



Department of Electrical Engineering & Computing Sciences

Academic Year	2025-2026				
Semester	<input checked="" type="radio"/> Fall	<input type="radio"/> Spring	<input type="radio"/> Summer		
Course Code - Name	ISTE-500.600 Senior Development Project I				
Instructor					
Exam	<input type="radio"/> Quiz/Test	<input type="radio"/> Assignment	<input type="radio"/> Mid	<input type="radio"/> Final	<input checked="" type="radio"/> Other
	Deliverable1 Report				
Start Date	Mon., Sep 1, 2025				
Duration	5 weeks/ Due Mon. Oct 6, 2025				

- Write and submit deliverable1 report based on report template guidelines and your mentors, instructor's guidance
- The report should include all sections mentioned in syllabus for deliverable1

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CLOs:

1. Apply requirements elicitation methods in an extra-classroom environment.
2. Architect an effective, user-centric solution.
3. Apply contemporary software development practices.
4. Create and document a proper project plan.

If the assessment maps to a single CLO, state the CLO below:

CLO	Max Score	Students Average Score
CLO1	10	

# **CourseGenie+: Centralized Academic Workflow Automation**

by

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A Capstone Project Submitted to RIT-Dubai

October 2025

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## ABSTRACT

Learning management systems are an essential component of higher education institutions. Existing platforms often prioritize student services and tend to underrepresent requirements from instructors and administrators. We present CourseGenie+, a web-based application with customized dashboards that streamlines faculty workflows by automating manual and time-consuming tasks. The system integrates syllabus and assessment management, grading statistics, course peer-reviewing, exam scheduling, room distributions, and reporting tools for course and program evaluation. CourseGenie+ also allows administrators to track syllabus submissions, collect Course Assessment Reports, configure course sections and manage faculty workflow. Integration of CourseGenie+ establishes it as a centralized academic workflow automation tool that bridges the gap between teaching, administration, and accreditation, enabling faculty to focus more on teaching while ensuring administrators meet compliance and quality standards.

### **Keywords**

Learning Management Systems, Workflow Automation, Academic Administration, Dashboards, Course Assessment Reports, Course Learning Outcomes, Program Learning Outcomes.

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## I. Introduction

Learning Management Systems (LMSs) have become essential tools in higher education systems, providing digital support for teaching, learning, and administration. At RIT, the LMS used is MyCourses by Brightspace. MyCourses supports students through their learning journey, by providing features such as assignment submission, content delivery, grade viewing and attendance tracking. These features are also provided for instructors, however, they are considered limited compared to the required teaching workflows.

To fill in these gaps, faculty often tend to rely on external solutions such as spreadsheets, email, online review forms and text reports. These methods not only require extra manual work, but are time consuming and prone to errors, inconsistencies and difficulties in meeting accreditation and academic requirements.

CourseGenie, a previous capstone project, demonstrated the potential of extending the LMS functionality with a narrowed focus on professor-centered tools as assessment management, syllabus generation and grading statistics. However, the system still lacks many advanced features and several unresolved issues.

CourseGenie+ introduces dedicated dashboards for both instructors and administrators. These dashboards will centralize the academic workflow and automate key academic tasks including, but not limited to, Course Assessment Report (CAR) file generation, course calendar generation, rubric creation, exam management, etc. By creating role-specific dashboards, CourseGenie+ aims to increase efficiency, reduce manual work, prevent errors and provide an enhanced visibility to course and program level performance.

## II. Problem Statement

Within higher education institutions, there is growing pressure on faculty members and educational administrators to carry out an ever-expanding number of repetitive, time-consuming academic management activities. These include drafting and collecting syllabi, preparing assessment rubrics, compiling CAR files, mapping Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs), and managing examination logistics such as scheduling and room allocation. Additional requirements, such as peer-review documentation, further add to the administrative responsibilities.

Currently, most of these activities are completed manually through emails, spreadsheets, and limited LMS tools. This fragmented approach results in inefficiencies, delays, and a lack of centralized oversight. For administrators, the absence of automated systems to track progress or alert relevant personnel often leads to missed deadlines, delayed course reviews, and difficulties in ensuring compliance with accreditation standards.

The core problem lies in the lack of centralized, automated tools to support professor and administrator workflows in existing LMS platforms, particularly MyCourses. Without such tools, inefficiencies persist, compliance becomes difficult, and academic staff are unable to fully focus on teaching and institutional quality improvement.

### III. Norms and Values

The team has established clear norms and values to be adapted by the team to ensure consistent quality, accountability, and collaboration throughout the project.

#### *A. Work and Quality*

All deliverables are expected to be completed, clean, and professional, reflecting both qualitative and quantitative effort. The team places emphasis on meaningful progress and constructive feedback, ensuring that all work contributes to the overall success of the project.

#### *B. Collaboration and Participation*

Tasks are assigned by skills, but all members are responsible for understanding all aspects of the project. This guarantees that during assessments and presentations, every member can answer questions and contribute fully. Open discussions in weekly meetings and ongoing communication through group chats provide space for all members to share ideas, raise issues, and propose solutions.

#### *C. Accountability*

Punctual attendance at team meetings is required, with any exceptions communicated in advance. Each member is responsible for meeting deadlines and delivering high-quality work. Team members are expected to take ownership of tasks, demonstrate initiative, and commit fully to the project, going beyond minimum requirements where necessary.

## IV. Literature Review

### *A. Introduction*

Learning Management Systems play a critical role in the higher education learning systems affecting all aspects of teaching, learning and administration. Several systems have been implemented and have reached a universal level. However, the literature shows that these systems vary significantly in terms of usability, reporting capabilities and support for different stakeholders. This review explores five major themes that have been identified across recent studies: core features and comparisons, common gaps and limitations in current LMSs, system visualization and analytics, assessment and accreditation requirements, and peer review in academic systems. These themes highlight the strengths and limitations of existing learning management systems which will aid in the process of delivering CourseGenie+.

### *B. Features and Comparisons*

One of the most recurrent conclusions in the literature is that learning management systems offer a “core toolkit” of features. Sánchez et al. [1] conducted a comparative study of 45 LMSs based on six categories: interoperability, accessibility, productivity tools, communication tools, learning tools, and security. They found that almost all systems included common functions such as assignment submissions, content repositories, announcements, and gradebooks. These are considered essential for course delivery and serve as the foundation of current LMSs. However, the authors also showed that systems differed significantly in adaptability and usability. For example, Moodle and Paradiso were rated as the strongest overall, as they offered greater adaptability and smoother integration of tools across categories. Brightspace, on the other hand, scored only average, providing the core toolkit but with less flexibility and limited support for

broader institutional workflows. The authors concluded that effectiveness depends not only on features themselves, but also on how well tools align with institutional needs and instructor workflows.

Another common theme is the trade-off between administrative strength and usability. Yamani, Alharthi, and Smirani [2] compared Brightspace and Blackboard with surveys of over 500 students. They found that Brightspace was preferred for its clean, user-friendly interface, while Blackboard was rated higher for its reporting and administrative capabilities. This variation reflected differences in design priorities: Blackboard emphasized administration and refined reporting, while Brightspace prioritized student accessibility and ease of use. At RIT Dubai, where MyCourses is based on Brightspace, this trade-off means students benefit from simplicity, but instructors and administrators face limitations in reporting and course management. CourseGenie+ aims to fill this gap by maintaining usability while introducing professor- and administrator-oriented tools such as CAR file generation, rubric creation, and exam scheduling.

These studies collectively show that while contemporary LMSs meet a baseline of shared features, they tend to prioritize students over faculty. This leaves instructors without sufficient tools for accreditation-related tasks or advanced analytics. For CourseGenie+, this evidence highlights the value of extending MyCourses by building on the core toolkit with enhanced visualization, reporting, and accreditation tools.

### *C. Gaps and Limitations in LMSs*

While LMSs are effective at delivering core teaching tools, multiple studies highlight persistent gaps in how they serve instructors and administrators. These gaps arise not only from missing features but also from the limited adoption and usability of tools that already exist.

Simon et al. [3], in a mixed-methods study with 41 instructors and 41 students, found that Moodle was primarily used as a repository for slides and announcements. Instructors avoided its collaboration features, preferring email or WhatsApp, while students reported built-in tools were confusing and time-consuming. The authors concluded that tool utilization depends more on alignment with teaching practices than on availability.

Li, Jung, and Wise [4] studied instructor engagement with learning analytics dashboards and found two patterns: some teachers attempted to adapt their teaching, while others only monitored performance. Yet, in both cases, dashboards were difficult to interpret, and instructors lacked institutional support to use the data effectively. The authors argued that dashboards often fail when they present complex data without actionable context.

Together, these studies show that LMSs often provide advanced features that are underutilized or ineffective in practice. Instructors rely on external tools for communication and spend extra time manually interpreting abstract data. For CourseGenie+, these insights reinforce the need to avoid duplicating replaceable features (e.g., chat forums) and instead focus on automating essential workflows such as CLO–PLO mapping, syllabus tracking, and CAR reporting. Its contextualized grade visualization and statistics aim to reduce manual effort while directly supporting instructor decision-making.

#### *D. Visualization and Analytics in LMSs*

The use of visualization and analytics in Learning Management Systems has grown to be essential for improving efficiency and vital decision-making. Hernández-de-Menéndez et al. [5] explained that learning analytics allows educators to gather, process, and interpret large amounts of data to better evaluate performance, boost student engagement, and refine teaching strategies.

Their research highlights that well-designed visualization dashboards can turn complex datasets into clear, actionable insights. These tools help instructors and administrators recognize trends, monitor progress, and make more informed decisions. This idea directly connects to the goals of CourseGenie+, which plans to include interactive dashboards that display grading trends, assessment completion, and course review updates for both professors and administrators.

Ngulube and Ncube [6] further emphasize that analytics should not only measure academic performance but also enhance the overall user experience (UX) of LMS platforms. Their review found that features such as progress charts, heatmaps, and interactive dashboards greatly improve engagement and usability, especially for instructors. When analytics are integrated in intuitive and concise ways, they argue that they help reduce mental effort and ease users in finding helpful insights quickly. In the same way, CourseGenie+ uses visual analytics within its professor and admin dashboards to simplify everyday tasks, such as monitoring syllabus submissions, tracking CAR file progress, and analyzing assessments.

Kui et al. [7] conducted a comprehensive survey of visual analytics techniques that are used in online education. They concluded that visual analytics bridge untapped educational data with actionable decision-making. The authors describe different visualization models, like temporal, comparative, and hierarchical, that enable educators to monitor student progress, recognize struggling learners, and analyze learning outcomes. They state that visual analytics encapsulates the intersection of untapped educational data and actionable data-driven decisions. Following the same logic, CourseGenie+ incorporates similar analytics to not only generate student performance visualization but also attend to institutional needs such as CLO–PLO mapping and monitoring course performance trends. These are the studies reinforcing the value

that analytics and visualization bring toward enhancing the quality of teaching and streamlining the administrative functions of an institution. Still, the majority of legacy LMS systems continue to prioritize the student-facing analytics while the faculty workflow components, like assessment documentation and peer-review tracking, remain underappreciated. Learning analytics in CourseGenie+ expands on this paradigm by offering comprehensive tools to document transparent, goal-directed, and collaborative efforts to bridge faculty and administrators.

#### *E. Assessment and Accreditation Needs*

Assessment and accreditation are central to quality assurance in higher education, ensuring that academic programs meet established educational standards. Vlachopoulos et al. [8] conducted a systematic review on “genuine assessment” and emphasized the importance of evaluation methods that reflect real-world outcomes and generate evidence-based data for accreditation. Their evaluation covers over a decade of research and shows the need and value of digital assessment systems in providing accurate, evidence-based data to accrediting authorities. This is consistent with CourseGenie+, which aims to improve consistency and transparency in the reports by automating CAR files and linking CLOs with PLOs. The same review pointed out that traditional assessment and reporting methods are often slow, inconsistent, and error-prone, creating major challenges during accreditation audits. They call for integrated digital systems that can centralize evidence, automate report generation, and simplify faculty participation within outcome-based education (OBE) frameworks. CourseGenie+ answers this need by offering a unified platform that streamlines rubric creation, CLO–PLO mapping, and CAR file submission. Automating these processes reduces administrative effort while maintaining the precision and accountability necessary for accreditation. The review further emphasizes that authentic assessment should go beyond checking boxes for compliance, and it should encourage continuous improvement and

reflective teaching. This necessitates systems that capture data over extended periods and associate assessment data with changes in the curriculum [8].

To summarize, while the literature demonstrates how technology has transformed assessment and accreditation, it also points to the absence of integrated solutions that consolidate all these disparate elements. CourseGenie+ addresses these issues by having a comprehensive and data-empowered solution that leverages valuable assessment, continuous improvement, and accreditation readiness to ensure the establishment is always prepared.

#### *F. Peer Review in Academic Systems*

A study done by Jenkins et al. [9] identified how a structured faculty peer-review process can enhance teaching quality and institutional culture. The study was conducted at Johns Hopkins School of Nursing, where they used the Design for Six Sigma (DMADV) framework: Define, Measure, Analyze, Design, Verify. The paper focused on the first three stages by conducting methods like surveys (Define), literature benchmarking (Measure), and taskforce discussions (Analyze), which helped to identify best practices in peer review of teaching [9]. These principles can guide the implementation of a digital peer review feature, where structured workflows, automated report generation, and survey integration ensure the process is systematic and transparent.

In the define phase, the Faculty Peer Review of Teaching Taskforce was created, composed of 11 members across different academic ranks and disciplines. Through earlier literature research, the group identified four key themes: (1) peer observation is useful but needs a supportive environment, (2) success requires clear goals, consistent tools, and trained reviewers, (3) post-observation discussions are essential, and (4) faculty ownership increases adoption. Benchmarking

across eight peer institutions revealed substantial variations, with some having formal models and others using peer review informally. This highlights the lack of a standardized model across higher education. CourseGenie+ could use these findings by embedding standardized peer review templates and structured discussion fields into its professor dashboard, improving consistency and collaboration.

To understand faculty opinions, the researchers conducted a Qualtrics survey on “qualities of good teaching” and “peer review procedures.” Out of 68 full-time faculty, 27 responded ( $\approx 40\%$ ), strongly supporting ideas like active learning, student–faculty interaction, prompt feedback, and inclusiveness in teaching. These findings aligned with Chickering and Gamson’s (1987) seven principles of good practice. While most faculty agreed with the teaching-quality indicators, weaker areas were related to online teaching and time management, showing that digital or hybrid instruction needs more institutional support. In CourseGenie+, similar surveys can be built directly into the system to collect feedback, with results visualized and linked to peer review reports to create a continuous improvement loop.

Most faculty also supported a formative and recurring peer review approach rather than a one-time evaluation. About 81% saw reviews as developmental, 93% preferred reviewers with several years of teaching experience, and all agreed that new faculty should receive a review within two years. Many suggested repeating reviews every 3–5 years and coordinating them through the Office of Teaching and Learning. This shows that faculty prefer a system focused on mentorship, reflection, and collaboration instead of ranking. The CourseGenie+ platform can apply this by automatically scheduling review cycles, sending alerts, and keeping data confidential, ensuring the process is efficient and consistent.

The main limitation of the study is that it was conducted at one institution with only full-time faculty, excluding adjunct and part-time instructors whose roles often differ. Despite this, the research provides a strong foundation for building peer review systems in higher education. For CourseGenie+, this means developing flexible tools that support all types of faculties and can be scaled across diverse academic contexts.

#### *G. Conclusion*

In conclusion, from the literature work, we noticed a recurring pattern that most LMS platforms provide a common set of features, such as gradebooks, submissions, and content repositories. However, they tend to fail to meet instructor and administrative needs. Comparative studies emphasized usability trade-offs, with systems like Brightspace favoring student experience but limiting advanced reporting and administrative workflows. Other studies showed that even when analytics and collaboration tools are present, they are often underutilized due to complexity or lack of alignment with educational needs. Together, these results highlight major weaknesses in the current LMS architecture and highlight the need for solutions that go beyond features that directly affect students to facilitate faculty collaboration, accreditation, and administrative management.

## V. Requirements Elicitation Methods

### *A. Brainstorming*

The team conducted brainstorming sessions in the initial weekly meetings alongside the project mentors. These discussions helped gather project requirements from the mentors. In addition, the brainstorming sessions also allowed the team members to collaborate with mentors in the process of identifying new features for the project.

### *B. Observations*

The team closely inspected the existing CourseGenie Phase 1 system to identify implemented features, gaps, and usability issues. Observing how some features were implemented revealed some bugs and limitations based on the requirements. In addition, the team reviewed the university's current LMS platform, MyCourses, from a faculty perspective to better understand the limitations and benchmark potential features for the project.

### *C. Interviews*

*1) Interviews with Professors:* Weekly meetings with project mentors Dr. Ali Assi and Mr. Qusai Hassan served as informal interviews for the requirement gathering stage. In these sessions, the mentors introduced the limitations of the current system being used, MyCourses, and the academic processes outside the lecture halls. They also provided suggestions on what enhancements and functionalities they expect in their roles as Professors at RIT Dubai.

*2) Interview with Institutional Effectiveness Manager:* To capture the administrative perspective, the team interviewed Ms. Dezzil Castelino, Institutional Effectiveness Manager at RIT Dubai. As a potential administrative user role in the proposed system, she highlighted the need for features such as an admin dashboard, syllabus submission tracking, CAR files collection and

initiation of peer-review processes. This ensured that the system requirements addressed not only professor needs but also administrative oversight.

## VI. Initial Scope and Expected Obstacles

### *A. Project Scope*

*1. Included Scope:* The initial scope of CourseGenie+ focuses on extending existing LMS functionalities with features specifically targeted toward professors and administrators. For professors, the scope includes tools such as assessment management, syllabus generation, grade visualization and statistics, CLO management, CAR file generation, CLO–PLO mapping, rubric creation, course review reports, and exam-related management (room allocation, schedules, notifications). Additionally, CourseGenie+ will provide a customizable course calendar with drag-and-drop functionality and professor profile management.

For administrators, the scope includes a dedicated dashboard to configure courses and sections, monitor syllabus submission, collect CAR files, and initiate peer-review processes. These features will ensure that CourseGenie+ serves as a centralized and streamlined platform for academic management while complementing existing student-oriented systems like MyCourses.

*2. Excluded Scope:* To avoid duplication of functionality already well-served by MyCourses, CourseGenie+ will not include student dashboard features such as assignment submissions, gradebooks, attendance and course content view.

## *B. Expected Obstacles and Risks*

The project may face the following risks:

- Technical Knowledge Gaps: Team members have no prior experience with Spring Boot, which is the backend framework used for the project. The learning process may slow down early progress. Similarly, some team members are new to Angular, the frontend framework being used.
- Time Constraints: As a capstone project, CourseGenie+ must be developed within a span of two semesters. Balancing project work with other academic responsibilities presents a challenge to the team.
- Integration Restrictions: A critical constraint is that the team cannot directly integrate CourseGenie+ with MyCourses or even access the required data needed, as there are no permissions from RIT's main campus in Rochester.

## VII. Development Methodology and Process

This project is managed using the Agile Scrum methodology, which provides a flexible and collaborative framework to ensure the timely delivery of a useful product. Agile is particularly effective in team projects where requirements evolve and continuous contributions are needed from members with diverse skills.

## *A. Flexibility*

Agile offers the flexibility needed for a team working together for the first time. As members become familiar with one another's strengths, roles can be adjusted dynamically. This adaptability ensures that efforts are focused on producing high-quality results rather than on rigid reporting structures.

### *B. Iterative Improvement with Focus on Value*

The system includes a wide range of features such as CAR file generation, CLO–PLO mapping, syllabus tracking, exam management, and collaboration tools. Agile Scrum supports development by delivering these features in increments, with each sprint focusing on the most important functionality. This approach prevents stagnation, allows for continuous refinement, and ensures steady progress toward a high-quality final product.

### *C. Stakeholder Engagement*

A central strength of Scrum is its emphasis on stakeholder feedback. The team holds regular meetings with the mentor, co-mentor, and institutional effectiveness representative to validate progress and gather input. This ensures that the evolving system remains relevant to professors and administrators and supports their actual workflows.

## VIII. Stakeholders

Our project involves multiple stakeholders with different priorities and interests. These stakeholders can be classified into primary, secondary and external groups based on their level of involvement and interaction with the system.

### *A. Primary*

*1) Professors:* They are the main users of the system. Professors use the dashboards to create and manage assessments, generate syllabi, visualize grades, and produce CAR files.

*2) Administrators:* Represented by the Institutional Effectiveness Manager and related staff, administrators use the system to configure courses, track syllabus submission, collect CAR files, and manage the peer-review process.

## *B. External*

*1) Accreditation Bodies:* Organizations such as the KHDA, set the standards for curriculum alignment and reporting. While they do not interact with the system directly, their requirements influence features such as CLO–PLO mapping, CAR reports, and syllabus submission tracking.

## IX. Project Requirements

### *A. Functional Requirements*

- The system must allow professors to generate and manage assessments with weights and descriptions.
- The system must allow professors to edit syllabi content and regenerate the file.
- The system must display student grades with visualization and summary statistics.
- The system must generate CAR files including CLO–PLO mapping and performance metrics.
- The system must provide professor profiles that can be edited (office hours, office location, email).
- The system must support cross-course collaboration by displaying professors teaching the same course and enabling communication.
- The system must support exam management by distributing students into rooms, generating reports, and sending notifications with exam date, time, and room details.
- The system must generate a course calendar automatically from assessments and allow drag-and-drop updates.
- The system must automate the process of generating assessment rubrics.

- The system must allow professors to create course review reports for remarks, suggestions, and peer review
- The system must allow admins to configure which courses professors can view.
- The system must track syllabus submission progress and display completion status.
- The system must provide a centralized collection of CAR files.
- The system must allow admins to initiate the peer-review process, assign reviewers, and set deadlines.

#### *B. Non-Functional Requirements*

- Given that multiple professors access the system simultaneously, the system must handle the load without crashing or significant performance degradation.
- Given that a professor or admin performs an action, when the action is being executed, then the system must respond within 2 seconds.
- Given that professors and admins may access the system across different devices, when the system is used on desktops, tablets, or mobiles, it must remain accessible and usable.
- Given that academic data is sensitive, when users log in or perform actions, the system must ensure session management and security to protect confidentiality.
- Given that the system is operational, when users attempt to access it at any time, it must maintain an uptime of 99.9% except during scheduled maintenance.

## X. Initial Milestones and Roles

### A. Milestones

Initial milestones have been structured to ensure incremental progress, timely delivery and alignment with Agile Scrum principles through the development of CourseGenie+. Each milestone builds on the previous one, each including functionality validation, testing and mentors/stakeholders' feedback.

Milestone	Description of Work	Expected Deliverables	Weeks
System Review and Requirement Gathering	Review the existing CourseGenie+ system, identify bugs and gaps, meet with mentors, and analyze similar platforms. Conduct a literature review and finalize project objectives.	Requirements document, literature review, updated backlog	1–6
Assessment and Syllabus Features	Begin implementation of core professor tools, including assessment management, syllabus generation, and grade visualization with color-coded analytics.	Functional assessment and syllabus modules	7–9

Automation and CLO–PLO Mapping	Develop automation tools for CAR files generation and CLO–PLO mapping, ensuring proper data integration and backend validation.	Working CAR and CLO–PLO mapping modules	10–12
Admin Dashboard Development	Create an admin dashboard with syllabus submission tracking, CAR file collection, and configuration controls for course and section management.	Functional admin dashboard	13–15
Exam and Collaboration Features	Implement exam room scheduling, student distribution, and automated email notifications. Add professor collaboration and communication functions.	Functional exam management and collaboration modules	16–19
Analytics and Visualization Dashboards	Integrate grade analytics and course performance dashboards for professors and administrators using charts and summary statistics.	Analytics dashboards (professor and admin views)	20–23
Final Documentation and Presentation	Finalize project report and documentation and prepare for a presentation demo.	Final report and presentation slides.	24–26

Table 1: Project Milestones

## B. Roles

To achieve the defined milestones, roles have been distributed among the team to manage code and project management tasks. Each member has both a development responsibility and a Scrum role. While each member has a defined role, the team will be working together on shared components and will provide support when challenges arise. All members are expected to have a full understanding of the full system and are responsible for the final product.

Member	Role	Responsibilities
Jeeda Kotob	Full-Stack Developer	<ul style="list-style-type: none"><li>○ Develop and integrate backend and frontend features.</li><li>○ Manage project database and ensure reliable data handling.</li></ul>
Ryma Ait Tayeb	Backend Developer	<ul style="list-style-type: none"><li>○ Implement backend features and application logic.</li><li>○ Maintain APIs and support integration with database.</li></ul>
Ibraheem Mustafa	Frontend Developer	<ul style="list-style-type: none"><li>○ Implement frontend features and user interface components.</li><li>○ Ensure smooth integration with backend services.</li></ul>

Table 2: Project Roles

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