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FOUNDATIONS OF DATABASES
REQUIREMENTS ANALYSIS OF BOOK CAFE DATABASE DESIGN

1 Introduction

In the bustling world of today, book cafes have emerged as tranquil oases where literature and leisure seamlessly coexist. These unique establishments offer a haven for bibliophiles to savor their favorite books, enjoy a cup of coffee, and engage in meaningful conversations. To ensure the smooth and efficient operation of a book cafe, a well-structured and tailored database system is essential. This report presents a comprehensive requirement analysis for the database design of our envisioned book cafe, with the goal of optimizing the management of diverse activities and resources within the establishment.

The successful operation of a book cafe is contingent on the ability to maintain an extensive collection of books, provide a cozy atmosphere for customers, manage inventory, track sales, and support customer engagement. A robust database system plays a pivotal role in overseeing these multifaceted operations. It not only serves as a repository for the book collection but also acts as a central hub for customer information, order processing, and resource management. Through this requirement analysis, we will delve into the various aspects of the book cafe's operations and identify the specific data and functionality that the database system must support.

This report will begin with an overview of the book cafe's objectives, followed by an exploration of the key stakeholders involved. We will then delve into the detailed requirements for the database system, encompassing the management of books, customers, orders, inventory, and other crucial aspects of the book cafe's operations. By identifying and documenting these requirements, we aim to pave the way for a well-informed and effective database design that aligns with the unique needs of our book cafe.

Ultimately, this requirement analysis sets the foundation for a robust database design that will enable our book cafe to offer an exceptional experience to its patrons while optimizing business operations. With a well-defined understanding of the cafe's requirements, we can move forward to design and implement a database system that enhances efficiency, ensures data accuracy, and supports the overarching goal of creating a haven for book lovers and coffee enthusiasts.

2 System Objectives

A book cafe is seeking to implement advanced technologies to enhance its operational efficiency and customer experience. The primary objective is to develop a database system that can efficiently manage various aspects of the book cafe's operations. This includes organizing the book collection, tracking customer preferences, and facilitating the cafe's services. The database will also support customer engagement by collecting data and providing insights, all while ensuring data integrity and security.

2.1 Stakeholders of the System. The stakeholders of the book cafe's database system are as follows:

- **Book Cafe Management**: The cafe's management team will oversee the database system to align with the cafe's objectives and ensure its efficient operation. They are responsible for the overall strategic direction of the database.
- **Book Cafe Staff**: Staff members, including baristas, librarians, and administrative personnel, will use the database system to manage inventory, process customer orders, and maintain records.
- **Customers**: The database system indirectly serves customers by facilitating quick and accurate order processing, tracking their preferences, and potentially offering personalized recommendations.
- **Accountants**: The accounting team will use the system to track sales, expenses, and financial records to ensure the cafe's financial health.
- **Marketing Team**: The marketing team can use customer data and transaction history from the database for targeted marketing campaigns, loyalty programs, and customer engagement initiatives.
- **External Service Providers**: Third-party service providers, such as IT support or maintenance services, might access relevant data within the system when their services are required.

These stakeholders collectively define the requirements, access levels, and functionalities of the database system for the book cafe, ensuring that it meets the needs of the cafe's operations and enhances the overall customer experience.

3 Database Terms

A Book Cafe business is in need of a comprehensive database to manage various aspects of its operations. The goal is to efficiently handle information related to books, customers, staff, and sales. Here are the key components and user roles for the database:

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3.1 User Roles.

- **Administrator:** This role is responsible for managing access privileges for all users of the system. They can control user permissions and oversee system configurations.
- **Librarian:** Librarians manage the books in the cafe. They can add new books to the collection, update book details, and handle book loans and returns.
- **Customer:** Customers use the database to search for books, check their account information, place orders, and review their borrowing history.
- **Sales Clerk:** Sales clerks handle book sales and transactions in the cafe. They can check book availability, process customer orders, and manage book sales records.
- **Data Analyst:** Data analysts have access to customer and sales data to perform data analysis, generate reports, and gain insights into customer preferences and sales trends.

3.2 Database Entities.

1. Book. :

- Each book has attributes such as title, author, genre, ISBN, and publication date.
- Books can be categorized into different genres (e.g., fiction, non-fiction, science fiction, romance).
- The database should store information about the number of available copies for each book.

2. Customer. :

- Customer details include name, contact information, and a unique customer ID.
- The database should keep track of customer borrowing history, including due dates and return dates.

3. Staff. :

- Staff members' details, such as name, contact information, and employee ID, should be stored.
- User roles and access privileges for staff should be defined in this entity.

4. Sales Transaction. :

- Records of sales transactions should be kept, including details like date, time, book(s) sold, customer ID, and total price.

5. Inventory. :

- Inventory information includes the number of copies for each book, their location in the cafe, and their availability status.

6. Stock / Ingredients. :

- The Cafe ingredients and their stock needs to be tracked also.

7. Orders. :

- Customers can place orders for books that are not currently available. Order details should be recorded, including the book(s) ordered, customer details, and expected delivery date.

8. Reviews. :

- Book reviews can be imported from the readers and review book site - Goodreads, which should be linked to the respective books available in the cafe. Each review has a rating and comments.

9. Data Analysis. :

- This entity stores data analysis results and reports generated by data analysts.

10. Café Events. :

- Records of events hosted by the cafe, such as book readings, author visits, and special promotions, should be kept.

11. Suppliers. :

- Information about book and ingredient suppliers, including contact details and the books they supply, should be maintained.

4 Database Relationships

I will separate the Database in Online System and In Person.There are pros and cons in both ways (whether to separate or not) but this is a Design decision in the end. The explanation behind is that probably different Software developers and engineers will work on both systems so there is no need in complicating the Database unnecessarily and making it more difficult for those that will be implementing it. Online Orders are only for Books, and In Store Purchases are for Books and Cafe Items.

- Book - Order Relationship (online): Customers make Orders for Books. This is a one-to-many relationship as an order can have for multiple books.

- Book - Sales Transaction (in Person) Relationship: Sales transactions involve selling books, creating a one-to-many relationship, as each sales transaction can include multiple books.
- Customer - Order Relationship: Customers can place multiple orders, and each order is associated with a single customer, creating a one-to-many relationship.
- Book - Inventory Relationship: The availability of each book is tracked in the inventory. It's a one-to-many relationship as a book can have multiple copies available.
- Staff - Sales Transaction (in Person) Relationship: Staff members interact with customers. This relationship is one-to-many, as staff member can take multiple transactions.
- Cafe Items - Sales Transaction (in Person) Relationship: Sales transactions involve selling cafe items, creating a one-to-many relationship, as each sales transaction can include multiple cafe items.
- Book-Review Relationship: Books can have multiple reviews, and each review is associated with a single book, forming a one-to-many relationship.
- Book - Supplier Relationship: Books are supplied by various suppliers, forming a one-to-many relationship.

In addition to these entities and relationships, it's essential to define attributes, data types, and constraints for each entity, as well as establish data flow and security protocols to ensure the efficient and secure operation of the Book Cafe's database.

5 Requirements

Functional and non-functional requirements are essential for defining the features, capabilities, and qualities of your Book Cafe database system. Here's a list of functional and non-functional requirements for a Book Cafe database design

5.1 Functional Requirements.

- Book Management:
  - The system must allow staff to add, update, and remove book records.
  - Books should be categorized by genre and have attributes like title, author, and rating.
- Customer Management:
  - Customer records should include details such as name, contact information, and a unique customer ID.
  - The system should track customer buying history and preferences.
- Staff Management:
  - Staff details, such as name, contact information, and employee ID, should be stored.
  - User roles and access privileges for staff should be defined in the system.
- Sales and Orders:
  - The system should record sales transactions, including date, time, book(s) sold, customer ID, and total price.
  - Customers should be able to place orders for books that are not currently available.
- Inventory Management:
  - The system must maintain information about the number of book copies available, their location in the cafe, and their availability status.
- Reviews and Recommendations:
  - Customers should be able to provide book reviews, with ratings and comments.
  - The system should offer personalized book recommendations based on customer preferences.
- Data Analysis and Reporting:
  - Data analysts should have access to data for computing analyses and generating reports.
  - The system should store and present data analysis results and insights.
- Cafe Events Management:
  - Records of cafe events, such as book readings, author visits, and promotions, should be stored.
  - Event details, including date, time, and attendee information, should be recorded.
- Supplier Information:
  - Information about book suppliers, including contact details and the books they supply, should be maintained.

5.2 Non-Functional Requirements.

- Data Integrity:
  - The system must ensure data accuracy and consistency by implementing data validation rules and constraints.
- Security:
  - Customer and sensitive business data must be secured through encryption and access controls.
  - User authentication and authorization mechanisms should be in place to protect the system from unauthorized access.
- Performance:
  - The system should be responsive and capable of handling concurrent user requests efficiently.
  - Database queries and operations should be optimized for speed.
- Scalability:
  - The system should be designed for scalability to accommodate future growth in the number of customers, books, and events.
- Availability and Reliability:
  - The database should be available and reliable, with minimal downtime, for customers, staff, and analysts.

- Usability:
  - The user interface should be intuitive, and staff should be trained on how to use the system effectively.
- Data Backup and Recovery:
  - Regular data backups should be performed to ensure data recovery in the event of system failures.
- Regulatory Compliance:
  - The system must comply with relevant data protection and privacy regulations, such as GDPR or HIPAA.
- Reporting and Analytics:
  - The system should support the generation of various reports and data analytics capabilities to provide insights into customer behavior and sales trends.
- Audit Trail:
  - The system should maintain an audit trail to track all changes and access to sensitive data for security and accountability purposes.

6 Development Process

- Make a Database Schema
- Implementation in PostgreSQL
- SQL Queries for Analytics Dashboards
- Client side implemented as a Web application, to guarantee easy management through different devices. Html, css and javascript will be needed;
- Server Side Implementation