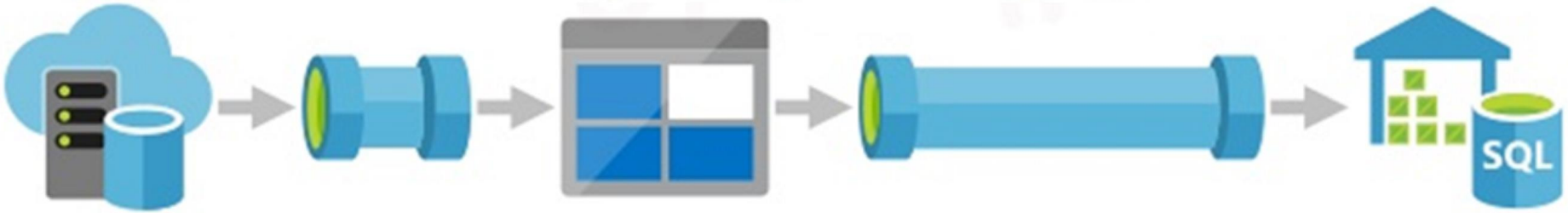
Azure Data Factory

Cloud version of SSIS

What can you do in Azure Data Factory?



Copy Data Transform Data

Copy Data

More than 80 connectors to different services are available

Transform Data

Using newly added Data Flow, now Data Factory is complete cloud based ETL tool.

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Azure Data Factory

Definition:

Azure Data Factory (ADF) is a hybrid data integration service that enables you to quickly and efficiently create automated data pipelines – without having to write any code!

Azure Data Factory

- Hybrid Data Integration Service
- Simplifies ETL at scale
- Enables modern data integration
- Drag and drop interface
- Over 80 connectors available
- Move, transform and save data
- Managed Service
- Create Data Driver workflows
- Orchestrate and automate data movement
- Transform and store data
- Operationalize the process
- ETL or ELT scenarious

Data Factory on Azure Ecosystem

01 Migration?

Data Factory excels in periodic data loads and transformation instead.

02 Streaming?

ADF can orchestrate, but there are other dedicated services for streaming

03 Transformations?

Data flows for simple ones, but you can use Databricks or HDInsight for more complex transforms

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SSIS vs Data Factory

SSIS	Data Factory
More code-free transformations	Much higher scalability
On Premises connectors (e.g excel)	Cloud and SaaS Connectors
	Event based Triggers
	Can use SSIS Packages

Data Factory considerations

Two versions	Build options	Highly integrated	No data storage	Security standards
ADF V2 is the current and improved version	PowerShell, .Net, Python, REST, ARM	DevOps, Key Vault, Monitor, Automation	Need to persist data by the end.	HTTP/TLS whenever possible

Azure Data Factory Components

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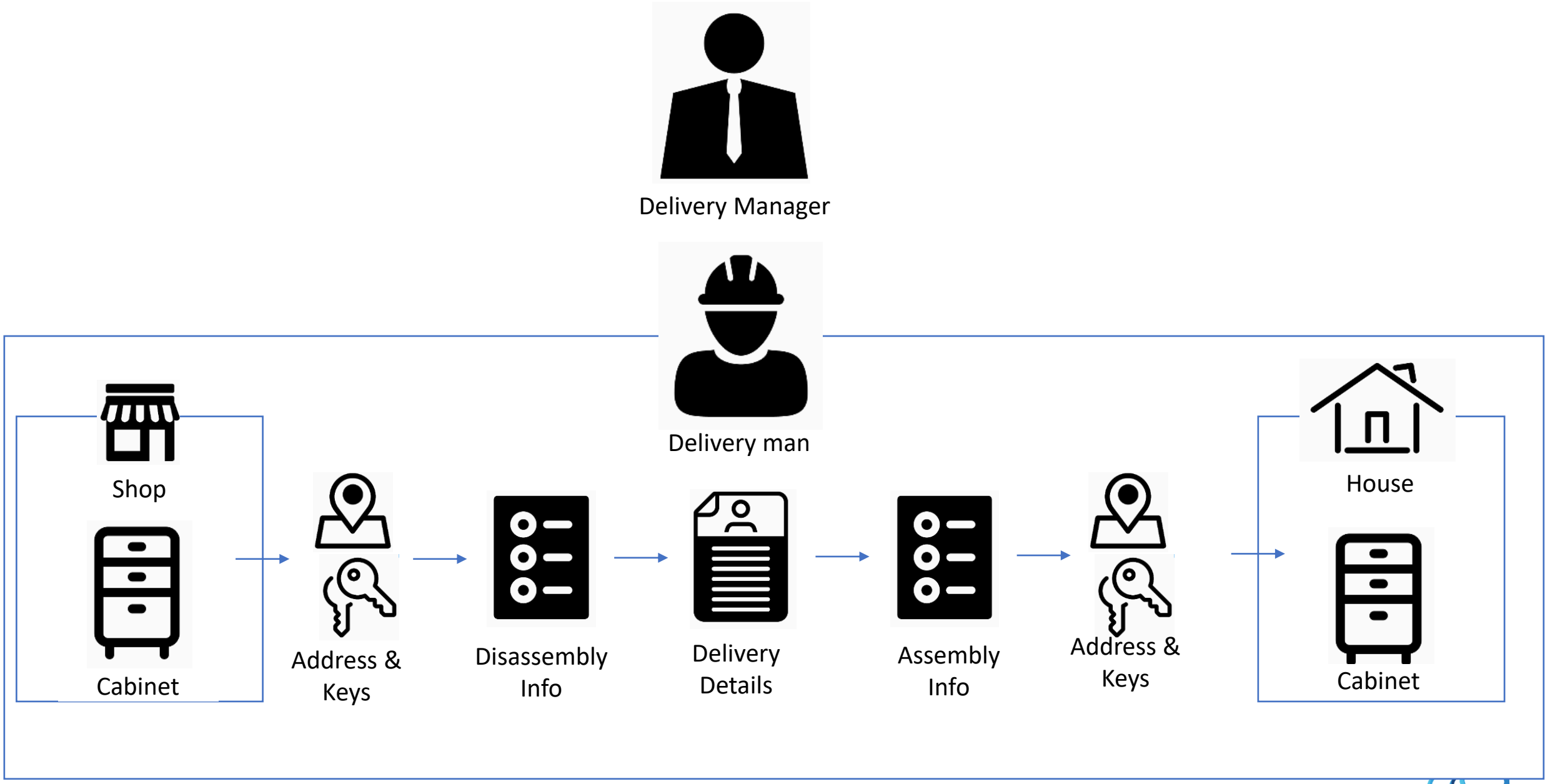

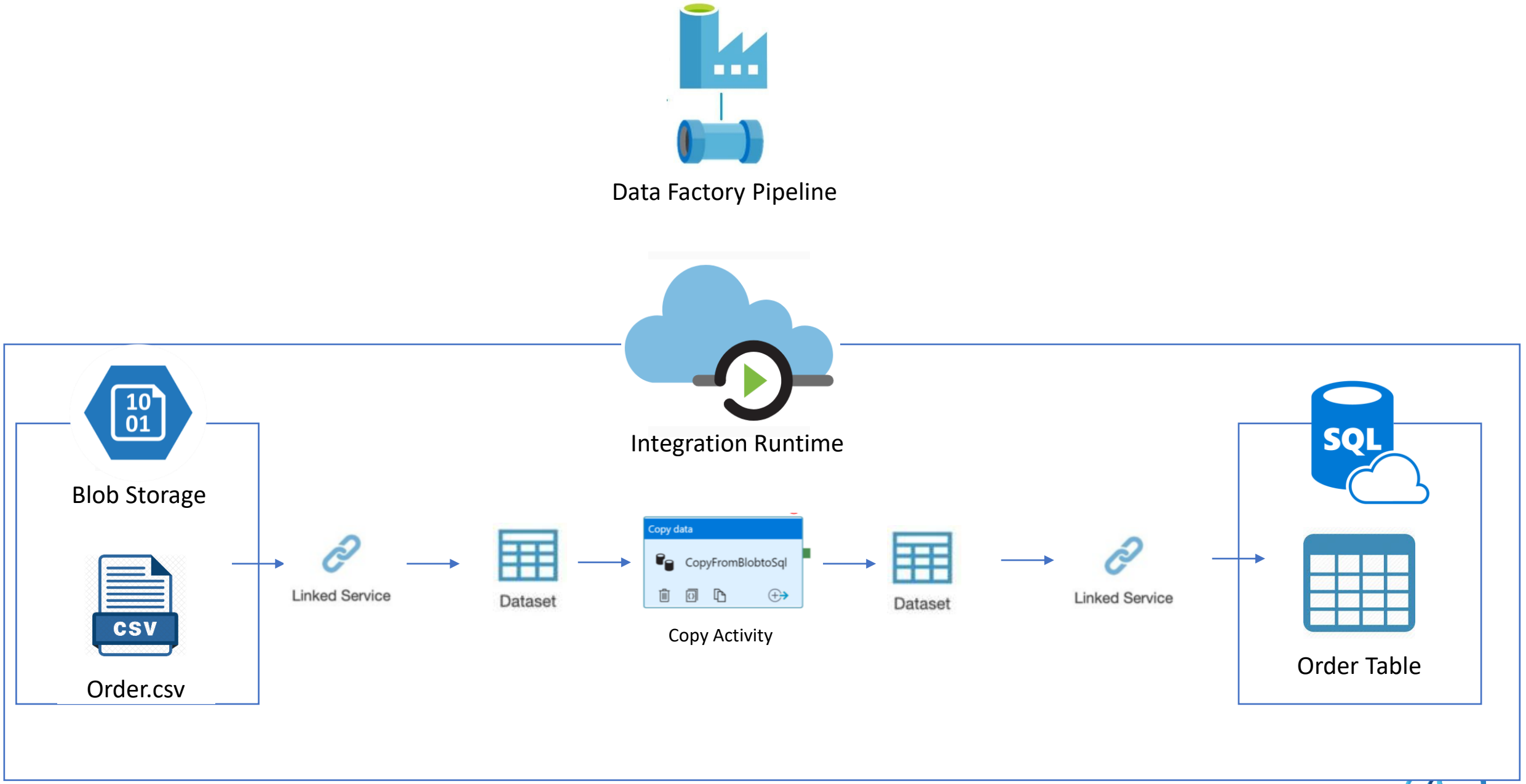
Data Factory Pipeline
Integration Runtime
Blob Storage
Order.csv
Linked Service
Dataset
Copy data
CopyFromBlobtoSql
Copy Activity
Dataset
Linked Service
SQL
Order Table
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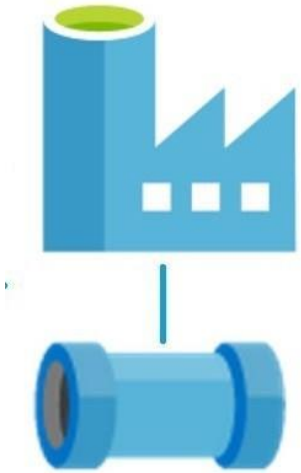
Data Factory vs SSIS

Azure Data Factory	SSIS
Pipeline	Package
Linked Service	Connection manager
Source	Source
Sink	Destination
Activity	Control flow task
Data Flow	Data flow



Data Factory
Pipeline

- Data Factories can contain one ore more pipelines
- Logical group of Activities
- Manage Activities as a set
- One Pipeline can have one or more activities

Azure Data Factory Activities

- Represents a processing step in the pipelines
- Actions to perform on data
  - Ingest data
  - Transform data
  - Store data
- Can be linked
  - Execute sequentially or
  - Run in parallel

Activity types

01 Data movement activities

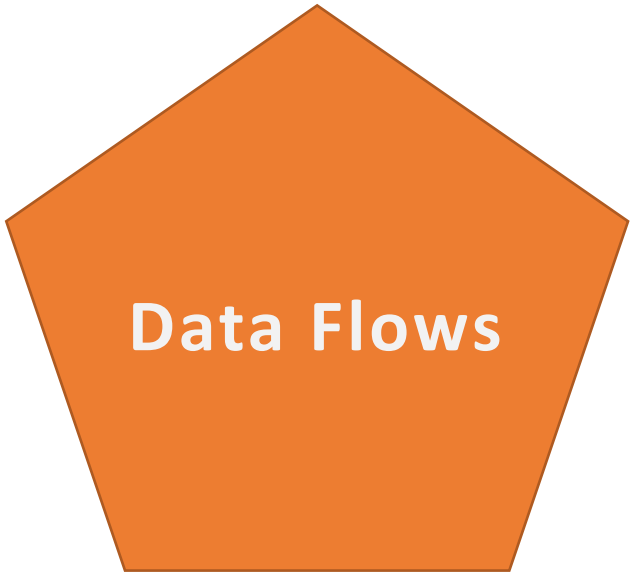
Copy data amongst data stores located on-premises and in the cloud
Data stores – Blob storage, Cosmos DB, Amazon Redshift, Google BigQuery Hive, Maria DB…etc.

02 Data transformation activities

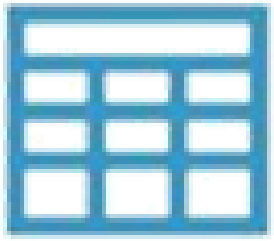
Transform and enrich data
e.g. Hive, Pig, MapReduce, Spark or Databricks

03 Control activities

Control pipeline flow
e.g. ForEach, Web



- Data Flow is a new feature of Azure Data Factory (ADF) that allows you to develop graphical data transformation logic that can be executed as activities within ADF pipelines.
- Two types:
  - Mapping
  - Wrangling



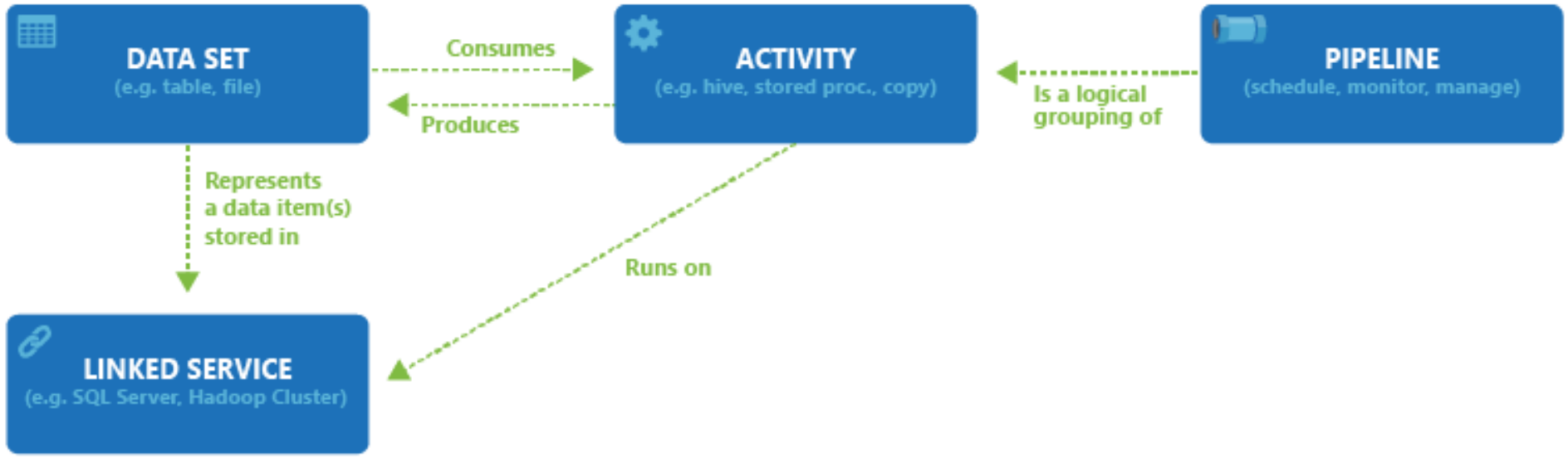
Dataset

- Simply point or reference the data
- Reference data used in an Activity
  - Files
  - Folders
  - Documents
  - Tables

Linked service

- Similar to connection string
- Represent the connection information to connect to external resources
  - Datastores like Azure SQL Server
  - Compute resource e.g. Spark Cluster

ADF Components



Integration Runtimes

- Provides fully managed, serverless compute infrastructure
  - You don't have to worry about infrastructure provision, software installation, patching, or capacity scaling.
  - Pay only for duration of actual use
- Bridges between the activity and linked service
  - Activity defines the action
  - Linked service define the location

Integration Runtimes

- **Data Integration Capabilities**
  - **Data Flow**
  - **Data Movement**
    - Format conversion, column mapping, serialization/ deserialization etc.
    - Provides the native compute to move data between cloud data stores in a secure, reliable, and high-performance manner.
  - **Activity dispatch** (e.g. Databricks Notebook, HDInsight Hive, pig, spark activity, SP, ADL Analytics U-SQL activity)
  - **SSIS Package execution**

Integration Runtimes

Specify the infrastructure to run activities

Azure Integration Runtime

Work on public networks

Responsible for data flows, data movements, and activity dispatches

Self-hosted Integration Runtime

Work on public and private networks

Provide data movement and activity dispatch capabilities

Need to install on on-premises machine or a virtual machine inside private network

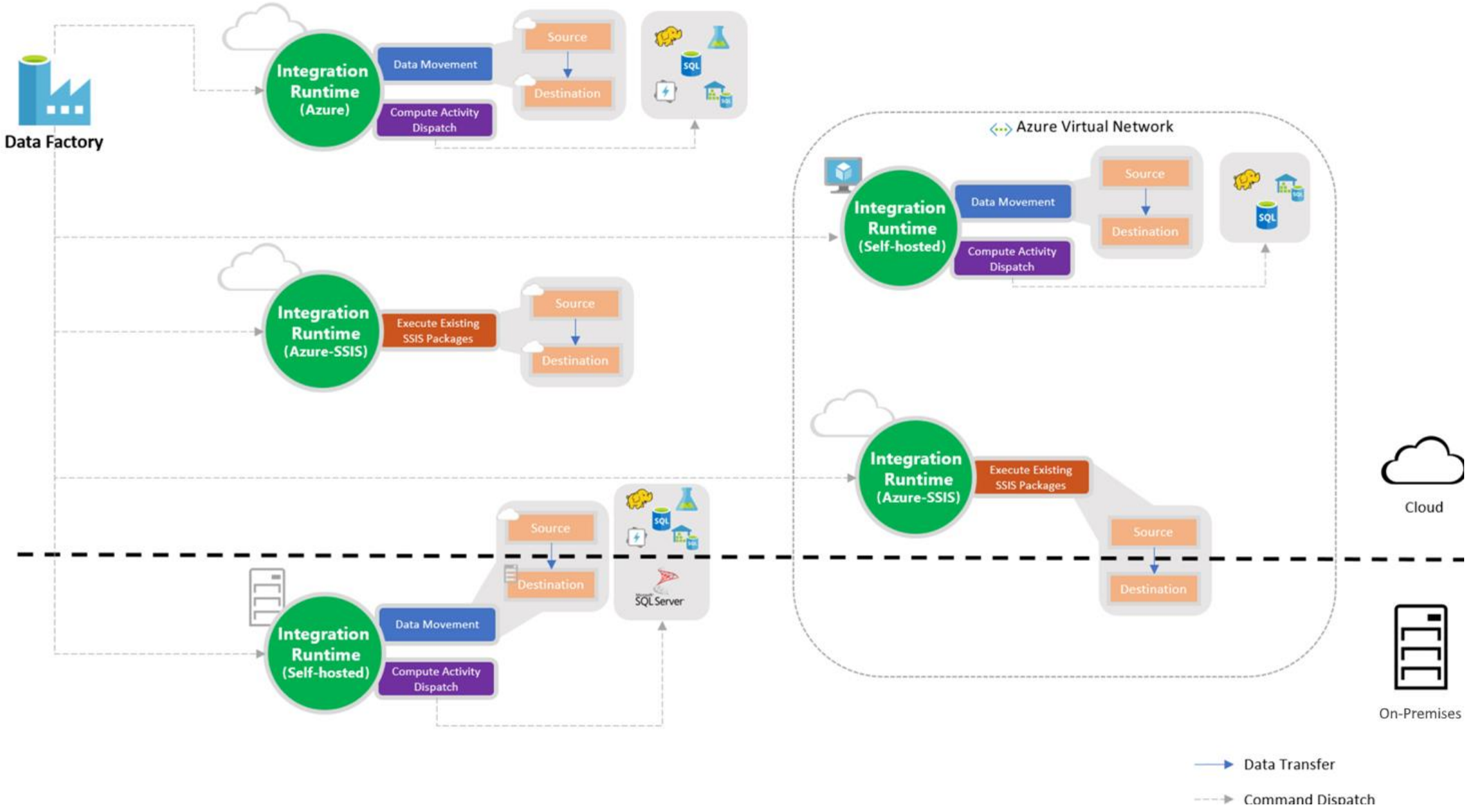
SSIS Integration Runtime

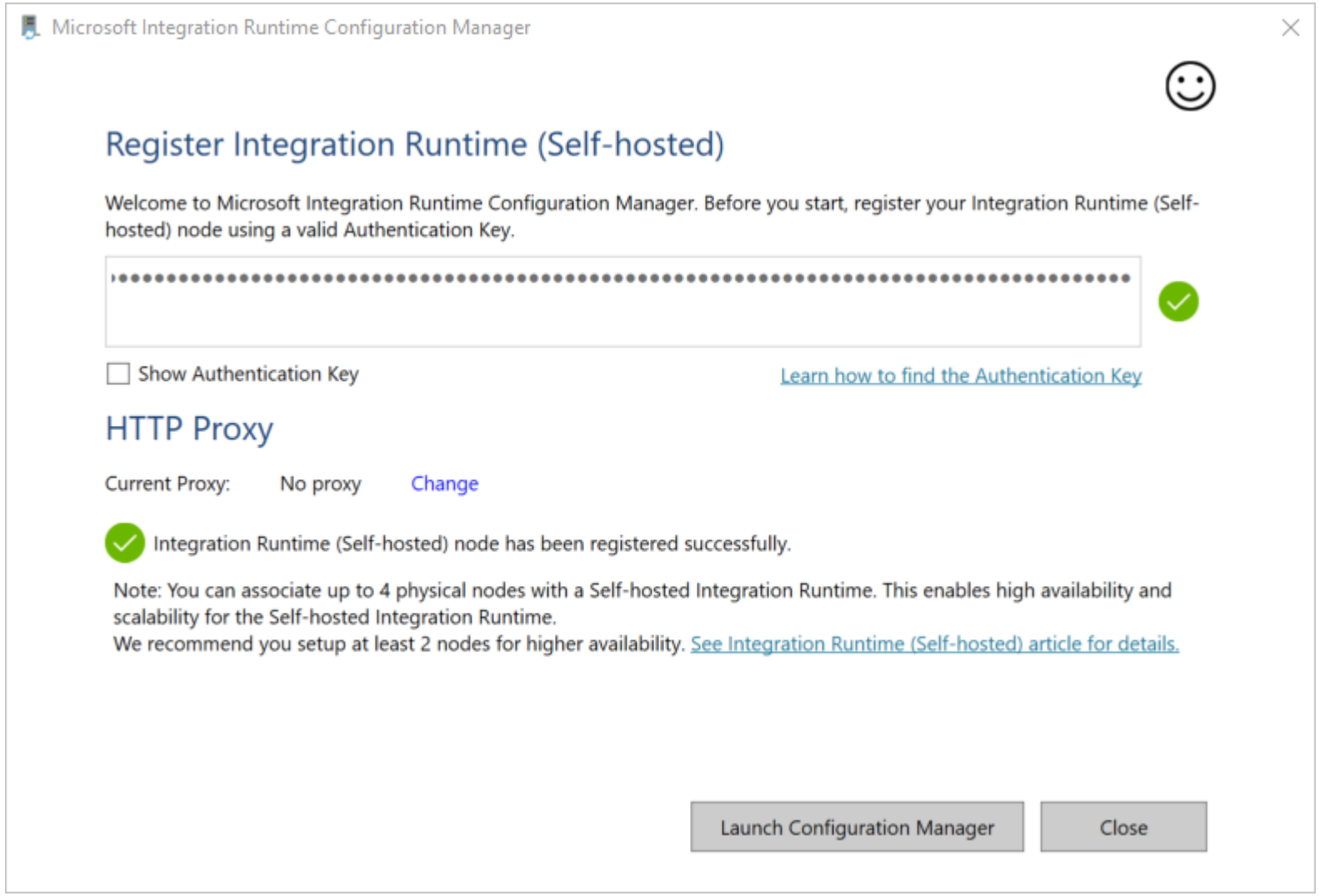
Supports SSIS package execution

Works on public and private networks

Integration Runtimes

IR type	Public network	Private network
Azure	Data Flow Data movement Activity dispatch	
Self-hosted	Data movement Activity dispatch	Data movement Activity dispatch
Azure-SSIS	SSIS package execution	SSIS package execution



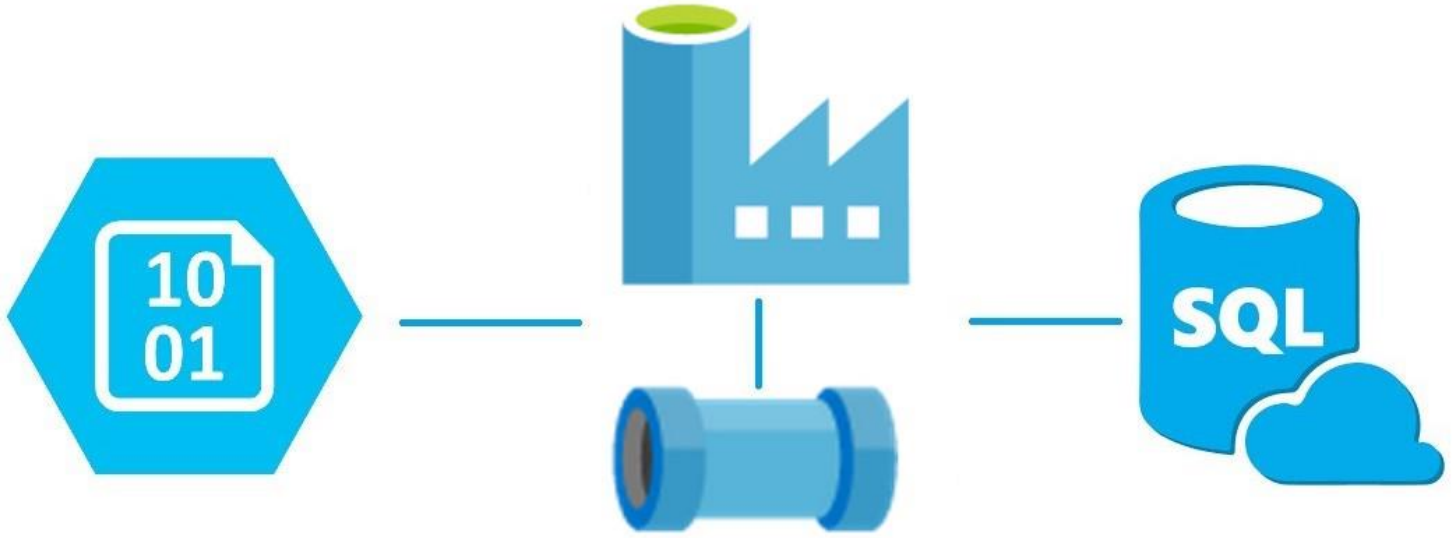


Integration Runtimes

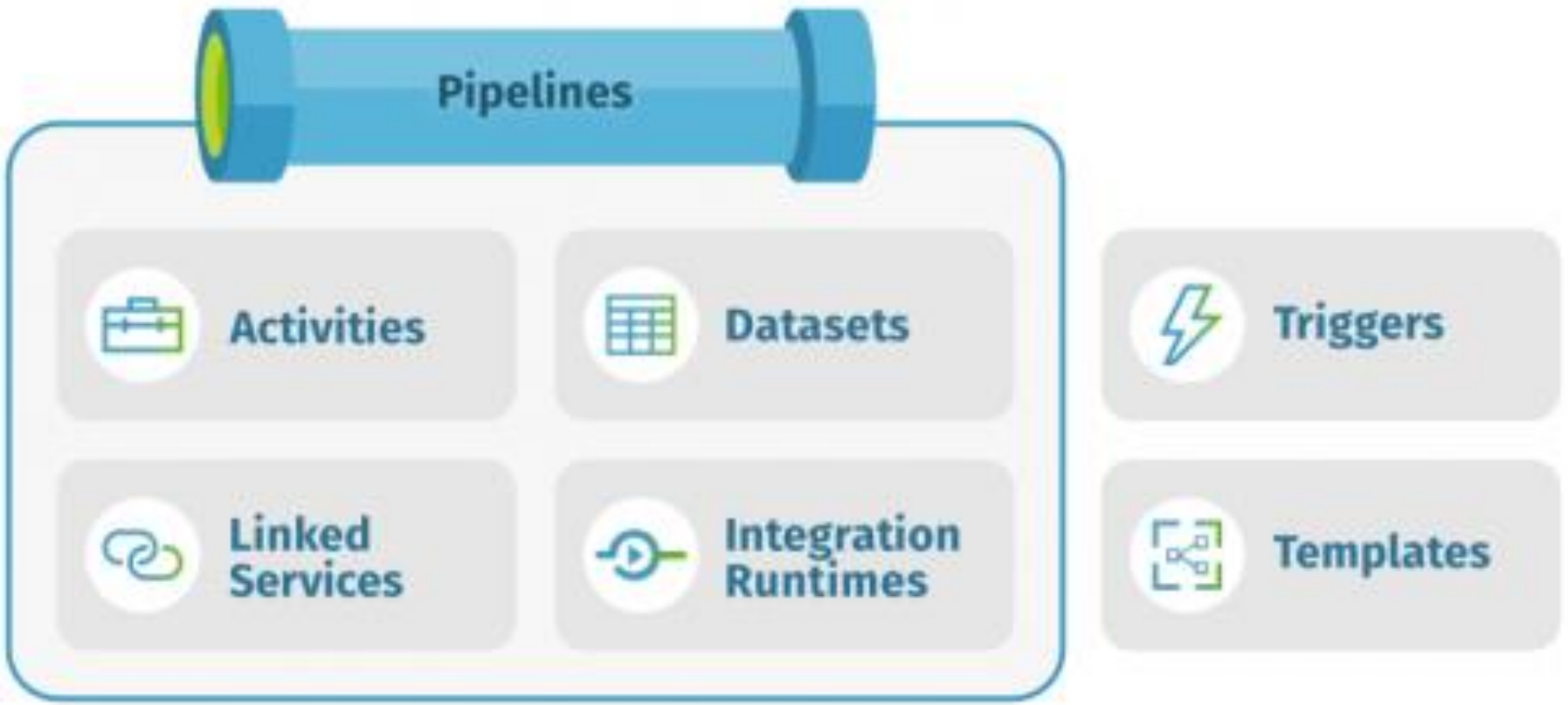
- Default IR – AutoResolveIntegrationRuntime
- Create Azure IR
  - When you want to explicitly define the location of IR
  - Virtually group the activities executions on different IR for management purpose

- **Execute pipeline**
- **Many to many relationship b/w pipeline and trigger**
- **Three types of Trigger**
  - **Schedule Trigger** – Invoke pipeline on a wall-clock schedule
  - **Tumbling Window Trigger –** Operates on a periodic interval, also retain state
  - one-to-one relationship
  - Advance configuration options - Dependencies, delay, retry, concurrency
  - Properties - trigger().outputs.WindowStartTime/WindowEndTime
  - **Event-based Trigger –** trigger pipeline in response to an event
    - e.g. Arrival/deletion of file in Blob storage
    - Event trigger with Azure Event Grid Service
    - Properties – triggerBody().folderPath/fileName

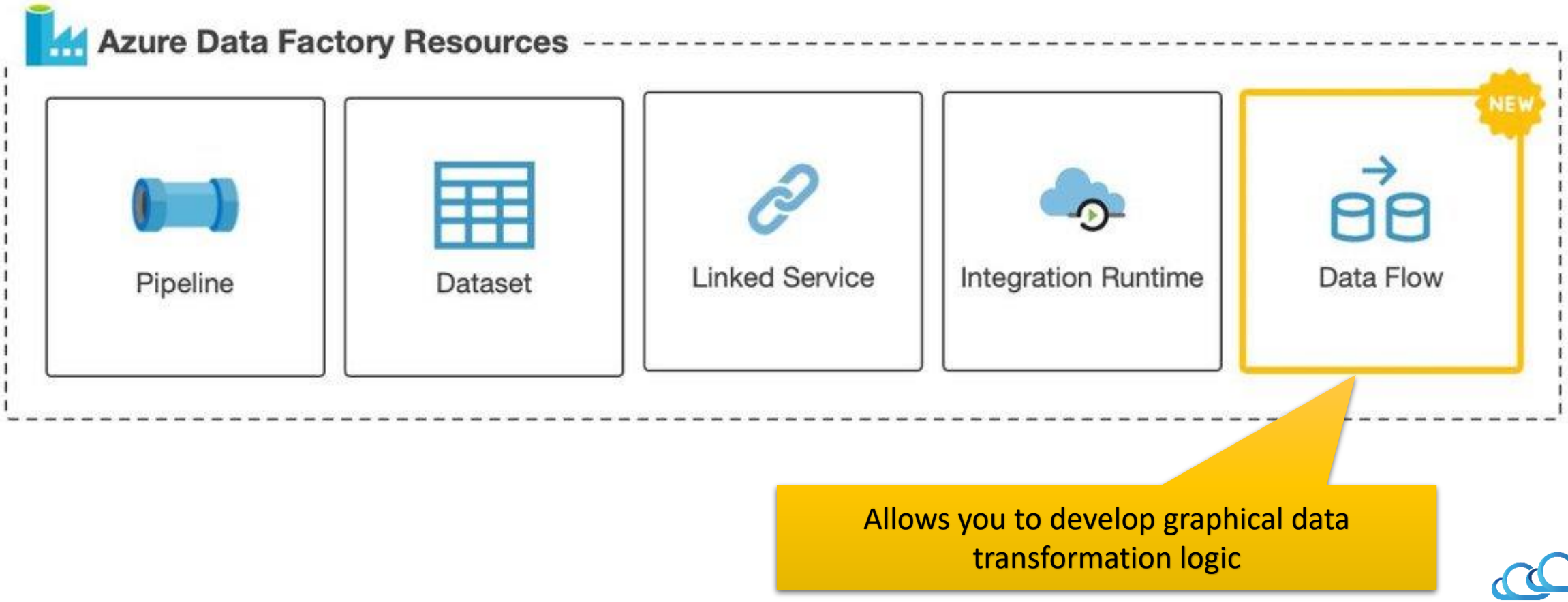
Demo: Copy Activity



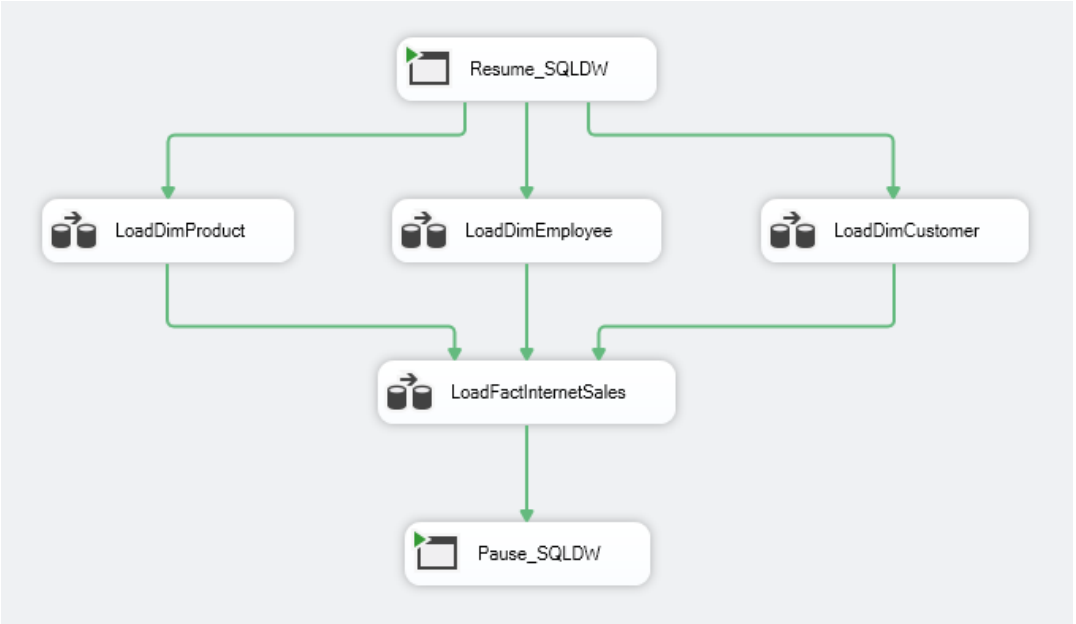
Summary



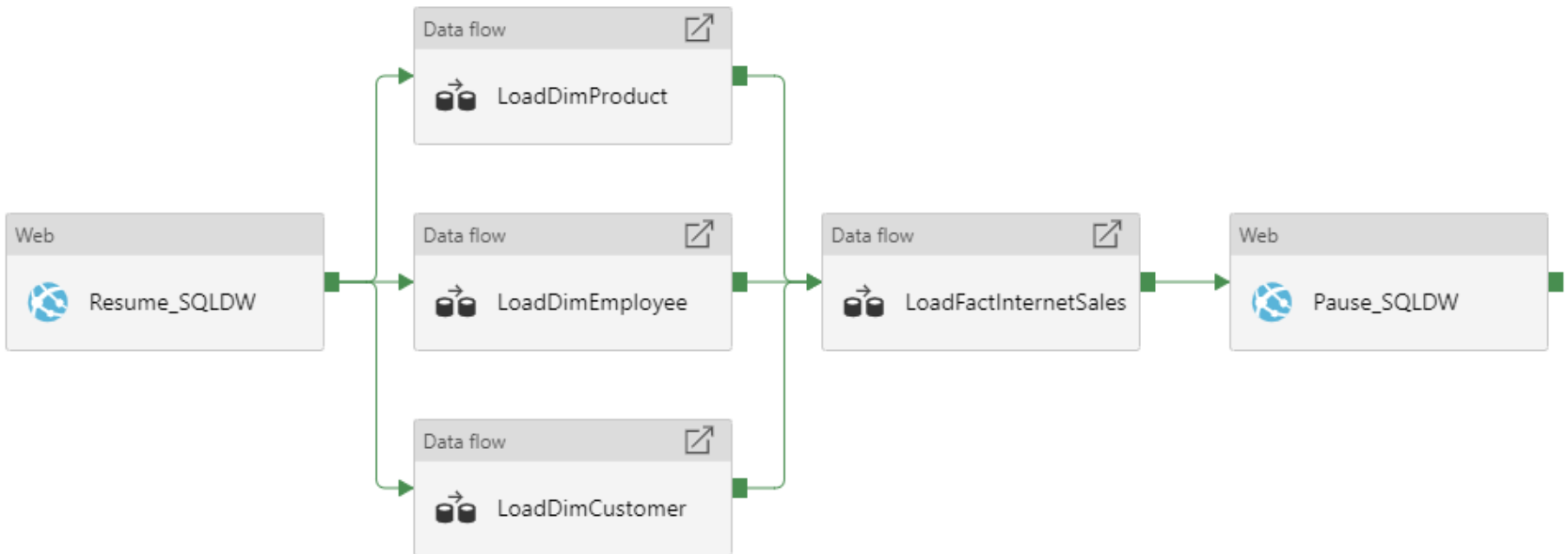
Data Flows



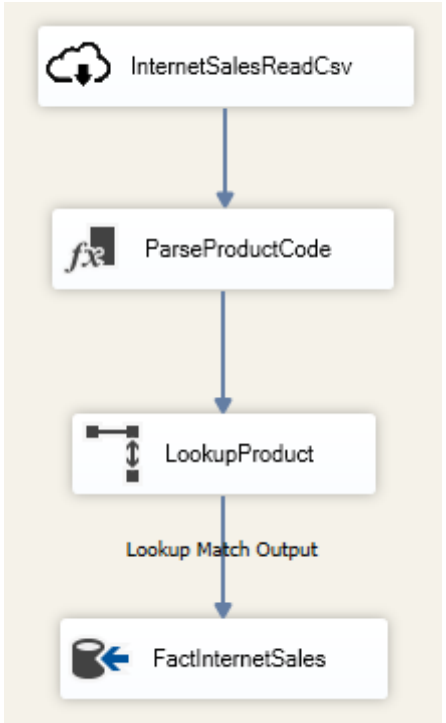
Example of the SSIS Control Flow tab for loading our data mart tables:



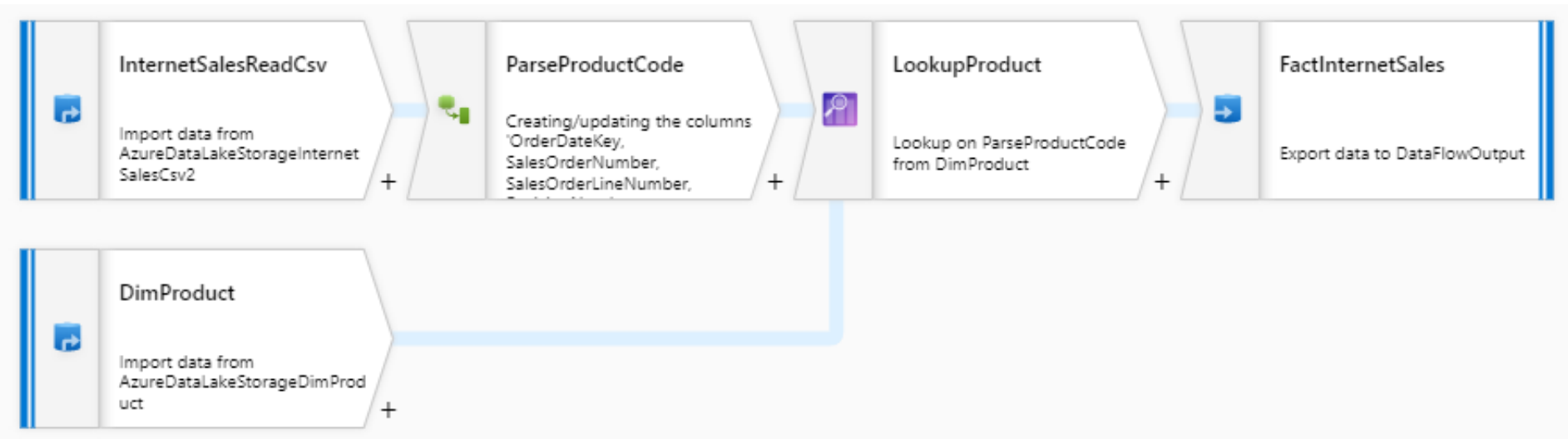
Example of the ADF Pipeline for loading our data mart tables:

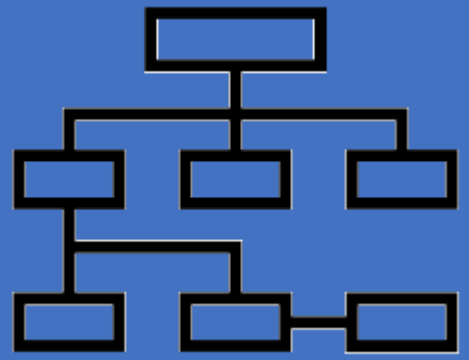


Example of SSIS Data Flow tab for loading the FactInternetSales table:



Example of ADF Mapping Data Flows for loading the FactInternetSales table:



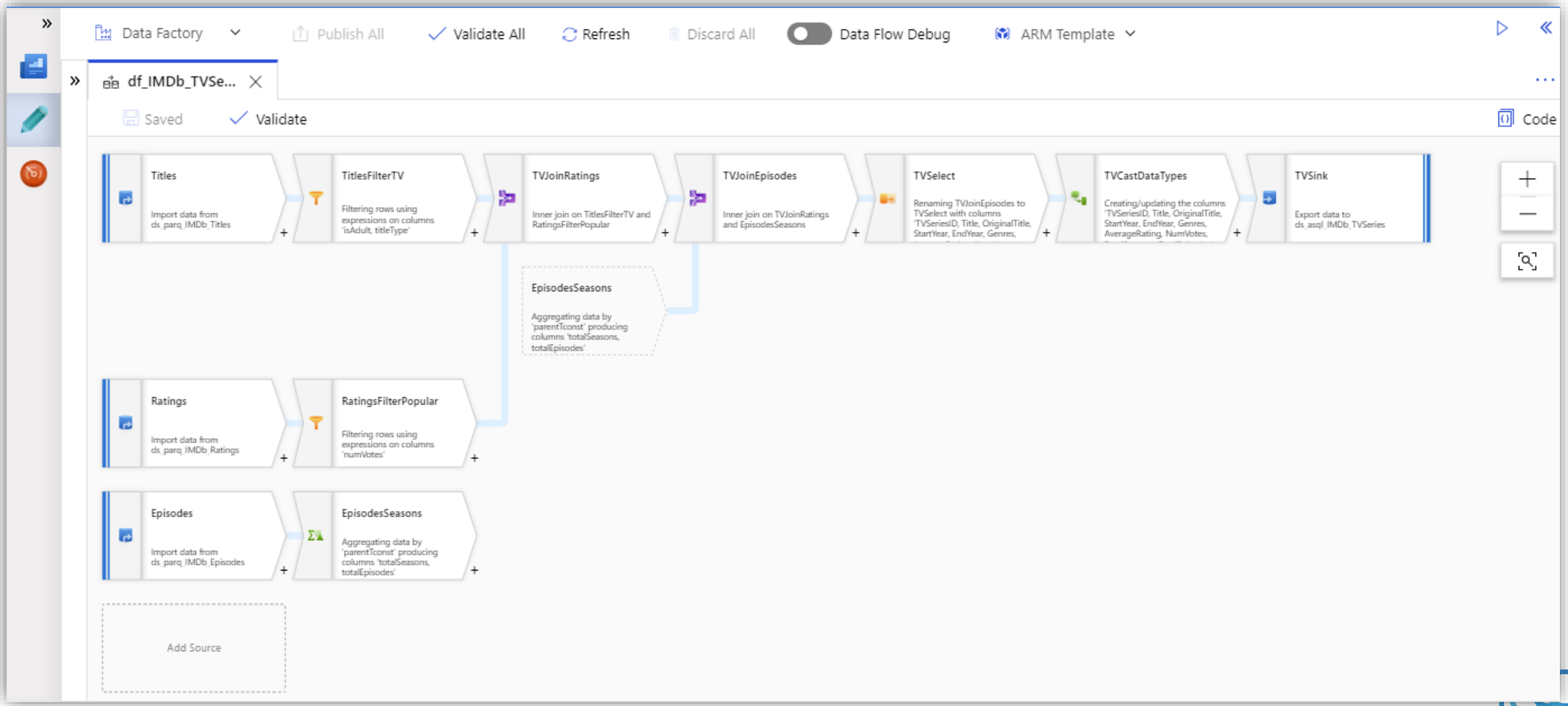


Data Flow

Mapping Data flow – Transform Data (Known data and schema)

Wrangling Data flow – Prepare and explore data using power query (known or unknown datasets)

Mapping Data Flows



Mapping Data Flow Actions

Multiple Inputs/outputs

Join

Conditional Split

Exists

Union

Lookup

Schema Modifiers

Derived Columns

Select

Aggregate

Surrogate key

Pivot

Unpivot

Window

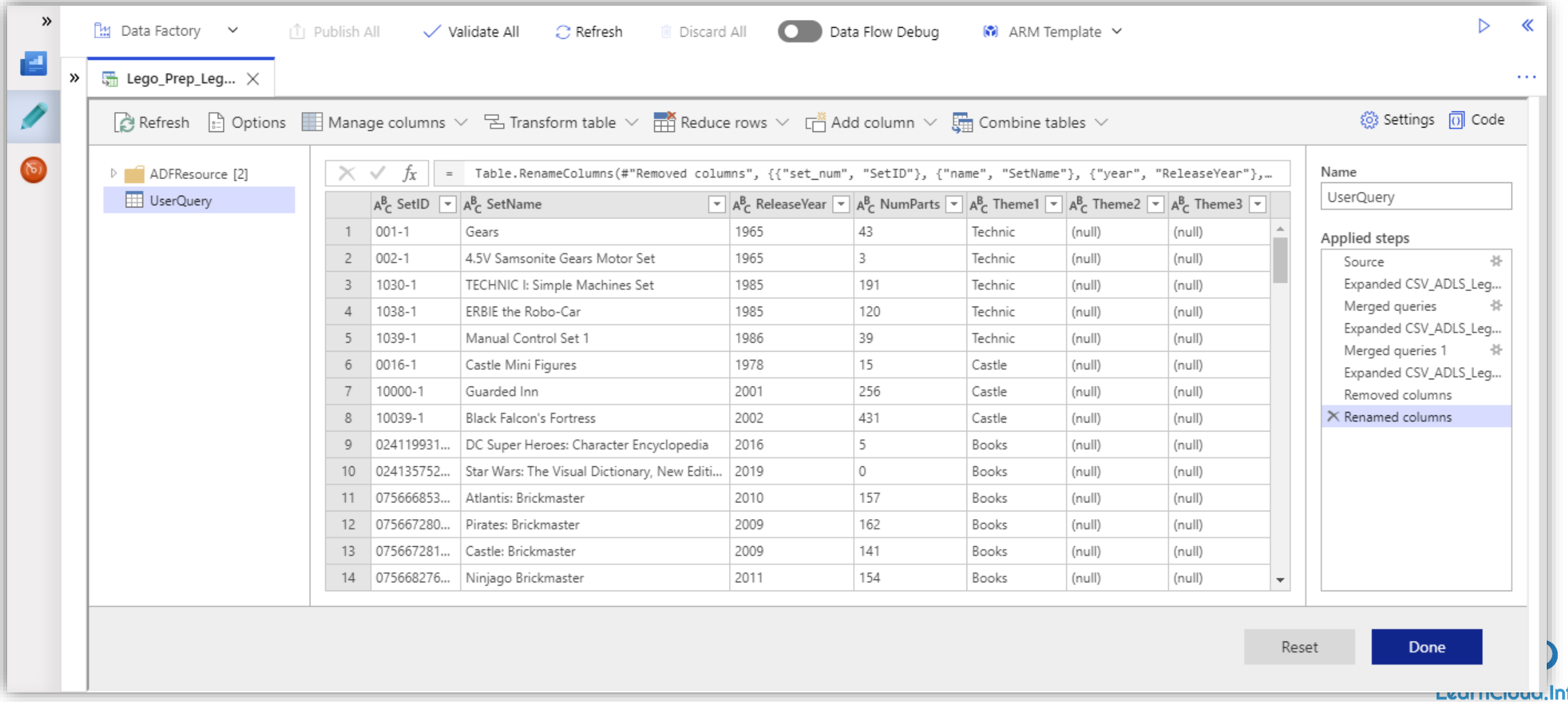
Row Modifiers

Filter

Sort

Alter Row

Wrangling Data Flows



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2	002-1	4.5V Samsonite Gears Motor Set	1965	3	Technic	(null)	(null)
3	1030-1	TECHNIC I: Simple Machines Set	1985	191	Technic	(null)	(null)
4	1038-1	ERBIE the Robo-Car	1985	120	Technic	(null)	(null)
5	1039-1	Manual Control Set 1	1986	39	Technic	(null)	(null)
6	0016-1	Castle Mini Figures	1978	15	Castle	(null)	(null)
7	10000-1	Guarded Inn	2001	256	Castle	(null)	(null)
8	10039-1	Black Falcon's Fortress	2002	431	Castle	(null)	(null)
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10	024135752...	Star Wars: The Visual Dictionary, New Editi...	2019	0	Books	(null)	(null)
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12	075667280...	Pirates: Brickmaster	2009	162	Books	(null)	(null)
13	075667281...	Castle: Brickmaster	2009	141	Books	(null)	(null)
14	075668276...	Ninjago Brickmaster	2011	154	Books	(null)	(null)

Data flows behind the scene

- Behind the scene Data flow will execute on Azure Databricks using Spark
- ADF internally handles all the code translation, spark optimization and execution of transformation