!

### Test the API with JUnit

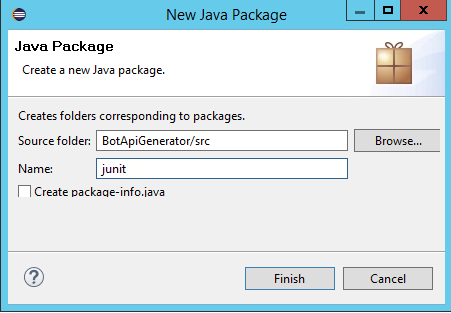
In this step you will test the RPA API using Junit. Junit is the original test framework and is still popular.

Revisit the Eclipse IDE you ran in 3.4.1.

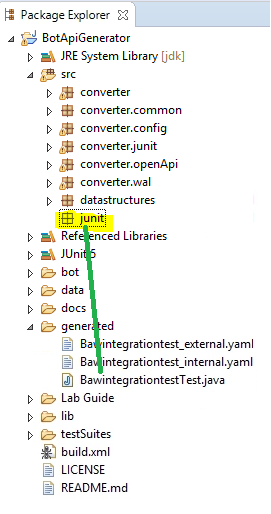
Create a new package under the *src* folder:



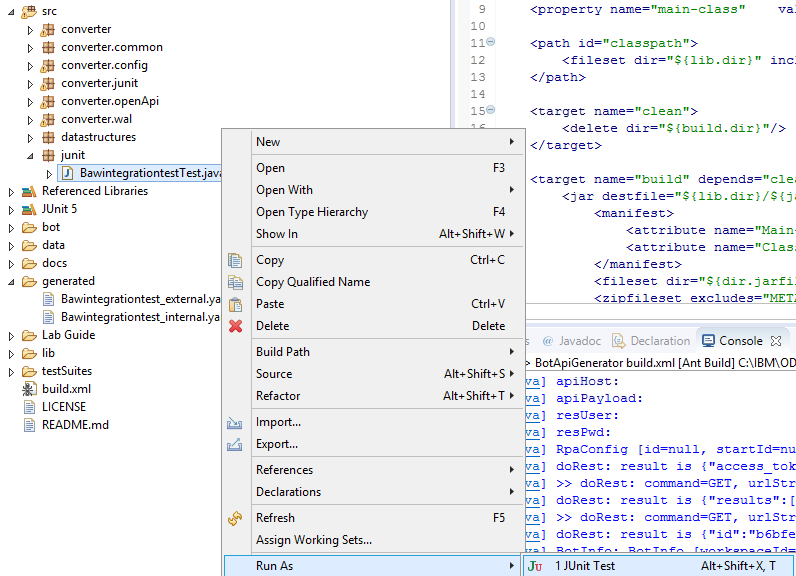
Set the name of the folder to *junit* and press Finish:



In the Package Explorer drag and drop *generated/BawintegrationTest.java* into the *junit* folder, as shown below:

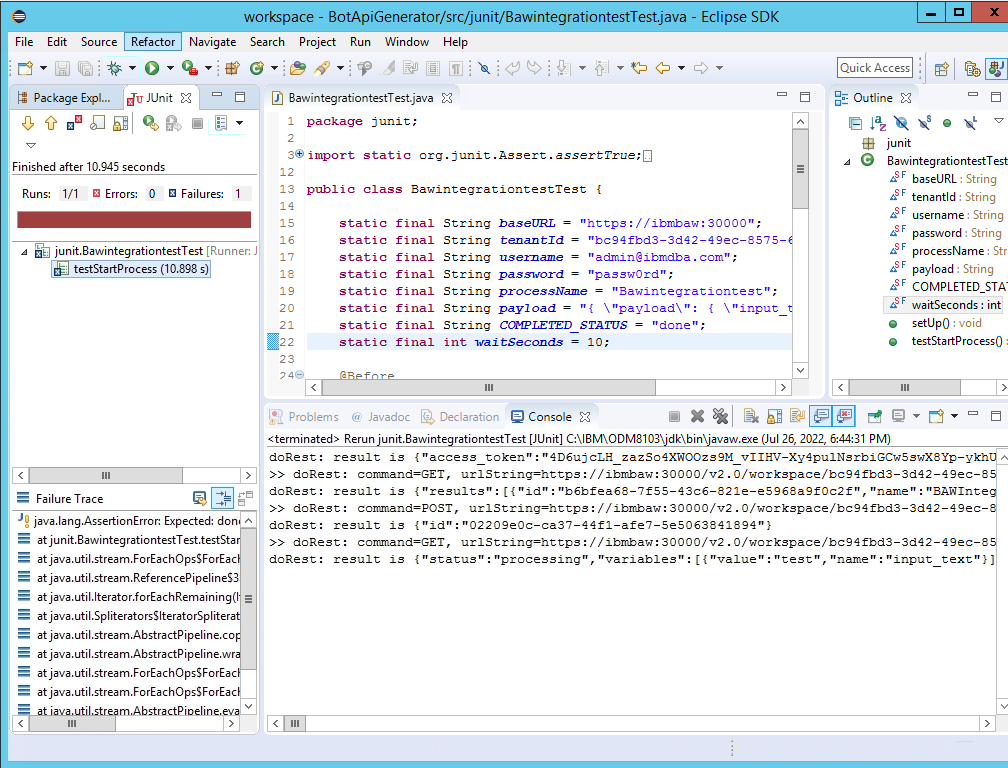


Now right-click *BawintegrationTest.java* and run as a Junit test:

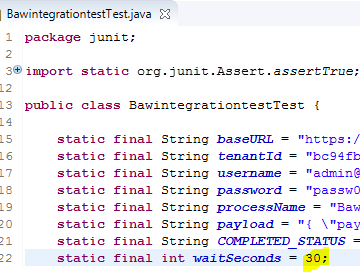


Junit will test the bot using the RPA API.

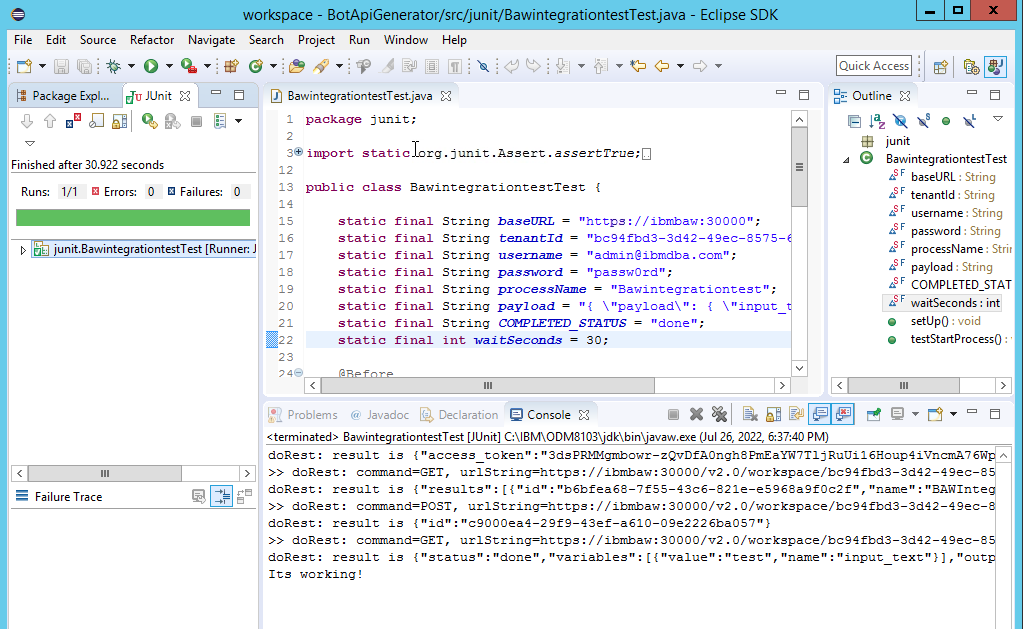
**Note:** Depending on how quickly you interact with the dialog boxes, you may see the test fail as shown below:



The test failed because you took too long to enter a response. Edit line 22 in *BawintegrationTest.java,* and increase the value to 30.



Re-run the test. This time, enter the values requested by the bot within 30 seconds and it should pass:

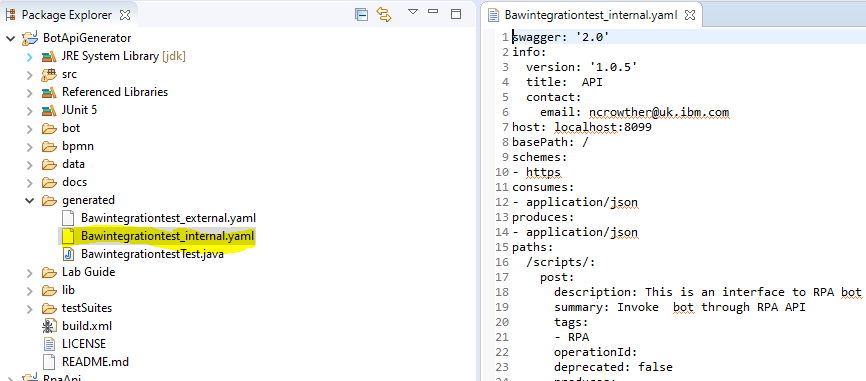


As you can see, there is a problem testing this bot. It relies on human input which fails if the human is too slow. Junit is not ideal for this scenario. It should be used for testing bots that do not require user input.

Nicely done! You have tested the RPA API with Junit.

## Integrate the Synchronous API with BAW

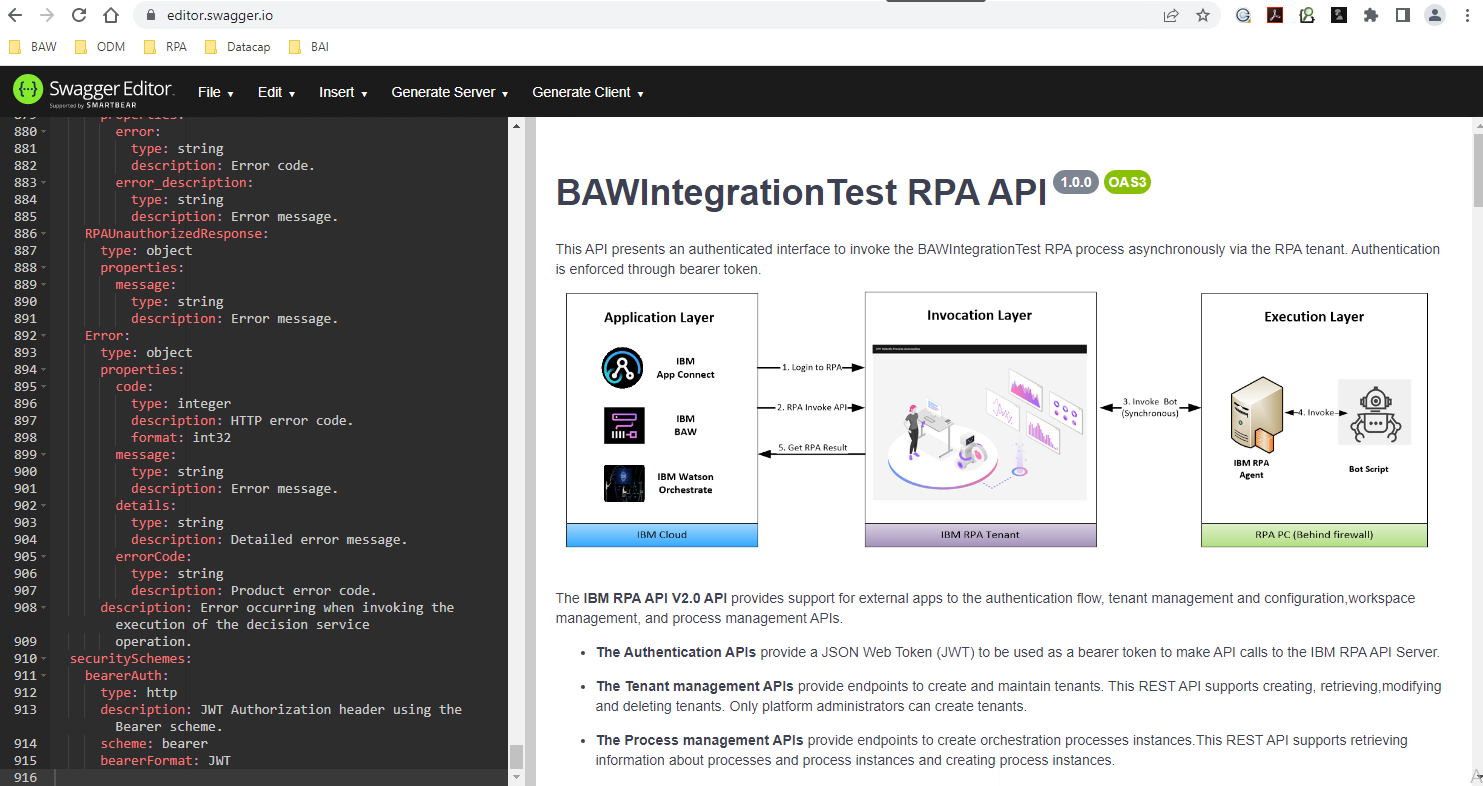
Let’s revisit the synchronous API we generated earlier. Go back to eclipse and this time open g*enerated/Bawintegrationtest\_internal.yaml:*



The contents of this file contain the generated OpenAPI specification to run your bot synchronously. Copy the contents of the entire file into the clipboard (Ctrl-A , Ctrl-C).

Open URL: <https://editor.swagger.io/>

Paste into the left panel. You should see the Synchronous Open API specification for your bot:



Take a moment to explore the API.

## Integrate with the World!

In this lab you should now be familiar with the RPA Asynchronous API. You called it using PowerShell, Curl and SoapUI. You generated an OpenApi specification for modern applications. Finally, you tested the API using Junit.

Now that you have completed this lab, you can start creating your own bot integration. The generator provided in the lab should help you create APIs for your bot. Give it a try and integrate with the world!

If you have feedback, please contact:

[ncrowther@uk.ibm.com](mailto:ncrowther@uk.ibm.com)

This concludes the lab.