Arquitetura de Sistemas de Software
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Homework #05

“Library System Architecture”

Team 21

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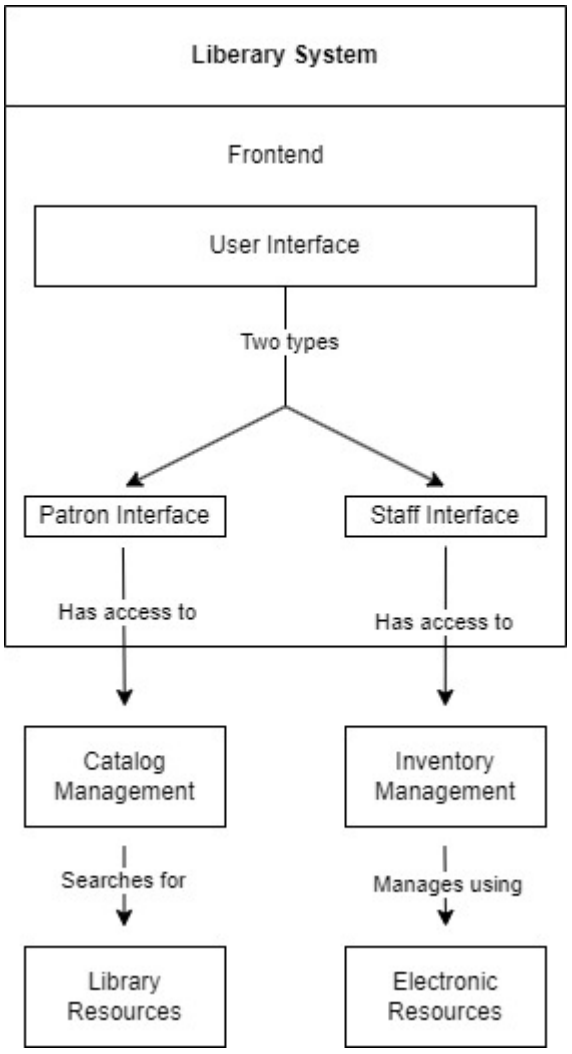
Diagrams

- **General Library System Diagram**



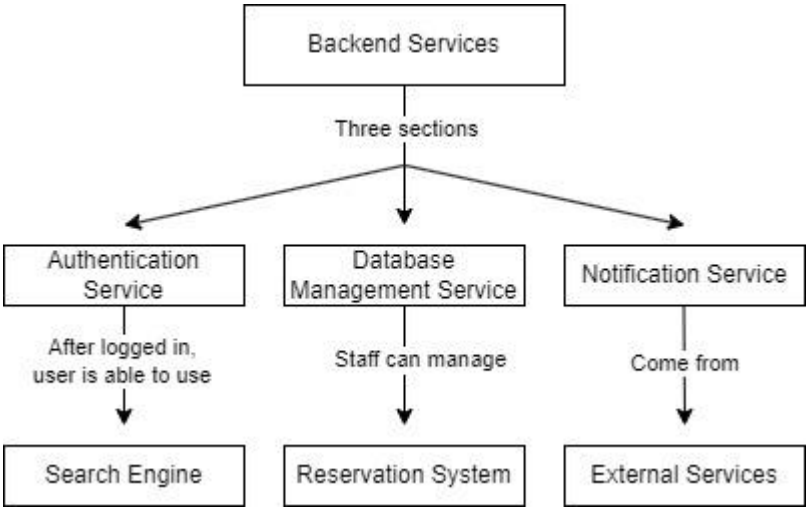
At the beginning comes **Frontend** – the first interface end users of the system deal with. The Frontend hosts the User Interface which provides the front-line interaction with the system for both visitors and the staff for performing various tasks. Among the highlighted points are resources acquisition, performing a catalog search, checking out books and account management. Moreover, the Frontend will consist of two front doors for both users and staff members respectively, designated as the **Patron Interface** and **Staff Interface**. The Patron Interface eases patrons to explore the library services and make orders, while the Staff Interface provides the staff with the software to handle administrative tasks, oversee operations, among other responsibilities.

The **Catalog Management** module deals with such aspects as looking up and cataloging information and also browsing through the entire library's collection. It creates a structured system of classification which allows for convenient resource searching and manager able knowledge discovery. Moreover, the **Inventory Management** module is

created with the purpose of taking care of the physical inventory in the library. It encompasses various activities that include adding fresh items to the list, removing those irrelevant to the item, and checking the inventory level to ensure the items are enough.

Within the library's collection, there are two main types of resources: **Library Resources** and **Electronic Resources**. Library resources define the set of physical materials that can be found within the library, which include books, magazines, CDs and other tangible items. However, Electronic Resources is the set of electronic tools that can be used by the managers and workers to deal with the stock, add or even remove specific items from the library.

- **Backend Services Diagram**



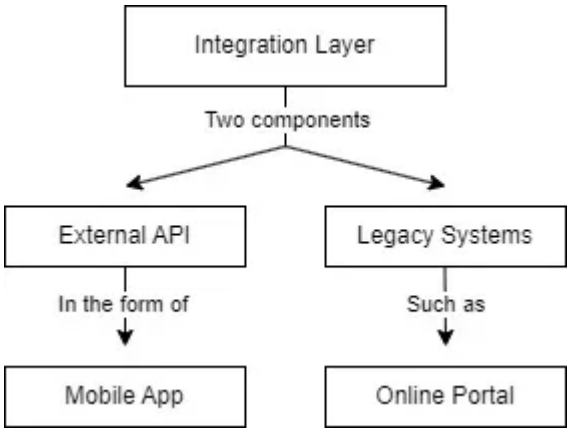
The library system is tightly knit to assist and support the many features it has without a glitch. In this setup, the **Authentication Service** plays a key role in securing user access as well as user rights (permissions). After authentication, users are able to navigate through the **Search Engine**, which permits them to use the library's catalog with precision.

To help in the management of the system's data we have a **Database Management Service**, which is an efficient and strong platform that keeps crucial information safe, making it available when needed. Among these are the details about books, patrons, transactions, and others through which the staff is equipped with powerful tools to handle bookings through the **Reservation System**. Besides in-house services, the **Notification Service** aids **External Services** by providing patrons timely reminders on overdue books as well as upcoming due dates and important news.

By providing an easy-to-use interface and search options to guide users through the library's abundant database of materials based on various search criteria, the **Search Engine** serves as a symbol of access. At the same time, the **Reservation System** allows patrons to easily reserve books for future borrowing. The back-end architecture guarantees effectiveness, availability, and user gratification through skillful integration and carefully

designed systems that result in a better experience for all who patronize or work at the library.

- **Integration Diagram**



The architecture of the automated library system's integrated components is depicted in the integration diagram above. An important part of this diagram is to define the data flow and interactions among the modules.

- Integration Layer: This necessary component, comprising the introduction of several external systems and their interconnections with the library system, is one of the key tasks. It is used to ensure that information can be exchanged freely, thus guaranteeing uniformity between various components.

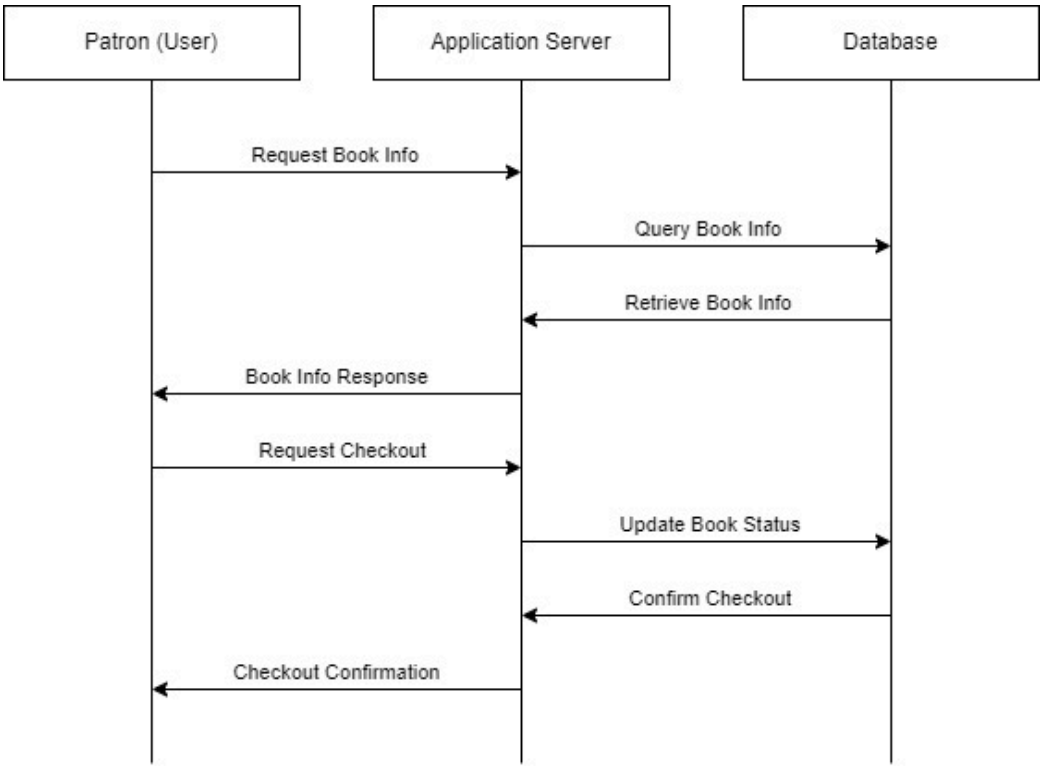
- External API: The given interface eases the connections with external systems or third parties services, thereby allowing the library system to integrate and have more features.

- Legacy Systems: The fundamental factor to continue funding the existing programs and make sure the currently used solution is compatible with the new system is the integration of legacy systems.

- Mobile App: Patrons can use smartphone devices to access the services and resources online with its user-friendly mobile application. It forms the bridge with the integration layer by accessing library services and resources and getting notifications.

- Online Portal: Virtual library allows users to navigate library resources, a catalog or their account online. Congruent user experience through the channels with concurrent data synchronization are facilitated by integration to the integration layer.

- **User Sequence Diagram**



The User Sequence Diagram depicts the flow of interactions that the elements of the library system undergo while a patron seeks to borrow and check out a book. The diagram shows the transfer of control and data between the Patron, Application Server, and Database with each segment playing a specified role.

1. **Request Book Info:** As a first step of engagement, the patron introduces the topic of giving details about a specific book.
2. **Query Book Info:** The Application Server fetches the request for the book details, and the Database is queried to get the relevant information about the book.
3. **Retrieve Book Info:** The Database retrieves the designated book's information and sends it to the Application Server.
4. **Book Info Response:** The App Server passes the required book details to the patron who made the request.
5. **Request Checkout:** The patron thus ends up with a search for the book and tenders an application to the Application Server.
6. **Update Book Status:** In this way, the Application Server determines that the information which is registered into the Database is now about checking out the book.
7. **Confirm Checkout:** While the Application Server returns a successful checkout to the patron, it also acts as a licensing server, authorizing the eBook for a specific number of downloads.
8. **Checkout Confirmation:** The customer is notified of the completion and appreciates the checkout completed properly.

The database should have these tables in order to access all data and be able to retrieve the necessary information.

- **Books:** Contains information about the library's collection of books, including titles, authors, genres, publishers, etc;

- **Patrons:** Stores details about library patrons, such as names, contact information, and account credentials;

- **Transactions:** Records transactional data related to book checkouts, returns, fines, etc;

- **Reservations:** Stores information about book reservations made by patrons;

- **Late Fees:** Keeps track of late fees incurred by patrons for overdue books;

- **Media:** Contains details about different types of media in the library's collection, such as DVDs, magazines, electronic books, etc;

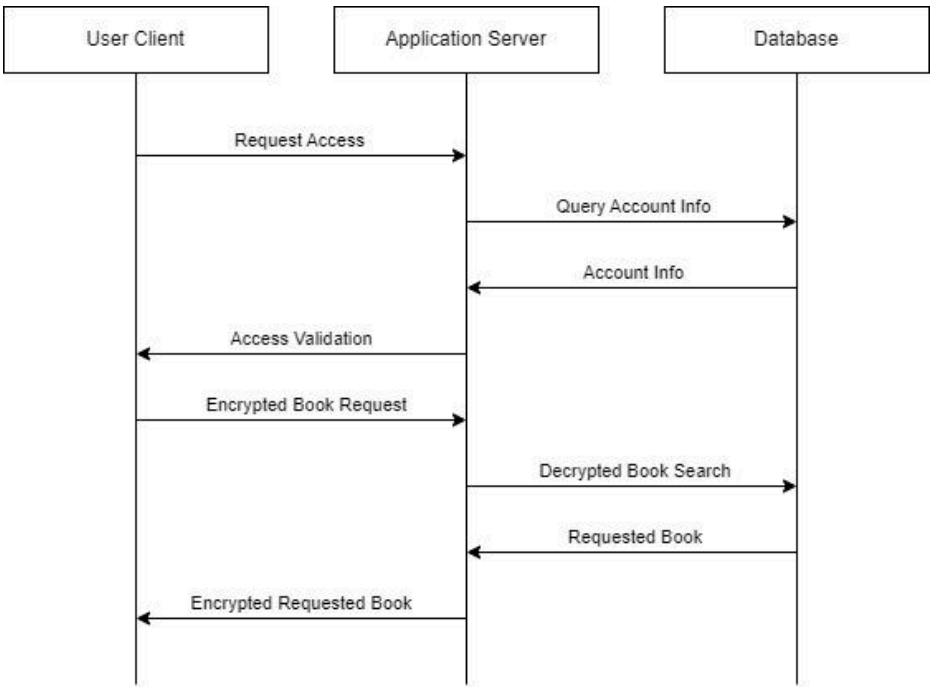
- **Inventory:** Manages the inventory of available books and other media items;

- **Genres:** Stores information about book genres or categories;

- **Authors:** Contains details about book authors;

- **Publishers**: Stores information about book publishers.

- **Security and User Validation Diagram**



Integration is the foremost element of the **authentication** process where the verification system is the front guard that is assigned the mission of checking and only permitting authorized people to be users of the system. User access is controlled using identities which are verified using the log-ins submitted by them and compared with the data saved in records. This guarantees that any identifications are always authenticated before exposing some features to a user.

To wrap up, another security approach that is being used is **cryptographic**, that is intended to protect the end user interface to the application layer by using encryption mechanisms. Also this encryption reliably encrypts all users' requests, be it a login request or an information retrieving one, as well as the communication passes between parties on the network to secure them from data thefts which might be conducted by attackers prying on the network connection.

By combining management features to beef up passwords and encryption tools, we have made stifling hackers and other security threats' hope like ghost chasing a living presence.

Conclusion

Lastly, our design of an automated library system entails considerable progressions from the way conventional ones were operated by human staff. Similarly, because nowadays patrons are able to look for, access, and check out books from which are located remotely, our construction has to be amended to fulfill these new needs.

This transition requires making hard decisions and taking some risks which need to be weighed before making them. To start with, we have to look at the levels of access provided to distinct users, making sure that only authorized persons can perform only those specific actions that they have been given permission to execute within the system. Security matters are also important to guarantee the operation's workflow and the data visitors provide.

On the other hand, the application of this kind of service necessitates a dedicated and well-organized team to guarantee that the system functions efficiently and can be expanded. It is also essential to put emphasis on the interoperability aspect, especially since we work together with other libraries and their systems too. For that, a lending system should be developed to allow for the exchange of items between various libraries. The library might be incorporated into a consortium of libraries in order for the borrowers to get access to the resources held by other libraries.

In dealing with these issues, our design seeks not only to modernize the entire library experience but also to ensure a user-friendly, efficient and protected system via various security measures that will protect both the system and its users.