Moving data between ADLS and other systems

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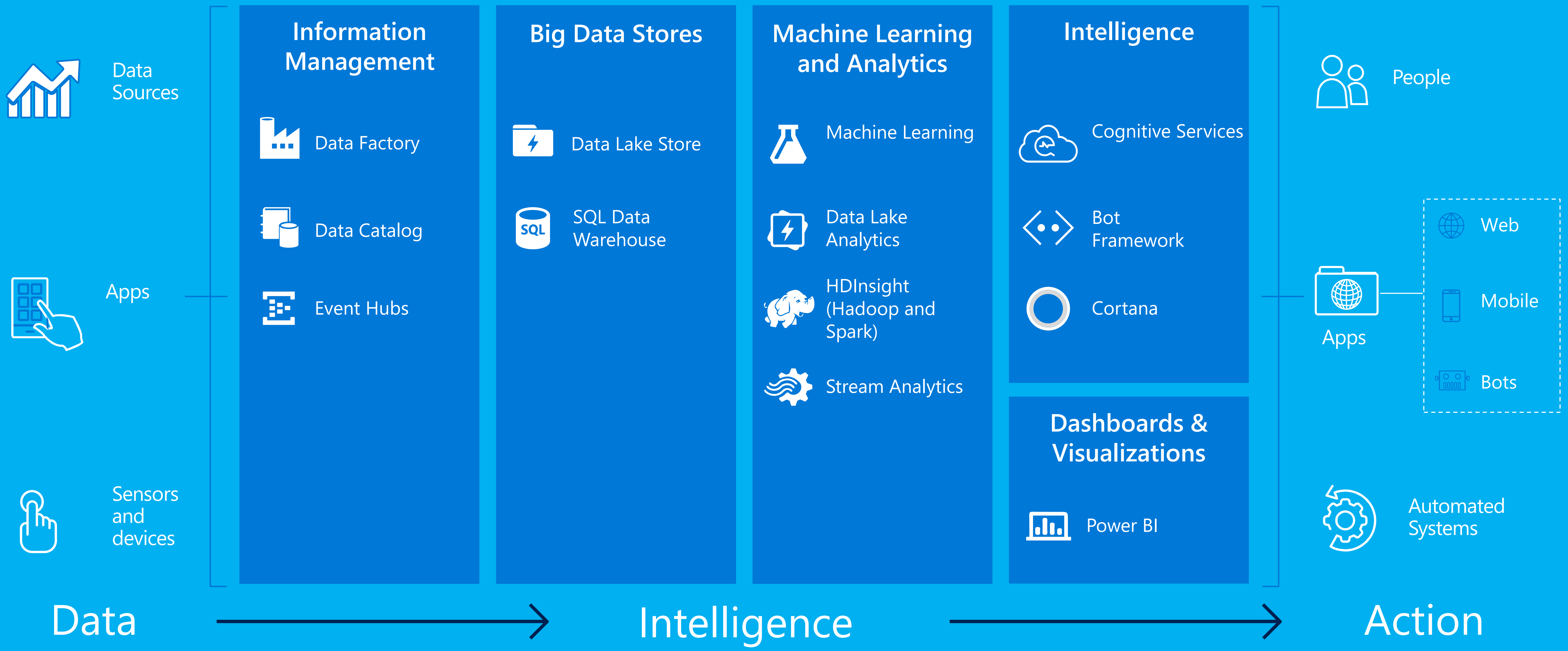
Agenda

- Overview
- Azure Data Lake Store PowerShell cmdlets
- AdlCopy
- Sqoop
- DistCP
- Azure Data Factory (ADF)

Cortana Intelligence Suite
Transform data into intelligent action



Data Sources

Apps

Sensors and devices

Information Management

- Data Factory
- Data Catalog
- Event Hubs

Big Data Stores

- Data Lake Store
- SQL Data Warehouse

Machine Learning and Analytics

- Machine Learning
- Data Lake Analytics
- HDInsight (Hadoop and Spark)
- Stream Analytics

Intelligence

- Cognitive Services
- Bot Framework
- Cortana

Dashboards & Visualizations

- Power BI

People

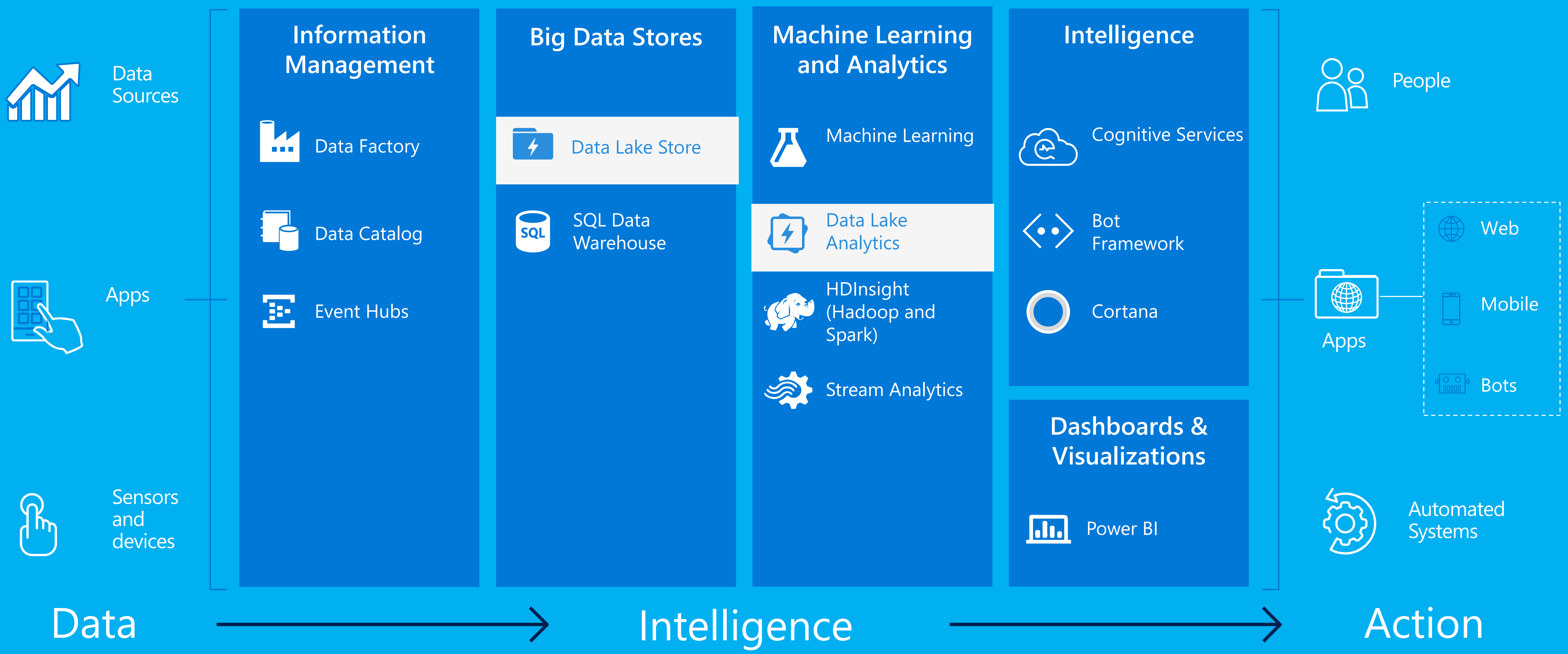
Apps

- Web
- Mobile
- Bots

Automated Systems

Data → Intelligence → Action

Cortana Intelligence Suite
Transform data into intelligent action



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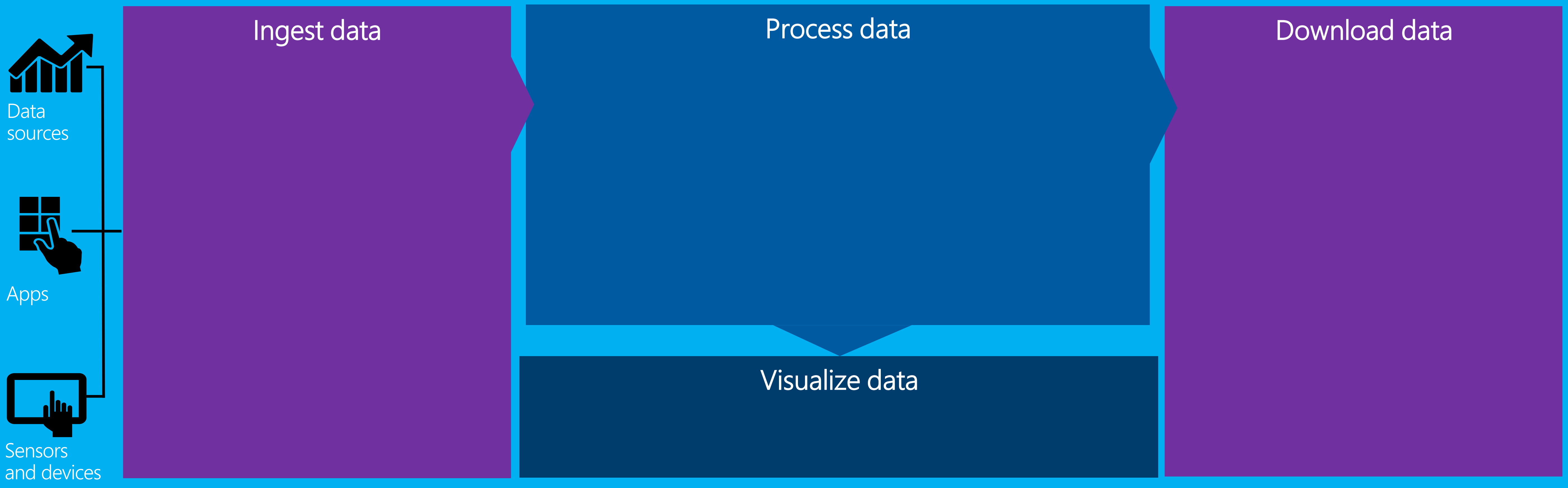
Big Data Analytics – Data Flow



Data sources

Apps

Sensors and devices

Ingest data

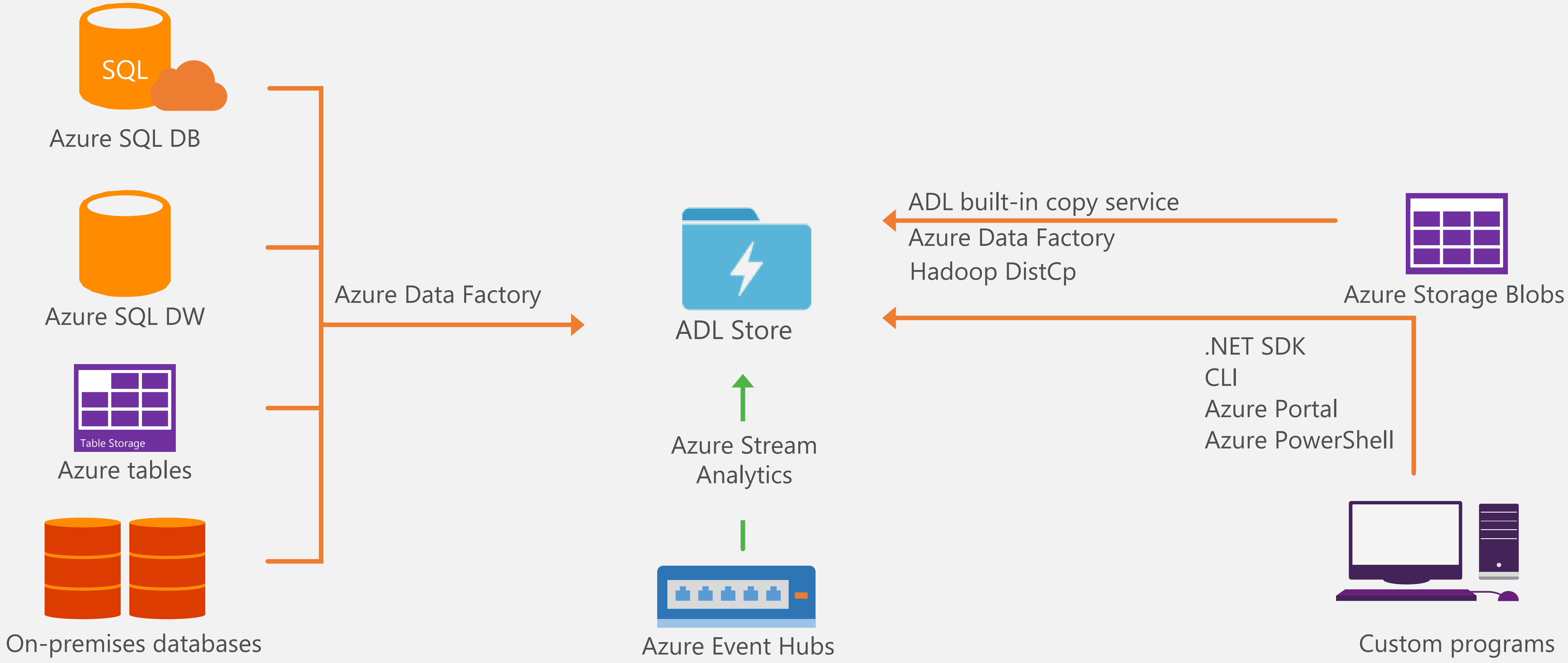
Process data

Visualize data

Download data

Ingestion

Data can be ingested into Azure Data Lake Store from a variety of sources



Azure SQL DB

Azure SQL DW

Azure tables

On-premises databases

Azure Data Factory

ADL Store

Azure Stream Analytics

Azure Event Hubs

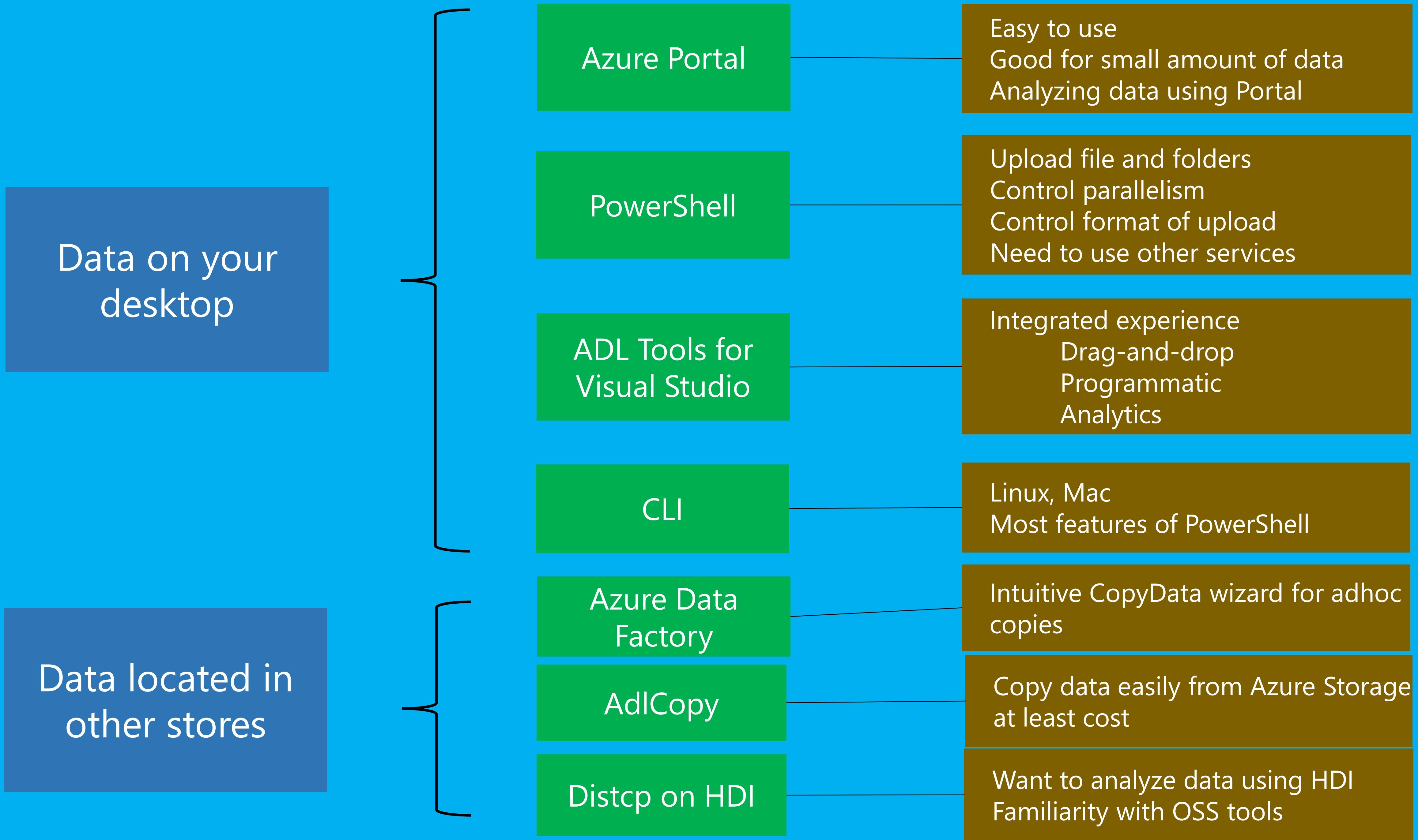
ADL built-in copy service
Azure Data Factory
Hadoop DistCp

Azure Storage Blobs

.NET SDK
CLI
Azure Portal
Azure PowerShell

Custom programs

ADLS Ingestion – Getting started



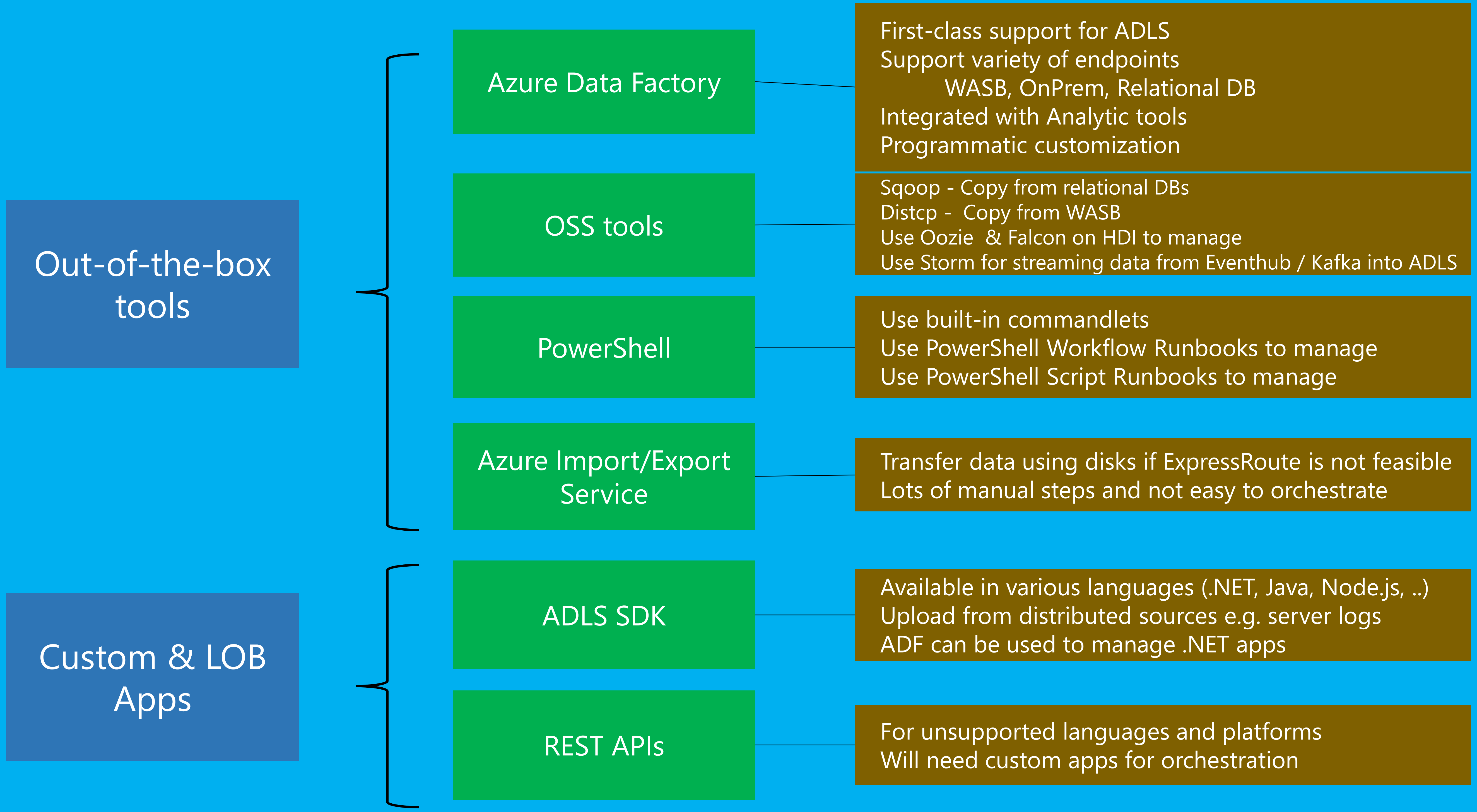
Data on your desktop

- Azure Portal
  - Easy to use
  - Good for small amount of data
  - Analyzing data using Portal
- PowerShell
  - Upload file and folders
  - Control parallelism
  - Control format of upload
  - Need to use other services
- ADL Tools for Visual Studio
  - Integrated experience
    - Drag-and-drop
    - Programmatic
    - Analytics
- CLI
  - Linux, Mac
  - Most features of PowerShell

Data located in other stores

- Azure Data Factory
  - Intuitive CopyData wizard for adhoc copies
- AdlCopy
  - Copy data easily from Azure Storage at least cost
- Distcp on HDI
  - Want to analyze data using HDI
  - Familiarity with OSS tools

ADLS Ingestion – Orchestration



Out-of-the-box tools

Azure Data Factory

First-class support for ADLS
Support variety of endpoints
WASB, OnPrem, Relational DB
Integrated with Analytic tools
Programmatic customization

OSS tools

Sqoop - Copy from relational DBs
Distcp - Copy from WASB
Use Oozie & Falcon on HDI to manage
Use Storm for streaming data from Eventhub / Kafka into ADLS

PowerShell

Use built-in commandlets
Use PowerShell Workflow Runbooks to manage
Use PowerShell Script Runbooks to manage

Azure Import/Export Service

Transfer data using disks if ExpressRoute is not feasible
Lots of manual steps and not easy to orchestrate

Custom & LOB Apps

ADLS SDK

Available in various languages (.NET, Java, Node.js, ..)
Upload from distributed sources e.g. server logs
ADF can be used to manage .NET apps

REST APIs

For unsupported languages and platforms
Will need custom apps for orchestration

Azure Data Lake Store PS Cmdlets

Export-AzureRmDataLakeStoreItem	Downloads a file from Data Lake Store.
Get-AzureRmDataLakeStoreItemContent	Gets the contents of a file in Data Lake Store.
Import-AzureRmDataLakeStoreItem	Uploads a file to Data Lake Store.
Join-AzureRmDataLakeStoreItem	Joins one or more files to create one file in Data Lake Store.
Move-AzureRmDataLakeStoreItem	Moves or renames a file or folder in Data Lake Store.
New-AzureRmDataLakeStoreItem	Creates a new file or folder in Data Lake Store.
Remove-AzureRmDataLakeStoreItem	Deletes a file or folder in Data Lake Store.

More details are here

AdlCopy

- More details are here
- Primarily it is command line tool, AdlCopy, to copy data very easily from Azure Storage Blobs / Data Lake Store into Data Lake Store.
- You can use the AdlCopy tool in two ways:
  - **Standalone**, where the tool uses Data Lake Store resources to perform the task.
  - **Using a Data Lake Analytics account**, where the units assigned to your Data Lake Analytics account are used to perform the copy operation. You might want to use this option when you are looking to perform the copy tasks in a predictable manner.

```
AdlCopy /Source <Blob source> /Dest <ADLS destination>
/SourceKey <Key for Blob account> /Account <ADLA account>
/Units <Number of Analytics units>
```

DistCP

- You can use DistCP to copy data **to and from** an HDInsight cluster storage (WASB) into a Data Lake Store account.
- More details are here.

```
hadoop distcp
wasb://<container_name>@<storage_account_name>.blob.core.windows.net/example/data/gutenberg
adl://<data_lake_store_account>.azuredatalakestore.net:443/myfolder
```

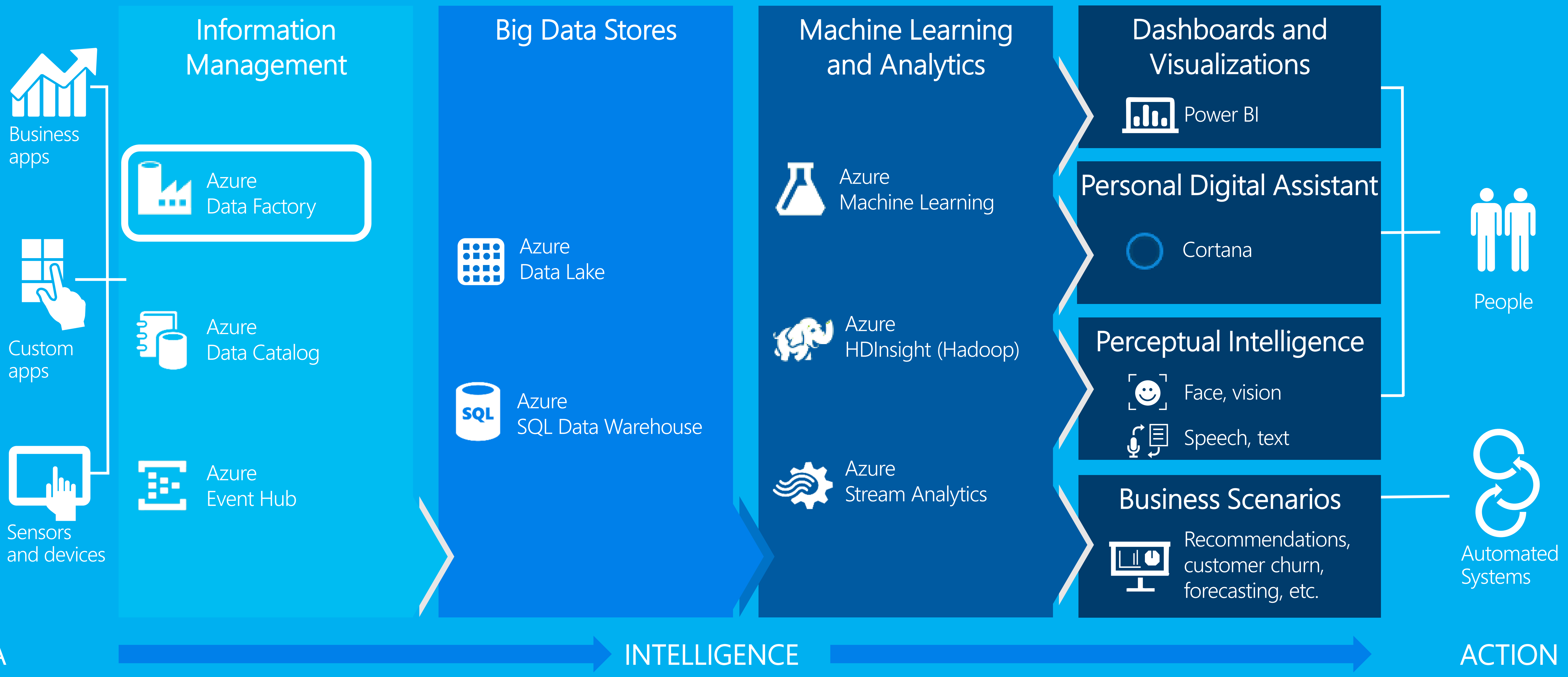
Sqoop

- Apache Sqoop is a tool designed to transfer data between relational databases and a big data repository, such as Data Lake Store.
- You can use Sqoop to copy data **to and from** Azure SQL database into a Data Lake Store account, in addition to other other relational DBs.
- More details are here.

```
sqoop-import --connect "jdbc:sqlserver://<sql-database-server-name>.database
.windows.net:1433;username=<username>@<sql-database-server-name>;password=
<password>;database=<sql-database-name>‟ --table Table1 --target-dir adl://
<data-lake-store-name>.azuredatalakestore.net/Sqoop/SqoopImportTable1
```

Cortana Intelligence Suite

Transform data into intelligent action



Information Management

- Azure Data Factory
- Azure Data Catalog
- Azure Event Hub

Big Data Stores

- Azure Data Lake
- Azure SQL Data Warehouse

Machine Learning and Analytics

- Azure Machine Learning
- Azure HDInsight (Hadoop)
- Azure Stream Analytics

Dashboards and Visualizations

- Power BI

Personal Digital Assistant

- Cortana

Perceptual Intelligence

- Face, vision
- Speech, text

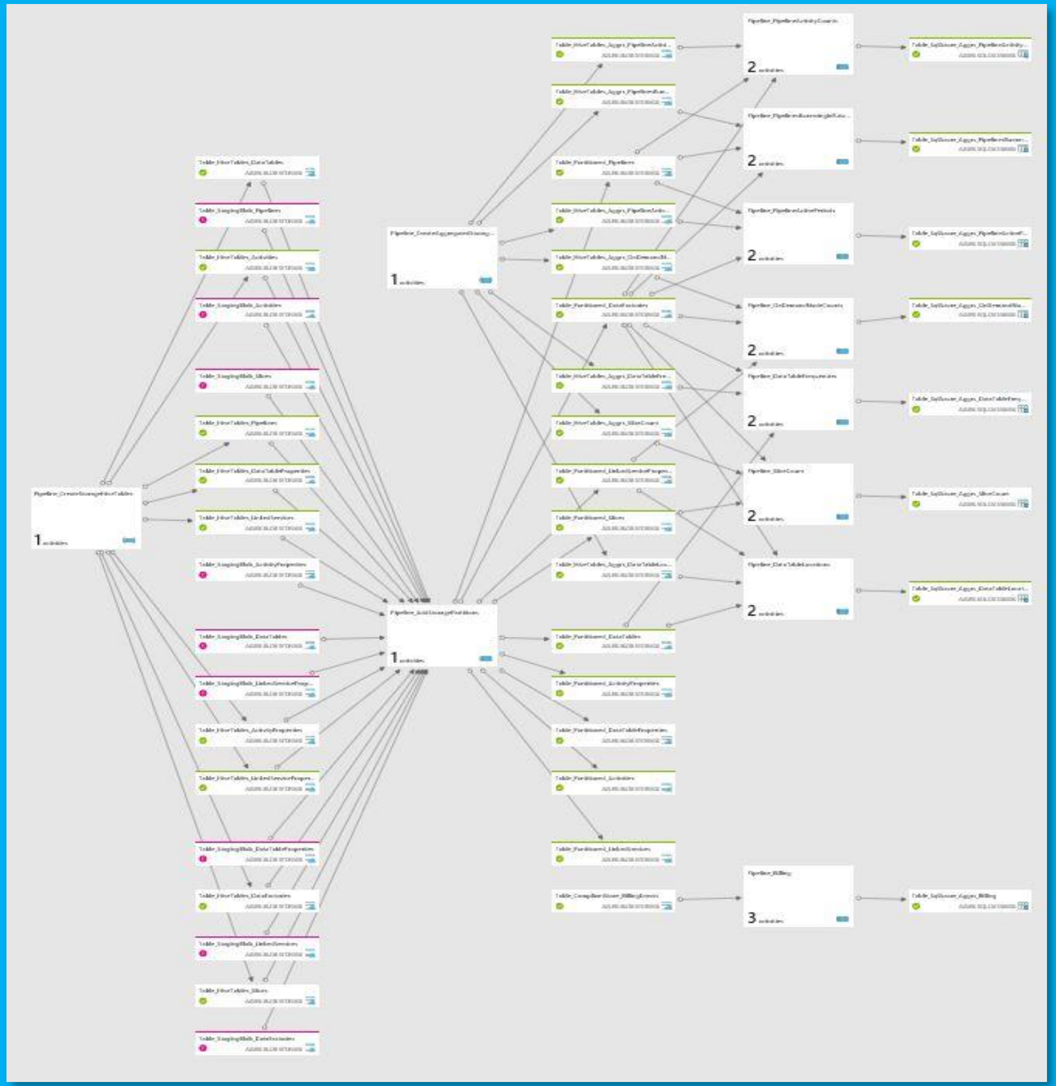
Business Scenarios

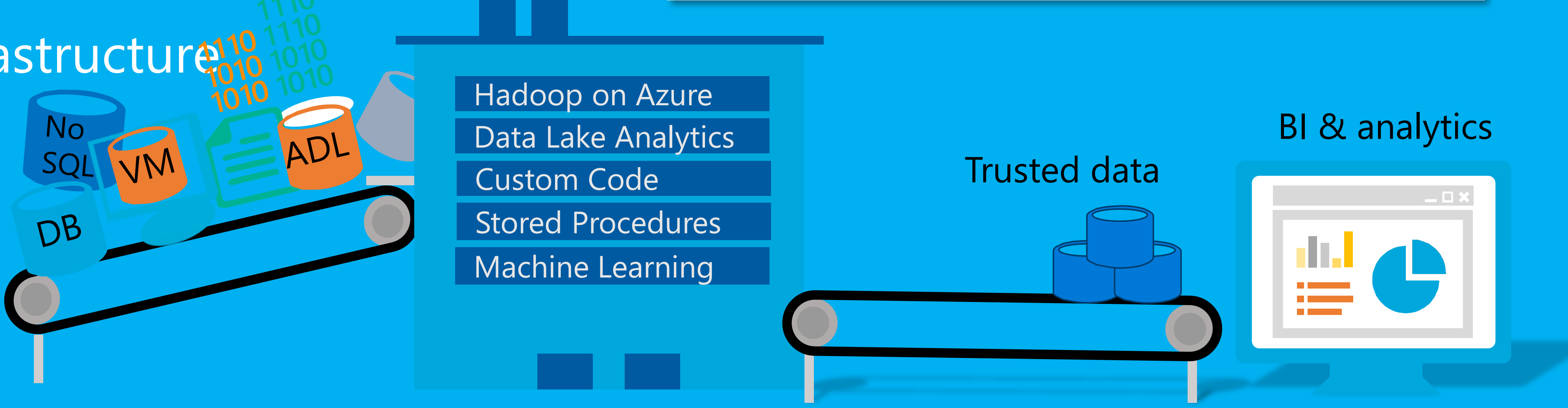
- Recommendations, customer churn, forecasting, etc.

Azure Data Factory

Compose, orchestrate & monitor data services at scale

- Fully managed service to support orchestration of data movement and transformation
- Connect to relational or non-relational data that is on-premises or in the cloud
- Single pane of glass to monitor and manage data processing pipelines
- Globally deployed service infrastructure
- Cost Effective





Hadoop on Azure

Data Lake Analytics

Custom Code

Stored Procedures

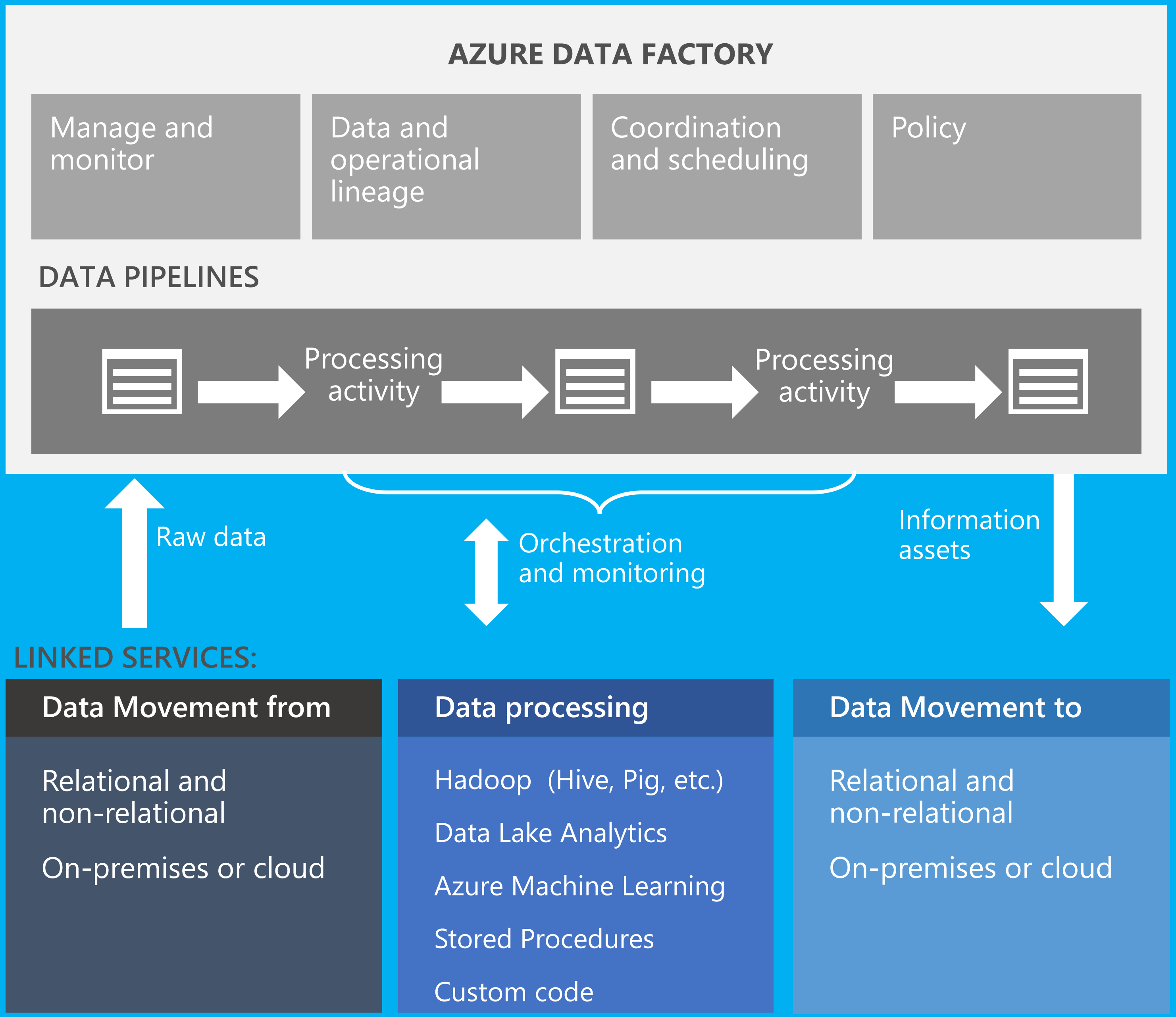
Machine Learning

Trusted data

BI & analytics

Azure Data Factory

Compose services to transform data into actionable intelligence



Linked Services

- Connect data factories to the resources and services you want to use
- Connect to data stores like Azure Storage and on premises SQL Server
- Connect to compute services like Azure ML, Azure HDI, and Azure Batch

Data Sets

- A named reference/pointer to data you want to use as an input or output of an activity

Activities

- Actions you perform on your data
- Takes inputs and produce outputs

Pipelines

- Logical grouping of activities for group operations

Azure Data Factory

Connects Azure out-of-the-box to all your stores

Category	Data store	Supported as source	Supported as sink
Azure	Azure Data Lake Store	√	√
	Azure Blob storage	√	√
	Azure SQL Database	√	√
	Azure SQL Data Warehouse	√	√
	Azure Table storage	√	√
	Azure DocumentDB	√	√
Databases	SQL Server*	√	√
	Oracle*	√	√
	MySQL*	√	
	DB2*	√	
	Teradata*	√	
	PostgreSQL*	√	
	Sybase*	√	
	Cassandra*	√	
	MongoDB*	√	
	Amazon Redshift	√	
File	File System*	√	√
	HDFS*	√	
	Amazon S3	√	
Others	Salesforce	√	
	Generic ODBC*	√	
	Generic OData	√	
	Web Table (table from HTML)	√	
	GE Historian*	√	

* Can be on-premises or on Azure IaaS, enabled using Data Management Gateway

Azure Data Factory Customers

Milliman

asos
discover fashion online

Bentley

Rockwell Automation

Honeywell

HALO 4

Ziosk

Microsoft Dynamics

Microsoft game studios

Pier 1 imports

LIONHEAD STUDIOS

ADF Resources

Get Started

- Learning Path
- Azure Portal & Customer Profiling
- Visual Studio plug-in installation

Learn More

- Product Recommendations Virtual Lab MS Technet
- Azure Big Data Blog

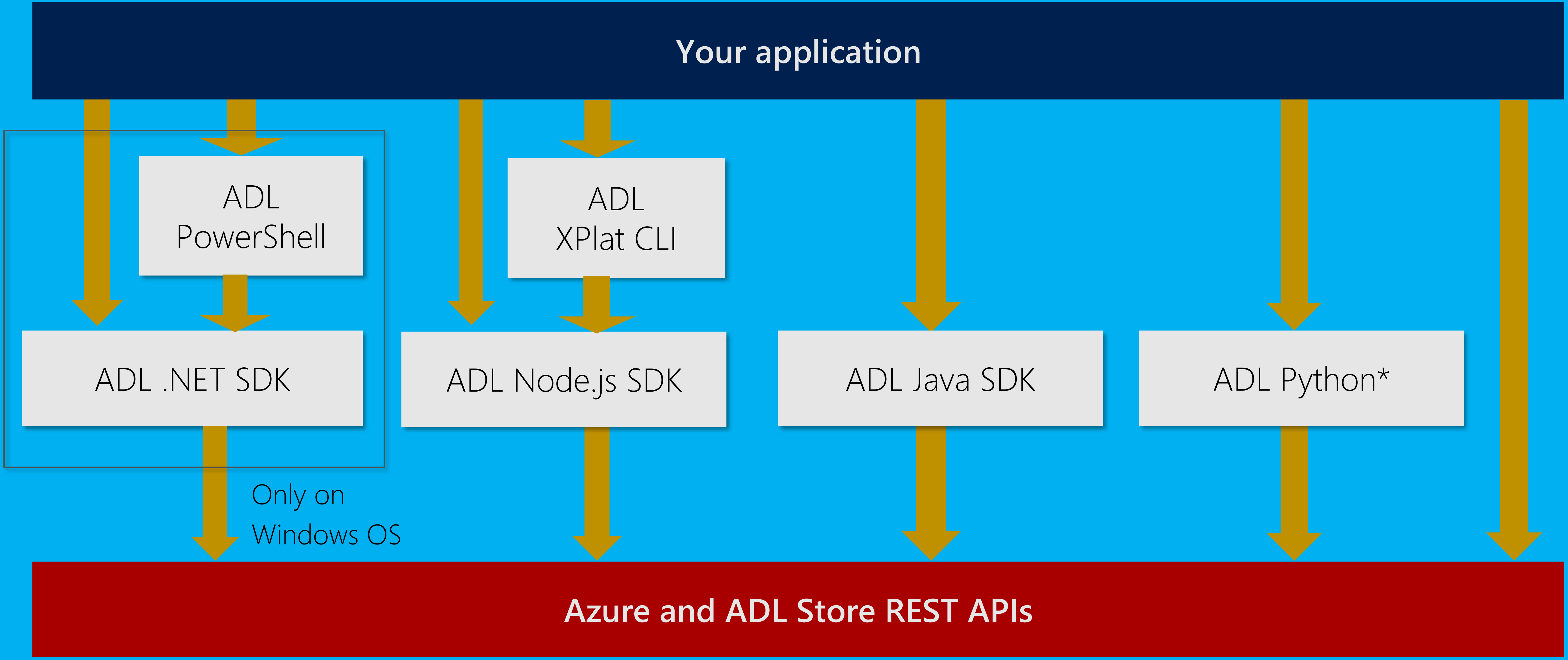
Give Feedback

- UserVoice

Get Help

- ADF Forums

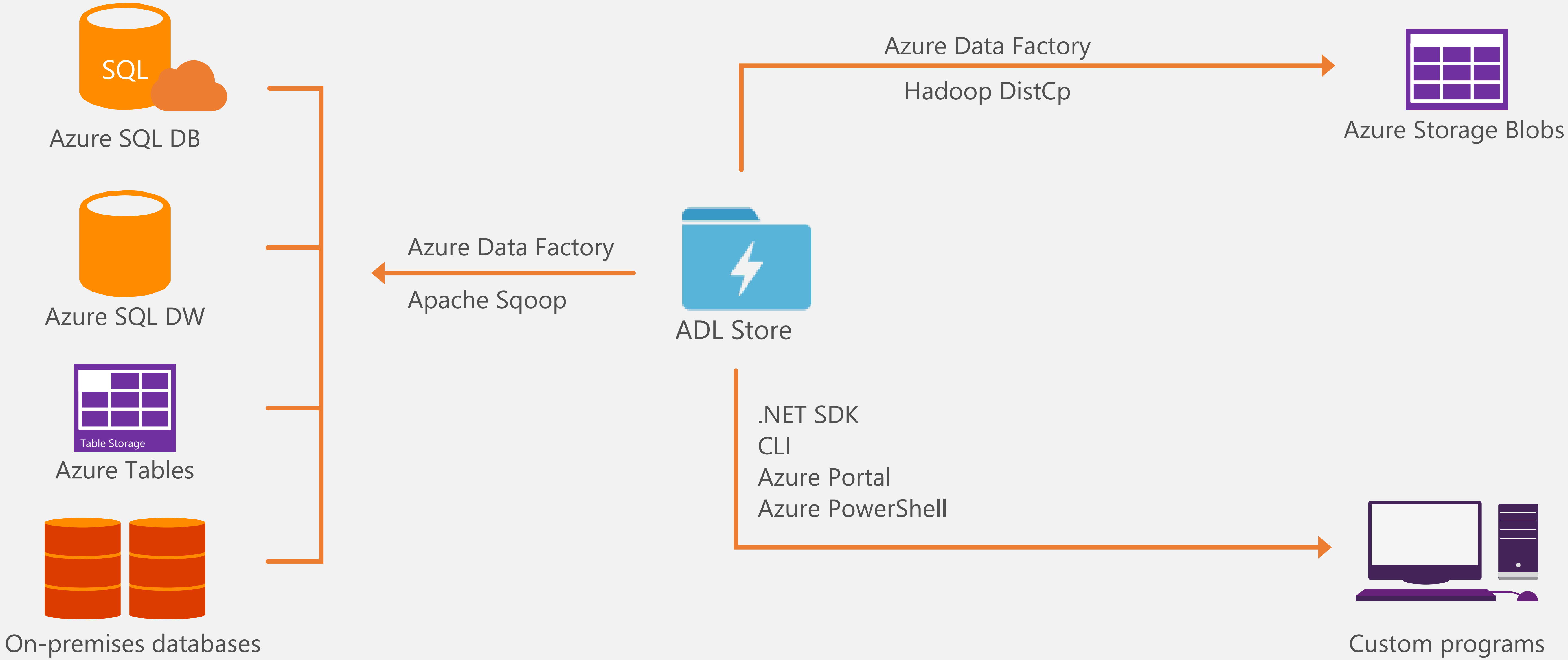
Customizing using SDKs/APIs



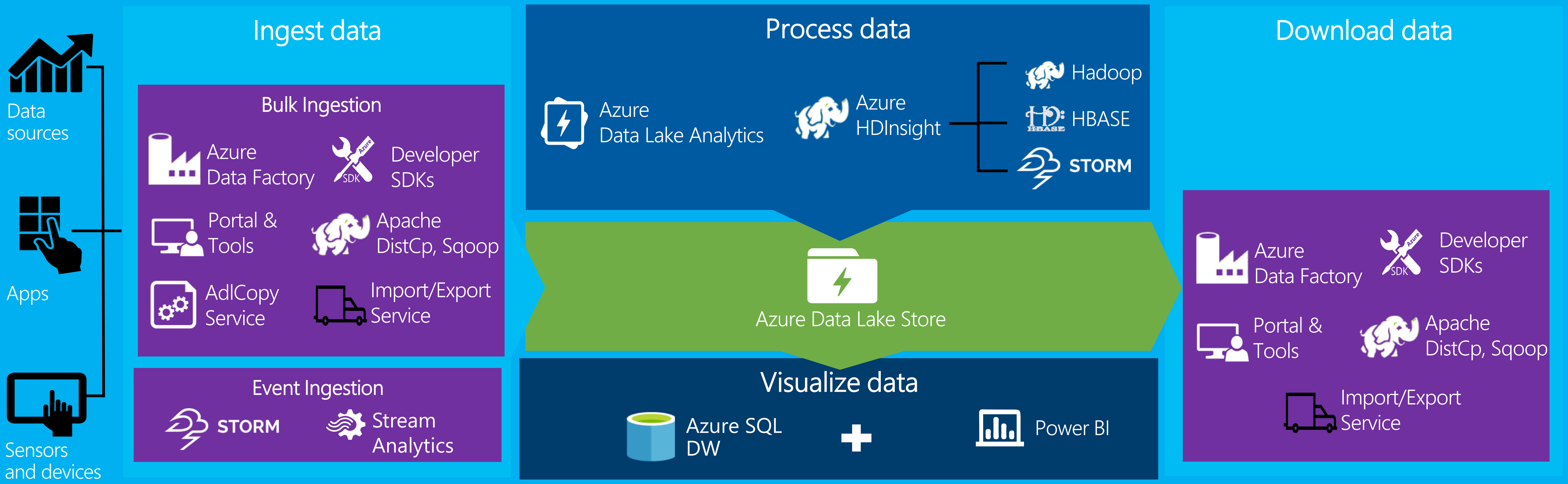
* At General Availability

Egress

Data can be egressed from Azure Data Lake Store into numerous targets/sinks



Big Data Analytics – Data Flow



Data sources

Apps

Sensors and devices

Ingest data

Bulk Ingestion

Azure Data Factory

Developer SDKs

Portal & Tools

Apache DistCp, Sqoop

AdlCopy Service

Import/Export Service

Event Ingestion

STORM

Stream Analytics

Process data

Azure Data Lake Analytics

Azure HDInsight

Hadoop

HBASE

STORM

Azure Data Lake Store

Visualize data

Azure SQL DW + Power BI

Download data

Azure Data Factory

Developer SDKs

Portal & Tools

Apache DistCp, Sqoop

Import/Export Service

In conclusion

- Many tools are available to copy data into ADLS and out of ADLS
  - More information is here
  - You can use generic Azure tools e.g. PowerShell
  - You can use Open Source tools e.g. DistCP
  - You can use special purpose tools e.g. ADF
  - You can create your own tools
- Pick the tool that meets your scenario requirements
  - Optimize it on the dimension you want – Cost, Performance. Etc.

Questions?

http://aka.ms/AzureDataLake

Microsoft