Modern Analytics Platform

Lambda Architecture in Azure

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10/03/2017

Microsoft Partner
Microsoft

Gold Data Analytics
Gold Data Platform
Gold Cloud Platform

MVP Microsoft® Most Valuable Professional

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Overview

Cloud BI

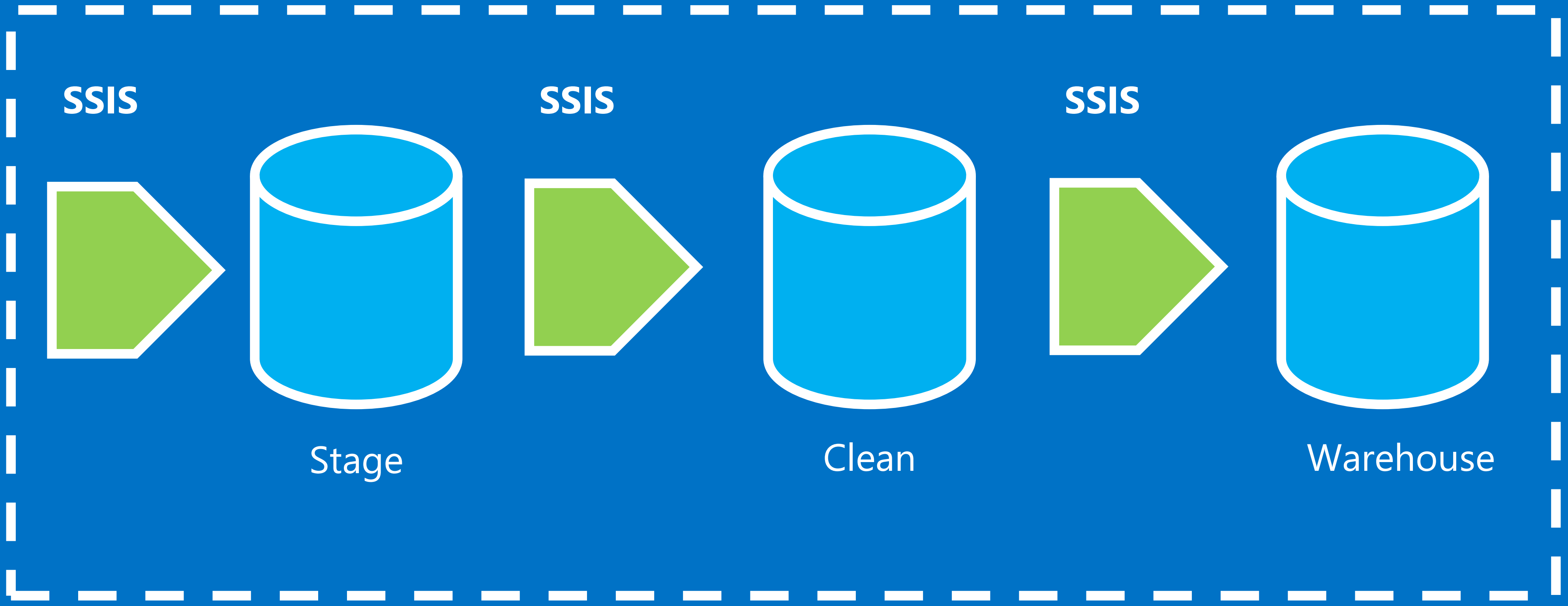
What is Lambda?

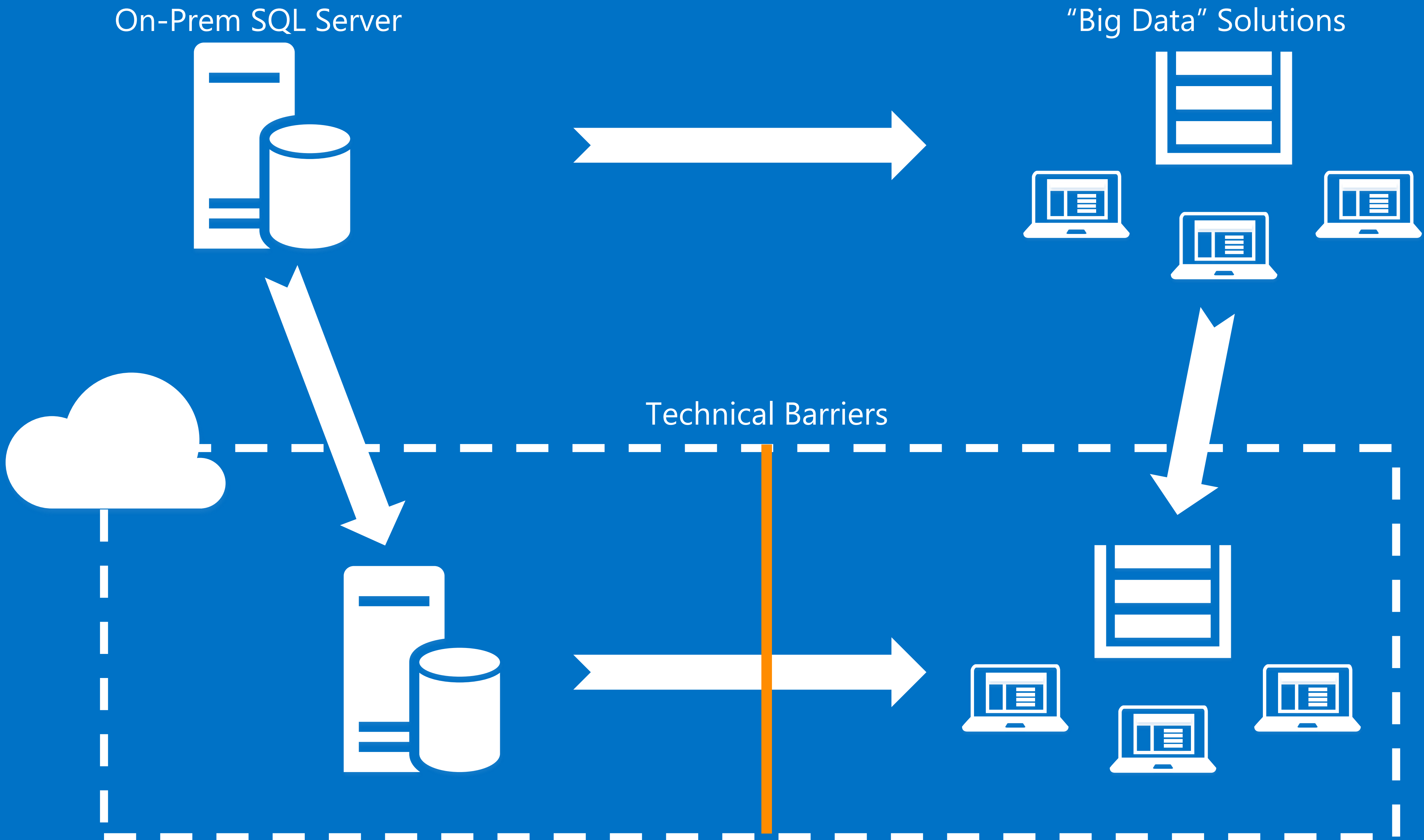
The Native Azure Approach

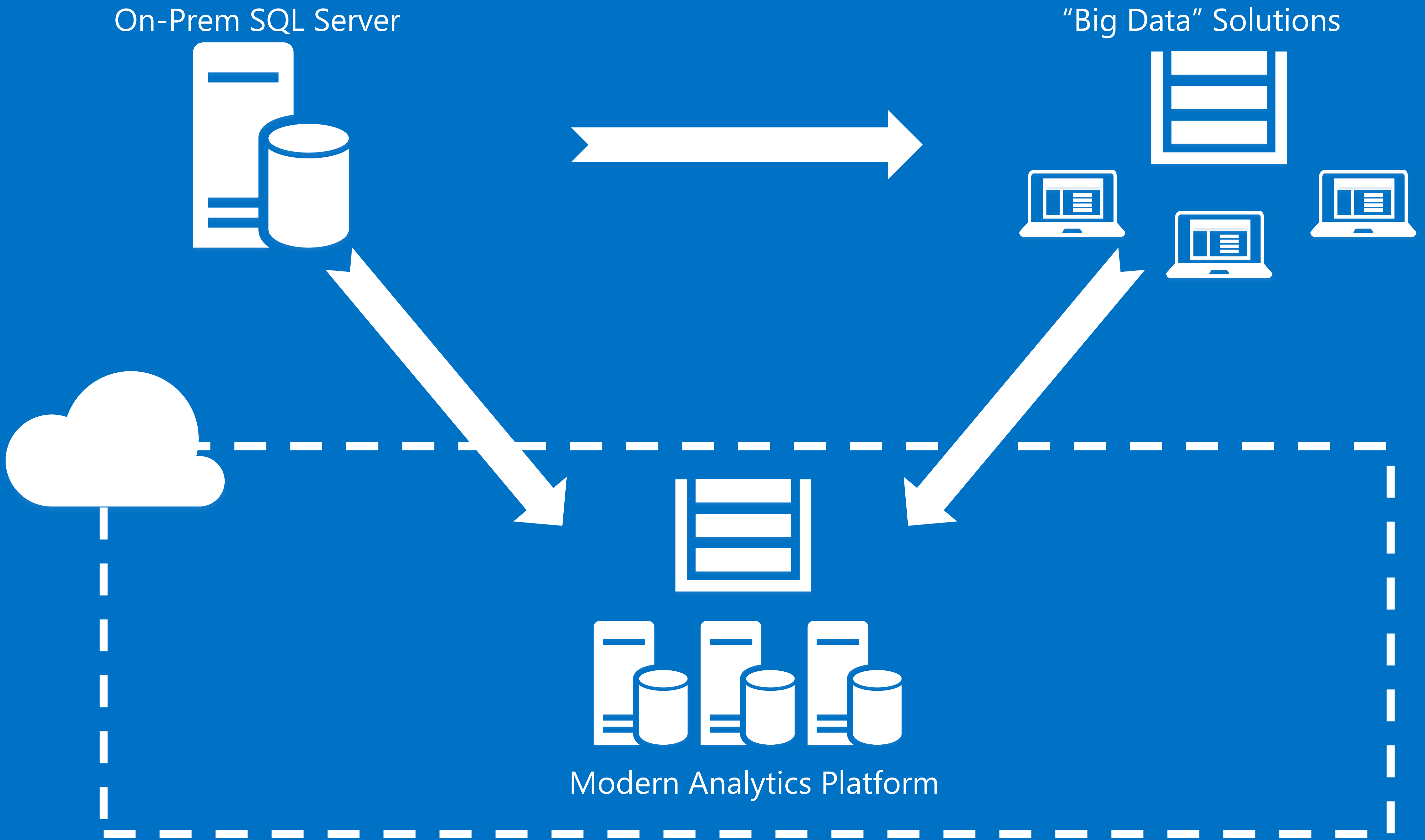
Alternative Models

History

One-Box SQL BI Architecture




On-Prem SQL Server
"Big Data" Solutions
Technical Barriers


On-Prem SQL Server
"Big Data" Solutions
Modern Analytics Platform

My Life Goal:

Never to manage another Server

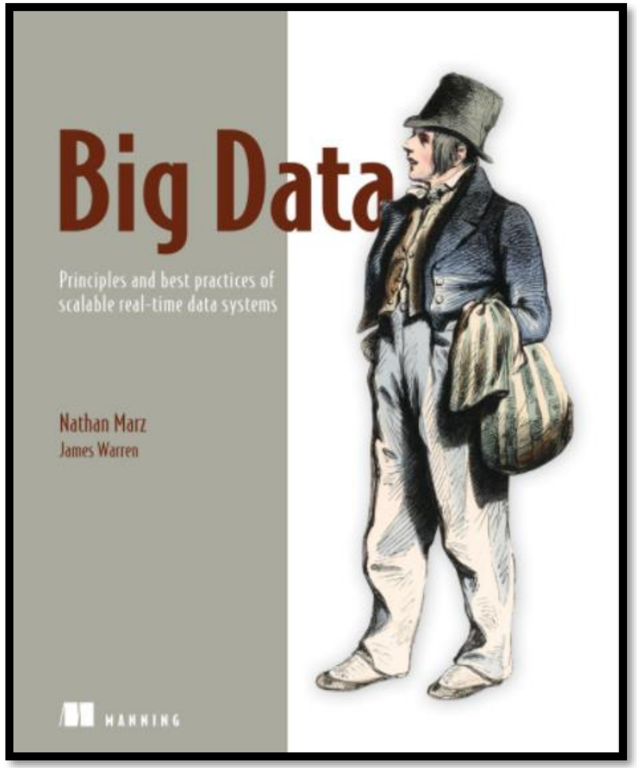
MAP Wish List

- Can Handle Massive Datasets
- Linearly Scalable
- Near Real-Time
- Fault Tolerant
- Low Tech Barrier for SQL Devs

LAMBDA

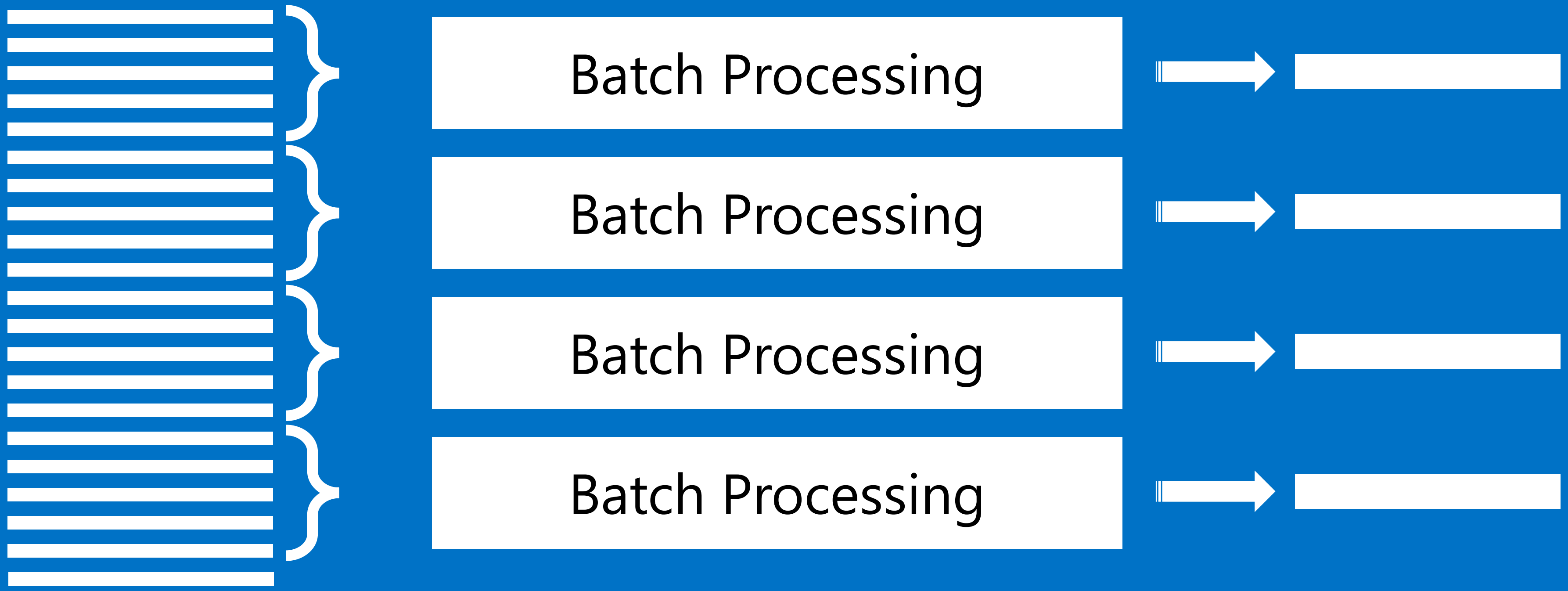
Lambda Architecture

Use Batch and Stream technologies together to balance latency, throughput and fault-tolerance


Big Data
Principles and best practices of scalable real-time data systems
Nathan Marz
James Warren
MANNING

Nathan Marz & James Warren

PROBLEM



Batch Processing

Batch Processing

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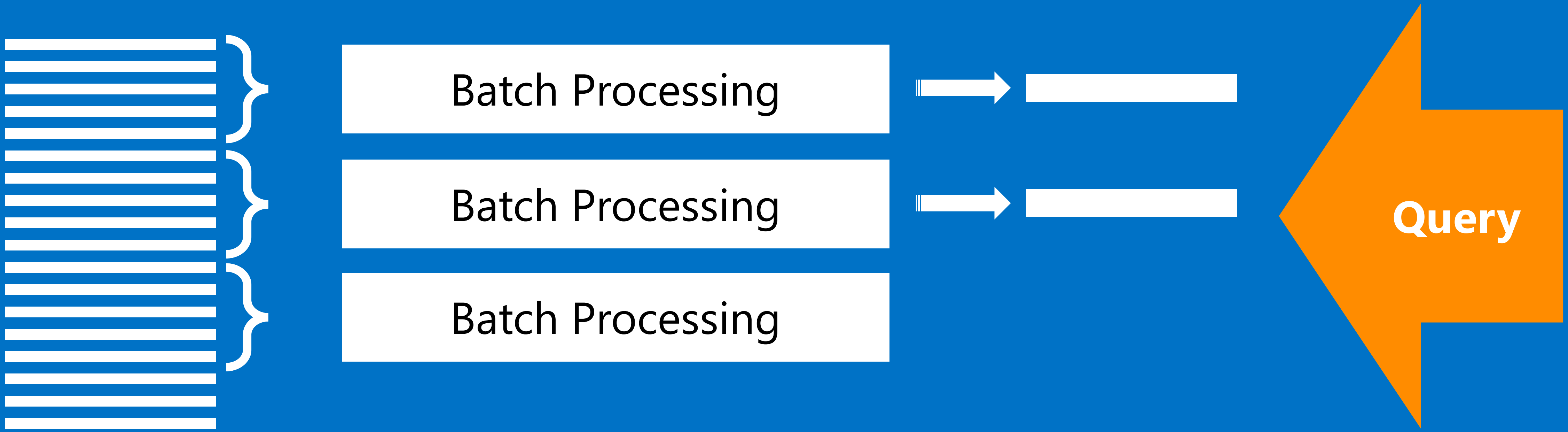
Batch Processing

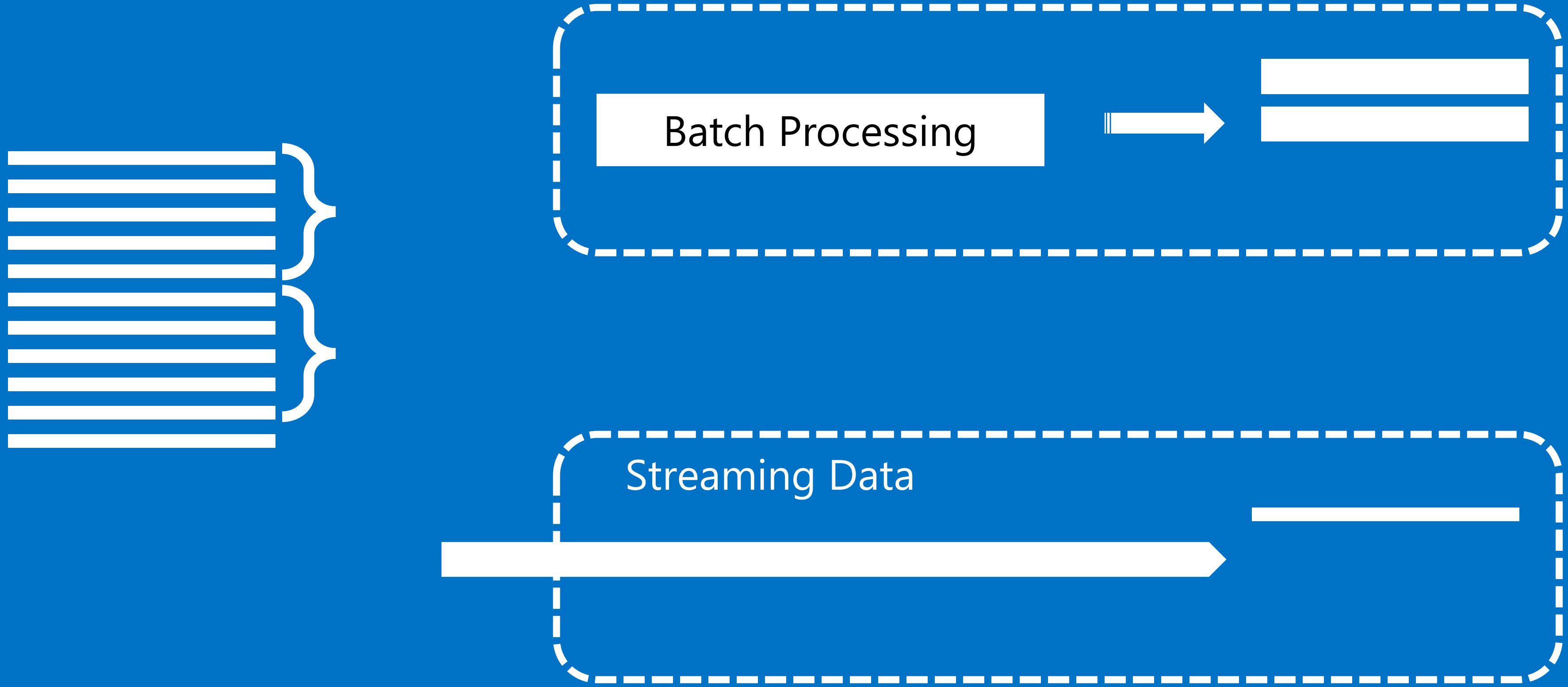

Batch Processing

Batch Processing

Batch Processing

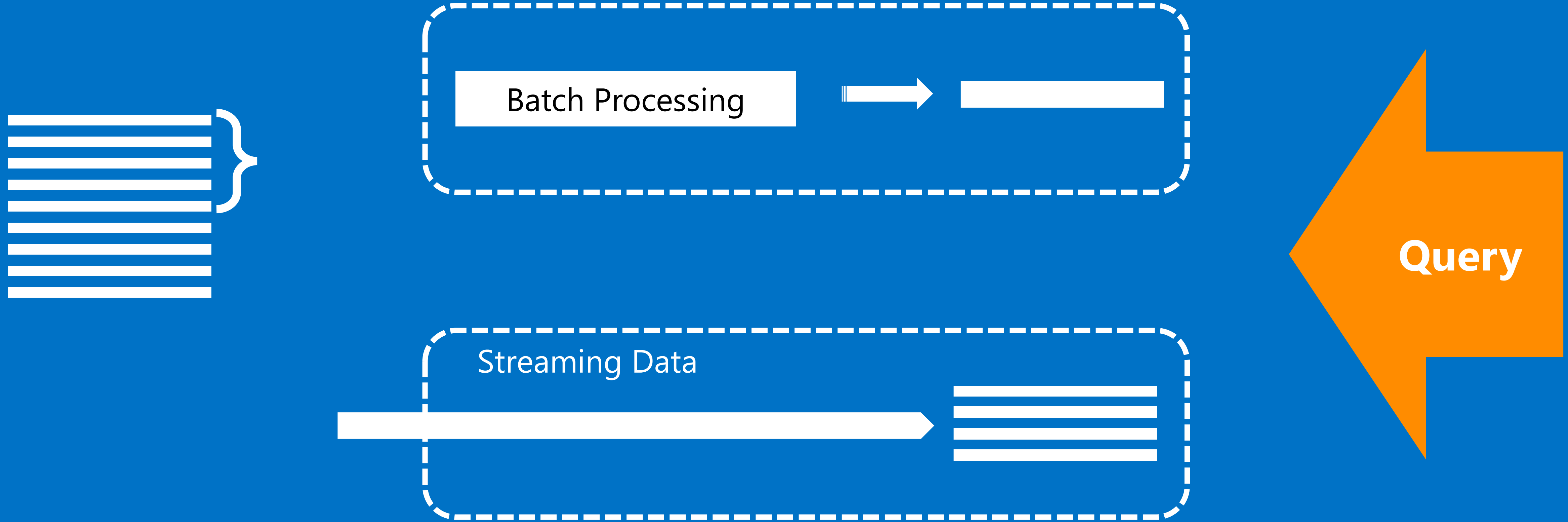
Query

SOLUTION



Batch Processing

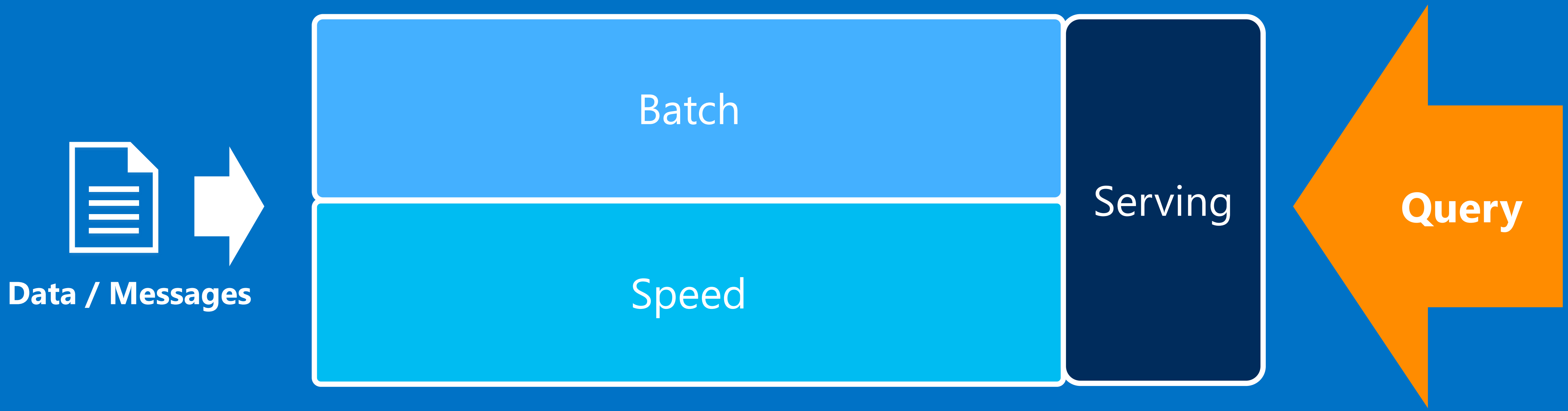
Streaming Data



Batch Processing

Streaming Data

Query



Data / Messages

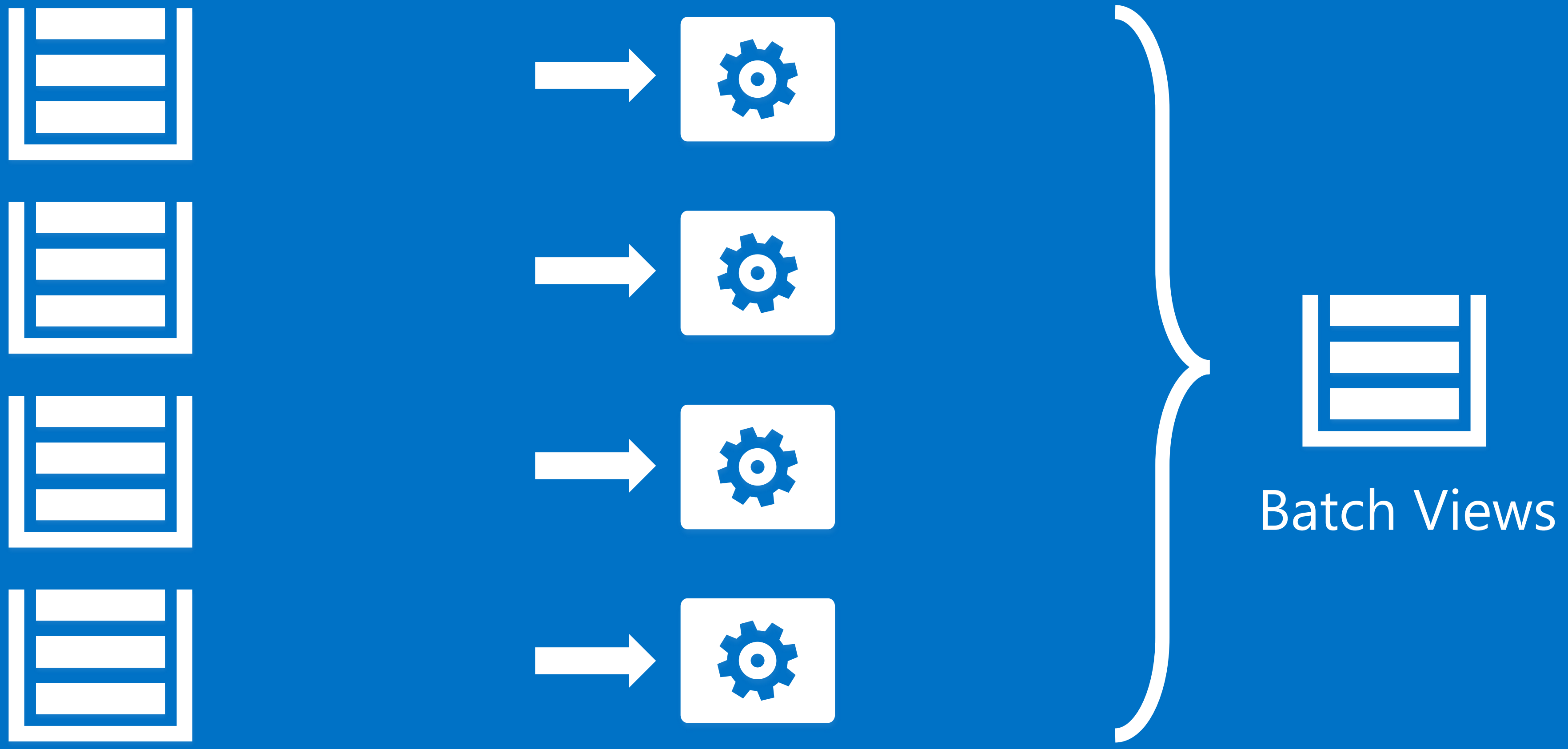
Batch

Speed

Serving

Query

Batch Layer

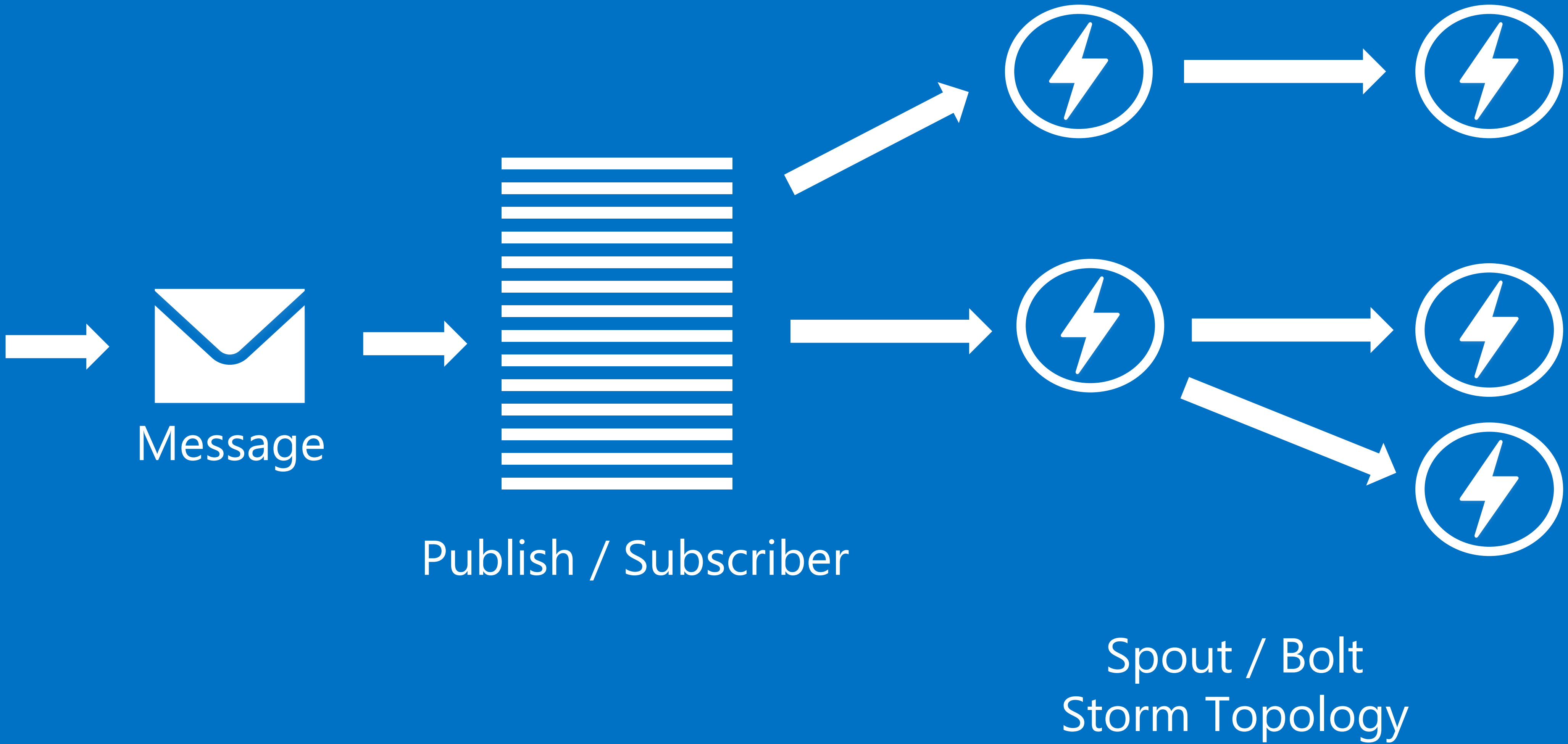


Batch Views

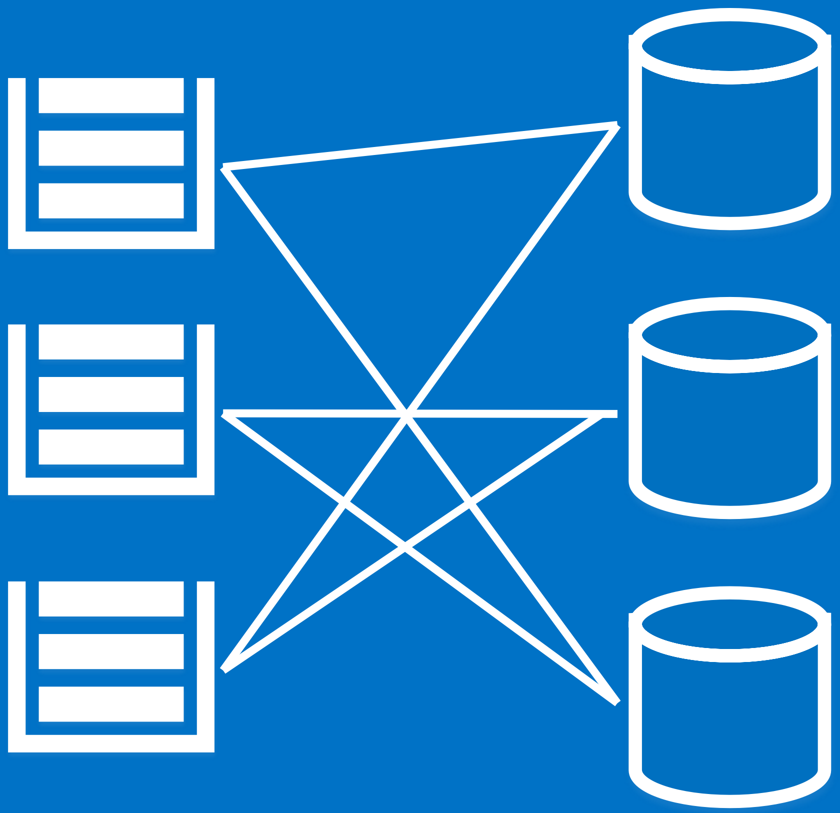
Distributed Storage
(HDFS)

Parallel Processing
(MapReduce)

Speed Layer



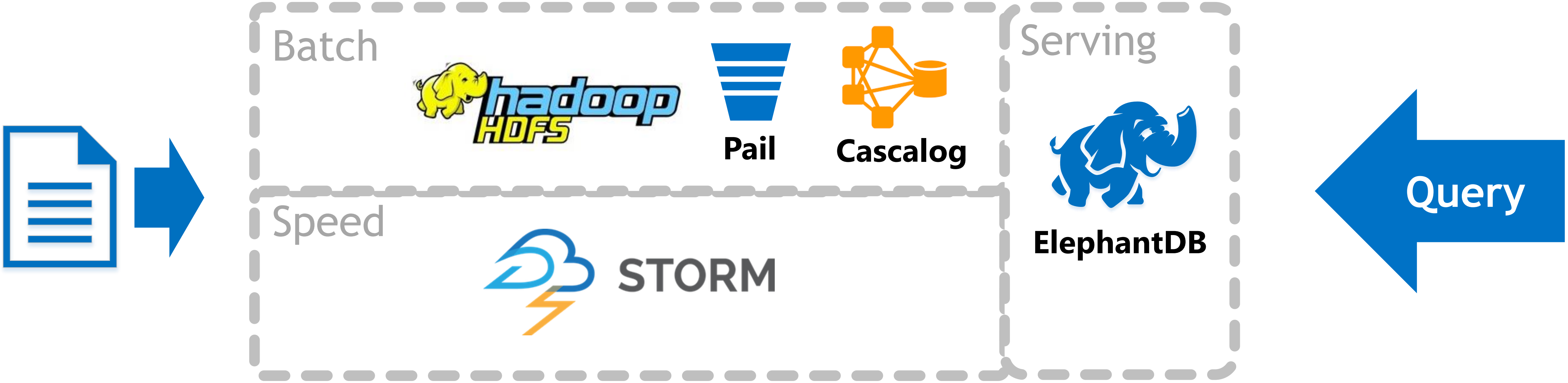
Serving Layer



Sharded Database Layer

Batch Views

The Marz Lambda Architecture



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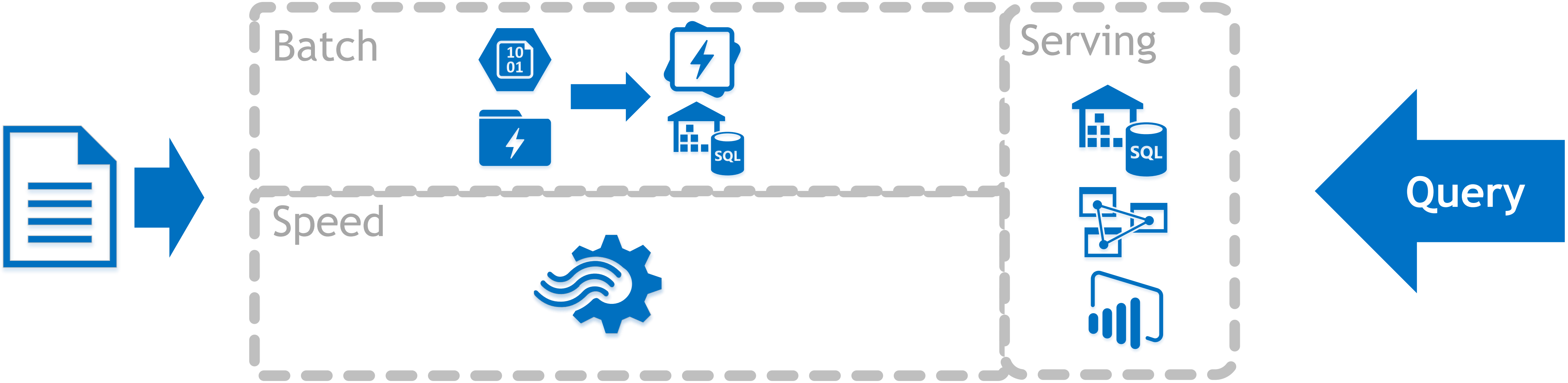
The Azure Approach

Applying Lambda to Azure



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Batch - Storage

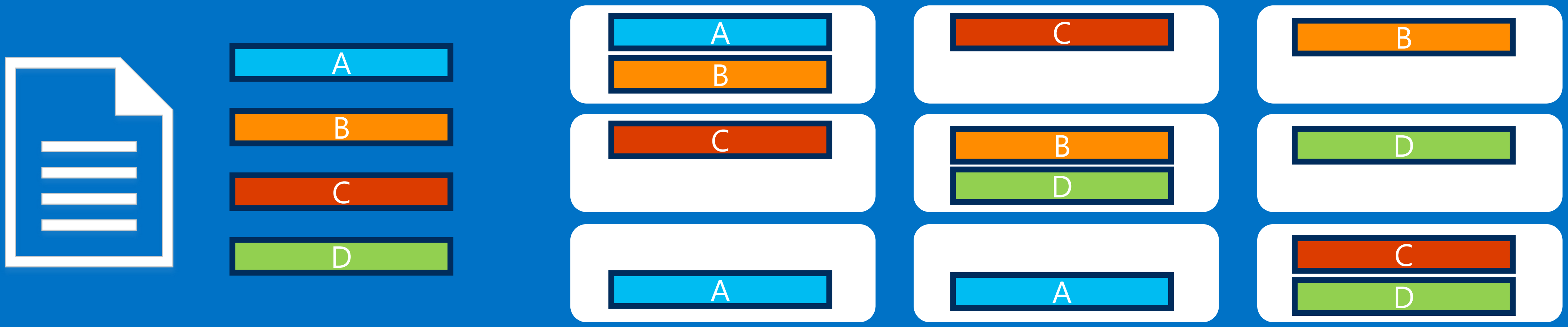
Blob Storage

- HDFS
- Hot/Cold Storage Tiers
- Limited Security
- File Size Limitations
- Widely Compatible / Available

Azure Data Lake Store

- WHDFS
- Single Pricing Model
- AAD-Integrated Security
- No Limitations
- Still Immature

Data Lake Store



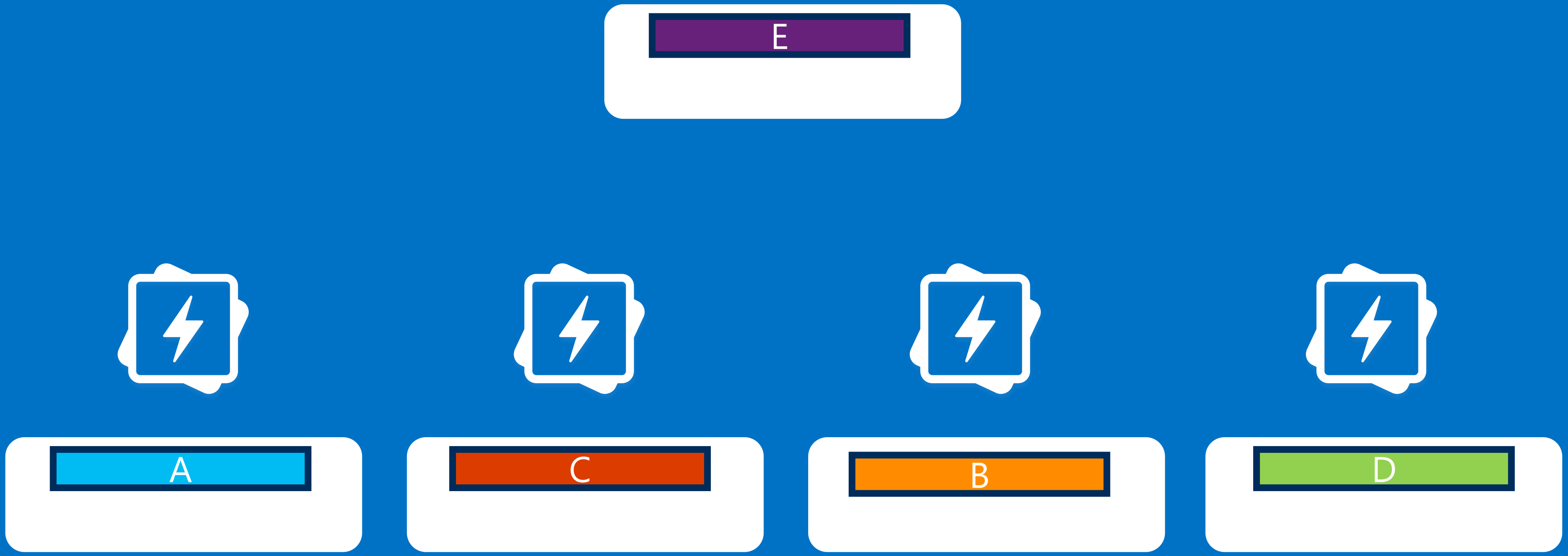
Parallelism

Fault Resilience

Batch - Compute

Azure Data Lake Analytics	Azure SQL DataWarehouse
Pay Per Query / Unit	Pay Per Hour / Node
U-SQL	T-SQL
Outputs Structured/Unstructured	Fully Structured
Uses MapReduce-style processing	Can use MapReduce via Polybase
Batch Mode	Batch or Live Query

Azure Data Lake Analytics



E

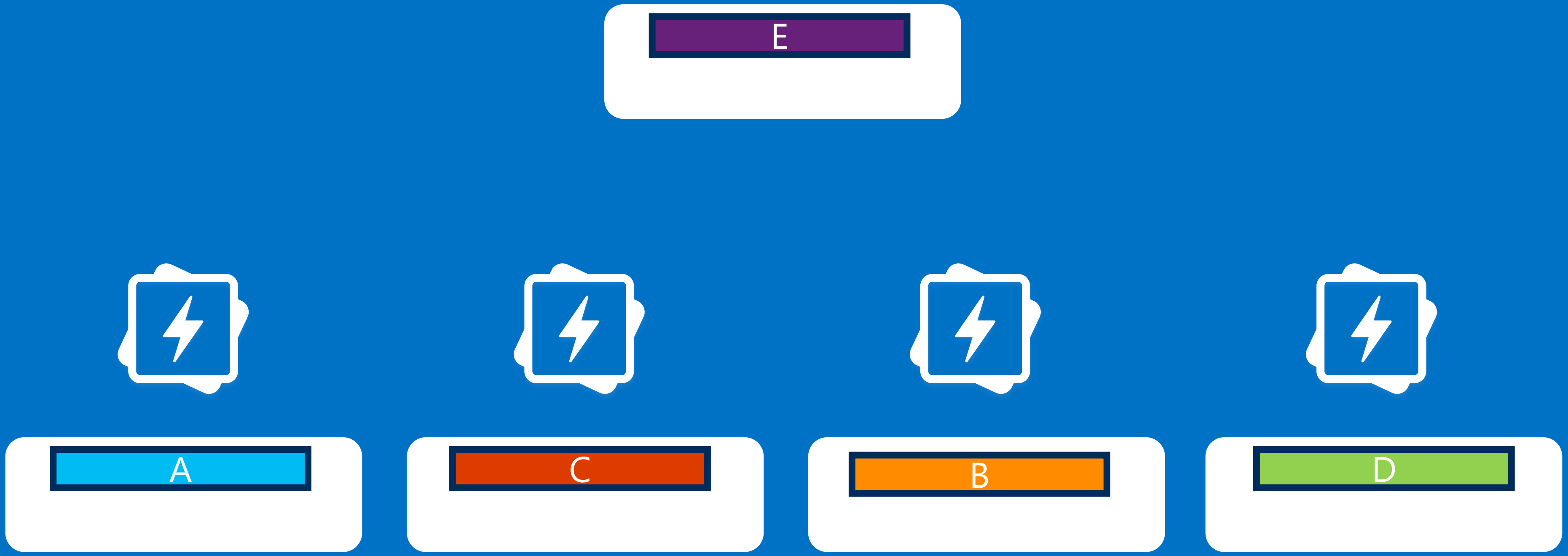
A

C

B

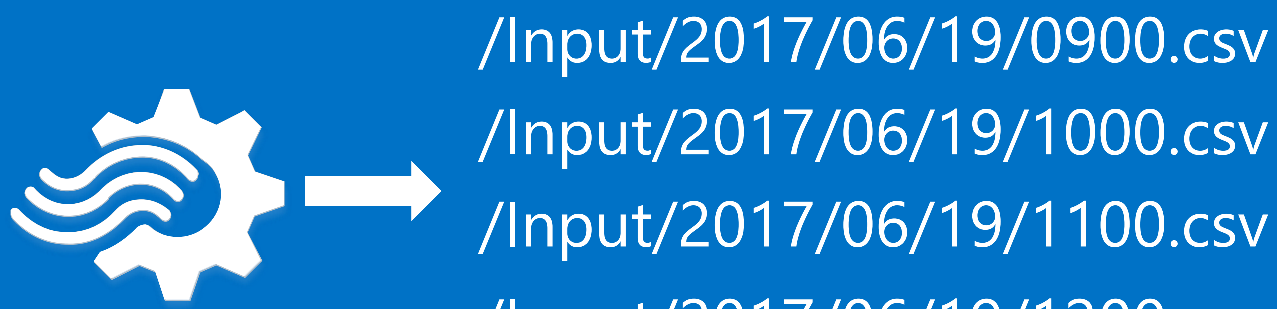
D

Azure Data Lake Analytics



Azure Streaming Analytics

- Only PaaS Native Offering
- Uses SQL Language
- Built-in Azure Integrations
- Can Vertically Partition Files
- Can Write to Multiple Outputs



/Input/2017/06/19/0900.csv

/Input/2017/06/19/1000.csv

/Input/2017/06/19/1100.csv

/Input/2017/06/19/1200.csv

Azure SQL DataWarehouse

- Low Concurrency (32!)
- Direct Query via Polybase
- Huge data capacity

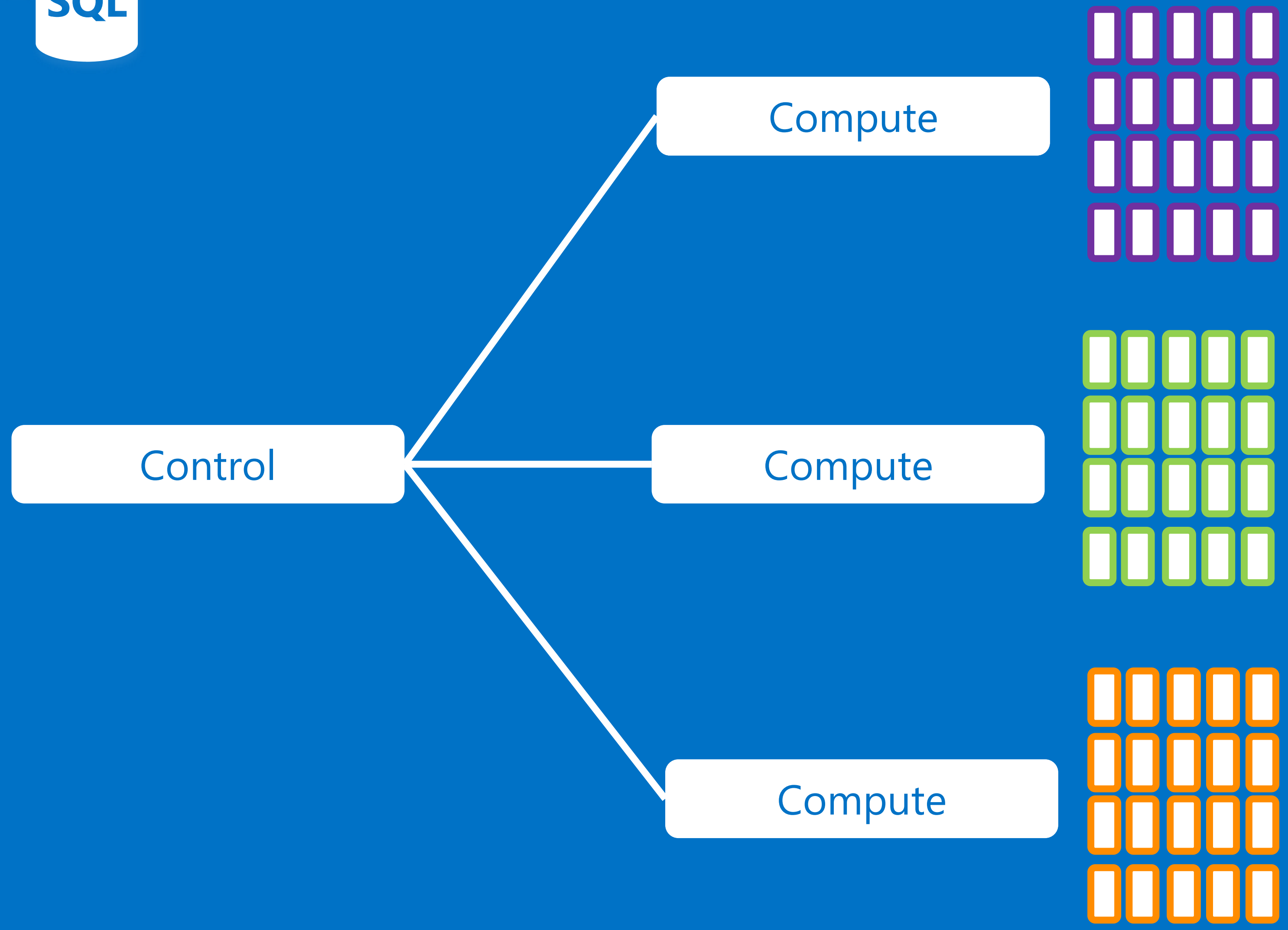
Azure Analysis Services

- High Concurrency
- Scheduled Refresh / Direct over DBs
- Model Size Limits

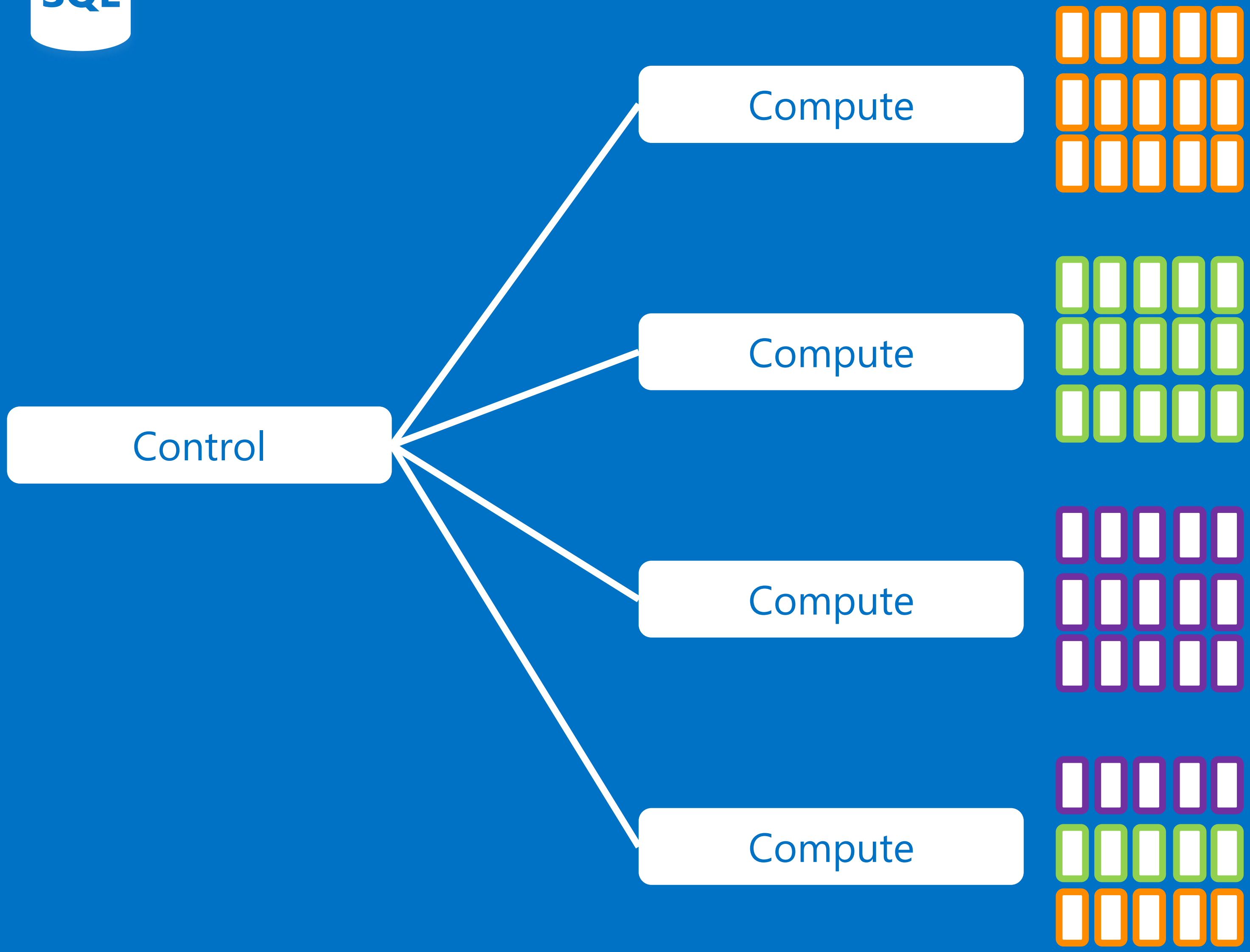
PowerBI

- High Concurrency
- Scheduled Refresh / Direct over DBs
- Model Size Limits

Azure SQL DataWarehouse



Azure SQL DataWarehouse



Compute

Compute

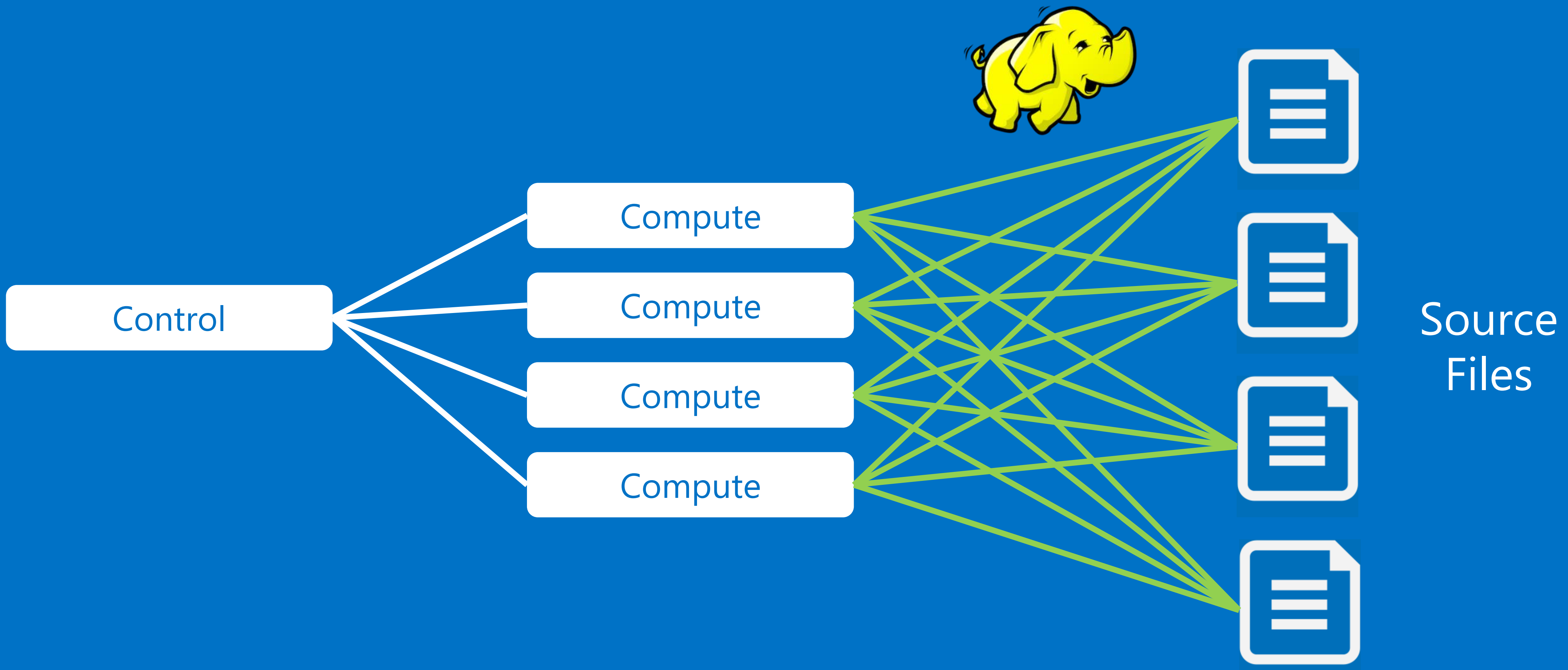
Control

Compute

Compute

Azure SQL DataWarehouse

PolyBase



Control

Compute

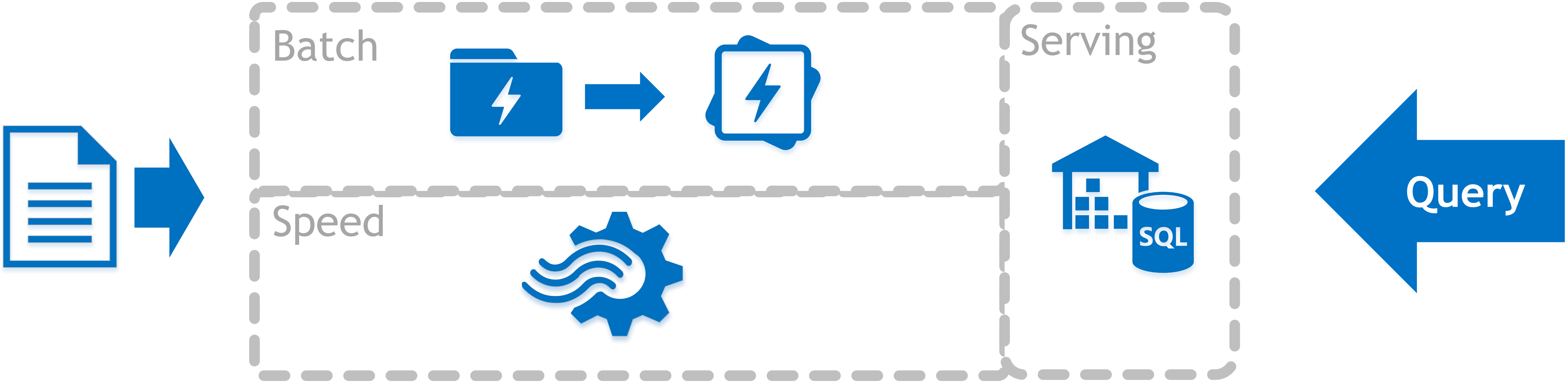
Compute

Compute

Compute

Source Files

Applying Lambda to Azure



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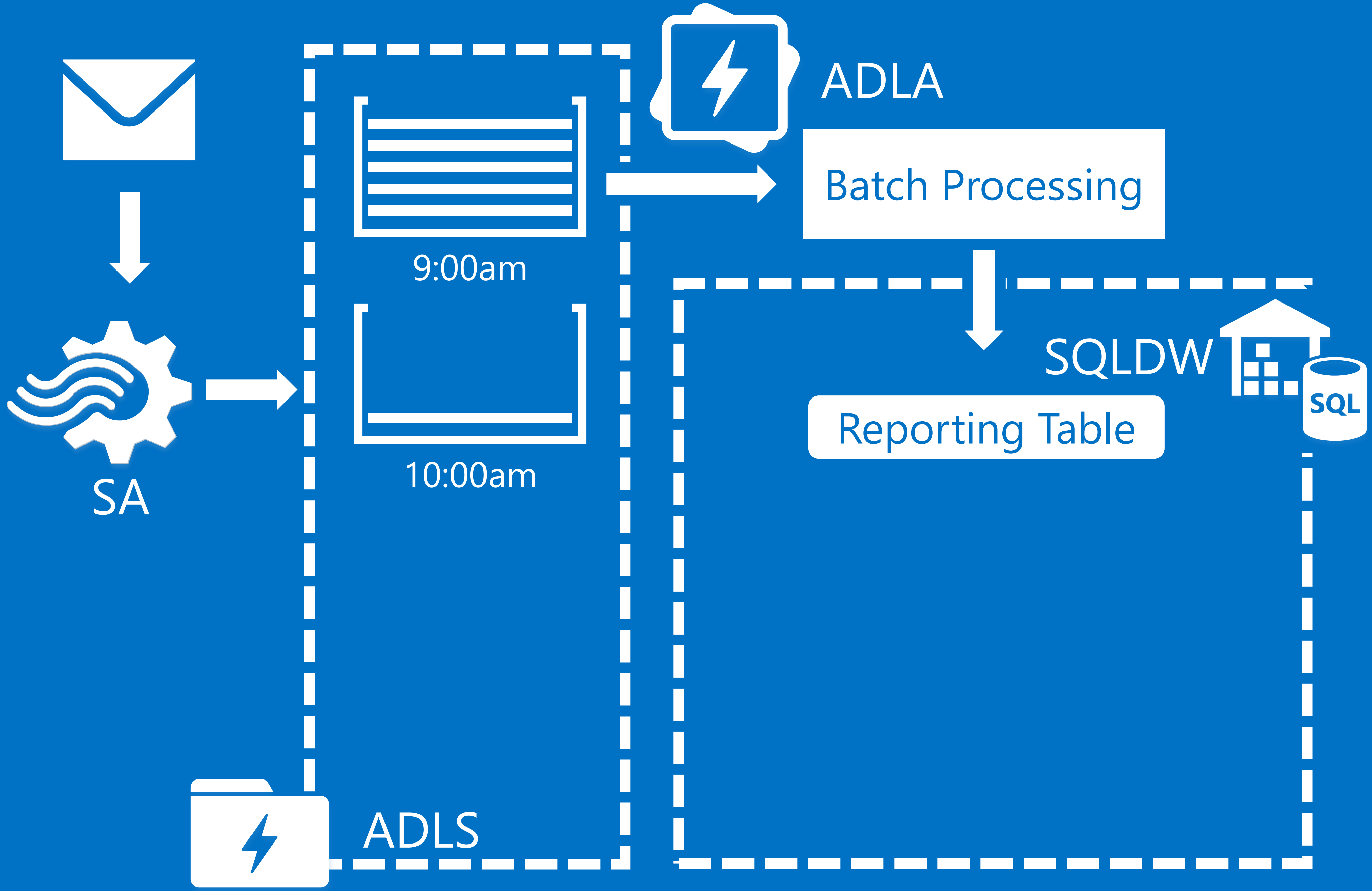
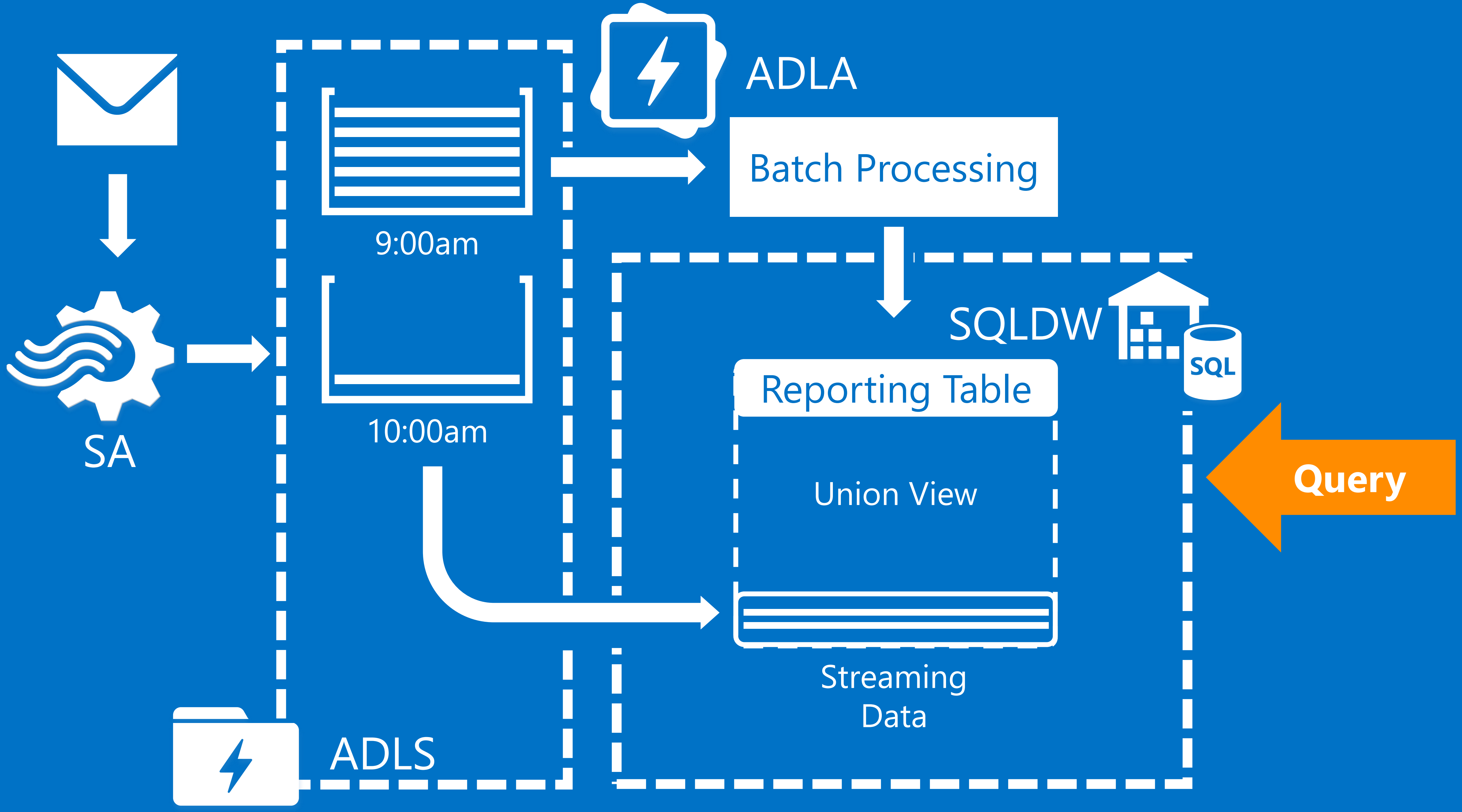
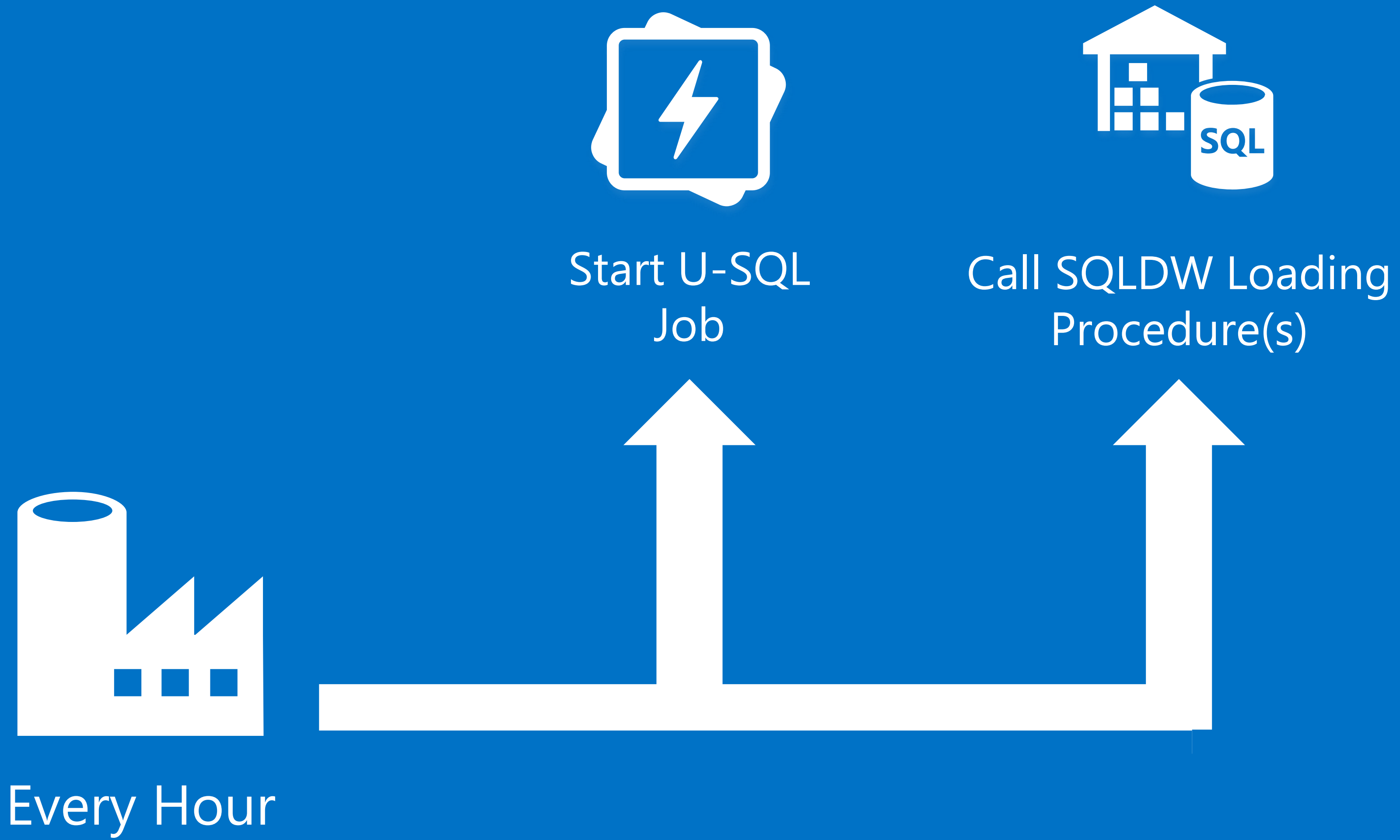

ADLA
Batch Processing
9:00am
10:00am
SA
SQLDW
SQL
Reporting Table
ADLS


ADLA
Batch Processing
9:00am
10:00am
SA
SQLDW
SQL
Reporting Table
Union View
Streaming Data
Query
ADLS



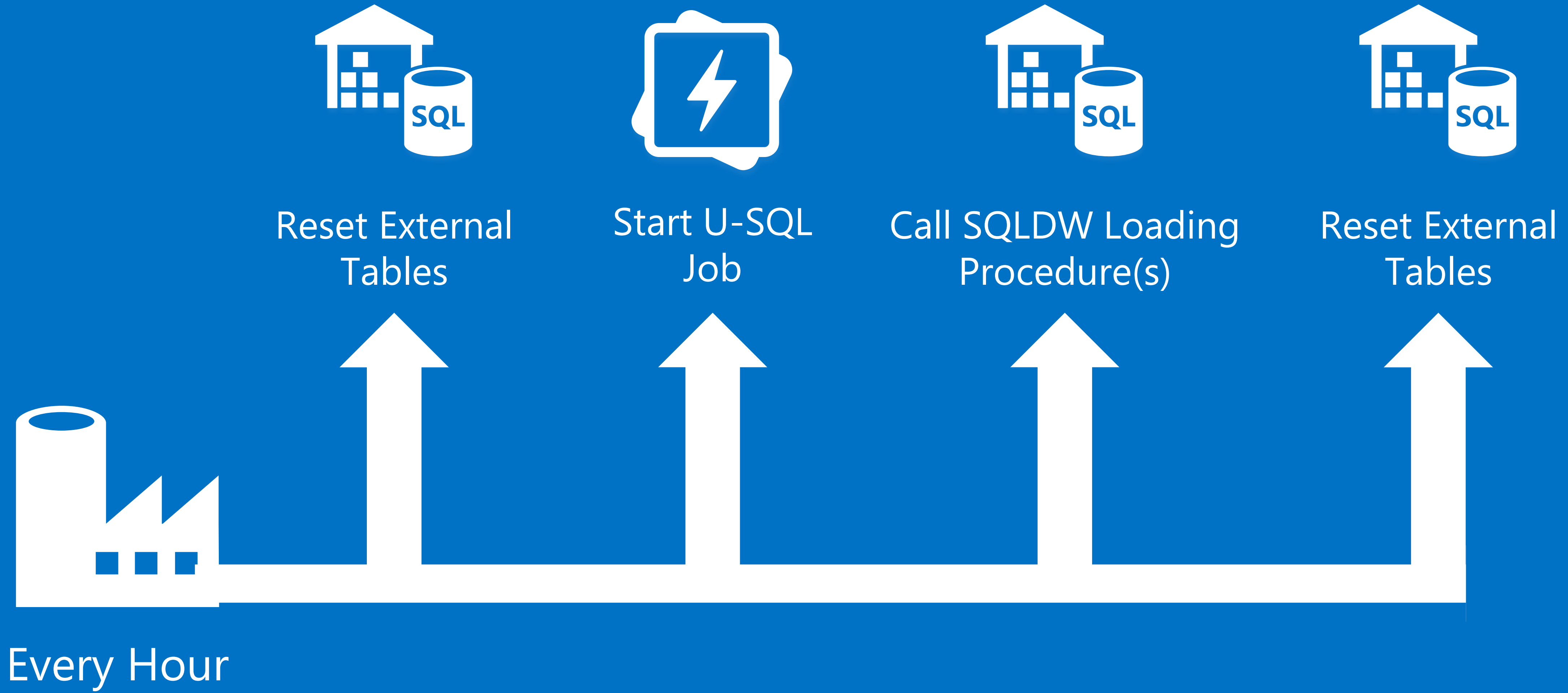
Start U-SQL Job

Call SQLDW Loading Procedure(s)

Every Hour

Azure Data Factory

Demo



Every Hour

Reset External Tables

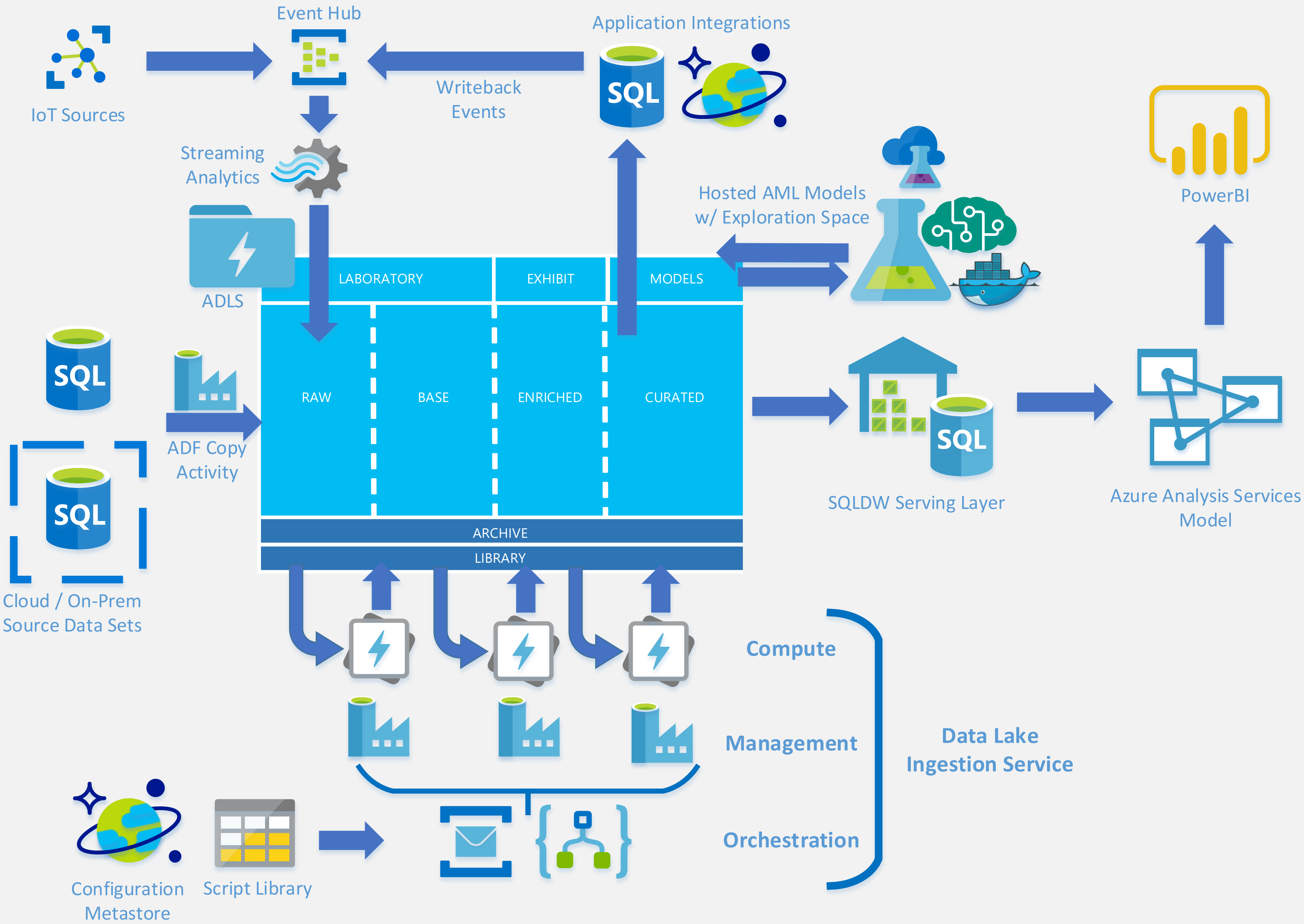
Start U-SQL Job

Call SQLDW Loading Procedure(s)

Reset External Tables

Azure Data Factory

Conclusions & Variations


Event Hub
Application Integrations
IoT Sources
Writeback Events
Streaming Analytics
Hosted AML Models w/ Exploration Space
PowerBI
ADLS
LABORATORY
EXHIBIT
MODELS
RAW
BASE
ENRICHED
CURATED
ARCHIVE
LIBRARY
ADF Copy Activity
SQLDW Serving Layer
Azure Analysis Services Model
Cloud / On-Prem Source Data Sets
Compute
Management
Orchestration
Data Lake Ingestion Service
Configuration Metastore
Script Library

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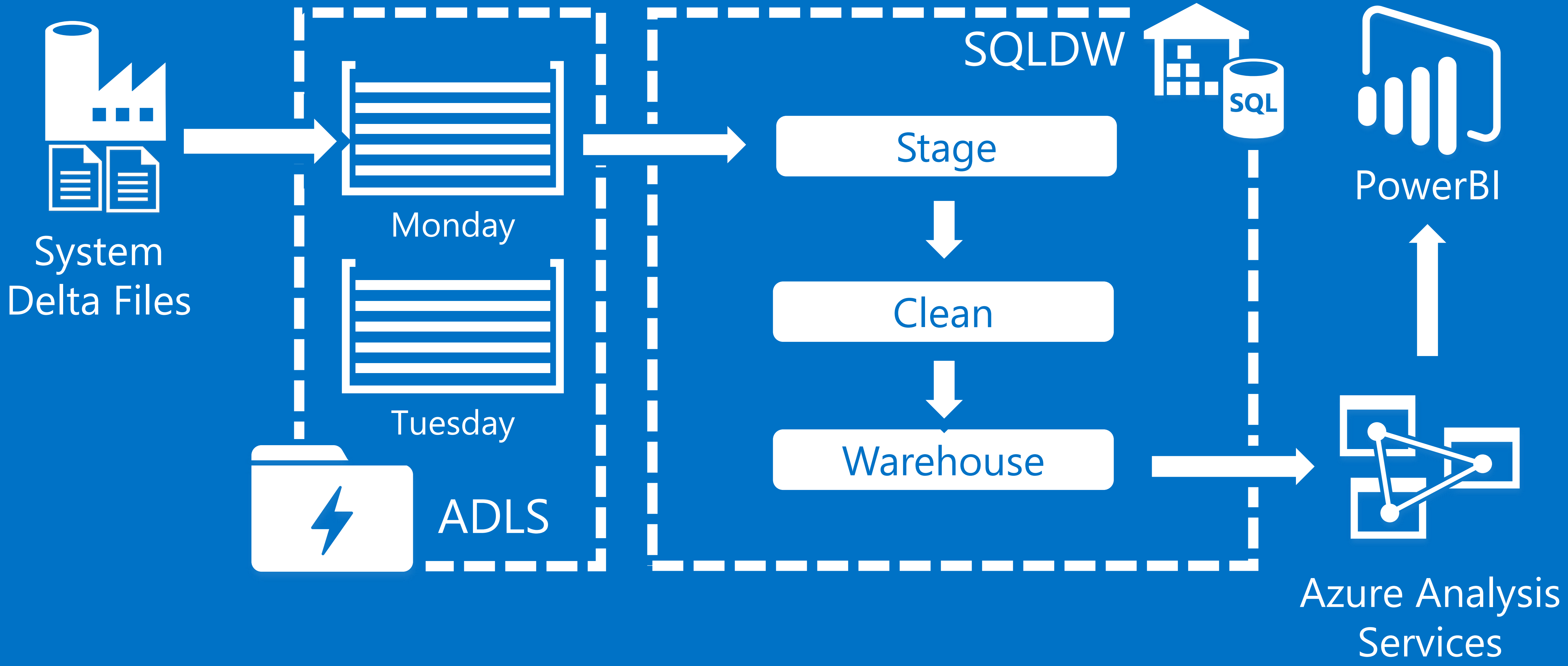
Relational Batch Systems



System Delta Files

Monday

Tuesday

ADLS

SQLDW

Stage

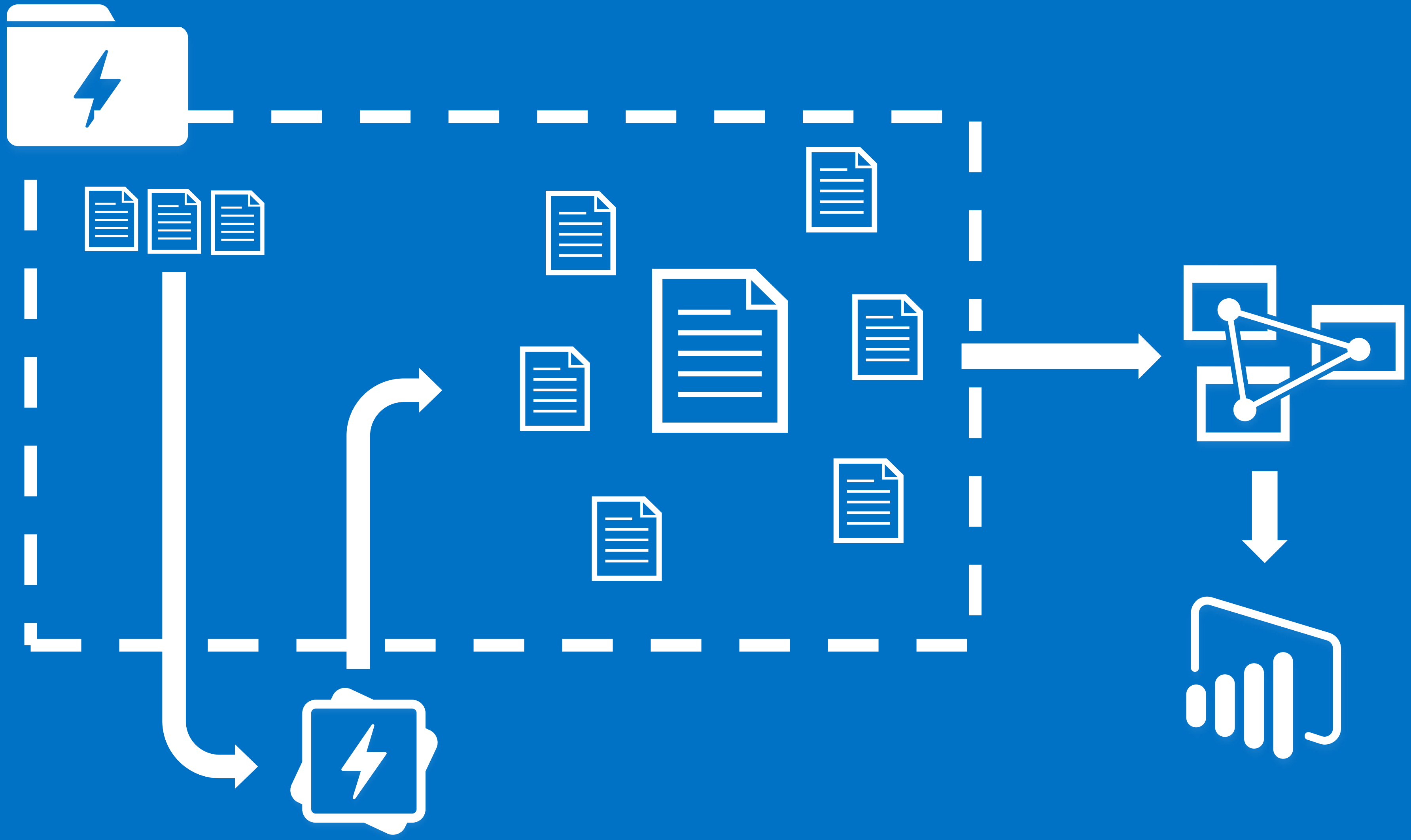
Clean

Warehouse

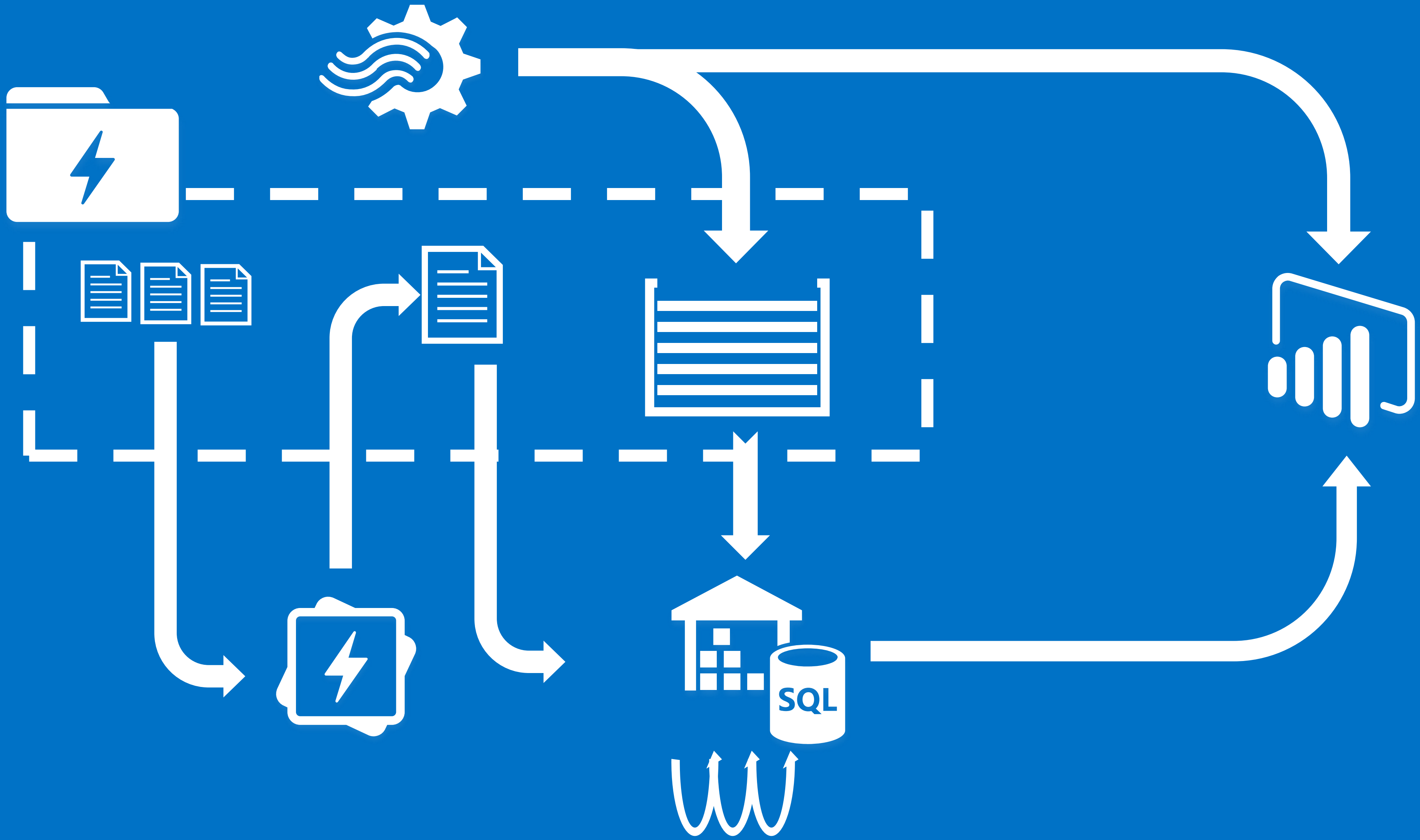
PowerBI

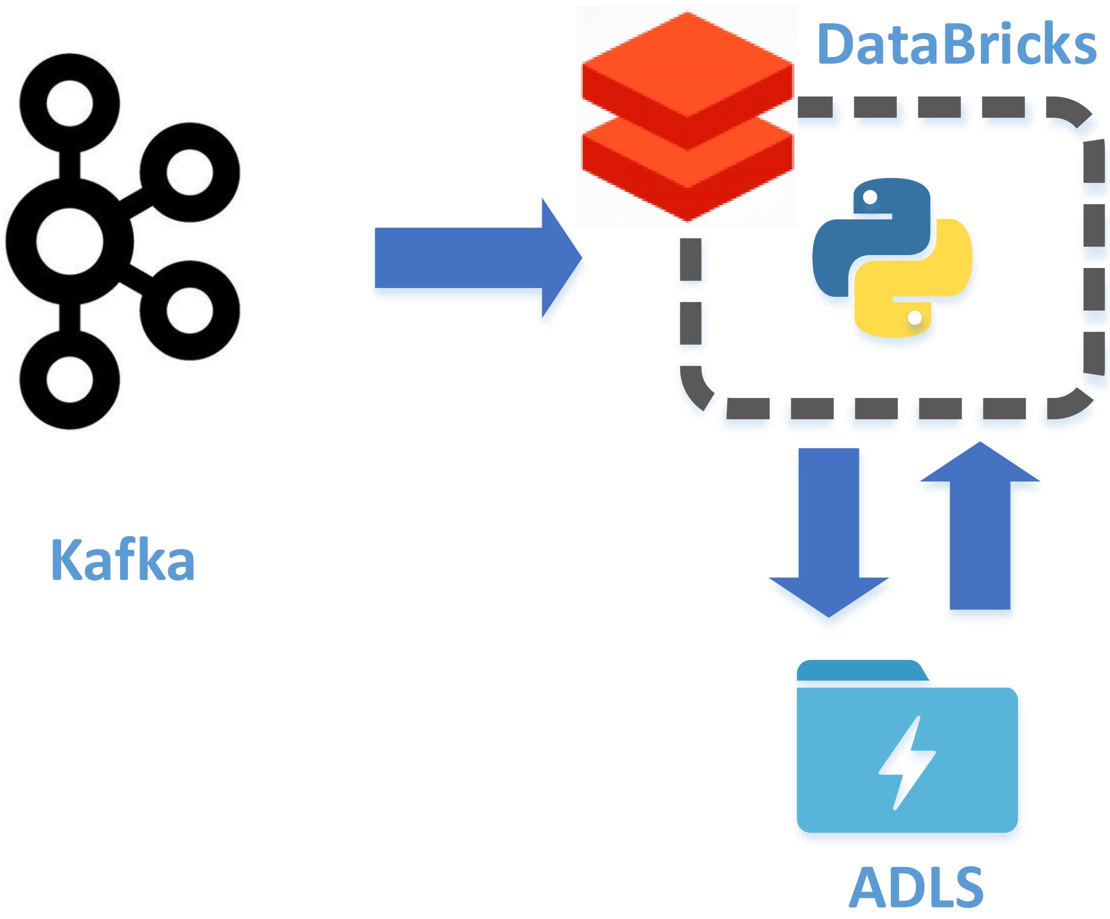
Azure Analysis Services

Who Needs a Database?



Parallel Streaming





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Thanks for Listening

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