

Microsoft Fabric in a Day Lab Manual – **Lab 3**

Author: Will Crayger

Email: wcrayger@lucidbi.co

LinkedIn: [LinkedIn.com/in/willcrayger/](https://www.linkedin.com/in/willcrayger/)

Course Material: [GitHub.com/Lucid-Will/FabCon-EU-Zero-To-Hero-with-Fabric](https://github.com/Lucid-Will/FabCon-EU-Zero-To-Hero-with-Fabric)

Working with Pipelines – Extracting Source Data

Introduction

Copying data from source to target is a fundamental pattern in pipelines. To illustrate this, Lab 3 is divided into two parts, showcasing both basic and advanced applications of this approach:

1. The first pipeline will extract data from a single table in an Azure SQL Database.
2. The second pipeline will demonstrate a more advanced, real-world "metadata-driven" method, using a lookup activity to iterate through a list of tables and extract their data.

Understanding how lookups and parameters work together is key, as they enable the creation of powerful, scalable pipelines.

Single Object Copy

Create a Data Pipeline: To begin creating your data pipeline, navigate to the **Data Engineering Fabric Landing** page. From here, choose **Data pipeline** from the available options. Name your pipeline **single_object_copy** and click **Create**.

MONITOR

Learn

Real-Time hub

Workspaces

fiad_wtc

...

Power BI

Microsoft Fabric →









- Power BI
- Databases
- Data Factory
- Data Activator
- Industry Solutions
- Real-Time Intelligence

Synapse

- Data Engineering**
- Data Science
- Data Warehouse

Get started with Synapse Data Engineering

Recommended items to create

 Lakehouse	 Notebook	 Environment	 Spark Job Definition	 Data pipeline	 API for GraphQL™ (preview)	 Import notebook	 Use a sample
--	---	--	---	--	--	--	---

New pipeline

Name

single_object_copy


Create

Cancel

Setup the Copy Data Activity: Once your pipeline is created, you'll land on the pipeline page. Select **Copy data assistant** to start the process. You will notice a variety of available data sources listed for data extraction. Choose **Azure SQL Database** from the list and click **Next**.


Build a data pipeline to organize and move your data

Start with a blank canvas




Pipeline activity
Automate data orchestrations using rich no-code activities.

Start with guidance




Copy data assistant
Follow guided steps to copy data into Microsoft Fabric, as well as other data stores.

Practice with sample data



Practice with sample data
Quickly build a data pipeline with a predefined template to load data into Lakehouse.

Templates



Templates
Generate a new data pipeline quickly using a predefined data scenario.

Need help? [Watch a demo](#)

With the **Create new connection** option is selected, reauthenticate with the read-only credentials from lab 2 and click **Next**. In the table selection screen, check the box next to **Sales.Customers** and click **Next**.

Copy data

- ☒ **Choose data source**
Select a connector. Then enter the connection information.

☐ Connect to data source

☐ Choose data destination

☐ Connect to data destination

☐ Review + save

Connect to data source



Azure SQL database

Azure
[Learn more](#)

Connection settings

Server * ⓘ

asql-fabcon-eu.database.windows.net

Database

sqldb-fabcon-eu

Connection credentials

Connection

Create new connection



Connection name

asql-fabcon-eu.database.windows.net;sqldb-fabcon-eu

Data gateway

(none)



Authentication kind

Basic

Username

read_only_user

Password

.....

Back

Next

Copy data

- ✓ Choose data source
- Connect to data source**
Select, preview, and choose the data.
- Choose data destination
- Connect to data destination
- Review + save

Connect to data source

Select a table

(Connection: asql-fabcon-eu.database.windows.net;sqlldb-fabcon-eu wcrayger)

☒ Tables
☐ Query

✓ sqlldb-fabcon-eu

☐ Select all

☒ Sales.Customers

☐ Sales.Customers_Archive

Selecting the Destination: In the **Destination** menu, switch to the **OneLake data hub** tab located at the top of the window. Choose the **bronze_lakehouse** created in Lab 1 as the **Lakehouse** destination.

On the next page, change the table name to **sales_customers**. Review the other settings to familiarize yourself but leave everything as default and then click **Next**. You'll be presented with the **Pipeline Summary**. Uncheck the **Start data transfer immediately** box. Click **OK** to save the configuration.

Copy data

- ✓ Choose data source
- ✓ Connect to data source
- Choose data destination
Define the data store as destination.
- Connect to data destination
- Review + save

Home OneLake data hub New Azure New Fabric item

Search

All My data Endorsed in your org Favorites Filter All domains

Explorer

Name	Type	Owner	Refreshed	Location
bronze_lakehouse_wtc	Lakehouse	Will Crayger	—	fi
DataflowsStagingWarehouse	Warehouse	Will Crayger	—	fi
bronze_lakehouse_wc	Lakehouse	Will Crayger	—	Fa
Lakehouse_WC	Lakehouse	Will Crayger	—	zF
Silver_Lakehouse_WC	Lakehouse	Will Crayger	—	zF
gold_warehouse_wc	Warehouse	Will Crayger	9/8/24, 8:50:30 AM	Fa
Bronze	Lakehouse	Will Crayger	—	Lt

Copy data

- ✓ Choose data source
- ✓ Connect to data source
- ✓ Choose data destination
- Connect to data destination
Select and map to folder path or table.
- Review + save

Connect to data destination

Connection: bronze_lakehouse_wtc

Root folder: ☒ Tables ☐ Files

Load settings: ☐ Load to existing table ☒ Load to new table

Table *: sales_customers

Column mappings

← Import schemas | + New mapping | ↺ Reset | 🗑 Delete

Source	Type	Destination	Type
<input type="checkbox"/> CustomerID	123 int	→ CustomerID	123 integ
<input type="checkbox"/> CustomerName	abc nvarchar	→ CustomerName	abc string
<input type="checkbox"/> BillToCustomerID	123 int	→ BillToCustomerID	123 integ

☐ Enable partitions


Back Next

Copy data


- ✓ Choose data source
- ✓ Connect to data source
- ✓ Choose data destination
- ✓ Connect to data destination
- **Review + save**
Confirm Copy summary

Review + save

Copy Summary

**Azure SQL Database**

→

**Microsoft Fabric Lakehouse T...**

Source
Connection name
asql-fabcon-eu.database.windows.net;s
qldb-fabcon-eu wcrayger
Table name
Sales.Customers

Destination
Connection name
bronze_lakehouse_wtc
Table name
sales_customers

Options
☐ Start data transfer immediately ⓘ

Back

OK

Configuring and Running the Pipeline: You should be returned to the canvas where the **Copy data** activity is visible. Select it and rename the activity to **single_object_copy** then select the **Source** tab to review the pre-populated configuration details that were set using the **Copy Data Tool**.

Next, select the **Destination** tab and review the settings there as well. For consistency, ensure the table name is lowercase, **sales_customers**. Expand the **Advanced** section and review the **Table action** options: **Append** and **Overwrite**. These are critically important depending on your project's requirements.

Once you've reviewed everything, return to the **Home** tab of the pipeline and click the **Validate** button. If all steps were done correctly, no errors should appear, and you can safely close the **Pipeline Validation Output**.

Home

Activities

Run

View



Validate



Run



Schedule



Trigger (preview)



View run history

Copy data



single_object_copy



General

Source

Destination

Mapping

Settings

Name *

single_object_copy

[Learn more](#)

Description

Activity state ⓘ



Activated



Deactivated

Timeout ⓘ

0.12:00:00

Retry ⓘ

0

> Advanced

Home

Activities

Run

View



Validate



Run



Schedule



Trigger (preview)



View run history

Copy data



single_object_copy



General

Source

Destination

Mapping

Settings

Connection *

asql-fabcon-eu.database.window... ▾

Refresh

Edit

Connection type

Azure SQL Database ▾

Test connection

Database

sqldb-fabcon-eu ▾

Refresh

Use query

☒ Table ☐ Query ☐ Stored procedure

Table

Sales.Customers ▾

Refresh

Preview data

☐ Enter manually

> Advanced

Home

Activities

Run

View



Validate



Run



Schedule



Trigger (preview)



View run history

Copy data



single_object_copy



General

Source

Destination

Mapping

Settings

Connection *

bronze_lakehouse_wtc

Refresh

Open

Root folder

☒ Tables ☐ Files

Table *

sales_customers

Refresh

Preview data

New

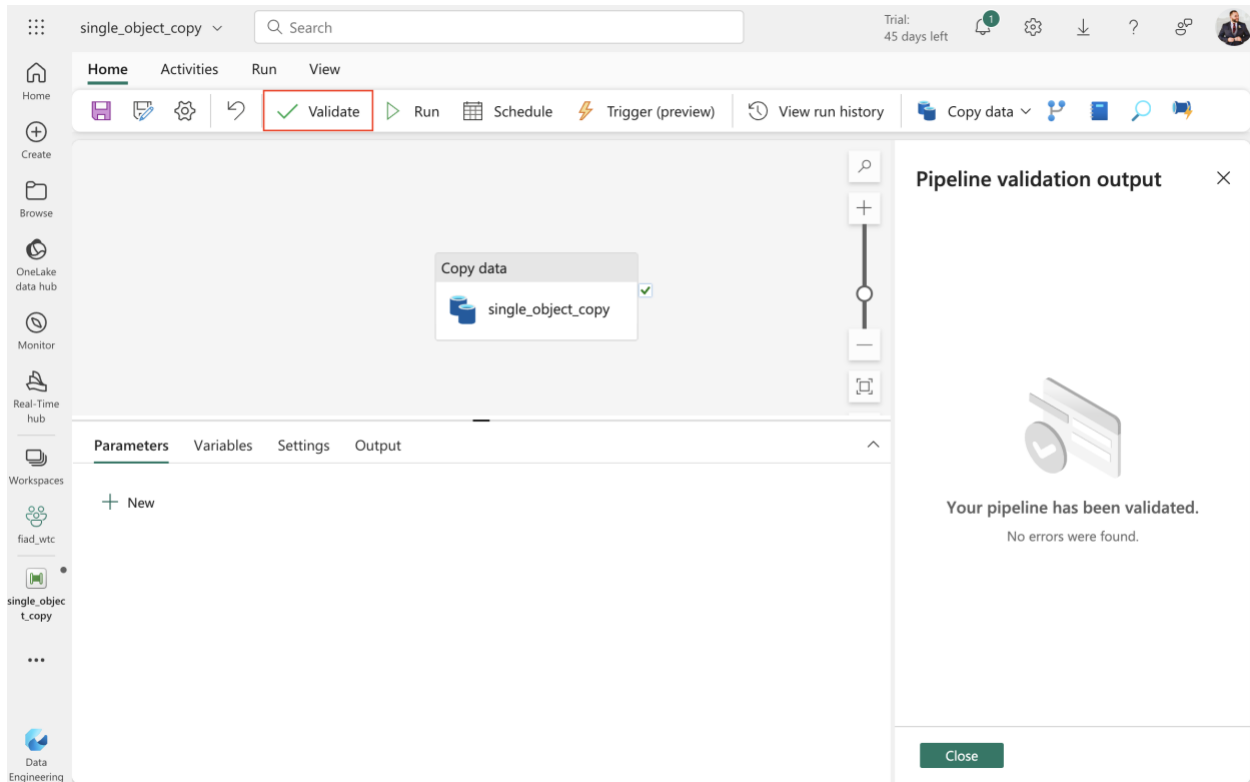
✓ Advanced

Table action

☐ Append ⓘ ☒ Overwrite ⓘ

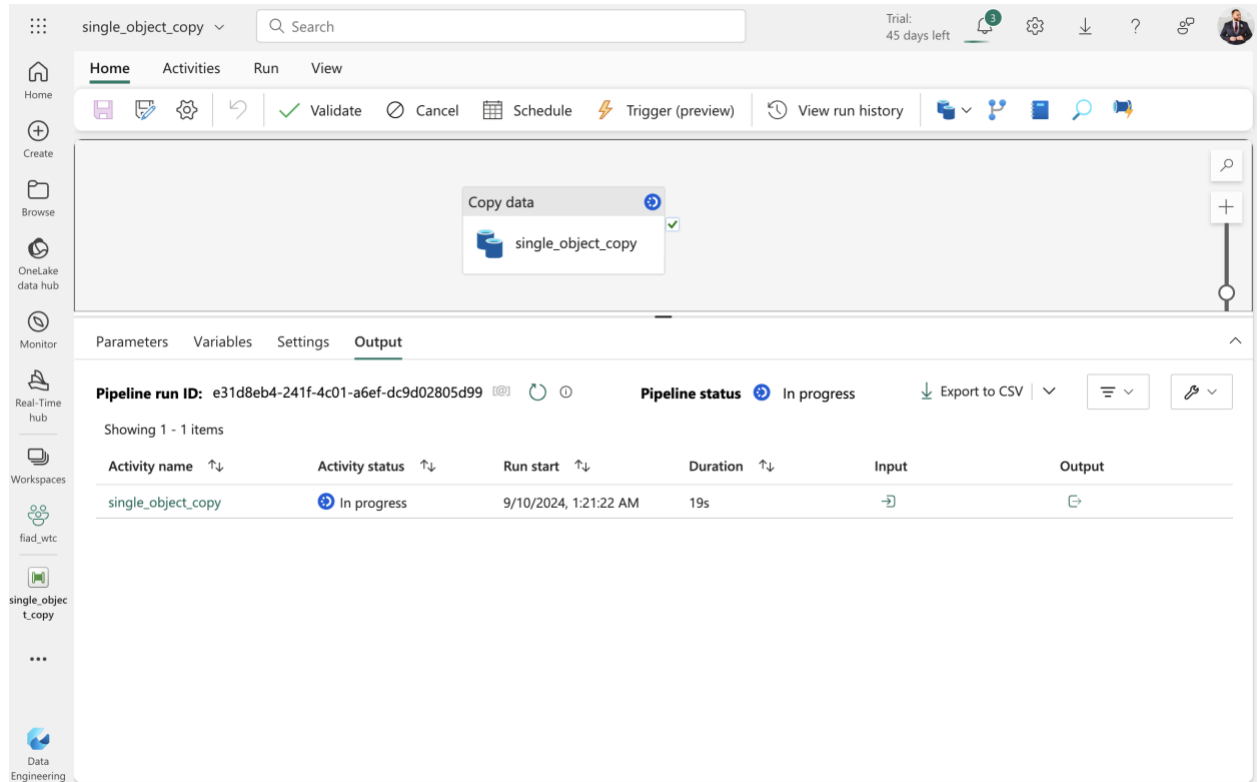
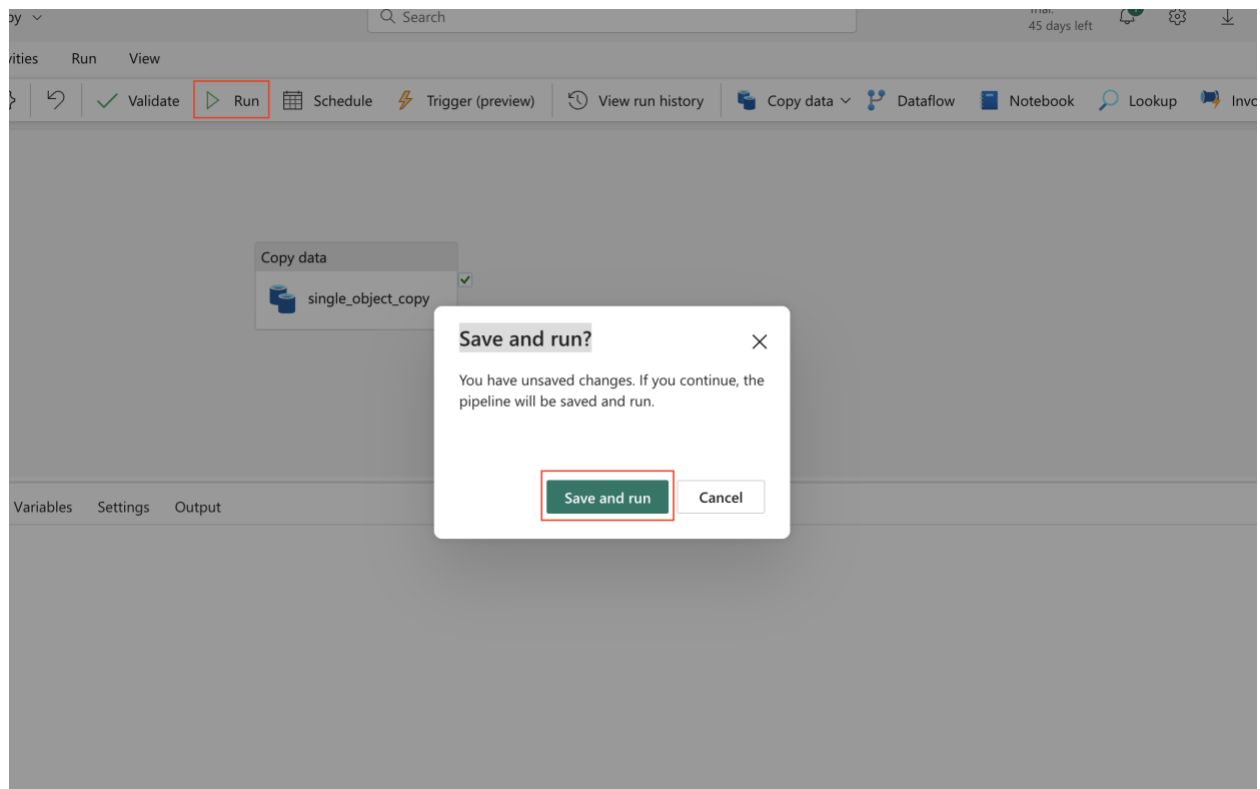
Enable partitions ⓘ

☐



Executing and Monitoring the Pipeline: Now that your pipeline is validated, click **Run** from the activity bar. Select **Save and Run** to begin the process. The **Output** of the pipeline will automatically display, allowing you to track the execution in real-time. You can also click on the **Activity Name** to launch the **Copy data details** blade, where you can monitor progress and review various metrics related to the run.

Once the pipeline is completed, navigate back to your **Lakehouse**. There, you should see the newly created table for **Sales_Customers**. You have now successfully completed **Part 1** of the lab.



Module ⚡ Trigger (preview) ⌚ View run history

Copy data ✓

single_object_copy ✓


🔄 ⓘ Pipeline status ✓ Succeeded

Run start	Duration
9/10/2024, 2:34:48 AM	22s

Copy data details


single_object_copy

Source

 Azure SQL Database

→

Destination

 Lakehouse

Data read: ⓘ 269.35 KB

Rows read: 676

Data written: ⓘ 72.646 KB

Files written: ⓘ 1

Rows written: ⓘ 676

Status

✓ Succeeded

Start time

9/10/2024, 2:34:48 AM

Activity run ID

9f1bc3f4-443c-4ab9-a541-8a318177e793

Throughput

22.446 KB/s

Total duration

00:00:18

> Duration breakdown

> Advanced

bronze_lakehouse_wtc 🔍 Search

Home

🔄 ⚙️ 📄 Get data ▾ 📅 New semantic model 📓 Open notebook ▾ 🔒 Manage OneLake data access (preview)

Explorer

bronze_lakehouse_wtc

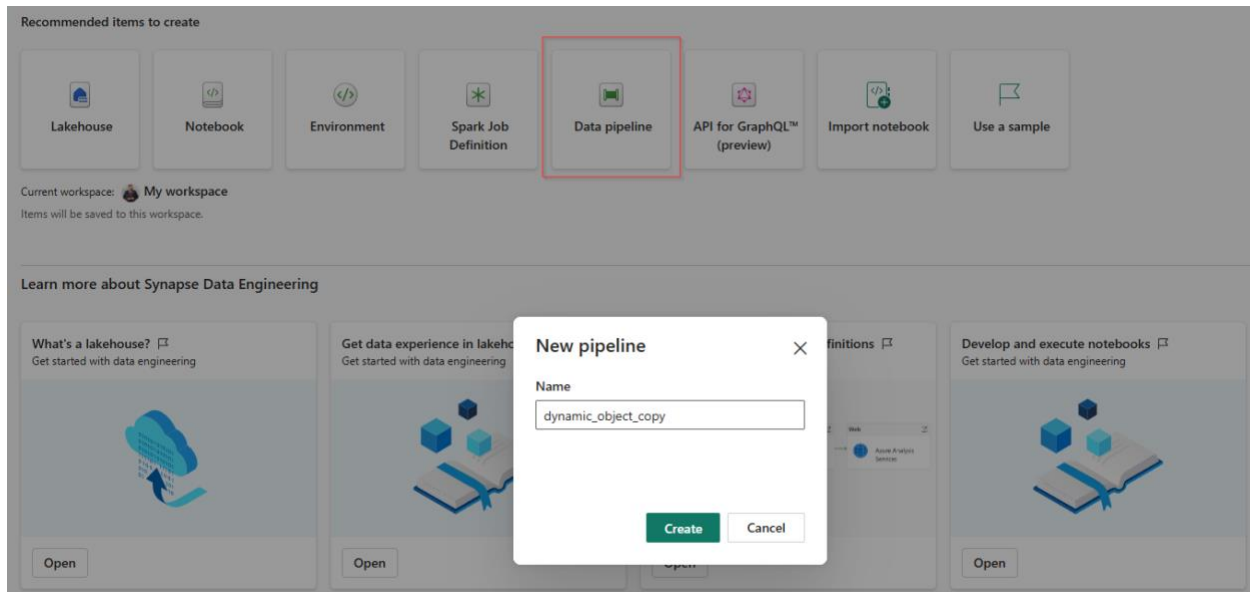
- Tables
 - locations
 - package_types
 - sales_customers
- Files

sales_customers

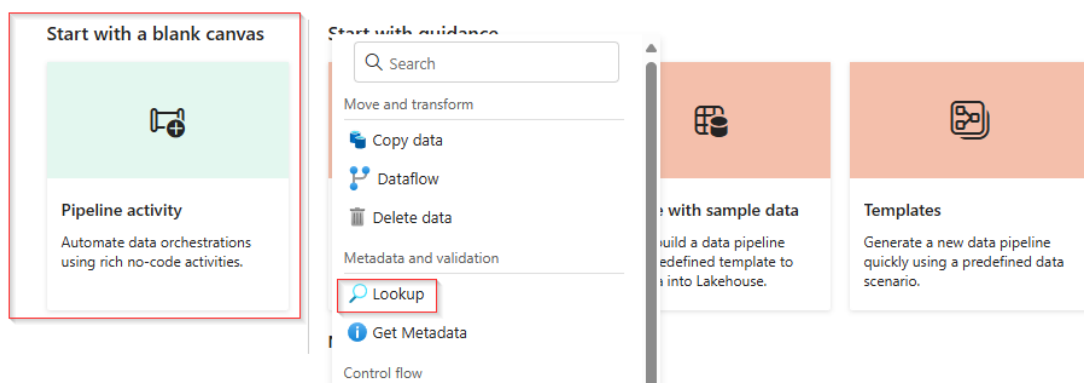
	123	CustomerID	ABC	CustomerNa...	123	BillToCusto...	123	CustomerCa...	123	Buy
1	1001			Dinh Mai	1001		5			
2	1002			Stefan Selezanu	1002		5			
3	1004			Drishti Bose	1004		6			
4	1005			Bhadram Kamas...	1005		3			
5	1006			Taj Syme	1006		3			
6	1007			Irma Berzina	1007		7			
7	1008			Vedrana Kovacevic	1008		3			
8	1009			Bhagavateeprasa...	1009		5			
9	1010			Serdar ozCelik	1010		4			
10	1011			Rajeev Sandhu	1011		6			
11	1012			Urve Kasesalu	1012		7			
12	1013			Annette Hetu	1013		5			
13	1014			Narendra Tickoo	1014		3			
14	1015			Isa Hulsegge	1015		5			
15	1016			Aive Petrov	1016		4			
16	1018			Nils Kaulins	1018		5			
17	1021			Fabrice Cloutier	1021		4			
18	1022			Nadir Seddigh	1022		5			

Part 2: Dynamic Object Copy

Creating the Dynamic Object Copy Pipeline: To begin, navigate to the **Data Engineering Fabric Landing** page. From there, choose **Data pipeline**. Name the pipeline **dynamic_object_copy** and click **Create**. Once the pipeline is created, click **Pipeline activity** from the landing page. We will start by executing a **Lookup** activity to retrieve a list of schema and table combinations. From the list of activities, choose **Lookup** and add it to the canvas. Select the **Lookup activity** and rename it to **lookup_table_and_schema**.



Build a data pipeline to organize and move your data



Lookup

🔍

lookup_table_and_s
chema

🗑️
</>
📄
➡️

General

Settings¹

Name *

lookup_table_and_schema

[Learn more](#)

Description

Activity state ⓘ

☒ Activated
 ☐ Deactivated

Timeout ⓘ

0.12:00:00

Retry ⓘ

0

> Advanced

Configuring the Lookup Activity: Navigate to the **Settings** tab of the Lookup activity and select the connection created in part 1 of this lab. Change the **Connection type** to **Azure SQL Database** and click the **Query** radial button. Now, locate the **Dynamic Load Source Query** file shared as part of the lab materials. Copy the query from the file and paste it into the **Query** box of the Lookup activity. Click **Preview Data** to see the output of the Lookup query and be sure to uncheck the box labeled **First row only**.

General

Settings

Connection *

sqldb-fabcon-eu

🔄 Refresh
✎ Edit

Connection type

Azure SQL Database

🔗 Test connection

Database

sqldb-fabcon-eu

🔄 Refresh

Use query

☐ Table
 ☒ Query
 ☐ Stored procedure

Query *

```
SELECT b.name schema_name
,a.name table_name
,LOWER(CONCAT(LOWER(b.name), '_', (a.name))) stage_table
FROM sys.tables a
INNER JOIN sys.schemas b ON a.schema_id = b.schema_id
WHERE a.name IN ('People', 'StockItems')
```

First row only

☐

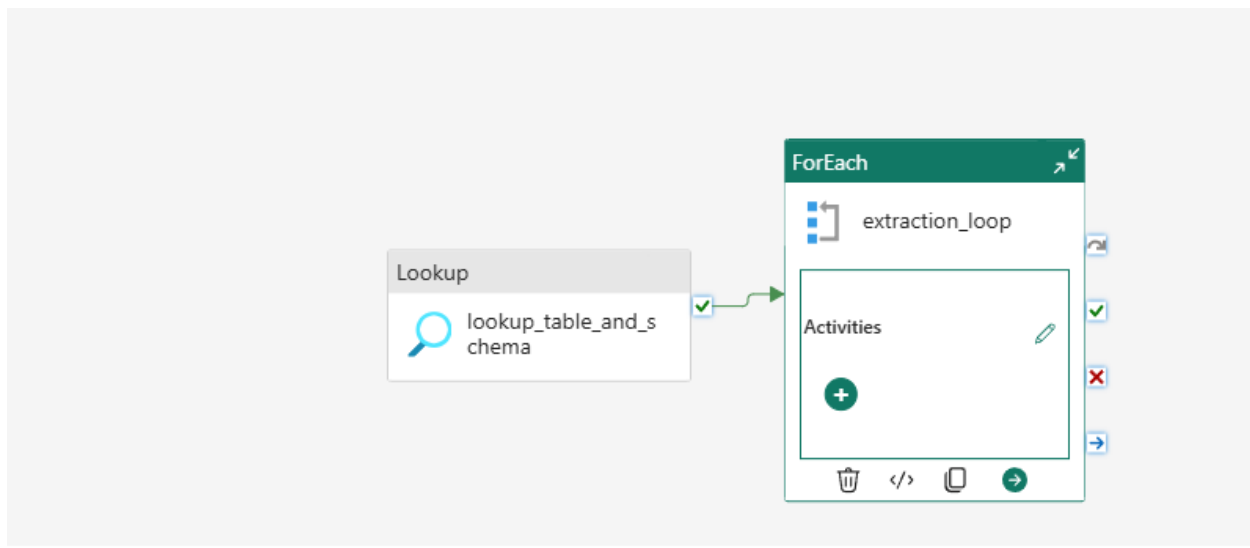
> Advanced

Preview data

	schema_name	table_name	stage_table
1	Application	People	application_people
2	Warehouse	StockItems	warehouse_stockitems

Setting Up the ForEach Loop: Next, open the **Activities** tab and add a **ForEach** activity to the pipeline canvas. Drag from the green checkmark on the **Lookup** activity to the **ForEach** activity to establish a connection between them. Select the ForEach activity and rename it **extraction_loop**. Go to the **Settings** tab of the ForEach activity, click inside the **Items** box, and select **Add dynamic content** to specify the items that will be looped through. Select **lookup_table_and_schema** value array from the list of activity outputs to populate the field, then click **OK**.

The screenshot shows the Power BI Dataflow interface. At the top, the 'Activities' tab is selected. A 'Lookup' activity named 'lookup_table_and_schema' is connected to a 'ForEach' activity named 'extraction_loop'. A green arrow points from the 'lookup_table_and_schema' activity to the 'extraction_loop' activity. The 'ForEach' activity is currently in the 'Settings' tab, and the 'Items' box is empty. The 'Name' field at the bottom is set to 'extraction_loop'. On the right side, the 'Move and transform' section is expanded, showing options like 'Copy data', 'Dataflow', and 'Delete data'. The 'Metadata and validation' section is also expanded, showing options like 'Lookup' and 'Get metadata'. The 'Control flow' section is expanded, showing options like 'If conditions', 'Switch', 'Filter', 'Wait', and 'ForEach'.



General **Settings**¹ Activities (0)

Sequential ☐

Batch count ⓘ

Items *

This property should be parameterized.

Add dynamic content [Alt+Shift+D]

Run Schedule Trigger (preview) View run history Copy data Dataflow Notebook

The diagram shows a 'Lookup' activity box with a magnifying glass icon and the text 'lookup_table_and_s schema'. A green arrow points from the right side of the 'Lookup' activity to the left side of a 'ForEach' activity box. The 'ForEach' activity box has a green header with the text 'ForEach'. Inside the 'ForEach' box, there is a sub-section titled 'extraction_loop' with a loop icon. Below this, there is an 'Activities' section with a green plus icon and a pencil icon. At the bottom of the 'ForEach' box, there are icons for deleting, editing code, copying, and running.

Pipeline expression builder

Add dynamic content below using any combination of expressions, functions and system variables.

```
@activity('lookup_table_and_schema').output.value
```

Clear contents

Activity outputs Parameters System variables Trigger parameters Functions

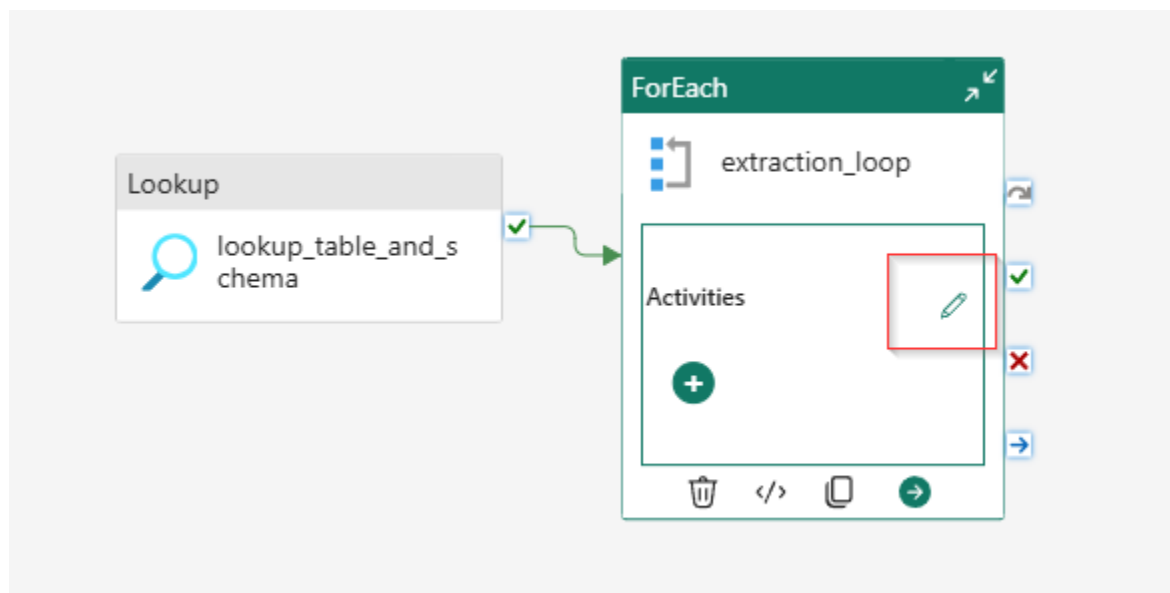
Q Search

- dynamic_object_copy
dynamic_object_copy activity output
- lookup_table_and_schema
lookup_table_and_schema activity output
- lookup_table_and_schema count
Count of the rows
- lookup_table_and_schema value array
Array of row data

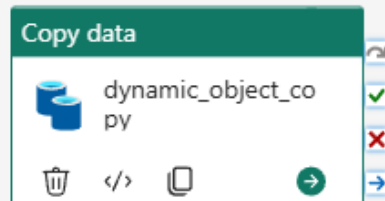
Configuring the Copy Data Activity: Once the ForEach activity is configured, click the **Pencil** icon to edit the loop's contents. In the **Activities** tab, add a **Copy Data** activity to the canvas inside the loop. Select the **Copy Data** task and rename it **dynamic_object_copy**.

In the **Source** tab, set the connection to connection created in part 1, choose **Azure SQL Database** as the connection type, and check the **Enter Manually** box for the table query.

For the **Schema Name** field, click **Add dynamic content**, then select **extraction_loop** from the **ForEach iterator** options. Specify the **schema_name** field from the Lookup activity, confirming the expression reads **@item().schema_name**. Click **OK**. Repeat this process for the **Table Name** field, confirming the expression reads **@item().table_name**.



Main canvas >  extraction_loop



General Source¹ Destination¹ Mapping Settings

dynamic_object_copy

[Learn more](#)

☒ Activated ☐ Deactivated

0.12:00:00

0

> **Advanced**

Home Activities Run View

Copy data Dataflow Notebook Get metadata Lookup Script Stored procedure

Main canvas > extraction_loop

Copy data

dynamic_object_co py

General Source Destination Mapping Settings

Connection * sqlldb-fabcon-eu wcrayger Refresh Edit

Connection type Azure SQL Database Test connection

Database sqlldb-fabcon-eu Refresh

Use query ☒ Table ☐ Query ☐ Stored procedure

Table schema name table name

Add dynamic content [Alt+Shift+D]
☒ Enter manually

Pipeline expression builder

Add dynamic content below using any combin

@item().schema_name

Clear contents

ForEach iterator Activity outputs

Search

extraction_loop
Current item

Home Activities Run View

Copy data Dataflow Notebook Get metadata Lookup Script Stored procedure

Main canvas > extraction_loop

Copy data

dynamic_object_co py

General Source Destination Mapping Settings

Connection * sqlldb-fabcon-eu wcrayger Refresh Edit

Connection type Azure SQL Database Test connection

Database sqlldb-fabcon-eu Refresh

Use query ☒ Table ☐ Query ☐ Stored procedure

Table @item().schema_name table name

☒ Enter manually

Pipeline expression builder

Add dynamic content below using any combinati

@item().table_name

Clear contents

ForEach iterator Activity outputs F

Search

extraction_loop
Current item

Setting the Destination: Navigate to the **Destination** tab of the **dynamic_object_copy** activity and select the **Lakehouse** created in **Lab 1**. In the **Table Name** field, click **Add dynamic content** to specify your **bronze lakehouse** (e.g, **bronze_lakehouse_wtc**) as the destination, ensuring the expression reads **@item().stage_table**. Open the **Advanced** menu and change the table action to **Overwrite**. Open the **Advanced** menu and change the table action to **Overwrite**.

The screenshot displays the Databricks workspace interface. In the center, a 'Copy data' activity named 'dynamic_object_copy' is shown. Below it, the 'Destination' tab is selected, showing the configuration for the activity. The 'Connection' is set to 'bronze_lakehouse_wtc', the 'Table' is '@item().stage_table', and the 'Table action' is 'Overwrite'. A red box highlights the 'Table' field, and a red arrow points from it to the 'Pipeline expression builder' on the right. The 'Pipeline expression builder' shows the expression '@item().stage_table' with a red box around it. The 'Advanced' menu is open, showing the 'Table action' set to 'Overwrite'.

Validating and Running the Pipeline: Return to the **Home** tab of the pipeline and click **Validate** to ensure that there are no errors in the setup. Once the validation is complete, click **Run** from the activity bar to execute the pipeline. You can monitor the pipeline run in the **Output** tab, where you'll notice multiple **Copy** activities running simultaneously.

Home

Activities

Run

View

Validate

Run

Schedule

Trigger (preview)

View run history

Copy data

Dataflow

Notebook

Lookup

Invoke Pipeline

Lookup

lookup_table_and_s
chema

ForEach

extraction_loop

Activities

dynamic_o
bject_copy

Pipeline validation output

✓

Your pipeline has been validated.
No errors were found.

General

Settings

Activities (1)

Name *

extraction_loop

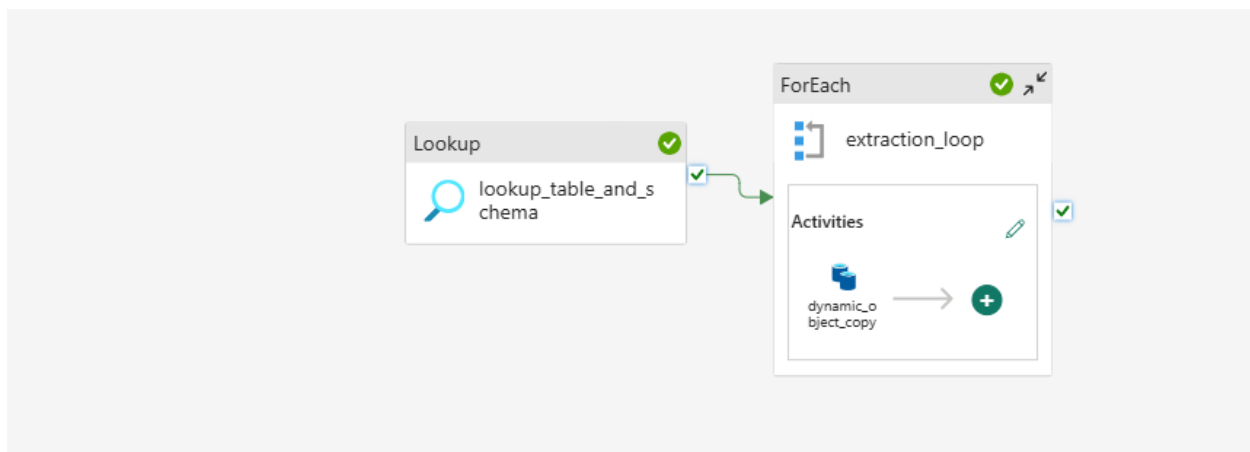
Learn more

Description

Activity state

Activated

Deactivated



ParametersVariablesSettingsOutput

Pipeline run ID: ca44fb94-a55a-4f2a-a4d6-da1e334b6466

🔍

🔄

ℹ️

Pipeline status ✓ Succeeded

🔍

Filter by keyword

Showing 4 items

Activity name ↑↓	Activity status ↑↓	Run start ↑↓
🔍 lookup_table_and_schema	✓ Succeeded	9/11/2024, 11:10:28 AM
▼ 🔍 extraction_loop	✓ Succeeded	9/11/2024, 11:10:43 AM
🔍 dynamic_object_copy	✓ Succeeded	9/11/2024, 11:10:44 AM
🔍 dynamic_object_copy	✓ Succeeded	9/11/2024, 11:10:44 AM

Confirming the Results: After the pipeline run completes, navigate back to your **Lakehouse** to confirm that the delta tables have been created. If the tables aren't immediately visible, refresh your browser or right-click on **Tables** and select **Refresh**.

Explorer

▼ bronze_lakehouse_wtc

▼ Tables

> application_people

> locations

> package_types

> sales_customers

> warehouse_stockitems

▼ Files

<<

application_people

	123	PersonID	ABC FullName	ABC PreferredNa...	ABC SearchName	0/1 IsPermittedT...
1	3		Hudson Onslow	Hudson	Hudson Hudson ...	True
2	5		Eva Muirden	Eva	Eva Eva Muirden	False
3	9		Alica Fatnowna	Alica	Alica Alica Fatno...	True
4	10		Stella Rosenhain	Stella	Stella Stella Rose...	True
5	11		Ethan Onslow	Ethan	Ethan Ethan Onsl...	True
6	16		Archer Lamble	Archer	Archer Archer La...	False
7	17		Piper Koch	Piper	Piper Piper Koch	True
8	18		Katie Darwin	Katie	Katie Katie Darwin	True
9	20		Jack Potter	Jack	Jack Jack Potter	True
10	2		Kayla Woodcock	Kayla	Kayla Kayla Woo...	True
11	4		Isabella Rupp	Isabella	Isabella Isabella ...	True

You have now successfully completed **Part 2** of the lab.