Lab 1 – GradMap Product Description

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CS411W, Spring 2026

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01/31/2026

Version 1

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1. Introduction

Selecting and arranging college courses each semester is a critical task for students, that it remains one of the most time-consuming and error-prone aspects of academic planning. Students must interpret complex degree requirements, keep track of prerequisite chains, fit classes into limited time slots, and balance academic responsibilities. Advisors, meanwhile, manage large caseloads of students often lack sufficient tools to efficiently review, correct, and approve schedules. These challenges can lead to delayed graduations, unnecessary stress, and inefficient use of advising resources. These are all issues that collectively impact student success at a grand scale.

2. GradMap Product Description

To address these needs, we introduce Grad Map, a web-based application that automates the creation of personalized, conflict-free class schedules for students. Grad Map consolidates degree planning, course availability, personal constraints, and advisor collaboration into a single platform. By generating optimized draft schedules that can be quickly reviewed and approved by advisors, Grad Map closes the gaps left by traditional tools and provides a modern, efficient approach to academic planning.

2.1 Key Product Features and Capabilities

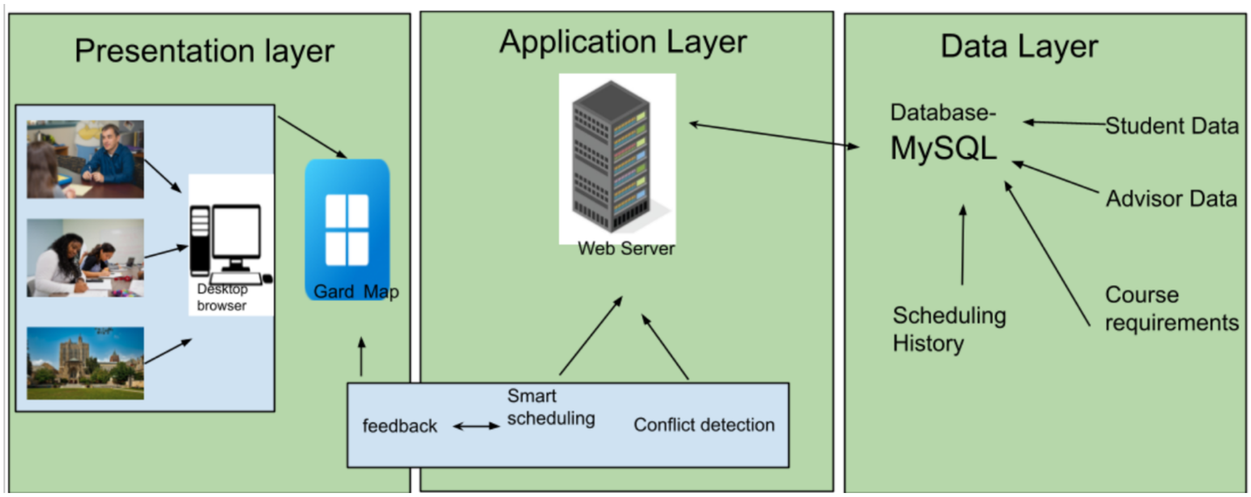
Despite the importance of course planning, existing tools fall short in addressing these challenges. Systems such as Degree Works allows students to view program requirements but do not automatically generate viable class schedules or consider personal constraints such as work hours or preferred class times (Kent, 2025). Registration platforms show available courses, but they do not help students determine which classes best fit their degree progress or how to avoid overlaps. Many students resort to manual trial-and-error methods, such as handwritten drafts which can further increase the likelihood of scheduling conflicts. Advisors spend valuable time correcting preventable mistakes rather than offering meaningful academic guidance. The lack of seamless coordination between degree auditing systems, course availability, and personal planning tools highlight a significant gap in our current solution arsenal. A scheduling solution should automatically integrate a student’s degree requirements, prerequisites pathways, personal preferences, and real-time course availability. It should reduce the cognitive burden of schedule creation while enhancing the efficiency of advisor-students collaboration. Ideally, such a system would create conflict-free schedules, provide alternative options when courses fill or are unavailable, and ensure that every semester keeps students aligned with timely graduation. By transforming a manual fragmented process into an intelligent and streamlined experience, the solution would not only support academic success but also make it easier for administrative pressure faced by advising departments

2.2 Major Components (Hardware/Software)

GradMap is designed with a modular, platform-independent architecture to ensure accessibility and reliability. At the system level, GrapMap operates as a web-based application, making it cross-platform. It can run on any operating system which includes Windows, macOS, and Linux. The web server layer may be implemented using Apache, Nginx, or Microsoft IIS allowing flexibility in deployment depending on institutional infrastructure or performance. Data persistence is handled through a MySQL database, which stores critical information such as the degree requirements, course schedules, and user data that will be given. This database-driven design enables efficient querying and scalability for the number of users or academic programs would grow. On its development side, GradMap will use Java as its server-side language, with development through a Java Integrated Development Environment (IDE) called Visual Studio Code. Version control is managed using Git, with GitHub serving as the central repository for collaboration, issue tracking, and code management. To support modern software engineering practices, GradMap incorporates Continuous Integration (CI) and Continuous Deployment (CD) through GitHub Actions and GitHub Workflows. These took will automate testing, building, and deployment that will allow new features and updates can be integrated efficiently. The major components diagram can be shown in Figure 1 as shown below.

Figure 1

Major Functional Components Diagram



3. Identification of Case Study

GradMap is identified as a web-based academic planning and visualization system that will assist in course selection for each semester. A case study would focus on the use of GradMap by a single academic institution with programs that have clearly defined degree requirements and advising structures. This would provide a realistic and controlled setting in which GradMap's functionality and impact on academic planning can be examined. By selecting a program with diverse course offerings with multiple pathways, this case study would capture common challenges that are faced by students, advisors and faculty in managing program requirements. This case study would also be over authentic workflows which will give you correct and significant data for this application. The study would show how these parts of the systems interact together and give what will be a good product for the university

4. Glossary

Academic institution: An organization that provides higher education programs and degrees

Academic pathways: Structured sequences of courses leading toward degree completion

Academic planning: The process of organizing coursework across semesters to satisfy degree requirements

Apache: an open-source web server used to deliver web content

Authentic workflows: Real-world user processes performed in operational academic settings

Continuous Deployment (CD): The automated release of software updates to a production environment

Continuous Integration (CI): The automated testing and integrated of code changes.

Cross-platform: The ability of software to operate on multiple operating systems such as Windows, macOS, and Linux

Database: A structured collection of data stored electronically

Git: A distributed version control system for tracking code changes

GitHub: A web-based platform for hosting Git repositories and supporting collaboration

GitHub Actions: Automation tools within GitHub used for CI/CD processes

GitHub Workflows: Configured automation pipelines defining CI/CD tasks

Integrated Development Environment (IDE): Software that provides tools for coding, testing, and debugging applications

Java: An object-oriented programming language

MySQL: An open-source relational database management system

Nginx: A high-performance web server and reverse proxy

Querying: The process of retrieving specific information from a database

Server-side Language: A programming language that executes on a server rather than a client device

Version control: The practice of tracking and managing changes to source code

Visual Studio Code (VS Code): A code editor used for software development

Web-based application: Software accessed through a web browser rather than installed locally

5. References

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