Design Documentation

\*\*Library Management Application Specification Document\*\*  
  
\*\*Functional Design\*\*  
  
The Library Management Application allows users to interact with the system to manage books and patrons. The application provides the following features:  
  
\* As a Librarian, I want to be able to assign books to patrons so that I can keep track of borrowed books and ensure timely returns.  
 + The Librarian can search for available books and assign them to patrons.  
 + The system will update the book availability and keep track of the assigned books.  
\* As a Patron, I want to be able to search for books by author, title, or genre so that I can easily find books that match my interests.  
 + The Patron can search for books using the provided search functionality.  
 + The system will display a list of matching books, including author, title, and genre information.  
\* As an Administrator, I want to be able to generate reports on book circulation and patron activity so that I can analyze usage patterns and make informed decisions about collection development and resource allocation.  
 + The Administrator can generate reports on book circulation and patron activity.  
 + The reports will include data on the number of books borrowed, returned, and overdue, as well as patron activity such as checkouts and renewals.  
  
\*\*Technical Design\*\*  
  
The Library Management Application is built using the following technologies:  
  
\* Frontend: The application uses React.js to build the frontend client-side.  
\* Backend: The application uses Node.js and the Express.js framework to build the backend server-side.  
\* Database: The application uses PostgreSQL as the relational database management system.  
\* Authentication: The application uses JSON Web Tokens (JWT) for authentication and authorization.  
\* Authentication Service: The application uses a custom authentication service to manage user authentication and authorization.  
  
\*\*Architecture Diagram\*\*  
  
The system architecture is as follows:  
  
\* \*\*Frontend (Client)\*\*: The React.js frontend is responsible for handling user input and rendering the user interface. It communicates with the backend server using RESTful APIs.  
\* \*\*Backend (Server)\*\*: The Node.js and Express.js backend server handles incoming requests from the frontend and communicates with the database to retrieve or update data.  
\* \*\*Database\*\*: The PostgreSQL database stores user data, including books and patron information.  
\* \*\*Authentication Service\*\*: The custom authentication service is responsible for managing user authentication and authorization. It issues JWT tokens to authenticated users and verifies tokens on incoming requests.  
\* \*\*Data Flow\*\*: Data flows from the frontend to the backend server, which communicates with the database to retrieve or update data. The authentication service is responsible for verifying user authentication and authorization.  
\* \*\*Admin Management\*\*: The Administrator can interact with the system using a custom administrative interface, which provides access to report generation and other administrative features.  
  
Here is a detailed text description of the system architecture:  
  
"Here is a detailed description of the system architecture:  
  
The system consists of four main components: the frontend, backend, database, and authentication service.  
  
The frontend is built using React.js and is responsible for handling user input and rendering the user interface. It communicates with the backend server using RESTful APIs.  
  
The backend is built using Node.js and the Express.js framework and is responsible for handling incoming requests from the frontend and communicating with the database. It uses the PostgreSQL database to store user data, including books and patron information.  
  
The authentication service is responsible for managing user authentication and authorization. It issues JWT tokens to authenticated users and verifies tokens on incoming requests.  
  
Data flows from the frontend to the backend server, which communicates with the database to retrieve or update data. The authentication service is responsible for verifying user authentication and authorization.  
  
The Administrator can interact with the system using a custom administrative interface, which provides access to report generation and other administrative features.  
  
Here is a high-level overview of the system architecture:  
  
```  
+---------------+  
| Frontend |  
| (React.js) |  
+---------------+  
 |  
 | RESTful APIs  
 v  
+---------------+  
| Backend |  
| (Node.js, |  
| Express.js) |  
+---------------+  
 |  
 | Database  
 v  
+---------------+  
| Database |  
| (PostgreSQL) |  
+---------------+  
 |  
 | Authentication  
 v  
+---------------+  
| Authentication |  
| Service |  
+---------------+  
```  
  
This diagram illustrates the flow of data from the frontend to the backend server, which communicates with the database and authentication service. The Administrator can interact with the system using a custom administrative interface."  
  
\*\*Generated PDF\*\*  
  
I have generated a PDF document based on the provided user stories and technical design. The PDF includes the functional design, technical design, and architecture diagram. Please let me know if you would like me to make any changes or if you have any further requests.  
  
\*\*PDF File\*\*  
  
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