Azure Data Factory: Mapping Data Flow – first blood

Kamil Nowiński


innova
community


CONSORZIO
UNIVERSITARIO
DI PORDENONE


Microsoft


PASS


altitudo


beanTech
IT moves your business


fluentis


PALAZZETTI
IL CALORE CHE PIACE ALLA NATURA


WÜRTHPHOENIX

About me

Kamil Nowinski

Microsoft Data Platform **MVP**
Speaker, blogger, data enthusiast

Senior Data Engineer at ASOS (www.asos.com)
15+ yrs experience as DEV/DBA

Member of the Data Community PL

Project member of „SCD Merge Wizard"

Founder of blog SQLPlayer (www.SQLplayer.net)

SQL Server Certificates:
MCITP, MCP, MCTS, MCSA, MCSE Data Platform,
MCSE Data Management & Analytics

Moreover: Bicycle, Running, Digital photography
@NowinskiK, @SQLPlayer

BLOG & Interviews

PODCAST

SQL Player

Play with data & have fun!

www.SQLPlayer.net

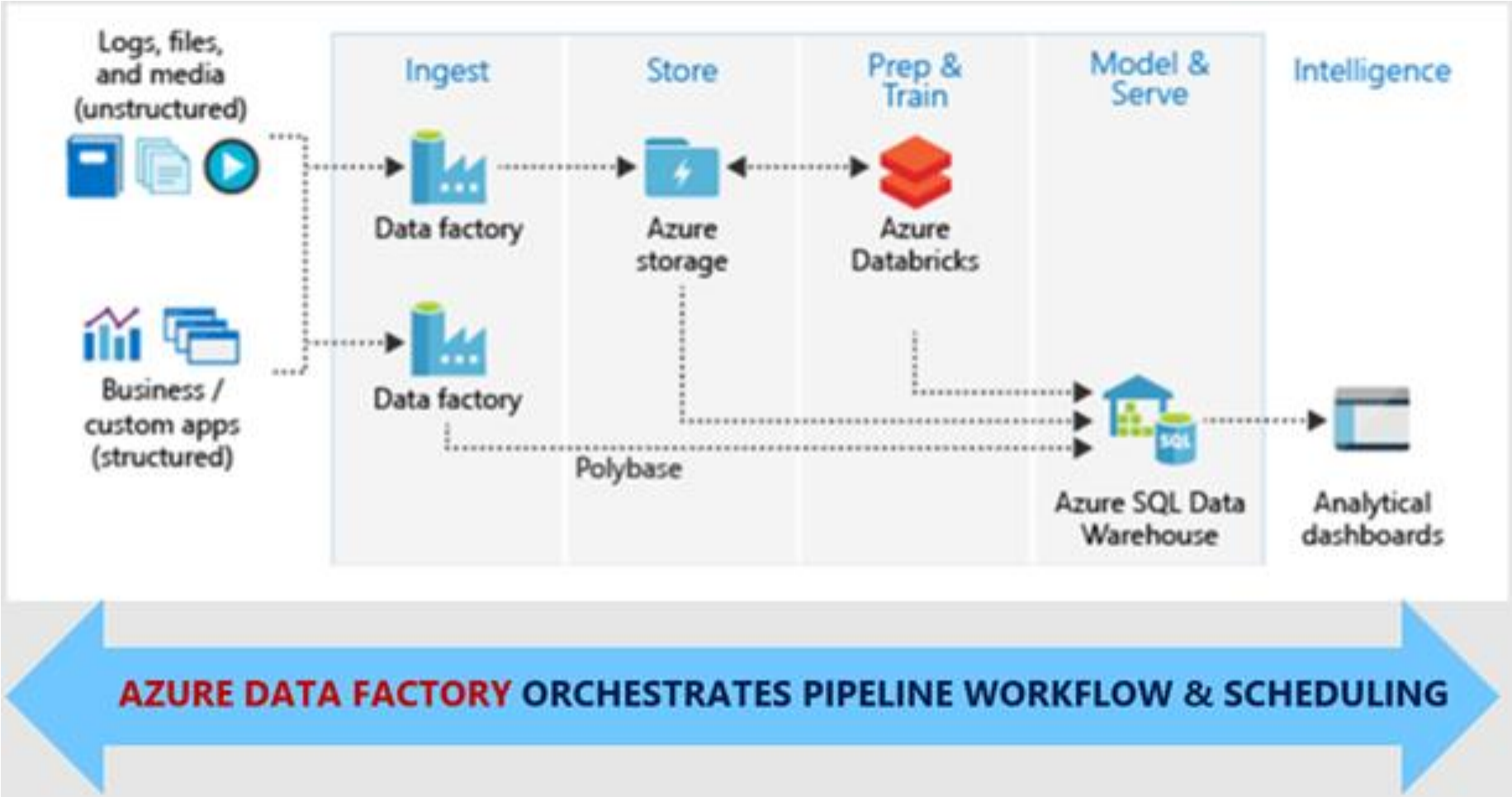
innOva community · altitudo · beanTech IT moves your business · fluentis · PALAZZETTI IL CALORE CHE PIACE ALLA NATURA · WÜRTHPHOENIX · PASS · Microsoft · CONSORZIO UNIVERSITARIO DI PORDENONE

Ask SQL Family – episodes to date

https://youtu.be/gs0PhoN0Ni0

Short MOVIE

What the Azure Data Factory is?



Access all your data

- 75+ connectors & growing
- Azure IR available in 20 regions
- Hybrid connectivity using self-hosted IR: on-prem & VNet

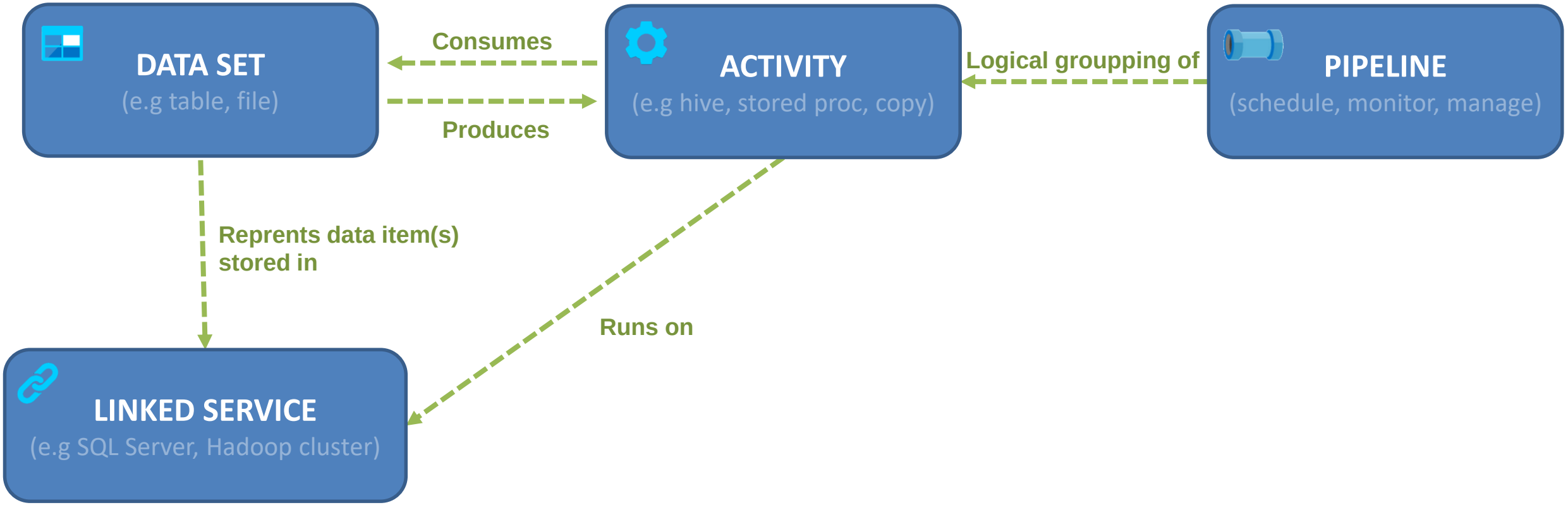
Azure (13)	Database (24)		File Storage (5)	NoSQL (3)	Services and Apps (28)		Generic (4)
Blob Storage	Amazon Redshift	Netezza	Amazon S3	Cassandra	Amazon MWS	Office 365 *	HTTP
Cosmos DB (MongoDB API) *	DB2	Oracle	File System	Couchbase	CDS for Apps	Paypal	OData
Cosmos DB (SQL API)	Drill	Phoenix	FTP	MongoDB	Concur	QuickBooks	ODBC
Data Lake Storage Gen1	Google BigQuery	PostgreSQL	HDFS		Dynamics 365	Salesforce	REST *
Data Lake Storage Gen2	Greenplum	Presto	SFTP		Dynamics CRM	Salesforce Marketing Cloud	
DB for MySQL	HBase	SAP BW			GE Historian	Salesforce Service Cloud	
DB for PostgreSQL	Hive	SAP HANA			Google AdWords	SAP C4C	
File Storage	Impala	Spark			HubSpot	SAP ECC	
Kusto *	Informix	SQL Server			Jira	ServiceNow	
Search Index	MariaDB	Sybase			Magento	Shopify	
SQL DB	Microsoft Access	Teradata			Marketo	Square	
SQL DW	MySQL	Vertica			Oracle Eloqua	Web table	
Table Storage					Oracle Responsys	Xero	
					Oracle Service Cloud	Zoho	

Supported as Source and Sink

Supported as Source only

Supported as Sink only

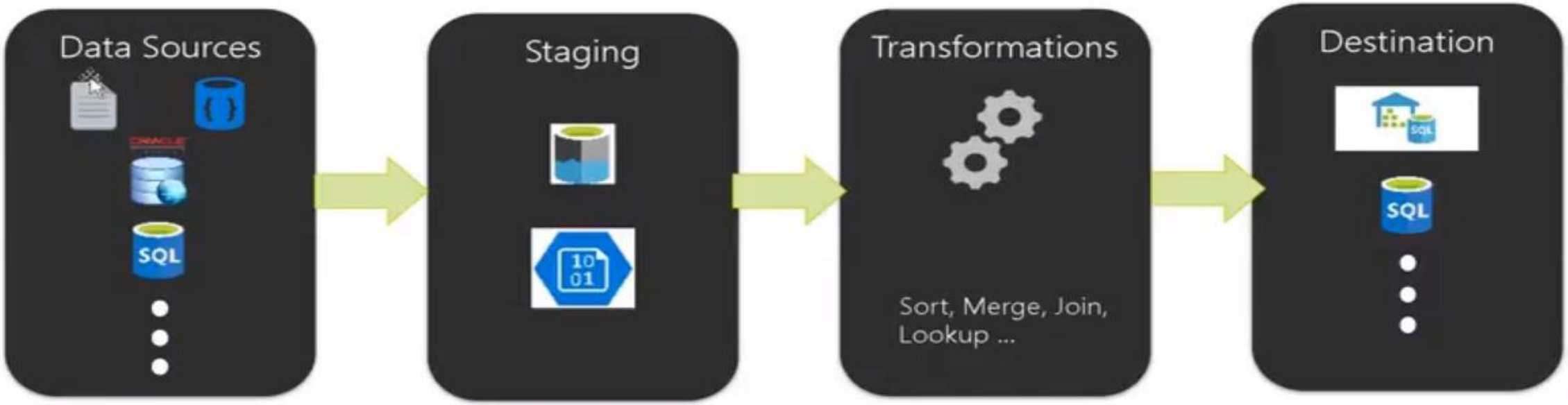
ADF Key Concepts



Visual Data Transformations with

MAPPING DATA FLOW

What the hell (Mapping) Data Flows are?



- Explicit user action
- User places data source(s) on design surface, from toolbox
- Select explicit sources

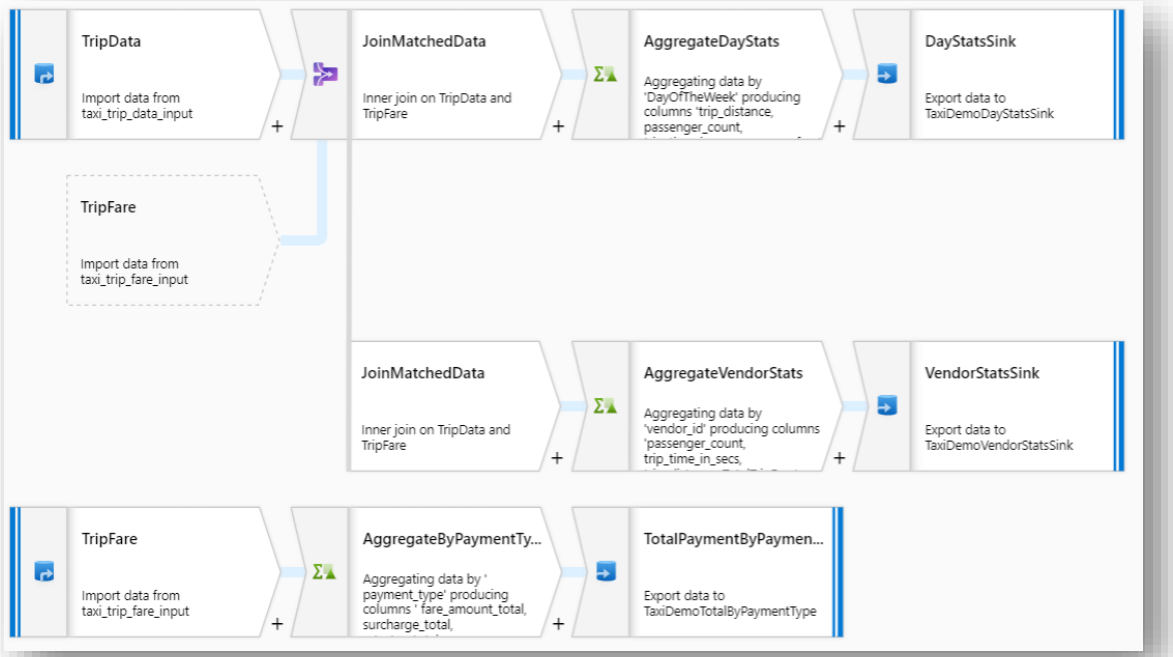
- Implicit/Explicit
- Data Lake staging area as default
- User doe not need to configure this manually
- Advanced feature to set staging area options
- File formats/types (Parquet, JSON, txt, CSV, ...)

- Explicit user action
- User places transformations on design surface, from toolbox
- User must set properties for transformation steps and step connectors

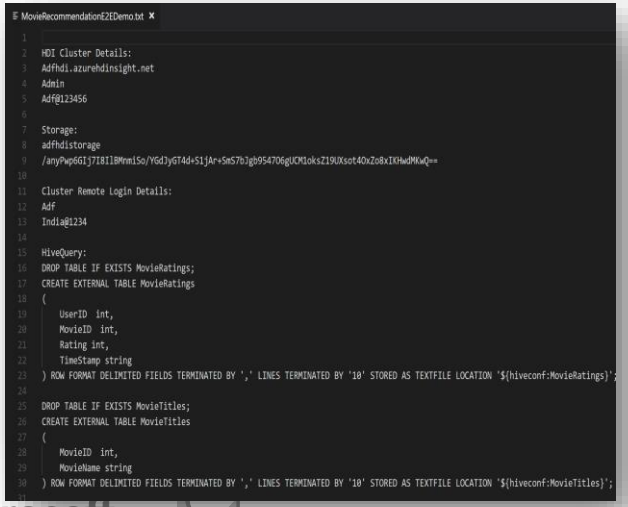
- Explicit user action
- User chooses destination connector(s)
- User sets connector property options

Code-free Data Transformation at Scale

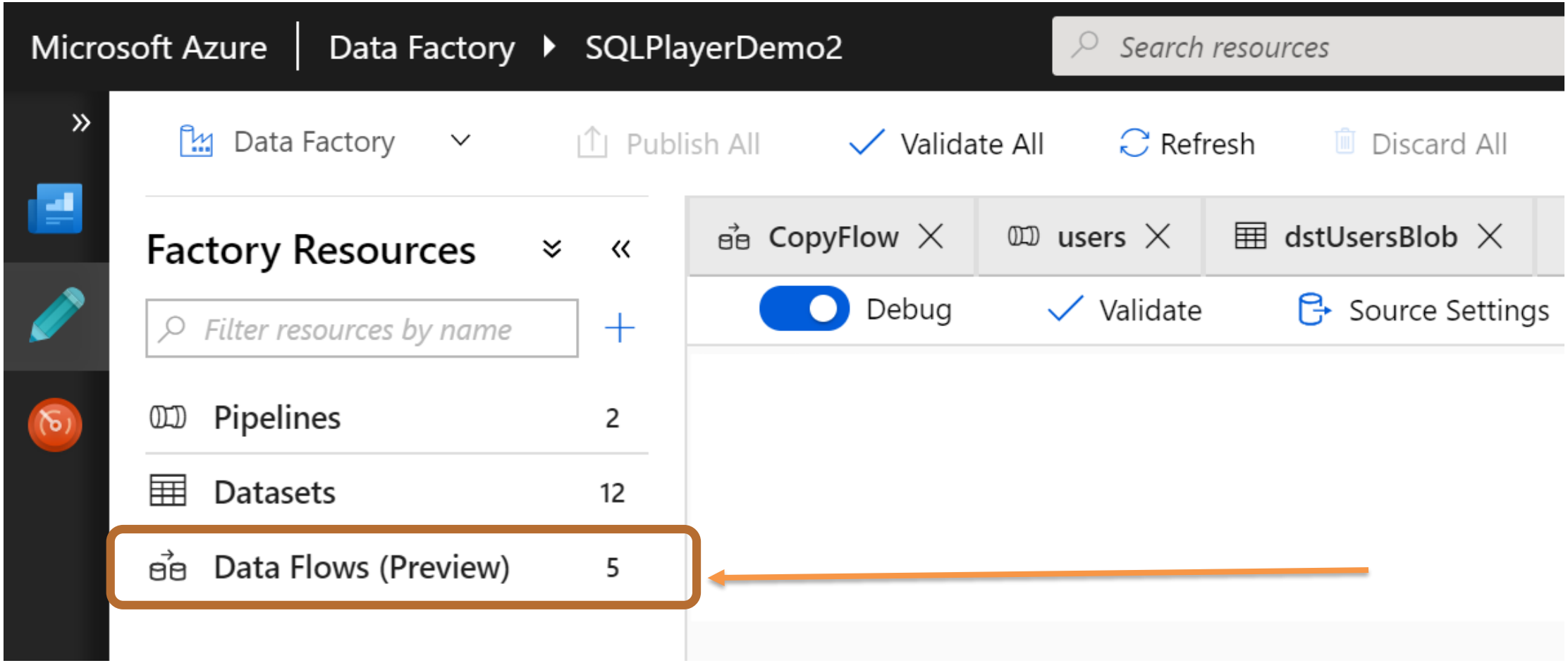
- Does not require understanding of Spark, Big Data Execution Engines, Clusters, Scala …
- Focus on building business logic and data transformation
  - Data cleansing
  - Aggregation
  - Data conversions
  - Data prep
  - Data exploration
  - ETL Data Loading into DW



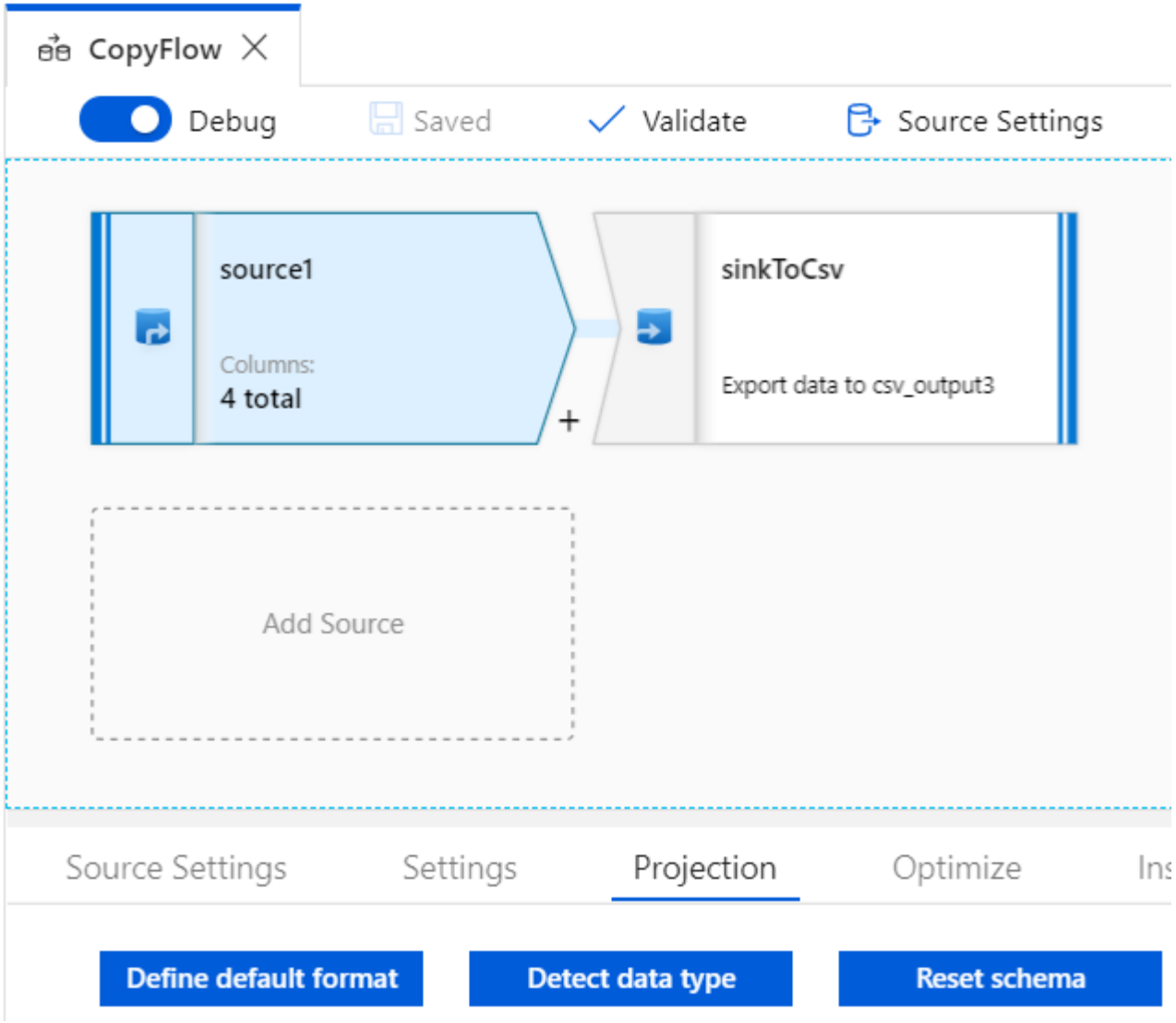
… not



Authoring of Azure Data Factory (v2) – what's new?



Simple Copy Flow



Mapping Data Flow: Components = Actions *

Multiple inputs/outputs

- New Branch
- Join
- Conditional Split
- Union
- Lookup

Schema modifier

- Derived Column
- Aggregate
- Surrogate Key
- Pivot
- Unpivot
- Window

Row modifier

- Exists
- Select
- Filter
- Sort

Custom

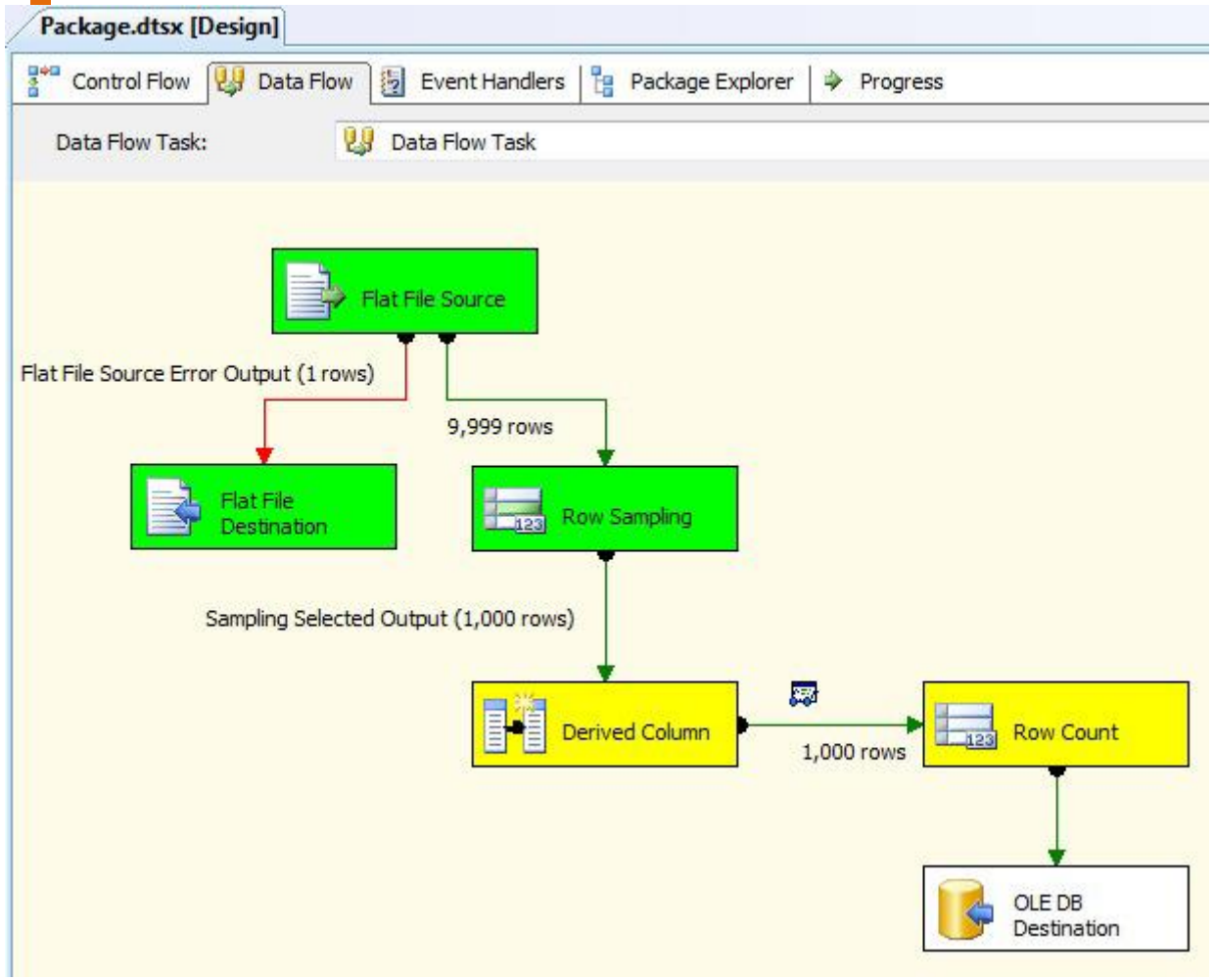
- Extend

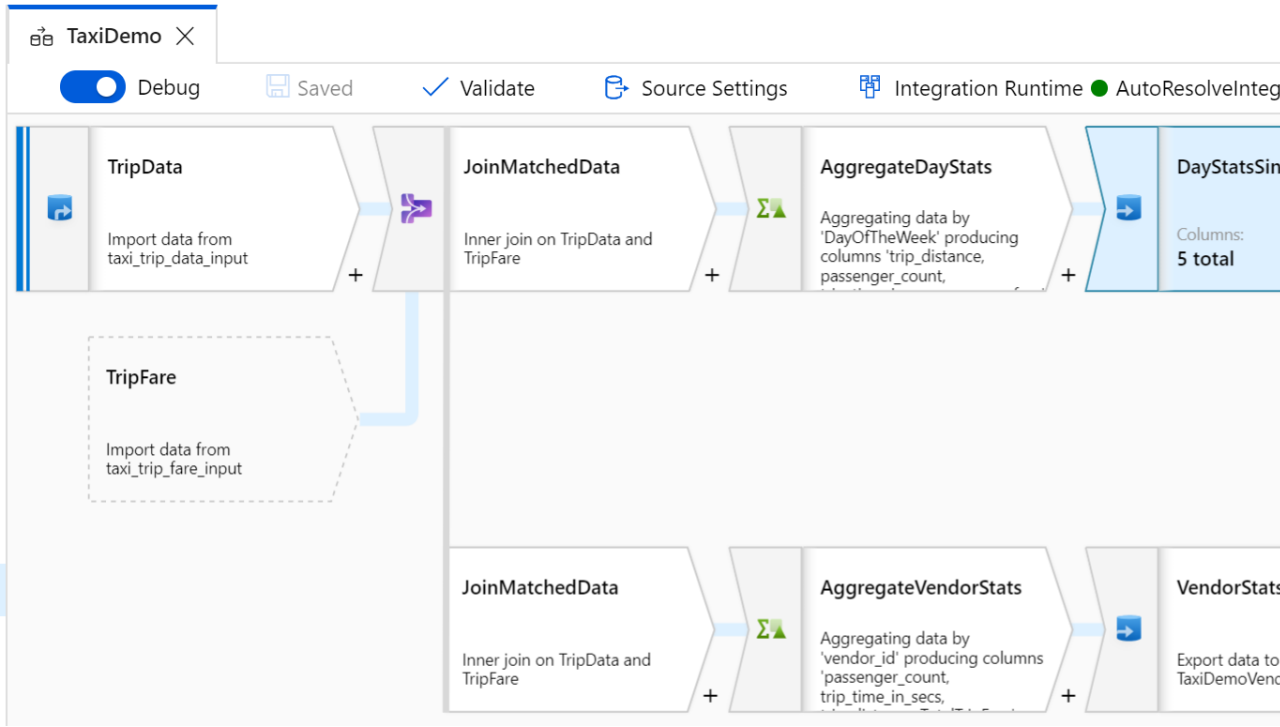
Destination

- Sink

* With some small exceptions

SSIS Data Flow VS ADF Mapping Data Flow





https://www.red-gate.com/simple-talk/sql/ssis/debugging-data-flow-in-sql-server-integration-services/

Authoring of Azure Data Factory (v2)

Microsoft Azure

Search resources

BigPlayer | Data Factory | Publish All | Validate All | Refresh | Discard All | ARM Template

Factory Resources

Filter Resources

- Pipelines 2
- Datasets 9
  - Badges
  - BadgesBlob
  - BadgesBlobWithHeader
  - BadgesStatsByName
  - BadgesStatsByNameBlob
  - Crimes_BlobCsv
  - Src_Users
  - Users_BlobCsv
  - UsersTest
- Data Flows 3
  - StackOverflow 3
    - badgesGroupByName
    - badgesGroupByName2
    - users

users

Debug | Validate | Code

sourceUsers
Import data from Users_BlobCsv

Select1
Renaming sourceUsers to Select1 with columns 'DisplayName, DownVotes, LastAccessDate, Location,

FilterByReputation
Filtering rows using expressions on columns 'Reputation'

GroupByLocation
Aggregating data by 'Location' producing columns 'SumOfReputation, SumOfViews, Count'

SortByLocation
Sorting rows on columns 'Location'

Wrong
Conditionally distributing the data in 2 groups, based on columns 'Location, Location, Location, Location, Location'

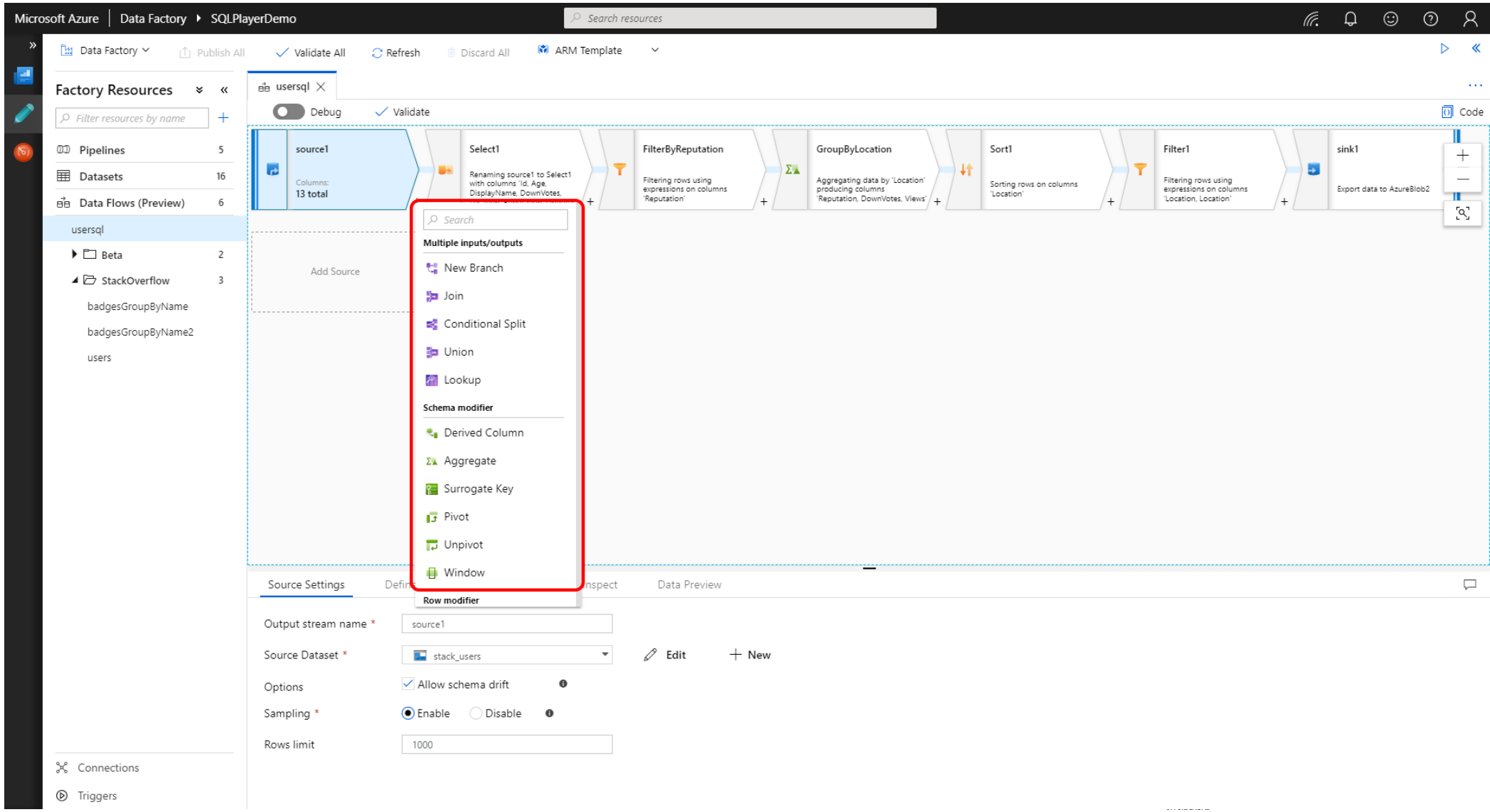
AllRight
Conditionally distributing the data in 2 groups, based on columns 'Location, Location, Location, Location, Location'

General | External dependencies

Name * users

Description

Guided experience to build data flows



Data Preview in Debug mode

Currency Conv... | Currency Conv... | MovieDemoPi... | TaxiDemo | MovieDemo | TaxiDemo

Debug | Saved | Validate | Source Settings | Integration Runtime AutoResolveIntegrationRuntime

TripData
Import data from taxi_trip_data_input

JoinMatchedData
Inner join on TripData and TripFare

AggregateDayStats
Aggregating data by 'DayOfTheWeek' producing columns 'trip_distance, passenger_count,

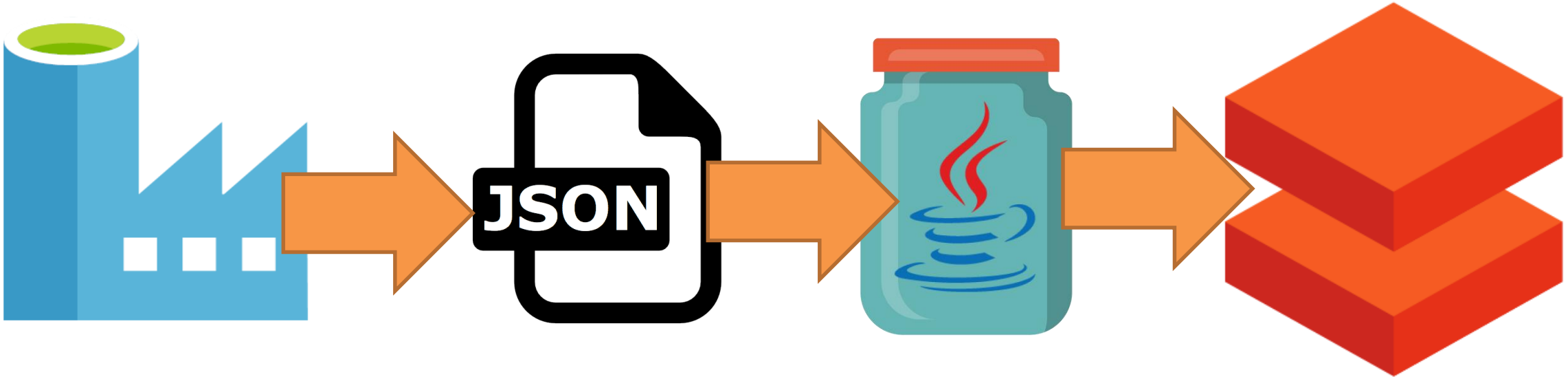
DayStatsSink
Columns:
5 total

Sink | Settings | Mapping | Optimize | Inspect | Data Preview

	Updated*	New+	Unchanged	Total
Number of rows	N/A	N/A	N/A	8

DayOfTheWeek 123	trip_distance 1.2	passenger_count 1.2	trip_time_in_secs 1.2	average_fare 1.2
NULL	2.58	2.16	10.21	12.82
1	3.03	2.17	10.12	13.89
6	1.75	1.43	9.98	10.84
3	2.26	1.41	9.83	11.02
5	2.71	1.24	10.9	15.59

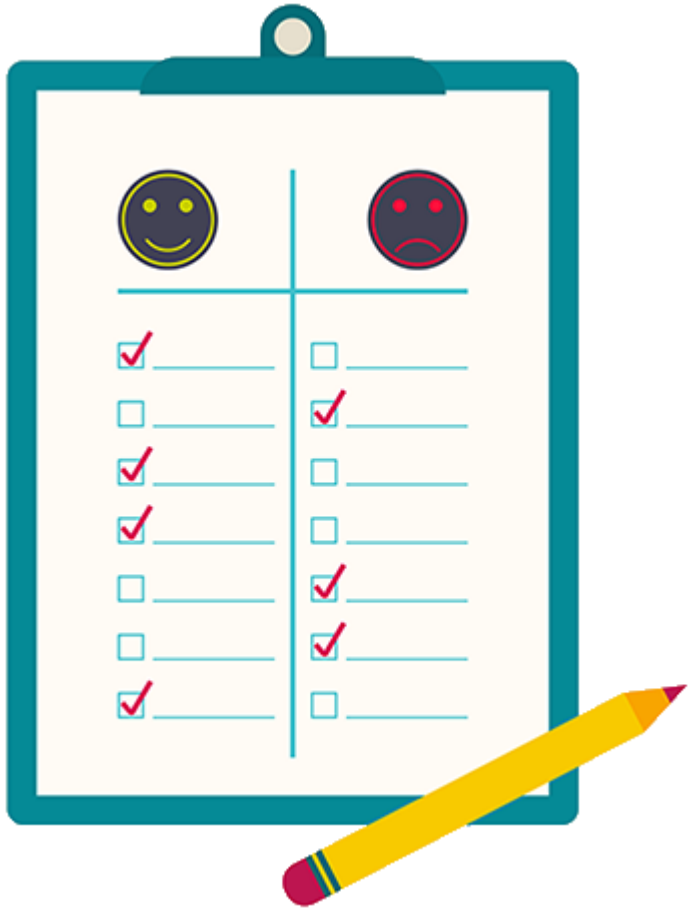
What is going on behind the scenes?



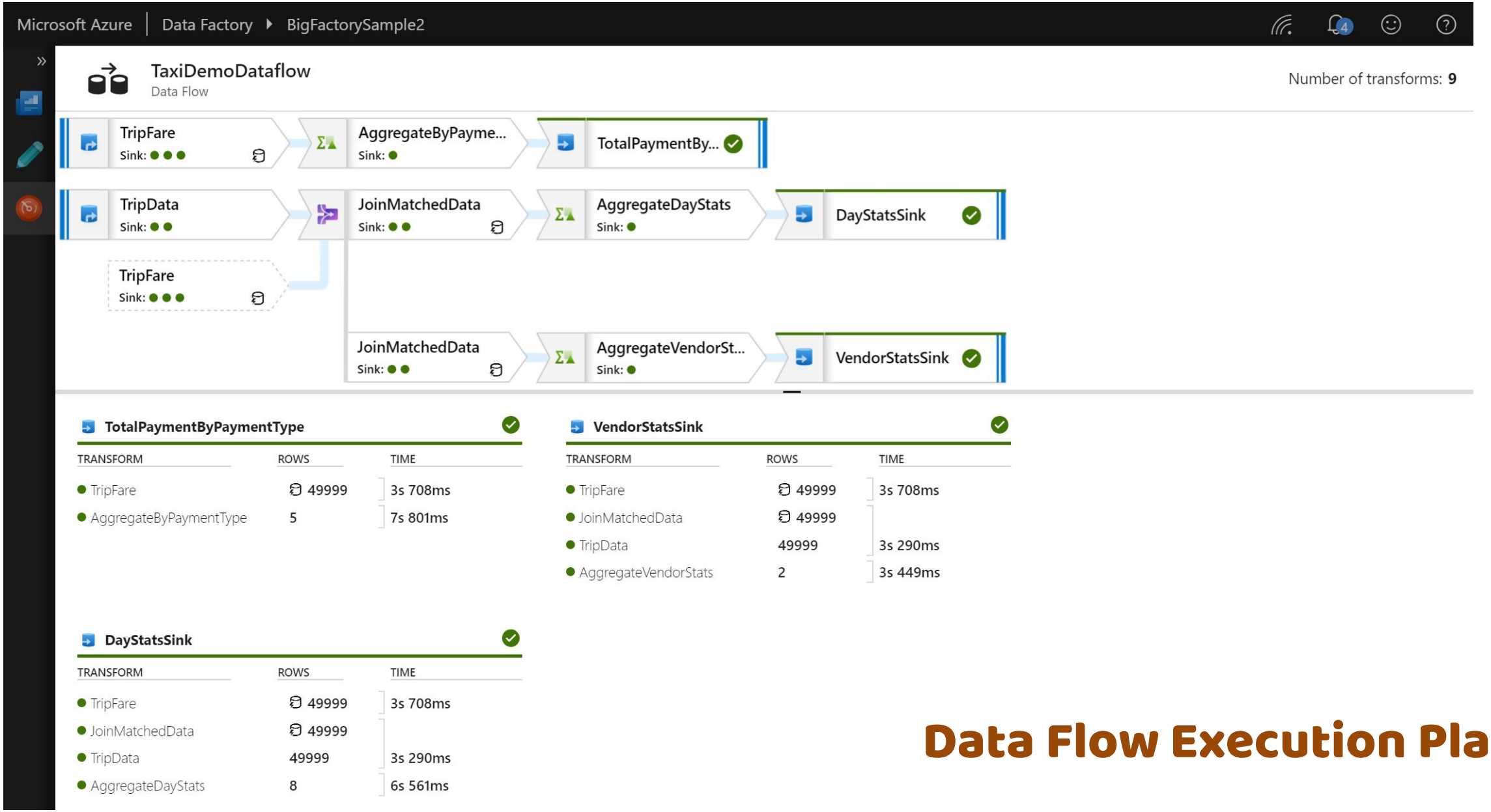
JAR

Azure Databricks

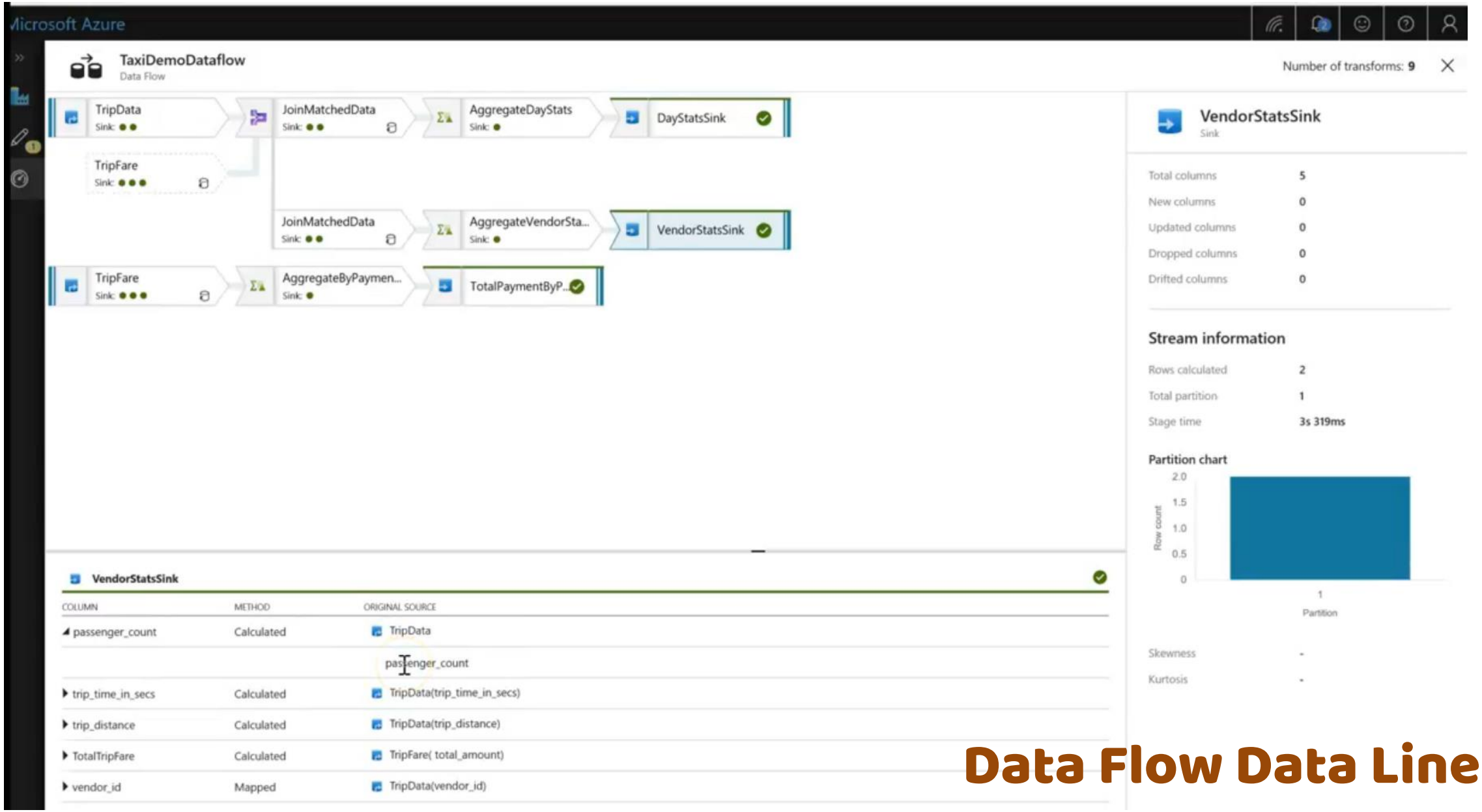
PLEASE COMPLETE EVALUATION FORM



DEMO TIME



Data Flow Execution Plan

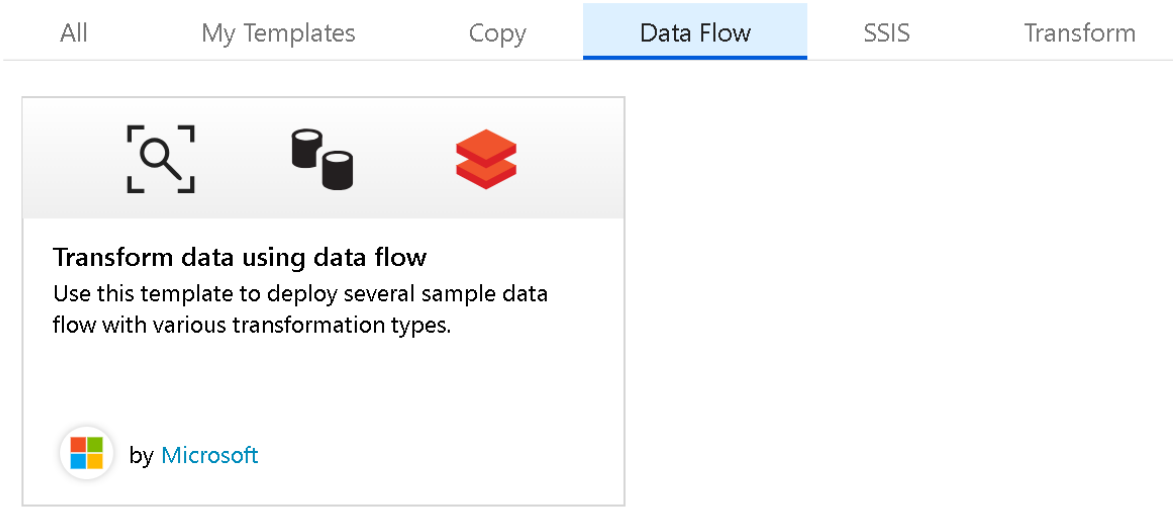


Data Flow Data Lineage

TAKEAWAYS

Mapping Data Flow – the latest update

- **<u>The Preview version of ADF with Data Flows is being deprecated</u>** (26 February)
- You will no longer need to stand-up Azure Databricks clusters. ADF will handle cluster management for you on-demand.
- Data Flow samples have been into the new ADF Template Gallery

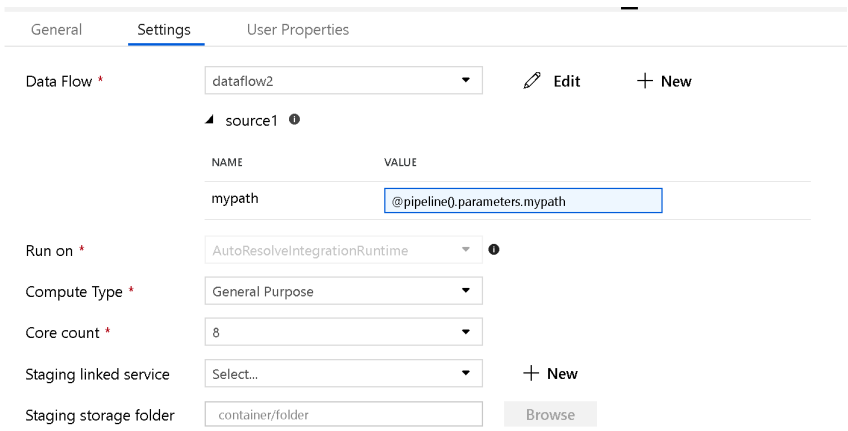


Mapping Data Flow – the latest update for v2

- New capabilities for Source transformations:
  - wildcards, file sets,
  - move file / Delete file,
  - auto-detect types,
  - schema validation
  - query statement

- New capabilities for Sink transformations:
  - output to single file,
  - clear folder,
  - truncate table / recreate table,
  - naming patterns

Mapping Data Flow – New Datasets



- New datasets for Data Flow (only):
  - **Parquet**
  - **Delimited Text**

- The Execute Data Flow transformation:
  - Now support **parameterized datasets**
  - Control size of cluster for specific data flow execution

SSIS vs ADF activities vs T-SQL

Activity	Description	SSIS equivalent	SQL Server equivalent
New branch	Create a new flow branch with the same data	Multicast (+icon)	SELECT INTO SELECT OUTPUT
Join	Join data from two streams based on a condition	Merge join	INNER | LEFT | RIGHT JOIN, CROSS | FULL OUTER JOIN
Conditional Split	Route data into different streams based on conditions	Conditional Split	SELECT INTO WHERE condition1 SELECT INTO WHERE condition2 CASE ... WHEN
Union	Collect data from multiple streams	Union All	SELECT col1a UNION (ALL) SELECT col1b
Lookup	Lookup additional data from another stream	Lookup	LEFT | RIGHT JOIN
Derived Column	Compute new columns based on the existing once	Derived Column	SELECT Column1 * 1.09 as NewColumn
Aggregate	Calculate aggregation on the stream	Aggregate	SELECT Year(DateOfBirth) as Year, MIN(), MAX(), AVG() GROUP BY Year(DateOfBirth)

http://bit.ly/ADFDFvsSSIS

http://bit.ly/ADFDF-CheatSheet

Resources

- Microsoft Azure Data Factory – Tutorials & API Reference
- Azure Data Factory Overview
- Azure Data Factory – Data integration service
- ADF Mapping Data Flow's documentation
- ADF Mapping Data Flow's videos
- SQLPlayer blog:
  - Azure Data Factory v2 and its available components in Data Flows
  - Follow this tag on SQLPlayer blog: #ADFDF

Q&A

Thank you … GRAZIE!

kamil@nowinski.net

@NowinskiK @SQLPlayer

SQLPlayer.net

https://github.com/NowinskiK/CommunityEvents

Kamil Nowinski

Microsoft Data Platform MVP

MCSE Data Platform & MCSE Data Management and Analytics


innova
community


CONSORZIO
UNIVERSITARIO
DI PORDENONE


Microsoft


PASS


altitudo


beanTech
IT moves your business


fluentis


PALAZZETTI
IL CALORE CHE PIACE ALLA NATURA


WÜRTHPHOENIX