VIRTUAL TEST HUB

PROJECT REPORT

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Contents

1 Introduction

1.1 Purpose

The purpose of this document is to specify the software requirements for the development of the Virtual Test Hub (VTH). This system aims to provide a robust platform for conducting online exams efficiently, securely, and at scale, addressing the challenges of traditional paper-based exams and current online systems.

1.2 Scope

The Virtual Test Hub will allow institutions to create, manage, and conduct exams online. Key features include user authentication, test management, multi-level test support, performance tracking, a repository of resources, and additional features like leaderboards and notifications. The system will primarily serve educational institutions seeking an alternative to physical exams.

1.3 Definitions, Acronyms, and Abbreviations

- **VTH**: Virtual Test Hub
- **UG**: Undergraduate
- **PG**: Postgraduate
- **MERN**: MongoDB, Express.js, React, Node.js

1.4 References

- Project description document: "VTH.txt" - Online exam system requirements - Security protocols for online exam systems

2 Overall Description

2.1 Product Perspective

With the rapid digitization of education, traditional paper-based exams are no longer practical for many institutions. The Virtual Test Hub is a web-based application that integrates various modules such as user authentication, test creation, performance tracking, and resource management, aimed at providing a seamless and secure environment for online exams.

2.2 Product Features

- **User Authentication**: Login, sign-in, and registration.
- **Test Management**: Timer-based tests, question randomization, multiple question types, and progress indicators.
- **Multi-Level test Support**: Support for Intermediate, Undergraduate, and Postgraduate exams.
- **Repository**: Books and articles for preparation with search, filter, favorites, and download options.
- **User Profile**: Career details, activity logs, and performance reports.
- **Additional Features**: Leaderboards, notifications, reminders, and dark mode.

2.3 User Classes and Characteristics

- **Students**: Users who will take the tests and view their performance reports.
- **Instructors**: Users who will create, manage, and assess quizzes.
- **Administrators**: Users who manage system-wide settings and user roles.

2.4 Operating Environment

The system will be web-based, compatible with modern web browsers, and hosted on a cloud platform to ensure scalability and reliability.

2.5 Design and Implementation Constraints

- Must ensure system stability under high server load during exam sessions.
- Must implement security measures to prevent cheating and unauthorized access.

2.6 Assumptions and Dependencies

- The system will rely on a stable internet connection for both students and instructors.
- Users are expected to have basic computer literacy to interact with the system.

3 Specific Requirements

3.1 Functional Requirements

FR	**Description**
Authentication	The system shall allow users to register, log in, and manage their profiles. Users should be able to update their personal information.
TestManagement	The system shall support quiz creation with multiple question types such as multiple choice, short answer, and essay. The system will also allow instructors to set time limits.
Randomization	The system shall randomize test questions to prevent cheating. This feature ensures that no two users receive the same order of questions.
Evaluation	The system shall track time during quizzes and provide immediate feedback after submission. The feedback will include correct answers and explanations.
Reporting	The system shall allow instructors to generate detailed performance reports, which include user activity, test scores, and progress over time.
ResourceManagement.	The repository module shall allow students to search, filter, and download resources such as study materials, articles, and books.
Engagement.	The system shall provide leaderboard rankings based on test performance, and send notifications or reminders about upcoming exams or deadlines.

Table 1: Functional Requirements for Virtual Test Hub (VTH)

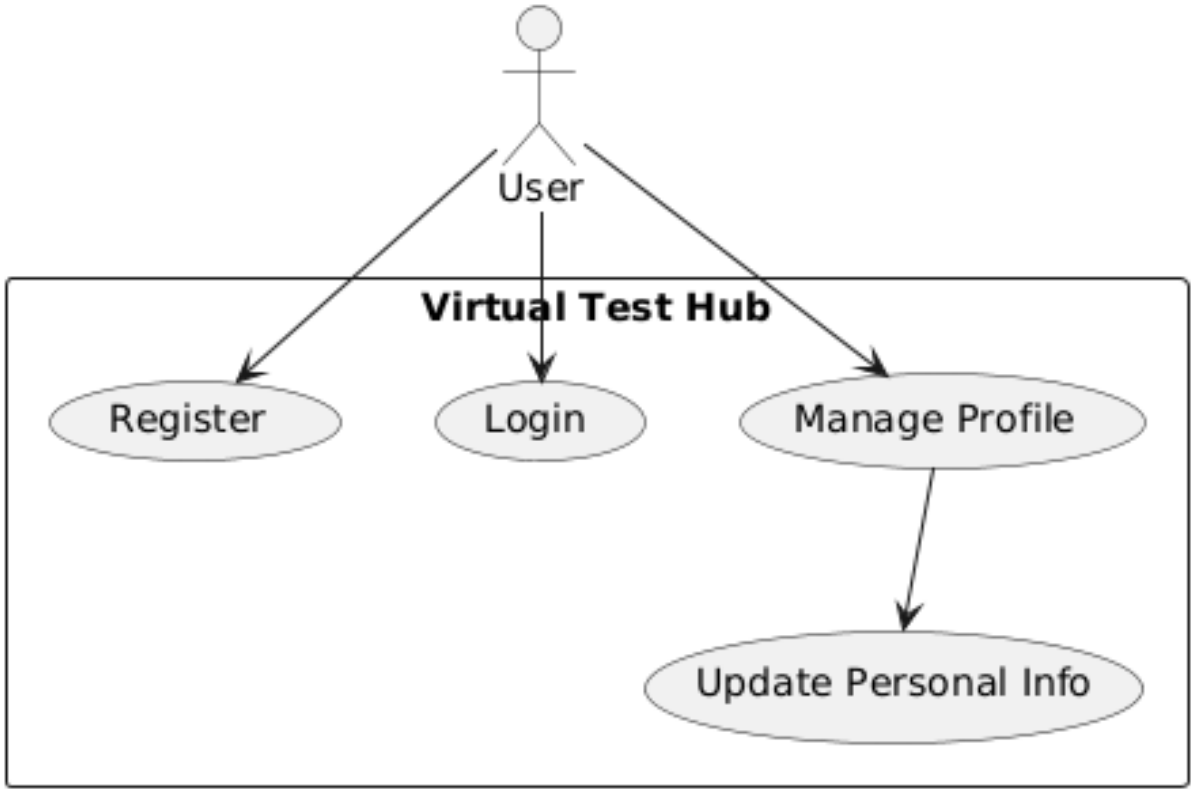

Figure 1: Use Case Diagrams for functional requirements

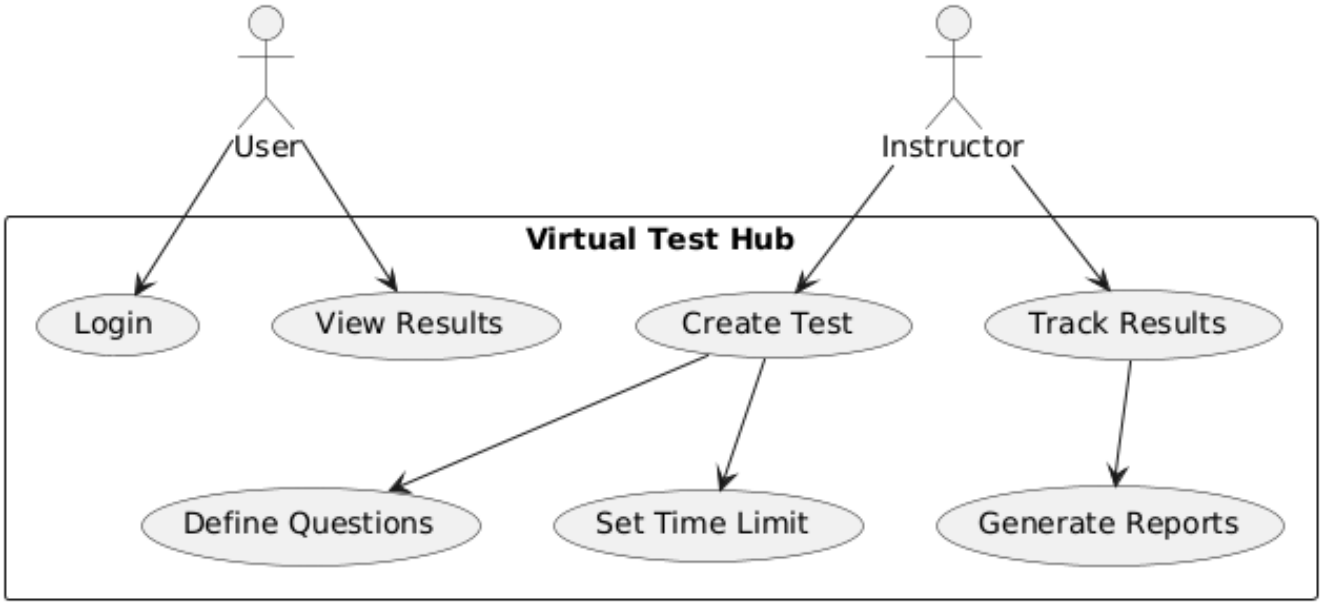

Figure 2: Use Case Diagrams for functional requirements

3.2 Non-Functional Requirements

Category	Non-Functional Requirement Description
Performance	The system must handle up to 1,000 concurrent users without crashing.
Security	The system must implement encryption for user data and exam content, and ensure data confidentiality.
Usability	The user interface should be intuitive and accessible to both students and instructors.
Reliability	The system should have 99.9% uptime during examination periods.
Scalability	The system must be scalable to handle an increasing number of users over time.
Maintainability	The system codebase will follow standard practices for maintainability and scalability.

Table 2: Non-Functional Requirements for Virtual Test Hub (VTH)

4 System Models

4.1 Use Case Diagrams

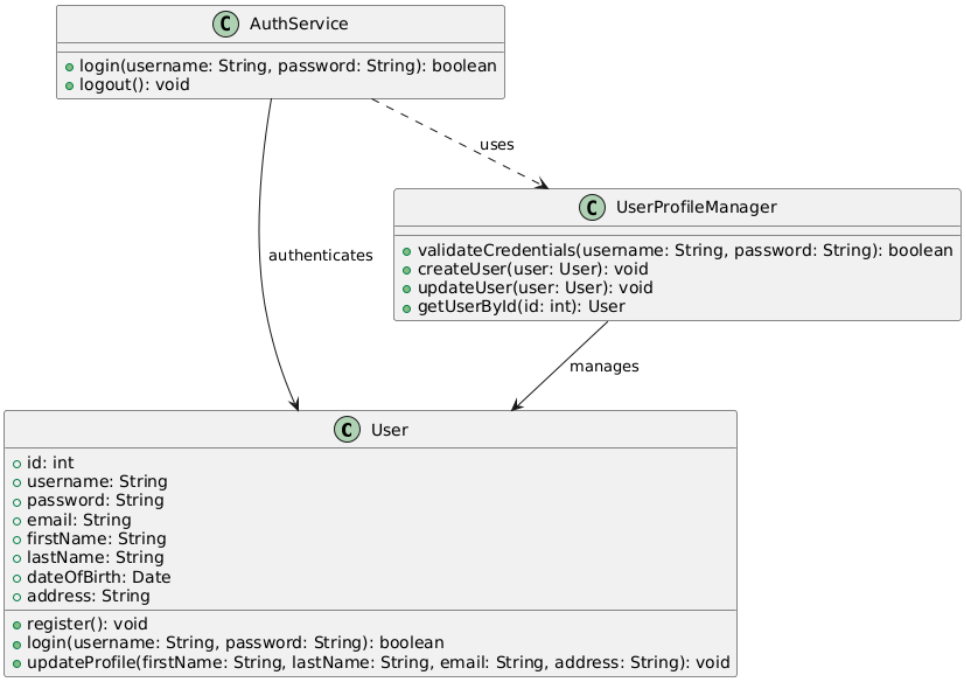

Figure 3: Use Case Diagram for User Login, test Creation, and Result Tracking

4.2 Data Flow Diagrams

5 External Interface Requirements

5.1 User Interfaces

- **Login Page**: Allows users to sign in or register.
- **test Interface**: Displays questions, a timer, and progress indicators.

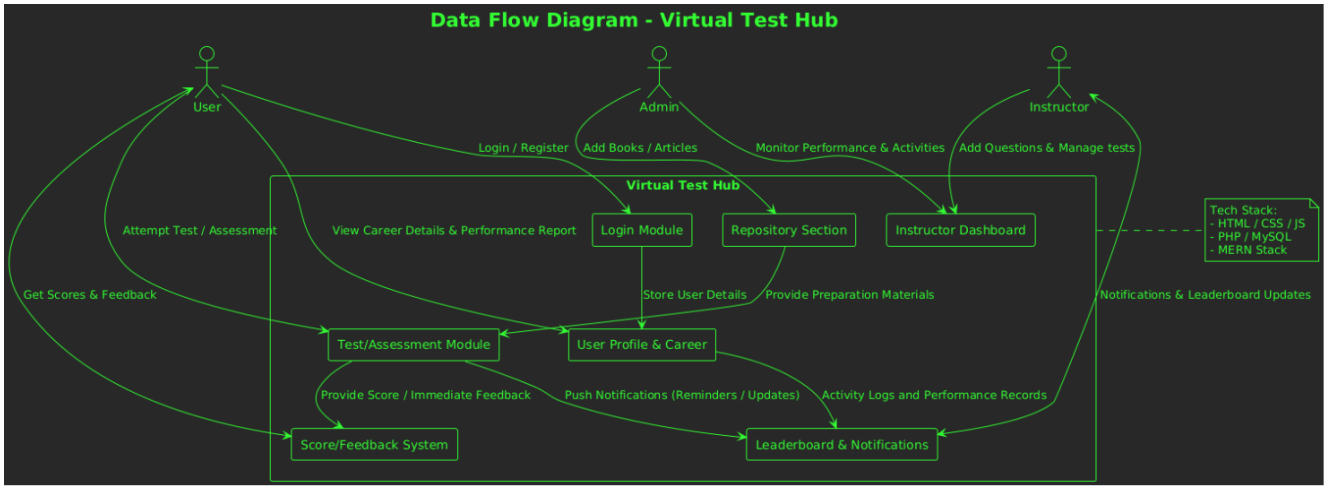

Figure 4: Data Flow Diagram for User Login and test Management

- **Instructor Dashboard**: Provides options to create tests, view reports, and manage users.

5.2 Hardware Interfaces

The system will interact with standard web browsers on personal computers and mobile devices.

5.3 Software Interfaces

The system will use PHP and MySQL for server-side operations, with MERN stack support for the user interface.

6 Other Non-Functional Requirements

6.1 Performance Requirements

Response times should be under 2 seconds for all user actions.

6.2 Security Requirements

The system must implement user session management and prevent unauthorized access using multi-factor authentication.

6.3 Maintainability

The system codebase will follow standard practices for maintainability and scalability.