USE case:- Building a cart analysis for Myph.

Aim:- To design and implement a data storage mechanism for an IOT platform that can efficiency store, retrieve, and index data from a wide range of heterogeneous devices the mechanism should support fast querying and flexible schema to handle new device type easily.

Explanation:- A generic IOT platform collects data from different types of devices such as temperature sensors humidity, sensors, and energy meters. Each devibe generate data in various formats and at different intervals. Relational database word require a find schema making it difficult to handle new or variable device data structures.

To overcome this issue, a JSON-based documents oriented database like mango DB is preferred. Mango DB stores data in flexible JSON-like documents, allowing each device type to store its own data attributes. The makes the system adaptable and scalable.

why Mango DB?

→ schema-less structure supports new device types dynamically.
→ Documents are stored in JSON format, suitable for IOT data.
→ supports indexing on single and multiple fields.
→ Allows fust retriecalls of data for specific devices or parameters.
→ scalable and efficient for handling large volumes real-time data.

Example JSON Documents:-

Temperature Sensor Example:

```
{
  "device_id": "D1001",
  "device_type": "Temperature sensor",
  "Location_id": "100",
  "timestamp": "2025-11-03T 10:45", oot
  "data": {
```

```
    "temperature": 2805,
    "humidity": 70
},
    "status": "active"
}
```

Energy meter Example:

```
{
    "device_id": "E 2001",
    "device_type": "Energy meter",
    "location_id": "1001",
    "time stamp": "2025-11-03 T10:46:007",
    "data": {
        "voltage": 220,
        "current": 1.5,
        "power": 330
    },
    "status": "M active"
}..
```

Index creation in Mango DB:-

"Create single and compound indexs.

```
db. iot_devices.creates index({"device_id":1});

db. iot_devices.create index({"device_id":1" local.
    _id":13);

db. iot_devices create index({"data temperature":13);
```

Sample Queries:-

1) Retrieve all recorder of a particular device: db_Iut_devices
   find ({"device_id": "1) 100 1"});

2) Retrieve data for a device in a particular location;
   db. Iot_devices find ({"devices_id": 1, "location_id": 3});

3) Retrieve temperature reading from all devicey.
   db. Iot_devices_find ({"data.temperature": {(exists:true}
                                                          });

Result:- using MongoDB allows the platform to store and retrieve data from devices without modifying the database structure indexces helps in first query execution especially when searching data by device location or parameters the temperature. The system remains scalable and adaptable to new devices types introduced in the future.