Final Project Report

Modern Application Development - II

Project Title: Quiz Master V2

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Introduction

As part of the Modern Application Development II course, I developed Quiz Master V2, a full-stack quiz platform designed to deliver real-time quizzes, user analytics, and administrative tools using modern technologies. This version expands on the previous MAD-I project with new architectural and performance enhancements such as caching, async processing, and scheduled automation.

Objectives

- Design a responsive, real-time quiz platform with performance enhancements

- Integrate modern tools like Redis and Celery for optimization

- Implement role-based dashboards with admin and user-specific actions

- Schedule automated tasks like daily reminders and monthly reports

Technologies Used

Backend:

- Flask

- SQLite

- Redis

- Celery

- Flask-Mail

- Flask-JWT-Extended

Frontend:

- Vue.js 3

- Vuex

- Vue Router

- Bootstrap 5

- Chart.js

- Axios

Database Design

Entities:

- User_Info

- Subject

- Chapter

- Quiz

- Question

- Score

Relationships:

- Subject -> Chapters

- Chapter -> Quizzes

- Quiz -> Questions

- Quiz <-> Score (one-to-many)

- User <-> Score (one-to-many)

Key Features

Core:

- Admin and User roles

- Quiz interface with live timer

- Score tracking and analytics

- Responsive SPA interface

- CSV export for performance data

Advanced (MAD-II):

- Redis caching of API and scores

- Background email and export tasks using Celery

- Scheduled daily reminders and monthly reports

- API-first architecture with JWT auth

Background Jobs (Celery)

- Daily Reminder Emails - Sent at 6 PM to inactive users

- Monthly Reports - Sent on the 1st of every month

- CSV Export - On-demand export for users or admins

- Email Notifications - Sent asynchronously

Performance Enhancements

- API and score caching using Redis (5-min TTL)

- Async processing of reports, emails, and exports

- Reduced backend load and improved response time

Demo Video

Link: https://drive.google.com/file/d/1c-hf2cDAE0j_wmTkx_rAbPnMvKrmHKnk/view?usp=sharing

Conclusion

This project provided a real-world experience in building a scalable, maintainable full-stack web

application with modern tooling. By combining Flask, Vue.js, Redis, and Celery, Quiz Master V2

demonstrates a production-grade architecture that can be extended for broader educational use cases.