MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY ALLAHABAD
Prayagraj, UP-211004

FINAL PROJECT REPORT

ON

QUIZ QUEST

A quiz application to tune into knowledge

Submitted By:

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CERTIFICATE

This is to certify that the project titled **QUIZ QUEST** has been developed by **Aman Kumar Tripathi, Yash Pal Singh, Yugam Saini,** under my supervision in partial fulfillment for the award of degree in **Master of Computer Applications** (MCA) for the session 2022-25.

Team Members :		**Project Guide**
Aman Kumar Tripathi	2022CA010	Dr. Ranvijay
Yash Pal Singh	2022CA112	
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UNDERTAKING

The work presented in our Project titled **QUIZ QUEST**, submitted to Computer Science and Engineering Department, Motilal Nehru National Institute of Technology, Allahabad, Prayagraj for the award of **Master of Computer Applications**, is our original work. We have neither plagiarized nor submitted the same work for the award of any other degree. In case this undertaking is found incorrect, we accept that our degree maybe withdrawn.

Team Members :

Aman Kumar Tripathi	2022CA010
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ACKNOWLEDGEMENT

We are profoundly grateful to **Dr.Ranvijay** for his expert guidance and continuous encouragement throughout to see that this project rights its target since its commencement to its completion.

Since the inception of the idea of, by our mentor, we are grateful to him for providing us with the necessary information regarding this project and giving us the free will to mold and build it as we like. We would be really fortunate if we are guided by him in our future.

I have always considered project development a challenging task that requires lot of concentration, hard work, and understanding several concepts related to project. I have learnt various new concepts, programming styles and above all I gain wonderful experience of project development and presentation.

At last, we must express our sincere heartfelt gratitude to all the staff members of Computer Engineering Department who helped us directly or indirectly during this course of work.

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ABSTRACT

The **Quiz Quest** web app, tailored for college use, revolutionizes the learning and assessment process with its innovative features and user-friendly interface. With separate login and registration options for students and faculty, the webapp ensures secure access and personalized experiences for all users.

Faculty members have the unique ability to create and manage groups, enabling students to join specific groups based on their academic needs or interests. Within these groups, faculty can design quizzes with set start and end times, ensuring that students can only begin the quiz after the designated start time and must complete it before the end time. This feature promotes fairness and academic integrity.

To uphold the integrity of the quiz-taking process, students are unable to copy quiz questions or switch tabs during the quiz. This ensures a focused and honest assessment environment, providing accurate evaluations of students' knowledge and skills.

One of it's standout features is its real-time leaderboard, visible to both faculty and students. This feature offers immediate feedback on performance, motivating students to excel and allowing faculty to assess the effectiveness of their teaching methods.

Additionally, the webapp allows for the download of quiz results in Excel format, simplifying the grading process for faculty. This functionality enables educators to analyze student performance comprehensively and identify areas for improvement.

In conclusion, **Quiz Quest** is a comprehensive and efficient tool that enhances engagement, integrity, and efficiency in college-level education. Its intuitive design and advanced features make it an invaluable asset for both faculty and students in the academic community.

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1. INTRODUCTION

In this report, we'll explore Quiz Quest, our college quiz app. Quiz Quest aims to enhance education by simplifying quiz creation and management. Similar to restaurant automation systems reducing costs, Quiz Quest optimizes quizzes, promoting engagement and integrity. Through features like student/faculty login, group creation, and real-time leaderboards, Quiz Quest transforms quiz processes for better learning.

1.1. Background

The idea for Quiz Quest stemmed from the need for a more efficient and engaging way to conduct quizzes in educational institutions. Traditional quiz methods often involve manual processes for creating, distributing, and grading quizzes, which can be time-consuming and prone to errors. Moreover, with the increasing adoption of online learning platforms, there was a growing demand for a digital solution that could streamline the quiz-taking process for both students and faculty.

To address these challenges, Quiz Quest was conceptualized as a web application that would simplify quiz creation and management while enhancing the overall learning experience. The app was designed to be user-friendly and accessible, allowing faculty to create quizzes, manage groups, and track student performance with ease. For students, Quiz Quest offered a seamless quiz-taking experience, with features like real-time leaderboards and result downloads to enhance engagement and motivation.

By leveraging technology to automate and optimize the quiz process, Quiz Quest aimed to improve the efficiency and effectiveness of quizzes in educational settings. Through its innovative features and user-centric design, Quiz Quest sought to revolutionize the way quizzes are conducted, making learning more interactive, engaging, and enjoyable for students and faculty alike.

1.2. Motivation

The motivation behind developing Quiz Quest was to transform the traditional quiz-taking experience into a more interactive and engaging process. We aimed to create a platform that not only simplifies quiz creation and management but also motivates students to actively participate in quizzes and take ownership of their learning.

Traditional quizzes often lack engagement and can be seen as a mundane task by students. By introducing features like real-time leaderboards, we aimed to gamify the quiz-taking process, making it more competitive and encouraging students to perform to the best of their abilities. The ability for faculty to create groups and track student performance further enhances this sense of competition and motivation.

Additionally, the download feature for quiz results in Excel format was intended to provide immediate feedback to students, allowing them to track their progress and identify areas for improvement. This feedback loop not only motivates students to strive for better results but also helps faculty to identify students who may need additional support.

Overall, the motivation behind Quiz Quest was to create a platform that not only simplifies quiz management but also enhances the overall learning experience by making quizzes more interactive, engaging, and rewarding for students and faculty alike.

1.3. Objectives

1. Develop Quiz Quest, a user-friendly web application, for creating and managing quizzes in educational institutions.
2. Enable faculty to create groups and schedule quizzes, ensuring fair access and efficient management.
3. Implement student and faculty login/register functionality to ensure secure access to the platform.
4. Provide real-time leaderboards to motivate students and offer immediate feedback on their performance.
5. Enable result downloads in Excel format for faculty and students, facilitating easy analysis and record-keeping.
6. Implement features to prevent cheating, such as restricting tab switching during quizzes.
7. Ensure cross-device compatibility and optimize the platform for a seamless user experience.
8. Continuously update and enhance Quiz Quest based on user feedback and emerging technologies.

1.4. Problem statement

Traditional quiz methods in education are inefficient. Manual quiz processes are time-consuming and error-prone, leading to suboptimal learning experiences. Online learning has increased the need for digital solutions to streamline quiz processes and enhance engagement. Existing platforms often lack features that promote active participation and motivation among students. There is a need for a comprehensive quiz management system that simplifies quiz creation and management for faculty while providing an engaging quiz-taking experience for students. Quiz Quest aims to address these challenges by offering a user-friendly platform with features like real-time leaderboards, group management, and result downloads.

1.5. Scope of Project

The scope of Quiz Quest encompasses the development and implementation of a comprehensive quiz management system for educational institutions. The project includes the following key components:

- **User Authentication:** Implementing a secure and user-friendly login/register system for students and faculty to access the platform.
- **Group Creation and Management:** Allowing faculty to create groups and enabling students to join specific groups based on their courses or interests.
- **Quiz Creation and Scheduling:** Providing faculty with the ability to create quizzes, set start and end times, and schedule quizzes for specific groups.
- **Quiz Taking:** Allowing students to take quizzes within the specified time frame, with features to prevent cheating and ensure academic integrity.
- **Real-Time Leaderboards:** Implementing a real-time leaderboard system to motivate students and provide immediate feedback on their performance.
- **Result Management:** Allowing faculty and students to download quiz results in Excel format for easy analysis and record-keeping.
- **Integration:** Designing the system to integrate with other systems, such as payment gateways, kitchen display systems, and loyalty programs, to enhance functionality and user experience.

- **Scalability:** Ensuring that the system is scalable to accommodate growth in the number of users and quiz activities.
- **Usability:** Designing an intuitive and user-friendly interface that is easy to use for both students and faculty.
- **Security:** Implementing measures to protect user data and ensure the integrity of quiz activities.

Overall, the scope of Quiz Quest is to create a robust and efficient quiz management system that enhances the learning experience for students and faculty in educational institutions.

2. REQUIREMENT ANALYSIS & SPECIFICATION

This section of the project report is the most critical element as, it provides a foundation for the entire project. It ensures that all stakeholders are aligned on the project's objectives, scope, and deliverables, and it provides a clear road map for the project team to follow.
This section is further divided into 3 sister sections:

- Feasibility Study
- Model Selection
- SRS

2.1. Feasibility Study

A feasibility study is the first stepping stone into the development of any project, including our online quiz portal : Quiz Quest. It involves assessing the potential for the project to be successful, which in turn includes evaluating the market, technology, and operational requirements.

2.1.1. Market Analysis

The market analysis for Quiz Quest involves evaluating the demand for quiz management systems in educational institutions. This includes identifying potential customers (universities, colleges, schools), understanding their needs and preferences, and analyzing the competition (existing quiz platforms). The market analysis helps determine the potential market size, market trends, and growth opportunities for Quiz Quest.

2.1.2. Technology Assessment

The technology assessment for Quiz Quest involves evaluating the technologies required to develop and operate the system. This includes assessing the feasibility of using technologies such as Node.js for server-side scripting, React.js for the frontend, and databases like MongoDB or MySQL for data storage. The technology assessment also involves evaluating the scalability, security, and performance of the chosen technologies to ensure they meet the requirements of Quiz Quest.

2.1.3. Operational Requirements

The operational requirements for Quiz Quest involve identifying the resources and processes required to operate the system. This includes determining the staffing requirements (developers, administrators), infrastructure requirements (servers, databases), and operational processes (quiz creation, user management, result tracking). The operational requirements help ensure that Quiz Quest can be effectively managed and maintained over time.

2.2. Selection of Process Model

The software life cycle process model is a framework that outlines the various stages involved in the development of a software application. So, choosing a life cycle process model is the stepping stone into the development of a software product.

2.2.1. Process Models

The choice of software development process model is crucial. While the waterfall model offers a structured approach suitable for well-defined requirements, agile methodologies like Scrum or Kanban may be more appropriate due to the project's dynamic nature. Agile allows for iterative development and frequent collaboration, enabling the team to adapt to evolving requirements and deliver a high-quality product.

2.2.2. Why Agile

Here are some reasons why the agile model is the best choice for developing our online quiz portal, Quiz Quest:

- **Adaptability:** Agile methodologies like Scrum or Kanban are highly adaptable to changing requirements, which is crucial for a project like Quiz Quest where requirements may evolve based on user feedback and emerging needs.
- **Stakeholder Collaboration:** Agile encourages frequent collaboration with stakeholders, including faculty and students, ensuring that the final product meets their needs and expectations.
- **Predictable outcomes:** The waterfall model can provide more predictable outcomes in terms of time, cost, and scope. Since each phase is completed before moving on

to the next phase, it can be easier to estimate the time and resources required for each phase. All this makes the waterfall model a perfect match for our team and project .

- **Incremental Development:** Agile allows for incremental development and delivery of features, enabling early and continuous feedback from users, which is valuable for refining the product.
- **Flexibility:** Agile provides flexibility in prioritizing and implementing features, allowing the team to focus on high-priority tasks and deliver value quickly.
- **Continuous Improvement:** Agile promotes a culture of continuous improvement, where the team reflects on their processes and practices after each iteration, leading to a more efficient and effective development process.

2.2.3. Why Not

Every coin has two sides thus, we can't forget to consider that the agile model has some limitations too such as:

- **Fixed Time and Budget Constraints:** If Quiz Quest has strict time and budget constraints, the iterative nature of agile methodologies may pose challenges in terms of meeting fixed deadlines and budgets.
- **Well-Defined Requirements:** If the requirements for Quiz Quest are well-defined and unlikely to change significantly, the structured approach of the waterfall model may be more suitable, as it allows for thorough planning and execution of each phase without the need for frequent changes.

If the project requirements change or there is a need to iterate on certain features, it can be challenging to make changes once a phase is completed. Therefore, it's important to carefully evaluate the project requirements and constraints before deciding on a software development methodology but this very limitation doesn't act as one in our case.

2.3. Software Requirements Specification

2.3.1. Introduction

1. Purpose

The purpose of Quiz Quest is to provide a comprehensive quiz management system for educational institutions, facilitating easy quiz creation, management, and participation for both students and faculty.

2. Scope

Quiz Quest will include features such as student and faculty login/register functionality, group creation and management, quiz creation and scheduling, real-time leaderboards, result management, and integration with other systems.

3. Definitions, Acronyms and Abbreviations

The section will consist of three parts:

- SRS : Software Requirements Specification
- UI : User Interface
- API : Application Programming Interface

4. References

IEEE Std 830-1998, IEEE Recommended Practice for Software Requirements Specifications.

5. Overview

The document will mostly consist of two parts:

- Overall Description
- Specific Requirements

Overall description describes the major components of the system, assumptions and dependencies of the system, while specific requirements describes the functions of the system and their roles in the system and the constraints faced by the system.

2.3.2. Overall Description

1. Product Perspective

Quiz Quest is a standalone web application that will serve as a comprehensive quiz management system for educational institutions. It will interact with users through a web-based UI, providing functionalities such as student and faculty login/register, group creation and management, quiz creation and scheduling, real-time leaderboards, result management, and integration with other systems. The system will be designed to enhance the overall quiz management experience for both students and faculty, offering a user-friendly interface and seamless integration with existing educational systems.

2. Product Functions

Quiz Quest will have the following functions:

- **Student and faculty login/register functionality**
- **Group creation and management**
- **Quiz creation and scheduling**
- **Real-time leaderboards**
- **Result management**
- **Integration with other systems**

3. User Characteristics

Quiz Quest will have two user classes:

- **Students :** Users who will take quizzes and view their results.
- **Faculty :** Users who will create and manage quizzes, groups, and view quiz results.

4. Operating Environment Quiz Quest will be developed using Node.js for server-side scripting and vanilla JavaScript for the frontend. It will be compatible with major web browsers such as Google Chrome, Mozilla Firefox, and Safari, ensuring that users can access the application from a variety of devices including desktops, laptops, tablets, and smartphones. The use of vanilla JavaScript for the frontend will ensure a lightweight and efficient user interface, providing a seamless user experience across different platforms.

2.3.3. Specific Requirements

1. External Interfaces

This part of the SRS discuss about the interfaces of Table Tech.

- **User Interface**
  1. Login/register screens for students and faculty.
  2. Dashboard for faculty to create/manage quizzes and view results
  3. Quiz interface for students to take quizzes
  4. Leaderboard interface for real-time ranking
- **Hardware Interfaces**

  1. Compatible with standard web browsers on desktops, laptops, tablets, and smartphones.
- **Software Interfaces**
  1. Integration with payment gateways and loyalty programs through APIs.

2. Functional Requirements

This section will consist of the functions of Quiz Quest:

- **Student Functionality**
  1. Register/login to the system
  2. Join groups created by faculty
  3. View and take quizzes
  4. View quiz results and leaderboard
- **Faculty Functionality**
  1. Register/login to the system
  2. Create/manage groups
  3. Create/manage quizzes
  4. View quiz results and leaderboard

3. Non-functional Requirements

In addition to the functional requirements outlined earlier, Quiz Quest must meet several non-functional requirements to ensure its performance, security, usability, reliability, and scalability.

- **Performance Requirements**
  1. The system should be able to handle high volumes of quiz transactions.
  2. Response times for quiz actions should be minimal to ensure a smooth user experience.
- **Security Requirements**
  1. User data should be securely stored and encrypted.
  2. Access to quizzes and results should be restricted to authorized users only.
- **Usability Requirements**
  1. The system should have an intuitive and user-friendly interface.
  2. Instructions for quiz creation and management should be clear and easy to follow.
- **Reliability Requirements**
  1. The system should be reliable and available at all times, with minimal downtime for maintenance.
- **Scalability Requirements**
  1. The system should be scalable to accommodate growth in the number of users and quiz activities.

4. Other Requirements

In addition to the functional and non-functional requirements outlined above, Quiz Quest must also adhere to certain other requirements to ensure its successful development, deployment, and operation.

- **Legal Requirements**
  1. The system should comply with data protection regulations such as GDPR.
  2. Any third-party software or libraries used should be properly licensed.
- **Documentation Requirements**
  1. User manuals and technical documentation should be provided for both users and developers.
  2. The system should include in-app help and guidance for users.

3. SOFTWARE AND HARDWARE REQUIREMENTS

The technical requirements of **Quiz Quest** is feasible and not very hard to obtain, although preferable the system should be equipped with a high speed processor. The software used is easily available on the internet and can be downloaded free of cost if not previously installed on the respective system. The hardware requirement too, is very minimal.

3.1. Software Requirements

The technologies required are:

1. HTML
2. Tailwind CSS
3. JavaScript
4. NodeJS
5. Express
6. Mongoose
7. MongoDB
8. VSCode

3.2. Hardware Requirements

The system should meet the following requirements:

1. Operating System : Linux / MacOS / Windows 7 or above
2. Processor : Intel Core or AMD
3. RAM : 2 GB or above
4. HDD / SSD : 256 GB or above

4. DESIGN SPECIFICATION

The design specification of Quiz Quest involves defining the requirements and functionalities of the quiz management system. In this section of the report, we detail these aspects through various diagrams.

Quiz Quest is designed to have an intuitive and user-friendly interface, ensuring ease of use for both students and faculty. The system is built to handle high volumes of quiz transactions and is scalable to accommodate growth in users and quiz activities.

Furthermore, Quiz Quest is designed to seamlessly integrate with other systems, such as user authentication mechanisms, databases, and analytics tools. This integration allows for a more streamlined quiz management process and enhances the overall user experience.

The system's architecture is designed to be modular and flexible, allowing for easy updates and additions of new features. Additionally, Quiz Quest is designed with security in mind, implementing measures to protect user data and ensure the integrity of quiz activities.

Overall, the design of Quiz Quest aims to create a robust and efficient quiz management system that meets the needs of educational institutions and enhances the learning experience for students and faculty.

We understand all these requirements better by developing the following diagrams of our system:

- Use Case Diagram
- Data Flow Diagram
- Class Diagram
- Sequence Diagram
- Activity Diagram

4.1. Use Case Diagram

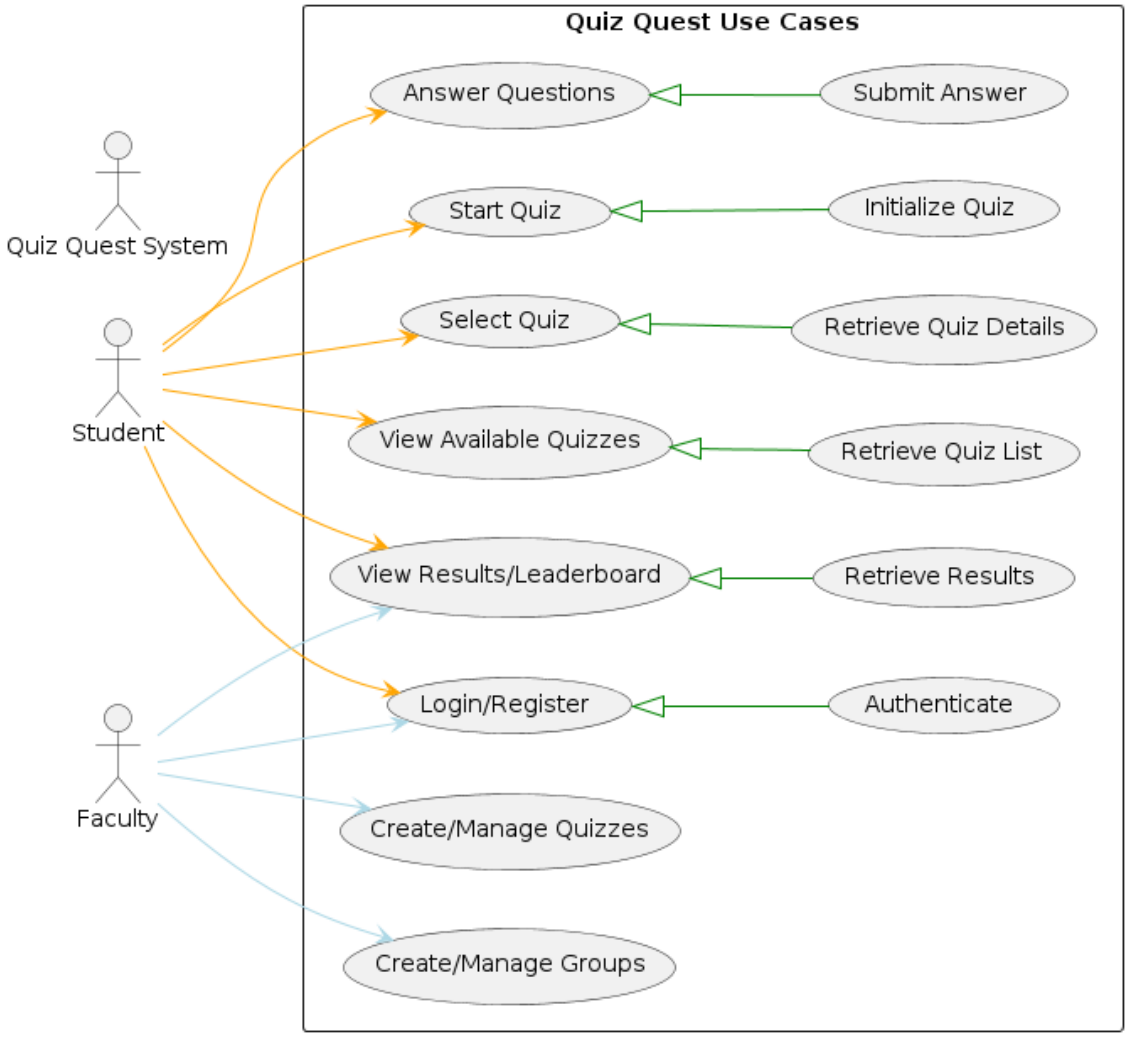
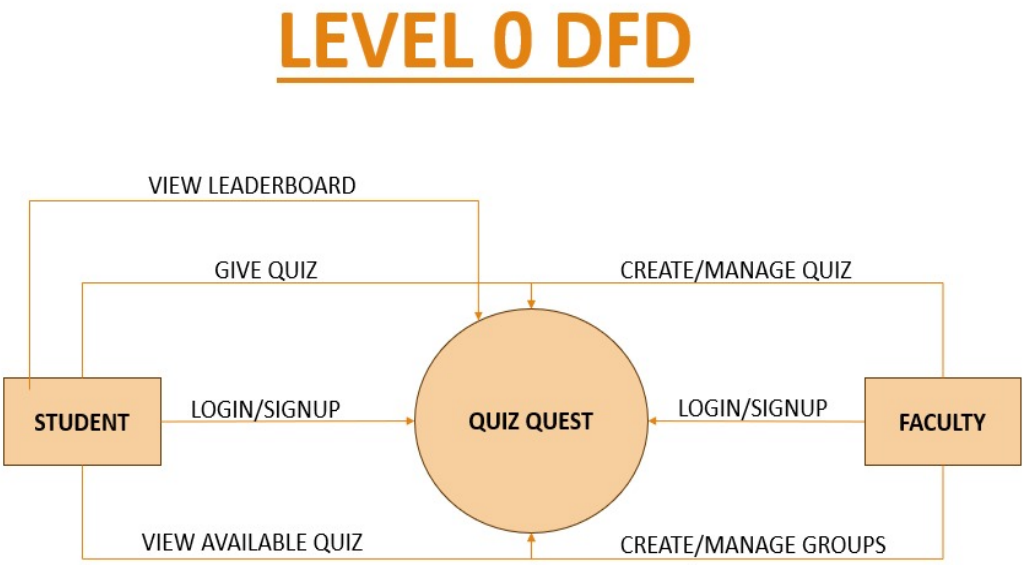
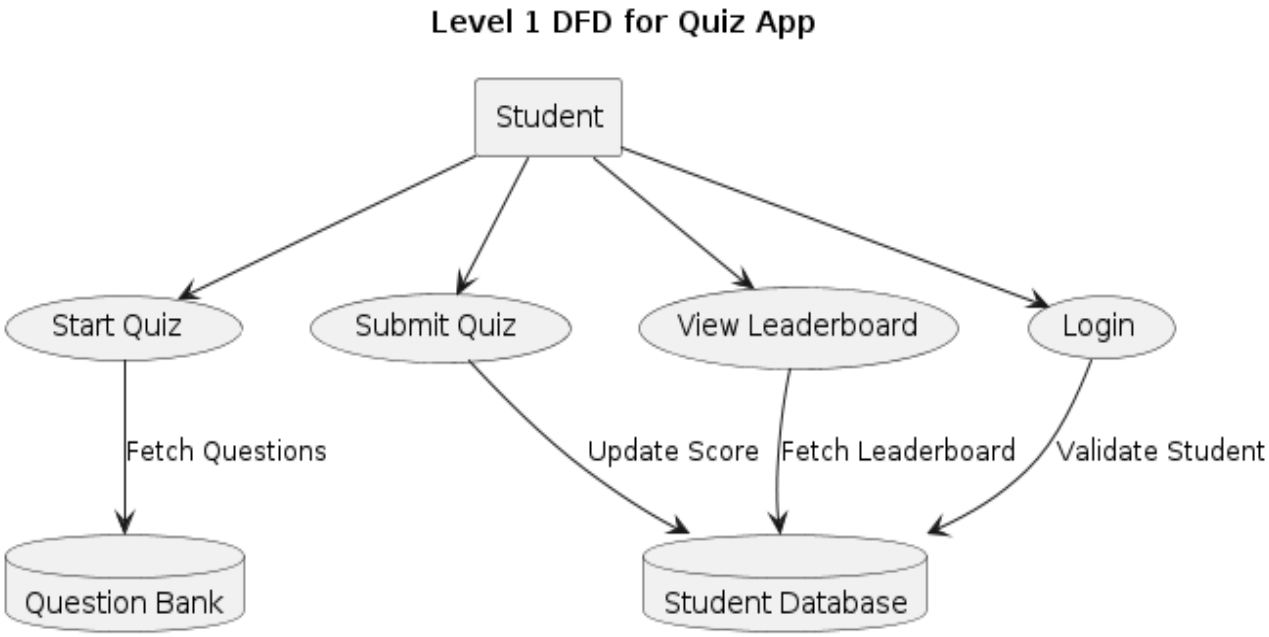


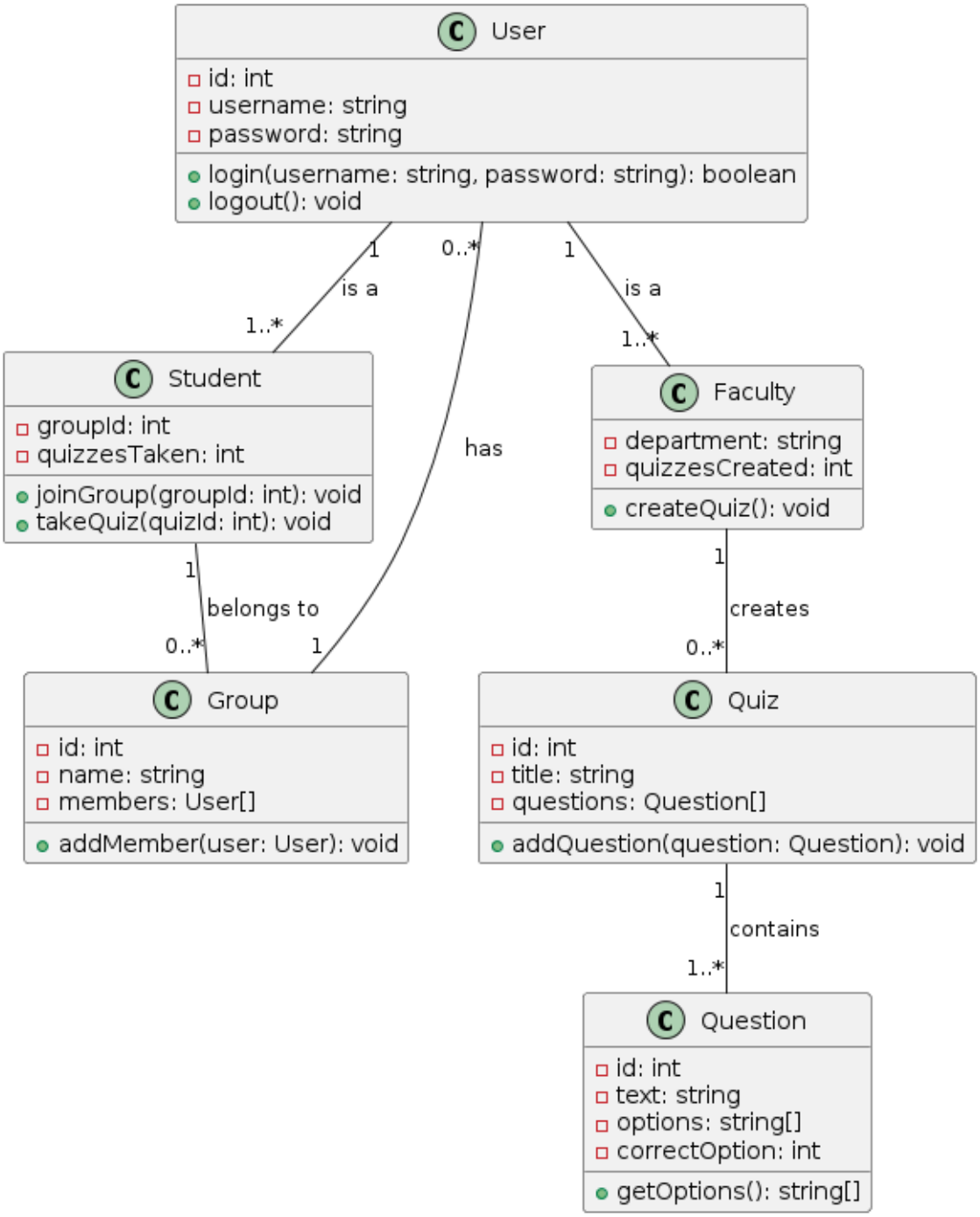
Fig 1: Use Case Diagram of Table Tech

4.2. Data Flow Diagram

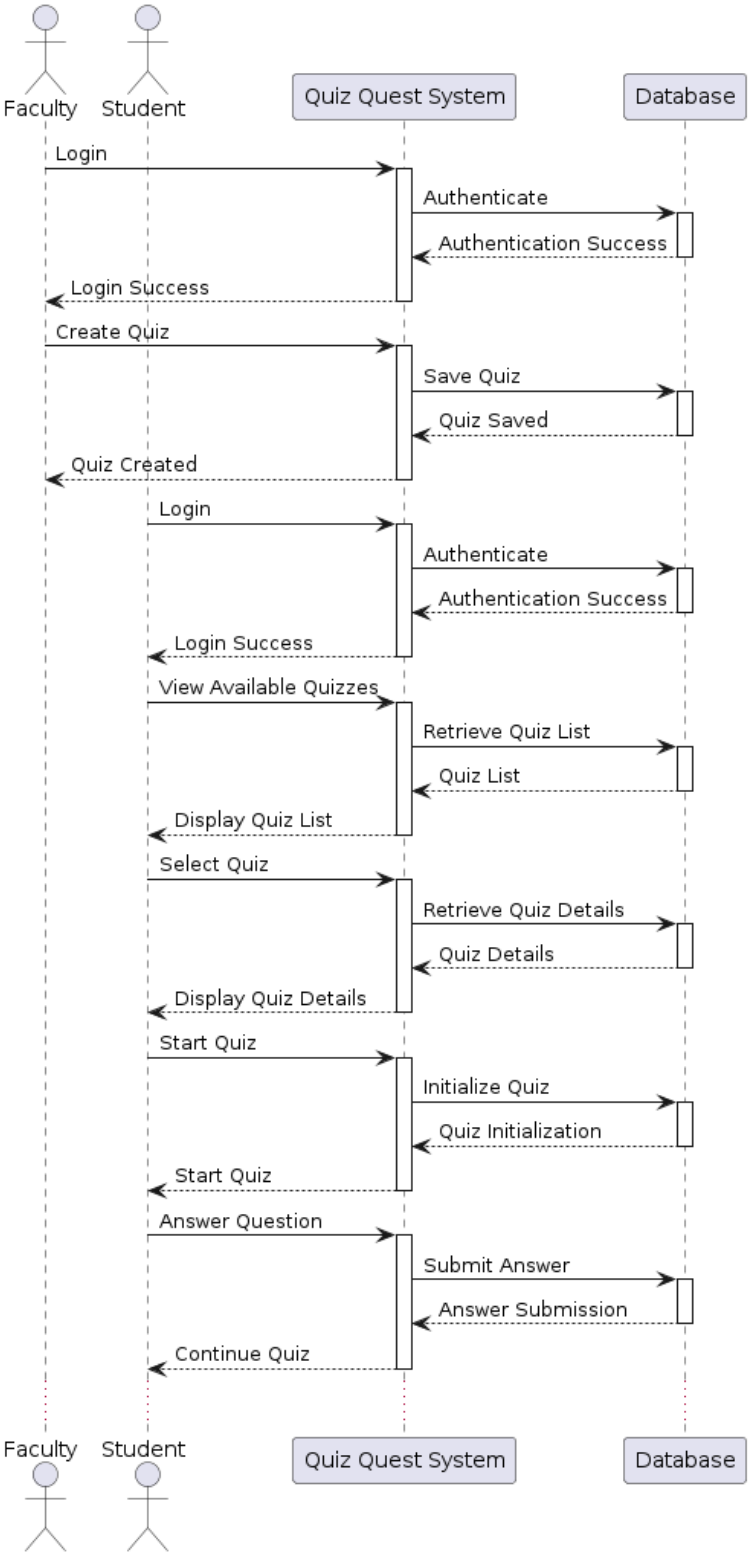




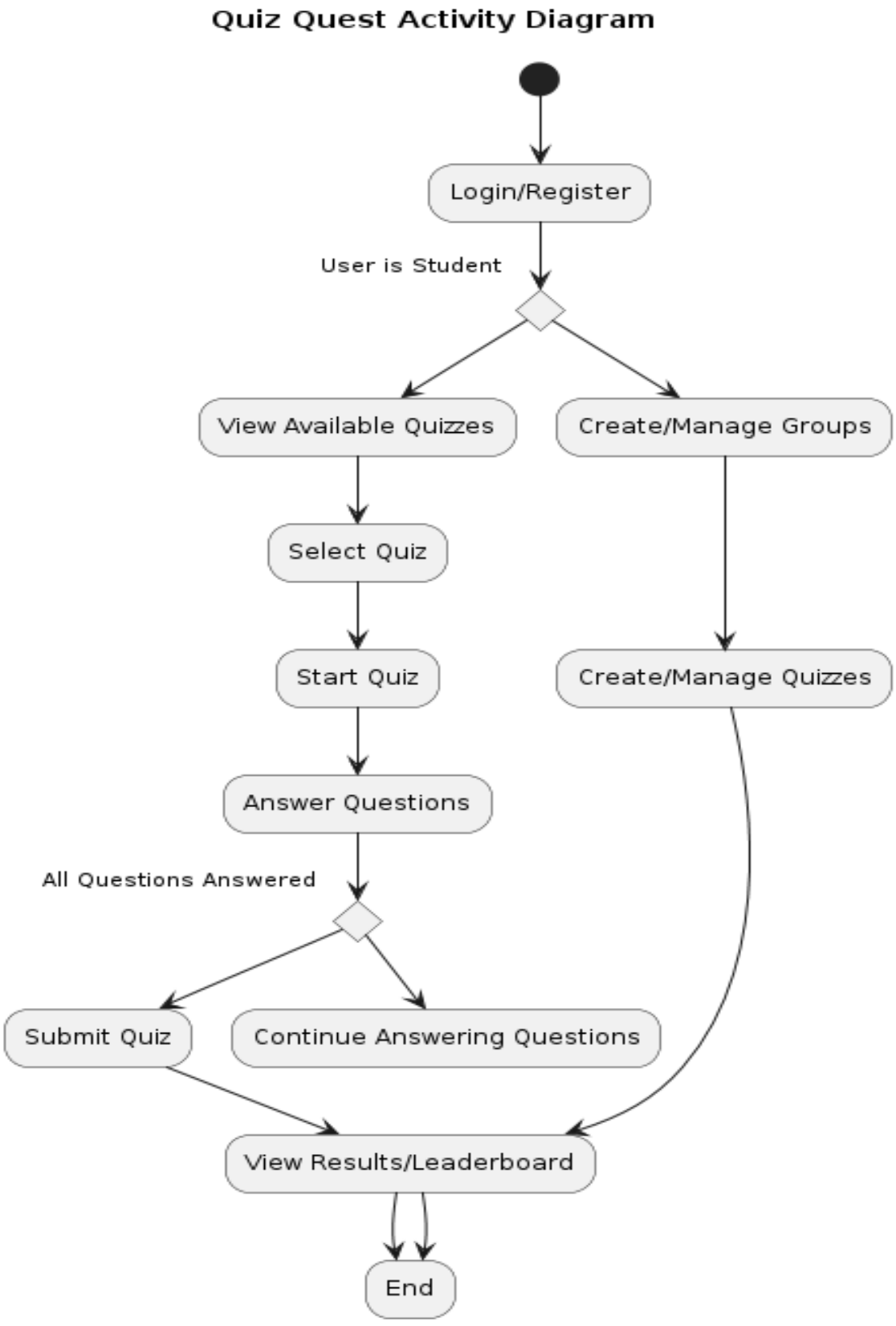
4.3. Class Diagram



4.4. Sequence Diagram



4.5. Activity Diagram



5. IMPLEMENTATION DETAILS

A quiz management system, such as Quiz Quest, is a digital solution designed to streamline quiz-related operations in educational institutions. It simplifies the process of quiz creation, management, and participation for both students and faculty. In this section, we discuss key implementation details to consider when developing Quiz Quest.

5.1. Frontend Development

The frontend of Quiz Quest will be developed using vanilla JavaScript, HTML, and CSS. This choice is made to ensure a lightweight and efficient user interface that can be easily accessed from various devices and web browsers. The UI will be designed to be intuitive and user-friendly, with clear navigation and interactive elements for quiz taking and result viewing.

5.2. Backend Development

The backend of Quiz Quest will be developed using Node.js, a popular and efficient server-side scripting language. Node.js will handle the logic for user authentication, quiz creation and management, result tracking, and leaderboard generation. MongoDB will be used as the database to store user information, quiz data, and results.

5.3. User Interface

The user interface of Quiz Quest will be designed to be intuitive and user-friendly, with a clean and modern design. The interface will feature clear navigation, interactive elements for quiz taking, and visually appealing displays for quiz results and leaderboards.

5.4. Security

Security measures will be implemented to protect user data and ensure the integrity of the quiz system. User authentication will be managed using JSON Web Tokens (JWT) to securely manage user sessions and access to the system. Additionally, all data transmission will be encrypted using HTTPS to protect against unauthorized access.

5.5. Testing

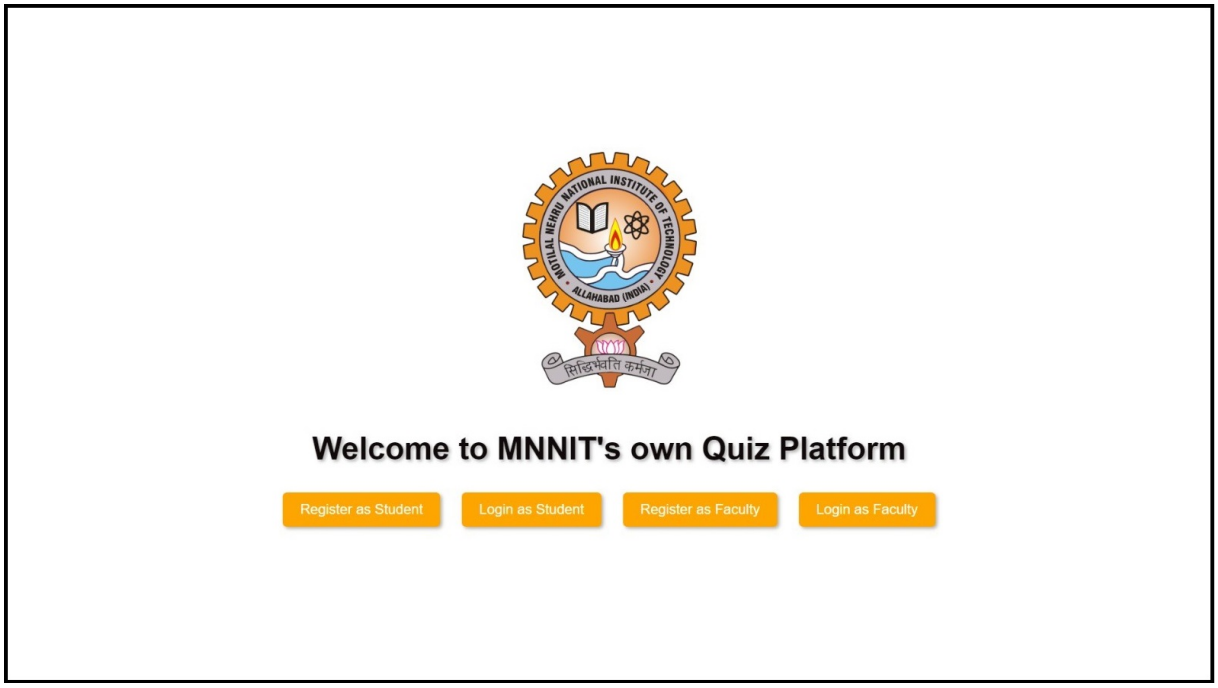
Quiz Quest will undergo thorough testing to ensure its functionality, performance, and security. Unit tests will be conducted for individual components, and integration tests will be performed to test the interactions between different modules. User acceptance testing (UAT) will also be conducted to gather feedback from users and ensure that the system meets their needs.

5.6. Deployment

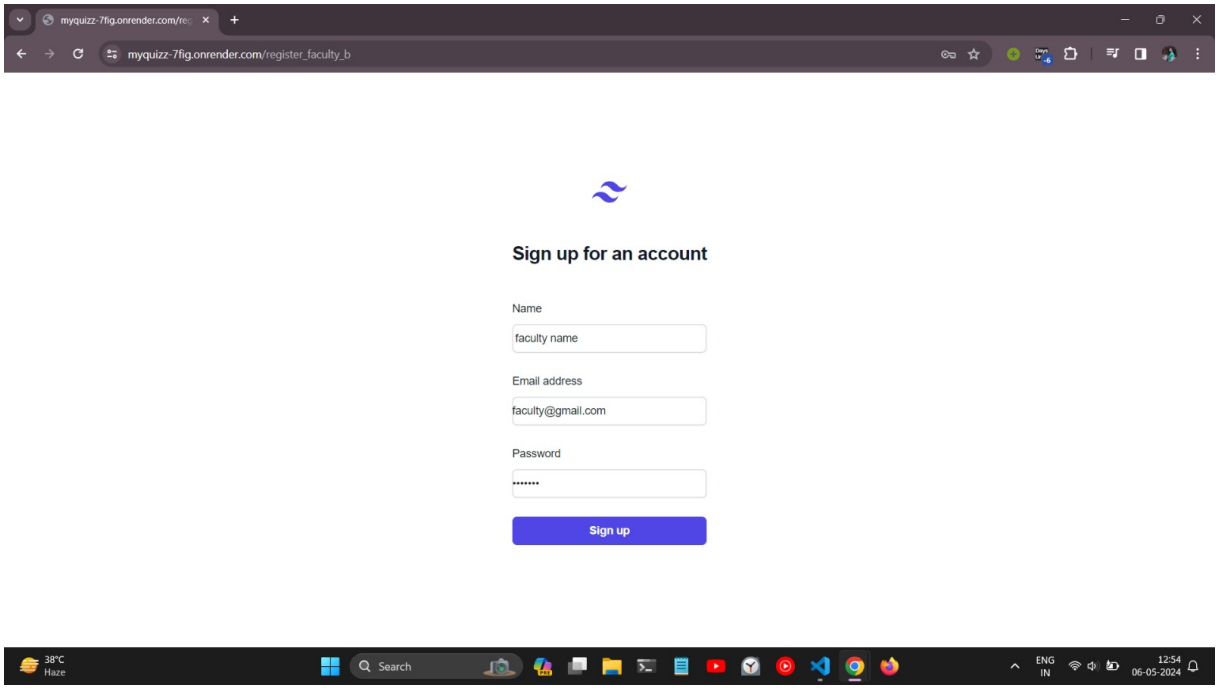
Quiz Quest will be deployed to a cloud-based hosting service, such as AWS or Heroku, to ensure scalability and reliability. Continuous integration and deployment (CI/CD) pipelines will be set up to automate the deployment process and ensure that updates are deployed smoothly.

5.7. Screenshots

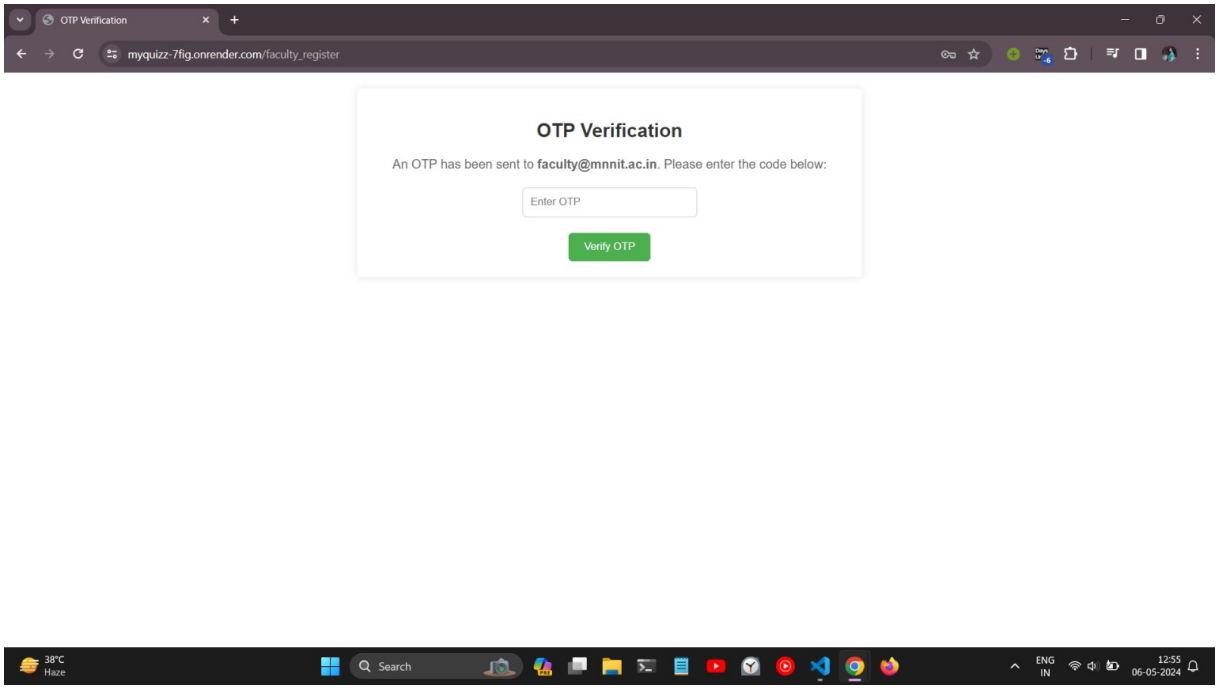
Home Page



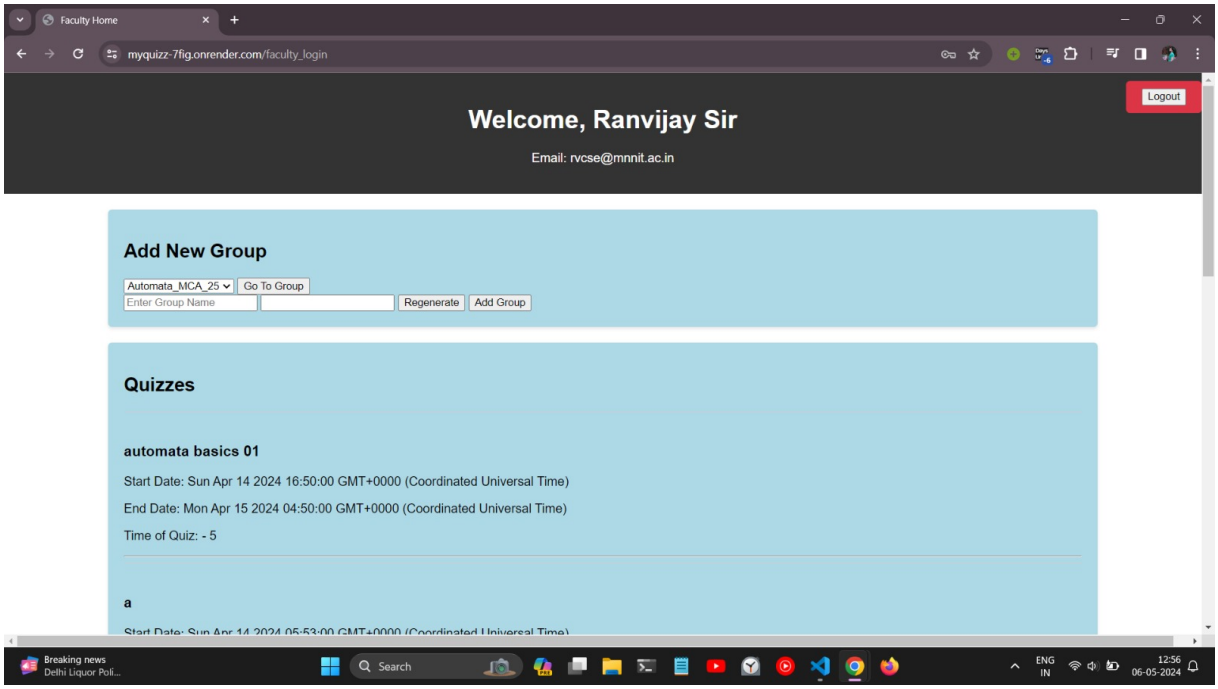
Sign up Page



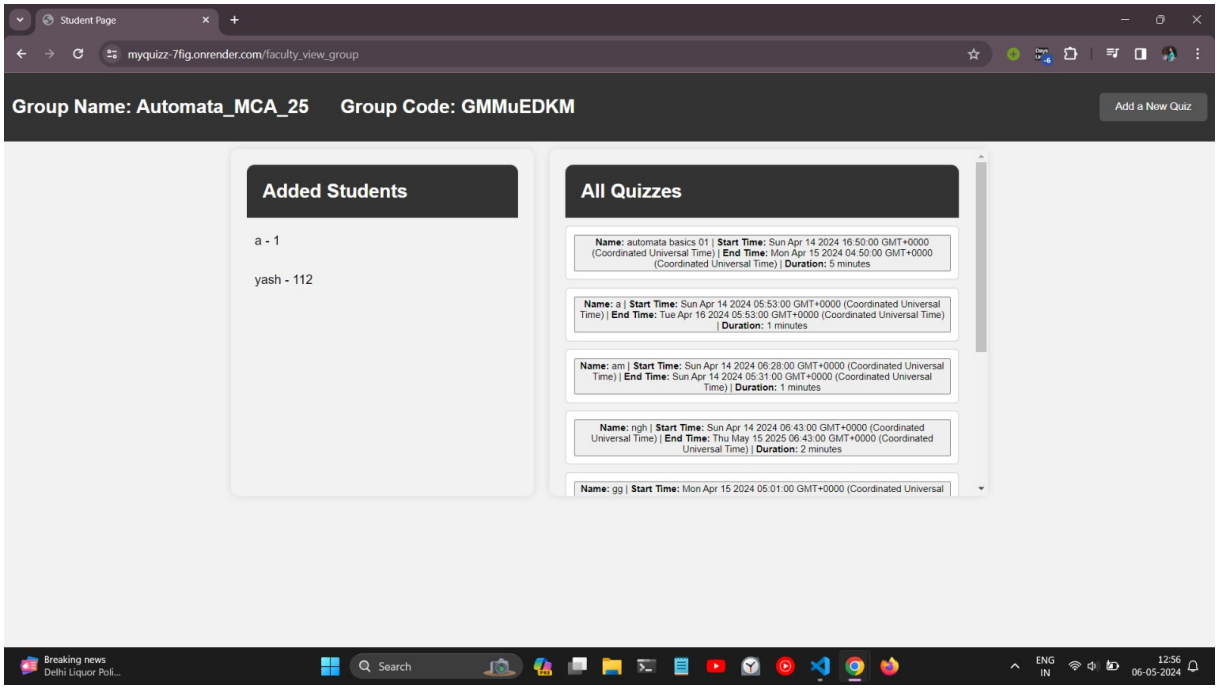
Verify OTP Page



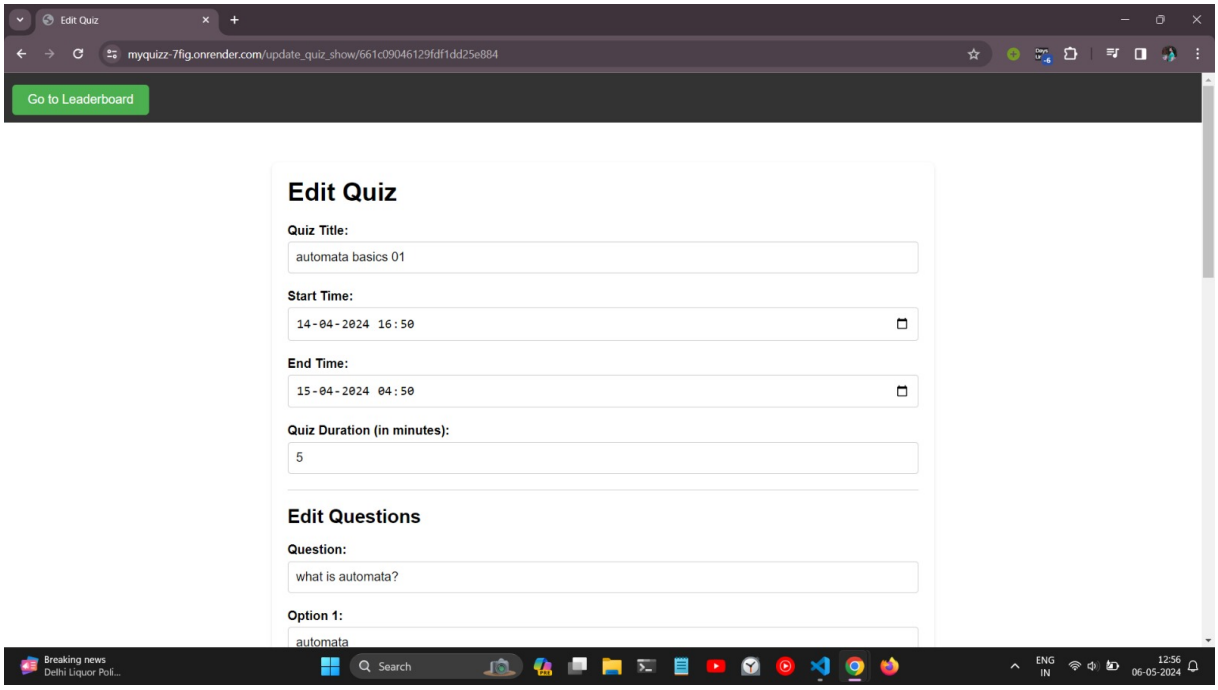
Faculty Dashboard



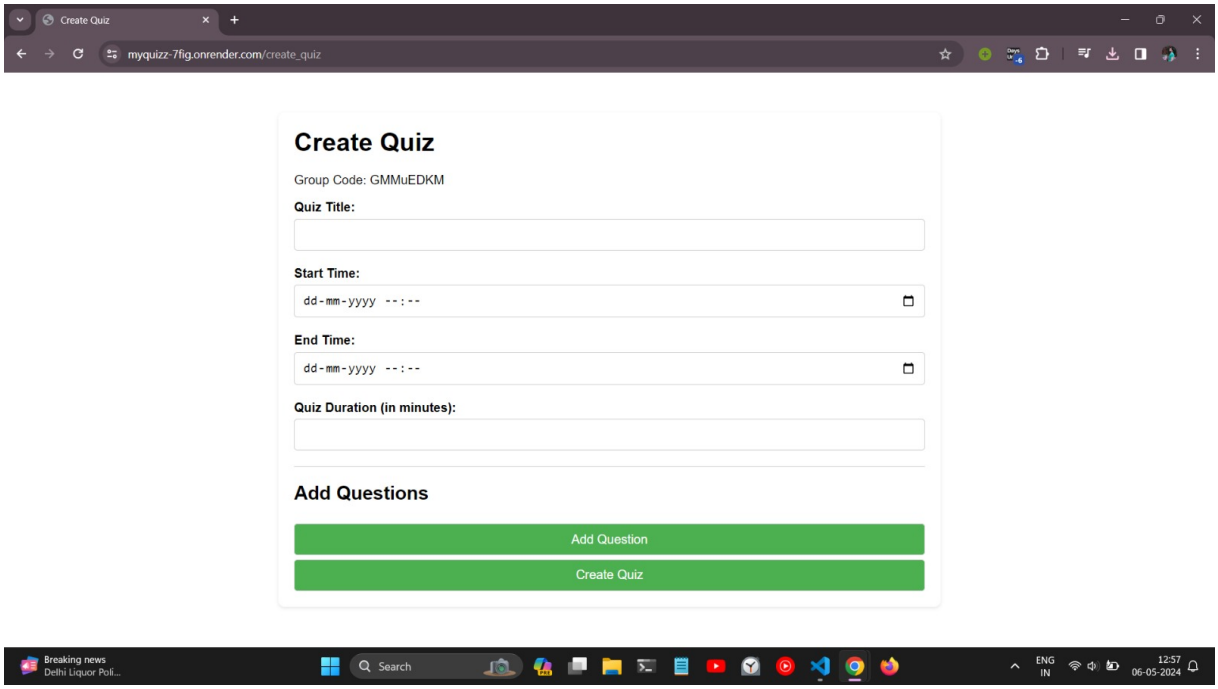
Faculty Group Page



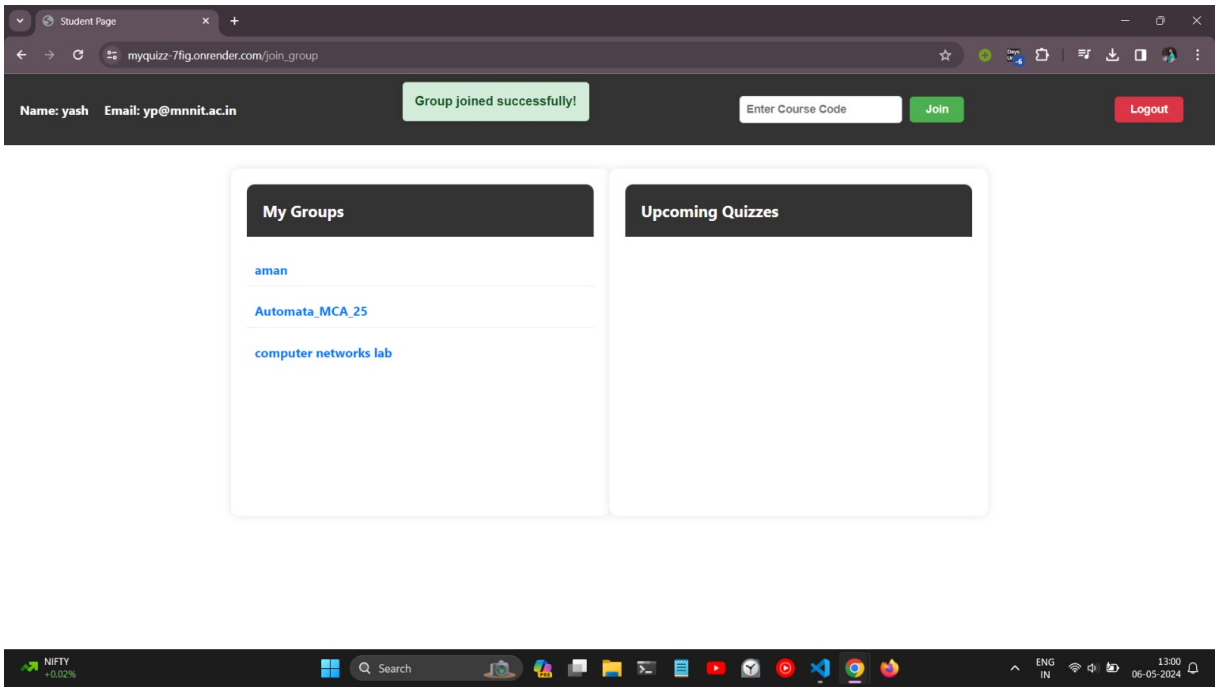
Faculty Edit Quiz Page



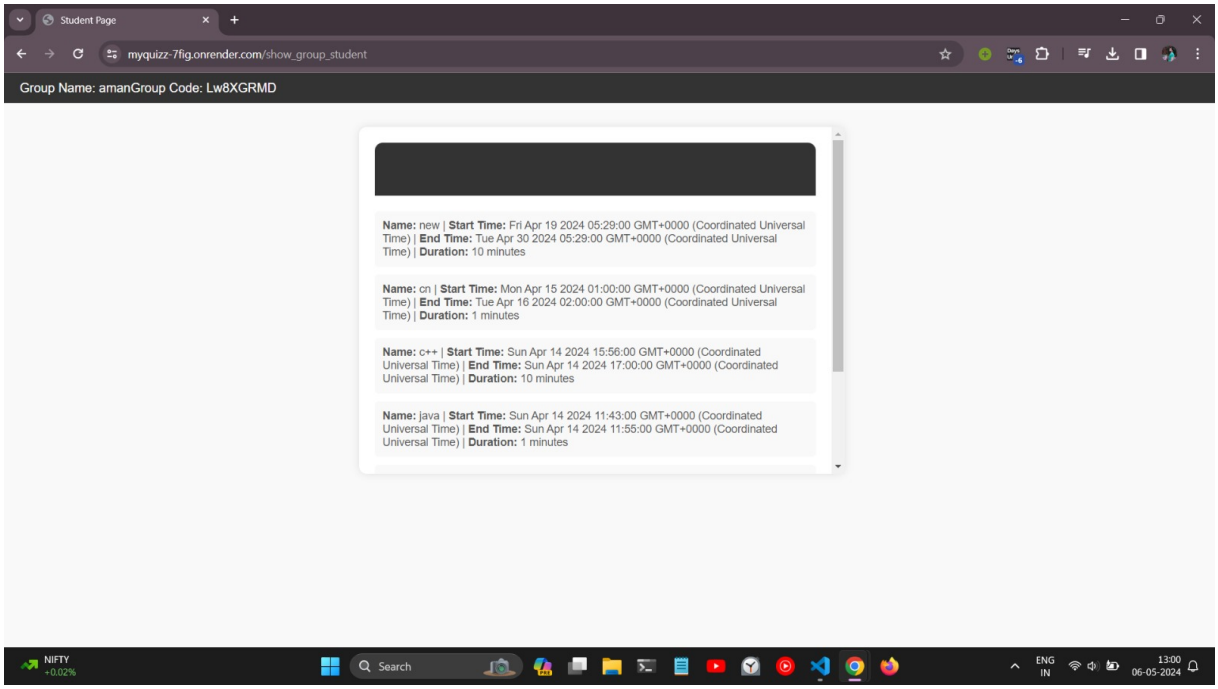
Faculty Create Quiz Page



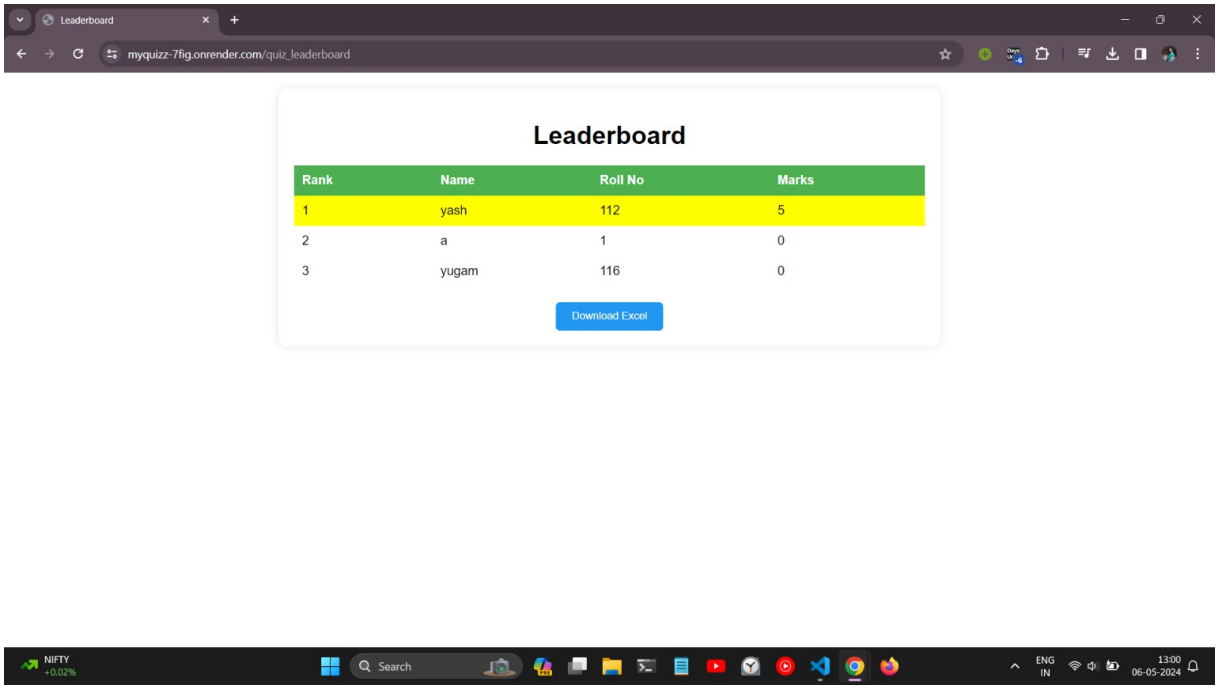
Student Dashboard



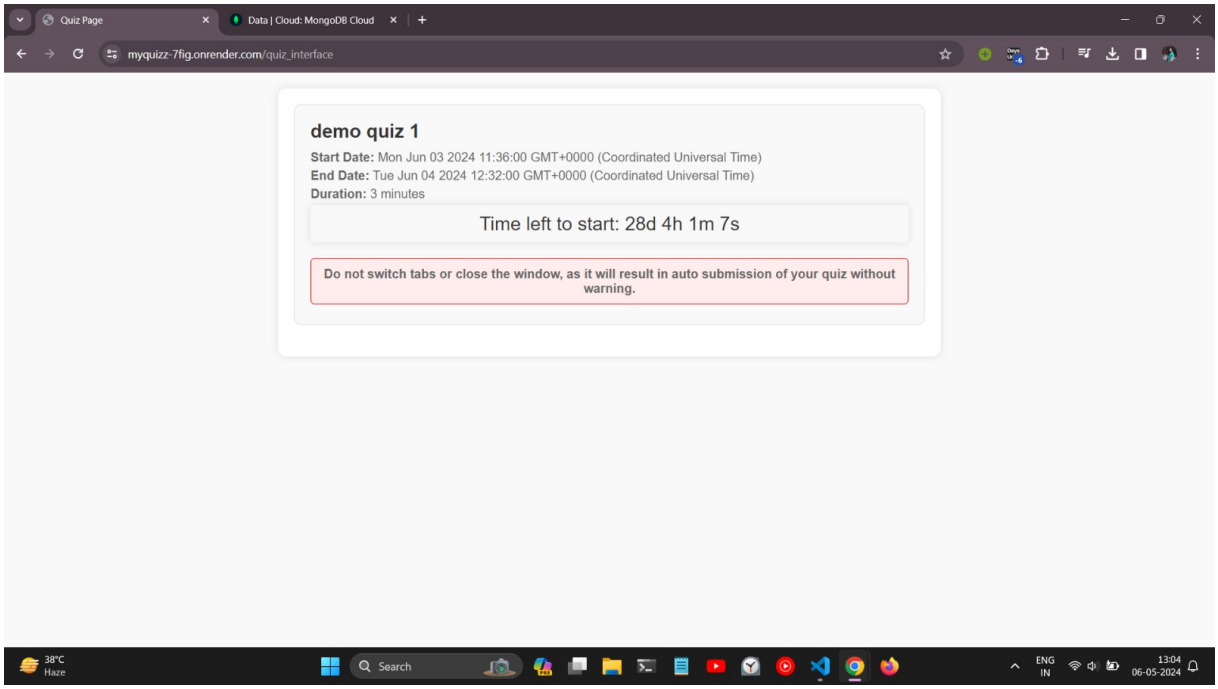
Student Group Page



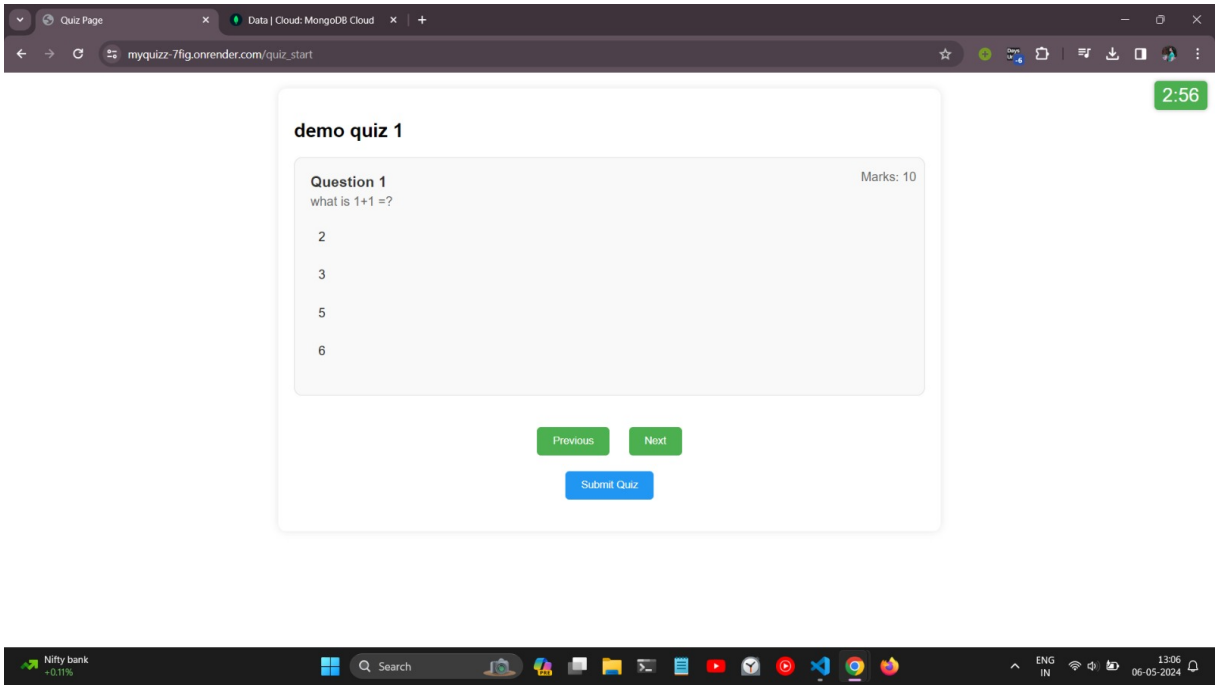
Leaderboard Page with download button



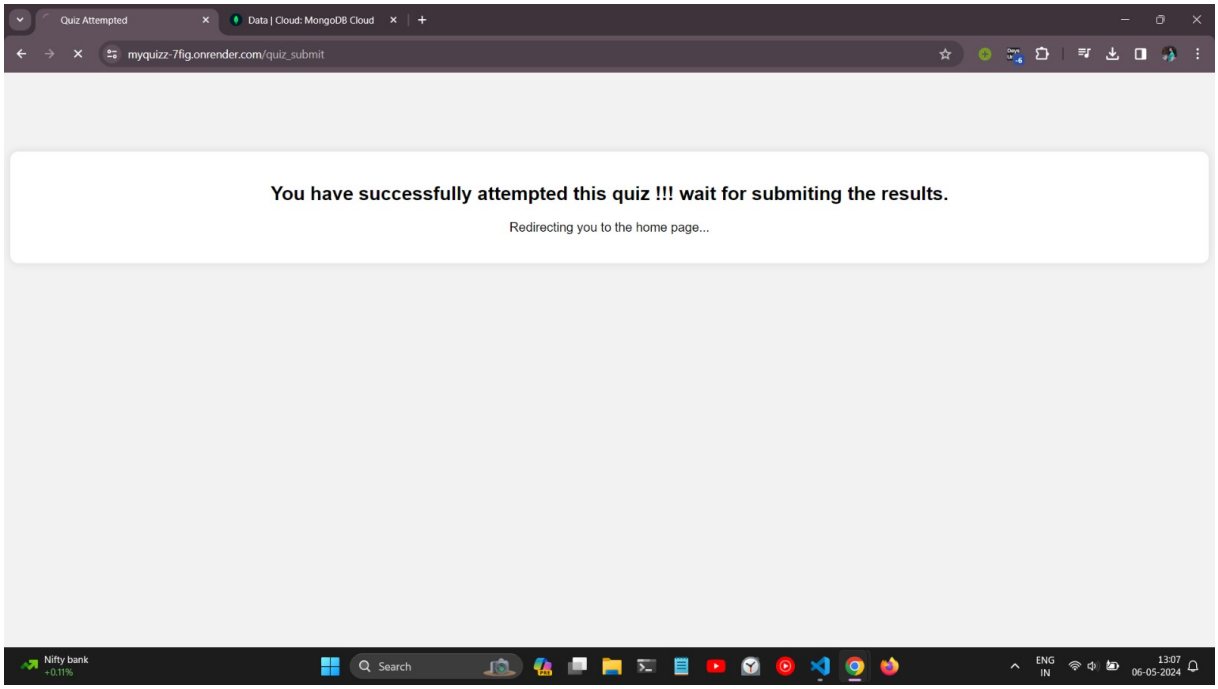
Student Start Quiz Page (before start time)



Student ongoing quiz page



Student Quiz Submitted Page



6. CONCLUSION

6.1. Conclusion

In conclusion, Quiz Quest has successfully addressed the challenges associated with traditional quiz-taking processes in educational institutions. By providing a user-friendly platform for quiz creation, management, and participation, Quiz Quest has enhanced the overall learning experience for both students and faculty.

The development of Quiz Quest has not only simplified quiz management but also promoted engagement and academic integrity. Features such as real-time leaderboards, group management, and result downloads have motivated students to actively participate in quizzes and take ownership of their learning. Similarly, faculty have benefited from the platform's efficiency and ease of use, allowing them to create and manage quizzes with ease.

Moving forward, there is a great opportunity to further enhance Quiz Quest by incorporating additional features based on user feedback and emerging technologies. By continuously updating and improving the platform, Quiz Quest can remain a valuable tool for educational institutions seeking to streamline their quiz-taking processes and promote a more interactive and engaging learning environment.

6.2. Limitations

1. **Limited customization** While Quiz Quest offers a range of features for quiz creation and management, the level of customization for quiz formats and question types may be limited compared to more specialized quiz platforms.

2. **Internet dependency** Quiz Quest relies on a stable internet connection for both quiz creation and participation, which may pose challenges in environments with unreliable internet connectivity.

3. **Device compatibility** While efforts have been made to ensure cross-device compatibility, there may still be limitations in terms of functionality and user experience on certain devices or browsers.

4. **Lack of offline access** Quiz Quest currently does not offer an offline mode for quiz-taking, which may be a limitation in environments where internet access is not available or reliable.

5. **Limited analytics** While Quiz Quest provides basic analytics such as quiz results and leaderboard rankings, more in-depth analytics and insights into student performance may be lacking.

6.3. Future Work

Every applications or systems are subject to upgrades and improvement, so do the **Quiz Quest**. This proposed project can still be enhanced in terms of its performances and features.

1. **Enhanced analytics** Implement more advanced analytics features to provide deeper insights into student performance, such as question-level analysis and trend identification.
2. **Mobile app development** Develop a mobile application version of Quiz Quest to provide users with more flexibility and convenience in accessing the platform.
3. **Integration with learning management systems (LMS)** Explore integration options with popular LMS platforms to streamline quiz management and data sharing processes.
4. **AI-based proctoring** Implement AI-based proctoring features to enhance exam security and prevent cheating during quizzes.
5. **Gamification elements** Introduce more gamification elements, such as badges, rewards, and virtual currency, to further enhance student motivation and engagement.

A. APPENDIX

A.1. References

1. ”Node.js” [Online] https://nodejs.org/en
2. ”Express.js” [Online] https://expressjs.com/
3. ”MongoDB” [Online] https://www.mongodb.com/
4. ”Tailwind CSS” [Online] https://tailwindcss.com/
5. ”Plantuml” [Online] https://plantuml.com/
6. ”Stack Overflow” [Online] https://stackoverflow.com/
7. ”Github” [Online] https://github.com/
8. ”MDN Web Docs” [Online] https://developer.mozilla.org/

A.2. Project Timeline

Quiz Quest project timeline: February 2024 to May 2024