# Software Engineering Report: Grand Egyptian Museum Client-Server Application

## Project Overview

The Grand Egyptian Museum client-server desktop application is a comprehensive platform designed to provide visitors with a seamless and engaging experience. It offers information about the museum, tours, workshops, and facilitates communication among users through a group chat feature. Additionally, a chatbot is integrated to answer frequently asked questions and guide users through the booking process.

## Key Features:

- **Information Portal:** Displays detailed information about the museum, including exhibits, events, and opening hours.
- **User Registration and Login:** Allows users to create accounts and log in to access personalized features.
- **Group Chat:** Enables users to communicate with other visitors, share experiences, and ask questions.
- **Chatbot:** Provides instant answers to common queries, offers guidance on museum navigation, and assists with booking procedures.
- **Booking Platform:** Integrates with the museum's booking system to allow users to reserve tickets and tours.
- **Offline Functionality:** Enables users to access certain features, such as saved chat logs, even when offline.

## Technical Implementation

The application is built using a client-server architecture, leveraging JavaFX for the user interface and Java for the backend. Key technologies and components include:

- **JavaFX:** A rich GUI toolkit for creating visually appealing and interactive user interfaces.
- **Java:** A versatile programming language for developing the application's logic and backend functionalities.
- **MySQL:** A relational database management system for storing user data, chat messages, and museum information.
- **Socket Programming:** For establishing communication between the client and server.
- **BCrypt:** A password hashing library for secure password storage.

### Server-Side Architecture

The server component handles the following tasks:

- **User Authentication:** Verifies user credentials and manages login/logout processes.
- **Database Interactions:** Interacts with the MySQL database to store and retrieve user data, chat messages, and museum information.
- **Chat Management:** Handles chat messages, broadcasts them to online users, and maintains user status updates.
- **Chatbot Logic:** Implements the chatbot's logic to process user queries and provide relevant responses.
- **Booking Integration:** Connects to the museum's booking system to facilitate ticket reservations.

### Client-Side Implementation

The client-side application is responsible for:

- **User Interface:** Creating a visually appealing and intuitive interface using JavaFX components.
- **User Interaction:** Handling user input, such as button clicks, text entry, and menu selections.
- **Communication:** Establishing a connection with the server using socket programming and exchanging messages.

- **Data Display:** Rendering information from the server, such as museum details, chat messages, and chatbot responses.

**Security Considerations**

To ensure the application's security, the following measures have been implemented:

- **Password Hashing:** User passwords are stored in a hashed format using BCrypt to prevent unauthorized access.
- **Data Encryption:** Sensitive data, such as user information and chat messages, is encrypted during transmission to protect against eavesdropping.
- **Input Validation:** Client-side input validation is performed to prevent malicious attacks like SQL injection.
- **Server-Side Security:** The server-side code is regularly updated with security patches and best practices to mitigate vulnerabilities.

## Future Enhancements

- **Push Notifications:** Implement push notifications to alert users of new messages or events.
- **Offline Mode:** Expand offline capabilities to allow users to access more features, such as offline chat and saved museum information.
- **Social Features:** Integrate social media features to enable users to share content and connect with friends.
- **Personalization:** Customize the user experience based on individual preferences and browsing history.

## Conclusion

The Grand Egyptian Museum client-server desktop application provides a valuable tool for visitors to explore the museum, engage with other users, and access essential information. By addressing security concerns and considering future enhancements, the application can continue to evolve and enhance the visitor experience.