

Student Attendance System

Technical Architecture

1. Choice of Architecture

A multi-user Web-based system is recommended. Both student users and instructor users are expected to interact with the system via a browser. When classes are taught in SOIS lab classrooms, the lab machines will be used. When classes are taught in non-lab classrooms, students will use their own mobile devices (smart phones and tablets) to access a responsive, browser-based version of the Web application.

It is recommended that the primary data store for the system be a full-function relational database management system. The complete recommended technology stack is:

- Browser-based desktop clients that support HTML5 and CSS3 running Windows or MacOS operating systems
- Browser-based mobile clients that support HTML5 and CSS3 running IOS or Android operating systems
- Apache HTTP Server running on the Linux operating system
- Tomcat JEE Application Server HTTP Server running on the Linux operating system
- Java-based application server programming using Java Servlets and JSPs
- MySQL Community Edition relational database server running on the Linux operating system

2. Rationale for Choice of Architecture

The multi-user nature of this application is dictated by both functional and non-functional requirements. Up to 70 simultaneous student users and up to 5 simultaneous instructor users are expected.

The use of a browser-based Web architecture allows for flexible system deployment and minimum expense. Students and instructors need to be able to access the system from inside and outside of the classroom. The chosen architecture allows that access with a minimum of expense. While mobile device support is necessary in order to allow students to use their own devices, a responsive HTML5/CSS3 application should be sufficient. As attractive as dedicated mobile apps might be, the additional expense of designing and developing them is not warranted.

The use of a standard relational DBMS product as the primary data store brings the performance, reliability, recoverability, and security features that this application requires. Standard RDBMS products can easily handle the type and volume of data required for this application. Standard features for transaction logging, backup, and restore will provide a robustness that will meet or exceed the many non-functional requirements that have been identified in the Systems Analysis document. The security of student-related data is always important. RDBMS security features will be an important component that supports system security requirements.

The server-side architecture has been chosen to minimize cost and allow for as many deployment options as possible. The Apache HTTP Server, the Tomcat JEE Application Server and the MySQL Community Edition RDBMS server are all free, open-source products that are typically included in the cost of a basic Web hosting package at most Internet services providers (ISPs).

The choice of the Tomcat JEE Application Server and applications developed in Java deserves further explanation. While these are certainly professional-grade tools, they do not have extensive support at SOIS. This choice was made to meet a preference expressed by Kevin Trainor, the project sponsor. Kevin is highly experienced with this tool set and he is expecting to develop the system himself as a demonstration application to be used in his teaching. Further, the JEE security features available out of the box will go a long way toward meeting the security requirements identified in the Non-Functional Requirements section of the Systems Analysis document.