

Exploring Azure Platform Solutions



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The Internet of Things

Devices and sensors

Connected to each other and the internet

Examples

- Smart thermostat
- Motion sensors and security cameras
- Sensors in manufacturing machines
- Sensors embedded in concrete
- Traffic sensors
- Sensors in streetlamps
- Fitness trackers
- Retail beacons

The Internet of Things

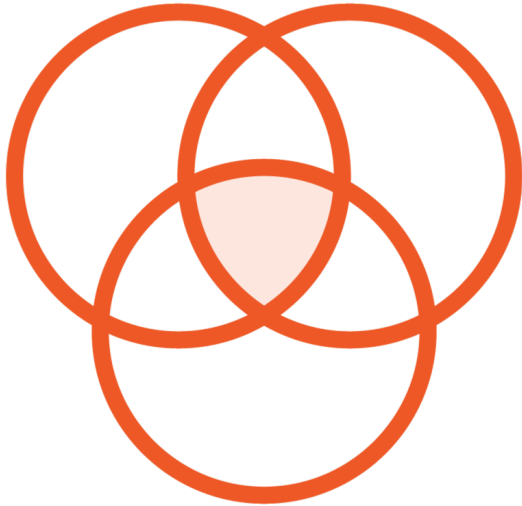
Alerts

Insights

Actions

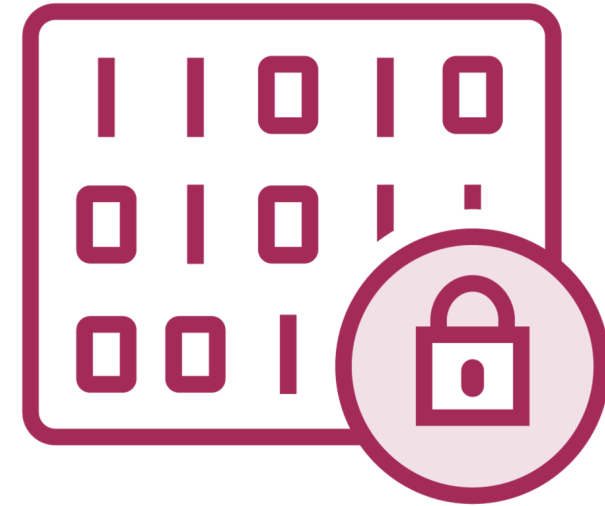


Issues with IoT



Lack of standards

IEEE is working on standards
Left to device manufacturers



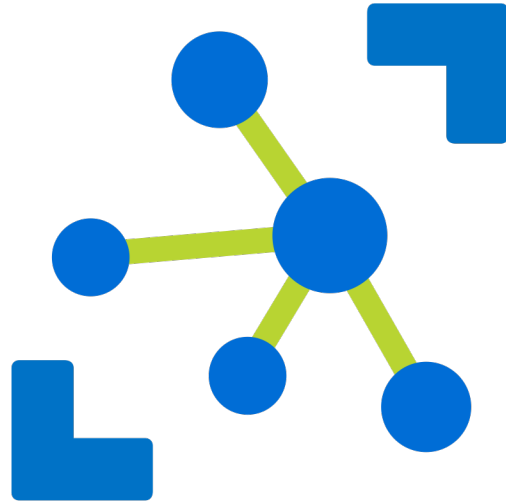
Security

Potential to be hacked
Communications can be intercepted

IoT Services in Azure



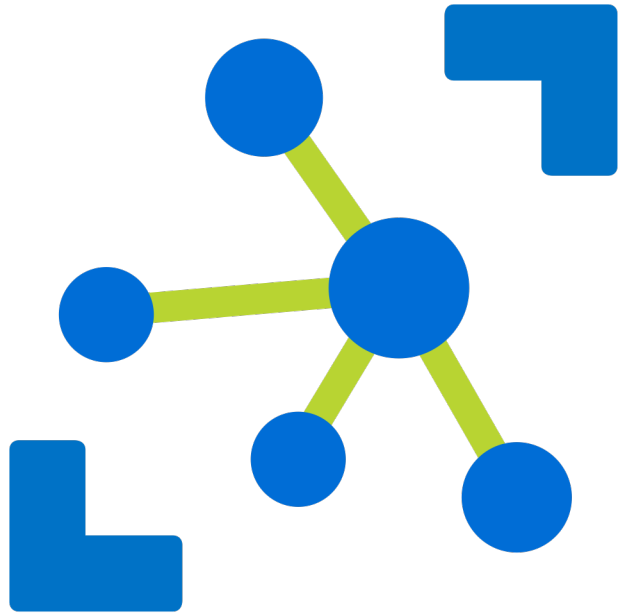
Azure IoT Central



Azure IoT Hub



Azure Sphere



Azure IoT Hub

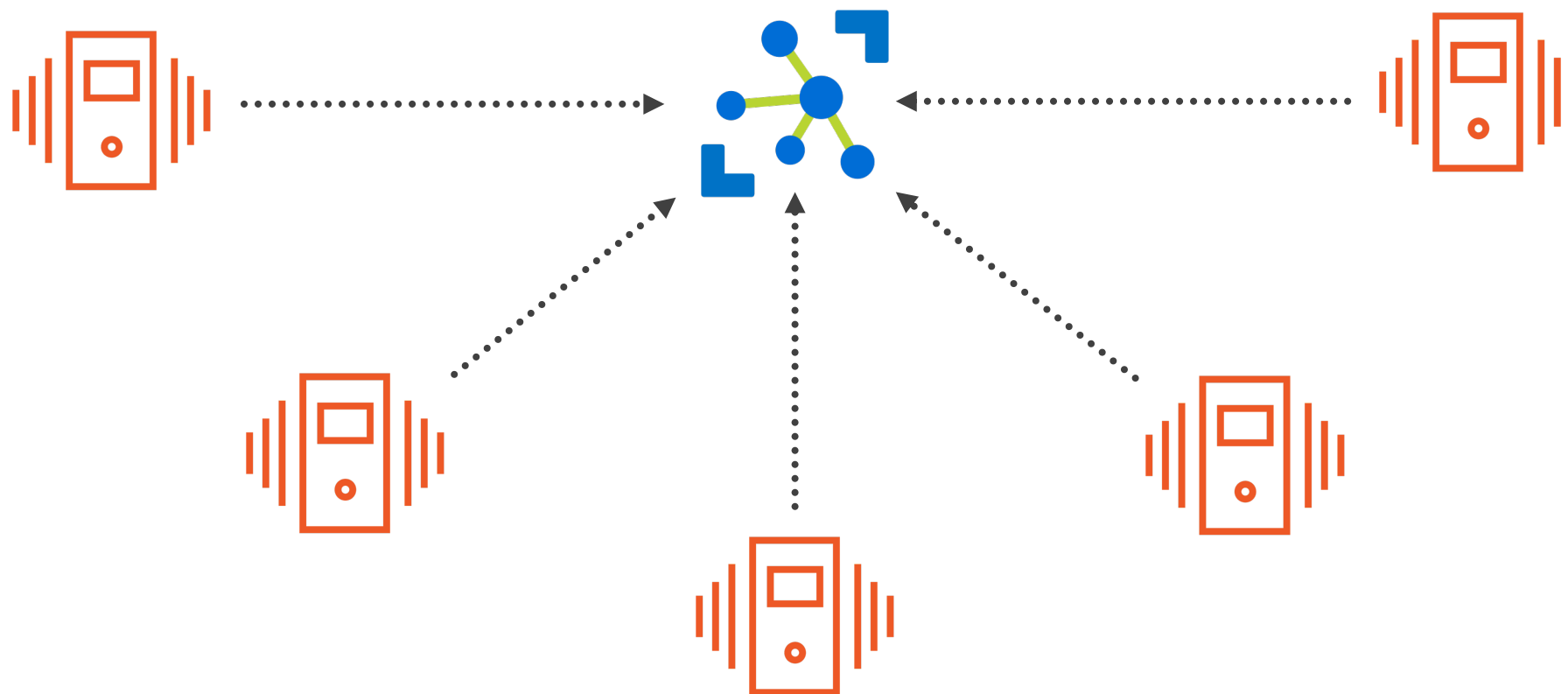
Platform service

- Connecting devices to the cloud
- Managing devices
- Ingesting data

Bi-directional communication

Automatic provisioning of device objects

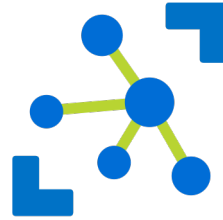
Azure IoT Hub



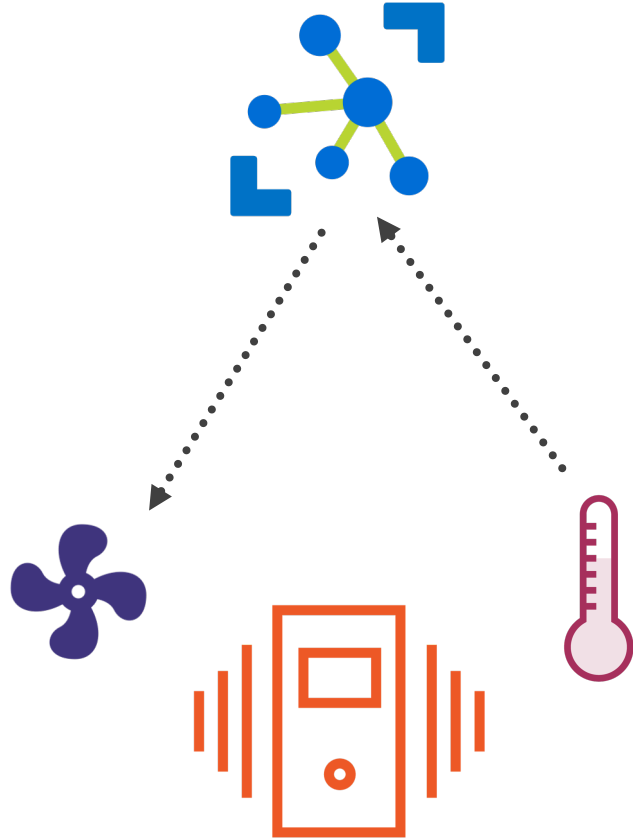
Azure IoT Hub

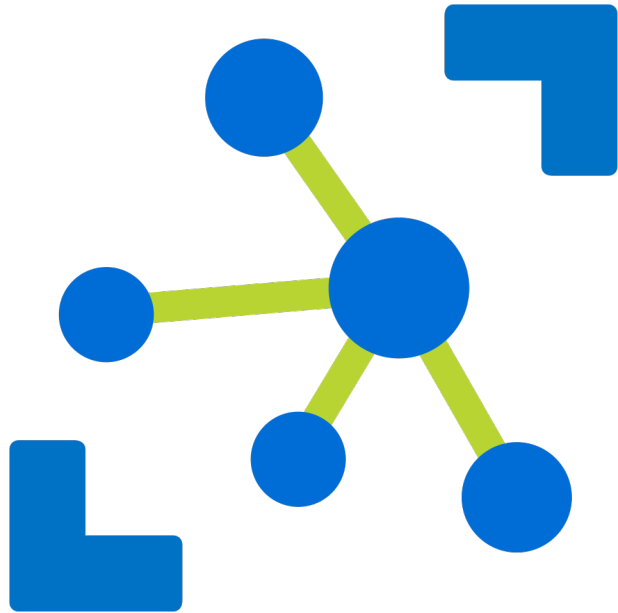


Azure IoT Hub



Azure IoT Hub





Azure IoT Hub

SDKs and APIs

Simulated devices for development

Authentication capabilities

- X.509 certificates
- Shared Access Signatures





**Azure IoT
Central**

Managed App Platform

Faster to start developing solutions

Industry-specific templates

Built-in device profiles





Azure Sphere

Application platform

- Micro-controller unit
- Linux-based operating system
- Cloud-based security service

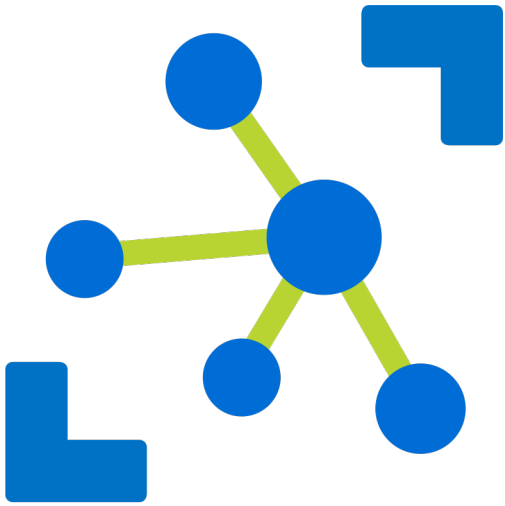
Foundation for IoT devices

Component to IoT solutions

Devices also use Azure Sphere service

- Verify security of operating system on start-up
- Microsoft pushes OS updates and security patches

IoT Services in Azure



Azure IoT Hub



Azure IoT Central



Azure Sphere

Overview



IoT platform solutions

Exploring Azure IoT Central

Big Data platform solutions

Azure Synapse Analytics

Artificial Intelligence platform solutions

- Machine Learning
- Cognitive Services
- Bot Service



Understanding Big Data





Big Data

Technologies and strategies

- Gather large datasets
- Organize the data
- Process the data
- Gather insights from the data

Insights



Data Analysis using
Excel spreadsheets

Manipulations and
visualizations

Data stored in
spreadsheet

Not scalable to Big
Data solutions



Big Data Analytics - Insights

**Sales and
Marketing**

Risk Management

Product Design

**Supply Chain
Management**

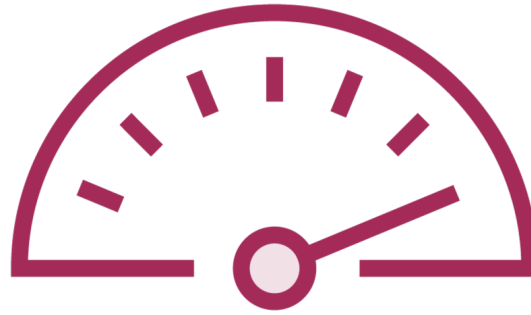
**Planning and
Safety**



The Three V's of Big Data



Volume

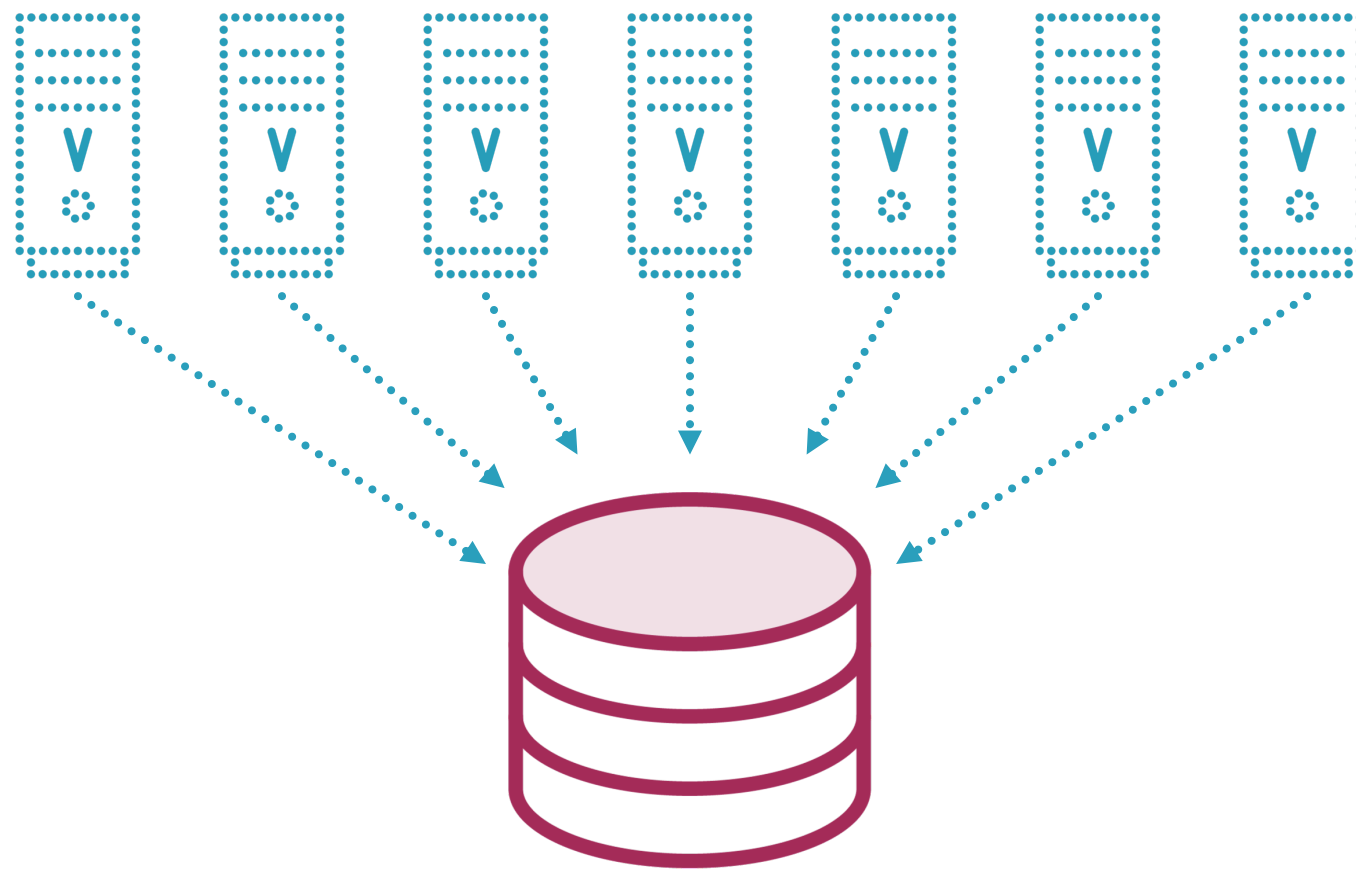


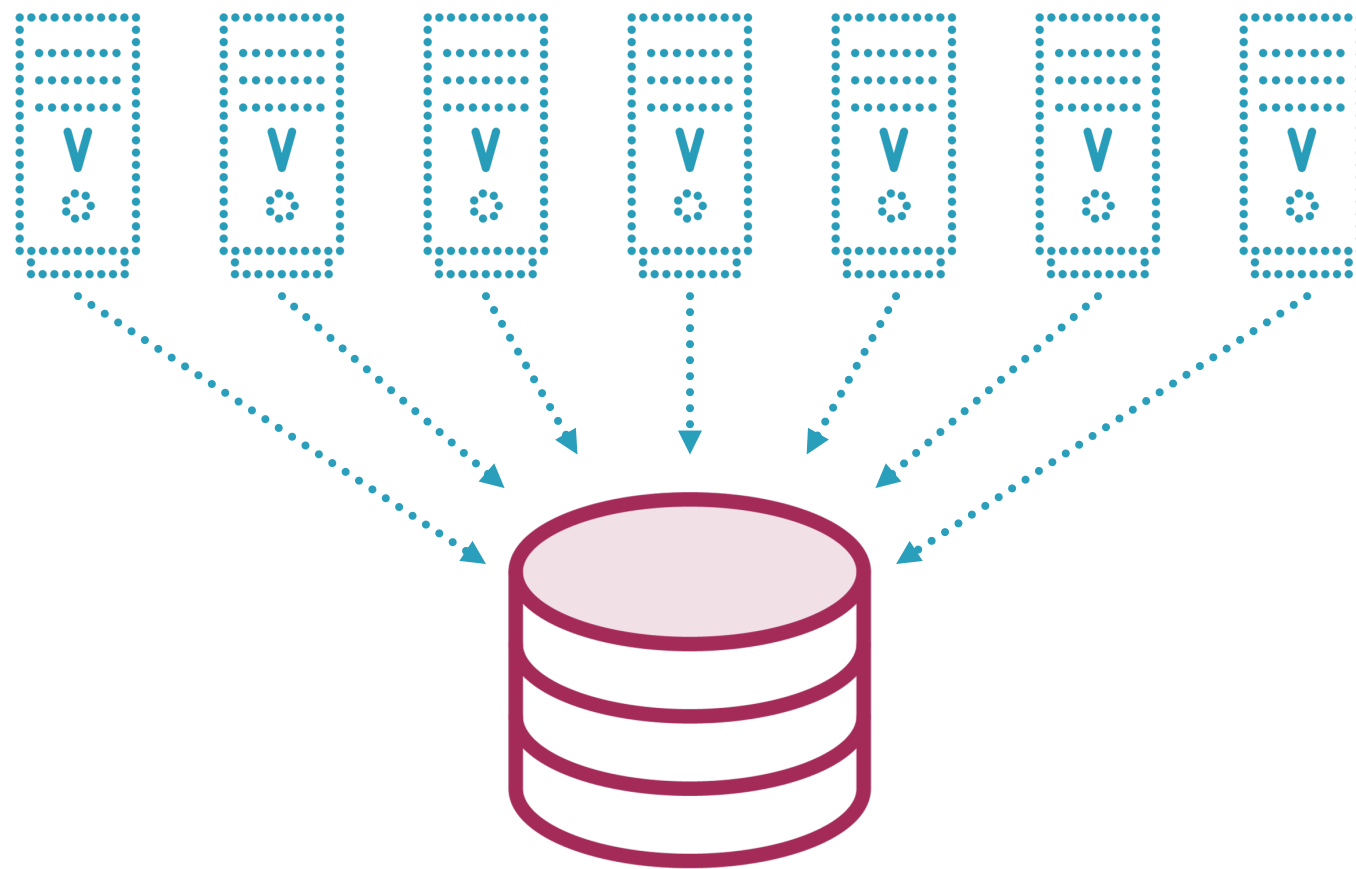
Velocity



Variety







Categories of Big Data Processing





Ingest

Extract-transform-load

Modifying

Categorizing

Filtering bad data

Validating data

Often stored as raw data

Azure Data Factory, Event Hubs, IoT Hubs,
SSIS, Azure Synapse, Kafka (HDInsight)





Persist

Data warehouse (Azure Synapse)

Distributed file systems (Hadoop)

Azure Blob Storage





Analyze

Batch processing

- Splitting, mapping, reducing, assembling
- Hadoop MapReduce
- Apache Spark

Real-time processing

- Spark
- Apache Storm, Kafka
- Azure Stream Analytics

R, Python, Scala

SQL, Java, C#





Visualize

Querying and reporting

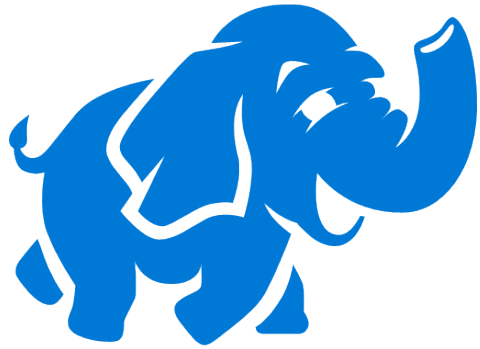
- Power BI
- MS Excel
- Jupyter notebooks



Big Data Solutions in Azure



Azure Big Data Solutions



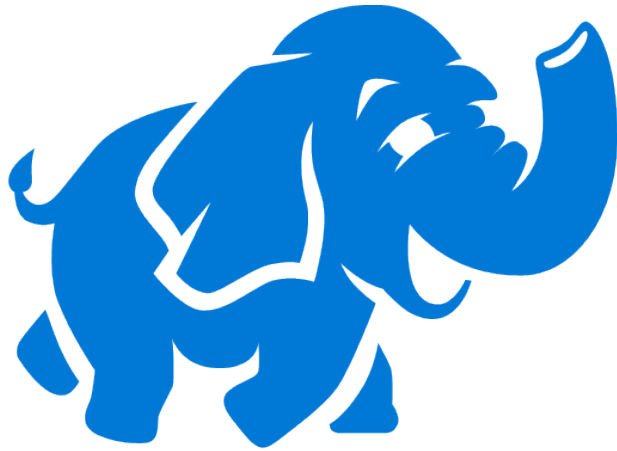
Azure HDInsight



**Azure
Databricks**



**Azure Synapse
Analytics**



Azure HDInsight

Open-source analytics tools

Apache Hadoop

Clusters of compute nodes

On-demand scalability and autoscale

Integration with Azure services for building analytics pipelines



Azure HDInsight Features



Hadoop Distributed File System (DFS)



MapReduce for batch processing



Also supports Apache Spark



Supports familiar open-source tools



Supports newer development environments also





Azure Databricks

Company outside Microsoft

Azure has hosted Databricks platform

Based on Apache Spark platform

Fully-managed Spark Clusters

Workspace for visualizing data

Serverless option

Notebooks

Interactive dashboards

Integration with other Azure services





**Azure Synapse
Analytics**

Formerly Azure SQL Data Warehouse

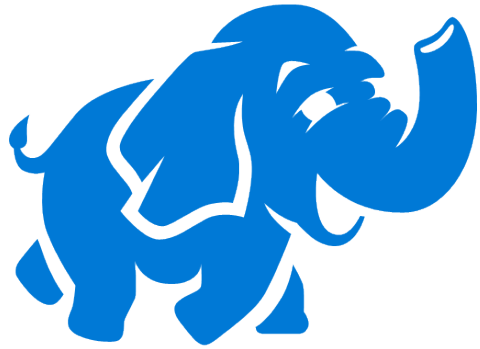
Storage component

Azure Synapse Analytics

- SQL technologies
- Spark analytics
- Pipelines for orchestration
- Serverless or provisioned options
- Spark languages and T-SQL
- ETL functionality
- Integration with Azure services



Azure Big Data Solutions



Azure HDInsight



**Azure
Databricks**



**Azure Synapse
Analytics**



Azure Machine Learning





Azure Machine
Learning

Using existing data to forecast future behaviors, outcomes and trends

Model is trained using known data

Model makes predictions for unknown data

Machine Learning Studio



Cognitive Services



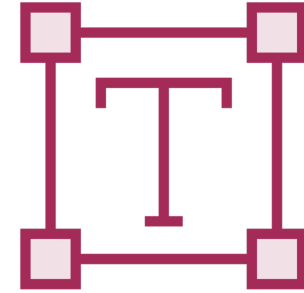
Azure Cognitive Services



Vision



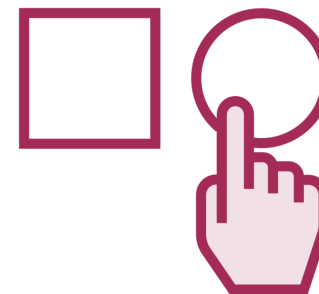
Speech



Language

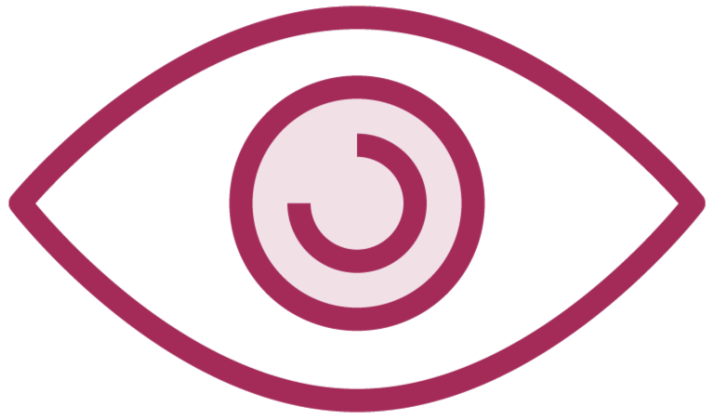


Web Search



Decision





**Computer
Vision**

Process and catalog images

Generate captions for images

Optical character recognition

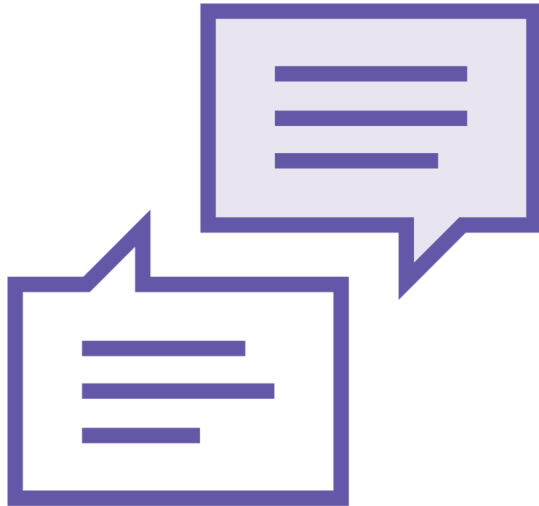
- Typewriter text
- Handwritten text
- Many languages

Video indexer

Face API

Form Recognizer

Speech APIs



Speech-to-text
Text-to-speech



Speaker recognition
Identify speaker by voice
Train model by providing samples

Language APIs



LUIS

Language Understanding API
Natural language input
Used in chat bots



Sentiment Analysis
Analyze text for
positive or negative



Translator Service
70+ languages





**Web Search
Service**

Bing Web Search

Bing Custom Search API

Bing Image Search

Bing Entity Search API

Bing News Search API

Bing Video Search API

Bing Visual Search API

Bing Autosuggest API

Bing Spell Check API

Bing Business Search API



Decision APIs

Anomaly API

Content
Moderator

Personalizer



Azure Bot Service





Azure Bot Service

Virtual assistant on the web

Responds to questions

Uses natural language processing

Tools

- Bot Framework SDK
- Bot Framework Composer
 - Desktop application
 - Emulator
 - .NET Core SDK 3.1

Deploy to App Service or Function App

Module Summary



The Internet of Things (IoT)

Azure IoT Central

Understanding Big Data

Azure Big Data solutions

Azure Synapse Analytics

AI platform solutions

- Machine Learning Studio
- Cognitive Services
- Bot Service



Up Next:
DevOps Solutions in Azure

