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## **1 Design Goals**

The top 2 design goals for our project will be the Security and Usability of the web application. Security is a necessary aspect in this web application because we deal with large amounts of private data, and usability is important to make the experience of the user seamless and smooth with minimal confusion and complications.

### **1.1 Security**

#### **Justification:**

Our system will record the data of multiple tour and fair applications made by different high schools and individual students. These applications will include the contact information of these users and some possible personal details. Therefore the data within the system needs to be kept private and secure, and only be visible to the intended authorities. No guest user should be able to view details of the applications made by other guest users. As for authorized users (who need to log in), their login information will be stored in the system, and this data needs to be kept private and secure.

#### **Tradeoffs:**

##### **a. Security —Performance Tradeoff in Encrypted Data:**

Encrypting and decrypting data using AES-256, enhances security but adds extra processing time for our system, especially for large datasets. This can slightly slow down read/write operations in the database. We will evaluate the decrease in performance against increase in security and carefully optimize this encryption system, prioritizing encryption of sensitive data first.

##### **b. Access Control—Ease of Use Tradeoff:**

The system will have access control to ensure the user can only access the functions and data they are authorized to access. However this level of control can add latency to user requests and reduce ease of use. We will balance this tradeoff and ensure the system has sufficient level of control and is still user-friendly.

### **c. Security—Overhead when managing Encryption Keys:**

While encryption protects sensitive data, this adds overhead for the administrative end. We (or the managers/administrators of the system) will need to handle encryption keys carefully. We need to implement this security system in such a way that does not overwhelm the administrative resources while still ensuring security.

#### **1.1.1 Data Encryption**

We will be securing our web application using multiple security protocols and encryptions. We will make use of HTTPS (TLS 1.3 or higher) to make sure our communications between the client and server are secured and cannot be intercepted. When sensitive data (e.g., student names, contact information, high school data, counselor details) is at rest within storage in the server we will store it using AES-256 encryption. We will use a secure Key Management System to store encryption keys.

#### **1.1.2 Access Control**

We will have a role based access control where only authorised roles can access sensitive data. We will ensure that users and systems have access only to the data they need for their roles.

#### **1.1.3 Session Control**

We will enforce a short session expiration time and invalidate sessions after a certain period of inactivity and logout the user automatically.

#### **1.1.4 Logs**

Maintain detailed logs of all data access and modifications to monitor suspicious activity.

## 1.2 Usability

### **Justification:**

It is vital for the users to be able to navigate through the web application easily without any unnecessary confusion caused by the UI. If the UI is too complicated the user might be confused about where to find which functionality. To avoid this we need to have similar related options consolidated into menus at one dashboard of the user, the menus will be named properly to clearly indicate what is contained in the menu options when they will be selected, and the name of the options should also be clear and concise. We will try to avoid creating too many menus so that it doesn't become repetitive and fatigue causing for the user. For example the guest user will only have 5 options under the dashboard and additionally one 'Contact Us' option. Each of these pages will display all their content clearly without having to scroll vertically or horizontally see any missing content.

### **Tradeoffs:**

#### **a. Tradeoff between Short and Long Term Usability:**

We aim for our design to be helpful in making the experience seamless for the user. On the contrary this may add a level of complexity for the new user who will have to go through a learning curve to fully familiarize themselves with the system because all the options are consolidated within drop down menus. New users may initially struggle to find specific pages, to perform basic operations. Consequently, usability at first may seem to be poor for the short-term experience of the user. Once users become familiar with the system's design, usability will be highly efficient in the long-term. We will balance this experience so that the design will be simple enough that the initial struggle won't drive away the users, but it will be complex enough for streamlined navigation between pages, menus, and functions for experienced users.

#### **b. User Satisfaction—Development Time Tradeoff in UI Design:**

To strike the perfect balance between complexity and simplicity in the UI we might need to conduct user tests which will add extra time to the development of the web application. We have to seriously consider project deadlines if we ever plan to do user tests. We will evaluate whether user testing is worth the time to ensure user satisfaction while still optimizing our development time.

## 2 Subsystem Decomposition

