Parking Lot Requirements Simplified

1. Parking Capacity: Our parking lot must accommodate up to 40,000 vehicles simultaneously.
2. Types of Parking Spots: We require four distinct parking spot categories:
    - Handicapped: Designated for vehicles with a handicapped permit.
    - Compact: Smaller spots tailored for smaller cars.
    - Large: Larger spots intended for bigger vehicles like trucks or vans.
    - Motorcycle: Spots specifically designed for motorcycles.
3. Entrances and Exits: The parking lot should feature multiple entry and exit points to facilitate vehicle flow and reduce congestion.
4. Vehicles Allowed: The parking lot will accommodate:
    - Cars: Standard passenger vehicles.
    - Trucks: Larger, heavier vehicles than cars.
    - Vans: Vehicles used for transporting goods or people.
    - Motorcycles: Two-wheeled motor vehicles.
5. Display Board: A display sign or screen should be present to show the availability of each parking spot type.
6. Max Capacity Rule: The parking lot cannot admit more vehicles once it reaches its full capacity of 40,000 spots.
7. Full Lot Notification: Upon reaching maximum capacity, notifications should be prominently displayed at the entrance and on the internal display board.
8. Parking Ticket: Customers should receive a parking ticket upon entry, which will be used to calculate and make payment upon exiting.
9. Payment Options at Exit: Parking fees can be paid in two ways upon exiting:
    - At an automated machine.
    - Directly to a parking agent.
10. Hourly Rates: Parking charges will be determined based on the duration of stay, with rates applied hourly.
11. Payment Methods: Payments can be made using:
    - Credit or debit cards.
    - Cash.

Elevator Design Requirements Simplified

1. Elevators and Floors: The building will have several elevator cars and multiple floors for them to service.
2. Building Limits: There's a cap of 15 floors in the building, with up to three elevators to service these floors.
3. Elevator Movement: Elevators can move up, move down, or stay idle (not moving).
4. Elevator Door Operation: The doors of an elevator can only open when it's not moving, in its idle state.
5. Floor Access: Each elevator car will stop at every floor in the building.
6. Outside Panel: Outside each elevator, there will be a panel with buttons. These let you call an elevator and indicate if you want to go up or down.
7. Inside Panel: Inside each elevator, there will be a control panel with buttons for all floors and to open or close the elevator doors.
8. Displays: Every elevator will have displays both inside and outside to show the current floor and the direction it's moving. The inside display will also show the elevator's capacity.
9. Floor Panels and Displays: Each floor will have its own set of panels and displays for calling elevators and showing their status.
10. Passenger Directions: Multiple passengers can use the elevator at the same time, even if they're going to different floors or in different directions.
11. Elevator Control: The elevator system manages the movement of the elevators, the operation of the doors, and keeps an eye on the elevators' statuses.
12. Smart Dispatch: When a passenger calls for an elevator, the system will choose the best elevator to send based on where the elevators are and where they're going.
13. Capacity: Each elevator can hold up to eight people or a total weight of 680 kilograms at any one time.

Car Rental System Requirements Simplified

1. Users: The system has two types of users: customers, who rent vehicles, and receptionists, who manage the rental process.
2. Vehicle Types: The system will include various vehicle types such as cars, trucks, vans, and motorcycles for rental.
3. Vehicle Subtypes: Each vehicle type has subcategories:
    - Cars can be economy, luxury, standard, or compact.
    - Vans can be passenger or cargo.
    - Motorcycles can be cruiser, touring, or sports.
    - Trucks can be categorized as light, medium, or high-duty.
4. Reservation Records: The system will record who has rented each vehicle and the date it was issued.
5. Rental Tracking: The system will track how many vehicles a particular customer has rented.
6. Reservation Cancellation: Customers should be able to cancel their reservations.
7. Vehicle Log: To monitor all activities related to each vehicle, the system will keep a detailed log.
8. Additional Equipment: Users can add extra equipment to their reservations, such as ski racks, child seats, and GPS navigation systems.
9. Additional Services: Users can also add extra services to their reservations, like hiring a driver, having Wi-Fi access, and getting roadside assistance.
10. Overdue Notifications and Fines: If a vehicle isn't returned by the due date, the system will notify the customer and impose a fine.
11. Vehicle Search: Users can search for vehicles by type or model within the system.
12. Branch Management: The system will oversee multiple branches of the car rental service.
13. Parking Facilities: Each branch will have parking stalls for the vehicles.

Library System Requirements Simplified

1. Storage of Information: The system must be able to keep records of all books and library members, as well as a detailed log of the book borrowing process.
2. Book Identification: Each book should have a unique ID, rack number, and other details to make finding it in the library easy.
3. Book Details: Every book must have an ISBN, title, author, subject, and publication date associated with it.
4. Book Copies: There can be multiple copies of a book, each treated as an individual book item in the system.
5. User Types: The system recognizes two types of users: librarians, who manage the library, and members, who borrow books.
6. Library Cards: Every user must have a library card with a unique number to use the library services.
7. Borrowing Limit: A member can borrow up to 10 books at any one time.
8. Borrowing Duration: Books can be borrowed for up to 15 days at a stretch.
9. Book Reservation: A book item can only be reserved by one member at a time.
10. Issuance Record: The system keeps a log of who borrowed or reserved a book and when.
11. Renewals: Members should be able to renew their borrowed books through the system.
12. Overdue Notifications: The system will alert users if a book is not returned by its due date.
13. Reservations for Unavailable Books: If a book is currently checked out, members should be able to reserve it for when it returns.
14. Book Search: Users should be able to search for books by title, author, subject, or publication date.

Hotel Management System Requirements Overview

This document outlines the fundamental requirements for a hotel management system, ensuring clarity and a solid foundation for system development.

1. Account Types: The system will support four types of user accounts: housekeeper, receptionist, guest, and server, each with distinct roles and permissions.
2. Room Styles: The hotel offers various room styles, including standard, deluxe, family suite, and business suite, catering to diverse guest preferences.
3. Room Booking: Guests can search for rooms and make reservations for any available room, ensuring a smooth and user-friendly booking process.
4. Booking Details: During booking, guests must specify their check-in date, stay duration, and make an advance payment to secure their reservation.
5. Cancellation Policy: Guests can cancel their booking and receive a full refund, provided the cancellation is made at least 24 hours before the scheduled check-in.
6. Notifications: The system will send timely notifications to guests regarding their booking status and other relevant hotel information, enhancing guest communication.
7. Housekeeping Management: All housekeeping tasks will be systematically logged and managed by the system, ensuring operational efficiency and room readiness.
8. Additional Services: Guests can enhance their stay by adding personalized services such as room service, food or kitchen services, and various amenities according to their preferences.
9. Room Keys: Each room will have a unique key, and a master key system will be implemented to access a specific set of rooms, ensuring security and convenience.
10. Multiple Branches: The hotel management system will accommodate multiple branches, allowing for seamless operations and management across different locations.

ATM System Instructions Overview

This document outlines the essential instructions for using the Automated Teller Machine (ATM) system, designed to provide a clear and user-friendly guide for bank customers.

1. Account Access: Users can access their bank account via the ATM by inserting their ATM card into the machine.
2. ATM Components: The ATM includes several key components to facilitate user interactions:
    - Card Reader: Reads the user's ATM card.
    - Keypad: Allows users to input their PIN and other transaction details.
    - Screen: Displays messages, prompts, and error messages to the user.
    - Cash Dispenser: Dispenses cash to the user upon request.
    - Printer: Provides printed receipts for transactions.
    - Network Infrastructure: Connects to the bank's system for account access and transaction processing.
3. User Authentication: The system authenticates the user by verifying the PIN entered, ensuring secure access to the account.
4. Transaction Authorization: Following successful authentication, users can proceed with various banking transactions.
5. Account Types and Transactions: Users with current or savings accounts can perform several operations, including:
    - Balance Inquiry: Check the account balance.
    - Cash Withdrawal: Withdraw money from the account.
    - Funds/Money Transfer: Transfer funds between accounts or to other bank accounts.
6. Session Management: After completing a transaction, users can choose to initiate another transaction or conclude their session.

Stack Overflow Requirements Overview

This document outlines the key requirements for the Stack Overflow platform, ensuring a comprehensive understanding for system development and user engagement.

1. Question Viewing and Searching: Guests can browse questions and search by tags, usernames, or specific words, making information accessible to everyone.
2. Posting Questions and Answers: Registered users have the privilege to post new questions and contribute answers to existing queries, fostering a collaborative knowledge base.
3. Content Moderation: Users can flag inappropriate content, including questions, answers, or comments, helping maintain community guidelines.
4. Interaction Options: Users can engage with content through upvoting, downvoting, and commenting. Comments, however, can only be upvoted to signify agreement or support.
5. Community Governance: Users can participate in community moderation by voting to delete or close questions. Answer deletion is also possible through community votes, ensuring content quality and relevance.
6. Bounties for Questions: Users can attach bounties to their questions, incentivizing detailed and high-quality answers by offering rewards.
7. Moderator Powers: Moderators play a critical role in content moderation by closing, restoring, or deleting questions and answers, maintaining the integrity of the platform.
8. User Notifications: The system will alert users about interactions with their content, such as receiving answers, earning badges, or changes in vote counts, keeping them engaged and informed.
9. Badges and Recognition: Users can earn badges for their contributions, encouraging helpful, accurate, and high-quality participation in the community.
10. Tag Popularity Analysis: The system will identify and highlight popular tags, helping users navigate and find content related to trending topics.
11. Question Tagging: Users can categorize their questions with relevant tags, improving the discoverability and organization of content based on topics.

LinkedIn Platform Requirements Overview

This document delineates the essential requirements for the LinkedIn platform, ensuring a clear guideline for functionalities aimed at enhancing professional networking and career development.

1. Profile Customization: Users can enrich their profiles with educational background, work experiences, achievements, and skills, offering a comprehensive professional summary.
2. Search and Exploration: Users have the capability to search for and view other users' profiles, pages, and groups, fostering networking and community engagement.
3. Connection Management: Users can send, cancel, accept, or ignore connection requests, enabling them to curate their professional network.
4. Following Users: The platform allows users to follow others without needing to connect, expanding their access to diverse professional insights and updates.
5. Insights and Analytics: Users can view analytics related to their connections, profile views, post impressions, and search appearances, offering valuable feedback on their professional visibility.
6. Recommendations: Users can request and provide professional recommendations, enhancing the credibility and value of their professional network.
7. Content Creation: Users have the ability to create and share new posts, contributing to the professional discourse within their network.
8. Engagement with Content: Users can interact with posts through reactions, shares, and comments, and also engage with comments on posts, fostering a vibrant professional community.
9. Messaging: Direct communication is facilitated through messaging, allowing users to send and receive messages with other professionals.
10. Notifications: The system will notify users about new messages, connection requests, and interactions with their content, keeping them informed and engaged.
11. Company Pages: Users can create pages for companies and follow other company pages, connecting them with corporate entities and professional opportunities.
12. Job Listings: Company pages can feature job openings, enabling users to explore and apply for career opportunities.
13. Groups: Users have the option to create and join professional groups, encouraging the exchange of ideas and networking within specific interest areas or industries.

Problem Definition: A meeting scheduler software helps organizations arrange meetings for multiple participants. This software selects a suitable time and place based on when participants are available. It aims to ensure that most people can attend the meeting at the chosen time and place. Users can book or cancel meetings using this system. Participants get notifications about these changes quickly. The organizer can also add new people to the meeting even after it has been scheduled.

Using a Meeting Scheduler: When designing a meeting scheduler, it's crucial to decide which components to include. Here are some key areas the interviewer might expect you to discuss:

Room Assignment: The meeting scheduler assigns a room for each meeting. You should ask the interviewer these questions to understand room assignment better:

- How does the system find out which rooms are available?
- How important is a room's capacity when assigning it for a meeting?

Availability of Attendees: Meetings involve multiple attendees, each with different schedules. To understand how the scheduler manages this, consider asking:

- How does the system check if attendees are available?
- How does the system get access to all attendees' meeting schedules?

Design Approach: We will use a bottom-up design approach to create a meeting scheduler:

- Start by designing small components like time intervals and meeting rooms.
- Use these components to build larger ones, such as a meeting or a calendar.
- Continue this process until we've designed the entire scheduler.

Design Pattern: In an interview, it's beneficial to discuss which design patterns your meeting scheduler aligns with. Mentioning design patterns shows that you understand advanced object-oriented design concepts.

Requirement Collection:
The requirements for the meeting scheduler are outlined as follows:
R1: There must be a specific number of meeting rooms available.
R2: Each meeting room should hold a certain number of people based on its capacity.
R3: Unless already booked, each meeting room should be able to be reserved, with a set start time and end time.
R4: A notification must be sent to everyone invited to the meeting.
R5: All invitees will receive an invitation, whether or not they are available at that time. They can accept or decline the invite.
R6: Every user should have a calendar that helps track dates and times and allows them to schedule or cancel meetings.

Having identified these requirements, we will explore different use cases for the meeting scheduler in the next lesson.

Vending Machine Requirements Simplified

Here are the simplified requirements for the vending machine:

R1: The vending machine has different products in various slots.
R2: The vending machine can be in one of three states:

- NoMoneyInsertedState: No money is in the machine.
- MoneyInsertedState: Money has been put into the machine.
- DispenseState: The machine gives out the product.

R3: There are two types of people who can use the system: a regular user and an admin.
R4: The admin can put new products in the machine or take them out.
R5: Users can pick a product to buy by entering the slot number.
R6: Users can put cash into the machine.
R7: The machine can add up how much money has been put in.
R8: The machine checks if the money inserted is exactly enough for the chosen product.
R9: If the money is more than the price, the machine will give back change and release the product.
R10: If the money is less than the price, the machine shows an error message and gives the money back.

These are the basic functions of the vending machine, and we will use them to design the system's class diagram in the next lesson.

Online Multiplayer Chess Game Requirements

Purpose:

This system allows players to play chess against each other online.

Game Rules:

The game follows the official international chess rules.

Player Setup:

- Each player is randomly given either black or white pieces.
- At the start, each player has the standard set of pieces: eight pawns, two rooks, two bishops, two knights, one queen, and one king.

Gameplay:

- The player with the white pieces makes the first move.
- Players cannot take back a move once it’s made.
- All moves are recorded by the system.
- The game can end in a few ways: checkmate, forfeit, stalemate (draw), or resignation.

Chess Piece Movement Rules:

Piece	Movement Rules
King	Moves one step in any direction. Cannot move into a check.
Queen	Moves horizontally, vertically, or diagonally. Cannot jump over pieces.
Pawn	Moves one box forward. Can move two boxes forward on the first move. Can move one box diagonally to capture an opponent's piece.
Bishop	Moves diagonally. Cannot jump over pieces.
Rook	Moves horizontally or vertically. Cannot jump over pieces.
Knight	Moves in an L-shape: two boxes in one direction and one box perpendicular. Can jump over pieces.

Special Situations in the Game:

Situation	Description
Checkmate	The king is in check (threatened) and cannot escape. The opponent wins.
Stalemate	The king is not in check, but the player has no legal moves left. The game is a draw.
Forfeiture	A player does not show up for the game. They lose by default.
Resignation	A player decides to quit because they believe they will lose. The opponent wins.
Castling	The king moves two boxes towards a rook, and the rook moves to the box the king passed over. Conditions: ● Neither piece has moved before ● No pieces between them ● The king is not in check or moving through check

Restaurant Management System (RMS) Overview

A restaurant management system (RMS) is a type of software that helps people who run restaurants manage different parts of their business. This includes tracking sales of food and drinks, organizing employee schedules, and handling customer reservations. It can be used in various kinds of eateries such as fast-food joints, fancy restaurants, and cafeterias. With this system, restaurants can work more smoothly, become more efficient, and offer better service to their customers.

Main Functions

The RMS allows restaurant managers to oversee and manage their operations from one place. They can check which tables are free, book reservations, and create bills.

Purpose

The main purpose of the RMS is to make various tasks easier and more automated for restaurant owners and managers. This helps them concentrate on providing a great dining experience for their guests.

Interview Preparation

Here are some aspects you might need to discuss in more detail during an interview:

Restaurant Services

- Does the restaurant offer delivery?
- Can customers order online?
- Does the restaurant accept online or card payments?

Restaurant Management

- Can services vary between different branches of the restaurant?
- Should we consider how the restaurant manages its stock of items?

Design Approach

We plan to design this system using a bottom-up approach, which means:

1. Start by designing the smallest parts like tables, seats, meals, meal items, and the seating layout.
2. Use these to design larger components like the menu, each branch, and the whole restaurant.
3. Keep building on these until the entire system is designed.

Design Pattern

Discussing the design patterns used in the RMS during an interview shows you understand advanced design concepts. This makes a good impression.

Requirements for Restaurant Management System:

Here are the main requirements for the RMS:

1. The restaurant offers a menu with different sections and items.
2. Waiters can create orders for a table and add items for each person seated.
3. Each person's order can include multiple menu items.
4. The system should show available tables for walk-in customers.
5. The system should allow for table reservations.
6. The receptionist should be able to search for available tables by date and time and make reservations.
7. The system should allow customers to make and cancel reservations.
8. The system should send reminders as the reservation time gets close.
9. Customers should be able to pay with credit cards, checks, or cash.
10. Each branch may have different table setups.