

# IBM Cloud Pak for Business Automation Demos and Labs 2023

## Consume & Publish Automation Services in IBM Business Automation Workflow

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V 1.4

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# 1 Introduction

## 1.1 IBM Business Automation Workflow

IBM Business Automation Workflow is software that combines business process management and case management capabilities in a single integrated workflow solution. It unites information process, and users to provide a 360-degree view of work to help drive more successful business outcomes.

Additional information about IBM Business Automation Workflow can be found [here](#).

## 1.2 Lab Overview

In this lab, you will learn how to work with automation services and external services.

[Automation services](#) provide a unified way to leverage services in the IBM Cloud Pak for Business Automation platform. Capabilities such as Decisions & Workflow can expose automation services to be consumed throughout the platform.

[External services](#) are used to call an application or a service that is external to IBM Business Automation Workflow. For example, you can create an external service to call a Java application that sends out emails.

As a part of this lab, you will consume an automation service published by the Decision capability to scoreboard (perform risk assessment and classification) a client. You will then create an external service that invokes a Java application that sends out emails. Finally, you will see how to publish the external service as an automation service so that the email capability can be leveraged by others in the platform.

**Approximate Duration:** 2 hours

## 1.3 Lab Setup Instructions

1. If you are performing this lab as a part of an IBM event, access the document that lists the available systems and URLs along with login instructions. For this lab, you will need to access **IBM Business Automation Studio**.
2. Download the **mailIntegration.jar** from the **Lab Data** folder onto your computer. This file contains the java implementation to send an email.

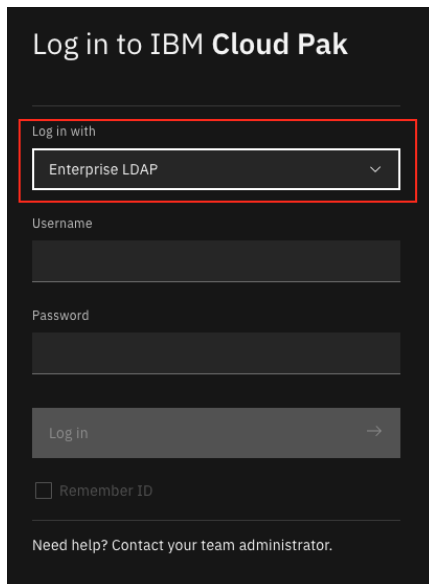
## 2 Exercise: Consume an Automation Service

### 2.1 Introduction

In this exercise, we will consume an automation service that is published using the IBM Automation Decision Service capability. This automation service invokes a decision that scoreboards a client i.e., gives an artificial intelligence backed risk assessment and classifies the client as Segment 1 or 2.

### 2.2 Exercise Instructions

1. In your browser, login to IBM Business Automation Studio using the Enterprise LDAP option.



Log in to IBM Cloud Pak

Log in with

Enterprise LDAP

Username

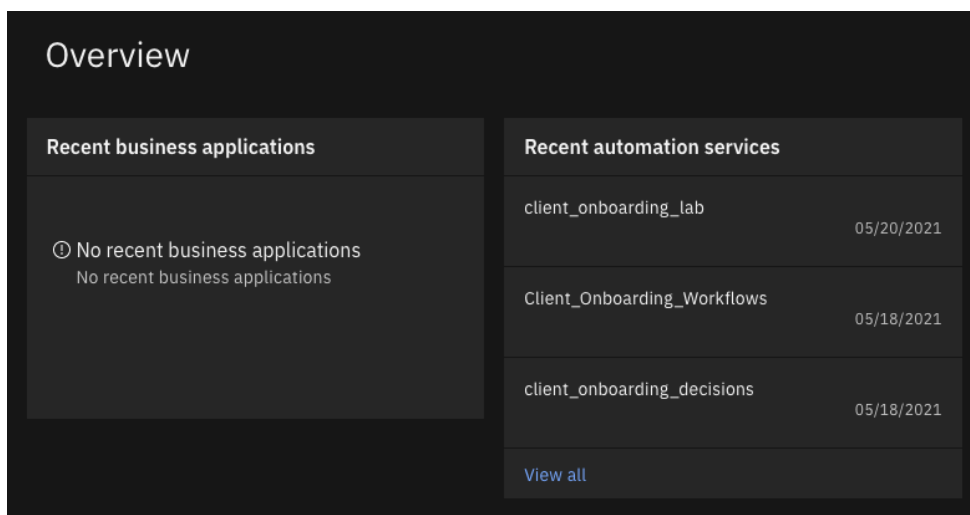
Password

Log in

☐ Remember ID

Need help? Contact your team administrator.

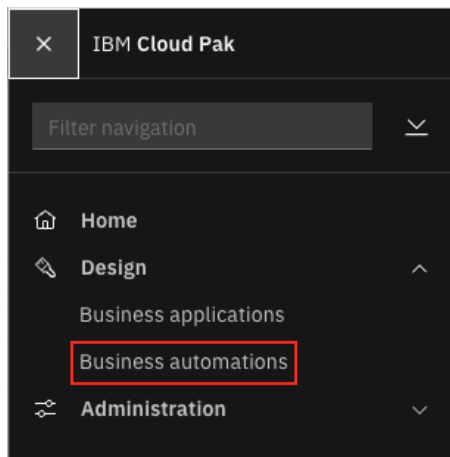
The homepage contains cards that showcase recent artifacts across all installed Cloud Paks in the system. For IBM Cloud Pak for Business Automation, the recent [business applications](#) and [automation services](#) are shown.



### Overview

Recent business applications	Recent automation services						
<p>ⓘ No recent business applications</p> <p>No recent business applications</p>	<table><tbody><tr><td>client_onboarding_lab</td><td>05/20/2021</td></tr><tr><td>Client_Onboarding_Workflows</td><td>05/18/2021</td></tr><tr><td>client_onboarding_decisions</td><td>05/18/2021</td></tr></tbody></table> <p><a href="#">View all</a></p>	client_onboarding_lab	05/20/2021	Client_Onboarding_Workflows	05/18/2021	client_onboarding_decisions	05/18/2021
client_onboarding_lab	05/20/2021						
Client_Onboarding_Workflows	05/18/2021						
client_onboarding_decisions	05/18/2021						

2. In the top-left corner, click on the menu icon and select **Design → Business automations** to access the automation repository.



This brings up the Business automations page where you can create or reuse automations from different capabilities of IBM Cloud Pak for Business Automation. If a capability is not installed on the system, it will be greyed out.

## Business automations

Create or reuse automations. An automation is a collection of artifacts that fulfills a business purpose. You can publish some automation artifacts as automation services that you can call and reuse in a consistent way. [Learn more](#)

Create

Import

Published automation services

Decision

Document processing

Workflow

External

Published (2)

Client_Onboarding_Workflows Workflow	Published 09/11/2023
Client Onboarding Decisions Decision	Published 09/11/2023

The default selection **Published automation services** shows all automation services available for consumption. The one we will be consuming as a part of this exercise is **Client Onboarding Decisions**.

- Click on **Client Onboarding Decisions** to view its details.

Created by cp4badmin · 09/11/2023

## Client Onboarding Decisions

Decision [Client-Onboarding](#)

List additional services and calculate associated fees based on client information provided during onboarding. Perform a client risk assessment.

1.0.0 (last published) ▼

Operation	Description
feeAndServices	
scoreboard	

An automation service can contain multiple operations. The table on the right shows the operations available along with a description for each operation. For this exercise, we will consume the **scoreboard** operation as the description matches our goal of scoreboarding the client.

- Click on the **twisty** icon next to **scoreboard** to view more details about the operation.

^ scoreboard

Input	Type	Description
Industry	Industry	
Client	ClientInformation	

Output	Type	Description
Scoreboard	Scoreboard	

Here, we can see the inputs and outputs that are specified for this operation. This means that anyone consuming this automation service will need to provide an **industry** and **client information** and will receive the **scoreboard** in return.

We will be consuming this automation service in a Workflow.

- Click on the **Back** button in the upper-left corner.

IBM Cloud Pak

← Published (2) 🔍 ⚙️

- Click on **Create** → **Workflow** → **Workflow automation**.

Create ▼ Import

Decision automations

Workflow > Workflow automation

External Template

Decision Toolkit

7. In the **Name** field, enter **UsrNNN Automation Services** where *UsrNNN* is your username.
8. Provide an optional purpose.
9. Click on **Create**.

Create a workflow automation ×

☐ Includes case features

Name  
Usr011 Automation Services

Purpose (optional)  
Consume & publish automation services

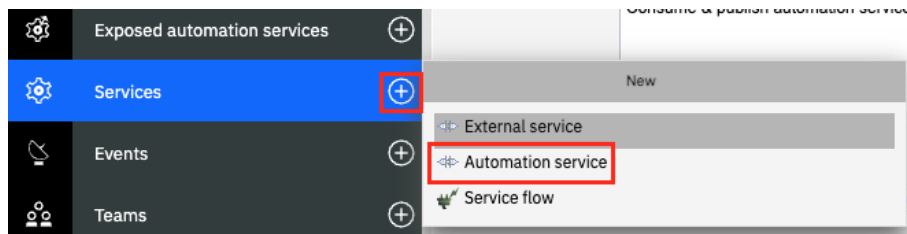
Create

This opens the [IBM Process Designer](#) which is the primary modeling and designing tool in IBM Business Automation Workflow.

The left-hand side pane is the library panel where you can create and access different artifacts.

**Note:** If the IBM Process Designer window does not load the first time, click on the browser's address bar and press Enter to reload the page.

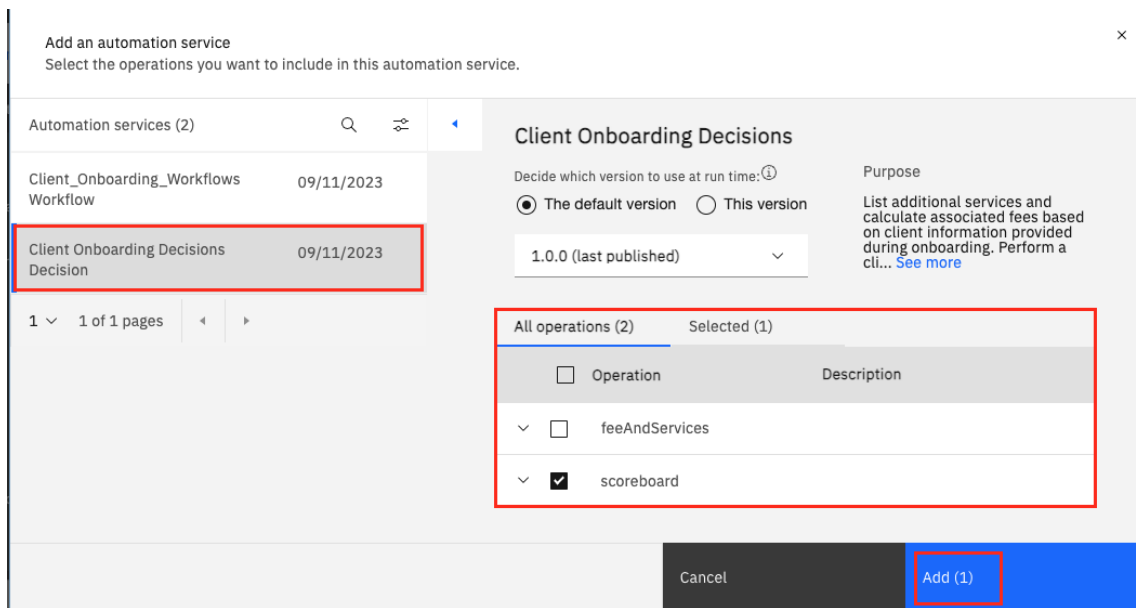
10. In the library panel, hover over **Services**, click on the **+** button and select **Automation service**.



This brings up the list of published automation services where you can select which one you want to consume.

11. Click on **Client Onboarding Decisions**.
12. Select the **scoreboard** operation.



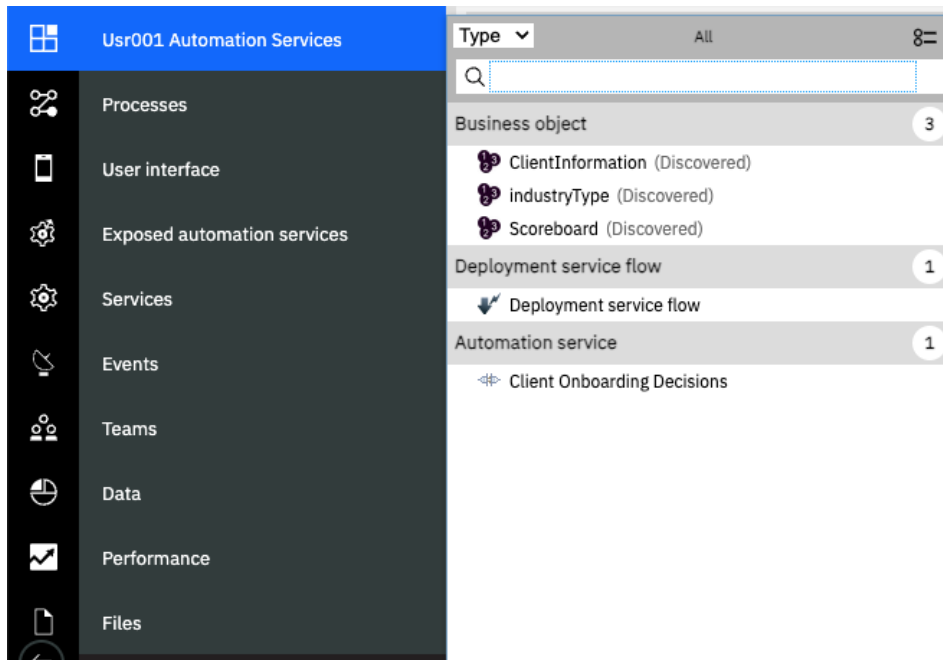


At the top, you can select which version of the automation service you want to consume. By default, the last published version is always chosen. We will leave that selection as is.

13. Click on **Add (1)**.

This creates the artifacts necessary to create the automation service in your workflow project and opens the Automation Service. This includes any [business objects](#) that are required to call the service. Let's take a look at the objects created.

14. Click on the title of your project to show the list of artifacts

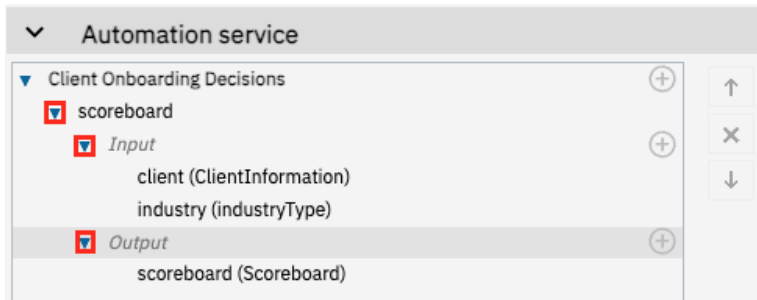


As you can see, the **ClientInformation**, **industryType** & **Scoreboard** business objects are automatically discovered as they are the inputs and outputs required to invoke the service.

Next, we will take a deeper look at the automation service.

15. Click on the **twisty** icon for the **scoreboard** operation to see its details.

16. Click on the **twisty** icons for the **Input** and **Output**.

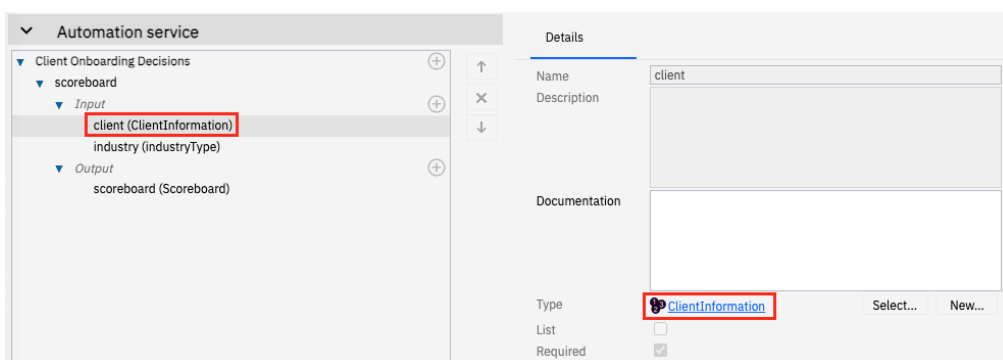


You can see the business objects used as input and output by the scoreboard operation.

17. Click on **client** under **Input**.

On the right, the details for the parameter are shown including its type: ClientInformation.

18. Click on **ClientInformation** to open the business object and see its parameters.

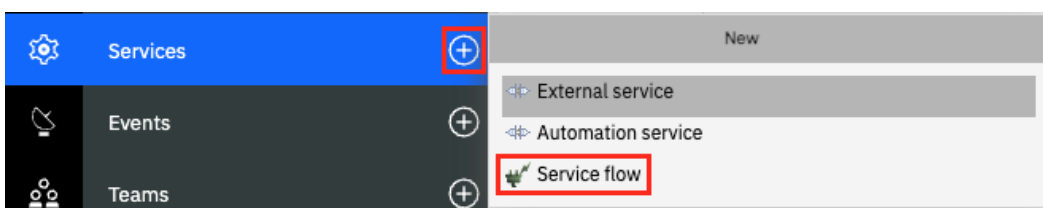


19. In the **Parameters** section, you can see the different parameters within this business object:



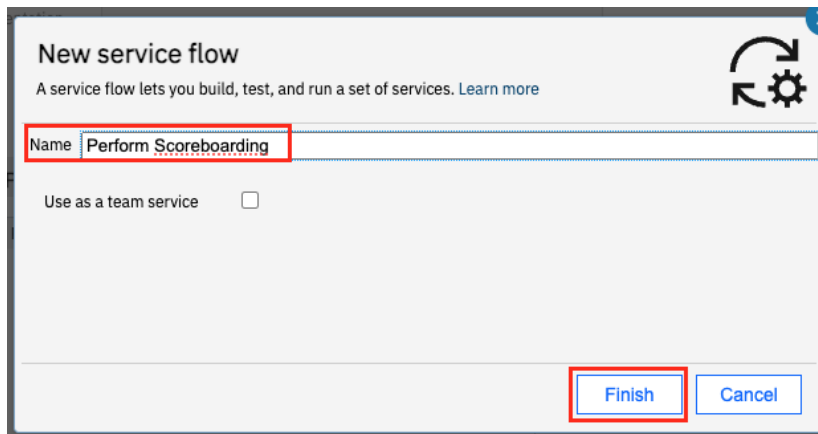
You can similarly explore the other inputs and outputs for the automation service. Next, we will create a [Service Flow](#) that can invoke this automation service.

20. In the library pane on the left, hover over **Services**, click on the **+** button and select **Service flow**.

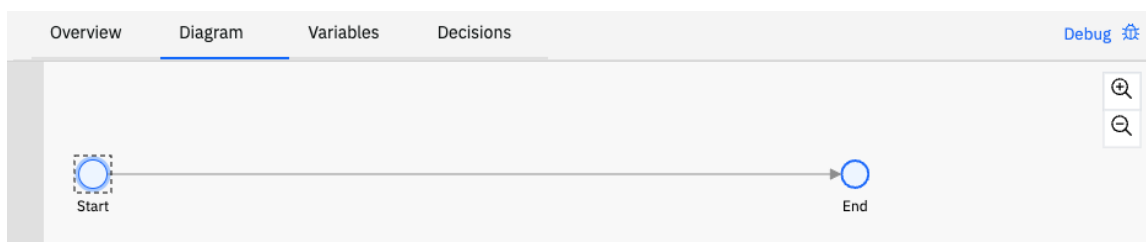


21. In the New Service Flow wizard, enter **Perform Scoreboarding** as the name.

22. Click on **Finish**.

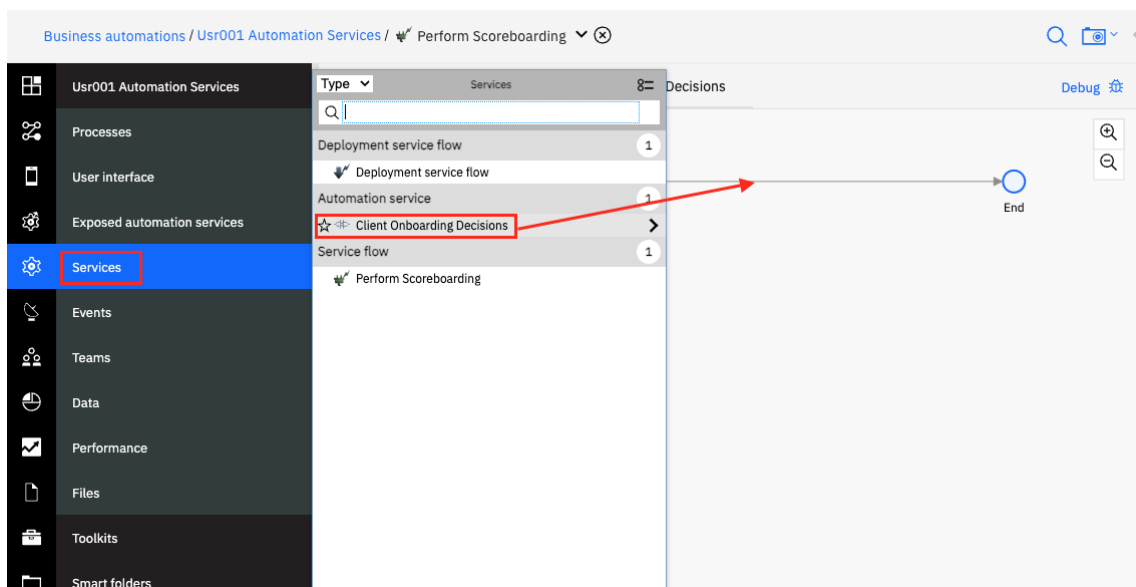


The service flow editor should now open with a default diagram:

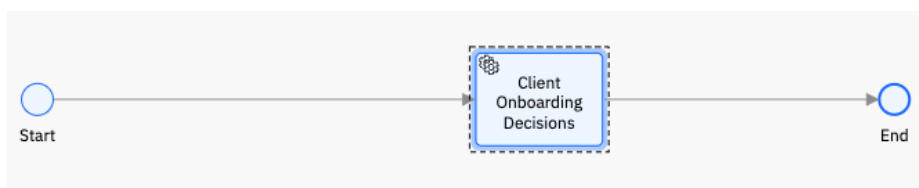


Now, we want to add a call to the automation service between the line connecting the **Start** and **End** nodes.

23. In the library pane on the left, click on **Services** and drag the **Client Onboarding Decisions** automation service on the line connecting the **Start** and **End** node.



Your diagram should then look as follows:



24. Click on the **Client Onboarding Decisions** service task between the **Start** and **End** nodes.
25. In the properties pane at the bottom, under **Implementation** select the **scoreboard** operation.

General

Implementation

Data mapping

Pre & post

Activity type

Type

Service task

Implementation

Client Onboarding Decisions

Select...

New...

Operation

scoreboard

26. Switch to the **Data Mapping** tab.

The contents of this tab allow you to map constant values and/or variables to the input and output of the automation service.

27. Click on the **auto-map** icon for the **Input Mapping** section.

General

Implementation

Data mapping

Pre & post

Input mapping

client (ClientInf...

industry (indus...

This brings up the variable creation wizard which allows us to automatically create the required variables. We want this service flow to be reusable so that it can be called by other artifacts (such as a human service). To do that, we can select the **client** and **industry** as inputs to this service flow. This means that anyone calling the **Perform Scoreboarding** service flow can provide these two variables as inputs.

28. Select the **Input** checkboxes for both **client** and **industry**.

Variable creation

Create variables where no matching variable exists. The new variables are automatically mapped. Existing mappings are not overwritten. Existing variables with the same name but different types are omitted.

Select the variables to be created and auto-mapped. By default, the variables are created as private variables. To create them as input, output, or input and output variables, select the check box beside the variable.

Variable name	Variable type	Input	Output
<input checked="" type="checkbox"/> client	ClientInformation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> industry	industryType	<input checked="" type="checkbox"/>	<input type="checkbox"/>

< Back

Next >

Finish

Cancel

We would check the output checkboxes if we were modifying the input. This way any artifact calling the service flow would be able to get the updated values as the output to the flow.

29. Click on **Finish**.

30. Repeat the steps above to auto-map the output variable **scoreboard**. In this case however, select the Output checkbox.

<input checked="" type="checkbox"/> Variable name	<input type="checkbox"/> Variable type	Input	Output
<input checked="" type="checkbox"/> scoreboard	Scoreboard	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Your data mapping section should now look as follows:

General	Input mapping	Output mapping
Implementation	tw.local.client → client (ClientInfo...)	scoreboard (Scoreboard) → tw.local.scoreboard
Data mapping	tw.local.industry → industry (industr...)	
Pre & post		

31. Switch to the **General** tab.
32. Change the name of the task to **Perform Scoreboarding**.

General	Common
Implementation	Name Perform Scoreboarding
Data mapping	Color
Pre & post	Documentation

Now, to test this service flow, we will need to provide some default values.

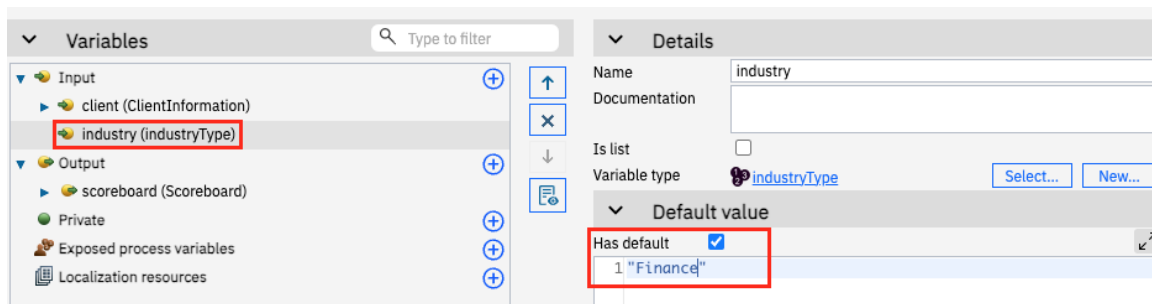
33. Click on the **Variables** tab at the top.
34. Select the **client** input variable.
35. On the right-hand side, **check** the checkbox for the **Has default** field.
36. Updated the following values in the autogenerated script:

- annualRevenue:** 50000000
- companyAge:** 30
- numberOfEmployees:** 75

Overview	Diagram	Variables	Decisions	Debug	Run
Variables		Details			
Input		Name client			
client (ClientInformation)		Documentation			
industry (IndustryType)		Is list			
Output		Variable type ClientInformation			
scoreboard (Scoreboard)		Default value			
Private		Has default			
Exposed process variables		1 var autoObject = new tw.object.ClientInformation();			
Localization resources		2 autoObject.annualRevenue = 50000000;			
		3 autoObject.companyAge = 30;			
		4 autoObject.defaultedPayment = false;			
		5 autoObject.numberOfEmployees = 75;			
		6 autoObject			

37. Click on the **industry** input variable.
38. **Check** the **Has default** checkbox.

39. Update the industry in the autogenerated script to **Finance**.

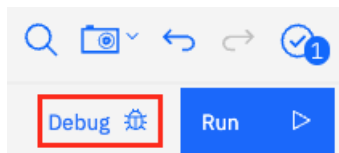


With the default values added, we are now ready to test the automation service.

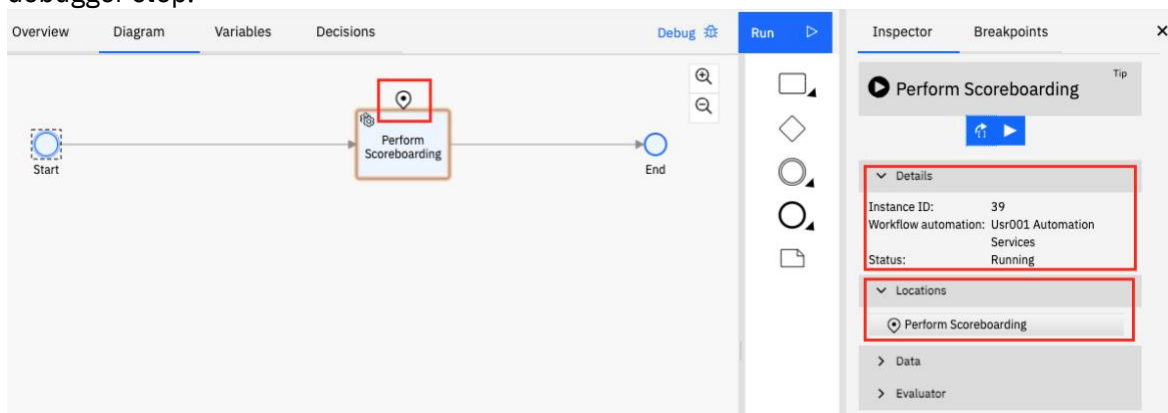
40. Click on the **Diagram** tab at the top.



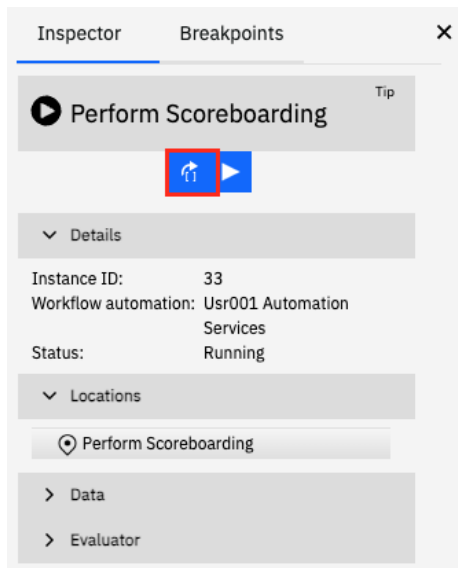
41. Click on the **Debug** icon in the upper-right corner.



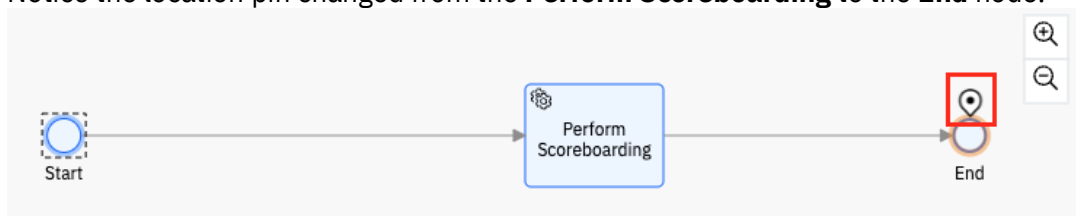
Notice how the **Inspector** panel is opened to the right containing the controls and information about your debugging session. The diagram now also shows a location pin indicating the current debugger step.



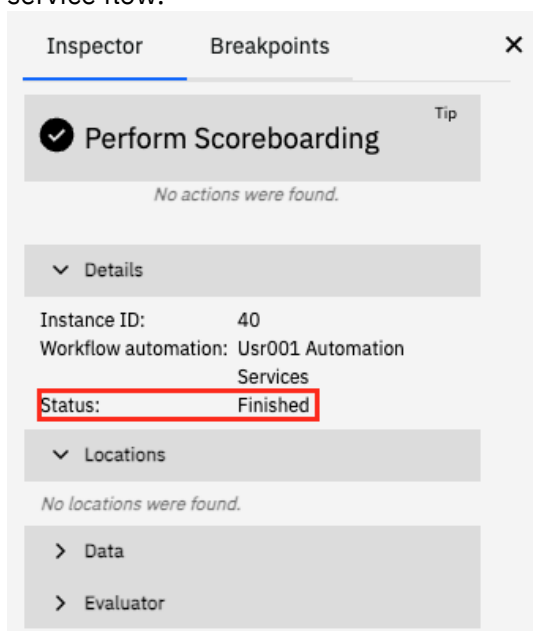
42. Click on the **Step over** button to invoke the automation service.



Notice the location pin changed from the **Perform Scoreboarding** to the **End** node.

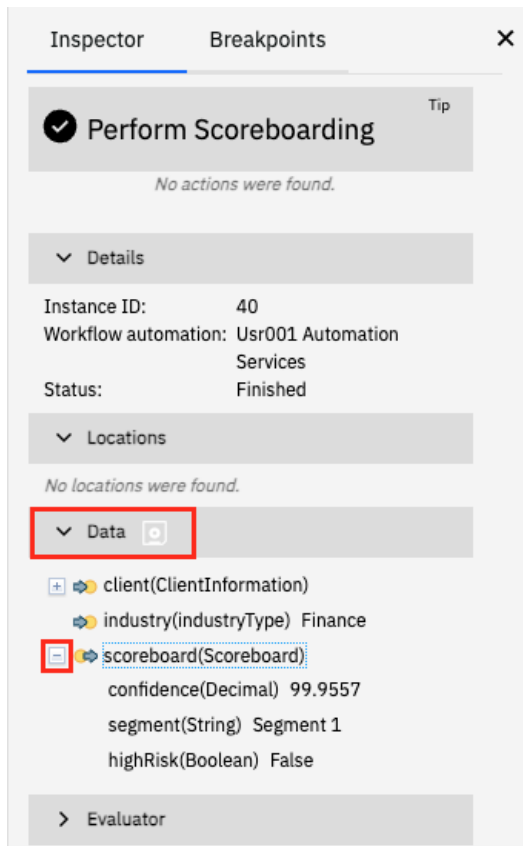


43. Click the **Step over** button one more time to complete the execution of the Perform Scoreboarding service flow.



The Inspector status should now be updated to **Finished**.

44. Click on the **twisty** icon to expand the **Data** section.
45. Expand the **scoreboard** variable.
46. Verify that the values shown match the screenshot below:



With that, you have successfully completed this exercise and learned how to consume an automation service. The service flow that encapsulates this automation service can now be reused throughout the project to call the decision service. If you want to learn more about this along with the basics of IBM Business Automation Workflow, take a look at the **Introduction to IBM Business Automation Workflow** lab.

In the next exercise, we will create an external service that calls out to a Java application to send emails.



## 3 Exercise: Create an External Service

### 3.1 Introduction

External services have various bindings like Java, REST API, Web Service, etc. In this exercise, we will create an external service that calls a Java application (.jar file) that sends an email.

**Note:** A single external service can only have one type of binding.

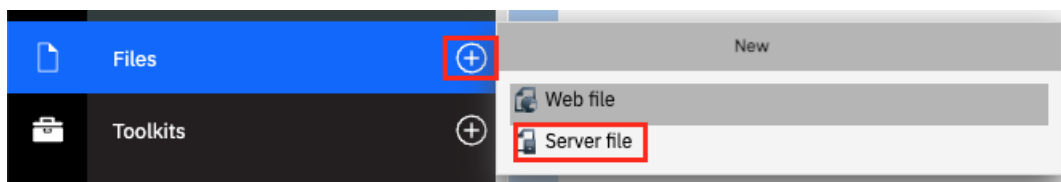
### 3.2 Exercise Instructions

1. Open the **UsrNNN Automation Services** workflow project if not already open.

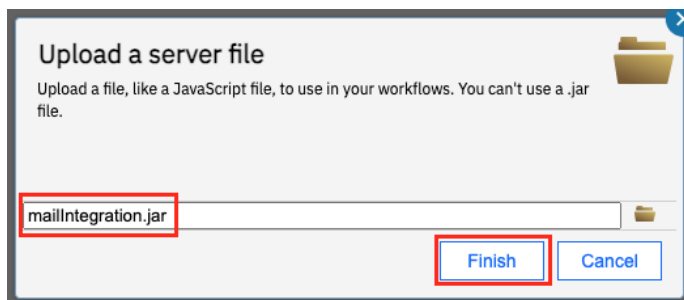
You can do this by going to the Business automation repository in **IBM Business Automation Studio**.

We first need to add a jar file to the project. This file contains the Java implementation to send an email. The [integration samples page](#) contains additional workflow project exports and the sample Java code that can be used to interact with emails.

2. In the library pane on the left, hover over **Files**, click on the **+** button and select the **Server file** option.

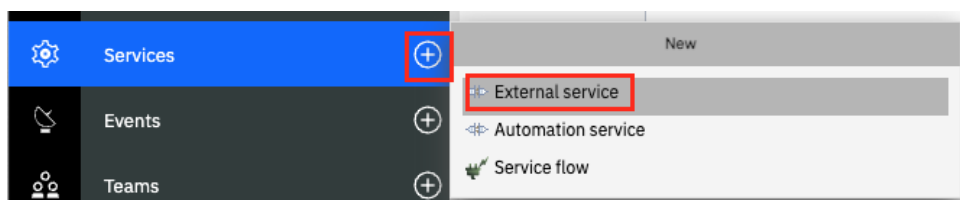


3. Select the **mailIntegration.jar** file downloaded as a part of the lab setup instructions.
4. Click on **Finish**.



Next, we will create the external service that uses this jar file.

5. In the library pane, hover over **Services**, click on the **+** button and select the **External service** option.



The **New external service** wizard pops up with two options. As we are integrating with a java application, we will use the default selection.


6. Click on **Next**.

7. For the **Select a method to discover the service** field, select **Java service from Server File** option.
8. In the **Managed file** field, click on **Select** and pick the **mailIntegration.jar** file.
9. For the **Java class** field, select the **Mail** class.

Select a method to discover the service.

Java service from Server File

External service name: Mail

Managed file:  mailIntegration.jar [Select...](#)


Java class: Mail (integration.mail)

### New external service

An external service lets you call a service or application that is external to a workflow automation. [Learn more](#)

Select a method to discover the service.

Java service from server file

Managed file  mailIntegration.jar [Select...](#)

Java class Mail (integration.mail)

External service name Mail

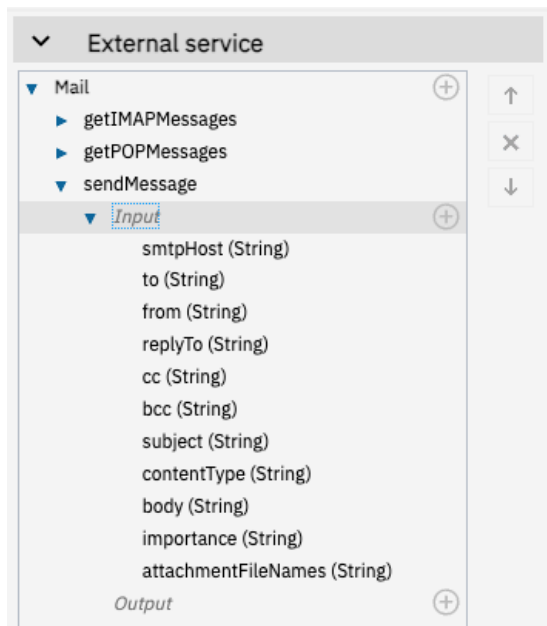
[< Back](#) [Next >](#) [Finish](#) [Cancel](#)

The external service name is automatically updated to match the name of the Java class.

10. Click on **Finish**.

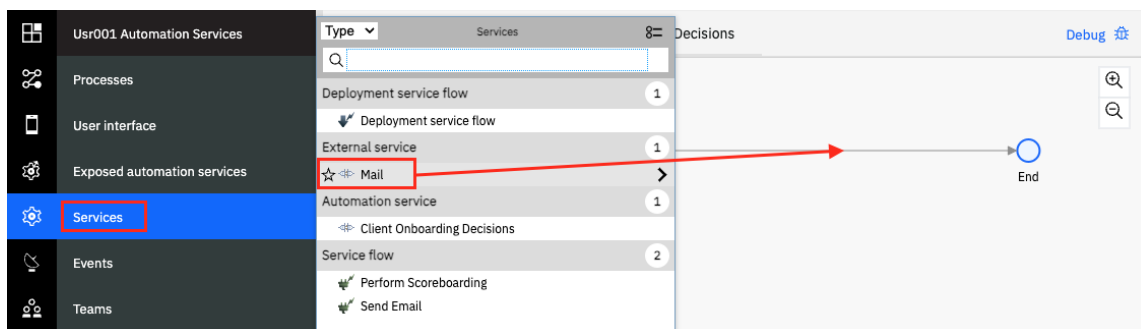
This opens the external service editor with a similar look and feel to the automation service editor from the previous exercise.

11. Expand the **sendMessage** operation and the **Input** section to view its details.

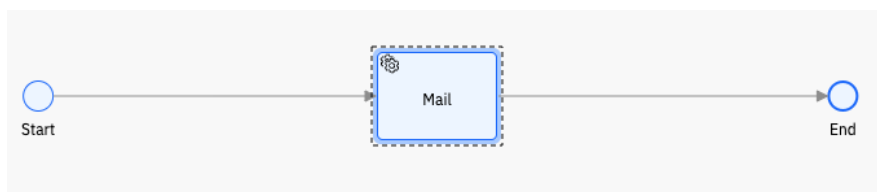


Here you can see the inputs that can be used to send an email. Next, we will create a service flow just like the previous exercise to test this external service and make it reusable. In the next exercise, we will see how to publish an automation service that calls this service flow.

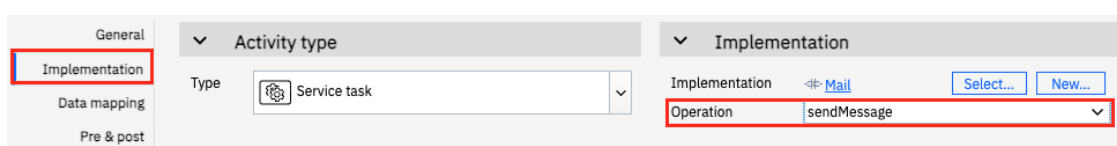
12. In the library pane on the left, hover over **Services**, click on the **+** button and select **Service Flow**.
13. In the New Service Flow wizard, enter **Send Email** as the name.
14. Click on **Finish** to open the service flow editor.
15. In the library pane on the left, click on **Services** and drag the **Mail** external service on the line connecting the **Start** and **End** node.



Your diagram should now look as follows:



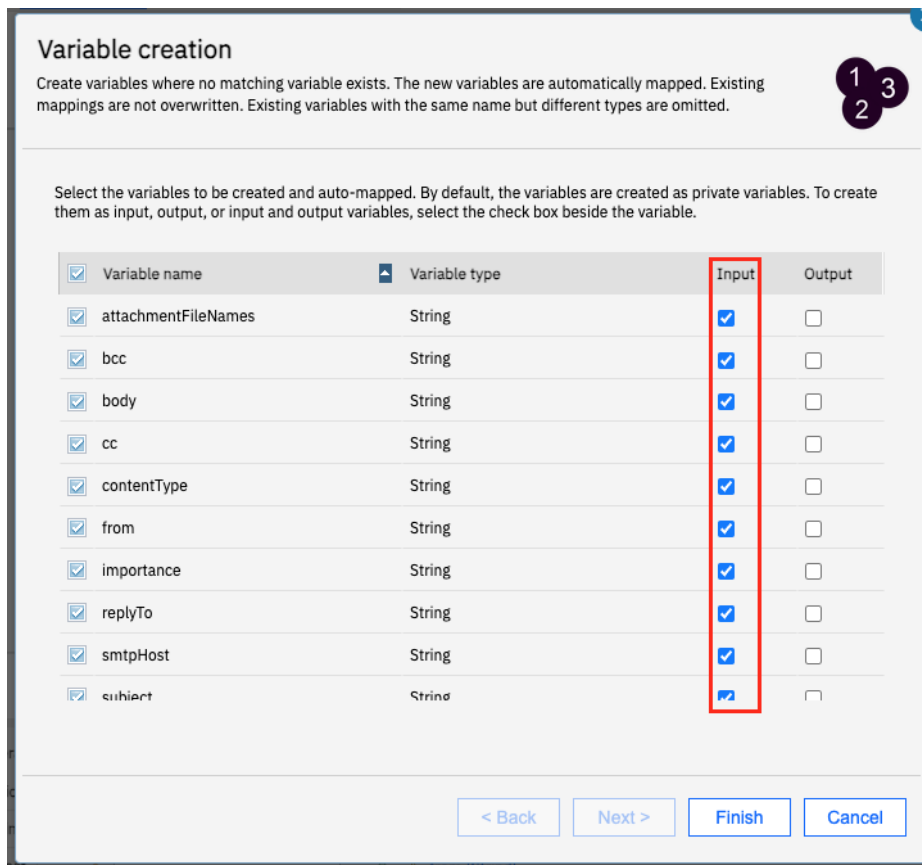
16. In the properties pane, under the **Implementation** section, select the **sendMessage** operation.



17. Switch the **Data Mapping** tab.

18. Click on the **auto-map** icon for the **Input Mapping** section.

19. In the variable creation wizard, select the **Input** checkboxes for **all** variables.

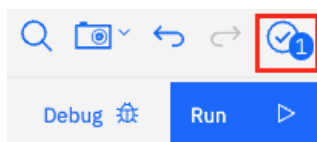


The image shows a 'Variable creation' dialog box. It has a title bar with a close button and three numbered steps (1, 2, 3) in the top right corner. The main text says: 'Create variables where no matching variable exists. The new variables are automatically mapped. Existing mappings are not overwritten. Existing variables with the same name but different types are omitted.' Below this, it says: 'Select the variables to be created and auto-mapped. By default, the variables are created as private variables. To create them as input, output, or input and output variables, select the check box beside the variable.' There is a table with four columns: 'Variable name', 'Variable type', 'Input', and 'Output'. The 'Input' column is highlighted with a red box. All variables in the table have their 'Input' checkbox checked. At the bottom, there are four buttons: '< Back', 'Next >', 'Finish', and 'Cancel'.

<input checked="" type="checkbox"/> Variable name	<input checked="" type="checkbox"/> Variable type	Input	Output
<input checked="" type="checkbox"/> attachmentFileNames	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> bcc	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> body	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> cc	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> contentType	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> from	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> importance	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> replyTo	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> smtpHost	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> subject	String	<input checked="" type="checkbox"/>	<input type="checkbox"/>

20. Click on **Finish**.

21. Click on the **Finish editing** button in the upper-right corner.



This completes the exercise. You can optionally choose to test this service flow by providing default values to the input variables, but you will need access to an email account with an SMTP server.

## 4 Exercise: Create and Publish an External Service

### 4.1 Introduction

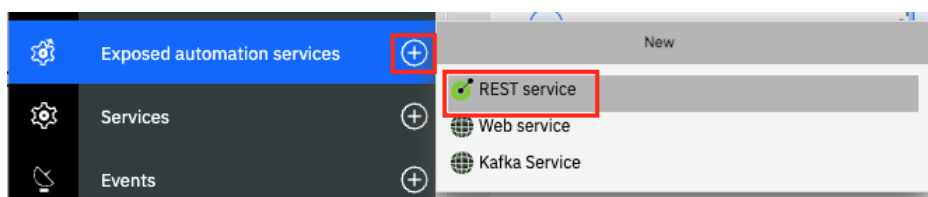
In this exercise, we will create an automation service containing an operation that invokes this service flow. We will then see how to publish this automation service.

### 4.2 Exercise Instructions

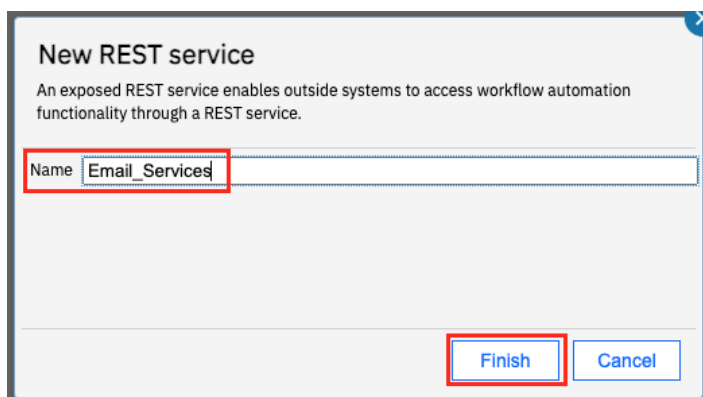
1. Open the **UsrNNN Automation Services** workflow project if not already open.

You can do this by going to the Business automation repository in **IBM Business Automation Studio**.

2. In the library pane on the left, hover over **Exposed automation services**, click on the **+** button and select the **REST service** option.

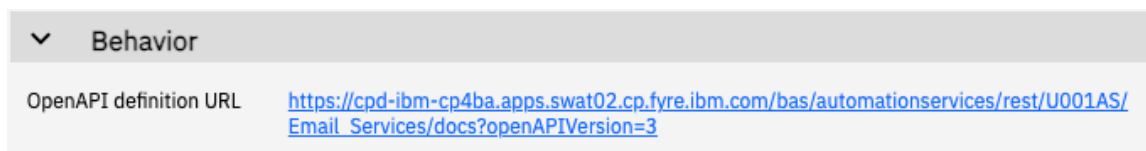


3. In the **Name** field, enter **Email\_Services**.
4. Click on **Finish**.



This opens the **REST service** editor where you can add multiple operations. In this exercise, we will only add one operation to send emails.

REST Services also provide an OpenAPI definition URL. The OpenAPI spec defines a standard, language-agnostic interface for REST APIs.

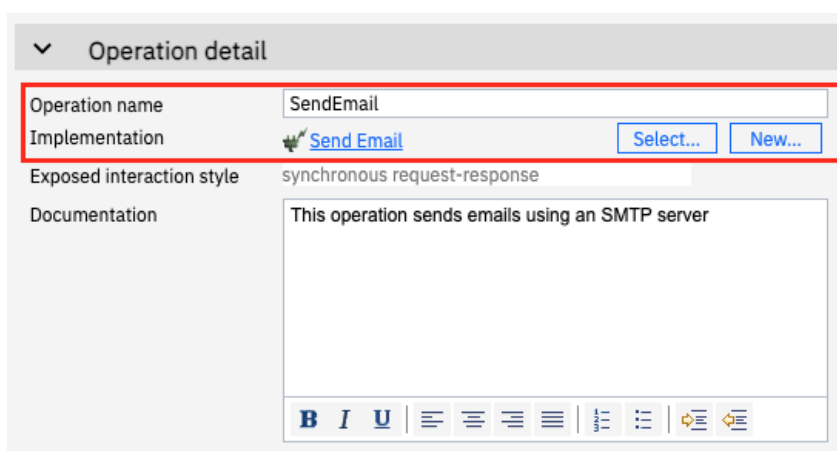


**Note:** The URL you see may be different compared to what's in the screenshot based on your lab environment.

5. In the **Operations** section, click on **+** to add a new operation.

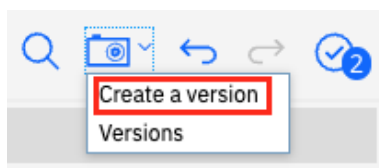


6. In the **Operation detail** section on the right, enter **SendEmail** in the **Operation name** field.
7. For the **Implementation** field, click on the **Select** button and select the **Send Email** service flow created in the previous exercise.

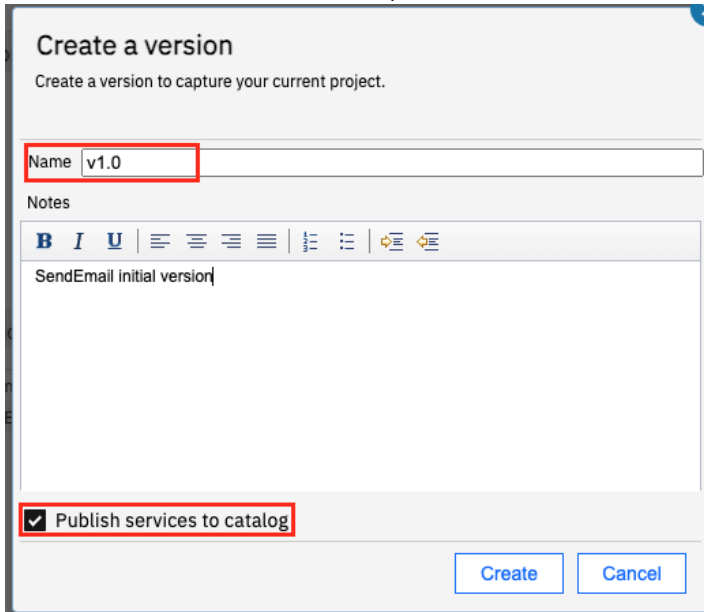


Next, we will need to create a version of this workflow project so that the REST service can be published as an automation service.

8. Click on the **Version** button in the upper right corner and select **Create a version**.



9. In the **Create a version** wizard, enter **v1.0** in the **Name** field and an optional description.



**Create a version**  
Create a version to capture your current project.

Name **v1.0**

Notes

SendEmail initial version

☒ Publish services to catalog

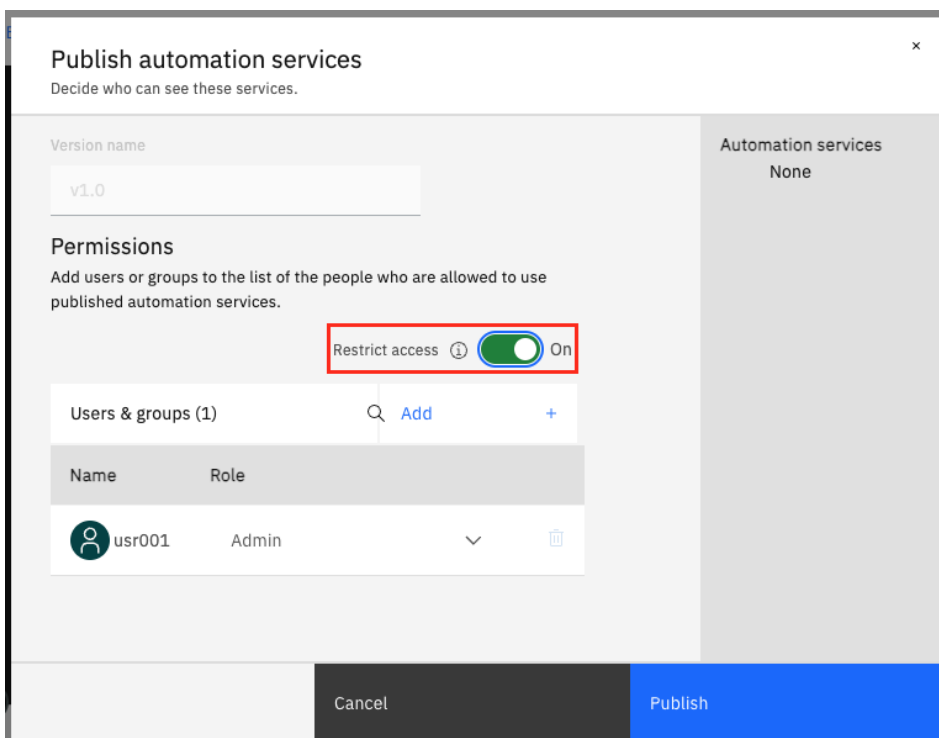
Create Cancel

Make sure the **Publish services to catalog** option is **checked**. When unchecked, the version is created but not published, hence not available for consumption by other components in the platform.

10. Click on **Create**.

This will close the **Create a version** wizard and will automatically open the **Publish automation services** dialog. You can control access, modify permissions and published the automation service from this dialog.

11. Click on the **Restrict access** toggle to turn access control on.



**Publish automation services**  
Decide who can see these services.

Version name  
v1.0

Automation services  
None

**Permissions**  
Add users or groups to the list of the people who are allowed to use published automation services.

Restrict access ☒ On

Users & groups (1) Add +

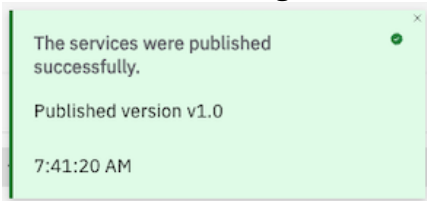
Name	Role
usr001	Admin

Cancel Publish

Note that you can assign different roles to the users and groups for this automation service and that you can add additional users and groups using the **Add** button.

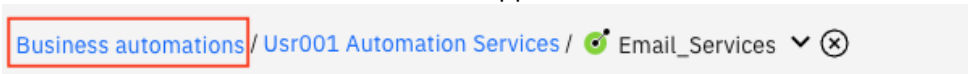
Click on **Publish**.

A confirmation message will show up at the top-right corner.

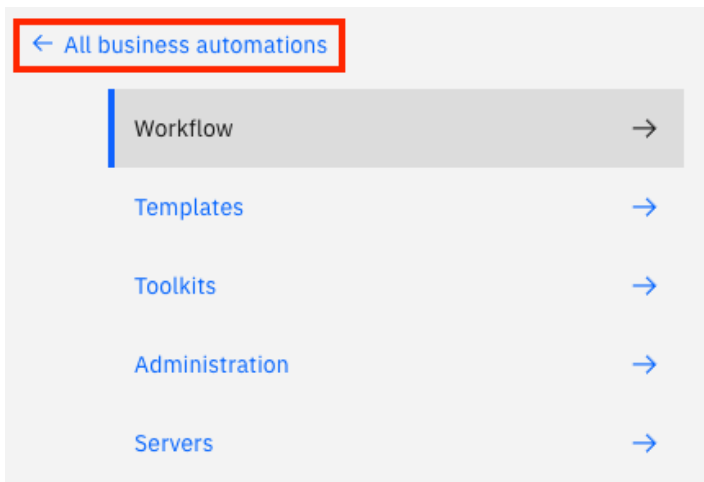


Next, we will verify that the external service has been published.

12. Click on **Business automations** in the upper-left corner.



13. Click on **All business automations**.



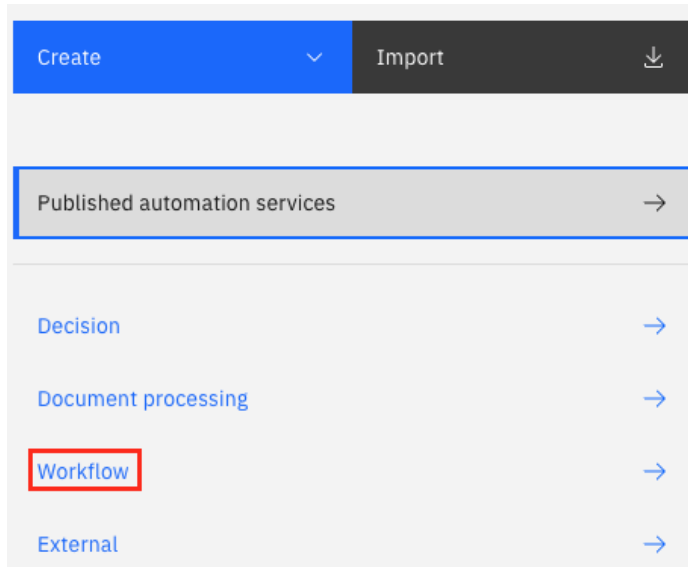
14. The list of published automation services will now show the **Email\_Service** automation service.

Published (3)		Q	⚙
Email_Services Workflow	Published 09/26/2023		
Client_Onboarding_Workflows Workflow	Published 09/11/2023		
Client Onboarding Decisions Decision	Published 09/11/2023		

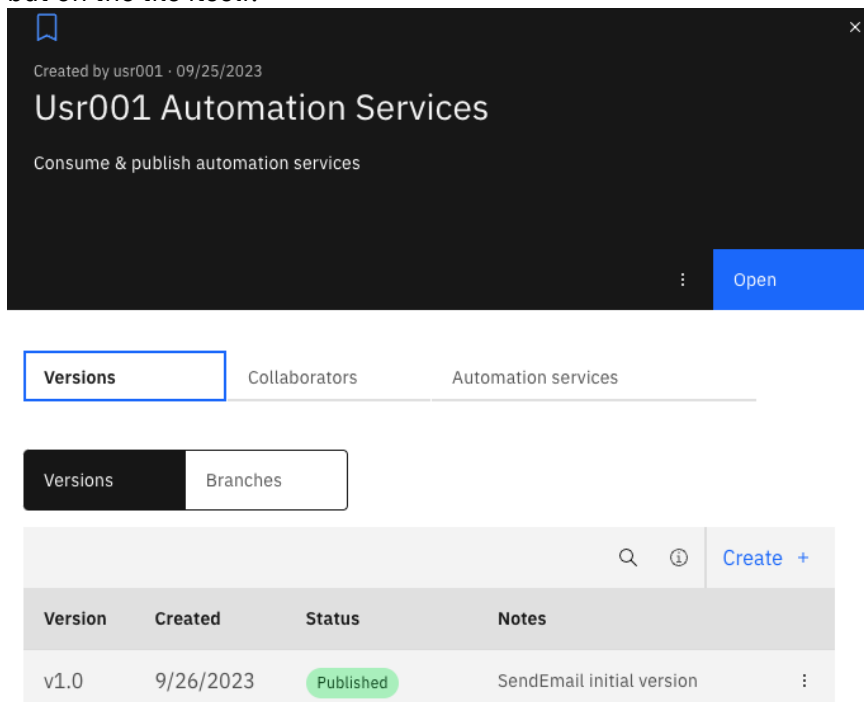
This indicates that the **Email\_Service** is ready to be used by other components in the platform. Now we will explore how to create and manage additional versions through the platform.



15. Click on **Workflow**.



16. Click on the **UsrNNN Automation Services** tile to open its details. Do not click on the open button but on the tile itself.



The project details view opens on the right. From this view you can fully manage the different versions of your project and publish or unpublish the capabilities provided by your service. Notice the version we previously created and published from the IBM Process Designer is listed.

Now you will create a new version to explore the capabilities available from this view.

17. Click on the **Create +** button in the top-right corner of the versions table.



18. Enter **v1.1** in the **Version name** field and an optional description.

Ustr001 Automation Services

Create a version for the Main branch

Version name

v1.1

Notes (optional)

Second version of the SendEmail service

Cancel Create

19. Click on the **Create** button in the **Create a version** dialog.

Ustr001 Automation Services

Create a version for the Main branch

Version name

v1.0

Notes (optional)

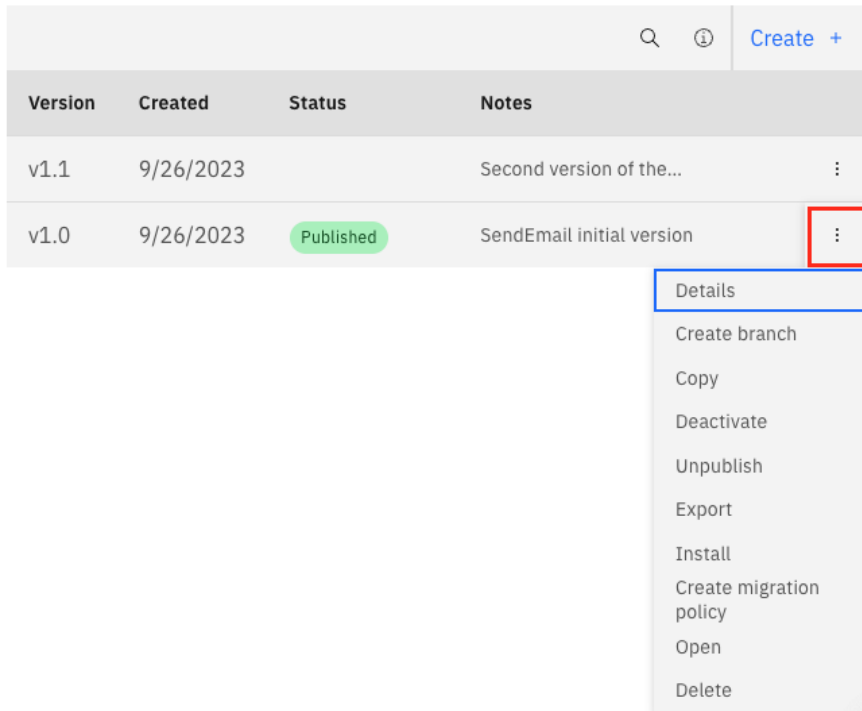
What changes did you make to this version?

Cancel Create

You should now see two version of your project.

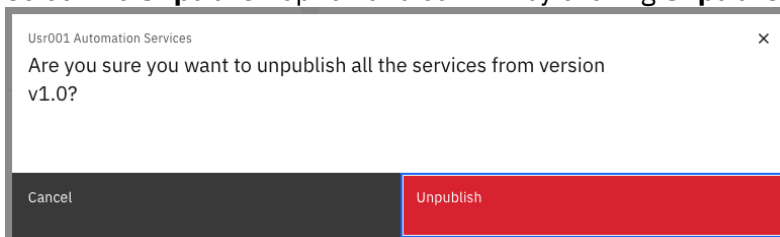
				Q	i	Create +
Version	Created	Status	Notes			
v1.1	9/26/2023		Second version of the...			
v1.0	9/26/2023	Published	SendEmail initial version			

20. Click on the **ellipsis (...)** menu next to the version that has already been published.

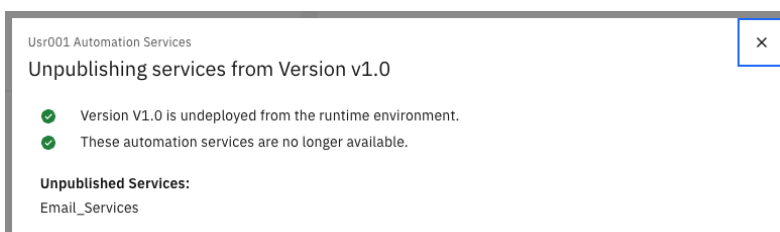


Explore the actions available for the version.

21. Select the **Unpublish** option and confirm by clicking **Unpublished** in the confirmation dialog.



Notice once the version is unpublished, the capabilities provided by your project will no longer be available for other components in the platform.



Close the confirmation dialog by clicking on the **X** icon in the top-right.

22. Finally publish the latest version of the project by clicking on the **ellipsis (...)** menu and selecting the **Publish** option for version **v1.1**.



				🔍 ⓘ Create +
Version	Created	Status	Notes	
v1.1	9/26/2023	Published	Second version of the SendEmail service	⋮
v1.0	9/26/2023		SendEmail initial version	⋮

This concludes the Create and publish an external service exercise.

**Congratulations on completing the lab!**