Name: Multi-Flooor Cycle Parking (10 Floors).

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3.1. Introduction

This is the professional High-Level Design (HLD) of 10-floor Multi-floor Cycle Parking System (floor footprint 560 × 20 units). One of them incorporates the Security Floor (decreased parking wharf, security office, protection attained room). The design includes both functional and non-functional high-level covering, software architecture, UML artifacts, deployment guidance and a README.md set to be run of a repository.

Target group: those desk drawing, preparing implementation or tender documents, or reviewing security architecture: architects, senior developers, devops, security teams.

3.2. Chapter 2 High Level(HLD) Design Overview

Combined with physical layout is the parking system software architecture.

Parking Zone: The parking slots of each floor (560 × 20 units) consists of a row of parking slot with a separation that is a pathway and is equipped with sensors, clever locks, and CCTV. Security floor contains fewer slots, and can house surveillance and personnel.

Entry/Exit Gate: RFID, six-digit replicas, and plate recognition controls have been used as automated entry/ exit gates.

Availability Check: Data on occupancy is monitored and displayed in a real-time mode with the help of sensors and provided in the app and on the digital displays.

User Interface: Mobile and web applications allow checking slot availability, book rooms and a graphical floor plan.

Notification System: The variants of the booking confirmation, theft warning, and insurance updates are informed by app, SMS, or mail messages.

3.3. UML Diagrams

Class Diagram: The highest classes are: Cycle, ParkingRow, User, Sensor, and Notification.

Parks through cycle- slots.

ParkingRow is responsible to control slot groups and occupancy.

User is something which represents customers, administrators and security personnel.

Detects slot occupancy by sensor and then updates system.

Notification is in charge of alerts and status update.

Slot diagram (Slot Request Flow):

Through the app, user requests a slot.

Availability is checked by the system.

A free slot is assigned marked as reserved.

Confirmation and notification is sent to the user and entry gates updated.

3.4. Technical Architecture

Frontend

- Developed in React or Angular (Whichever the team is able to manage).
- Offers booking interface, in real time slot maps, user dashboards and notifications.

Backend

- Deployed using Node.js (Express or NestJS) to provide fast event driven services.
- Alternative stack Java (Spring Boot) to get deployment enterprise-grade.

Databases

- PostgreSQL (Julius) relational storage floors, slots, users, reservations and policies.
- MongoDB University and M ranging: unstructured data such as user KYC metadata and CCTV analytics can be stored with flexible document storage.

3.5. References

- Draw.io for diagrams URL Link:- (https://viewer.diagrams.net/?tags=%7B%7Dclightbox=1Chighlight=0000ffCedit=_blankClayers=1Cnav=1Cdark=auto#G1xgUNrvk2L_7uXfzsGDCUzE-AZNm5alv7).