This is a backend API for a Smart Home/IoT Management System.

It manages users, smart devices (like switches, sensors, IR remotes), device models/types, dealers, and real-time device control. It supports integration with platforms like Google Home and Amazon Alexa, and provides features for scheduling, power monitoring, and employee access.

Main Features & Flow

1. User Management
2. Device & Appliance Management
3. Real-Time Control & Communication
4. Scheduling & Automation
5. Power Monitoring & Analytics
6. Third-Party & Voice Assistant Integration
7. Notifications
8. Dealers & Quotation Management

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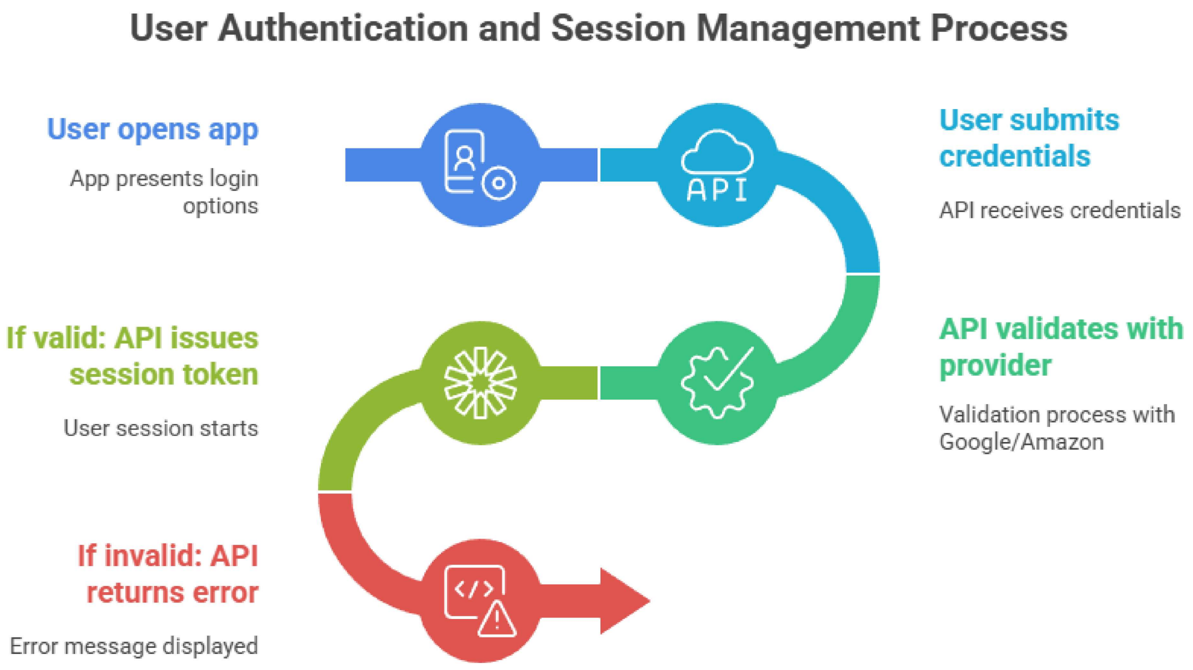
1. User Management

- Users can register, log in (via Google or Amazon), and manage their profiles.
- Users have roles (userType) and can have appliances, moods, schedules, and preferences.
- Employee access and tagging is supported for enterprise/office use.


User Authentication and Session Management Process
User opens app
App presents login options
User submits credentials
API receives credentials
API
API validates with provider
Validation process with Google/Amazon
If valid: API issues session token
User session starts
If invalid: API returns error
Error message displayed

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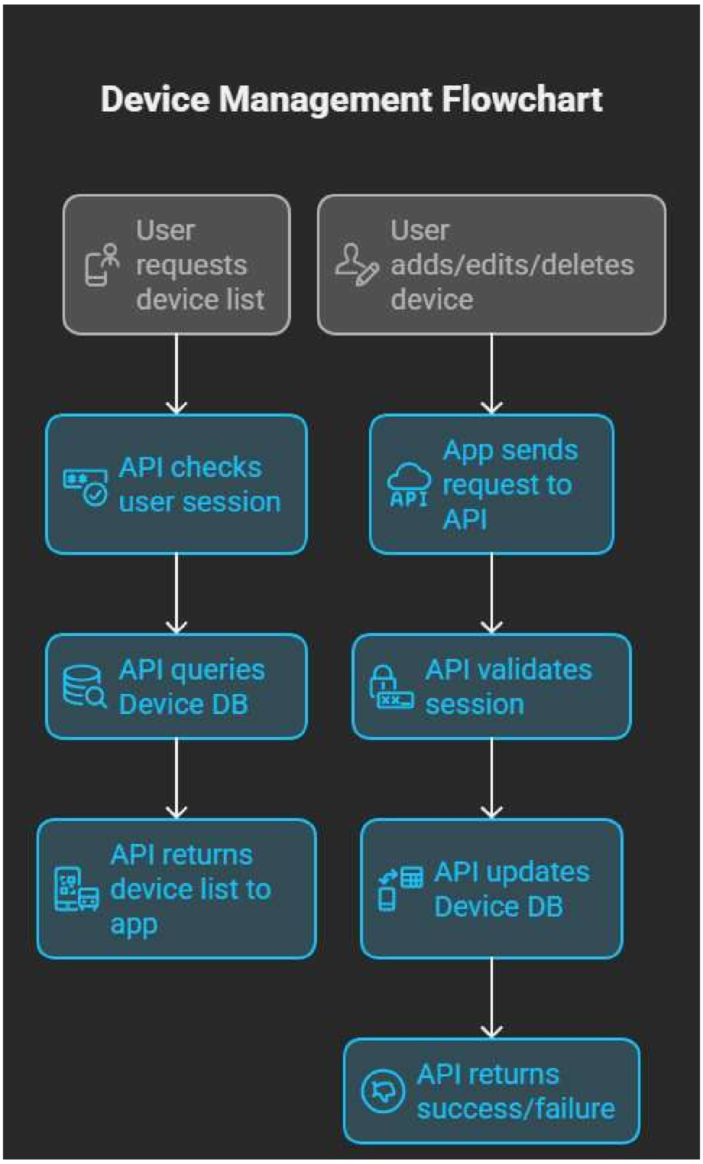
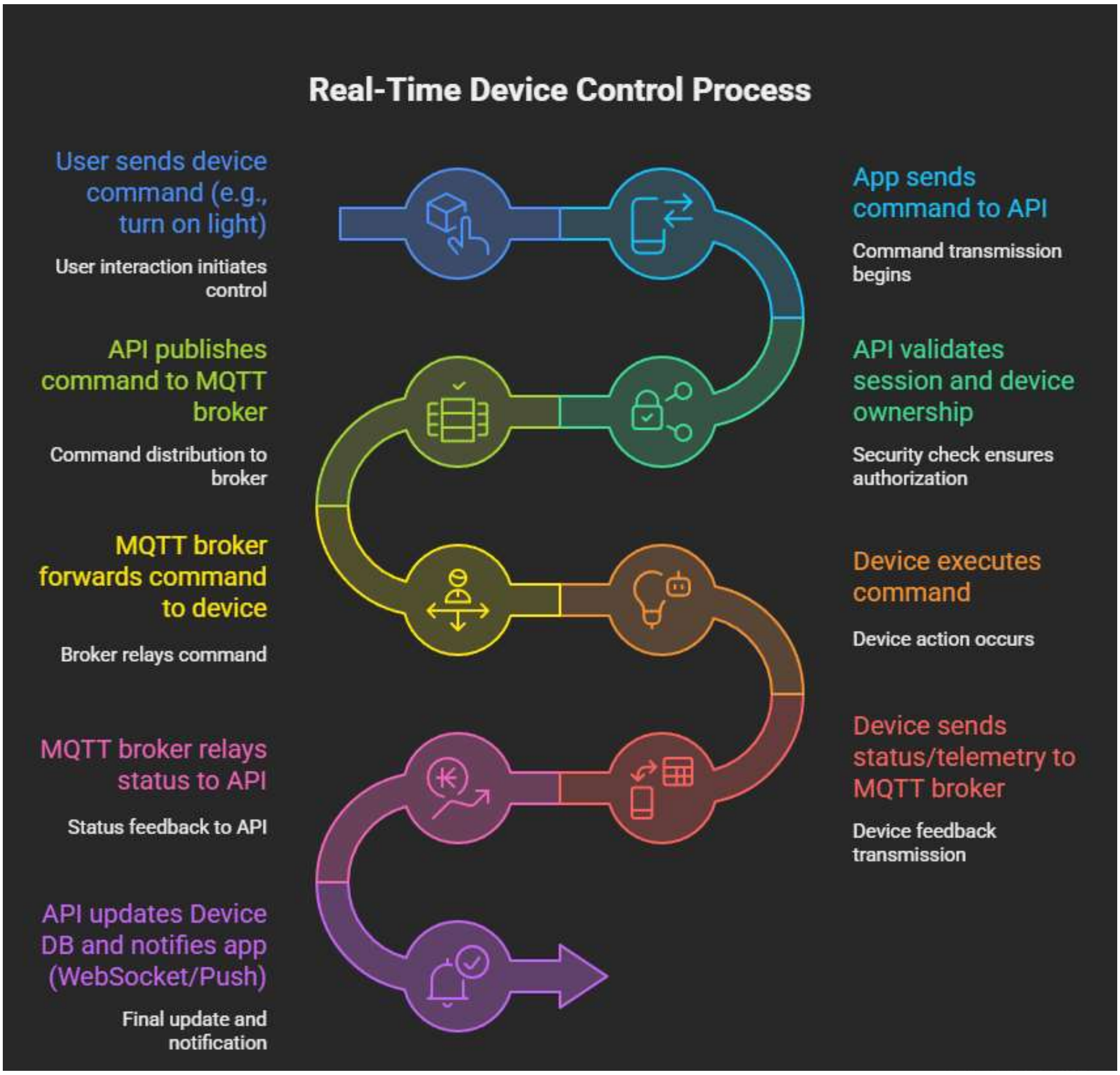
2. **Device & Appliance Management**
    - Users can add, edit, delete, and control smart appliances (switches, IR devices, sensors, etc.).
    - Devices are organized by type, model, room, and can be shared with other users.
    - Device models and types are managed for inventory and compatibility.

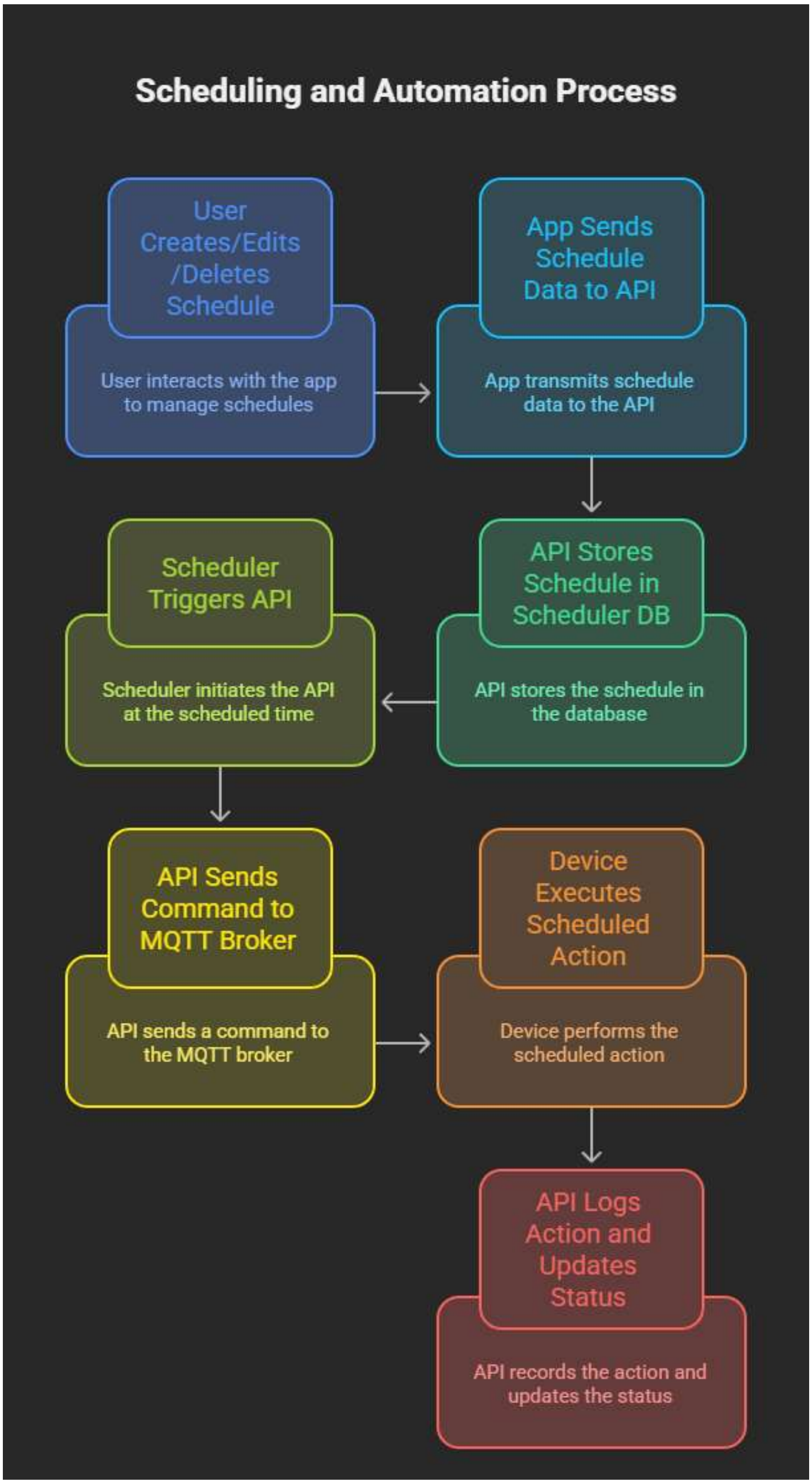

Device Management Flowchart
User requests device list
User adds/edits/deletes device
API checks user session
App sends request to API
API
API queries Device DB
API validates session
API returns device list to app
API updates Device DB
API returns success/failure

3. **Real-Time Control & Communication**
   - Uses MQTT for real-time device communication (turning devices on/off, status updates).
   - WebSocket endpoints for live updates and device status tracking.


Real-Time Device Control Process
User sends device command (e.g., turn on light)
User interaction initiates control
App sends command to API
Command transmission begins
API publishes command to MQTT broker
Command distribution to broker
API validates session and device ownership
Security check ensures authorization
MQTT broker forwards command to device
Broker relays command
Device executes command
Device action occurs
MQTT broker relays status to API
Status feedback to API
Device sends status/telemetry to MQTT broker
Device feedback transmission
API updates Device DB and notifies app (WebSocket/Push)
Final update and notification

4. **Scheduling & Automation**

- Users can schedule device actions (e.g., turn on lights at 7pm).
- Moods/scenes can be created (e.g., “Movie Night” sets multiple devices to specific states).
- Scheduled jobs run in the background for power logging, firmware updates, and alerts.



Scheduling and Automation Process

User Creates/Edits /Deletes Schedule

User interacts with the app to manage schedules

App Sends Schedule Data to API

App transmits schedule data to the API

API Stores Schedule in Scheduler DB

API stores the schedule in the database

Scheduler Triggers API

Scheduler initiates the API at the scheduled time

API Sends Command to MQTT Broker

API sends a command to the MQTT broker

Device Executes Scheduled Action

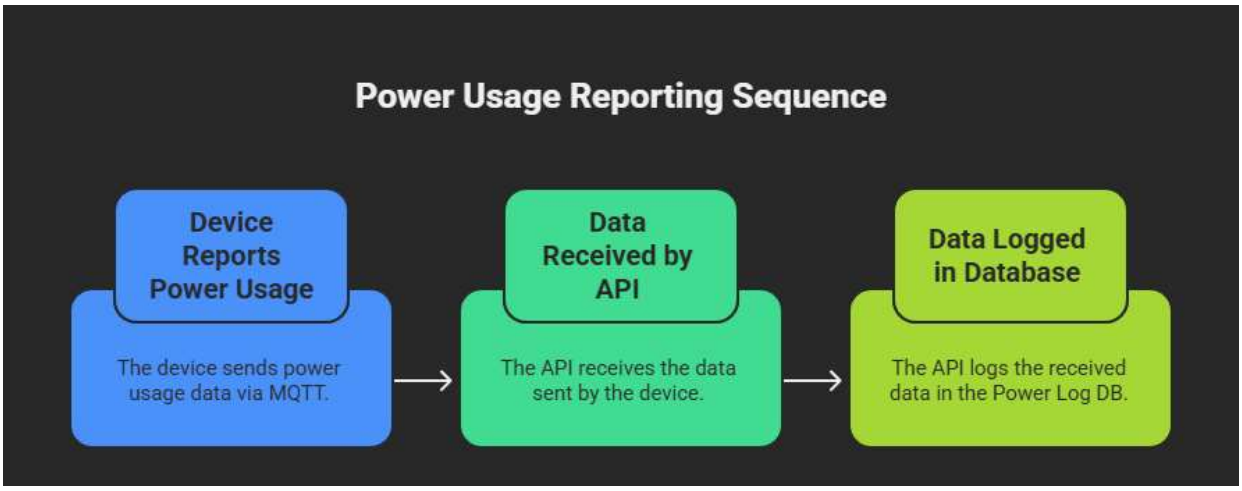
Device performs the scheduled action

API Logs Action and Updates Status

API records the action and updates the status

5. Power Monitoring & Analytics

- Tracks power consumption per device, room, and user.
- Provides logs and analytics for energy usage, with alerts for thresholds.



Power Usage Reporting Sequence

Device Reports Power Usage

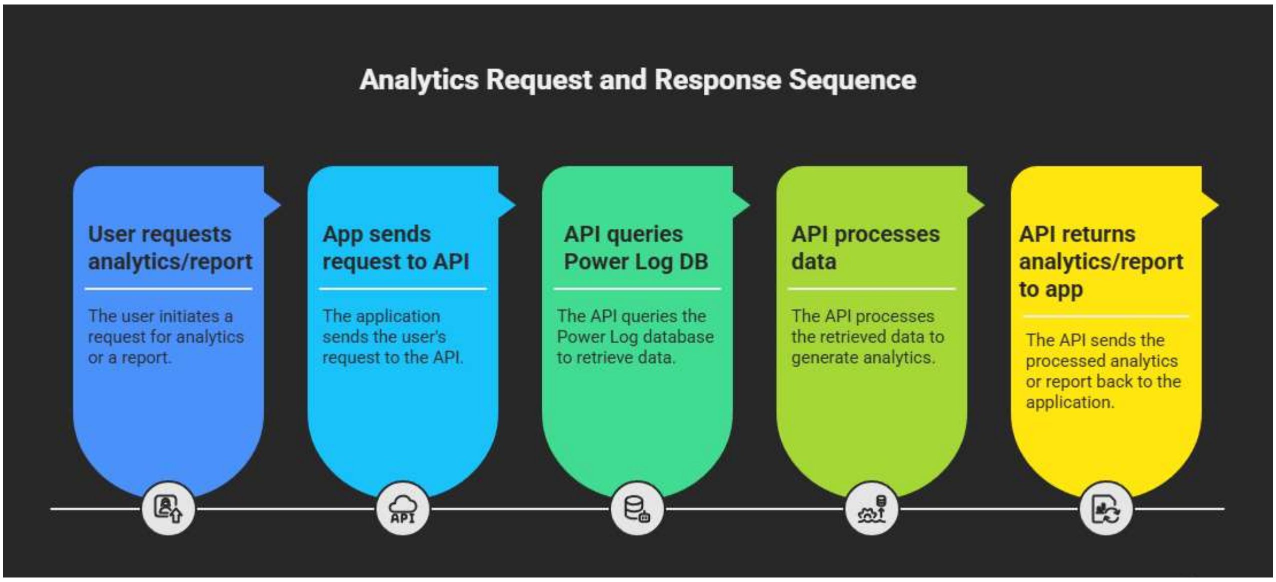
The device sends power usage data via MQTT.

Data Received by API

The API receives the data sent by the device.

Data Logged in Database

The API logs the received data in the Power Log DB.



Analytics Request and Response Sequence

User requests analytics/report

The user initiates a request for analytics or a report.

App sends request to API

The application sends the user's request to the API.

API queries Power Log DB

The API queries the Power Log database to retrieve data.

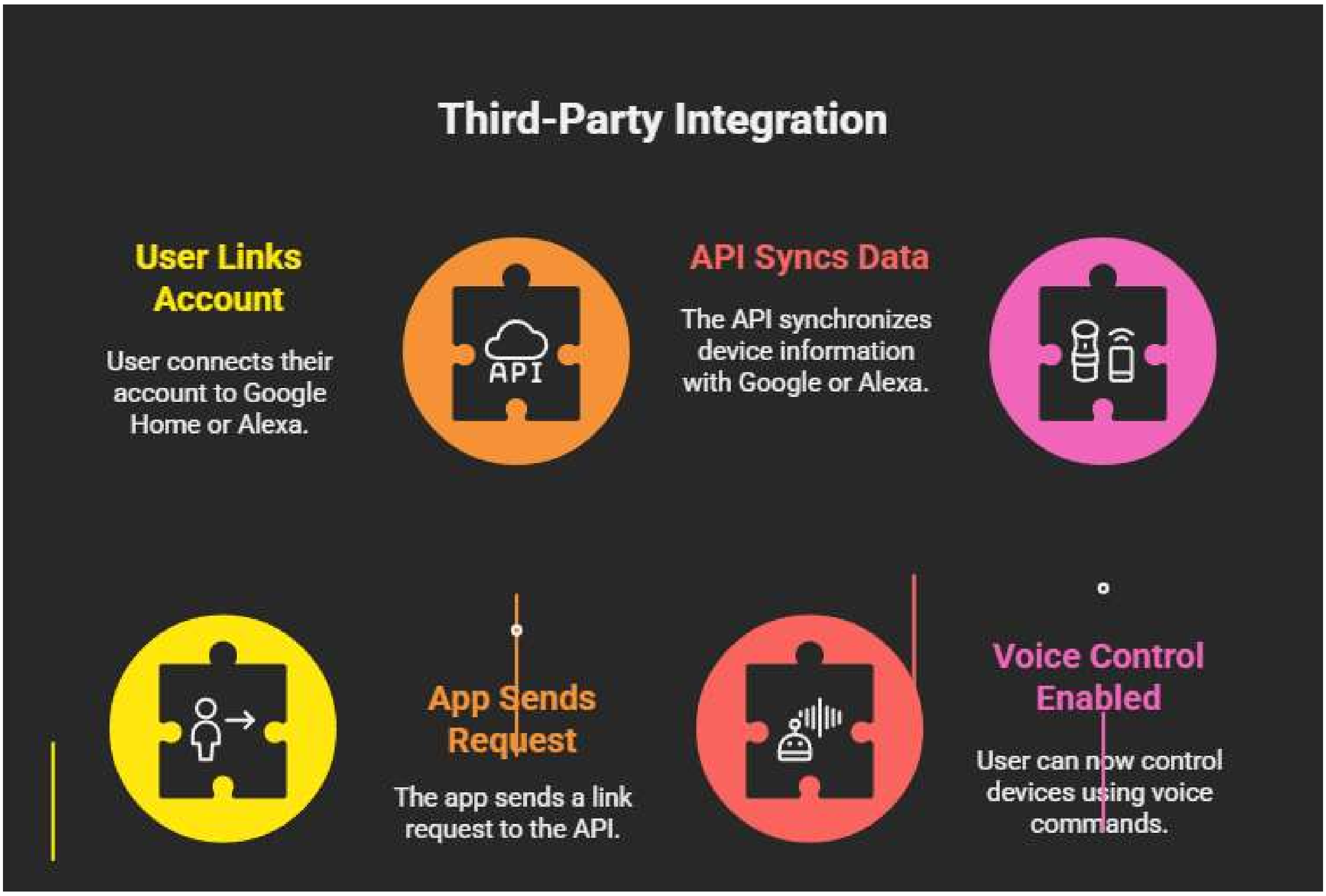
API processes data

The API processes the retrieved data to generate analytics.

API returns analytics/report to app

The API sends the processed analytics or report back to the application.

6. **Third-Party & Voice Assistant Integration**
    - Integrates with Google Home and Amazon Alexa for voice control and synchronization.
    - Supports hotel/enterprise integrations via third-party APIs.



Third-Party Integration

User Links Account

User connects their account to Google Home or Alexa.

API Syncs Data

The API synchronizes device information with Google or Alexa.

App Sends Request

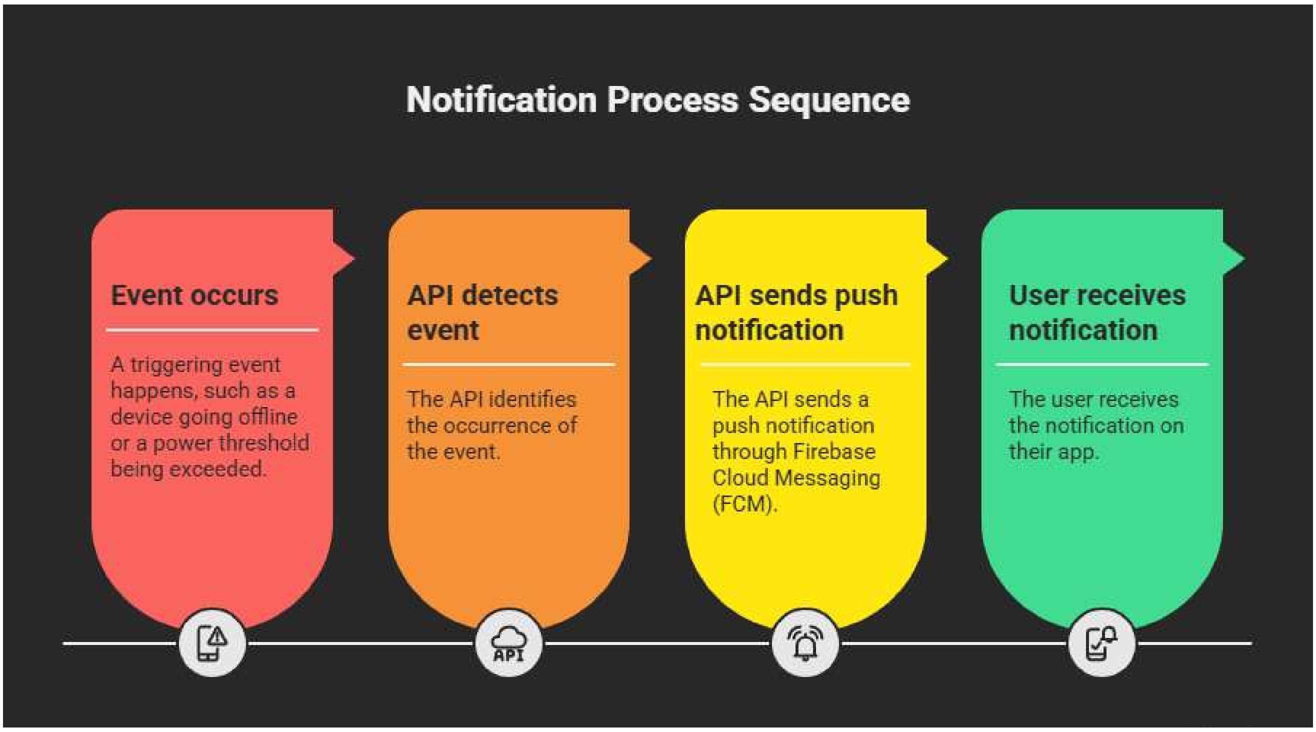
The app sends a link request to the API.

Voice Control Enabled

User can now control devices using voice commands.

7. **Notifications**

- Uses Firebase Cloud Messaging (FCM) for push notifications (e.g., alerts, reminders).



Notification Process Sequence

Event occurs

A triggering event happens, such as a device going offline or a power threshold being exceeded.

API detects event

The API identifies the occurrence of the event.

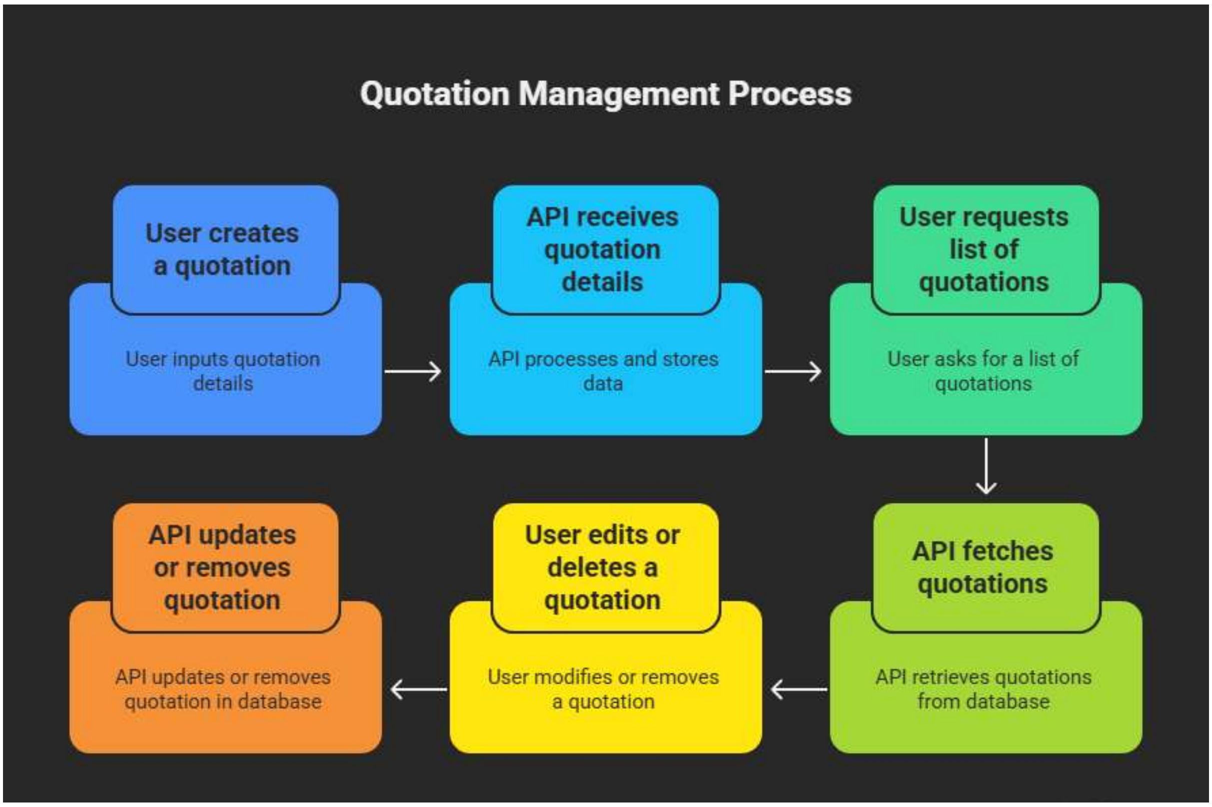
API sends push notification

The API sends a push notification through Firebase Cloud Messaging (FCM).

User receives notification

The user receives the notification on their app.

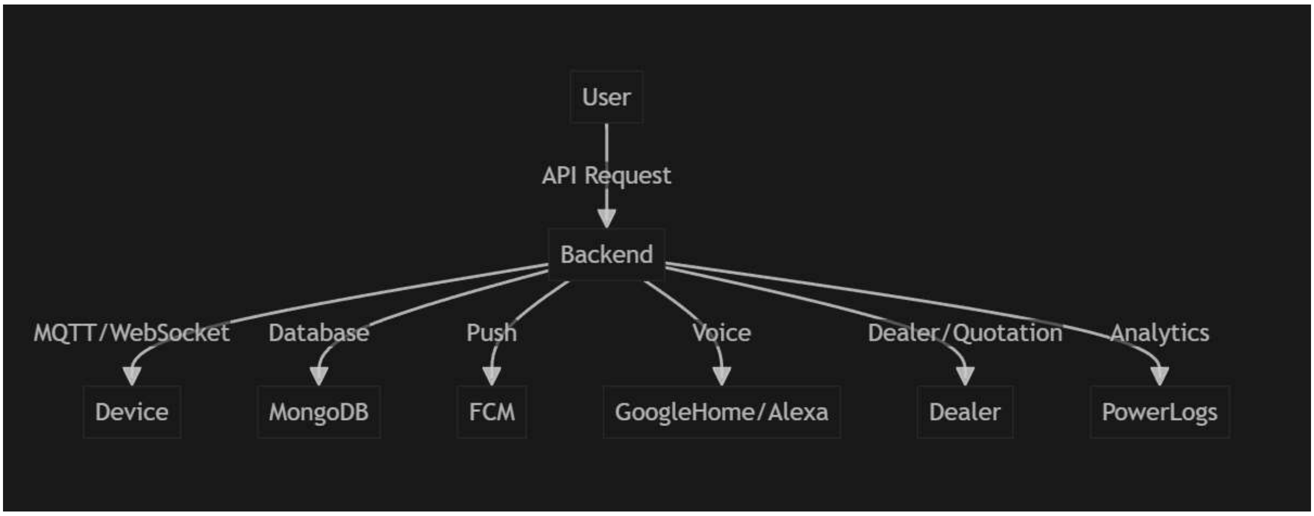
8. **Dealers & Quotation Management**
   - Dealers can be added/managed for device distribution.
   - Quotation system for device sales and installations.



Quotation Management Process

User creates a quotation
User inputs quotation details
API receives quotation details
API processes and stores data
User requests list of quotations
User asks for a list of quotations
API fetches quotations
API retrieves quotations from database
User edits or deletes a quotation
User modifies or removes a quotation
API updates or removes quotation
API updates or removes quotation in database

High-Level Flow Diagram



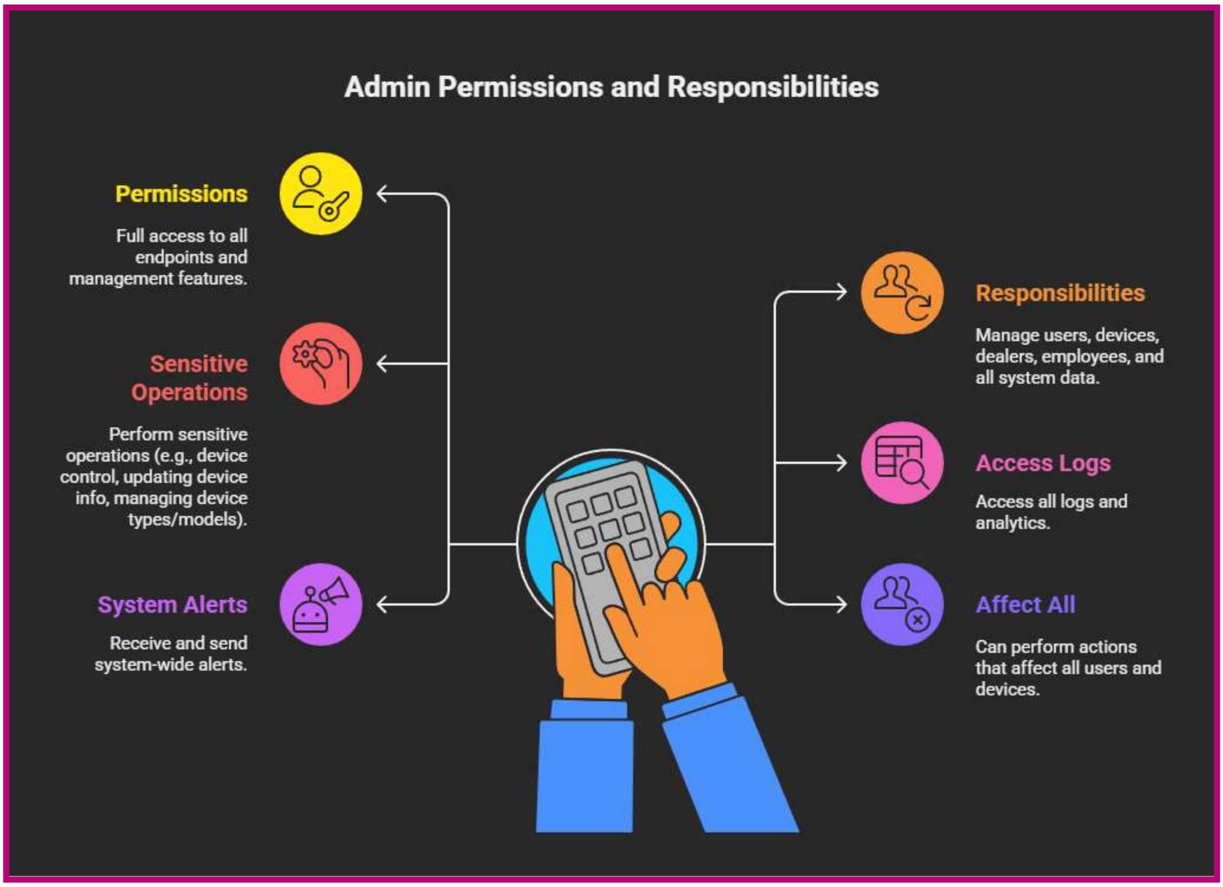
Example User Flow

1. User logs in (Google/Amazon or custom).
2. Adds devices (switches, sensors, IR remotes) to their account.
3. Controls devices via app or voice assistant (real-time via MQTT/WebSocket).
4. Schedules automation (e.g., turn on lights at sunset).
5.Monitors power usage and receives alerts/notifications.
6. Shares devices with family or employees.
7.Dealers manage inventory and provide quotations for new installations.

User Roles and Their Responsibilities

1. Admin

- **Permissions:** Full access to all endpoints and management features.
- **Responsibilities:**
  - Manage users, devices, dealers, employees, and all system data.
  - Perform sensitive operations (e.g., device control, updating device info, managing device types/models).
  - Access all logs and analytics.
  - Receive and send system-wide alerts.
  - Perform actions that affect all users and devices



Admin Permissions and Responsibilities

Permissions

Full access to all endpoints and management features.

Sensitive Operations

Perform sensitive operations (e.g., device control, updating device info, managing device types/models).

System Alerts

Receive and send system-wide alerts.

Responsibilities

Manage users, devices, dealers, employees, and all system data.

Access Logs

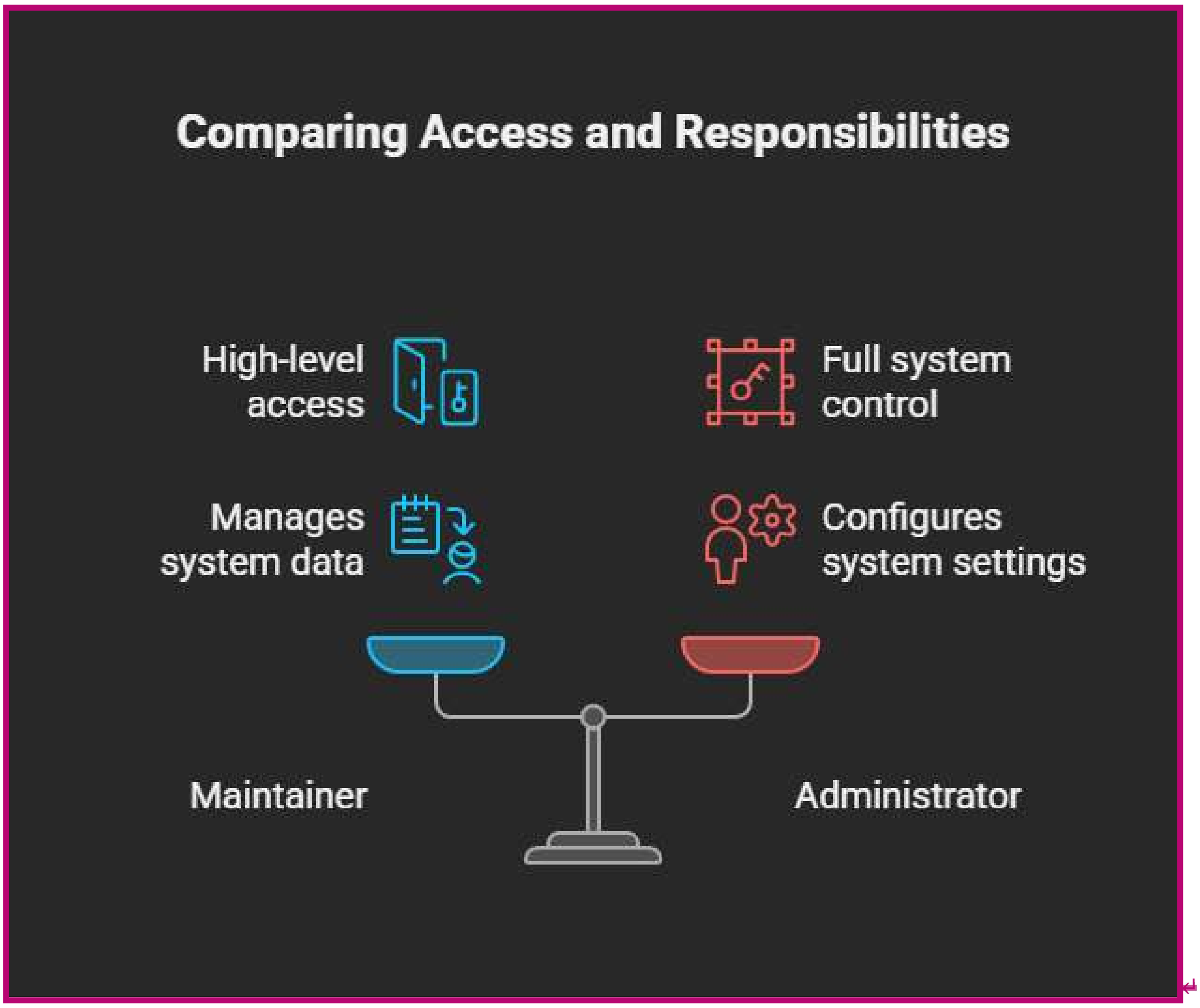
Access all logs and analytics.

Affect All

Can perform actions that affect all users and devices.

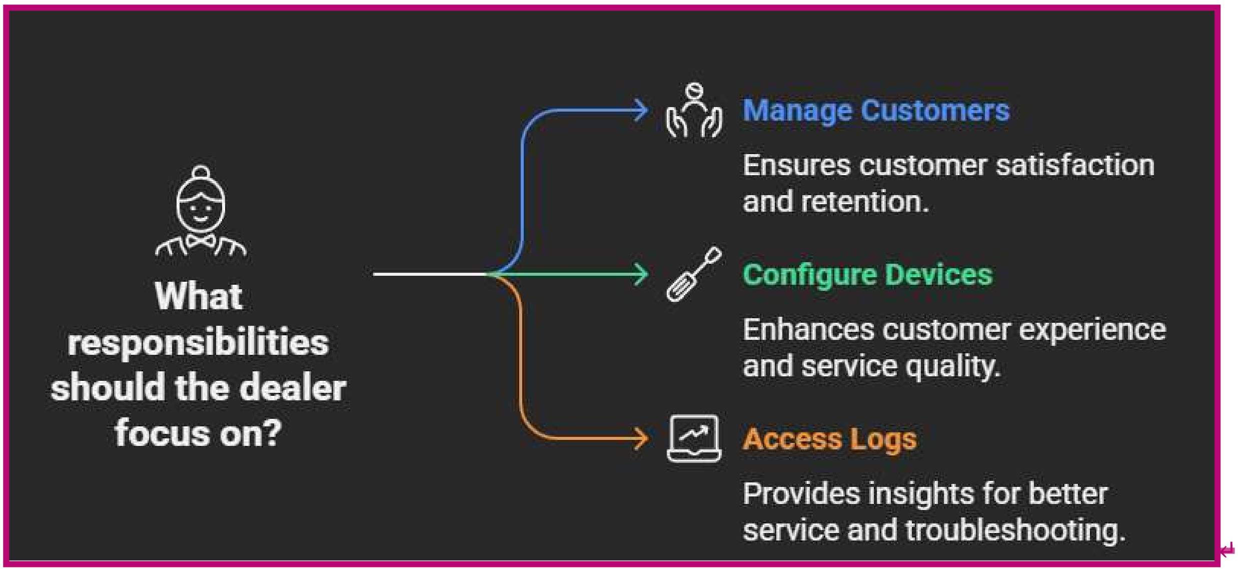
2. Maintainer

- **Permissions:** High-level access, slightly less than admin.
- **Responsibilities:**
  - Access and manage most system data (users, devices, logs).
  - Perform customer lookups and analytics.
  - Cannot perform certain admin-only actions (e.g., some system configurations).



3. Dealer

- **Permissions:** Limited to their own customers and devices.
- **Responsibilities:**
  - Manage their own customers and devices.
  - Add or configure devices for their customers.
  - Access logs and analytics for their customers.
  - Cannot access or modify data belonging to other dealers or the entire system.



What responsibilities should the dealer focus on?

Manage Customers

Ensures customer satisfaction and retention.

Configure Devices

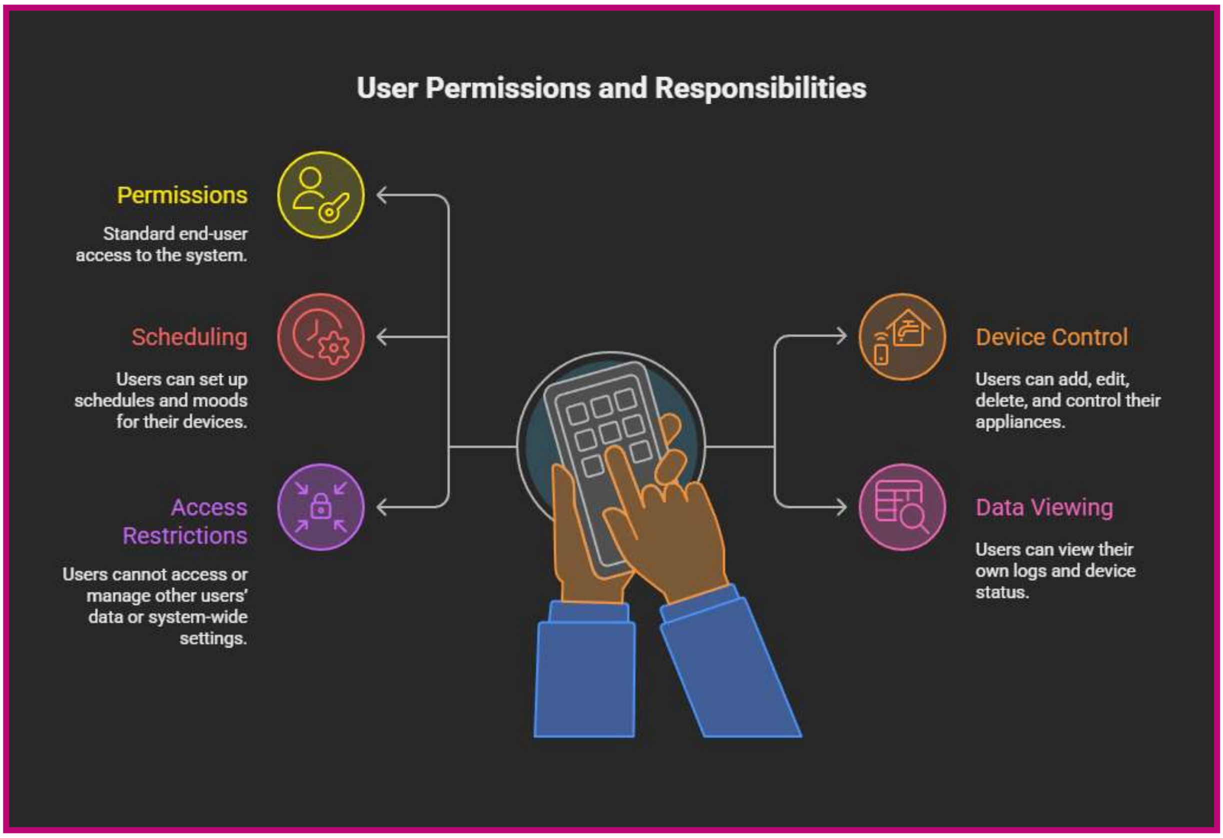
Enhances customer experience and service quality.

Access Logs

Provides insights for better service and troubleshooting.

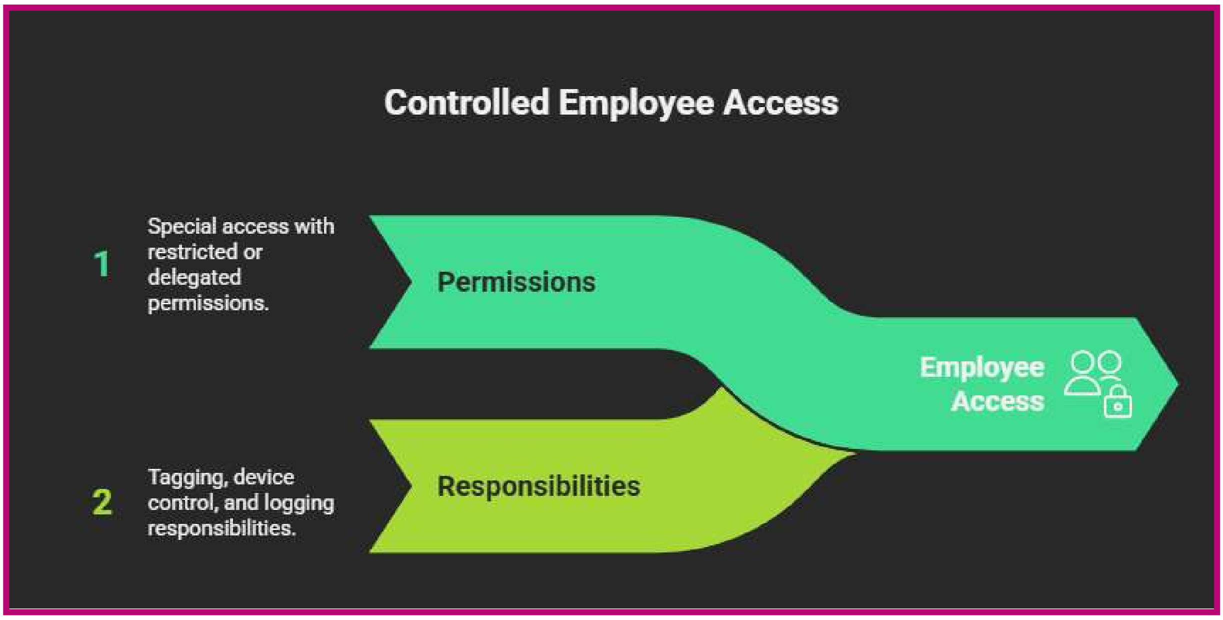
4. User

- **Permissions:** Standard end-user access.
- **Responsibilities:**
  - Control their own devices (add, edit, delete, control appliances).
  - Set up schedules and moods for their devices.
  - View their own logs and device status.
  - Cannot access or manage other users’ data or system-wide settings.


User Permissions and Responsibilities
Permissions
Standard end-user access to the system.
Scheduling
Users can set up schedules and moods for their devices.
Access Restrictions
Users cannot access or manage other users' data or system-wide settings.
Device Control
Users can add, edit, delete, and control their appliances.
Data Viewing
Users can view their own logs and device status.

5. Employee *(controlled by `employeeAccess`)*

- **Permissions:** Special access for employees with restricted or delegated permissions.
- **Responsibilities:**
  - Tag/untag appliances.
  - Access or control devices as permitted by their employer (dealer/admin).
  - May have logging enabled for their actions.



Controlled Employee Access

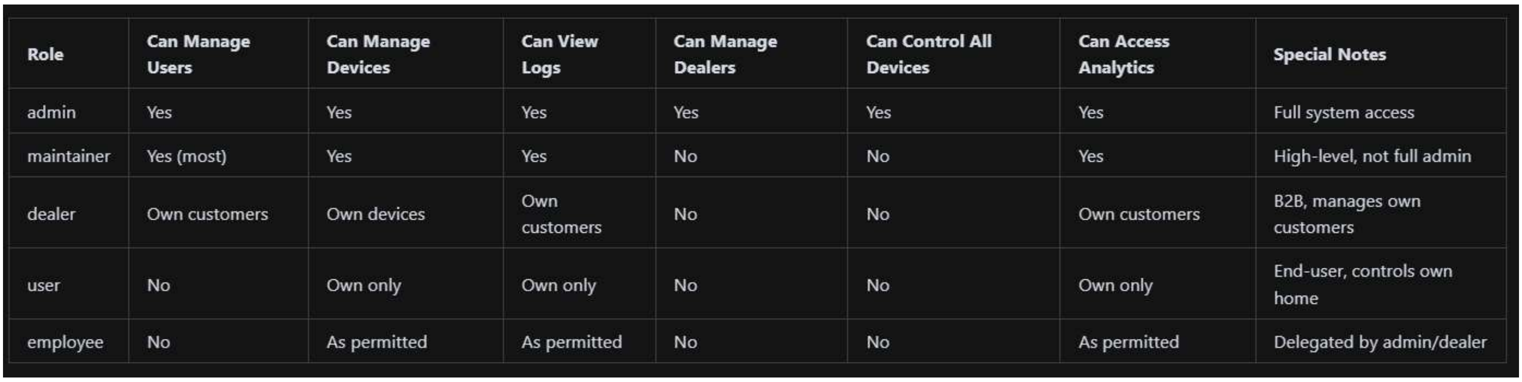
1 Special access with restricted or delegated permissions.

2 Tagging, device control, and logging responsibilities.

How Permissions Are Enforced

- Endpoints check if the `userType` is in the allowed roles list (e.g., `['admin', 'maintainer']`).
- If not allowed, the operation is denied with an unauthorized message.
- **Admin-only endpoints:** Device type/model management, system-wide alerts.
- **Dealer or admin endpoints:** Managing offline devices.
- **User-level endpoints:** Controlling appliances are open to the user who owns the device.

Summary Table



Role	Can Manage Users	Can Manage Devices	Can View Logs	Can Manage Dealers	Can Control All Devices	Can Access Analytics	Special Notes
admin	Yes	Yes	Yes	Yes	Yes	Yes	Full system access
maintainer	Yes (most)	Yes	Yes	No	No	Yes	High-level, not full admin
dealer	Own customers	Own devices	Own customers	No	No	Own customers	B2B, manages own customers
user	No	Own only	Own only	No	No	Own only	End-user, controls own home
employee	No	As permitted	As permitted	No	No	As permitted	Delegated by admin/dealer