Building a reading platform based on Bookmate

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***Abstract*—This paper presents the design of the relational database for a digital reading platform inspired by Bookmate. The project focuses on structuring the system's data to support core functionalities such as book and audiobook browsing, reviews, user interactions, and subscription management. Functional requirements were defined based on detailed user stories and organized by feature groups. A normalized relational model was developed to support scalable, consistent, and efficient data handling. A preliminary architecture outlines the role of the database in receiving structured input from administrative and user interfaces and providing the necessary outputs to external layers. This work establishes the foundation for the platform's backend and frontend integration in future development stages.**

***Index Terms*—Digital reading platforms, relational database design, data modeling, functional requirements, Bookmate, user interaction, subscriptions, content management, database architecture.**

I. Introduction

In recent years, digital platforms have transformed the way users access and consume literary content. Among these, Bookmate stands out for offering a personalized reading experience through subscriptions that include books, audiobooks, and social interaction features. This project presents the design and implementation of the database architecture for a platform inspired by Bookmate, emphasizing personalized content delivery, efficient data handling, and scalability.

The main goal is to model and create a robust, normalized relational database that supports essential functionalities such as user management, content cataloging, recommendation mechanisms, and user interaction. This effort is part of a broader system development project that includes interface design and backend architecture. The database acts as the core foundation to ensure consistency, integrity, and performance of the application.

II. Methodology and Materials

A. Methodology

A requirements-driven methodology was followed, beginning with the definition of the business model using the Business Model Canvas to identify stakeholders, value propositions, and key functionalities. From there, the team specified functional requirements and user stories to define user interactions and system behavior.

Code	Requirement
FR-	
FR-	
FR-	

Fig. 1. Requirement table template

Title:	**Priority:**
User Story:	
Acceptance Criteria:	

Fig. 2. Use story table template

The project adopts a relational database model to ensure consistency, integrity, and scalability. We used the relational modeling technique, and the diagram was created using crow's foot notation. The central entity is `user`, which supports various roles such as reader, creator, or administrator. Other key entities include `book`, `review`, `subscription`, `favorite`, `follow`, and `reading_list`.

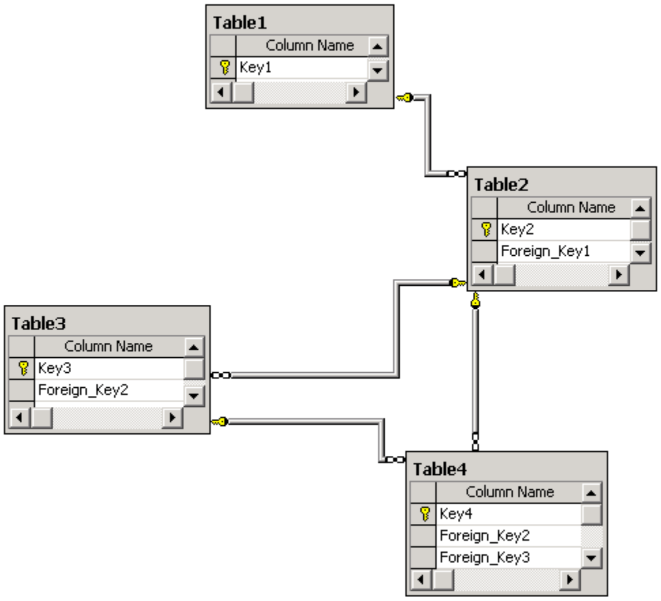


Fig. 3. Example of a relational model

Design Choices:

- Users can create personalized reading lists composed of multiple books.
- A `review` is a comment and score linked to both a book and a user.
- The `subscription` entity captures plan details, status, and dates.
- `Follow` and `notification` entities enable social interaction.

B. Materials

We chose these tools because they combine agility in designing data models, team collaboration, and editorial quality when presenting the project. Each offers specific advantages in the analysis, design, and communication phases of a database.

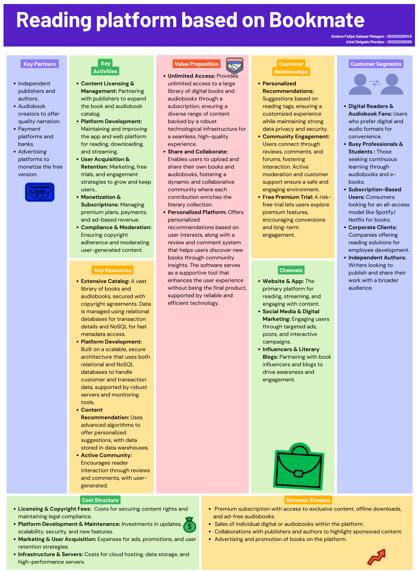
- **Modeling Tools:** Draw.io, Lucidchart. Draw.io covers our ”fast and free” needs for sketches and early adjustments. Lucidchart, on the other hand, provides professional collaboration layers, permission control, and a repository of templates for diagramming the logical and physical architecture of the solution.
- **Documentation Tools:** Microsoft Word, LaTeX and Canva. These technologies allow us to implement early collaborative writing; LaTeX generates the final document with a uniform and general format, supporting us with specific templates for each type of document requested. Canva transforms technical information into visual pieces that capture the attention of a diverse audience, while maintaining brand consistency with predefined palettes and fonts.

III. Results

A. Business Model

The platform is structured around a subscription-based model, offering access to books and audiobooks, with additional features such as personalized recommendations and social interaction. Key components include:

- Customer Segments: Avid readers, audiobook listeners, educational users.
- Value Proposition: Curated reading experiences, thematic collections, and a social network for book lovers.
- Revenue Streams: Subscription plans, potential ads, and affiliate programs.



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Key Partners

- Independent publishers and authors.
- Audiobook creators to offer quality narration.
- Payment platforms and banks.
- Advertising platforms to monetize the free version.

Key Activities

- **Content Licensing & Management:** Partnering with publishers to expand the book and audiobook catalog.
- **Platform Development:** Maintaining and improving the app and web platform for reading, downloading, and streaming.
- **User Acquisition & Retention:** Marketing, free trials, and engagement strategies to grow and keep users..
- **Monetization & Subscriptions:** Managing premium plans, payments, and ad-based revenue.
- **Compliance & Moderation:** Ensuring copyright adherence and moderating user-generated content.

Key Resources

- **Extensive Catalog:** A vast library of books and audiobooks, secured with copyright agreements. Data is managed using relational databases for transaction details and NoSQL for fast metadata access.
- **Platform Development:** Built on a scalable, secure architecture that uses both relational and NoSQL databases to handle customer and transaction data, supported by robust servers and monitoring tools.
- **Content Recommendation:** Uses advanced algorithms to offer personalized suggestions, with data stored in data warehouses.
- **Active Community:** Encourages reader interaction through reviews and comments, with user-generated.

Value Proposition

- **Unlimited Access:** Provides unlimited access to a large library of digital books and audiobooks through a subscription, ensuring a diverse range of content backed by a robust technological infrastructure for a seamless, high-quality experience.
- **Share and Collaborate:** Enables users to upload and share their own books and audiobooks, fostering a dynamic and collaborative community where each contribution enriches the literary collection.
- **Personalized Platform:** Offers personalized recommendations based on user interests, along with a review and comment system that helps users discover new books through community insights. The software serves as a supportive tool that enhances the user experience without being the final product, supported by reliable and efficient technology.

Customer Relationships

- **Personalized Recommendations:** Suggestions based on reading tags, ensuring a customized experience while maintaining strong data privacy and security.
- **Community Engagement:** Users connect through reviews, comments, and forums, fostering interaction. Active moderation and customer support ensure a safe and engaging environment.
- **Free Premium Trial:** A risk-free trial lets users explore premium features, encouraging conversions and long-term engagement.

Channels

- **Website & App:** The primary platform for reading, streaming, and engaging with content.
- **Social Media & Digital Marketing:** Engaging users through targeted ads, posts, and interactive campaigns.
- **Influencers & Literary Blogs:** Partnering with book influencers and blogs to drive awareness and engagement.

Customer Segments

- **Digital Readers & Audiobook Fans:** Users who prefer digital and audio formats for convenience.
- **Busy Professionals & Students :** Those seeking continuous learning through audiobooks and e-books.
- **Subscription-Based Users:** Consumers looking for an all-access model like Spotify/ Netflix for books.
- **Corporate Clients:** Companies offering reading solutions for employee development.
- **Independent Authors:** Writers looking to publish and share their work with a broader audience.

Cost Structure

- **Licensing & Copyright Fees:** Costs for securing content rights and maintaining legal compliance.
- **Platform Development & Maintenance:** Investments in updates, scalability, security, and new features.
- **Marketing & User Acquisition:** Expenses for ads, promotions, and user retention strategies.
- **Infrastructure & Servers:** Costs for cloud hosting, data storage, and high-performance servers.

Revenue Streams

- Premium subscription with access to exclusive content, offline downloads, and ad-free audiobooks.
- Sales of individual digital or audiobooks within the platform.
- Collaborations with publishers and authors to highlight sponsored content.
- Advertising and promotion of books on the platform.

Fig. 4. Business model for reading platform

B. Requirements Definition

The project began with the identification of user needs through a set of user stories, which were then translated into functional requirements grouped by feature domains. The system is expected to support readers, premium users, creators, and administrators. A total of 25 functional requirements were documented and categorized as follows:

- **Audiobooks and Reading Module (FR-1.1 to FR-1.5):** Includes search capabilities with filters, an online reading viewer, streaming controls, offline downloads, and font/background customization.
- **Reviews, Favorites, and Comments (FR-2.1 to FR-2.4):** Enables star-based rating, written reviews, and the creation of personal favorite lists.
- **Community and Profiles (FR-3.1 to FR-3.5):** Supports profile customization, follow/follower relationships, notifications, and social discovery of content.
- **Book Management and Uploading (FR-4.1 to FR-4.3):** Allows administrators and creators to upload, edit, or delete books and audiobooks with complete metadata.
- **Recommendations and Discoveries (FR-5.1 to FR-5.3):** Personalized recommendations are based on history and social activity, along with curated thematic collections.
- **Monetization and Subscriptions (FR-6.1 to FR-6.3):** Defines Premium user access, including ad-free playback and unrestricted downloads.

These requirements guided the design of the data structures and relationships implemented in the platform’s database model.

C. Relational Database Model

The relational model was derived directly from the functional requirements and includes the core entities and relationships necessary to support user interaction, content management, and personalization.

- **User Management:**
  - `user`: stores profile data and links to `user_type`.
  - `follow`: models follower-followed relationships.
  - `subscription`: links users to `plan_type` and `payment_status_type`.
- **Content Management:**
  - `book`: stores metadata, audio status, file links, and cover.
  - `genre_book`: supports multi-genre classification.
  - `review`, `favorite`, `user_book`: model user interaction with content.
- **Social and Notification Features:**
  - `notification`: linked to `notification_type` and users.
  - `reading_list`, `reading_list_item`: support personal book collections.
- **Administrative Functions:**
  - `uploaded_by` in `book`: connects books to their uploader (creator or admin).

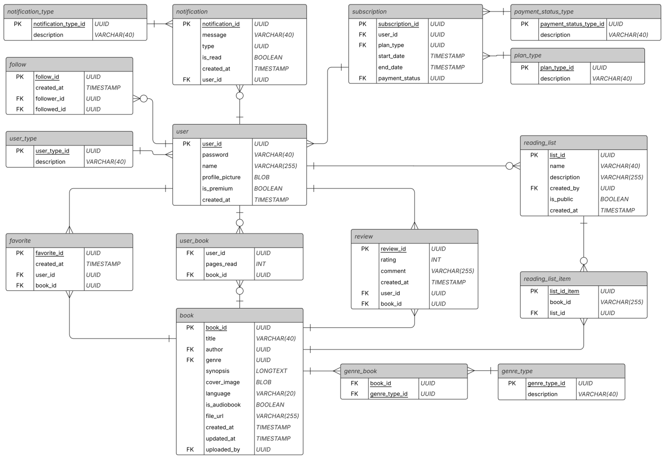

Fig. 5. Relational model for the reading platform

The model is normalized to third normal form (3NF) to reduce redundancy and ensure consistency. Primary and foreign keys were defined appropriately to maintain data integrity.

D. Preliminary System Architecture

The proposed system architecture was designed from the perspective of the database development team, focusing exclusively on how data is received, structured, stored, and made available for external use. The architecture includes the following components:

- **Data Sources:**
  - Administrative forms and upload interfaces that provide raw book and audiobook metadata.
  - User input collected via registration forms, profile updates, reading actions, reviews, and social interactions (e.g., follows, favorites).
- **Data Ingestion Layer:**
  - Data is entered into the system through backend services (outside our scope), which interact with the database using standard SQL queries and API calls.
  - Our responsibility includes ensuring the database supports these operations efficiently and reliably.
- **Relational Database Layer:**
  - Stores structured information across normalized tables with referential integrity.
  - Supports essential operations like:
    - ∗ Searching and filtering books by title, author, or genre.
    - ∗ Fetching user profiles and reading history.
    - ∗ Retrieving favorites, reviews, and recommendations.
    - ∗ Delivering user-specific content like personalized reading lists.
  - Includes support tables (e.g., `genre_type`, `notification_type`, `user_type`) to simplify querying and filtering.
- **Data Output Interfaces:**
  - The database serves preprocessed or indexed data to the application's backend layer.
  - Common output includes:
    - ∗ Lists of books by category or popularity.
    - ∗ User-generated lists, favorites, and reviews.
    - ∗ Recommended books (based on ratings and follow data).
    - ∗ User subscriptions and access control status.
  - Includes support tables (e.g., `genre_type`, `notification_type`, `user_type`) to simplify querying and filtering.

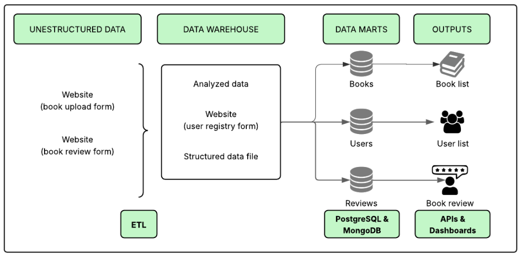

Fig. 6. Database-Centered Architecture Diagram

This preliminary architecture allows future backend and frontend layers to query the database efficiently without the database needing to manage logic beyond structured storage and response generation.

IV. Conclusions

The project successfully defined and structured the database layer for a social reading platform inspired by Bookmate. The system requirements were clearly established through user stories, and the resulting relational model was designed to support key features such as subscriptions, user-generated content, and personalized reading lists.

From a database perspective, the architecture ensures proper data flow from administrative and user input to external systems, maintaining integrity and scalability. The relational model provides a solid foundation for querying and managing books, users, interactions, and recommendations.

Future stages of the project will focus on database population, indexing, and performance testing, followed by full integration with backend services and user interfaces.

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