Final Workshop

TC1004B.531

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Flooding in Mexico

Date: April 28th, 2021

Location: In 5 mayors' offices in Mexico City.

Main problems:

In Álvaro Obregón municipality there were power outages.

In Benito Juarez there was a lack of electricity supply and downed trees and light poles.

In Coyoacán, Miguel Hidalgo and Cuauhtémoc strong winds and lack of power supply.

Flooding in Brazil

Date: February 17th, 2021

Location: Brazilian city of Petrópolis, in the state of Rio de Janeiro

Main problems:

Streets and houses totally destroyed

Electrical system destroyed

Dozens of people missing

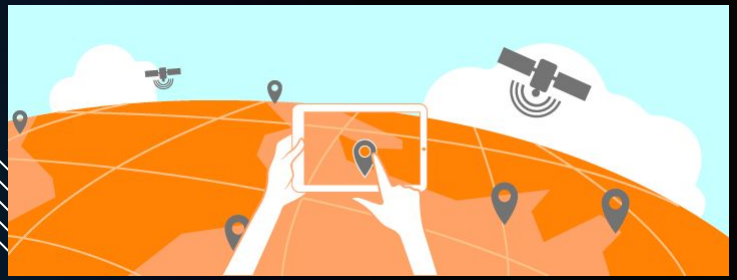
More than 100 dead

Why this project is important?

Effective communication in a natural disaster such as floods can make the difference in preventing accidents, saving property, locations and people.

Advantages:

- Quick communication for any need
- Geolocation services.
- Finding safe places
- Reliable safety measurement information.



Sending a message in real time

User Persona

Name: Leo Martínez

Personal Background

Age: 22
Status: Student at Tecnológico de Monterrey
Education : LAD student

User Environment

Location: Tec CCM Campus
Devices: Cell phone and laptop

Professional Background

Occupation: Bimbo Internship
Income: $10,000 per month

User Persona

Name: Leo Martínez

Psychographics

Lives on an apartment on the 5th floor. Experienced the September 19th earthquake at the CCM campus. Is afraid of earthquakes.

End Goals

To find a rescue app to send distress messages in case of an earthquake or any other natural disaster

Scenario

“Every time there is an earthquake, I find myself without access to communication because telecoms services fail. As I spend most of my time at my apartment or at school, I am afraid that the buildings may collapse and I’ll be unable to ask for rescue.”

Empathy Map

Says

“In an earthquake, I always first get to safety and try to call rescue services.”
“Telecommunications often fail and so I am unable to call anyone.”
“I am afraid I’d be unable to call for help in an emergency.”

Thinks

“I have to run to safety.”
“I hope my family is okay, I need to call them now.”
“My phone signal isn’t working, damn it.”
“I’m safe right now but what if I was hurt?”

User

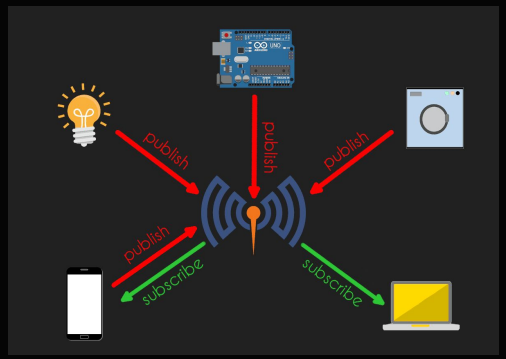
Does

Get to the ground floor and outside, away from buildings.
Attempt to call family or rescue services
Wait for telecommunications to come back and call emergency services.

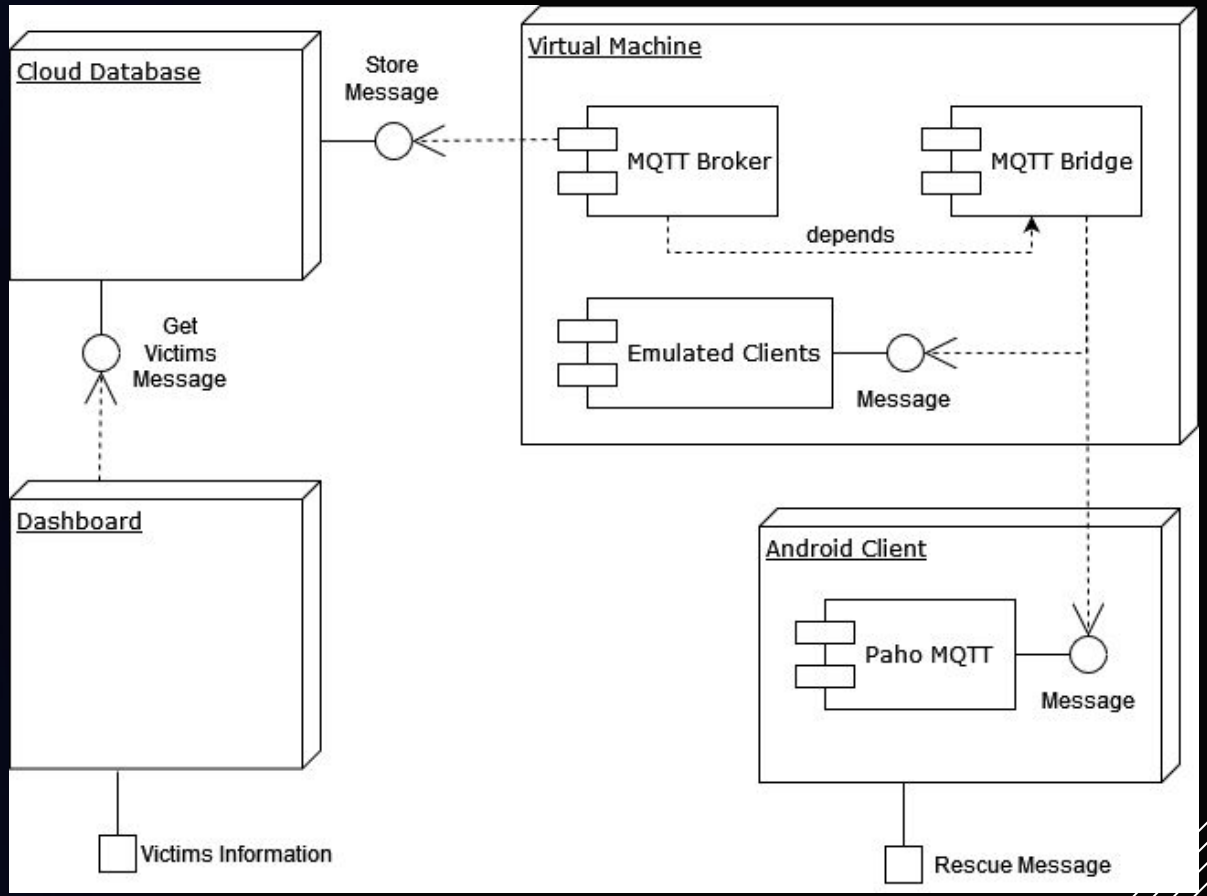
Feels

He wishes that he had a way to call emergencies immediately during a natural disaster.
He feels afraid that he’d be stuck without help if he was injured.
He is frustrated at the bad telecoms infrastructure.

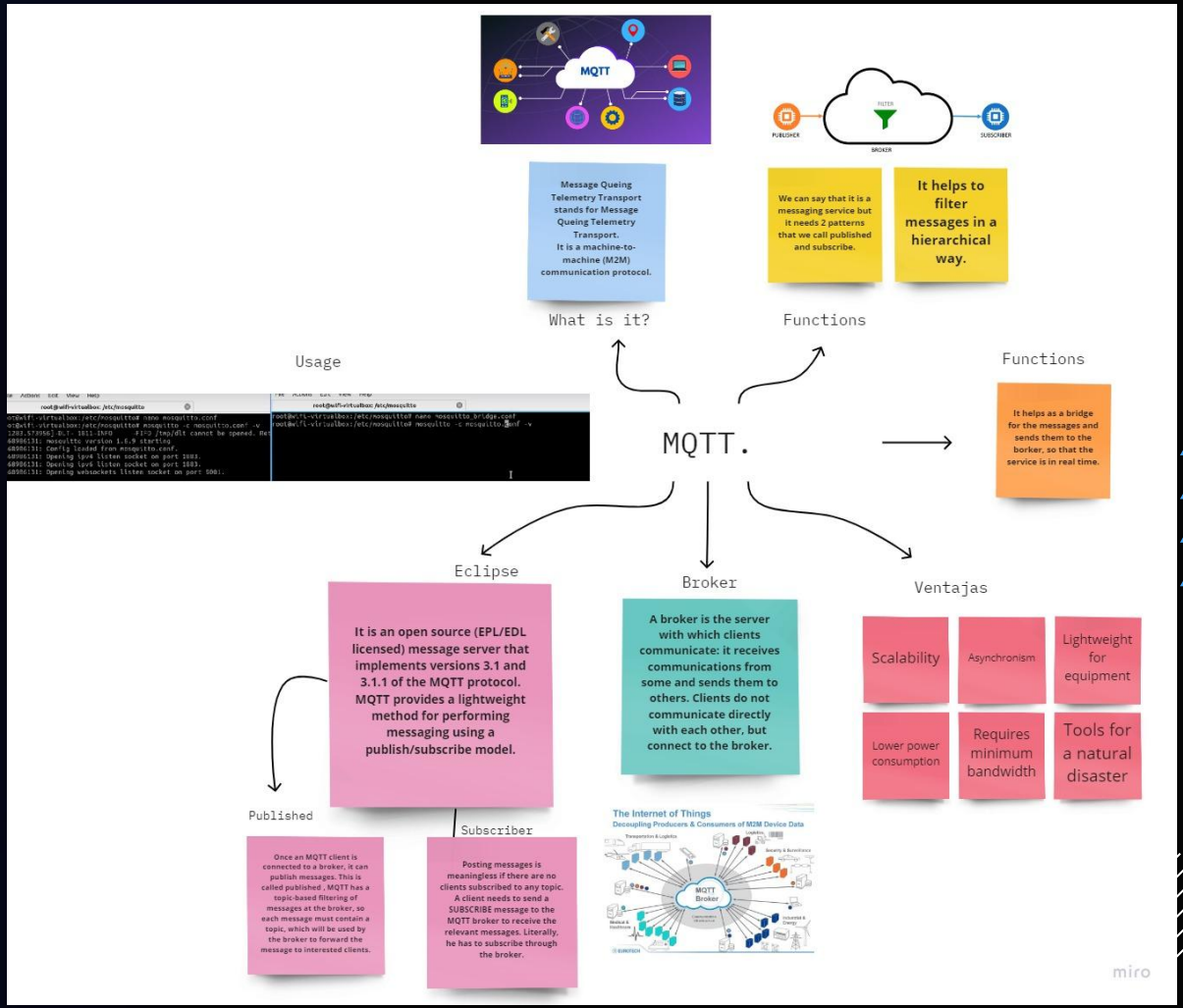
Technical Architecture of Solution



Architecture Diagram



Mosquito.


MQTT
Message Queing Telemetry Transport stands for Message Queing Telemetry Transport.
It is a machine-to-machine (M2M) communication protocol.
What is it?
PUBLISHER
FILTER
BROKER
SUBSCRIBER
We can say that it is a messaging service but it needs 2 patterns that we call published and subscribe.
It helps to filter messages in a hierarchical way.
Functions
Usage
MQTT.
Functions
It helps as a bridge for the messages and sends them to the borker, so that the service is in real time.
Eclipse
It is an open source (EPL/EDL licensed) message server that implements versions 3.1 and 3.1.1 of the MQTT protocol. MQTT provides a lightweight method for performing messaging using a publish/subscribe model.
Broker
A broker is the server with which clients communicate: it receives communications from some and sends them to others. Clients do not communicate directly with each other, but connect to the broker.
Ventajas
Scalability
Asynchronism
Lightweight for equipment
Lower power consumption
Requires minimum bandwidth
Tools for a natural disaster
Published
Once an MQTT client is connected to a broker, it can publish messages. This is called published , MQTT has a topic-based filtering of messages at the broker, so each message must contain a topic, which will be used by the broker to forward the message to interested clients.
Subscriber
Posting messages is meaningless if there are no clients subscribed to any topic. A client needs to send a SUBSCRIBE message to the MQTT broker to receive the relevant messages. Literally, he has to subscribe through the broker.
The Internet of Things
Decoupling Producers & Consumers of M2M Device Data
MQTT Broker
miro

Python.

What is it?

Python is a programming language widely used in web applications, software development, data science and machine learning (ML).

Pip is the package installer for Python. You can use pip to install packages from the Python package index and other indexes.

Usage

Use the free public MQTT broker provided by EMQX. This service relies on the MQTT - EMQX Cloud service to create.

At the same time, we call the Python function random.randint to randomly generate the MQTT client id and insert this data into the database

Microsoft Azure.

What is it?

Is a cloud computing platform created by Microsoft to build, test, deploy and manage applications.

Virtual machine

Is a cloud computing platform created by Microsoft to build, test, deploy and manage applications.

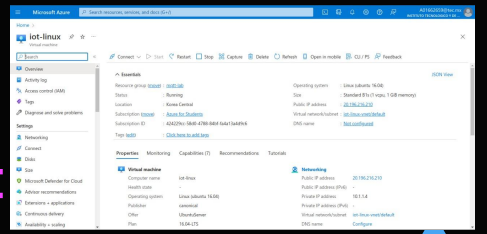
Use

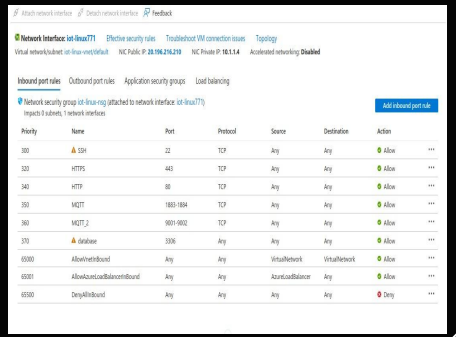
We use the virtual machines to simulate the scenario already implemented.

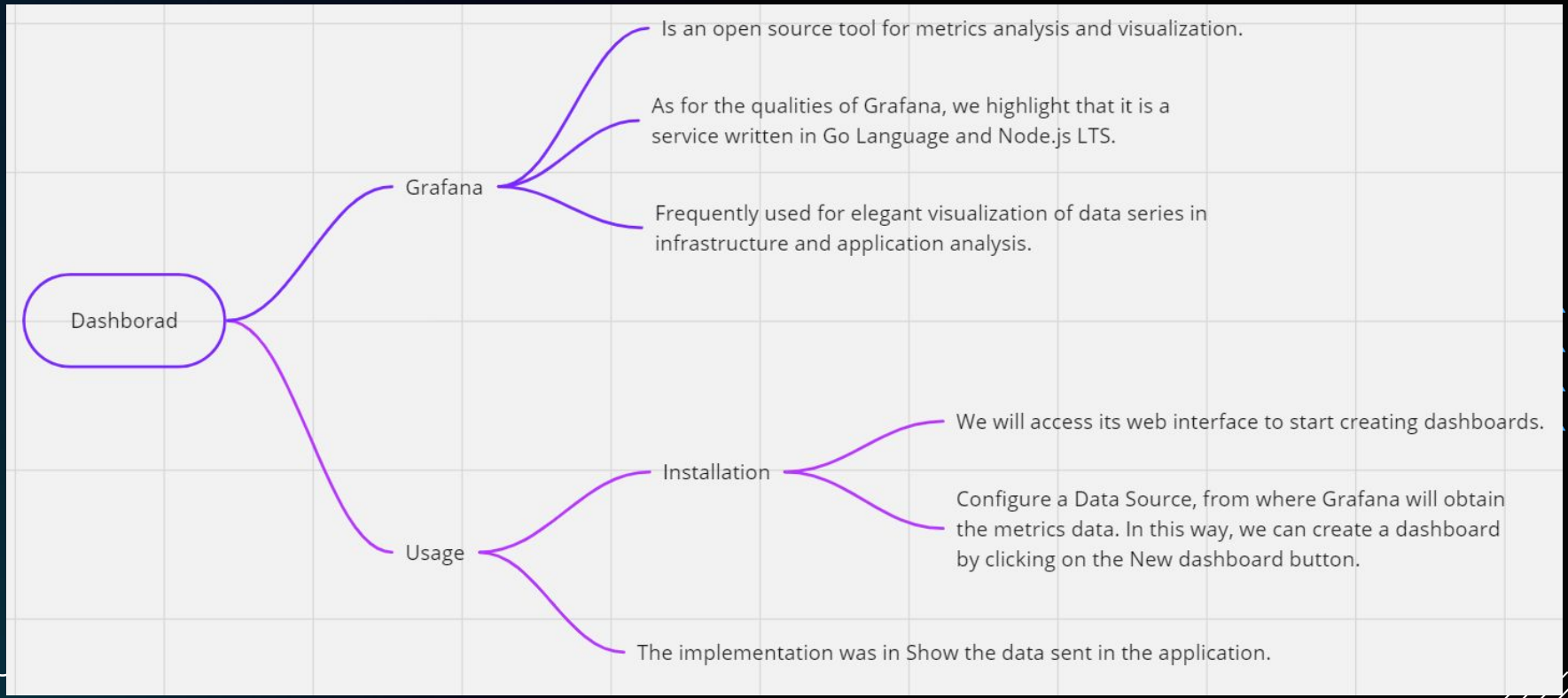
Evidence

Jupiter is quite big

Submit






Dashborad
Grafana
Is an open source tool for metrics analysis and visualization.
As for the qualities of Grafana, we highlight that it is a service written in Go Language and Node.js LTS.
Frequently used for elegant visualization of data series in infrastructure and application analysis.
Usage
Installation
We will access its web interface to start creating dashboards.
Configure a Data Source, from where Grafana will obtain the metrics data. In this way, we can create a dashboard by clicking on the New dashboard button.
The implementation was in Show the data sent in the application.

What is it?

SQL is a programming language for working with relational databases. It is used for creating, updating and querying data.

Functions

Defined in the database only through SQL statements, including at least one RETURN statement. It can return a scalar value, a row or a table. SQL functions cannot be aggregate functions.

Implementation

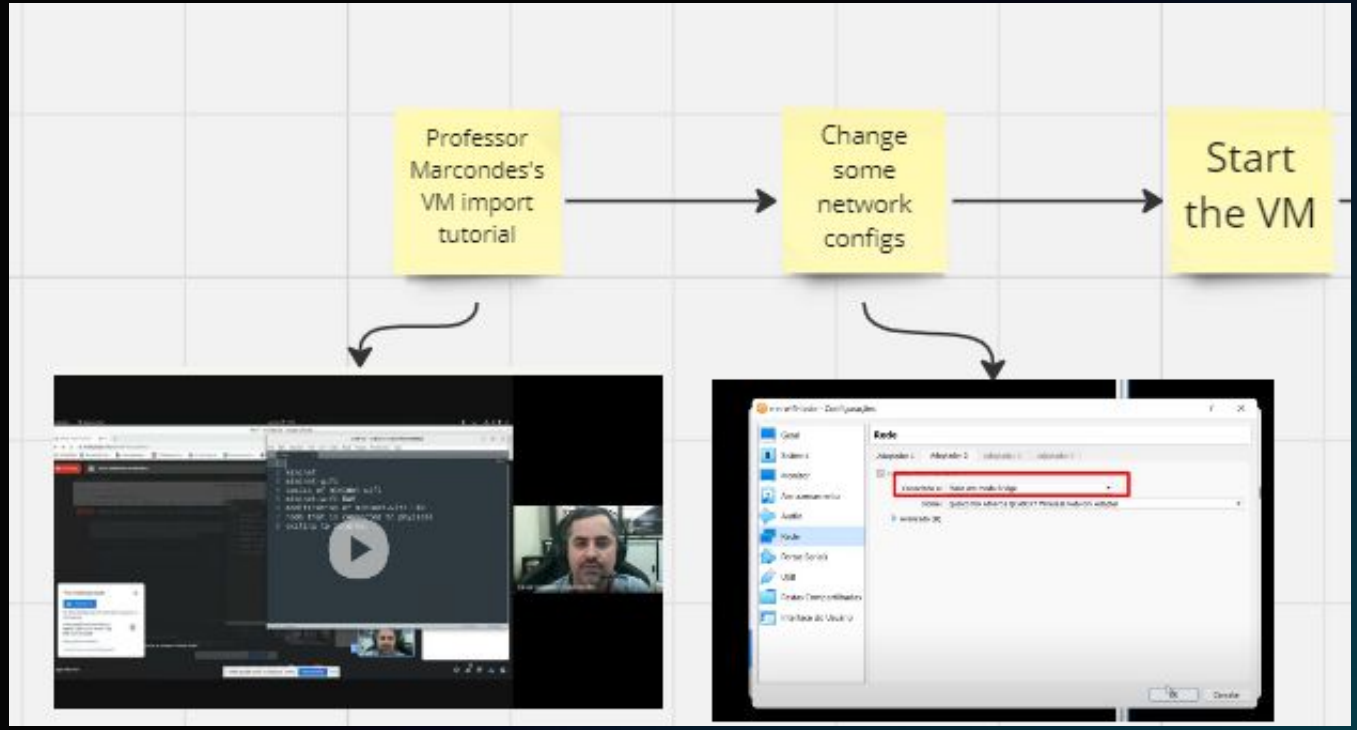
The basic implementation was to create and modify a relational database.

9 lines (8 sloc) | 165 Bytes

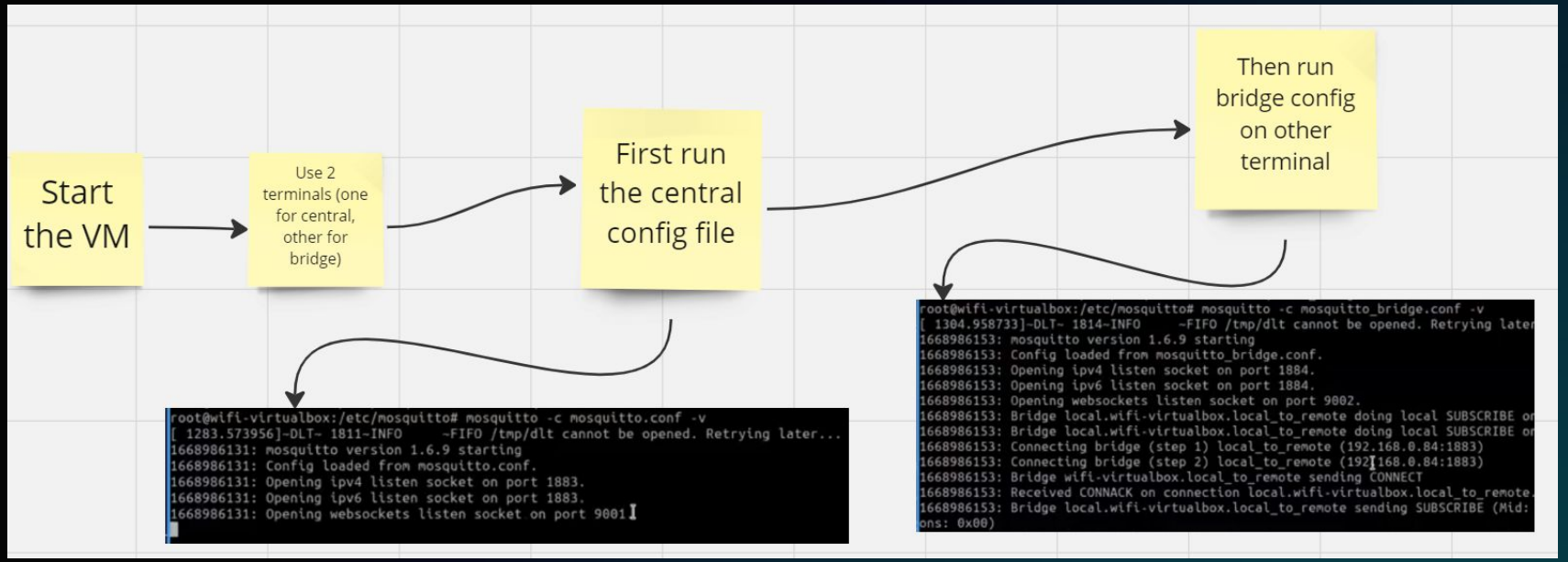
```
1  CREATE DATABASE rescue;
2  USE rescue;
3
4  CREATE TABLE messages(
5    nodeId INT PRIMARY KEY,
6    severity VARCHAR(255),
7    latitude VARCHAR(255),
8    longitude VARCHAR(255)
9   );
```

HOW TO INSTALL THE PROJECT?

VM Setup


Professor Marcondes's VM import tutorial
Change some network configs
Start the VM

VM Setup


Start the VM
Use 2 terminals (one for central, other for bridge)
First run the central config file
Then run bridge config on other terminal
root@wifi-virtualbox:/etc/mosquitto# mosquitto -c mosquitto.conf -v
[1283.573956]~DLT~ 1811~INFO ~FIFO /tmp/dlt cannot be opened. Retrying later...
1668986131: mosquitto version 1.6.9 starting
1668986131: Config loaded from mosquitto.conf.
1668986131: Opening ipv4 listen socket on port 1883.
1668986131: Opening ipv6 listen socket on port 1883.
1668986131: Opening websockets listen socket on port 9001
root@wifi-virtualbox:/etc/mosquitto# mosquitto -c mosquitto_bridge.conf -v
[1304.958733]~DLT~ 1814~INFO ~FIFO /tmp/dlt cannot be opened. Retrying later
1668986153: mosquitto version 1.6.9 starting
1668986153: Config loaded from mosquitto_bridge.conf.
1668986153: Opening ipv4 listen socket on port 1884.
1668986153: Opening ipv6 listen socket on port 1884.
1668986153: Opening websockets listen socket on port 9002.
1668986153: Bridge local.wifi-virtualbox.local_to_remote doing local SUBSCRIBE on
1668986153: Bridge local.wifi-virtualbox.local_to_remote doing local SUBSCRIBE on
1668986153: Connecting bridge (step 1) local_to_remote (192.168.0.84:1883)
1668986153: Connecting bridge (step 2) local_to_remote (192.168.0.84:1883)
1668986153: Bridge wifi-virtualbox.local_to_remote sending CONNECT
1668986153: Received CONNACK on connection local.wifi-virtualbox.local_to_remote.
1668986153: Bridge local.wifi-virtualbox.local_to_remote sending SUBSCRIBE (Mid:
ons: 0x00)

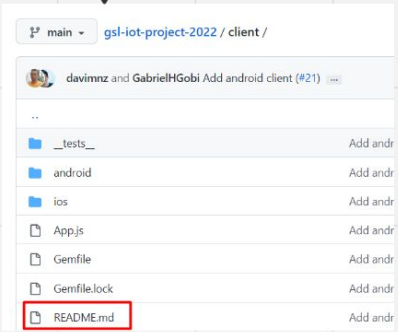
Celular Setup

Professor Barreto's Configuration Tutorial

Open the /client folder

Follow the instructions on the README there

USING MQTT WITH REACT NATIVE



Running the client application

```
npm install --force
npx react-native start
npx react-native run-android
```

Project Demo