Eclipse Ditto: an introduction

06/2021

Digital Twins

→ digital representation of real physical devices

→ act as broker for communicating with assets

→ applicable for both industrial and consumer-centric IoT scenarios

DT - our interpretation

→ a pattern for working with **things** in the IoT

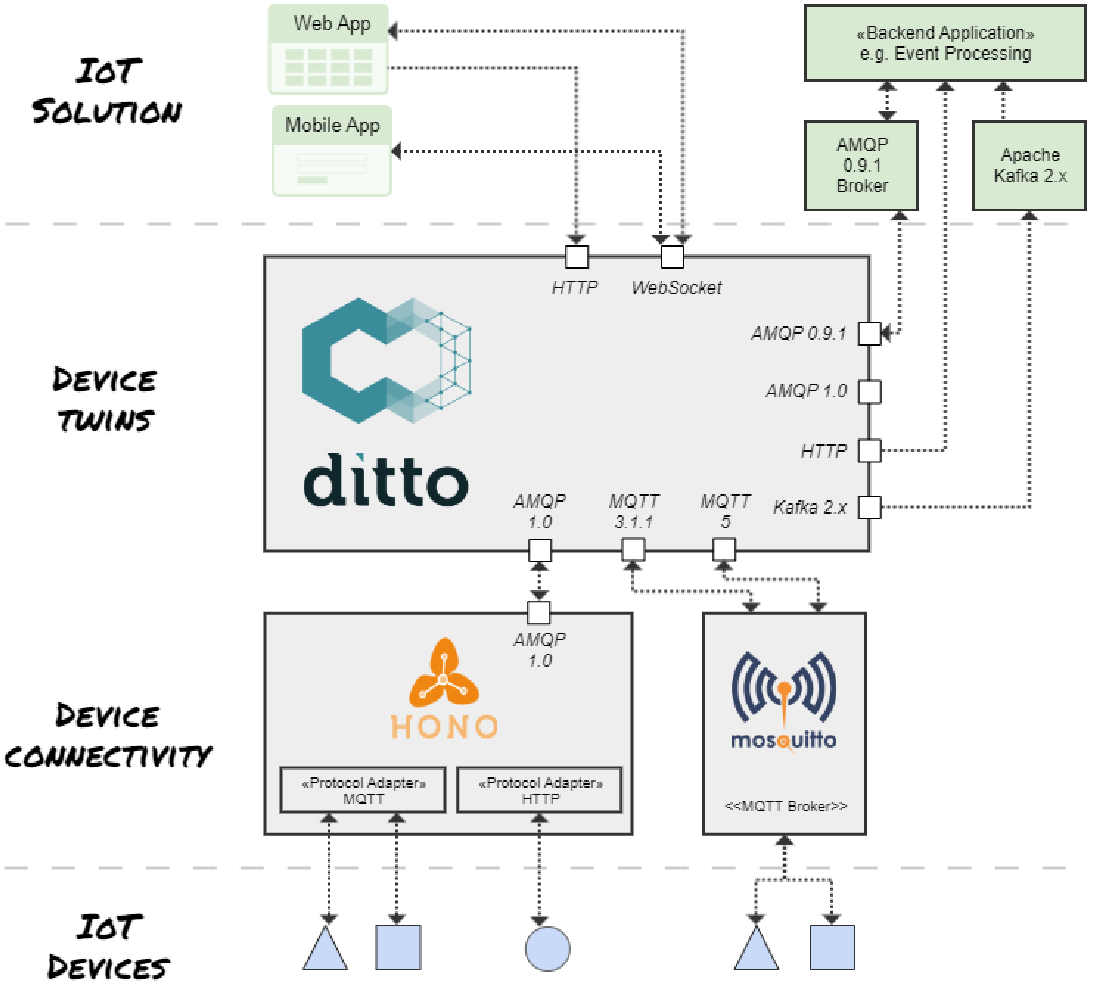
→ provide state **persistence** and **search** capabilities

→ access twins always in an **authorized** way

→ provide APIs - **Device as a Service**

→ **normalize** device payloads

Eclipse Ditto in context



Ditto as
Digital Twin
"middleware"

turn device data into APIs

```
{
  "thingId": "io.foo:car1",
  "policyId": "io.foo:car1",
  "attributes": {
    "manufacturer": "Foo corp",
    "productionData": {
      "serialNo": 4711
    }
  },
  "features": {
    "temperature": {
      "properties": {
        "value": 23.42
      }
    }
  }
}
```

JSON repr. of a Thing

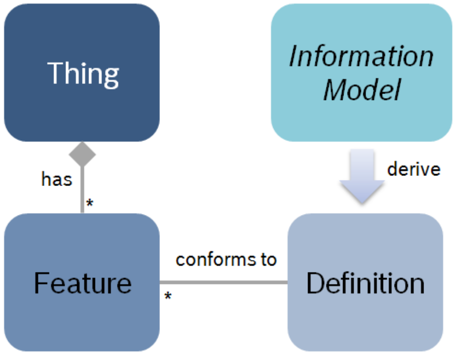
```
GET/PUT/DELETE /api/2/things/io.foo:car1
 /api/2/things/io.foo:car1/thingId
 /api/2/things/io.foo:car1/policyId
 /api/2/things/io.foo:car1/attributes
 /api/2/things/io.foo:car1/attributes/manufacturer
 /api/2/things/io.foo:car1/attributes/productionData
 /api/2/things/io.foo:car1/attributes/productionData/se


 /api/2/things/io.foo:car1/features
 /api/2/things/io.foo:car1/features/temperature
 /api/2/things/io.foo:car1/features/temperature/propert
 /api/2/things/io.foo:car1/features/temperature/propert
```

→ docs

modeling thing capabilities

→ by default, thing attributes and feature properties are "schemaless"

→ a feature may be aware of several "definitions" linking to a model



→ docs

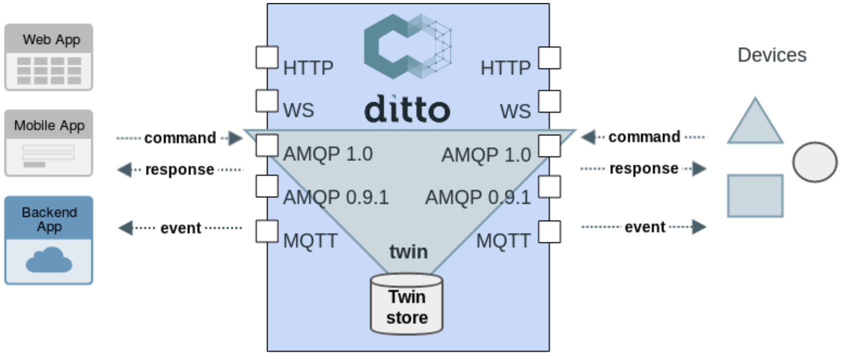
→ a thing may be aware of one "definition" listing which features/aspects it provides

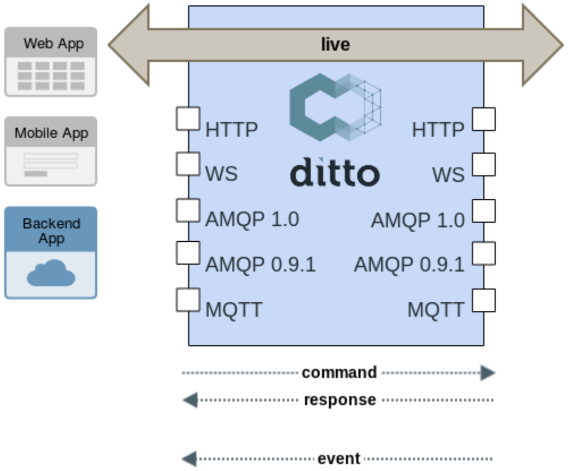
persistence of device state

→ devices are not always connected to the net

→ applications always need to be able to access their data

→ **twin** vs. **live** access on API level





authorization

→ docs

- → Ditto contains a built-in authorization mechanism (**Policies**)
- → every API call is authorized

search

→ you must not
→ Ditto has you covered

```
GET /api/2/search/things
  ?filter=like(attributes/manufacturer,"Foo*")
```

```
GET /api/2/search/things
  ?filter=and(
    exists(attributes/manufacturer),
    gt(features/temperature/properties/value,23.0)
  )
  &namespaces=io.foo
  &option=sort(-_modified,-attributes/manufacturer)
  &fields=thingId,attributes/manufacturer,_modified
```

→ search for arbitrary data with RQL query
→ Ditto again ensures authorization
→ apply field projection over the results
→ don't worry about indexing

→ docs

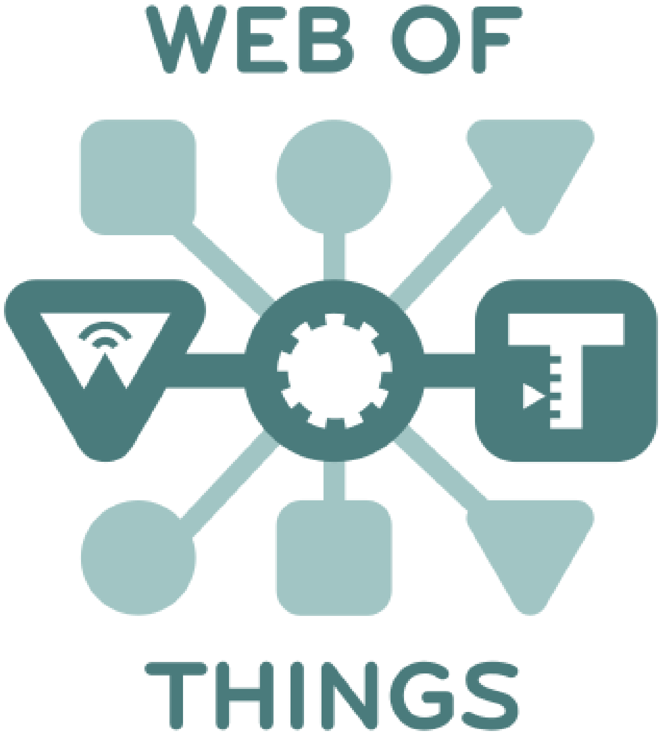
get notified about changes

→ notification via various channels: WebSocket, SSE, MQTT (3.1.1 | 5), AMQP (0.9.1 | 1.0), Apache Kafka, HTTP hook

→ server side filtering via RQL (same as in search)

→ docs

Eclipse Ditto +



could benefit from each other

- → Eclipse Ditto bringing scalable "cloud-ready" digital twin framework to the table
- → Ditto currently lacks modeling things
- → WoT "Thing Models" could be a good fit for feature "definitions"
- → later: WoT TD facade in Ditto?

Wrap up

→ Digital Twins as pattern for simplifying IoT solution development

→ Mission: provide Device-as-a-Service

→ Eclipse Ditto as OpenSource framework for Digital Twins

Links:

→ Ditto website and documentation

→ GitHub - please give us a star ;)

→ Chatroom to ask more questions

→ Commercial offering incl. free plan