Microsoft Fabric in a Day Lab Manual

# Lab 1: Working with Fabric Lakehouse – Creating your Lakehouse

## Introduction:

In this lab, you will create a Lakehouse in the Fabric workspace. A Lakehouse is essential because it serves as a centralized repository for all types of data, structured or unstructured. It enables efficient data management and analysis, forming the backbone of any data-driven operation. Go to home screen of your Fabric Workspace

1. **Authenticate into Fabric / Power BI:** Navigate to<https://app.fabric.microsoft.com/> and authenticate in with the credentials provided to you as part of the FIAD program

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1. **Access the Fabric Home Screen:** you can select from the different tiles representing each persona and giving different experiences for creating Fabric items.

Select Synapse Data Engineering. **A screenshot of a computer

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1. **Selecting the Correct Workspace**: Ensure that you’re working in the correct Fabric Workspace. From the left navigate pane, click the Workspaces button and select the FIADStudent Workspace that corresponds to your student id. **Do not use the “My Workspace” environment.**

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1. **You can switch your persona using the bottom left corner:** if you have selected another persona previously you can switch and chose the one matching the item creation experience you need.

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1. **Select Lakehouse:** By choosing 'Lakehouse', you initiate the process of setting up your data repository. This is an important step in establishing a central location for data storage and analysis.

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1. **Name Your Lakehouse**: Personalize your workspace by naming your Lakehouse 'Lakehouse\_{your initials}'. A clear name helps in organizing and managing your data projects, especially when working with multiple datasets or collaboratively.

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# Lab 2: Uploading a CSV File – Creating Your First Delta Table

## Introduction:

Now that our Lakehouse has been created, we will hydrate the lake with our first batch of data. To do so, we will be using Fabric’s Lakehouse ability of uploading a CSV file and converting it to a delta table in the lake.

1. Navigate to your Lakehouse that was created in Lab 1

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1. Right click the Files section. Hover over Upload and select “Upload files”

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1. Click the folder icon in the Upload files blade that opens on the right side of the window
2. Navigate to the location of the saved “Lab 2 – PackageType.csv” file from the course material, select the file, and click Open

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1. Click Upload and wait for the file to be uploaded to the Lakehouse

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1. Close the Upload files blade
2. Select the Files root folder from the Lakehouse Explorer and observe the uploaded PackageTypes file

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1. Right-click the file, hover over “Load to Tables”, and select “New table”

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1. Change the name of the table to “packagetypes” and click Load

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1. You will notice a notification in the top right letting you know the file is being converted to a delta table. Once completed, you will get another notification letting you know it was successful.

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**Note: It may take 60-90 seconds for the table to load due to background processes. Please be patient and do not try to create the table multiple times.**

1. You will now see the “packagetypes” table under the Tables section of the Lakehouse Explorer. Click the table to preview the data.

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**Note: If at any point you see “Undefined” instead of a table name in your Lakehouse please refresh your browser. The Fabric UI has not registered the Delta table being created yet and a refresh should resolve the issue.**

1. This lab is now complete

# Lab 4: Working with Pipelines – Extracting Source Data

## Introduction:

For this lab, we will create two pipelines. Copying data from source to target is one of the most commonly used patterns for pipelines. As such, our first pipeline will be created to extract a single table from an Azure SQL Database. Our second pipeline will also be used to extract data, but we’ll create a pattern that loops through many tables using a lookup activity. Leveraging lookups and parameters are incredibly powerful and efficient, as you’ll see during the exercise.

## Part 1: Single Object Copy

1. From the Data Engineering Fabric Landing page, select New and chose Data Pipeline

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1. Name the pipeline “Single Object Copy” and click Create

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1. Select Copy Data from the pipeline landing page

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1. Select Azure from the top to filter the list

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1. Select Azure SQL Database and click next

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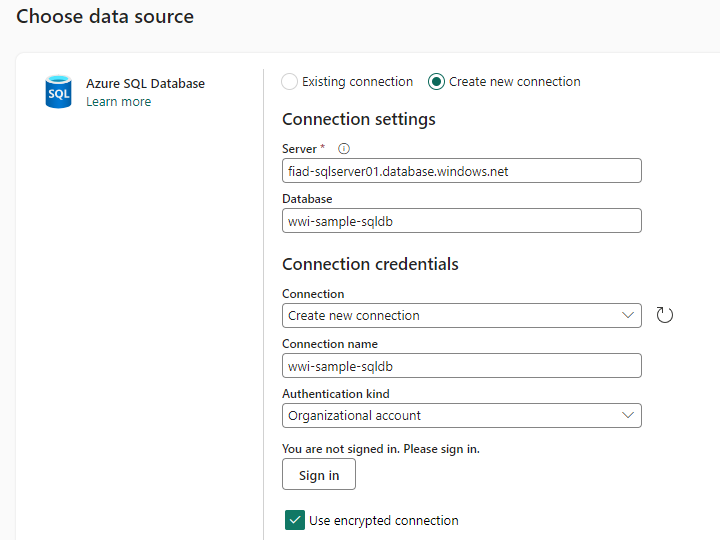
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1. Ensure the “Create new connection” radial button is active, then populate the connection details as below:

Server: **fiad-sqlserver01.database.windows.net**

Database: **wwi-sample-sqldb**Connection name **: wwi-sample-sqldb**

Authentication kind: **Organizational account**

****

1. Then click on **Sign in.**A popup will appear asking for credentials, reuse your FIADStudentxx identity

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Once the login process is complete, you’ll have this screen, then click on Next  
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1. Select the “Sales.Customers” table from the list by checking the box and click Next

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1. Select the “Workspace” tab from the top of the Destination menu, choose Lakehouse, and click Next

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1. Ensure the “Existing Lakehouse” radial button is active, select the Lakehouse that was created in Lab 1 from the dropdown menu, and click Next

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1. Review the settings on the next page, but leave them all default and click Next

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1. Review the pipeline summary, uncheck the “Start data transfer immediately” box, and click OK

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1. Select the copy data activity from the Canvas and change the name of the activity to Copy Single Object

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1. Open the Source tab of the activity and review the configuration that was populated using the Copy Data Tool

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1. Open the Destination tab of the activity and review the configuration

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1. Click Advanced to open the advanced options

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1. Notice that we can change the writer behavior to Append or Overwrite
2. Go back to the Home tab of the pipeline and click the Validate button in the activity bar of the pipeline

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1. If everything was done correctly, you shouldn’t receive any errors and can close the Pipeline Validation Output

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1. Click Run from the activity bar

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1. Click Save and run

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1. The Output of the pipeline run will automatically come up
2. You can track the execution through the Output of the pipeline activity

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1. You can also click the Activity Name to launch the Copy data details blade and track the progress from there as well as review various metrics about the run

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1. Once the pipeline has completed, navigate to back to your Lakehouse to review the new table that has been created for Sales\_Customers.

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1. You are now done with Part 1 of the lab

## Part 2: Batch Object Copy

1. From the Data Engineering Fabric Landing page, select New and chose Data Pipeline

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1. Name the pipeline “Batch Object Copy” and click Create

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1. Click “Add pipeline activity” from the pipeline landing page

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1. We’ll start by executing a Lookup to return a list of schema.table combos, so choose the Lookup activity from the list

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1. Select the Lookup activity and name it “Lookup Schema and Table”

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1. Navigate to the Settings tab and select the previously used “wwi-sample-sqldb” connection from the previous lab
2. Change the connection type to Azure SQL Database
3. Click the Query radial button

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1. Paste below query into the Query box of the Lookup activity

*SELECT b.name schema\_name, a.name table\_name  
FROM sys.tables a  
INNER JOIN sys.schemas b ON a.schema\_id = b.schema\_id  
WHERE a.name IN ('OrderLines', 'Orders', 'People', 'StockItems','Cities','Countries','StateProvinces')  
AND a.name NOT LIKE '%Archive'*

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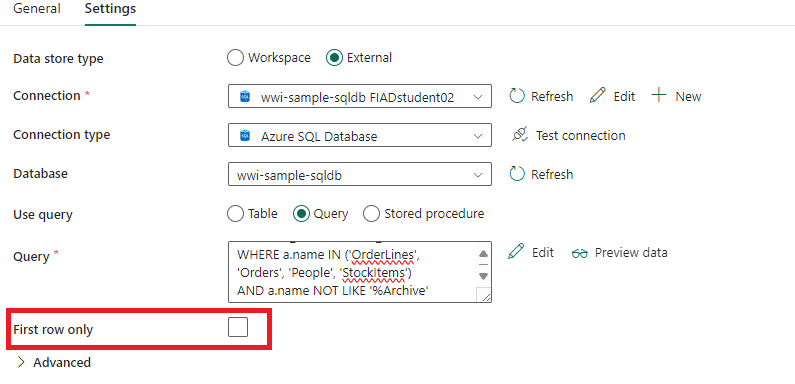
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1. Click Preview Data to see the output of the Lookup query

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1. Uncheck the box for “First row only”



1. Open the Activities Tab from the top of the pipeline and click the ForEach activity to add to the pipeline canvas

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1. Click and drag from the green checkmark on the Lookup activity to the ForEach activity to create a connection between them

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1. Click on the ForEach activity and change the name to “Extraction Loop”

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1. Click on the Settings tab
2. Click in the Items box and click “Add dynamic content” to edit the Items that will be looped through

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1. Select “Lookup Schema and Table value array from the Activity outputs list to automatically populate the dynamic field and click OK

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1. Click the Pencil icon on the ForEach Activity to edit the inside of the loop

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1. From the Activities tab, select Copy Data and Add to canvas

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1. Click the Copy Data task and change the name to “Batch Object Copy”

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1. Under the Source tab, set the connection to “wwi-sample-sqldb”, connection type to Azure SQL Database, use query to Table, and check the Enter Manually box

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1. Click the schema name box and select “Add dynamic content”

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1. Click “Extraction Loop” from the ForEach iterator options to populate the first part of the schema name

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1. Now, we must tell the pipeline which field from the Lookup activity we want to capture, which is “schema\_name”, and click OK

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1. Repeat this process for the table name box

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1. Navigate to the Destination tab and select the Lakehouse that was created in Lab 1

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1. Click on the Table name box and click “Add dynamic content”

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1. Paste the following into the expression box to create a concatenated “schema\_table” table name and click OK

*@concat(item().schema\_name,'\_', item().table\_name)*

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1. Open the Advanced menu and change the table action to Overwrite

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1. Return to the Home tab and click Validate to ensure there are no errors in the pipeline
2. Click Run to execute the pipeline

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1. Monitor the pipeline run in the Output tab
   * Notice that there are multiple Copy activities happening simultaneously.

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1. Once the pipeline is complete, navigate back to your Lakehouse to confirm the delta tables have been created
   * If the tables aren’t immediately visible, refresh your browser or right-click “Tables” and refresh the schema

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1. You are now done with Part 2 this lab

# Lab 5: Data Engineering – Data Transformation and Engineering in Fabric

## Introduction:

In this lab, you’re going to create a “silver” Lakehouse and begin loading data from the Lakehouse that was created in Lab 1.

**Note: As you begin querying or transforming data, please note that you’re working in a case-sensitive environment.**

## Part 1: Creating the Silver Lakehouse

The reason for creating a Silver Lakehouse is to simulate the medallion development pattern. The Silver Lakehouse will give you separation from the Bronze layer, allowing you to begin cleansing and shaping the data.

1. Navigate to the data engineering landing page of Fabric

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1. Chose Lakehouse from the tiles across the top

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1. Name your lakehouse “Silver\_Lakehouse\_{your\_initials}” and click Create

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1. Notice that because we’re creating a new lakehouse the tables and files sections from the Lakehouse Explorer are empty

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1. You’re now done with Part 1 of the lab

## Part 2: Data Engineering via Fabric Notebook

In the Notebook section of lab 5, the notebook will serve as the primary documentation source and have been commented for visibility, clarity, and are complete with code examples that can be referenced to complete each code exercise.

The notebook that will be used for these exercises is the “Lab 5 - Data Engineering and Modeling Notebook” that was provided as part of the program. To set up the environment and launch the notebook, complete the following steps.

1. Navigate to the data engineering landing page of Fabric

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1. Click Import Notebook from the actions across the top

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1. Click upload, navigate to the location of the course files that were saved, select the Data Engineering and Modeling Notebook, and click Open

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1. Navigate back to the workspace home page and you should see the notebook as part of the workspace artifacts
2. Click the notebook to open

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1. Click Add in the Add Lakehouse blade

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1. Select Existing Lakehouse and click Add

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1. Choose the Lakehouse that was created as part of Lab 1 as well as the Silver Lakehouse from Part 1 of this lab from the list and click Add

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1. You’re now ready to begin executing code from your notebook

**Note: Notebooks are structured in a way that reads top to bottom and should be executed in the same manner. There are two types of cells in a notebook, Markdown and Code cells. Markdown cells are not executable and are intended for comments.**

**In the markdown cells, you’ll find overviews of what each subsequent cell (or group of cells) does as well as a code snippet that can be used for reference to complete the code cells. I encourage you to write some of the code to familiarize yourself with the different approaches, but you can copy/paste the code as well.**

**Code cells are intended to be completed by you and give you a hands-on experience to data engineering in a notebook.**

**To execute a code cell in the notebook (after adding code), click the “play” icon next to it to “Run Cell”.**

**Don’t forget to change the Lakehouse reference in the code if you do choose the copy/paste approach.**

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**When you’ve completed the exercises, you will have 2 new tables in your Silver\_Lakehouse visible from the Lakehouse Explorer as shown below.**

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**Note: If you encounter error indicators in your notebook as shown below, disregard them. The code cell will still execute.**

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## Part 3: Data Engineering via Lakehouse SQL Endpoint

We can also leverage the Lakehouse SQL Analytics Endpoint to transform and prepare our data. In this section, you’ll use cross-database joins to query data from the bronze Lakehouse and create a view in the silver Lakehouse.

1. Navigate to the Silver Lakehouse SQL Analytics Endpoint from the workspace landing page

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1. Click the “+ Warehouses” button at the top of the Explorer

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1. Check the box for your Lab 1 Lakehouse and click Connect

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1. You will now see the schema from the Lab 1 Lakehouse available in the Explorer

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1. Select New SQL Query from the action ribbon at the top

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1. Begin building the query needed to retrieve data from the Lab 1 (bronze) Lakehouse by simply writing SELECT FROM and dragging “Application\_People” from the Lakehouse\_WC schema to your query

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1. Update the SELECT statement to include only the PersonID, FullName, PreferredName, and LogonName columns by either dragging the column names to the query window or by typing them in directly
   1. As you begin typing, notice the intellisense working to identify the schema and aid you in writing your query

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1. Your final query should look similar to the image below

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1. Execute the query by clicking Run in the query window and review the output

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1. Now that we have our query complete, copy the query from the query window and click “Save as view”

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1. Name the view salesperson and click OK

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1. You will now have a view created in your Silver\_Lakehouse called salesperson

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1. You are now done with Part 3 of this lab

# Lab 6: Data Warehousing – Designing Your Data Warehouse Strategy in Fabric

## Introduction:

In this lab, we will be creating a new Fabric Warehouse to be used as the “Gold” layer in our medallion pattern. We will work through several patterns related to how to load our warehouse such as views, cross-database joins, and CTAS (Create Table As Select) statements.

## Part 1: Creating the Warehouse

1. Navigate to the Warehouse experience of your workspace

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1. Click Warehouse from the tiles across the top

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1. Name it “Warehouse\_{your\_initials}” and click Create

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1. You will now have an empty Fabric Warehouse and are done with Part 1 of this lab

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## Part 2: Creating and Loading a Table Using TSQL

In this exercise, you’ll use TSQL to create a table in the Warehouse. You’ll then load data into the newly created table.

1. Navigate to the Fabric Warehouse from the workspace landing page

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1. Click New SQL Query from the top action ribbon

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1. Write the create table statement shown in the image below and click Run

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*CREATE TABLE [dim\_customer](    [CustomerID] [int] NOT NULL,  
    [CustomerName] [varchar](100) NOT NULL,  
    [PhoneNumber] [varchar](20) NOT NULL  
)*

1. The schema of the warehouse will now be updated to reflect the empty table that was created

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1. Click New SQL Query again from the top ribbon and choose a blank query

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1. Click the “+ Warehouses” button from the explorer, check the box for the Lab 1 Lakehouse, and click Connect

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1. In the query window, write the following SELECT statement using the click+drag functionality to populate the three-part table identifier from the previous lab and click Run

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*INSERT INTO [dim\_customer]  
SELECT CustomerID, CustomerName, PhoneNumber FROM [Lakehouse\_WC].[dbo].[Sales\_Customers]*

1. Click the dim\_customer table from the Fabric Warehouse explorer to preview the newly loaded data

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1. You’re now done with Part 2 of this lab

## Part 3: Creating and Loading a Table Using CTAS (CREATE TABLE AS SELECT)

In your Fabric Warehouse, you can also combine the create and load table process by utilizing the CREATE TABLE AS SELECT functionality.

1. Navigate to the Fabric Warehouse from the workspace landing page

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1. Click New SQL Query from the top action ribbon

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1. Write or copy the below statement to create the dim\_location table

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*CREATE table dim\_location AS*

*SELECT*

*Cities.[CityID],*

*Cities.[CityName],*

*Countries.[CountryID],*

*Countries.[CountryName],*

*Countries.[FormalName],*

*Countries.[CountryType],*

*Countries.[Continent],*

*Countries.[Region],*

*Countries.[Subregion],*

*Provinces.[StateProvinceCode],*

*Provinces.[StateProvinceName]*

*FROM [Lakehouse\_WC].[dbo].[Application\_Cities] Cities*

*INNER JOIN [Lakehouse\_WC].[dbo].[Application\_StateProvinces] Provinces ON*

*Provinces.[StateProvinceID] = Cities.[StateProvinceID]*

*INNER JOIN [Lakehouse\_WC].[dbo].[Application\_Countries] Countries ON*

*Countries.[CountryID] = Provinces.[CountryID]*

1. You’ll now have the dim\_location table added to the schema of your Fabric Warehouse for previewing

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## Part 4: Creating Remaining Objects

For the last part of this lab, we’ve provided you the code to create the remaining tables using the CTAS method. You’ll need to use the supporting file to copy/paste the SQL statements into your Fabric Warehouse query editor.

1. Copy below the SQL queries to a new SQL Query

*-- Create Package Dimension  
CREATE TABLE dim\_package AS  
SELECT \* FROM [Silver\_Lakehouse\_WC].[dbo].[package\_type];*

*-- Create Salesperson Dimension*

*CREATE TABLE dim\_salesperson AS*

*SELECT \* FROM [Silver\_Lakehouse\_WC].[dbo].[salesperson];*

*-- Create Stock Items Dimension*

*Create TABLE dim\_stock\_items AS*

*SELECT \* FROM [Lakehouse\_WC].[dbo].[Warehouse\_StockItems];*

*-- Create Sales Orders Fact*

*CREATE TABLE fact\_sales\_orders AS*

*SELECT \* FROM [Silver\_Lakehouse\_WC].[dbo].[sales\_orders];*

1. Replace the Lakehouse naming with the correct naming of your bronze and silver Lakehouse artifacts and click run

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1. You should have a total of 6 tables in your model A screenshot of a computer

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2. You are now done with lab 6

# Lab 7: Data Analysis - Building Your Semantic Model and Reports in Fabric

## Introduction:

Now that the Data Warehouse has been loaded, you’re ready to design the Semantic Model. The Semantic Model is the business representation of your data. It’s where relationships between tables and calculations are created.

## Part 1: Designing the Semantic Model

1. Navigate to Power BI experience of your Fabric Workspace and click the Fabric Warehouse that was created in Lab 6

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1. Open the “Model” tab from the bottom of the Warehouse UI to launch the semantic modeling experience

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1. You will see a list of all tables available in the data warehouse

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1. Click the “Default dataset objects” tab from the bottom of the model window

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1. Build a relationship between dim\_salesperson and fact\_sales\_orders by click + dragging the SalespersonPersonId field from fact\_sales\_orders to the PersonId field on dim\_salesperson and releasing

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1. In the New Relationship tab, confirm fact\_sales\_orders as Table 1, Cardinality as many-to-one, and Cross-Filter Direction as Single and click Ok

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1. There will now be a relationship between the dim\_salesperson and the fact\_sales\_orders table visible in the modeling UI

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1. Repeat steps 5-7 for the remaining dimension tables using the following mapping
   1. fact\_sales\_orders.DeliveryCityId -> dim\_location.CityID
   2. fact\_sales\_orders.CustomerId -> dim\_customer.CustomerID
   3. fact\_sales\_orders.PackageTypeId -> dim\_package.PackageTypeId
   4. fact\_sales\_orders.StockItemId -> dim\_stock\_items.StockItemID
2. Pay close attention to the Cross-Filter Direction of each join

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1. Click the fact\_sales\_orders table from the Explorer and click “New Measure” from the top ribbon

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1. The expression bar for creating a measure will now appear at the top

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1. Add the following to the expression box:
   1. Extended Amount = SUMX(fact\_sales\_orders, fact\_sales\_orders[Quantity] \* fact\_sales\_orders[UnitPrice])

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1. You will now see the Extended Amount measure under the Explorer

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1. You are now done with Part 1 of Lab 7

## Part 2: Visualizing Your Data via Custom Power BI Report

Once the semantic model has been defined you are ready to begin visualizing the data using Power BI. What makes Fabric unique is that all of the modeling and reporting activities can be done through the browser. That said, you can still leverage Power BI desktop if needed.

1. Navigate to Power BI experience of your Fabric Workspace and click the Semantic Model of the Fabric Warehouse that was created in Lab 6

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1. From the navigate tiles, click the dropdown for “Explore This Data” and click “Create a blank report”

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1. Notice that the report development experience resembles the experience of Power BI report creation in the web today
   1. Data blade contains all available objects from our semantic model
   2. Visualization blade allows you to select the visualization type to be used
   3. Filters blade allows you to visual, page, and report level filters

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1. Click the down-carrot next to dim\_customer from the Data blade and check the box next to CustomerName to create the first visualization on your canvas

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1. Click on the table that was created to select it

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1. Repeat step 4 for the tables and fields listed below
   1. dim\_customer.CustomerName
   2. dim\_location.CityName
   3. dim\_location.StateProvinceName
   4. dim\_package.PackageTypeName
   5. dim\_stock\_items.StockItemName
   6. fact\_sales\_orders.OrderId

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1. Resize the table and move it to the bottom of the canvas

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1. Create a new Clustered Column Chart visual to the canvas by clicking the icon from the visualization blade

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1. From the Data blade, add dim\_salesperson.FullName and the measure that was created in Part 1 (fact\_sales\_orders Extended Amount) to the chart

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1. Adjust the visualization to the left of the canvas

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1. Add a Card visualization to the canvas and add the OrderId field to it

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1. Click Save in the top right corner to save your report

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1. Name your report “FIAD Manual Report {your\_intials}” and click save

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1. You are now done with Part 2 of Lab 7

## Part 3: Visualizing Your Data via Auto-Generated Power BI Report

1. Navigate to Power BI experience of your Fabric Workspace and click the Semantic Model of the Fabric Warehouse that was created in Lab 6

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1. From the navigate tiles, click the dropdown for “Explore This Data” and click “Auto-create a report”

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1. Fabric will begin creating a Power BI report based on the data points in your Semantic Model

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1. If desired, you can edit this report and tailor it to specific scenarios. Otherwise, click Save from the top ribbon

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1. Name the report “FIAD Auto-Created Report {your\_initials}” and click Save

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1. Navigate back to your Workspace Landing page to view all artifacts from the course

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1. You are now done with Lab 7