Visualising MQTT data using golang, InfluxDB and Grafana

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ESP8266 —MQTT publish→ **MQTT** mosquitto —MQTT subscribe→ **mqti** —InfluxDB write→ **InfluxDB** ←InfluxDB read— **Grafana**

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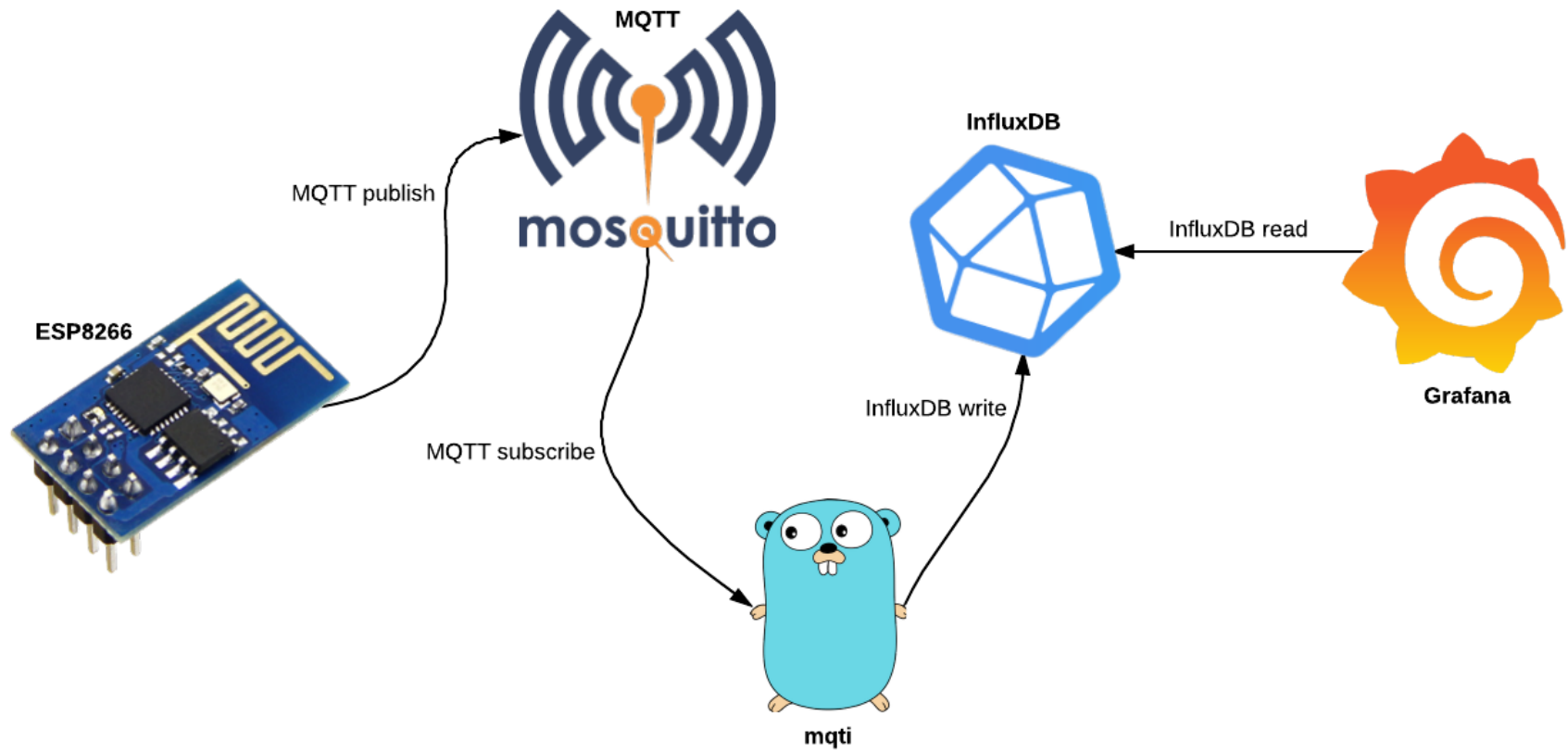
MQTT, officially

> MQTT (MQ Telemetry Transport) is an ISO standard publish-subscribe-based "lightweight" messaging protocol for use on top of the TCP/IP protocol. It is designed for connections with remote locations where a "small code footprint" is required or the network bandwidth is limited.

en.wikipedia.org/wiki/MQTT

MQTT, in practice

- Pub/sub messaging protocol

- Very basic protocol, consisting of `Connect`, `Disconnect`, `Subscribe`, `UnSubscribe` and `Publish`

- Perfect for resource limited devices such as Raspberry Pi, Arduino

- Many implementations, mosquitto is fantastic

- Client libraries for Go, Ruby, Python, Java

- Latest specification is v3.1.1

Mosquitto

- Open source, MQTT broker implementation

- Supports v3.1.x

- Written in C

- TLS, username/password support

- ACL restriction for topics
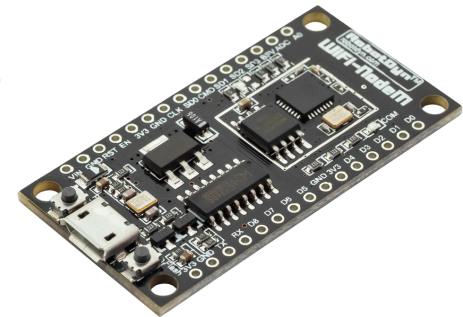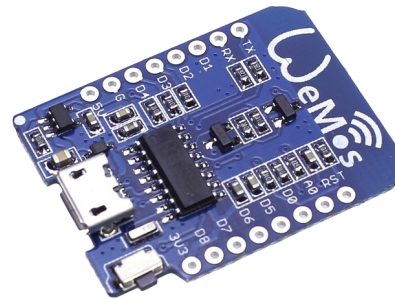
- Docker image available 😍

ESP8266

- Arduino compatible board

- Can also use Lua for some boards

- WIFI, deep sleep, interrupts, digital/analog IO

- Lots of variants with USB->serial included, more IO pins etc

- Easily publish MQTT messages with MQTT library

- Very cheap, ~$3AUD 😱 - checkout AliExpress 😉
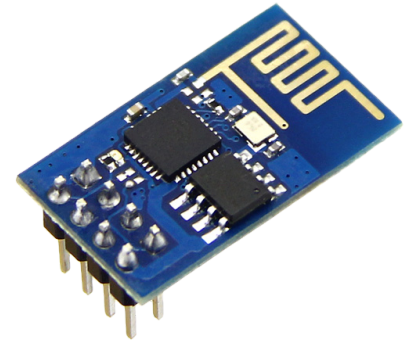
ESP8266 - more variants

InfluxDB

- Open source, time series database

- Written in Go

- High throughput (claims of millions of data points per second)

- Continuous Queries (CQ) and Retention Policies (RP)

- SQL-like query syntax

- Flexible 'structure'

- Client libraries for Go, Ruby, Python, Java

- Docker image available 😍

What is a time series database ?

A database that is optimised for time centric data, often including easy data retention and downsampling.

- The original; RRDtool (used by Nagios/Icinga, collectd, MRTG)

- Other notables:

  - Graphite (whisper)
  - OpenTSDB
  - Prometheus

mqti

MQTT subscriber that pumps data into InfluxDB.
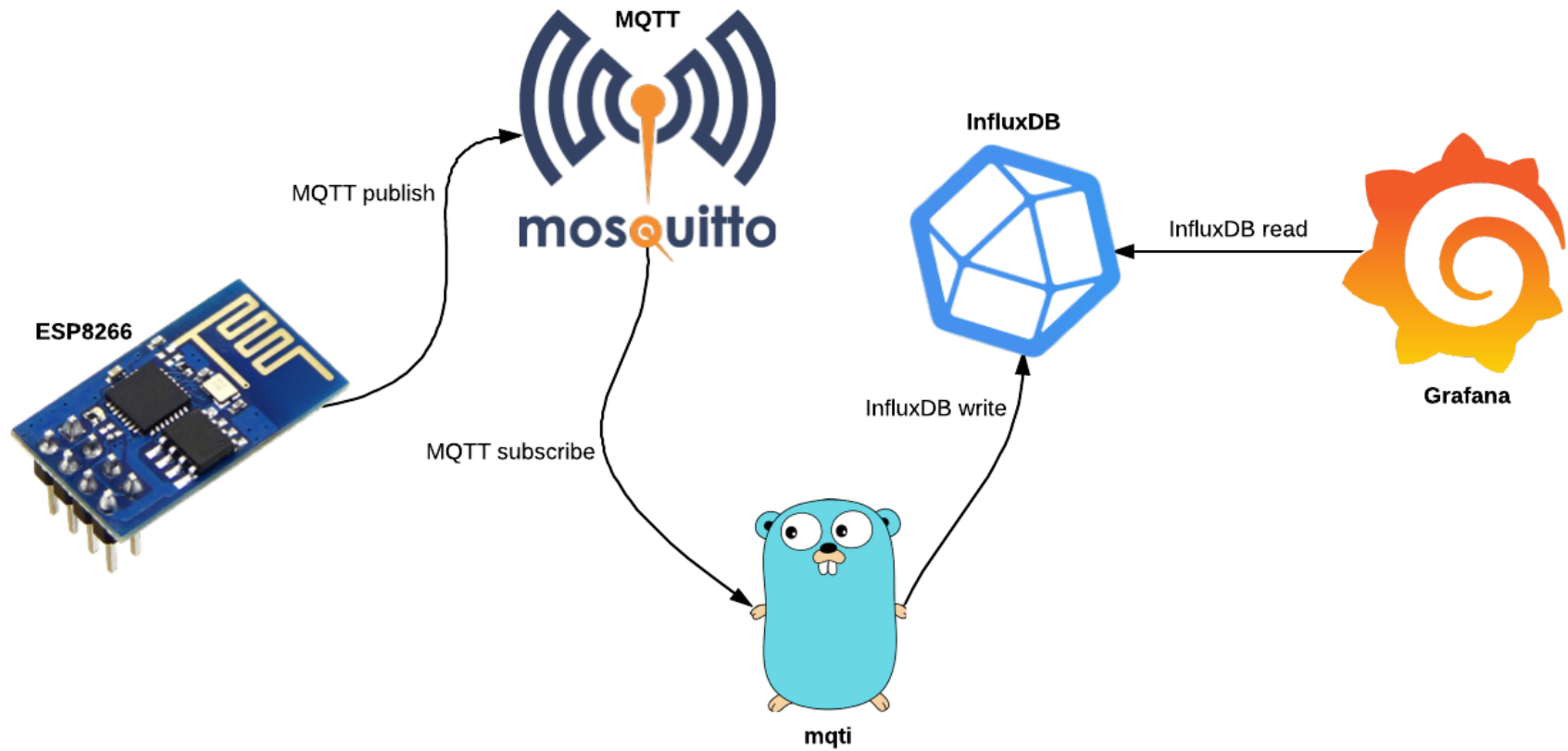
github.com/ashmckenzie/go-mqti

mqti features

- Written in Go

- MQTT v3.1.1 supported, TLS, username/password

- InfluxDB with TLS, username/password

- Consume MQTT messages and inspect (`watch`) or `forward`

- Filter MQTT messages with AND + OR expressions

- Write MQTT messages into InfluxDB including:
    - Adding tags based on MQTT fields (when payload is JSON)
    - Geohash support (e.g. messages generated by Owntracks)

- Docker image available 😍

Grafana

- Open source, time series analytics interface
- Beautiful UI, tonnes of options
- Supports InfluxDB, Graphite, Elastisearch, MySQL, OpenTSDB, Prometheus and CloudWatch
- Includes primitive alerting capabilites
- Plugin system with 75+ available currently
- Docker image available 😍

MQTT

MQTT publish

mosquitto

ESP8266

InfluxDB

InfluxDB read

Grafana

MQTT subscribe

InfluxDB write

mqti

Demo time 🙏

github.com/ashmckenzie/golang-melbourne-july-2017