# Range Therapy developer manual

A diagram of a cloud

Description automatically generated

## PC config

Install VSCode from <https://code.visualstudio.com/download>

Add the extensions C/C++, C/C++ Extension Pack and PlatformIO IDE

Install Git and Git Desktop (optional)

Install python 3

Clone repository from Github (currently at <https://github.com/EncludeLtd/Battery-Emulator>)

## Useful tools

**MQTTX** client to monitor mqtt messages

Use the topic rangetherapy/sensor/# for all messages

Or

rangetherapy/sensor/+/info for general battery status

rangetherapy/sensor/+/events for events

rangetherapy/sensor/+/spec\_data

The + stands for all clients, this may be replaced by the client id, in the development board this is battery-emulator\_esp32-CFF924

**pgAmin4** for database admin

## EMQX platform

Login using <https://accounts.emqx.com/signin>

One deployment at j2ee4cd2.ala.dedicated.aws.emqxcloud.com port 1883 accepts all events pushed from the emulator(s)

Three rules are active

<https://cloud-intl.emqx.com/console/deployments/j2ee4cd2/integrations/all/rule_details?id=rule-cf48a111> matches the /info messages

<https://cloud-intl.emqx.com/console/deployments/j2ee4cd2/integrations/all/rule_details?id=rule-a586ed09> matches the /spec\_data messages

<https://cloud-intl.emqx.com/console/deployments/j2ee4cd2/integrations/all/rule_details?id=rule-111e1931> matches the /events messages

each rule has one action that takes the matching message, adds a timestamp, decodes the payload and sends the raw payload and the decoded fields to a Postgres database running on AWS

A virtual private cloud has been created to encapsulate the EMQX deployment, the Postgres database and the Grafana display package.

## AWS Platform

This hosts the database and the Grafana display package

The database is at database-mqtt.cxmymmyeyegb.eu-west-1.rds.amazonaws.com

Grafana is at <https://g-56ac810d1e.grafana-workspace.eu-west-1.amazonaws.com/dashboards>

There are two dashboards – Range Therapy dashboard that shows battery voltages and events from the emulators and an Admin dashboard that allows a battery locations table to be updated to show user friendly locations on the main dashboard.

Login to EC2 is restricted to specified IP addresses – document how to add an address

To provide an SSH client for database admin, there is an instance of Amazon Lunix running in EC2, also within the VPC

## Compiling the software

In usersettings.cpp, set the username and password for the mqtt user

const char\* mqtt\_user = "RangeTherapy";

const char\* mqtt\_password = look in lastpass

also set the battery used and remove Test\_fake\_battery

Build using the Build option in the Platform.io extension (alien icon)

A screenshot of a computer

Description automatically generated

Send to the board using the Upload option.

When the board is connected to the USB port, Monitor allows you to see the debug messages

Once the board is running, connect to the Battery Emulator wifi, go to 192.168.4.1 and set the SSID and password for the host network.

Data should immediately start flowing to emqx

## Costs

The EMQX broker is on their Dedicated Plan, because this supports unencrypted http messages from the battery emulators.

This costs $0.36 per hour (about $260 per month) and allows for 1,000 simultaneous sessions and 1,000 transactions per second.

AWS services are currently on the free tier which lasts for 12 months all prices after that are estimates.

Except for Grafana which is on a 90 day free trial which started in the first week of September

EC2 to host the virtual PC for pgAdmin $2.12 per month

RDS for PostGres on db.t4g.micro instance $12.41 per month

AWS managed Grafana is charged per active user per month

An “Active user” is any user that has logged in to an Amazon Managed Grafana workspace or made an API request at least once during a monthly billing cycle.

Admin and Editor users cost $9 each per month.

Viewers cost $5 per month

Currently two admins, so $18 per month

Total estimate for AWS services is $32.53 per month