

MING - An open-source LAMP-like stack for the Internet of Things and Embedded
Embedded World 2023 - Nuremberg - 16th of March 2023





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How did you learn programming?



AMSTRAD CPC 6128



USER INSTRUCTIONS



Did you use any stack
to reduce friction?





Why LAMP succeeded?



Why LAMP succeeded?

- Reduced the friction to developers
- Open-source and free
- Flexible and scalable
- Wide community support

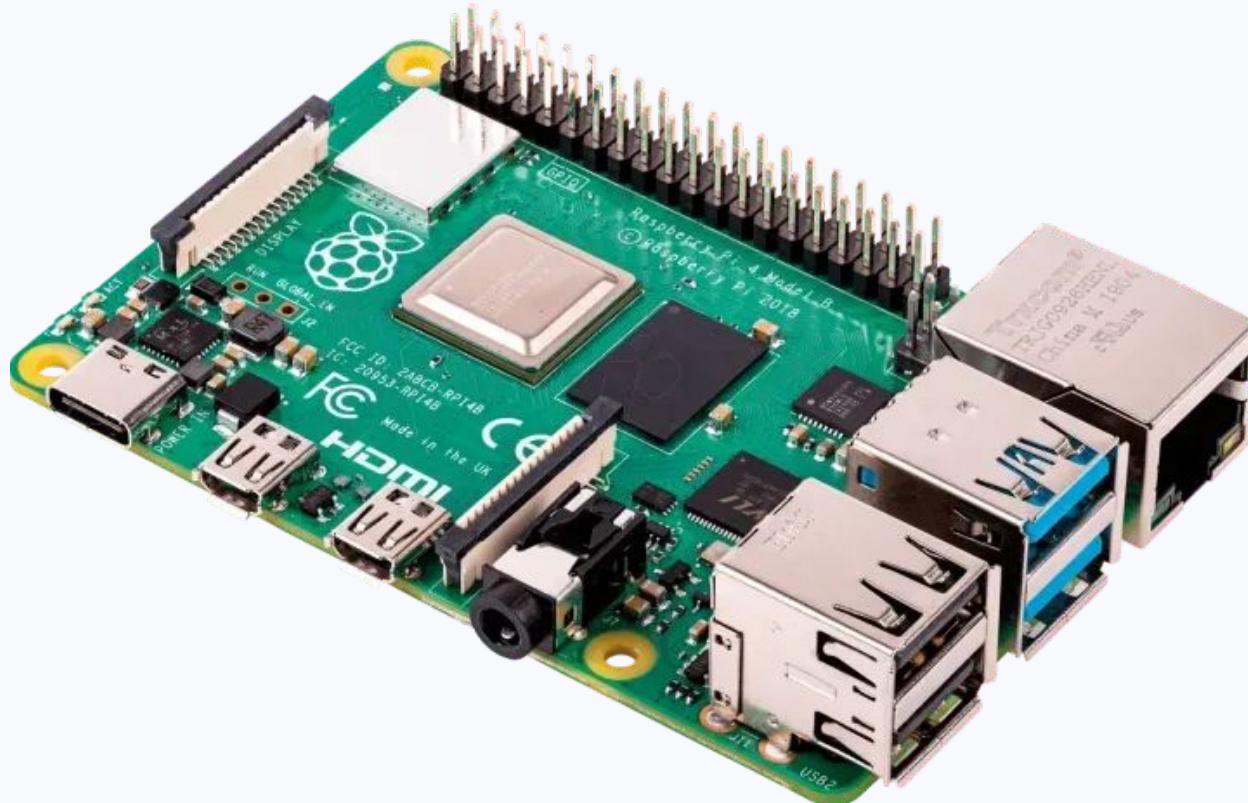


What can we do for the
IoT and embedded?



What does a developer
need to have a LAMP-like
stack for the IoT?





The screenshot shows a complex Node-RED flow running on a web browser. The flow is organized into several sections:

- Interacting with InfluxDB:** This section contains four parallel flows:
 - 1. "show all db's" - A "inject" node followed by a "Test Query" node.
 - 2. "show all tables" - A "inject" node followed by a "Test Query" node.
 - 3. "DROP" - A "inject" node followed by a "Test Query" node.
 - 4. "SELECT" - A "inject" node followed by a "Test Query" node.
- manual cost injection to DB:** A "cost in pence/kWh -> db (manual injection)" node followed by an "Insert Details for new a Device" node.
- sensor readings -> db & total calculated cost -> db:** This section includes:
 - A "sub: tasmota" node connected to an "Extract Device ID" node.
 - An "Archive payload / Set price query" node.
 - A "getPricePencePerKWh" node.
 - A "Modify payload for InfluxDB" node.
 - A "Price Calculator total pounds / kwh" node.
- Manual changes to devices/tasmota:** This section contains four parallel flows:
 - 1. "Prefix2" -> "change Prefix2 value (stat)"
 - 2. "10 seconds (change me)" -> "change TelePeriod value"
 - 3. "Prefix3" -> "change Prefix3 value (tele)"
 - 4. "custom cmnd" -> "cmnd"
- change mqtt prefix manually - change me first:** A "Prefix1" node connected to a "change Prefix1 value (Sub)" node.
- daily morning email report (turned off due to it coming through on telegram):** An "at 9AM send cmnd to" node connected to a "cmnd" node.
- Activate report email via MOTT:** A "vansense/cmnd/+email" node connected to a "SELECT" node, which then connects to a "calculator for today & yesterday" node.

The browser interface includes a sidebar with node categories like "filter nodes", "function", and "network". On the right, there is a "debug" panel showing a video feed of a person speaking and a list of participants: Alex (@embedded_iot), Marc Pous, Lizzie Epton, Mikhail Volkov, and Mikhail Volkov again.



MING





Mosquitto

(MQTT)





Mosquitto InfluxDB

(MQTT)

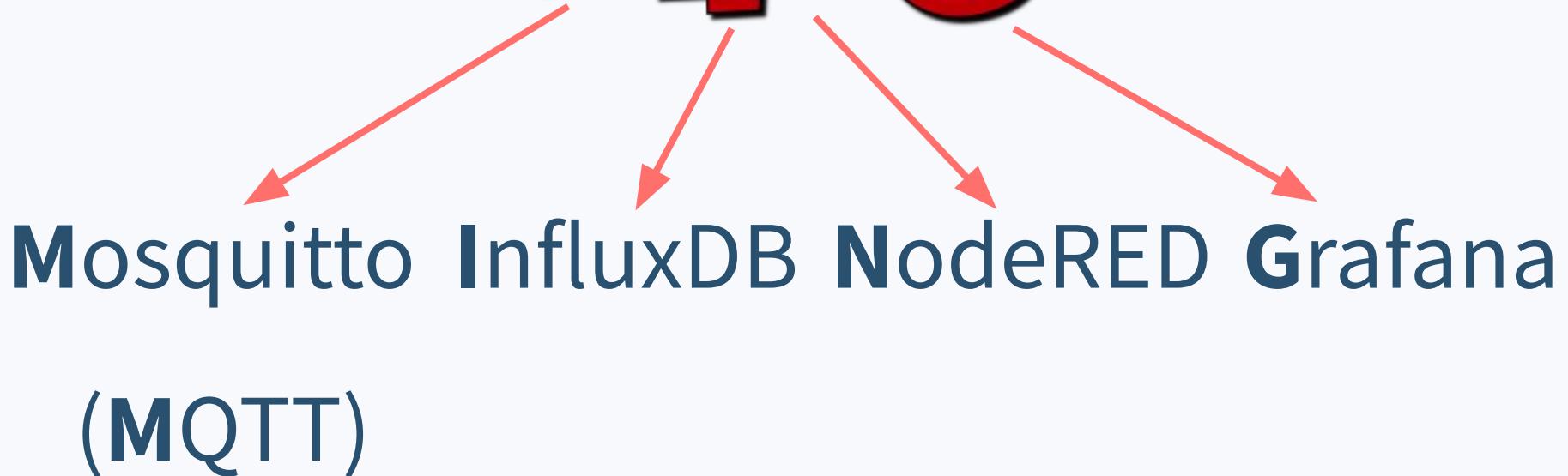




Mosquitto InfluxDB NodeRED

(MQTT)







MQTT InfluxDB NodeRED Grafana

DATA COMMUNICATION

DATA STORAGE

DATA PROCESSING / ACQUISITION

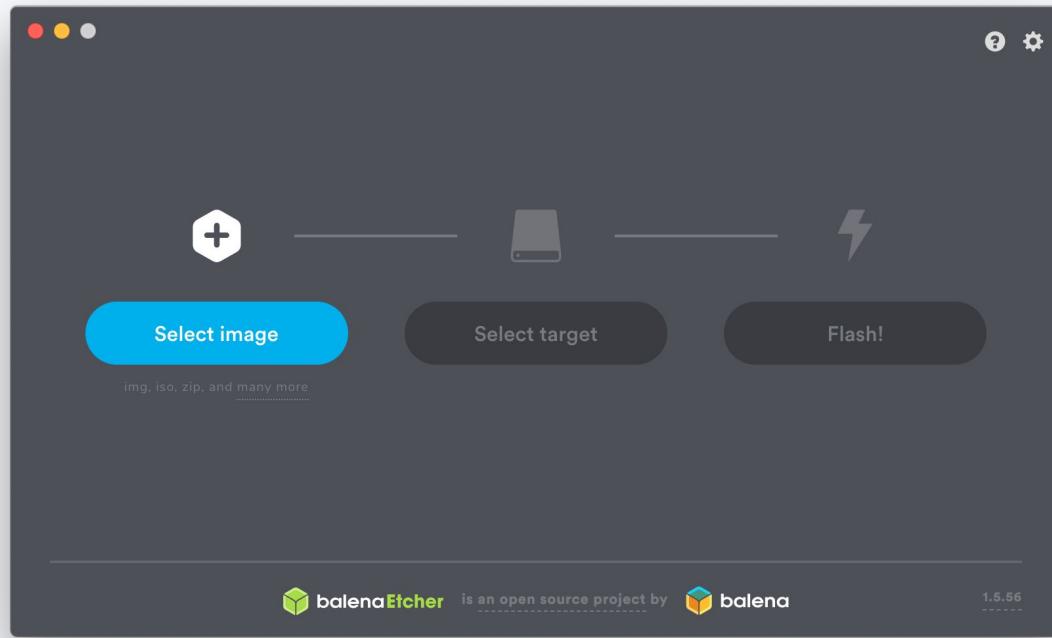
DATA VISUALIZATION



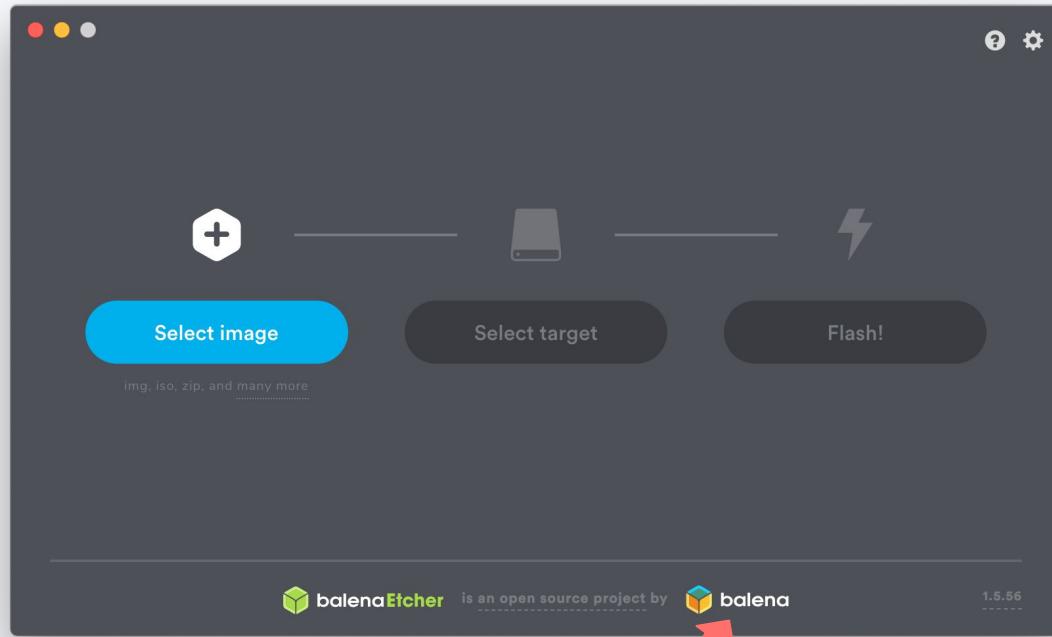
How can I get started?

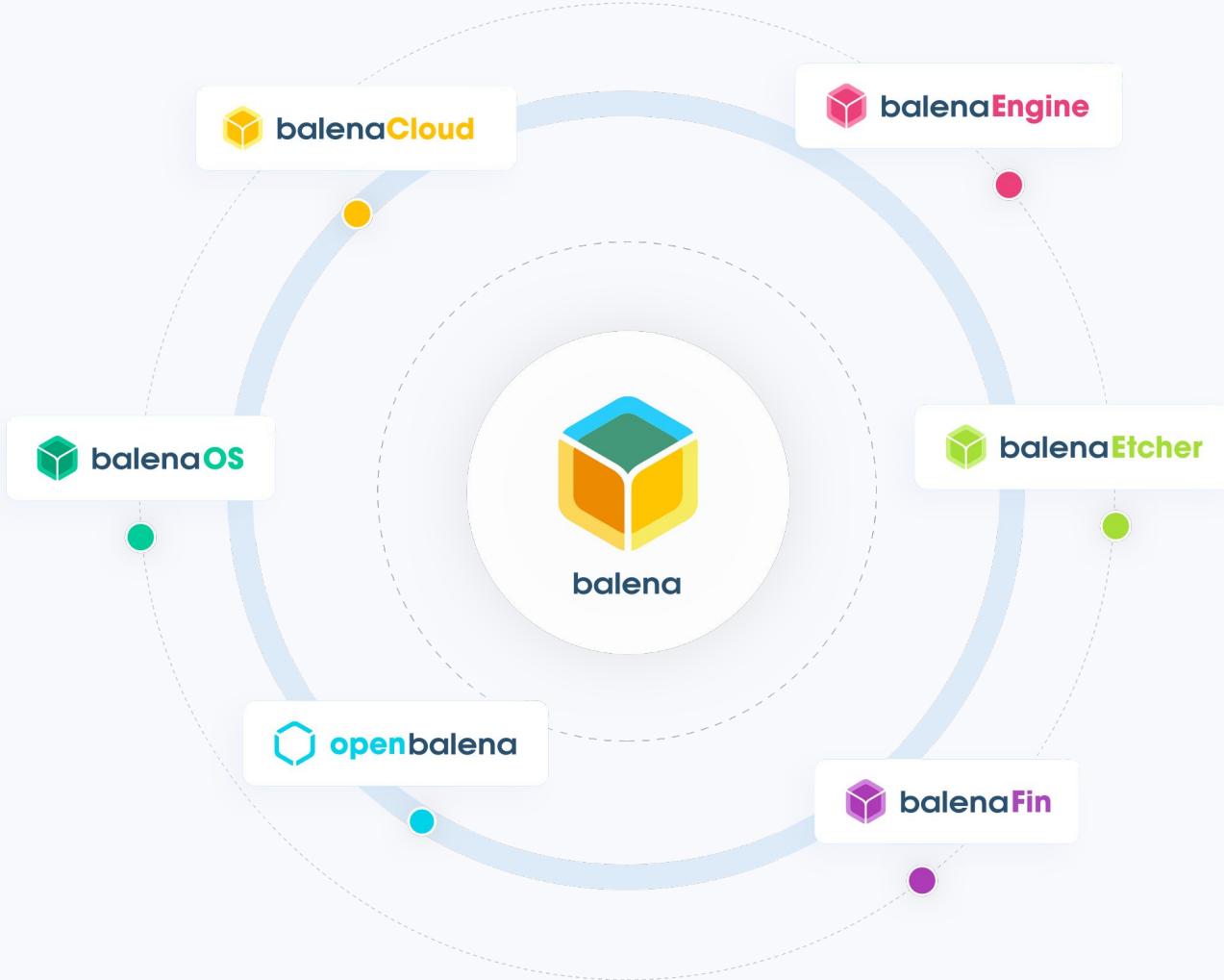


Anyone know this?

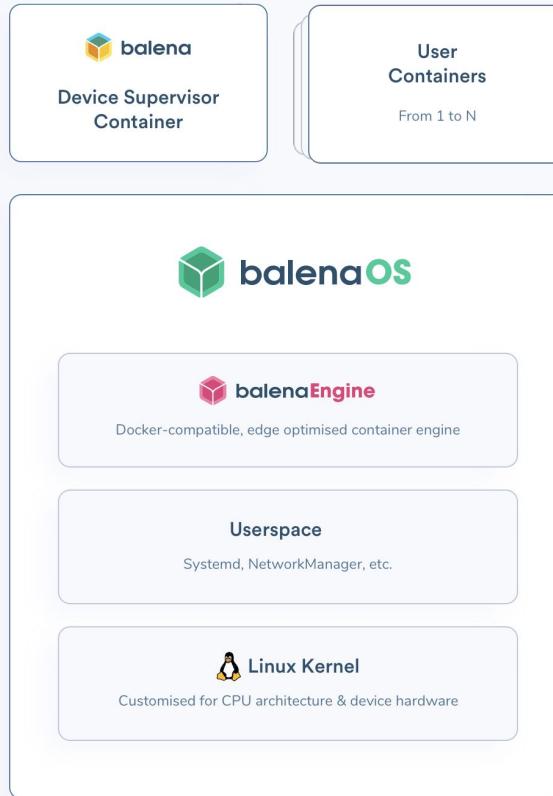


Anyone know this?

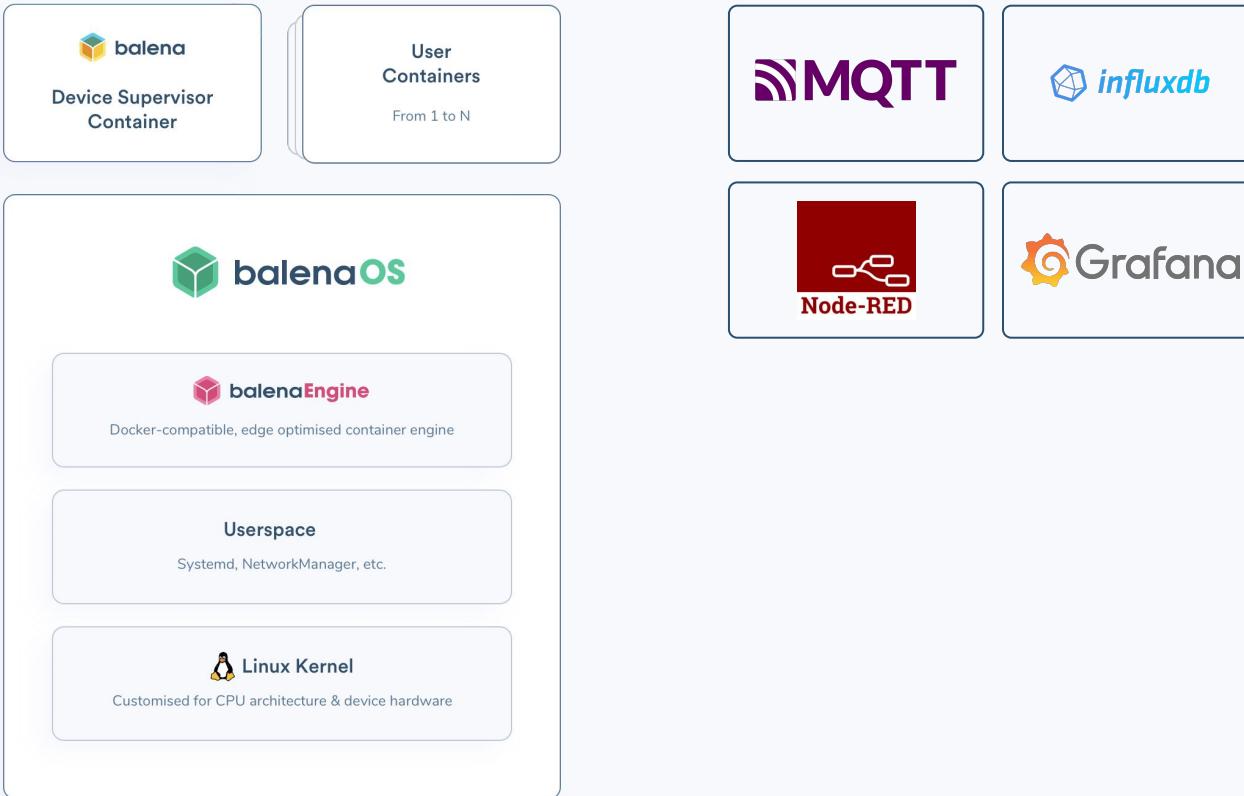




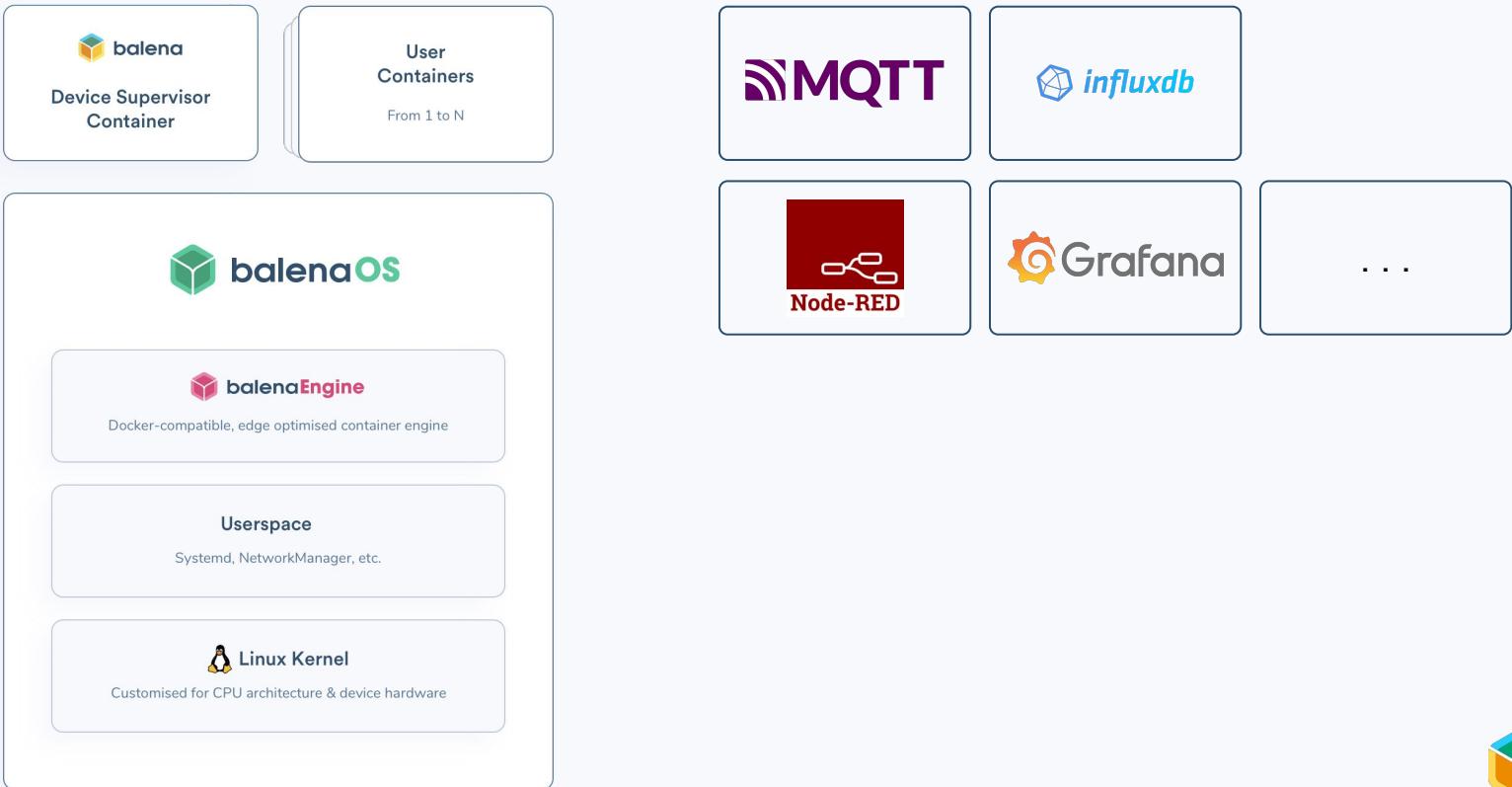
Let's take advantage of the containers in the Edge



Let's take advantage of the containers in the Edge



Let's take advantage of the containers in the Edge



The Die Hard method...



MING by Marc Pous - Balena X +

https://hub.balena.io/apps/1874947/MING

balenaHub IoT Marketplace

Apps Blocks Fleets for Good balenaCloud > IoT Dashboard

balenaHub has a new look! Read more on our blog

Home / Apps / MING Share

 **MING** by Marc Pous

Deploys MING Stak (MQTT, InfluxDB, NodeRED and Grafana). An Open-Source LAMP-like stack for the Internet of Things

[View code](#) [Report issue](#)

App overview

Version 0.0.0+rev10
Size 14MB
Last Update 7/10/2022
Supported Devices Raspberry Pi 3 (using 64bit OS), Raspberry Pi 4 (using 64bit OS), Raspberry Pi 400, Raspberry Pi CM4 IO Board

Description

No description

Release notes

No release notes

 Terms of use

<https://hub.balena.io/apps/1874947/MING>



Industrial-Gateway-MING-x86

https://hub.balena.io/apps/2016701/Industrial-Gateway-MING-x86

balenaHub
IoT Marketplace

balenaHub has a new look! Read more on our blog

Home / Apps / Industrial-Gateway-MING-x86

Share   

Industrial-Gateway-MING-x86

by Marc Pous

Industrial IoT gateway compatible with Modbus to convert legacy to digital.

Free

Deploy

View code  Report issue 

App overview

Version 0.0.0
Size 682MB
Last Update 6/2/2023
Supported Devices  Generic x86_64 (legacy MBR)  Intel NUC

Description

Run this Industrial IoT Gateway gateway compatible with amd64 and x86

using NodeRED, MQTT, InfluxDB and Grafan to convert legacy to digital in the edge. To access NodeRED use the local IP address on port 80, if you are on the same network of your device. You also can use the Public Device URL by balena to access to the Node-RED UI. Use balena as Username and Password to access to the Node-RED UI. You can change this variables on the Device Variables

To access Grafana use the local IP address on port 3000. Find more instructions on the [Github repository](#) and feel free to contribute.



balena dashboard | mean-rainfall

https://dashboard.balena-cloud.com/devices/79274f1c47d09ad5888d3d092a01e049

Getting Started Docs Forums Status Marc Pous

mean-rainfall

Actions

STATUS Online **UUID** 79274f1 **TYPE** Balena Fin (CM3)

ONLINE FOR 5 days **HOST OS VERSION** balenaOS 2.83.21+rev1 **SUPERVISOR VERSION** 12.10.3

CURRENT RELEASE 4e72605 **TARGET RELEASE** 4e72605

LOCAL IP ADDRESS 10.136.218.127 **PUBLIC IP ADDRESS** 192.168.1.34 **MAC ADDRESS** B8:27:EB:1F:04:F09
AC:3F:A4:EB:21:EC
AC:3F:A4:EB:20:EC

PUBLIC DEVICE URL [Link](#)

TAGS (0) [Edit](#)
No tags configured yet

SERVICES

Service	Status	Release	Actions
grafana	Running	4e72605	View Logs Terminal Edit Delete
influxdb	Running	4e72605	View Logs Terminal Edit Delete
mqtt	Running	4e72605	View Logs Terminal Edit Delete
node-red	Running	4e72605	View Logs Terminal Edit Delete
wifi-connect	Running	4e72605	View Logs Terminal Edit Delete

90% [Help](#) [Docs](#) [Forums](#) [Status](#) [Marc Pous](#)

Logs

Search entries... Add filter Views

```
07.10.22 02:35:02 (+0000) influxdb [httpd] 172.18.0.2 - - [07/Oct/2022:02:35:02 +0000] "GET /query?db=balena&q=show+field+keys HTTP/1.1" 200 70 "-" "Python-urllib/3.7" a549f3ed-45e8-11ed-8075-0242ac120003 1 159
07.10.22 02:35:02 (+0000) grafana Interim dashboard sync skipped: No schema found.
07.10.22 02:35:12 (+0000) influxdb [httpd] 172.18.0.2 - - [07/Oct/2022:02:35:12 +0000] "GET /query?db=balena&q=show+field+keys HTTP/1.1" 200 70 "-" "Python-urllib/3.7" ab42ab82-45e8-11ed-8076-0242ac120003 1 302
07.10.22 02:35:12 (+0000) grafana Interim dashboard sync skipped: No schema found.
07.10.22 02:35:22 (+0000) influxdb [httpd] 172.18.0.2 - - [07/Oct/2022:02:35:22 +0000] "GET /query?db=balena&q=show+field+keys HTTP/1.1" 200 70 "-" "Python-urllib/3.7" b13b454f-45e8-11ed-8077-0242ac120003 1 974
07.10.22 02:35:22 (+0000) grafana Interim dashboard sync skipped: No schema found.
```

Terminal

Select a target Start terminal session

Changelog v15.2.0

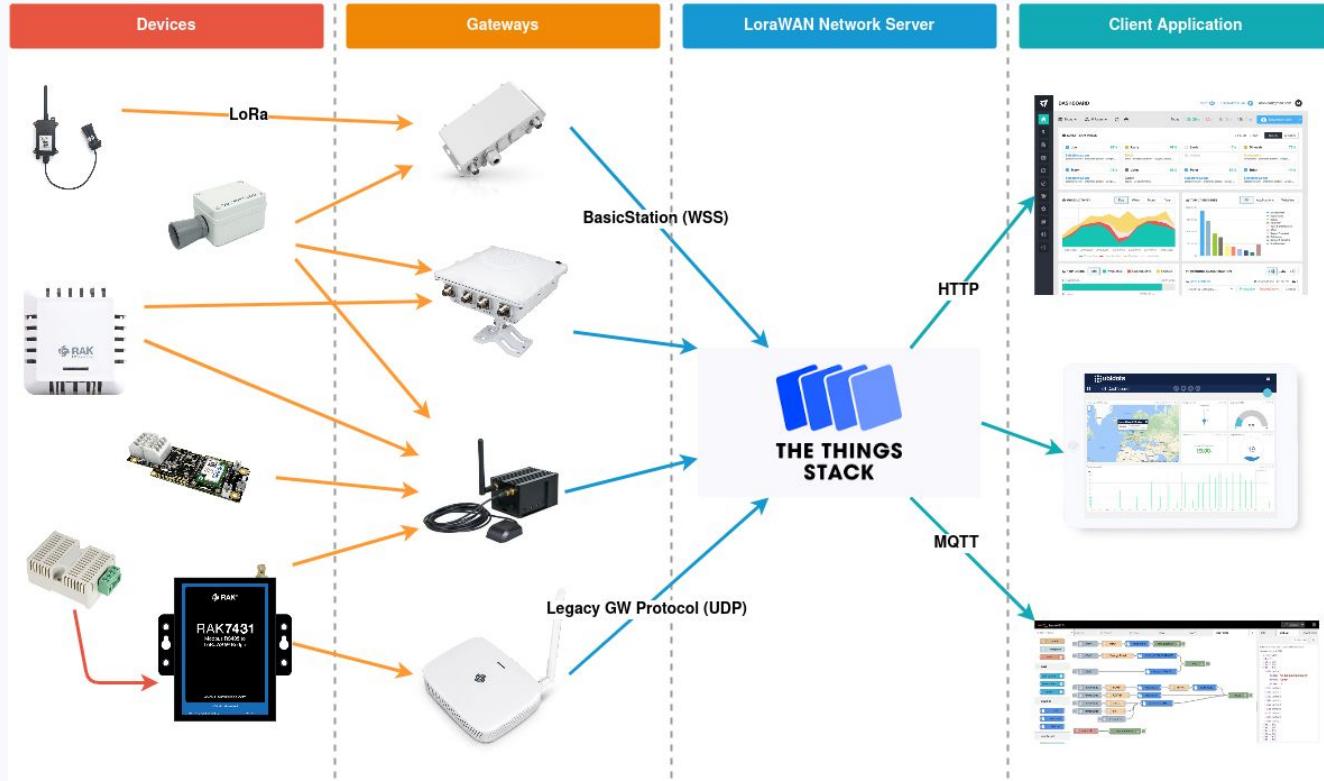
Need help ?



Some examples about MING?



LoRaWAN Network with MING



balena dashboard | aged-wood Application data - TTC Application balena Node-RED: 192.168.1.38 TTC Test - Grafana

https://dashboard.balena-cloud.com/devices/d4576c729cbdbbede732edf10217705d

90% Getting Started Docs Forums Status Marc Pous

Device Details:

- Status:** Online (green)
- UUID:** d4576c7
- Type:** Raspberry Pi 4 (using 64bit OS)
- Online For:** an hour
- HOST OS VERSION:** balenaOS 2.103.1+rev1 (development)
- SUPERVISOR VERSION:** 14.0.14
- CURRENT RELEASE:** 0fc85a1
- TARGET RELEASE:** 0fc85a1
- LOCAL IP ADDRESS:** 192.168.1.38
- PUBLIC IP ADDRESS:** 79.153.124.126
- MAC ADDRESS:** DC:A6:32:55:4B:34
- PUBLIC DEVICE URL:** (disabled)
- TAGS:** EUI:DCA632FFFFE554B34, URL:https://192.168.1.38
- NOTES:** EUI : DCA632FFFFE554B34

Services:

Service	Status	Release
basicstation	Running	0fc85a1
grafana	Running	0fc85a1
influxdb	Running	0fc85a1
node-red	Running	0fc85a1
postgres	Running	0fc85a1
redis	Running	0fc85a1
stack	Running	0fc85a1
wifi-connect	Running	0fc85a1

Logs:

Search entries... UTC Timestamps

```

: "pipe", "request_id": "01GDDADY55FB0AYKCHM8ATZ94Y"
20.09.22 11:27:20 (+0000) basicstation 2022-09-20 11:27:20.111 [SYN:VERB] Time sync rejected: quality=2
74 threshold=241
20.09.22 11:27:24 (+0000) influxdb 2022-09-20T11:27:24.536Z61Z info Executing query ("log_id"
: "0d2b81t000", "service": "query", "query": "SELECT Fieldkey, FieldType FROM balena.autogen_fieldKeys"
}
20.09.22 11:27:24 (+0000) influxdb [http://172.17.0.5:8086/] 208 153 "-" "Python-urllib/3.7" 322355e-38d7-11ed-81dd-0242ac100004 16
62
20.09.22 11:27:24 (+0000) grafana 2022-09-20T11:27:24 Dashboard not found
logger=
context user_id=0 org_id=1 remote_addr="Dashboard not Found" remote_addr=127.0.0.1
20.09.22 11:27:24 (+0000) grafana INFO [09-20|11:27:24] Request Completed
logger=
context user_id=0 org_id=1 uname=method=GET path=/api/dashboards/uid/paylod.end_device_ids.device_id stat
us=404 remote_addr=127.0.0.1 time_ms=152 size=33 referer=
20.09.22 11:27:24 (+0000) grafana Interim dashboard sync complete.

```

Terminal:

```

root@58a70af2e71a:/# influx
Connected to http://localhost:8086 version 1.7.11
InfluxDB shell version: 1.7.11
> create database balena

```



balena dashboard | shy-sky Overview - Console - The Thing +

https://012e801cea281877752c446b9295026.balena-devices.com/console/

THE THINGS STACK
Open Source

Overview Applications Gateways Organizations admin

Welcome to the Console!

Get started right away by creating an application or registering a gateway.

Need help? Have a look at our [Documentation](#).

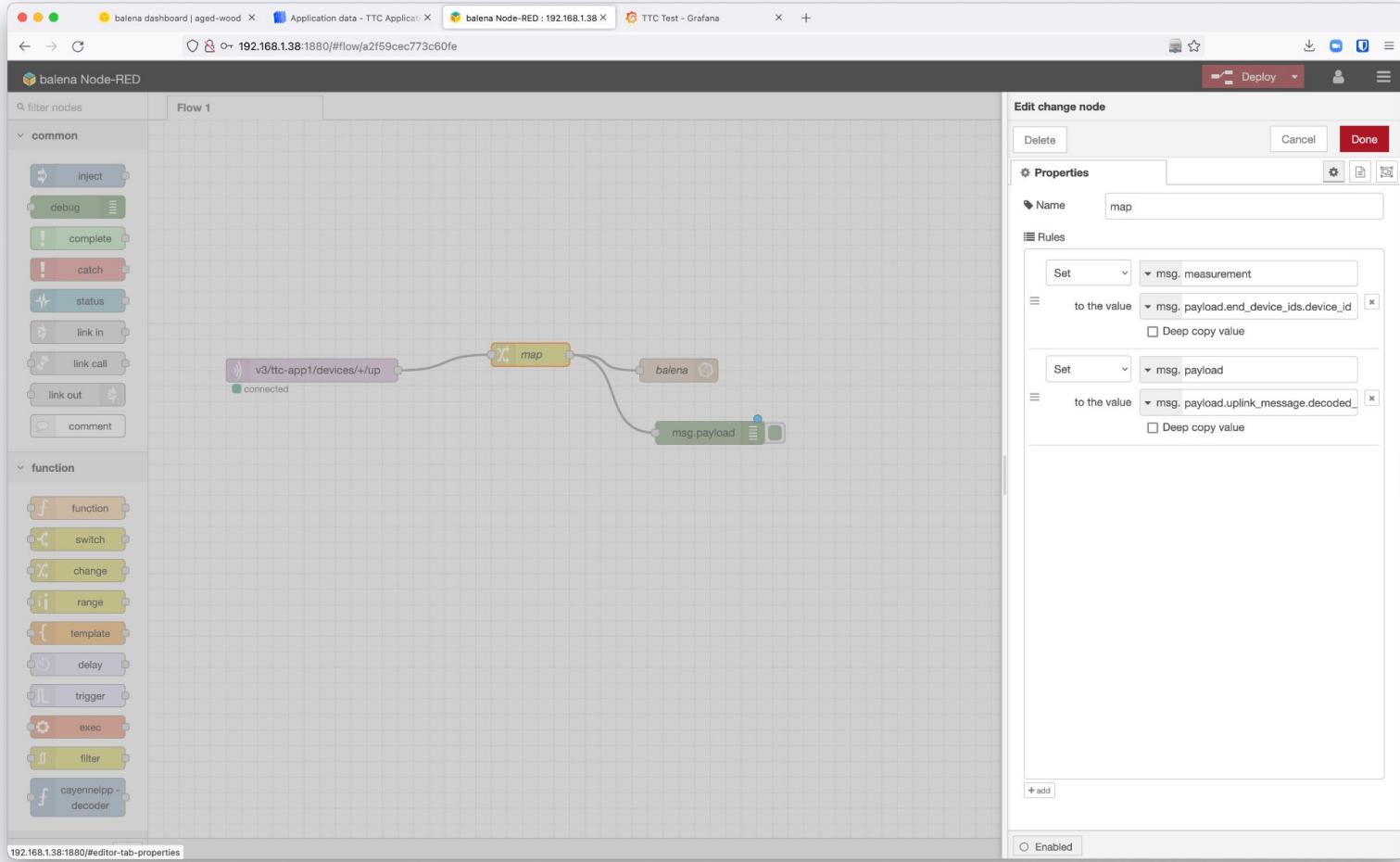
Create an application

Register a gateway

Version info Component status

Application Server





balena dashboard | aged-wood X Application data - TTC Applicat... X balena Node-RED : 192.168.1.38 X TTC Test - Grafana X

← → ⌂ ⌂ or 192.168.1.38:1880/#flow/a2f59cec773c60fe

balena Node-RED

Flow 1

filter nodes

common

- inject
- debug
- complete
- catch
- status
- link in
- link call
- link out
- comment

function

- function
- switch
- change
- range
- template
- delay
- trigger
- exec
- filter
- cayennelpp - decoder

```
graph LR; v3["v3/ttc-app1/devices/+/up"] --> map["map"]; map --> balena["balena"]; balena --> payload["msg.payload"]
```

Edit influxdb out node

Delete Cancel Done

Properties

Name: balena

Server: [v1.x] influxdb:8086/balena

Measurement:

Advanced Query Options

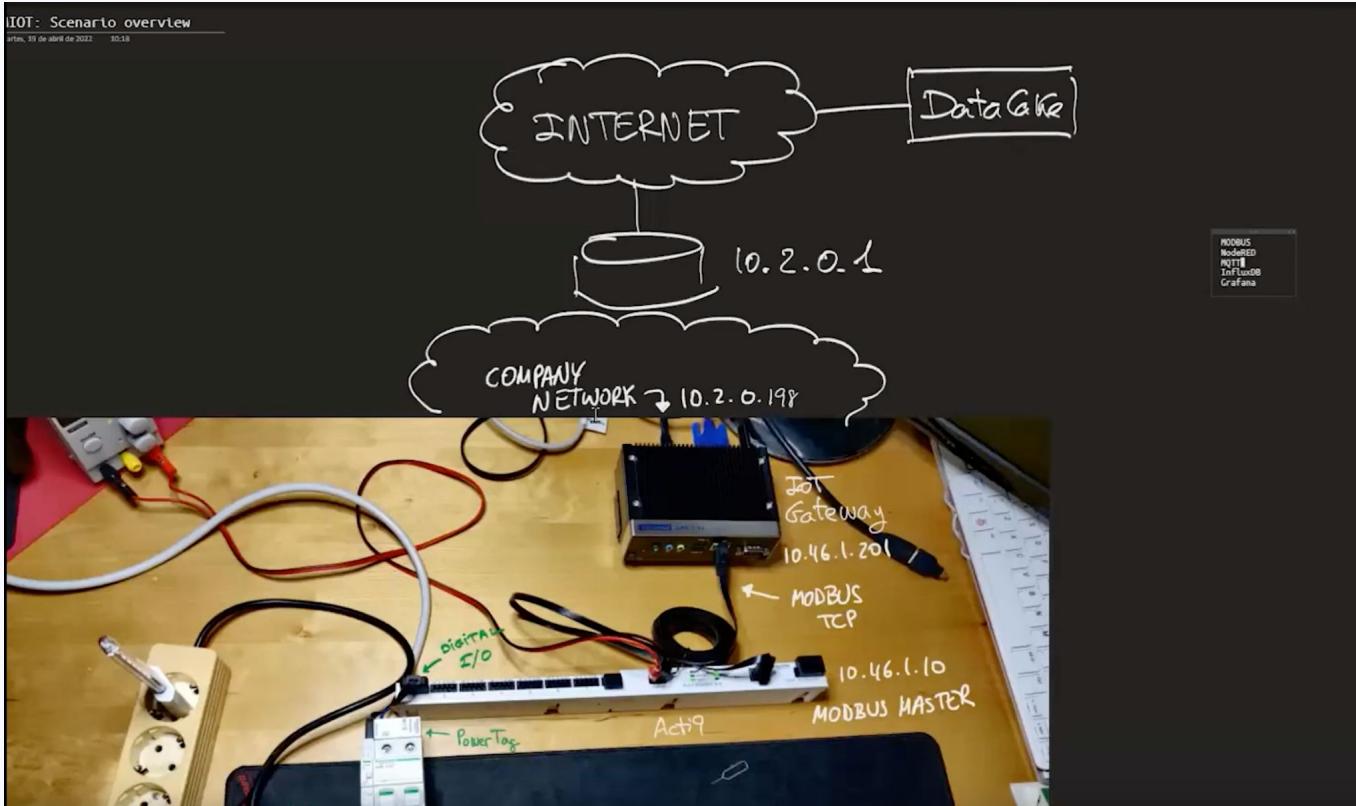
Tip: If no measurement is specified, ensure `msg.measurement` contains the measurement name.

Tip: If no retention policy is specified, `autogen` will be assumed.

Enabled



Industrial IoT?



YouTube MX

Search

Not secure | 10.2.0.198/#flow/b774e57a4fb492e4

balena Node-RED

pulling data to database aux bak

common

function

Workshop: From legacy to digital factory using open source tools

59 views · May 4, 2022

37:16 / 1:26:49

90%

Oríol Rus

Protocol translation

iC60N

Modbus Response

ic60n/status

mqtt

debug

current flow all

The screenshot shows a Node-RED flow titled "balena Node-RED". The flow consists of several nodes connected by wires. It starts with an "inject" node followed by a "debug" node. A "status" node is connected to the "debug" node. An "iC60N" node is connected to the "status" node. A "protocol translation" function node is connected to the "iC60N" node. A "Modbus Response" function node is connected to the "protocol translation" node. The output of the "Modbus Response" node is connected to an "ic60n/status" node, which is then connected to an "mqtt" node. The "mqtt" node has a status indicator "open". A "debug" node is also connected to the "mqtt" node. The left sidebar lists common and function nodes, and the right sidebar shows a video feed of a person named "Oríol Rus". The bottom of the screen shows a YouTube player interface with a video title, view count, date, and various interaction buttons.

<https://www.youtube.com/watch?v=Lit72r576QE>

<https://github.com/mpous/nodeRED-iiot-gateway>



Let's build it here :)



Let's wrap-up!



Why do we do this?

- Reduce friction to developers who want to get introduced into the IoT.
- Open-source and free toolkit.
- Flexible and scalable in multiple use cases.
- Feel free to contribute!



https://github.com/mpous/ming

The screenshot shows a GitHub repository page for 'mpous/ming'. The repository is public and contains 1 issue, 2 branches, and 0 tags. The master branch has 1 commit from 'mpous' made 10 hours ago. The README.md file describes 'MING (MQTT, InfluxDB, NodeRED and Grafana)' as an educative project based on MQTT, InfluxDB, balena Node-RED block, Grafana and WiFi Connect balena blocks. It is an Open-Source LAMP-like stack for the Internet of Things. The requirements section lists hardware components: Mosquitto MQTT broker, InfluxDB, NodeRed, Grafana, and WiFi Connect. The repository has 1 watching and 1 fork. It also includes sections for releases, packages, and contributors.

Code

Issues 1 Pull requests Actions Projects Wiki Security Insights Settings

master 2 branches 0 tags

Go to file Add file Code

mpous ming made by blocks 052f828 10 hours ago 1 commit

README.md ming made by blocks 10 hours ago

balena.yml ming made by blocks 10 hours ago

docker-compose.yml ming made by blocks 10 hours ago

logo.png ming made by blocks 10 hours ago

About

No description, website, or topics provided.

Readme 0 stars 1 watching 1 fork

Releases

No releases published Create a new release

Packages

No packages published Publish your first package

Contributors 16

+ 5 contributors





Marc Pous

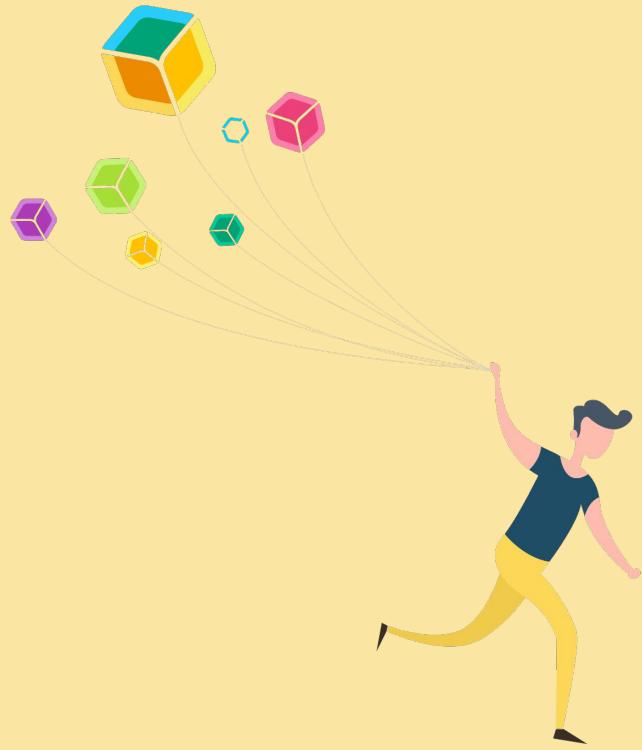
Developer Advocate @ balena.io

e: marc@balena.io

t: [@gy4nt](https://twitter.com/@gy4nt)



Questions?



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