Alternate 1

Web-Based Application

This design will implement the student management System as a web-based application. The tools/technology needed:

* **Frontend:** HTML5, Tailwind CSS, JavaScript.
* **Backend:** PHP server, MySQL database.
* **Security:** Role-based access, and authentication using JWT tokens, and encryption for sensitive data.

Usability

1. **Responsiveness**

The interface will be fully responsive, allowing access from desktops, tablets, and smartphones.

1. **Ease of use**

Simple navigation with clear icons for common actions like viewing grades, tracking attendance, and managing schedules.

Strengths and Weaknesses

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| **Strengths** | **Weaknesses** |
| Portability, Users can easily access it from any device. | Offline Access, Users need a stable internet connection to use the system. |
| Performance, the use of JavaScript ensures fast UI updates, while PHP offers scalability for handling multiple concurrent users | Complexity: the implementation of modules may require specialized developers, leading to higher initial setup costs. |

Alternative 2

Mobile Application for Android and iOS

This design alternative will involve a native mobile application that provides more offline capabilities and better performance on mobile devices. Technologies/tools needed:

* **Frontend**: React Native for cross-platform development (Android/iOS).
* **Backend**: Firebase for real-time data and authentication.

**Usability**

1. **Offline Access**

The system stores local data for offline access. Once online, the system syncs the local changes with the server.

1. **Mobile-Friendly**

Tailored specifically for mobile devices, making use of native device features like notifications.

Strengths and Weaknesses

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| **Strengths** | **Weaknesses** |
| Mobile Optimization, provides an intuitive and fluid experience on mobile devices. | Portability, primarily designed for mobile, limiting full-scale usability on desktops or larger screens. |
| Push Notifications, can deliver real-time alerts for important updates such as grade postings or assignment due dates. | Development Cost,Requires native mobile development expertise and potentially higher maintenance costs due to platform-specific features. |

Evaluation and Comparison

After evaluating and comparing both alternatives, looking at the strengths and weaknesses, both alternatives meet the requirements for reliability, security, maintainability, and performance, but differ in their focus on accessibility. We chose the Web-based application because it is highly accessible and portable across all devices, and it is suitable for institutions with variety of user needs.