## Part 1 - Types of Data Generated by Each Sensor

| Sensor Name | Data Generated | Purpose |
|---|---|---|
| Moisture Sensor | Measures moisture content in %RH (Relative Humidity). | Maintains optimal moisture levels to preserve food quality. |
| Power Sensor | Measures electricity consumption in watts (w). | Tracks real-time power usage to monitor efficiency. |
| Water Consumption Sensor | Measures water usage in gallons. | Monitors water consumption for efficiency and diagnostics. |

### Part 2 - Units of Measure and Precision

- **Moisture Sensor**:
  - Unit: %RH (Relative Humidity).
  - Precision: 1 decimal place (e.g., 25.3 %RH).
- **Power Sensors**:
  - Unit: Decawatts (DW) for fridges, Hectowatts (HW) for dishwashers (converted to Watts in the system).
  - Precision: 2 decimal places (e.g., 15.35 W).
- **Water Consumption Sensor**:
  - Unit: Gallons.
  - Precision: 0.1 gallon (e.g., 3.4 gallons).

### Time Zones

- All timestamps in the database are stored in **UTC** for standardization.
- The system converts UTC to **PST** during query processing to align with user expectations.

### System Workflow : explanation of how the system processes queries.

1. Client sends a query to the server.
2. Server uses metadata to identify the device (assetUid).
3. Database is queried for relevant sensor data.
4. Calculations are performed (e.g., averages, conversions).
5. Results are sent back to the client.

## Part 3 - Metadata Usage in the System

Metadata serves as the backbone of the system, linking devices to their sensors and enabling accurate data retrieval. The metadata used in this system was managed via the **Dataniz** platform.

**Device-Sensor Mapping**:

- Each device's metadata includes its name (e.g., "Smart Fridge") and a unique assetUid.

Example Metadata Entry .json

{"customAttributes": { "name": "Smart Fridge" },

"assetUid": "fridge123"}

**Error Validation**:

Metadata ensures data validity by enforcing operational ranges:

- **Moisture Sensor**: Accepts data between 0–40 %RH.
- **Power Sensors**: Accepts 30–80 decawatts for fridges and 12–24 hectowatts for dishwashers.
- **Water Consumption Sensor**: Accepts data between 2–6 gallons.

Data outside these ranges is excluded from calculations to ensure accuracy.

**Scalability**:

Metadata allows new devices and sensors to be added by creating new entries. For example, adding a new temperature sensor would only require defining its metadata and sensor ID without modifying the system logic.

**Limitations of Dataniz:**

While metadata provides flexibility, the Dataniz platform does not allow editing existing metadata entries. Instead, updates require creating entirely new entries, which adds management overhead.