# Integration with UiPath Robotic Process Automation

## Introduction to UiPath

### UiPath Overview

UiPath is one of the leading Robotic Process Automation (RPA) vendors. UiPath consists of 3 main components:

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UiPath Component Architecture

1. UiPath Studio: UI tool to visually design the process to automate
2. UiPath Orchestrator: Web application that manages the creation, monitoring, and deployment of all robots and processes
3. UiPath Robot: Runs processes that were built in UiPath Studio. Execution agent that is installed and executed in the actual machine.

### UiPath Concepts and Terms

Here are some of the basic concepts and terms in UiPath that you should get familiar with for the tutorial later:

- Machine: Represents the actual machine the robot executes in
- Environment: An environment is a grouping of Robots, that is used to deploy processes
- Package: A UiPath Studio project that is published
- Process: A process represents the association between a package and an environment. Each time a package is deployed to an environment, it is automatically distributed to all machines that belong to that environment.
- Job: A job is the execution of a process on one or multiple Robots.

There are other concepts for more advanced usage that will not be used in the tutorial, such as:

- Library: A process library describes a system of activities that are reusable for sharing
- Schedule: Enables jobs to be executed in a preplanned manner

- Asset: Usually represent shared variables or credentials that can be used in different projects.
- Queue: A place to store multiple types of data, such as invoice information or customer details.

# Get Started with UiPath

ⓘ Note: This tutorial is for the latest UiPath Studio 20.10 Stable Release, which provides a much simplified sign in and first run experience compared to previous releases.

## Step 1: Sign Up for UiPath Cloud Platform

Let’s sign up for an account at https://www.uipath.com/platform-trial.

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Sign up using a social account or an email, and upon registration you will be taken to a dashboard at https://platform.uipath.com.

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A **service** represents a deployment in the company. A default service is already created e.g. DemoDefault.

Select the service name to open the **UiPath Orchestrator** web application.

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## Step 2: Install UiPath Studio

Download the **UiPath Studio** installer (UiPathStudioSetup.exe) from the Resource Center, and install it on the target computer. More information on UiPath Studio is available at the UiPath Studio Guide.

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After installing UiPathStudioSetup.exe, start **UiPath Studio** from the Windows Start menu and login using the UiPath account created previously. Choose a profile to use, e.g. **UiPath Studio**.

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## Step 3: Launch UiPath Assistant

In the Windows Start menu, search for **UiPath Assistant** and start it.

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Choose an image, give the robot a name e.g. DemoRobot and click on **Get Started** to create the robot.

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Once the robot is created, it will automatically connect and register itself to the **UiPath Orchestrator**.

In the **UiPath Orchestrator**, browse to **Tenant** > **Robots** and you should see the robot created in the listing.

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Next, we will create an Unattended Robot that does not require human supervision to execute jobs. In the **UiPath Orchestrator**, browse to **Tenant** > **Users** and select **Edit** in the menu for your user account.

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Click on **Unattended Robot**, enable the "Automatically create an unattended robot for this user" switch, fill in the Windows user credentials and **Update**.

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## Step 4: Create and Publish a Process

Next, let's create an automation process and publish it. Follow the Creating Your First Automation Project tutorial in the UiPath documentation. In that page, there is also a ZIP file containing the completed sample project that you can download.

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Once you have completed the project, click on the **Publish** button in the top toolbar.

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Fill in the package properties (you can leave the default values) and click on **Publish**.

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Once the project has been published, you will see it in the **UiPath Assistant**.

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In the **UiPath Orchestrator**, browse to **My Workspace** > **Automations** and you will see the process under listed under **Processes**.

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## Step 5: Start a Job

Now that the robot is published, it's time to start a job to test it. In the **UiPath Orchestrator** click on the **Play** icon on the right of the process in the **Processes** list. Click on the **Start** button.

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In the **UiPath Assistant**, the robot will be installed and executed.

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In the **UiPath Orchestrator**, you can monitor the jobs in the **Jobs** tab under **My Workspace** > **Automations**.

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## Step 6: Prepare for UiPath Integration

There are a number of steps required to retrieve some required information for integration to start a job using the UiPath Orchestrator API. You can use any API testing tool (e.g. Postman), and the example below uses the linux command line using the curl tool.

### 6.1 Obtain Client ID, User Key, Account Logical Name and Tenant Logical Name:

Browse to https://cloud.uipath.com, select **Admin**, select the **Tenant**, and click on the **API Access** icon.

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Copy the **Client ID**, **Account Logical Name**, **Tenant Logical Name** and **User Key** values to be used in API calls later.

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### 6.2 Authenticate to Obtain Access Token

Execute the following curl POST request:

```
    export ACCOUNT_NAME=yourAccountName # the Account Logical Name obtained above
export SERVICE_NAME=yourServiceName # the Tenant Logical Name obtained above
export USER_KEY=yourUserKey # the User Key obtained above
export CLIENT_ID=yourClientID # the Client ID obtained above

# get access token
curl -X POST "https://account.uipath.com/oauth/token" \
-H "Content-Type: application/json" \
--data-raw "{
    \"grant_type\": \"refresh_token\",
    \"client_id\": \"$CLIENT_ID\",
    \"refresh_token\": \"$USER_KEY\"
}"
```

Copy the values for **access_token** from the response.

```
    {
    "access_token": "eyJ0eX...",
    "id_token": "eyJ0eX...",
    "scope": "openid profile email offline_access",
    "expires_in": 86400,
    "token_type": "Bearer"
}
```

### 6.3 Get Process Release Key and Organization Unit ID

Execute the following curl GET request:

```
    export ACCESS_TOKEN=yourAccessToken # set the access token obtained above
export ACCOUNT_NAME=yourAccountName # the Account Logical Name
export SERVICE_NAME=yourServiceName # the Tenant Logical Name
export PROCESS_NAME=First.automation.project # name of your desired process

# get process release key
curl -X GET "https://cloud.uipath.com/$ACCOUNT_NAME/$SERVICE_NAME/orchestrator_/odata
/Releases?$filter=ProcessKey%20eq%20%27$PROCESS_NAME%27" \
-H "accept: application/json" \
-H "Authorization: Bearer $ACCESS_TOKEN"
```

Copy the value for **Key** from the response as the Process Release Key, and the **OrganizationUnitId** as the Organization Unit ID (Folder ID)**:**

```
    {
   "@odata.context": "https://cloud.uipath.com/jogetgdunlhs/DemoDefault/orchestrator_/odata/$metadata#Releases",
   "@odata.count": 1,
   "value": [
       {
           "Key": "66945223-98b3-4a0a-8b48-0f60dd7d1c2e",
           "ProcessKey": "First.automation.project",
           "ProcessVersion": "1.0.1",
           "IsLatestVersion": false,
           "IsProcessDeleted": false,
           "Description": "Start with a blank project to design a new task automation",
           "Name": "First.automation.project",
           "EnvironmentId": null,
           "EnvironmentName": "",
           "InputArguments": null,
           "ProcessType": "Process",
           "SupportsMultipleEntryPoints": false,
           "RequiresUserInteraction": true,
           "AutoUpdate": false,
           "FeedId": "1c57a87b-91c4-4310-97b7-986e1d228a26",
           "JobPriority": "Normal",
           "CreationTime": "2020-10-15T04:28:49.7Z",
           "OrganizationUnitId": 123456,
           "OrganizationUnitFullyQualifiedName": "user’s workspace",
           "Id": 173235,
           "Arguments": {
               "Input": null,
               "Output": null
           },
           "ProcessSettings": null
       }
   ]
}
```

### 6.4 Test Orchestrator API Call to Start a Job

Let’s try making an API call to start a job for the process.

```
    export ACCESS_TOKEN=yourAccessToken # set the access token obtained above
export ACCOUNT_NAME=yourAccountName # the Account Logical Name
export SERVICE_NAME=yourServiceName # the Tenant Logical Name
export PROCESS_RELEASE_KEY=yourProcessReleaseKey # copy from the process release key above
export ORGANIZATION_UNIT_ID=yourOrganizationUnitId # copy from the Organization Unit ID above

# start job
curl -X POST "https://cloud.uipath.com/$ACCOUNT_NAME/$SERVICE_NAME/orchestrator_/odata/Jobs/UiPath.Server.
Configuration.OData.StartJobs" \
-H "accept: application/json" \
-H "Content-Type: application/json;odata.metadata=minimal;odata.streaming=true" \
-H "Authorization: Bearer $ACCESS_TOKEN" \
-H "X-UIPATH-OrganizationUnitId: $ORGANIZATION_UNIT_ID" \
-d "{ \"startInfo\": { \"ReleaseKey\": \"$PROCESS_RELEASE_KEY\", \"Strategy\": \"ModernJobsCount\", \"
JobsCount\": \"1\", \"RuntimeType\": \"Studio\" }}"
```

If successful, the response will be as follows, with the status of the Job shown in the **State** attribute:

```
    {
   "@odata.context": "https://cloud.uipath.com/jogetgdunlhs/DemoDefault/orchestrator_/odata/$metadata#Jobs",
   "value": [
       {
           "Key": "4c8ba95c-fb66-43fa-81bf-8996b4326c09",
           "StartTime": null,
           "EndTime": null,
           "State": "Pending",
           "JobPriority": "Normal",
           "Source": "Manual",
           "SourceType": "Manual",
           "BatchExecutionKey": "141042d1-20b7-4271-91bb-07aa08087431",
           "Info": null,
           "CreationTime": "2020-10-15T13:36:34.497Z",
           "StartingScheduleId": null,
           "ReleaseName": "First.automation.project",
           "Type": "Unattended",
           "InputArguments": null,
           "OutputArguments": null,
           "HostMachineName": null,
           "HasMediaRecorded": false,
           "PersistenceId": null,
           "ResumeVersion": null,
           "StopStrategy": null,
           "RuntimeType": "Unattended",
           "RequiresUserInteraction": true,
           "ReleaseVersionId": null,
           "EntryPointPath": null,
           "OrganizationUnitId": 611841,
           "OrganizationUnitFullyQualifiedName": null,
           "Reference": "",
           "Id": 18614259
       }
   ]
}
```

# Integrate UiPath with Joget

## How to Integrate with UiPath

UiPath provides the Orchestrator API for integration.

The most commonly used function is Starting a Job, which should satisfy a majority of use cases. We will use this function in the following integration tutorial.

## Design a Process to Start a UiPath Job

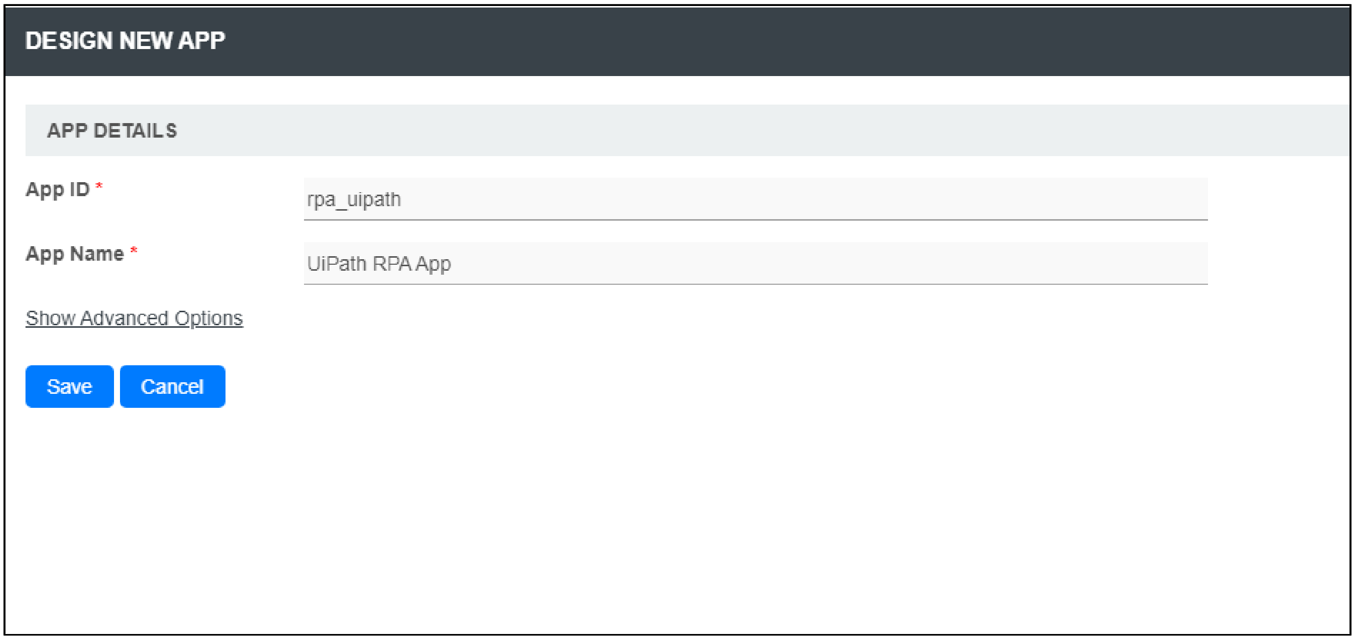
Since the UiPath Orchestrator API is a REST API with data in JSON format, we can use the Joget JSON Tool to invoke the API.

Before we start, ensure that you have the following critical UiPath information at hand (obtained from the previous Prepare for UiPath Integration tutorial):

- **clientId** (Client ID)
- **userKey** (Refresh Token / User Key)
- **accountName** (Account Logical Name)
- **serviceName** (Service Name / Tenant Logical Name)
- **organizationUnitId** (Folder ID or Organization Unit ID)
- **processReleaseKey** (Process Release Key)

## Step 1. Design New App

First, let's design a new app by clicking on **Design New App** in the Joget App Center.


DESIGN NEW APP

APP DETAILS

App ID * rpa_uipath

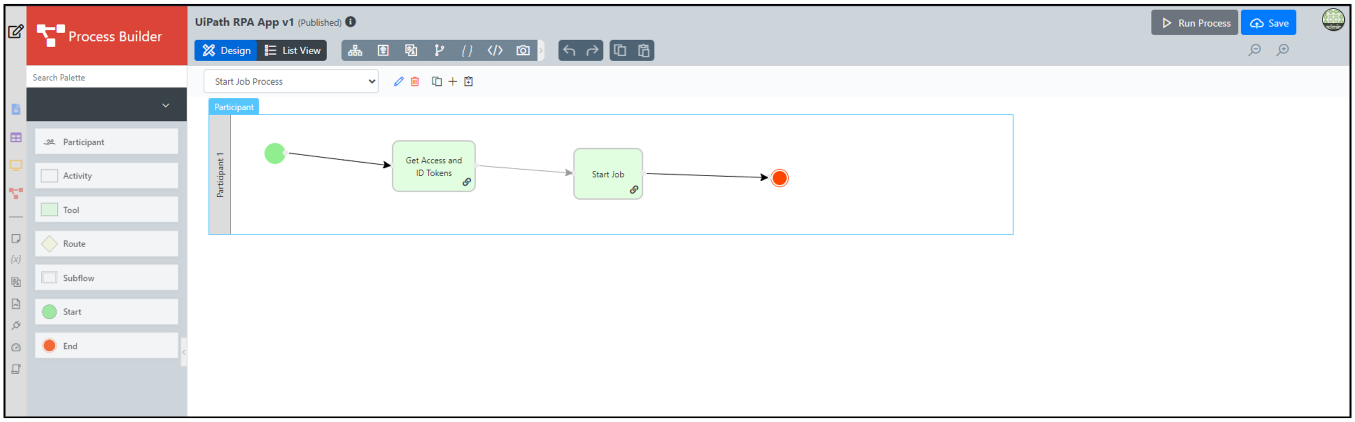
App Name * UiPath RPA App

Fill in desired values for the **App ID** and **App Name**, and click **Save**.

## Step 2. Design New Process

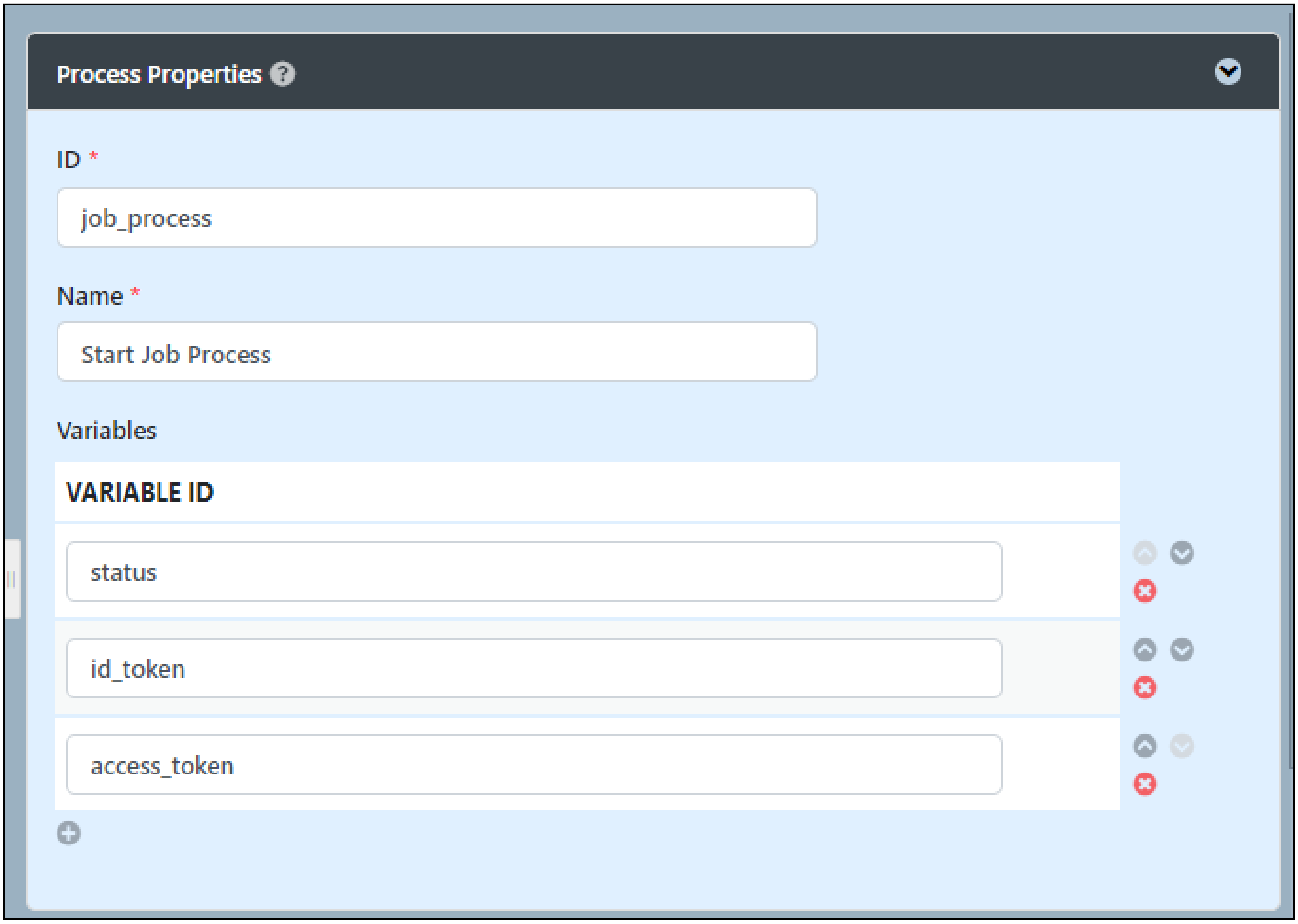
Click on the **Processes** from the App composer to launch the process in the Process Builder

Design a simple process containing 2 tools, as shown below.



Click on the edit pencil icon beside the process name at the top to configure the process properties. Enter a suitable process name and create 3 workflow variables to store the response values from UiPath API call:

- status
- Id_token
- access_token



Process Properties

ID *

job_process

Name *

Start Job Process

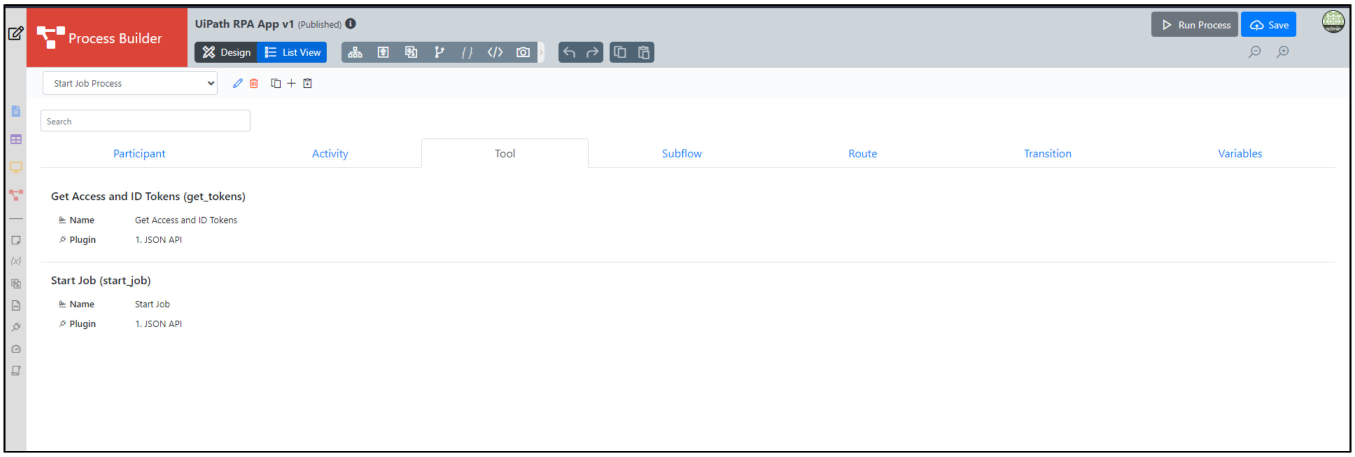
Variables

| VARIABLE ID |
|---|
| status |
| id_token |
| access_token |

Click on Deploy.

## Step 3. Configure First Tool to Get UiPath Access Token

Once the process has been saved, close the Process Builder. In the List View, select the Tools tab to Map Plugins.



Start Job Process

Get Access and ID Tokens (get_tokens)

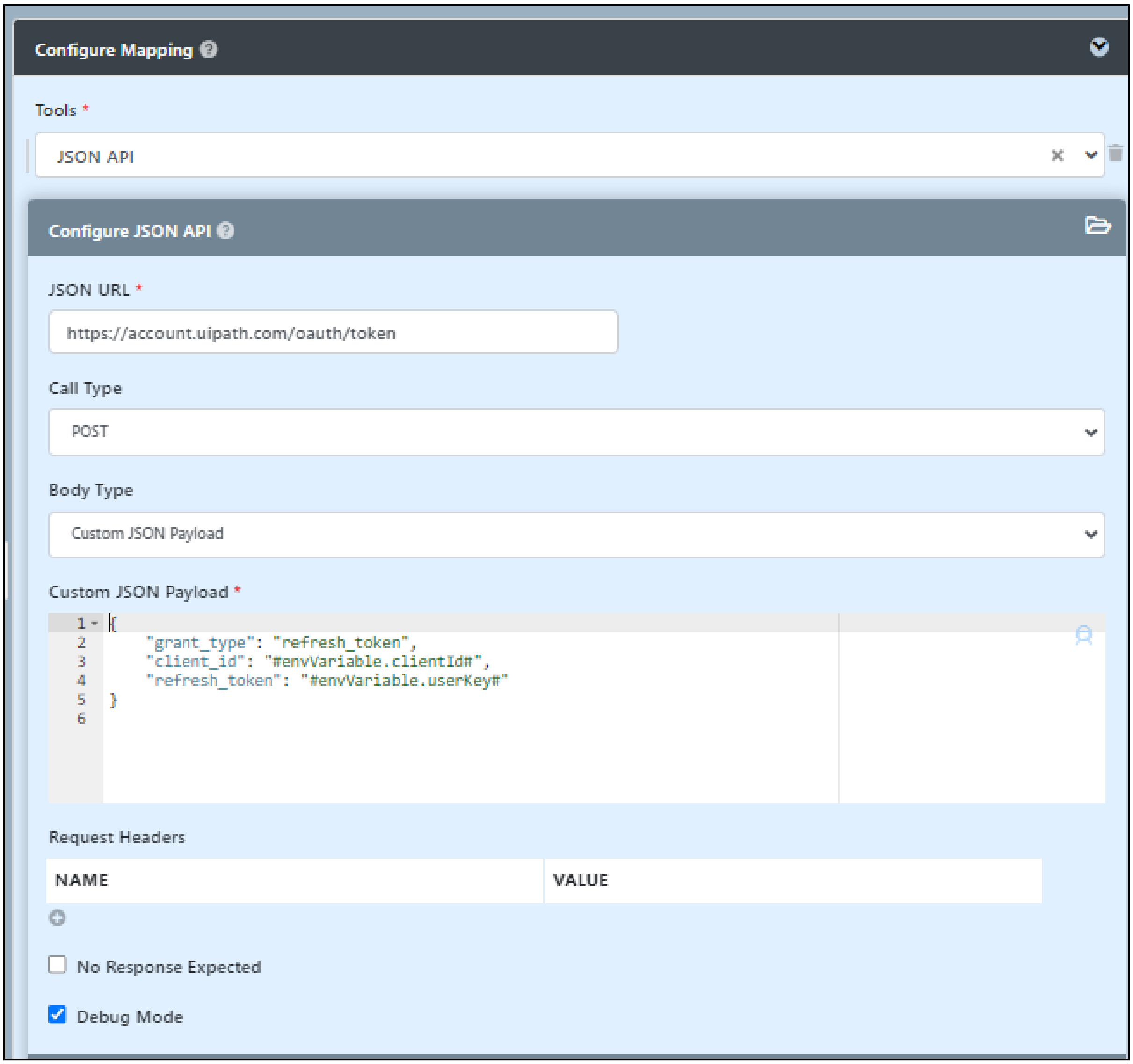
| | |
|---|---|
| Name | Get Access and ID Tokens |
| Plugin | 1. JSON API |

Start Job (start_job)

| | |
|---|---|
| Name | Start Job |
| Plugin | 1. JSON API |

Click on the first tool to configure **Plugin** and select **JSON API**, then key in the following configuration:

| | |
|---|---|
| JSON URL | https://account.uipath.com/oauth/token |
| Call Type | POST |
| Body Type | Custom JSON Payload |
| Custom JSON Payload | {<br>"grant_type": "refresh_token",<br>"client_id": "**[clientId]**",<br>"refresh_token": "**[userKey]**"<br>} |



Configure Mapping

Tools *

JSON API

Configure JSON API

JSON URL *

https://account.uipath.com/oauth/token

Call Type

POST

Body Type

Custom JSON Payload

Custom JSON Payload *

```
{
    "grant_type": "refresh_token",
    "client_id": "#envVariable.clientId#",
    "refresh_token": "#envVariable.userKey#"
}
```

Request Headers

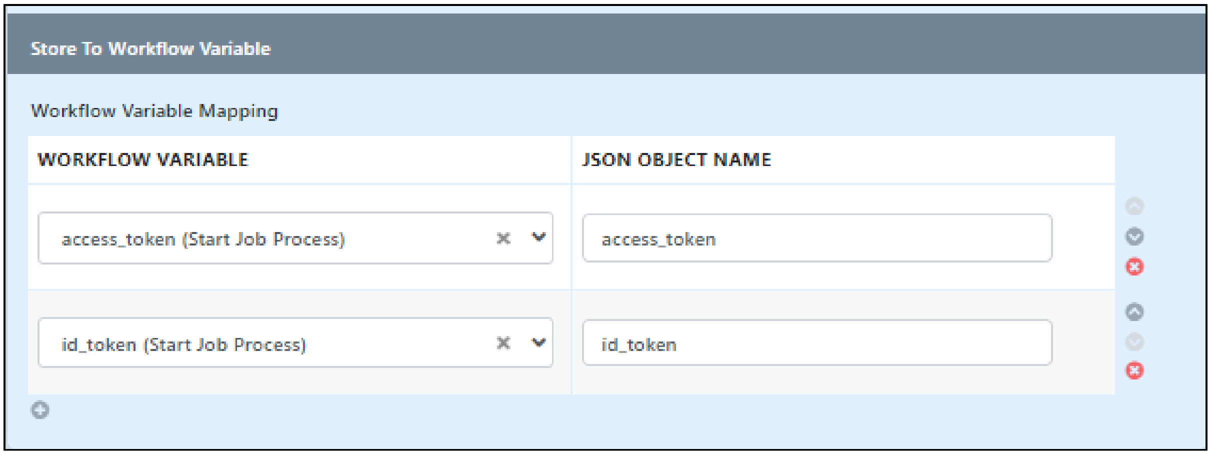
| NAME | VALUE |
|---|---|

□ No Response Expected

☑ Debug Mode

Under Store to Workflow Variable, map the variables to store the tokens in the matching workflow variables i.e.

| | |
|---|---|
| access_token | access_token |
| id_token | id_token |



Store To Workflow Variable

Workflow Variable Mapping

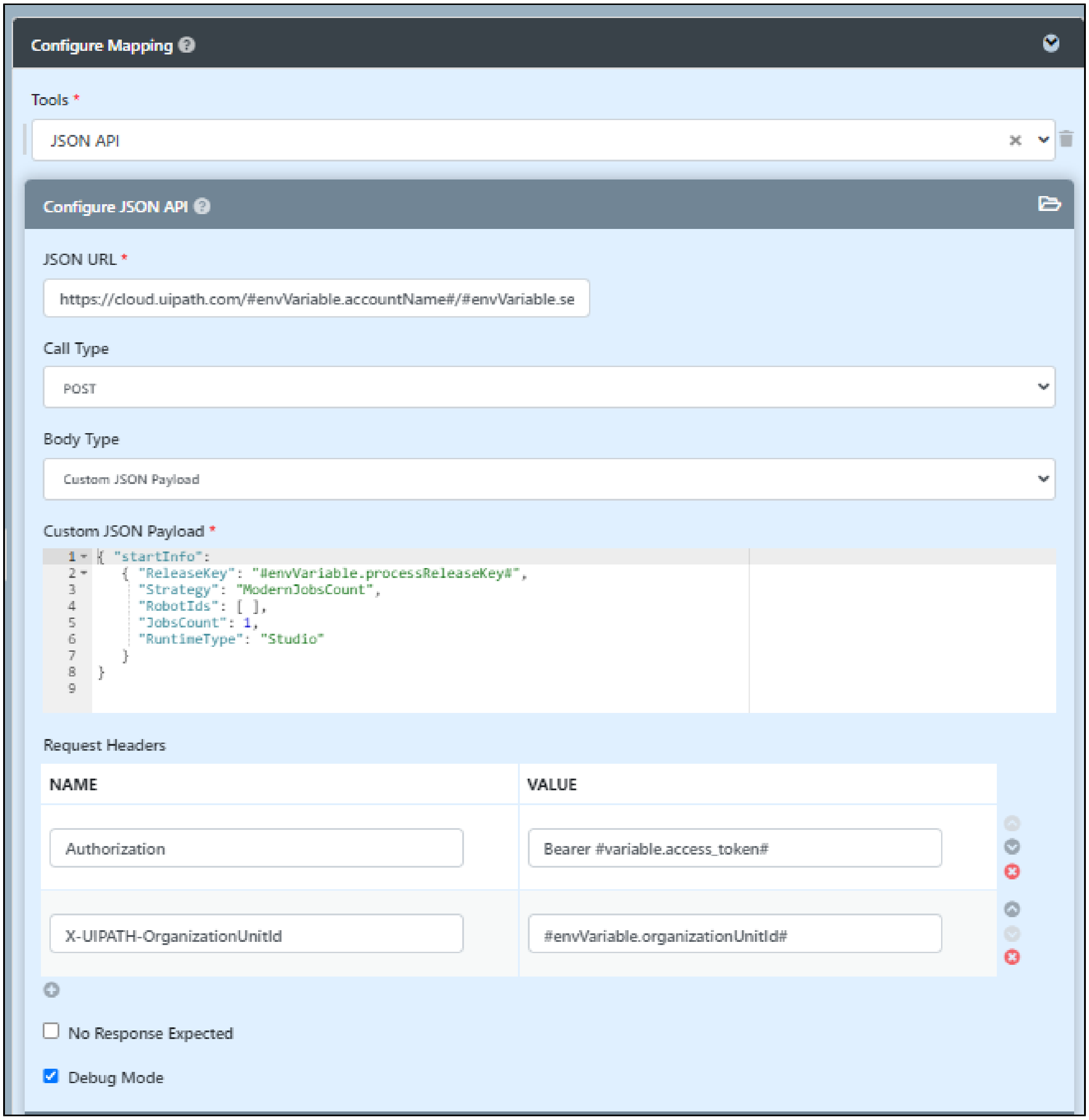
| WORKFLOW VARIABLE | JSON OBJECT NAME |
|---|---|
| access_token (Start Job Process) | access_token |
| id_token (Start Job Process) | id_token |

Click on Apply change to save.

## Step 4. Configure Second Tool to Start Job Using the Access Token

Click on  the second tool to configure **Plugin** and select **JSON API** , then key in the following configuration:

| | |
|---|---|
| JSON URL<br>(Replace **[accountName]** and **[serviceName]** with the actual values) | https://cloud.uipath.com/**[accountlogicalName]**/**[tenantLogicalName]**/orchestrator_/odata/Jobs/UiPath.Server.Configuration.OData.StartJobs |
| Call Type | POST |
| Body Type | Custom JSON Payload |
| Custom JSON Payload  (Replace **[processReleaseKey]** with the actual Release Key) | { "startInfo":<br>{ "ReleaseKey": "**[processReleaseKey]**",<br>"Strategy": "ModernJobsCount",<br>"JobsCount": 1,<br>"RuntimeType": "Studio"<br>}<br>} |
| Request Headers (Replace [**organizationUnitId**] with the actual Folder ID or Organization Unit ID | Authorization: Bearer #variable.access_token#<br>X-UIPATH-OrganizationUnitId: **[organizationUnitId]** |



Configure Mapping

Tools *

JSON API

Configure JSON API

JSON URL *

https://cloud.uipath.com/#envVariable.accountName#/#envVariable.se

Call Type

POST

Body Type

Custom JSON Payload

Custom JSON Payload *

```
{ "startInfo":
   { "ReleaseKey": "#envVariable.processReleaseKey#",
     "Strategy": "ModernJobsCount",
     "RobotIds": [ ],
     "JobsCount": 1,
     "RuntimeType": "Studio"
   }
}
```

Request Headers

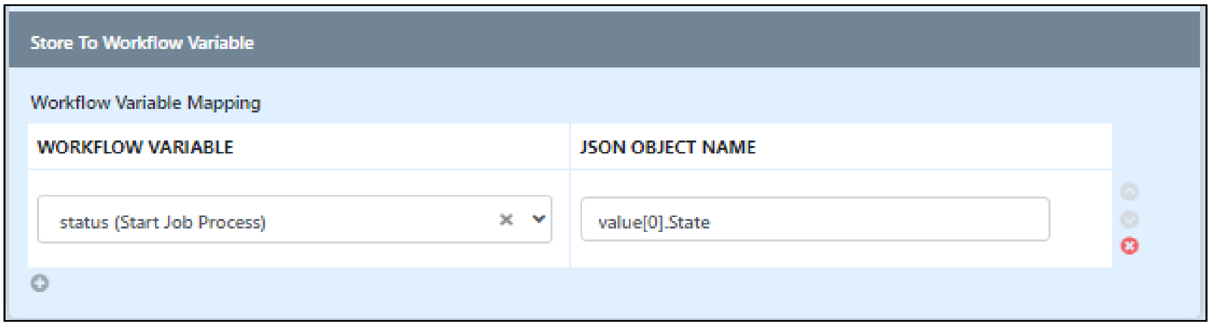
| NAME | VALUE |
|---|---|
| Authorization | Bearer #variable.access_token# |
| X-UIPATH-OrganizationUnitId | #envVariable.organizationUnitId# |

□ No Response Expected

☑ Debug Mode

Under **Store to Workflow Variable**, map the status variable to the **State** attribute in the response JSON  i.e.

| | |
|---|---|
| status | value[0].State |



Store To Workflow Variable

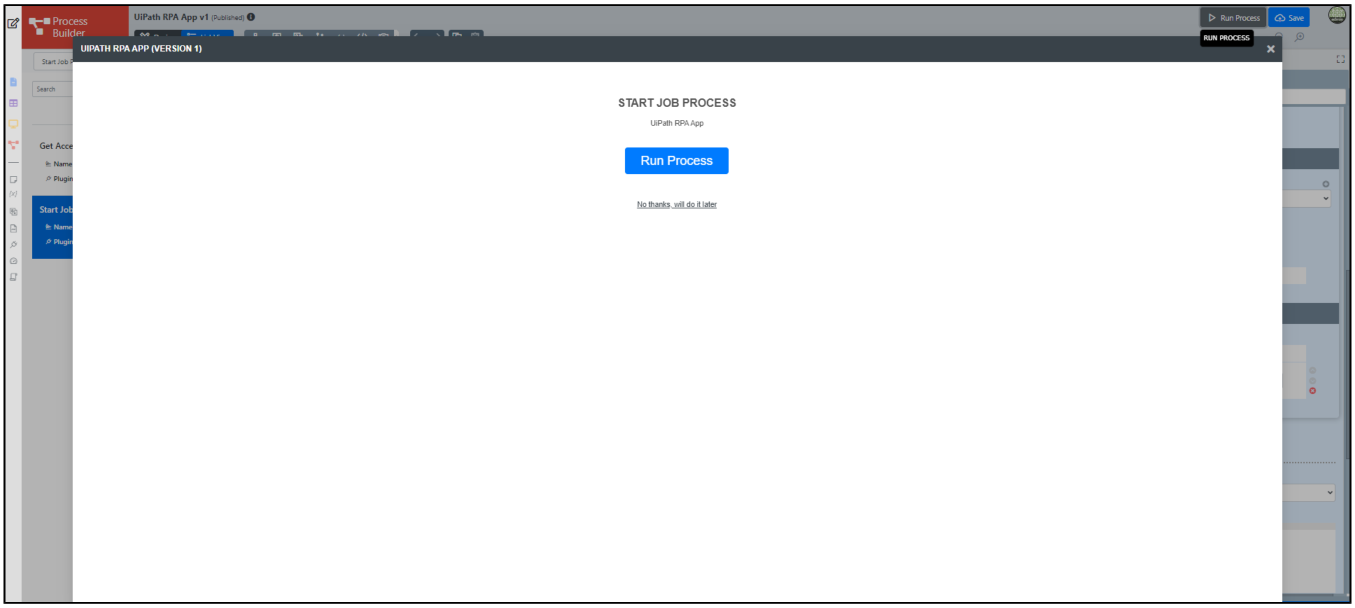
Workflow Variable Mapping

| WORKFLOW VARIABLE | JSON OBJECT NAME |
|---|---|
| status (Start Job Process) | value[0].State |

That’s it. The Joget process has been configured to invoke the **UiPath Orchestrator API** to start a job.

## Step 5. Run the Process

Now, let’s test the process. Click on the **Run Process** button at the top, then **Run Process** again in the confirmation dialog.



UIPATH RPA APP (VERSION 1)

START JOB PROCESS

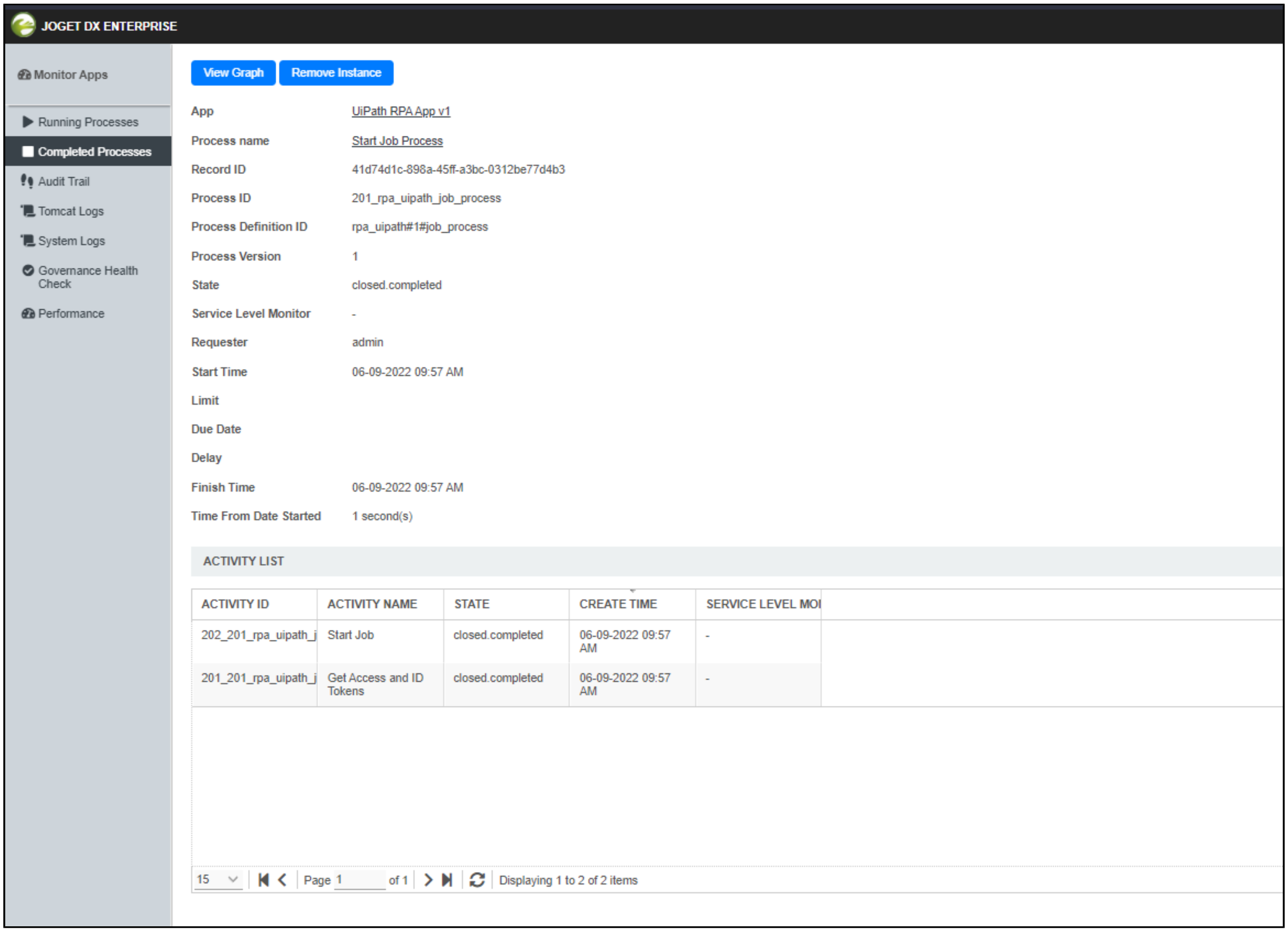
UiPath RPA App

Run Process

No thanks, will do it later

Once the process has started, the 2 tools will execute as configured. To view the results of the process, navigate to **Monitor** -> **Completed Processes**.

Select the process instance and you will see the 2 tools executed.

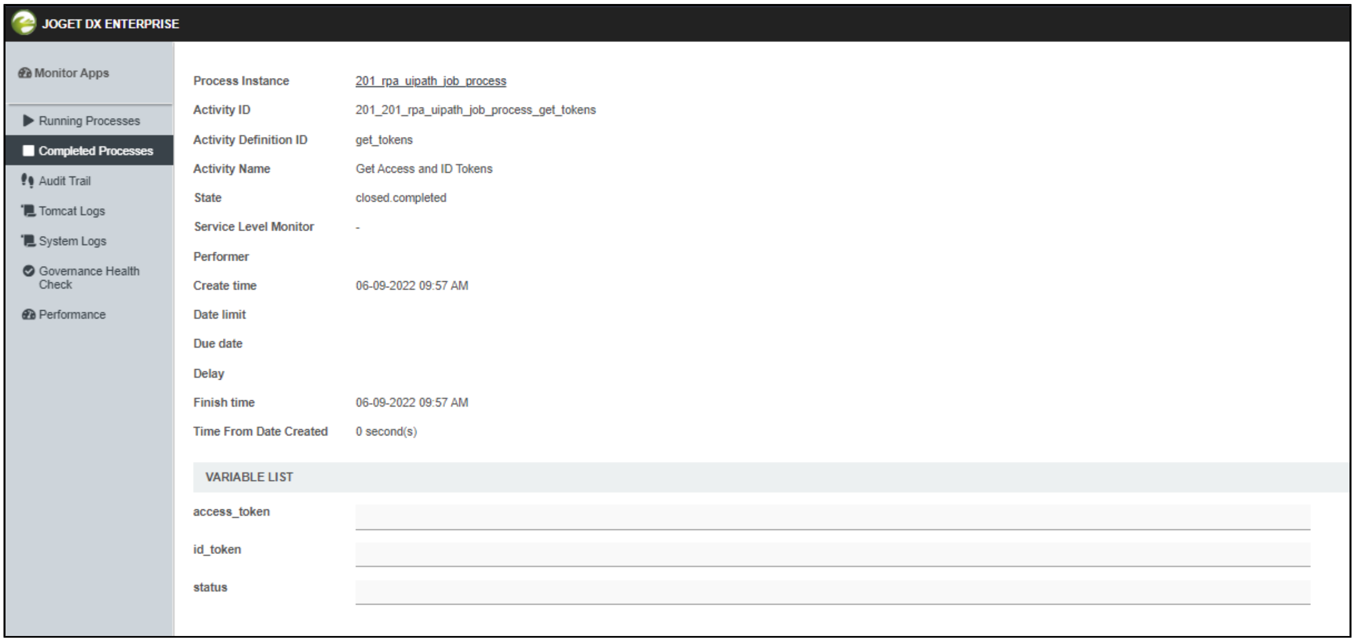


| | |
|---|---|
| App | UiPath RPA App v1 |
| Process name | Start Job Process |
| Record ID | 41d74d1c-898a-45ff-a3bc-0312be77d4b3 |
| Process ID | 201_rpa_uipath_job_process |
| Process Definition ID | rpa_uipath#1#job_process |
| Process Version | 1 |
| State | closed.completed |
| Service Level Monitor | - |
| Requester | admin |
| Start Time | 06-09-2022 09:57 AM |
| Limit | |
| Due Date | |
| Delay | |
| Finish Time | 06-09-2022 09:57 AM |
| Time From Date Started | 1 second(s) |

ACTIVITY LIST

| ACTIVITY ID | ACTIVITY NAME | STATE | CREATE TIME | SERVICE LEVEL MOI |
|---|---|---|---|---|
| 202_201_rpa_uipath_j | Start Job | closed.completed | 06-09-2022 09:57 AM | - |
| 201_201_rpa_uipath_j | Get Access and ID Tokens | closed.completed | 06-09-2022 09:57 AM | - |

Click on each activity to view the values of the workflow variables which obtained the results of the **Orchestrator API** calls.



| | |
|---|---|
| Process Instance | 201_rpa_uipath_job_process |
| Activity ID | 201_201_rpa_uipath_job_process_get_tokens |
| Activity Definition ID | get_tokens |
| Activity Name | Get Access and ID Tokens |
| State | closed.completed |
| Service Level Monitor | - |
| Performer | |
| Create time | 06-09-2022 09:57 AM |
| Date limit | |
| Due date | |
| Delay | |
| Finish time | 06-09-2022 09:57 AM |
| Time From Date Created | 0 second(s) |

VARIABLE LIST

| | |
|---|---|
| access_token | |
| id_token | |
| status | |

You will be able to see the tool requests and responses in the logs if the debugging option is enabled.

Sample log output:

```
    INFO 16 Oct 2020 00:07:42 org.joget.apps.app.lib.JsonTool - POST : https://account.uipath.com/oauth/token
INFO 16 Oct 2020 00:07:42 org.joget.apps.app.lib.JsonTool - Custom JSON Payload : {_ "grant_type":
"refresh_token",_ "client_id": "client_id",_ "refresh_token": "refresh_token"_}_
INFO 16 Oct 2020 00:07:43 org.joget.apps.app.lib.JsonTool - https://account.uipath.com/oauth/token returned
with status : 200
INFO 16 Oct 2020 00:07:43 org.joget.apps.app.lib.JsonTool - {"access_token":"access_token","id_token":"
id_token","scope":"openid profile email offline_access","expires_in":86400,"token_type":"Bearer"}
INFO 16 Oct 2020 00:07:43 org.joget.apps.app.lib.JsonTool - POST : https://cloud.uipath.com/yourAccountName
/DemoDefault/orchestrator_/odata/Jobs/UiPath.Server.Configuration.OData.StartJobs
INFO 16 Oct 2020 00:07:43 org.joget.apps.app.lib.JsonTool - Custom JSON Payload : { "startInfo":_ {
"ReleaseKey": "processReleaseKey",_ "Strategy": "ModernJobsCount",_ "RobotIds": [ ],_ "JobsCount": 1,_
"RuntimeType": "Studio" _ } _}_
INFO 16 Oct 2020 00:07:43 org.joget.apps.app.lib.JsonTool - Adding request header Authorization : Bearer
access_token
INFO 16 Oct 2020 00:07:43 org.joget.apps.app.lib.JsonTool - Adding request header X-UIPATH-OrganizationUnitId :
organizationUnitId
INFO 16 Oct 2020 00:07:44 org.joget.apps.app.lib.JsonTool - https://cloud.uipath.com/yourAccountName/DemoDefault
/orchestrator_/odata/Jobs/UiPath.Server.Configuration.OData.StartJobs returned with status : 201
INFO 16 Oct 2020 00:07:44 org.joget.apps.app.lib.JsonTool - {"@odata.context":"https://cloud.uipath.com
/yourAccountName/DemoDefault/orchestrator_/odata/$metadata#Jobs","value":[{"Key":"0a53aca6-ad56-40de-bd72-
dd757e817a5b","StartTime":null,"EndTime":null,"State":"Pending","JobPriority":"Normal","Source":"Manual","
SourceType":"Manual","BatchExecutionKey":"2e1adac4-c4f6-4bb8-b697-c87e33744de9","Info":null,"CreationTime":"
2020-10-16T00:07:44.43Z","StartingScheduleId":null,"ReleaseName":"First.automation.project","Type":"
Unattended","InputArguments":null,"OutputArguments":null,"HostMachineName":null,"HasMediaRecorded":false,"
PersistenceId":null,"ResumeVersion":null,"StopStrategy":null,"RuntimeType":"Development","
RequiresUserInteraction":true,"ReleaseVersionId":null,"EntryPointPath":null,"OrganizationUnitId":
organizationUnitId,"OrganizationUnitFullyQualifiedName":null,"Reference":"","Id":18675957}]}
```

Back at the **UiPath Orchestrator** and **UiPath Assistant**, you would also be able to monitor the execution of the job.

## Sample Joget App

The sample app containing this process can be downloaded below:

Download the sample app

APP_rpa_uipath...1016023843.jwa