Lab 1: Descriptive Paper

Daniella Brandt

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Instructor: Sanober, Sumay

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1. Introduction

Over the years universities have faced an increase in challenges when it comes to helping students graduate on time due to outdated degree planning and course registration system, as well as student obligation and conflicting scheduling. There are many students that can experience delays in graduation because they cannot accurately track their degree progress or due to time conflict with other commitments and are unable to schedule the courses necessary for the degree requirement. advisors also spend a significant amount of time manually reviewing student schedules, create and degree plans, and proof of courses that students are registered for. Existence such as degree works do not always provide real-time schedule and data and automated conflict detection which can result in student often Mission required courses or misunderstanding course requirements and prerequisite sequences which leads to an extended graduation timeline and increased financial burden.

A solution to this problem must integrate life course data, degree requirements, and student preferences all into one singular platform. The system must be able to detect conflicts including overlapping class times and missing prerequisites. It should also be able to support both students and advisors and make it a clear and easy visualization of the degree progress while being optimal and scheduling based off of the users real life time constraints.

Grandmap is my team's proposed solution for these challenges. Gradmap is a web-based platform designed to integrate degree requirements, real-time course schedules, and automated conflict detection into a user-friendly system. Being able to provide students with personalized semester planning and giving advisors the ability to be more efficient. Gradmap's main goal is to reduce graduation delays for students, improve graduation rates for Universities, and provide an easier integrated system for advisors to help guide students.

2. Product Description

GradMap is a web based application meant for scheduling and degree planning to assist college students and academic advisors in creating conflict free course schedules. The system addresses common challenges such as overlapping class times, unmet prerequisites, and conflicts between academic and personal commitments that frequently delay graduation. The primary objective of GradMap is to streamline the scheduling process by integrating degree requirements, course availability, and student constraints into a single platform. By automating schedule generation while preserving advisor oversight, GradMap reduces manual workload, minimizes scheduling errors, and supports on time graduation.

2.1. Key Product Features and Capabilities

GradMap automatically generates personalized course schedules using a student's degree requirements, academic history, availability, and personal constraints. The system provides real time conflict detection to identify overlapping class times, prerequisite or corequisite violations, and credit overloads prior to schedule approval. Additionally, GradMap offers recommendations to help students meet their requirements each semester. Advisor collaboration is supported through a review workflow that allows advisors to approve, reject, or request modifications to proposed schedules.

2.2. Major Components (Hardware/Software)

GradMap is implemented as a cross platform web application accessible through standard devices; laptops, desktops, and tablets with internet access. No specialized hardware is required. The software architecture consists of a web server, backend application logic, and a relational database. Backend components, implemented using Java, manage schedule generation, conflict

detection, and degree requirement validation. A MySQL database stores user information, degree requirements, course data, and generated schedules. This modular architecture supports system scalability, maintainability, and future integration with institutional systems.

3. Identification of Case Study

GradMap is being developed for college students and academic advisors who experience difficulties with course scheduling and degree progression. The primary case study group consists of undergraduate students and advisors of computer science major at Old Dominion University, who will sample the prototype. In the future, GradMap may also help college and university students and advisors all over the country by enabling academic planning and monitoring of graduation outcomes.

5. Glossary

Automated Smart Scheduling

A scheduling process where the system automatically builds personalized class plans based on each student's degree requirements, course availability, and preferences.

Conflict Detection

The system's ability to identify and alert users about scheduling overlaps or degree-requirement conflicts.

Conflict-Free Scheduling

A process that ensures no overlapping classes or time conflicts occur within a student's schedule.

Constraint Blocks

Reserved time periods (for work, personal, or other obligations) when classes cannot be scheduled.

Continuous Integration and Continuous Deployment (CI/CD)

Automated workflows that build, test, and deploy GradMap updates using GitHub Actions.

Database (MySQL)

Stores user data, course information, degree requirements, and scheduling records.

Degree Requirements

The specific set of courses and academic conditions a student must complete to earn a degree.

Graphical User Interface (GUI)

The visual component of GradMap that users interact with — menus, buttons, and forms.

Integrated Development Environment (IDE)

A software tool — Visual Studio Code — used by developers to write and test GradMap's code.

Load-Balancing Recommendations

A GradMap feature that suggests optimal course combinations to balance workloads and prevent burnout.

Server-Side Language (Java)

The programming language used on the back end of GradMap to handle data processing and logic.

Streamlined Workflow

A simplified, guided scheduling process that helps users navigate course planning efficiently.

Version Control (Git / GitHub)

Tracks and manages changes in GradMap's codebase, allowing collaboration among developers.

Web Server (Apache, Nginx, or IIS)

Hosts and delivers the GradMap web application to users' browsers.

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