IoT Platform

the platform that scales

Stages in IoT Execution

Six Stages

1 IoT Devices

1. IoT Hardware
2. IoT Protocols
3. Device connection
4. Information Model

2 Data sensing

1. Device State
2. Telemetry data
3. Event streams
4. Reliable data

3 Infrastructure

1. Data transport
2. Data governance
3. Cloud systems
4. High availability

4 Data analytics

1. Data lake
2. Data warehouse
3. ETL pipelines
4. Machine learning

5 Data value

1. Analysis to Action
2. Intelligence
3. Services and APIs
4. Sharing and Using

6 Human value

1. Smart applications
2. Stakeholder value
3. Tangible benefits
4. Alerts and Advise

IoT Platform - Features

IoT platform is a unified, highly scalable solution which brings together services and emerging technologies in a coherent and in cost effective way to enable IoT transformation by eliminating technological bottlenecks, providing flexibility to your business to stay competitive and deliver value to your customers .

Device Registry

Register, Provision, Activate and monitor IoT devices with complete life cycle management.

Device Rollout

Device Rollout is a secure, scalable and robust software update system for IoT Devices.

Time Series

Proven time series service to store, query and aggregate millions of timeseries with infinite storage.

IoT Broker (MQTT)

MQTT broker is a highly scalable, fast service implements MQTT v5.0 for reliable data delivery.

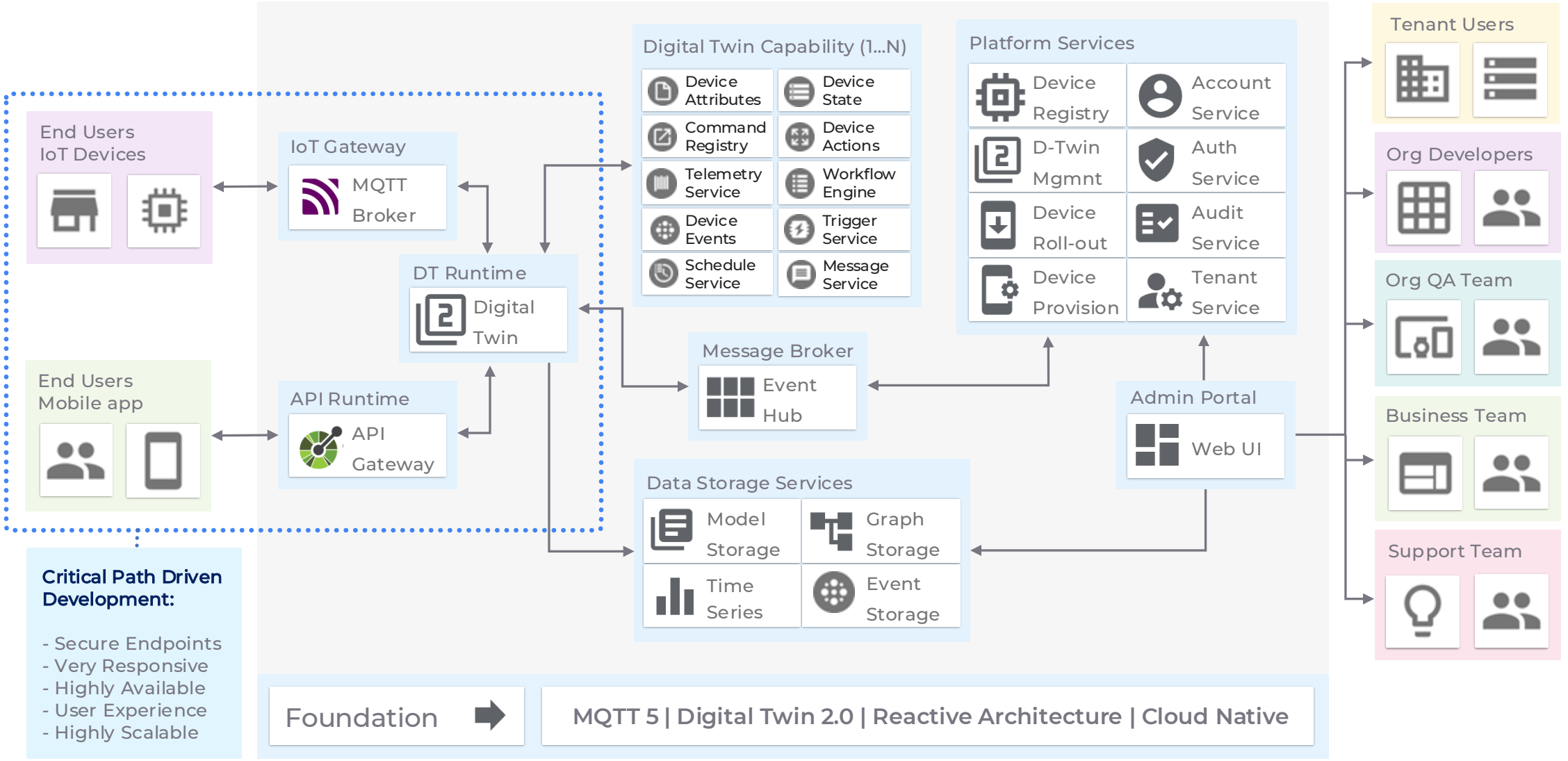
Digital Twin 2.0

Digital Twin is a next generation virtual device technology to manage millions of devices. Connect. Command. Control

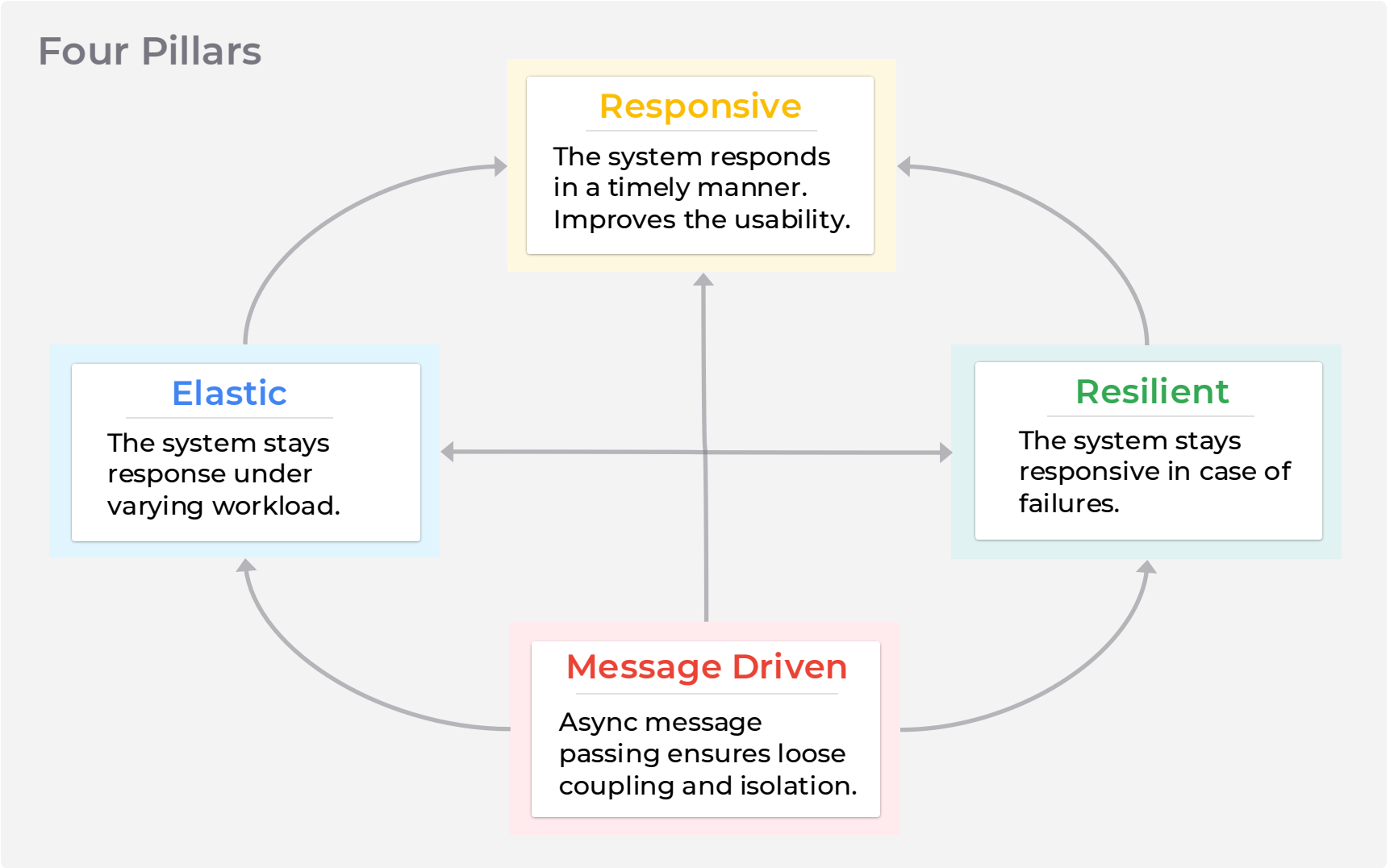
API Gateway

All the Device operations are exposed through highly secure API Gateway for Mobile Applications

IoT Platform - Architecture



Reactive Architecture



MQTT 5.0

Definition

MQTT is abbreviation for **Message Queuing Telemetry Transport** .

MQTT is a IoT Protocol, which is,

- Very lightweight
- Publish-Subscribe
- Ordered messaging
- Topic based

Reliable Data Transmission: 3 Quality of Services,

1. QoS 0: At most once (fire & forget)
2. QoS 1: At least once (ack delivery)
3. QoS 2: Exactly once (assured delivery)

Two Components:

1. MQTT Client on the Device
2. MQTT Broker on the Server side

Advantage of MQTT

MQTT Client:

- Low power consumption on Device
- Only One connection from Device
- Consumes less CPU on Device
- Enables Device to perform better
- Reliable ordered message delivery

MQTT Broker:

- Secure client connectivity
- Can easily scale to Millions of devices
- 20x faster & 50x less traffic than HTTP
- Manages all client connection states
- Takes care of security and certificates
- Reduced network bandwidth
- High performance data transfer
- Reason codes are defined
- Shared subscriptions for load
- Message expiry can be set
- Reliable ordered message delivery
- Request-Response model
- Decouples services from Devices

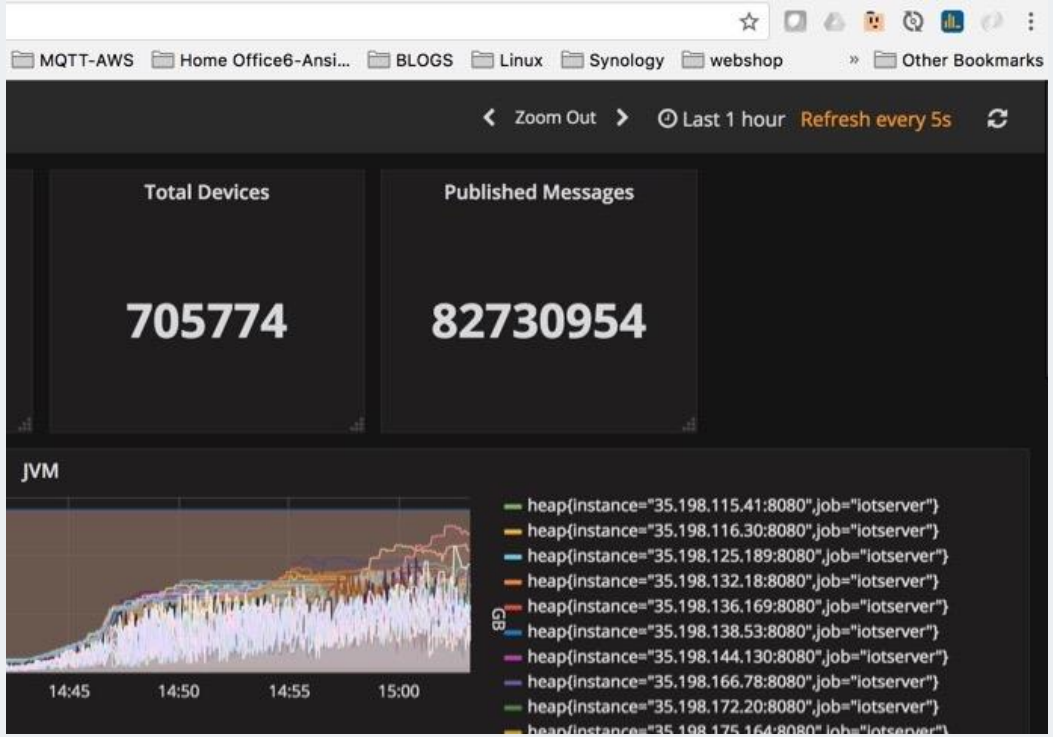
MQTT Broker in Sangam

Sneak Preview

MQTT Broker implements MQTT Specification 5.0

- Highly scalable broker
- Reliable Data Transmission
- Quality of Services,
  1. QoS 0: At most once (fire & forget)
  2. QoS 1: At least once (ack delivery)
  3. QoS 2: Exactly once (assured delivery)
- Received message will be available if acknowledged by the server
- 700K Individual MQTT Clients
- 82 Million messages in 15 minutes
- ~5.4 Million message per minute
- ~90K message per second

- Messages stored in TimeSeries Storage



Digital Twin 2.0

Definition

Digital Twin refers to a **digital representation** of a real-world physical IoT device.

Digital Twin acts as the **contact point** to access and work with different features and capabilities of the IoT device it represents.

Digital Twin can provide **holistic view** of all the capabilities, and it helps to orchestrate different aspects of the thing it represents.

With **Reliable connectivity**, **Unified Model** and **Extensible API**, the Digital Twin makes working with IoT Devices and assets very easy.

Value Creation

The **holistic view** of Digital Twin can bring four levels of understanding.

By combining these four levels, Digital Twins help business to move from **reaction to prediction** and then to **greater control**, therefore delivering tangible value to your customers.

Four levels of Understanding

1. DESCRIBE | WHAT-IS
2. HISTORICAL | WHAT-WAS
3. PREDICTION | WHAT-NEXT
4. PRESCRIBE | HOW-TO

Route to Holistic view

Key Components

1. Device Connection
2. Descriptive Models
3. Predictive Models
4. Common Modelling
5. Analytics services
6. Elastic & Fast Storage

Key Enablers

1. High Scalability
2. High Performance
3. Cost Effective

Digital Twin 2.0

Digital Twin Domain Capabilities

Attributes
These are static values that doesn't change often. Classified as Server, Device or Shared.

State
Defines the current state of this capability or the feature. This is modified via issuing Commands.

Command Registry
Define the list of Commands that this capability can accept, which results in a State updated Event.

Actions
Action is a operation that can be invoked on occurance of certain Event. Actions are configured.

Telemetry Service
Provides the capability to store and aggregate various Time Series measurement data.

Workflow Engine
Serverless workflows can be configured and triggered based on certain Event or Request.

Events
Define the model and type of Events that are expected to be created by this Capability

Trigger Service
Provides rule based configuration to invoke Actions based on certain conditions or Events.

Schedule Service
Provides scheduling time based tasks to notify or invoke a clean up Job periodically.

Message Service
Provides capability to Store and Forward messages\Notifications to the target device using Trigger.

Key Operational Features

1. Information Model
2. Common Semantics
3. Simulations
4. Lifecycle Management
5. Access Control
6. Schema Registry

Questions