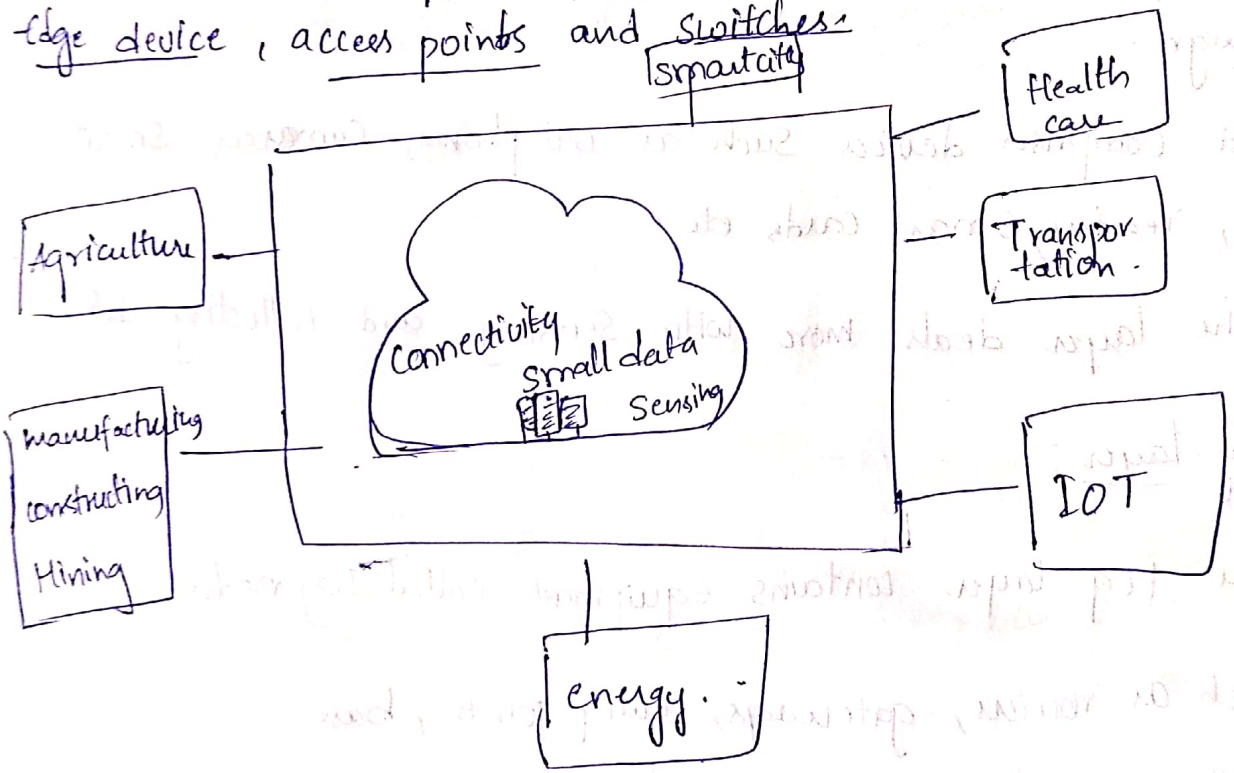
Fog computing architecture:-

* Fog computing is also known as Edge computing
* Fog computing decentralize the computing inform infrastructure without depending on the centralize computing such as cloud computing.
* Fog computing is proposed to integrate IOT, latency, and cloud concept to support user mobility, low latency and Location awaness.
* Typical examples include transportation, industrial automation, agricul-ture and other smart city applications.
* Fog infrastructure supports hetrogeneous devices, such as end device, Edge device, access points and switches.



Fog computing.

3.

There are 2 models in Fog computing Architecture.

(i) Hierarchical Architecture model

(ii) layered Architecture model.

i) Hierarchical Architecture Model:- This model of cloud comp uses the fundamental three-layer structure in the hierarchical architecture they are:

There are three layers 1) Terminal layer

2) Fog layer

3) Cloud layer.

1. Terminal layer:-

* The terminal layer is the fundamental layer in the Fo design.

* It comprises devices such as cell phones, cameras, Smart cars, readers, Smart cards etc.

* The layer deals more with sensing and collecting data

2. Fog layer:-

* The fog layer contains equipment called Fog nodes.

* Such as routers, gateways, entry points, base stations, individual Fog servers etc.

* The fog nodes are placed at the edge of the Network.

* These nodes are located between Cloud Data Centers and end devices.

3) Cloud layer :-

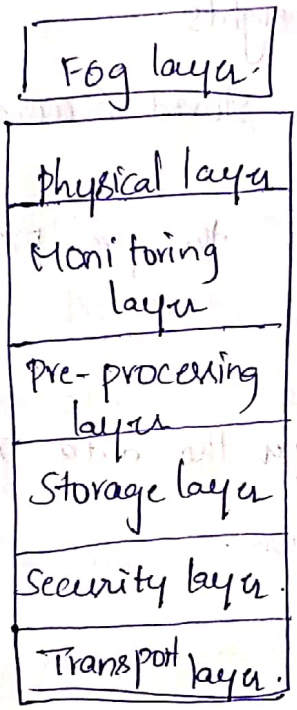
* this layer consists of computers that can provide high performance with massive storage and machines.

* the Data cent

* A cloud layer is created by enormous data centers with high processing ability.

* the data centers are both flexible and have on-demand computing services.

2) layered Architecture Model :-



ie layer

1. ~~physical~~ lay

This model of the architecture of Fog computing consists of six layers :-

1) physical layer :-

* the first stage consists of physical and virtual nodes as well as Sensors.

* These sensors are distributed geographically to sense the environment and retrieve data.

2) Monitoring layer:-

* In this layer, the then received nods and senso will be monitored thoroughly.

* Another key feature that will be monitored is the energy consumption of the nodes.

3) Pre-processing layer: This layer collects, analyzes, and trims the data to get meaningfull insights.

* After which the data is stored securely.

4) Storage layer: This is where the pre-processed data will b Stored.

5) Security layer: In this layer the data received is sent fo processing, encryption, decryption.

6) Transport layer:-

* It is the final stage of fog computing Architecture Sends the data to the cloud which is then stored and used to create services for users.

Advantages and Disadvantages:-

* It offers better security, privacy.
* Easy to develop fog application.
* Data consistency and data management in fog computing is a challenge.
* Power consumption is high.

2) Security and privacy issues and solutions of Fog computing:-

* It would be difficult for the Fog to execute a full suite of security solutions that can detect and prevents attacks due to its relatively low computing power.
* Fog will be easier and more accessible than the cloud.
* It increases the probability of attacks.
* Fog will be an attractive target to many attacks, due to ability to obtain sensitive data.
* Fog nodes may encounter several ~~malicious~~ attacks and.
* (It has the) new security and privacy challenges.

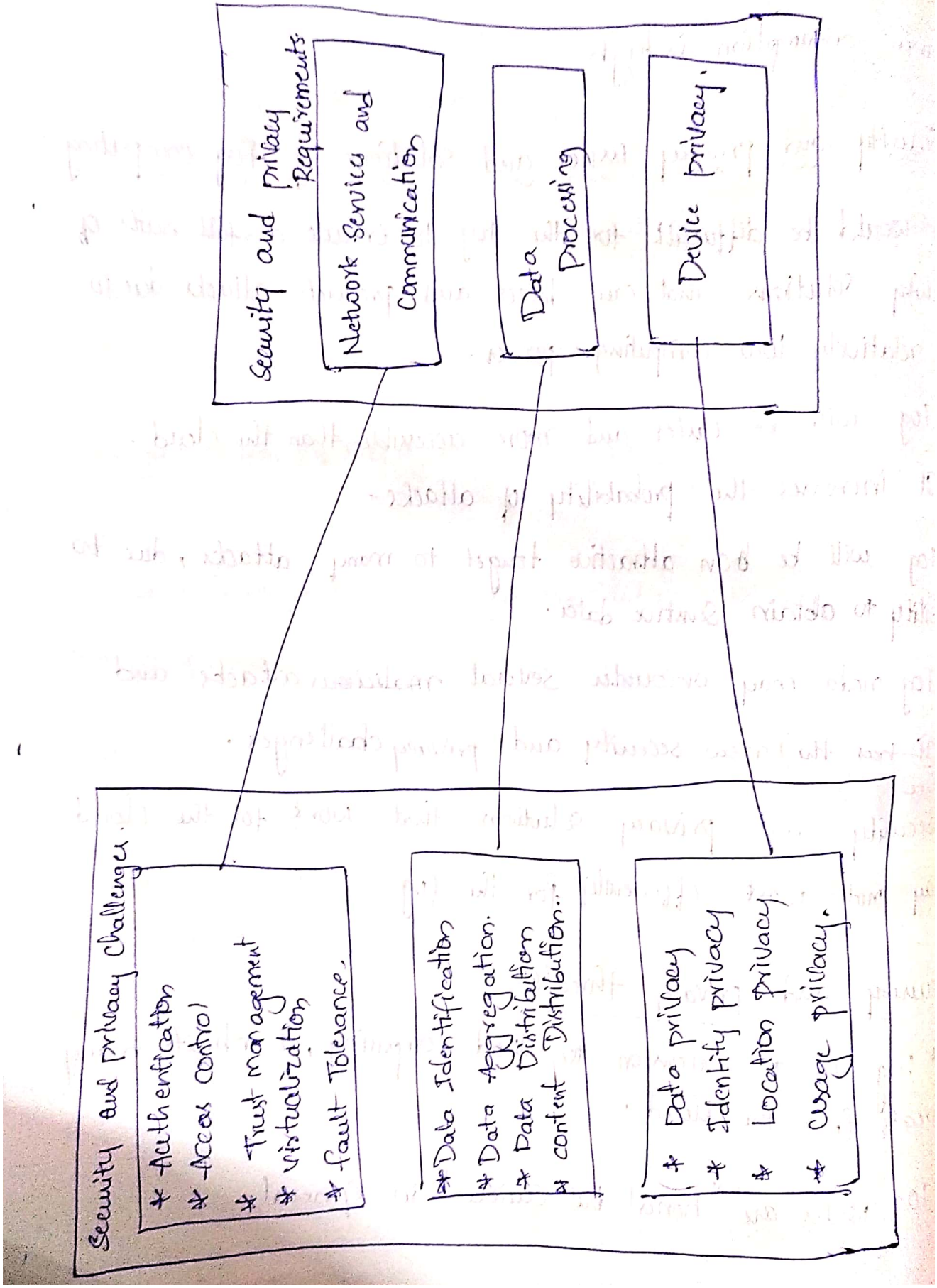
Hence,

* Security and privacy solutions that work for the cloud may not work efficiently for the fog.

Security and privacy threats:-

* Fog is an extension to cloud computing, it inherits many threats from the cloud.
* Fog Nodes are "honest but curious" in General.

The below mentioned diagram summarize the different attacks that may occur on Fog nodes.



* Only the Data Owner can access the data. This prevents unauthorized access while data are transmitted or received among the device layer, Fog layer, core Network.

* Data Integrity checking mechanisms can be used to ensure the consistency between sent data and received data.

* ~~These requirements~~

* To achieve these requirements, different tools, techniques, procedures, and strategies ;)

* Only the Data owner can access the data: This prevents unauthorized access while data are transmitted or received among the device layer, Fog layer, core Network.

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* ~~Their requirements~~

(* To achieve these requirements, different tools, techniques, procedures, and strategies.)*

3) cloud to Fog Architecture:-

* There are several layers mentioned in the same below figure they are:- 1) cloud layer
2) Fog layer
3) Edge layer.

* This figure is composed of the Networking devices such as base station, routers, Step-top boxes etc.

level 1 (Cloud layer):- *It demonstrates the End Devices ~~of end users~~

* where all the IoT enabled devices are known as Terminal Nodes.

~~An tatin~~

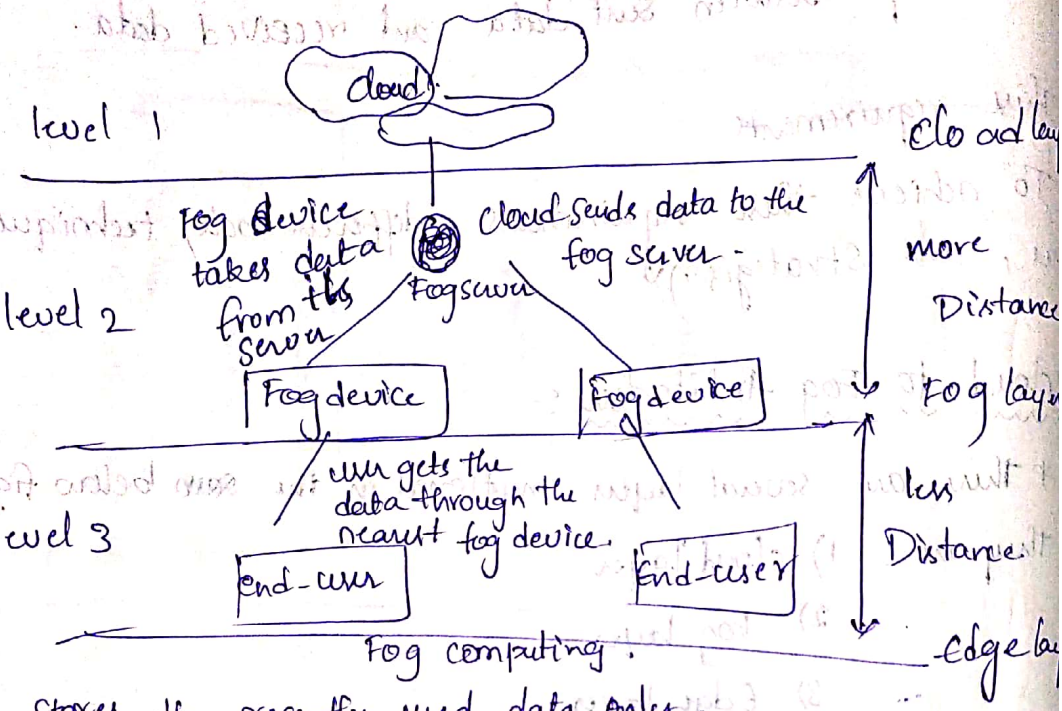
level 2 (Fog layer): * It is the actual Fog computing layer.

* This layer consists of the fog nodes in the form of routers, Set-top boxes, base stations ~~routers~~ etc.

* these nodes have storage facilities and as well as computation capability.

Level-3 (Edge layer): It is the cloud computing layer.

* All the cloud data centers and servers reside in this layer and they have storage and computing facilities.



* Fog stores the recently used data only.

* end-users are connected through Internet.

* User roles: User lies at the lowest level of a typical fog computing environment.

* user will have to access the datae from the fog nodes.

* If the required data is not available in fog devices, then the user will directly access cloud storage of the cloud server.

* Fog devices role: * Fog is the intermediate level between the user and cloud layer.

* It is the most important layer for computing purposes.

* It usually consists the fog nodes in the form of base stations, routers, set-top boxes.

* The users can easily retrieve the data from the fog nodes through Internet communication

Cloud Server Role :-*

* Cloud is the topmost level of a typical fog computing environment.

* This level consists of centralized data centre, which has the capacity to store all the data of the fog nodes.

* It has usually the capacity to store a huge amount of data.