University of British Columbia, Vancouver
Department of Computer Science

CPSC 304 Project Cover Page

Milestone #: 1

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Group Number: 75

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia.

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Car Parking Management System (CPMS)

Deliverables

2.

Project Description

Our project involves the development of a database system tailored for multi-level car parks. This application is designed to streamline the management of parking facilities, providing a solution for overseeing operations, assessing profitability, and analyzing car distribution within a network of parking lots. The primary goal is to enhance efficiency and user experience in parking lots while addressing common challenges such as finding parking spaces in crowded areas, locating parked cars, and planning ahead for reservations.

Domain of the Application

The domain of this application revolves around car parking lots and the broader aspects of parking management, logistics, and business administration. The key functionalities cater to the following domains.

1. Parking Management
The application focuses on efficiently managing parking spaces within multi-level car parks. It addresses challenges related to the allocation of parking spots, real-time monitoring, and utilization optimization.

2. Logistics
The system incorporates logistics elements by providing tools for analyzing car distribution, ensuring a smooth flow of vehicles within the parking facility, and optimizing overall traffic management.

3. Business Management
The application supports effective business management by offering insights into the profitability of the parking facility. Managers can make data-driven decisions, assess the financial performance, and strategize for future improvements.

Aspects Modeled by the Database

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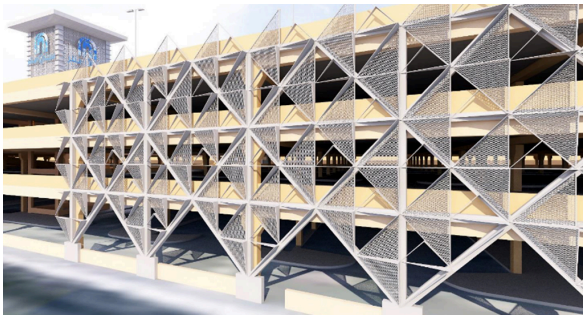
In the following sections, we explain the details of several factors we targeted when creating our relational model. Our design simulates a large-scale car parking company, similar to those in Southeast and East Asian countries, that handles multiple superblocks, malls, which comprise dense residential and commercial buildings. Below are certain examples of superblocks that became an inspiration for our idea.



Central Park, Grand Indonesia, Taman Anggrek (Jakarta), Mirdif City Center (Dubai)

The companies handling these megastructures would require a robust and detailed system to facilitate security and revenue accounting. The features and their details can be summarized as follows.

1. Parking Space Allocation and Utilization
   - The system models the allocation and utilization of parking spaces within a multi-level car park. It tracks the availability and occupancy of each space, facilitating real-time monitoring and efficient space management.
   - Example: During peak shopping hours at a mall, the database helps in allocating spaces to optimize capacity, preventing congestion and enhancing the overall parking experience for users.

2. Checking Ahead
   - The database allows users to check current parking building capacity. This feature minimizes the uncertainty associated with finding parking during high-demand periods, and facilitates on-site staff in assisting customers.
   - Example: Curing a crowded popular event, customers can check parking spaces through the system, ensuring a hassle-free experience and reducing the likelihood of long queues or unavailability.

3. Car Distribution Analysis
   - The system models data related to the distribution of cars within the parking facility. It helps analyze patterns, identify peak hours, and optimize traffic flow to enhance overall logistics.
   - Example: By analyzing historical data, the database can predict high-traffic times, allowing the parking management team to deploy additional staff or implement traffic control measures during those periods.

4. Real-Time Monitoring and Security
   - The database includes real-time monitoring features, allowing managers to track the movement of cars within the parking facility. It contributes to enhanced security by providing insights into the location of parked cars.
   - Example: If a car owner forgets where they parked, the system can help locate the vehicle quickly. Additionally, the database aids in identifying and addressing security concerns, such as unauthorized access or suspicious activities.

3.

Fundamentally, this database caters to multi-level car parks, enabling managers to oversee operations, assess profitability, and analyze car distribution. It provides comprehensive statistics for effective management of a network of large-scale, large-capacity car parks. The user interface allows car owners to register their parking, view reservation details, and plan ahead based on available spaces.

4.

The project opts for MySQL as its database, chosen for its versatility and dev-friendliness. The tech stack comprises React.js for the frontend, and Node.js with Express.js for the backend and API, which integrate with MYSQL to store and access data efficiently.

5.

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The ER Diagram is as follows: