Microsoft

# DevOps for IoT Apps

IoT Production Training Pack

# Agenda

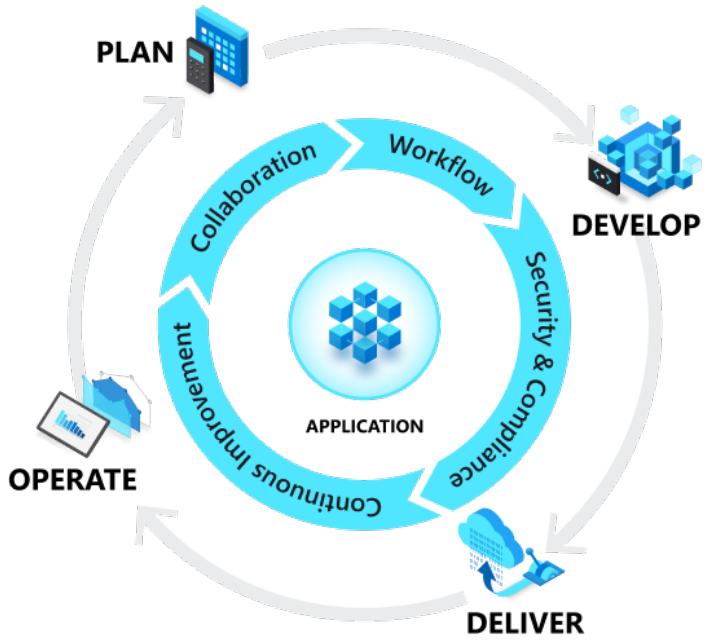
- Azure IoT Solutions
- DevOps
- Azure IoT Reference Architecture
- Infrastructure as Code (IaC)
  - IoT Hub
  - Monitoring
  - IoT Hub DPS
  - Message Routing
- Wrap Up

# DevOps

# DevOps

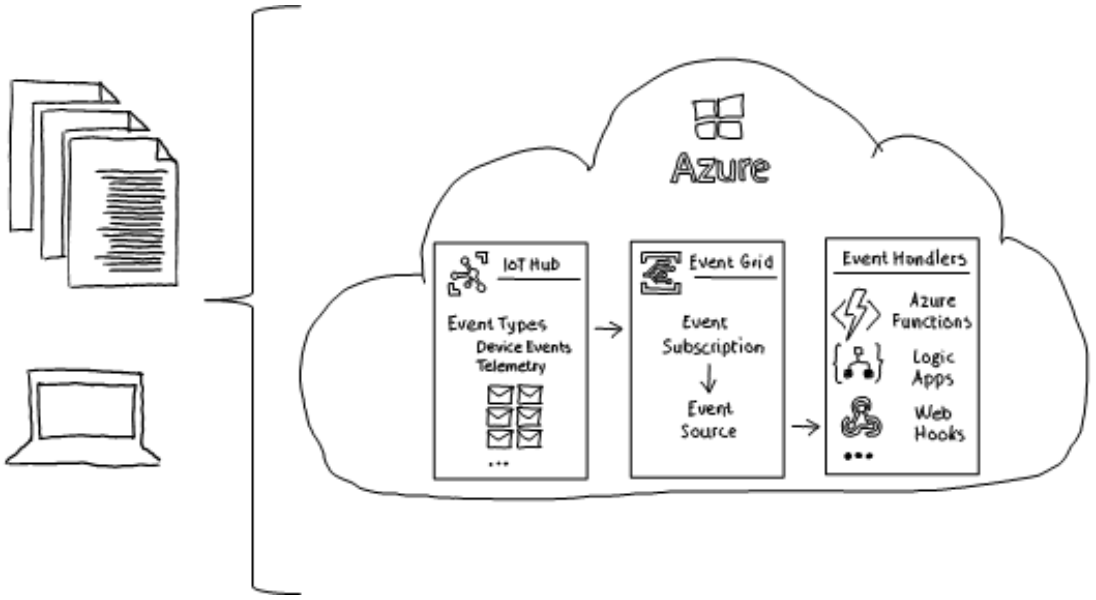
DevOps is the union of people, process, and products to enable continuous delivery of value to our end users.

- Donovan Brown



# Infrastructure as Code

- ARM
- Bicep
- Terraform
- Azure CLI
- PowerShell
- REST calls



# Infrastructure as Code (IaC)

# Types of Infrastructure as Code (IaC)

## ARM / Bicep

- Fully integrated with Azure and its features.
- Supports role-based access control, policies, tags, and locks.
- Supports exporting existing resources as templates.
- Bicep documentation | Microsoft Learn

## Terraform

- Declarative and modular approach.
- Supports state management and drift detection.
- Supports cross-cloud and hybrid scenarios.
- Terraform on Azure documentation | Microsoft Learn

## AZ CLI

- Easy to install and use.
- Supports multiple platforms and shells.
- Supports interactive mode and query filters.
- Azure Command-Line Interface (CLI) - Overview | Microsoft Learn

## PowerShell

- Familiar and powerful tool for Windows users.
- Supports multiple Azure services and features.
- Supports remote execution and automation.
- Get started with Azure PowerShell | Microsoft Learn

# Why use Infrastructure as Code (IaC)?

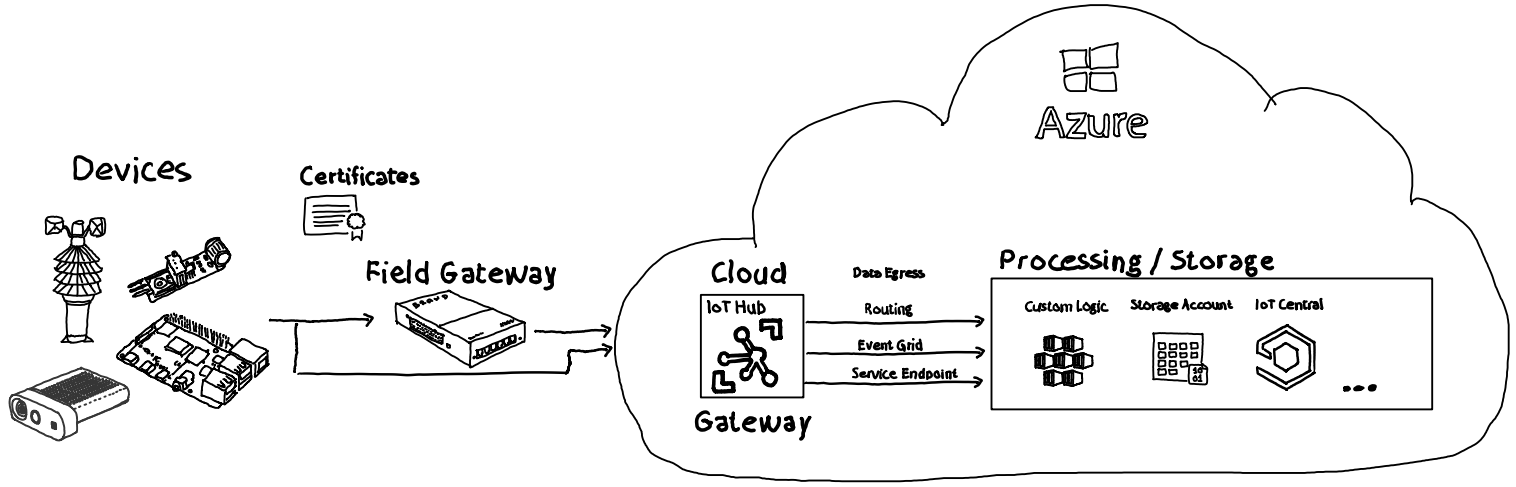
- Speed and simplicity
- Increased efficiency in software development
- Cost savings
- Configuration consistency
- Minimization of risk
- Infrastructure as Code - Cloud Adoption Framework | Microsoft Learn

# Azure IoT Solutions

# Azure IoT Apps

- Devices
- Ingestion & Provisioning
- Hot Path
- Warm Path
- Cold Path

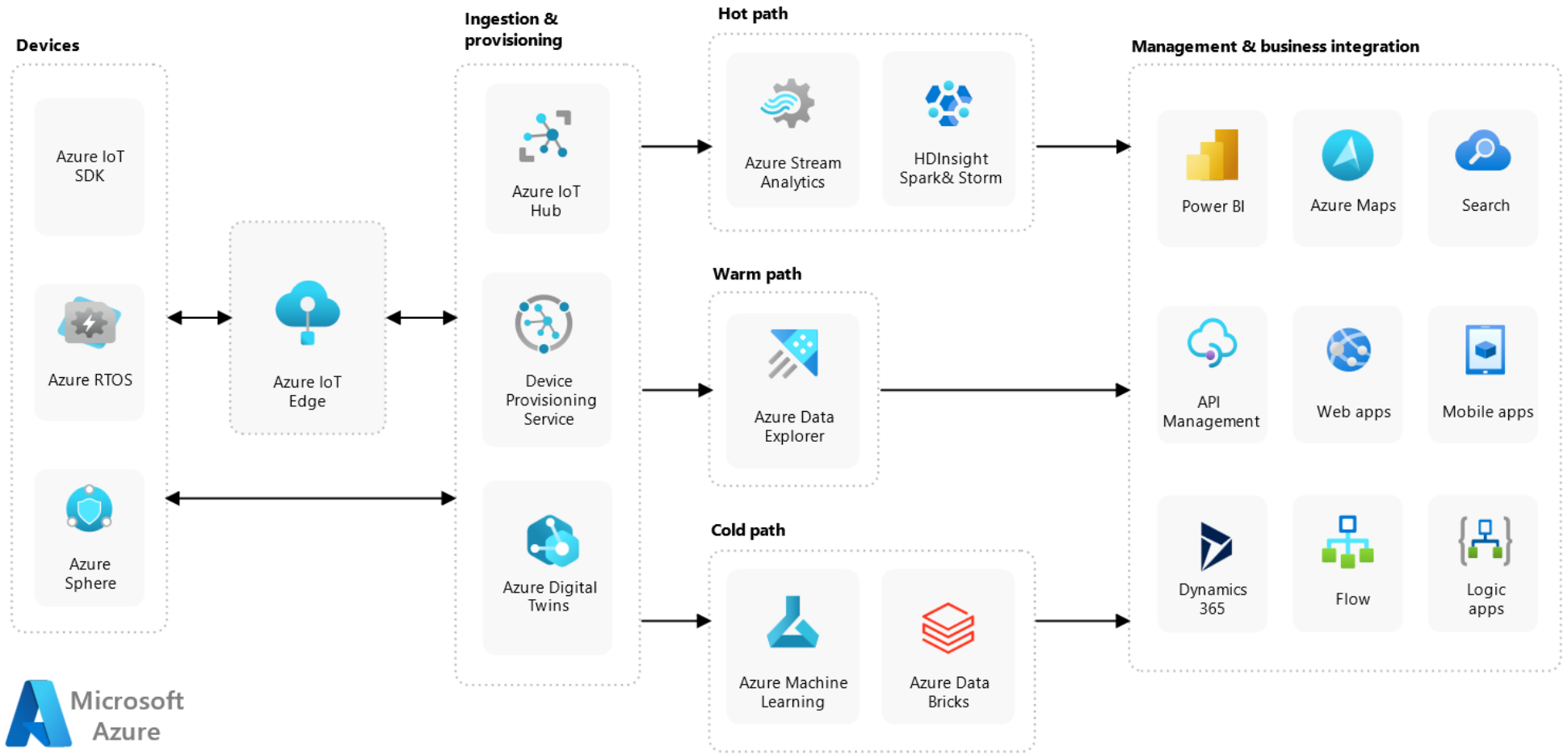
- Management & Business Integration
- Web Apps
- APIs
- Monitoring



# Azure IoT Sample Application

Building Solutions at Scale

# Sample Azure IoT Architecture

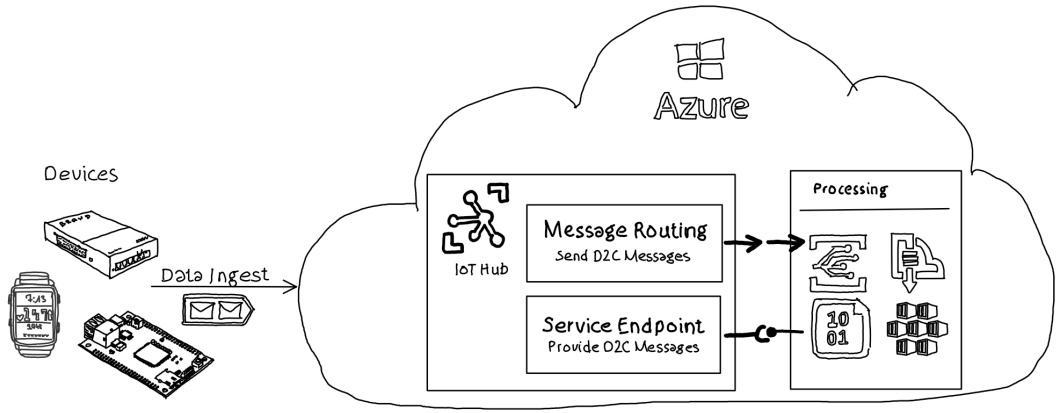


# IoT Hub

# IoT Hub

Azure IoT Hub is a fully managed service that helps enable reliable and secure bi-directional communications between millions of devices and a solution back end.

Azure IoT Hub Features: Identity and Authentication, Communication, Telemetry, Properties, Commands, Endpoints, Routing



# IoT Hub

## Networking

- Allowed DNS
- IP Filtering
- Network Rules
- Public Access
- Private Endpoints
- Outbound Networking

## Security

- Identity
- Certificates
- Authorization

## Scale and Configuration

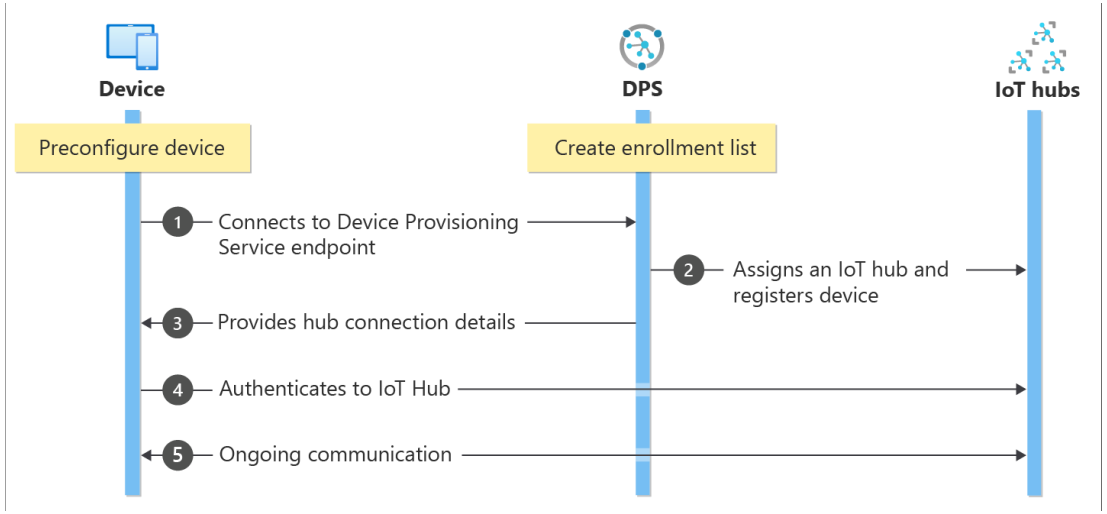
- Skus
- Consumer Groups
- Endpoints
- Message Counts
- Linked DPS
- Monitoring

## Resources

- Microsoft.Devices/IotHubs - Bicep, ARM template & Terraform AzAPI reference | Microsoft Learn
- Use Bicep to publish Azure IoT Hub, storage account, route messages | Microsoft Learn

# IoT Hub Device Provision Service (DPS)

The IoT Hub Device Provisioning Service (DPS) is a helper service for IoT Hub that enables zero-touch, just-in-time provisioning to the right IoT hub without requiring human intervention. DPS enables the provisioning of millions of devices in a secure and scalable manner.



# IoT Hub Device Provision Service (DPS)

## Security

- Identity
- Certificates
- Authorization
- Public Access
- Private Endpoints

## Scale and Configuration

- Skus
- Linked IoT Hubs
- Allocation Policy
- Data Residency

## Resources

- Microsoft.Devices/provisioningServices - Bicep, ARM template & Terraform AzAPI reference | Microsoft Learn
- Quickstart - Create an Azure IoT Hub Device Provisioning Service (DPS) using Bicep | Microsoft Learn

# Wrapping up

## DevOps

- We can apply DevOps practices to our IoT Solutions
- IoT Services are just other Azure PaaS Services

## Azure IoT Apps Developers

- We can build out the foundational pieces of our IoT Solutions in a repeatable, secure, scalable manner.