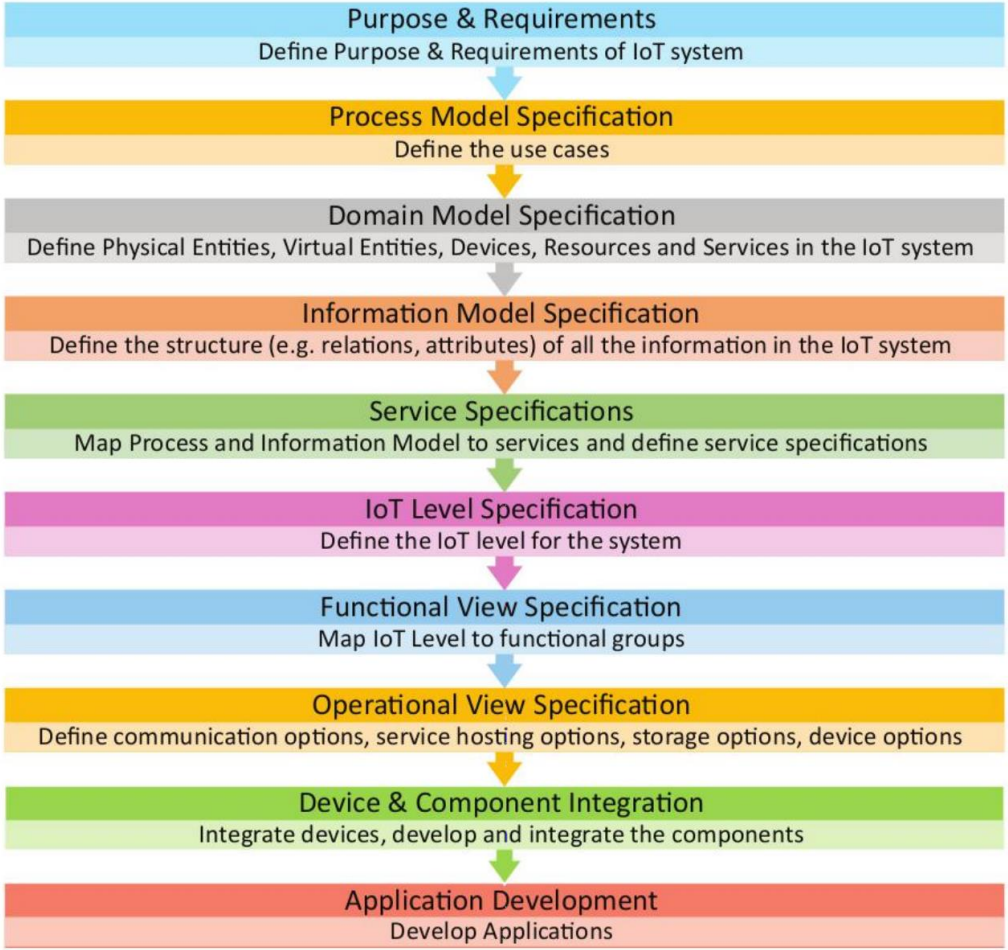
Home Automation Case Study

IOT Design Methodology Steps



Step 1: Purpose & Requirements Specification

Purpose :

- A home automation system that allows controlling of the lights in a home remotely using a web application.

Step 1: Purpose & Requirements Specification

Behaviour :

- The home automation system should have **auto** and **manual** modes.
- In auto mode, the system measures the light level in the room and switches on the light when it gets dark.
- In manual mode, the system provides the option of manually and remotely switching on/off the light.

Step 1: Purpose & Requirements Specification

System Management Requirement:

- The system should provide remote monitoring and control functions.

Data Analysis Requirement:

- The system should perform local analysis of the data.

Step 1: Purpose & Requirements Specification

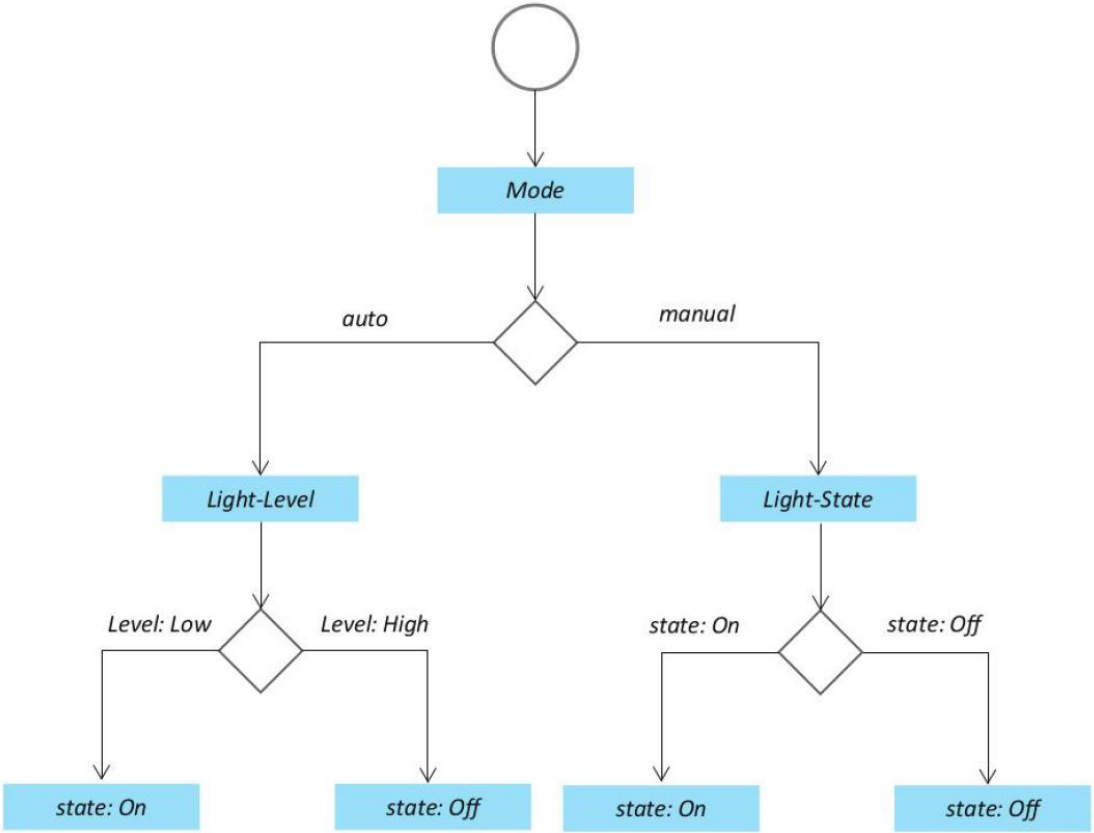
Application Deployment Requirement :

- The application should be deployed locally on the device, but should be accessible remotely.

Security Requirement :

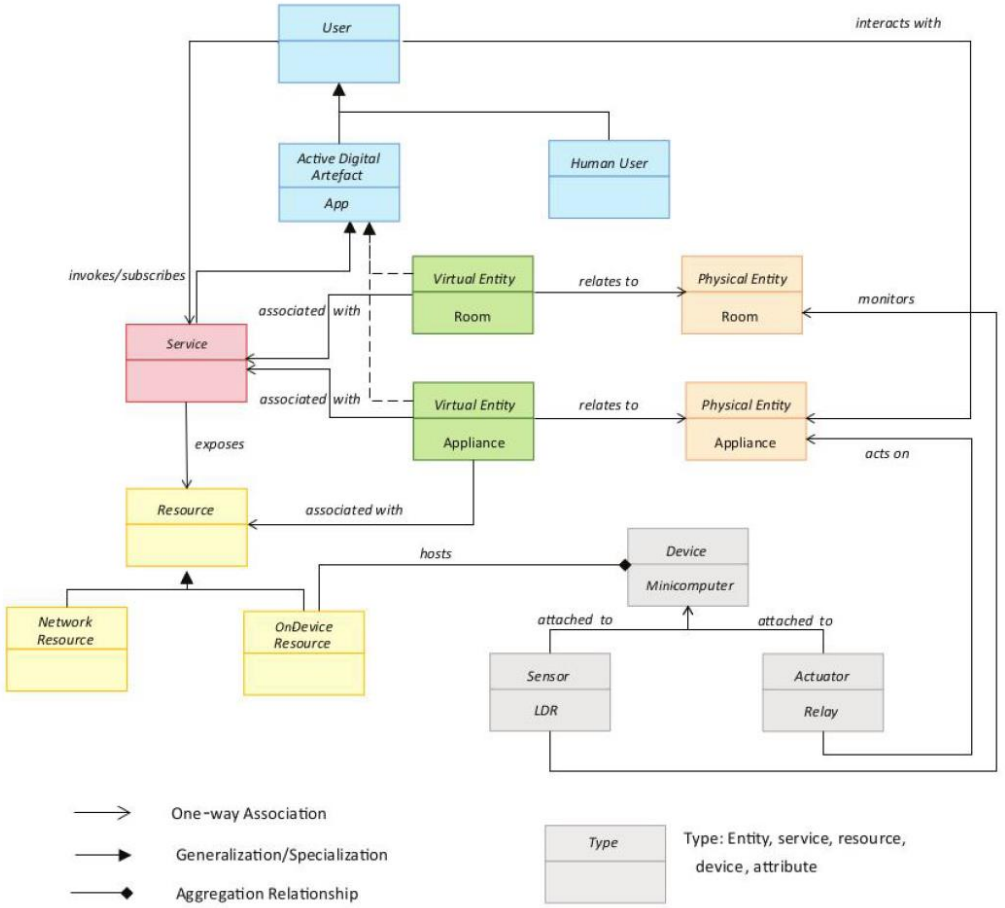
- The system should have basic user authentication capability.

Step 2: Process Specification



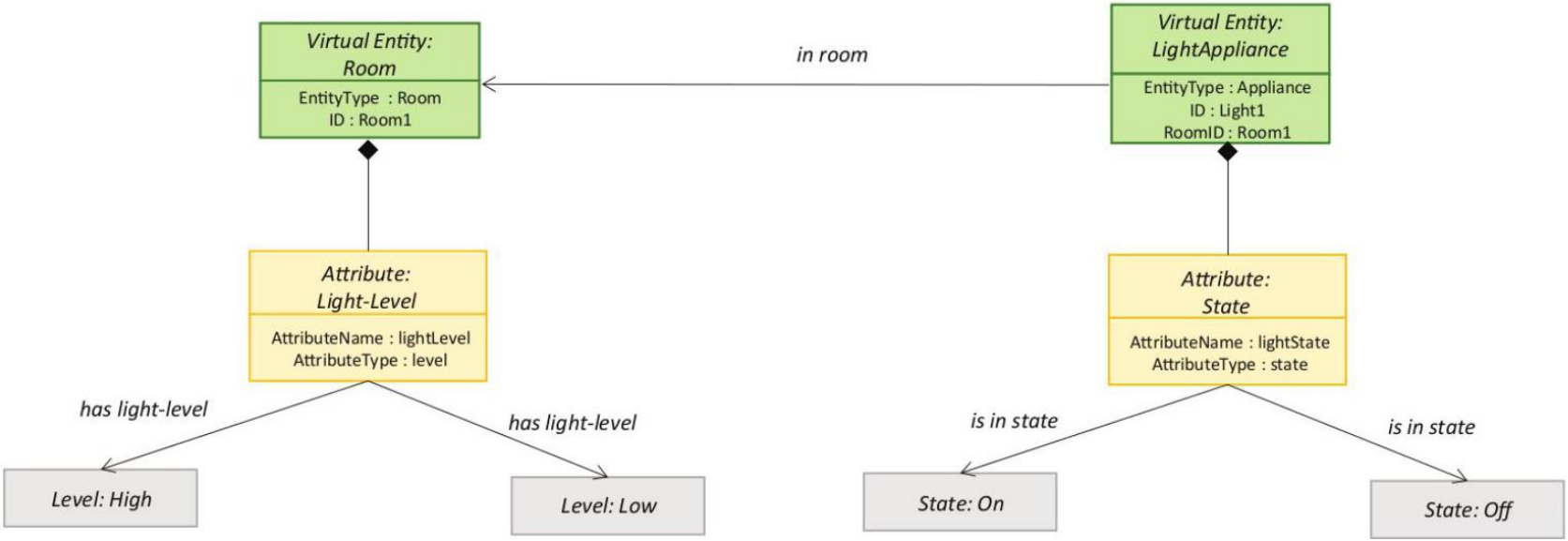
Step 3: Domain Model Specification

- Physical entity
- Virtual entity
- Device
- Resource
- Service

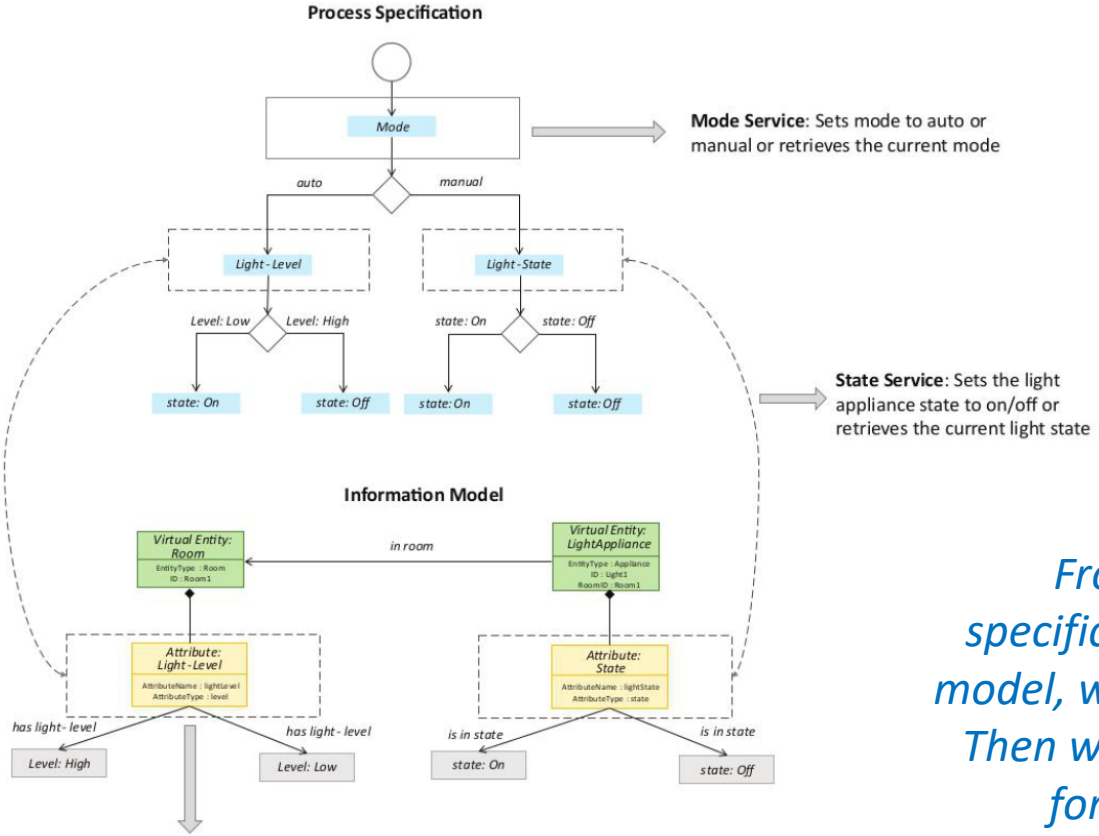


Step 4: Information Model Specification

Information model adds details to the virtual entities



Step 5: Service Specifications



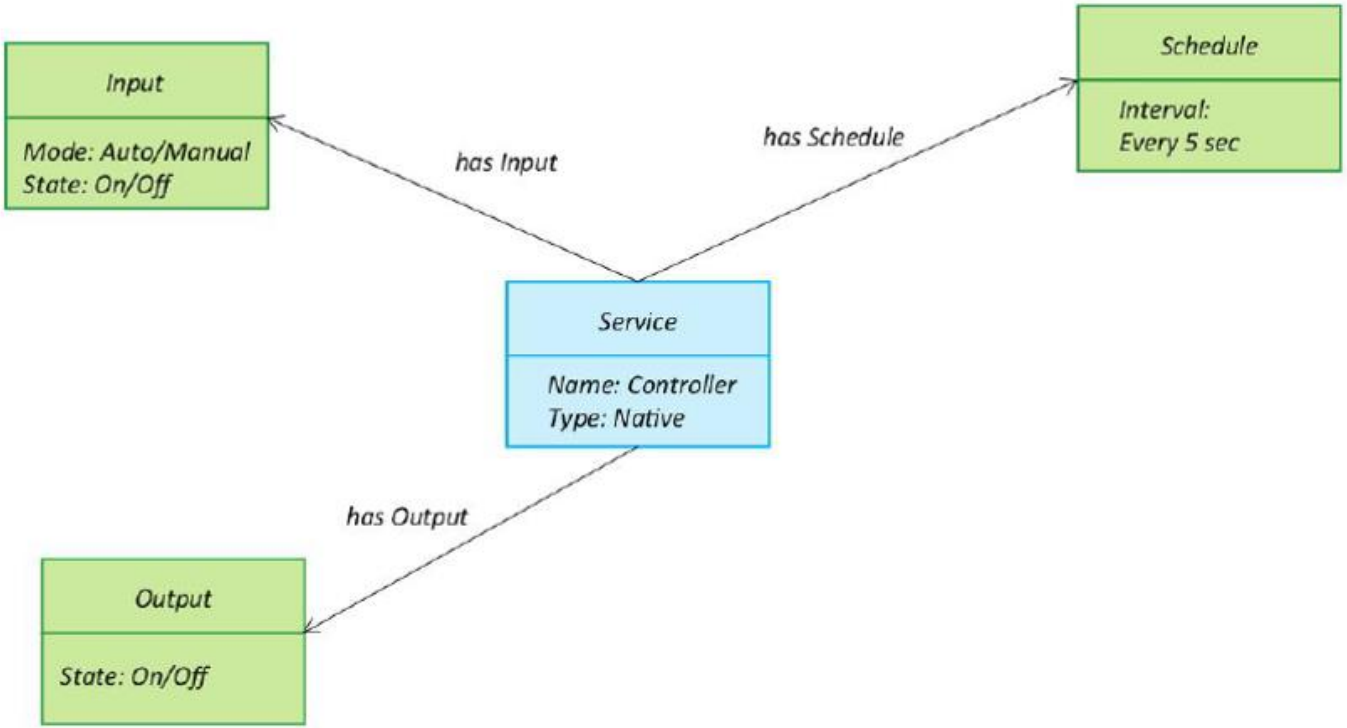
Mode Service: Sets mode to auto or manual or retrieves the current mode

State Service: Sets the light appliance state to on/off or retrieves the current light state

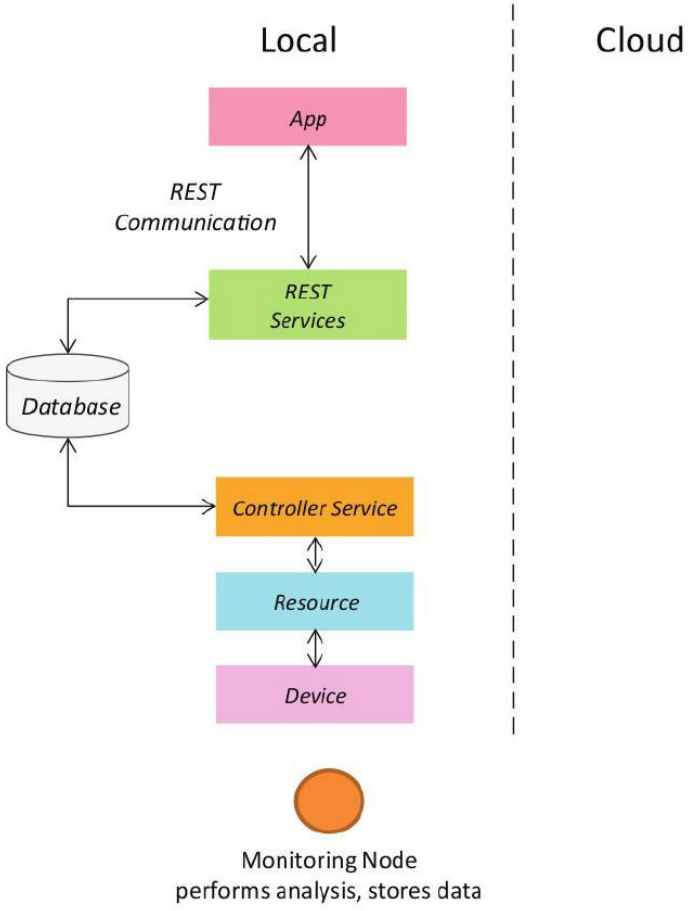
Controller Service: In auto mode, the controller service monitors the light level and switches the light on/off and updates the status in the status database. In manual mode, the controller service, retrieves the current state from the database and switches the light on/off.

From process specifications and info model, we identify states. Then we define service for each state

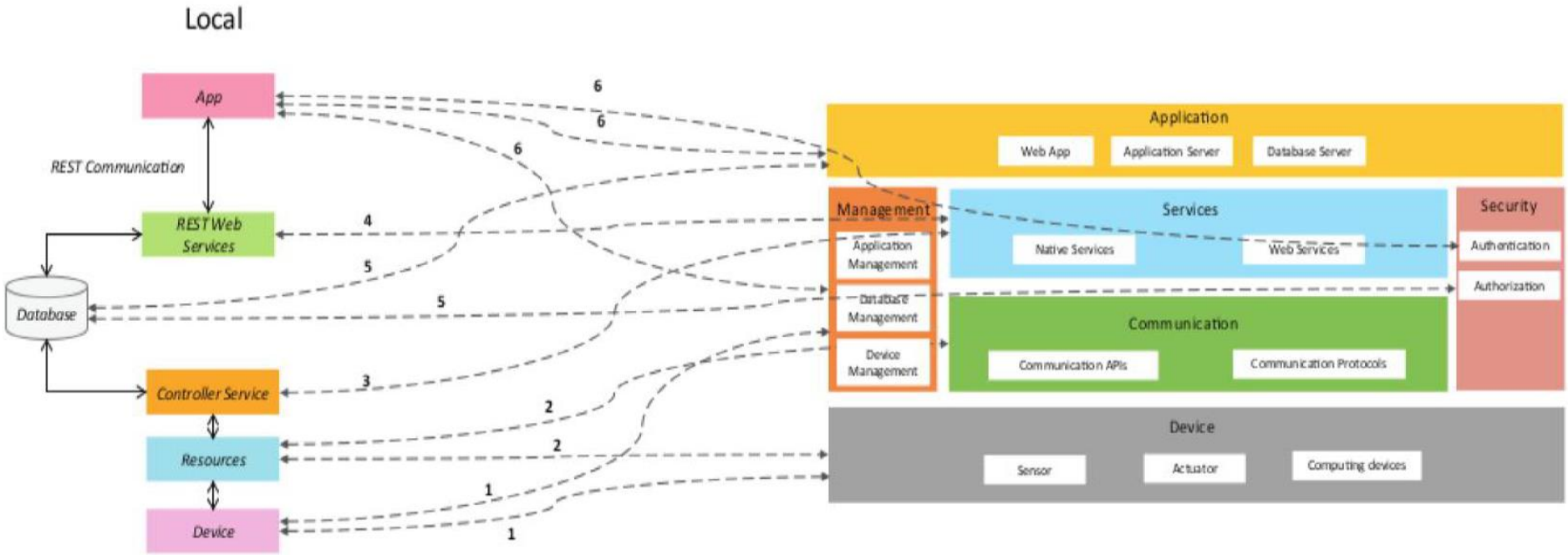
Step 5: Service Specifications



Step 6: IOT Level Specifications



Step 7: Functional View Specification



1. IoT device maps to the Device FG (sensors, actuators devices, computing devices) and the Management FG (device management)

2. Resources map to the Device FG (on-device resource) and Communication FG (communication APIs and protocols)

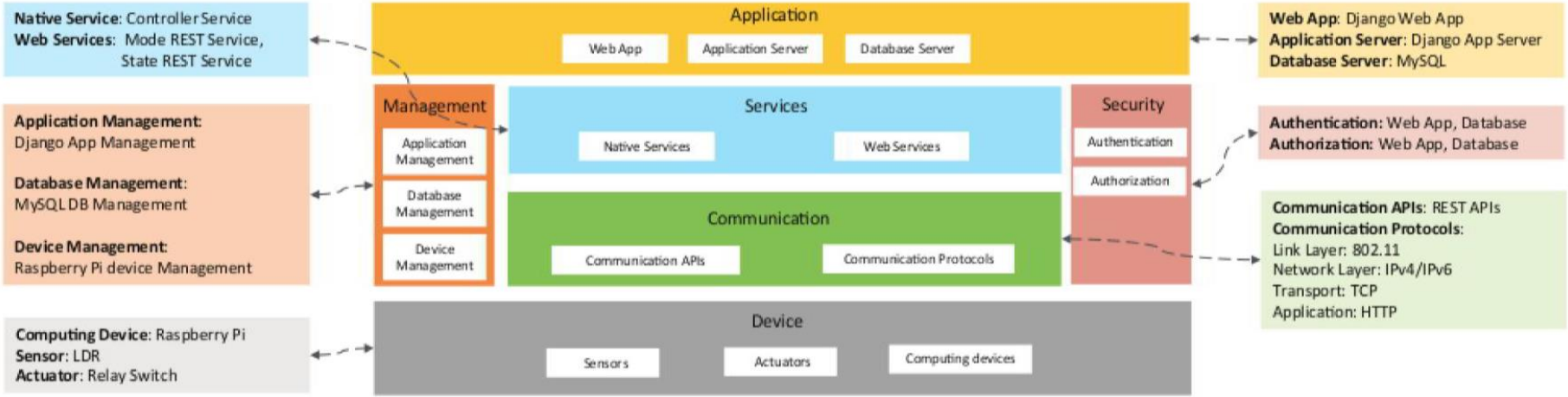
3. Controller service maps to the Services FG (native service). Web Services map to Services FG (web services)

4. Web Services map to Services FG (web services)

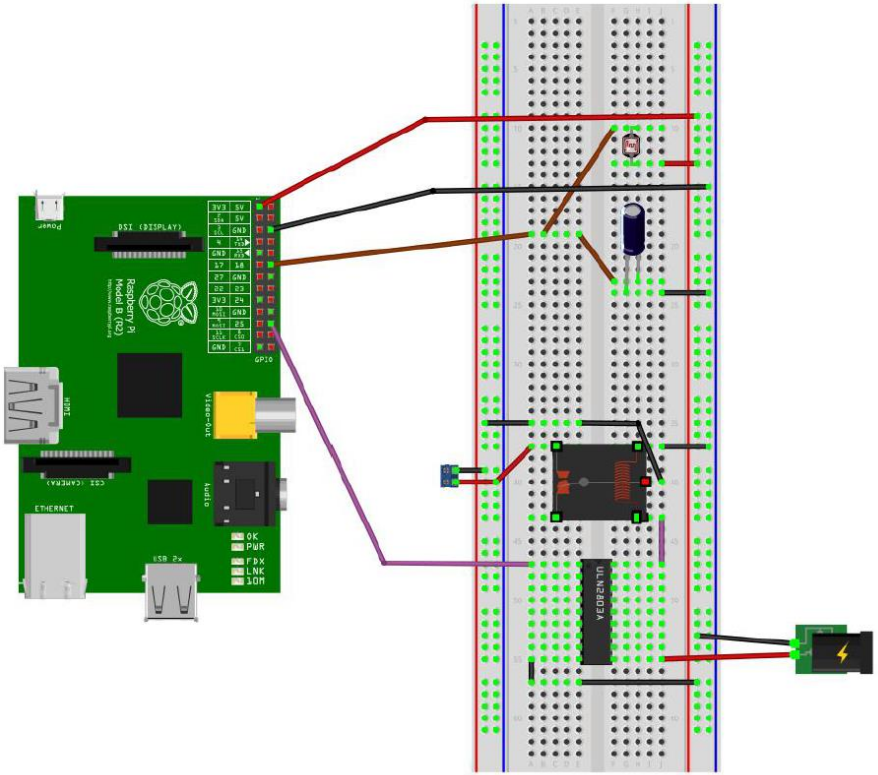
5. Database maps to the Management FG (database management) and Security FG (database security)

6. Application maps to the Application FG (web application, application and database servers), Management FG (app management) and Security FG (app security)

Step 8: Operational View Specification



Step 9: Device & Component Integration



Step 10: Application Development

- Auto
  - Controls the light appliance automatically based on the lighting conditions in the room
- Light
  - When Auto mode is off, it is used for manually controlling the light appliance.
  - When Auto mode is on, it reflects the current state of the light appliance.

Thank you