| | | |
|---|---|---|
| | | |
| Laboratory 1: Installing Home Assistant, ESPHome, Database On Docker | School of Applied Digital Technology | |
| Name:<br>Name: | ID:<br>ID: | Section:<br>Section: |
| Date: | Due date: | |

## Objectives (Home Assistant on Docker)

- To learn how to install Docker and Docker Compose on the host system.
- To practice downloading and running the official Home Assistant Container image using Docker.
- To configure persistent storage and networking for Home Assistant within Docker.
- To access and interact with the Home Assistant interface via a web browser on the same local network.
- To install and enable the ESPHome add-on (via Home Assistant Supervisor or by running ESPHome in Docker).
- To create and flash a custom IoT device using ESPHome and connect it to Home Assistant.
- To prepare for building a scalable smart home system using Docker containers for monitoring and controlling connected devices.

## Experiment: Installing Home Assistant with Docker on All OS

## Step 1: Install Docker

### 1. macOS (M1/M2/Intel)

1. Go to https://www.docker.com
2. Download .dmg ⟶ Drag to Applications ⟶ Launch Docker Desktop
3. Wait until the whale icon 🐳 appears in the menu bar
4. Open Terminal ⟶ check Docker:

   **Bash:**

   ```
   docker --version

   docker compose version
   ```

   **or**

   ```
   docker-compose version
   ```

### 2. Windows 10/11

1. Go to Docker Desktop for Windows
2. Download installer ⟶ Run ⟶ Enable WSL2 integration when prompted
3. Open PowerShell ⟶ check Docker:

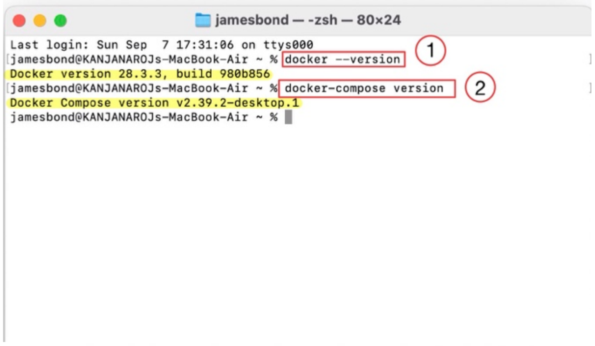
   **Bash:**

   ```
   docker --version

   docker compose version
   ```

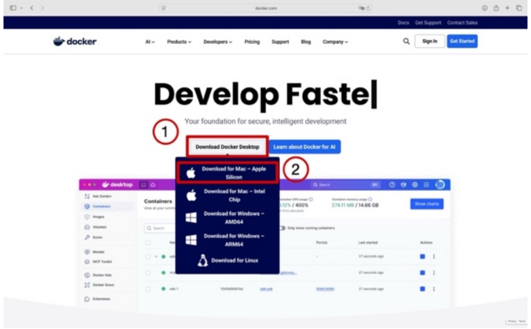
## 3. Linux (Ubuntu/Debian)

Bash:

```
sudo apt update && sudo apt upgrade -y

sudo apt install -y ca-certificates curl gnupg lsb-release

curl -fsSL https://get.docker.com | sh

docker --version

docker compose version
```

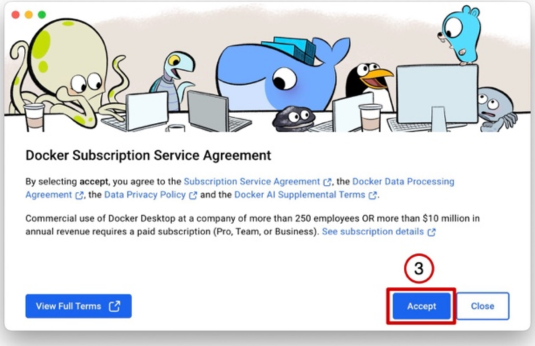


```
jamesbond — -zsh — 80×24
Last login: Sun Sep  7 17:31:06 on ttys000
jamesbond@KANJANAROJs-MacBook-Air ~ % docker --version
Docker version 28.3.3, build 980b856
jamesbond@KANJANAROJs-MacBook-Air ~ % docker-compose version
Docker Compose version v2.39.2-desktop.1
jamesbond@KANJANAROJs-MacBook-Air ~ %
```



Develop Faste|

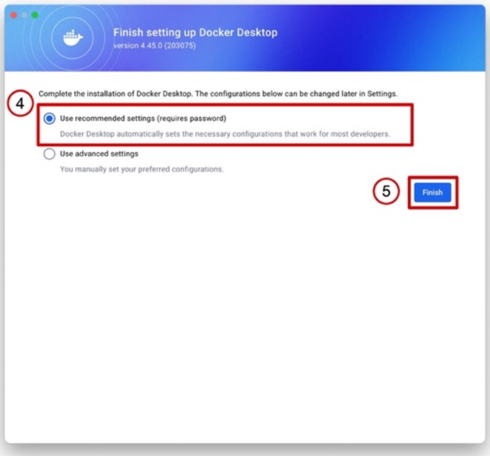
Your foundation for secure, intelligent development



Docker Subscription Service Agreement

By selecting **accept**, you agree to the Subscription Service Agreement, the Docker Data Processing Agreement, the Data Privacy Policy and the Docker AI Supplemental Terms.

Commercial use of Docker Desktop at a company of more than 250 employees OR more than $10 million in annual revenue requires a paid subscription (Pro, Team, or Business). See subscription details

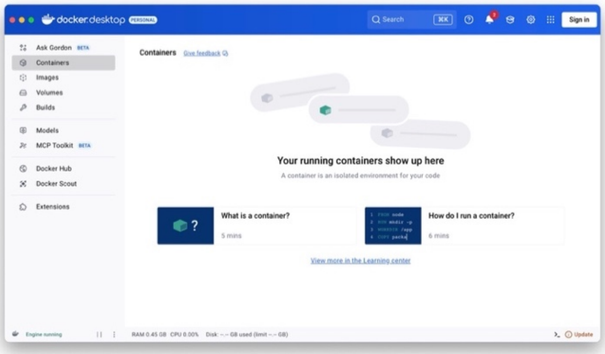


Finish setting up Docker Desktop
version 4.45.0 (203075)

Complete the installation of Docker Desktop. The configurations below can be changed later in Settings.

● Use recommended settings (requires password)
Docker Desktop automatically sets the necessary configurations that work for most developers.

○ Use advanced settings
You manually set your preferred configurations.



Your running containers show up here

A container is an isolated environment for your code

What is a container?
5 mins

How do I run a container?
6 mins

View more in the Learning center

Engine running RAM 0.45 GB CPU 0.00% Disk: --.-- GB used (limit --.-- GB)

## Step 2: Prepare Folder Structure

- macOS / Linux:

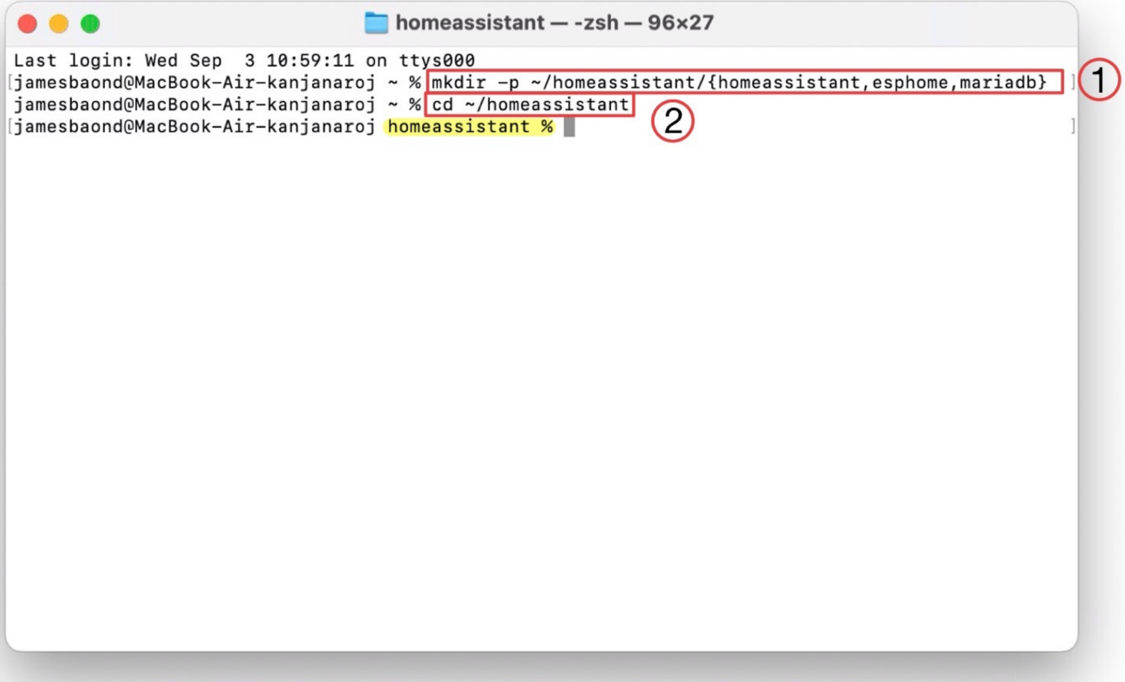
  Bash:

  ```
  mkdir -p ~/homeassistant/{homeassistant,esphome,mariadb}

  cd ~/homeassistant
  ```

- Windows (PowerShell):

  PowerShell:

  ```
  mkdir C:\homeassistant\homeassistant
  mkdir C:\homeassistant\esphome
  mkdir C:\homeassistant\mariadb
  cd C:\homeassistant
  ```



```
Last login: Wed Sep  3 10:59:11 on ttys000
jamesbaond@MacBook-Air-kanjanaroj ~ % mkdir -p ~/homeassistant/{homeassistant,esphome,mariadb}
jamesbaond@MacBook-Air-kanjanaroj ~ % cd ~/homeassistant
jamesbaond@MacBook-Air-kanjanaroj homeassistant %
```

## Step 3: Create docker-compose.yml

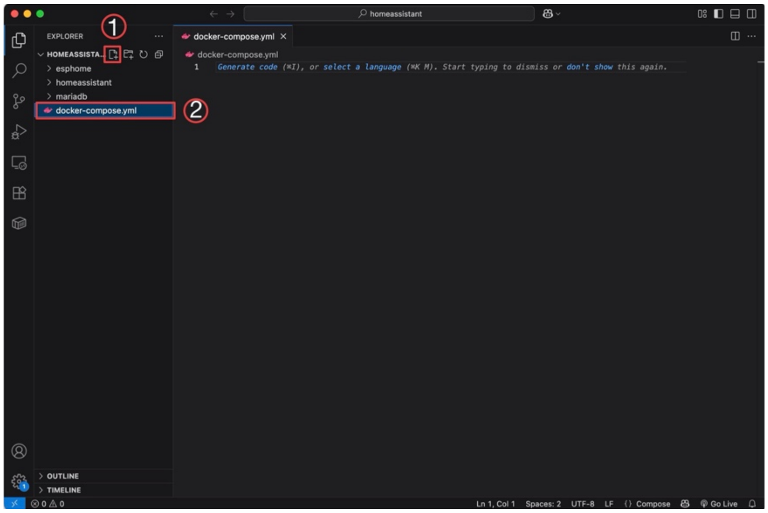
**Create a file docker-compose.yml in VS code and paste the following:**

**Yaml:**

```yaml
version: '3.9'
services:
  homeassistant:
    container_name: homeassistant
    image: ghcr.io/home-assistant/home-assistant:stable
    volumes:
      - ./homeassistant/config:/config
      - /etc/localtime:/etc/localtime:ro
    restart: unless-stopped
    ports:
      - "8123:8123"
    depends_on:
      - mariadb

  esphome:
    container_name: esphome
    image: ghcr.io/esphome/esphome
    volumes:
      - ./esphome/config:/config
      - /etc/localtime:/etc/localtime:ro
    restart: unless-stopped
    ports:
      - "6052:6052"

  mariadb:
    container_name: mariadb
    image: mariadb:11
    restart: unless-stopped
    environment:
      MYSQL_ROOT_PASSWORD: rootpassword1122
      MYSQL_DATABASE: homeassistant
      MYSQL_USER: admin
      MYSQL_PASSWORD: Home1122
    volumes:
      - ./mariadb/data:/var/lib/mysql
    ports:
      - "3306:3306"

  phpmyadmin:
    container_name: phpmyadmin
    image: phpmyadmin:latest
    restart: unless-stopped
    ports:
      - "8080:80"
    environment:
      PMA_HOST: mariadb
      PMA_USER: admin
      PMA_PASSWORD: Home1122
    depends_on:
      - mariadb
```

**Explanation:**

- Home Assistant: Web UI ⟶ port 8123
- ESPHome: Web UI ⟶ port 6052
- MariaDB: DB ⟶ port 3306 (persistent)



```
1  Generate code (⌘I), or select a language (⌘K M). Start typing to dismiss or don't show this again.
```

## Step 4: Run Docker Containers

- **Open Terminal / PowerShell in folder with docker-compose.yml:**

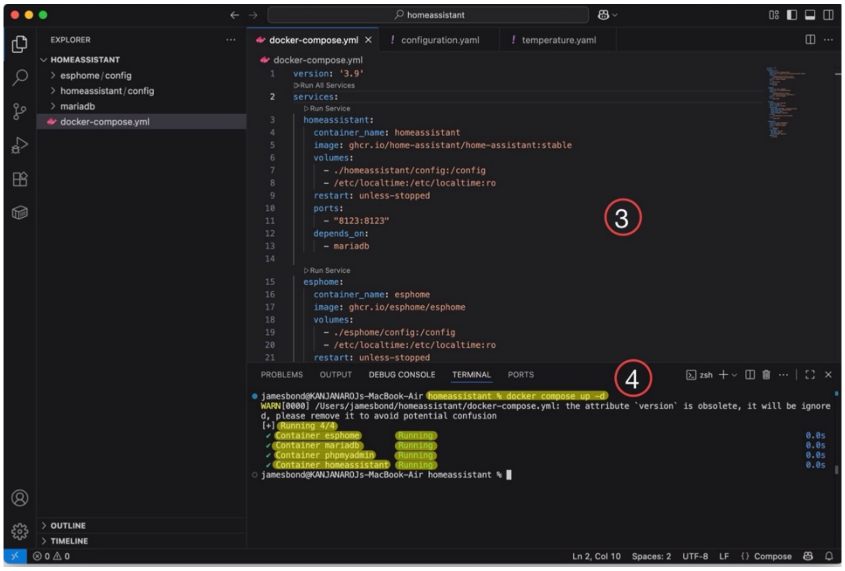
  **Bash:**

  ```
  docker compose up -d
  ```

- **Check running containers:**

  **Bash:**

  ```
  docker ps
  ```



```
version: '3.9'
services:
  homeassistant:
    container_name: homeassistant
    image: ghcr.io/home-assistant/home-assistant:stable
    volumes:
      - ./homeassistant/config:/config
      - /etc/localtime:/etc/localtime:ro
    restart: unless-stopped
    ports:
      - "8123:8123"
    depends_on:
      - mariadb

  esphome:
    container_name: esphome
    image: ghcr.io/esphome/esphome
    volumes:
      - ./esphome/config:/config
      - /etc/localtime:/etc/localtime:ro
    restart: unless-stopped
```

```
jamesbond@KANJANAROJs-MacBook-Air homeassistant % docker compose up -d
WARN[0000] /Users/jamesbond/homeassistant/docker-compose.yml: the attribute `version` is obsolete, it will be ignore
d, please remove it to avoid potential confusion
[+] Running 4/4
 ✓ Container esphome        Running                                                                       0.0s
 ✓ Container mariadb        Running                                                                       0.0s
 ✓ Container phpmyadmin     Running                                                                       0.0s
 ✓ Container homeassistant  Running                                                                       0.0s
jamesbond@KANJANAROJs-MacBook-Air homeassistant %
```

## Step 5: Accessing the configuration.yaml File with Docker

**yaml:**

```
recorder:
    db_url: mysql://admin:Home1122@mariadb/homeassistant?charset=utf8mb4
     purge_keep_days: 7   # เก็บ log 7 วัน
    commit_interval: 1   # บันทึกทุก 1 นาที
```

- **Access the Files:**

Navigate to that folder on your host machine. This is where all your Home Assistant configuration files are stored, including configuration.yaml.

- **Edit the Code:**

Open the **configuration.yaml** file using a code editor

Add the code snippet you need to the file.

**Note:** Pay close attention to indentation. YAML is very sensitive to proper spacing, and incorrect indentation can cause Home Assistant to fail.

Save the file after making your changes.

- **Restart Home Assistant:**

For the changes to take effect, you must restart the Home Assistant container.

If you are using docker-compose, open your terminal in the directory containing the docker-compose.yamlfile and run the command:

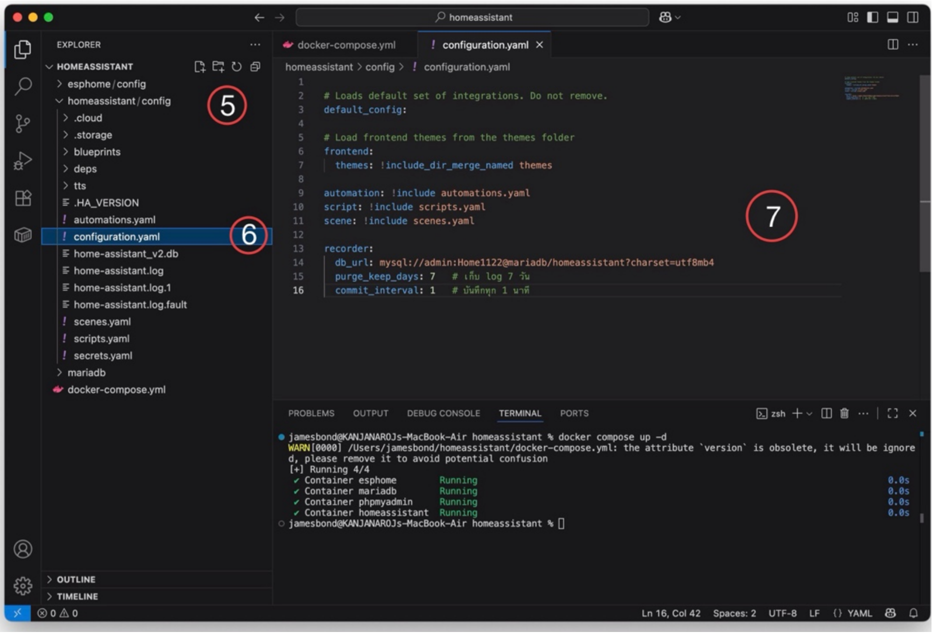
**Bash:**

```
docker-compose restart
```

If you are using a **docker run** command, you'll need to stop the old container and start it again with the same parameters.

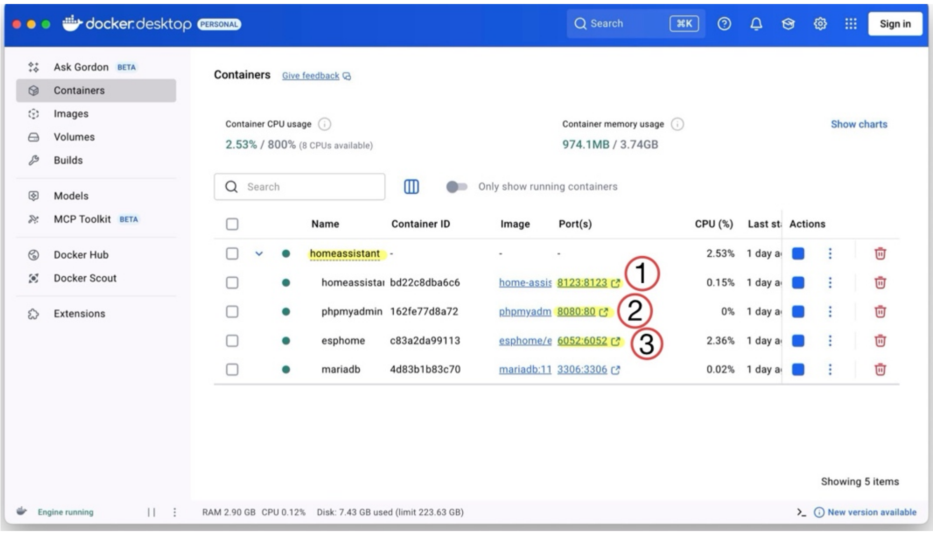
**Bash:**

```
docker stop homeassistant

docker start homeassistant
```



```yaml

# Loads default set of integrations. Do not remove.
default_config:

# Load frontend themes from the themes folder
frontend:
  themes: !include_dir_merge_named themes

automation: !include automations.yaml
script: !include scripts.yaml
scene: !include scenes.yaml

recorder:
  db_url: mysql://admin:Home1122@mariadb/homeassistant?charset=utf8mb4
  purge_keep_days: 7   # เก็บ log 7 วัน
  commit_interval: 1   # บันทึกทุก 1 นาที
```

```
jamesbond@KANJANAROJs-MacBook-Air homeassistant % docker compose up -d
WARN[0000] /Users/jamesbond/homeassistant/docker-compose.yml: the attribute `version` is obsolete, it will be ignore
d, please remove it to avoid potential confusion
[+] Running 4/4
 ✔ Container esphome        Running                                                                          0.0s
 ✔ Container mariadb        Running                                                                          0.0s
 ✔ Container phpmyadmin     Running                                                                          0.0s
 ✔ Container homeassistant  Running                                                                          0.0s
jamesbond@KANJANAROJs-MacBook-Air homeassistant % 
```



Containers

Container CPU usage
2.53% / 800% (8 CPUs available)

Container memory usage
974.1MB / 3.74GB

| ☐ | | | Name | Container ID | Image | Port(s) | CPU (%) | Last st | Actions |
|---|---|---|---|---|---|---|---|---|---|
| ☐ | ⌄ | ● | homeassistant | - | - | - | 2.53% | 1 day a | |
| ☐ | | ● | homeassistai | bd22c8dba6c6 | home-assis | 8123:8123 | 0.15% | 1 day a | |
| ☐ | | ● | phpmyadmin | 162fe77d8a72 | phpmyadm | 8080:80 | 0% | 1 day a | |
| ☐ | | ● | esphome | c83a2da99113 | esphome/e | 6052:6052 | 2.36% | 1 day a | |
| ☐ | | ● | mariadb | 4d83b1b83c70 | mariadb:11 | 3306:3306 | 0.02% | 1 day a | |

Showing 5 items

RAM 2.90 GB CPU 0.12% Disk: 7.43 GB used (limit 223.63 GB)

## Step 5: Access Home Assistant

- **Open browser:**

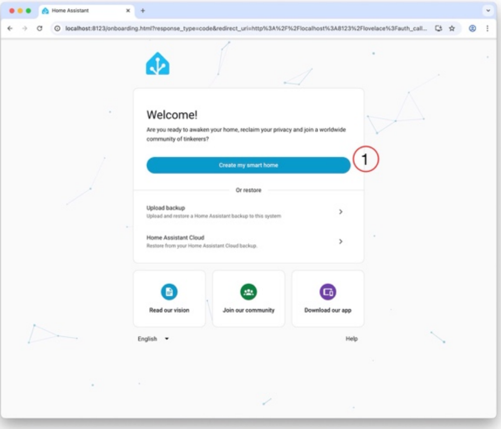
  http://localhost:8123

- **Home Assistant Onboarding**

This set of images shows the initial setup process for Home Assistant after it's been installed.

### Step 1: Welcome Screen

- The first screen you'll see is a welcome page. To get started with your smart home setup, click the **"Create my smart home"** button.



Home Assistant

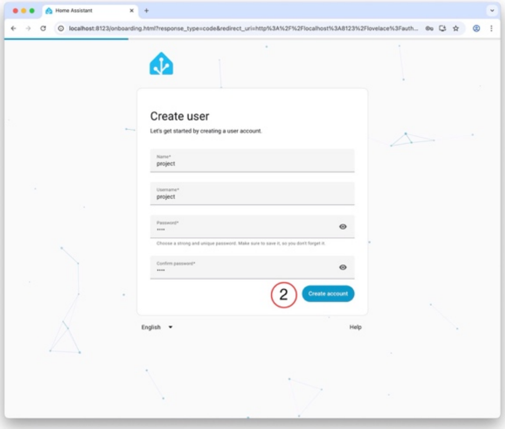
localhost:8123/onboarding.html?response_type=code&redirect_uri=http%3A%2F%2Flocalhost%3A8123%2Flovelace%3Fauth_call...

Welcome!

Are you ready to awaken your home, reclaim your privacy and join a worldwide community of tinkerers?

### Step 2: Create User

- You need to create a user account to manage your Home Assistant instance. Fill in your desired **Name**, **Username**, and a strong **Password**.
- Click **"Create account"** to proceed.



Home Assistant

localhost:8123/onboarding.html?response_type=code&redirect_uri=http%3A%2F%2Flocalhost%3A8123%2Flovelace%3Fauth...

Create user

Let's get started by creating a user account.

Name*
project

Username*
project

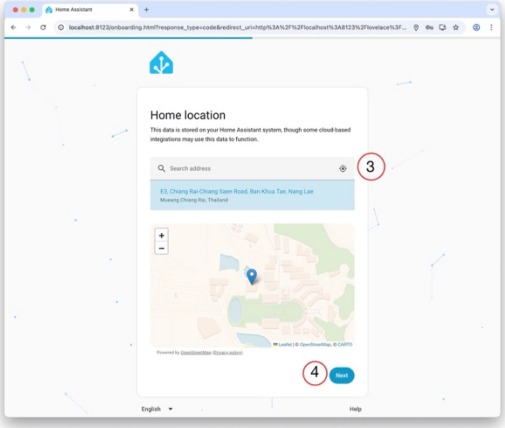
Password*
••••

Choose a strong and unique password. Make sure to save it, so you don't forget it.

Confirm password*
••••

### Step 3: Home Location

- Set your home's physical location. This is important for features like weather forecasting and automations that depend on sunrise and sunset times. You can either type in an address or drag the pin on the map.
- Click **"Next"**.



localhost:8123/onboarding.html?response_type=code&redirect_uri=http%3A%2F%2Flocalhost%3A8123%2Flovelace%3F...

Home location

This data is stored on your Home Assistant system, though some cloud-based integrations may use this data to function.

Search address

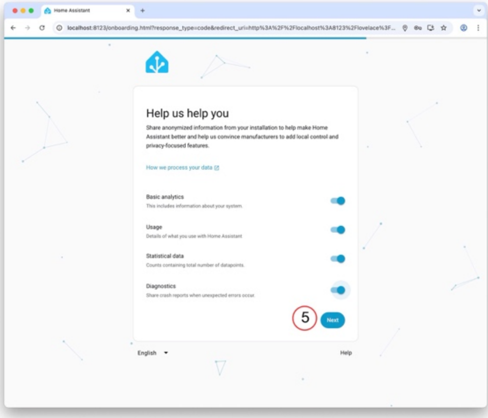
E3, Chiang Rai-Chiang Saen Road, Ban Khua Tae, Nang Lae
Mueang Chiang Rai, Thailand

Leaflet | © OpenStreetMap, © CARTO

Powered by OpenStreetMap (Privacy policy).

### Step 4: Help Us Help You

- This screen asks for your consent to share anonymous data to help improve the Home Assistant platform. You can toggle these options on or off based on your preference.
- Click **"Next"**.



localhost:8123/onboarding.html?response_type=code&redirect_uri=http%3A%2F%2Flocalhost%3A8123%2Flovelace%3F...

Help us help you

Share anonymized information from your installation to help make Home Assistant better and help us convince manufacturers to add local control and privacy-focused features.

How we process your data

Basic analytics
This includes information about your system.

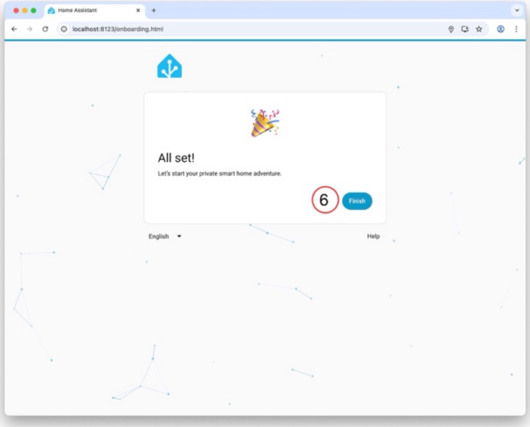
Usage
Details of what you use with Home Assistant

Statistical data
Counts containing total number of datapoints.

Diagnostics
Share crash reports when unexpected errors occur.

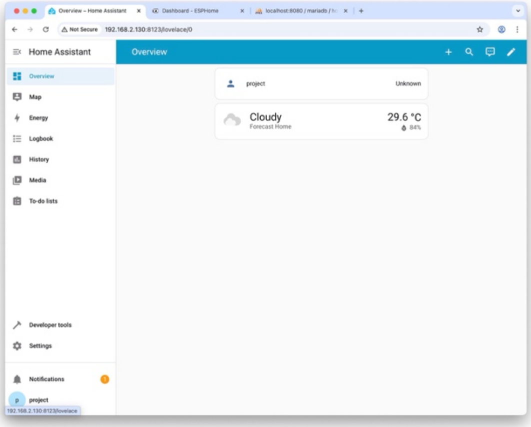
## Step 5: Finish Setup

- The initial setup is complete. Click **"Finish"** to go to your Home Assistant dashboard.



All set!

Let's start your private smart home adventure.



project Unknown

Cloudy 29.6 °C
Forecast Home 84%

## Step 6: Access ESPHome

- **Open browser:**

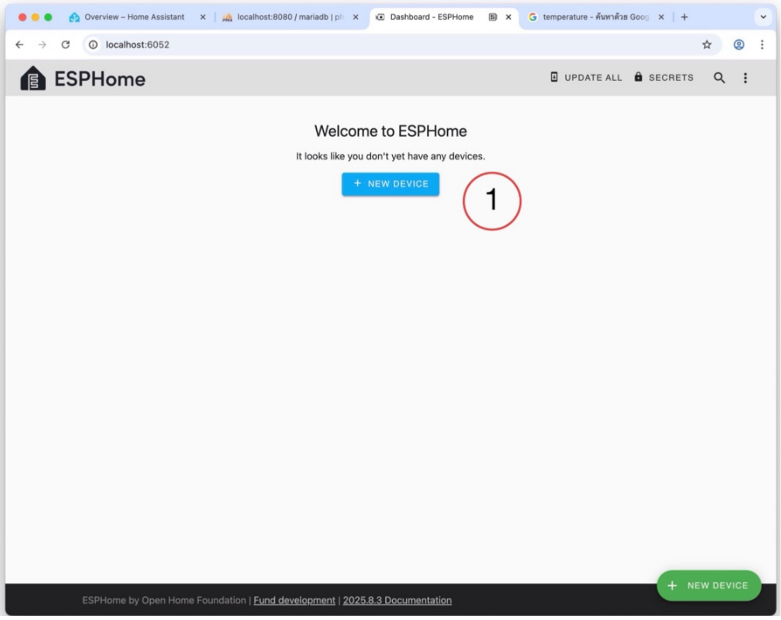
  http://localhost:6052

- **ESPHome User Guide for Beginners**

ESPHome is a tool that lets you easily set up and control your Wi-Fi devices without needing to write complex code.

### Step 1: Start the Device Setup

- **Open the Dashboard:** Open the ESPHome Dashboard on your computer.
- **Create a New Device:** At the bottom right of the screen, click the **"+ NEW DEVICE"** button to begin the process of adding a new device.



Welcome to ESPHome

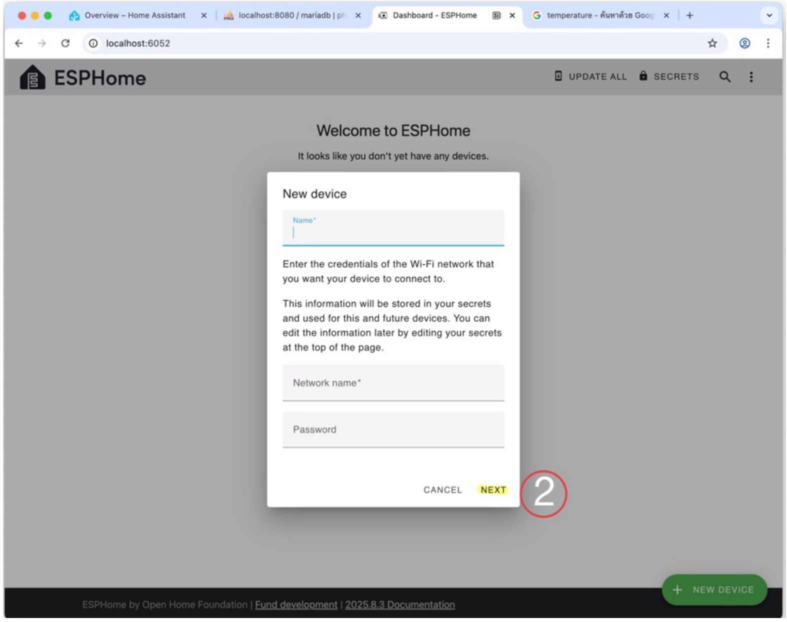
It looks like you don't yet have any devices.

ESPHome by Open Home Foundation | Fund development | 2025.8.3 Documentation

Overview – Home Assistant
localhost:8080 / mariadb | ph
Dashboard - ESPHome
temperature - ค้นหาด้วย Goog
localhost:6052
ESPHome
UPDATE ALL
SECRETS
+ NEW DEVICE
1
+ NEW DEVICE

### Step 2: Name Your Device and Connect to Wi-Fi

- **Name the Device:** A new window will pop up. Enter a name for your device in the **"Name"** field (this name will identify your device on the network).
- **Enter Wi-Fi Details:** Input your Wi-Fi network name in the **"Network name"** field and the password in the **"Password"** field.
- **Proceed:** Click **"NEXT"**.


Overview – Home Assistant
localhost:8080 / mariadb | ph
Dashboard - ESPHome
temperature - ค้นหาด้วย Goog
localhost:6052
ESPHome
UPDATE ALL
SECRETS
CANCEL
NEXT
2
NEW DEVICE
ESPHome by Open Home Foundation | Fund development | 2025.8.3 Documentation

Welcome to ESPHome

It looks like you don't yet have any devices.

New device

Name*

Enter the credentials of the Wi-Fi network that you want your device to connect to.

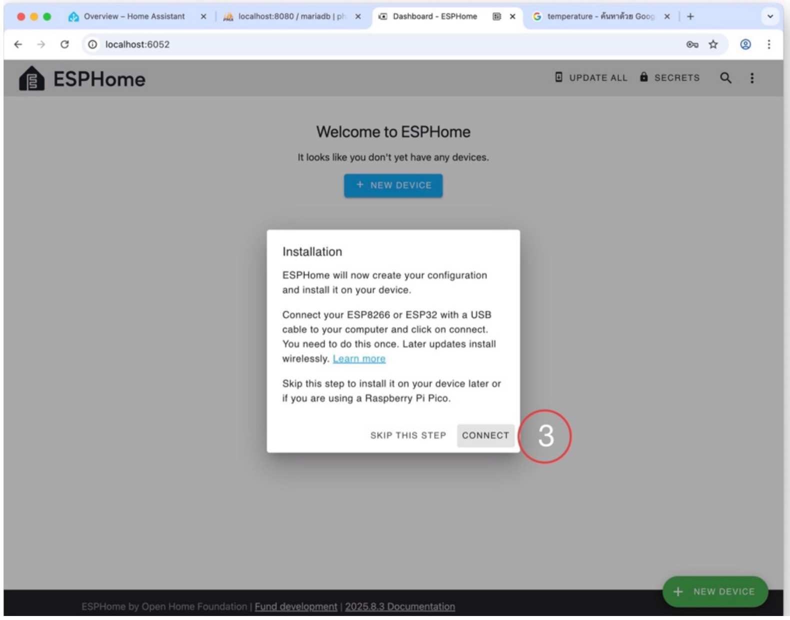
This information will be stored in your secrets and used for this and future devices. You can edit the information later by editing your secrets at the top of the page.

Network name*

Password

### Step 3: Connect the Device to Your Computer

- **Plug in the USB:** Take your ESP8266 or ESP32 board and plug it into a USB port on your computer.
- **Initiate Connection:** Click **"CONNECT"**.


Overview – Home Assistant
localhost:8080 / mariadb | ph
Dashboard - ESPHome
temperature - ค้นหาด้วย Goog
localhost:6052
ESPHome
UPDATE ALL
SECRETS
+ NEW DEVICE
SKIP THIS STEP
CONNECT
3
NEW DEVICE
ESPHome by Open Home Foundation | Fund development | 2025.8.3 Documentation

Welcome to ESPHome

It looks like you don't yet have any devices.

Installation

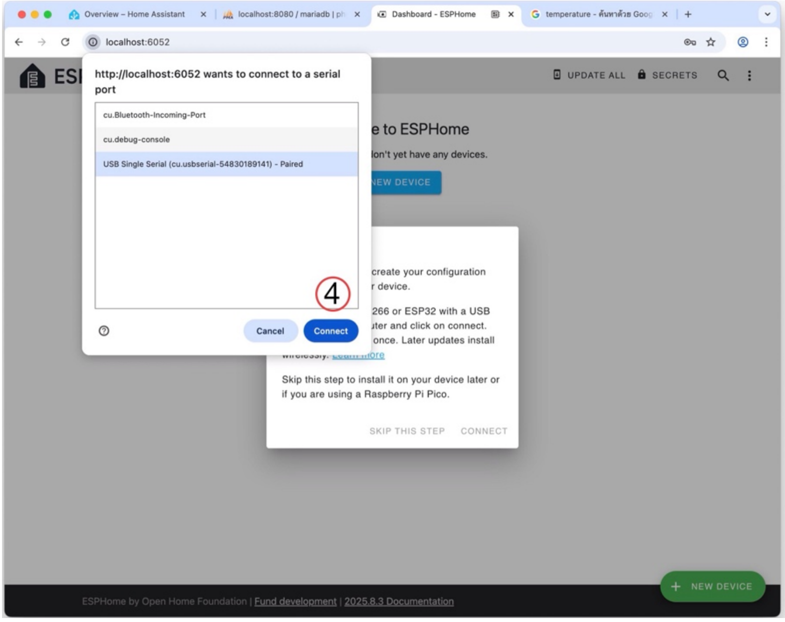
ESPHome will now create your configuration and install it on your device.

Connect your ESP8266 or ESP32 with a USB cable to your computer and click on connect. You need to do this once. Later updates install wirelessly. Learn more

Skip this step to install it on your device later or if you are using a Raspberry Pi Pico.

### Step 4: Select the Connection Port

- **Choose the Port:** A small window will appear with a list of connection ports. Select the one that corresponds to your device (it's often labeled "USB Single Serial" or something similar).
- **Confirm Connection:** Click **"Connect"** to allow ESPHome to communicate with your device.



http://localhost:6052 wants to connect to a serial port

cu.Bluetooth-Incoming-Port
cu.debug-console
USB Single Serial (cu.usbserial-54830189141) - Paired

e to ESPHome
lon't yet have any devices.

create your configuration
r device.

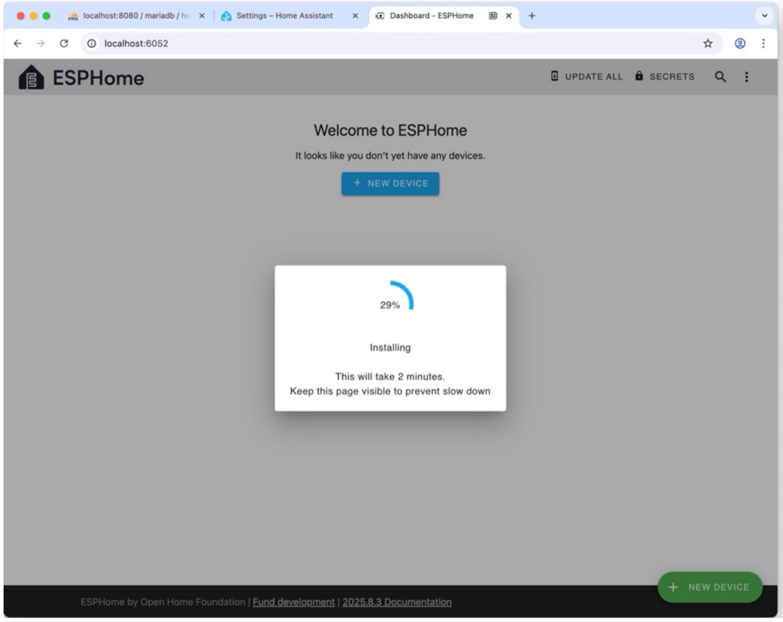
266 or ESP32 with a USB
ıter and click on connect.
once. Later updates install
Learn more

Skip this step to install it on your device later or if you are using a Raspberry Pi Pico.

ESPHome by Open Home Foundation | Fund development | 2025.8.3 Documentation

### Step 5: Install the Firmware

- **Wait for Installation:** ESPHome will now begin uploading the generated firmware to your device. A progress bar will be displayed.
- **Important:** Do not unplug the USB cable or close the browser window during this process, as it could cause the installation to fail.



Welcome to ESPHome

It looks like you don't yet have any devices.

29%

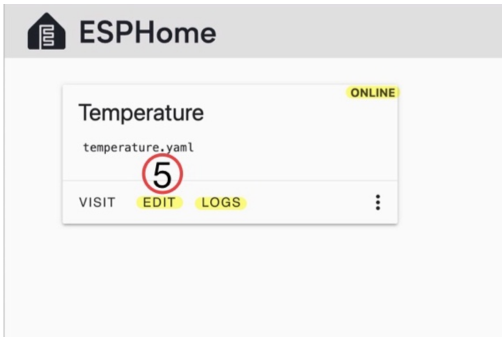
Installing

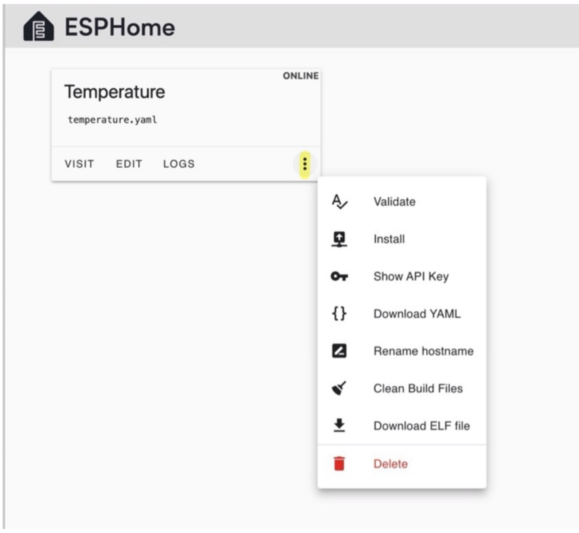
This will take 2 minutes.
Keep this page visible to prevent slow down

ESPHome by Open Home Foundation | Fund development | 2025.8.3 Documentation

## Step 6: Check and Manage Your Device

- **View Your Device:** Once the installation is complete, your new device will appear on the ESPHome Dashboard with an **"ONLINE"** status.
- **Access Settings:** On the device card, you'll see various options. You can click **"EDIT"** to modify the YAML configuration file, or click the three dots to access additional options like updating the firmware or deleting the device.



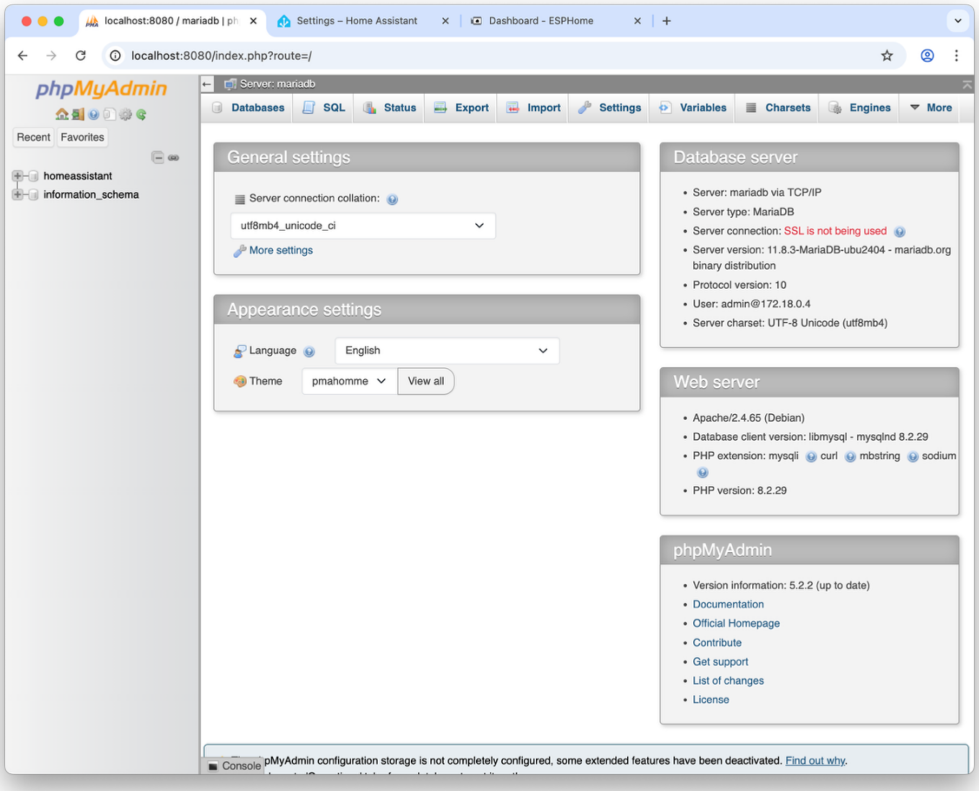


## Step 7: Optional – Access phpMyAdmin

- Open browser:

  http://localhost:8080

- phpMyAdmin available on port 8080:
  - User: admin
  - Password: Home1122
  - Database: homeassistant



General settings

Server connection collation: utf8mb4_unicode_ci

More settings

Appearance settings

Language: English

Theme: pmahomme

View all

Database server

- Server: mariadb via TCP/IP
- Server type: MariaDB
- Server connection: SSL is not being used
- Server version: 11.8.3-MariaDB-ubu2404 - mariadb.org binary distribution
- Protocol version: 10
- User: admin@172.18.0.4
- Server charset: UTF-8 Unicode (utf8mb4)

Web server

- Apache/2.4.65 (Debian)
- Database client version: libmysql - mysqlnd 8.2.29
- PHP extension: mysqli curl mbstring sodium
- PHP version: 8.2.29

phpMyAdmin

- Version information: 5.2.2 (up to date)
- Documentation
- Official Homepage
- Contribute
- Get support
- List of changes
- License

pMyAdmin configuration storage is not completely configured, some extended features have been deactivated. Find out why.