# Pós-graduação em Data Science & Business Analytics

Executive Education

Data Warehousing

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Executive Education

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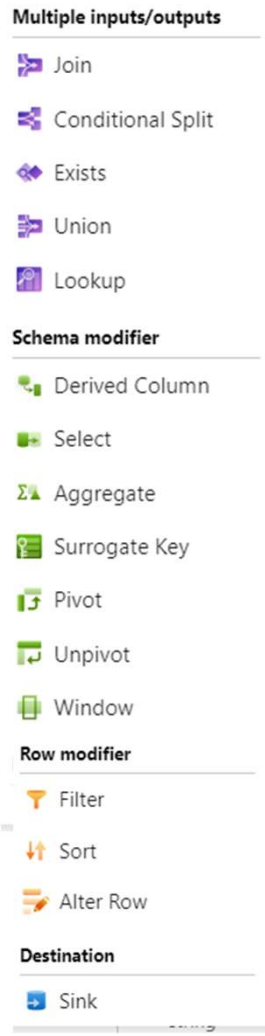
# ADF – Data Factory Concepts

## Multiple input/Output

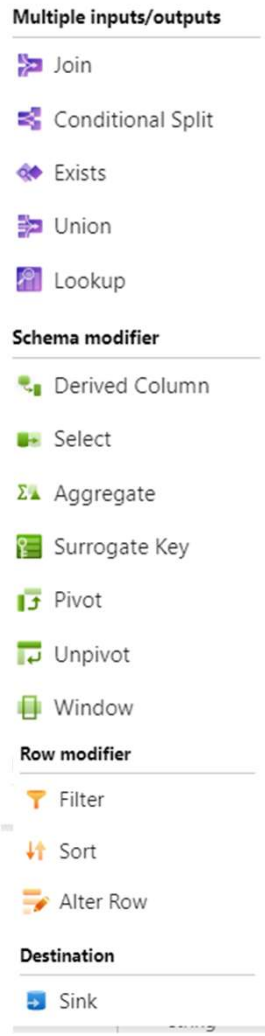
- **Join** - Use the join transformation to **combine data from two sources or streams in a mapping data flow**. The output stream will include all columns from both sources matched based on a join condition
- **Conditional split** - The conditional **split transformation routes data rows to different streams** based on matching conditions. The conditional split transformation is similar to a CASE decision structure in a programming language. The transformation evaluates expressions, and based on the results, directs the data row to the specified stream.
- **Exists** - The exists transformation is a **row filtering transformation that checks whether your data exists in another source or stream**. The output stream includes all rows in the left stream that either exist or don't exist in the right stream. The exists transformation is similar to SQL WHERE EXISTS and SQL WHERE NOT EXISTS.
- **Union** - Union will **combine multiple data streams into one**, with the SQL Union of those streams as the new output from the Union transformation. All of the schema from each input stream will be combined inside of your data flow, without needing to have a join key.
- **Lookup** - Use Lookup to **add reference data from another source to your Data Flow**. The Lookup transform requires a defined source that points to your reference table and matches on key fields.



# ADF – Data Factory Concepts

## Schema modifier

- **Derived Column** - Use the derived column transformation to generate new columns in your data flow or to modify existing fields.
- **Select** - Use this transformation for column selectivity (reducing number of columns), alias columns and stream names, and reorder columns.
- **Aggregate** - The Aggregate transformation defines aggregations of columns in your data streams. Using the Expression Builder, you can define different types of aggregations such as SUM, MIN, MAX, and COUNT grouped by existing or computed columns.
- **Surrogate Key** - Use the Surrogate Key Transformation to add an incrementing non-business arbitrary key value to your data flow rowset. This is useful when designing dimension tables in a star schema analytical data model where each member in your dimension tables needs to have a unique key that is a non-business key, part of the Kimball DW methodology.
- **Pivot** - Use Pivot in ADF Data Flow as an aggregation where one or more grouping columns has its distinct row values transformed into individual columns. Essentially, you can Pivot row values into new columns (turn data into metadata).
- **Unpivot** - Use Unpivot in ADF mapping data flow as a way to turn an unnormalized dataset into a more normalized version by expanding values from multiple columns in a single record into multiple records with the same values in a single column.
- **Window** - The Window transformation is where you will define window-based aggregations of columns in your data streams. In the Expression Builder, you can define different types of aggregations that are based on data or time windows (SQL OVER clause) such as LEAD, LAG, NTILE, CUMEDIST, RANK, etc.). A new field will be generated in your output that includes these aggregations. You can also include optional group-by fields.



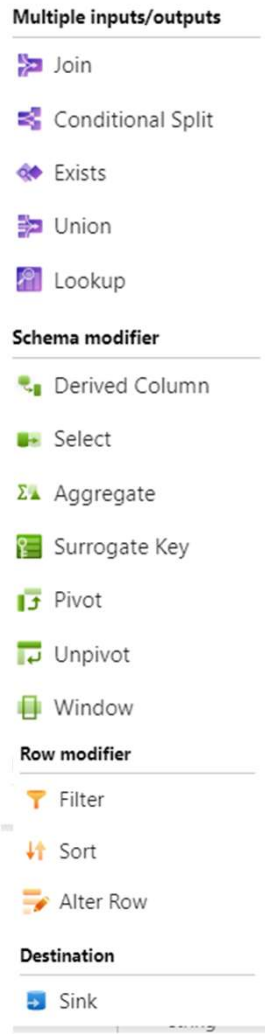
# ADF – Data Factory Concepts

## Row modifier

- **Filter** - The Filter transforms allows row filtering based upon a condition. The output stream includes all rows that matching the filtering condition. The filter transformation is similar to a WHERE clause in SQL.
- **Sort** - The Sort transformation allows you to sort the incoming rows on the current data stream. The outgoing rows from the Sort Transformation will subsequently follow the ordering rules that you set. You can choose individual columns and sort them ASC or DEC, using the arrow indicator next to each field. If you need to modify the column before applying the sort, click on "Computed Columns" to launch the expression editor. This will provide with an opportunity to build an expression for the sort operation instead of simply applying a column for the sort.
- **Alter Row** - Use the Alter Row transformation to set insert, delete, update, and upsert policies on rows. You can add one-to-many conditions as expressions. These conditions should be specified in order of priority, as each row will be marked with the policy corresponding to the first-matching expression. Each of those conditions can result in a row (or rows) being inserted, updated, deleted, or upserted. Alter Row can produce both DDL & DML actions against your database.

## Destination

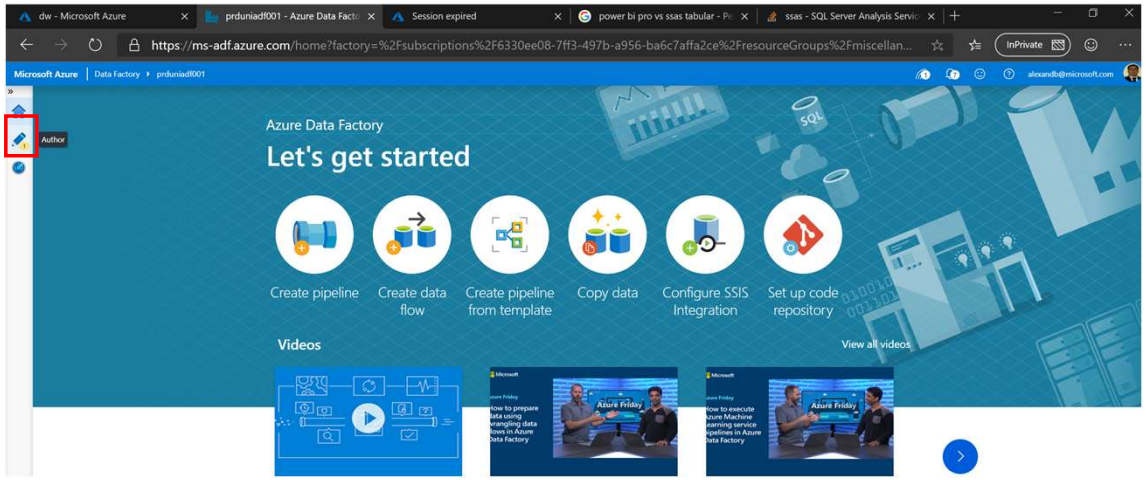
- **Sink** - After you transform your data flow, you can sink the data into a destination dataset. In the sink transformation, choose a dataset definition for the destination output data. You can have as many sink transformations as your data flow requires.

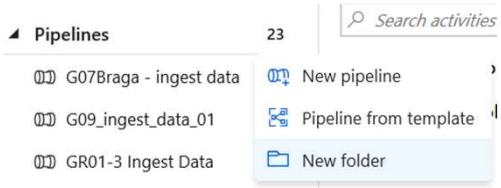


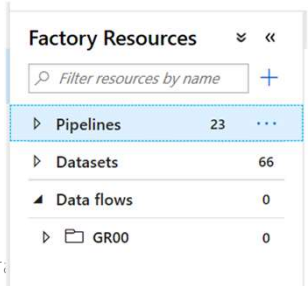
# ADF – Organize Data Factory Artifacts

## In this task, you will organize the Data Factory Artifacts

1. **Open** Data Factory
2. Choose the **Author** pen icon on the Right
3. In the Factory Resources pick the **…** option right to the Pipelines section
4. Select **New Folder**
5. Name the new Folder **/iXXXXXX**
6. **Move your pipelines** into the created Folder
7. Perform the same operation in **Datasets sections**
8. **Create the Group Folders** for the Dataflows section too



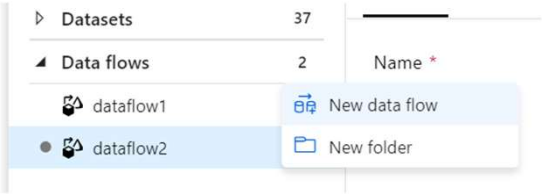



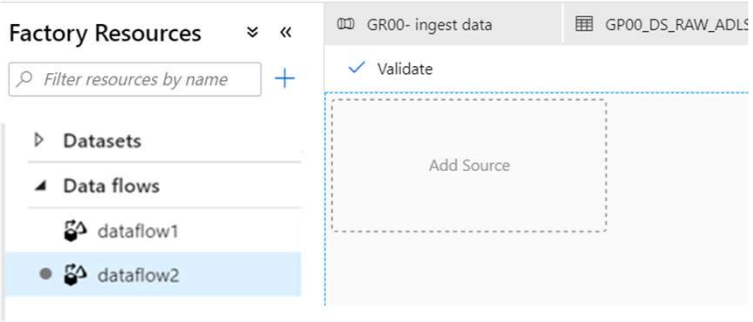



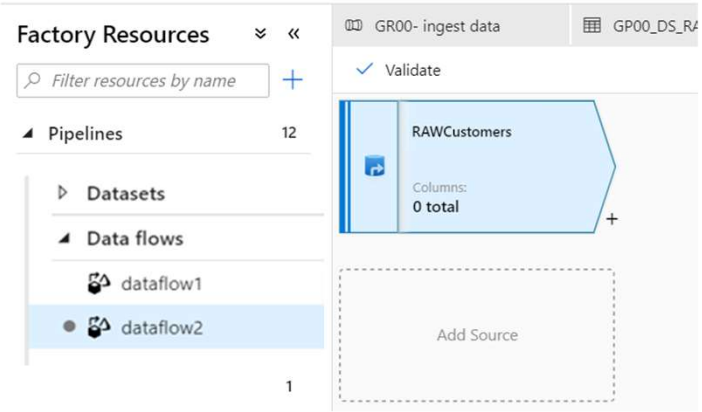

# ADF Data Flows – Mapping Data Flow

## In this task, you will create a Mapping Data Flow

1. In the Factory Resources pick the **…** option right to the **Data Flows** section
2. Select **New data flow** option
3. ~~Select **Mapping Data Flow**~~
4. Rename the new Data flow **iXXXXXX_TransformSalesData**
5. Add **Dataflow process to prepare the Sales Data** to the description
6. Click on the **Add Source** rectangle inside the main area
7. In the Source Section set the output stream name to **RAWCustomers**
8. Select **iXXXXXX_DS_RAW_ADLS_Customers** in Source Dataset
9. Select **Allow Schema drift** and **Infer drifted column types** to ON
10. Validate that the Columns is set to **0 Total**



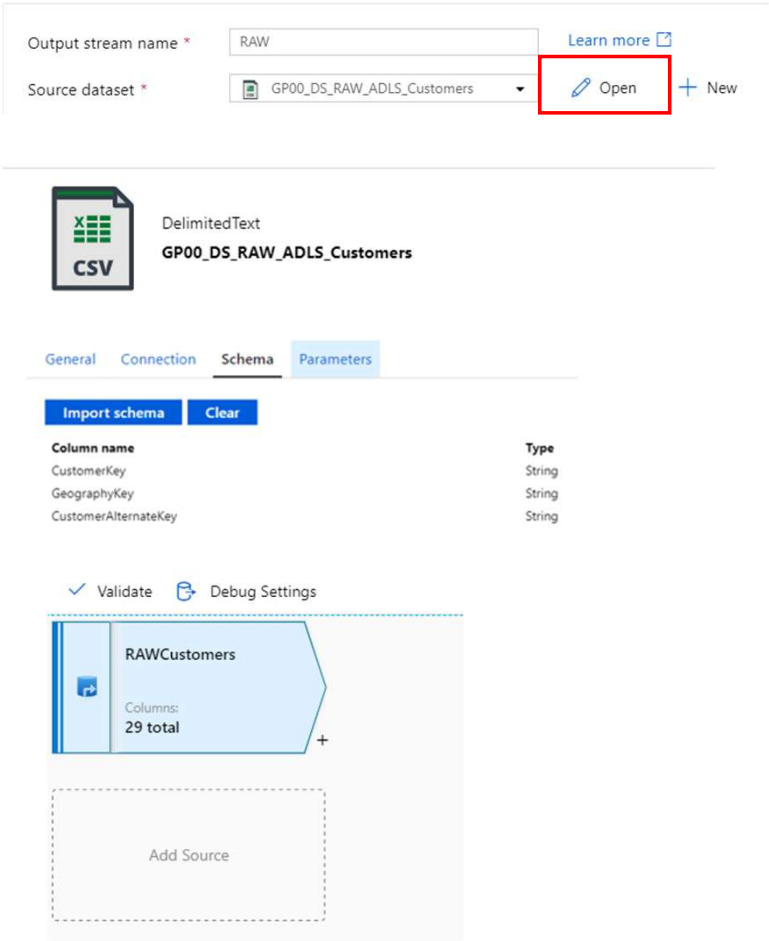



# ADF Data Flows – Mapping Data Flow

## In this task, you will create a Mapping Data Flow

1. For columns to be recognized go to Source settings TAB
2. Press **Open** next to the Source Dataset
3. In the Dataset option select **Schema**
4. Press the **Import Schema** button and ensure fields are populated
5. Navigate back to the Data Flow using the opened TABS


6. Make sure the columns were populated and that you now see **29 Columns** in Total
7. Select the **RAWCustomers** Activity
8. Navigate to **Projections** TAB and check that all columns are set to String
9. This is because data is coming from CSV format with no schema definition



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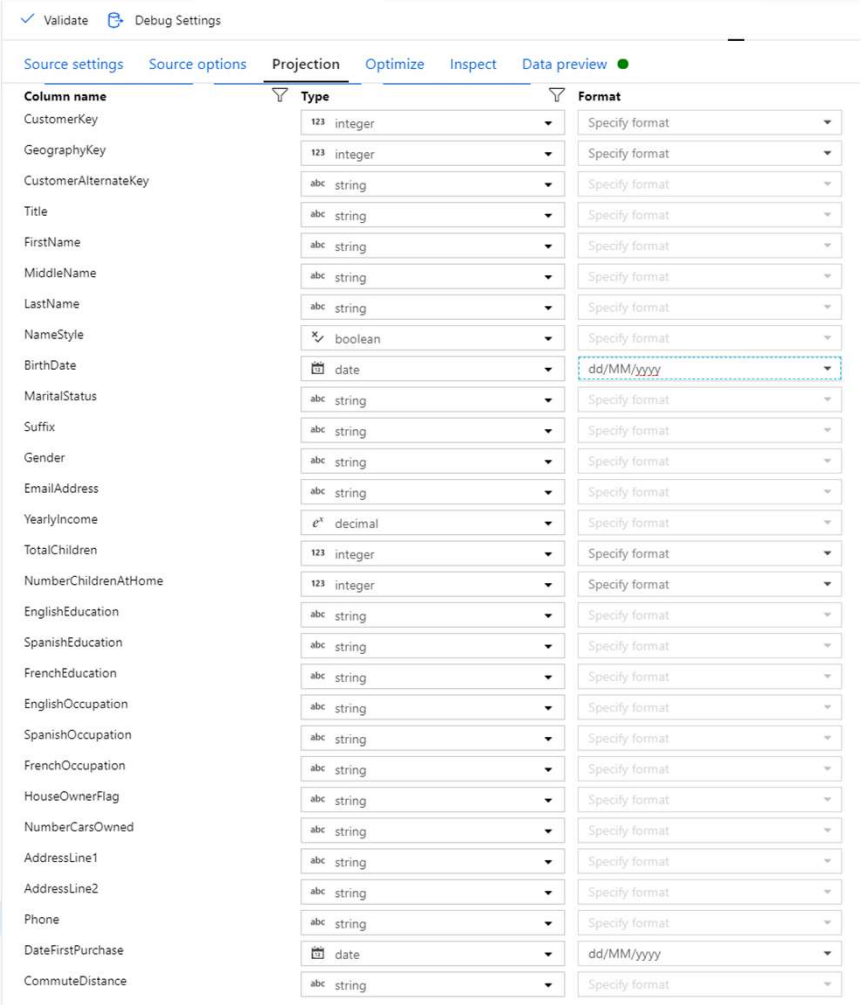
# ADF Data Flows – Mapping Data Flow

## In this task, you will create a Mapping Data Flow

1. In the Projections Window
2. Change **CustomerKey** type to Integer
3. Change **GeographyKey** type to Integer
4. Change **NameStyle** type to Boolean
5. Change **BirthDate** type to Date
6. Change **BirthDate** Format to dd/MM/yyyy
7. Change **YearlyIncome** type to decimal
8. Change **TotalChildren** type to Integer
9. Change **NumberChildrenAtHome** type to Integer
10. Change **DateFirstPurchase** type to Date
11. Change **DateFirstPurchase** Format to dd/MM/yyyy



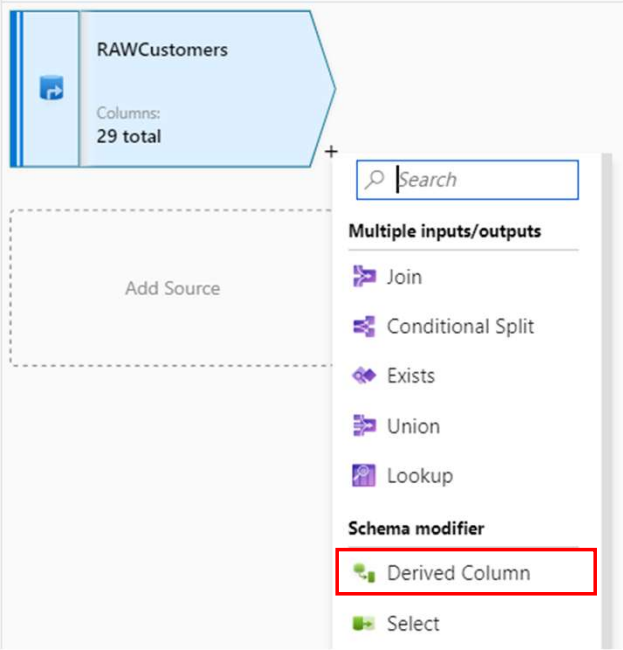
# ADF Data Flows – Mapping Data Flow

**In this task, you will add derived columns to the Customer Stream**

1. In the main pane select the + next to the RAWCustomers Activity
2. Select the **Derived Column** Option
3. Make sure the Derived Column activity is selected
4. Set the Output stream name to **RAWCustomersDerived**
5. In the Derived Column's Settings Name the first column **Address**
6. **Press the Value field** in front of the Column name
7. In the Expression for field "Address"

   write **AddressLine1+" "+iif(isNull(AddressLine2), "", AddressLine2)**

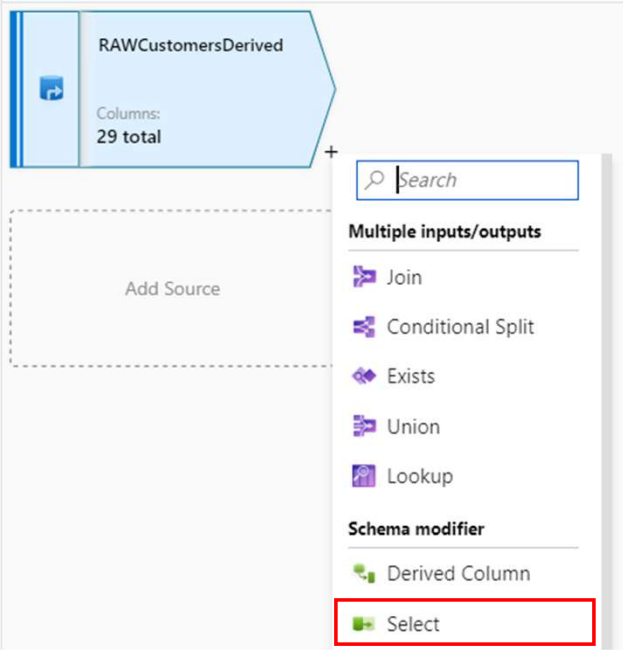
1. Press the **Save and Finish** button
2. Press the **+** button in front of the column and choose **Add Column**
3. Name the second column **GenderDesciption**
4. **Press the Value field** in front of the Column name
5. In Expression for field "GenderDesciption" write **iif(Gender=="M", "Male", "Female")**
6. Press the **Save and Finish** button

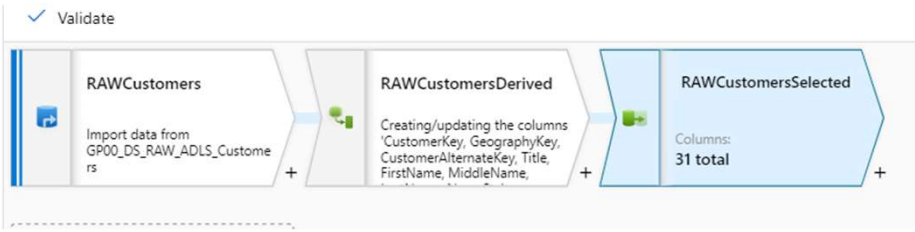



# ADF Data Flows – Mapping Data Flow

**In this task, you will select the Columns from Customers to use**

1. In the main pane select the + next to the RAWCustomersDerived Activity
2. Select the **Select** Option
3. Make sure the Select activity is selected
4. Set the Output Stream Name to **RAWCustomersSelected**
5. Remove Column **SpanishEducation** from the Columns to Select
6. Remove Column **FrenchEducation** from the Columns to Select
7. Remove Column **SpanishOccupation** from the Columns to Select
8. Remove Column **FrenchOccupation** from the Columns to Select
9. Remove Column **AddressLine1** from the Columns to Select
10. Remove Column **AddressLine2** from the Columns to Select

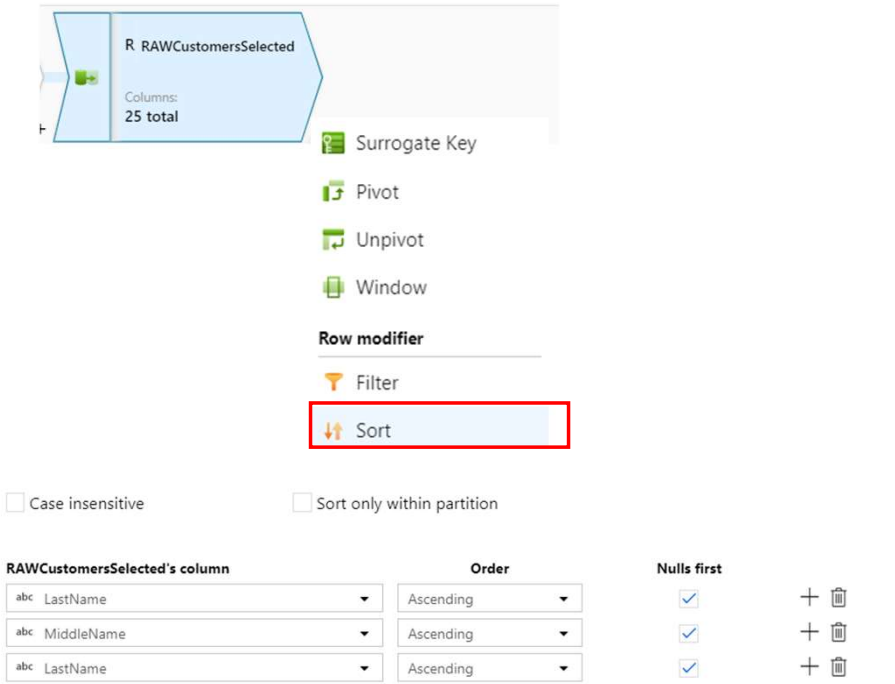


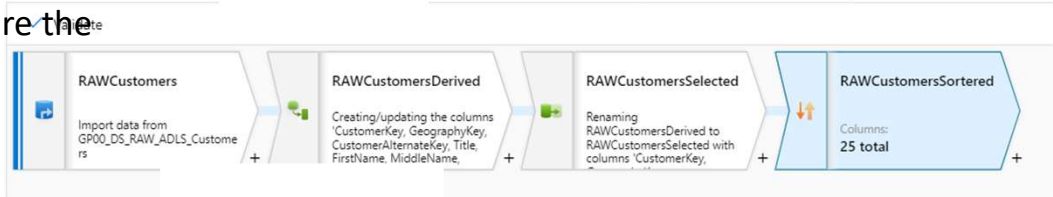



# ADF Data Flows – Mapping Data Flow

**In this task, you will sort the Customers data to be used**

1. In the main pane select the + next to the RAWCustomersSelected Activity
2. Select the **Sort** Option
3. Make sure the Sort activity is selected
4. Set the Output Stream Name to **RAWCustomersSortered**
5. In the Sort Conditions select the Column **LastName** and make sure the order is **Ascending**
6. Press the **+** button in front of the column
7. In the Sort Conditions select the Column **MiddleName** and make sure the order is **Ascending**
8. Press the **+** button in front of the column
9. In the Sort Conditions select the Column **FirstName** and make sure the order is **Ascending**

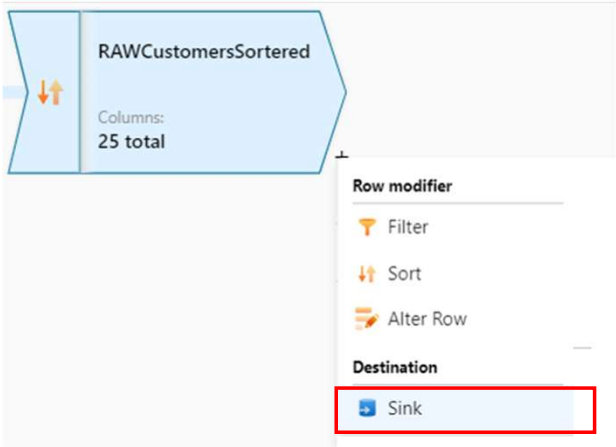


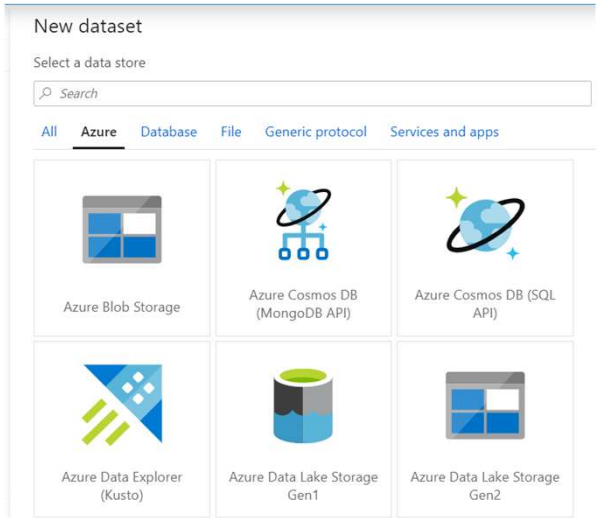



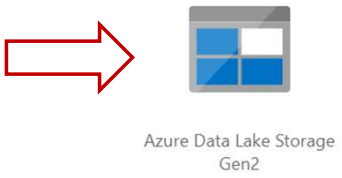
# ADF Data Flows – Mapping Data Flow

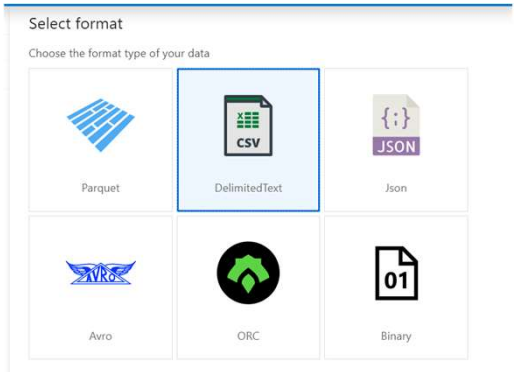
## In this task, you will save the Customers data to a Sink

1. In the main pane select the **+** next to the RAWCustomersSorted Activity
2. Select the **Sink** Option
3. Make sure the Sink activity is selected
4. Set the Output Stream Name to **RAWCustomersSink**
5. In the Sink Data Set option press the **New** button
6. In the New Dataset Window select the **Azure Tab**
7. Select the **Azure Data Lake Storage Gen 2** and Select **Continue**
8. In the select format Window select **delimited**
9. Press the **Continue** button



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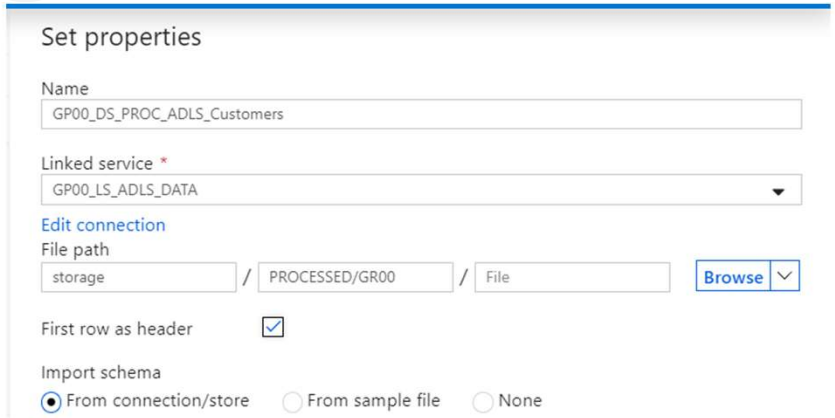
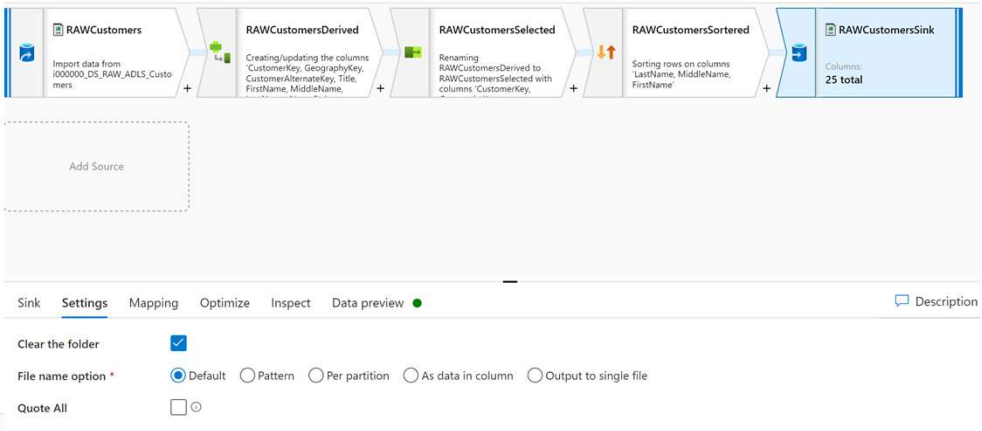
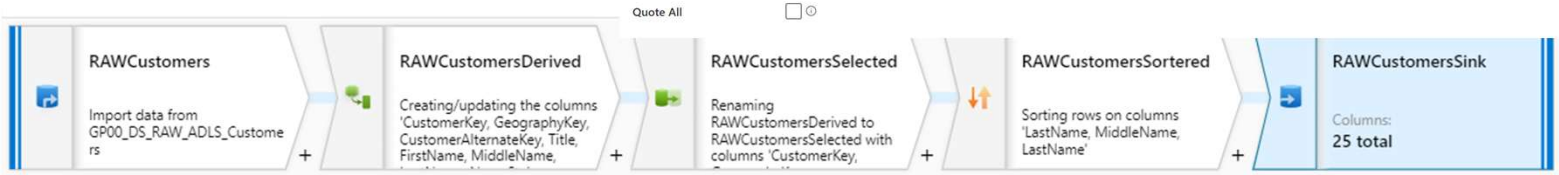
# ADF Copy Activity – Configure Sink

**In this task, you will set the Sinc settings for Copy Activity**

1. In the set properties window set the name to **iXXXXXX_DS_PROC_ADLS_Customers**
2. In the New linked Service (Azure Data Lake Storage Gen2) select the Name value to **iXXXXXX_LS_ADLS_DATA**
3. In the set properties press the **Browse** button
4. Select the **Storage/tXX/iXXXXXX/PROCESSED/dimCustomer/** Path
5. Let the **File field** empty
6. Select the **First row as header** option
7. In the Import Schema select **From Connection/store**
8. In the Settings tab check “Clear the Folder” check box
9. Press **OK**



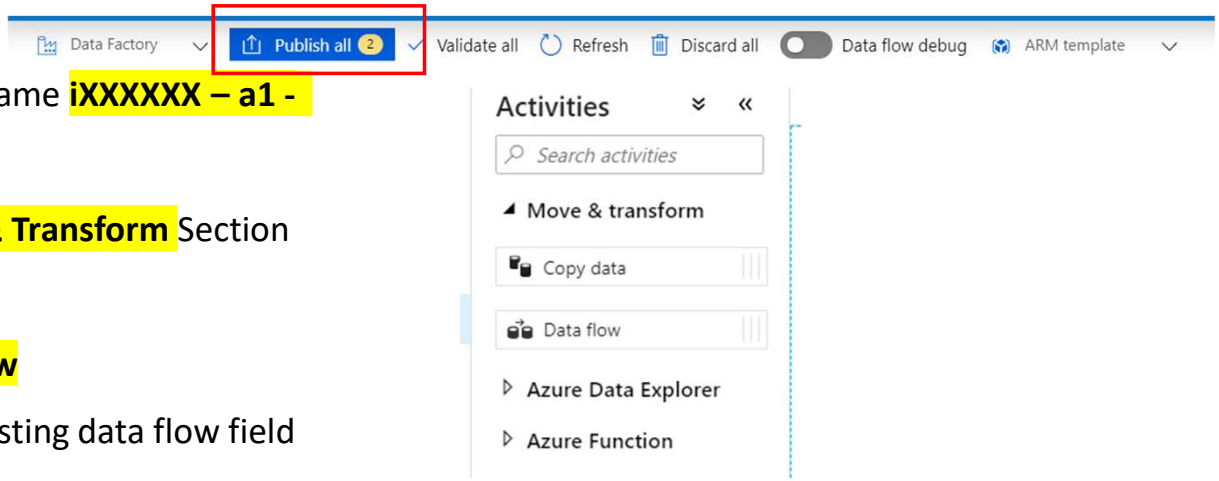



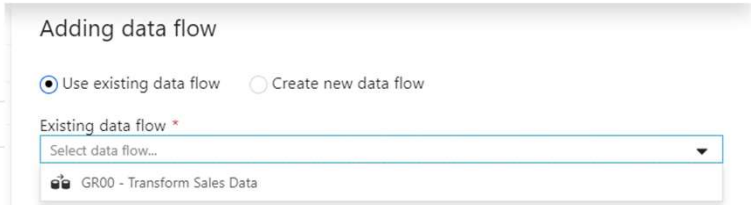



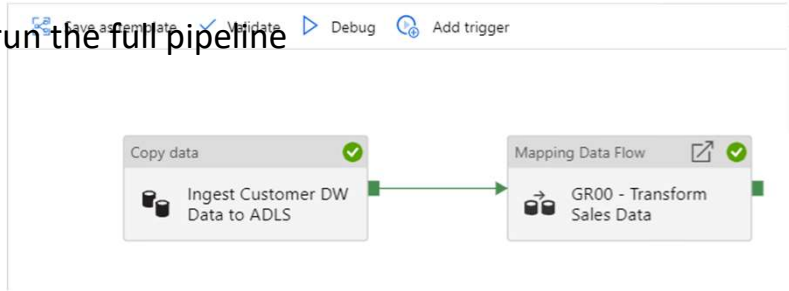
# ADF Copy Activity – Deploy Package

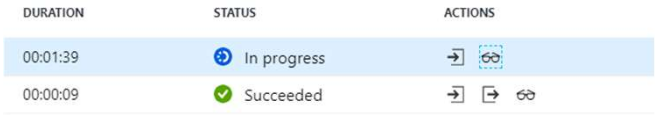
**In this task, you will operationalize the package to run it**

1. Press **Publish All** button
2. Open the Pipeline developed in the previous class name **iXXXXXX – a1 - ingest data**
3. In the Activities pane on the Right open the **Move & Transform** Section
4. Drag the **Data Flow** activity into the main pane
5. In the Adding data Flow select **Use existing data flow**
6. Select the **iXXXXXX_Transform Sales Data** in the existing data flow field
7. Press **OK**
8. Connect the **Copy Activity** to the **Mapping data flow Activity** for precedence
9. Run the **Debug** option to run the full pipeline
10. Use the to follow the pipeline execution



# Projecto Final

**O trabalho é dividido em 2 partes**: A 1ª parte corresponde à elaboração do Dimensional Model e a 2ª ao ETL.

- ~~1ª Parte (40% do trabalho): O enunciado será disponibilizado em 29/06, com data de entrega até 31/07/2022;~~
- 2ª Parte (60% do trabalho): O enunciado será disponibilizado em 19/09, com data de entrega até 19/10.

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