

Project 1 Report: Examination Management System

Developed using React.js, Node.js, Express, MySQL

May 4, 2025

Problem Statement

Inspired by standardized online examination systems such as GRE and TOEFL, this project aims to develop a robust and complete online examination system. It facilitates online registration, scheduling, adaptive test-taking, monitoring, and performance analytics for students and evaluators. The goal is not to compete with such global platforms, but to simulate their key functionalities in a self-contained academic environment with additional insights and flexibility.

Technologies Used

- **Frontend:** React.js
- **Backend:** Node.js with Express
- **Database:** MySQL
- **Other:** REST APIs, Bootstrap, TailwindCSS, Multer for file handling

System Features and Implementation

(a) Exam Portal (Full Functionality)

A comprehensive portal providing interfaces for students and admins to register, schedule, attend, and review exams. Role-based access control ensures secure data and function segregation.

(b) Student Registration

Students register by entering personal and academic details, followed by ID verification and OTP/email confirmation. Secure storage of credentials with hashing.

(c) Exam Slot Registration by Admin

Admins create exam slots with parameters like date, time, subject, capacity. These are later made available for booking by registered students.

(d) Booking and Fees Payment

Students book desired slots and complete simulated or actual payment through integrated gateway APIs. Payment logs are maintained in the backend.

(e) Schedule/Reschedule Exams

Students may modify bookings once within a set deadline, provided the new slot is available. Logic ensures no clashes or overbookings.

(f) Photo/ID Verification Before Exam

Before starting the exam, a live photo (or randomly generated placeholder) is submitted along with ID proof. These are stored for manual verification.

(g) Exam Timer

A global countdown timer monitors exam duration, auto-submitting responses upon expiry. Timer state persists across reloads and reconnections.

(h) Quit/Disconnect Handling

Session and progress are saved in intervals. On abrupt disconnection, students may resume their exam later or the next day from the last saved point.

(i) Adaptive Questioning

The system dynamically adjusts difficulty based on the student's performance using a categorized question bank with tagging on difficulty and topic.

(j) Post Exam Evaluation

Automatic grading for objective questions and backend provision for manual scoring of subjective responses. A comprehensive result report is generated.

(k) Strength/Weakness Dashboard

Students receive visual analytics on their performance per topic. Evaluators get access to cumulative dashboards showing cohort-level strengths and weaknesses.

(l) Percentile Calculation

Percentile scores are computed once a minimum cohort size is reached, benchmarking individual performance against peers.

(m) Time Spent Per Question

Time tracking for each question is implemented. This helps both students and evaluators understand question difficulty and time efficiency.

(n) Post Exam Analysis of Questions

Analytics allow admins to assess which questions were too easy, hard, or time-consuming. Such questions can be refined or replaced in future sets.

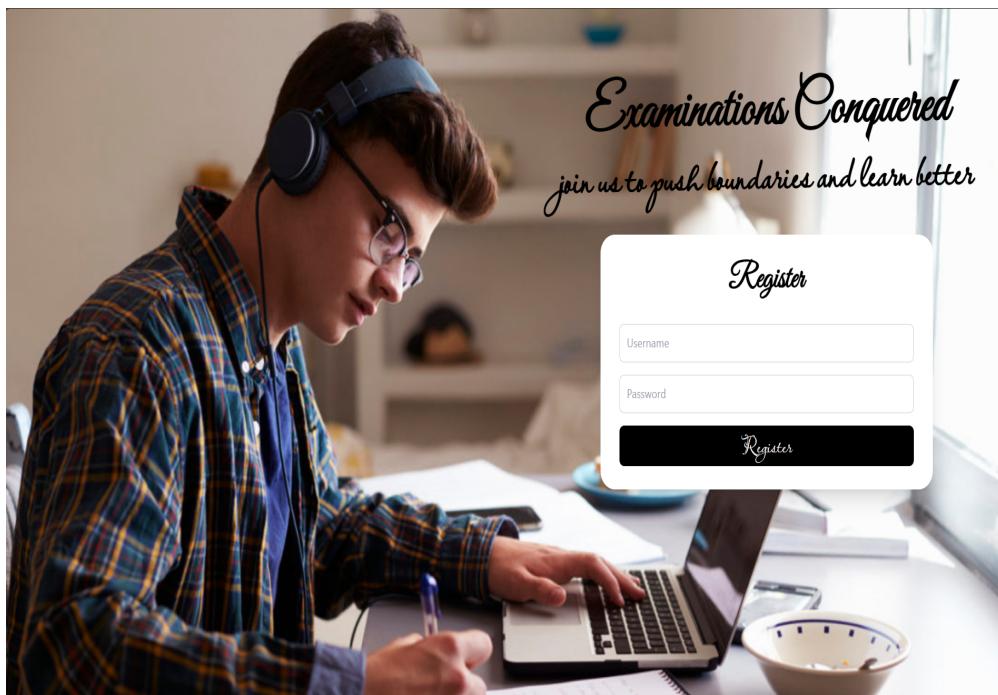
(o) Difficulty Adjustment and Dashboard Trigger

The system updates question difficulty ratings based on collective student performance and adjusts future tests and analytics dashboards accordingly.

Screenshots

Student Interface

Screenshot: Registration Page



Screenshot: Book/Reschedule Requests for Exams

Exam Portal

Home My Exams Results 🌐

Student Dashboard

Exam ID	Exam Name	Department	Slot	Fees	Duration	Pay Fees	Reschedule
1	Math Midterm	Mathematics	2/25/2025, 5:30:00 PM	500	90 mins	<button>Book</button>	<button>Reschedule</button>
2	Physics Final	Physics	2/19/2025, 3:30:00 PM	700	120 mins	<button>Book</button>	<button>Reschedule</button>
3	Chemistry Quiz	Chemistry	2/25/2025, 10:00:00 AM	300	60 mins	<button>Book</button>	<button>Reschedule</button>
4	Biology Exam	Biology	2/12/2025, 8:30:00 PM	600	45 mins	<button>Book</button>	<button>Reschedule</button>
5	English Test	Literature	3/5/2025, 11:00:00 AM	400	150 mins	<button>Book</button>	<button>Reschedule</button>
6	History Quiz	Social Science	5/6/2025, 7:29:00 PM	450	180 mins	<button>Book</button>	<button>Reschedule</button>
7	Computer Science Exam	Computer Science	4/16/2025, 3:00:00 PM	900	100 mins	<button>Book</button>	<button>Reschedule</button>
8	Economics Test	Economics	2/12/2025, 2:40:00 AM	350	110 mins	<button>Book</button>	<button>Reschedule</button>
9	Philosophy Final	Social Science	3/25/2025, 1:00:00 PM	500	75 mins	<button>Book</button>	<button>Reschedule</button>
10	Statistics Exam	Mathematics	3/30/2025, 11:00:00 AM	600	95 mins	<button>Book</button>	<button>Reschedule</button>

Screenshot: My Exams

Exam Portal

Home My Exams Results 🌐

If you try to do your best there is no failure.

Mike Farrell

Upcoming Exams

Mathematics Quiz

Start Time: 9:05:00 PM

Starts in: 0h 50m 45s

View Result

Economics Midsem

Start Time: 8:40:00 PM

Starts in: 0h 25m 45s

View Result

General Instructions

- The test link will only be active for 15 minutes.
- Please ensure that you log in at the right time, or the test will no longer be available in that slot.
- The time for the test starts the moment you log into the link. Candidates must complete the test in one shot.

Screenshot: Solving the Exam

The screenshot shows a blue header bar with the text "ECONOMICS MIDSEM" in white. In the top right corner, there is a white box containing the text "Time Left: 0h 59m 54s". Below the header, the main content area displays a question: "Q1: What is the term for an extended period of economic downturn?". Four options are listed: "Recession" (radio button selected), "Inflation", "Stagflation", and "Depression". At the bottom of the content area are two blue buttons labeled "Prev" and "Next".

Screenshot: Results Dashboard

The screenshot shows a dark-themed dashboard with a large image of a rocky coastline at sunset in the background. The text "PROGRESS, NOT PERFECTION." is overlaid in large white letters. At the top, there is a navigation bar with links for "Exam Portal", "Home", "My Exams", "Results", and a user icon. On the right side, there is a section titled "Results" showing three exam scores: "Math Midterm" (0 / 4), "Economics Test" (5 / 7), and "Computer Science Exam" (6 / 7).

Screenshot: Exam Analytics Dashboard



Your Exam Analysis

Rank	Percentile
1	100.00000%

Strengths and Weaknesses

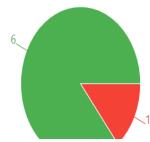
Strengths:

- Web Development
- Number Systems

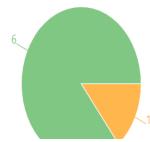
Weaknesses:

- Operating Systems
- Computer Architecture

Question Accuracy

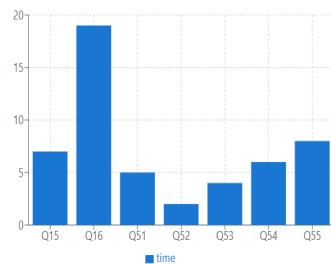


Difficulty Distribution



Screenshot: Question-wise Analytics

Time Spent on Each Question



Exam Review

1. What does HTTP stand for?

HyperText Transfer Protocol

HyperText Transmission Process

HyperText Transfer Program

Hyper Transfer Protocol

5. What is the base of the binary number system?

2

8

10

16

6. What is the full form of CPU?

Central Process Unit

Central Processing Unit

Computer Processing Unit

Central Performance Unit

7. What is an operating system?

Hardware

System software

A type of virus

A type of database

Admin Interface

Screenshot: View/Add Exams

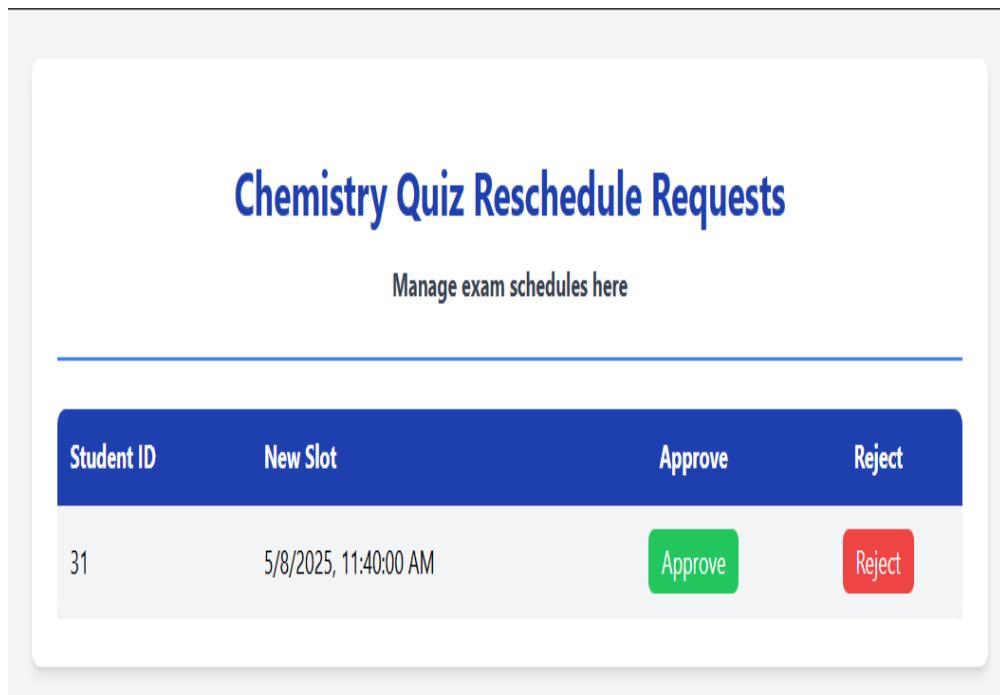
Admin Dashboard

Manage exams, students, and schedules here.

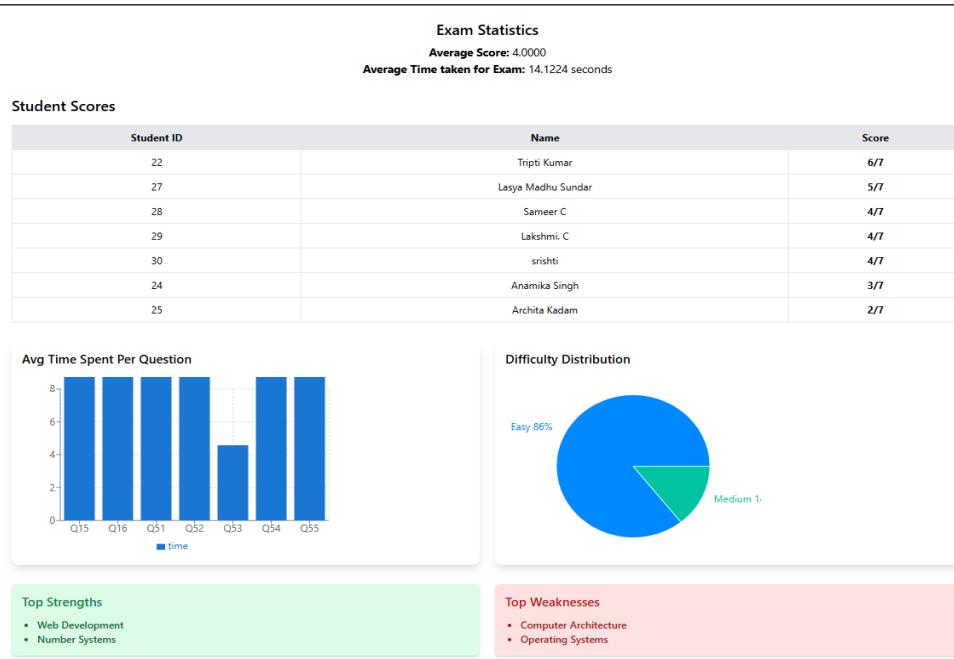
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12	Literature Quiz	Literature	5/19/2025, 4:55:00 PM	300	60 mins	<button>Reschedule</button>	<button>Analysis</button>
13	Mathematics Quiz	Mathematics	5/8/2025, 8:45:00 PM	600	60 mins	<button>Reschedule</button>	<button>Analysis</button>
15	Economics Midsem	Economics	5/8/2025, 8:40:00 PM	200	60 mins	<button>Reschedule</button>	<button>Analysis</button>

[Add Exam](#)

Screenshot: Reschedule Request Management



Screenshot: Exam Analytics Dashboard



Conclusion

The Examination Monitoring and Scheduling System closely emulates features found in standardised online tests such as GRE/TOEFL. It provides a modular, scalable platform that

supports secure testing, adaptive learning, and insightful post-exam analytics. Developed using modern full-stack technologies, it caters to the full lifecycle of online examinations.

Future Enhancements

- Integrate AI-based proctoring with webcam monitoring
- Support audio/video questions for speaking/listening sections
- Plug into university LMS or third-party test platforms
- Include LLM-based scoring for subjective answers