

Web Service: Web services serve as a link between an IoT device, application, databases and analysis components. Web services can be implemented using HTTP and REST principles or using Websocket-protocol.

Analysis Component: This is responsible for analyzing the IoT data generating results in form that is easy for the user to understand.

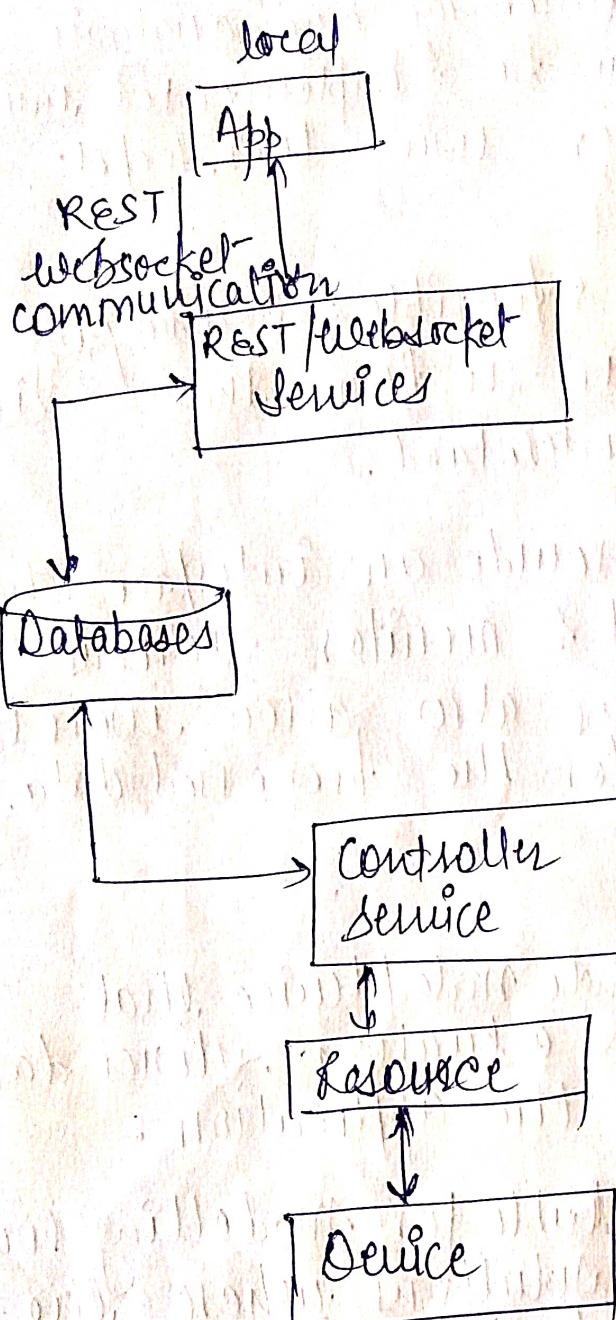
Application: IoT applications provide an interface that the users use to control & monitor various aspects of the IoT. Applications also allow users to view the system states for the processed data.

* IoT Level 1 :

→ A level 1 IoT system has single node / device that performs sensing and/or actuation, stores data, perform analysis and hosts the application.

→ Level-1 IoT systems are suitable for modelling low cost and low complexity solutions where the data involved isn't big and the analysis requirements are not computationally intensive.

IOT Level - 1



Cloud

Monitoring Node

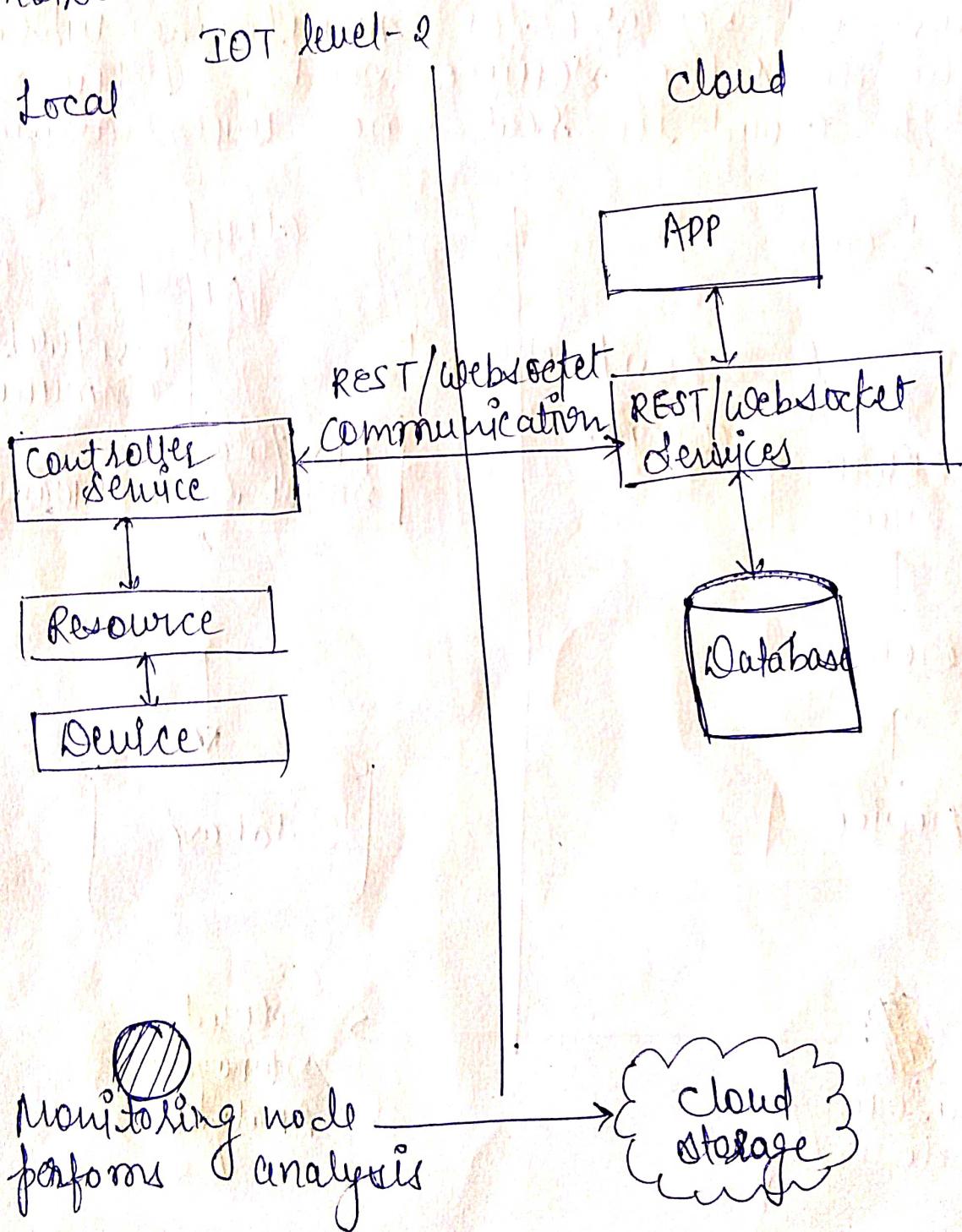
performs analysis & stores data

Example's IOT system for home-automation? This system consists of a single node that allows controlling of lights & appliances in home.

IOT level 2:

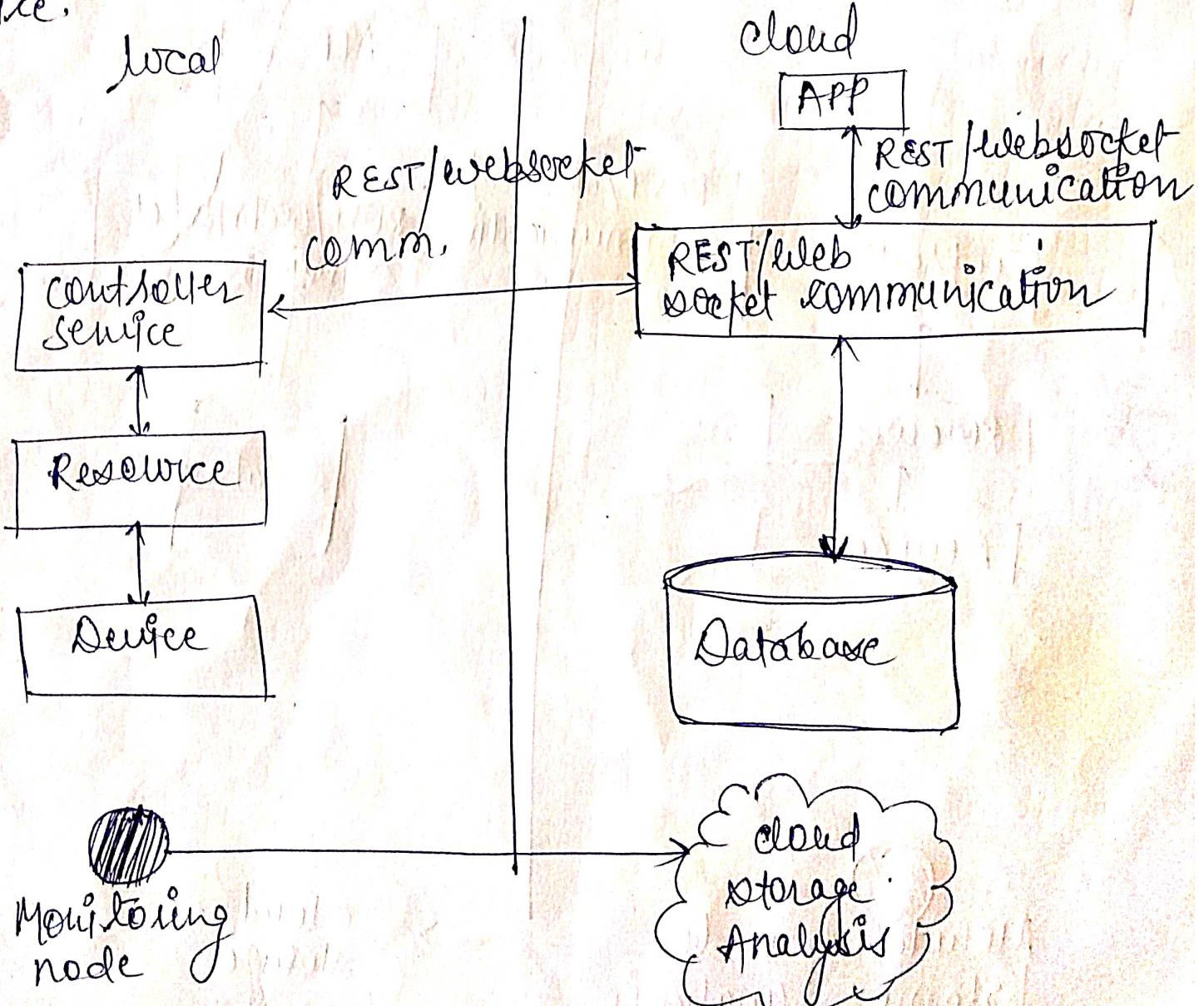
→ A level two IOT system has a single node that performs sensing and for actuation and local analysis. Data is stored in cloud & application is usually cloud based.

→ Level 2 IOT systems are suitable for solutions where involved is big to big data, the data is Example: IOT system for smart irrigation. This system consists of a single node that monitors the soil moisture level controls the irrigation system.

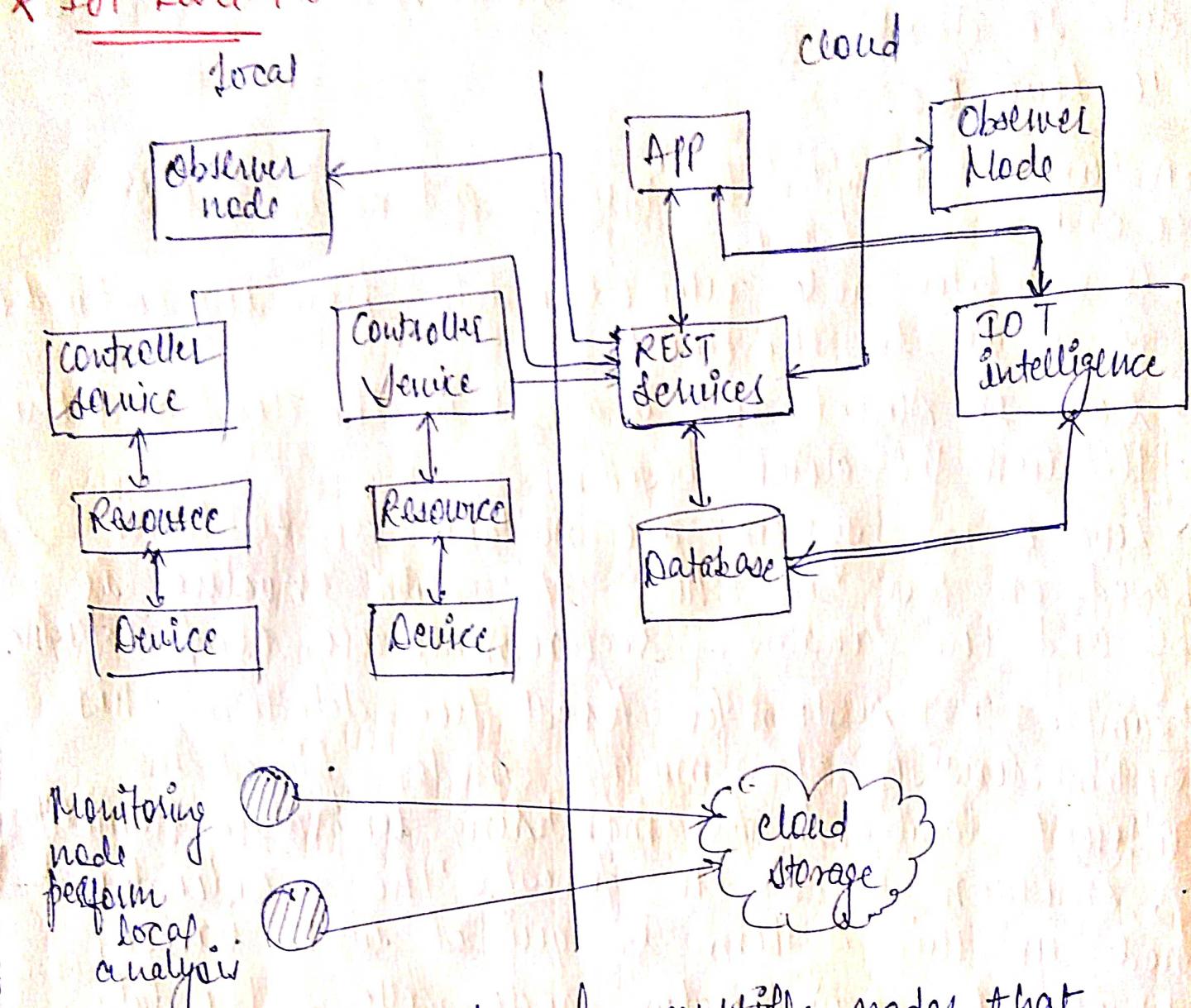


* IOT Level -3 :

- A level -3 IOT system has a single node. Data is stored and analyzed in cloud and the application is cloud based.
- Level-3 systems are suitable for solutions where the data is involve is big and the analysis requirements are computationally intensive.
- Example: IOT system for tracking package handling:
This system consists of a single node that monitors the vibration levels for a package being shipped. The device in this system uses accelerometers and sensors for monitoring vibration levels. The controller service sends the sensor data to the cloud in real time using websocket service.



* IOT Level-4 :



→ A level-4 IoT system has multiple nodes that perform local analysis. Data is stored in the cloud & the application is cloud based.

→ IoT level-4 contains local & cloud based observer nodes which can subscribe to & receive information collected in the cloud from IoT devices.

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

Example : IoT system for noise monitoring. The system consists of multiple nodes placed in different locations for monitoring noise levels. The nodes are equipped with sensors. Nodes are independent of each other.

each node runs its own controller service that sends data to cloud.

* IOT Level-5:

- A level 5 IOT system has multiple end nodes and 1 co-ordinator node.
 - Co-ordinator node collects the data from the end nodes & sends it to the cloud;
 - Data is stored and analyzed in the cloud and the application is cloud-based.
 - Level 5 IOT systems are suitable for solutions based on IoT, in which the data involved is big and the analysis requirements are comp. intensive
- Example: IOT system for forest fire detection: This system consists of multiple nodes placed in different locations for monitoring temperature, humidity, CO₂ emission levels in forest. The co-ordinator node in this system is equipped with various sensors. The co-ordinator node collects the data from the end nodes & acts as a gateway that provides internet connectivity to the IOT system. The data is stored & analyzed in cloud database.

IOT Level - 5

