Middleware

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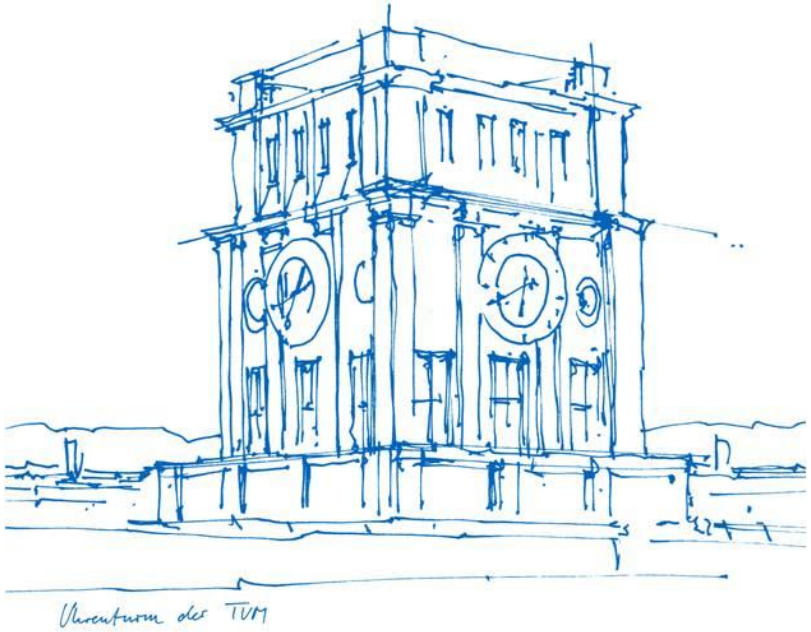

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Introduction

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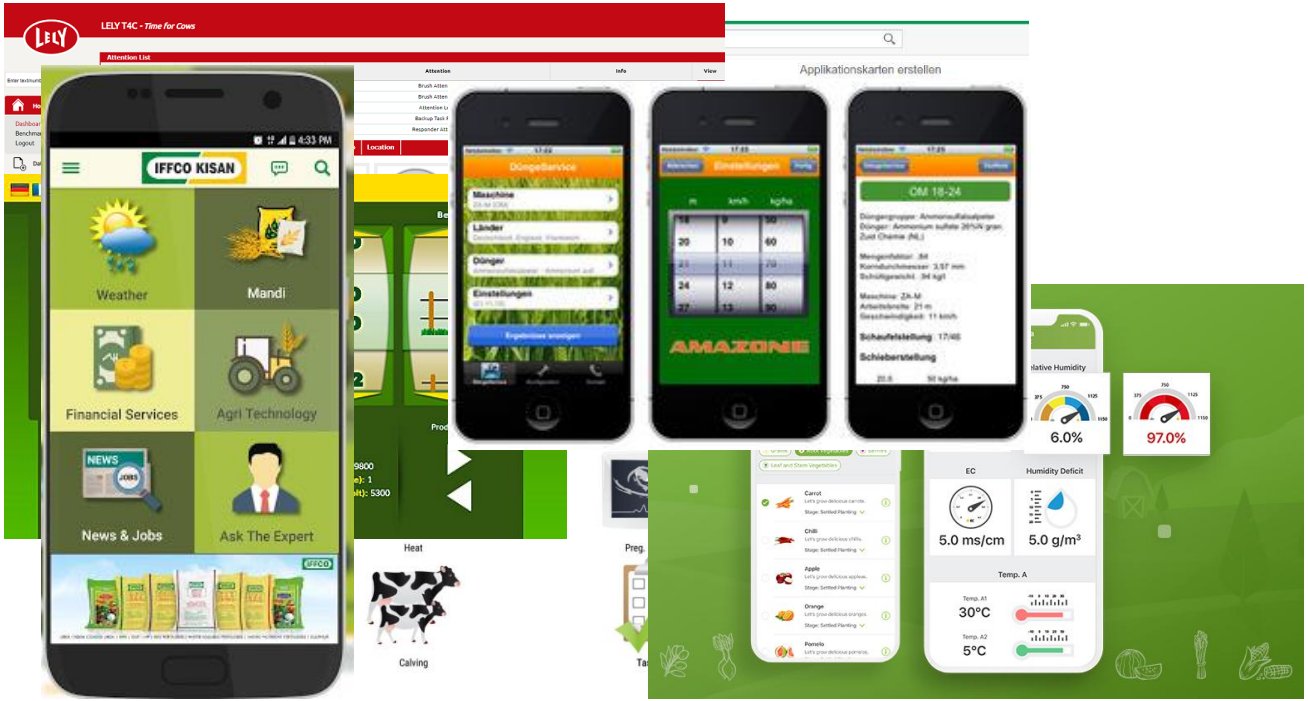
Problem: no compatibility & interoperability of digital services & IoT solutions in agriculture



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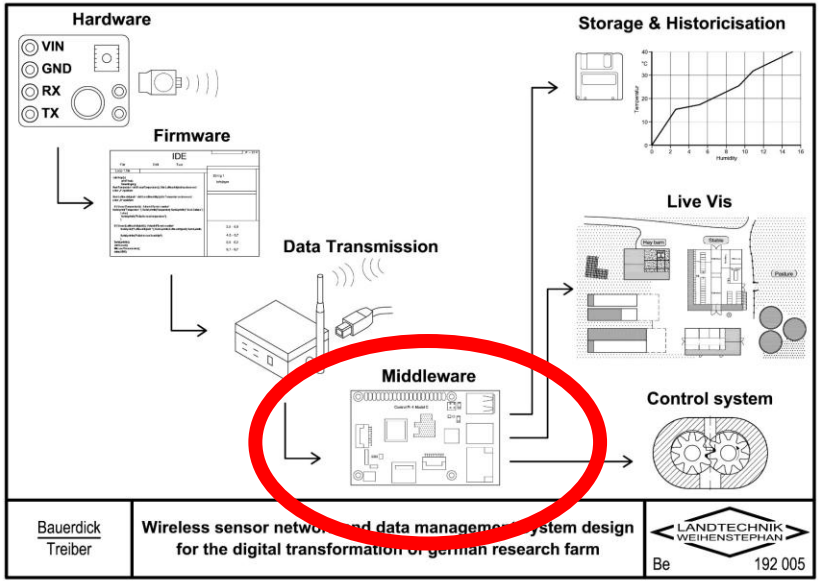
Middleware brings it all together – unseen by the user



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Definitions & Concepts

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Definitions

Server

Computer, providing services like Applications, data or other resources, in a way that other Computers (Clients) can access them in a network.

Differentiate:

- **Software-Server**: a program that communicates with other programs in a Client-Server-Model. The client can use functionalities provided by the server, e.g. applications, network services, access to a database or filesystem
- **Hardware-Server**, physical computer that runs one or several software servers

Middleware

Software for data exchange between applications that run on different operating systems or in different networks

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Middleware

Middleware is software that provides common services and capabilities to applications outside of what's offered by the operating system. Data management, application services, messaging, authentication, and API management are all commonly handled by middleware.
Middleware helps developers build applications more efficiently. It acts like the connective tissue between applications, data, and users.

For organizations with multi-cloud and containerized environments, middleware can make it cost-effective to develop and run applications at scale.

(source: RedHat)

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Examples for Middleware-like products from the agricultural domain

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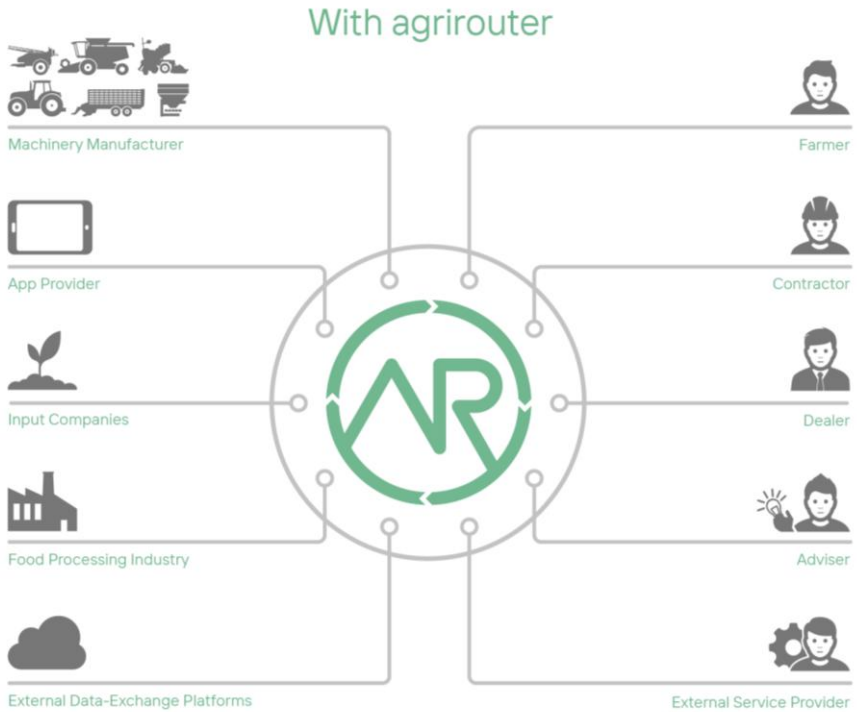
Examples for middleware in Ag

agrirouter



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DataConnect

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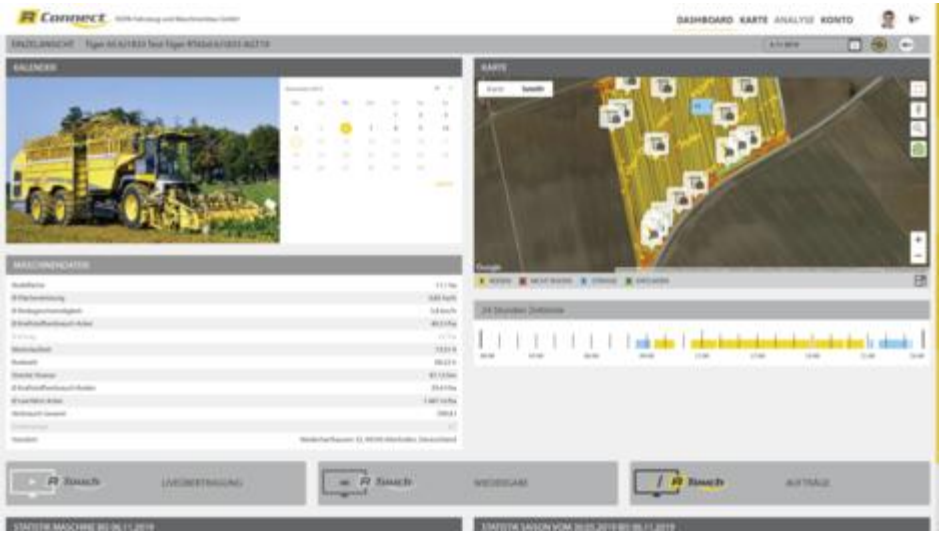
BEDM d.buddy



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NEVONEX

Powered by BOSCH

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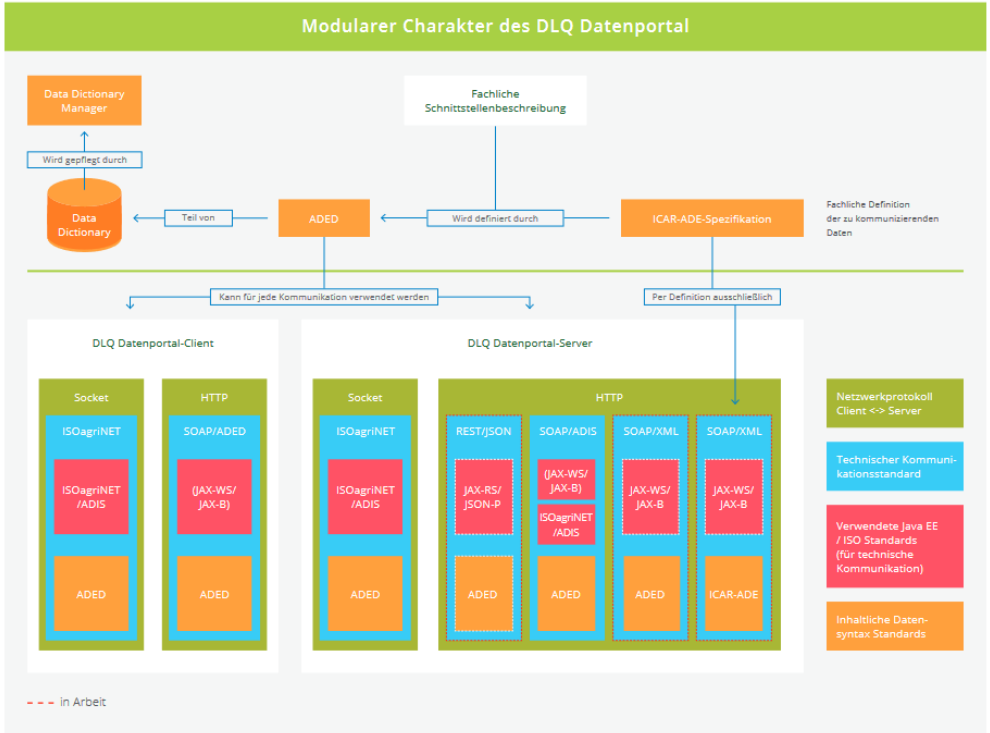
ISOagriNET & DLQ Datenportal (nicht aktiv!)



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Example Software from the open-source Home-Automation sector

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OpenHAB

Java-based Software, implemented in Eclipse Smart-Home-Framework

OpenHAB-Prjects consist of:

- Things
- Bindings
- Channels
- Items

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ioBroker

ioBroker is an integration platform for IoT based on JavaScript created with Node.js that can be used as a central Smart-Home-Server.

ioBroker Projects consist of:

- adapters
- instances
- objects

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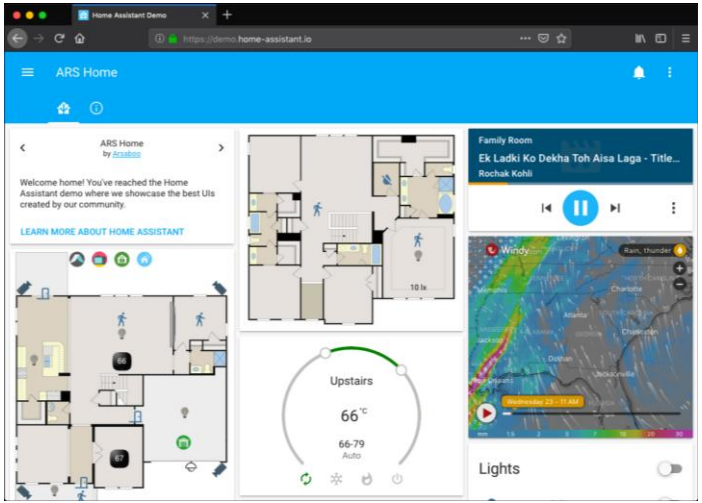
Home Assistant

Python-based, Open Source Home Automation Platform

- Markup Language config file
  - Definition of location
  - Binding of devices
- Components
  - Different devices and services
- Automations
  - Trigger
  - Condition
  - Action



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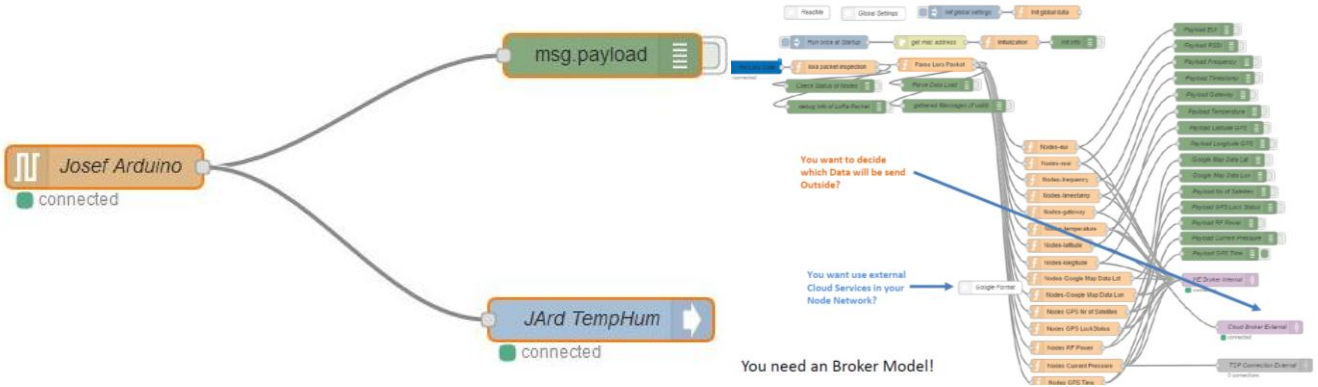
Node-Red

- Node-RED is an IoT programming environment based on JavaScript and Node.js
- Hardware-Devices, programing interfaces (APIs) and online services can be linked
- Lightweight solution suitable for use on cheap hardware like Raspis

There is a Node-RED adapter in ioBroker -> can be run as an instance on an ioBroker server!



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Middleware architecture – example: ioBroker

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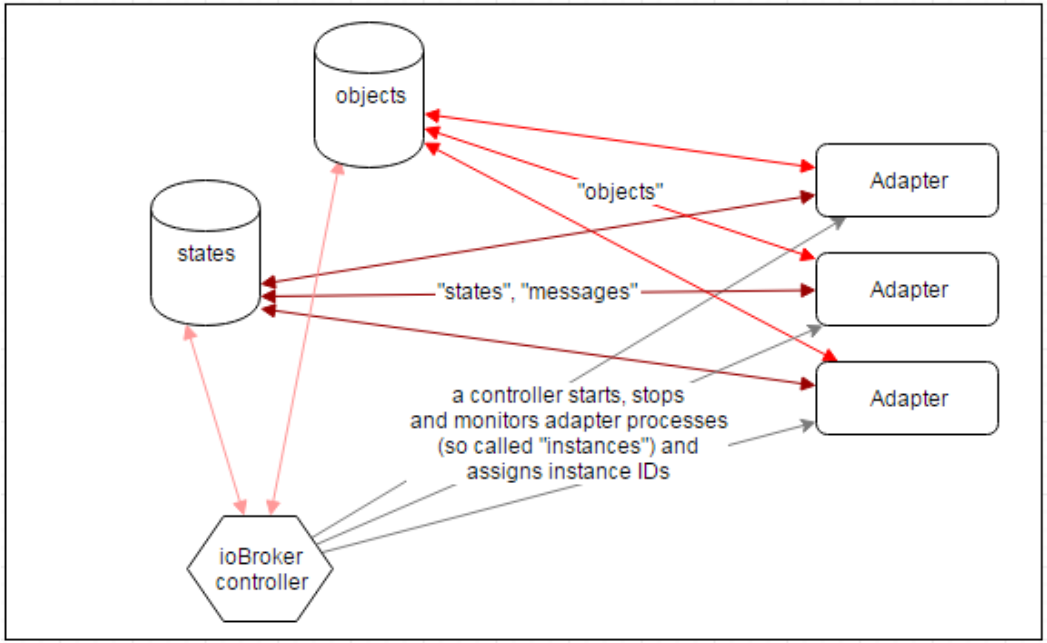
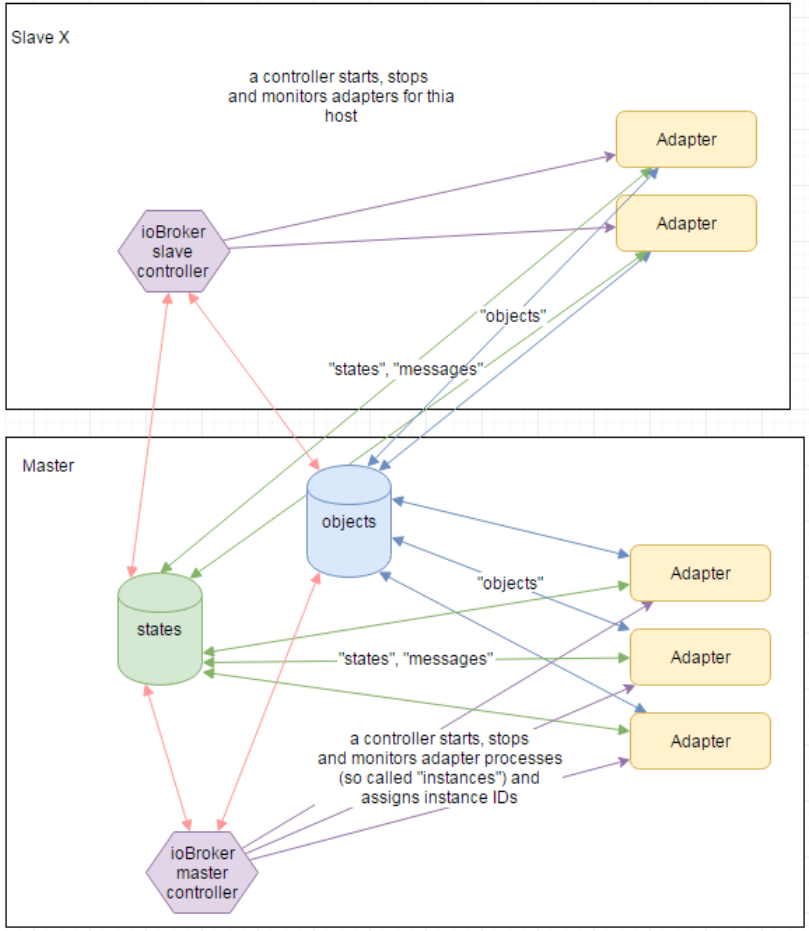
Modular architecture



Multihost capability



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Exercise Middleware

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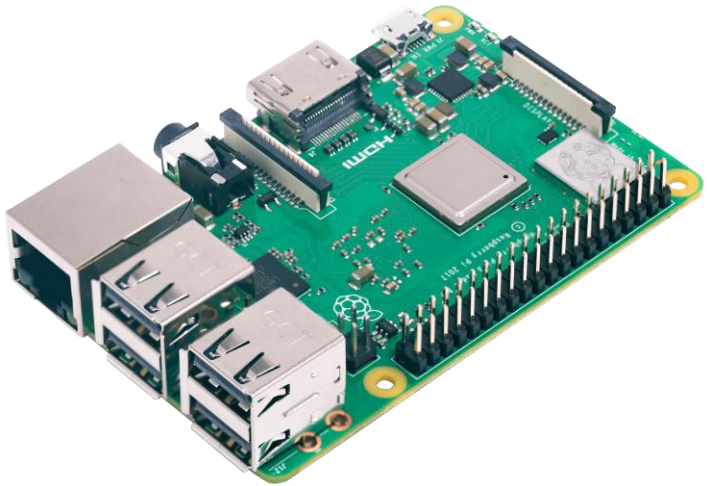
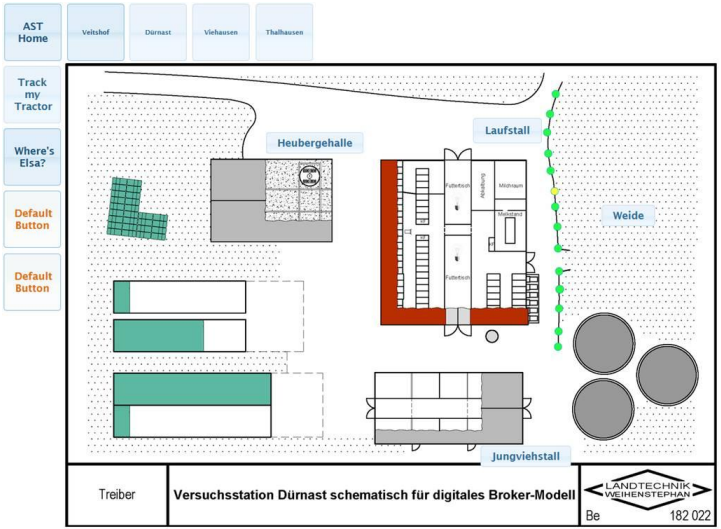
Exercise: setting up a Raspberry Pi as ioBroker Server





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Neccessary Hard- and Software

Software:

- Win32DiskImager (Windows) oder Etcher (Mac)
- Putty (Windows) or other terminal software (Mac have it included)
- Softperfect Network Scanner
- ioBroker image

Hardware:

- Raspberry Pi 3B (+)
- Power-supply
- Protective housing for Raspi
- Micro SD-card 16 GB recommended
- Micro SD-card reader
- Laptop

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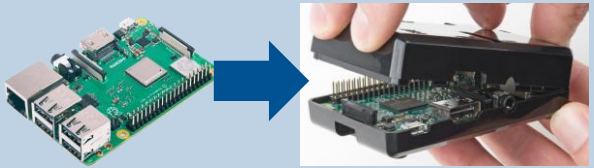
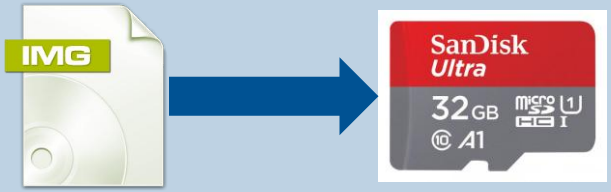
What you will do during the exercise

1. Unbox Raspi & assemble

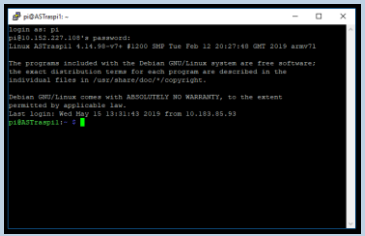
„Hey it‘s me Pandora, welcome to my new unboxing video“





2. Flash image to the SD-card

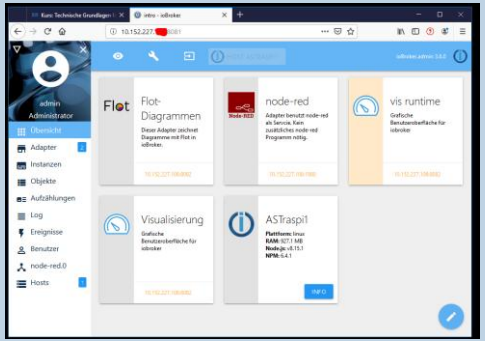
3. Start & configure Raspi



What you will do during the exercise

4. Access ioBroker from your browser

10.152.227.XXX:8081



5. Install adapters & build a dashboard

Congratulations you created your IoT Middleware Server!!!

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Questions to remember

- Difference hard-/software-server
- what is middleware?
- Process of setting up the Raspi