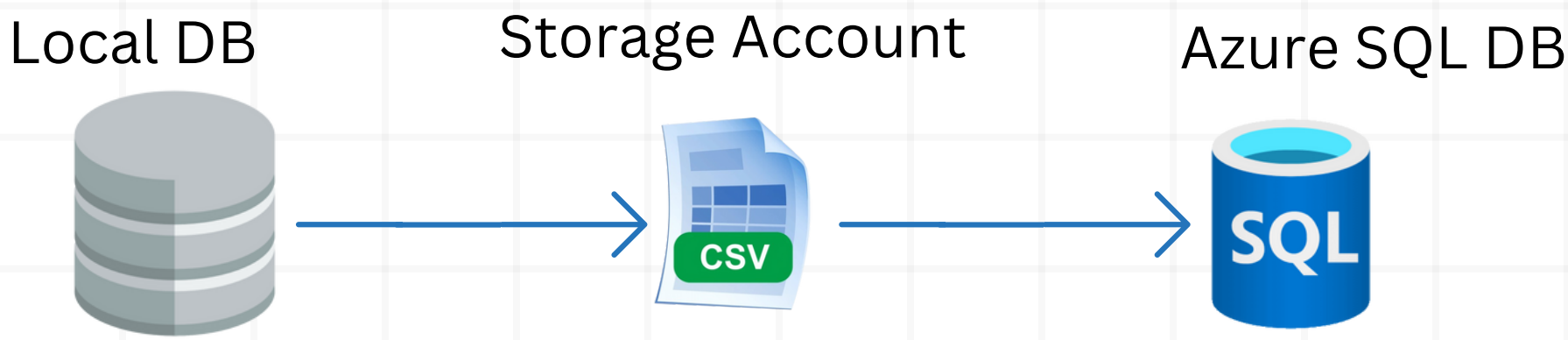


Data Migration Project

Incremental Data, File Backup, SCD Type 1 and Type 2 Implementation in Azure Synapse Workspace

Data Migration in Azure

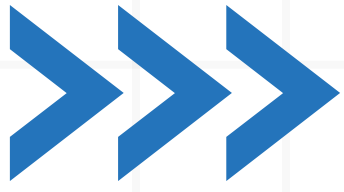
The process of moving data from one storage system to another within the Azure cloud environment, optimizing for accessibility, scalability, and performance.

Why do we need this concept?

To efficiently manage and scale resources, ensuring data is accessible and optimized for cloud-based applications.

What are SCD and why are they important in data warehousing?

SCDs are methods used in data warehousing to manage and track changes to record data over time, enabling historical data analysis and accurate reporting.



Best practices to follow for this data migration project

Key practices included thorough initial planning, continuous monitoring, using staging environments for tests, and incremental loading to minimize system impact.

Want to see the step by step guide?

Let’s go!

Data Migration and SCD Implementation in Azure SQL Database

Create 5 source tables and one Watermark table in the **on-premises** database as shown below:

```
----------SCD Type 1--------------
CREATE TABLE Suppliers (
    supplier_id INT,
    name VARCHAR(255),
    contact_name VARCHAR(255),
    phone VARCHAR(50),
    address Varchar(100),
    supplierUpdatedDate datetime -------------Delta Column
);

CREATE TABLE Products (
    product_id INT,
    name VARCHAR(255),
    category VARCHAR(100),
    price DECIMAL(10, 2),
    stock INT,
    supplier_id INT,
    productUpdatedDate datetime ------------Delta Column
);

----------SCD Type 2--------------
CREATE TABLE Employee (
    employee_id INT,
    first_name VARCHAR(255),
    last_name VARCHAR(255),
    hire_date DATETIME,
    last_review_date DATETIME,  ----------------Delta Column
    role VARCHAR(100)
);

CREATE TABLE Sales (
    sale_id INT,
    sale_date DATETIME,
    product_id INT,
    quantity INT,
    total_amount DECIMAL(10, 2),
    cashier_id INT,
    salesUpdatedDate datetime  -------------------Delta Column
);

CREATE TABLE Inventory_Logs (
    log_id INT,
    product_id INT,
    log_updatedDate DATETIME,    ---------------------Delta Column
    change_quantity INT,
    remaining_stock INT
);
```

----------SCD Type 1--------------
CREATE TABLE Suppliers (
  supplier_id INT,

```
  name VARCHAR(255),
  contact_name VARCHAR(255),
  phone VARCHAR(50),
  address Varchar(100),
        supplierUpdatedDate datetime ----------Delta Column
);

CREATE TABLE Products (
  product_id INT,
  name VARCHAR(255),
  category VARCHAR(100),
  price DECIMAL(10, 2),
  stock INT,
  supplier_id INT,
        productUpdatedDate datetime ----------Delta Column
);

----------SCD Type 2----------
CREATE TABLE Employee (
  employee_id INT,
  first_name VARCHAR(255),
  last_name VARCHAR(255),
  hire_date DATETIME,
  last_review_date DATETIME,  ----------Delta Column
  role VARCHAR(100)
);

CREATE TABLE Sales (
  sale_id INT,
  sale_date DATETIME,
  product_id INT,
  quantity INT,
  total_amount DECIMAL(10, 2),
  cashier_id INT,
        salesUpdatedDate datetime  ----------Delta Column
);

CREATE TABLE Inventory_Logs (
  log_id INT,
  product_id INT,
  log_updatedDate DATETIME,   ----------Delta Column
  change_quantity INT,
  remaining_stock INT
);
```

Insert records into these source tables

```
----Insert data into Supplier Table
INSERT INTO Suppliers (supplier_id, name, contact_name, phone, address, supplierUpdatedDate) VALUES
(1, 'Fresh Farms', 'John Doe', '555-3489', '123 Farm Lane', '2023-11-11 00:00:00'),
(2, 'Healthy Beverages Co.', 'Emily Stone', '555-7623', '47 Beverage Blvd','2023-11-11 00:00:00'),
(3, 'Premium Meats', 'Alan Smith', '555-9876', '233 Meat St', '2023-11-11 00:00:00');

----Insert data into Products Table
INSERT INTO Products (product_id, name, category, price, stock, supplier_id, productUpdatedDate) VALUES
(1, 'Organic Apples', 'Fruits', 2.99, 150, 1, '2023-09-25 00:00:00'),
(2, 'Almond Milk', 'Beverages', 3.49, 85, 2, '2023-09-24 00:00:00'),
(3, 'Chicken Breast', 'Meat', 7.99, 60, 3, '2023-09-23 00:00:00');

----Insert data into Employee Table
INSERT INTO Employee (employee_id, first_name, last_name, hire_date, last_review_date, role) VALUES
(1, 'Raj', 'Sharma', '2022-01-05 09:00:00', '2023-09-10 00:00:00', 'Cashier'),
(2, 'Harpal', 'Vaghela', '2022-05-15 09:00:00', '2023-09-20 00:00:00', 'Cashier'),
(3, 'Amit', 'Singh', '2023-03-23 09:00:00', '2023-09-30 00:00:00', 'Stock Manager');

----Insert data into Sales Table
INSERT INTO Sales (sale_id, sale_date, product_id, quantity, total_amount, cashier_id, salesUpdatedDate) VALUES
(1, '2023-10-01 14:00:00', 1, 10, 29.90, 1,'2023-10-01 14:02:00'),
(2, '2023-10-01 14:15:00', 2, 5, 17.45, 2, '2023-10-01 14:17:00'),
(3, '2023-10-01 15:00:00', 3, 4, 31.96, 1, '2023-10-01 15:02:00');

----Insert data into Inventory_Logs Table
INSERT INTO Inventory_Logs (log_id, product_id, log_updatedDate, change_quantity, remaining_stock) VALUES
(1, 1, '2023-10-01 08:00:00', 20, 170),
(2, 2, '2023-10-01 09:00:00', -10, 75),
(3, 3, '2023-10-01 10:00:00', 30, 90);
```

----Insert data into Supplier Table
INSERT INTO Suppliers (supplier_id, name, contact_name, phone, address, supplierUpdatedDate) VALUES
(1, 'Fresh Farms', 'John Doe', '555-3489', '123 Farm Lane', '2023-11-11 00:00:00'),
(2, 'Healthy Beverages Co.', 'Emily Stone', '555-7623', '47 Beverage Blvd','2023-11-11 00:00:00'),
(3, 'Premium Meats', 'Alan Smith', '555-9876', '233 Meat St', '2023-11-11 00:00:00');

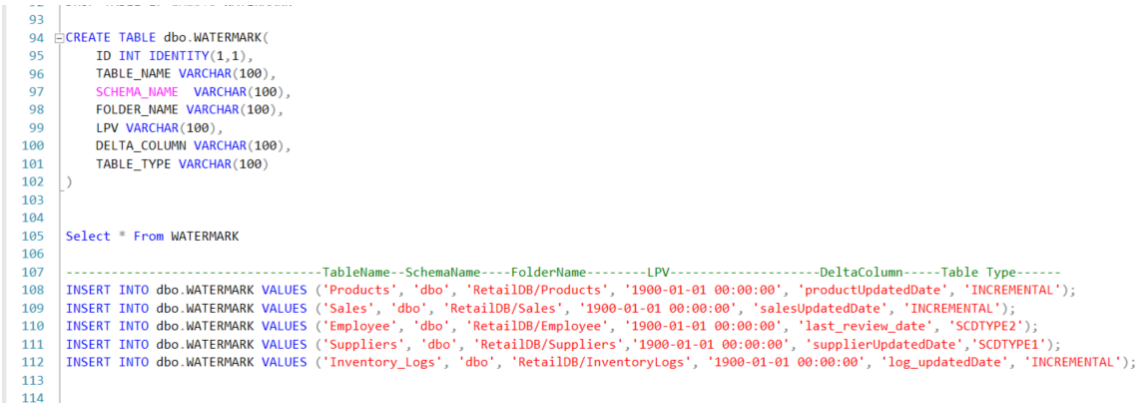
----Insert data into Products Table
INSERT INTO Products (product_id, name, category, price, stock, supplier_id, productUpdatedDate) VALUES
(1, 'Organic Apples', 'Fruits', 2.99, 150, 1, '2023-09-25 00:00:00'),
(2, 'Almond Milk', 'Beverages', 3.49, 85, 2, '2023-09-24 00:00:00'),
(3, 'Chicken Breast', 'Meat', 7.99, 60, 3, '2023-09-23 00:00:00');

----Insert data into Employee Table
INSERT INTO Employee (employee_id, first_name, last_name, hire_date, last_review_date, role) VALUES
(1, 'Raj', 'Sharma', '2022-01-05 09:00:00', '2023-09-10 00:00:00', 'Cashier'),
(2, 'Harpal', 'Vaghela', '2022-05-15 09:00:00', '2023-09-20 00:00:00', 'Cashier'),
(3, 'Amit', 'Singh', '2023-03-23 09:00:00', '2023-09-30 00:00:00', 'Stock Manager');

----Insert data into Sales Table
INSERT INTO Sales (sale_id, sale_date, product_id, quantity, total_amount, cashier_id, salesUpdatedDate) VALUES
(1, '2023-10-01 14:00:00', 1, 10, 29.90, 1,'2023-10-01 14:02:00'),
(2, '2023-10-01 14:15:00', 2, 5, 17.45, 2, '2023-10-01 14:17:00'),
(3, '2023-10-01 15:00:00', 3, 4, 31.96, 1, '2023-10-01 15:02:00');

----Insert data into Inventory_Logs Table
INSERT INTO Inventory_Logs (log_id, product_id, log_updatedDate, change_quantity, remaining_stock) VALUES
(1, 1, '2023-10-01 08:00:00', 20, 170),
(2, 2, '2023-10-01 09:00:00', -10, 75),
(3, 3, '2023-10-01 10:00:00', 30, 90);

Create Watermark table and insert data



```
CREATE TABLE dbo.WATERMARK(
    ID INT IDENTITY(1,1),
    TABLE_NAME VARCHAR(100),
    SCHEMA_NAME  VARCHAR(100),
    FOLDER_NAME VARCHAR(100),
    LPV VARCHAR(100),
    DELTA_COLUMN VARCHAR(100),
    TABLE_TYPE VARCHAR(100)
)


Select * From WATERMARK

---------------------------------TableName--SchemaName----FolderName--------LPV--------------------DeltaColumn-----Table Type------
INSERT INTO dbo.WATERMARK VALUES ('Products', 'dbo', 'RetailDB/Products', '1900-01-01 00:00:00', 'productUpdatedDate', 'INCREMENTAL');
INSERT INTO dbo.WATERMARK VALUES ('Sales', 'dbo', 'RetailDB/Sales', '1900-01-01 00:00:00', 'salesUpdatedDate', 'INCREMENTAL');
INSERT INTO dbo.WATERMARK VALUES ('Employee', 'dbo', 'RetailDB/Employee', '1900-01-01 00:00:00', 'last_review_date', 'SCDTYPE2');
INSERT INTO dbo.WATERMARK VALUES ('Suppliers', 'dbo', 'RetailDB/Suppliers','1900-01-01 00:00:00', 'supplierUpdatedDate','SCDTYPE1');
INSERT INTO dbo.WATERMARK VALUES ('Inventory_Logs', 'dbo', 'RetailDB/InventoryLogs', '1900-01-01 00:00:00', 'log_updatedDate', 'INCREMENTAL');
```

CREATE TABLE dbo.WATERMARK(
    ID INT IDENTITY(1,1),
    TABLE_NAME VARCHAR(100),
    SCHEMA_NAME VARCHAR(100),
    FOLDER_NAME VARCHAR(100),
    LPV VARCHAR(100),
    DELTA_COLUMN VARCHAR(100),
    TABLE_TYPE VARCHAR(100)
)

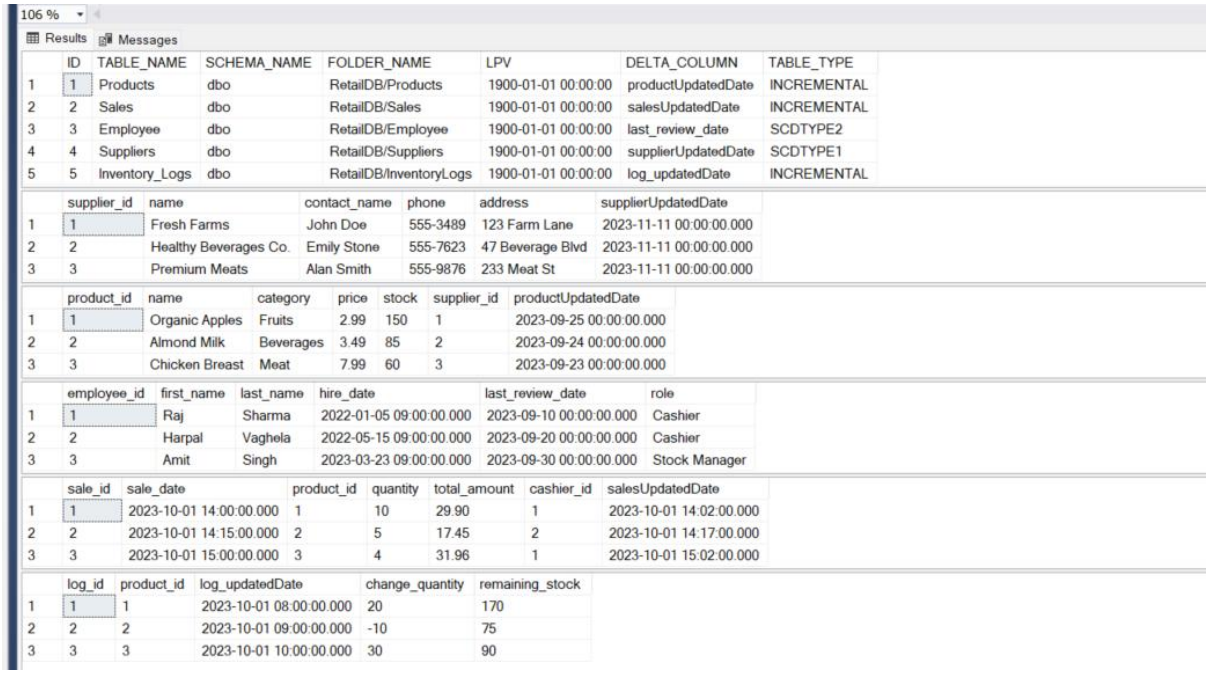
INSERT INTO dbo.WATERMARK VALUES ('Products', 'dbo', 'RetailDB/Products', '1900-01-01 00:00:00', 'productUpdatedDate', 'INCREMENTAL');
INSERT INTO dbo.WATERMARK VALUES ('Sales', 'dbo', 'RetailDB/Sales', '1900-01-01 00:00:00', 'salesUpdatedDate', 'INCREMENTAL');
INSERT INTO dbo.WATERMARK VALUES ('Employee', 'dbo', 'RetailDB/Employee', '1900-01-01 00:00:00', 'last_review_date', 'SCDTYPE2');
INSERT INTO dbo.WATERMARK VALUES ('Suppliers', 'dbo', 'RetailDB/Suppliers','1900-01-01 00:00:00', 'supplierUpdatedDate','SCDTYPE1');
INSERT INTO dbo.WATERMARK VALUES ('Inventory_Logs', 'dbo', 'RetailDB/InventoryLogs', '1900-01-01 00:00:00', 'log_updatedDate', 'INCREMENTAL');

Create a Stored Procedure to Update LPV Value

```
114
115  ----------Stored Procedure----------
116
117  CREATE PROC USP_WATERMARK_UPDATE
118  @Table_Name VARCHAR(100),
119  @LPV_Value VARCHAR(50)
120  AS
121  UPDATE WATERMARK
122  SET LPV = @LPV_Value
123  WHERE TABLE_NAME = @Table_Name
124
125
```

```
CREATE PROC USP_WATERMARK_UPDATE
@Table_Name VARCHAR(100),
@LPV_Value VARCHAR(50)
AS
UPDATE WATERMARK
SET LPV = @LPV_Value
WHERE TABLE_NAME = @Table_Name
```

Check the data in all tables



Results | Messages

ID	TABLE_NAME	SCHEMA_NAME	FOLDER_NAME	LPV	DELTA_COLUMN	TABLE_TYPE
1	Products	dbo	RetailDB/Products	1900-01-01 00:00:00	productUpdatedDate	INCREMENTAL
2	Sales	dbo	RetailDB/Sales	1900-01-01 00:00:00	salesUpdatedDate	INCREMENTAL
3	Employee	dbo	RetailDB/Employee	1900-01-01 00:00:00	last_review_date	SCDTYPE2
4	Suppliers	dbo	RetailDB/Suppliers	1900-01-01 00:00:00	supplierUpdatedDate	SCDTYPE1
5	Inventory_Logs	dbo	RetailDB/InventoryLogs	1900-01-01 00:00:00	log_updatedDate	INCREMENTAL

supplier_id	name	contact_name	phone	address	supplierUpdatedDate
1	Fresh Farms	John Doe	555-3489	123 Farm Lane	2023-11-11 00:00:00.000
2	Healthy Beverages Co.	Emily Stone	555-7623	47 Beverage Blvd	2023-11-11 00:00:00.000
3	Premium Meats	Alan Smith	555-9876	233 Meat St	2023-11-11 00:00:00.000

product_id	name	category	price	stock	supplier_id	productUpdatedDate
1	Organic Apples	Fruits	2.99	150	1	2023-09-25 00:00:00.000
2	Almond Milk	Beverages	3.49	85	2	2023-09-24 00:00:00.000
3	Chicken Breast	Meat	7.99	60	3	2023-09-23 00:00:00.000

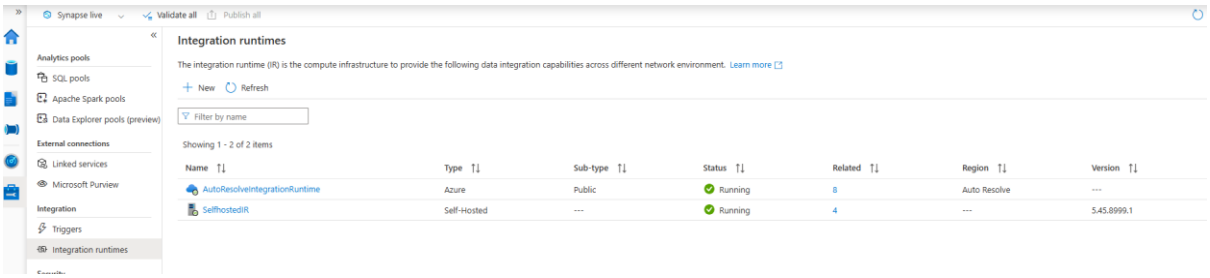
employee_id	first_name	last_name	hire_date	last_review_date	role
1	Raj	Sharma	2022-01-05 09:00:00.000	2023-09-10 00:00:00.000	Cashier
2	Harpal	Vaghela	2022-05-15 09:00:00.000	2023-09-20 00:00:00.000	Cashier
3	Amit	Singh	2023-03-23 09:00:00.000	2023-09-30 00:00:00.000	Stock Manager

sale_id	sale_date	product_id	quantity	total_amount	cashier_id	salesUpdatedDate
1	2023-10-01 14:00:00.000	1	10	29.90	1	2023-10-01 14:02:00.000
2	2023-10-01 14:15:00.000	2	5	17.45	2	2023-10-01 14:17:00.000
3	2023-10-01 15:00:00.000	3	4	31.96	1	2023-10-01 15:02:00.000

log_id	product_id	log_updatedDate	change_quantity	remaining_stock
1	1	2023-10-01 08:00:00.000	20	170
2	2	2023-10-01 09:00:00.000	-10	75
3	3	2023-10-01 10:00:00.000	30	90

```
Select * From WATERMARK
Select * From Suppliers
Select * From Products
Select * From Employee
Select * From Sales
Select * From Inventory_Logs
```

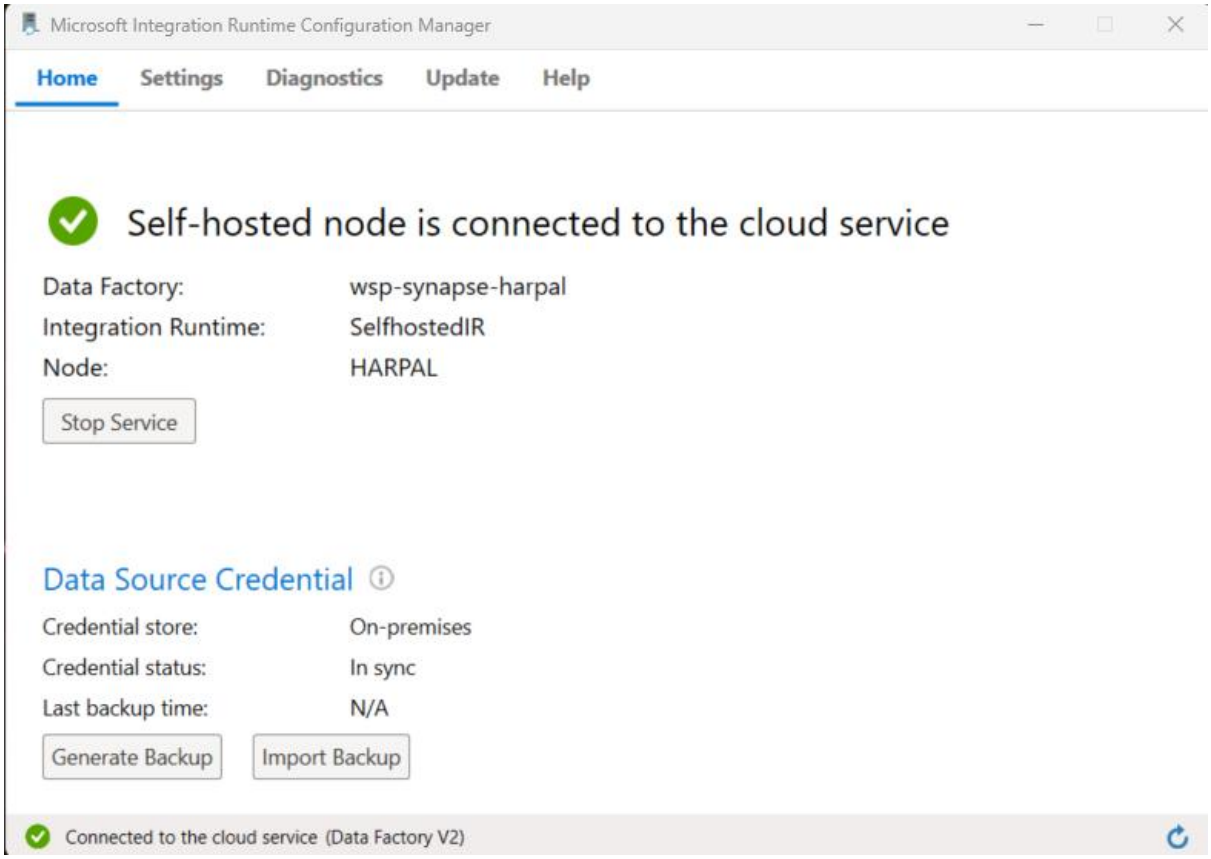
Create Self-Hosted IR in the Manage tab in Synapse

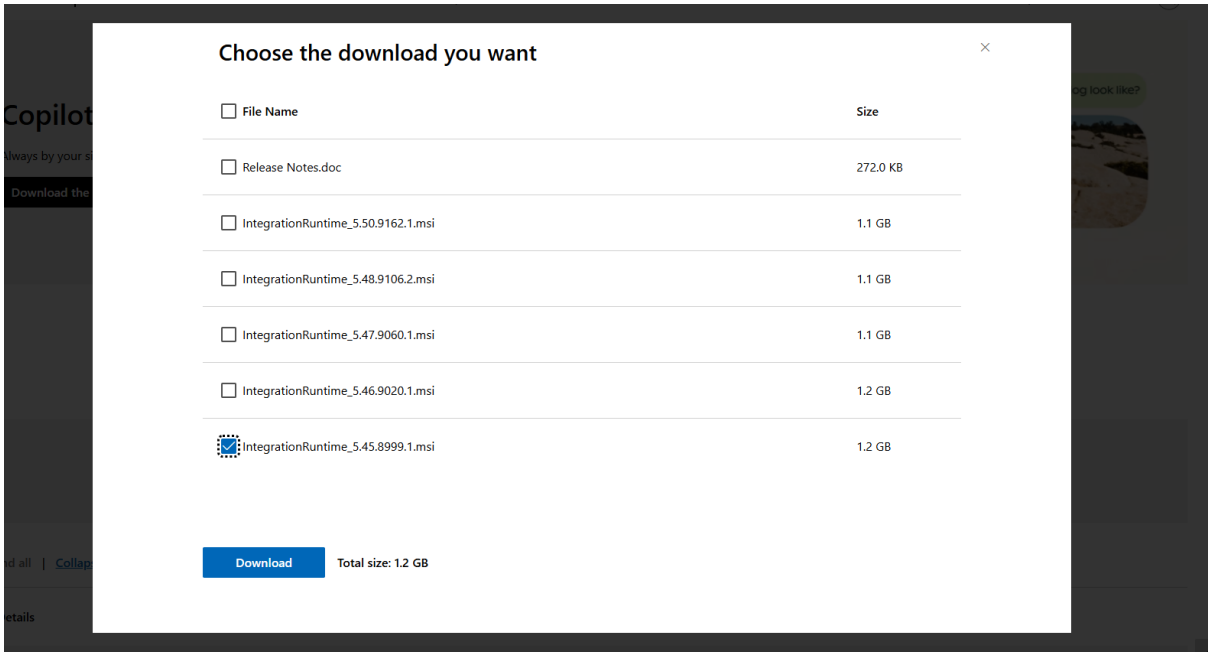


Install Integration Runtime software from the Microsoft Website and configure it to support Self-Hosted IR, copy and paste Key from synapse Self-Hosted IR in Microsoft Integration Runtime Configuration Manager

Website to download Integration Runtime:

https://www.microsoft.com/en-us/download/details.aspx?id=39717

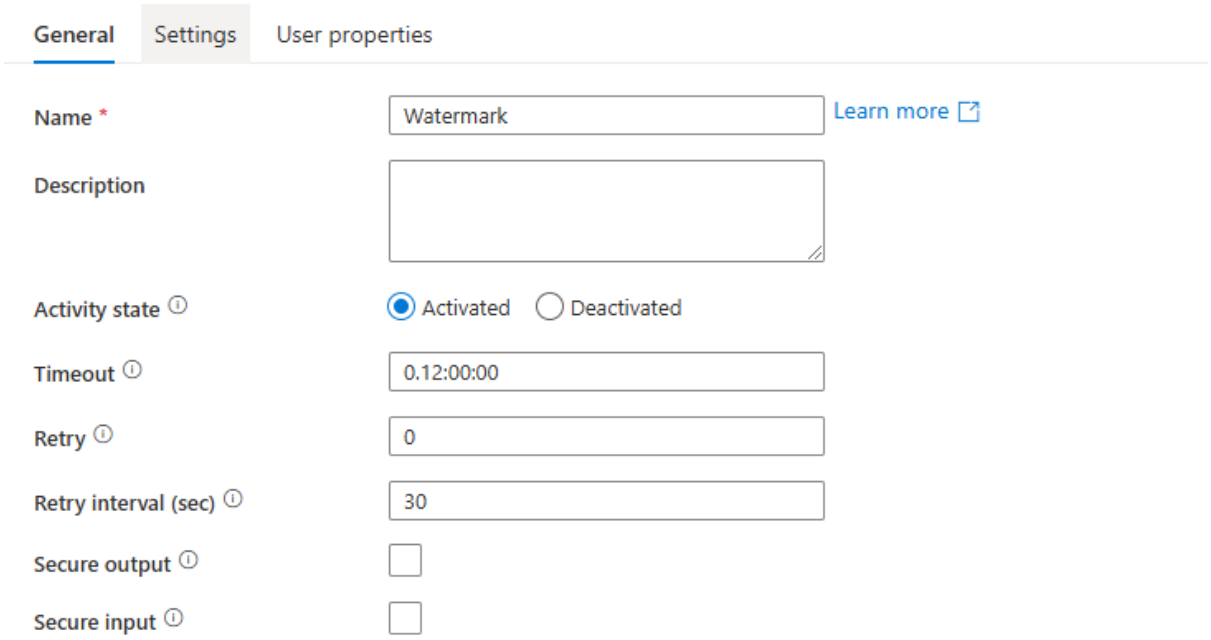




Let's create the pipeline

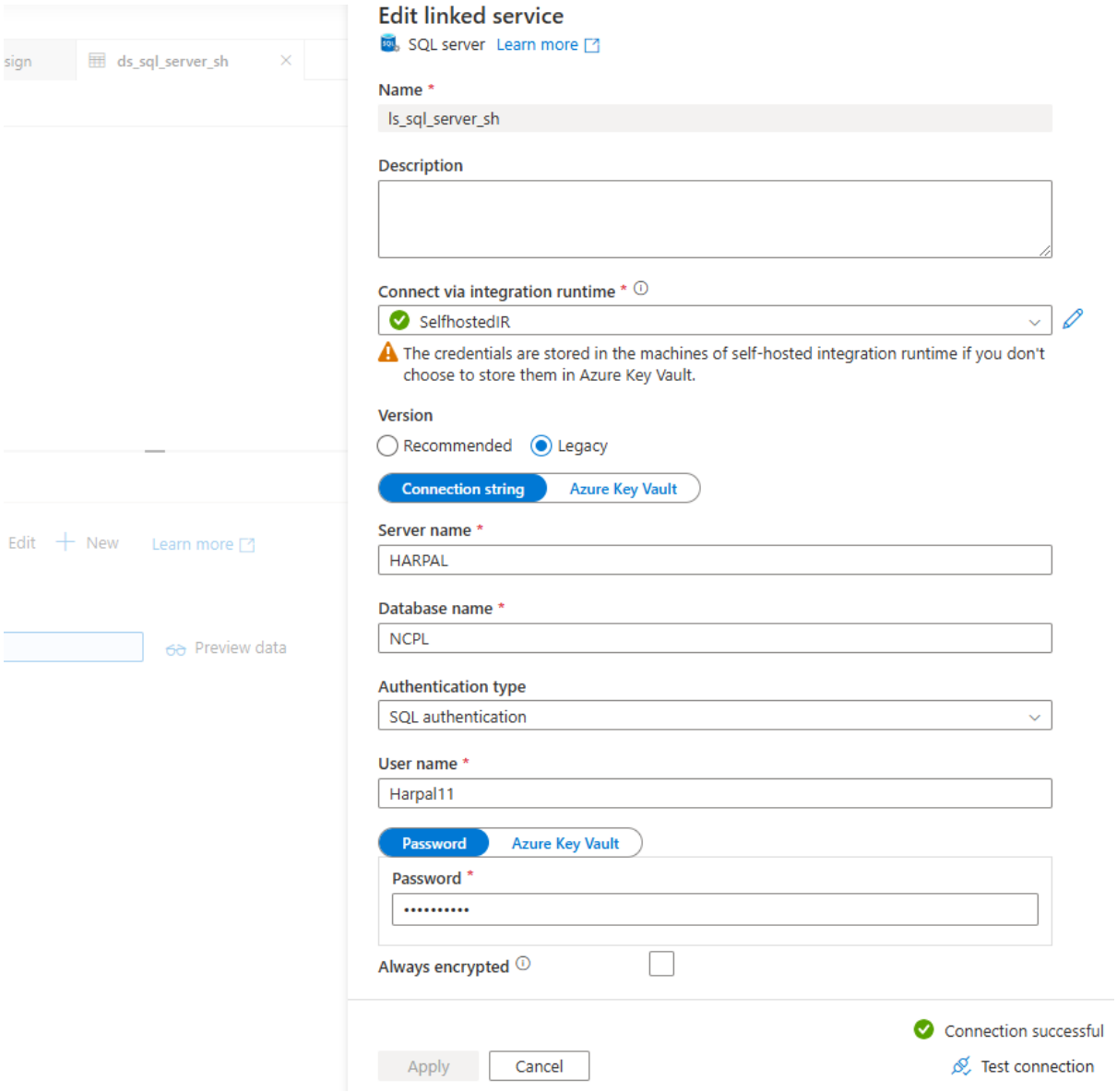
Azure Home -> Synapse Workspace -> New Pipeline

Drag and drop Lookup activity, rename as "Watermark"

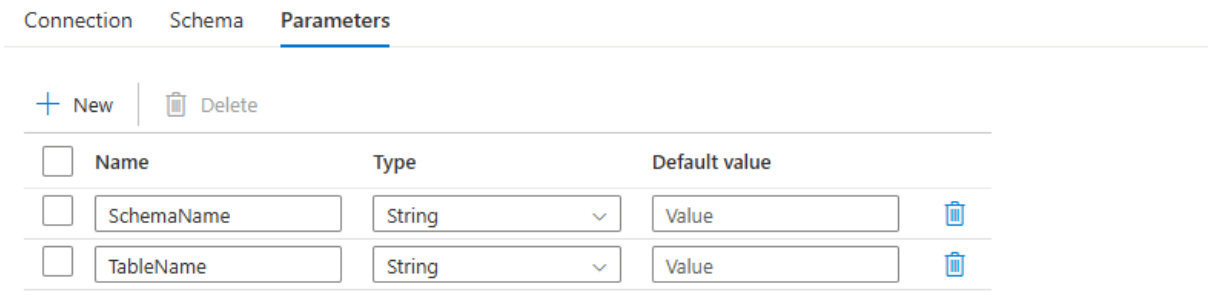


Create new Source Dataset as SQL Server, as we are connecting with on-premises database.

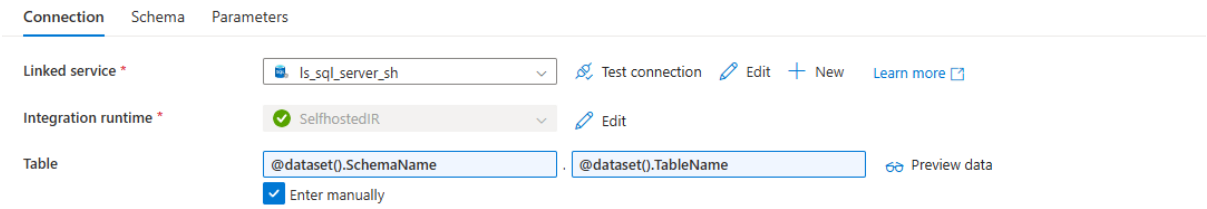
Select the linked service, make sure to select Self Hosted IR.



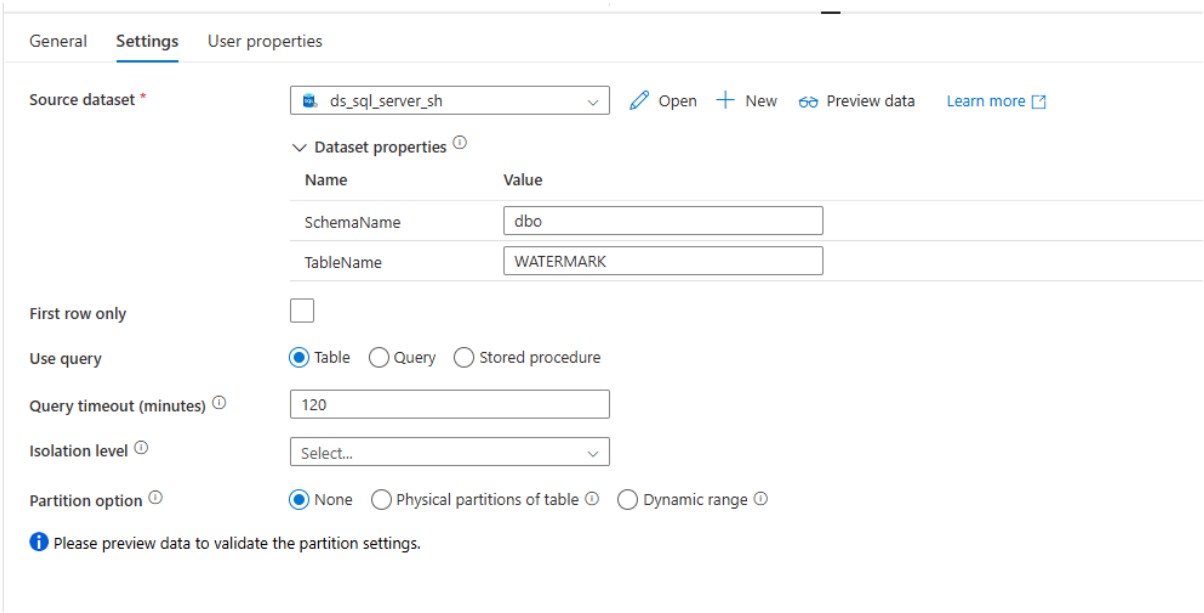
Take two parameters:



Go to the Connection tab and assign those parameters

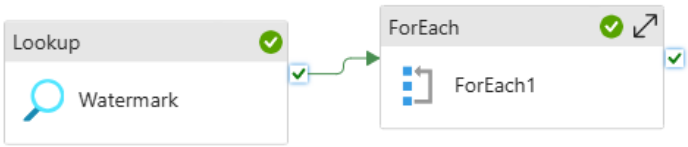


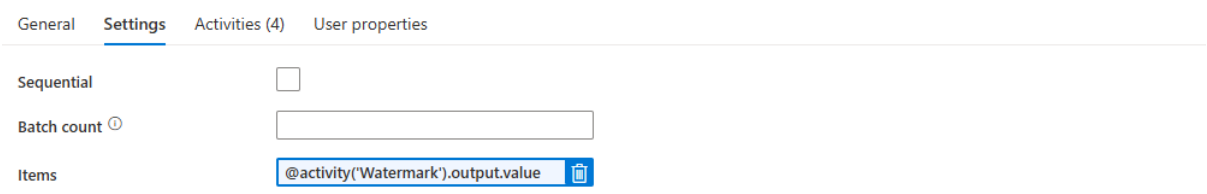
In Settings tab, mention the schema name and table name as shown below



Take ForEach Activity and write this expression in settings tab -> Item

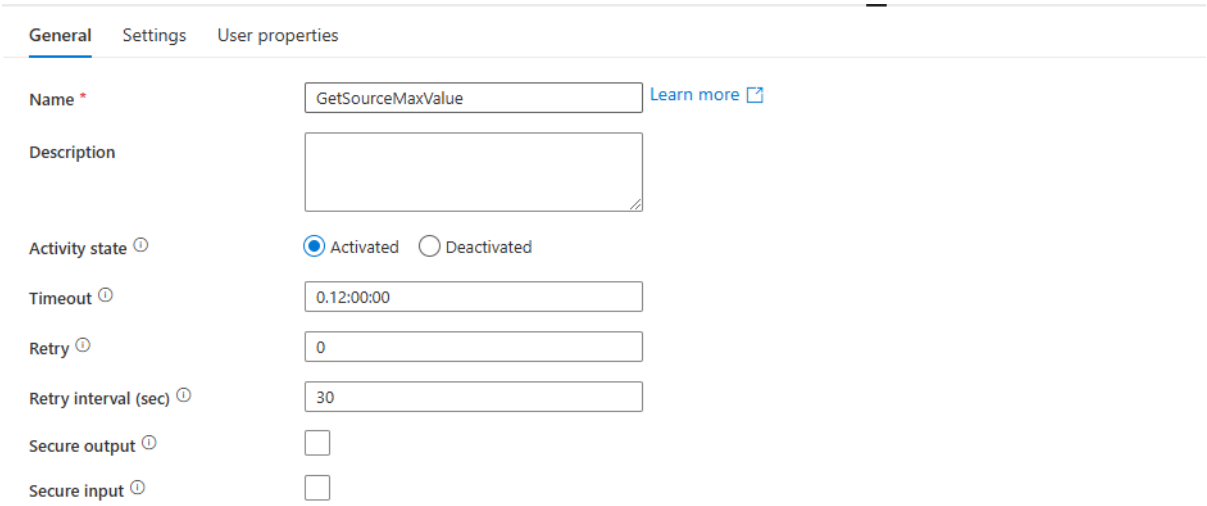
@activity('Watermark').output.value



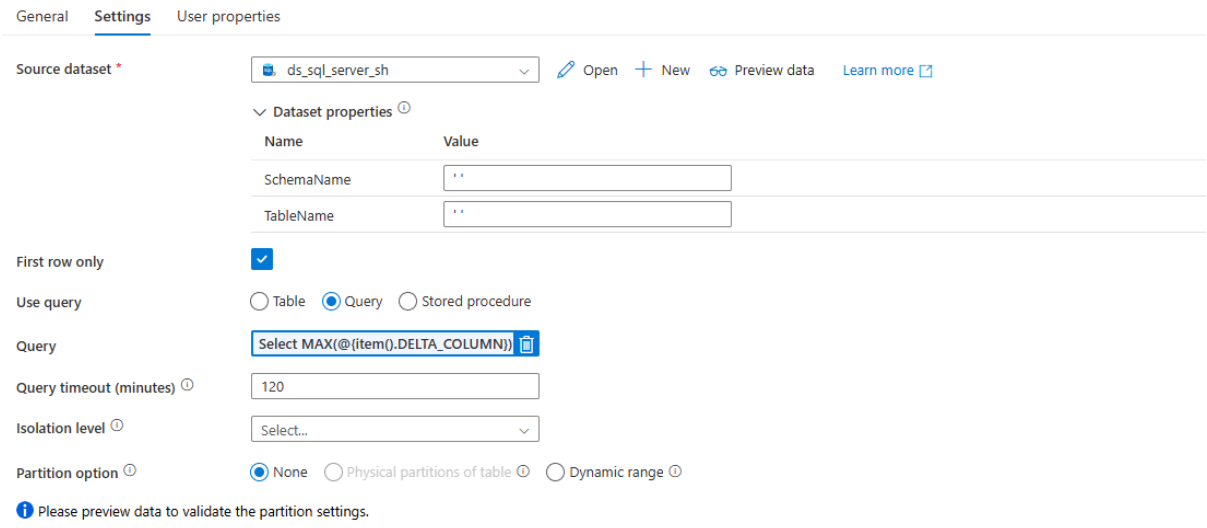


Click on the Edit icon on ForEach Activity

Take Lookup activity and rename “GetSourceMaxValue”

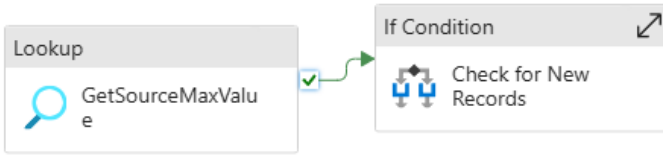


Select the Source Dataset as an on-premises database and linked service (Self-hosted IR) And Write this expression in the Query option



Select MAX(@{item().DELTA_COLUMN}) as MaxValue from @{item().SCHEMA_NAME}.@{item().TABLE_NAME}

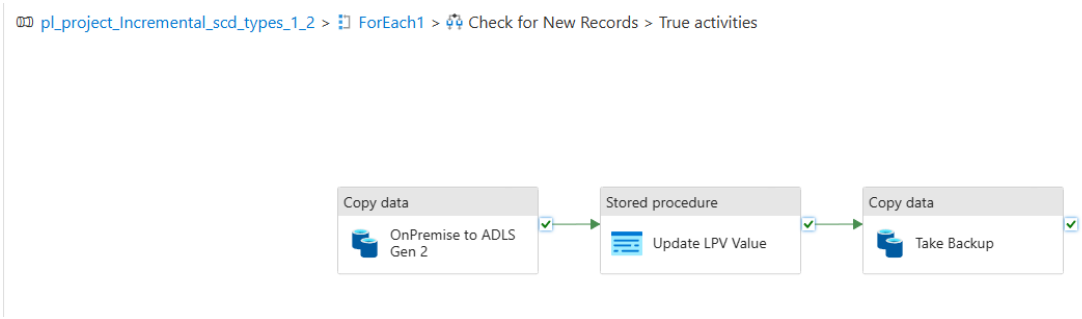
Take If Condition and write this expression



@less(string(item().LPV), string(activity('GetSourceMaxValue').output.firstRow.MaxValue))

Click the edit icon on the True Conditions part

Take these activities

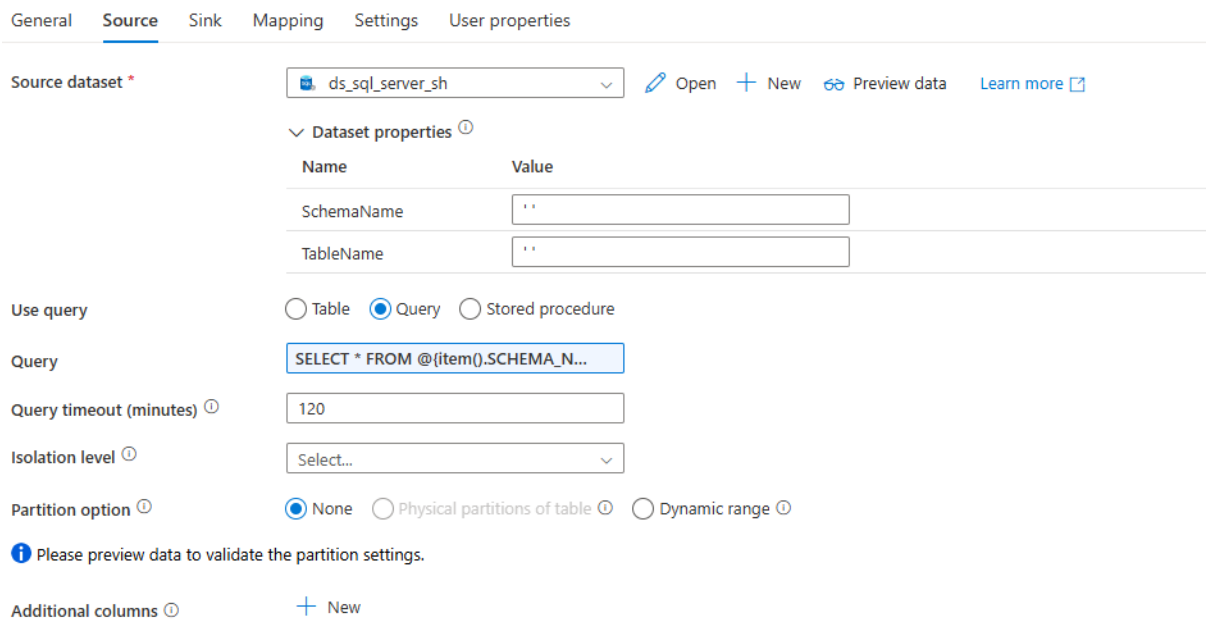


For Copy Data Activity:

Take Source Dataset as an on-premises database and Self Hosted Linked Service

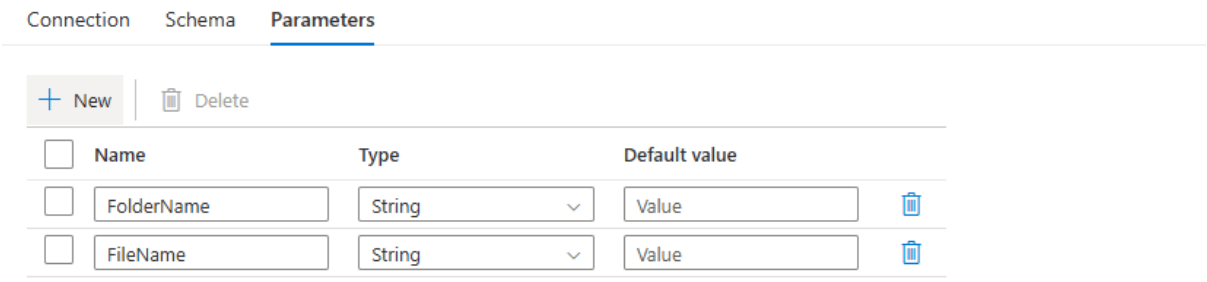
Write this query in the source section in the query option

SELECT * FROM @{item().SCHEMA_NAME}.@{item().TABLE_NAME} WHERE @{item().DELTA_COLUMN}>'@{item().LPV}'

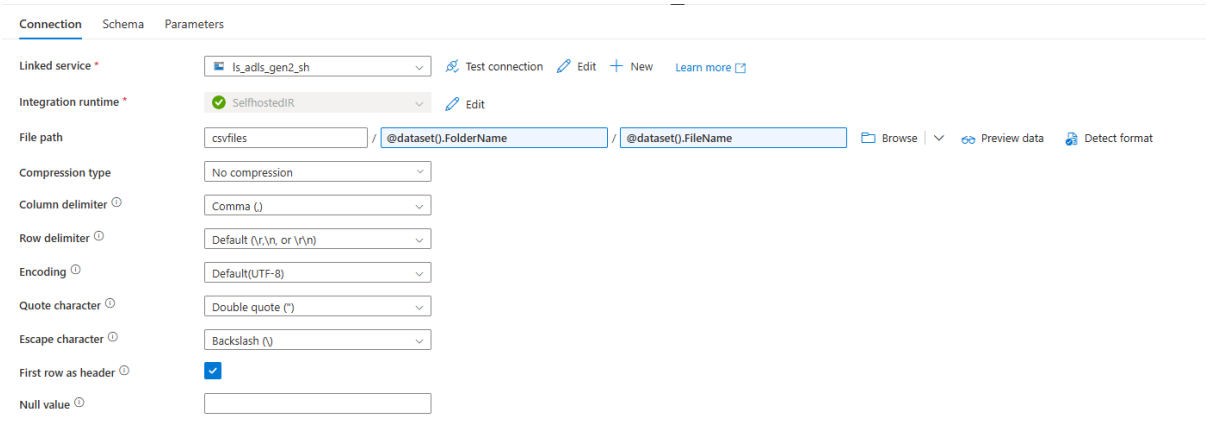


On the Sink side, select delimited Text source dataset and Auto Resolve Integration Runtime service.

Take two parameters



Connection tab

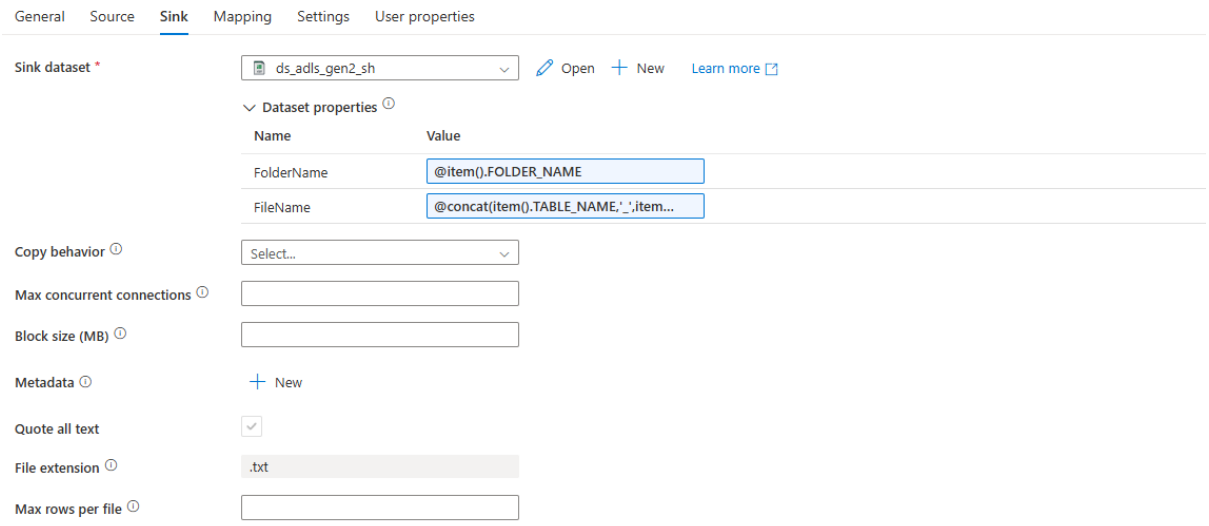


Write this expression for FolderName

@item().FOLDER_NAME

And this below expression for FileName

@concat(item().TABLE_NAME,'_',item().TABLE_TYPE,'.csv')

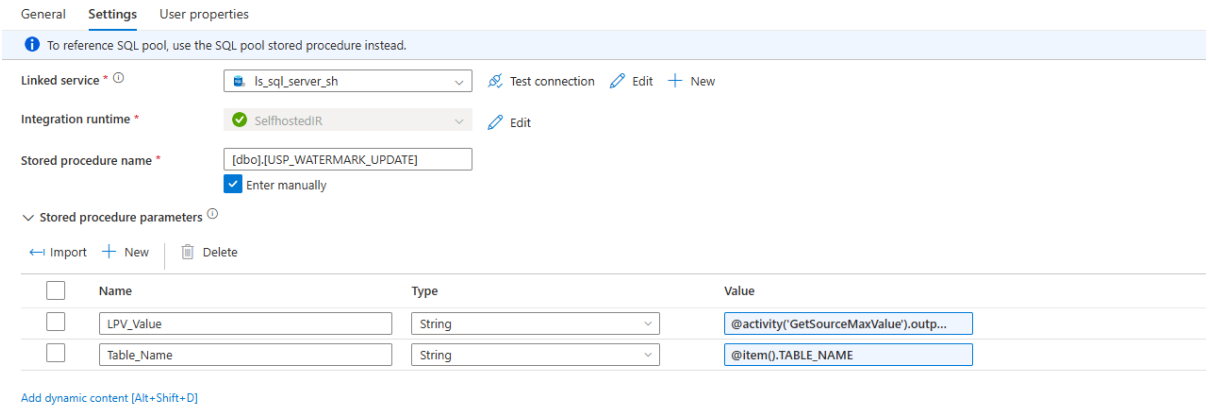


For Stored Procedure Activity:

Rename it as “Update LPV Value”

Select the linked service, select the stored procedure and click on import parameters

Two parameters will be imported from our stored procedure,



For LPV Value,

Write this expression

@activity('GetSourceMaxValue').output.firstRow.MaxValue

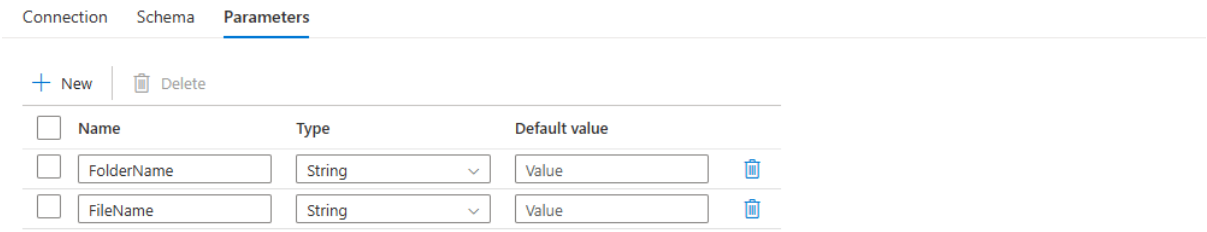
For the Table Name parameter, write this below expression,

@item().TABLE_NAME

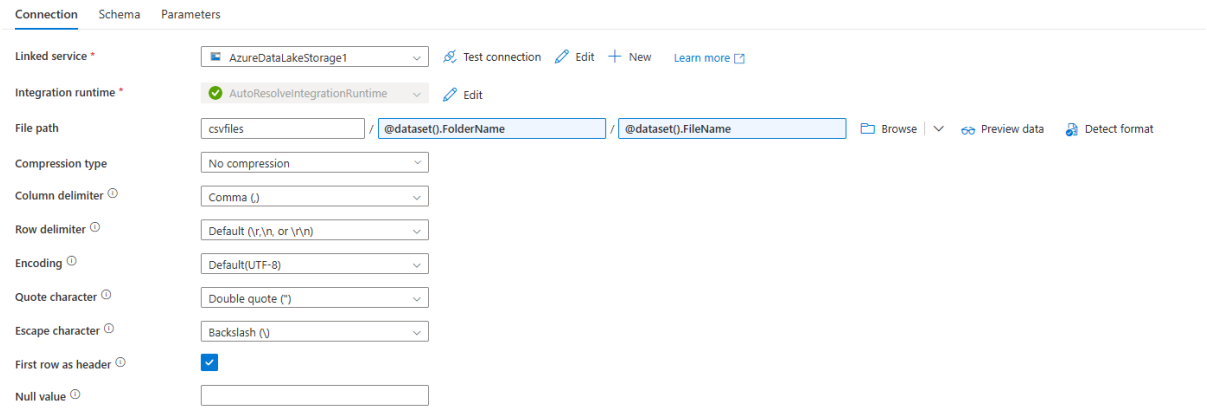
For CopyData Activity (Take Backup):

Source:

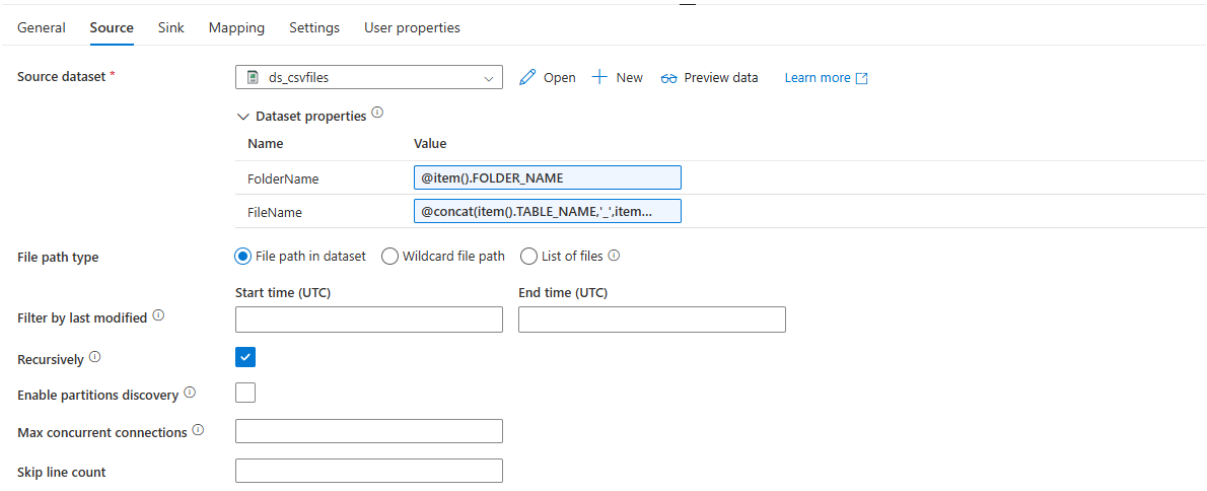
Select the source dataset as delimited text and write two parameters



Connection tab



Source



Provide the expression for Folder Name and File Name parameters as follows:

Folder Name:

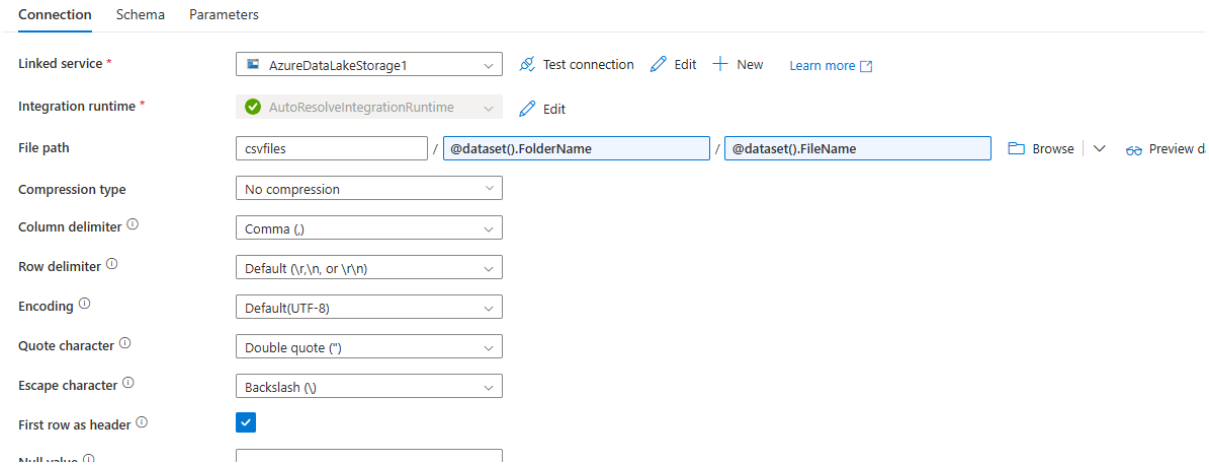
@item().FOLDER_NAME

File Name:

@concat(item().TABLE_NAME,'_',item().TABLE_TYPE,'.csv')

Go to the Sink,

Again take the source dataset as delimited text as shown below, take two parameters and give the connection in the connection tab



Provide the expression for Folder Name and File Name parameters as follows:

Folder Name:

@concat('backup/',item().FOLDER_NAME)

File Name:

@concat(item().TABLE_NAME,'_',utcNow(),'.csv')

Now, Create 5 tables in Azure SQL Database as destination

```
-------SCD Type 1 Table ----------------

CREATE TABLE tbl_Suppliers (
    supplier_id INT,
    name VARCHAR(255),
    contact_name VARCHAR(255),
    phone VARCHAR(50),
    address Varchar(100),
    createdBy varchar(100),
    createdDate datetime,
    updatedBy varchar(100),
    updatedDate datetime,
    hashKey Bigint
);

--TRUNCATE TABLE tbl_Suppliers
Select * from tbl_Suppliers

--Target Source Query in Dataflow SCD Type 1
Select supplier_id, hashKey from tbl_Suppliers;
```

```
CREATE TABLE tbl_Employee (
employee_id INT,
first_name VARCHAR(255),
last_name VARCHAR(255),
hire_date DATETIME,
last_review_date DATETIME,
role VARCHAR(100),
CREATEDBY VARCHAR(100),
CREATEDDATE DATETIME,
UPDATEDBY VARCHAR(100),
UPDATEDDATE DATETIME,
HASHKEY BIGINT,
ISACTIVE INT
);

--TRUNCATE TABLE tbl_Employee
Select * from tbl_Employee

--Target Source Query in Dataflow SCD Type 2
Select employee_id, HASHKEY from tbl_Employee where ISACTIVE = 1
```

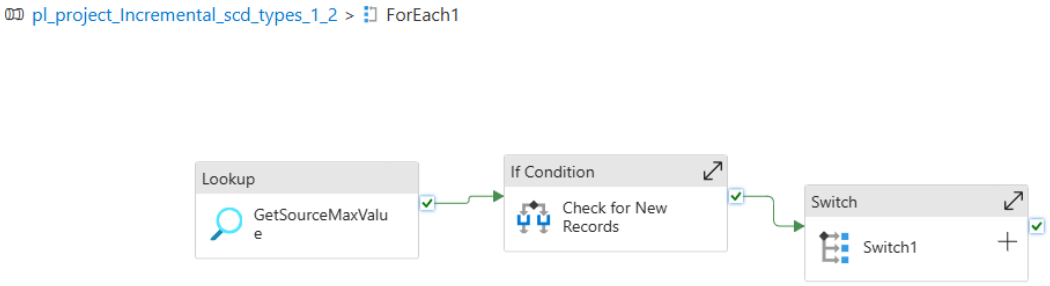
```
74  CREATE TABLE tbl_Products (
75      product_id INT,
76      name VARCHAR(255),
77      category VARCHAR(100),
78      price DECIMAL(10, 2),
79      stock INT,
80      supplier_id INT,
81      productUpdatedDate datetime
82  );
83
84  CREATE TABLE tbl_Sales (
85      sale_id INT,
86      sale_date DATETIME,
87      product_id INT,
88      quantity INT,
89      total_amount DECIMAL(10, 2),
90      cashier_id INT,
91      salesUpdatedDate datetime
92  );
93
94  CREATE TABLE tbl_Inventory_Logs (
95      log_id INT,
96      product_id INT,
97      log_updatedDate DATETIME,
98      change_quantity INT,
99      remaining_stock INT
100 );
```

```
CREATE TABLE tbl_Products (
  product_id INT,
  name VARCHAR(255),
  category VARCHAR(100),
  price DECIMAL(10, 2),
  stock INT,
  supplier_id INT,
        productUpdatedDate datetime
);

CREATE TABLE tbl_Sales (
  sale_id INT,
  sale_date DATETIME,
  product_id INT,
  quantity INT,
  total_amount DECIMAL(10, 2),
  cashier_id INT,
        salesUpdatedDate datetime
);
```

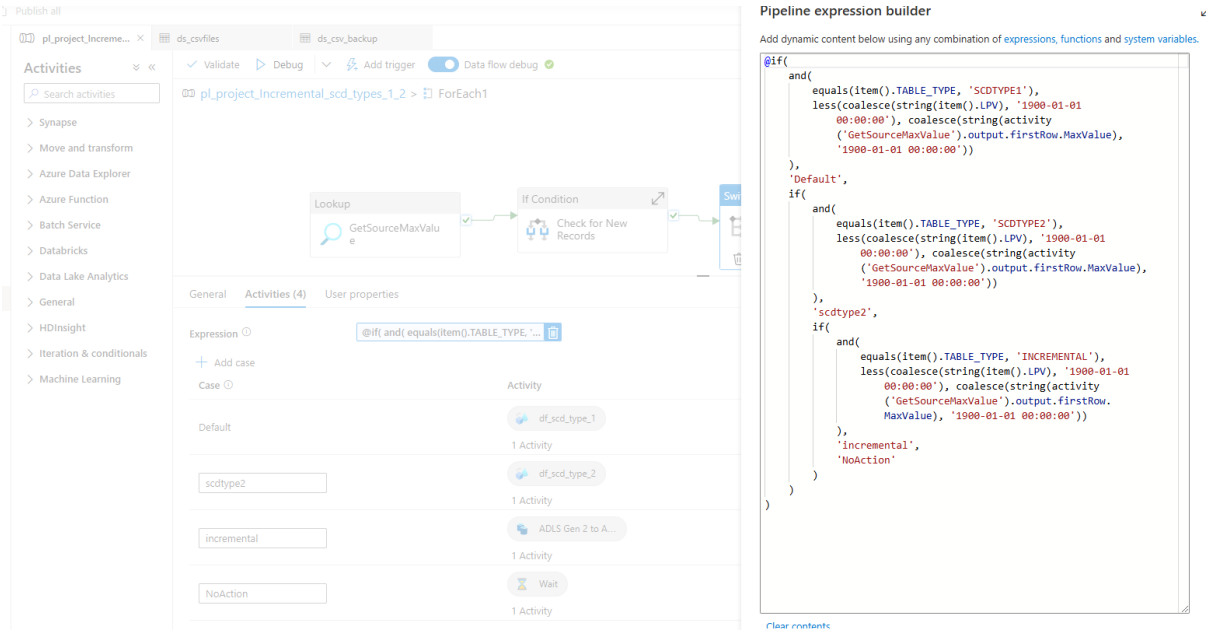
```
CREATE TABLE tbl_Inventory_Logs (
   log_id INT,
   product_id INT,
   log_updatedDate DATETIME,
   change_quantity INT,
   remaining_stock INT
);

CREATE TABLE tbl_Employee (
employee_id INT,
first_name VARCHAR(255),
last_name VARCHAR(255),
hire_date DATETIME,
last_review_date DATETIME,
role VARCHAR(100),
CREATEDBY VARCHAR(100),
CREATEDDATE DATETIME,
UPDATEDBY VARCHAR(100),
UPDATEDDATE DATETIME,
HASHKEY BIGINT,
ISACTIVE INT
);

--TRUNCATE TABLE tbl_Employee
Select * from tbl_Employee

--Target Source Query in Dataflow SCD Type 2
Select employee_id, HASHKEY from tbl_Employee where ISACTIVE = 1
-------SCD Type 1 Table ----------------

CREATE TABLE tbl_Suppliers (
   supplier_id INT,
   name VARCHAR(255),
   contact_name VARCHAR(255),
   phone VARCHAR(50),
   address Varchar(100),
         createdBy varchar(100),
         createdDate datetime,
         updatedBy varchar(100),
         updatedDate datetime,
         hashKey Bigint
);

--TRUNCATE TABLE tbl_Suppliers
Select * from tbl_Suppliers
```

--Target Source Query in Dataflow SCD Type 1
Select supplier_id, hashKey from tbl_Suppliers;

Now go outside of For Each activity, drag and drop **Switch Activity**



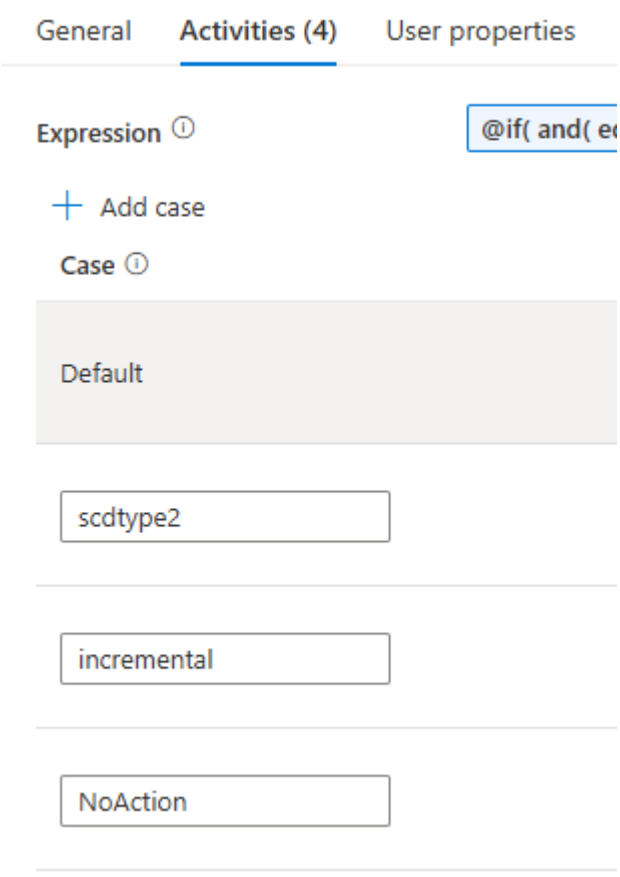
Click on Switch Activity, and go to Activities -> Expression and write this below expression




```
@if(
  and(
    equals(item().TABLE_TYPE, 'SCDTYPE1'),
    less(coalesce(string(item().LPV), '1900-01-01 00:00:00'),
coalesce(string(activity('GetSourceMaxValue').output.firstRow.MaxValue), '1900-
01-01 00:00:00'))
  ),
  'Default',
  if(
    and(
      equals(item().TABLE_TYPE, 'SCDTYPE2'),
```

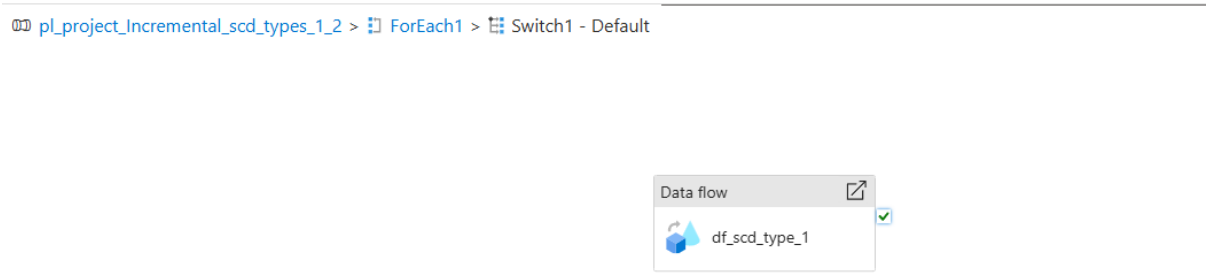
```
        less(coalesce(string(item().LPV), '1900-01-01 00:00:00'),
coalesce(string(activity('GetSourceMaxValue').output.firstRow.MaxValue), '1900-
01-01 00:00:00'))
      ),
      'scdtype2',
      if(
        and(
          equals(item().TABLE_TYPE, 'INCREMENTAL'),
          less(coalesce(string(item().LPV), '1900-01-01 00:00:00'),
coalesce(string(activity('GetSourceMaxValue').output.firstRow.MaxValue), '1900-
01-01 00:00:00'))
        ),
        'incremental',
        'NoAction'
      )
    )
)
```

Click on **Add case** and create 3 new cases as below

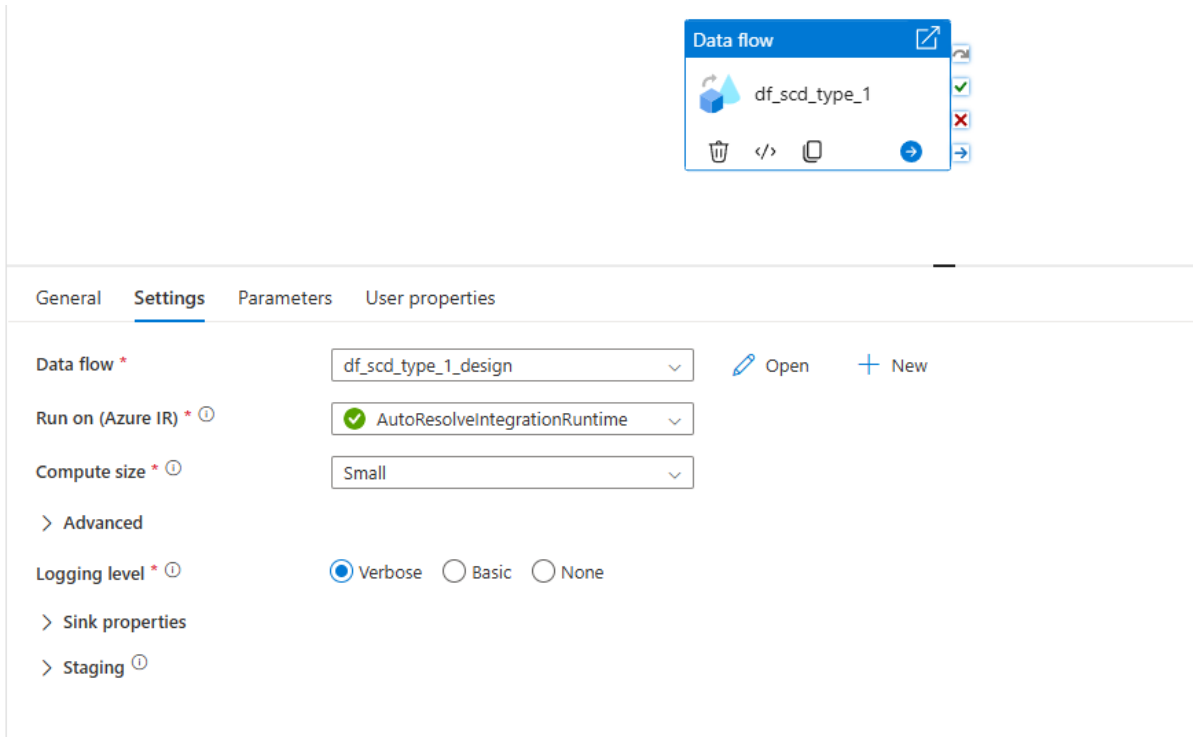


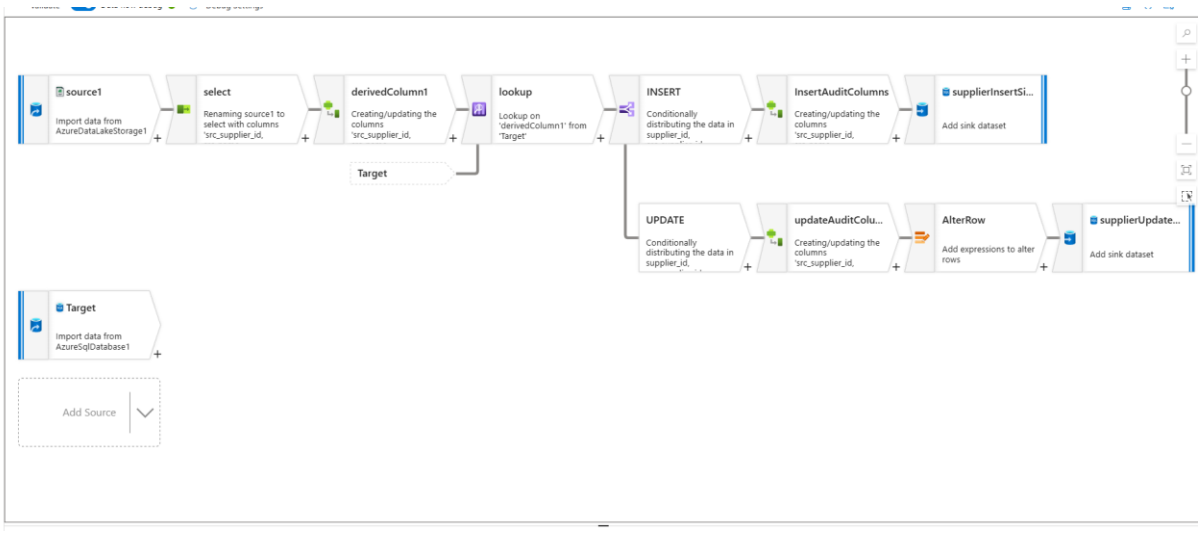
Click on the Default case edit icon

Drag and drop Dataflow Activity

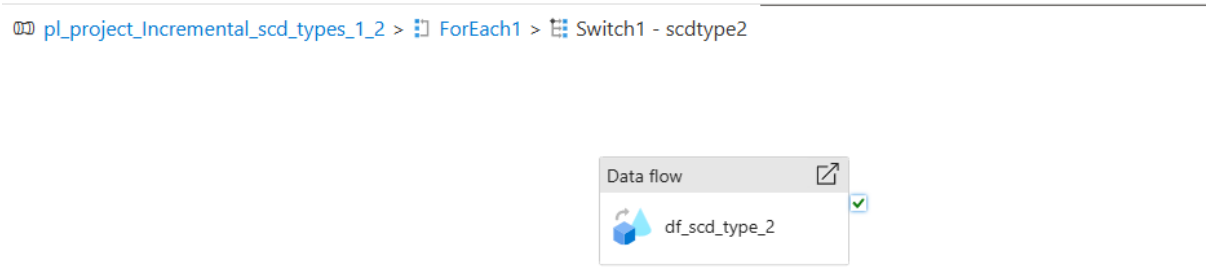


Go to settings and select the dataflow we have already designed for SCD type 1 logic

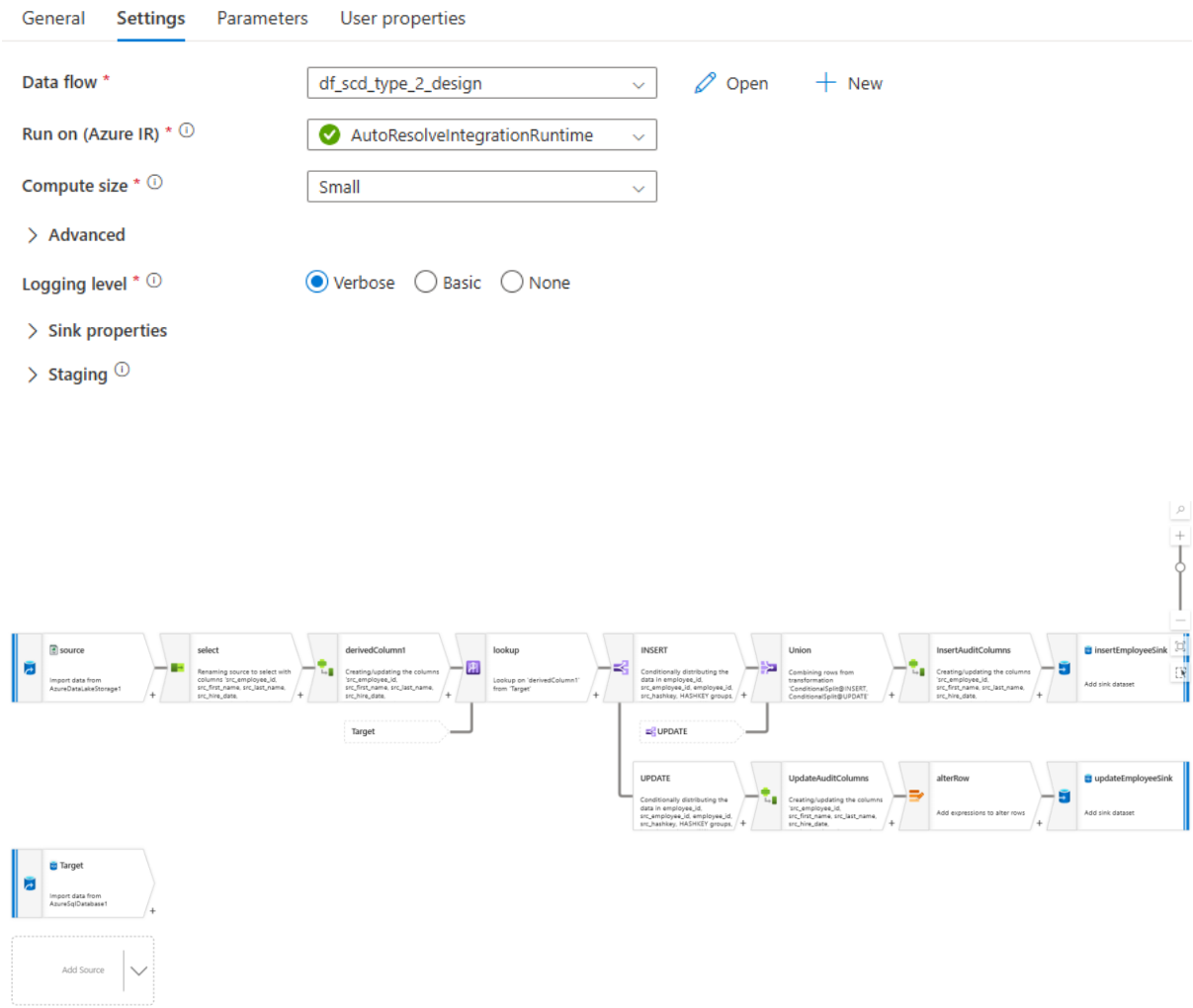




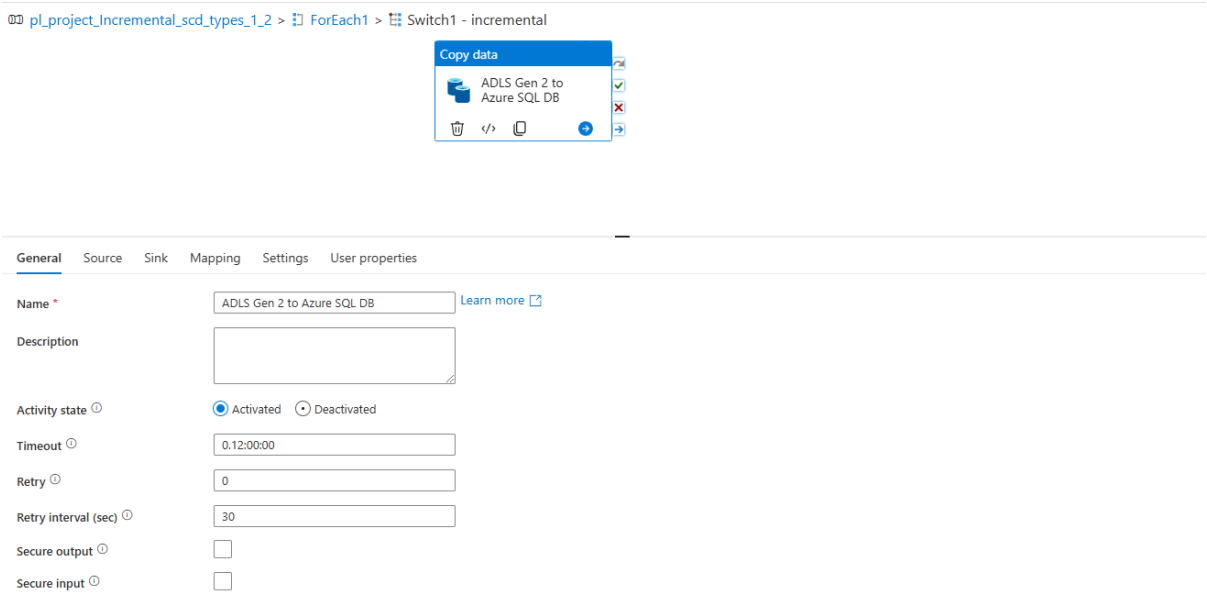
Go back to switch case -> **scdtype2** edit icon and drag and drop dataflow activity



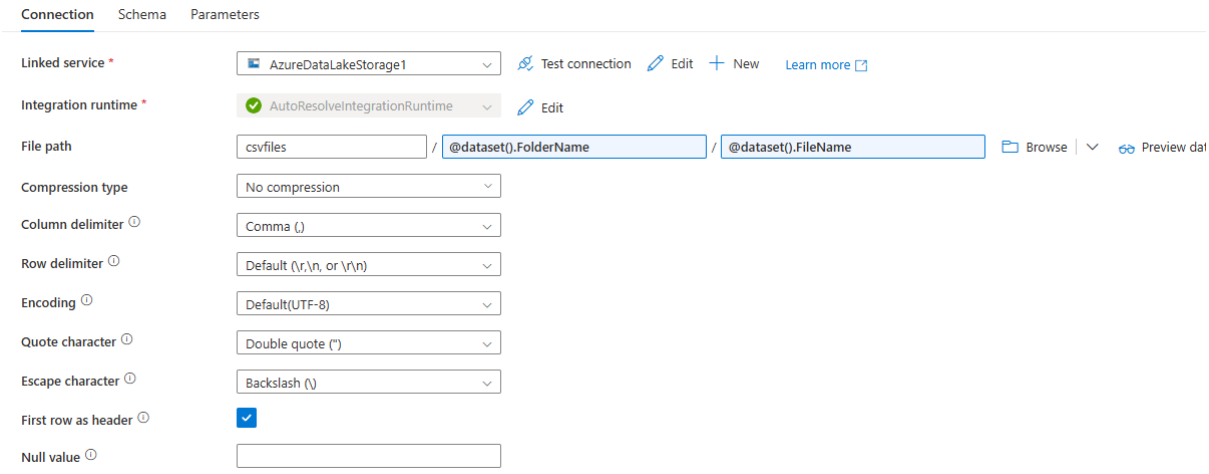
Go to settings and select the dataflow we have already designed for SCD type 2 logic



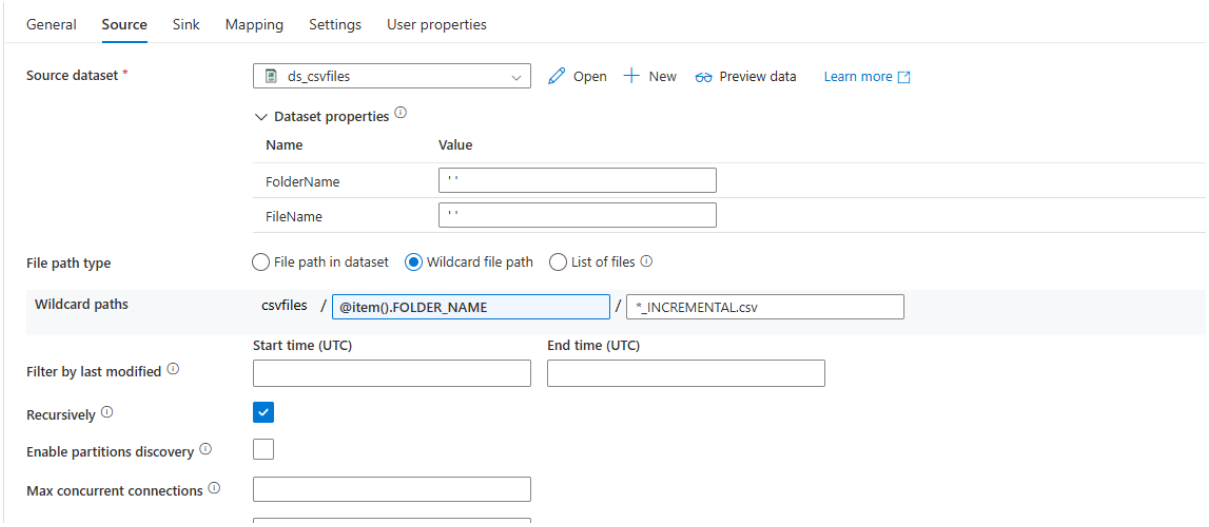
Go back to switch case -> **incremental** edit icon and drag and drop copy data activity



Select the source dataset as delimited text file and take two parameters and build the connection



Select the Wildcard paths option and write these two expression and value

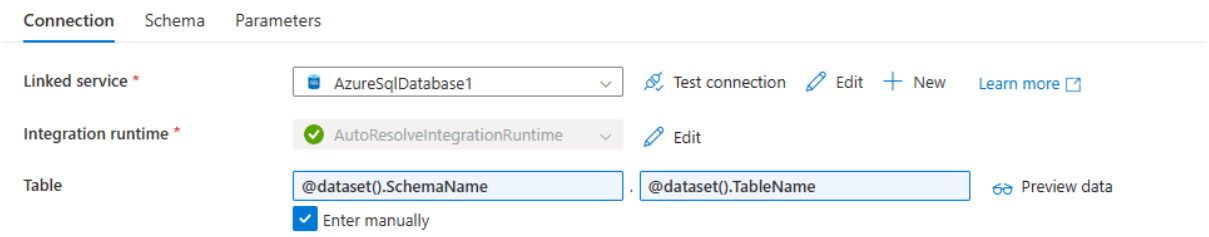


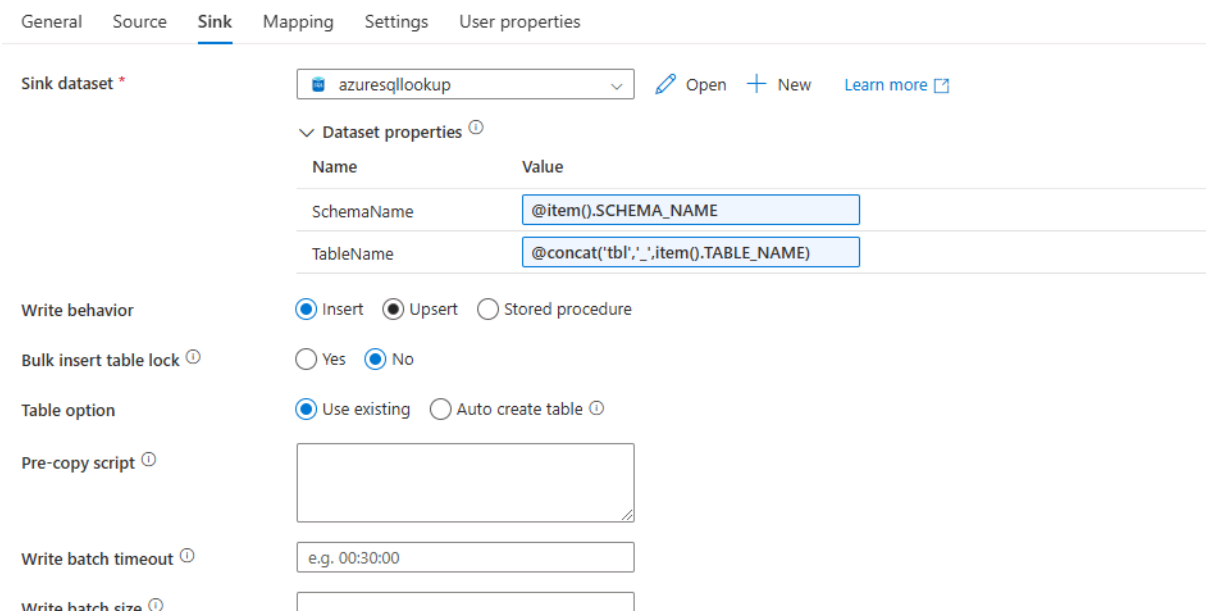
Folder name: **@item().FOLDER_NAME**

Filename: ***_INCREMENTAL.csv**

Go to the Sink

Select the source dataset as Azure SQL Database, take two parameters and build the connection





Write this two expressions in Schema Name and Table Name

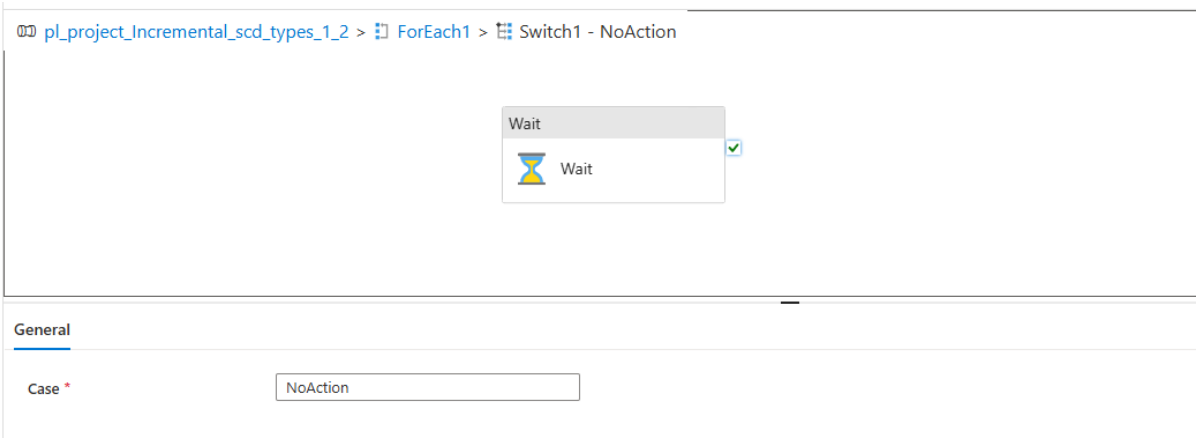
Schema Name:

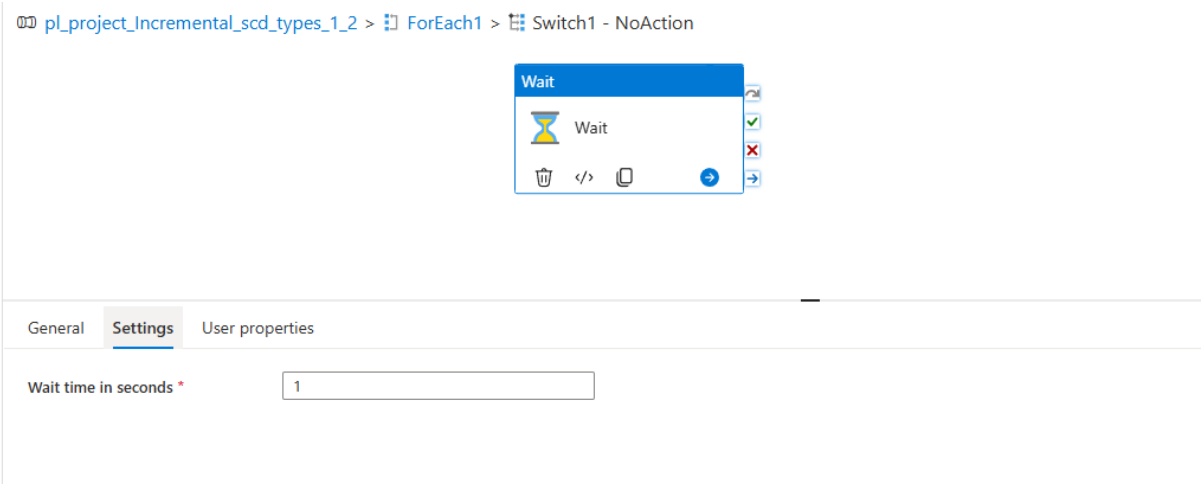
@item().SCHEMA_NAME

Table Name:

@concat('tbl','_',item().TABLE_NAME)

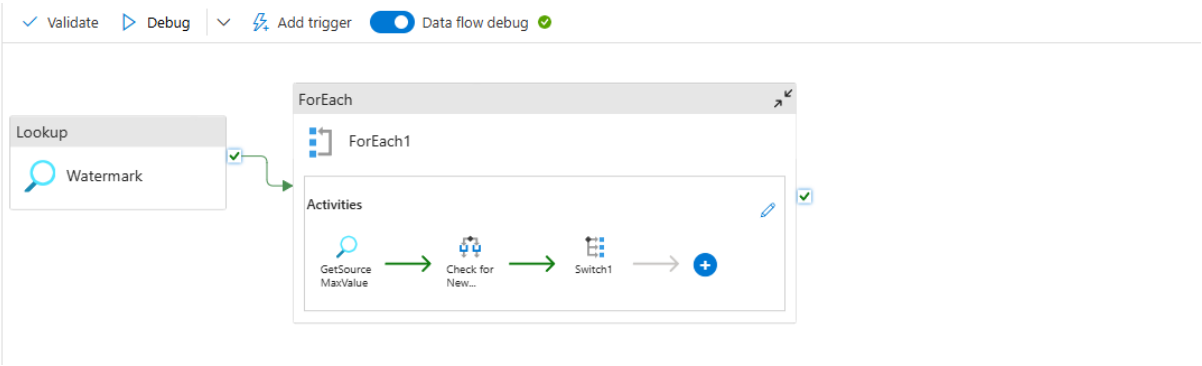
Go back to switch case -> **No Action** edit icon and drag and drop Wait Activity



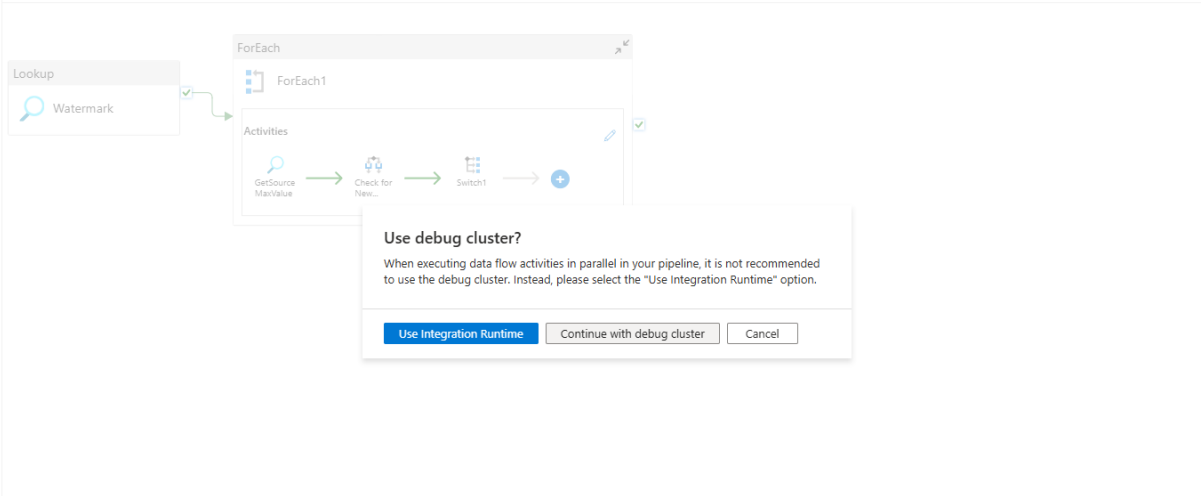


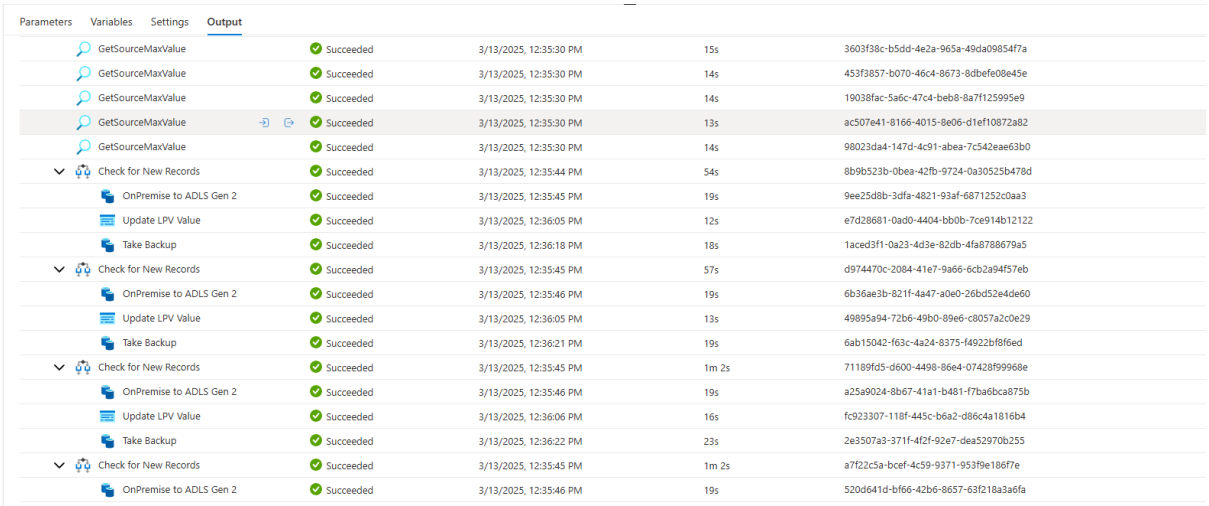
Let's run the pipeline

Enable **Data flow Debug** option



Click on **Continue with debug cluster**

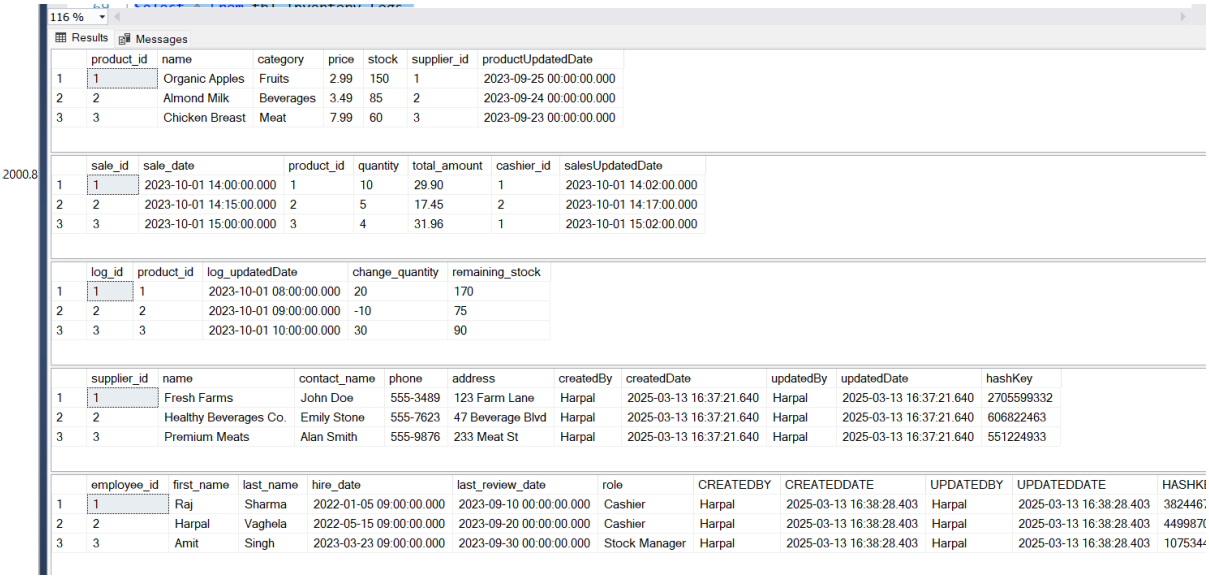




Parameters | Variables | Settings | Output

GetSourceMaxValue	Succeeded	3/13/2025, 12:35:30 PM	15s	3603f38c-b5dd-4e2a-965a-49da09854f7a
GetSourceMaxValue	Succeeded	3/13/2025, 12:35:30 PM	14s	453f3857-b070-46c4-8673-8dbefe08e45e
GetSourceMaxValue	Succeeded	3/13/2025, 12:35:30 PM	14s	19038fac-5a6c-47c4-beb8-8a7f125995e9
GetSourceMaxValue	Succeeded	3/13/2025, 12:35:30 PM	13s	ac507e41-8166-4015-8e06-d1ef10872a82
GetSourceMaxValue	Succeeded	3/13/2025, 12:35:30 PM	14s	98023da4-147d-4c91-abea-7c542eae63b0
Check for New Records	Succeeded	3/13/2025, 12:35:44 PM	54s	8b9b523b-0bea-42fb-9724-0a30525b478d
OnPremise to ADLS Gen 2	Succeeded	3/13/2025, 12:35:45 PM	19s	9ee25d8b-3dfa-4821-93af-6871252c0aa3
Update LPV Value	Succeeded	3/13/2025, 12:36:05 PM	12s	e7d28681-0ad0-4404-bb0b-7ce914b12122
Take Backup	Succeeded	3/13/2025, 12:36:18 PM	18s	1aced3f1-0a23-4d3e-82db-4fa8788679a5
Check for New Records	Succeeded	3/13/2025, 12:35:45 PM	57s	d974470c-2084-41e7-9a66-6cb2a94f57eb
OnPremise to ADLS Gen 2	Succeeded	3/13/2025, 12:35:46 PM	19s	6b36ae3b-821f-4a47-a0e0-26bd52e4de60
Update LPV Value	Succeeded	3/13/2025, 12:36:05 PM	13s	49895a94-72b6-49b0-89e6-c8057a2c0e29
Take Backup	Succeeded	3/13/2025, 12:36:21 PM	19s	6ab15042-f63c-4a24-8375-f4922bf8f6ed
Check for New Records	Succeeded	3/13/2025, 12:35:45 PM	1m 2s	71189fd5-d600-4498-86e4-07428f99968e
OnPremise to ADLS Gen 2	Succeeded	3/13/2025, 12:35:46 PM	19s	a25a9024-8b67-41a1-b481-f7ba6bca875b
Update LPV Value	Succeeded	3/13/2025, 12:36:06 PM	16s	fc923307-118f-445c-b6a2-d86c4a1816b4
Take Backup	Succeeded	3/13/2025, 12:36:22 PM	23s	2e3507a3-371f-4f2f-92e7-dea52970b255
Check for New Records	Succeeded	3/13/2025, 12:35:45 PM	1m 2s	a7f22c5a-bcef-4c59-9371-953f9e186f7e
OnPremise to ADLS Gen 2	Succeeded	3/13/2025, 12:35:46 PM	19s	520d641d-bf66-42b6-8657-63f218a3a6fa

Let’s check the data in Azure SQL Database tables



116 % | Results | Messages

	product_id	name	category	price	stock	supplier_id	productUpdatedDate
1	1	Organic Apples	Fruits	2.99	150	1	2023-09-25 00:00:00.000
2	2	Almond Milk	Beverages	3.49	85	2	2023-09-24 00:00:00.000
3	3	Chicken Breast	Meat	7.99	60	3	2023-09-23 00:00:00.000

2000.8

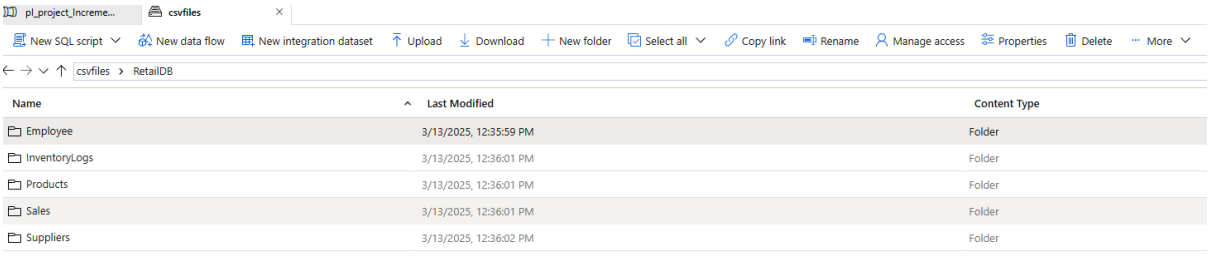
	sale_id	sale_date	product_id	quantity	total_amount	cashier_id	salesUpdatedDate
1	1	2023-10-01 14:00:00.000	1	10	29.90	1	2023-10-01 14:02:00.000
2	2	2023-10-01 14:15:00.000	2	5	17.45	2	2023-10-01 14:17:00.000
3	3	2023-10-01 15:00:00.000	3	4	31.96	1	2023-10-01 15:02:00.000

	log_id	product_id	log_updatedDate	change_quantity	remaining_stock
1	1	1	2023-10-01 08:00:00.000	20	170
2	2	2	2023-10-01 09:00:00.000	-10	75
3	3	3	2023-10-01 10:00:00.000	30	90

	supplier_id	name	contact_name	phone	address	createdBy	createdDate	updatedBy	updatedDate	hashKey
1	1	Fresh Farms	John Doe	555-3489	123 Farm Lane	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	2705599332
2	2	Healthy Beverages Co.	Emily Stone	555-7623	47 Beverage Blvd	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	606822463
3	3	Premium Meats	Alan Smith	555-9876	233 Meat St	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	551224933

	employee_id	first_name	last_name	hire_date	last_review_date	role	CREATEDBY	CREATEDDATE	UPDATEDBY	UPDATEDDATE	HASHKI
1	1	Raj	Sharma	2022-01-05 09:00:00.000	2023-09-10 00:00:00.000	Cashier	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	382446
2	2	Harpal	Vaghela	2022-05-15 09:00:00.000	2023-09-20 00:00:00.000	Cashier	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	449987
3	3	Amit	Singh	2023-03-23 09:00:00.000	2023-09-30 00:00:00.000	Stock Manager	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	107534

Let’s check the data in the ADLS Gen 2 storage account



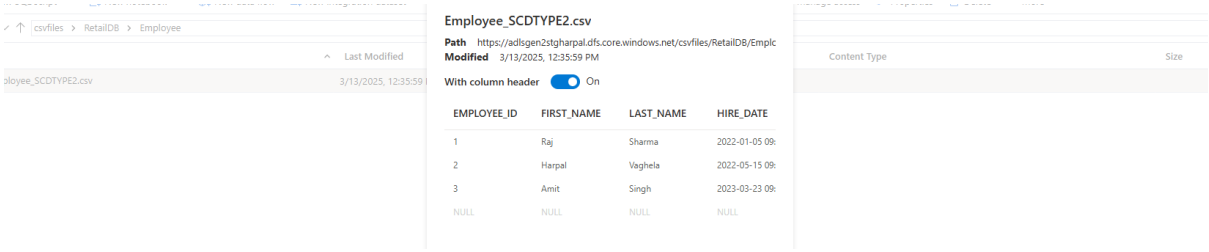
pl_project_Increme... | csvfiles

New SQL script | New data flow | New integration dataset | Upload | Download | New folder | Select all | Copy link | Rename | Manage access | Properties | Delete | More

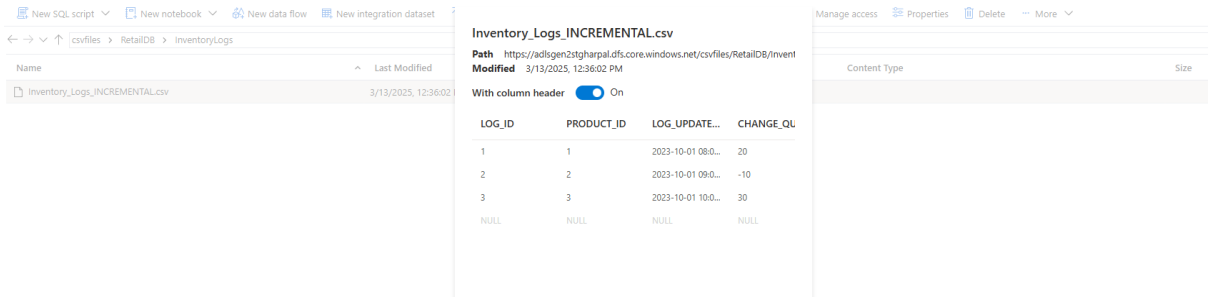
csvfiles › RetailDB

Name	Last Modified	Content Type
Employee	3/13/2025, 12:35:59 PM	Folder
InventoryLogs	3/13/2025, 12:36:01 PM	Folder
Products	3/13/2025, 12:36:01 PM	Folder
Sales	3/13/2025, 12:36:01 PM	Folder
Suppliers	3/13/2025, 12:36:02 PM	Folder

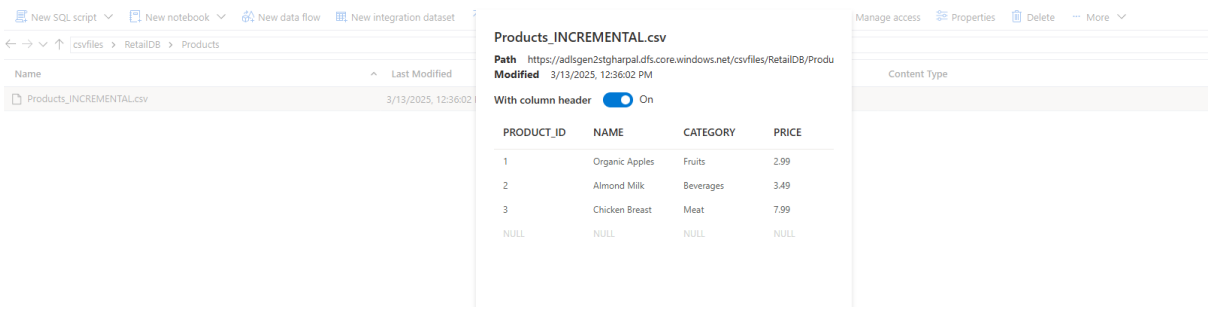
Employee Data



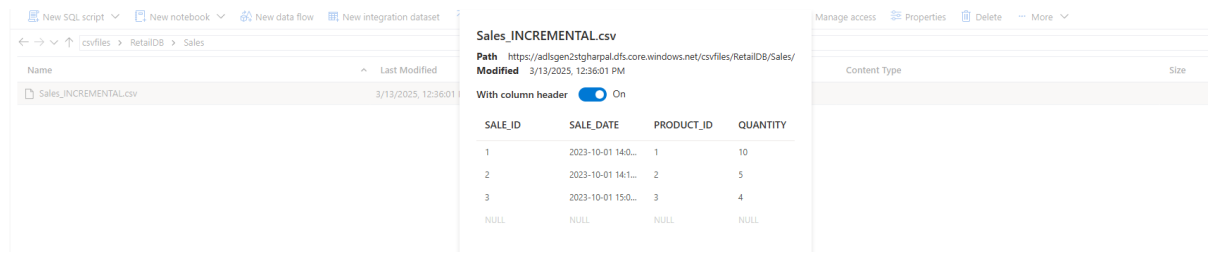
Inventory Log Data



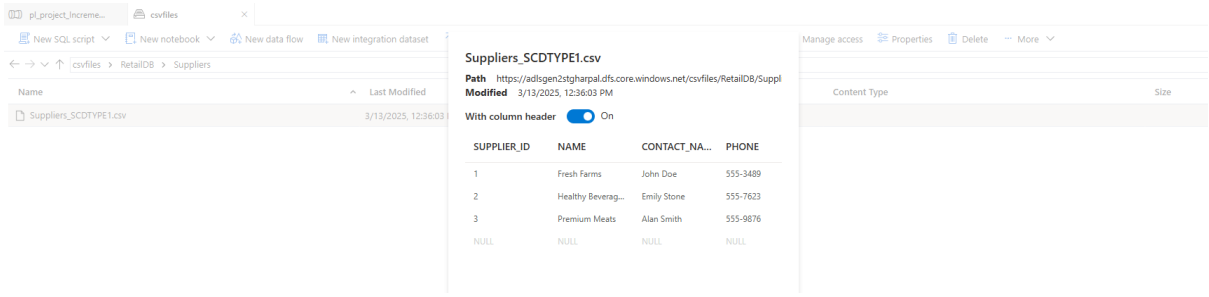
Products Data



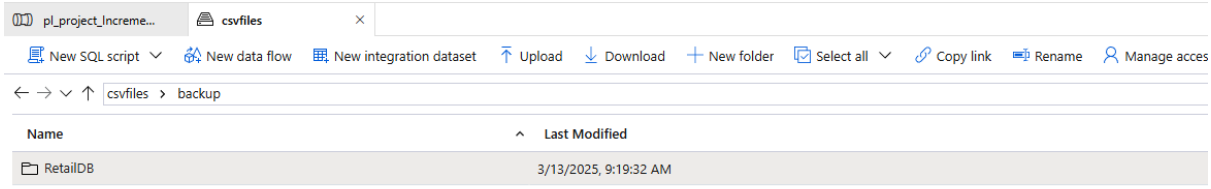
Sales Data

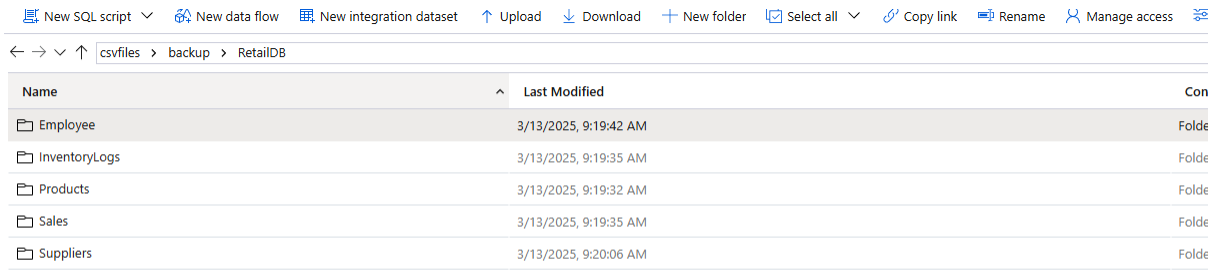


Supplier Data

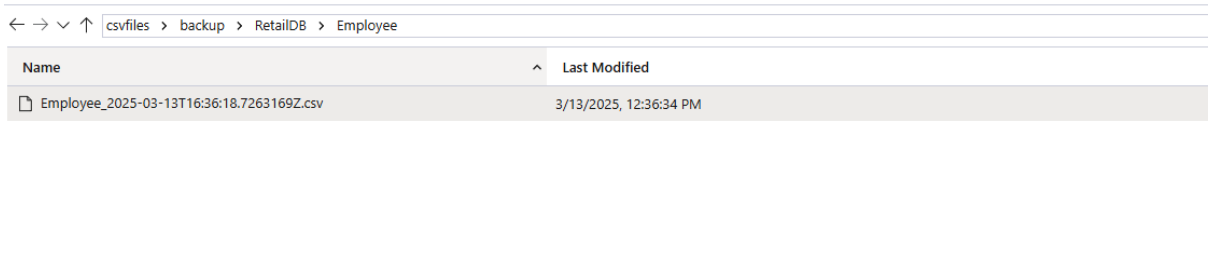


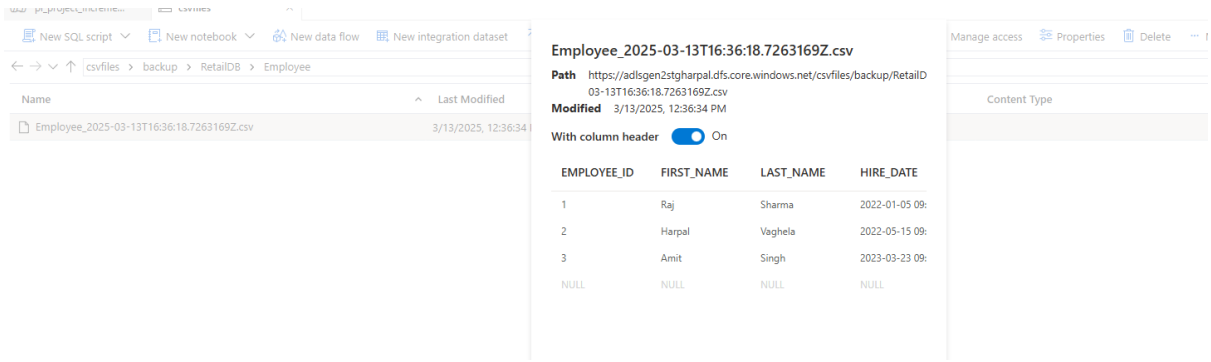
Lets check the backup container in storage account



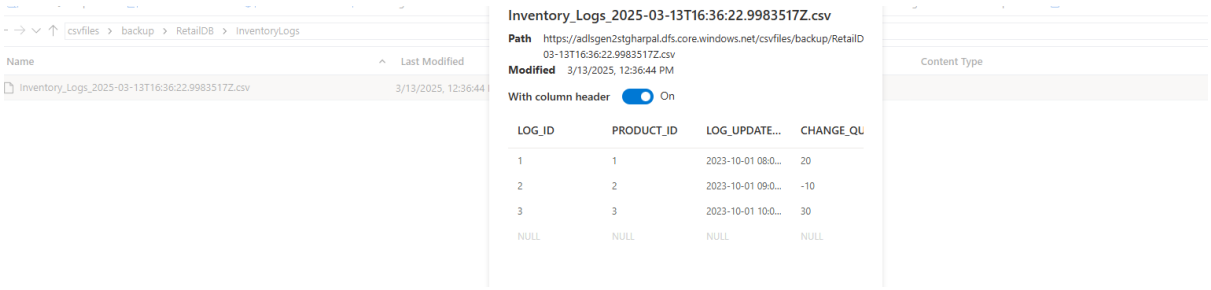


Employee Data Backup

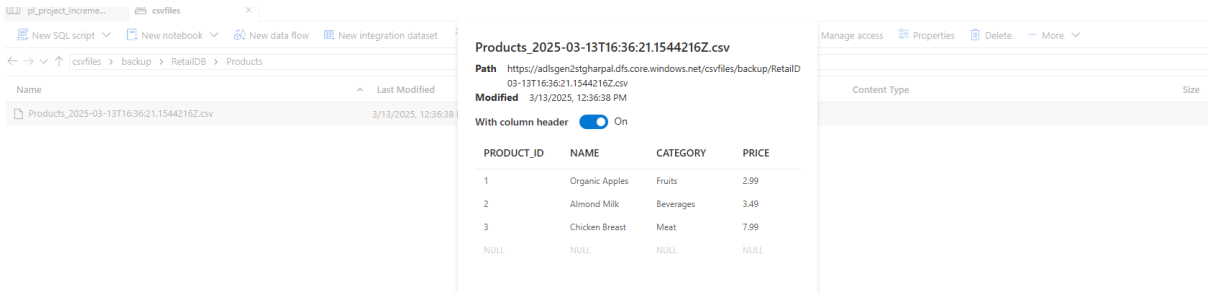




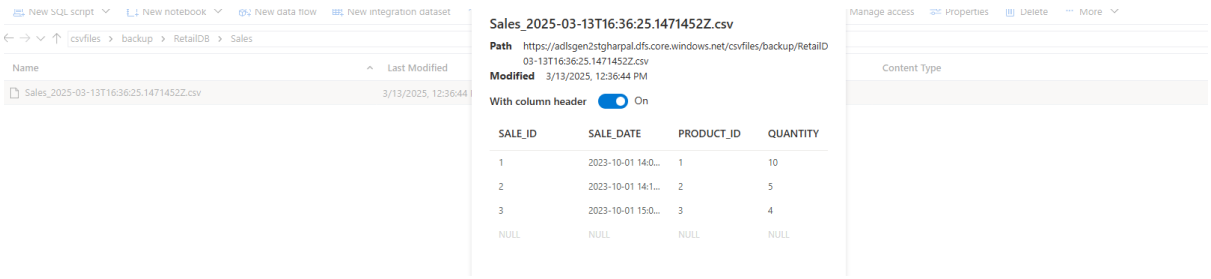
Inventory Data Backup



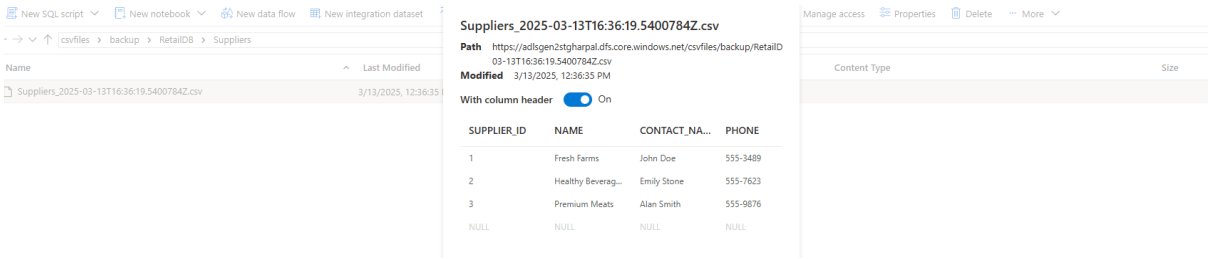
Product Data Backup



Sales Data Backup



Supplier Data Backup



Let's insert new records in on-premise database tables

```
----------------------------------------------------------------------------------------------
----Insert new data into Products table
INSERT INTO Products (product_id, name, category, price, stock, supplier_id, productUpdatedDate) VALUES
(4, 'Vegetable Oil', 'Groceries', 4.50, 100, 2, '2023-12-01 00:00:00');

----Insert new data into Sales table
INSERT INTO Sales (sale_id, sale_date, product_id, quantity, total_amount, cashier_id, salesUpdatedDate) VALUES
(4, '2025-02-25 10:30:00', 5, 20, 90.00, 1, '2025-02-25 10:35:00');


----Insert new data into Suppliers table --- SCD Type 1
INSERT INTO Suppliers (supplier_id, name, contact_name, phone, address, supplierUpdatedDate) VALUES
(4, 'Bakers Delight', 'Nora Special Bates', '111-1111', '88 Baker Rd', '2025-02-22 00:00:00');


----Insert new data into Employees table ---- SCD Type 2
INSERT INTO Employee (employee_id, first_name, last_name, hire_date, last_review_date, role) VALUES
(4, 'Nayan', 'Vaghela', '2025-01-01 09:00:00', '2025-02-20 00:00:00', 'Inventory Specialist');
```

----Insert new data into Products table
INSERT INTO Products (product_id, name, category, price, stock, supplier_id, productUpdatedDate) VALUES
(4, 'Vegetable Oil', 'Groceries', 4.50, 100, 2, '2023-12-01 00:00:00');

----Insert new data into Sales table

```
INSERT INTO Sales (sale_id, sale_date, product_id, quantity, total_amount, cashier_id, salesUpdatedDate) VALUES
(4, '2025-02-25 10:30:00', 5, 20, 90.00, 1, '2025-02-25 10:35:00');
```

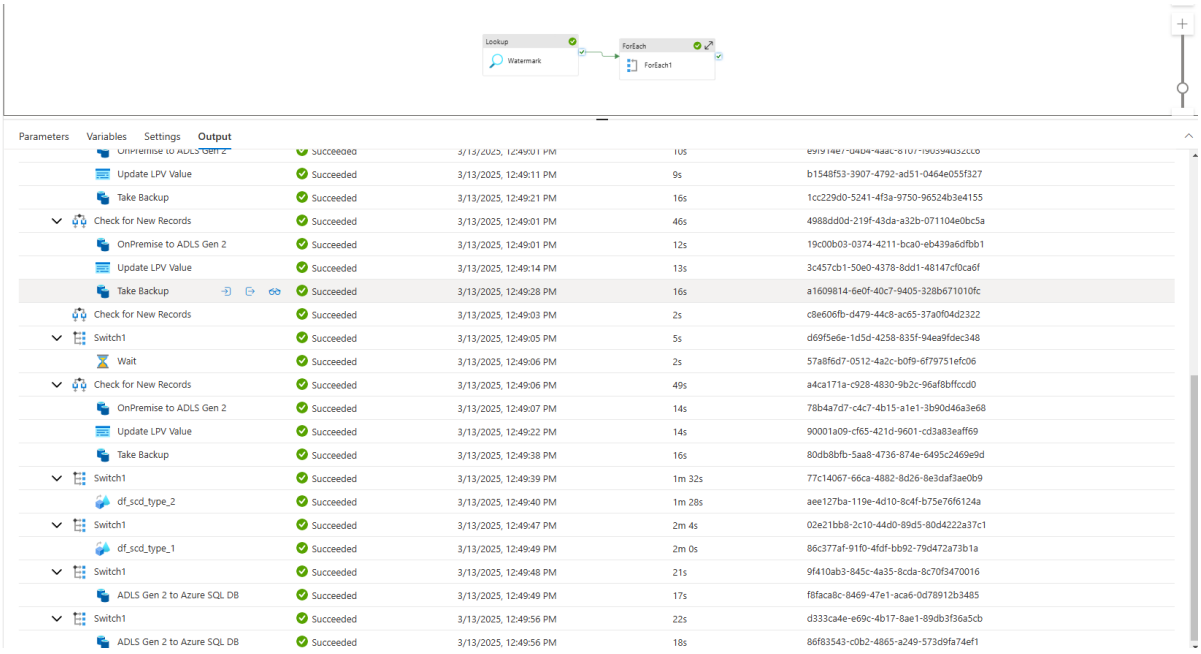
----Insert new data into Suppliers table --- SCD Type 1

```
INSERT INTO Suppliers (supplier_id, name, contact_name, phone, address, supplierUpdatedDate) VALUES
(4, 'Bakers Delight', 'Nora Special Bates', '111-1111', '88 Baker Rd', '2025-02-22 00:00:00');
```

----Insert new data into Employees table ---- SCD Type 2

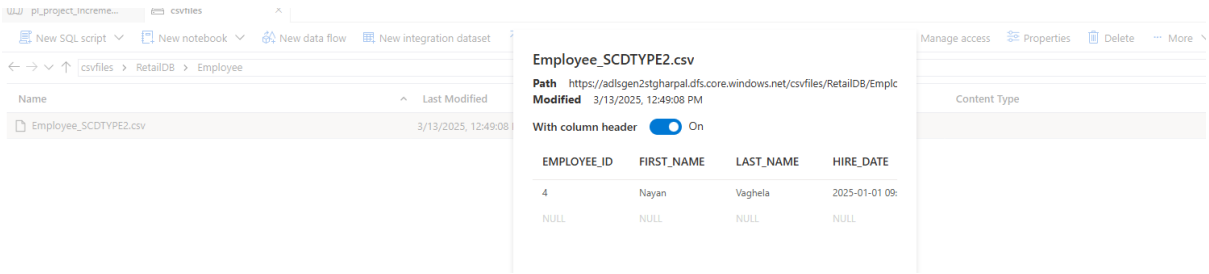
```
INSERT INTO Employee (employee_id, first_name, last_name, hire_date, last_review_date, role) VALUES
(4, 'Nayan', 'Vaghela', '2025-01-01 09:00:00', '2025-02-20 00:00:00', 'Inventory Specialist');
```

Debug the pipeline

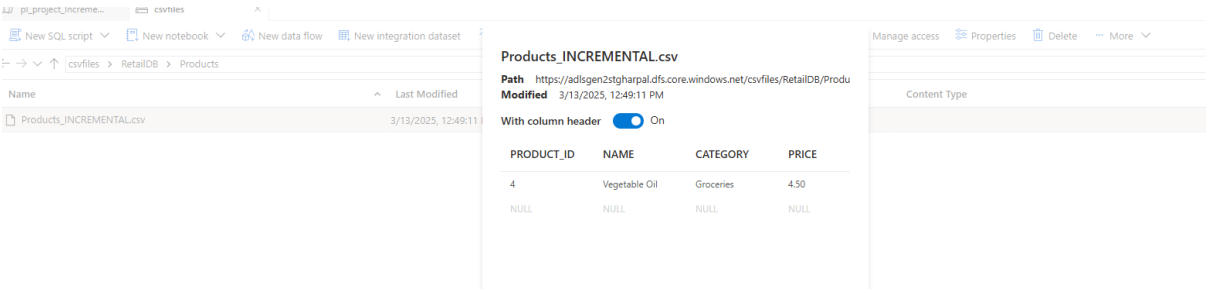


Now, let's check the data in the ADLS Gen 2 storage account

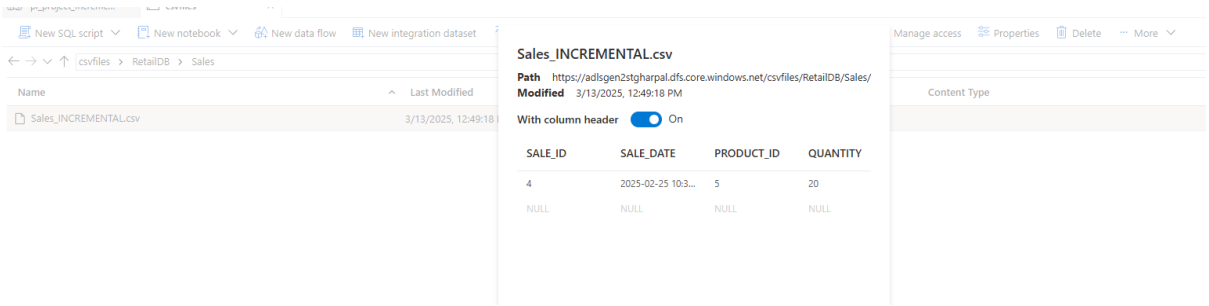
Employee Data



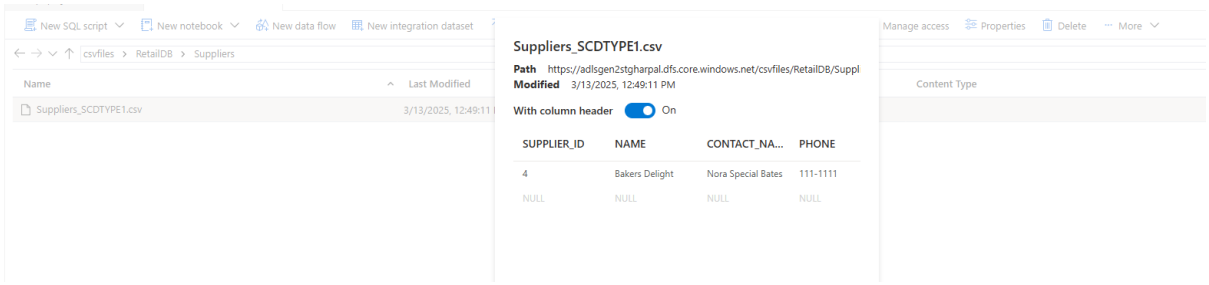
Product Data



Sales Data



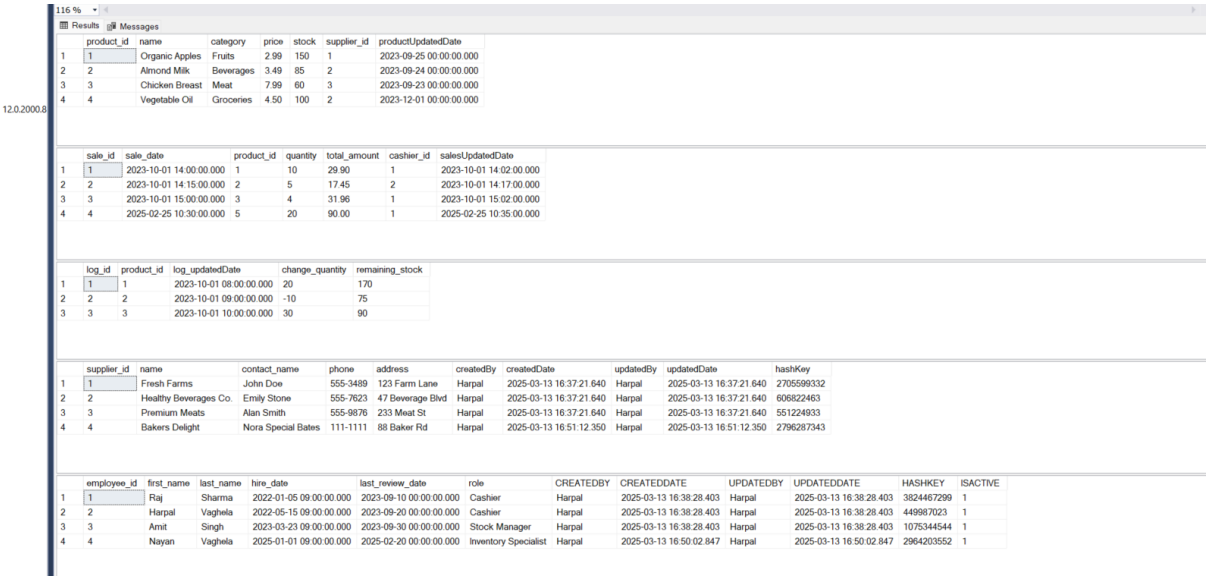
Supplier Data



Let's check the output of Azure SQL tables

Select * From tbl_Products
Select * From tbl_Sales
Select * From tbl_Inventory_Logs

Select * from tbl_Suppliers order by 1
Select * from tbl_Employee order by 1



116 %

Results Messages

	product_id	name	category	price	stock	supplier_id	productUpdatedDate
1	1	Organic Apples	Fruits	2.99	150	1	2023-09-25 00:00:00.000
2	2	Almond Milk	Beverages	3.49	85	2	2023-09-24 00:00:00.000
3	3	Chicken Breast	Meat	7.99	60	3	2023-09-23 00:00:00.000
4	4	Vegetable Oil	Groceries	4.50	100	2	2023-12-01 00:00:00.000

12.0.2000.8

	sale_id	sale_date	product_id	quantity	total_amount	cashier_id	salesUpdatedDate
1	1	2023-10-01 14:00:00.000	1	10	29.90	1	2023-10-01 14:02:00.000
2	2	2023-10-01 14:15:00.000	2	5	17.45	2	2023-10-01 14:17:00.000
3	3	2023-10-01 15:00:00.000	3	4	31.96	1	2023-10-01 15:02:00.000
4	4	2025-02-25 10:30:00.000	5	20	90.00	1	2025-02-25 10:35:00.000

	log_id	product_id	log_updatedDate	change_quantity	remaining_stock
1	1	1	2023-10-01 08:00:00.000	20	170
2	2	2	2023-10-01 09:00:00.000	-10	75
3	3	3	2023-10-01 10:00:00.000	30	90

	supplier_id	name	contact_name	phone	address	createdBy	createdDate	updatedBy	updatedDate	hashKey
1	1	Fresh Farms	John Doe	555-3489	123 Farm Lane	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	2705599332
2	2	Healthy Beverages Co.	Emily Stone	555-7623	47 Beverage Blvd	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	606822463
3	3	Premium Meats	Alan Smith	555-9876	233 Meat St	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	551224933
4	4	Bakers Delight	Nora Special Bates	111-1111	88 Baker Rd	Harpal	2025-03-13 16:51:12.350	Harpal	2025-03-13 16:51:12.350	2796287343

	employee_id	first_name	last_name	hire_date	last_review_date	role	CREATEDBY	CREATEDDATE	UPDATEDBY	UPDATEDDATE	HASHKEY	ISACTIVE
1	1	Raj	Sharma	2022-01-05 09:00:00.000	2023-09-10 00:00:00.000	Cashier	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	3824467299	1
2	2	Harpal	Vaghela	2022-05-15 09:00:00.000	2023-09-20 00:00:00.000	Cashier	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	449987023	1
3	3	Amit	Singh	2023-03-23 09:00:00.000	2023-09-30 00:00:00.000	Stock Manager	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	1075344544	1
4	4	Nayan	Vaghela	2025-01-01 09:00:00.000	2025-02-20 00:00:00.000	Inventory Specialist	Harpal	2025-03-13 16:50:02.847	Harpal	2025-03-13 16:50:02.847	2964203552	1

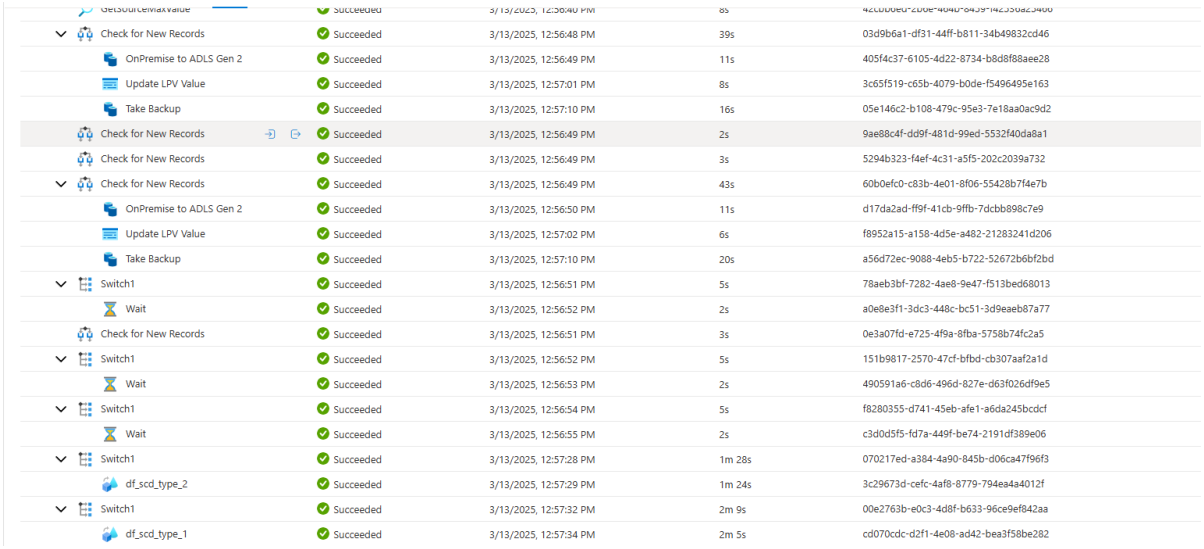
Let’s test the SCD Type 1 and 2 logic by modifying the data

```
133
134  ----Insert new data into Suppliers table --- SCD Type 1 -- 2nd Round
135  INSERT INTO Suppliers (supplier_id, name, contact_name, phone, address, supplierUpdatedDate) VALUES
136  (4, 'Bakers Magic Delight', 'Nora Magic Bates', '555-2222', '88 Baker Rd', '2025-02-23 00:00:00');
137
138  ----Update Employee Table
139  Update Employee
140  Set first_name = 'Nayansinh', last_name = 'Patel', role = 'Inventory Manager', last_review_date = '2025-02-27 00:00:00'
141  Where employee_id = 4;
142
143
144  -------------------------------------
```

----Insert new data into Suppliers table --- SCD Type 1 -- 2nd Round
INSERT INTO Suppliers (supplier_id, name, contact_name, phone, address, supplierUpdatedDate) VALUES
(4, 'Bakers Magic Delight', 'Nora Magic Bates', '555-2222', '88 Baker Rd', '2025-02-23 00:00:00');

----Update Employee Table
Update Employee
Set first_name = 'Nayansinh', last_name = 'Patel', role = 'Inventory Manager', last_review_date = '2025-02-27 00:00:00'
Where employee_id = 4;

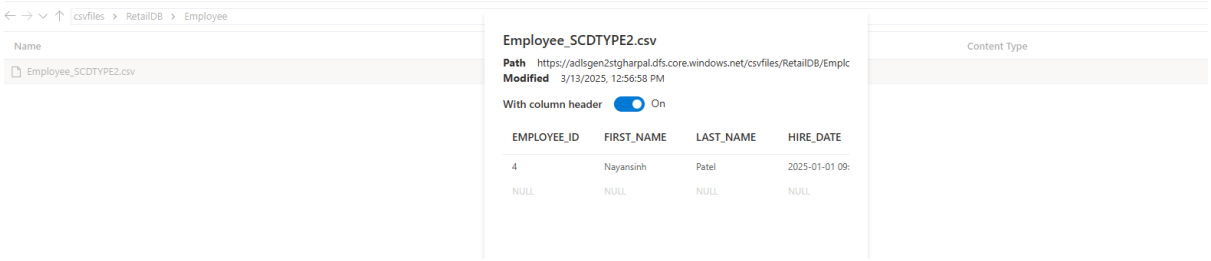
Debug the Pipeline



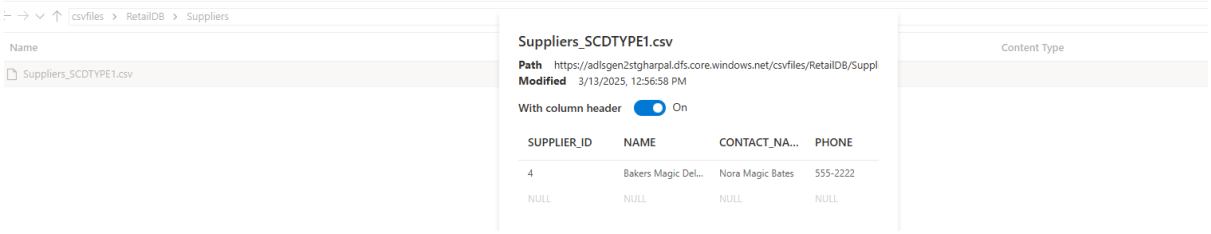
Check for New Records	Succeeded	3/13/2025, 12:56:48 PM	39s	03d9b6a1-df31-44ff-b811-34b49832cd46
OnPremise to ADLS Gen 2	Succeeded	3/13/2025, 12:56:49 PM	11s	405f4c37-6105-4d22-8734-b8d8f88aee28
Update LPV Value	Succeeded	3/13/2025, 12:57:01 PM	8s	3c65f519-c65b-4079-b0de-f5496495e163
Take Backup	Succeeded	3/13/2025, 12:57:10 PM	16s	05e146c2-b108-479c-95e3-7e18aa0ac9d2
Check for New Records	Succeeded	3/13/2025, 12:56:49 PM	2s	9ae88c4f-dd9f-481d-99ed-5532f40da8a1
Check for New Records	Succeeded	3/13/2025, 12:56:49 PM	3s	5294b323-f4ef-4c31-a5f5-202c2039a732
Check for New Records	Succeeded	3/13/2025, 12:56:49 PM	43s	60b0efc0-c83b-4e01-8f06-55428b7f4e7b
OnPremise to ADLS Gen 2	Succeeded	3/13/2025, 12:56:50 PM	11s	d17da2ad-ff9f-41cb-9ffb-7dcbb898c7e9
Update LPV Value	Succeeded	3/13/2025, 12:57:02 PM	6s	f8952a15-a158-4d5e-a482-21283241d206
Take Backup	Succeeded	3/13/2025, 12:57:10 PM	20s	a56d72ec-9088-4eb5-b722-52672b6bf2bd
Switch1	Succeeded	3/13/2025, 12:56:51 PM	5s	78aeb3bf-7282-4ae8-9e47-f513bed68013
Wait	Succeeded	3/13/2025, 12:56:52 PM	2s	a0e8e3f1-3dc3-448c-bc51-3d9eaeb87a77
Check for New Records	Succeeded	3/13/2025, 12:56:51 PM	3s	0e3a07fd-e725-4f9a-8fba-5758b74fc2a5
Switch1	Succeeded	3/13/2025, 12:56:52 PM	5s	151b9817-2570-47cf-bfbd-cb307aaf2a1d
Wait	Succeeded	3/13/2025, 12:56:53 PM	2s	490591a6-c8d6-496d-827e-d63f026df9e5
Switch1	Succeeded	3/13/2025, 12:56:54 PM	5s	f8280355-d741-45eb-afe1-a6da245bcdcf
Wait	Succeeded	3/13/2025, 12:56:55 PM	2s	c3d0d5f5-fd7a-449f-be74-2191df389e06
Switch1	Succeeded	3/13/2025, 12:57:28 PM	1m 28s	070217ed-a384-4a90-845b-d06ca47f96f3
df_scd_type_2	Succeeded	3/13/2025, 12:57:29 PM	1m 24s	3c29673d-cefc-4af8-8779-794ea4a4012f
Switch1	Succeeded	3/13/2025, 12:57:32 PM	2m 9s	00e2763b-e0c3-4d8f-b633-96ce9ef842aa
df_scd_type_1	Succeeded	3/13/2025, 12:57:34 PM	2m 5s	cd070cdc-d2f1-4e08-ad42-bea3f58be282

Check the data in the ADLS Gen 2 storage account

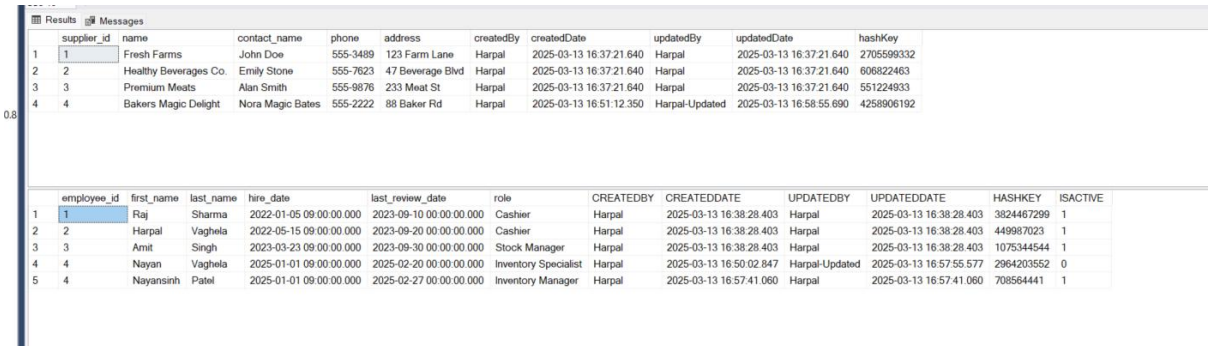
Employee Data



Supplier Data



Check the data in Azure SQL Tables



Results Messages

	supplier_id	name	contact_name	phone	address	createdBy	createdDate	updatedBy	updatedDate	hashKey
1	1	Fresh Farms	John Doe	555-3489	123 Farm Lane	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	2705599332
2	2	Healthy Beverages Co.	Emily Stone	555-7623	47 Beverage Blvd	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	606822463
3	3	Premium Meats	Alan Smith	555-9876	233 Meat St	Harpal	2025-03-13 16:37:21.640	Harpal	2025-03-13 16:37:21.640	551224933
4	4	Bakers Magic Delight	Nora Magic Bates	555-2222	88 Baker Rd	Harpal	2025-03-13 16:51:12.350	Harpal-Updated	2025-03-13 16:58:55.690	4258906192

	employee_id	first_name	last_name	hire_date	last_review_date	role	CREATEDBY	CREATEDDATE	UPDATEDBY	UPDATEDDATE	HASHKEY	ISACTIVE
1	1	Raj	Sharma	2022-01-05 09:00:00.000	2023-09-10 00:00:00.000	Cashier	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	3824467299	1
2	2	Harpal	Vaghela	2022-05-15 09:00:00.000	2023-09-20 00:00:00.000	Cashier	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	449987023	1
3	3	Amit	Singh	2023-03-23 09:00:00.000	2023-09-30 00:00:00.000	Stock Manager	Harpal	2025-03-13 16:38:28.403	Harpal	2025-03-13 16:38:28.403	1075344544	1
4	4	Nayan	Vaghela	2025-01-01 09:00:00.000	2025-02-20 00:00:00.000	Inventory Specialist	Harpal	2025-03-13 16:50:02.847	Harpal-Updated	2025-03-13 16:57:55.577	2964203552	0
5	4	Nayansinh	Patel	2025-01-01 09:00:00.000	2025-02-27 00:00:00.000	Inventory Manager	Harpal	2025-03-13 16:57:41.060	Harpal	2025-03-13 16:57:41.060	708564441	1

We got the expected output in these tables.

Thank you

You can connect with me on these profiles:

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Medium Blog: https://medium.com/@harpalvaghela

Website: https://www.harpalvaghela.com/