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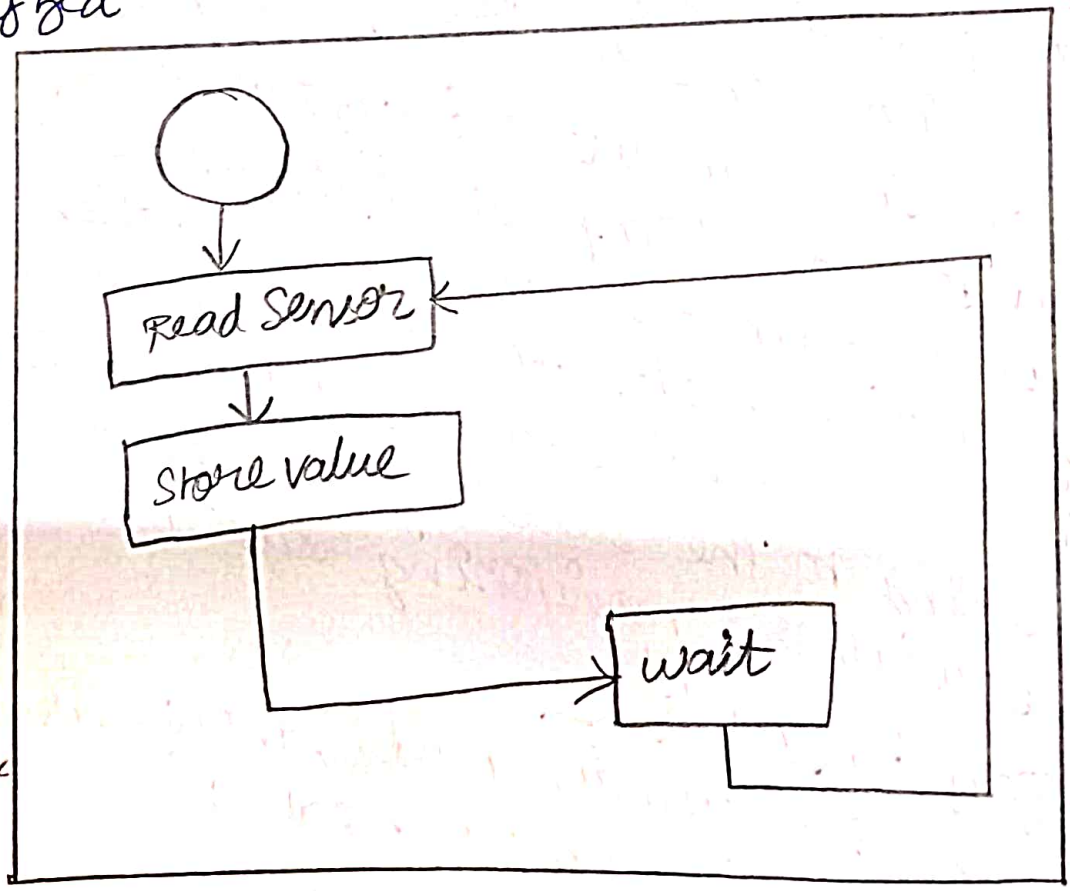
Internet of Things
Assignment-1

Case study: Weather Monitoring System

1. purpose and Requirements:

* The purpose of the weather monitoring system is to collect data on environmental conditions such as temperature, pressure, humidity and light in an area using multiple end nodes

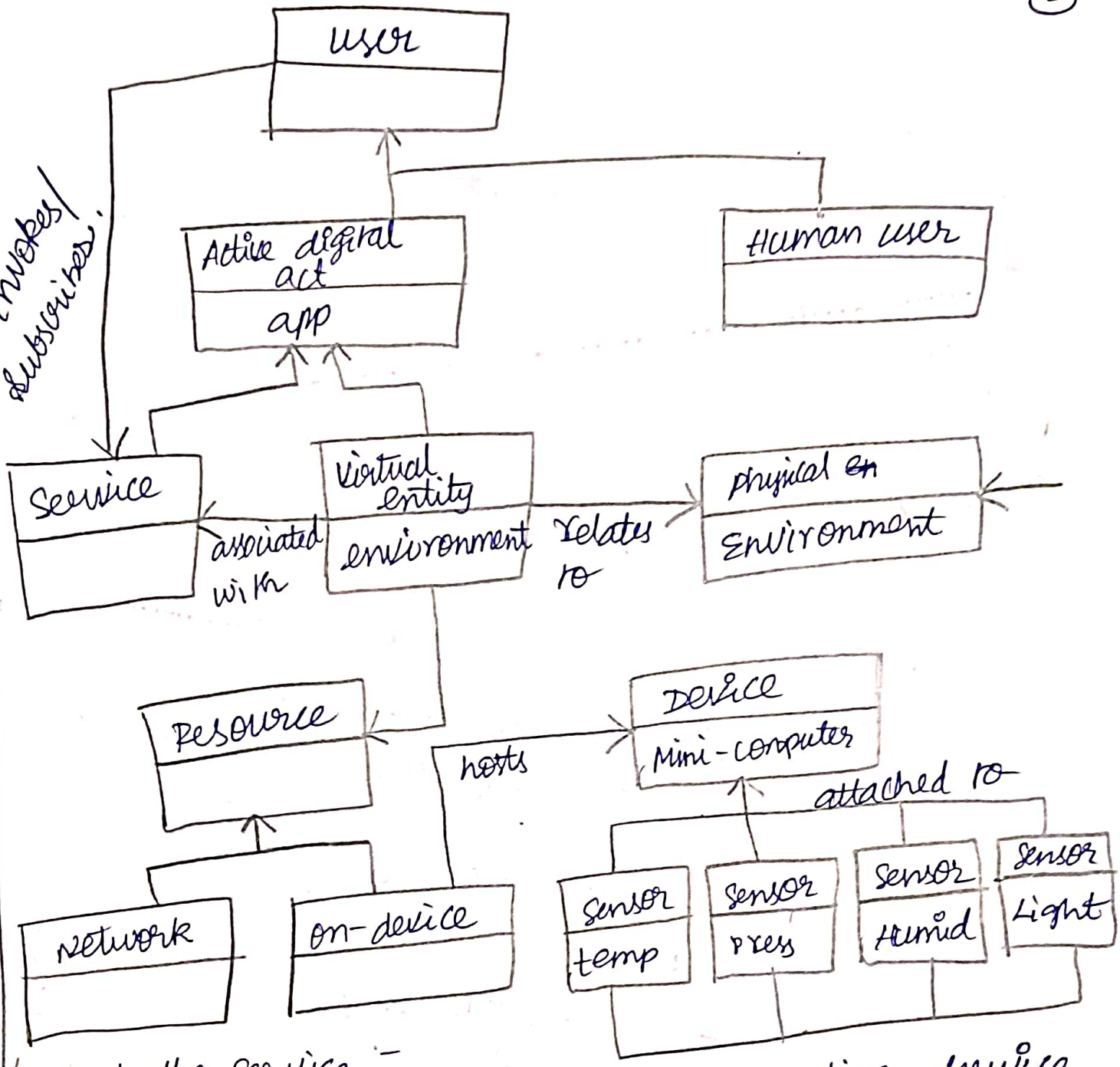
* The end nodes send the data to the cloud where the data is aggregated and analyzed



* The diagram shows the process specificati for the weather monitoring system
* The process specification shows that the sensors are read after fixed intervals and the sensors are read after fixed interva and the sensors measurements are stored

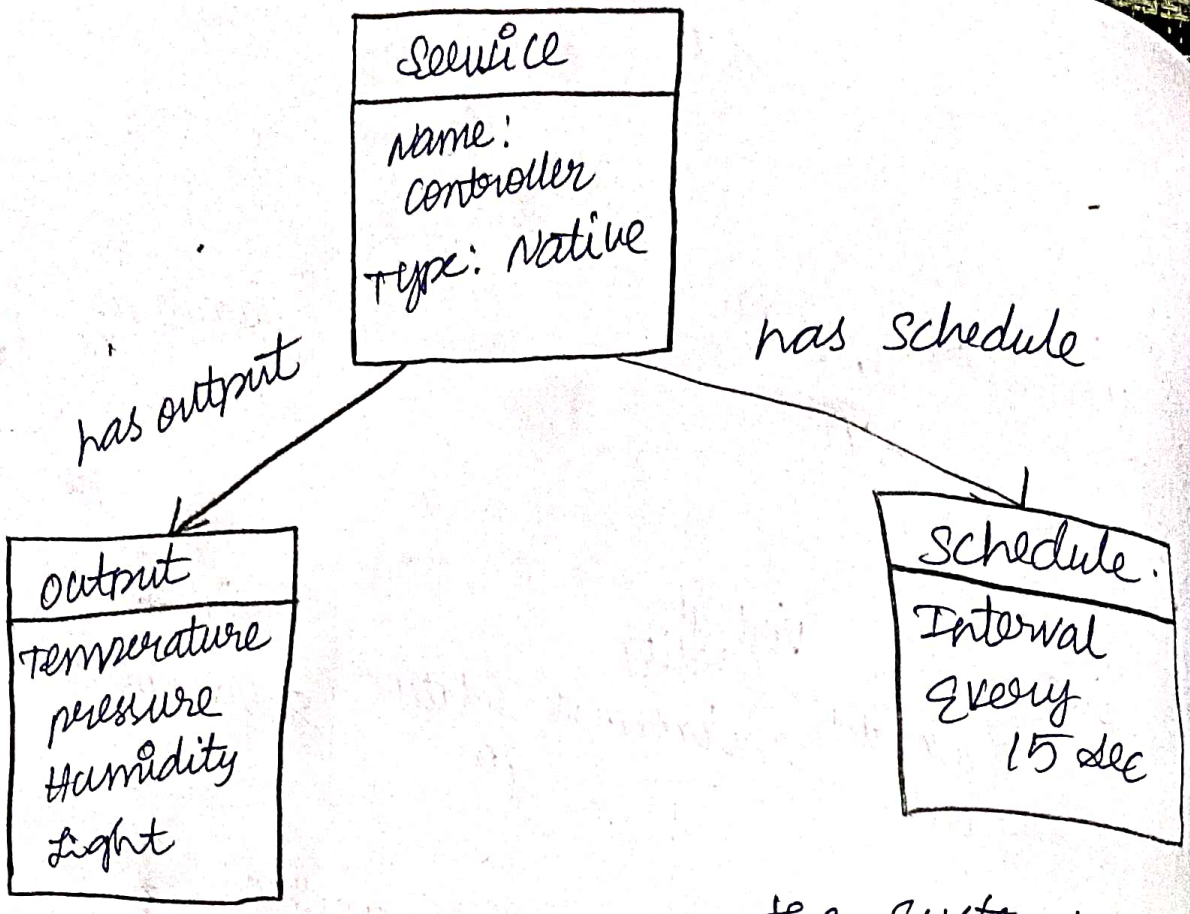
3. Domain Model specification
* In this Domain model the physical entity is the environment which is being monitore
* There is a virtual entity for the environm
* Devices include temperature sensor, pressure sensor, humidity sensor, light sensor and single board mini computer
* Resources are software components which c be either on-device or network-resources
* Services include the controller service that monitors the temperature, pressure deriving t services from the process specification and information model for the weather monitori system, humidity and light and sends the reading to the deriving the services from the weather monitoring system.

4. Domain Model
* In this domain model, there is one vir entity for the environment being sensed



5. Controller Service :-

* The controller service runs as a native service on the device and monitors temperature, pressure, humidity and light once every 15 sec
* The controller services calls the REST service to stores these measurements in the cloud.



6. Deployment Design for the system:

* The system consists of multiple nodes placed in different locations for monitoring temperature, humidity and pressure in an area.
* The endnodes are equipped with various sensors
* The endnodes sends the data to the cloud and the data is stored in database
* The analysis of data is done in the cloud to aggregate in data and make predi

7. Case Study Weather Monitoring System:

* IOT device maps to the Device FG (Sensors, and computing devices) and the Management FG (device Management)

* Resources map to the Device FG (on-device resources and communication FG (communication API's and protocols)

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

* web services map to services FG (web services)

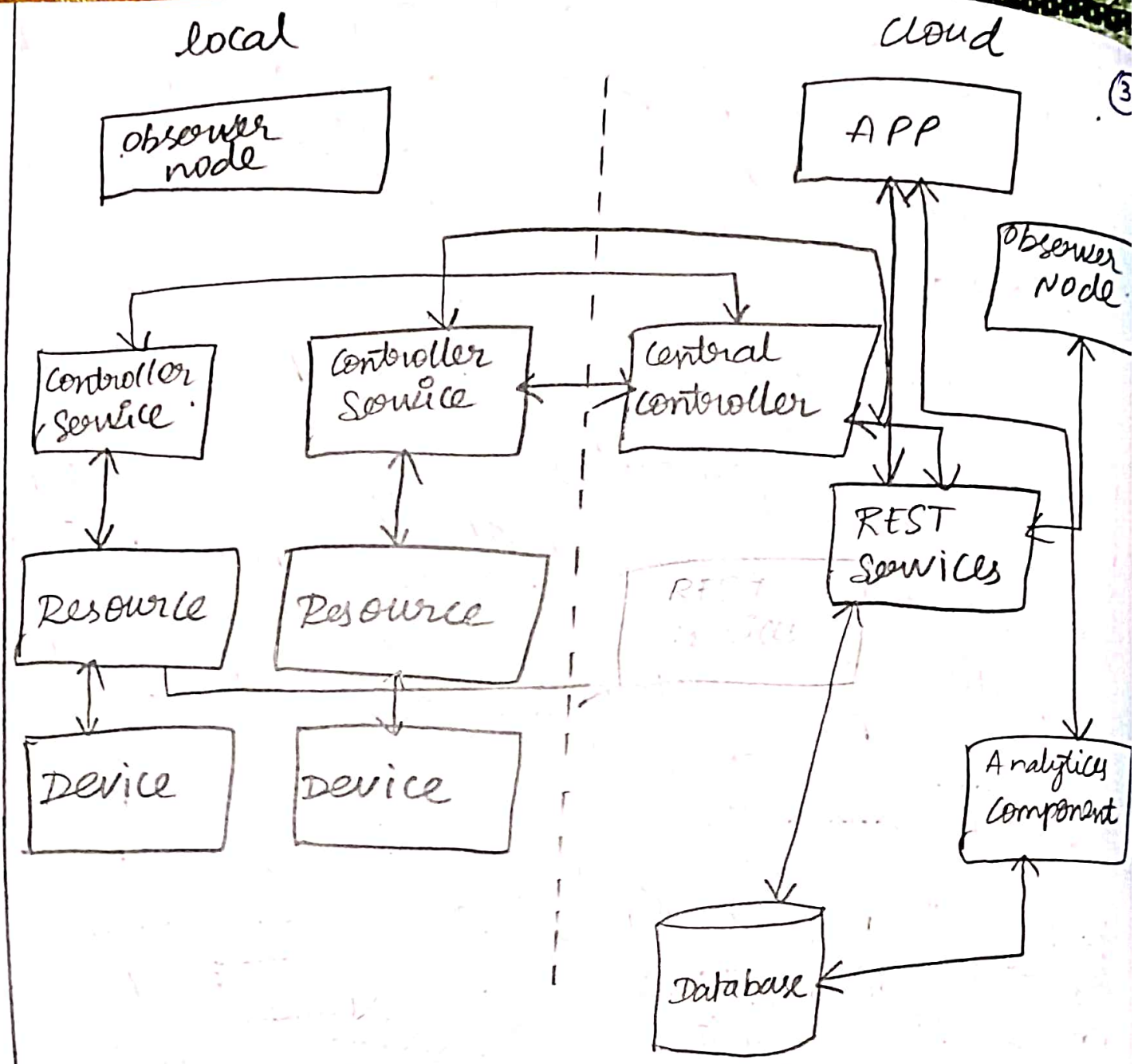
* Database maps to the management FG (database management) and security FG (database security)

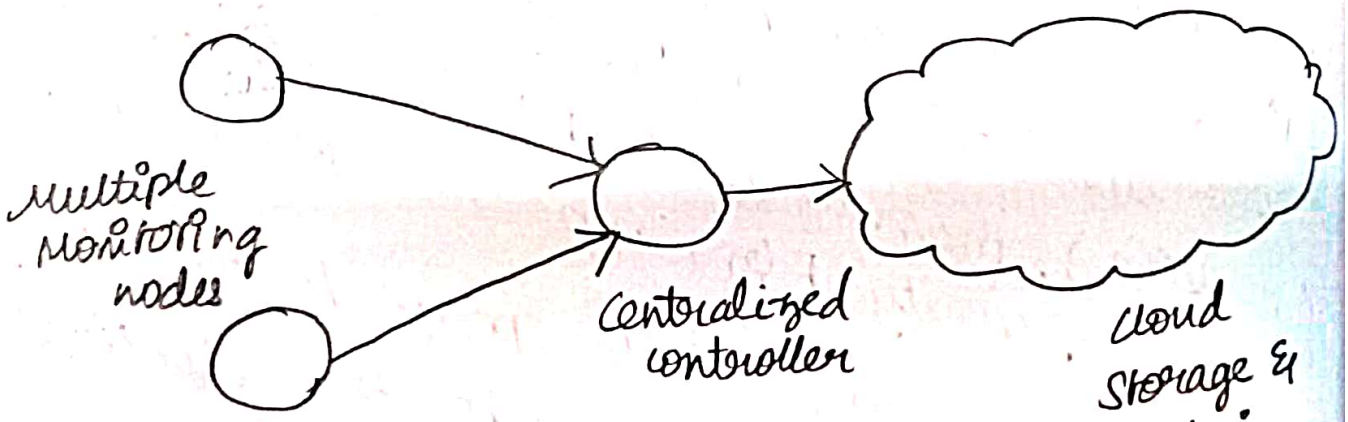
* Application maps to the Application FG (web application, application and database servers), management FG (app management) and security FG (app security)

* Analytics components maps to the application FG.

* Observer node maps to the Application FG.

1. mapping development level to functional groups for the weather motioring system





Deployment design for Software.

2. mapping functional Groups to operational view specifications for the weather monitoring system: (4)

The diagrams are depicted below:-

mapping functional Groups to operational view specifications for weather monitoring system.

Application :-

Web App :- Django web App
Application server : Django App Server.
Database server : xively cloud server
Analytics : Hadoop
Observer : cloud app, Mobile app

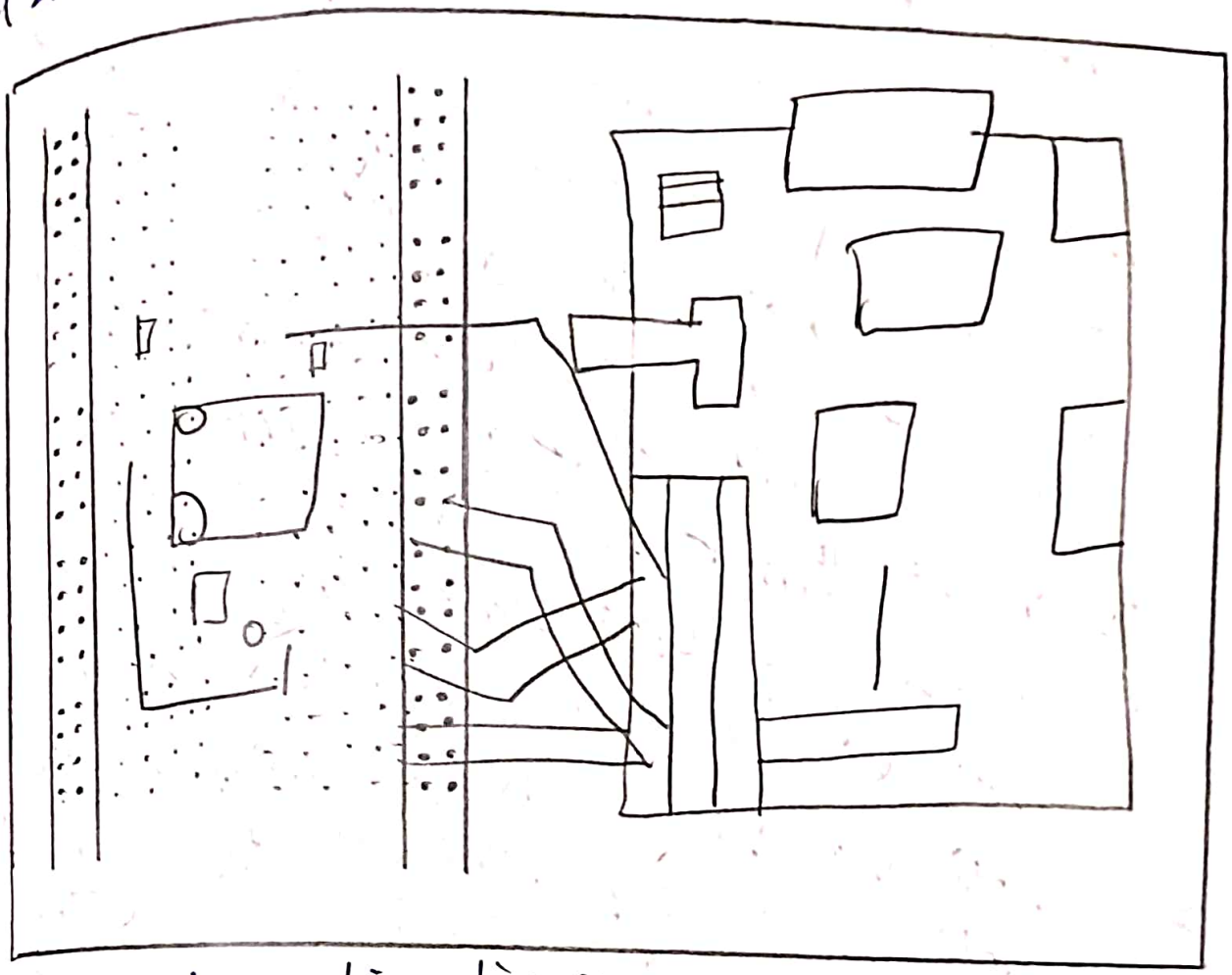
Security :
Authentication : Web App, Database
Authorisation : Web App, Database

Communication :
Communication API's : Rest API's
Communication protocols :
Link layer : 802.11
Network layer : IPV4 | IPV6
Transport : TCP
Application : HTTP

Device :
Computing device : Raspberry pi
Sensor : Temperature, Humidity, Pressure, Ligh

Management :
Application management :
Django App management
Database management :
MySQL DB management
Device management :
Raspberry pi device management.

(S1 9 & 10): Controller Device :-



*The Schematic diagram of the weather monitoring system

* The devices and components used in this example are Rasberry Pi mini computer, temperature, sensor, humidity sensors, pressure sensors and LDR sensors.

Conclusion:-

This depicts the generic design methodology for IOT system design which is independent of specific product device or programming language.

In the first step, system design methodology is to define purpose and requirements, In second step, the use case were formally described. The third step is to design the domain model which describe main concepts entities and objects in the domain Of IOT system to be designed. The same way the fourth and fifth step to define structure of system and to define functional view which defines the functional groups. The sixth step to define the service specifications, The seventh step is to define Deployment & operational view specifications. The last 3 steps has controller service. The ultimate aim is to design IOT methodology for applications.