Part 3 - Report

Sensor Name	Type	Data Generated	Purpose
Moisture Content Sensor	Moisture Content Sensor	Measures the moisture content (e.g., relative humidity %RH).	Maintains optimal moisture levels to preserve food quality.
Infrared (IR) Sensor	Infrared Sensor	Detects infrared signals for motion detection or device status.	Enhances environmental awareness and security.
Ammeter	Current Sensor	Measures current flow for connected devices (e.g., Smart Fridge or Dishwasher).	Tracks real-time power usage.
Moisture Meter	Moisture Content Sensor	Measures relative humidity (%RH).	Ensures optimal moisture conditions in specific locations.
Water Sensor	Water Flow Sensor	Tracks water usage in liters per second.	Monitors water consumption for efficiency and diagnostics.

Unit of Measure:

- Moisture Content: Measured in %RH (Relative Humidity).
- Current: Measured in Amperes (A).
- Water Usage: Measured in liters (L) or gallons (converted in the system).

Data Precision:

- Moisture Sensors: Precise to one decimal place (e.g., 25.3 %RH).
- Current Sensors: Precise to two decimal places (e.g., 0.15 A).
- Water Flow Sensors: Precise to the nearest 0.1 liter.

Time Zones:

- Data in the database uses UTC timestamps for standardization, the system adjusts timestamps to PST for user queries.

Metadata Usage in the System

Metadata is a critical component of the system, linking devices to their associated sensors and ensuring accurate data retrieval.

Example: The Smart Fridge metadata links to the Moisture Meter Sensor using fields such as Device Name and Sensor ID. and The system uses this metadata to fetch the unique assetUid from the database and retrieve all relevant sensor readings for that device.

For Error Validation, Metadata ensures sensor data is valid and within acceptable operational ranges:

- Moisture Meter: Only processes data between 0–40 %RH.
- Water Sensor: Only processes water flow data between 0–50 liters per second.

Any data outside these ranges is excluded from calculations, ensuring the accuracy and reliability of the results.

For Scalability, Metadata enables the system to easily add new devices or sensors without changing the core code.

Example: A new sensor, such as a Temperature Sensor, can be added by simply updating the metadata with the appropriate Device Name and Sensor ID.

The system processes queries as follows:

1. Identify the Device:The system uses metadata to map the device name (e.g., "Smart Fridge") to its unique assetUid.
2. Fetch Relevant Data: Based on the query type (e.g., average moisture, power consumption), the system retrieves sensor readings for the associated device from the database.
3. Perform Calculations:
    - The system calculates required values:
    - Average moisture level over the last 3 hours.
    - Average water consumption per dishwasher cycle.
    - Total power usage by devices.
4. Return Results:The calculated results are sent back to the client for display.