The OpenHAB platform

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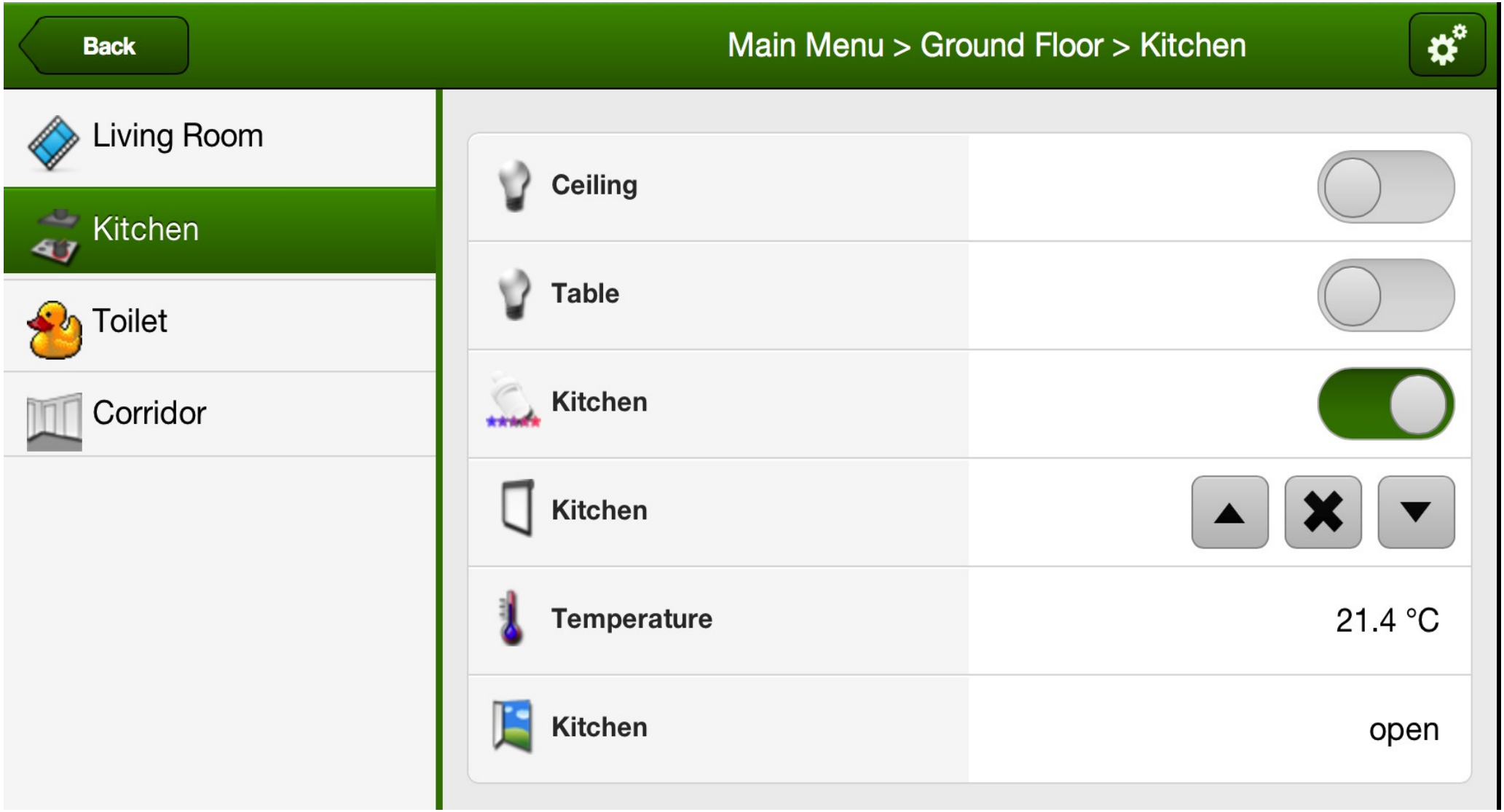
OpenHAB

https://code.google.com/p/openhab

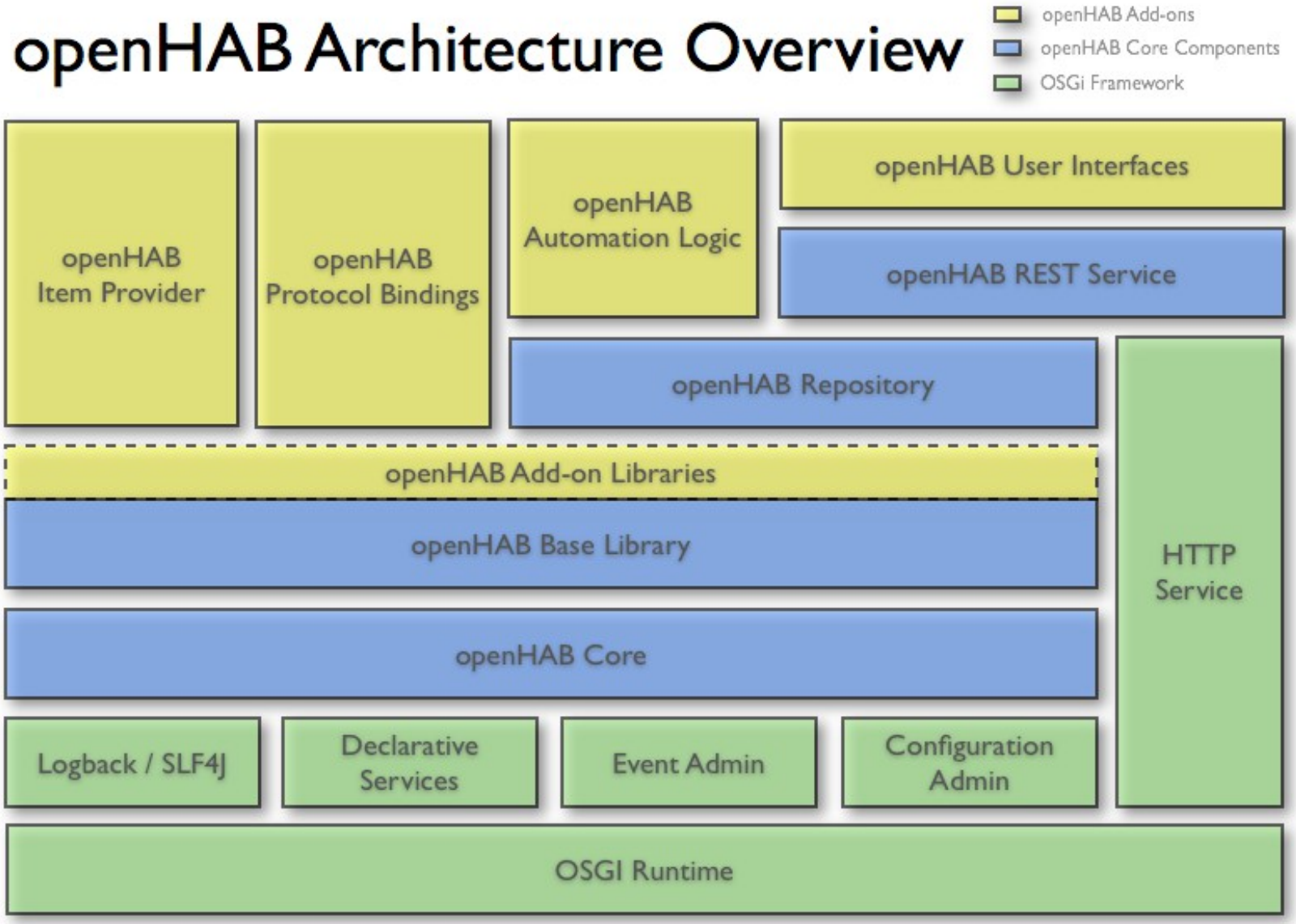
- open Home Automation Bus (openHAB)
- Universal integration platform
  for home automation things
- Based on OSGi Java (Equinox OSGi)
- Event bus (OSGi Event Admin)
- DSL for ECA Rules and HCI
  - Using Eclispe Xtext and Xtend
- Bindings with many SOHO protocols (enOcean, ZigBee, Hue ...)
- Now part of Eclipse Smart Home project
  - EPL licence

OpenHAB Demo

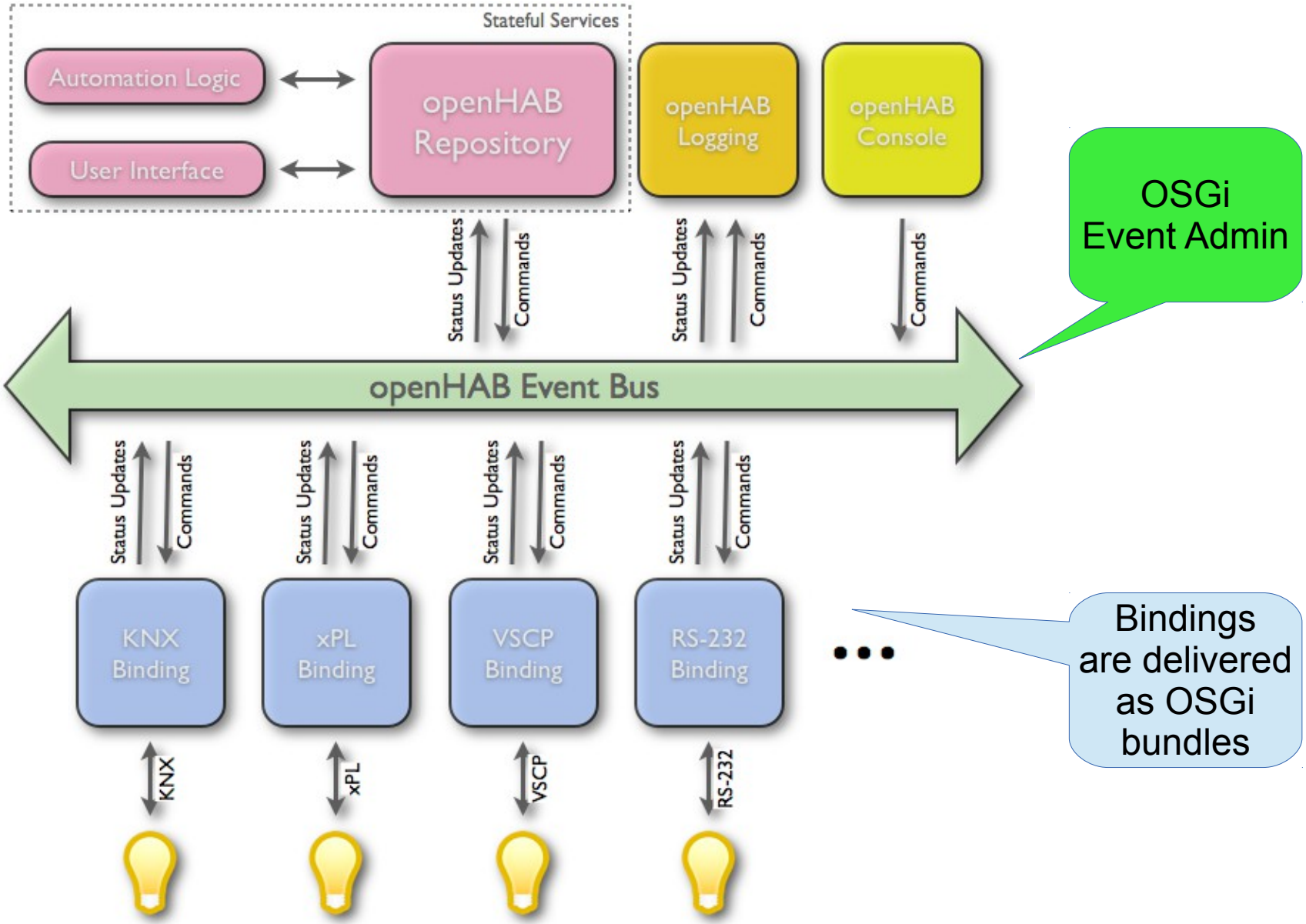
http://demo.openhab.org:8080/greent



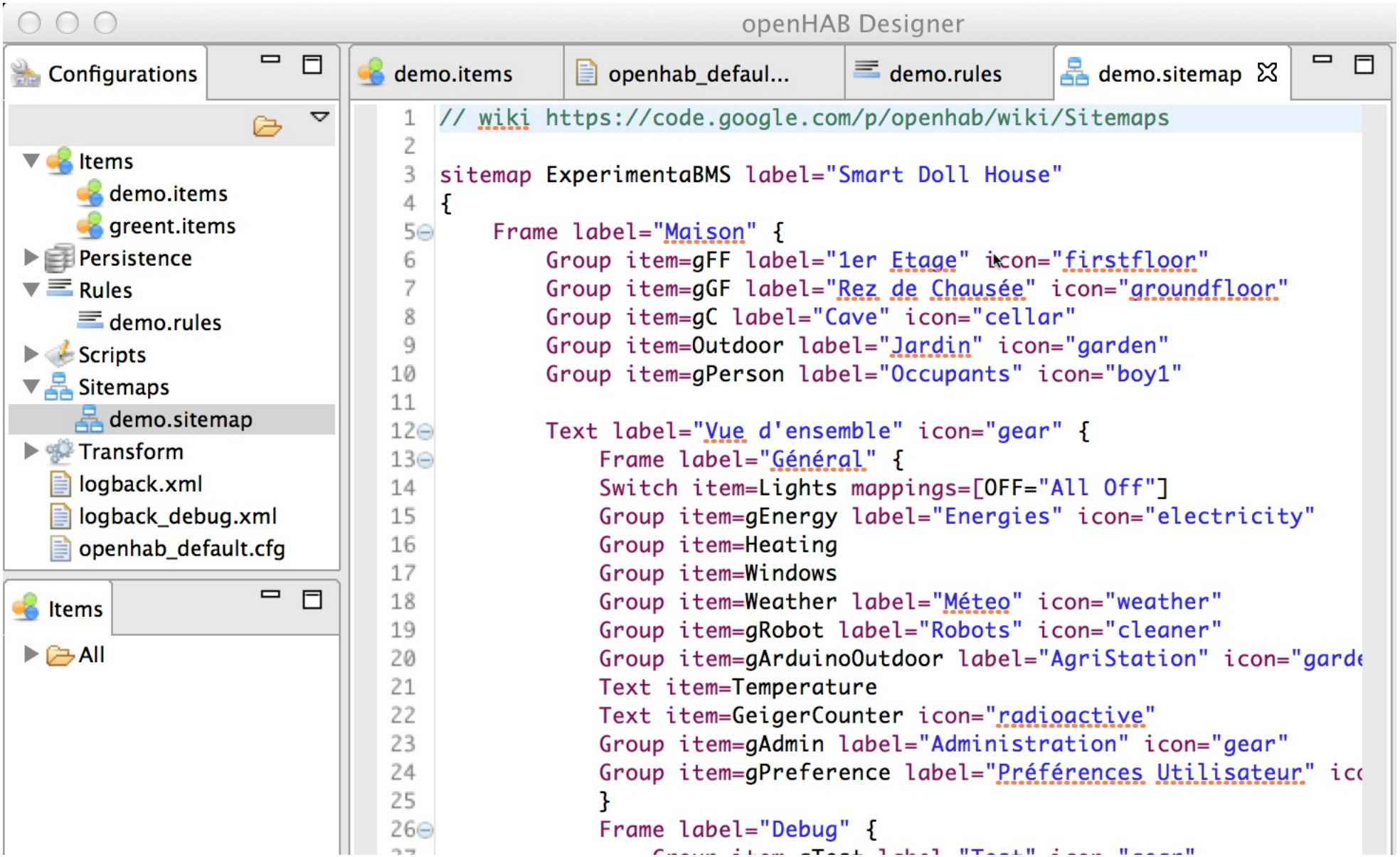
openHAB Architecture Overview



OpenHAB Event Bus



OpenHAB IDE


openHAB Designer
Configurations
Items
demo.items
greent.items
Persistence
Rules
demo.rules
Scripts
Sitemaps
demo.sitemap
Transform
logback.xml
logback_debug.xml
openhab_default.cfg
Items
All
demo.items
openhab_defaul...
demo.rules
demo.sitemap
1 // wiki https://code.google.com/p/openhab/wiki/Sitemaps
2
3 sitemap ExperimentaBMS label="Smart Doll House"
4 {
5 Frame label="Maison" {
6 Group item=gFF label="1er Etage" icon="firstfloor"
7 Group item=gGF label="Rez de Chausée" icon="groundfloor"
8 Group item=gC label="Cave" icon="cellar"
9 Group item=Outdoor label="Jardin" icon="garden"
10 Group item=gPerson label="Occupants" icon="boy1"
11
12 Text label="Vue d'ensemble" icon="gear" {
13 Frame label="Général" {
14 Switch item=Lights mappings=[OFF="All Off"]
15 Group item=gEnergy label="Energies" icon="electricity"
16 Group item=Heating
17 Group item=Windows
18 Group item=Weather label="Météo" icon="weather"
19 Group item=gRobot label="Robots" icon="cleaner"
20 Group item=gArduinoOutdoor label="AgriStation" icon="garde
21 Text item=Temperature
22 Text item=GeigerCounter icon="radioactive"
23 Group item=gAdmin label="Administration" icon="gear"
24 Group item=gPreference label="Préférences Utilisateur" ico
25 }
26 Frame label="Debug" {

Model : Items and Groups

- Items
  - Are SOHO-specific sensors & actuators
    - *Switch, Dimmer, RollerShutter, Color, Contact, Number, Text*
  - Sensors emit « state » events
  - Actuators receive « command » events
  - Bound to protocols (*enOcean, Serial, Hue, ModBus, MQTT ...*)
- Groups
  - of Items
  - of Group
  - Logical, Physical, Device … classes and sub-classes
  - can be active (command and state)

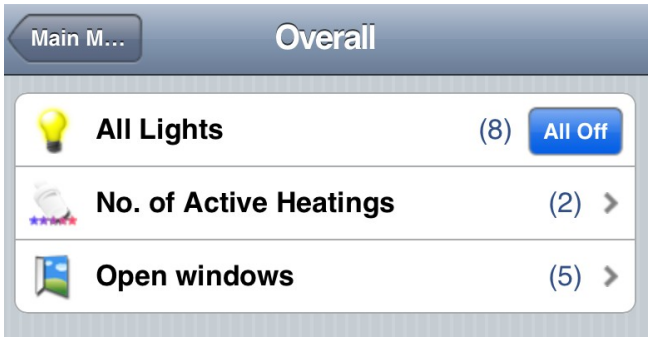
DSL for Items and Groups

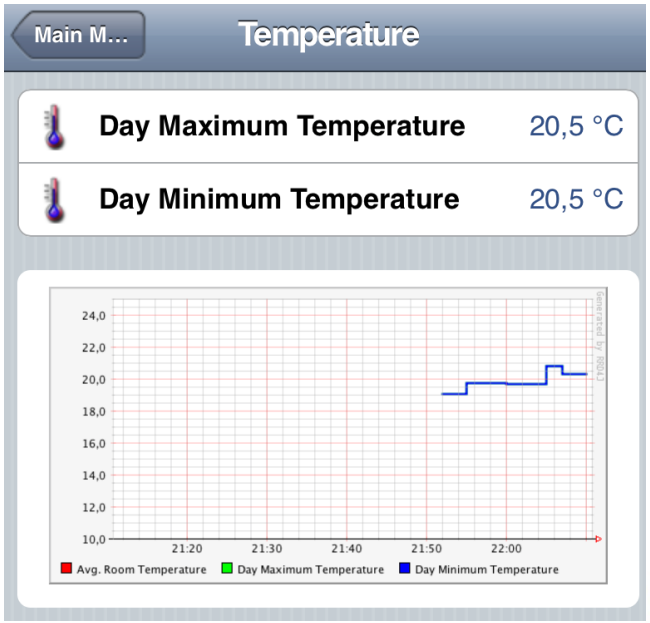
```
Group All
Group gGF                                                (All)
Group gFF                                                (All)
...
Group GF_Living         "Living Room"   <video>          (gGF)
Group GF_Kitchen        "Kitchen"       <kitchen>        (gGF)
Group FF_Office         "Office"        <office>         (gFF)
Group FF_Child          "Child's Room"  <boy>            (gFF)
...
Group Shutters                                           (All)
Group Lights                                             (All)
...
Group:Switch:OR(ON, OFF)      Lights          "All Lights [(%d)]"    (All)
Group:Number:AVG      Temperature    "Avg. Room Temperature [%.1f °C]" <temperature> (Status)
...
Dimmer Light_GF_Living_Table          "Table"                                (GF_Living, Lights)
Switch Light_GF_Kitchen_Table         "Table"                                (GF_Kitchen, Lights)
Switch Heating_GF_Corridor            "GF Corridor"   <heating>              (GF_Corridor, Heating)
Switch Shutter_all                                                           (Shutters)
Rollershutter Shutter_GF_Kitchen      "Kitchen"                              (GF_Kitchen, Shutters)
Number Temperature_GF_Corridor  "Temperature [%.1f °C]" <temperature> (Temperature, GF_Corridor)
Contact Window_GF_Frontdoor   "Frontdoor [MAP(en.map):%s]"                   (GF_Corridor, Windows)

Switch Button_Up              {enocean="{id=00:00:00:00, eep=F6:02:01, channel=B, parameter=I}"}
Number Temp_FF_Office         {onewire="26.AF9C32000000#temperature"}
Color PhilipsHueBulb          {hue="1"}
```

DSL for HCI

```
sitemap demoCamp label="Main Menu" {
      Frame {
            Group item=gFF label="First Floor" icon="firstfloor"
            Group item=gGF label="Ground Floor" icon="groundfloor"
            Text label="Overall" icon="settings" {
                  Switch item=Lights mappings=[OFF="All Off"]
                  Group item=Heating
                  Group item=Windows

            }
      }
      Frame label="Chart" {
            Text item=Temperature label="Temperature" {
                  Frame {
                        Text item=Temp_Max
                        Text item=Temp_Min
                  }
                  Frame {
                        Chart item=Temp_Chart period=h refresh=10000
                  }
            }
      }
}
```

DSL for HCI






```
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      Frame {
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            Group item=gGF label="Ground Floor" icon="groundfloor"
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                  Group item=Windows

            }
      }
      Frame label="Chart" {
            Text item=Temperature label="Temperature" {
                  Frame {
                        Text item=Temp_Max
                        Text item=Temp_Min
                  }
                  Frame {
                        Chart item=Temp_Chart period=h refresh=10000
                  }
            }
      }
}
```

DSL for ECA Rules

```
var Timer timer = null

rule "Update max and min temperatures"
when
        Item Temperature changed or
        Time cron "0 0 0 * * ?" or
        System started
then
        postUpdate(Temp_Max, Temperature.maximumSince(now.toDateMidnight).state)
        postUpdate(Temp_Min, Temperature.minimumSince(now.toDateMidnight).state)
end


rule "Set random room temperatures"
        when
                System started or
                Time cron "0 0/5 * * * ?"
        then
                Temperature?.members.forEach(temperature|
                        postUpdate(temperature, 20.0
                        + (25.0 - (Math::random * 50.0).intValue) / 10.0)
                )
end
```

Condition

Xtend

Bindings

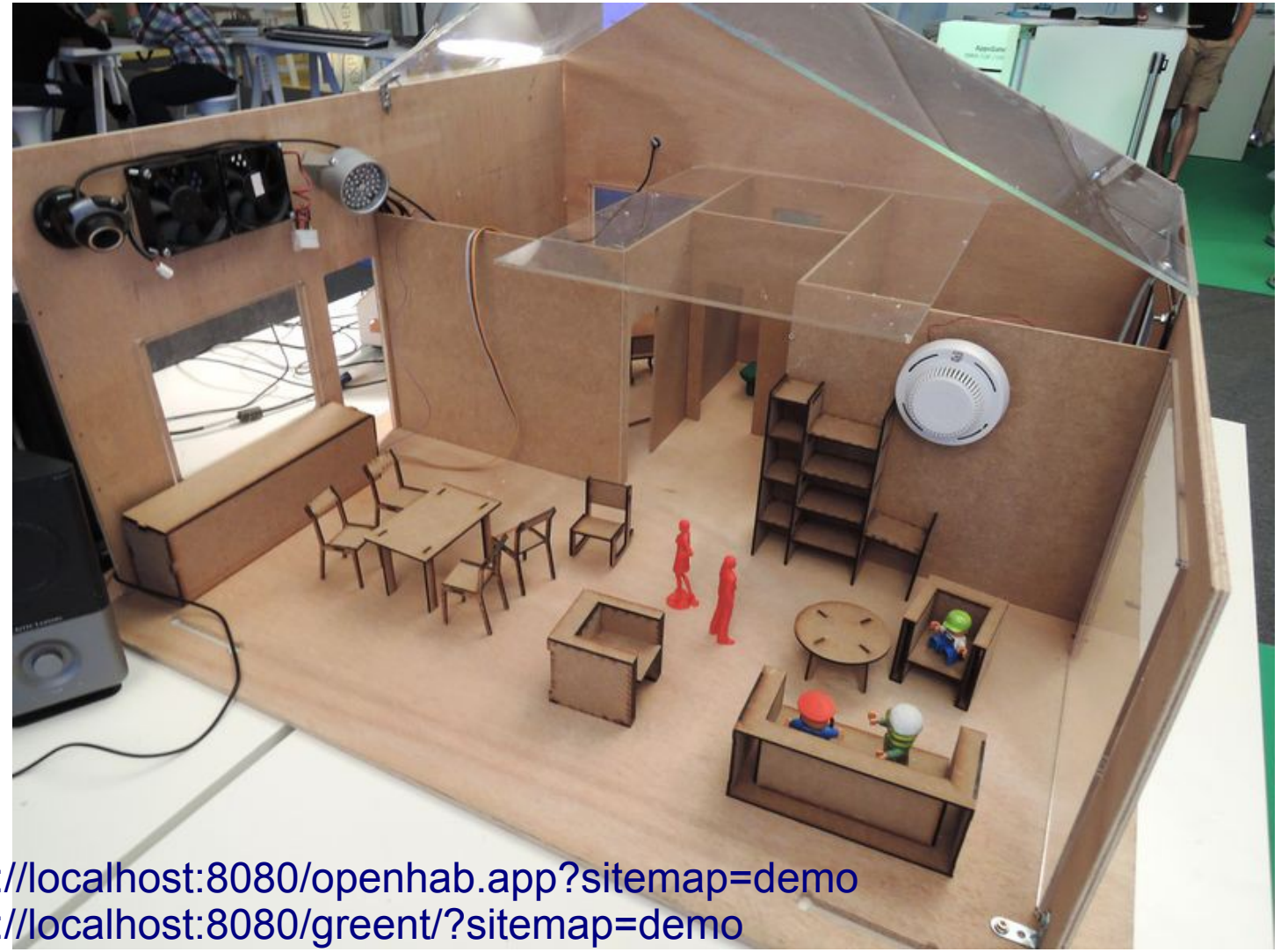
- Devices
  - Serial, enOcean, KNX, ...
- Communication protocols
  - HTTP, MQTT
- Utilities
  - NTP …
- Custom
  - CSVReplay

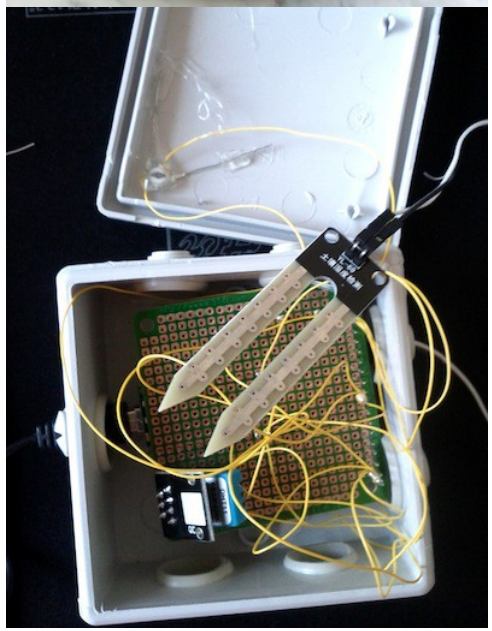
```
Switch Button_Up            {enocean="{id=00:00:00:00, eep=F6:02:01, channel=B, parameter=I}"}
Number Temp_FF_Office       {onewire="26.AF9C32000000#temperature"}
Color PhilipsHueBulb        {hue="1"}
```

Misc with OpenHAB

- MQTT (Binding)
- Mosquitto,
- Node-RED
  - MongoDB, Redis.io
- MQTT Panel

Demo Smart Doll House
OpenHAB + Arduino + MQTT

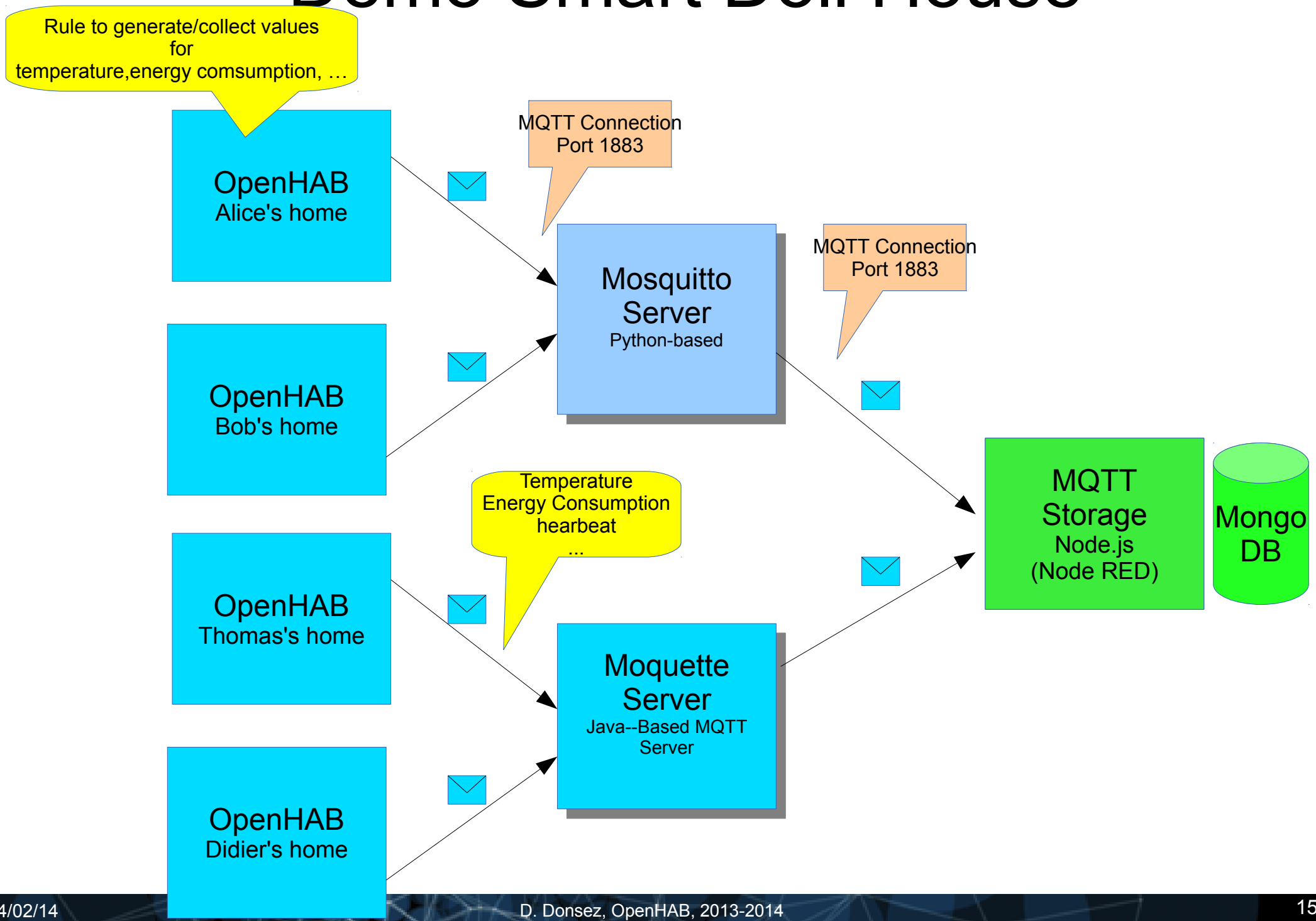




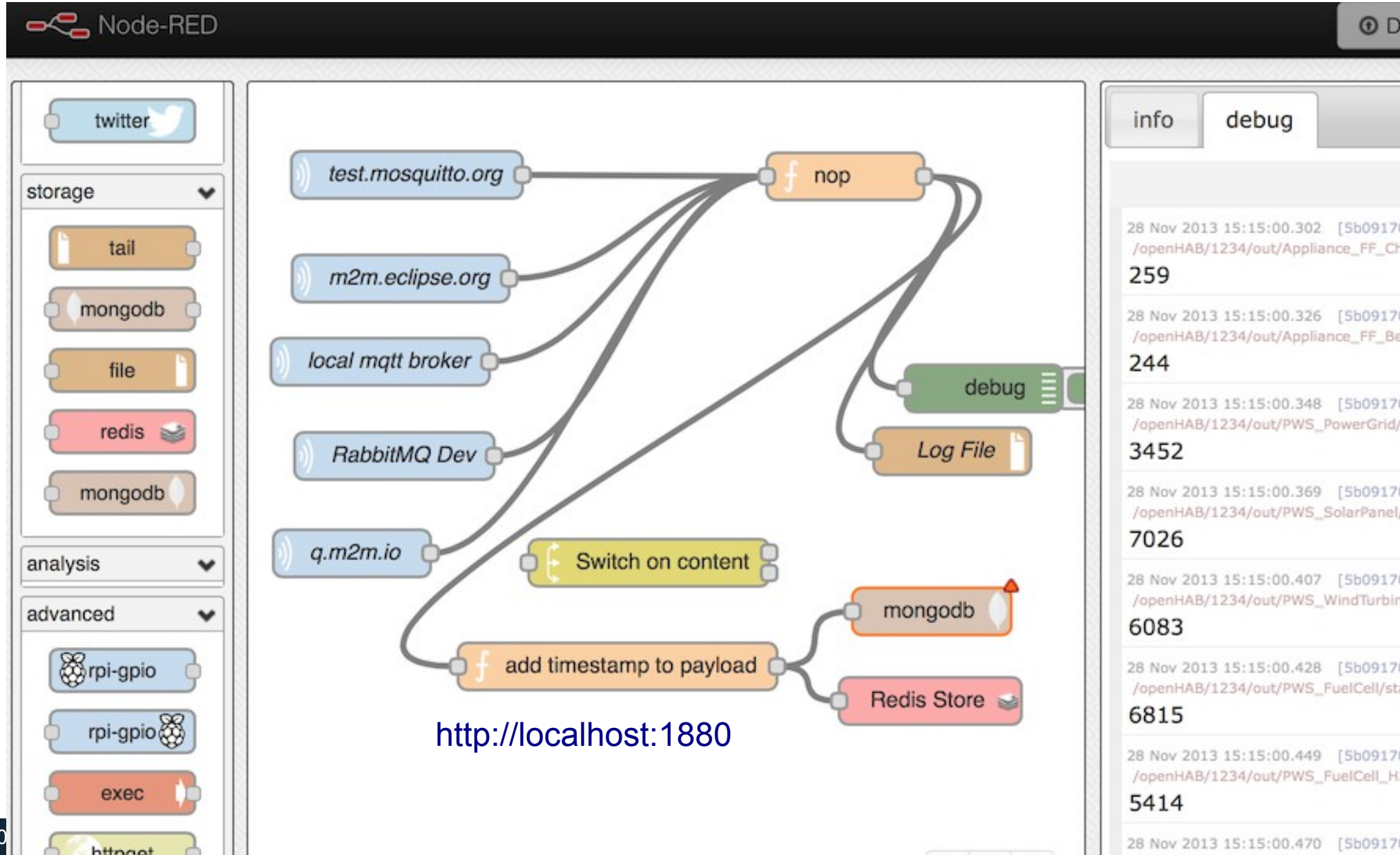
http://localhost:8080/openhab.app?sitemap=demo
http://localhost:8080/greent/?sitemap=demo

http://air.imag.fr/index.php/SDH

Demo Smart Doll House



Node RED
Mashup for IoT stream processing

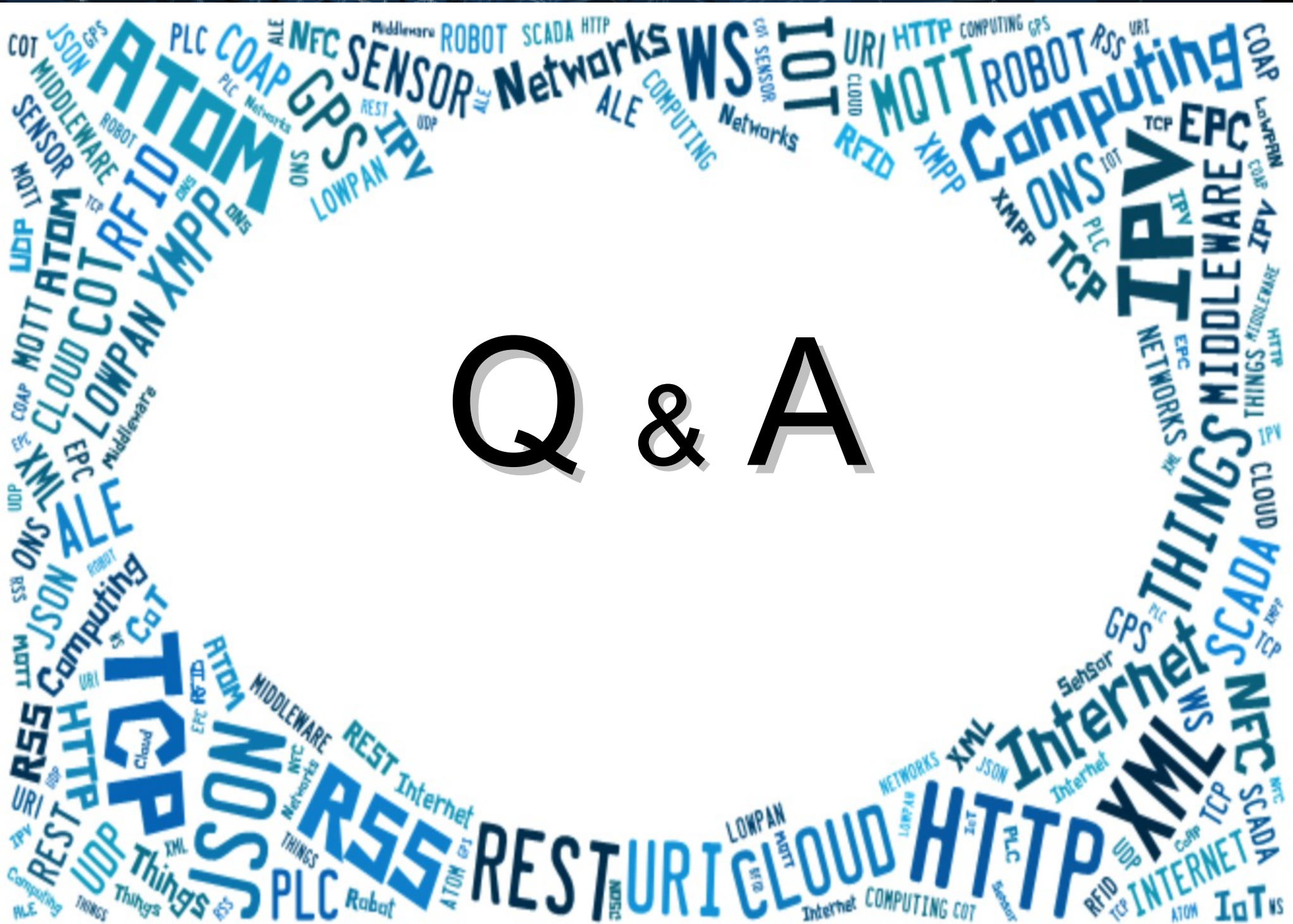


MQTT Panel (MQTT Simple Dataviz)

Sensors conditions

living - id: 2 (Sensor value: 14)		14°C
geiger - id: 6 (Sensor value: 15)		15Bq
back - id: 5 (Switch value: false)		Open
mq4 - id: 7 (Sensor value: 53)		53ppm
basement - id: 3 (Sensor value: 23)		23°C
front - id: 4 (Switch value: true)		Closed
DHT22 - id: 1 (Sensor value: 11)		11°C

Latest MQTT message: sensors/mq47/ppm, 53


Q & A