## **SRS Document**

**Project Name:** IoT Smart Home

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**1. Introduction**

**1.1 Purpose**The purpose of this system is to manage smart home appliances, monitor sensor data, and provide a dashboard for real-time appliance control and analytics.

**1.2 Scope**

* Register and deregister smart devices (AC, Fan, Speaker).
* Toggle device on/off.
* Simulate device levels (temperature, speed, volume).
* Track sensor readings over time.
* Maintain network connections between devices and server.
* Display device status and logs via a dashboard.
* Persist devices and sensor readings in DynamoDB.

**1.3 Definitions / Abbreviations**

* **Appliance:** Any device managed by the system.
* **SensorData:** Readings from appliances.
* **DAO:** Data Access Object, used for DB operations.
* **Client / Server:** Network components for device communication.

**2. Functional Requirements**

| **ID** | **Feature** | **Description** |
| --- | --- | --- |
| FR1 | Device Registration | User can register devices specifying type, brand, and name. |
| FR2 | Device Deregistration | User can remove a device by ID. |
| FR3 | Toggle Device | User can switch devices ON/OFF. |
| FR4 | Device Simulation | Simulate device parameters (temperature, speed, volume). |
| FR5 | Sensor Logging | System stores sensor data in DynamoDB. |
| FR6 | View Sensor Readings | Display sensor readings by device or date range. |
| FR7 | Network Management | Connect/disconnect devices to the server. |
| FR8 | Dashboard | Real-time updates of devices using Observer pattern. |
| FR9 | Data Persistence | Save and load all devices and readings from DynamoDB. |
| FR10 | Safe Shutdown | Properly close connections and save state when exiting. |

**3. Non-functional Requirements**

| **Requirement** | **Description** |
| --- | --- |
| NFR1 | Performance |
| NFR2 | Reliability |
| NFR3 | Maintainability |
| NFR4 | Scalability |
| NFR5 | Usability |

**4. System Architecture**

* **Layers:**
  + Model (Appliance, SensorData)
  + Database (ApplianceDB, SensorDataDB)
  + Service (SmartHomeService)
  + Controller (SmartHomeController)
  + View (ConsoleMenu, DeviceObserver)
  + Network (Client, Server)
  + Config (AppConfig, DynamoDBConnection)
* **Design Patterns Used:**
  + Factory (Appliance creation)
  + Builder (Appliance and SensorData)
  + Observer (Device status updates)
  + Command (Toggle and Simulate actions)
  + DAO (DB operations)

**5. External Interfaces**

| **Interface** | **Description** |
| --- | --- |
| DynamoDB | Stores device and sensor data. |
| Console | Allows user to interact with the system. |
| TCP Socket | Client-server communication for device network. |

**6. Constraints**

* Requires Java 21+
* DynamoDB Local (or AWS credentials)
* Network port 5555 must be free
* Console input only (no GUI)