Milestone 1: Table Garden

A demonstration of DHT22 sensor connected to the RPi4 board, controlled from fledge service running in a docker container, managed by Open Horizon Agent.
Image updates are deployed on the RPi4 board as soon as the service update is published from the development workstation.

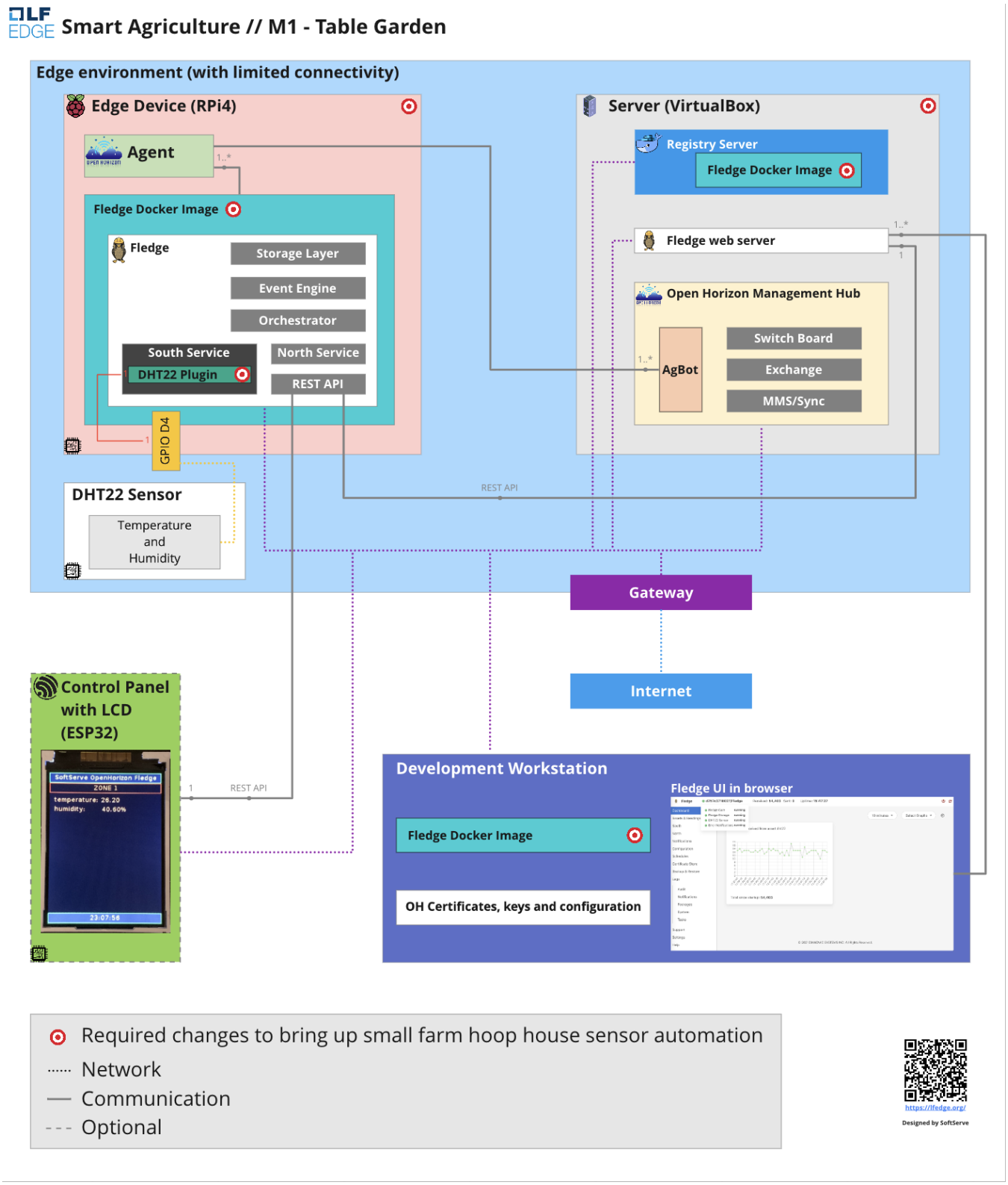
It's open-source, find the source code under milestone_1 tag.

Goals

1. Prepare easy-to-follow steps to deploy on both the dev environment and in the field.
2. Get a working example to be prepared for the next milestones with **S-Soil MTEC-02B** industrial soil moisture & temperature sensor.
3. Connect hardware **DHT22** sensor to **RPi4** and get sensor data from **Fledge plugin** running in a docker container and managed by **Open Horizon Agent** on **RPi4**.
4. Test full cycle of autonomous remote image deployment in **Edge environment**:
    a. Build and deploy container as **Open Horizon** service from developer environment.
    b. Install by **OpenHorizon Agent** a newly updated service container.
5. Test data retrieval and storage in a limited connectivity **Edge environment**.

Video presentation of Milestone 1: Table Garden

System Diagram



Prerequisites

Hardware

1. Raspberry Pi4 model B 4GB+ RAM
2. DHT22 Digital Temperature and Humidity Sensor (with 3 Dupont Wires)
3. 32+ GB micro SD Card

4. Power supply for Raspberry Pi 4
5. SD card reader
6. x64 PC (laptop or dedicated server)

Software

If you are looking for advanced configuration steps without preinstalled images and want to set up everything from scratch consider using this manual.

1. Download and install Virtual Box on the server (it could be a laptop or dedicated server where Open Horizon Management Hub will be running)
2. Download and install Raspberry Pi imager

Environment

The wifi with the stable signal is required to be in the range where RPi4 is used.

During setup and configuration Internet connection is mandatory.

Steps to configure

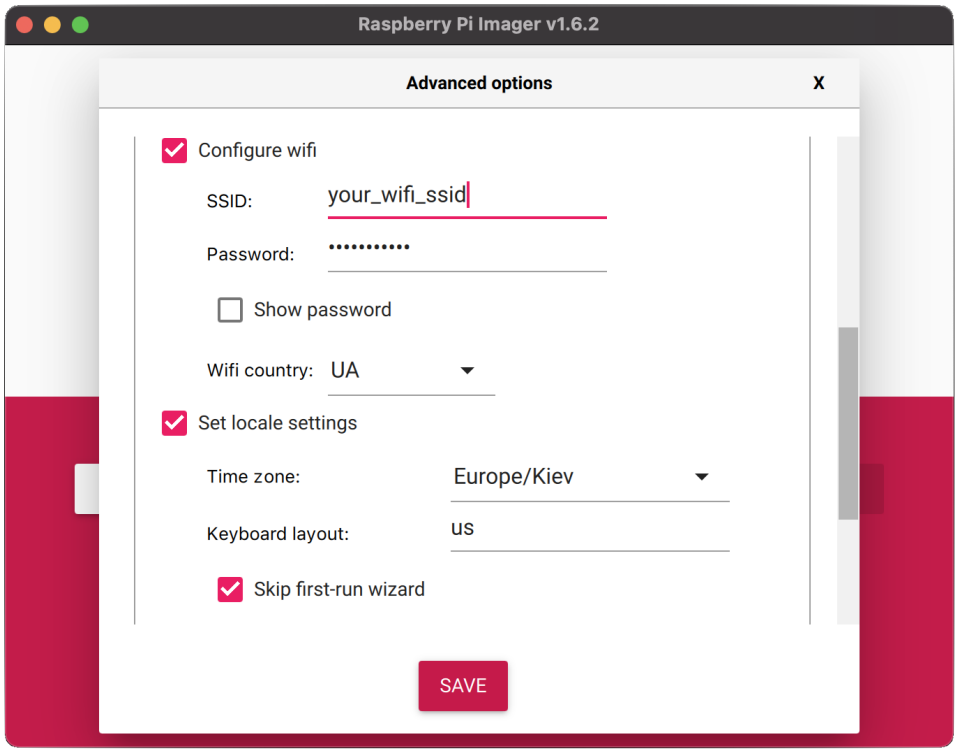
1. Download EdgeDevice image with preinstalled software (for **RPi4**) - OpenHorizon_SmartAg_EdgeDevice_RPi4.img (8.1G)

2. Download EdgeServer image with preinstalled software (for EdgeServer running in **Virtual Box)** - OpenHorizon_SmartAg_EdgeServer.ova (5.8G)

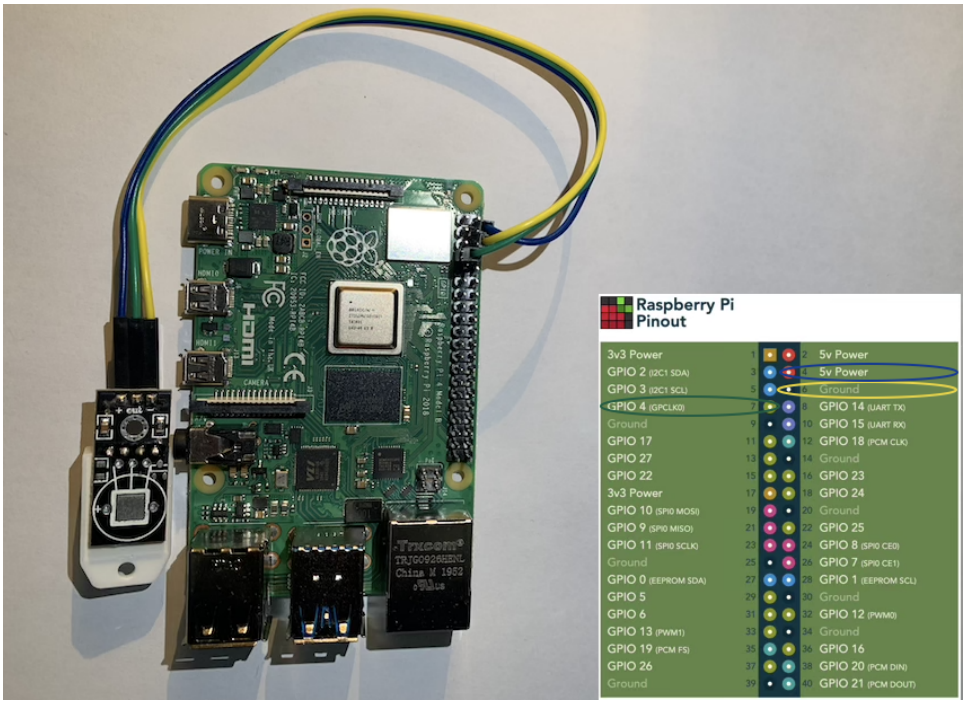
3. Insert SD card in your host

4. Open Raspberry Pi Imager
   Select custom image - use **OpenHorizon_SmartAg_EdgeDevice_RPi4.img**
   Select target drive newly inserted SD card

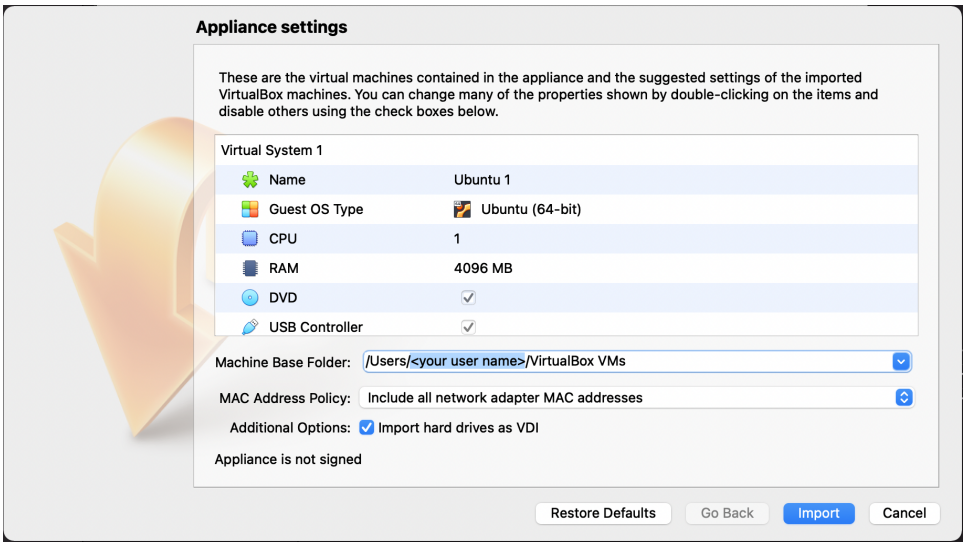
5. Configure Raspberry Board
   Press **CTRL+SHIFT+X**
   - enable **SSH**
   - configure wifi **SSID network** name and **password**
   - setup locale and time
   - select "**Skip first-run wizard**"
   - **SAVE** and **WRITE** new image
   (proceed with other steps while the OS image is burning)



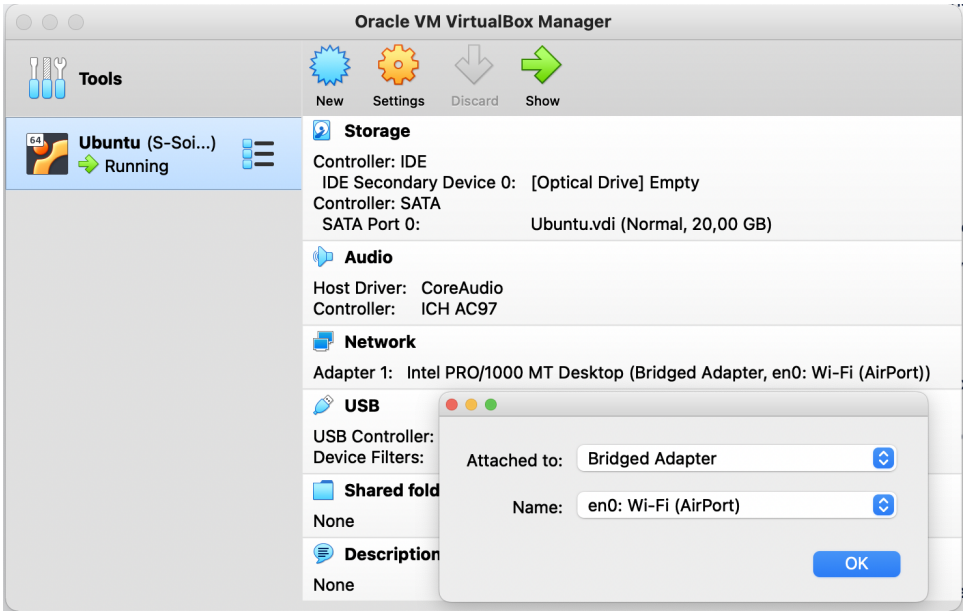
6. Connect **HDT22**
   - use middle data wire, VCC, and GND as shown below



7. Open and run **Virtual Box** image **OpenHorizon_SmartAg_EdgeServer.ova**



Make sure you selected "Bridged Adapter", this is required to get a separate IP address for Edge Server running in Virtual Box.



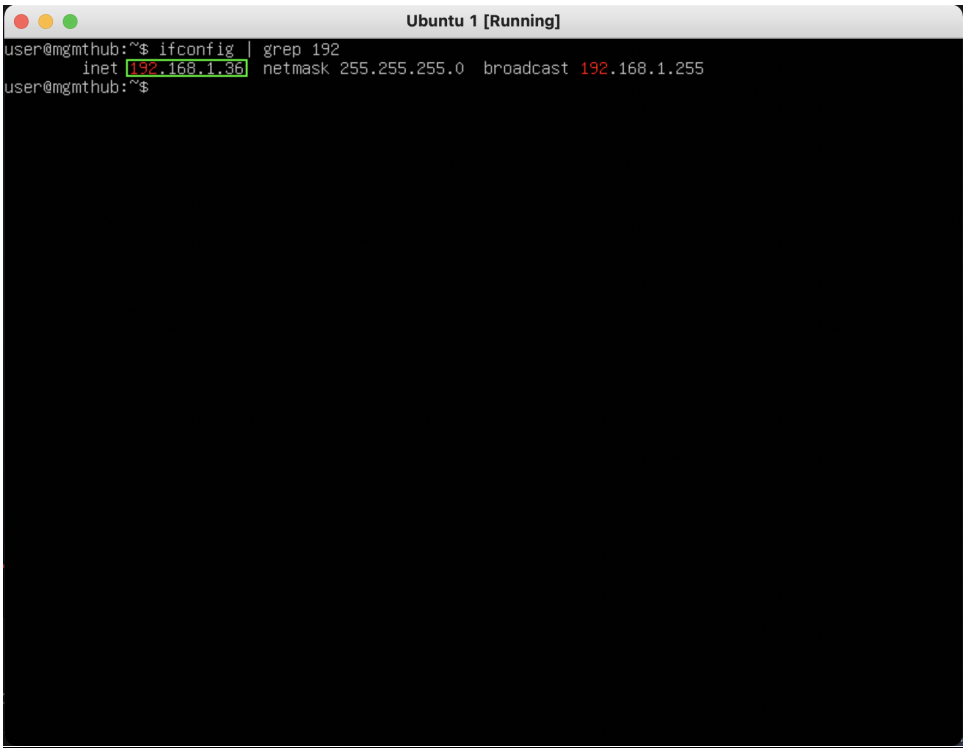
8. Wait for the Raspberry Pi image written on SD card, insert SD card into a raspberry board and connect the power cable to start the board. Raspberry should connect to Wifi on start, as configured in step 5.

9. Login into **Edge Device** (RPi4 board), check if it is up and running.
   - [from **Development Workstation**] check IP address by running ***sudo nmap -sn 192.168.1.0/24 | awk '/^Nmap/{ip=$NF}/DC:A6:32/{print ip}'***
   - [from **Development Workstation**] connect via ssh to the RPi4 board (password is **openhorizon**):
     ssh pi@<IP address from the previous command>
   - [from **ssh session to Edge Device**] change the default password by running ***passwd***

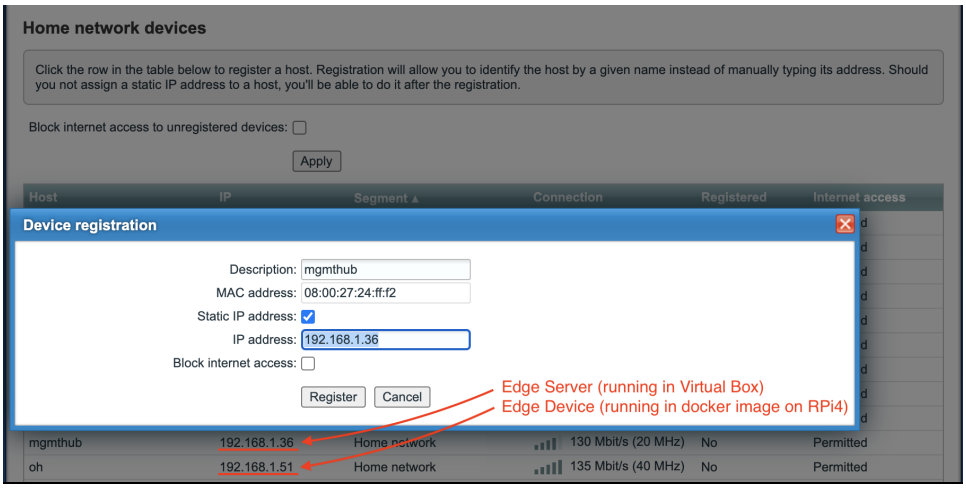
10. Login to Edge Server it should be running after step 7
    - [from Virtual Box console] with the user: **user** and password: **user**
    - [from Virtual Box console] make sure you changed the default password on the first login with ***passwd***

11. Configure IP addresses for **Edge Server** and **Edge Device**

    IMPORTANT: It is recommended to use **192.168.1.36** for your **Edge Server** and **192.168.1.51** for **Edge Device** to avoid any further configuration
    To check IP addresses for **Edge Server** [from **Development Workstation**] run ***ifconfig | grep 192*** command.

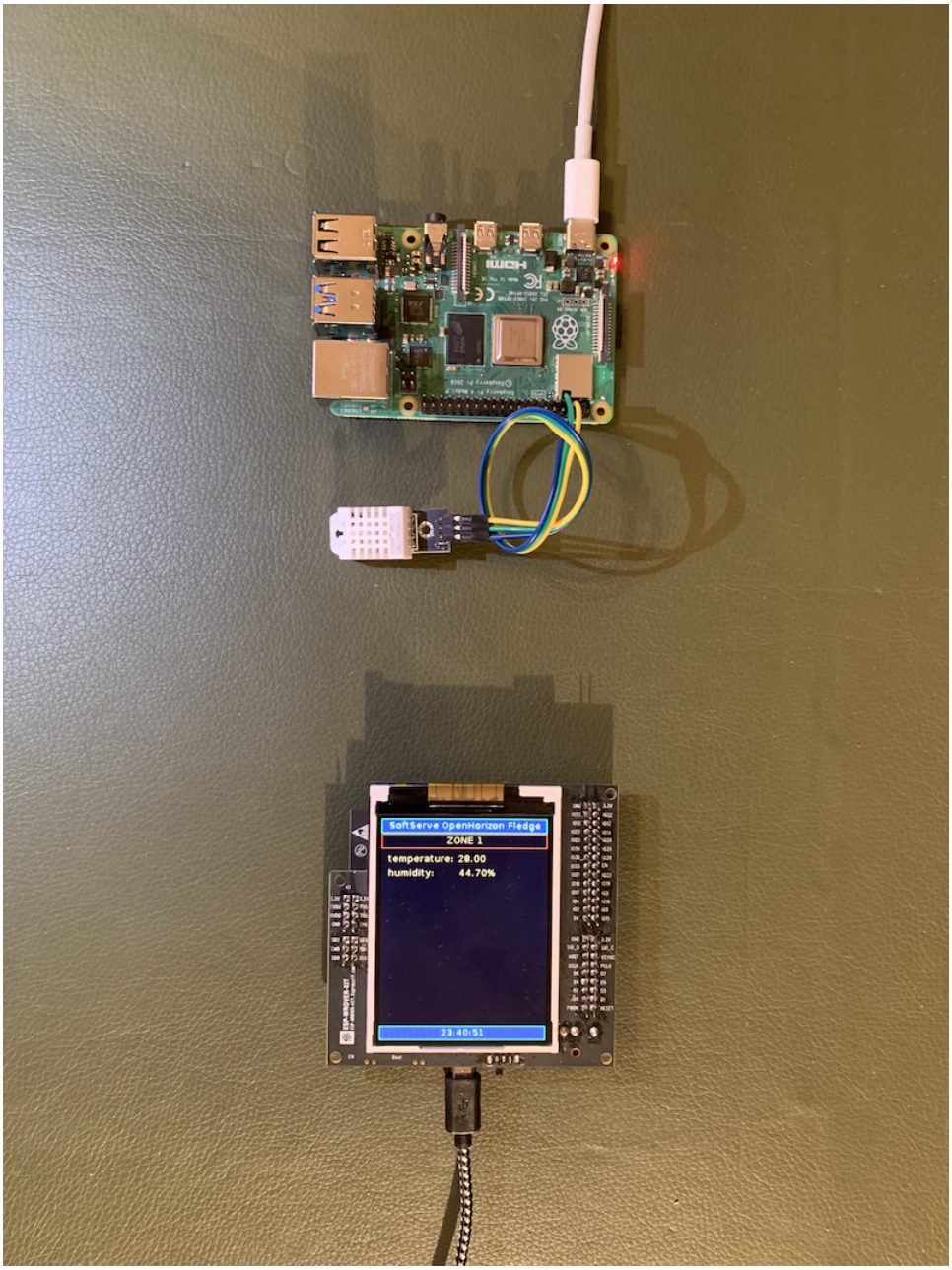


Use command ***ip route | awk '/default/ { print $3 }'*** to get IP address of default router.
To configure your IP address for **Edge Server** (**mgmthub**) and **Edge Device RPi4** (**oh**) open your wifi router settings in the browser by IP address of the default router.



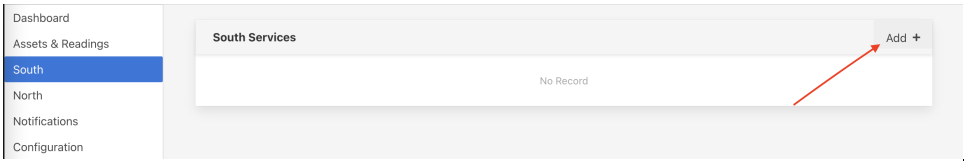
Set static IP addresses for **mgmthub** (Edge Server) to **192.168.1.36** and **oh** (Edge Device) to **192.168.1.51**

12. Connect the power cable to the **Edge Device RPi4 (oh)** board



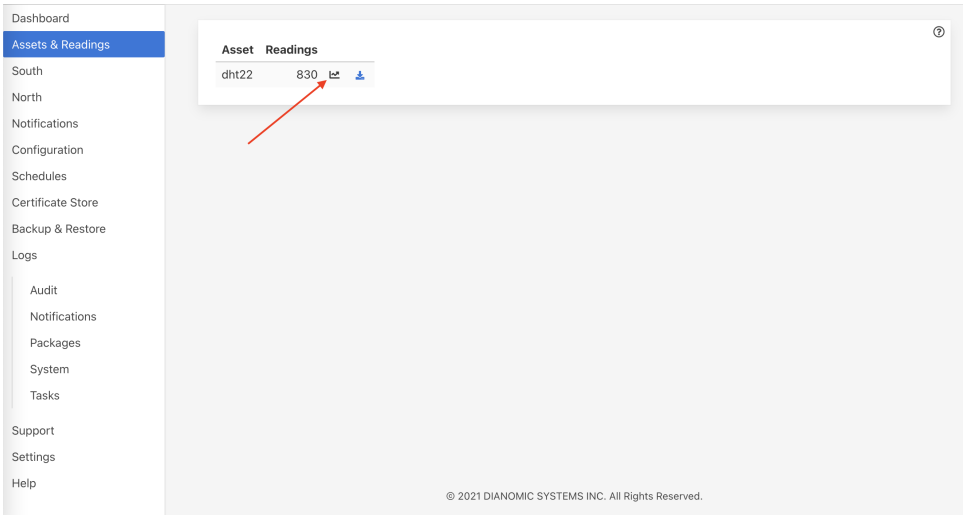
Use Web UI to Get Sensors Data

1. Activate pre-configured south plugin for **DHT22**, open **192.168.1.36** in the browser



- select **dht22** from the list and assign it any name (i.e. DHT22 Sensor)
- use default GPIO pin number 4

2. Get your readings from **Assets & Readings**


Dashboard
Assets & Readings
South
North
Notifications
Configuration
Schedules
Certificate Store
Backup & Restore
Logs
Audit
Notifications
Packages
System
Tasks
Support
Settings
Help
Asset
Readings
dht22
830
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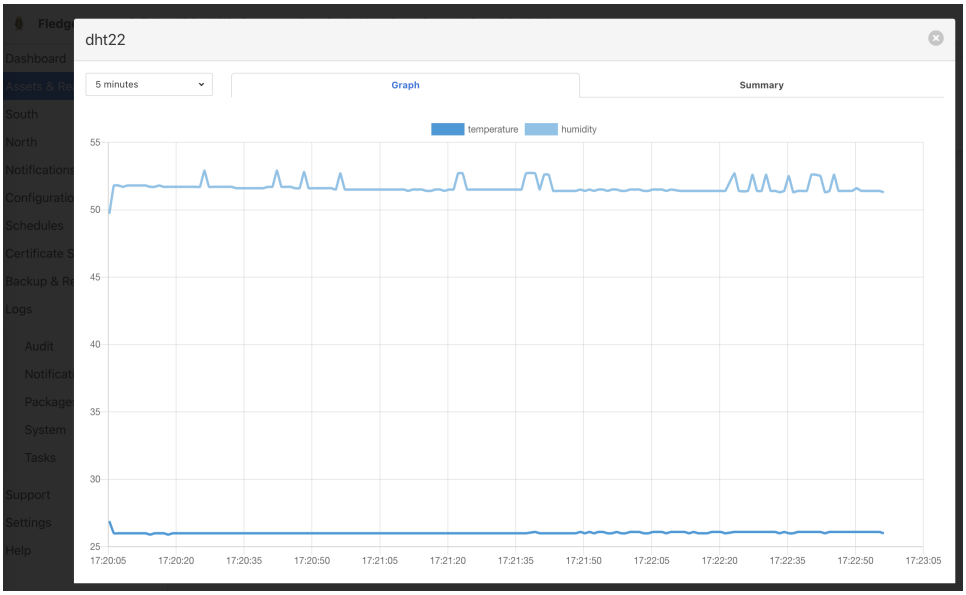
dht22
5 minutes
Graph
Summary
temperature
humidity
55
50
45
40
35
30
25
17:20:05
17:20:20
17:20:35
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17:23:05