

Internet of Things

REST APIs & MQTT

APIs

- Application Programming Interface (API)
- A set of defined rules that explain how computers or applications communicate with one another.

<https://www.ibm.com/cloud/learn/api>

- A set of definitions and protocols for building and integrating application software.

<https://www.redhat.com/en/topics/api/what-is-a-rest-api>

APIs

- Users don't have to know the implementation details of an API.
- They use it as an interface in order to receive information and use services.
- It can be viewed as a contract between two applications.

APIs

- Public APIs

<https://github.com/public-apis/public-apis>

REST

- Representational State Transfer (REST)
- It is not a protocol or a standard
- Is a software architectural style
- Defines a set of architectural constraints

REST

- Architectural constraints
 - Client-server architecture
 - Stateless
 - Cacheable
 - Layered system
 - Code on demand (optional)
 - Uniform interface

An API that conforms to the constraints of the REST architectural style is often described as RESTful.

Source: <https://www.redhat.com/en/blog/rest-architecture>

OpenAPI Specification

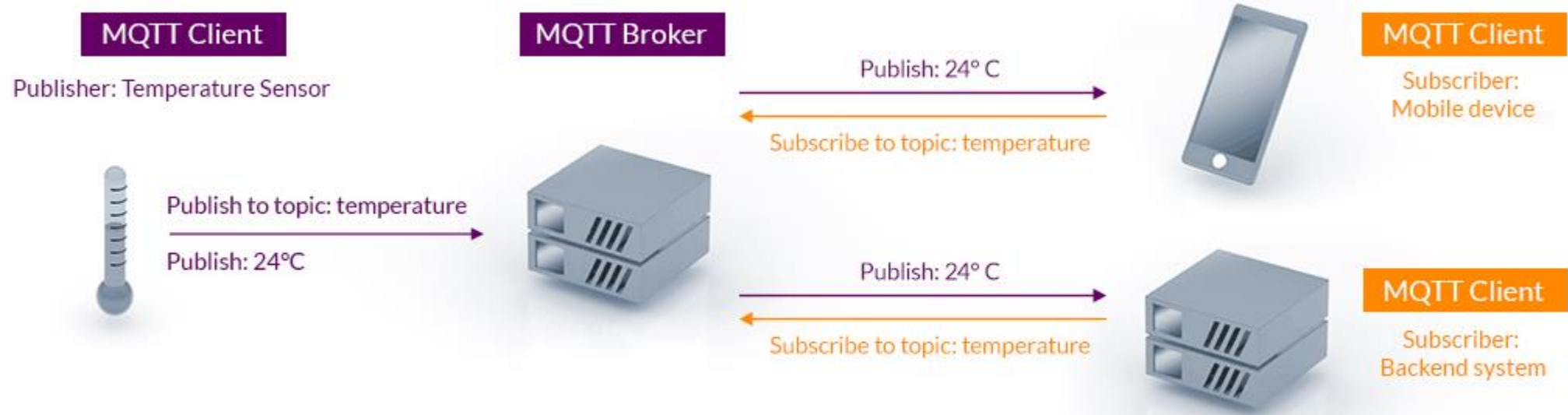
- Defines a standard, language-agnostic interface to RESTful APIs.
- Allows both humans and computers to discover and understand the capabilities of the service without access to source code, documentation, or through network traffic inspection.
- A consumer can understand and interact with the remote service with a minimal amount of implementation logic.

MQTT

- MQTT is an OASIS standard messaging protocol for the Internet of Things (IoT).
- Designed for constrained devices and low-bandwidth.
- Typically runs over TCP/IP.
- Publish-subscribe pattern

Source: <https://mqtt.org/>

MQTT



Source: <https://mqtt.org/>

MQTT Topics

- Messages in MQTT are published on topics.
- There is no need to configure a topic, publishing on it is enough.
- Topics are treated as a hierarchy, using a slash (/) as a separator.

Examples:

sensor/1/env/temperature

sensor/1/env/humidity

sensor/2/location

MQTT Subscription Wildcards

- “+” can be used as a wildcard for a single level of hierarchy.

sensor/+/env/temperature

sensor/+/env/+

- “#” can be used as a wildcard for all remaining levels of hierarchy.

sensor/1/#

MQTT Brokers

- Publicly available MQTT brokers:
 - test.mosquitto.org:1883
 - broker.hivemq.com:1883
 - broker.emqx.io:1883

Note: No authentication and encryption is provided!

MQTT Brokers

- Instructions on how to deploy an instance of the Eclipse Mosquitto MQTT broker can be found at:
<https://mosquitto.org/download/>
https://hub.docker.com/_/eclipse-mosquitto

MQTT Clients

- A list of MQTT client libraries for various programming languages can be found at:

<https://www.eclipse.org/paho/index.php?page=downloads.php>