Tutorial 1 : IoT System Design Methodology

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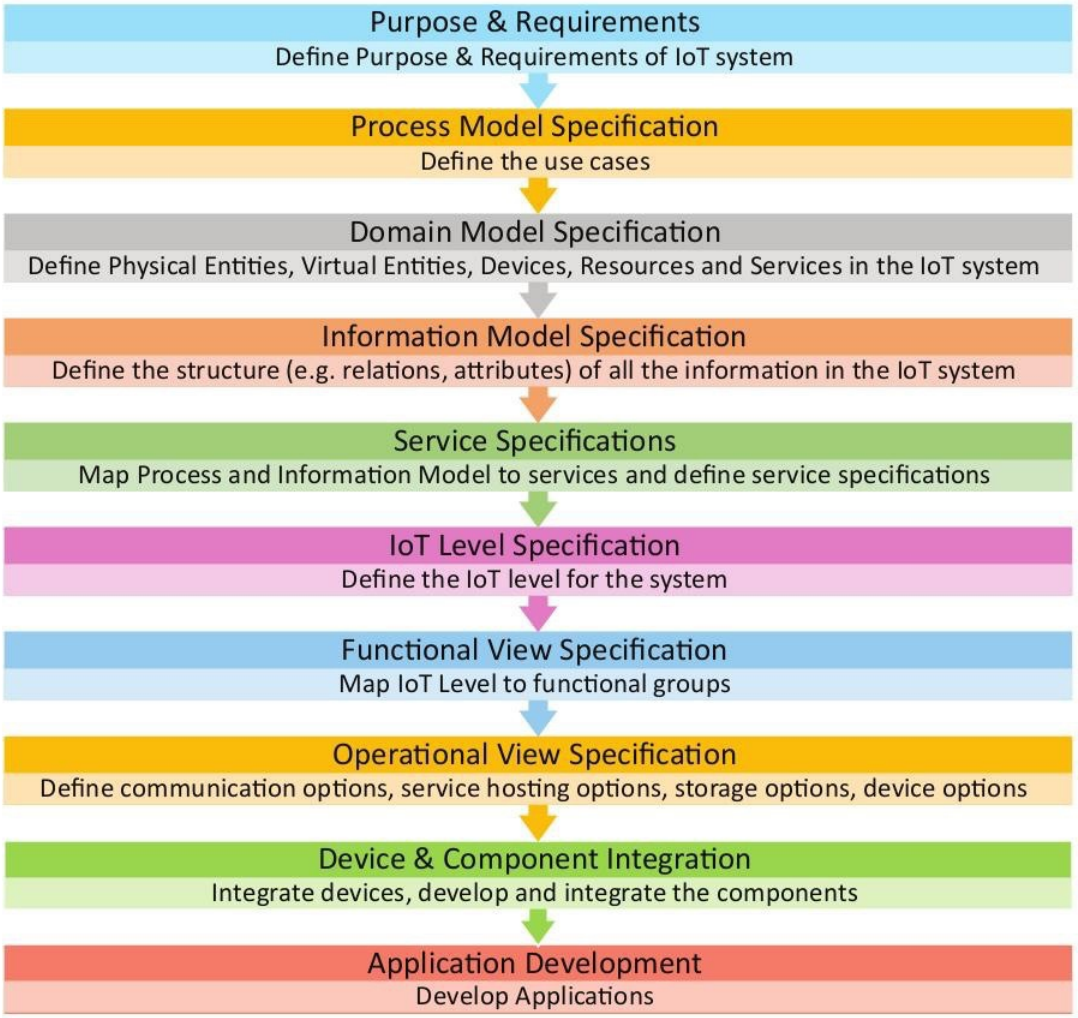
IoT Design Methodology



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IoT System Design : Home Automation

Step:1 - Purpose & Requirements

• Purpose : A system that allows controlling of the lights in a home remotely using a web application

• Behaviour : The home automation system should have auto and manual modes.

Auto mode - the system measures the light level in the room, switches light when dark.

Manual mode - the system provides the option of manually and remotely switching on/off the light.

• System Management Requirement : The system should provide remote monitoring and control functions.

• Data Analysis Requirement : system should perform local analysis of data

• 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.

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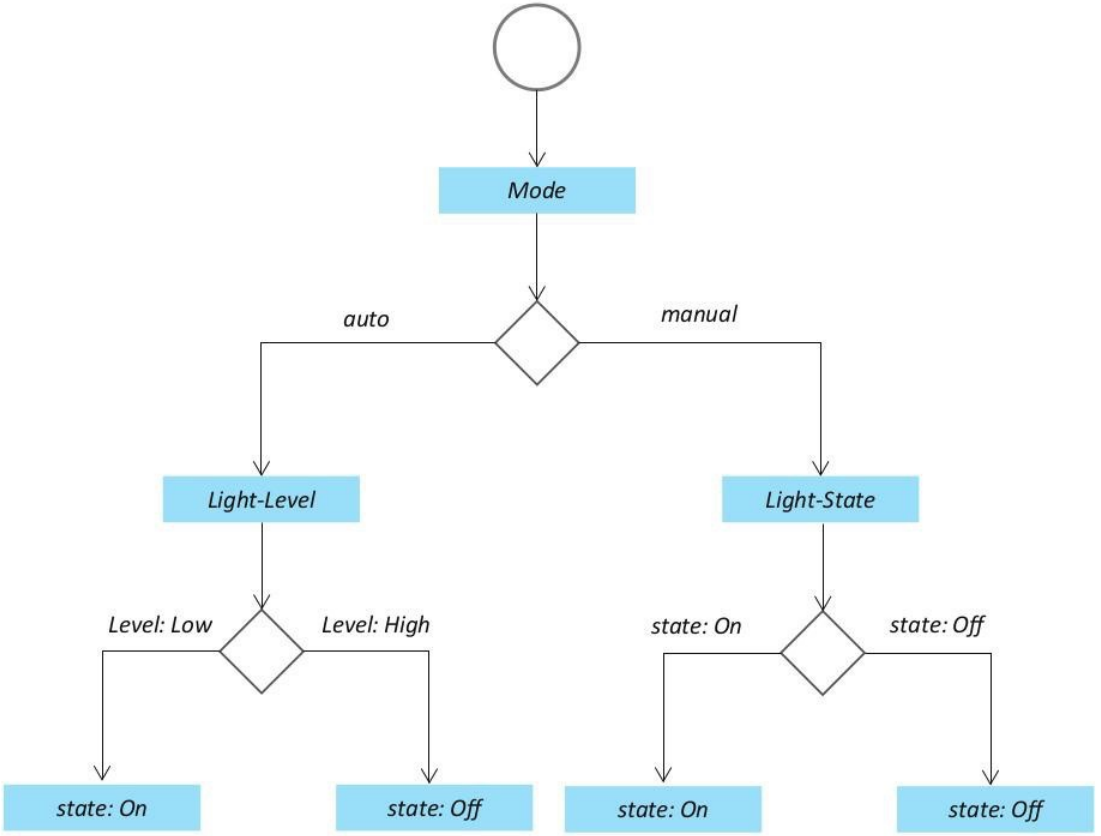
IoT System Design : Home Automation

Step : 2 - Process Specification



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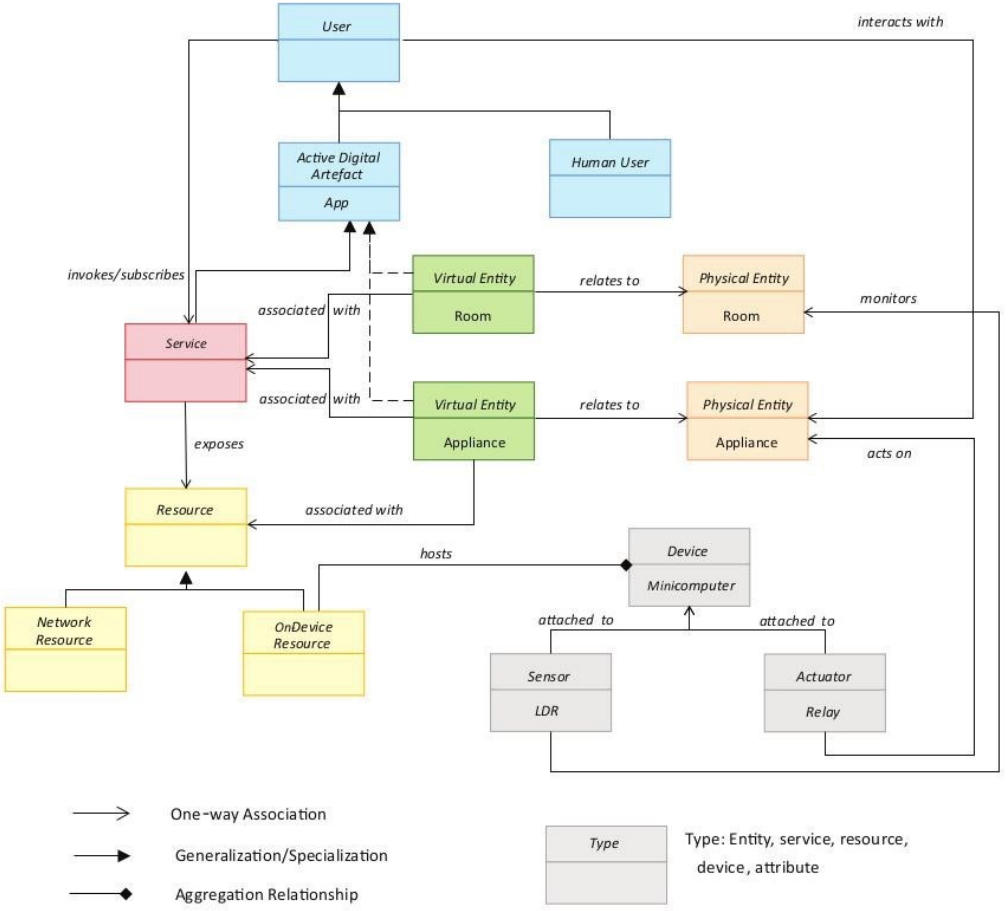
Step : 3 - Domain Model Specification



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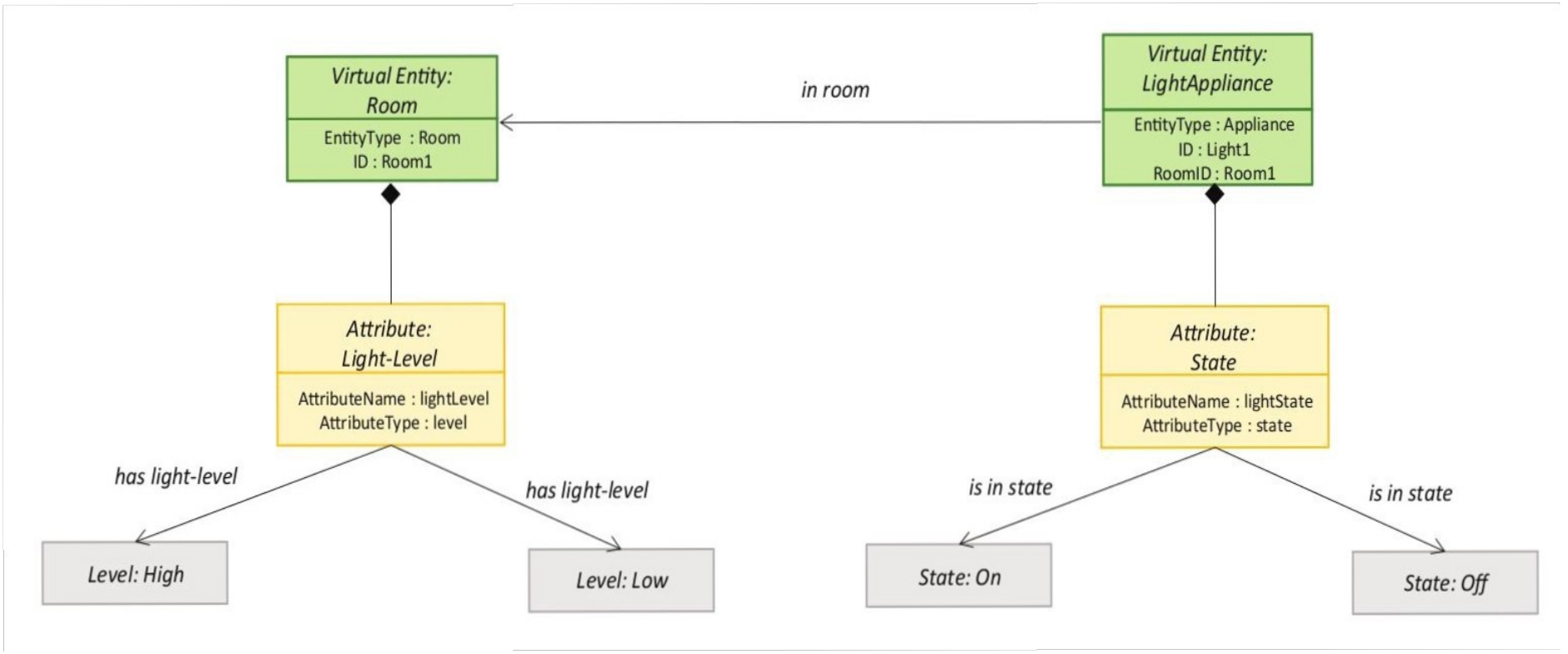
Step : 4 - Information Model Specification



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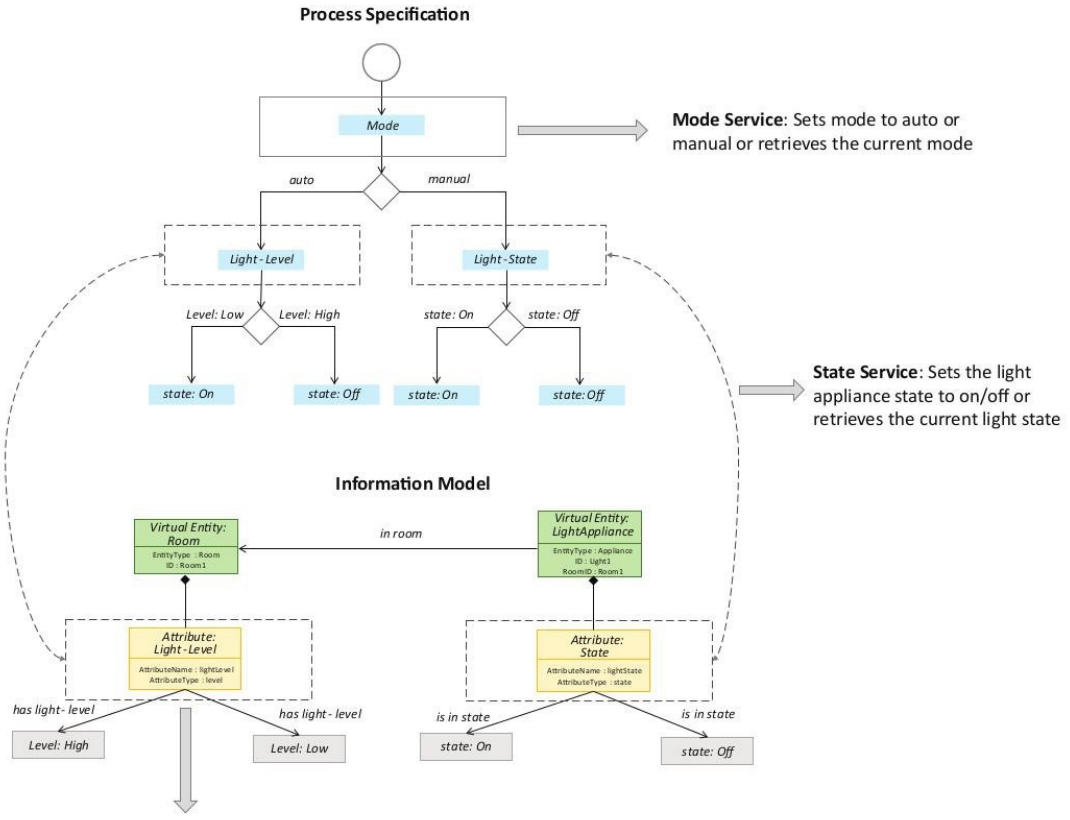
Step : 5 - Service Specification



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.

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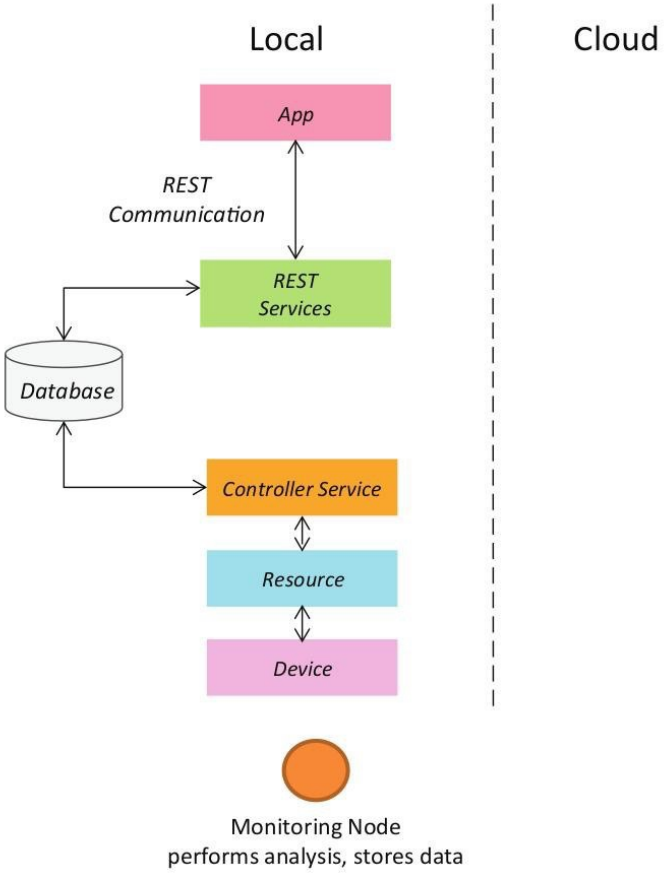
Step : 6 – IoT Level Specification



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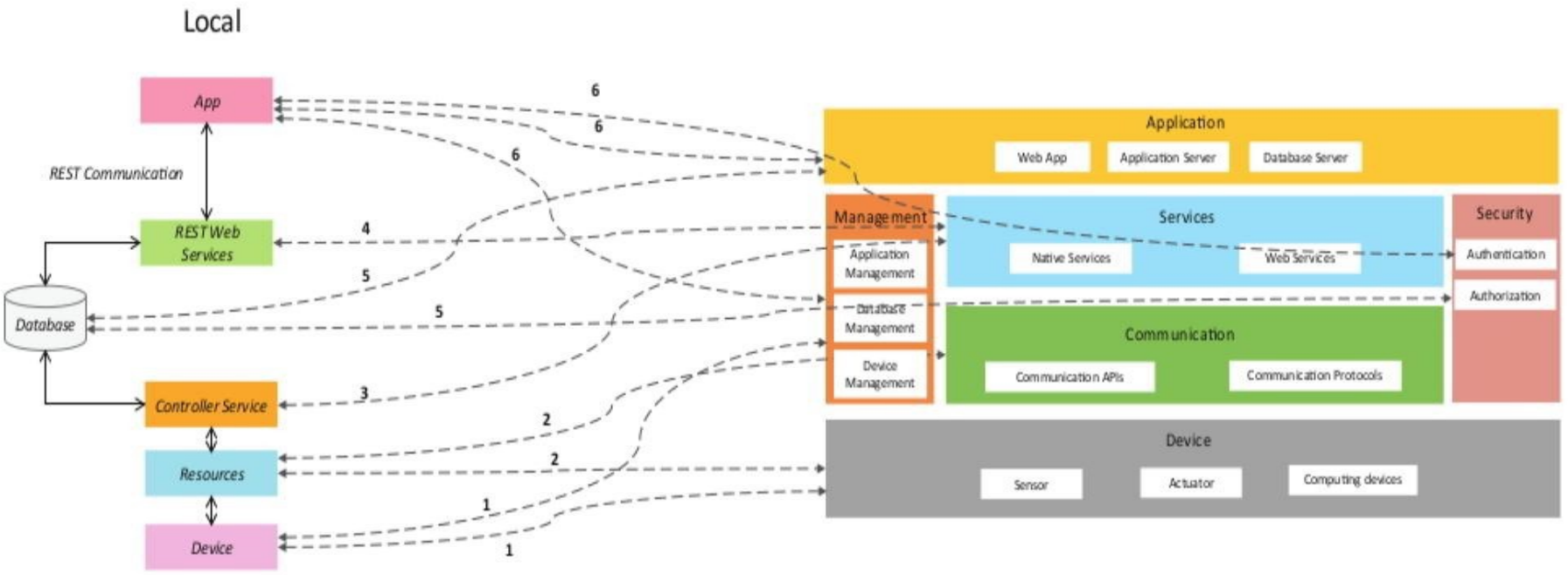
Step : 7 – Functional View Specification



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)

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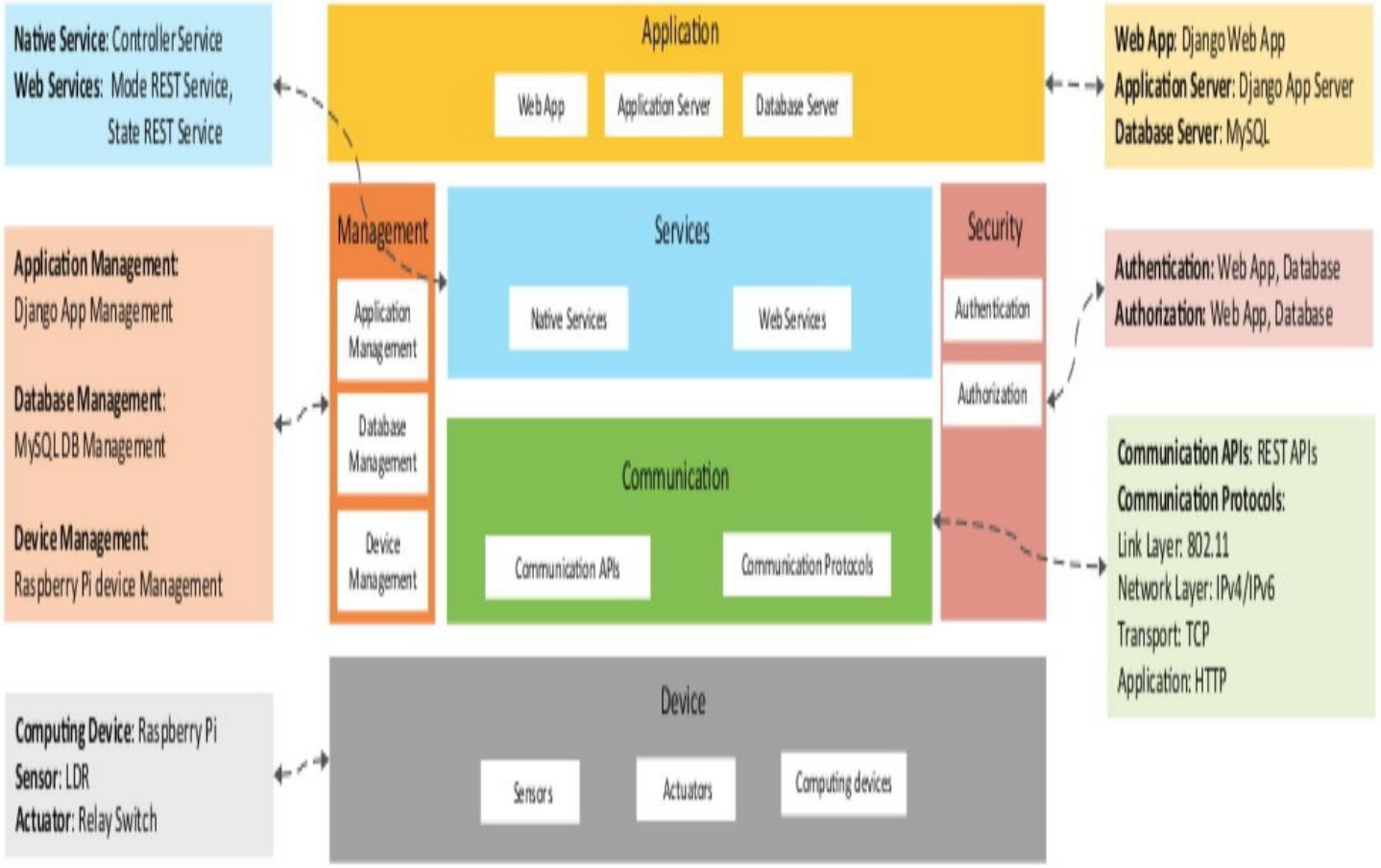
Step : 8 – Operational View Specification



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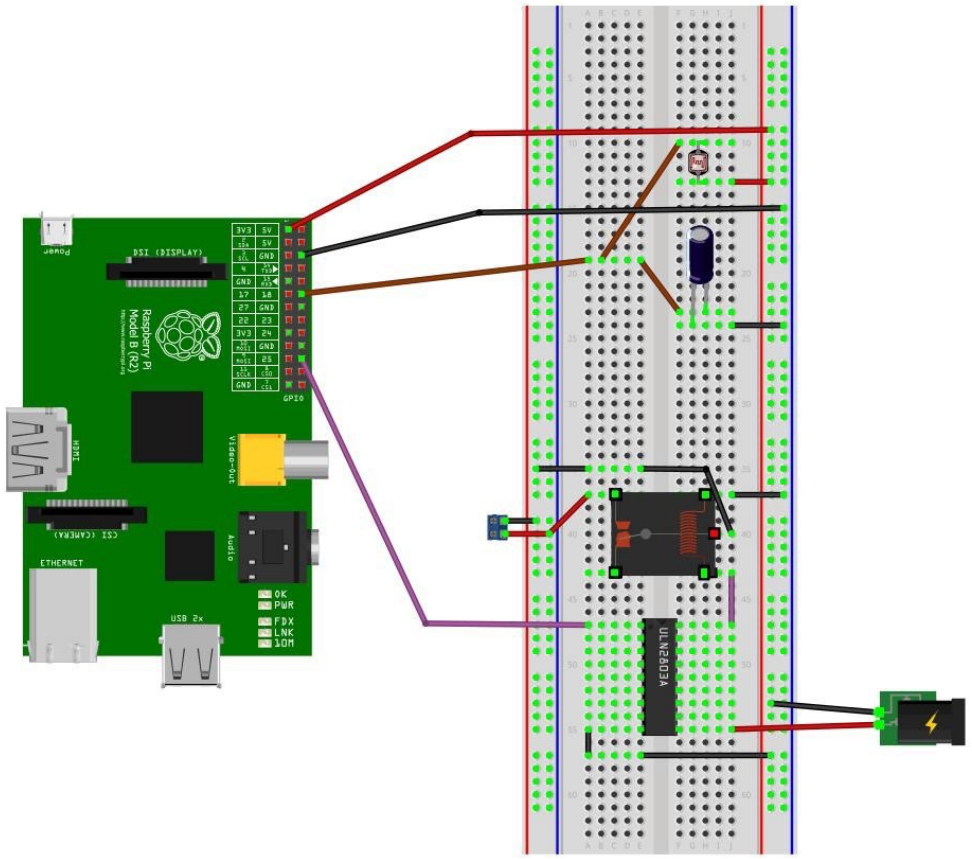
Step : 9 – Device and Component Integration



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Step : 10 – Application Development (Interface)

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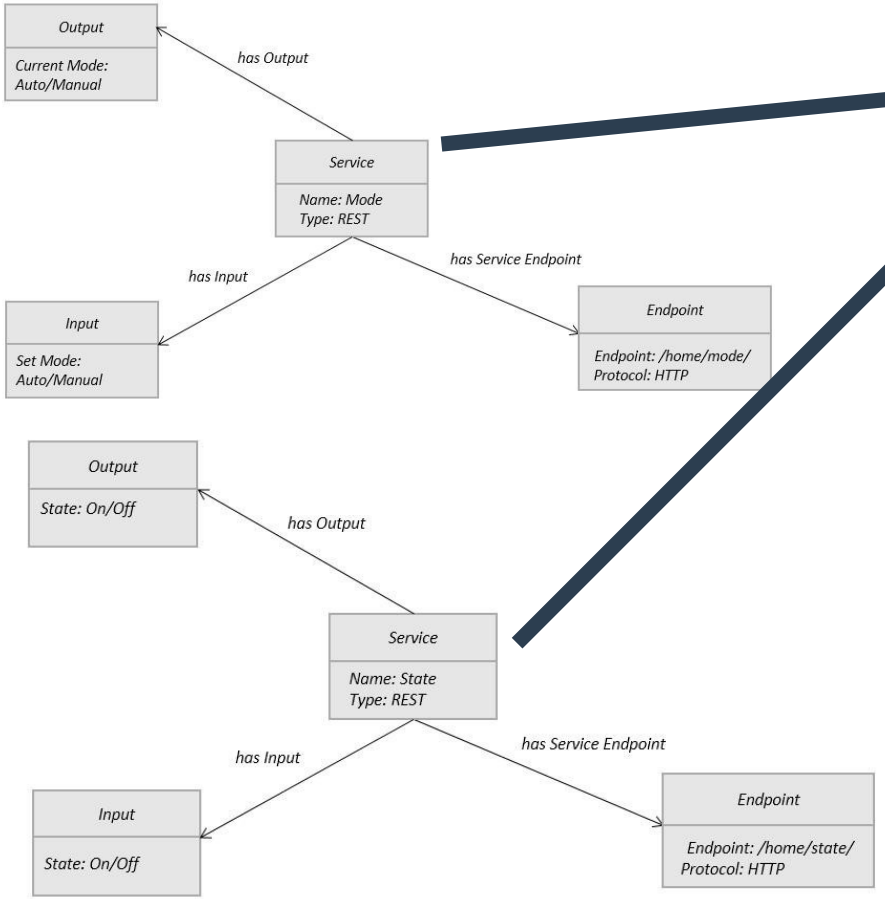
Step : 11 – Web Services Development



1. Map services to models. Model fields store the states (on/off, auto/manual)

2. Write Model serializers. Serializers allow complex data (such as model instances) to be converted to native Python datatypes that can then be easily rendered into JSON, XML or other content types.

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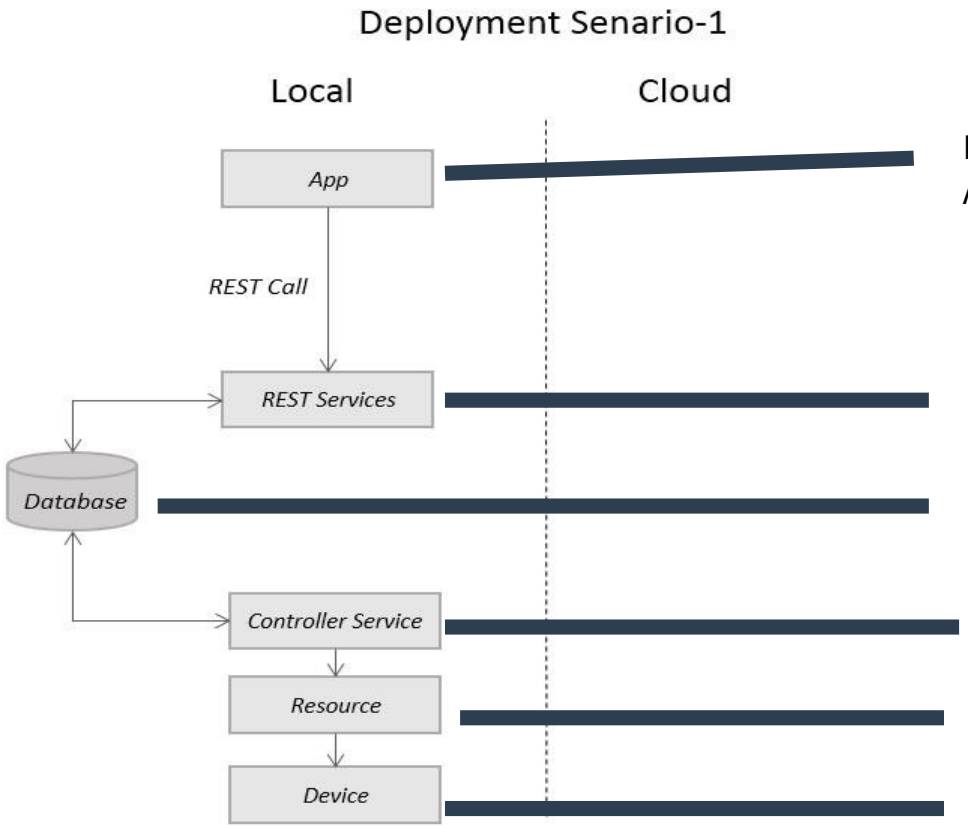
Step : 12 – Integrating the System



Django Application

REST services implemented with Django-REST framework

SQLite Database

Native service implemented in Python

OS running on Raspberry Pi

Raspberry Pi device to which sensors and actuators are connected

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