Smart Home "Follow me"
Based on

iCasa iPOJO OSGi

Project of **Autonomic System(CPS)**

Tianchi YU

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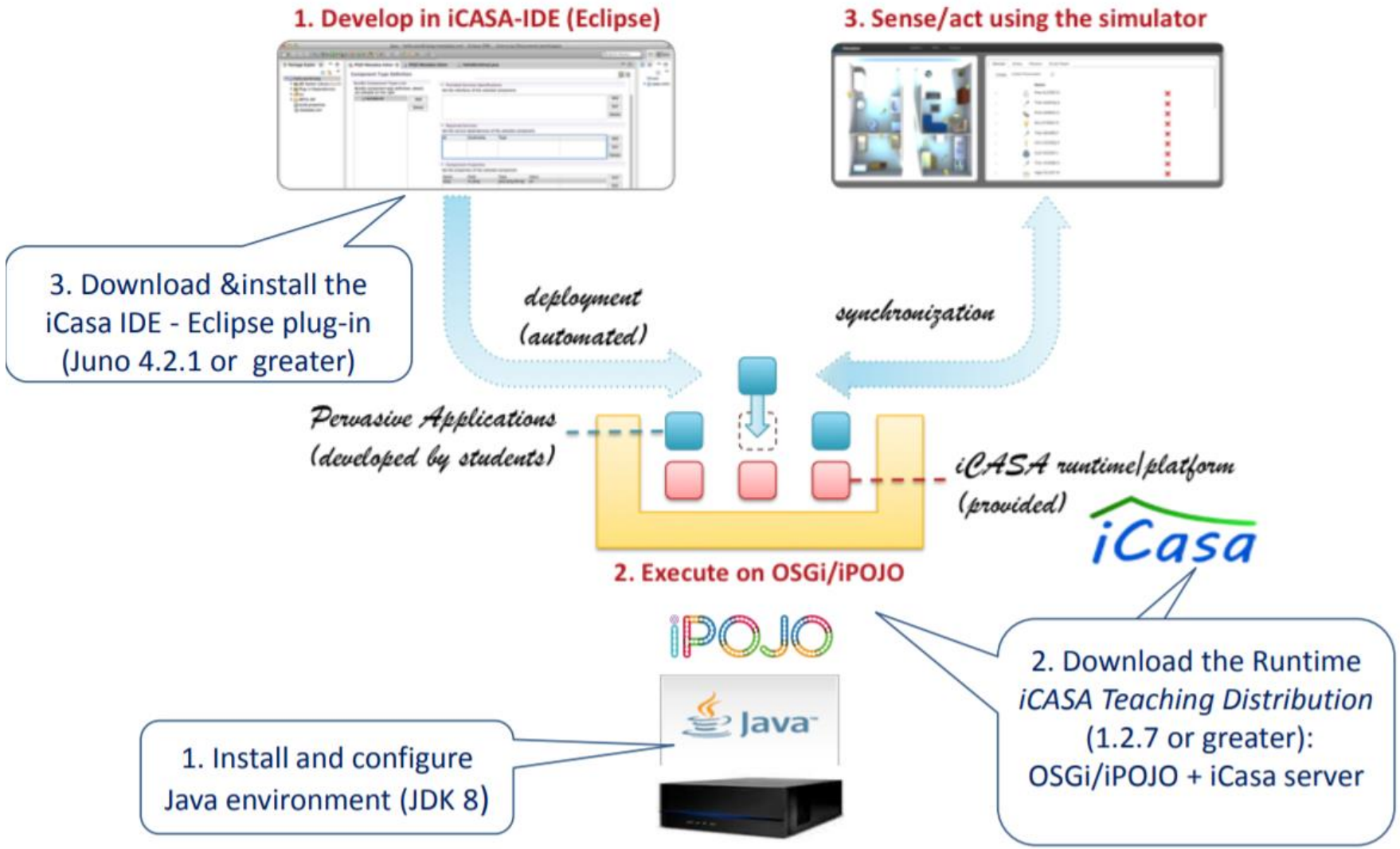
Environment



Bundles Deployment and Instances

Build the components and implements

```
 101 | Active      |    1 | wisdom-monitor (0.8.0)
 102 | Active      |    1 | wisdom-vertx-engine (0.8.0)
 103 | Active      |    1 | Woodstox XML-processor (4.2.1)
 104 | Active      |    1 | OW2 Chameleon - XML-Based Shared Preferences Service Implementation (0.2.0)
 105 | Active      |    1 | ADELE-Common :: deployment.package.chameleon (1.2.7.SNAPSHOT)
 106 | Active      |    1 | BinaryLightFollowMe (1.0.0.qualifier)
 107 | Active      |    1 | FollowMeCommand (1.0.0.qualifier)
 108 | Active      |    1 | FollowMeManager (1.0.0.qualifier)
```

```
Instance org.wisdom.framework.vertx.VertxSingleton-0 -> valid
Instance org.wisdom.framework.vertx.WisdomVertxServer-0 -> valid
Instance XmlSharedPreferences-1 -> valid
Instance dp-chameleon-file-installer-1 -> valid
Instance my.first.follow.me -> valid
Instance follow.me.manager -> valid
Instance follow.me.mananger.command -> valid
Instance unnamed of type org.ow2.shelbie.core.internal.blueprint.BlueprintConverterTracker is not bound.
```

Lifecycle and un/bind methods

```
TIM@shelbie$ start 107
TIM@shelbie$ The Manager is starting...
```

```
TIM@shelbie$ stop 107
[INFO]    f.l.a.i.c.h.CommandHandle
egistered
[INFO]    f.l.a.i.c.h.CommandHandle
nregistered
[INFO]    f.l.a.i.c.h.CommandHandle
nce unregistered
[INFO]    f.l.a.i.c.h.CommandHandle
egistered
[INFO]    f.l.a.i.c.h.CommandHandle
nce unregistered
[INFO]    f.l.a.i.c.h.CommandHandle
nregistered
The Manager is stopping...
TIM@shelbie$
```

Build simulator by scripts

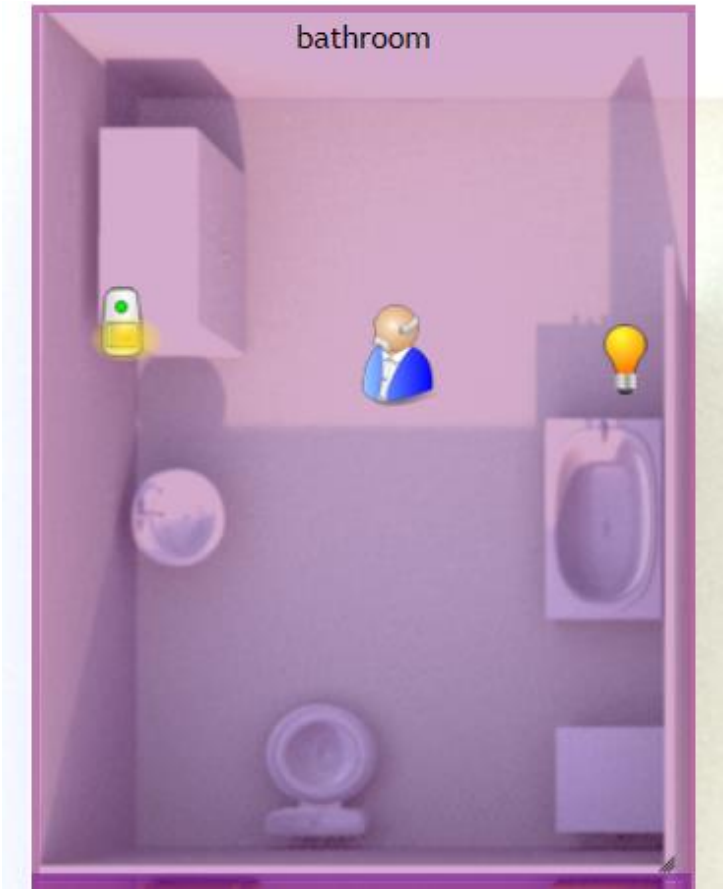
Example:

<create-zone id="bedroom" leftX="55" topY="370" X-Length="259" Y-Length="210" />

<add-zone-variable zoneId="bedroom" variable="Illuminance" />

<modify-zone-variable zoneId="bedroom" variable="Illuminance" value="0"/>

...




```
----------------------------print part----------------------------
The device with the serial numberPres-D1255D-D has changedpresenceSensor.sensedPresence
This sensor is in the room :bathroom
----------------------------end print part----------------------------
----------------------------print part----------------------------
In this location bathroom we have
sensor Pres-D1255D-D
binarylights 1
dimmerlights 0
with number of lights which have turned on : 0
The maximum number of lights are : 1
The maximum energy per room is : 100.0
REQUIREMENT1: We need binary lights: 1 and dimmer lights(idealy): 0
STATE1: Now We have binary lights: 0 and dimmer lights: 0
REQUIREMENT2: And the assignment according to energy is like: 100W for binary lights ; 0W for
 dimmer lights!
STATE2: The dimmer light power is : 0.0W;
REQUIREMENT3: The assignment power of dimmer light should be 0.0W!
So, we should turn on more lights or change the lights arrangement.
[34m[INFO]      o.o.c.s.x.SharedPreferencesServiceImpl[0;39m [36m{vert.x-eventloop-thread-
0}[0;39m - Returning existing prefs Platform-: org.ow2.chameleon.sharedprefs.xml.SharedPrefe
rencesImpl@33e05187
[34m[INFO]      o.o.c.s.x.SharedPreferencesServiceImpl[0;39m [36m{vert.x-eventloop-thread-
0}[0;39m - Returning existing prefs Platform-: org.ow2.chameleon.sharedprefs.xml.SharedPrefe
rencesImpl@33e05187
with number of lights is :1
----------------------------end print part----------------------------
```

One complex demo – with default setting

Maximum number of lights = 1
Energy power in one room = 100W

```
----------------------------print part-------------------------------
In this location livingroom we have
sensor Pres-B1255D-D
binarylights 2
dimmerlights 1
with number of lights which have turned on : 0
The maximum number of lights are : 1
The maximum energy per room is : 100.0
REQUIREMENT1: We need binary lights: 1 and dimmer lights(idealy): 0
STATE1: Now We have binary lights: 0 and dimmer lights: 0
REQUIREMENT2: And the assignment according to energy is like: 100W for binary lights ; 0W for
 dimmer lights!
STATE2: The dimmer light power is : 0.0W;
REQUIREMENT3: The assignment power of dimmer light should be 0.0W!
So, we should turn on more lights or change the lights arrangement.
```

Multiple Bundles – Providing and Using Services

The purpose

1. **FollowMeConfiguration interface/service** - Instrument the FollowMe component to allow monitoring and reconfiguration.

2. **Manager Service** – Translate high-level goals into lower-level configurations

3. **Command Service** – high level command, via command console

Configuration

```
admin@wisdom>getEnergyPreference
EnergyMode  =  LOW


admin@wisdom>getIlluminancePreference
The  illuminance  goal  is  SOFT


admin@wisdom>setEnergyPreference  MEDIUM
admin@wisdom>setIlluminancePreference  FULL
admin@wisdom>getEnergyPreference
EnergyMode  =  MEDIUM


admin@wisdom>getIlluminancePreference
The  illuminance  goal  is  FULL
```

Example of configurate the parameters of the follow.me Bundle.
EnergyMode = LOW, MEDIUM, HIGH (100W,200W,1000W)
IlluminanceGoal = SOFT, MEDIUM, FULL (1,2,3)

Maximum number of lights in one room = 3
Energy power in one room = 200W

More managements - Add Targeted Illuminance for every room

```
7  public enum IlluminanceGoal {
8
9      /** The goal associated with soft illuminance. */
10     SOFT(1, 500d),
11     /** The goal associated with medium illuminance. */
12     MEDIUM(2,2750d),
13     /** The goal associated with full illuminance. */
14     FULL(3,4000d);
15
16     /** The number of lights to turn on. */
17     private int numberOfLightsToTurnOn;
18     private double targetedIlluminance;
19
```

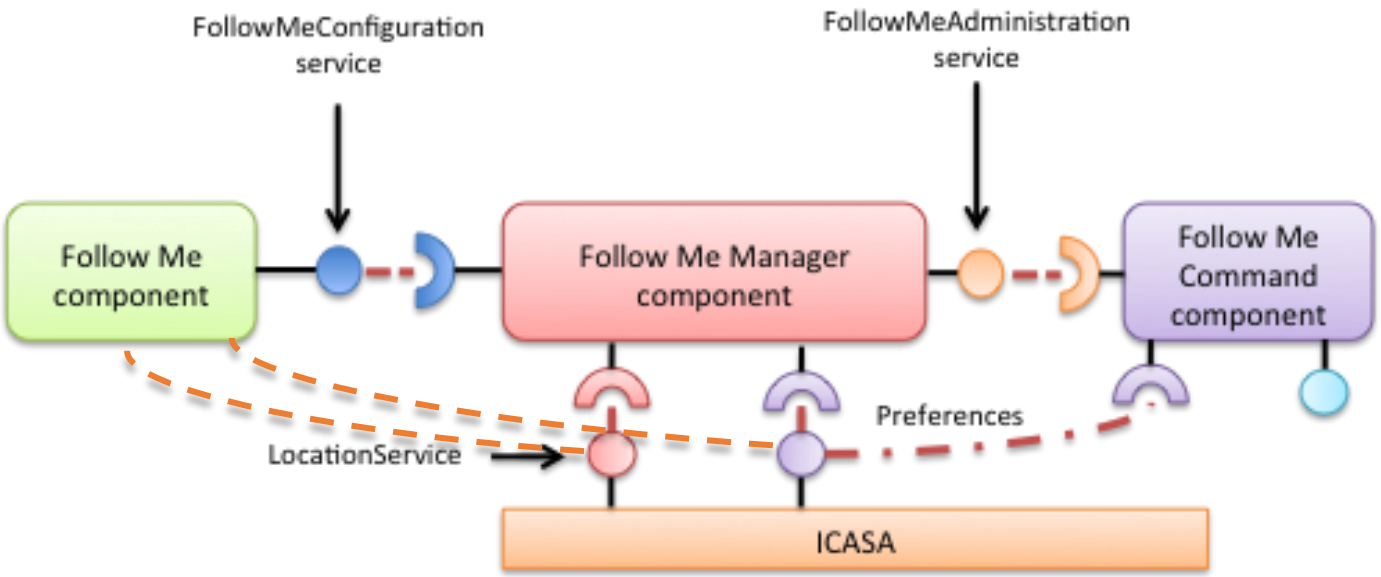
Pb: Not find the inner function for the surface of rooms

```
429     public synchronized double illuminancePerRoom(String location) {
430         List<DimmerLight> dimmerLightsAtLocation = getDimmerLightsFromLocation(location);
431         double illuminancePerRoom = 0.0;
432         for (DimmerLight dimLight : dimmerLightsAtLocation ) {
433             illuminancePerRoom += dimLight.getPowerLevel()*dimLight.getMaxPowerLevel()*ONE_WATT_TO_ONE_LUMEN;
434         }
435         System.out.println("The room of "+ location +  " has the illuminance : "+ illuminancePerRoom + "lumens.(As
436         return illuminancePerRoom;
437
438     }
```

Example of process of computation / running

```
                              print part
In this location bedroom we have
sensor Pres-C1255D-D
binarylights 2
dimmerlights 0
with number of lights which have turned on : 2
The maximum number of lights are : 3
The maximum energy per room is : 200.0
REQUIREMENT1: We need binary lights: 2 and dimmer lights(idealy): 0
STATE1: Now We have binary lights: 2 and dimmer lights: 0
REQUIREMENT2: And the assignment according to energy is like: 200W for binary lights ; 0W for
 dimmer lights!
STATE2: The dimmer light power is : 0.0W;
REQUIREMENT3: The assignment power of dimmer light should be 0.0W!
We don't need to turn on more lights.
--------------------------end print part--------------------------
--------------------------print part---------------------------
In this location bathroom we have
sensor Pres-D1255D-D
binarylights 4
dimmerlights 1
with number of lights which have turned on : 0
The maximum number of lights are : 3
The maximum energy per room is : 200.0
However, we need to turn off all lights because the sensor is off.
--------------------------end print part--------------------------
                              print part
```

More managements - Add User Pereferences

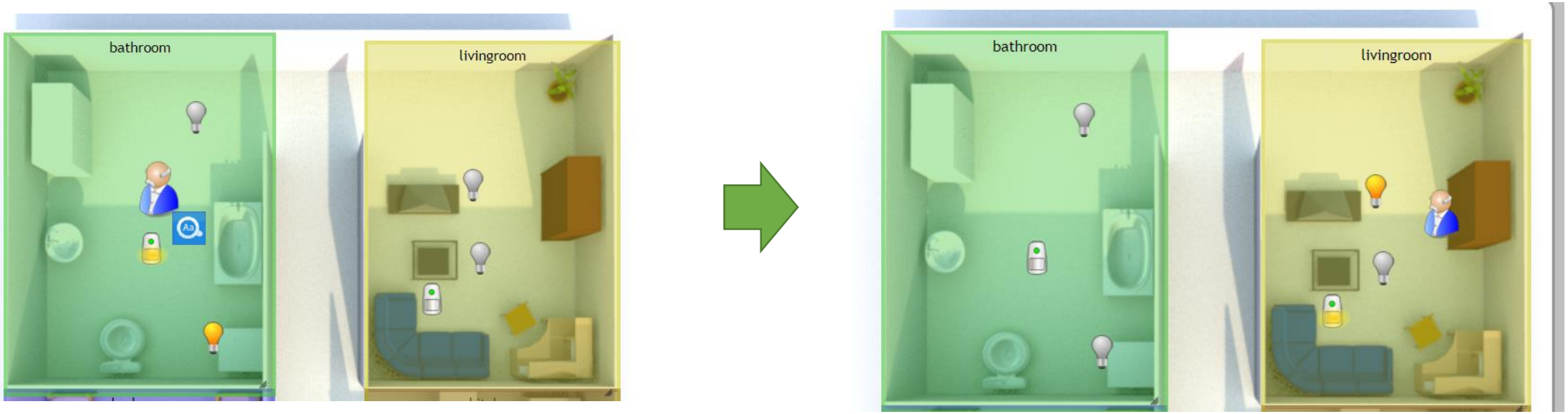


Example:

setUserPreference Alice FULL

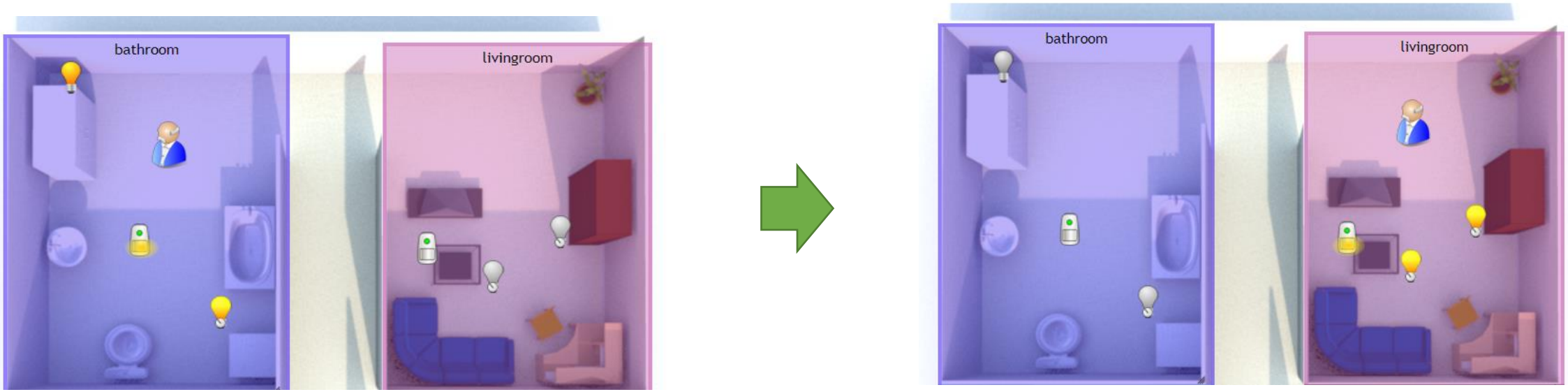
setUserPreference Bob MEDIUM

Scenario1 – Basic following light with binary lights




```
**************************User Pereference**********************
--->Users : [Bob] is/are in livingroom, the preference is :3
----------------------------print part----------------------------
In this location livingroom we have
sensor Pres-B1255D-D
binarylights 2
dimmerlights 0
with number of lights which have turned on : 0
The maximum number of lights are : 1
The maximum number of lights defined by users in this room are : 3
The maximum energy per room is : 100.0
--->REQUIREMENT1: We need binary lights: 1.0 and dimmer lights(idealy): 0.0
--->STATE1: Now We have binary lights: 0 and dimmer lights: 0
--->REQUIREMENT2: And the assignment according to energy is like: 100W for binary lights ; 0W for dimmer lights!
--->STATE2: The dimmer light power is : 0.0W;
--->REQUIREMENT3: The assignment power of dimmer light should be 0.0W!
--->So, we should turn on more lights or change the lights arrangement.
□[34m[INFO]      o.o.c.s.x.SharedPreferencesServiceImpl□[0;39m □[36m{vert.x-eventloop-thread-0}□[0;39m - Returning ex
ing prefs Platform-: org.ow2.chameleon.sharedprefs.xml.SharedPreferencesImpl@4fda42db
□[34m[INFO]      o.o.c.s.x.SharedPreferencesServiceImpl□[0;39m □[36m{vert.x-eventloop-thread-0}□[0;39m - Returning ex
ing prefs Platform-: org.ow2.chameleon.sharedprefs.xml.SharedPreferencesImpl@4fda42db
with number of lights is :1
----------------------------end print part----------------------------
```

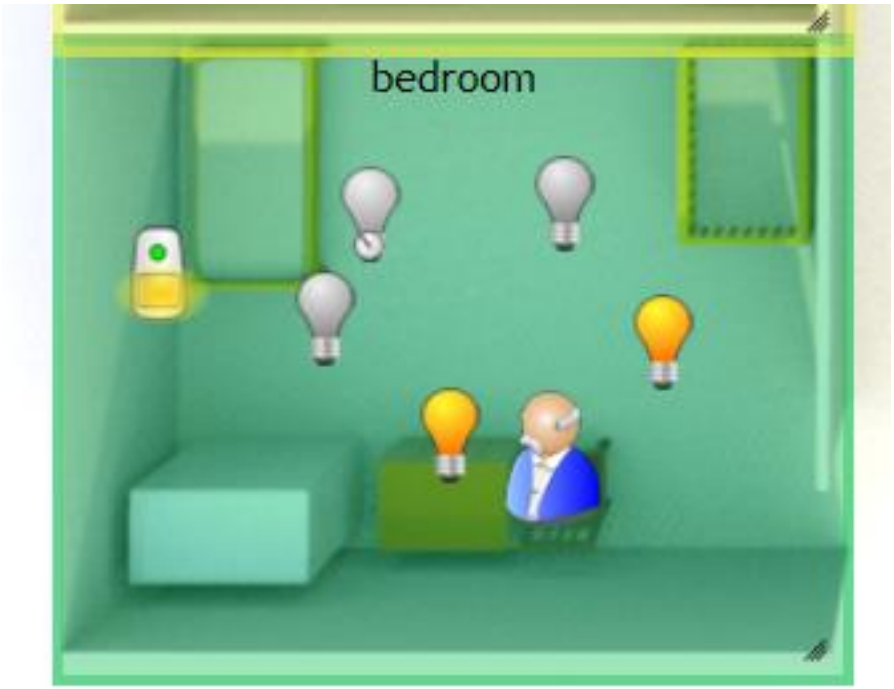
Scenario2 – dimmer lights




```
**************************User Pereference**********************
--->Users : [Bob] is/are in livingroom, the preference is :3
----------------------------print part-----------------------------
In this location livingroom we have
sensor Pres-B1255D-D
binarylights 0
dimmerlights 2
with number of lights which have turned on : 0
The maximum number of lights are : 3
The maximum number of lights defined by users in this room are : 3
The maximum energy per room is : 200.0
--->REQUIREMENT1: We need binary lights: 0.0 and dimmer lights(idealy): 2.0
--->STATE1: Now We have binary lights: 0 and dimmer lights: 0
--->REQUIREMENT2: And the assignment according to energy is like: 0W for binary lights ; 200W for dimmer lights!
--->STATE2: The dimmer light power is : 0.0W;
--->REQUIREMENT3: The assignment power of dimmer light should be 100.0W!
--->So, we should turn on more lights or change the lights arrangement.
######################## Need dimmer light#####################
all number of dimmer lights :2; dimmer lights have turned on: 0
[34m[INFO]      o.o.c.s.x.SharedPreferencesServiceImpl[0;39m [36m{vert.x-eventloop-thread-0}[0;39m - Returning
ing prefs Platform-: org.ow2.chameleon.sharedprefs.xml.SharedPreferencesImpl@4fda42db
[34m[INFO]      o.o.c.s.x.SharedPreferencesServiceImpl[0;39m [36m{vert.x-eventloop-thread-0}[0;39m - Returning
ing prefs Platform-: org.ow2.chameleon.sharedprefs.xml.SharedPreferencesImpl@4fda42db
with number of lights is :1
######################## Need dimmer light#####################
all number of dimmer lights :2; dimmer lights have turned on: 1
[34m[INFO]      o.o.c.s.x.SharedPreferencesServiceImpl[0;39m [36m{vert.x-eventloop-thread-0}[0;39m - Returning
```

Scenario3 – limitation of number of lights and energy saving

Scenario3 – limitation of number of lights and energy saving

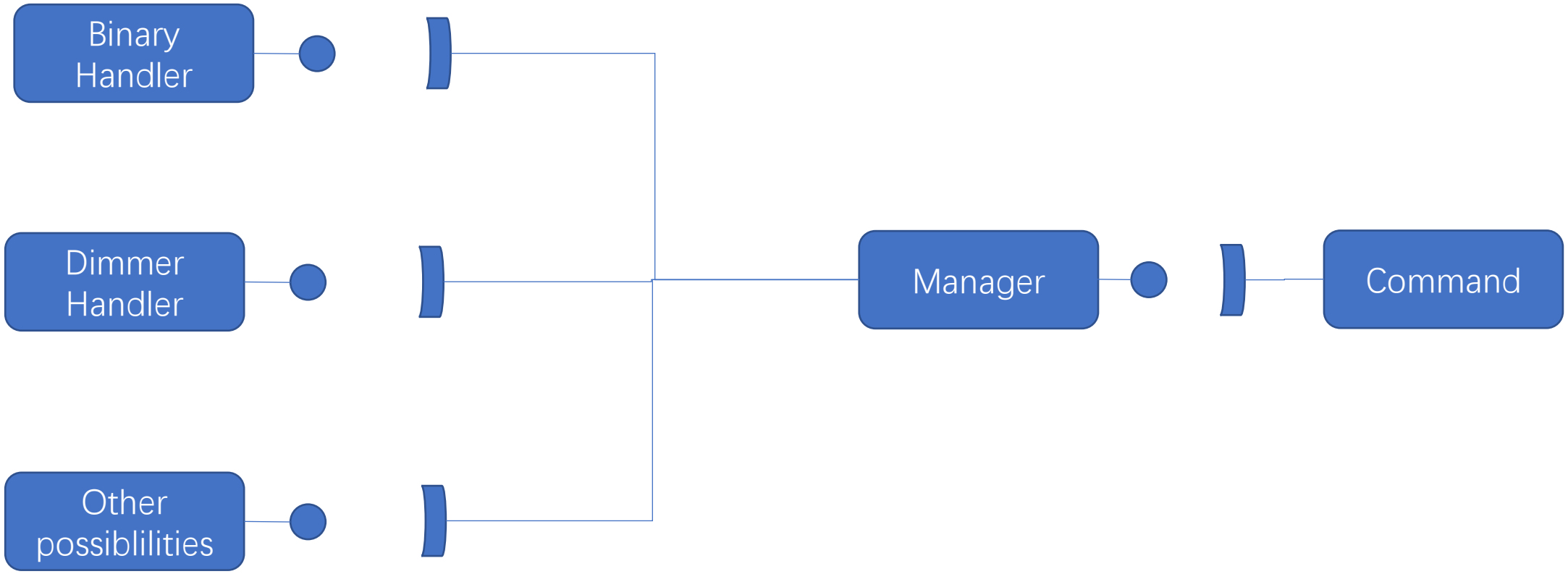


Note: Binary light has higher priority than dimmer light.

Scenario4 – user preferences

setIlluminancePreference FULL
setEnergyPreference MEDIUM
setUserPreference Alice FULL
setUserPreference Bob SOFT

De-centralisation – imagination



Conclusions

Achieves:

1. Build a complete system for “follow me” project, which can realize the autonomic running.
2. Light will be turned on or turned off according to the sensors and other more precise information.
3. Based on several bundles, we can configurate the parameters we need for the system, for examples: maximum number of lights, energy saving, illuminance setting per room and even the user preferences (almost finished).
4. Providing and using services make the system more reusable and modularity.

Bugs:

1. After the command, we need to move the user to another room to update the states and the preferences;
2. Not ready for multiple persons in the same room.(Considering the users preferences)