3STechLabs
Technology Redefined

DigitalCounter

Preliminary Report V1

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Overview

This preliminary report aims at defining an architecture for the DigitalCounter for Control and Automation Projects. The goals of this report are mentioned below

Goals

1. Less number of components
2. Easy-integrations

Specifications

The system is divided into 4 different layers which should communicate with each other in real time.

Layers

- Hardware - SingleBoardComputer
- Processing Layer - Server {Ubuntu Server 18.04(recommended)}
- Transport Layer - MQTT(communication protocol) and REST API
- Network Layer - WiFi

Components Required

The list below is a suggested list of components for the 1st prototype

- Raspberry Pi 4(or 3B+)
    - https://www.amazon.com/CanaKit-Raspberry-Pi-Extreme-Kit/dp/B08NZ4JK26/ref=sr_1_4?dchild=1&keywords=raspberry+pi+4&qid=1612251118&sr=8-4
- RFID Reader
    - https://www.amazon.com/SunFounder-Mifare-Reader-Arduino-Raspberry/dp/B07KGBJ9VG/ref=sr_1_3?dchild=1&keywords=rfid+reader+arduino&qid=1612780346&sr=8-3
- RFID Sticker/Tags 13.56 MHz
    - https://www.amazon.com/13-56MHZ-ISO15693-RFID-Sticker-15X30mm/dp/B07HLLF8BZ/ref=sr_1_5?dchild=1&keywords=13.56MHz+rfid+sticker&qid=1612780434&sr=8-5
- Arduino Nano

Architecture

The complete product has

- Sensor Node
- Gateway

A complete System is referred to as a Product in this report.

The sensor Node Consists of an Arduino Nano while the gateway is a Raspberry Pi to which Arduino Nano is connected via USB cable.

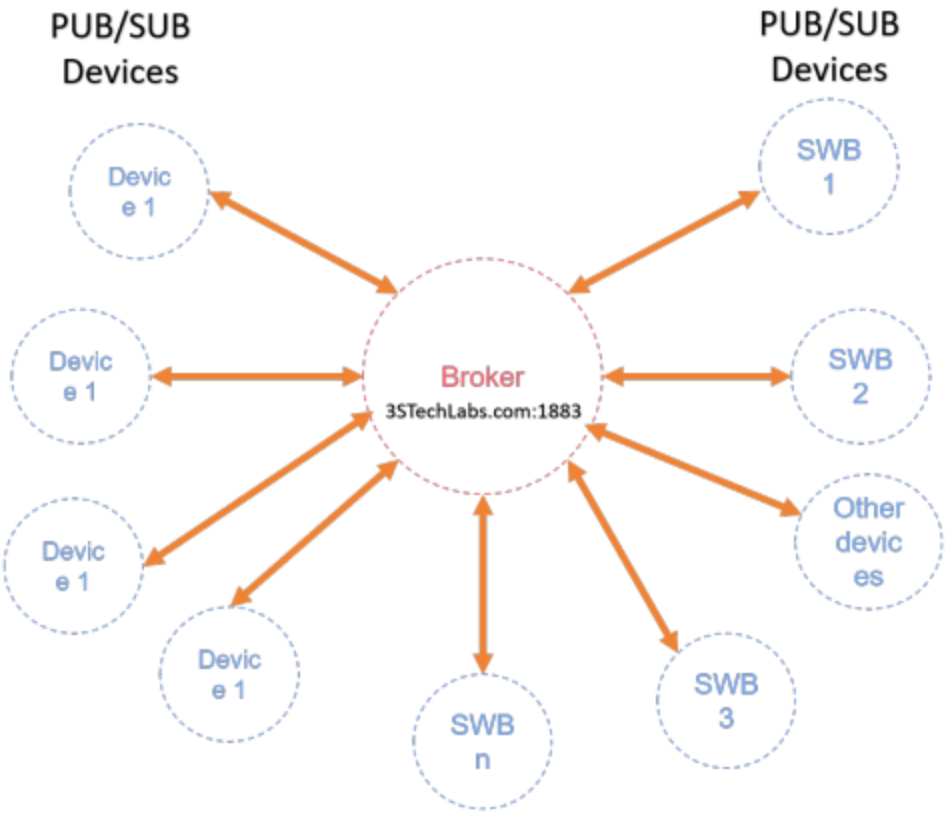
Software Architecture

- User Scans the RFID card. The RFID reader is attached to the Raspberry Pi.
- The scanned user ID is sent to the Backend which is present on the remote server. This will act as an active ID.
- Arduino Nano will be connected to the Raspberry Pi via USB cable and will sense the pulses and send the data to the Raspberry Pi via Serial Communication.
- Raspberry Pi will save the data, format it and send it to MQTT Broker.
- The Dashboard will be connected to the same MQTT Broker and will get the incoming data and store it on the ledger.

Milestones Breakdown

- Arduino Nano Firmware
- Raspberry Pi Python based firmware
- Backend, Dashboard and Database on remote server.

What is MQTT?



Take an example of a system in which there are hundreds of people having smart bands that can display information of a person's surroundings. And then there are Android, iOS and Windows devices that can be used to monitor smart bands to get a defined set of parameters for bands.

So in a scenario where there are mixed types of devices including hardware platforms, the best communication protocol is MQTT.

It can handle two-way and parallel communication and the number of devices that can be connected and communicate via MQTT are limitless, the only limit is server resources. MQTT is also known as pub/sub protocol.

Hence the protocol of choice here is MQTT.