



Visionary Duo

On-line skill test in every sector for every level of skill

Software Requirements Specification

Version <1.0>

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from Rajasthan Technical University, Kota

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1. Introduction

The **Online Skill Test Application** project aims to create a versatile platform that provides sector-specific skill assessments for users. This application is designed to cater to industries like IT, healthcare, education, finance, and more, ensuring tailored tests for each sector's unique requirements. It empowers organizations to evaluate candidates' skills effectively, streamline recruitment processes, and support professional development.

1.1 Purpose

The purpose of the **Online Skill Test Application** is to provide an efficient platform for assessing skills across various sectors, including IT, healthcare, education, and finance. It streamlines evaluation processes for organizations, offers sector-specific tests, and empowers individuals to identify strengths and improve skills. By leveraging automation and analytics, the application ensures cost-effective, accessible, and accurate assessments, enabling data-driven decisions for recruitment, upskilling, and career development.

1.2 Scope

The scope of the **Online Skill Test Application** includes creating a platform that caters to skill assessments for multiple sectors, such as IT, healthcare, finance, and education. It will offer customizable tests tailored to specific industry needs, support real-time scoring, and provide detailed analytics for evaluation. The application will be accessible via web and mobile platforms, ensuring broad usability. It can be utilized by organizations for recruitment and employee training, educational institutions for student assessments, and individuals for self-evaluation and skill enhancement. With scalability and adaptability, the platform aims to serve global users across diverse industries.

1.3 Definitions, Acronyms and Abbreviations

- **Skill Test:** An assessment designed to evaluate an individual's knowledge or abilities in specific areas.
- **App:** A software platform used for conducting skill tests via web or mobile devices.

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- **NLP:** Natural Language Processing, technology for understanding and processing user input.
- **API:** Application Programming Interface, used for integrating with other systems or services.
- **UI/UX:** User Interface/User Experience, focusing on the design and usability of the application.
- **AI:** Artificial Intelligence, powering features like adaptive testing and detailed analytics.
- **DB:** Database, used for storing user data, test content, and results.
- **HR:** Human Resources, a key user group for recruitment and employee skill evaluation.

1.4 References

References for the **Online Skill Test Application** include AI and NLP books like Speech and Language Processing by Jurafsky and Martin, documentation for tools like Rasa and Dialogflow, and industry reports from platforms like LinkedIn Learning and Coursera on skill assessment trends. Data protection standards like GDPR should also be considered.

1.5 Technologies to be used

- **Programming Languages:** Python (for AI/ML), JavaScript (for frontend and backend).
- **NLP Tools:** Hugging Face, SpaCy, or NLTK for text analysis and processing.
- **AI/ML Frameworks:** TensorFlow, PyTorch, and OpenAI for adaptive testing and analytics.
- **Backend:** Flask or Django for server-side functionality.
- **Frontend:** React.js or Angular for creating an interactive user interface.
- **Databases:** MySQL, MongoDB, or Firebase for storing test data and results.
- **Cloud Services:** Google Cloud, AWS, or Microsoft Azure for hosting and scalability.
- **APIs:** OpenAI API for intelligent responses and Twilio API for communication integration.

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1.6 Overview

The **Online Skill Test Application** is a digital platform designed to evaluate skills across various industries, such as IT, healthcare, finance, and education. It provides sector-specific assessments, real-time scoring, and detailed analytics to streamline recruitment, employee training, and personal skill enhancement.

Built using advanced technologies like AI, machine learning, and NLP, the application ensures accurate and adaptive testing experiences. It offers web and mobile accessibility, integration with APIs, and robust data management through secure cloud platform.

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2. Literature survey

The literature survey for the **Online Skill Test Application** highlights the growing demand for digital skill assessment platforms driven by global hiring trends and the increasing need for remote evaluations. Studies reveal a significant skill gap across industries like IT, healthcare, and education, emphasizing the importance of adaptive testing for more accurate assessments. Existing platforms like Mettl and HackerRank offer domain-specific tests but often lack customization, real-time analytics, or flexibility for smaller businesses. Advancements in AI and NLP, such as using GPT models for dynamic question generation and response analysis, are transforming the testing landscape. Additionally, cloud computing and API integrations enhance scalability, while gamification improves user engagement. However, there remains a gap in fully customizable, scalable, and adaptive solutions tailored to diverse industries, which this project aims to address effectively.

2.1 Review of Related Work

Existing platforms and tools in the domain of skill assessment provide valuable insights into the strengths and limitations of current solutions. Platforms like **Mettl** and **HackerRank** specialize in domain-specific skill evaluations for IT and technical roles. These tools offer features such as coding challenges, automated scoring, and candidate benchmarking. However, they often lack the flexibility to cater to non-technical sectors like healthcare or education, limiting their applicability.

Learning platforms like **Coursera** and **edX** integrate assessments within their courses, focusing on skill improvement rather than standalone evaluations. These platforms excel in adaptive learning but may not offer comprehensive testing solutions for recruitment or certification purposes. Advancements in **AI-powered assessment systems**, such as OpenAI's GPT, have enabled dynamic question generation and personalized feedback, improving user engagement. Similarly, NLP has enhanced conversational interfaces for skill tests, allowing interactive and user-friendly assessments. However, many of these systems struggle with context retention and scalability across diverse industries.

2.2 Knowledge gaps

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- **Sector-Agnostic Solutions:** Many existing platforms are specialized for certain industries (e.g., IT) but lack comprehensive tools for diverse sectors like healthcare, finance, or education.
- **Customization and Flexibility:** Current systems offer limited customization for creating sector-specific tests tailored to unique organizational needs.
- **Adaptive Testing:** While adaptive testing exists, it is not widely implemented across all skill types or industries, resulting in generic assessments that may not accurately reflect user capabilities.
- **AI Integration:** AI-driven features like dynamic question generation, natural language understanding, and open-ended answer evaluation are underutilized, especially in non-technical fields.
- **Scalability:** Many platforms struggle with scalability for large-scale assessments, particularly for global, multilingual audiences.
- **User Engagement:** Engagement techniques like gamification and interactive testing are not universally incorporated, reducing user retention and satisfaction.
- **Analytics and Reporting:** Real-time, detailed analytics for both individuals and organizations are often limited, hindering actionable insights.

2.3 Comparative Analysis

Existing skill test platforms like **Mettl** and **HackerRank** cater primarily to IT and technical roles, offering domain-specific assessments, moderate customization, and detailed analytics. However, they lack adaptability for non-technical sectors such as healthcare or education. Learning platforms like **Coursera** and **edX** focus on education and skill improvement, with well-developed adaptive learning paths but limited functionality for recruitment or corporate testing needs. These platforms often underutilize AI for dynamic question generation, natural language understanding, and open-ended response evaluation, particularly in non-technical fields. Scalability is generally strong for IT-focused tools, but multi-sector applicability and advanced multilingual support remain underdeveloped. Additionally, engagement techniques like gamification are either absent or minimally integrated, reducing user retention.

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2.4 Summary

The **Online Skill Test Application** aims to address the limitations of existing platforms by providing a scalable, multi-sector solution. Current tools like Mettl and HackerRank focus primarily on IT and technical roles, while platforms like Coursera emphasize education and upskilling, often neglecting adaptability and advanced AI features. Key gaps include limited sector coverage, lack of robust customization, underutilization of AI for dynamic testing, and insufficient engagement techniques. The proposed application bridges these gaps with a comprehensive, user-friendly platform offering sector-specific assessments, adaptive testing, real-time analytics, and gamification, making it a versatile solution for recruitment, education, and professional development across industries.

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3. Specific Requirements

3.1 Functional Requirement

- **User Management:** Registration, login, and role-based access control for candidates, recruiters, and admins.
- **Test Creation:** Customizable test parameters, question types, and difficulty levels.
- **Question Bank:** Repository for questions, supporting multiple formats like multiple-choice and coding.
- **Adaptive Testing:** AI-driven question selection based on user performance.
- **Test Administration:** Scheduling and assigning tests with live proctoring options.
- **Test-Taking Interface:** User-friendly interface with multimedia support and timers.
- **Scoring:** Automated scoring for objective questions and AI-based evaluation for open-ended answers.
- **Analytics:** Performance dashboards and exportable reports.
- **Notifications:** Email and in-app notifications for test updates and results.
- **Integration:** Support for API integrations with external platforms.
- **Multilingual Support:** Tests and interface available in multiple languages.
- **Security:** Data encryption, secure login, and anti-cheating measures.
- **Accessibility:** Mobile-responsive design and support for assistive technologies.

3.2 Non Functional Requirements

- **Performance:** The app should support high concurrent users with quick load and submission times (under 2 seconds).
- **Scalability:** Must scale easily to handle growing user traffic.
- **Reliability:** Ensure 99.9% uptime with regular backups.
- **Security:** Data encryption, two-factor authentication, and GDPR compliance.
- **Usability:** Intuitive UI, accessible on desktop and mobile devices.
- **Compatibility:** Works with modern browsers and operating systems.
- **Maintainability:** Modular and well-documented for easy updates.
- **Localization:** Multi-language support for various regions.

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- **Supportability:** Includes helpdesk and documentation for user assistance.

3.3 Hardware Requirements

- **Server:** Multi-core processor (Intel Xeon/AMD EPYC), 16GB RAM, SSD storage (500GB+), and high-speed internet (1 Gbps+).
- **Client-side:** Dual-core processor, 4GB RAM, 50GB storage, 1080p display, and stable internet (5 Mbps+).
- **Backup System:** Cloud or external storage for regular backups.

3.4 Software Requirements

- **Server-side:** Linux/Windows Server, Apache/Nginx, Python, JavaScript (Node.js), MySQL/PostgreSQL/MongoDB, TensorFlow/PyTorch for AI.
- **Client-side:** Chrome, Firefox, Safari, React.js or Angular.
- **Middleware:** RESTful or GraphQL APIs.
- **Development Tools:** VS Code, PyCharm, Git/GitHub.
- **Testing and Deployment:** Selenium/JUnit, AWS/Google Cloud/Azure.

3.5 Agile Methodology

- **Sprint Planning:** The project is divided into 2-4 week sprints, each focusing on specific features.
- **Daily Standups:** Daily meetings to discuss progress and challenges.
- **Iterative Development:** Features are developed and delivered incrementally after each sprint.
- **Continuous Integration:** Frequent integration and testing to ensure a stable product.
- **Collaboration and Feedback:** Continuous collaboration with stakeholders for feedback and improvement.
- **Sprint Review and Retrospective:** Review completed work and reflect on areas for improvement.

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3.6 Business Process Model

- **User Registration and Login:** Users (candidates, recruiters, admins) register and log in based on their roles.
- **Test Creation:** Recruiters/admins create customized tests by selecting categories, question types, and difficulty.
- **Test Assignment:** Recruiters assign tests to candidates with scheduled invitations.
- **Test Taking:** Candidates take the test, answering various question formats within the given time
- **Test Evaluation:** The system automatically scores objective questions and uses AI for descriptive answers.
- **Results Reporting:** Recruiters/admins review scores and performance reports.
- **Analytics and Feedback:** Recruiters/admins analyze test data for improvements and strategic decisions.
- **Notifications:** Automated notifications are sent for test invitations, reminders, and results.

3.7 Supplementary Requirements

- **UI Design:** Simple, intuitive, and accessible with light/dark mode options.
- **Data Privacy:** Compliance with GDPR and HIPAA, with proper consent management.
- **Load Handling:** Support for high user traffic with load balancing.
- **Accessibility:** Compatible with screen readers and follows WCAG guidelines.
- **Localization:** Multi-language support and region-specific content.
- **Mobile Responsiveness:** Fully responsive design for mobile devices.
- **Backup and Recovery:** Regular backups and disaster recovery plans.
- **System Monitoring:** Continuous monitoring with automated alerts for performance issues.

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4.2 Communication Interfaces

The communications interfaces for the Online Skill Test Application involve using HTTP/HTTPS protocols for client-server interaction, with data exchanged in JSON/XML format. RESTful APIs or GraphQL are used to handle requests for user login, test submission, and result retrieval. For secure authentication, OAuth 2.0 or JWT tokens are used. Server communication with the database is done through SQL or NoSQL queries, depending on the type of database (relational or NoSQL). Real-time communication features may use WebSockets for live updates, and push notifications to alert users. Error handling is done through standard HTTP status codes and descriptive error messages. Additionally, integration with external APIs can enable functionalities like AI-based test scoring.

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5. Design and Implementation

The Online Skill Test Application is a web-based platform designed to help recruiters and organizations assess candidates' skills efficiently through various types of tests, such as multiple-choice questions (MCQs), coding challenges, and descriptive assessments. The system allows candidates to take skill tests from any location, while recruiters can create, manage, and evaluate these tests.

The platform is structured with three main user roles: candidates, recruiters, and administrators. Candidates can register, log in, and take assigned tests. Recruiters can create custom tests, assign them to candidates, and review results. Administrators manage the overall system, including user accounts and test data.

The application leverages client-server architecture, ensuring the separation of the user interface from the backend, where all the business logic, data storage, and test evaluation occur. RESTful APIs facilitate smooth communication between the client-side interface and server-side logic, and the database stores all relevant data securely.

Real-time features may be integrated for immediate feedback and notifications to keep users informed about deadlines, test results, and updates. The system also supports multi-device access and offers responsive design to ensure usability across desktops, tablets, and smartphones.

Overall, the Online Skill Test Application offers a scalable, secure, and user-friendly platform for evaluating skills, making it an essential tool for the modern recruitment process.

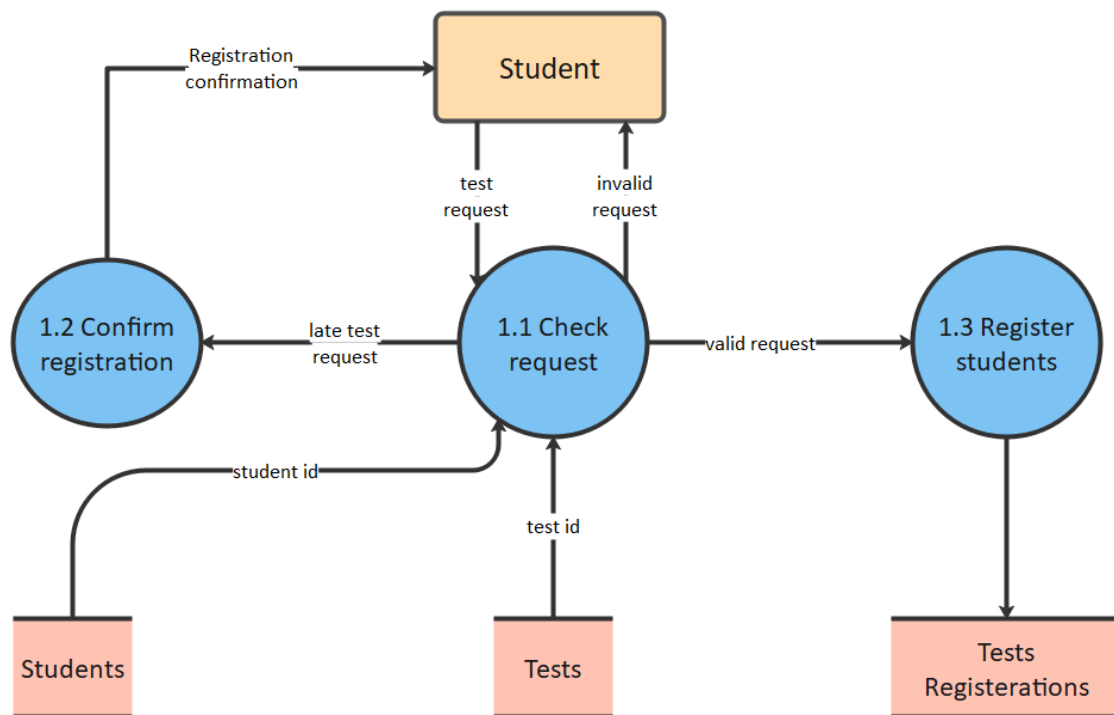
5.1 Product feature

- 1. User Registration & Authentication:** Secure login with email or social media accounts.
- 2. Custom Test Creation:** Recruiters can create and customize tests with various question types.
- 3. Test Assignment:** Recruiters can assign and schedule tests for candidates.
- 4. Real-Time Test Taking:** Candidates take tests with a user-friendly interface.

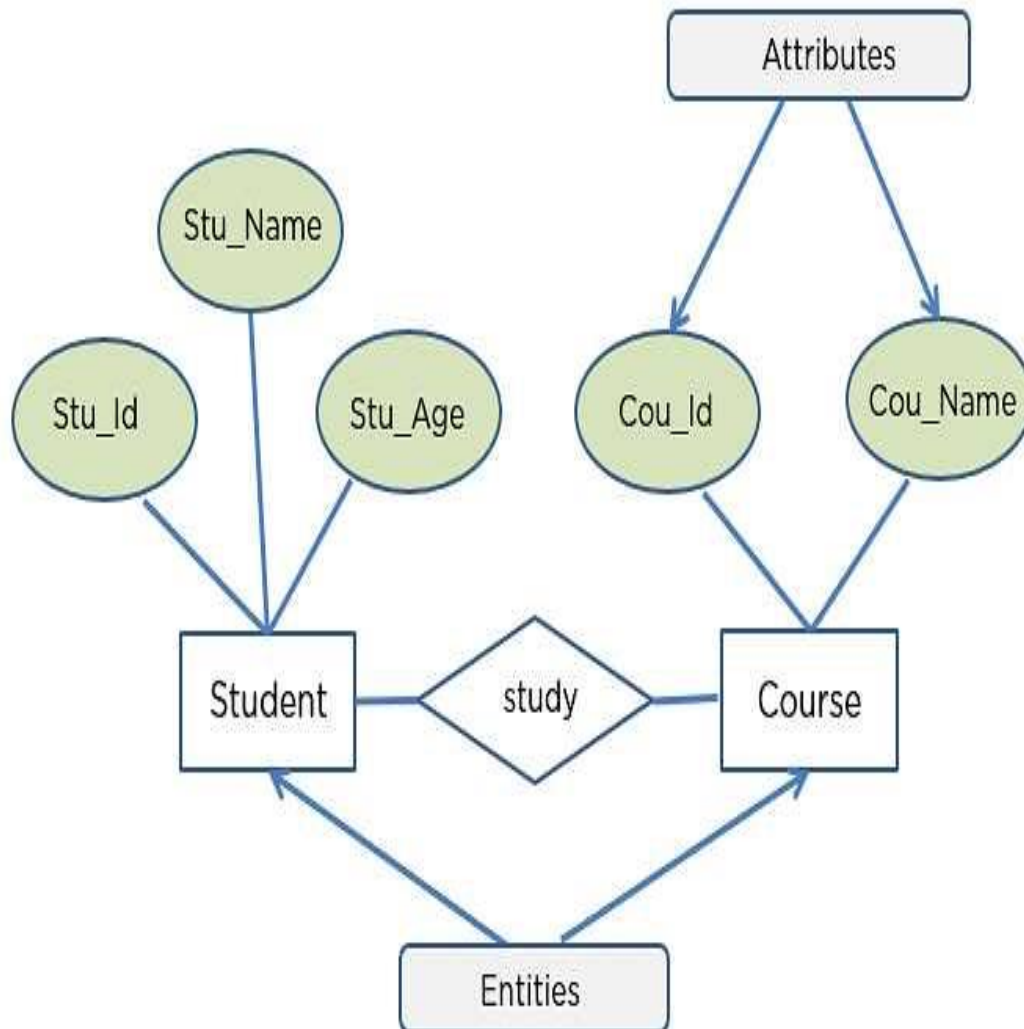
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- 5. Automated Evaluation:** Automatic grading of MCQs and coding challenges; AI or manual review for descriptive answers.
- 6. Instant Feedback & Results:** Candidates receive immediate feedback and results.
- 7. Analytics & Reporting:** Recruiters access detailed performance reports.
- 8. Multi-Device Accessibility:** Fully responsive on desktops, tablets, and smartphones.
- 9. Notifications:** Automated email and push notifications for test updates.
- 10. Security & Privacy:** Compliance with data protection regulations (e.g., GDPR) and encrypted communication.
- 11. Admin Dashboard:** Centralized management of users and tests for admins.

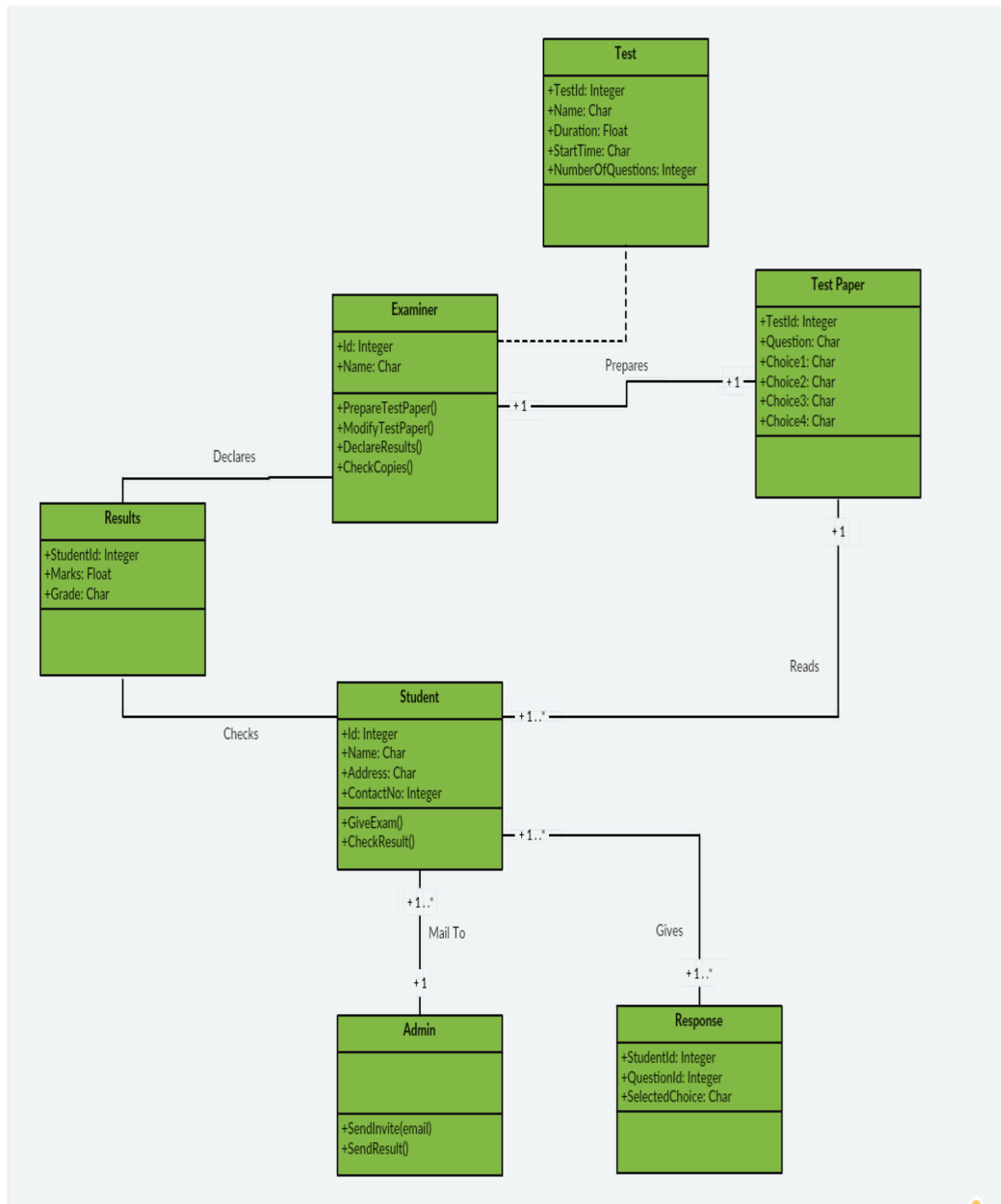
5.2 Data Flow Diagram



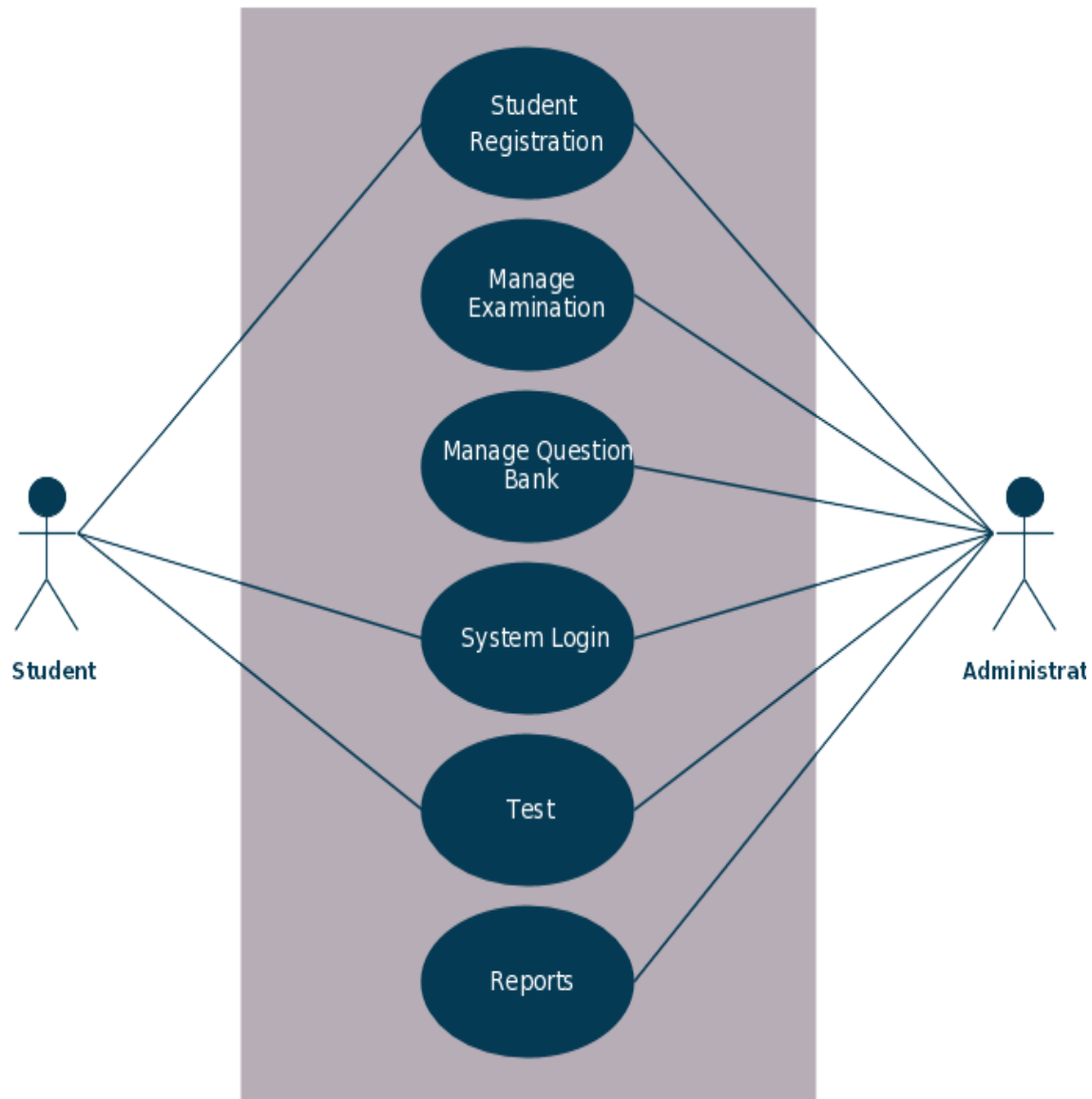
5.3 E-R Diagram



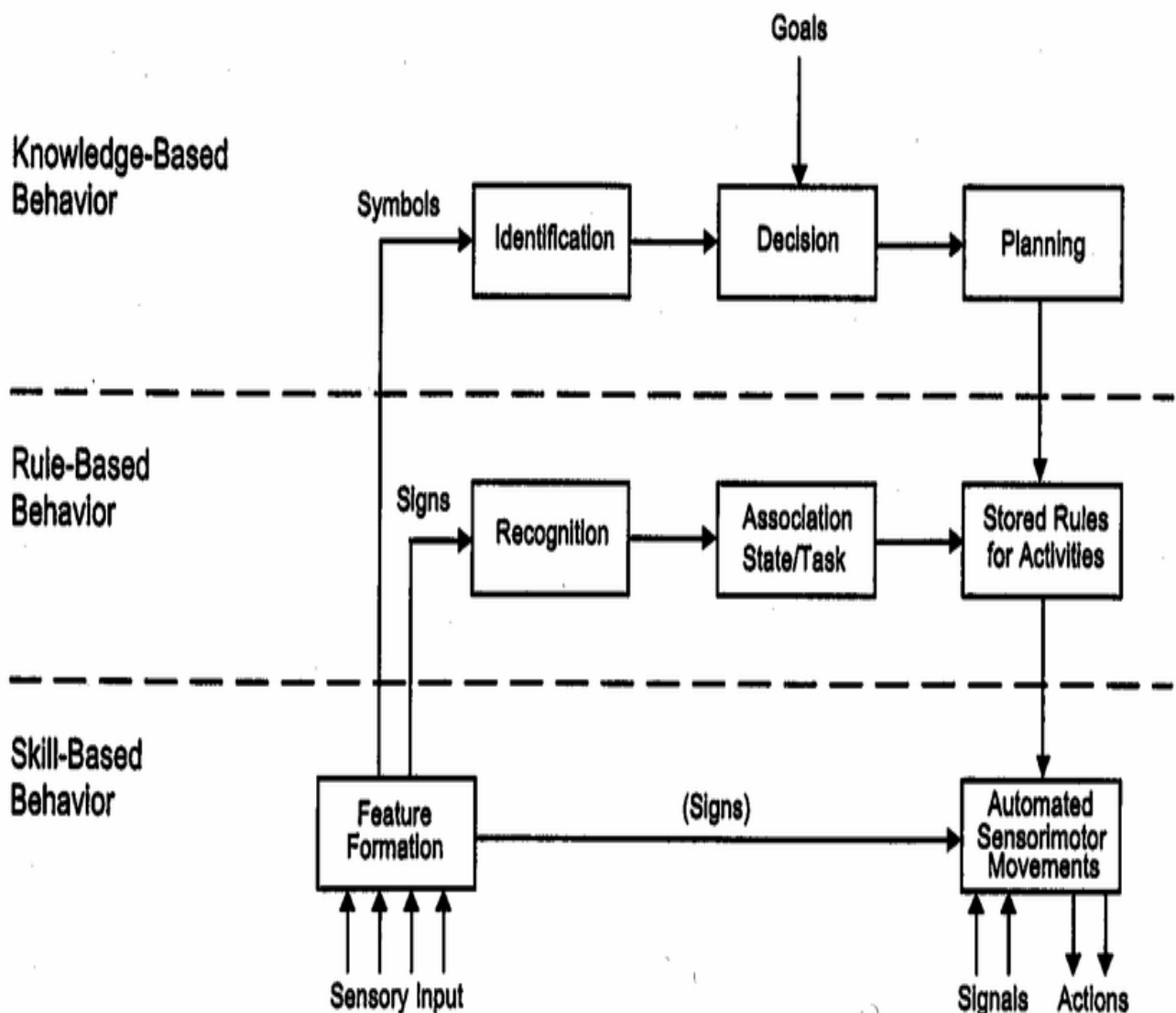
5.4 Class Diagram



5.5 Use-Case Model



5.6 Behaviors Diagrams



5.7 Assumptions and Dependencies

- **Internet Connectivity:** The application assumes that users (candidates, recruiters, admins) have a stable internet connection to access and use the platform effectively.
- **User Devices:** The platform assumes that users will be using devices (computers, tablets, smartphones) with standard web browsers (Chrome, Firefox, etc.) to interact with the application.

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- **Basic User Knowledge:** Users (candidates, recruiters, and admins) have basic knowledge of navigating a web application, including logging in, taking tests, and using online interfaces.
- **Test Content:** It is assumed that recruiters will provide valid and appropriate test content (questions, answers, etc.) for the skill assessments.
- **Secure Authentication:** The system assumes the use of secure authentication protocols (like OAuth 2.0 or JWT) to ensure proper user access and protection of personal data.

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6. Supporting Information

- **User Documentation:** Guides for candidates, recruiters, and admins on using the platform, including a FAQ section for common issues.
- **System Architecture:** Diagrams and descriptions of the client-server model, backend infrastructure, and database design.
- **Security Protocols:** Data encryption methods, authentication (OAuth 2.0, JWT), and backup strategies.
- **Technology Stack:** Technologies used, such as ReactJS, Node.js, and MongoDB/MySQL, with integration details for third-party services.
- **Performance and Scalability:** Performance testing results and plans for handling increased users and data.
- **Compliance and Legal:** Information on data protection (GDPR) and accessibility (ADA) compliance, plus licensing details.
- **Maintenance and Support:** Ongoing maintenance plans and contact information for technical support.

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7. Concerns / Queries / Doubts if any:

- **Security:** How is sensitive data protected, and how is unauthorized access prevented?
- **Test Integrity:** How is cheating or fraud prevented during tests?
- **Scalability:** Can the system handle large numbers of concurrent users and scale in the future?
- **AI Evaluation:** How accurate is the AI-based evaluation, especially for subjective questions?
- **Compliance:** Is the platform compliant with data protection regulations like GDPR and ADA for accessibility?
- **User Experience:** Is the platform user-friendly for all users (candidates, recruiters, admins)?
- **Third-Party Dependencies:** How does the system handle failures in external services (e.g., notifications, cloud storage)?
- **Maintenance and Support:** How frequently is the system updated, and what support options are available?