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Cygentic Test Center
Professional Online Examination Platform

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Introduction:

The Cygentic Test Center is an examination platform developed for the Object Oriented Programming course. It provides a multi-user environment for remote testing with three user roles: Students, Examiners, and Head Administrator.

Problem Statement

Traditional examination systems face limitations in remote administration, scalability, delayed results, and security risks with question paper distribution. They also incur high operational costs.

Objectives

- Develop multi-user exam system with three roles
- Support MCQ and Paragraph questions
- Create secure test ID system
- Implement C++ backend with web frontend
- Provide real-time results and analytics

System Architecture

Backend

- C++ with Socket Programming

Frontend

- HTML, CSS, JavaScript

Design Overview

Client-server architecture with C++ backend and web frontend.

Storage

- File-based system

Communication

- HTTP over TCP

Key Requirements

Functional Requirements

- Student login with unique Test IDs
- MCQ and Paragraph questions
- Timer-based examinations
- Automatic MCQ grading
- Examiner dashboard for management
- Question bank system
- Head admin control panel management

Non-Functional Requirements

- Performance: 100 concurrent users
- Reliability: 99% uptime
- Security: Secure ID generation
- Usability: Intuitive interface
- Cross-platform compatibility

Object-Oriented Design & Server Implementation

Main Classes

```
class Student { ... };
class Result { ... };
class ExamSetting { ... };
class Examiner { ... };
class ExaminerData { ... };
class CygenticTestCenter { ... };
```

Core data classes for managing users, results, and exam settings.

HTTP Server

```
string handleRequest(const string& request) {
  // ...
  if (path == "/api/student-login") {
      return handleStudentLogin(request);
  } else if (path == "/api/submit-exam") {
      return handleExamSubmit(request);
  }  // ...
```

Handles various API requests for student login, exam submission, and more.

User Workflows & Data Management

Student Flow

Enter Test ID → View regulations → Start exam → Answer questions → Submit → View results

Examiner Flow

Login → Manage students → Create questions → Set duration → View results → Export data

Head Admin Flow

Login → Manage categories → Manage examiners → View all results

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File Structure

- categories.txt
- examiners_list.txt
- examiner_[ID].txt

Testing Results & Challenges

Test Cases

Student login with valid ID	Pass
MCQ answering	Pass
Timer expiration	Pass
Examiner login	Pass
Add new student	Pass

Technical Challenges & Solutions

- **HTTP server in C++:** Socket programming with custom parser
- **Data persistence:** Custom file serialization
- **Real-time timer:** Server-side time tracking

Design Challenges & Solutions

- **Multiple user roles:** Role-based access control
- **Question organization:** Category-based management
- **Test security:** One-time use IDs

Conclusion & Future Work

Conclusion

The Cygentic Test Center successfully demonstrates OOP principles in a practical online examination system, offering a complete solution for remote testing with multi-user support, various question types, and instant results.

Future Enhancements

- Database integration (MySQL/PostgreSQL)
- Mobile application development
- Advanced proctoring features
- Cloud deployment
- Enhanced analytics

Thank You!