



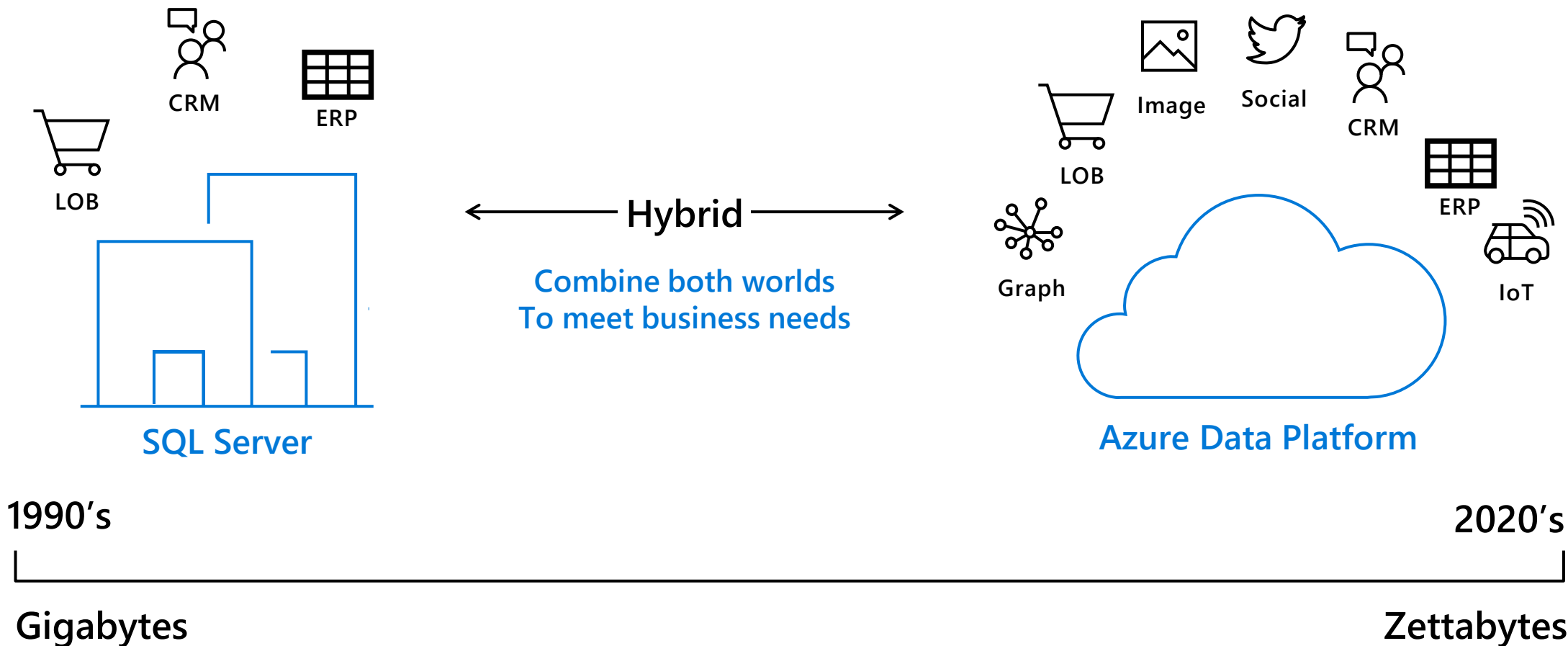
Delivering a Modern Data Warehouse in Azure

Junghwan Lee
Infinov

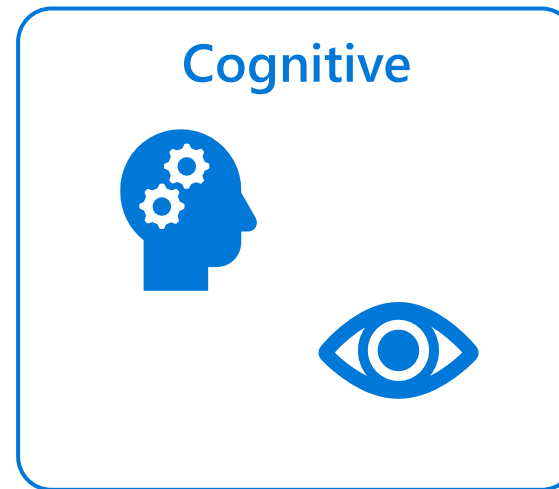
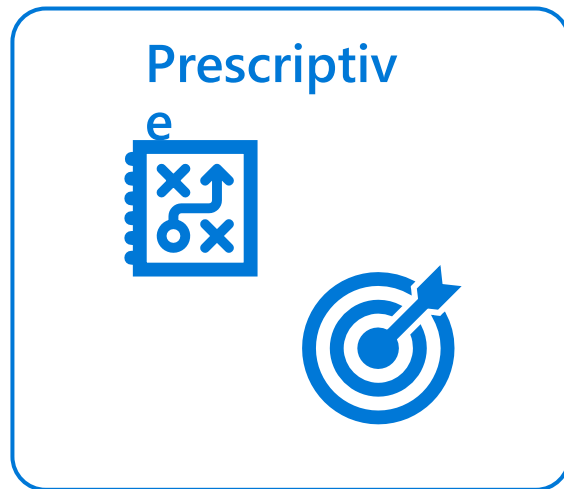
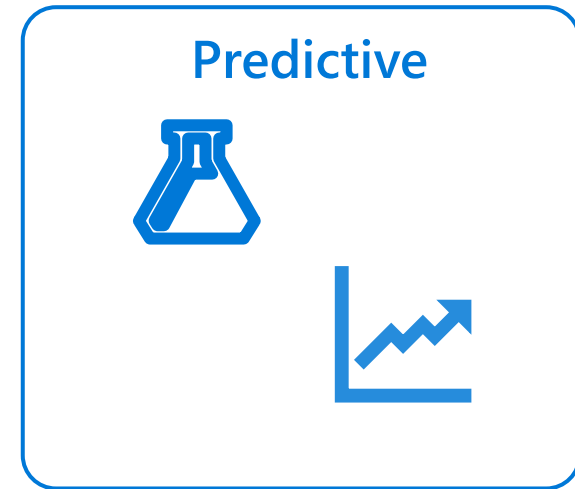
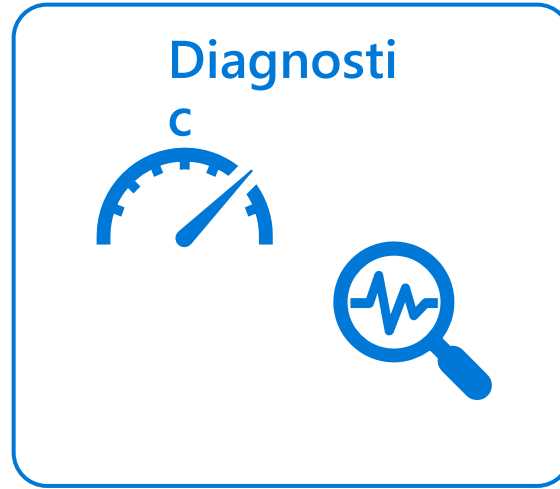
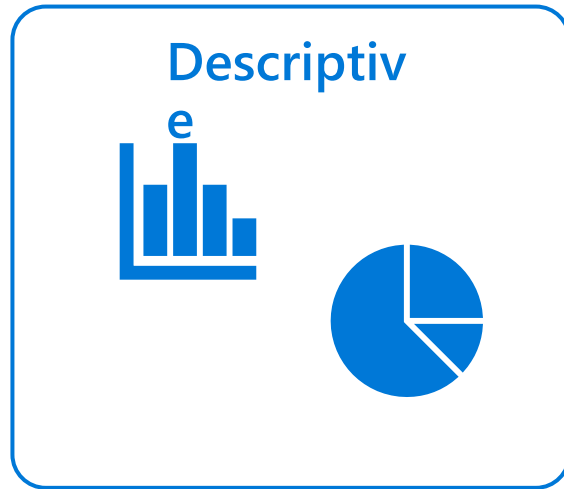


Why modernize?

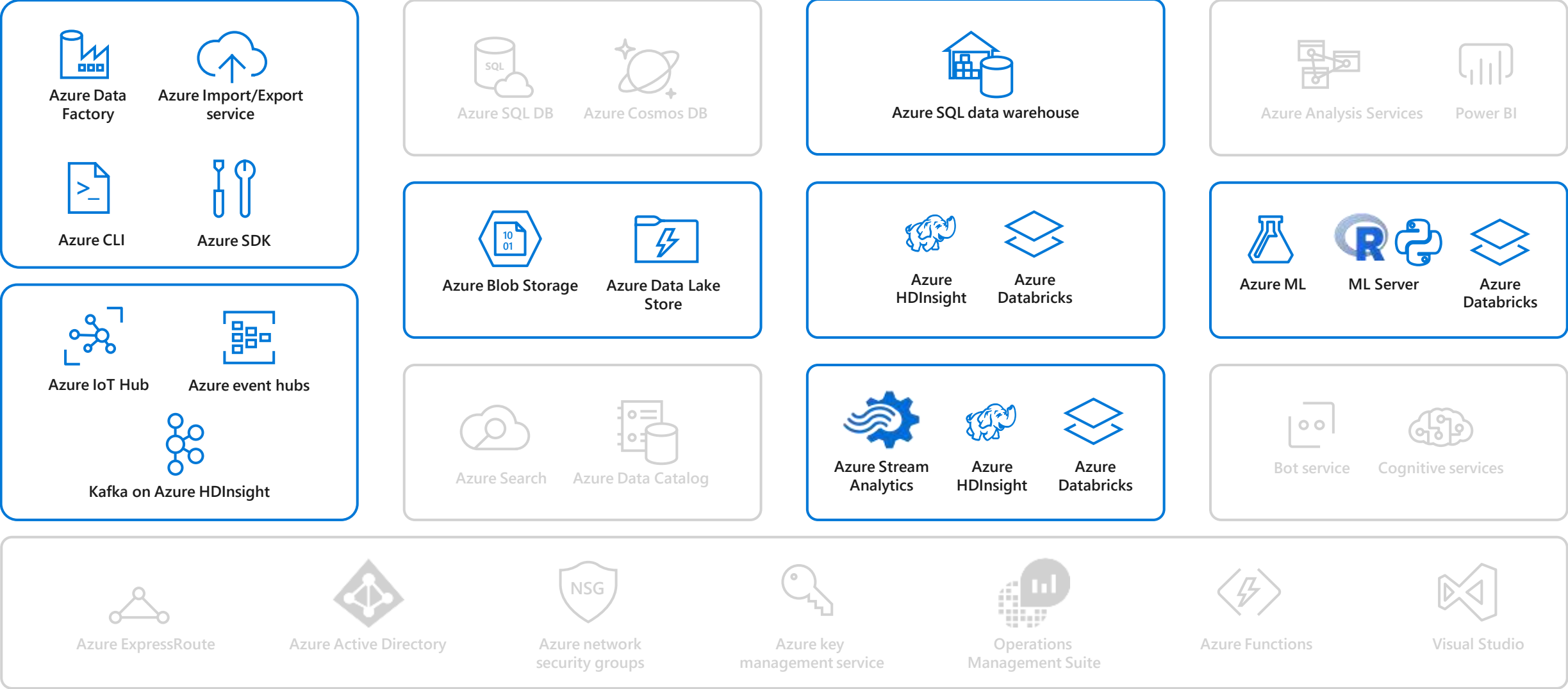
The evolving world of data



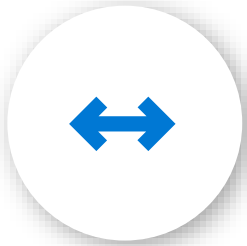
The evolving world of analytics



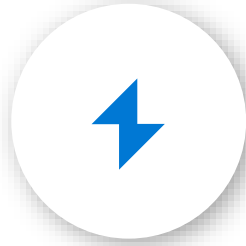
The Azure Big Data Landscape



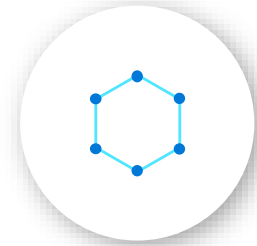
Azure Modern Data Warehouse benefits



Elastic Architectures



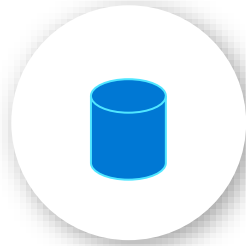
Workload Optimized
Compute



Analyze All Data



Hybrid



No Data Silos

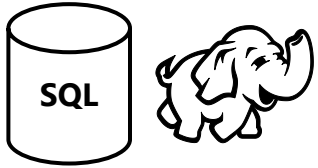


Governed Self-Service

Solution scenarios

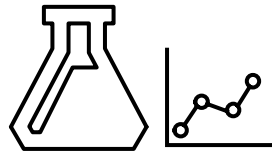
Solution scenarios

Big Data and advanced analytics



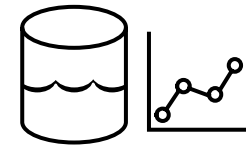
Modern data warehousing

“We want to integrate all our data—including Big Data—with our data warehouse”



Advanced analytics

“We’re trying to predict when our customers churn”

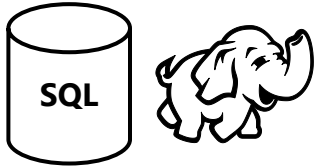


Real-time analytics

“We’re trying to get insights from our devices in real-time”

Azure Modern data warehousing

The modern data warehouse extends the scope of the data warehouse to serve Big Data that's prepared with techniques beyond relational ETL



Modern data warehousing

"We want to integrate all our data—including Big Data—with our data warehouse"



Advanced analytics

"We're trying to predict when our customers churn"



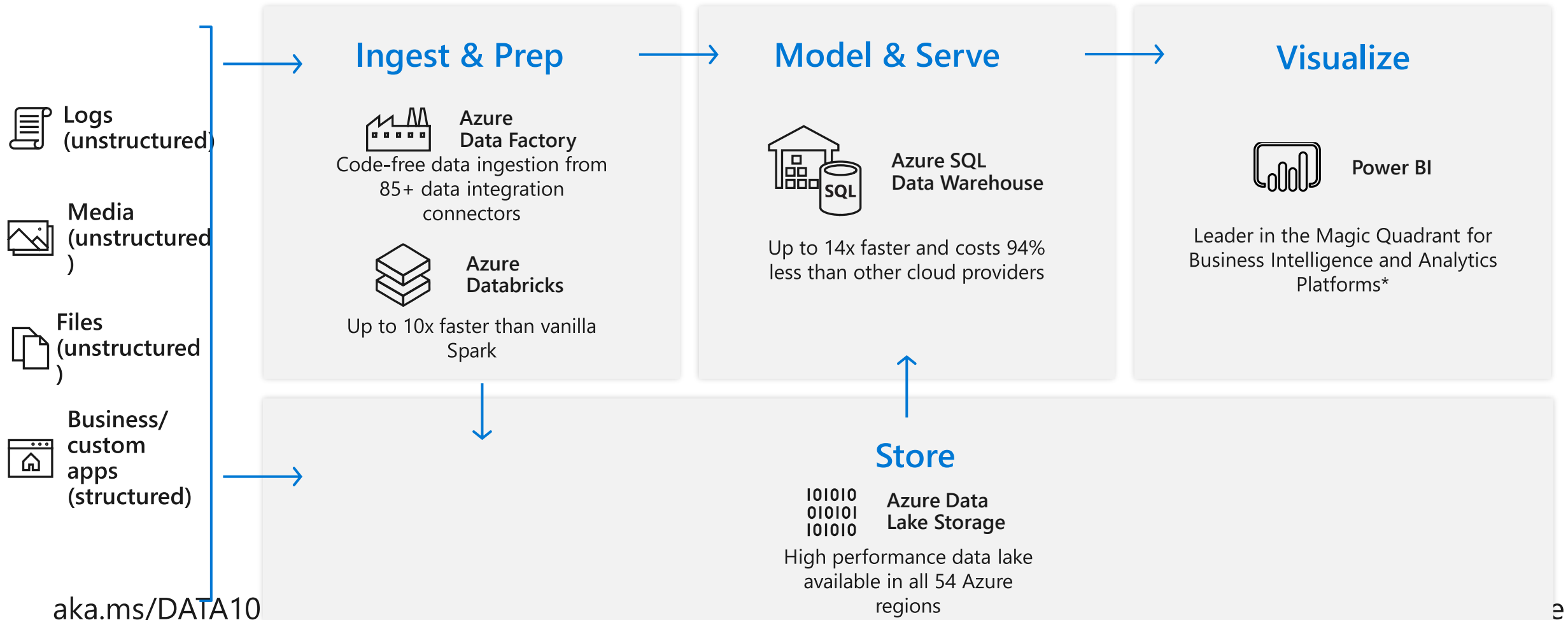
Real-time analytics

"We're trying to get insights from our devices in real-time"

Azure Modern Data Warehouse Processes

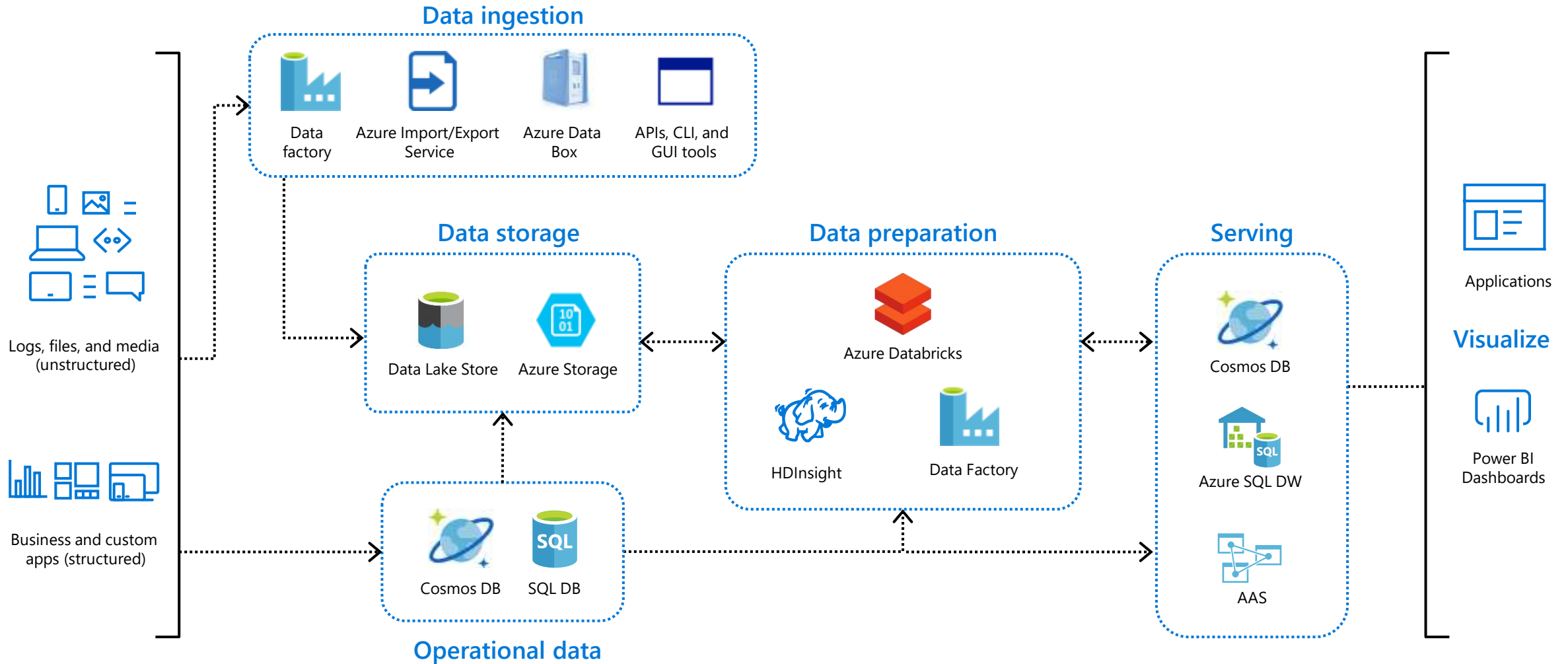
Best end-to-end ecosystem to turn your data into actionable insights

Unparalleled performance



Data warehousing pattern in Azure

Loading and preparing data for analysis with a data warehouse



Example solution architecture

Things to note

A background image showing two women in a professional setting. One woman, wearing a patterned top, is pointing at a whiteboard with a marker. The other woman, in a dark top, is also pointing at the whiteboard. The whiteboard has various papers and diagrams pinned to it.

- There are no right or wrong solutions, only optimal solutions
- Lead with certain solutions and customize based on customer scenarios
- Customer voice and product and service maturity govern lead solutions
- Consider price and performance, ease of use, and ecosystem acceptance as factors
- Everything is fluid - a lead solution today might be non-optimal tomorrow, based on the factors above and new releases

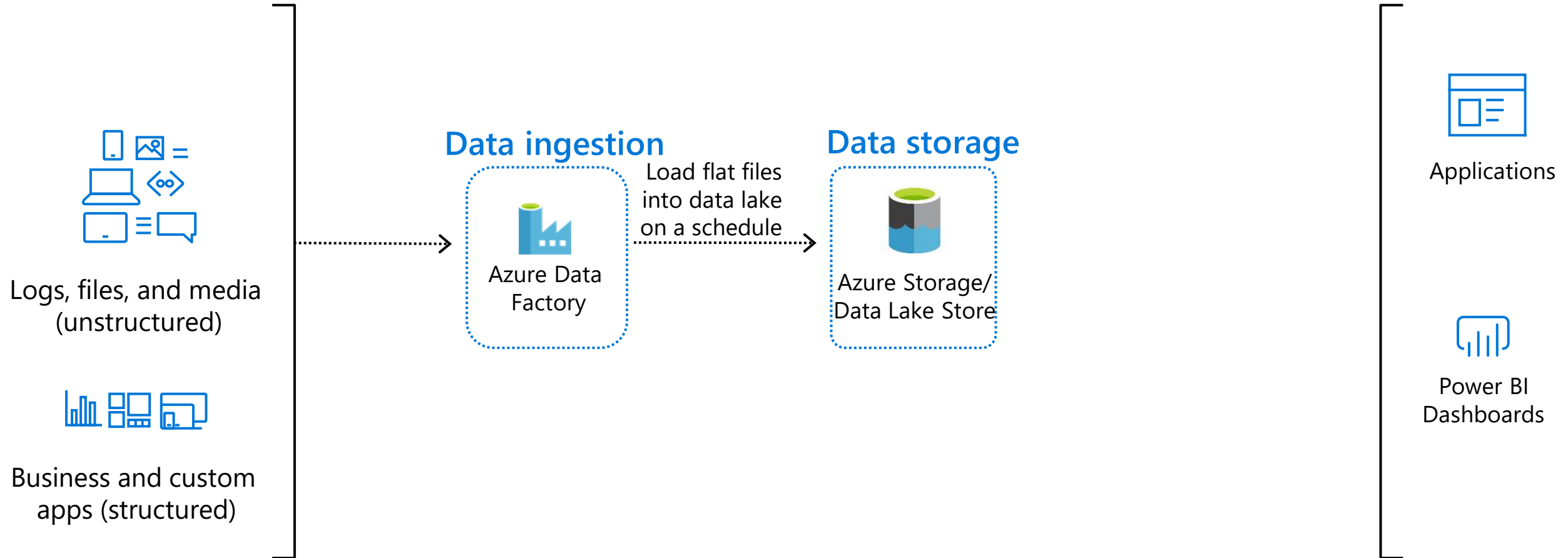
A technician wearing a blue cap and jacket is working on a server rack in a data center. The rack is filled with various electronic components and cables. The technician is reaching into the rack, possibly to install or maintain a component.

Data ingestion and storage

The storage that persists the transferred data that will be consumed by subsequent processing

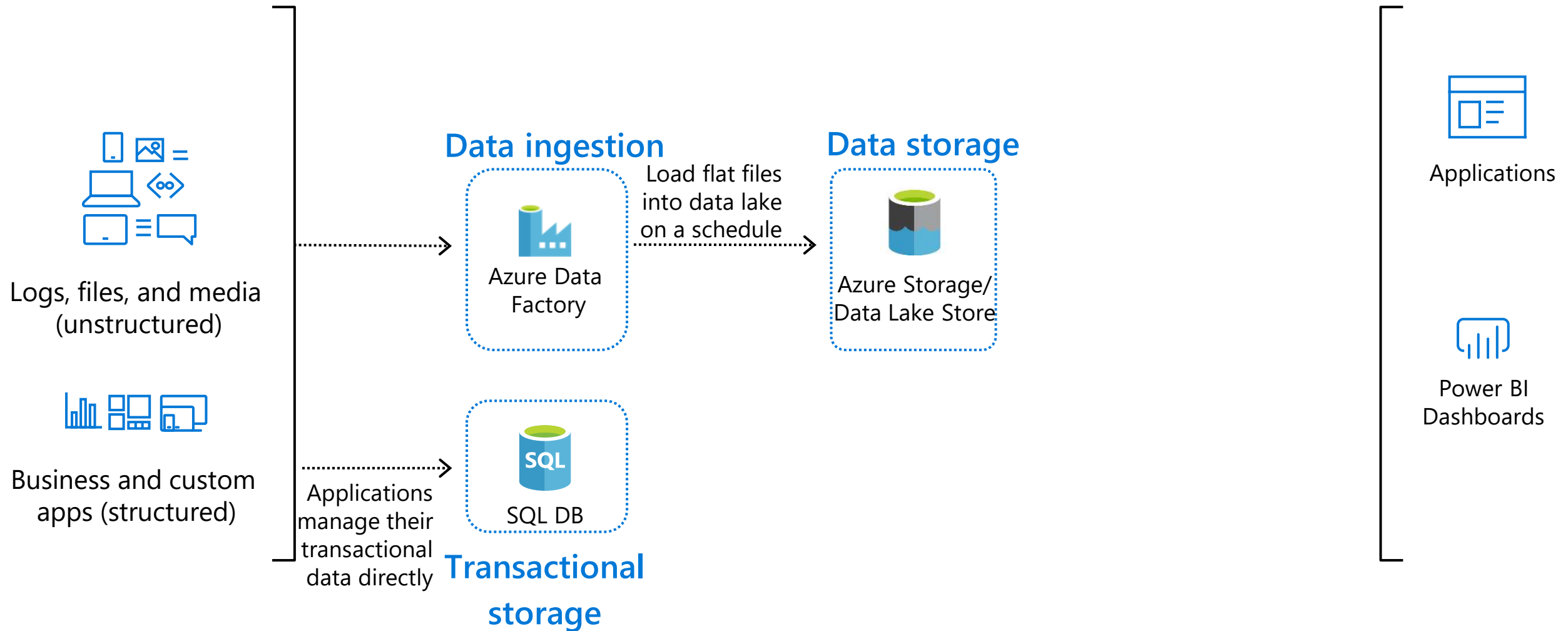
Data warehousing pattern in Azure

Ingesting data into Azure Data Lake with Azure Data Factory



Data warehousing pattern in Azure

Ingesting data into Azure Data Lake with Azure Data Factory



A person with glasses is seen from the side, working at a desk with two computer monitors. The monitors display code in a dark-themed editor. The background is a modern office with glass partitions.

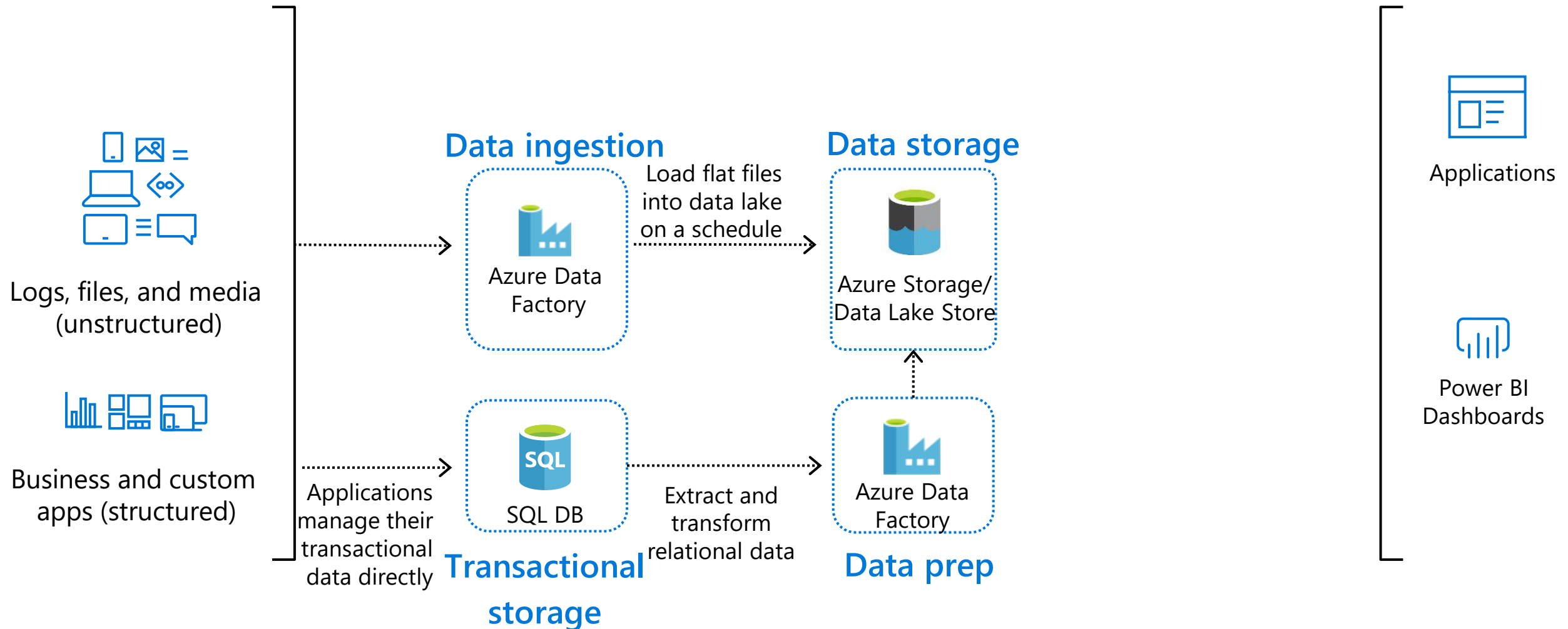
Data preparation

Is data cleansing, structuring, curation, and aggregation in data warehousing.

The data is batch processed in preparation for loading into a data warehouse

Data warehousing pattern in Azure

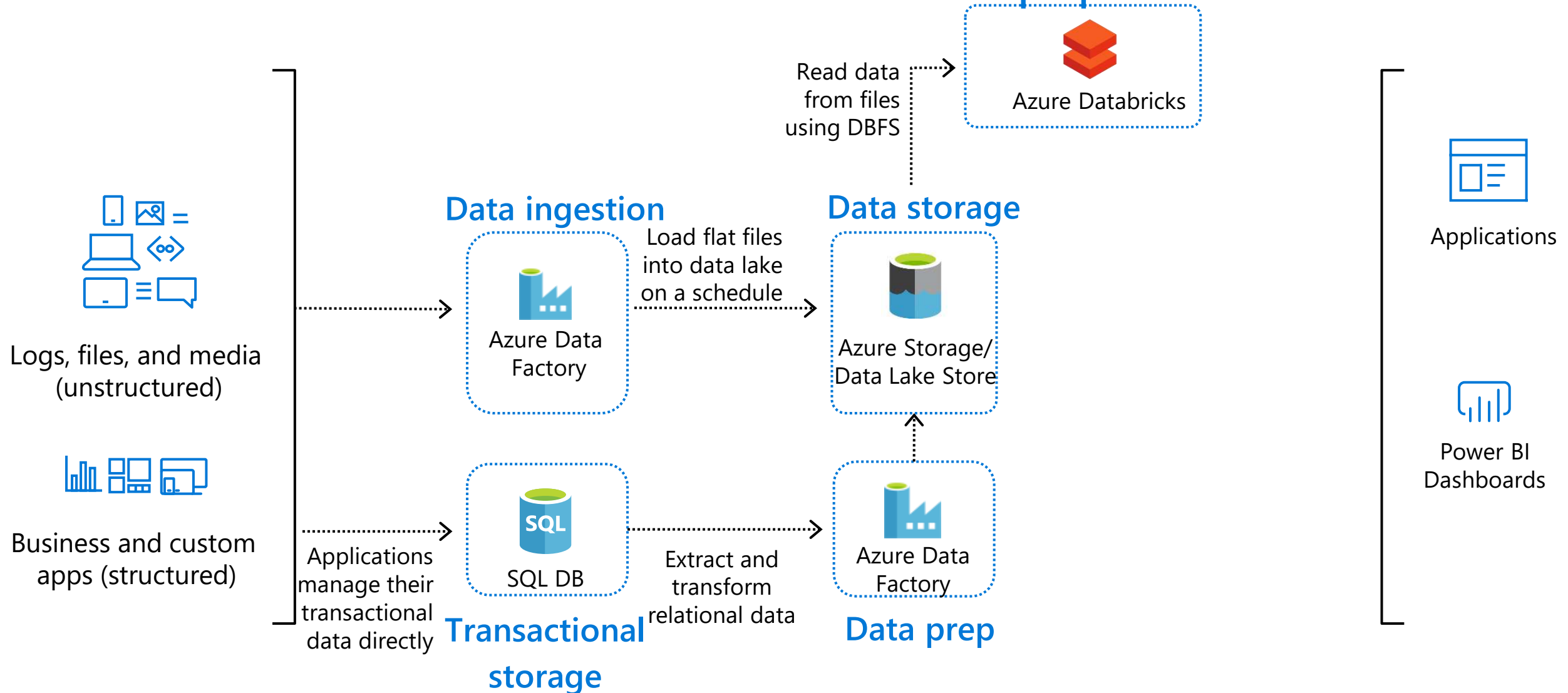
Ingesting data into Azure Data Lake with Azure Data Factory



Data warehousing pattern in Azure

Ingesting data into Azure Data Lake with Azure Data Factory

Data preparation



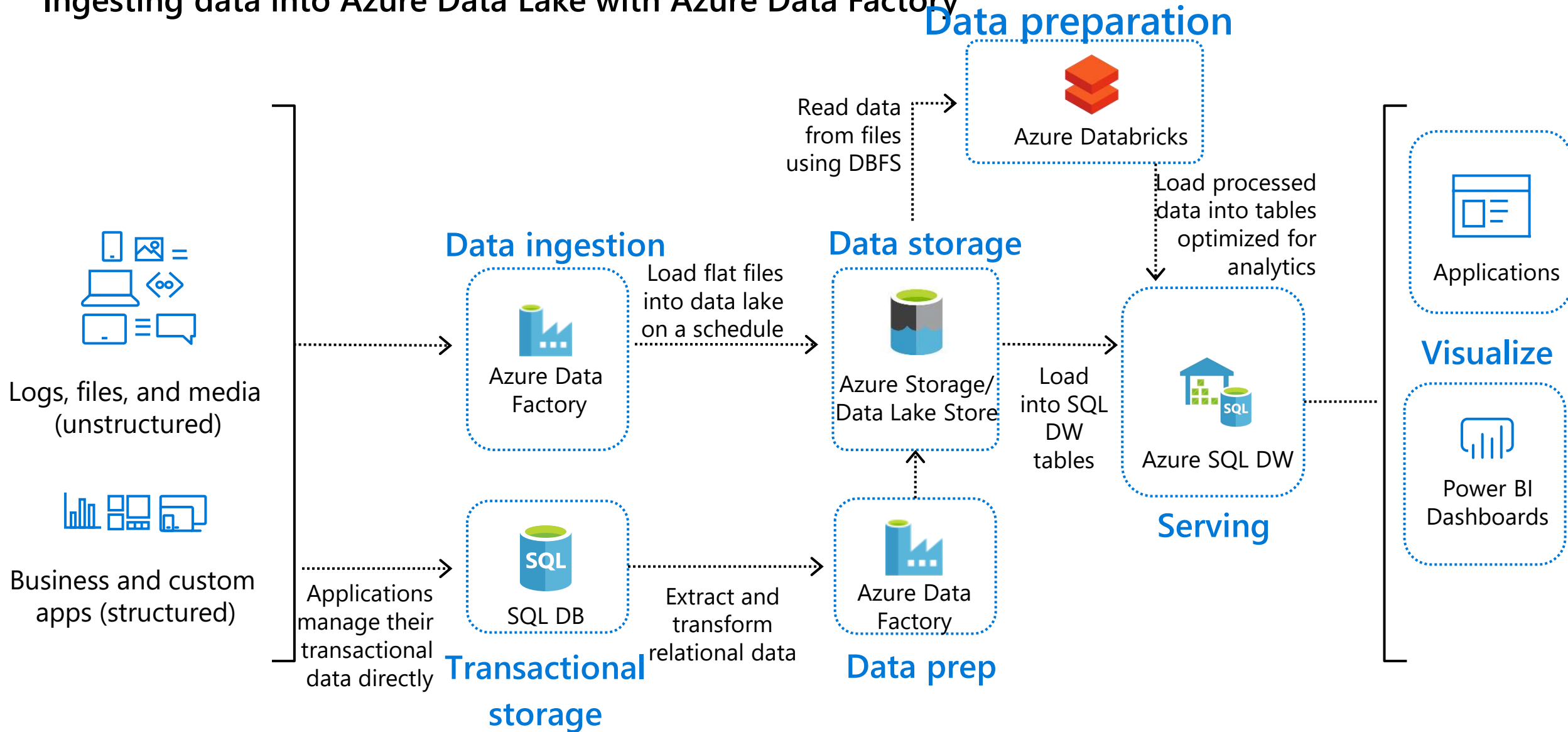
Data serving

Processed data served by a data warehouse to analytic clients and reporting tools

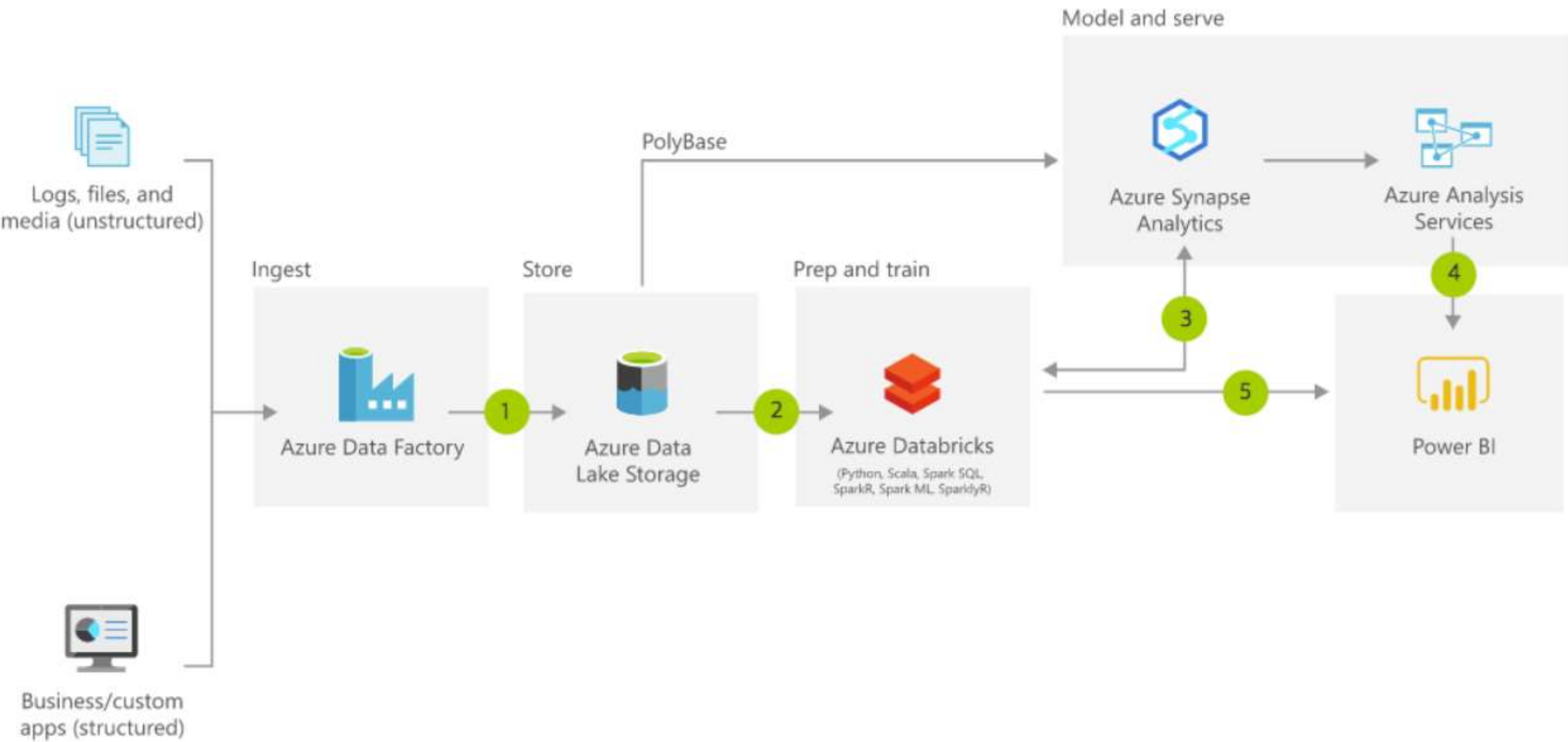
The data warehouse provides increased query flexibility and reduced query latency in comparison to batch data processing options

Data warehousing pattern in Azure

Ingesting data into Azure Data Lake with Azure Data Factory



Architecture



Modern Data Warehouse considerations

Big Data and advanced analytics



Security

Enables the modern data warehouse to control access in order to protect sensitive data and maintain desired compliance



Automation

Enables all components of the modern data warehouse solution to be controlled, deployed, and monitored programmatically



Monitoring

Provides insights into the status and health of the data warehouse solution

Ingesting Data with Azure Data Factory



What is Azure Data Factory?

AZURE DATA FACTORY

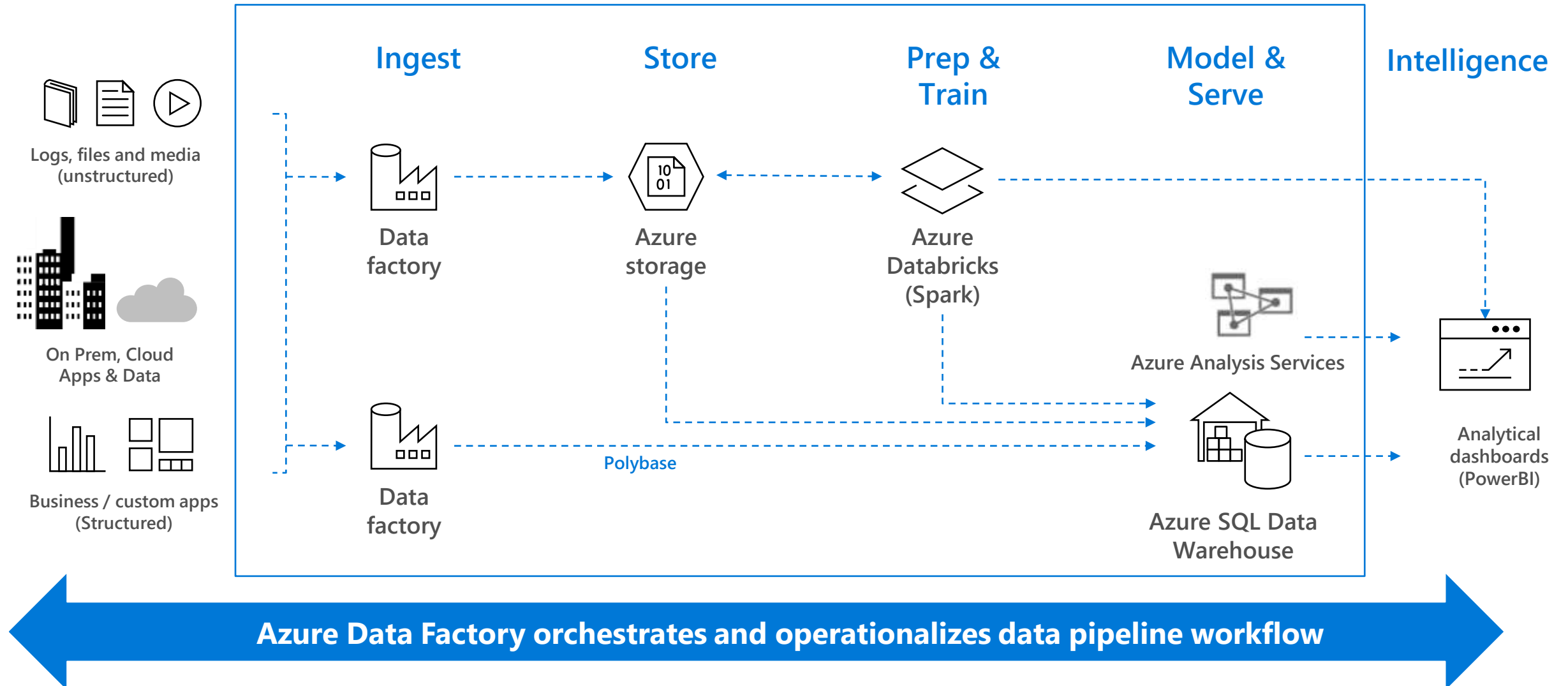
A cloud-based data integration service that allows you to orchestrate and automate data movement and data transformation.

AZURE DATA FACTORY는

코딩이 필요 없는 하이브리드 데이터 통합 서비스 솔루션

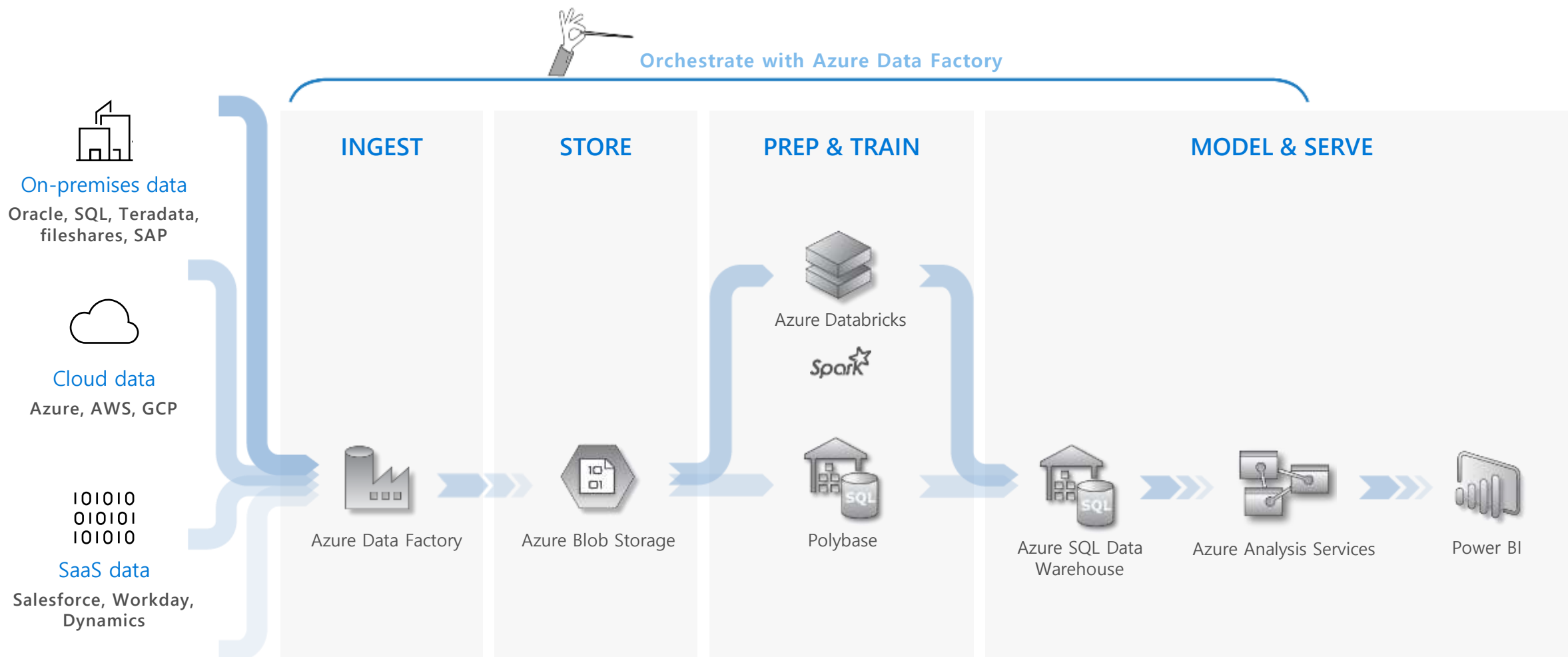
- 다양한 데이터 소스에서 데이터를 추출하고
- 원하는 분석 엔진 또는 비즈니스 인텔리전스 도구에 게시
- 데이터 파이프라인을 모니터링 및 관
- 데이터가 클라우드와 온-프레미스 중 어디에 있든,
엔터프라이즈급 보안으로 작업
- 80개 이상의 데이터 원본 커넥터를 사용.
- 그래픽 사용자 인터페이스를 사용하여 데이터 파이프라인을
빌드하고, 모니터링하고, 관리

Modern DW for BI



AZURE DATA FACTORY

Modernize your enterprise data warehouse at scale



Microsoft Azure also supports other **Big Data** services like **Azure HDInsight**, **Azure SQL Database** and **Azure Data Lake** to allow customers to tailor the above architecture to meet their unique needs.

Hybrid and Multi-Cloud Data Integration



1 Properties

One time copy

2 Source

Connection

Dataset

3 Destination

4 Settings

Fault tolerance

5 Summary

6 Deployment

Source data store

Specify the source data store for the copy task. You can use an existing data store connection or specify a new data store. Click [HERE](#) to suggest new copy sources or give comments.

FROM EXISTING CONNECTIONS

CONNECT TO A DATA STORE



Amazon Redshift



Amazon S3



Azure Blob Storage



Azure Cosmos DB



Azure Data Lake Store



Azure Database for MySQL

Azure Database for
PostgreSQL

Azure File Storage



Azure SQL Data Warehouse



Azure SQL Database



Azure Table Storage



Cassandra



FTP



Previous

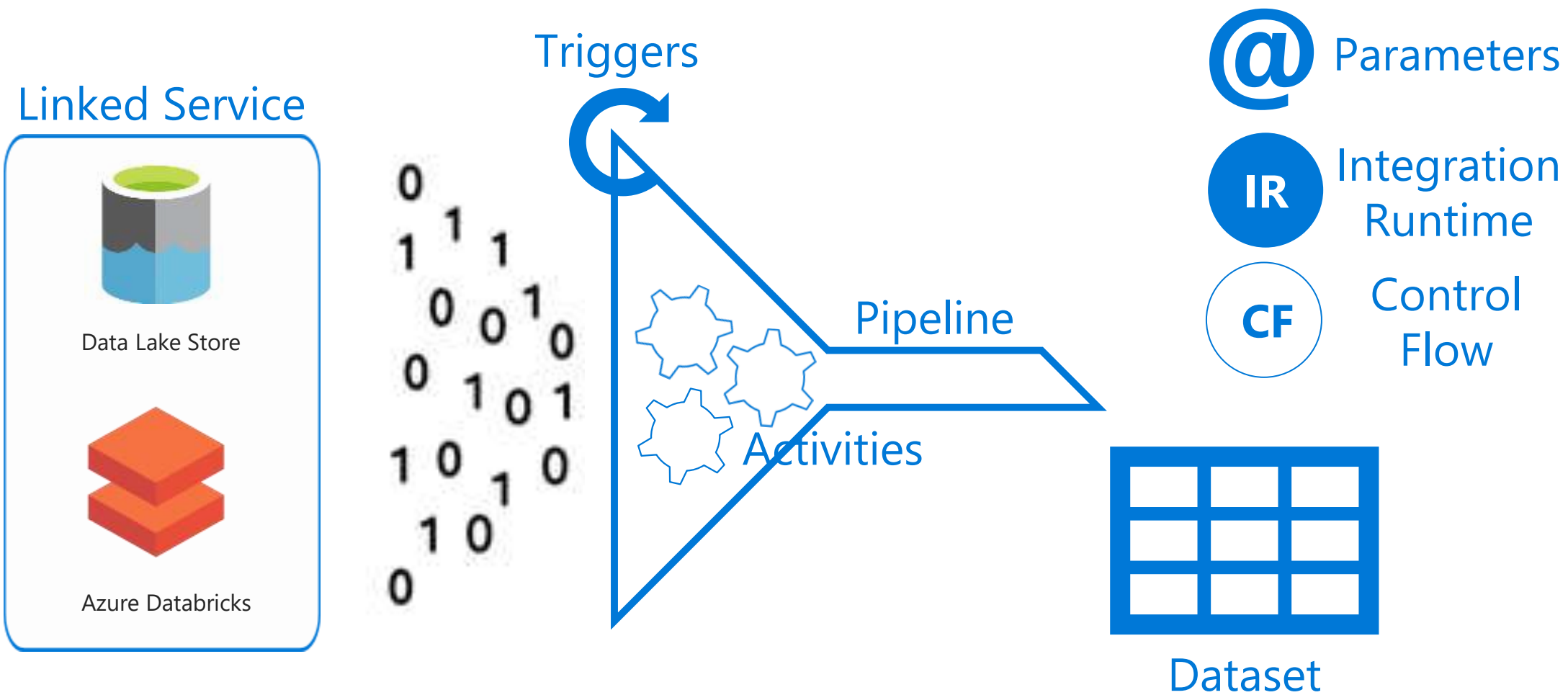
Next

Access all your data – 90+ connectors & growing

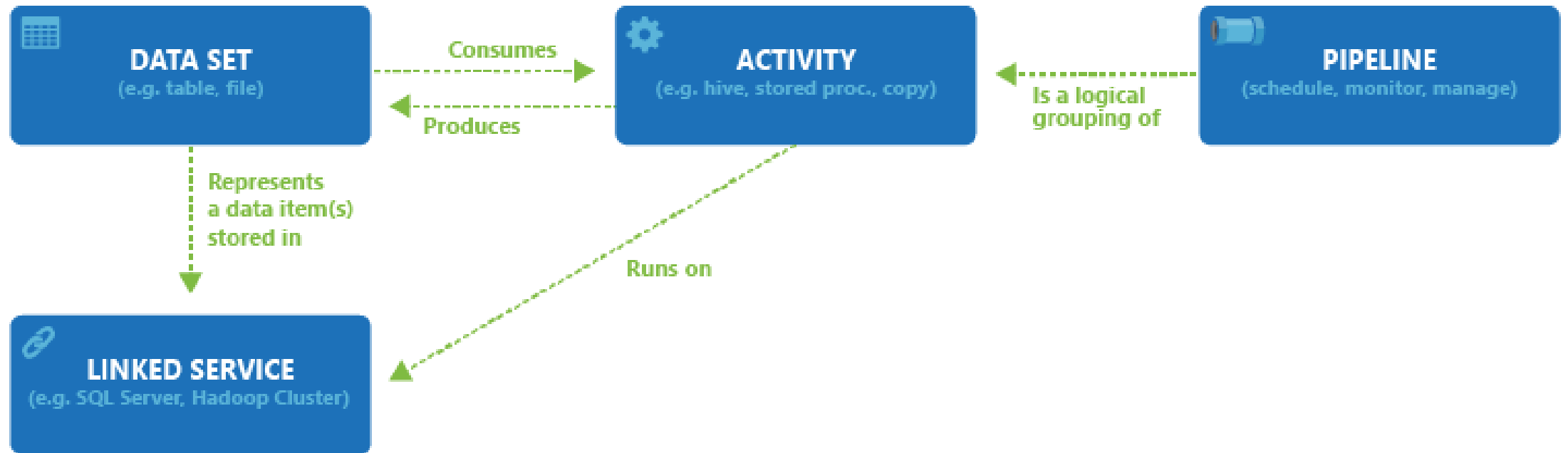
Azure (12)	Database (24)		File Storage (5)	NoSQL (3)	Services and Apps (28)		Generic (3)
Blob Storage	Amazon Redshift	Netezza	Amazon S3	Cassandra	Amazon MWS	Oracle Service Cloud	HTTP
Cosmos DB (SQL API)	DB2	Oracle	File System	Couchbase	Common Data Service for Apps	Paypal	OData
Data Lake Storage Gen1	Drill	Phoenix	FTP	MongoDB	Concur	QuickBooks	ODBC
Data Lake Storage Gen2	Google BigQuery	PostgreSQL	HDFS		Dynamics 365	Salesforce	
DB for MySQL	Greenplum	Presto	SFTP		Dynamics CRM	Salesforce Marketing Cloud	
DB for PostgreSQL	HBase	SAP BW			GE Historian	Salesforce Service Cloud	
File Storage	Hive	SAP HANA			Google AdWords	SAP C4C	
SQL DB	Impala	Spark			HubSpot	SAP ECC	
SQL DB Managed Instance	Informix	SQL Server			Jira	ServiceNow	
SQL DW	MariaDB	Sybase			Magento	Shopify	
Search Index	Microsoft Access	Teradata			Marketo	Square	
Table Storage	MySQL	Vertica			Office 365	Web table	
					Oracle Eloqua	Xero	
					Oracle Responsys	Zoho	

* Supported file formats: CSV, Parquet, AVRO, ORC, JSON

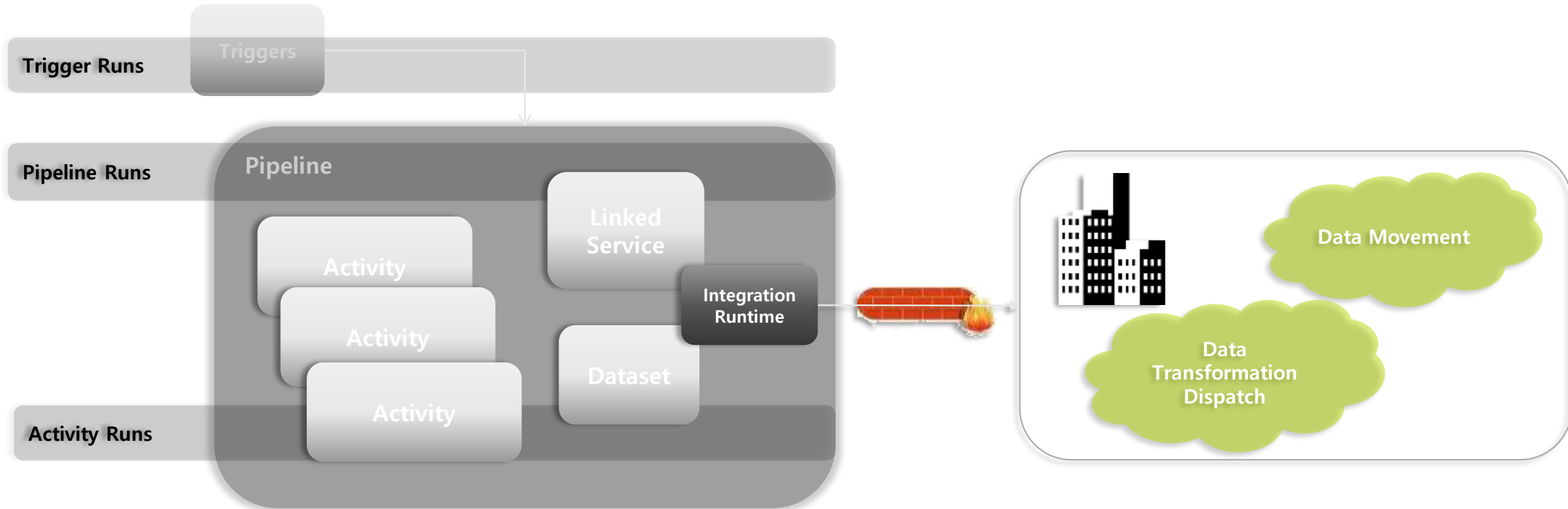
AZURE DATA FACTORY COMPONENTS



COMPONENT DEPENDENCIES

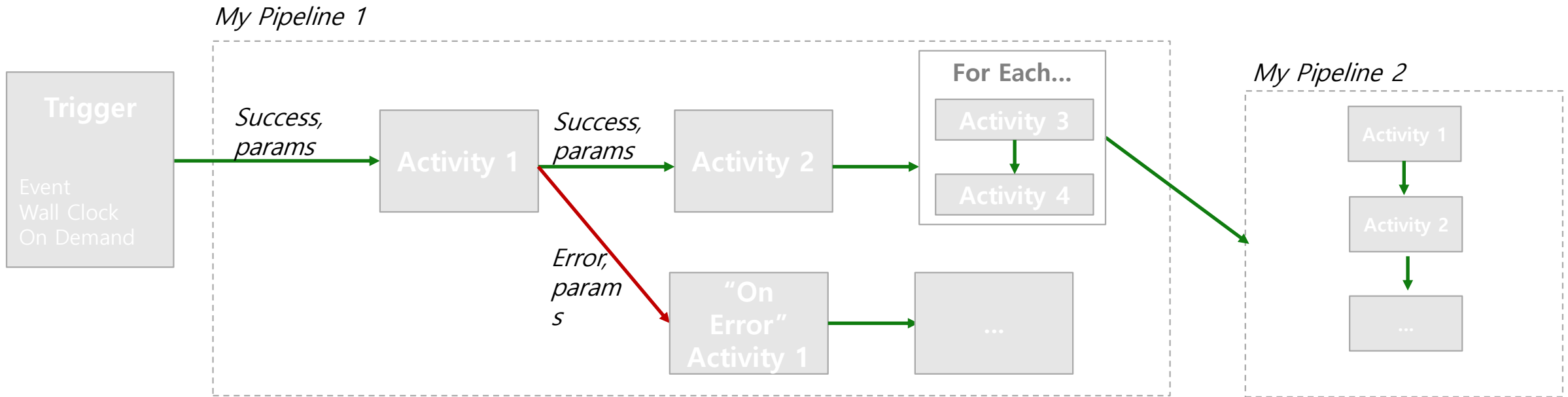


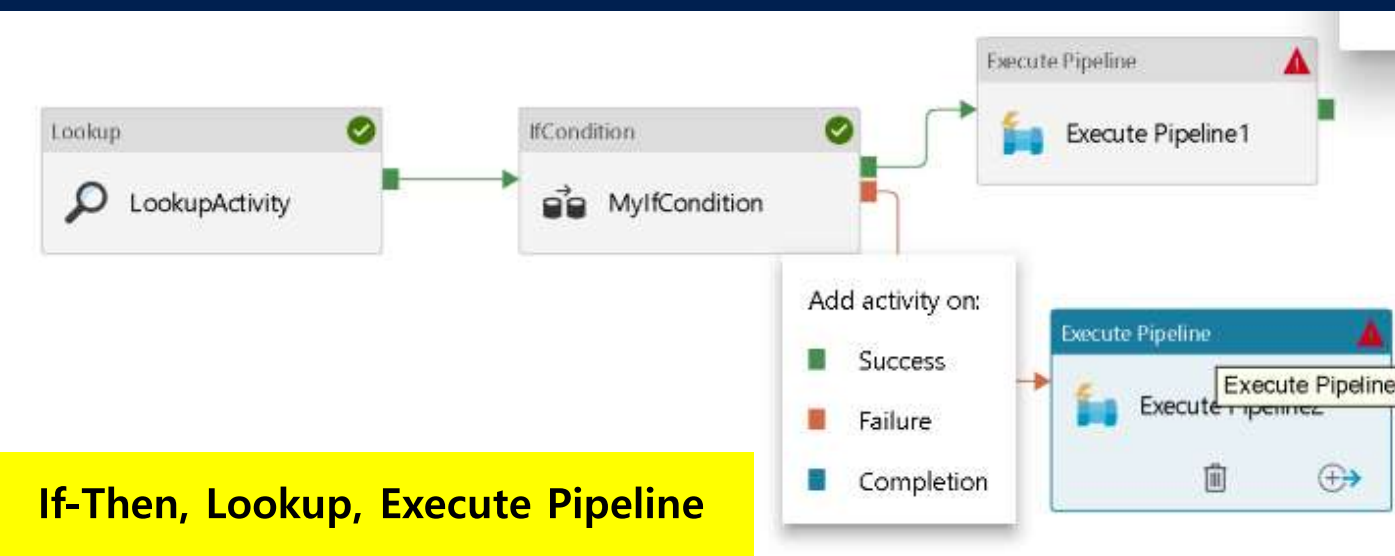
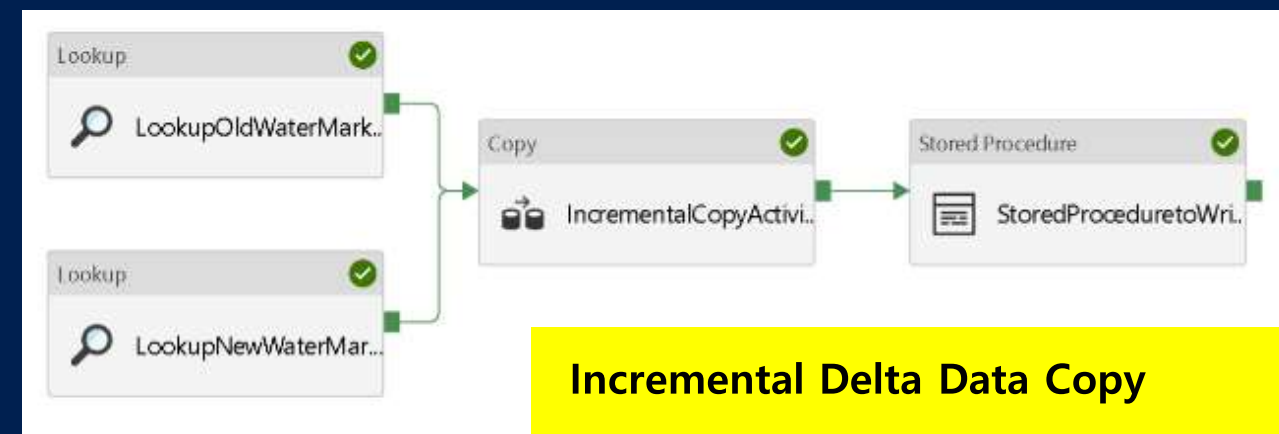
Azure Data Factory Updated Flexible Application Model



Control Flow Introduced in Azure Data Factory

Coordinate pipeline activities into finite execution steps to enable looping, conditionals and chaining while separating data transformations into individual data flows





Connections X

Linked Services Integration Runtimes

+ New

Name	Actions	Type
AzureSQLDatabaseLinkedService		Azure SQL Database
AzureSqlLinkedService		Azure SQL Database
AzureStorageLinkedService		Azure Storage
AzureBatchLinkedService		Azure Batch
AzureStorage1		Azure Storage
129bb8d5-5ff6-4847-b667-a49b4f438771		Amazon S3
5a680b8c-40b0-46d9-b5e4-8b4359ae3b		Azure Storage
SQLDBLS		Azure SQL Database

Connection Managers



Refresh



Custom Range 11/01/2017 9:00 AM - 12/23/2017 9:00 AM ▾

Time Zone (UTC-08:00) Los Angeles ▾

All Succeeded In Progress Failed

Pipeline Name ▾	Actions	Run Start ▴	Duration	Triggered By	Status	Parameters	Error	RunID
LookupPipeline		12/04/2017, 4:59:33 PM	00:00:49	Manual trigger	✔ Succeeded...			8fd7c2e1-440c-45d7-aff0-21dc8552c207
LookupPipeline		12/04/2017, 4:56:24 PM	00:00:53	Manual trigger	✔ Succeeded...			ecd6bec4-b7b8-47b0-aaac-c32ba199a5ff
LookupPipeline		12/04/2017, 4:53:34 PM	00:00:33	Manual trigger	✖ Failed			c272ebf7-f784-4d8c-9b82-c5e10f06250b
LookupPipeline		12/04/2017, 4:20:25 PM	00:00:29	Manual trigger	✖ Failed			6018a772-81c8-4ec0-ab18-24424c25195c
LookupPipeline		12/04/2017, 4:10:50 PM	00:00:33	Manual trigger	✖ Failed			06c7db30-d77b-47d2-917a-935244f1c2c5
pipeline4_7e0990af-c...		11/27/2017, 11:12:27 AM	00:00:05	Manual trigger	✖ Failed			c3aa1144-ebdc-448b-a1b8-9f1b5d65cb40
MyWebActivityPipeline		11/26/2017, 9:37:02 PM	00:00:10	Manual trigger	✖ Failed			23c5e44c-a191-4a1f-ac21-ff276b7da43b
batchpipe		11/17/2017, 3:24:19 PM	00:00:38	Manual trigger	✔ Succeeded...			b2ef549a-b5cf-4786-9ffd-f9f71948c6d9
batchpipe		11/17/2017, 3:20:12 PM	00:00:00	Manual trigger	✖ Failed			a3dec17f-a370-4e8b-9a3e-285483680fde
ifconditionpipeline2		11/16/2017, 6:00:20 PM	00:00:04	Manual trigger	✖ Failed			07b7812d-0af0-4f67-a0b8-ec64ddd38fc9
ifconditionpipeline		11/16/2017, 6:00:11 PM	00:00:05	Manual trigger	✖ Failed			8ac7565d-eefd-4831-92c5-33bfebfdf2c60
ifconditionpipeline		11/15/2017, 4:58:45 PM	00:00:07	Manual trigger	✔ Succeeded...			dcff3e04-6158-40e7-b21d-70d417ae646f
ifconditionpipeline		11/15/2017, 4:52:36 PM	00:00:06	Manual trigger	✖ Failed			f1d615ca-f4d9-47bf-930b-0bc47dbb3430
pipeline3_9a1f3c55-e...		11/10/2017, 2:52:13 PM	00:00:05	Manual trigger	✖ Failed			052056da-9cd6-48c8-8441-4d11feb911a4
IncrementalCopyPipeli...		11/01/2017, 2:02:16 PM	00:01:36	Manual trigger	✔ Succeeded...			f176d4e0-1535-4aec-8eca-25dc7a4b0e80
IncrementalCopyPipeli...		11/01/2017, 1:56:06 PM	00:01:13	Manual trigger	✔ Succeeded...			1f3d9bc2-9b30-4245-9489-786ca77796ca
IncrementalCopyPipeli...		11/01/2017, 1:49:30 PM	00:00:36	Manual trigger	✖ Failed			7824bd16-9e72-4409-ae80-238faf861a5c

1 Properties

One time copy

2 Source

Connection

Dataset

3 Destination

4 Settings

Fault tolerance

5 Summary

6 Deployment

Source data store

Specify the source data store for the copy task. You can use an existing data store connection or specify a new data store. Click [HERE](#) to suggest new copy sources or give comments.

Easy-to-use Wizard for Copying Data at Scale

FROM EXISTING CONNECTIONS

CONNECT TO A DATA STORE



Amazon Redshift



Amazon S3



Azure Blob Storage



Azure Cosmos DB



Azure Data Lake Store



Azure Database for MySQL

Azure Database for
PostgreSQL

Azure File Storage



Azure SQL Data Warehouse



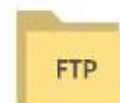
Azure SQL Database



Azure Table Storage



Cassandra



FTP



Previous

Next

ADF Certifications

[HIPAA/HITECH](#)

[ISO/IEC 27001](#)

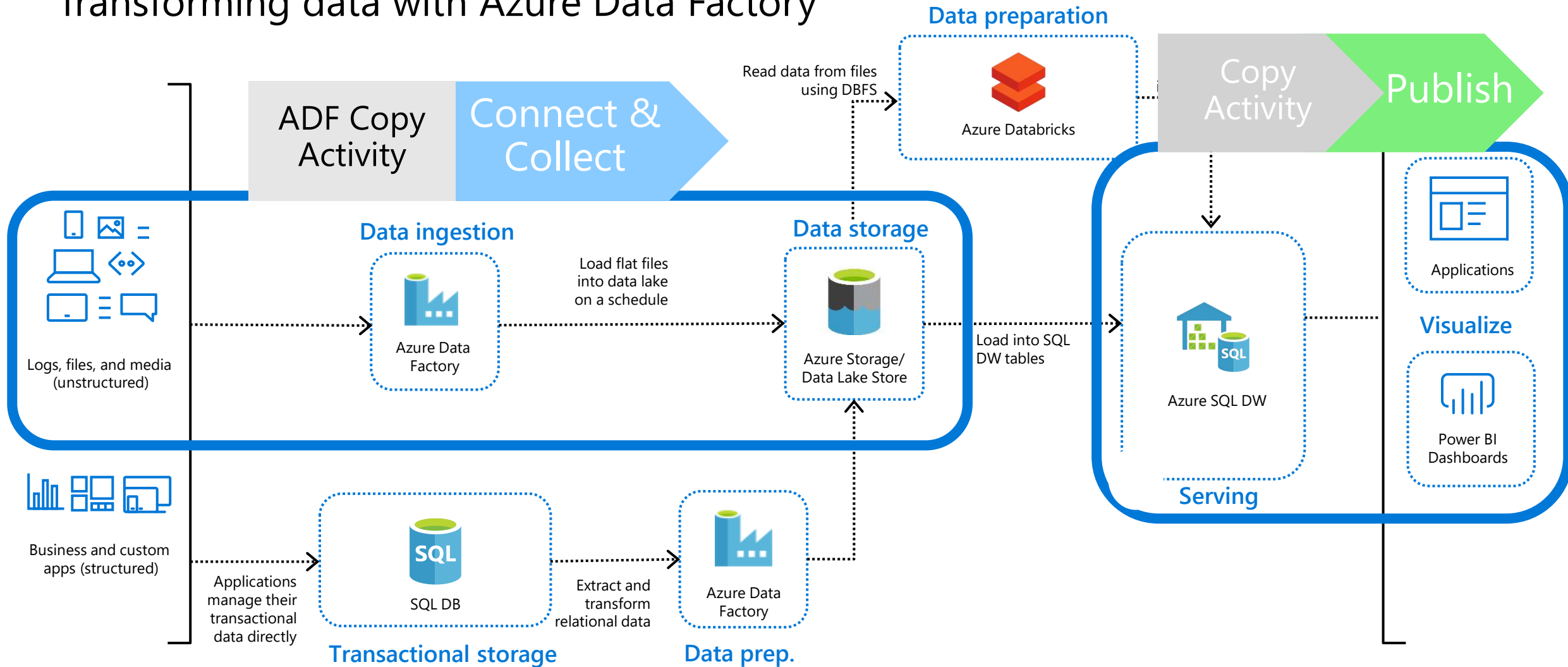
[ISO/IEC 27018](#)

[CSA STAR](#)

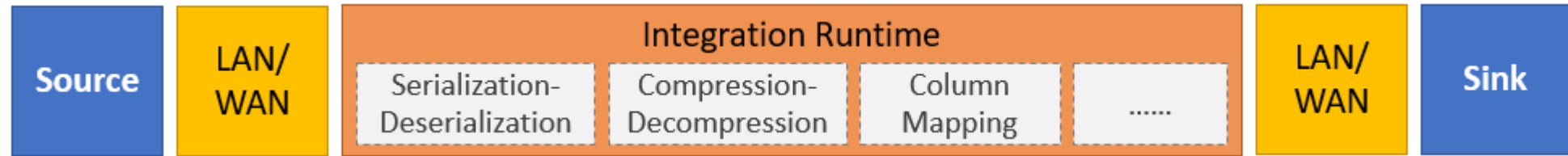
Ingesting data

Data transformation in Azure

Transforming data with Azure Data Factory

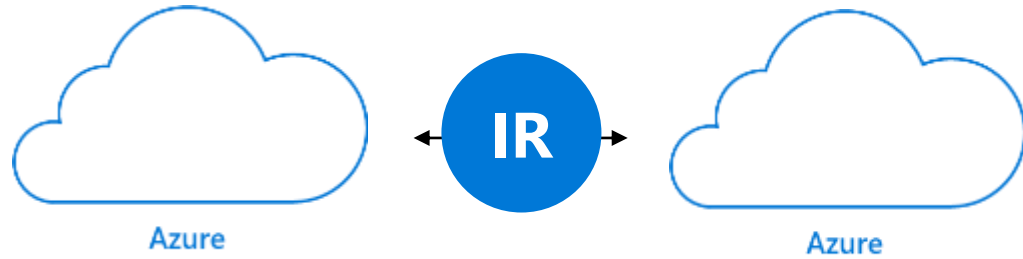


COPY ACTIVITY PROCESS

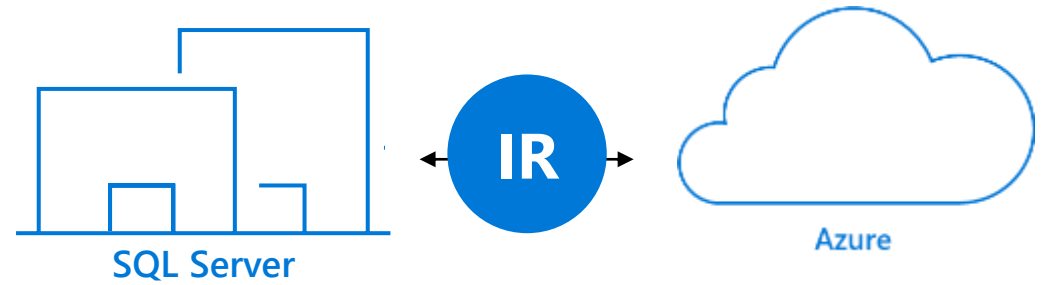


- Reads data from a source data store.
- Performs serialization/deserialization, compression/decompression, column mapping, and so on. It performs these operations based on the configuration of the input dataset, output dataset, and Copy activity.
- Writes data to the sink/destination data store

INTEGRATION RUNTIME

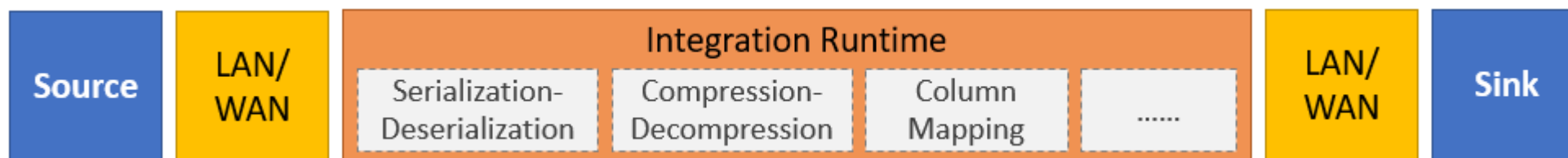


Azure Integration
Runtime



Self-hosted
Integration Runtime

COPY FILES WITH THE COPY ACTIVITY



Supported file formats:

Text
JSON
Avro
ORC
Parquet


Copy activity can compress and decompress files with
The following codecs:


Gzip
Deflate
Bzip2
ZipDeflate


Monitoring data ingestion


Monitoring

Activity runs









LoadADLSG1Demo | Monitor Pipeline Runs ▾





Pipelines / CopyFromAmazonS3ToADLSG1

Refresh

Activity Runs

Pipeline Run ID **d614f808-7b9d-4362-bb8b-a0bddf226d34**

All Succeeded In Progress Failed Cancelled

Activity Name	Activity Type	Actions	Run Start	Duration	Status	Integration Runtime
Copy-copyfroms3	Copy	  	01/17/2018, 11:12:45 PM	00:04:00	 Succeeded	DefaultIntegrationRuntime (East US 2)

Summary

A background image showing two women in a professional setting. One woman, wearing a patterned top, is pointing towards a whiteboard. The other woman, in a dark top, is also looking at the whiteboard. The whiteboard has various papers and diagrams pinned to it.

- Azure Data Factory (ADF) is a cloud-based data integration service that allows you to orchestrate and automate data movement and data transformation.
- Ingesting data can be performed by the ADF Copy Activity
- The ADF Copy Activity can be used to connect and collect data for ingestion, and to publish data to BI tools and applications.
- Different Integration Runtimes are required for different ingestion scenarios
- File copy are very efficient using the ADF Copy Activity
- You can monitor the performance of the ADF Copy Activity both visually and programmatically

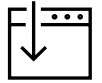
Transform your Data with Azure Data Factory

Speaker name

Title

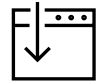


RESOURCES



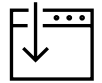
Session Resources Hub

aka.ms/DATA30



Session Code on GitHub

aka.ms/DATA30Repo



All Event Session Resources

aka.ms/mysignitethetour

What is Azure Data Factory?

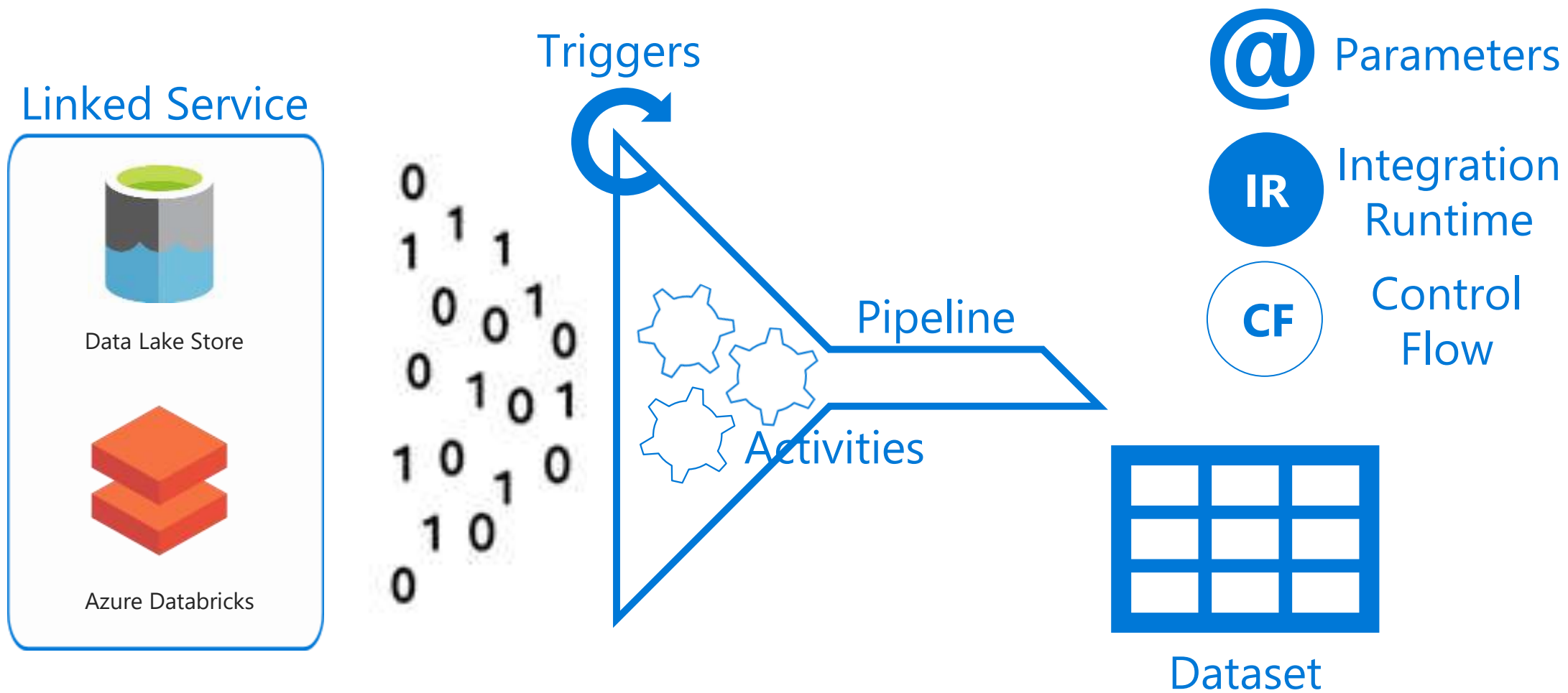
AZURE DATA FACTORY

A cloud-based data integration service that allows you to orchestrate and automate data movement and data transformation.

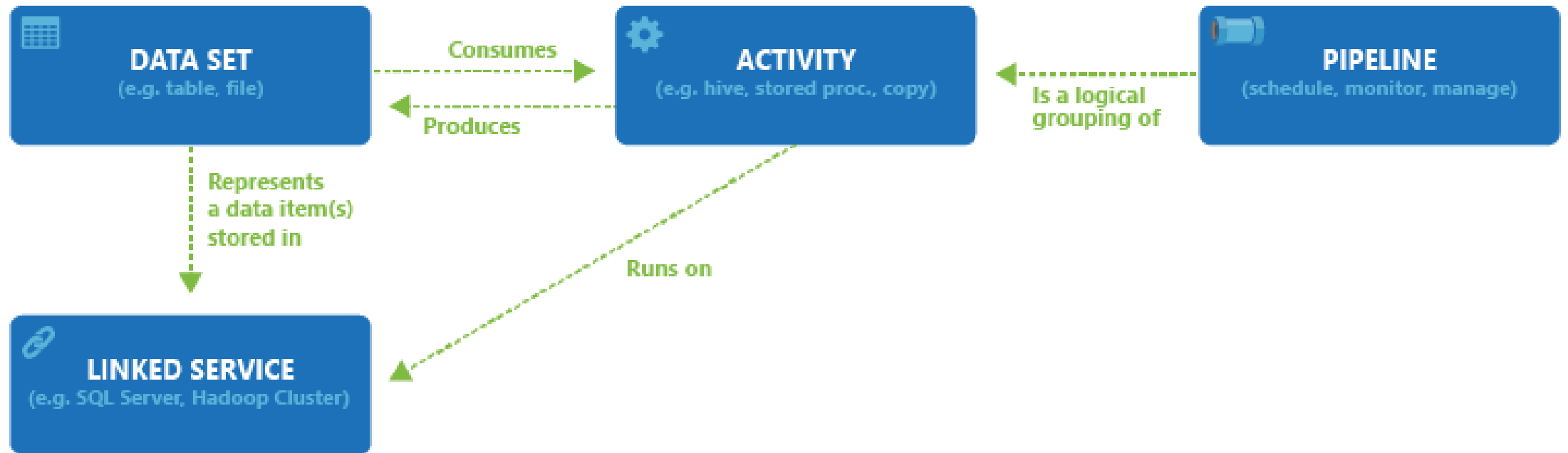
AZURE DATA FACTORY PROCESS



AZURE DATA FACTORY COMPONENTS



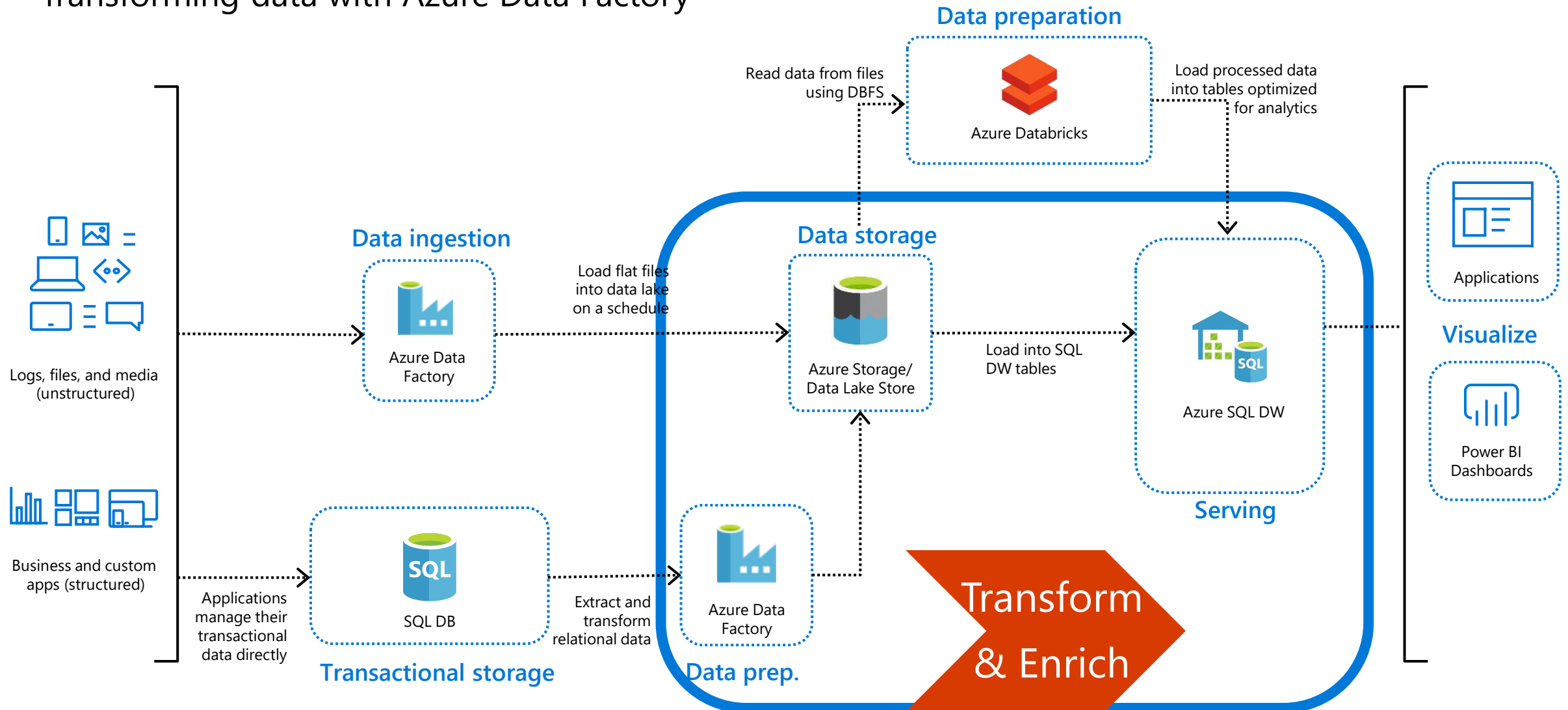
COMPONENT DEPENDENCIES



Transforming data with the ADF Mapping Data Flow

DATA TRANSFORMATION IN AZURE

Transforming data with Azure Data Factory



METHODS FOR TRANSFORMING IN AZURE DATA FACTORY

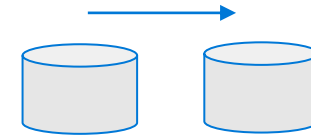
Compute
resources



SSIS Packages



Mapping Data
Flow



METHODS FOR TRANSFORMING DATA IN AZURE DATA FACTORY

Code free data transformation at scale

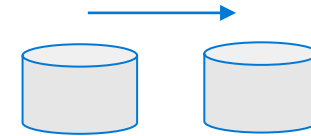
Compute
resources



SSIS Packages



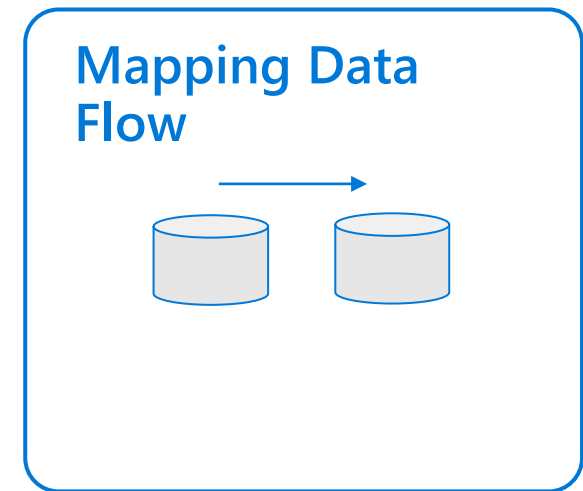
Mapping Data
Flow



BENEFITS OF MAPPING DATA FLOW

Code free data transformation at scale

- Perform data cleansing, transformation, aggregations, etc.
- Enables you to build resilient data flows in a code free environment
- Enable you to focus on building business logic and data transformation
- Underlying infrastructure is provisioned automatically with cloud scale via Spark execution



USING THE MAPPING DATA FLOW

Code free data transformation at scale

The screenshot displays the Azure Data Factory Mapping Data Flow editor. The interface is divided into several sections:

- Left Panel (Factory Resources):** A sidebar showing a hierarchy of resources. Under "Data Flows (Preview)", "dataflow3" is selected and highlighted in blue. Other resources include Pipelines (6), Datasets (14), and Templates (0).
- Top Bar:** A horizontal bar at the top of the editor containing tabs for "MoviesAnalytics", "DataFlowDemo", "DataFlowDemo", "dataflow2", and "dataflow3". Below the tabs are buttons for "Save", "Validate", and "Debug Settings". A red label "top bar" points to this area.
- Graph:** The central workspace for building the data flow. It contains a "source1" node with the description "import data from MoviesDB". Below it is a dashed box labeled "Add Source". A red label "graph" points to this central area.
- Configuration Panel:** A panel at the bottom of the editor. It has two tabs: "General" and "Parameters". Under the "General" tab, there are input fields for "Name" (containing "dataflow3") and "Description". A red label "configuration panel" points to this bottom section.

STARTING THE MAPPING DATA FLOW

Code free data transformation at scale

The screenshot displays the Databricks Dataflow Editor interface. At the top, a tab bar shows several open files: `soccerETL`, `pipeline8`, `pipeline9`, and `DataflowDemo`. Below the tabs, there are toggle switches for `Debug` and `Validate`. The main workspace area contains a visual data flow diagram with a source component labeled `source1` and a column `total`. Below the diagram is a dashed box labeled `Add Source`. On the right side, a panel titled `Adding Data Flow` is open, showing a `Code` tab and a `Create new Data Flow` button. Below this, there are buttons for `+`, `-`, and a search icon. At the bottom of the interface, a `Source Settings` panel is visible, containing the following fields and options:

- `Output stream name *`: `source1`
- `Source Dataset *`: `USDOutput` (with `Edit` and `+ New` buttons)
- `Options`: `Allow schema drift` (checked)
- `Sampling *`: `Enable` and `Disable` (radio buttons, with `Disable` selected)

At the bottom right of the interface, there are `Cancel` and `Finish` buttons.

TRANSFORMATION OPTIONS IN THE MAPPING DATA FLOW

Unpivot Union Join
Lookup Window
Derived Column
Sink Alter Row New Branch
aggregate Pivot Filter
Conditional Split Sort
Exists Select
Surrogate Key Source



Triggering and monitoring

TRIGGERING THE MAPPING DATA FLOW

Code free data transformation at scale

New Trigger

Dashboards

Pipeline Runs

Trigger Runs

Integration Runtimes

Alerts & Metrics

Run

Cancel

Refresh

Last 24 Hours

01/29/2019 12:11 PM - 01/30/2019 12:11 PM

Time Zone

(UTC-08:00) Pacific Time (US & Ca...

View All Rerun History

Filter





All

Succeeded

In Progress

Failed

Cancelled

Pipeline Name	Actions	Run Start	Duration	Triggered By	Status	Parameters	Annotations	Error	RunID
pipeline7	 	01/29/2019, 4:22:47 PM	00:00:39	Manual trigger	Failed				25e91785-9bed-42fd-beee-92d725fac
pipeline7	 	01/29/2019, 1:47:54 PM	00:02:18	Manual trigger	Succeeded				7d8f3f63-7bee-4e0c-8c07-35760c56d

View Activity Runs

A background image showing two women in a professional setting. One woman, wearing a patterned top, is pointing at a whiteboard. The other woman, in a dark top, is holding a tablet and looking at the whiteboard. The whiteboard has various papers and diagrams pinned to it.

Summary



Azure Data Factory (ADF) is a cloud-based data integration service that allows you to orchestrate and automate data movement and data transformation.



Transforming data can be performed in ADF by orchestrating a compute resource, calling an SSIS package or using the Mapping Data Flow feature



The Mapping Data Flow feature enables code free data transformation at scale



Enable you to focus on building business logic and data transformation



It is added to an ADF Pipeline, and can be scheduled or triggered



You can monitor the Mapping Data Flow both visually and programmatically

Data Loading Best Practices

Speaker name

Title

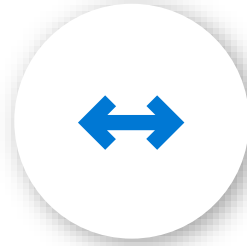


What is Azure SQL Data Warehouse?

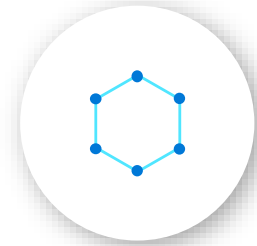
AZURE SQL DATA WAREHOUSE



PaaS



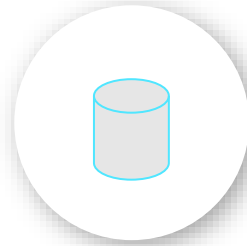
Elastic Scale



Big Data



Pause/Resume

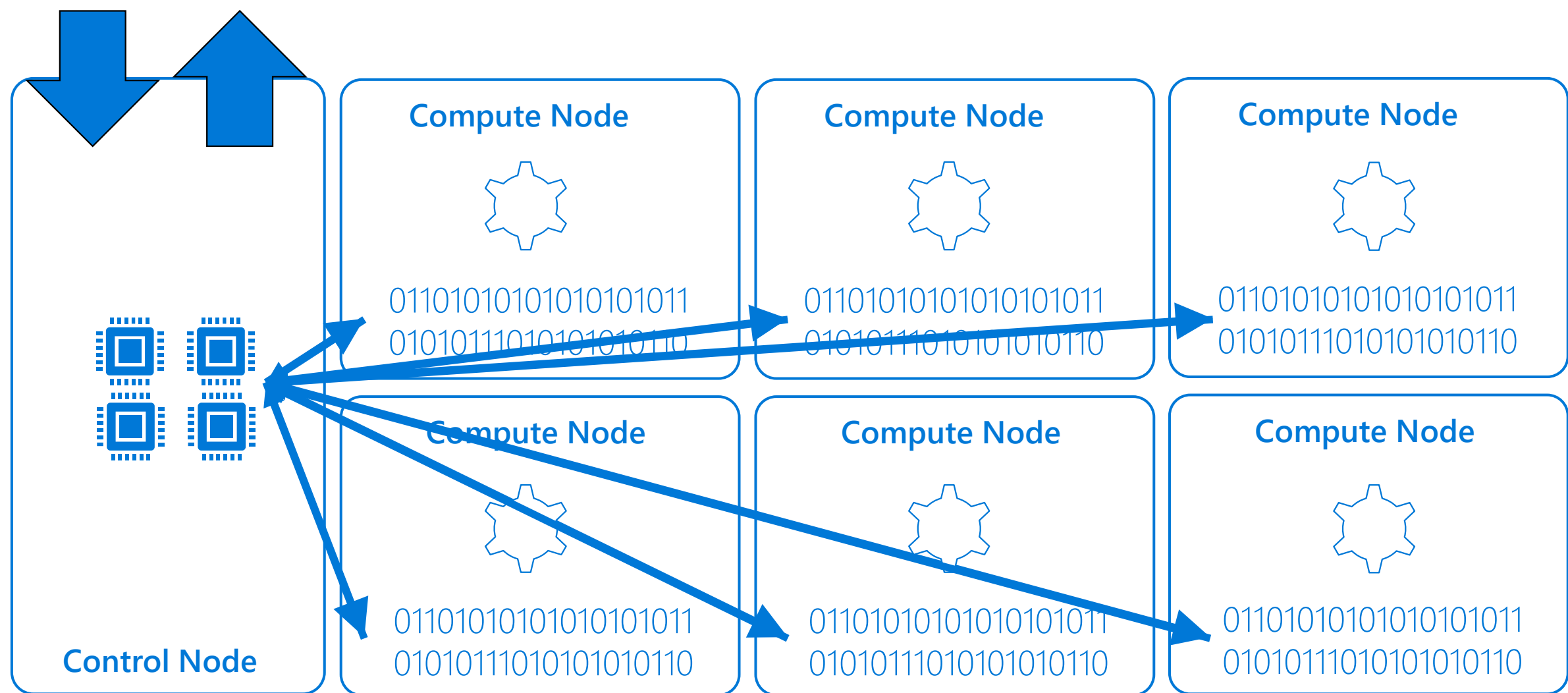


Separate
Storage/Compute

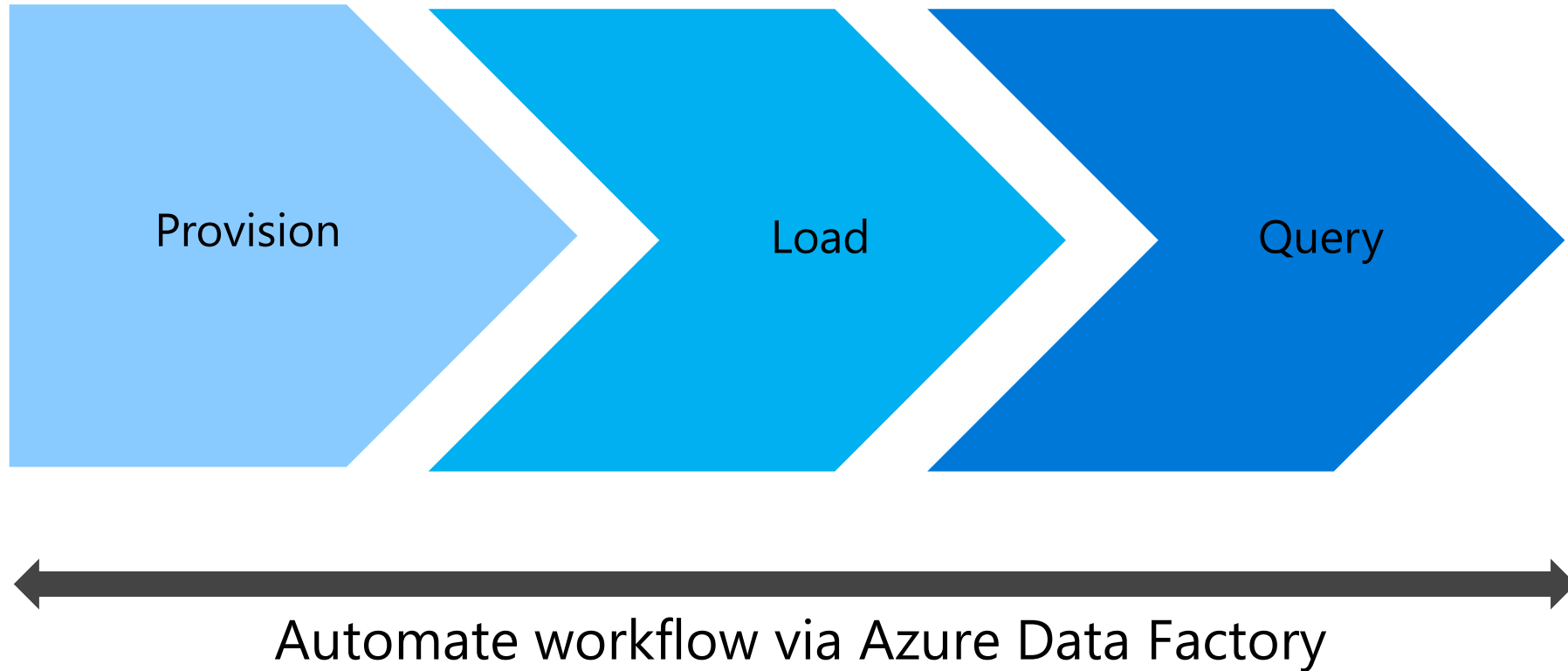


Workload
Management

SQL Data Warehouse Architecture



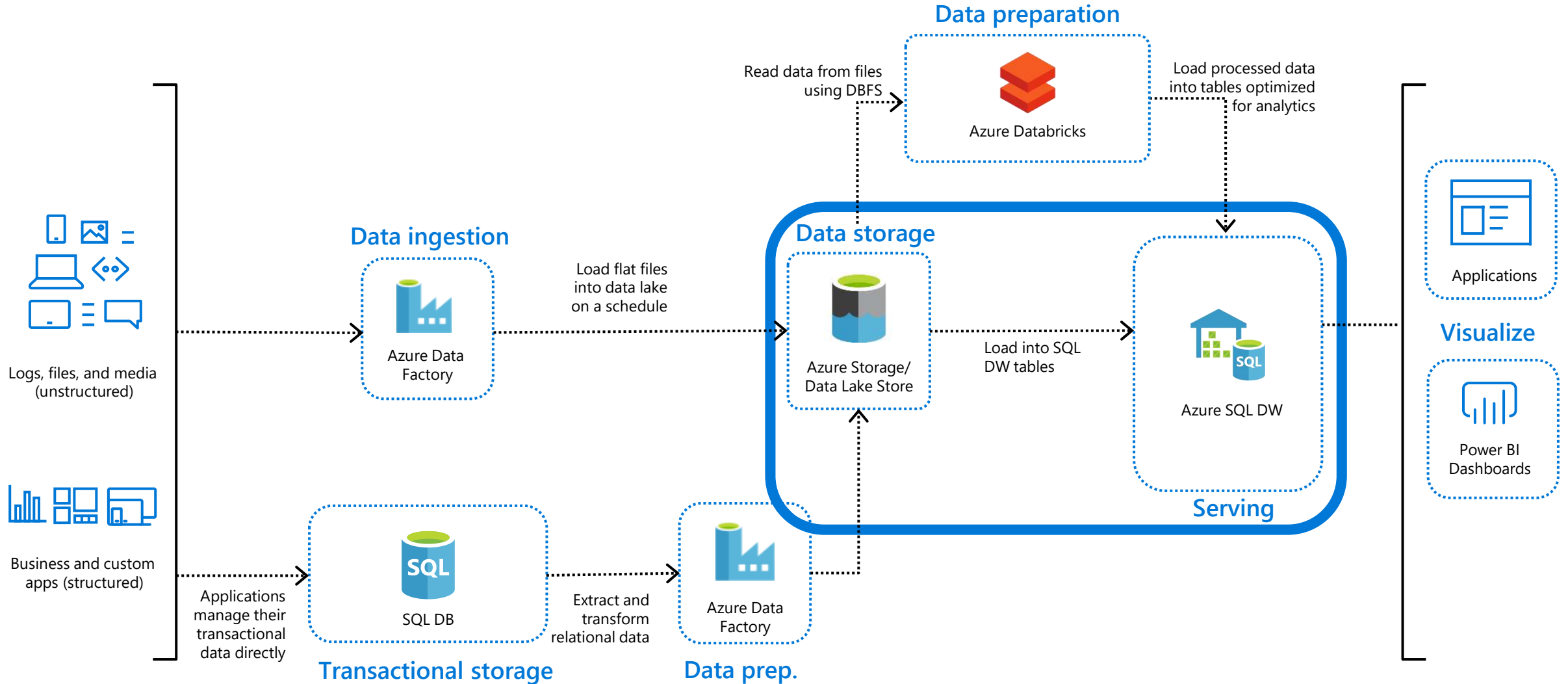
AZURE SQL DATA WAREHOUSE PROCESSES



Loading design goals

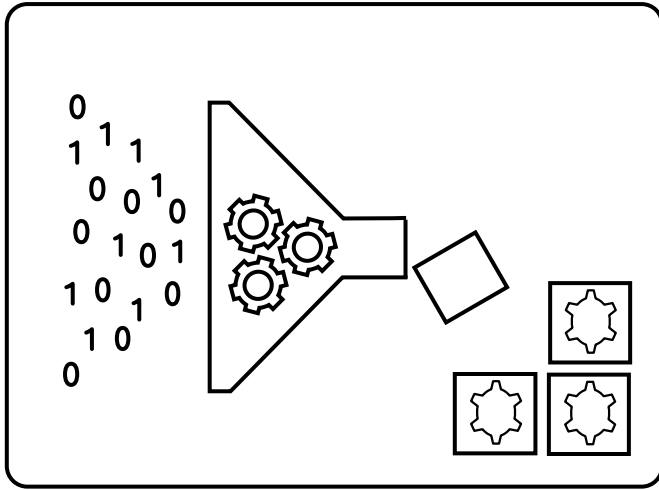
Data warehousing loading in Azure

Loading data into Azure SQL Data Warehouse



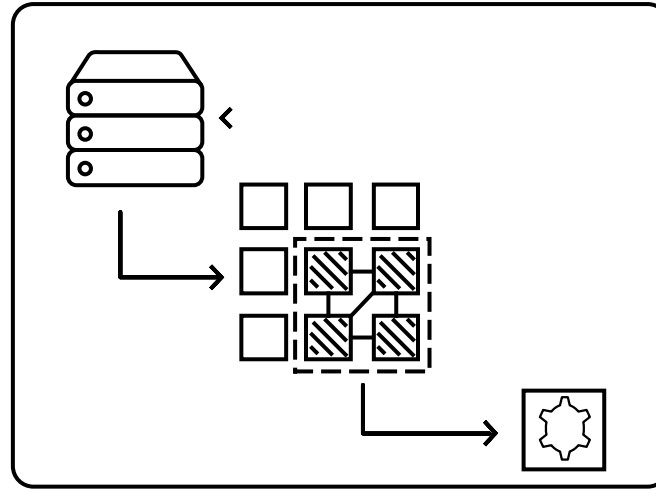
Loading Methods

BCP



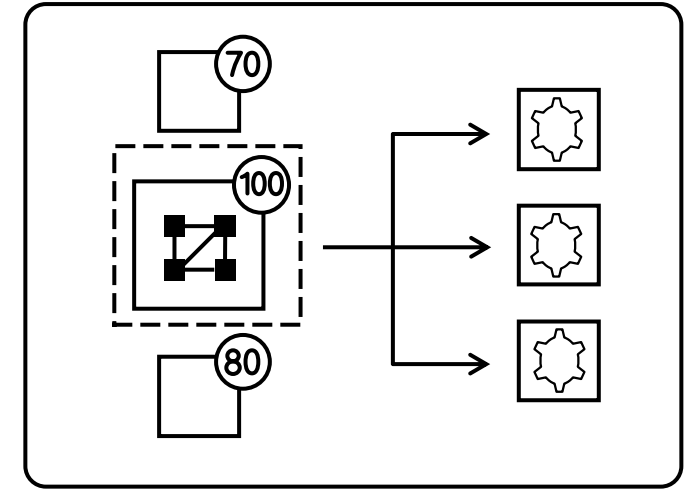
File based

SSIS



Heterogenous

PolyBase

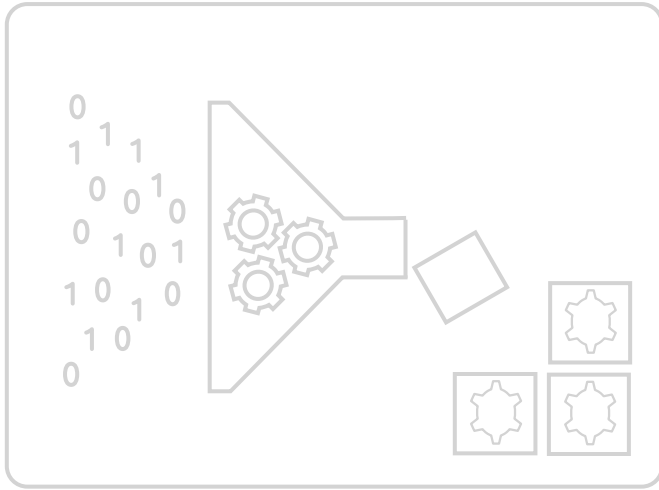


File based

Loading Methods

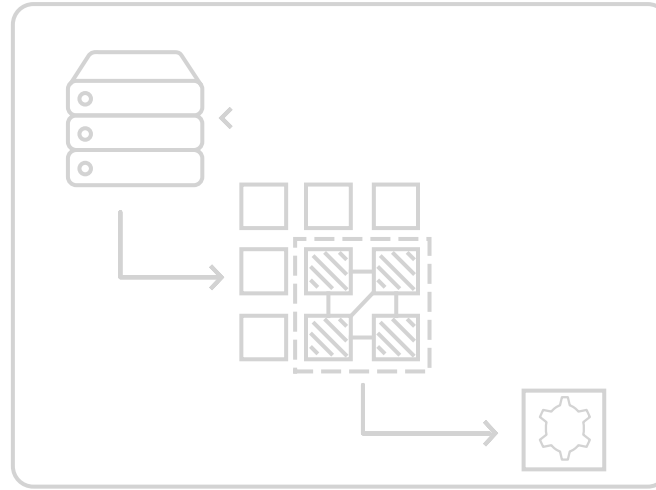
For large amounts of data, there is only one choice

BCP



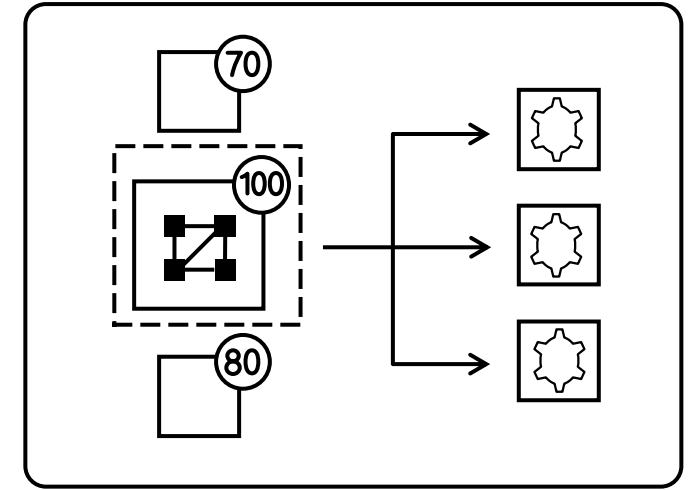
File based

SSIS



Heterogenous

PolyBase



File based

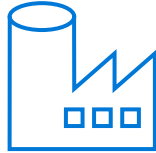
PolyBase benefits

The best practice for loading large amount of data



Leverages MPP architecture

PolyBase is designed to leverage the MPP (Massively Parallel Processing) architecture of SQL Data Warehouse and will therefore load and export data magnitudes faster than any other tool.



Azure Data Factory support

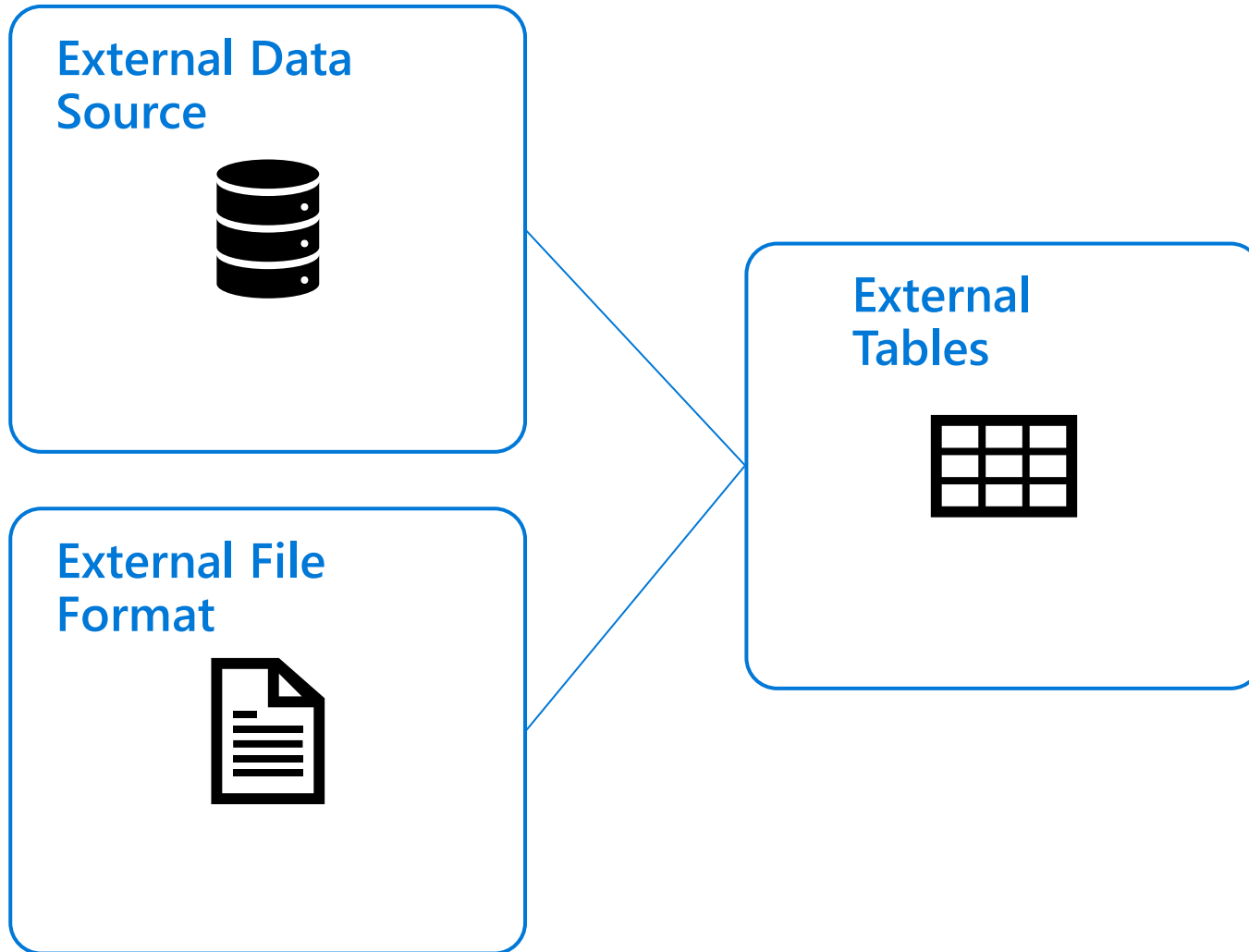
Azure Data Factory also supports PolyBase loads and can achieve similar performance to running PolyBase manually



Variety of file formats

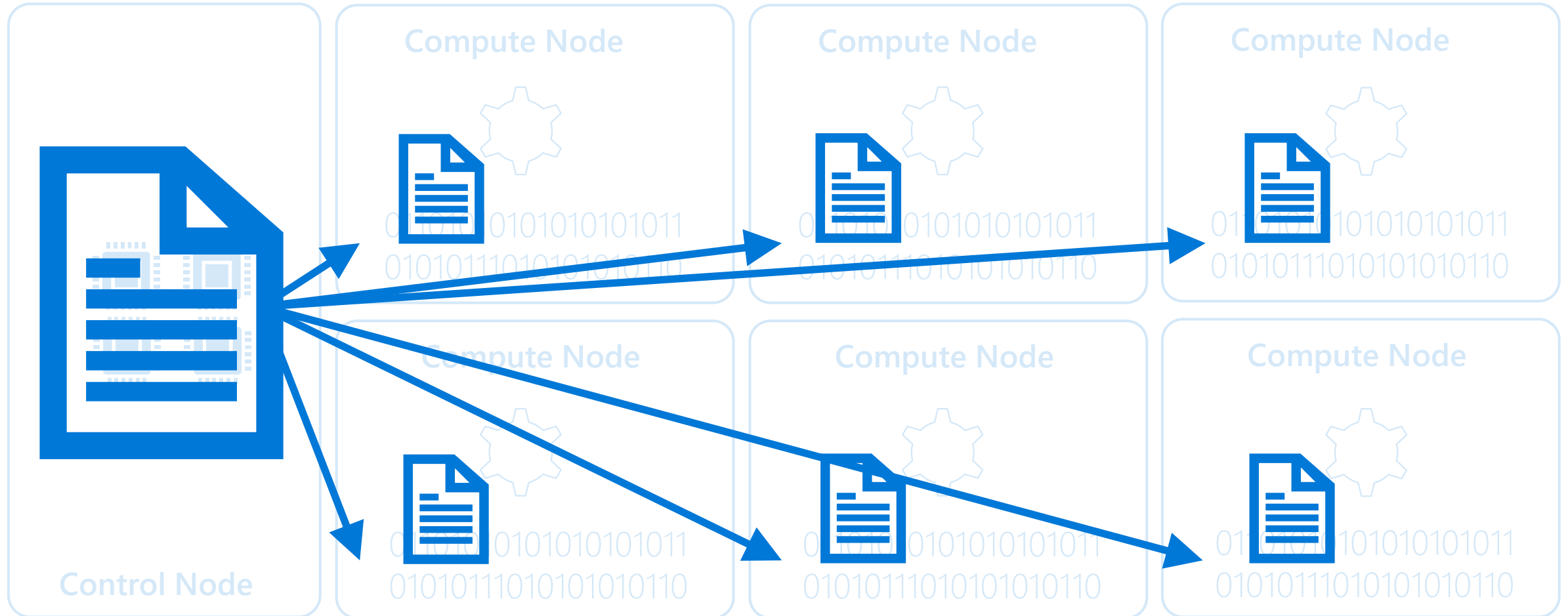
PolyBase supports a variety of file formats including RC, ORC and Gzip files.

Components of PolyBase

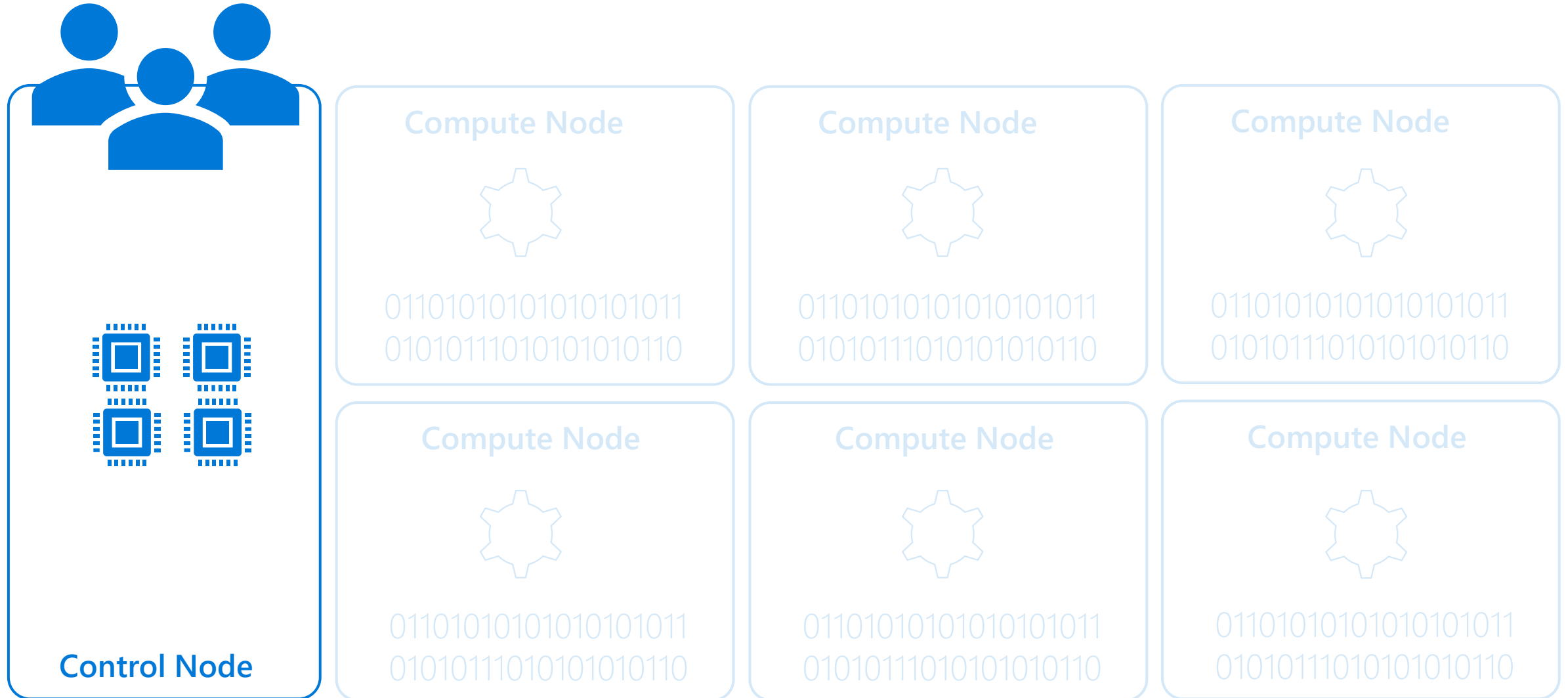


Loading best practices

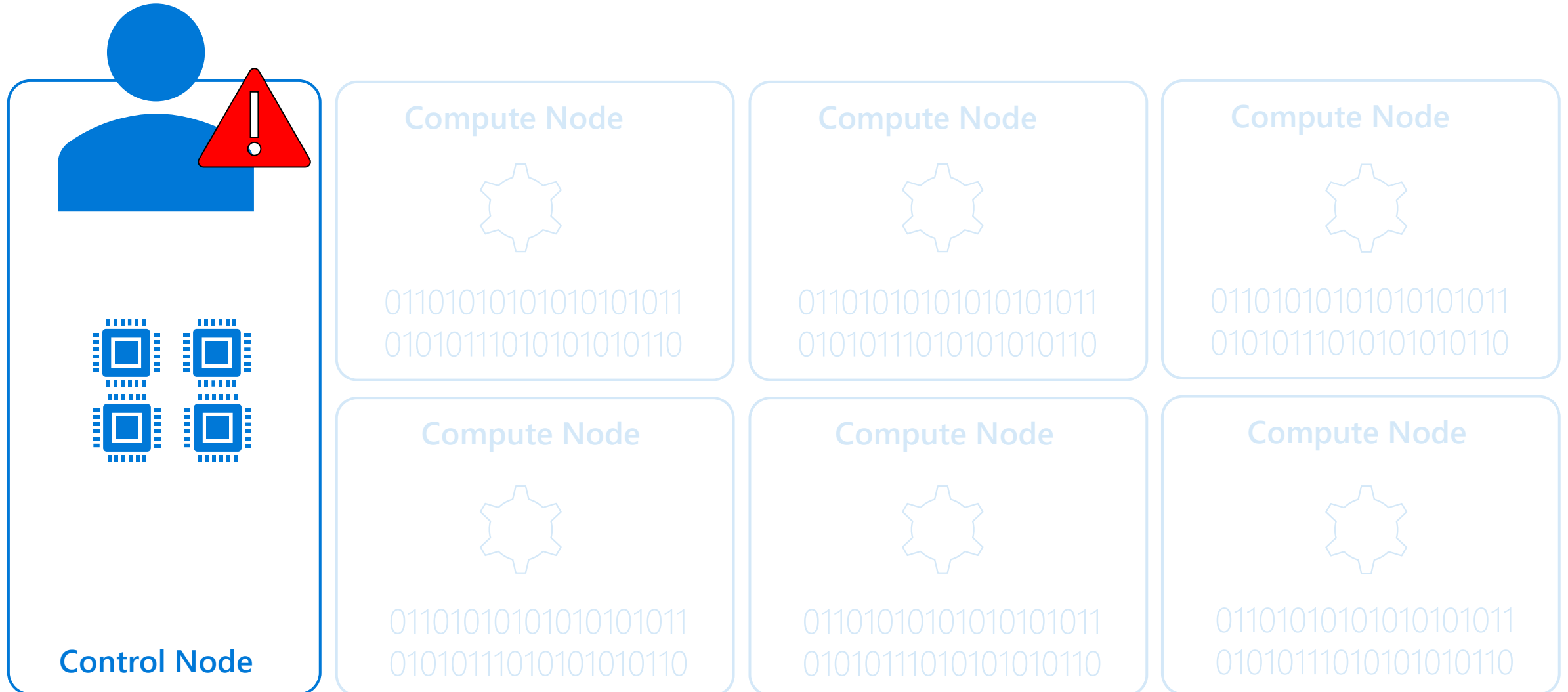
Manage your files



Reduce concurrent access



Create a dedicated load user account



Manage singleton updates



Control Node

Compute Node



01101010101010101011
01010111010101010110

Compute Node



01101010101010101011
01010111010101010110

Compute Node



01101010101010101011
01010111010101010110

Compute Node



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Compute Node



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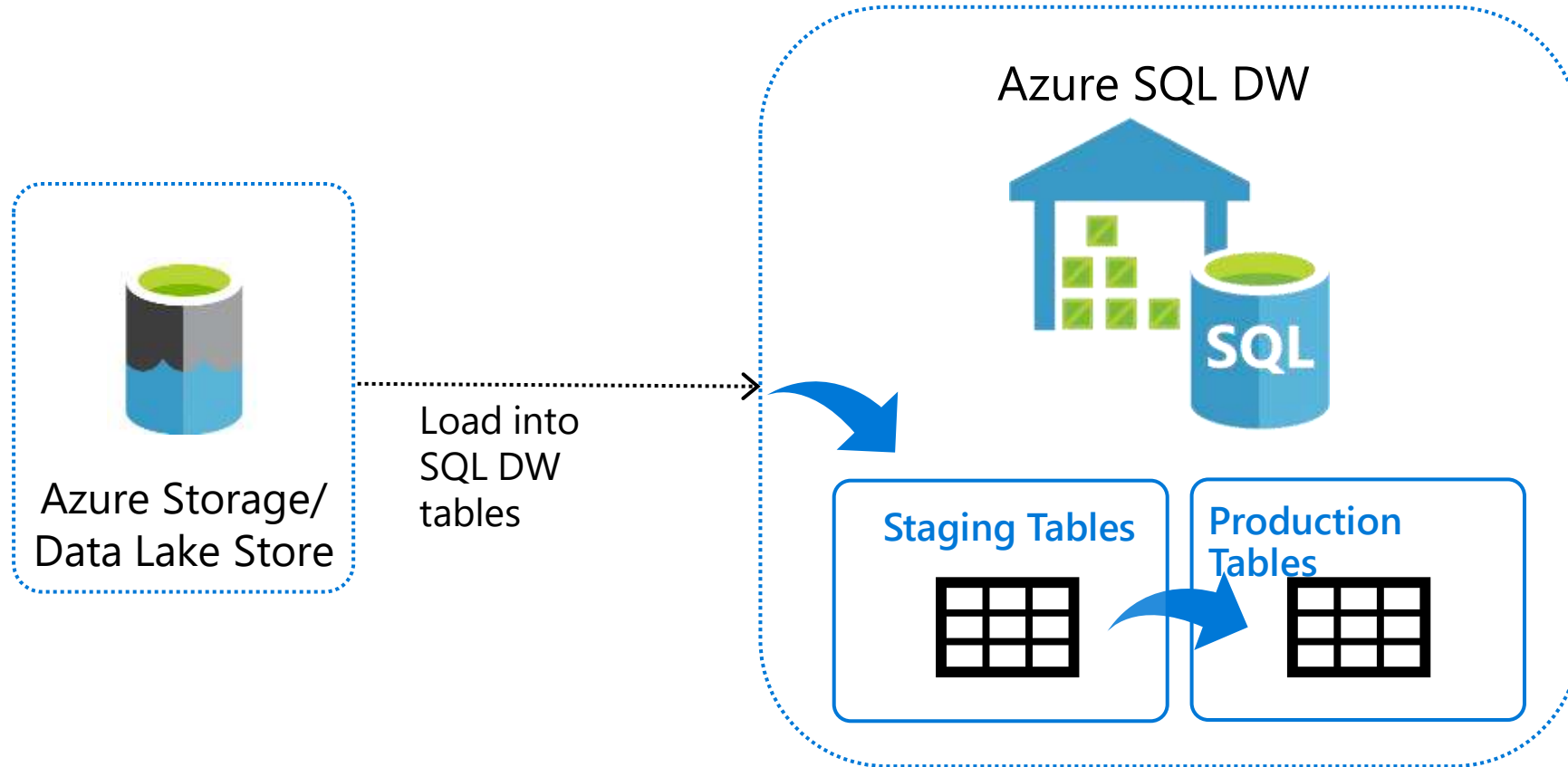
Compute Node



01101010101010101011
01010111010101010110

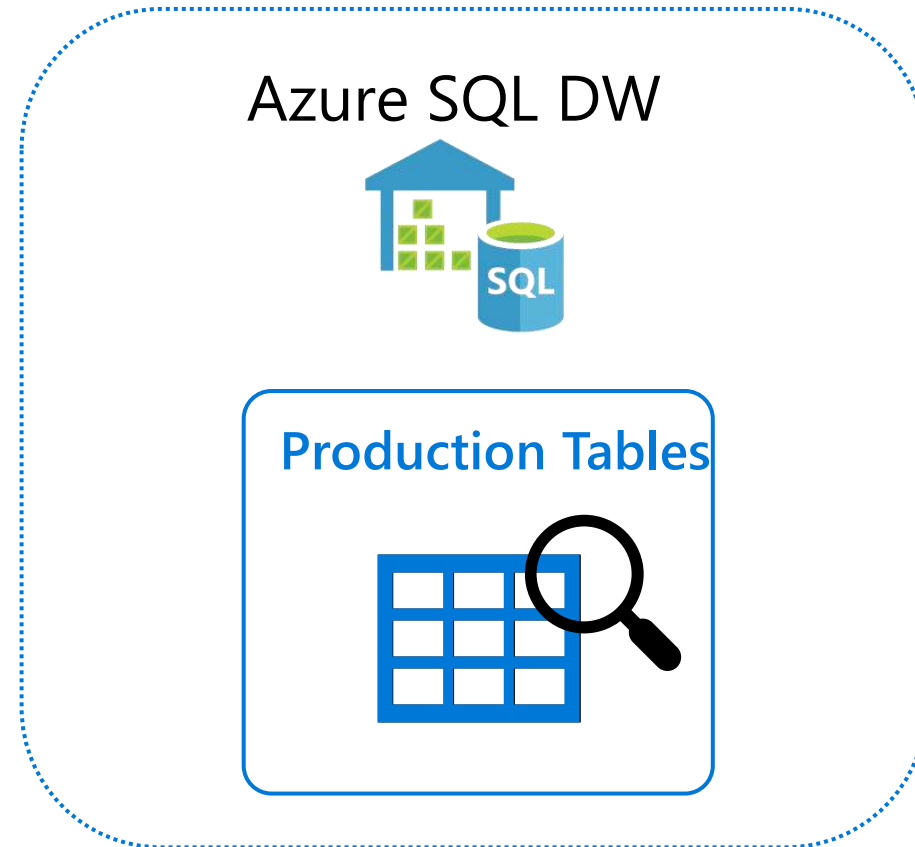
Optimize your loads

View it as a two-stage process



Create statistics after loading

Improve the query performance for users

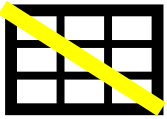


Maximizing Performance

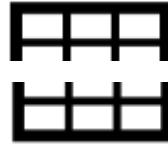
Maximizing Query Performance

Table distribution

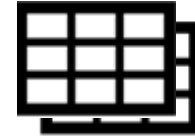
Round Robin
Tables



Hash Distributed
Tables



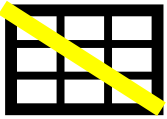
Replicated
Tables



Maximizing Query Performance

Round-robin distribution

Round-robin Tables

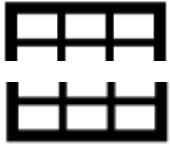


- > Is the default option for newly created tables
- > Evenly distributes the data across the available compute nodes in a random manner, giving an even distribution of data across all nodes
- > Loading into Round-robin tables is fast
- > Queries on Round-robin tables may require more data movement as data is “reshuffled” to organize the data for the query
- > Great to use for loading staging tables

Maximizing Query Performance

Hash distribution

Hash Distributed Tables



- Distributes rows based on the value in the distribution column, using a deterministic hash function to assign each row to one distribution.
- Is designed to achieve high performance for queries that run against large fact tables in a star schema.
- Choosing a good distribution column is important to ensure the hash distribution performs well
- As a starting point, use on tables that are greater than 2GB in size and has frequent inserts, updates and deleted
- But don't choose a volatile column for the hash distributed column

Maximizing Query Performance

Replicated Table

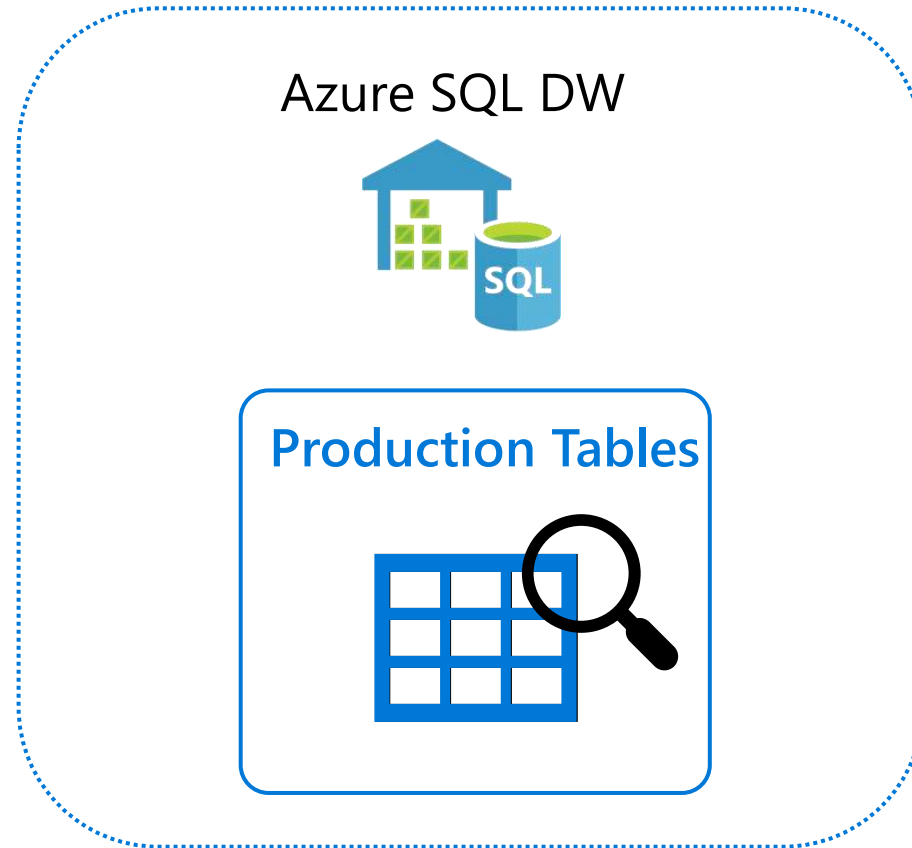
Replicated Tables



- > A full copy of a table is placed on every single compute node to minimize data movement
- > Works well for dimension tables in a star schema that are less than 2GB in size and are used regularly in queries with simple predicates
- > Should not be used on dimension tables that are updated on a regular basis

Create statistics after loading

Improve the query performance for users



Summary

A background image showing two women in a professional setting. One woman, wearing a patterned top, is pointing towards a whiteboard. The other woman, in a dark top, is also looking at the whiteboard. The whiteboard has some papers and diagrams on it.

- Azure Data Factory (ADF) is a cloud-based data integration service that allows you to orchestrate and automate data movement and data transformation.
- Enable you to focus on building business logic and data transformation
- It is added to an ADF Pipeline, and can be scheduled or triggered
- You can monitor the Mapping Data Flow both visually and programmatically
- Load data efficiently
- Multiple methods of loading

