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)