Using MQTT for a Clockchain on Docker containers

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Outline

Objective

First steps

Sketch of Final system

Objective

Final destination is

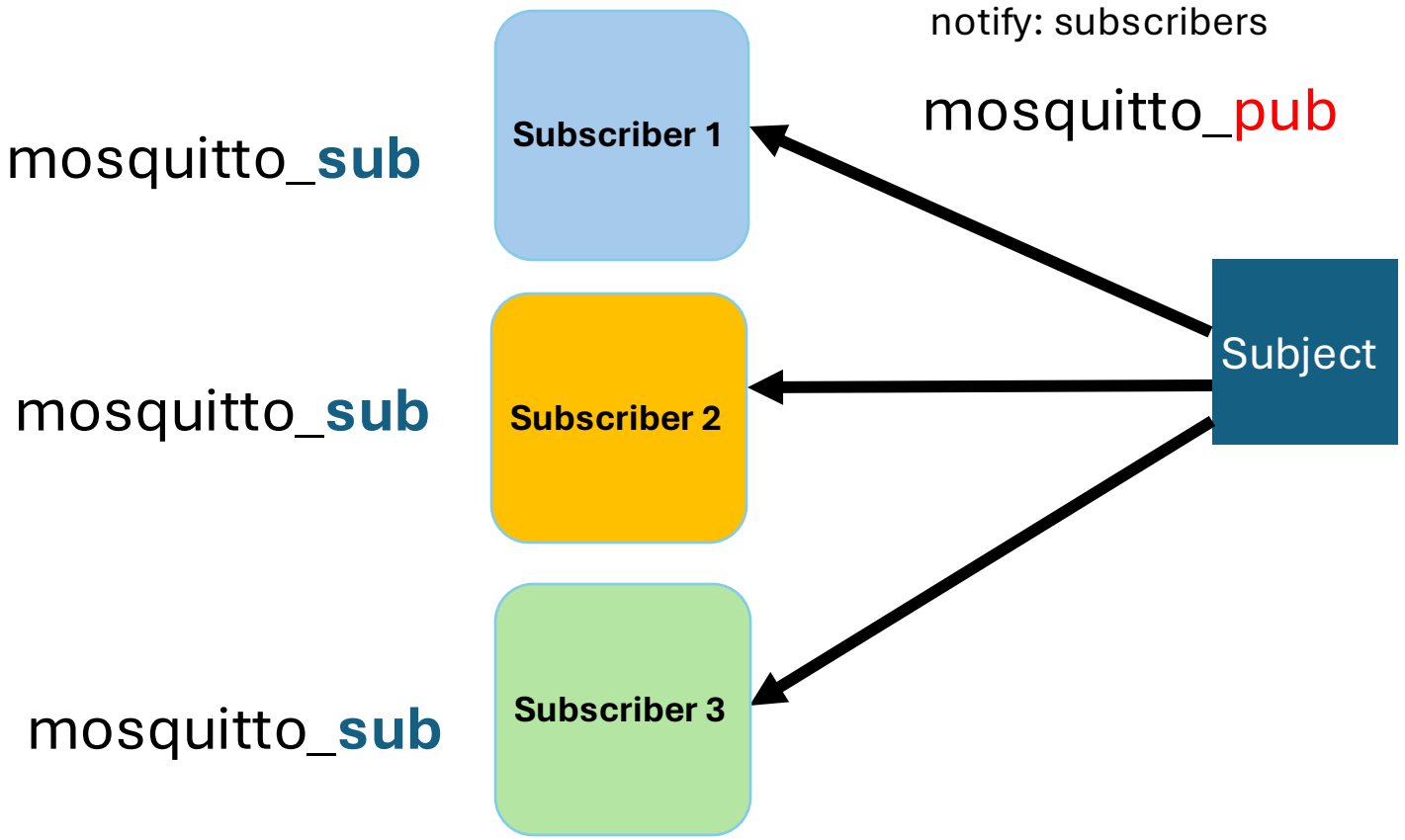
1. a basic Clockchain running on Docker containers
2. the containers mine blocks and communicate using MQTT

MQTT

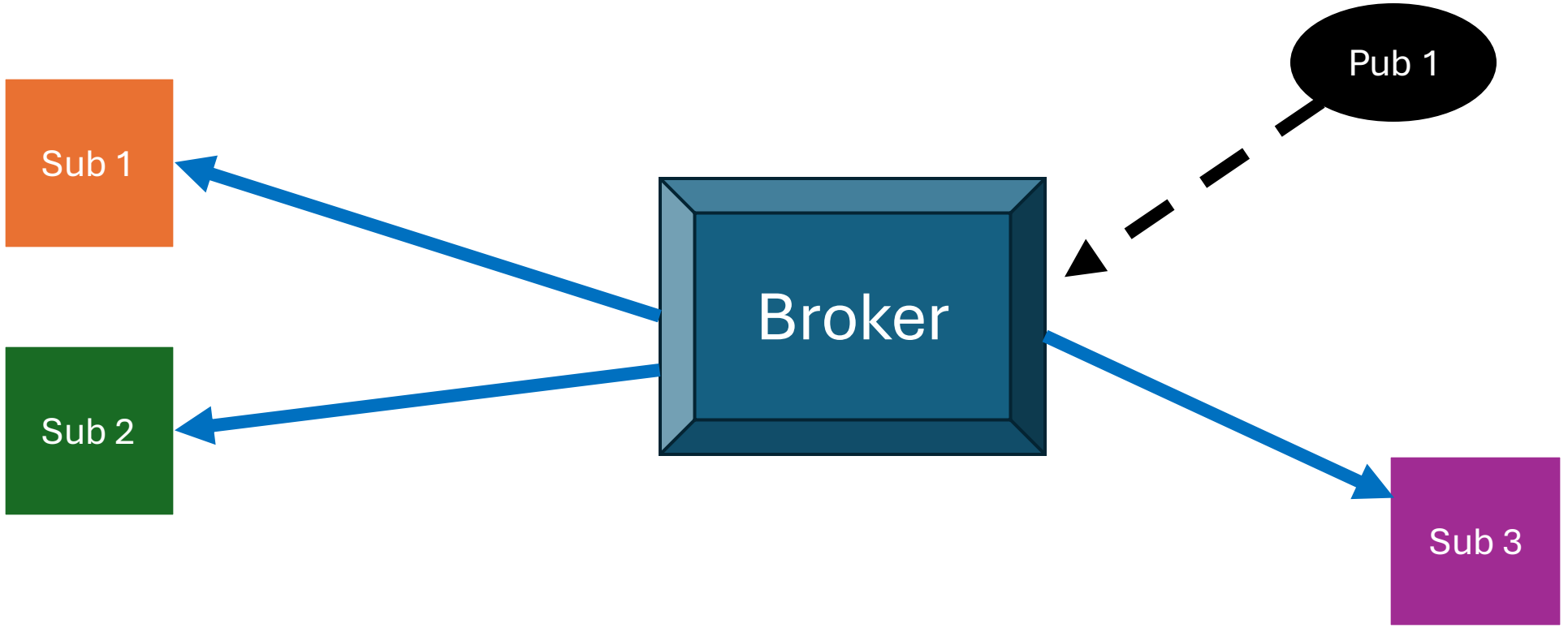
MQTT – message queue telemetry transport

Publish-subscribe

Subscriber: High-level



MQTT



First steps

MQTT – a publish and subscribe message system

One system serves as the message broker

All clients can publish or subscribe to the broker

We use paho mosquito MQTT

All Computers> sudo apt update

Broker computer> sudo apt install mosquitto mosquitto-clients

Client computers> sudo apt install mosquitto-clients

First steps: validation

To validate the way this will work

- Install paho.mqtt on an Ubuntu instance
- Initially Ubuntu will serve as the broker and clients
- We will need three terminals

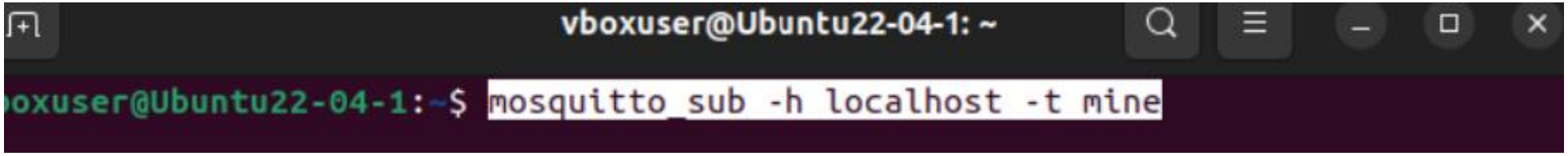
Copy the files CC1.py and CC2.py from ch8 in https://github.com/wonder-phil/ChainsThatBindUs

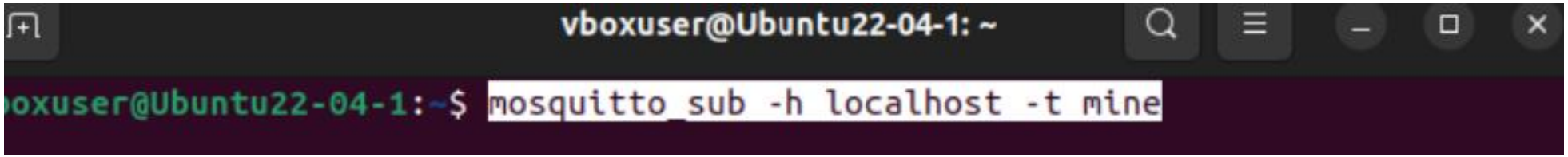
First steps – is paho-mqtt working?

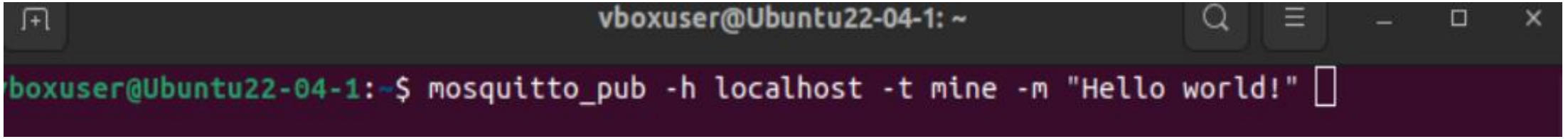
Terminal 1> mosquitto_sub –h localhost –t mine

Terminal 2> mosquitto_sub –h localhost –t mine

Terminal 3> mosquitto_pub –h localhost –t mine –m “Hello world!”







First steps – is paho-mqtt working?

Once this paho MQTT using mosquitto and mosquitto-client is verified

Copy the files CC1.py and CC2.py from ch8 in https://github.com/wonder-phil/ChainsThatBindUs

To the main directory

/home/user

Pip install paho-mqtt

Using Python3 pip install paho-mqtt

Ubuntu> pip install paho-mqtt

Running CC1 and CC2

Ensure each terminal is in /home/user

Terminal 1> python3

Python 3.10.12 (main, Nov 6 2024, 20:22:13) [GCC 11.4.0] on linux

Type "help", "copyright", "credits" or "license" for more information.

>>> from CC1 import run_chain

>>> run_chain()

Terminal 2> python3

Python 3.10.12 (main, Nov 6 2024, 20:22:13) [GCC 11.4.0] on linux

Type "help", "copyright", "credits" or "license" for more information.

>>> from CC2 import run_chain

>>> run_chain()

Starting the Clockchains CC1 and CC2

Terminal 3> mosquitto_pub -h localhost -t mine -m “start”

One Clockchain

```
mine topic says : CC1 wins done
start mining
prevHash: genesis
data: data
time: 2024-12-05 11:15:15.701678
nonce: 8511682
interrupted: False
bHash: 000002e011c6b81b4b1fb5a664adb6a552cccc19ec9ca0dedc11fed0c8cb09f7
mine topic says : CC1 wins done

start mining
mine topic says : CC2 won!
mine topic says : CC1 wins done
prevHash: genesis
data: data
time: 2024-12-05 11:15:15.701678
nonce: 12836013
interrupted: False
bHash: 00000cb339c7d102c6cb1fab018d81f0b0c81a0242e406e8150f596e6bf439ab

mine topic says : CC2 won!
start mining
mine topic says : CC2 won!
```

Use the Ubuntu VM as the broker

Ubuntu> sudo nano /etc/mosquitto/mosquitto.conf

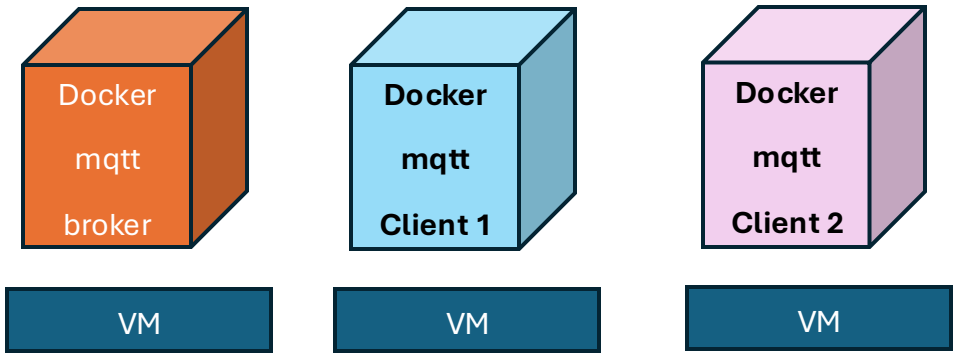
Add these two lines (security risk!):

allow_anonymous true

listener 1883 0.0.0.0

Ubuntu> sudo systemctl restart mosquitto.service

Installing the tools on Docker containers



References

Phillip G. Bradford: *Chains that bind us*, self-published, 2023. See Amazon.