Bahria University

Karachi Campus

CQI REPORT

(SOFTWARE CONSTRUCTION)

"Smart Home Automation System"

Student Name	Enrollment
Rana Muzammil	02-131222-012
Mohsin Akhtar	02-131222-005
Muneeb Niaz	02-131222-122
Zaeem Shafqat	02-131222-028

Submitted to: Engr. Muniba Humayun

1. Project Definition

A Smart Home System integrates IoT devices and automation to allow homeowners to monitor, control, and automate their homes remotely. The system will include:

- Control over lights, fans, ACs, and other appliances.
- Security features like door sensors, motion detection, and camera monitoring.
- A mobile app interface.
- Voice assistant integration.
- Real-time status and alerts.
- Automation rules (e.g., turn on lights when motion is detected).

Target Users: Homeowners, renters, tech-savvy individuals, families.

Stakeholders: Users, developers, hardware manufacturers, security providers.

2. Vision Statement

"Our goal is to deliver a smart automation experience that's simple, intelligent, and secure — making everyday living easier, safer, and more efficient, all while being accessible from anywhere at any time."

3. Functional Requirements

Login and User Roles

- Users should be able to create their own accounts and log in securely.
- Admin users should have more control and use extra login steps like verification codes.

Connect and Set Up Devices

- The system should find and add smart devices (like lights and cameras) automatically.
- It should also let users add devices manually using a control panel.

Main Control Panel

- A control center should be available on both phone and computer to see and control all devices.
- The system should work with voice tools like Alexa or Google Assistant.

Automate Tasks and Set Schedules

- Users should be able to set rules like “turn on hallway light when motion is detected.”
- They should also be able to set times to turn devices on or off.

Group Actions and Smart Scenes

- Users should create “scenes” like “Movie Night” that change several devices at once.
- Routines should run based on time, location, or sensor activity.

Remote Control and Instant Alerts

- Users should be able to check or change device settings from anywhere using the internet.
- The system should send alerts when something important happens, like smoke detection.

Track Energy Use

- The system should show how much power each device uses and track total usage.

Home Safety Features

- Users should be able to see live camera feeds and record video based on motion or a schedule.
- Smart door locks should be controllable from the app, and actions should be logged.

Understand Voice Commands

- The system should respond to easy voice instructions like “Make it warmer in the living room.”

Save and Recover Settings

- Users should be able to save their settings and get them back if something goes wrong.

4. Non-Functional Requirements

Quick and Responsive

- When a user sends a command to a device, it should respond in one second or less.
- Dashboards should load quickly — under two seconds on regular internet.

Always Available

- The system should be online and ready at least 99.5% of the time.

Ready to Grow

- It should support up to 200 devices in one home without slowing down.

Strong Protection

- All online communication should be encrypted for safety.
- Passwords should be safely stored with strong security.
- Logs should track major actions like lock access or login attempts and must be tamper-proof.

Works Even with Problems

- If a device disconnects, the system should try again and let the user know if it fails.
- Backup copies of settings should be saved to avoid data loss.

Easy for Everyone

- Regular users (not just tech experts) should be able to use it with just a few steps.
- Helpful tips or guides should appear where needed.

Simple to Update

- The system should be modular so changes (like a new device type) don’t need a full system update.
- Logs should be searchable to fix problems quickly.

Works with Other Brands

- It should support common standards like Zigbee, Z-Wave, MQTT, and APIs to connect to other smart devices.

Protects User Privacy

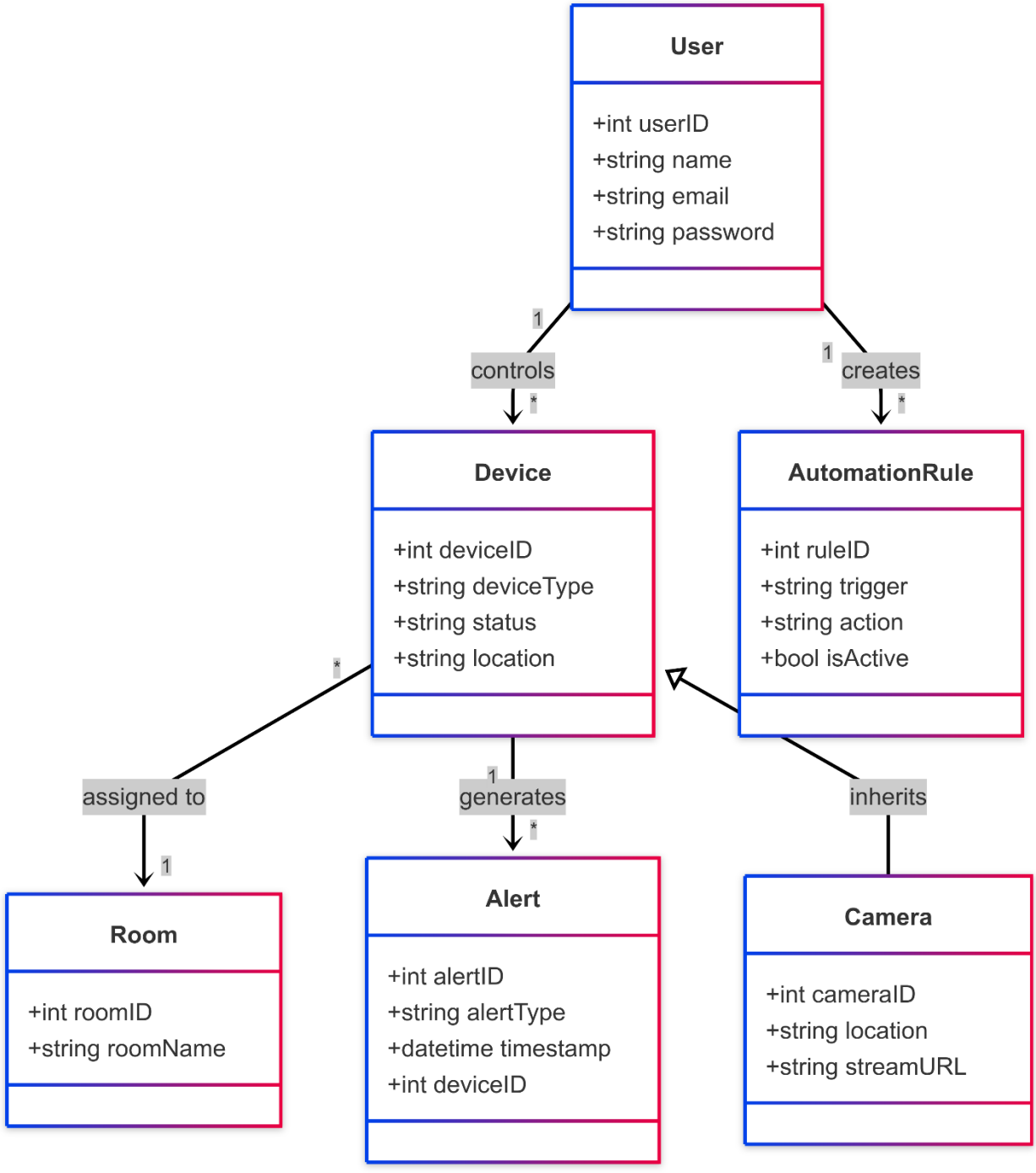
- User data should never be shared without their permission.
- Video/audio recordings should only be saved with user approval and should be auto-deleted after a set time.

Supports Multiple Languages

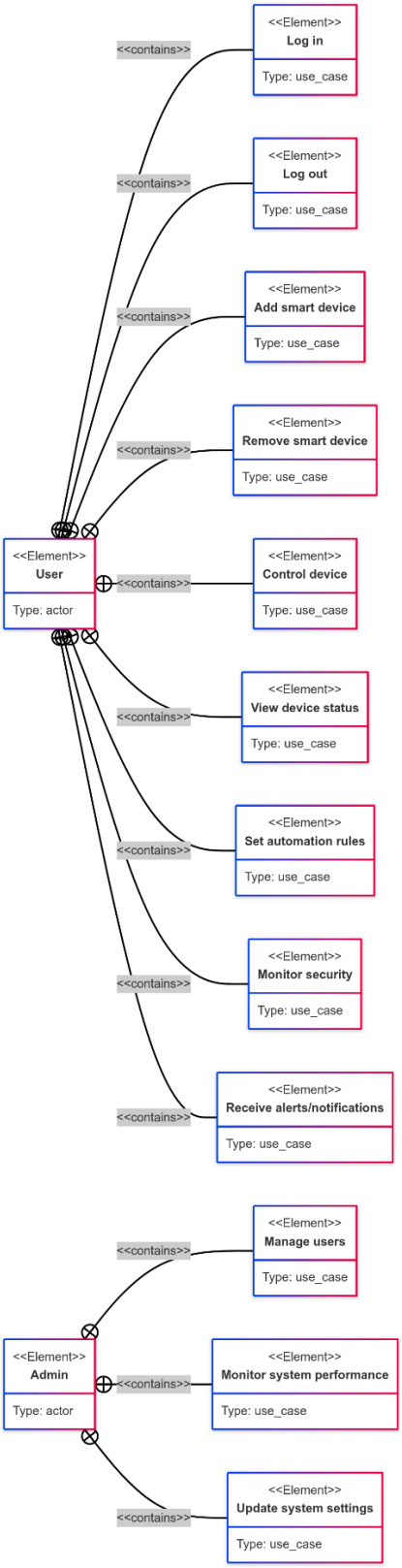
- The system should work in more than one language from day one (e.g., English + one more).
- Dates and times should display based on the user's region.

4. UML Diagrams

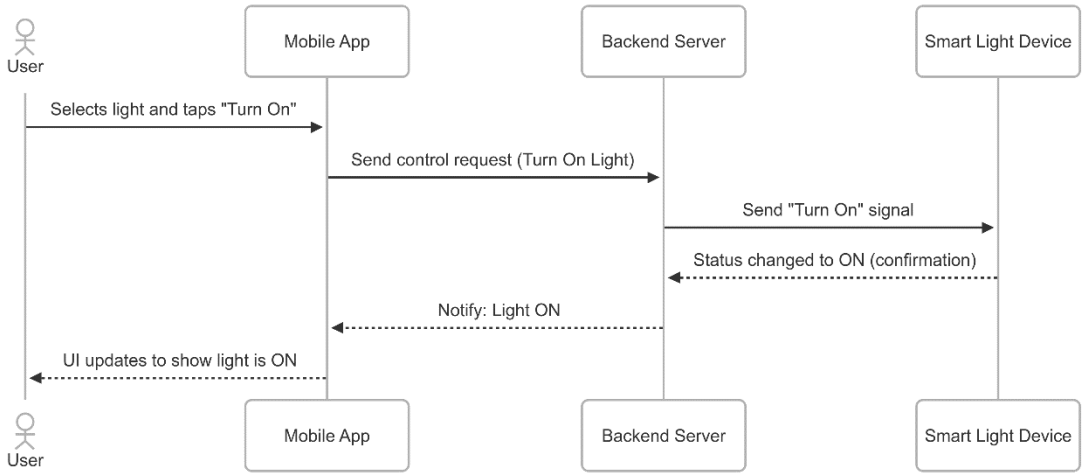
1. Class Diagram:



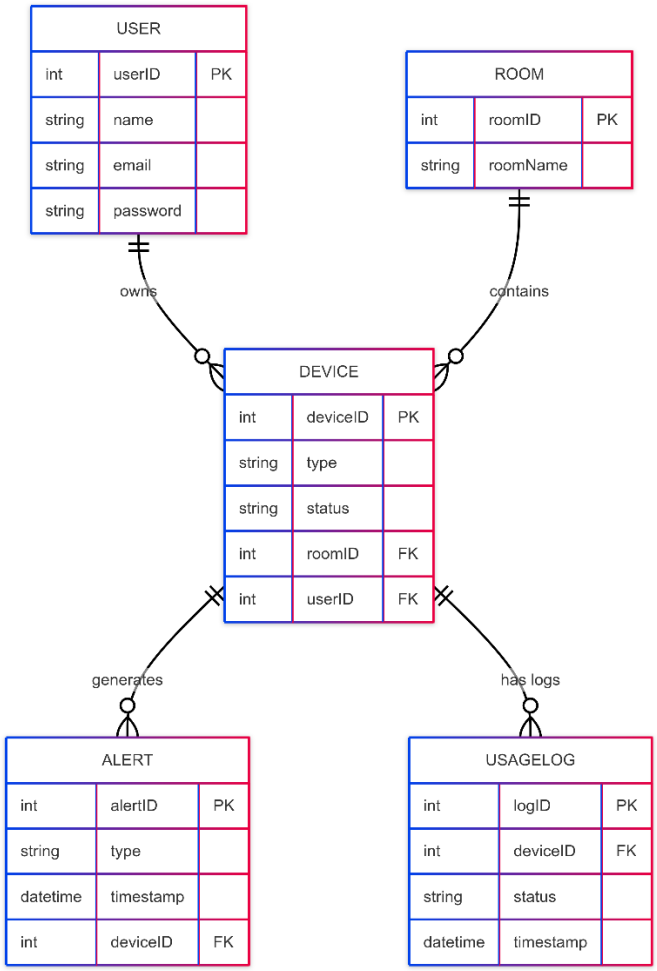
2. UseCase Diagram:



3. Sequence Diagram:



4. ERD Diagram:



6. Prototypes