IoT lEVELS AND DEPLOYMENT TEMPLATES

Developing an IoT Level Template system consists of the following components:

- 1.**Device**: These may be sensors or actuators capable of identifying, remote sensing, or monitoring.

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

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

- 4.**Database**: Stores data generated from the device

- 5.**Web Service**: It provides a link between IoT devices, applications, databases, and analysis components.

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- 6.**Analysis Component**: It performs an analysis of the data generated by the lol device and generates results in a form which are easy for the user to understand.

- **Application:** It provides a system for the user to view the system status and view product data. It also allows users to control and monitor various aspects of the IoT system.

IoT LEVELS

IoT level 1-Sensors

- Any IoT system starts with sensors and other data-collection devices.
- They are in charge of converting analog to digital signals and serving as the link between the physical and digital worlds.
- Sensors, routers, cloud components, application etc. all are at the user's end. This standard is **good for those ecosystems where data is neither big nor varying.**
- A uniform stream of data is **coming from a pre-set group of sensors and that is all happening in a simple way.**

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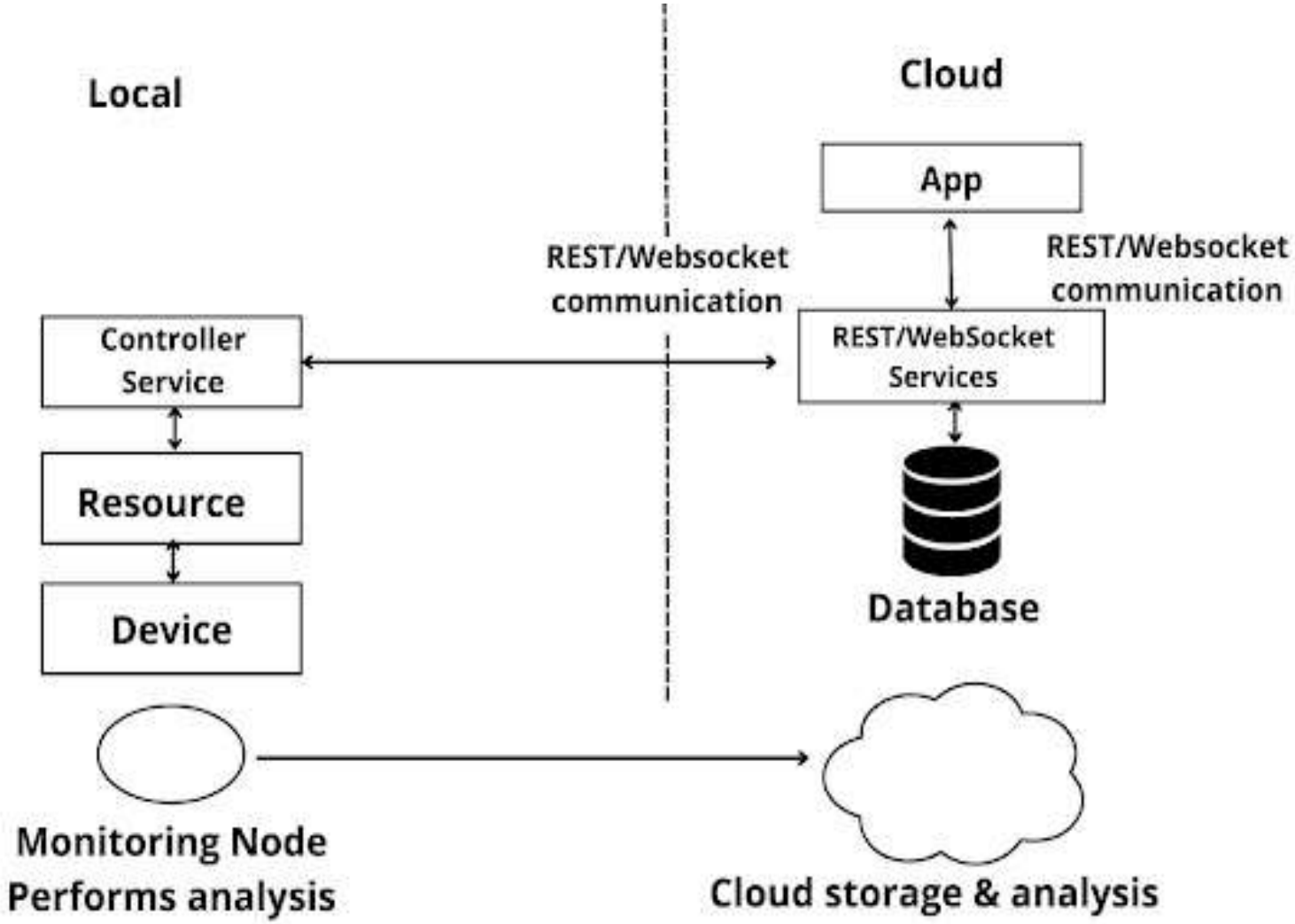
- Example: We can understand with the help of an eg. let's look **at the IoT device that monitors the lights in a house.** The lights are controlled through switches. The database has maintained the status of each light and also REST services deployed locally allow retrieving and updating the state of each light and trigger the switches accordingly.

- For controlling the lights and applications, the application has an interface. The device is connected to the internet and hence the application can be accessed remotely as well.

IoT LEVEL 2- Sensors Network Gateway

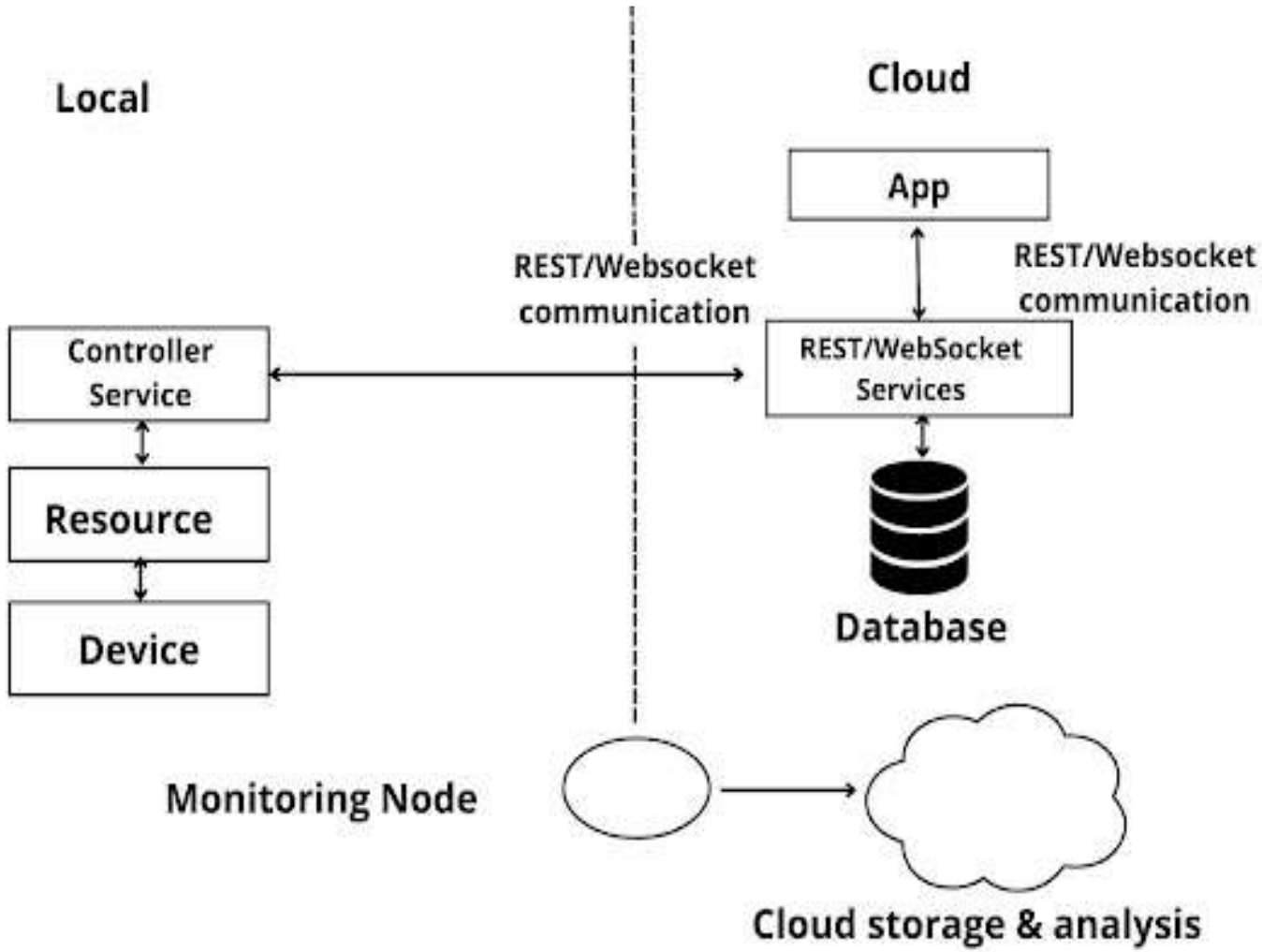
- In the IoT levels system, this layer is the first network layer. It is in charge of transferring data from the first layer's sensors to the third layer's gateways.

- Example: Cloud-based application is used for monitoring and controlling the IoT system A single node monitors the soil moisture in the field Which is sent to the database on the cloud using REST APIS. The controller service continuously monitors moisture levels.


Local
Cloud
App
REST/Websocket
communication
REST/Websocket
communication
Controller
Service
REST/WebSocket
Services
Resource
Device
Database
Monitoring Node
Performs analysis
Cloud storage & analysis

IoT LEVEL 3- SINGLE NODE

- At this level, **the application is cloud-based.**
- A **single node monitors the environment and stores data in the cloud**.
- Example: A node is **monitoring a package using devices like an accelerometer and gyroscope.**
- These devices track vibration levels. controller service sends sensor data to the cloud in the rear time using WebSocket APL. **Data is stored in the cloud and visualized using a cloud-based application.** The analysis component triggers an alert if vibration levels cross a threshold.


Local
Cloud
App
REST/Websocket
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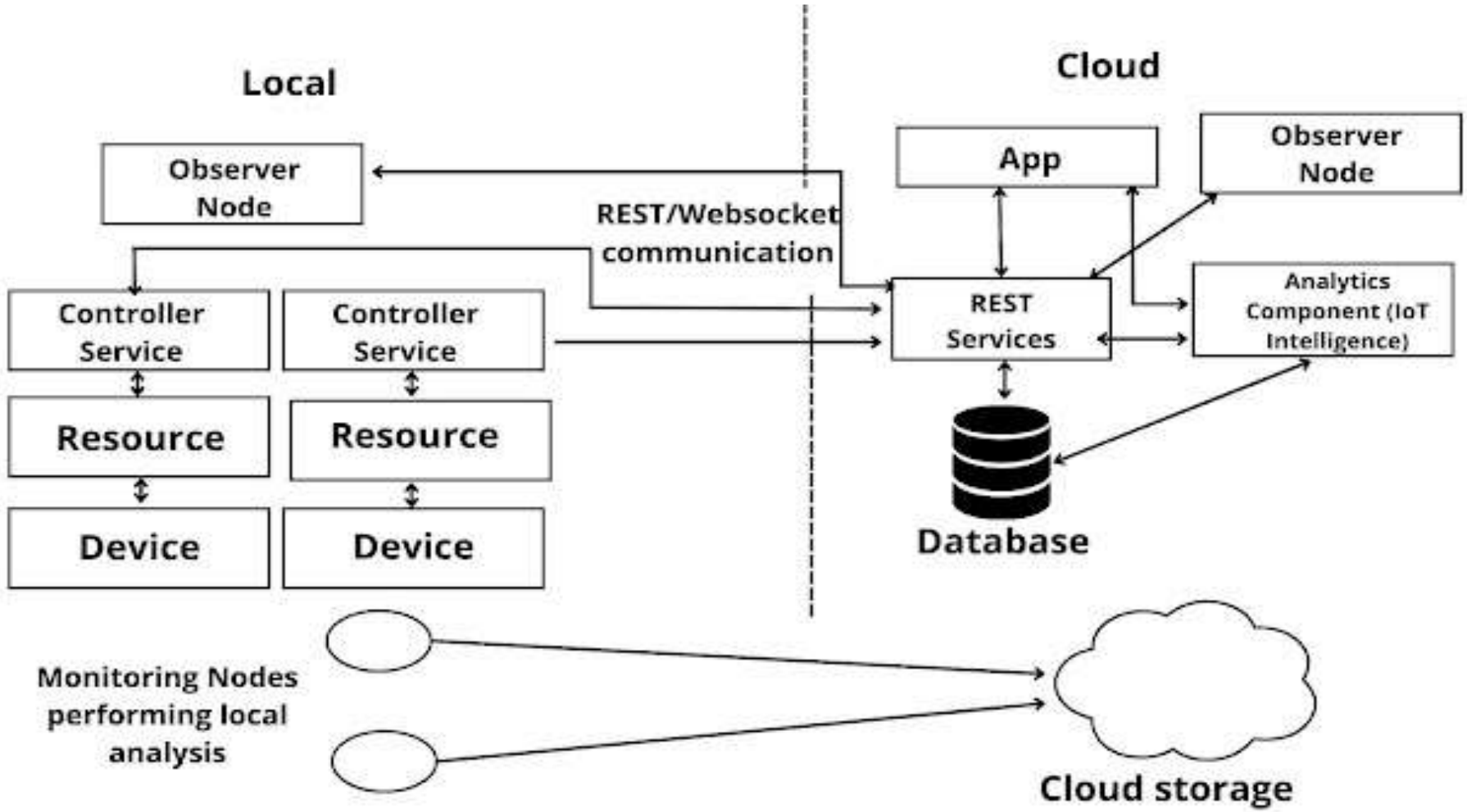
IoT LEVEL 4- MULTIPLE NODE

- 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 cloud- based observer nodes** which can **subscribe to and receive information collected in the cloud from IoT devices.**


Local
Cloud
Observer Node
App
Observer Node
REST/Websocket communication
Controller Service
Controller Service
REST Services
Analytics Component (IoT Intelligence)
Resource
Resource
Device
Device
Database
Monitoring Nodes performing local analysis
Cloud storage