Jessica Braganza
F17112151
BE Comp 2

PAGE NO :
DATE :

Cloud Computing Assignment

1) Explain architecture of IoT with suitable diagram?

Ans. 1) The Internet of Things (IoT) is a collection of diverse technologies that interact with the physical world.

2) The block diagram shown below provides a high-level architectural view of IoT.

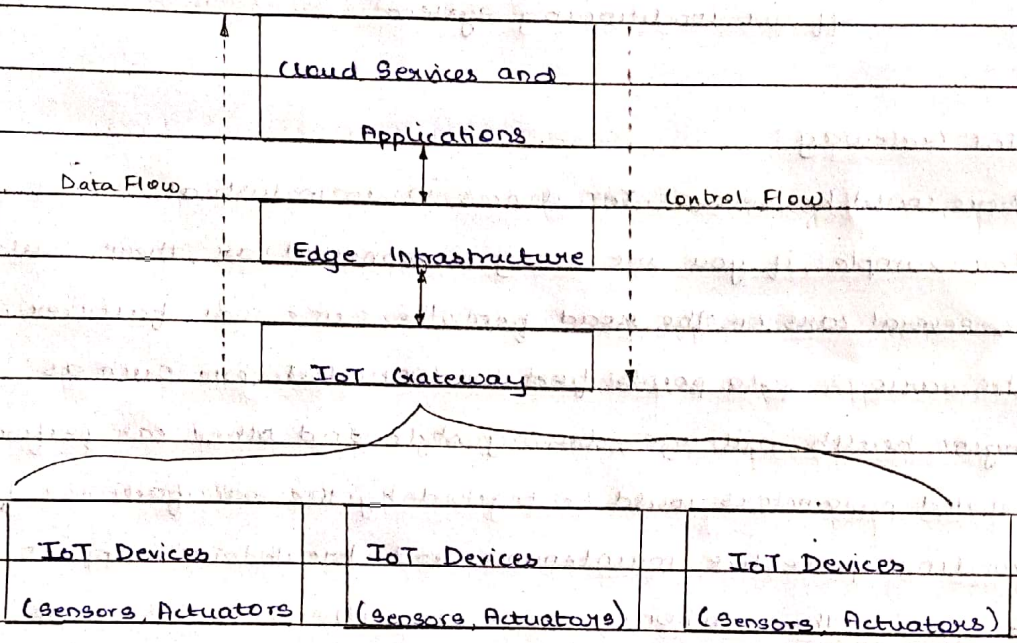

Fig: High-level architectural view of IoT

3) IoT architecture consists of 4 major components.

i) IoT Devices ii) IoT Gateway iii) Edge Infrastructure iv) Cloud Services and applications.

i) IoT Devices

These are the IoT devices such as thermostats, cameras, watch, refrigerator, cars, etc. These devices continuously record and track various data as per their design. For example, your smart watch continuously tracks your pulse. These devices have various connectivity options such as ZigBee, Bluetooth and Wifi.

Iot devices typically have : Sensors and Actuators.

i) Sensors : These are electronic circuits that continuously read the data as designed. These could be RFID, GPS, Accelerometers, Gyroscope, etc.

2) Actuators : These are electronic circuits that can not only read data but also take actions. For example, if the room temperature goes beyond a certain limit, an actuator can automatically power on or power off air conditioning system.

ii) IoT Gateway :

- There could be several IoT devices in an industrial setting.
- For example, if you are using a connected car, there could be several cars on the road from the same manufacturer.
- The various data points from the connected cars such as engine health, mileage, driving style and other car performance related parameters could be tracked by the manufacturer for providing preventive maintenance and breakdown support.
- To optimize the number of direct connections to the devices, an IoT Gateway is used. %
- An IoT gateway aggregates data from several devices and processes them.
- The pre-processing is required so that only the meaningful information is sent further.
- IoT devices could collect data at a milli-second level.
- Such high granularity of data may not be required to be sent further in its entirety.
- IoT gateways, thus, process the granular data from several devices and send them further.

iii) Edge Infrastructure :

- Once the IoT data is synthesized at the IoT gateway, it is sent to edge infrastructure.

- Edge infrastructure provides cloud computing resources closer to the user to avoid sending large volume of data over the network.
- You can run analysis functions, execute based on machine learning models, keep data in sync, and communicate with other devices securely.
- You can further filter device data and only send necessary information to the cloud.

iv) Cloud Services and Applications

- Finally, the IoT data can further be analysed using cloud services and resources.
- You could have several IoT based applications such as car predictive maintenance, health monitoring, traffic monitoring system, home automation system or anything else that could consume the data from the IoT devices and produce meaningful information and actions.

2) Write a short note on RFID tag?

Ans 1) RFID tag contains a circuit and an antenna.

2) They are a type of tracking system that uses smart barcodes in order to identify items.

3) RFID is short for "radio frequency identification" and use radio frequency identification.

4) These radio waves transmit data from the tag to a reader, which then transmits the information to an RFID computer program.

5) An RFID tag may also be called as an RFID chip.

6) RFID tag works by transmitting and receiving information via an antenna and a microchip - also sometimes called an IC.

7) The microchip on an RFID reader is written with whatever information the user wants.

ii) There are 2 main types of RFID tags: active and passive.

iii) Active RFID tags have their own power source whereas passive RFID tags are activated using external power source.

iv) You usually see passive RFID tags at shops where the tag gets activated when it comes near the RFID reader bars.

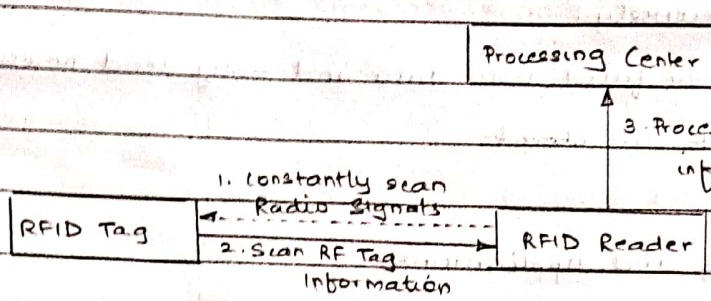

Fig: Working of RFID

3) Explain smart power grid and smart building?

Ans: Smart power grid:

- A power grid manages the supply and distribution of energy (electricity).
- A smart power grid is a modernized grid that enables bidirectional flows of energy and uses two-way communication and control capabilities that creates new functionalities and applications.
- Earlier there were only a few power generating plants.
- The distribution of energy was the sole purpose of the grid.
- But now, power generating resources are distributed into solar cells, combustion engines (water turbines), nuclear power plants and energy storage systems.
- These resources provide important benefits such as energy and economic savings, reduced system losses, improved resilience and power quality, and greater customer participation.
- It is no more just limited to distributing the energy but ensuring the best usage of it.
- Applications are: Smart meters, remote management, grid efficiency, customers as producers.

PAGE NO :
DATE :

Smart Building :

- A smart building is any structure that uses automated processes to automatically control the building's operations including heating, ventilation, air conditioning, lighting, security and other systems.
- A smart building uses sensors, actuators and microchips.
- It collects data and manages it according to the functions of the building - a building could be a home, office, hospital, mall or any other establishment.
- The infrastructure helps owners, operators and facility managers to
  1) Improve asset reliability and performance
  2) Reuse the use of energy.
  3) Optimize building space utilization
  4) Minimize the impact of buildings on the environment by controlling emissions and by following other environment friendly measures.
- The building is fitted with several IoT devices that consist of several sensors for various physical elements such as temperature, light, security, etc.
- The sensor data is continuously collected and evaluated by a central system called the facility controller.
- The facility controller monitors the entire building and takes suitable actions such as
  1) controlling the building temperature
  2) Controlling water level in supply tanks
  3) Controlling electrical power supply from grids.
  4) Recording activities in the building.
  5) Sounding alarms in case of emergencies.

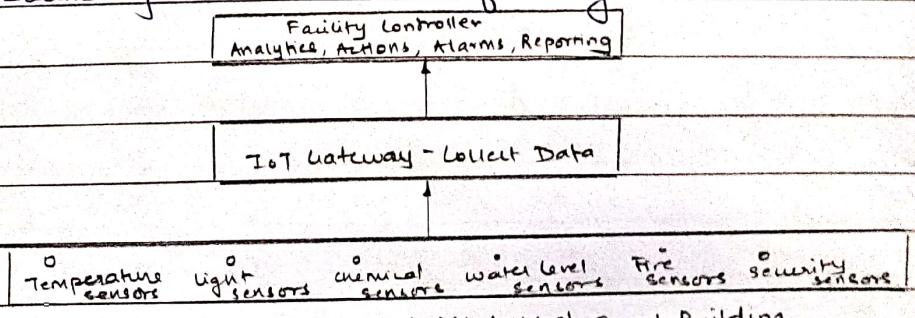

Fig: High level Architecture of Smart Building