Azure Datafactory and Databricks

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CORPORATE FACTS

Established in 2000

90+
Customers Served

2300+
Employees

23%
CAGR since inception

Top 10
NA P/C IT Svs Provider
by # of customers

OUR DIGITAL & CLOUD SERVICES

VALUEMOMENTUM
Deliver Value. Drive Momentum.

Customers trust ValueMomentum to rapidly deliver new experiences and stay competitive in today's digital-centric market.*

App Dev

- Rapid App Development
- Cloud App Development
- Mobile App Development

Integration

- Integration Architecture
- API Development
- Service Modernization

Cloud & Infrastructure

- Cloud Platform Adoption
- Cloud Migration
- DevOps & CloudOps

ITSM

- IT Service Management
- IT Asset Management
- IT Operations Management

*To learn more, please log on to ValueMomentum – Digital & Cloud Services

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Agenda

- Typical Data Engineering Scenario
- Tool Selection Dilemma
- Selection Basis
- Demo

Typical Data Engineering Scenarios

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Data Engineering Scenarios

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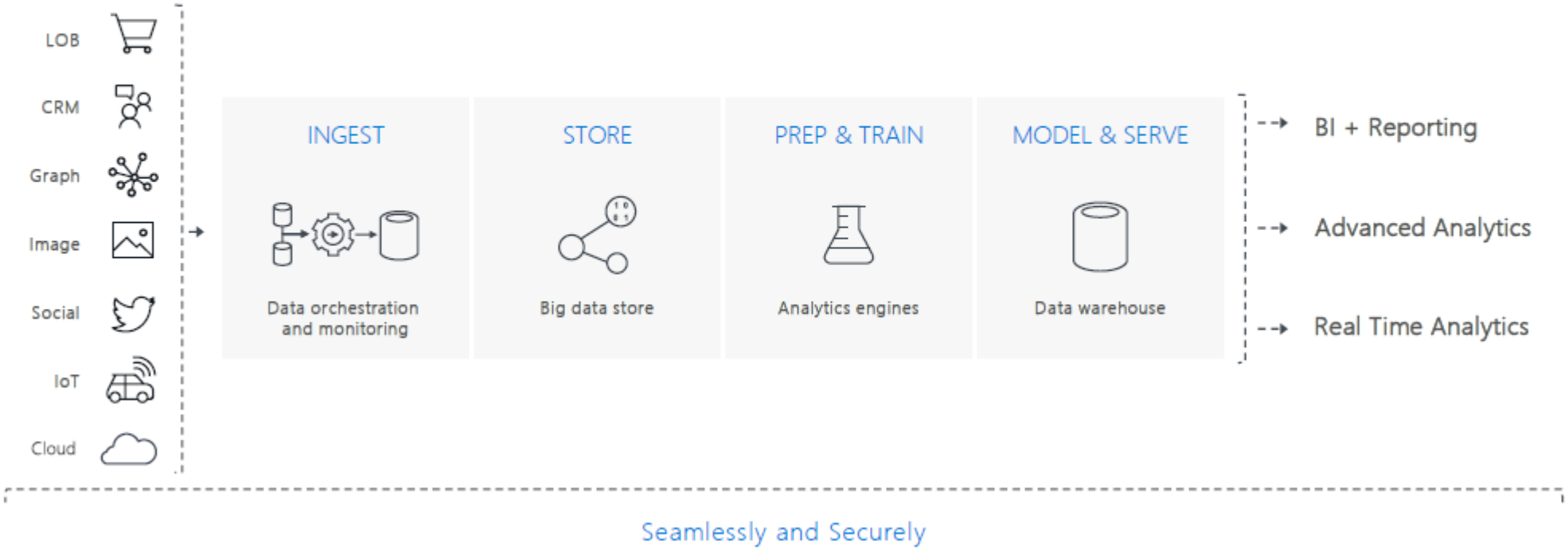

Data Engineering Scenarios

Common scenarios

"We want to extend to untapped sources."

Modern data warehouse

"We want to use ML and AI to get deeper insights from our data."

ML and AI on big data

"We want to get insights from our devices in real-time."

Real-time analytics

The Plight of a Data Engineer

Why is Data Engineering Hard?

- Various sources/formats
- Schema mismatch
- Different representation
- Corrupted files and data
- Scalability
- Schema evolution
- Monitoring & Auditing
- Multi activity integration
- Evolve as fast as the business

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Typical Project Scenario

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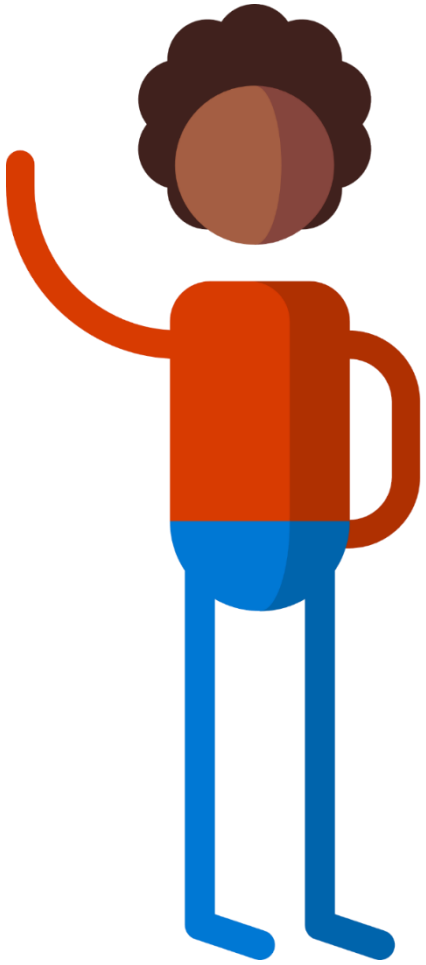
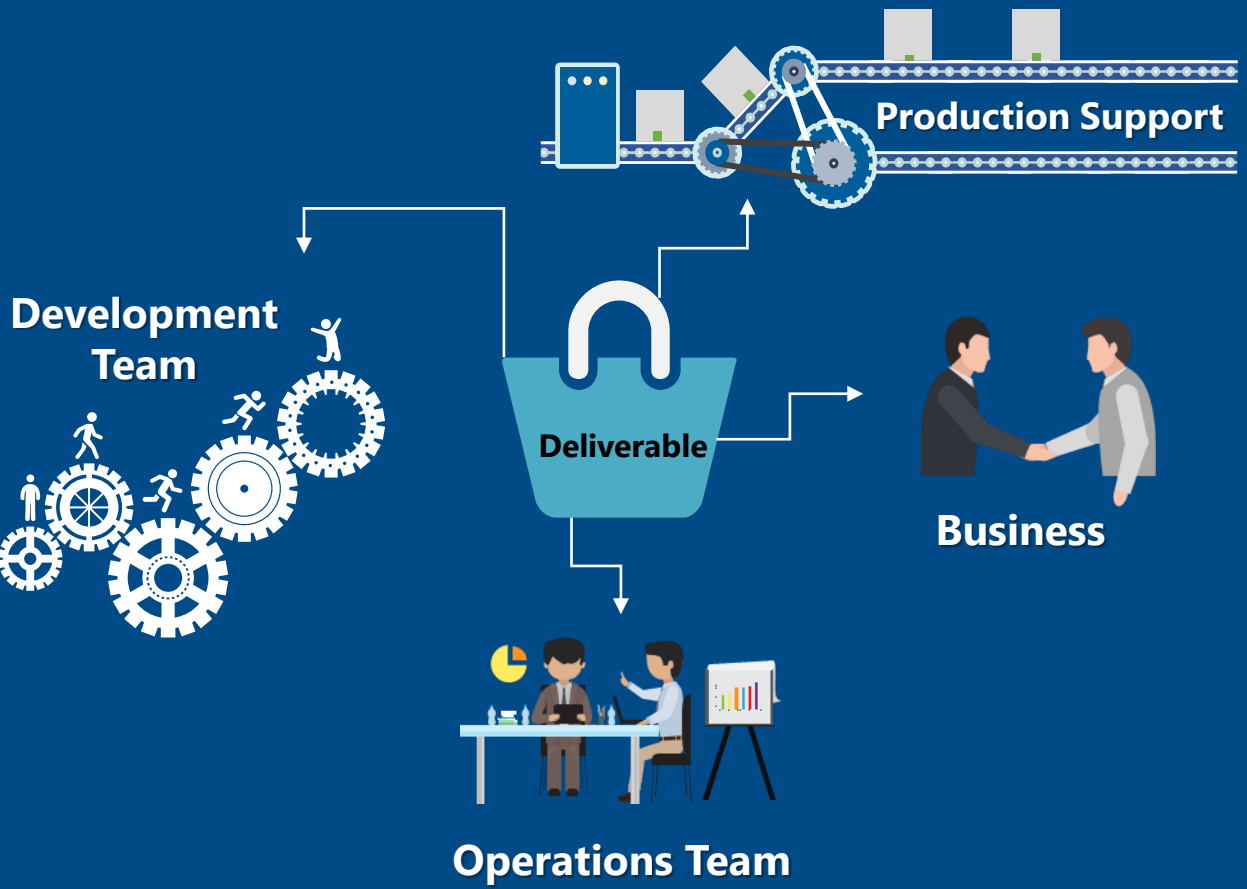


You are a data engineer starting a new project

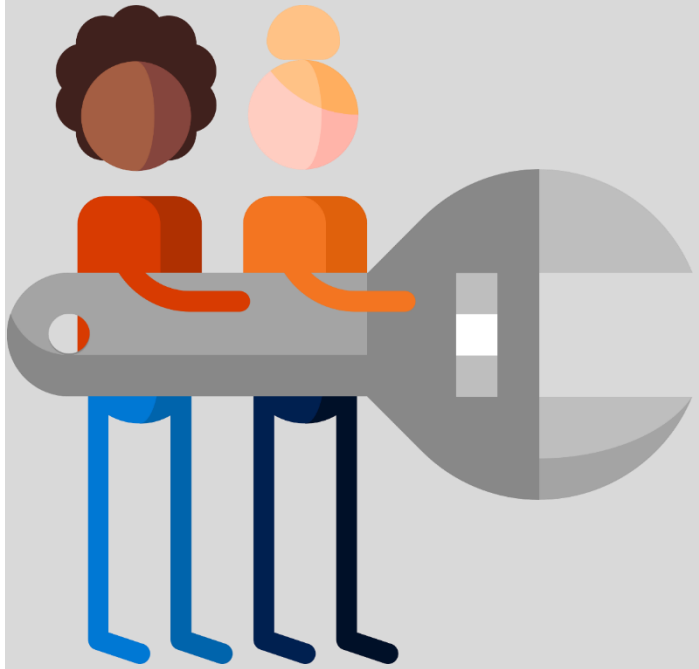
You are a Technical Manager starting a new project

Expectations vs Reality

Expectations:



Reality:



Which Tool do we pick ???

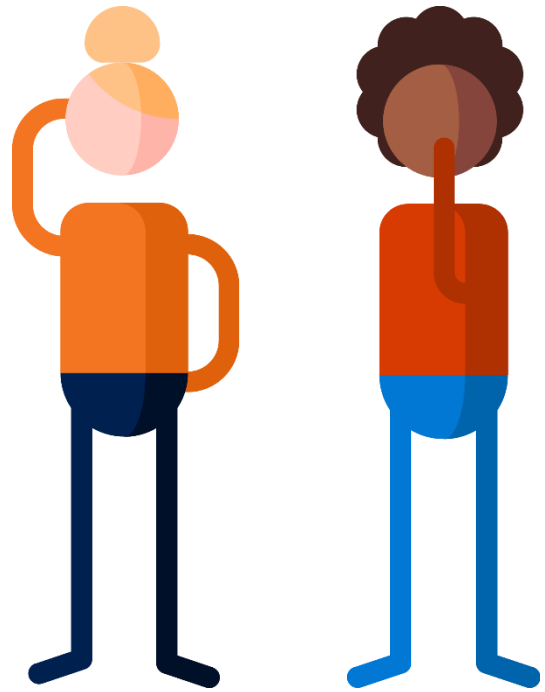
Tool Options

a) SQL Server Integrations Services (SSIS)?

b) Azure Data Factory (ADF)?

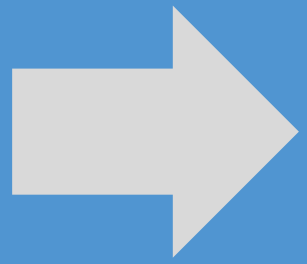
c) Azure Databricks?

d) All of the above?



It Depends

What does it depend on?



Let's take a look!

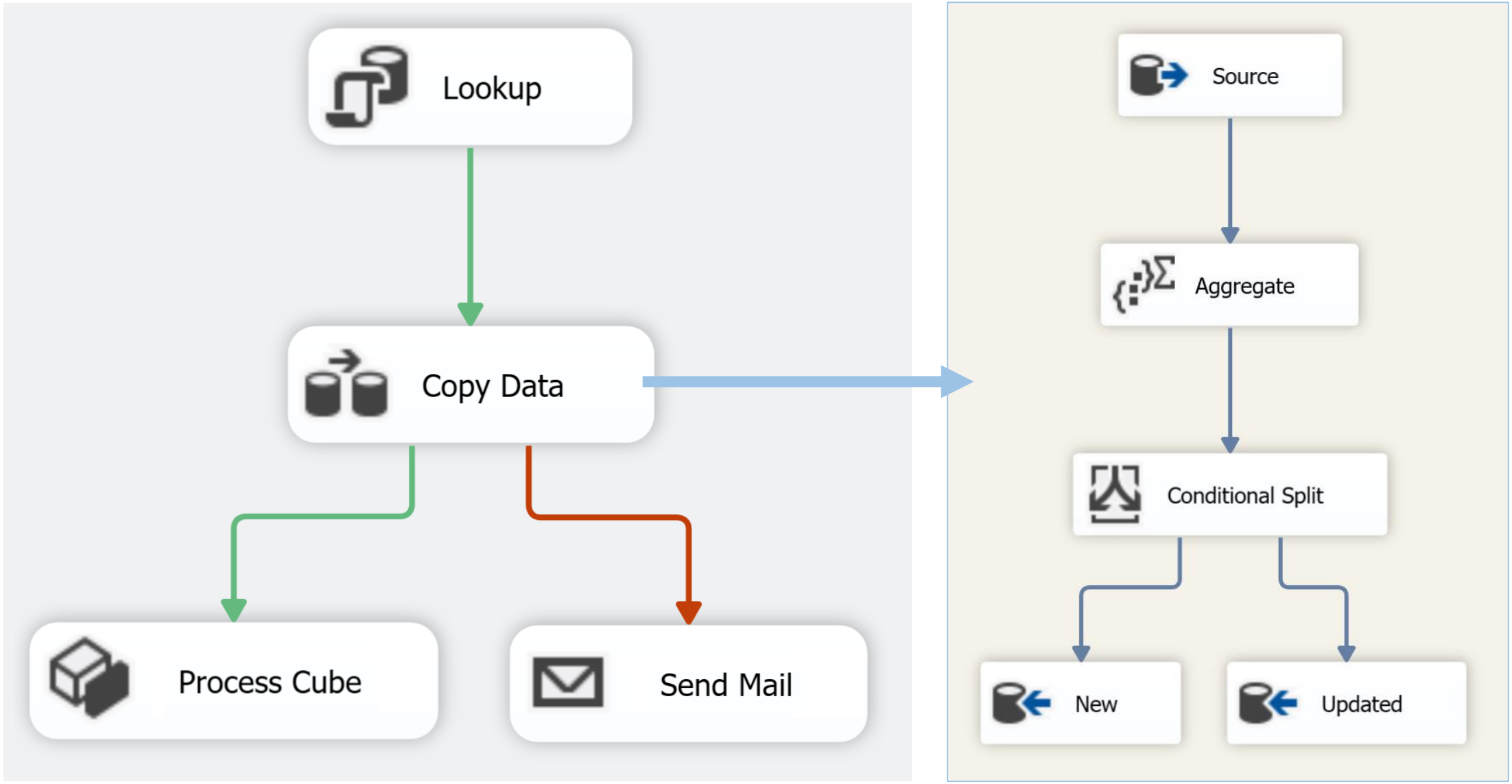
SQL Server Integration Services

Data Integration

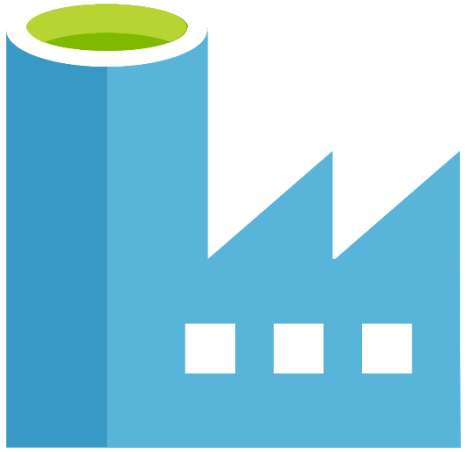
Extract, Transform, Load (ETL)

Hybrid

Sample Flow: SSIS



Azure Datafactory



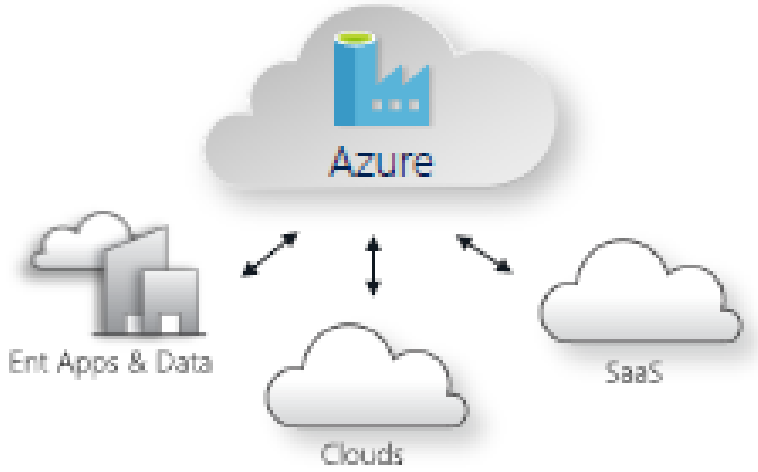
Data Movement & Orchestration

Extract, Load, Transform (ELT)

Hybrid

Azure Datafactory

Data Integration Service: Serverless, Scalable, Hybrid



Hybrid Pipeline Model

Seamlessly span: on prem, Azure, other clouds & SaaS
Run on-demand, scheduled, data-availability or on event

SSIS Package Execution

Lift existing SQL Server ETL to Azure
Use existing tools (SSMS, SSDT)

Data Movement @Scale

Cloud & Hybrid w/ 80+ connectors provided
Up to 1 GB/s

Author & Monitor

Programmability w/ multi-language SDK
Visual Tools

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Guided Experience to build data flows

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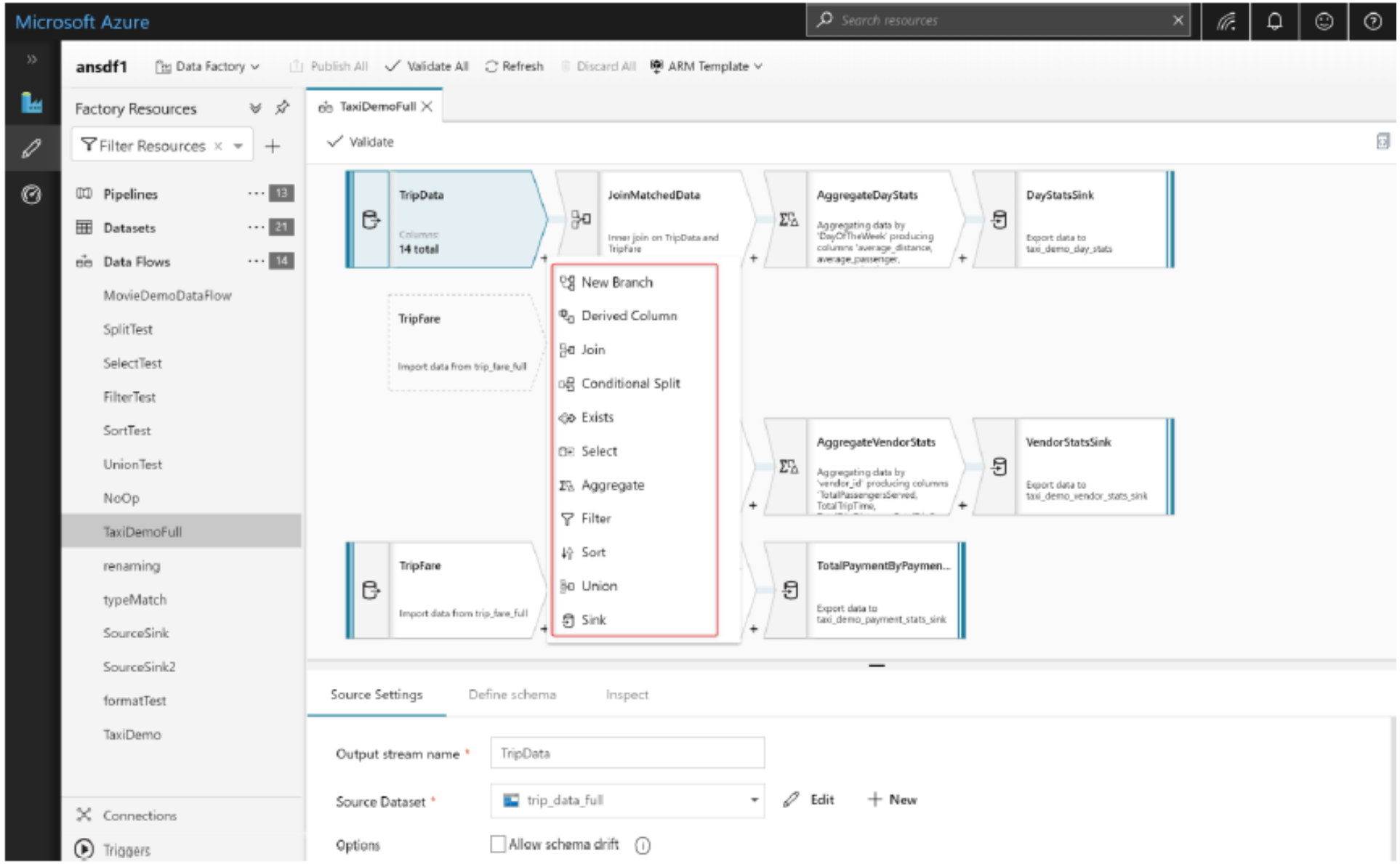
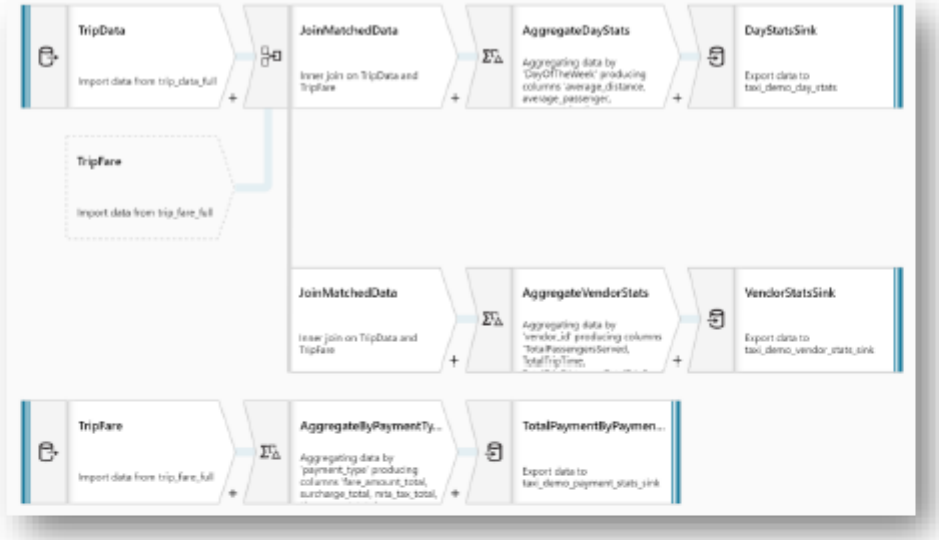


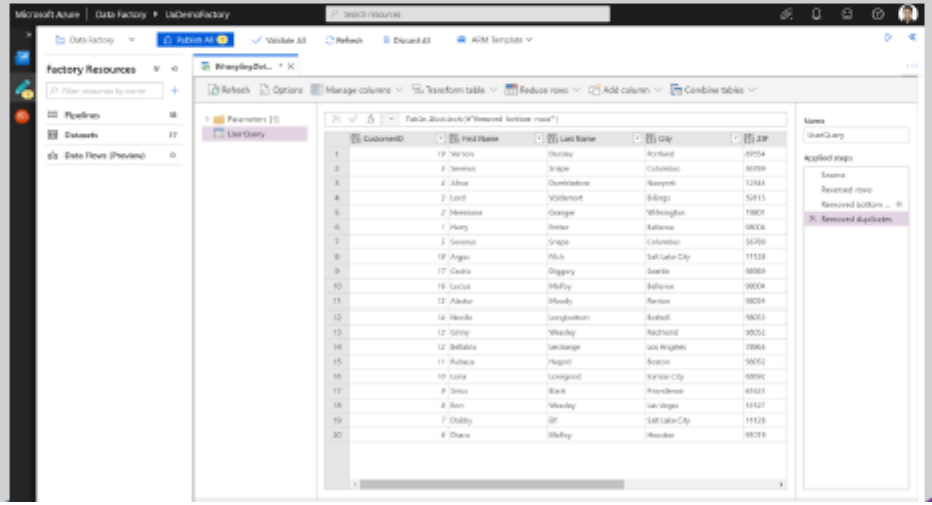
Progress and Roadmap

MAPPING DATAFLOW
Code-free data transformation @scale



PUBLIC PREVIEW

WRANGLING DATAFLOW
Code-free data preparation @scale

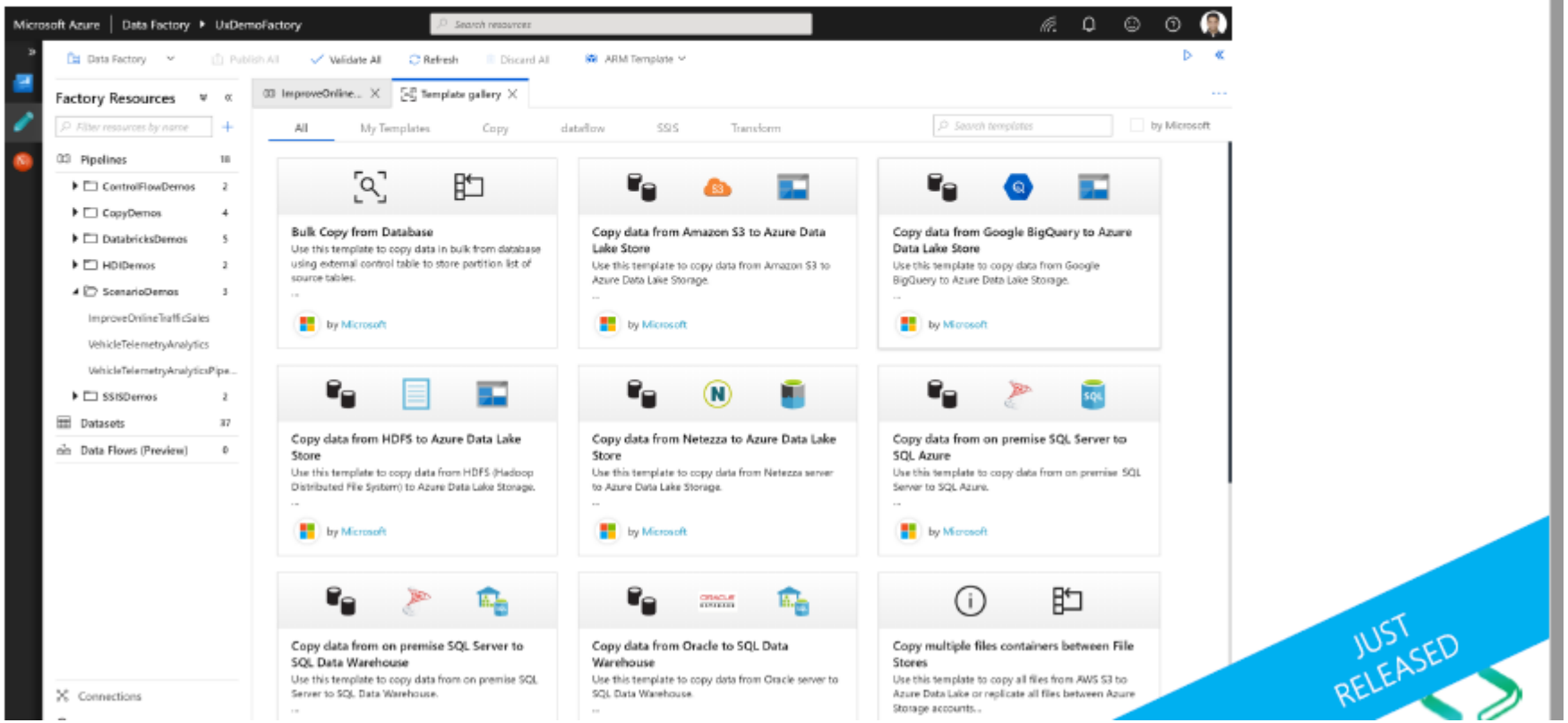


PRIVATE PREVIEW MARCH 2019

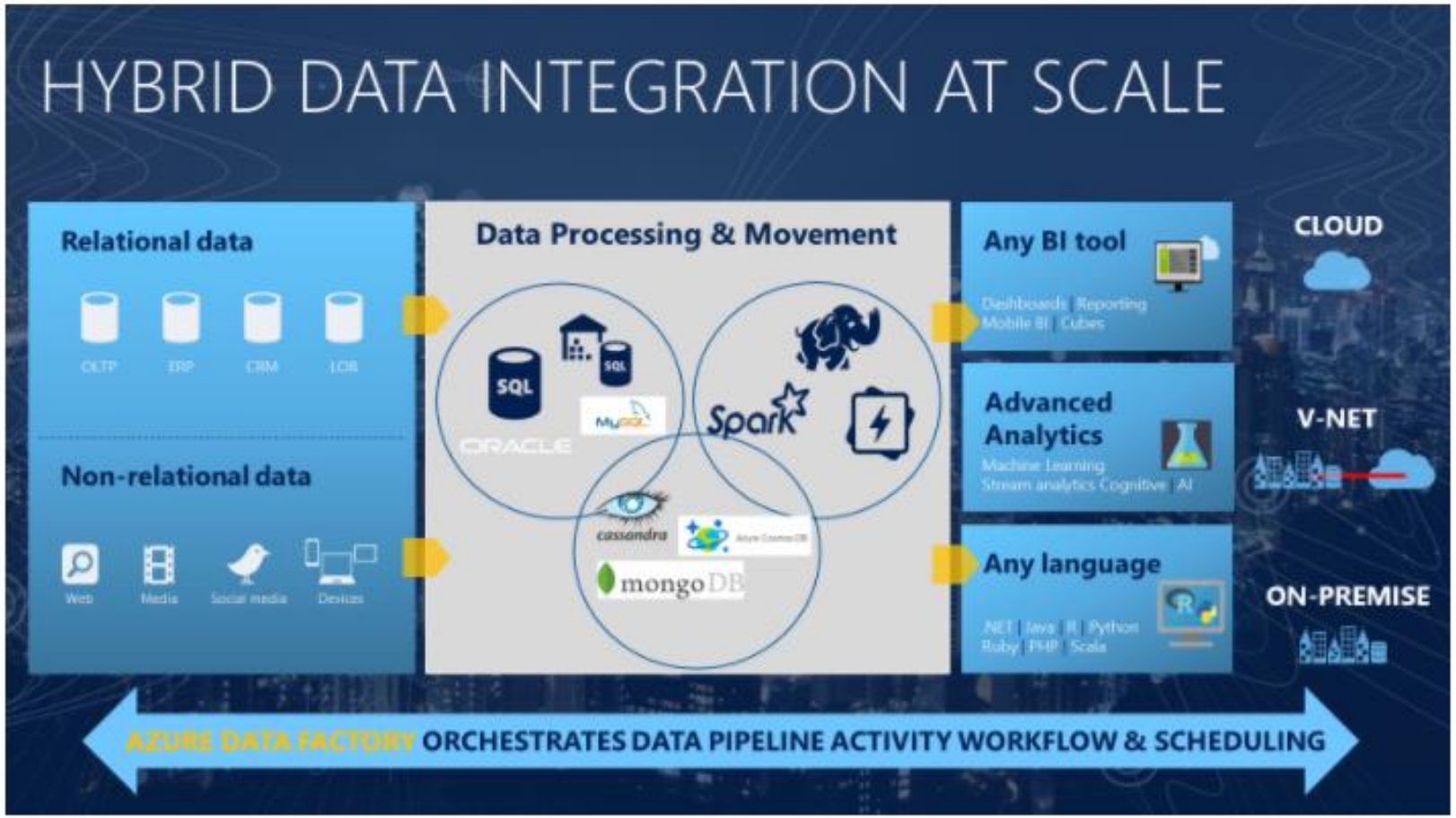
Azure DataFactory - Templates

Use Templates to quickly get started with ADF

Quickly get started with building data integration solutions
Avoid building same workflows repeatedly. Simply instantiate a template
Improve developer productivity along with reducing development time for repeat processes



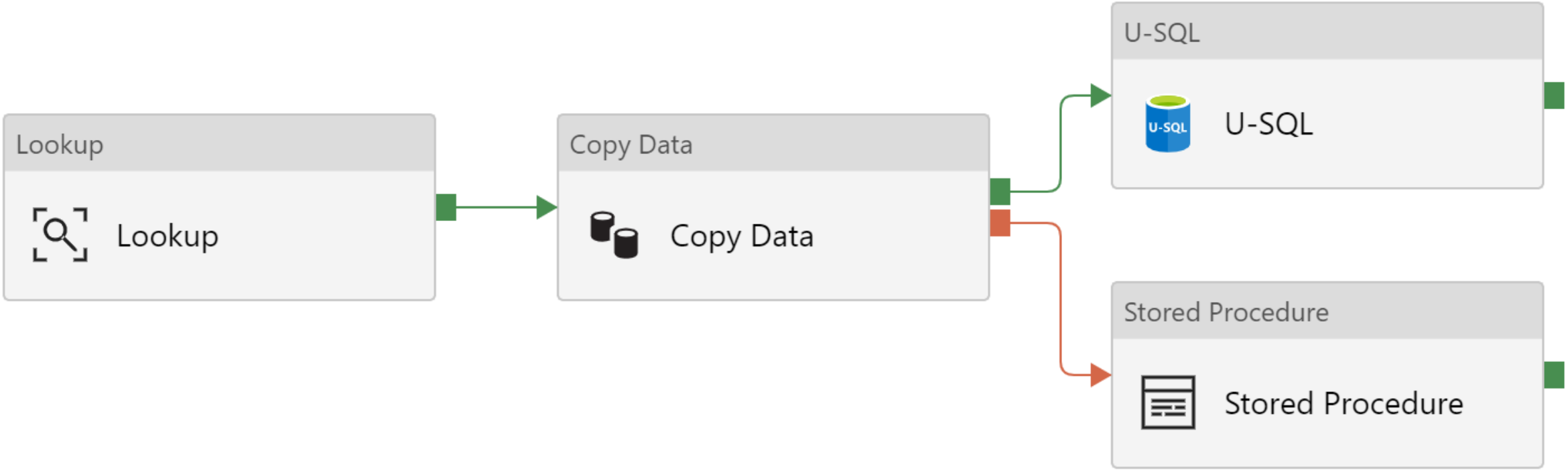
Azure DataFactory: How does it work



Top-level concepts:

1. **Pipeline**
2. **Datasets**
3. **Linked services**
4. **Triggers**
5. **Control flow**

Sample Flow: Datafactory



Azure Databricks

Apache Spark + Databricks + Enterprise Cloud = Azure Databricks

Apache Spark-based Analytics Service

Collaborative Notebooks

Cloud

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Provisioning Azure DataBricks Workspace

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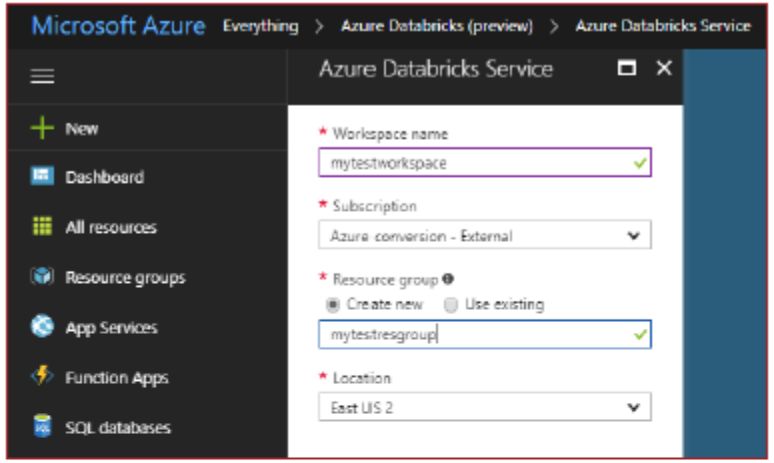
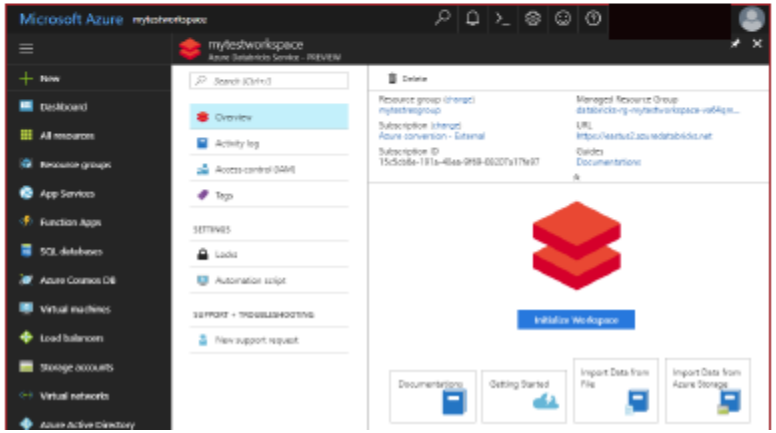
- Azure Databricks is provisioned directly from the Azure Portal like any other Azure service
  - In contrast, with other clouds, it has to be provisioned through the Databricks portal.
  - With Azure Databricks, the Azure Portal offers a unified portal to provision and administer Azure Databricks as well as other Azure services.
- Any Azure user with the appropriate subscription and authorization can provision Azure Databricks service*.
  - There is no need for a separate Databricks account

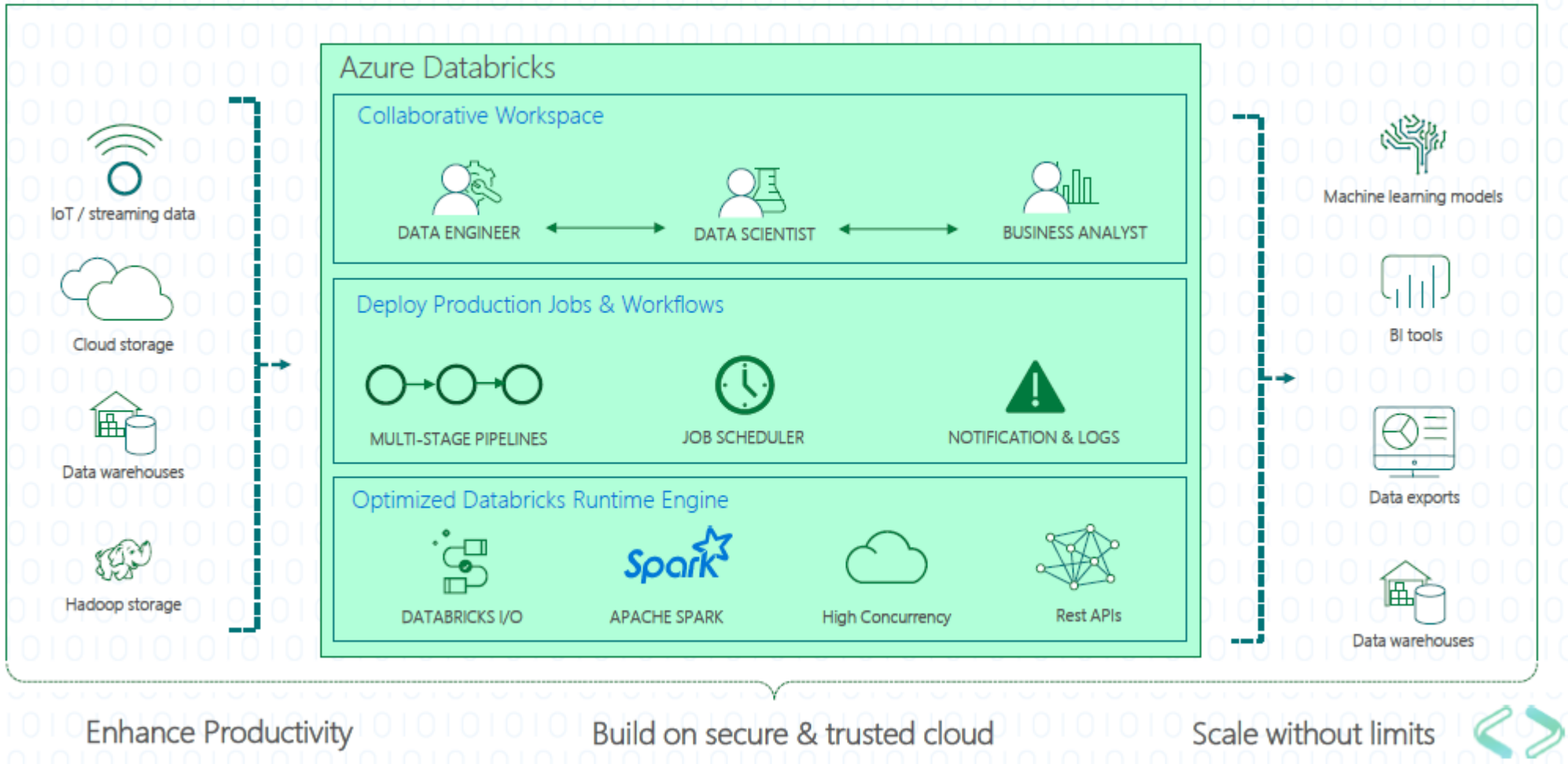


Provisioning the Azure Databricks Service



After provisioning the is complete

Azure Databricks



Sample Flow: Databricks

databricks Data Exploration on Databricks (Setup) (Python) Import Notebook

Sample Apache Access Web Logs

```
> display(dbutils.fs.ls("/mnt/my-data/apache"))
```

path	name	size
dbfs:/mnt/my-data/apache/ex20150814.log	ex20150814.log	208693
dbfs:/mnt/my-data/apache/ex20150815.log	ex20150815.log	208693

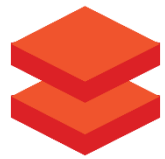
```
> myApacheLogs = sc.textFile("/mnt/my-data/apache")
  myApacheLogs.take(10)

Out[11]:
[u'10.0.0.127 - 2696232 [14/Aug/2015:00:00:26 -0800] "GET /index.html HTTP/1.1" 304 428',
 u'10.0.0.104 - 2404465 [14/Aug/2015:00:01:14 -0800] "GET /Cascades/rss.xml HTTP/1.1" 304 514',
 u'10.0.0.108 - 2404465 [14/Aug/2015:00:04:21 -0800] "GET /Olympics/rss.xml HTTP/1.1" 200 499',
 u'10.0.0.213 - 2185662 [14/Aug/2015:00:05:15 -0800] "GET /Hurricane+Ridge/rss.xml HTTP/1.1" 200 288',
 u'10.0.0.203 - 2185662 [14/Aug/2015:00:05:17 -0800] "GET /index.html HTTP/1.1" 200 212',
 u'10.0.0.104 - 2696232 [14/Aug/2015:00:06:09 -0800] "GET /Cascades/rss.xml HTTP/1.1" 304 420',
 u'10.0.0.206 - 2576242 [14/Aug/2015:00:08:40 -0800] "GET /index.html HTTP/1.1" 304 343',
 u'10.0.0.213 - 2185662 [14/Aug/2015:00:09:07 -0800] "GET /Olympics/rss.xml HTTP/1.1" 304 323',
 u'10.0.0.212 - 2404465 [14/Aug/2015:00:10:29 -0800] "GET /index.html HTTP/1.1" 304 530',
 u'10.0.0.114 - 2575718 [14/Aug/2015:00:11:22 -0800] "GET /index.html HTTP/1.1" 304 341']
```

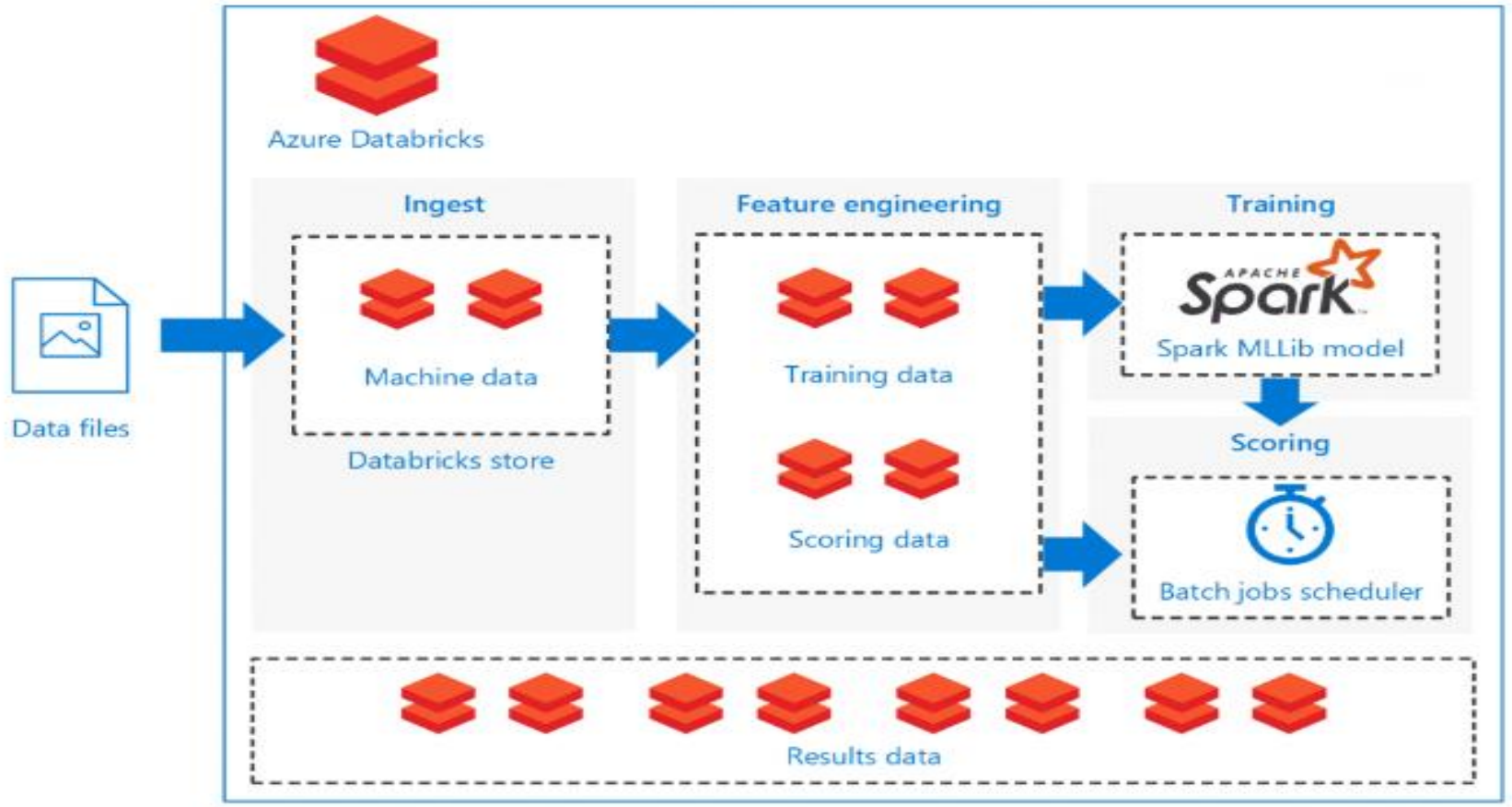
Sample Web Response Codes

```
> display(dbutils.fs.ls("/mnt/my-data/response"))
```

path	name	size
dbfs:/mnt/my-data/response/responsecodes.txt	responsecodes.txt	55



Regression model - Data Bricks



Important Components:

- **Data files**
- **Ingestion**
- **Training pipeline**
- **Scoring pipeline**
- **Scheduler**.

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Selection Dilemma

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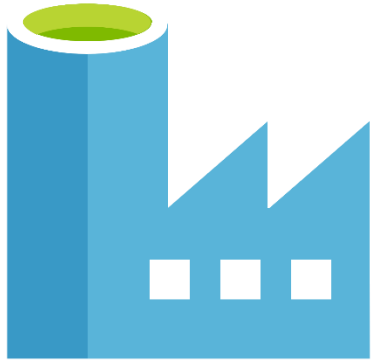

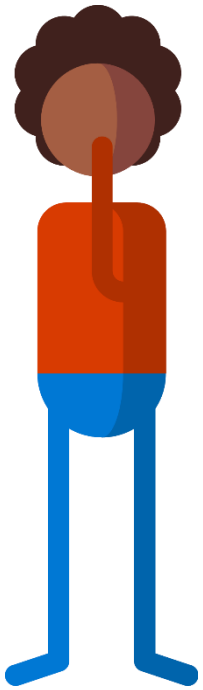

Selection Basis

Data

Volume

Velocity

Variety

Development

Tools

Interface

Languages

Usage

Platform

Pricing

Purpose

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Data

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Volume	Medium	High	High
Velocity	Batch	Batch Streaming	Batch Streaming Real -Time
Variety	Structured	Structured Unstructured	Structured Unstructured

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Development

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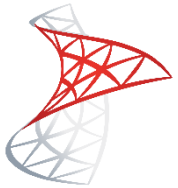
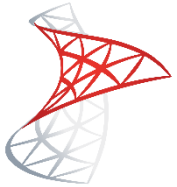
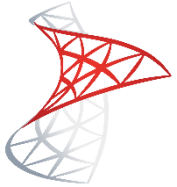
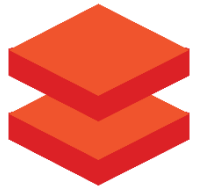
Tools	 SSDT	 Browser	 Browser
Interface	 Drag and Drop	 Drag and Drop Code	 Code
Languages	 VB / C# Biml	 .NET Python PowerShell	 SQL Python R Scala

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Development

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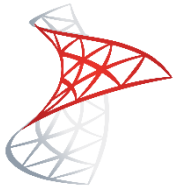
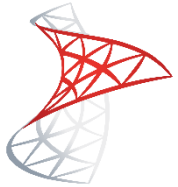
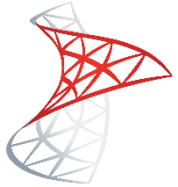
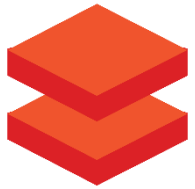
Platform	 On-Premises Own Hardware Scale Out	 Hybrid Managed Scale Up	 Cloud Managed Autoscale
Pricing	 License	 Pay as you go	 Pay as you go
Purpose	 Integration Transformation ETL	 Movement Orchestration ETL / ELT	 Preparation Collaboration AI / ML

SSIS ♥ ADF

Lift and Shift SSIS

Execute SSIS in ADF

ADF ♥ Databricks

Databricks Activities

Data Flows run on Databricks

Modern Data Warehouse Implementation using Native Azure Components

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Modern Data Warehousing

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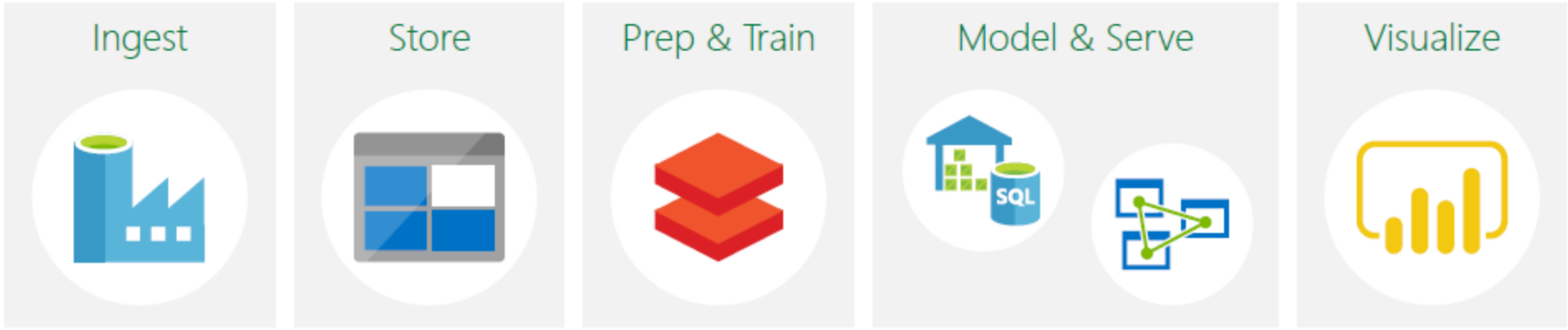


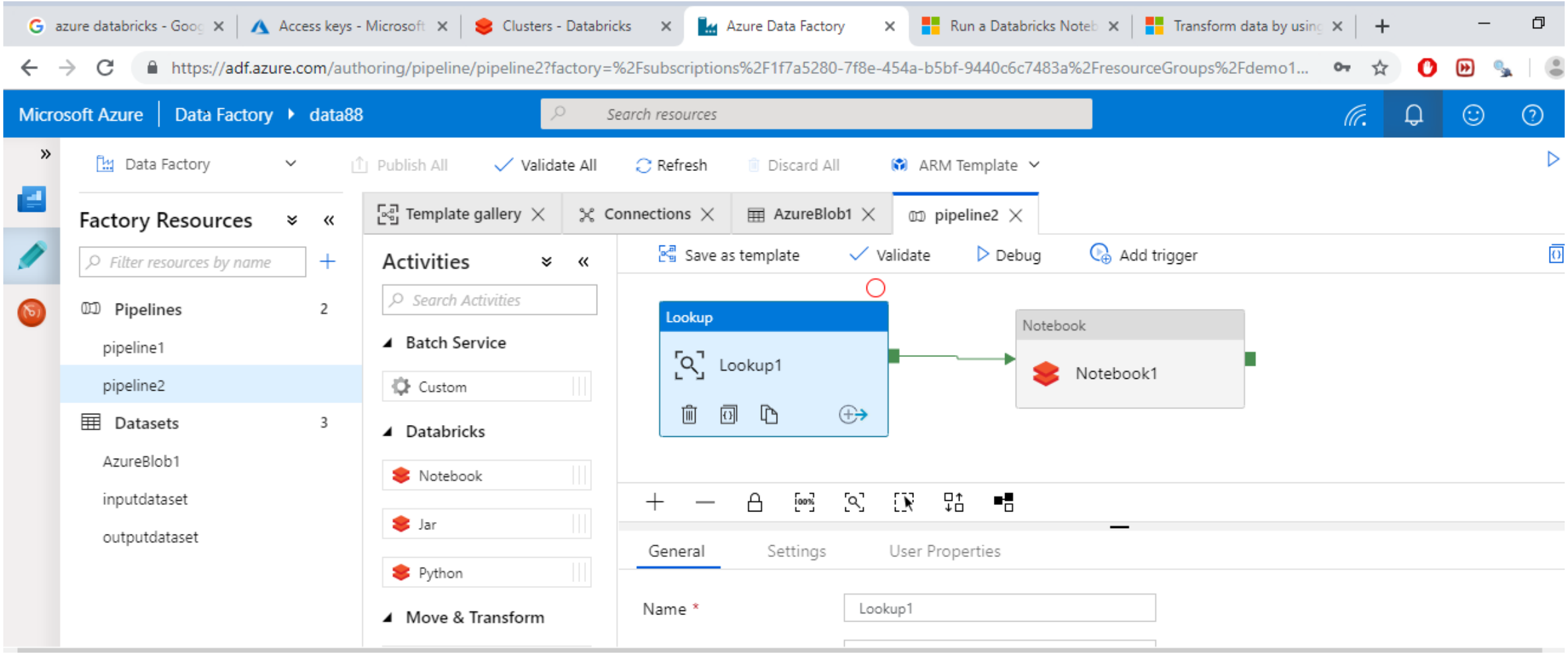
Demo Use Case – Azure Datafactory and Databricks

Use case Description

- Predicting the price of diamond.
- Linear Regression is implemented with the properties of diamond being the independent variables.
- Some of the properties used to predict the price are Carat, Color, Clarity and Depth.
- The Dataset contains 53,940 rows and 10 columns.

Demo

Use Case Snapshots



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Use Case Snapshots

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