MQTT Tutorial

What is MQTT?

MQTT (Message Queuing Telemetry Transport) is a lightweight messaging protocol designed based on the publish/subscribe pattern. Initially developed by IBM, it has become one of the standard protocols in the Internet of Things (IoT) field.

Main Features

Advantages

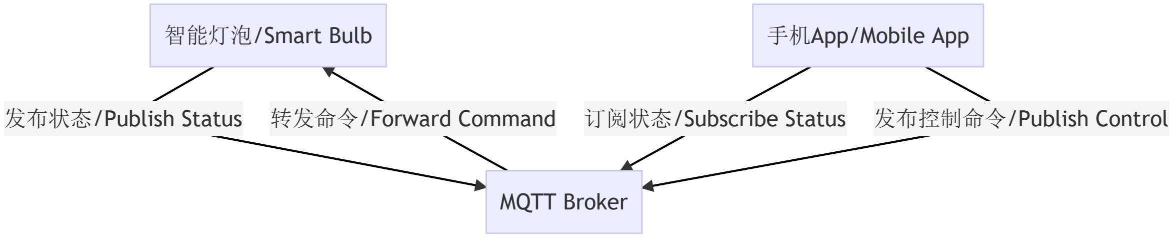
1. **Lightweight**
    - Simple protocol, low resource consumption
    - Suitable for bandwidth-constrained networks
    - Supports low-power devices
2. **Reliability**
    - Provides three Quality of Service (QoS) levels
    - Supports connection recovery
    - Persistent sessions
3. **Flexibility**
    - Supports multiple communication patterns
    - Flexible topic configuration
    - Supports one-to-many communication

Disadvantages

1. **Functional Limitations**
    - Not suitable for large file transfers
    - No built-in security mechanisms
    - Requires additional Broker server
2. **Dependencies**
    - Depends on centralized Broker
    - Single point of failure risk

Typical Use Cases

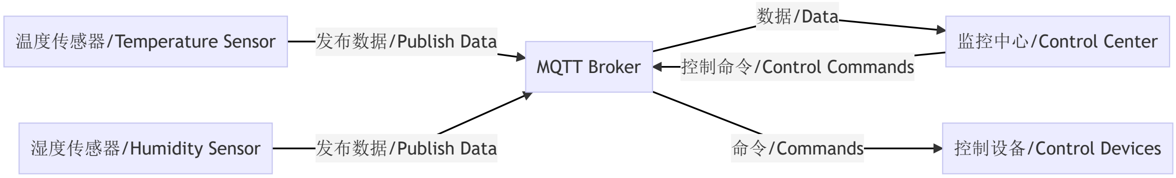
1. Smart Home


智能灯泡/Smart Bulb
手机App/Mobile App
发布状态/Publish Status
转发命令/Forward Command
订阅状态/Subscribe Status
发布控制命令/Publish Control
MQTT Broker

Example Topics:

- home/livingroom/light/status
- home/livingroom/light/control

2. Industrial Monitoring

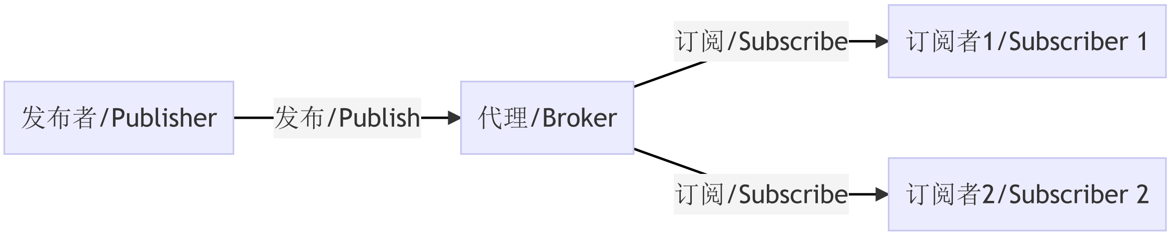

温度传感器/Temperature Sensor
发布数据/Publish Data
湿度传感器/Humidity Sensor
发布数据/Publish Data
MQTT Broker
数据/Data
控制命令/Control Commands
命令/Commands
监控中心/Control Center
控制设备/Control Devices

3. Connected Vehicles

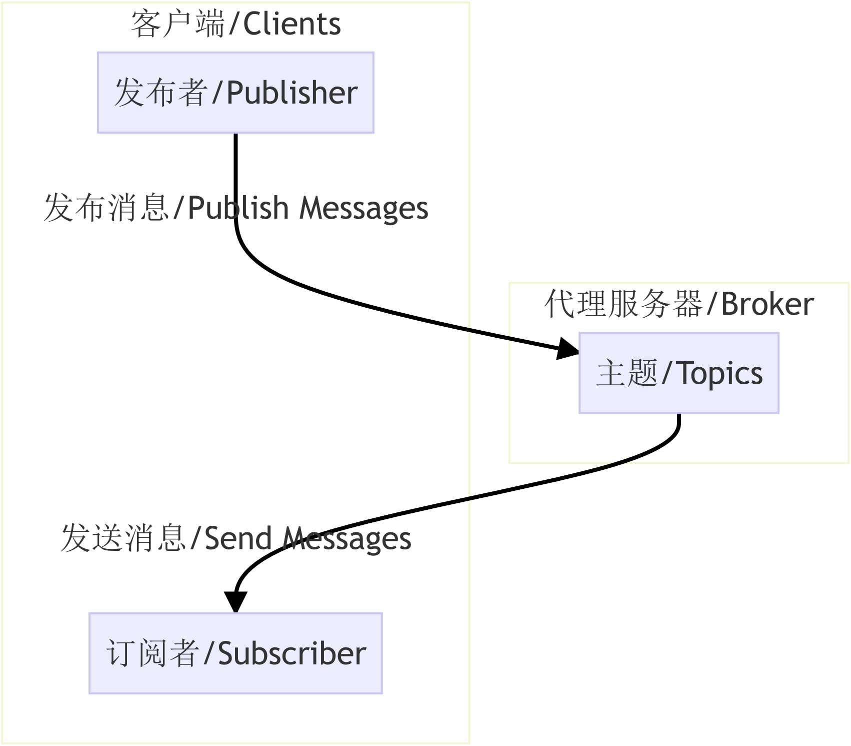
- Vehicle location tracking
- Remote diagnostics
- Real-time status monitoring

Basic Concepts

Publish-Subscribe Pattern

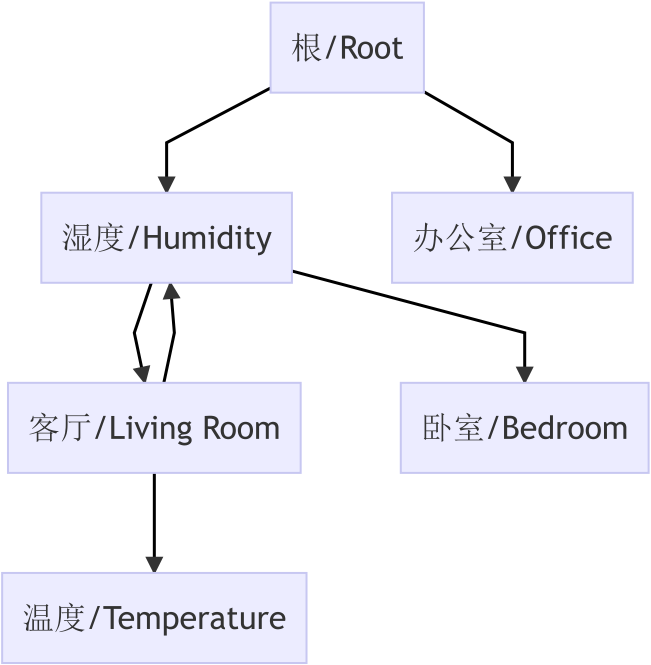

发布者/Publisher
发布/Publish
代理/Broker
订阅/Subscribe
订阅/Subscribe
订阅者1/Subscriber 1
订阅者2/Subscriber 2

MQTT Components


客户端/Clients
发布者/Publisher
发布消息/Publish Messages
代理服务器/Broker
主题/Topics
发送消息/Send Messages
订阅者/Subscriber

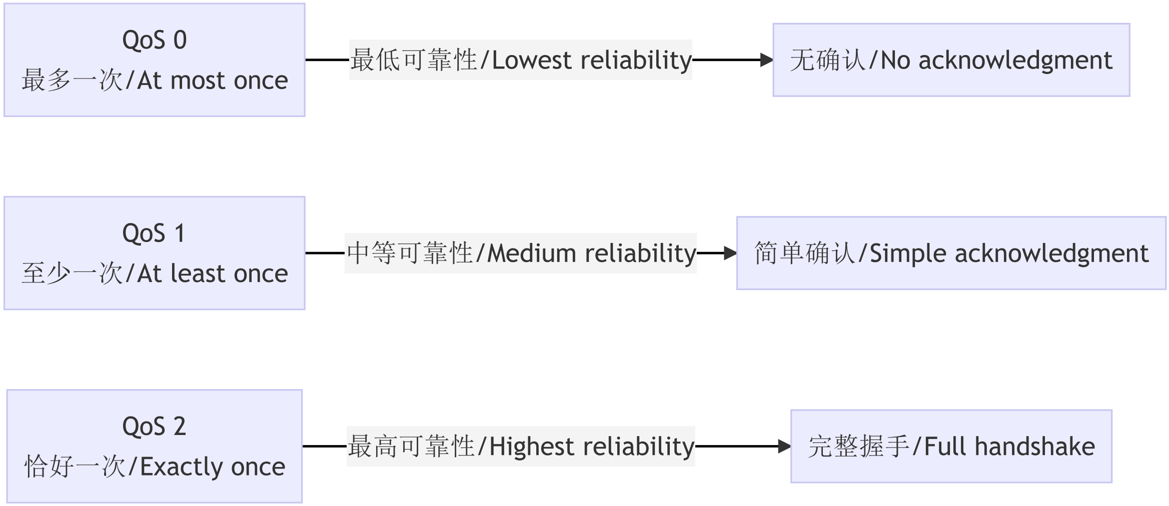
MQTT Topics

Topics are organized in a hierarchical structure, with slashes (/) separating each level.

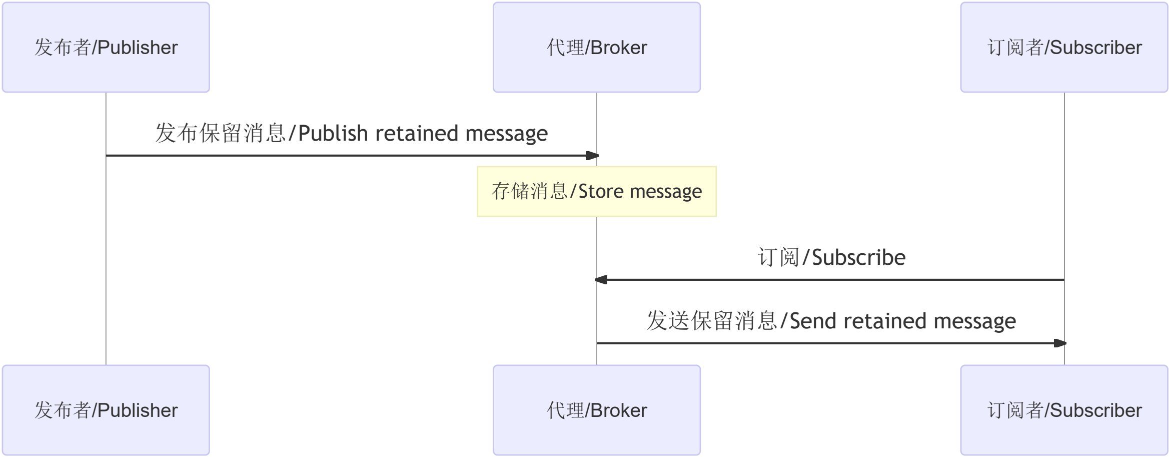

根/Root
湿度/Humidity
办公室/Office
客厅/Living Room
卧室/Bedroom
温度/Temperature

QoS Levels

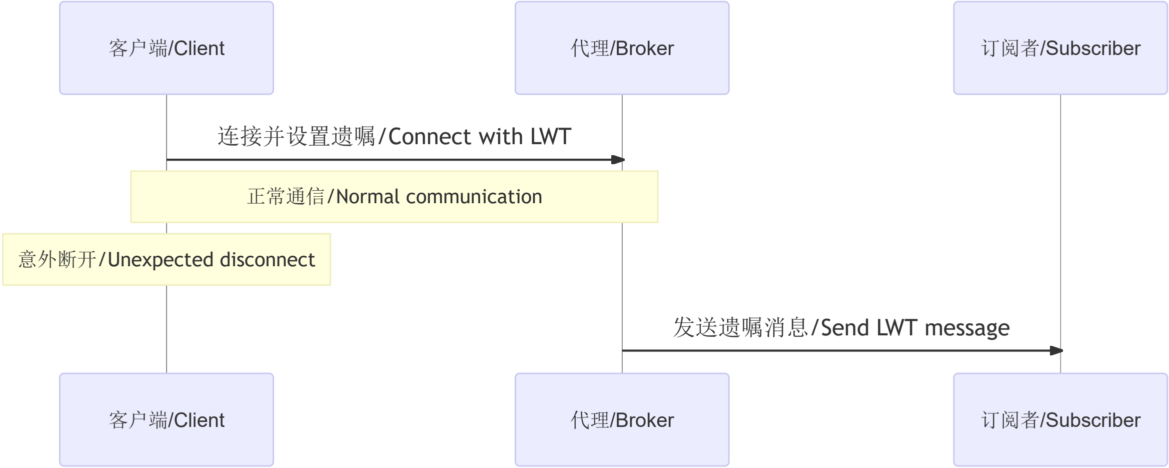
MQTT provides three quality of service levels:


QoS 0
最多一次/At most once
最低可靠性/Lowest reliability
无确认/No acknowledgment
QoS 1
至少一次/At least once
中等可靠性/Medium reliability
简单确认/Simple acknowledgment
QoS 2
恰好一次/Exactly once
最高可靠性/Highest reliability
完整握手/Full handshake

Retained Messages


发布者/Publisher
代理/Broker
订阅者/Subscriber
发布保留消息/Publish retained message
存储消息/Store message
订阅/Subscribe
发送保留消息/Send retained message
发布者/Publisher
代理/Broker
订阅者/Subscriber

Last Will and Testament


客户端/Client
代理/Broker
订阅者/Subscriber
连接并设置遗嘱/Connect with LWT
正常通信/Normal communication
意外断开/Unexpected disconnect
发送遗嘱消息/Send LWT message
客户端/Client
代理/Broker
订阅者/Subscriber

Code Examples

> For code examples, please refer to the Yabo Smart K230 tutorial MQTT-Publisher and MQTT-Subscriber sections