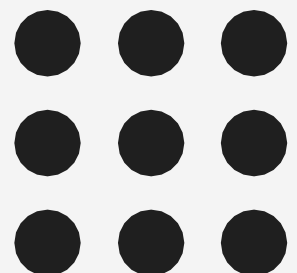# SNS COLLEGE OF ENGINEERING

Department of AI & DS

Course Name –Internet of Things & AI

V Semester

Unit 1 – IoT INTRODUCTION AND APPLICATIONS

Topic 8- IoT Levels

IoT Levels

An IoT system comprises of the following components:

- **Device**
- **Resource**
- **Controller Service**
- **Database**
- **Web service**
- **Analysis component**
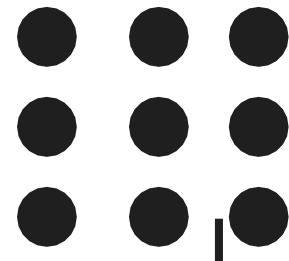- **Application**

IoT Levels

An IoT system comprises of the following components:

- **Device**: An IoT device allows identification, remote sensing, actuating and remote monitoring capabilities.

- **Resource:** Resources are software components on the IoT device for accessing, processing, and storing sensor information, or controlling actuators connected to the device. Resources also include the software components that enable network access for the device.

- **Controller Service**: Controller service is a native service that runs on the device and interacts with the web services. Controller service sends data from the device to the web service and receives commands from the application (via web services) for controlling the device.

- **Database:** Database can be either local or in the cloud and stores the data generated by the IoT device.
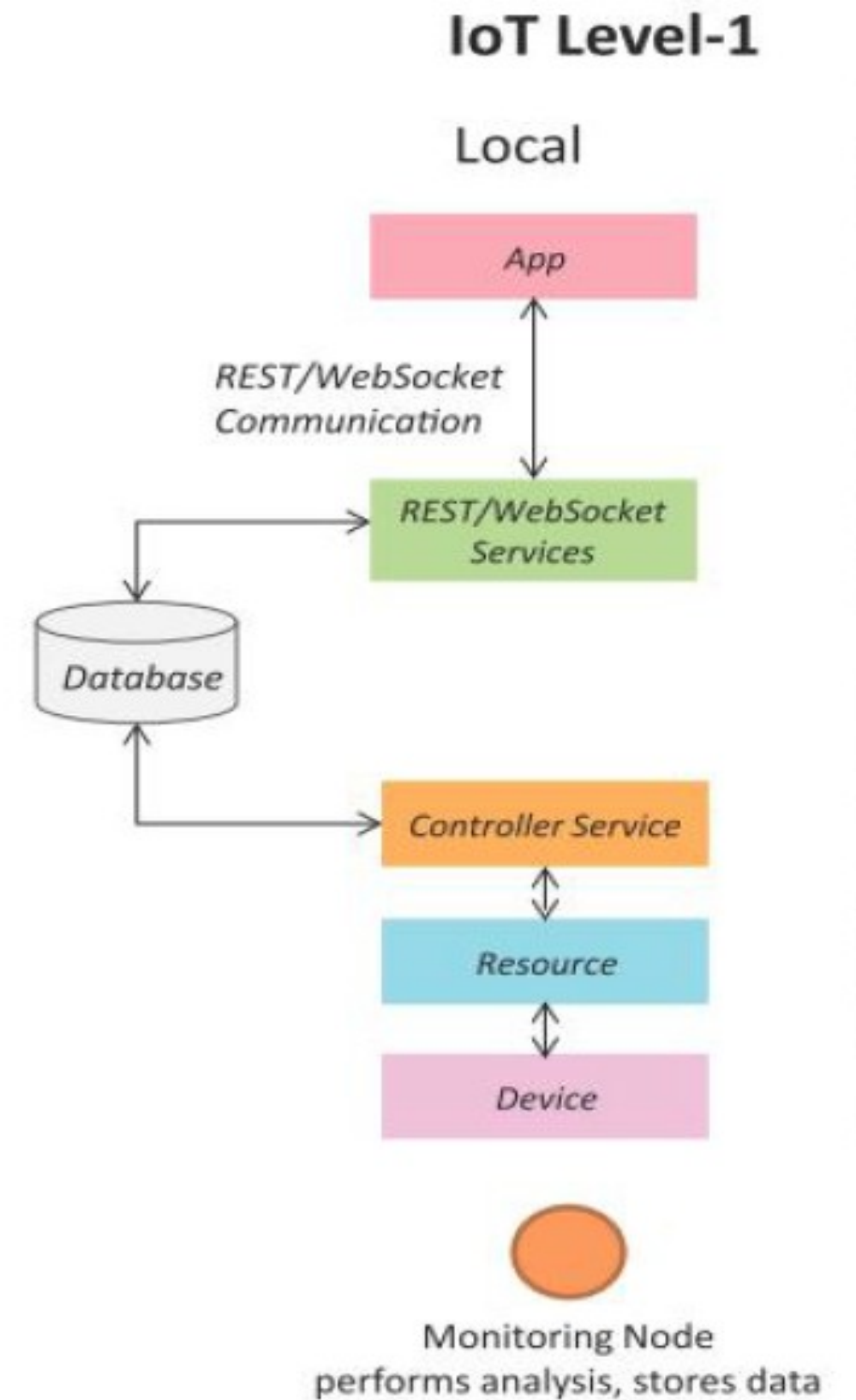
IoT Levels

- **Web Service**: data will be transferred from one device to another mostly IOT device use wireless service so we need to use web servce

- Web services serve as a link between the IoT device, application, database and analysis components. Web service can be either implemented using HTTP and REST principles (REST service) or using WebSocket protocol (WebSocket service).

- **Analysis Component**: There is a continuous flow of data from iot devices and we need a analysis component to analyse the data and to decide what to do with that data.

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- The Analysis Component is responsible for analyzing the IoT data and generate results in a form which are easy for the user to understand.

- **Application:** IoT applications provide an interface that the users can use to control and monitor various aspects of the IoT system. Applications also allow users to view the system status and view the processed data.
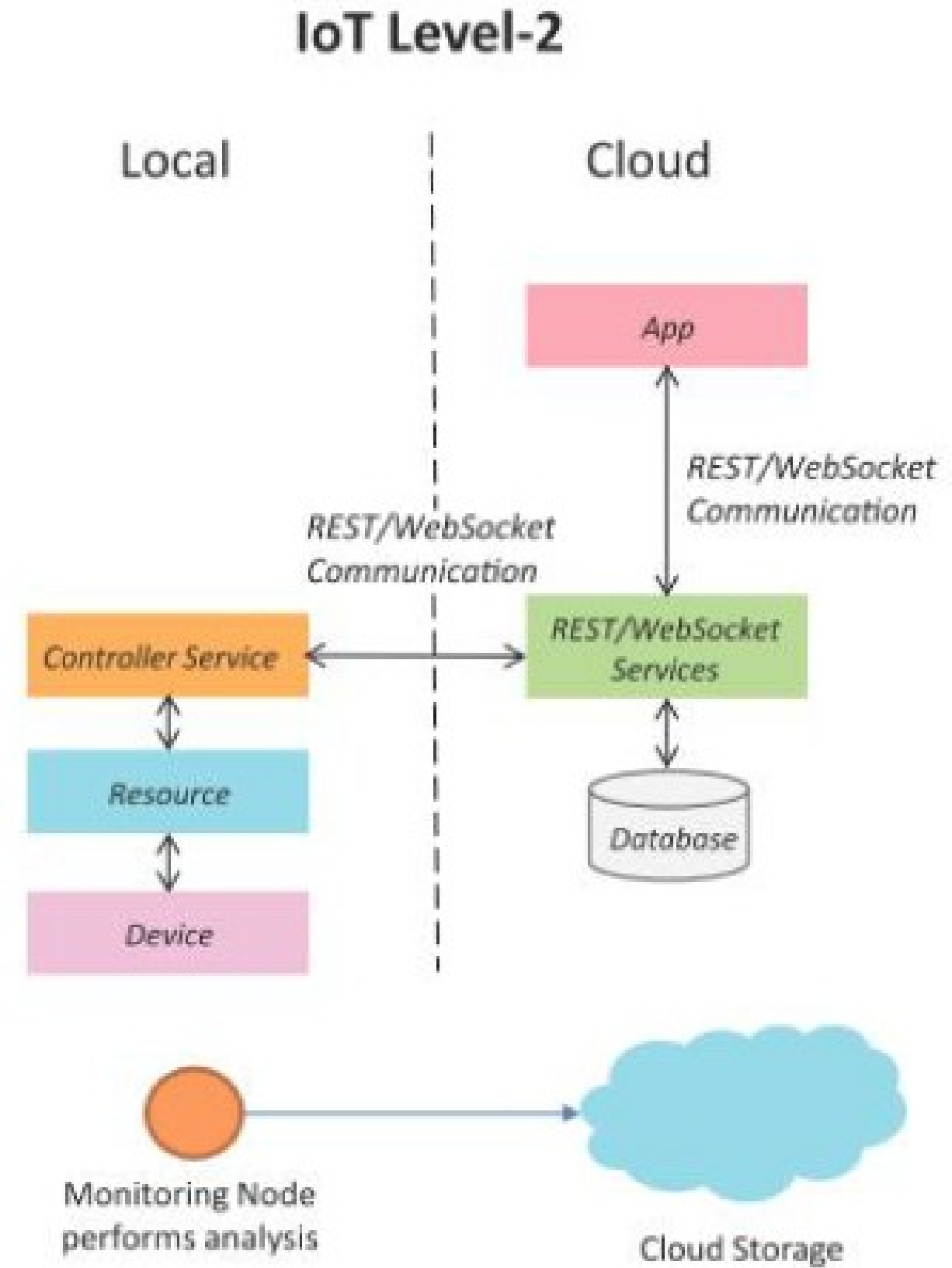
- A level-1 IoT system has a single node/device that performs sensing and/or actuation, stores data, performs analysis and hosts the application

- Level-1 IoT systems are suitable for modeling lowcost and low-complexity solutions where the data involved is not big and the analysis requirements are not computationally intensive.

- Example : Home Automation, AC or Light

IoT Level-1

Local   Cloud

App

REST/WebSocket
Communication

REST/WebSocket
Services

Database

Controller Service

Resource

Device

Monitoring Node
performs analysis, stores data

- A level-2 IoT system has a single node that performs sensing and/or actuation and local analysis.

- Data is stored in the cloud and application is usually cloudbased.

- Level-2 IoT systems are suitable for solutions where the data involved is big, however, the primary analysis requirement is not computationally intensive and can be done locally itself.
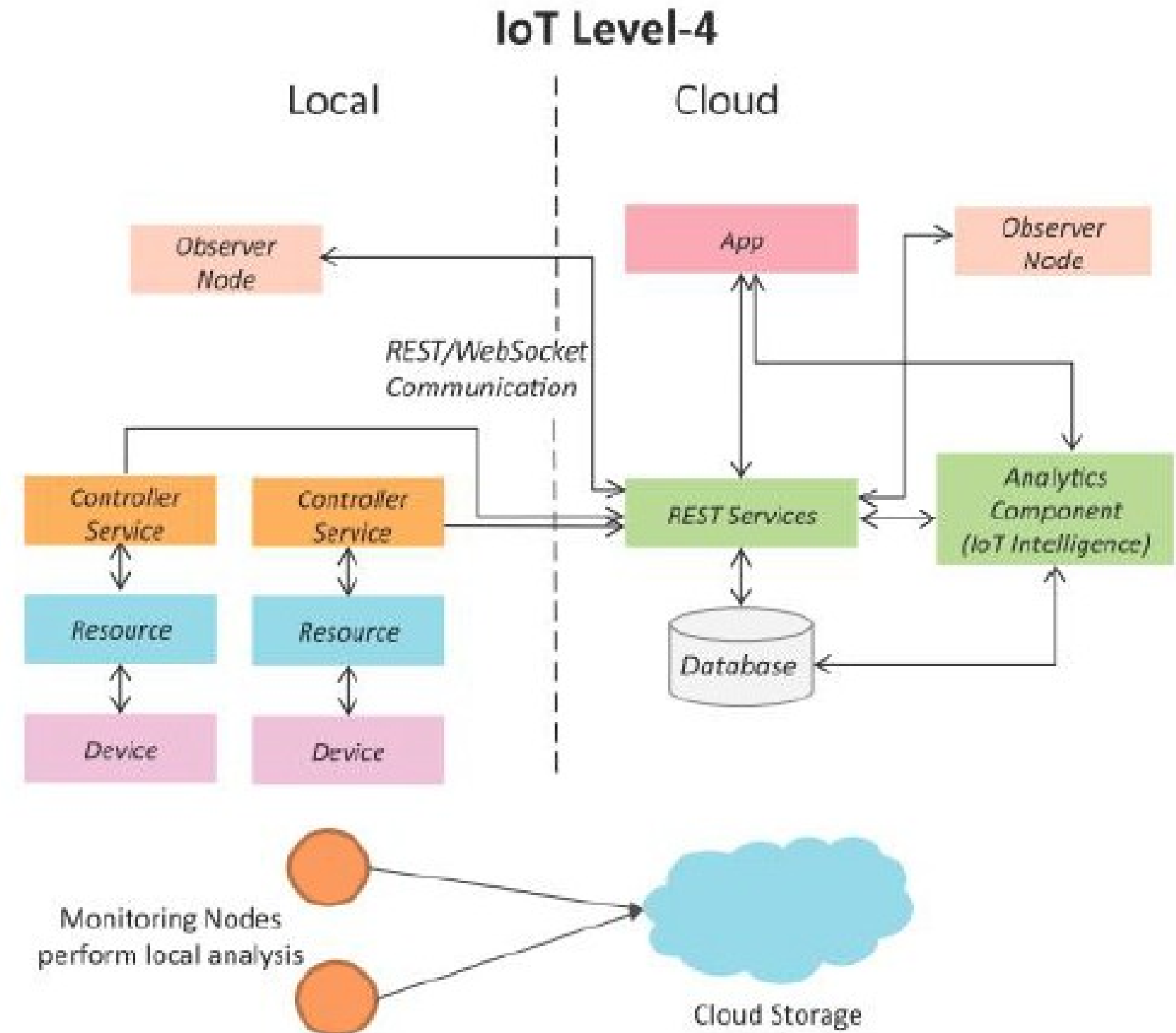
- Example : Smart Irrigation System

IoT Level - 3

- A level-3 IoT system has a single node. Data is stored and analyzed in the cloud and application is cloudbased.

- Level-3 IoT systems are suitable for solutions where the data involved is big and the analysis requirements are computationally intensive

- Example : Tracking Package Handling
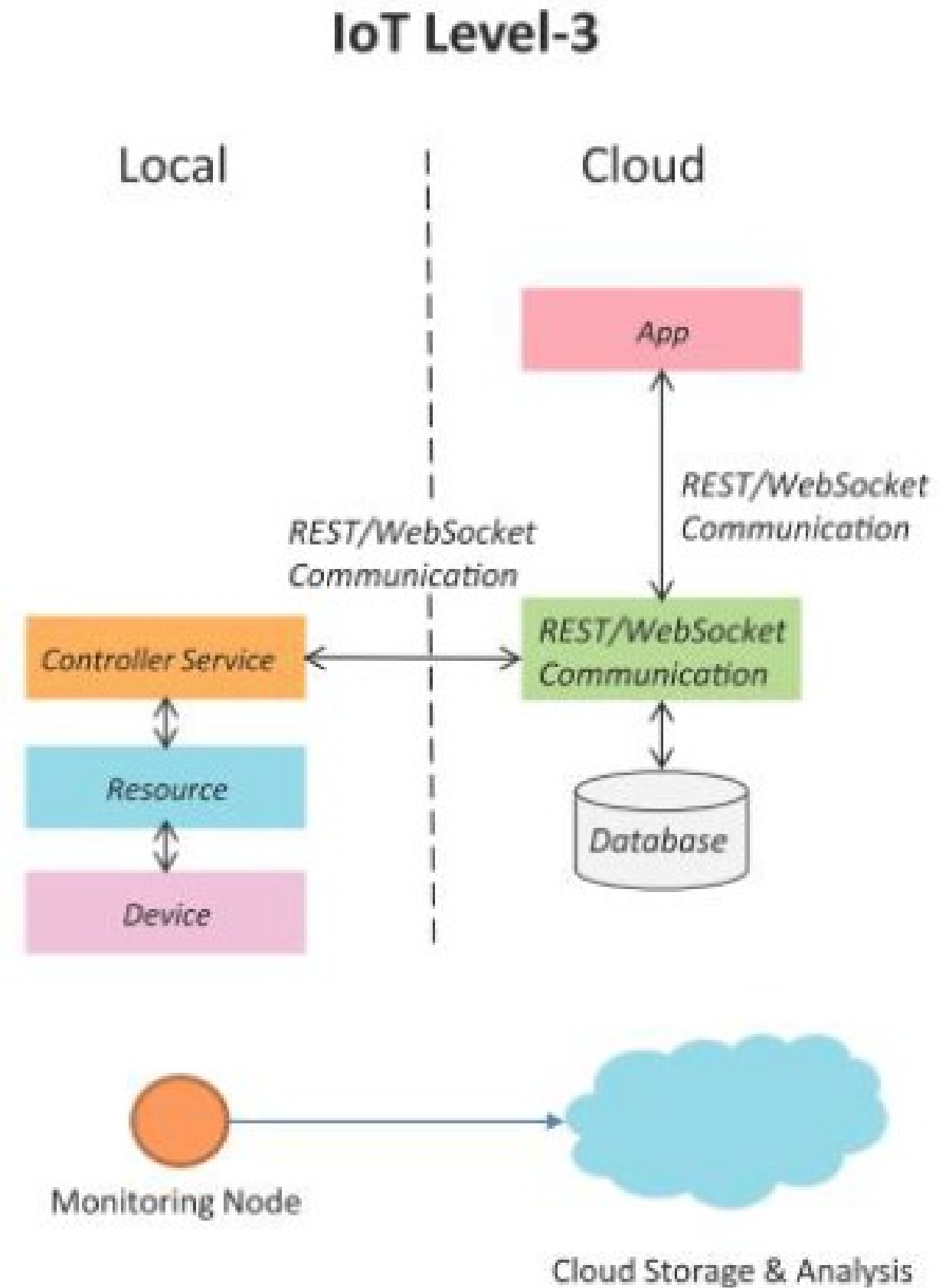
- A level-4 IoT system has multiple nodes that perform local analysis. Data is stored in the cloud and application is cloud-based.

- Level-4 contains local and cloudbased observer nodes which can subscribe to and receive information collected in the cloud from IoT devices.

- Level-4 IoT systems are suitable for solutions where multiple nodes are required, the data involved is big and the analysis requirements are computationally intensive.
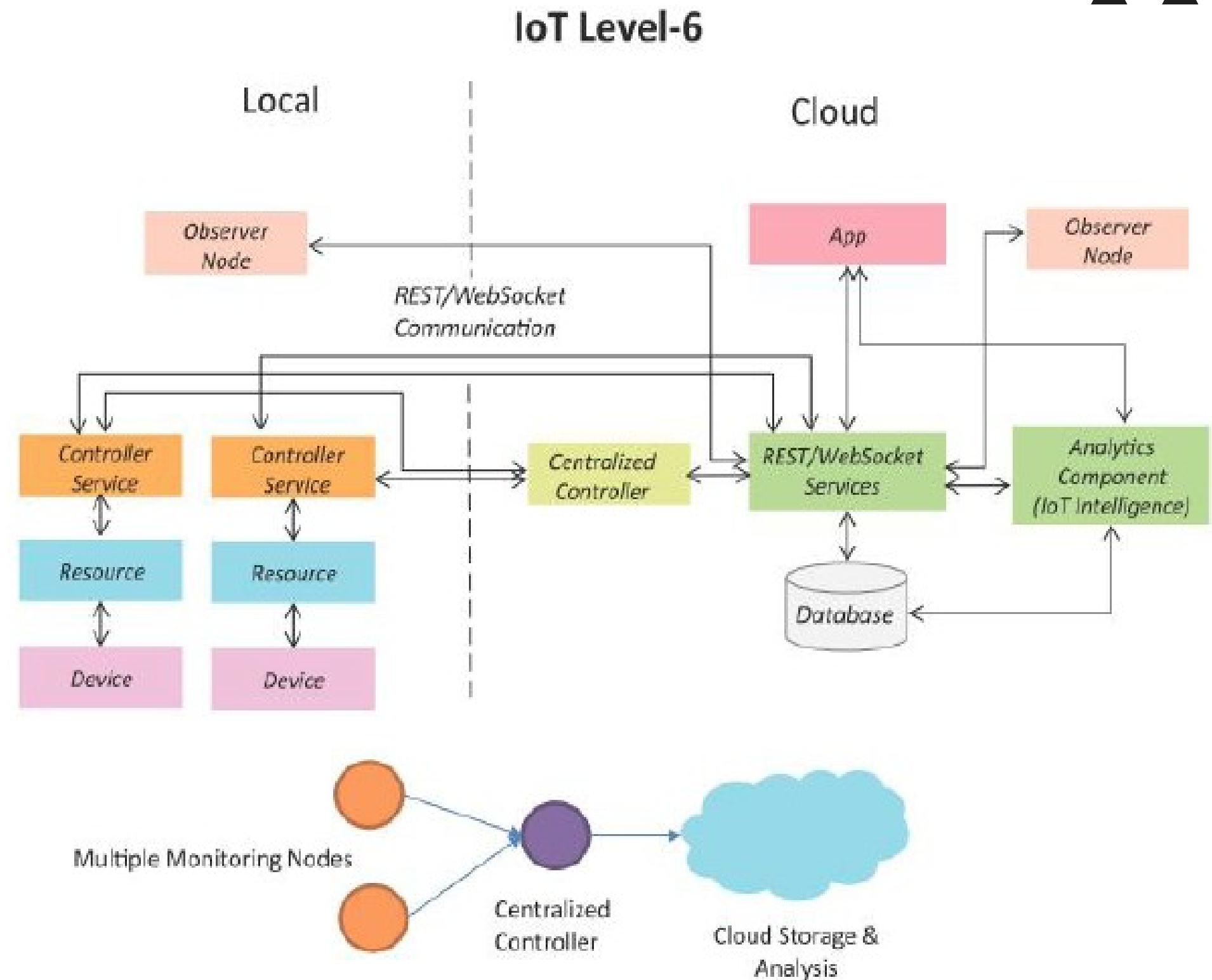
- Example – Noise Monitoring

- A level-5 IoT system has multiple end nodes and one coordinator node.

- The end nodes that perform sensing and/or actuation.

- Coordinator node collects data from the end nodes and sends to the cloud.

- Data is stored and analyzed in the cloud and application is cloud-based.

- Level-5 IoT systems are suitable for solutions based on wireless sensor networks, in which the data involved is big and the analysis requirements are computationally intensive.

- Example – Forest Fire Detection
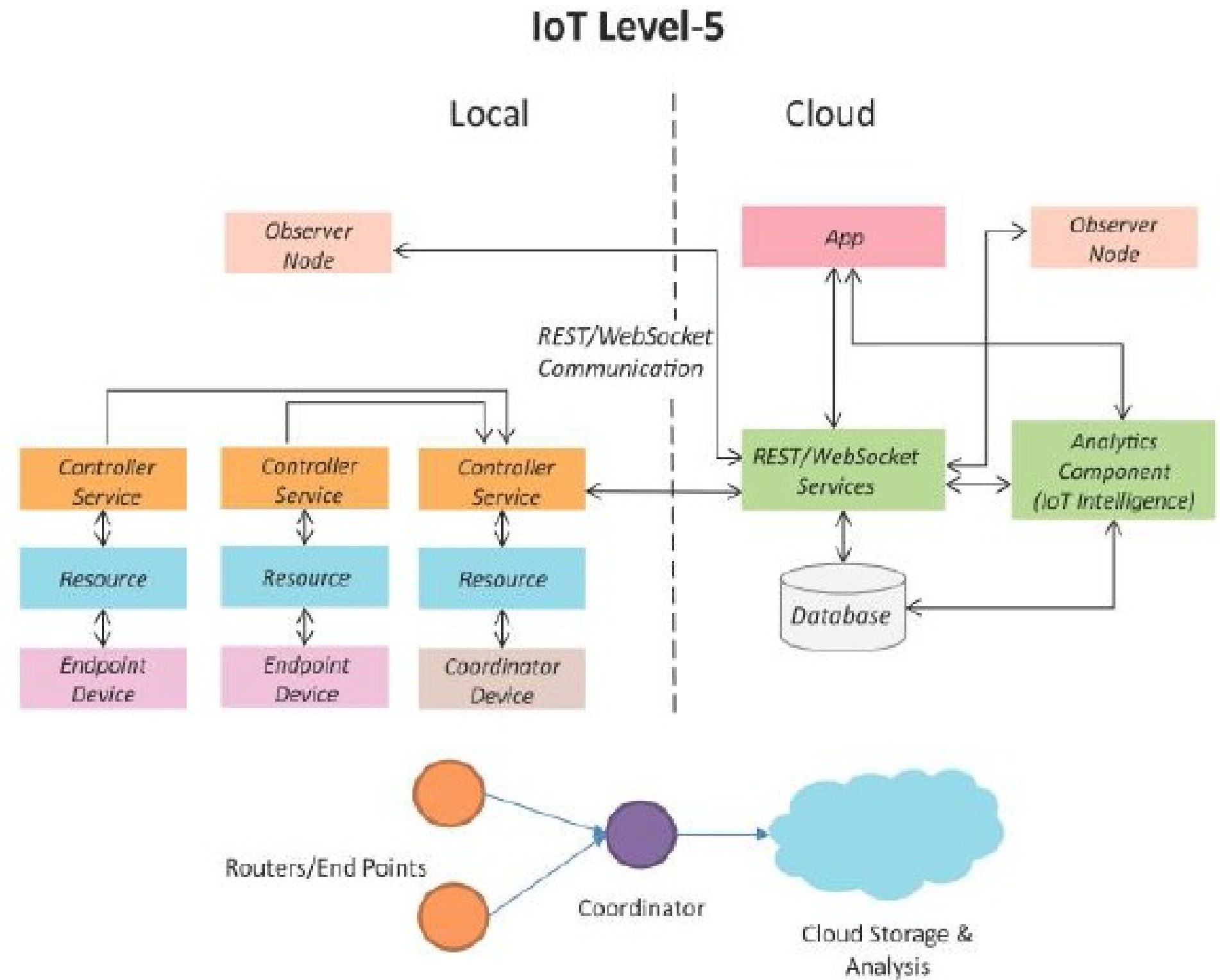
IoT Level-5

- A level-6 IoT system has multiple independent end nodes that perform sensing and/or actuation and send data to the cloud.

- Data is stored in the cloud and application is cloud-based. The analytics component analyzes the data and stores the results in the cloud database.

- The results are visualized with the cloud-based application.

- The centralized controller is aware of the status of all the end nodes and sends control commands to the nodes.

Example – Weather Monitoring

THANK YOU