innoQ
https://www.innoq.com
What is a Smart Home?
Smart Home

is NOT a connected device

is NOT a cloud service

is NOT a single product
“A dwelling incorporating a communications network that connects the key electrical appliances and services, and allows them to be remotely controlled, monitored or accessed.”
It’s a system of things which support the occupants use cases.
Smart Home participants

Software

User

Device

Interaction

Access
The user’s expectations

Flexibility: Cover custom use cases

Extensibility: Installation extension

Sustainability: Long term benefit

Avoid vendor lock-in: Should be extensible
Passive User

Ambitioned User

Expert
Best setup
- Extensibility
- Flexibility

Device
+ Modification to final product
— Privacy
— Offline
Eclipse SmartHome
Eclipse SmartHome (ESH)
Eclipse SmartHome

- An open source Internet of Things framework
- Java OSGi based Project
- Eclipse Public License
- Since 2014
- Base of openHAB
- Requirements: Java $\geq 6$
- Base of successful commercial Projects
What you get

› Structure to handle IoT devices
› Web-Interfaces, Apps, Examples
› More than 100 already supported things
› Documentation
› Commercial support available
› Large and active community
What you do not get

- Hardware
- A Java license
How to use this?
Hue Bridge
Hue Lamp
Color
Brightness
Color Temp.

Status: ONLINE
State: #FF0000
Link

ColorItem
Bridge Thing
Thing
Channel
Channel
Channel
Channel

Id, Description, ...
Configuration
<table>
<thead>
<tr>
<th>Eclipse SmartHome</th>
<th>Binding</th>
<th>Binding</th>
<th>UI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Binding</td>
<td>UI</td>
<td>Binding</td>
</tr>
<tr>
<td></td>
<td>Persistence</td>
<td>Rules</td>
<td>REST</td>
</tr>
<tr>
<td></td>
<td>Discovery</td>
<td>...</td>
<td>UIs</td>
</tr>
</tbody>
</table>
Eclipse SmartHome Core

- Items
- Bindings
- Rules

Eclipse SmartHome Event Bus

- Persistence
- Logging
How to program this?
<thing:thing-descriptions bindingId="hue"
    xmlns:xsi="..." xmlns:thing="...
    xsi:schemaLocation=".../thing-description-1.0.0.xsd">
    
    <bridge-type id="bridge">
        <label>Hue Bridge</label>
        <description>The hue bridge ...</description>

        <config-description>
            <parameter name="ipAddress" type="text">
                <context>network_address</context>
                <label>Network Address</label>
                <description>Network address of the hue bridge.</description>
                <required>true</required>
            </parameter>
        </config-description>
    </bridge-type>

</thing:thing-descriptions>
<thing:thing-descriptions bindingId="hue"
 xmlns:xsi="..." xmlns:thing="...
 xsi:schemaLocation=".../thing-description-1.0.0.xsd">

 <thing-type id="LCT001">
   <supported-bridge-type-refs>
     <bridge-type-ref id="bridge" />
   </supported-bridge-type-refs>

   <label>Hue Lamp</label>
   <description>This is a standard Philips hue bulb ...

   <channels>
     <channel id="color" type="color" />
     <channel id="color_temperature" type="color_temperature" />
     ...  
   </channels>

   <config-description>
     <parameter name="lightId" type="text">
       <label>Light ID</label>
       <description>...</description>
       <required>true</required>
     </parameter>
   </config-description>
 </thing-type>
</thing:thing-descriptions>
<thing:thing-descriptions bindingId="hue"
xmlns:xsi="..." xmlns:thing="..."
xsi:schemaLocation=".../thing-description-1.0.0.xsd">

<channel-type id="color">
  <item-type>Color</item-type>
  <label>Color</label>
  <description>...</description>
  <category>ColorLight</category>
</channel-type>

<!-- Brightness Channel -->
<!-- Color Temperature Channel -->
</thing:thing-descriptions>
Core ItemTypes

› Color
› Contact
› DateTime
› Dimmer
› Group
› Location
› Number
› Player
› Rollershutter
› String
› Switch
What does Lost in Abstraction mean?
Use case: Wash again, if washing finished and the door has not been opened after 16h.
Own Solution

My Washing Machine

Loss

Power
Water Amount
Temperature
Spin
Extra H2O
Door contact
Time running
Thing Model:
- Power
- Water Amount
- Temperature
- Spin
- Extra H2O
- Door contact
- Time running

Items:
- SwitchItem
- NumberItem
- NumberItem
- NumberItem
- SwitchItem
- ContactItem
- NumberItem
- NumberItem

Own solution:
- X
- Y

Setup:
- Use Cases

Power Plug:
- Consumption
Use case: Wash again

on wmPower changed to OFF
    timer = startTimer({
        wmPower.state = ON
    }, now + 16h)
end

on wmDoor changed to OPEN
    if timer then timer.cancel()
end
Eclipse SmartHome Benefits

- Good framework to implement IoT device lifecycle
- Easy to understand
- Parallel development: UI + Binding
- UI Testing without devices
- Offline, “Intranet of Things”
Thank you!

Questions?