



National University Of Computing & Emerging Sciences

Final Year Project (CS-491) Software Requirement Specification (SRS) Document Fall '23, BS(CS) CogniAssess

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1 Introduction

1.1 Purpose of Document

This Software Requirements Specification (SRS) document is prepared to define the framework and detailed requirements for CogniAssess, an advanced assessment tool for gauging non-technical skills in candidates. Its primary aim is to provide a clear and comprehensive set of guidelines that articulate the functional and non-functional specifications the software must satisfy. The document is intended to ensure alignment between stakeholders' expectations and the development team's deliverables, facilitating a unified approach to the development of a robust and efficient platform for non-technical talent evaluation. The SRS will cover the scope of the project, overall system description, intended use cases, and functional and non-functional requirements.

1.2 Intended Audience

The intended audience for this SRS document encompasses a broad spectrum of stakeholders including Supervisors, Jury and students. This document aims to provide these professionals with a clear understanding of the project scope, functional and non-functional requirements and intended use cases of COGNIASSESS, facilitating effective collaboration and alignment across different phases of the development process.

1.3 Abbreviations

Definition of Terms, Acronyms, and Abbreviations

This section should provide the definitions of all terms, acronyms, and abbreviations required to interpret the terms used in the document properly.

Term	Definition
ASP	Active Server Pages
DD	Design Specification

1.4 Document Conventions

This document adheres to a standardized format for consistency and clarity. The primary text is set in Times New Roman, with a font size of 12 points, ensuring readability and professionalism. Headings are formatted in bold with a size of 14 points to distinguish them clearly from the main text. Key technical terms, code snippets, and important notes are highlighted in italics to draw attention and aid in quick reference.

2 Overall System Description

2.1 Project Background

As highlighted in the "Introduction", the emergence of COGNIASSESS arises from the conspicuous absence of platforms in the non-technical roles assessment facilitating effortless integration of varied use cases. It's a common scenario to encounter platforms singularly concentrating on one pivotal feature[1]. We observe:

1. **TestGorilla** - While it allows CV analysis, recruiter connectivity, and offers roadmaps, it lacks in providing LLM-Driven Modules and proctoring is not fully realized. Role-specific customization and personalized feedback are also absent, limiting the depth of the assessment.
2. **Vervoe** - It excels in delivering personalized feedback, scenario generation, and roadmaps but does not offer role-specific customization, and LLM-Driven Modules, impacting the diversity and innovation in assessment strategies.
3. **HireVue** - It is adept at providing CV analysis and connecting with recruiters, it, however, does not offer proctoring, personalized feedback, role-specific customization, and LLM-Driven Modules, restricting its comprehensive assessment capabilities.

From diverse viewpoints, including those of business, integration convenience, professional development, and recruitment agencies aspiring to seamlessly adopt advanced assessment models, the necessity for an adaptable, scalable, and user-friendly application becomes overwhelmingly evident. COGNIASSESS, with its innovative approach and multifaceted features like Role-Specific Customization and LLM-Driven Modules, aims to fill this void, offering a comprehensive solution that addresses diverse needs without compromising on the integral aspects of professional assessments and development.

2.2 Project Scope

The COGNIASSESS project's scope is designed to create a streamlined, efficient platform for non-technical skill assessment in recruitment. Key inclusions:

- Web-based platform development for non-technical skill assessments.
- AI integration for dynamic assessments and secure proctoring.
- User-friendly interfaces for candidate profile creation, CV upload, and role selection and Feedback.
- Diverse assessment modules and personalized feedback mechanisms.
- Adherence to data privacy and security standards.
- Ongoing system updates and user experience enhancements.

2.3 Not in Scope

- Assessment of technical skills or roles.
- Real-time video interviewing and advanced technical analysis tools in the initial launch.
- Job posting or application functionalities.
- Integration with external job boards or recruitment platforms in the initial version.
- Multilingual support beyond English in the initial release.

2.4 Project Objectives

The COGNIASSESS project aims to transform non-technical role assessments by addressing current challenges. Key objectives include using Large Language Models for personalized assessments, mitigating biases, providing role-specific evaluations, implementing anti-cheating proctoring, offering real-time feedback, and creating specialized developmental roadmaps. The goal is to develop a Minimum Viable Product (MVP) as a universal solution for fair and accurate non-technical skill assessments, leveraging AI-driven methodologies. The project follows a comprehensive Software Development Life Cycle (SDLC) to ensure effectiveness and accessibility, targeting various roles such as BPO Customer Service, Technical Writer, Content Developer, Social Media Marketer, Finance Manager, and HR Executive[2].

2.5 Stakeholders

The key stakeholders for CogniAssess include:

1. **Educational Institution:** They leverage the tool for evaluating students' non-technical skills.
2. **Project Team:** Responsible for the development, maintenance, and updates of the platform.

2.6 Operating Environment

CogniAssess will function in a diverse, multi-platform digital environment. It is designed to be cloud-native, ensuring high availability and scalability. The application will be accessible via web browsers on desktops, laptops, and mobile devices, supporting cross-platform functionality to cater to a wide user base. Regular updates and maintenance will be managed without disrupting the user experience.

2.7 System Constraints

CogniAssess operates within a set of constraints that impact its design and functionality. These constraints are shaped by various factors in the external environment:

1. **Software Constraints** - CogniAssess relies on sophisticated AI algorithms, necessitating high-performance computing resources for real-time data processing and assessment generation. - The software must ensure the security and confidentiality of user data, complying with international data privacy regulations such as GDPR.
2. **Hardware Constraints** - High-performance hardware infrastructure is essential to support the AI-driven features, ensuring efficient and timely assessments.
3. **Legal Constraints** - CogniAssess must adhere to legal requirements, including international data privacy laws and regulations, to protect user data and maintain compliance.
4. **Scalability** - The system should be scalable to accommodate an increasing number of users and assessments as the platform grows.
5. **Integration** - The architecture of CogniAssess should be robust enough to integrate seamlessly with existing HR systems and databases, ensuring secure data exchange and functionality[1].

These constraints influence the design, development, and operation of CogniAssess, ensuring it meets the demands and expectations of both users and legal authorities while delivering effective assessments.

2.8 Assumptions and Dependencies

This section highlights new issues related to design, distinct from those captured in the System Requirements Specification (SRS) document. Key points include:

- The assumption that the selected technology stack, including the fine-tuned LLM, will remain stable, supported, and available throughout the development cycle.
- Dependency on external services for AI proctoring and integration of the fine-tuned LLM, assuming consistent access and performance levels.

- Expectation of users interacting with the platform in a manner consistent with the predefined user journey, particularly in relation to interactions with the LLM-driven assessment tools.
- Reliance on robust and scalable cloud infrastructure for hosting the platform, which is critical for the high-performance demands of the LLM.
- Presumption of continuous internet connectivity, essential for the LLM's real-time processing and data analysis capabilities.

3 External Interface Requirements

3.1 Hardware Interfaces

Moreover, employing a personal computer equipped with a graphics card, possessing a minimum of 16 GB VRAM, serves as another budget-conscious option. This configuration is adept at the proficient fine-tuning of extensive language models and can yield outcomes that are on par with conventional fine-tuning methods.

3.2 Software Interfaces

Fine-tuning larger models often necessitates substantial GPU memory, thereby incurring considerable expenses. However, innovations like LoRa and QLoRa present effective solutions to mitigate these costs. For instance, QLoRa facilitates economical fine-tuning, making it feasible to utilize platforms like Google Colab Pro. Priced at \$9.72 monthly, Google Colab Pro is an advantageous alternative due to its easy cancellation flexibility[2].

By leveraging open-source models and utilizing efficient fine-tuning methods such as QLoRa, combined with meticulous attention to the expenses of serving machines, one can achieve considerable savings in cost. This cost-effectiveness is maintainable even during instances of high traffic or real-time scenarios, contingent upon the distinct use case. For example, the estimated costs for developing a model based on Falcon 7B can be exceptionally economical—\$9.99 using Google Colab Pro for development, and roughly \$1.006 per hour for deploying on-demand with a single GPU machine. This ensures effective management and control of costs.

3.3 Communications Interfaces

CogniAssess will utilize various communication interfaces to ensure efficient interaction with users. This includes:

Email Integration: For user notifications, verification, and communication. Web Browser Compatibility: Ensuring seamless operation across major web browsers. Network Communications: Adherence to standard protocols such as HTTP/HTTPS for data transfer. Electronic Forms: Utilized for user input and assessments. Message Formatting: Standardized formats for data interchange, like JSON or XML. Communication Security: Implementing SSL/TLS encryption for secure data transfer. Data Transfer Rates: Optimized for efficient and fast data exchange. Synchronization Mechanisms: Ensuring real-time updates across different user sessions.

These interfaces will support the robust functioning of CogniAssess, maintaining high standards of security and efficiency in communications.

4 Functional Requirements

The functional requirements for the CogniAssess project specify the features and capabilities that the system must provide to meet its objectives. These requirements are categorized based on different aspects of the system's functionality:

4.1 User Authentication and Registration

1. **User Registration:**

- Users can register with valid credentials, including email and password.
- Users must provide necessary personal information during registration.

2. **User Login:**

- Registered users can log in with their email and password.
- Optionally, users can log in using third-party authentication services like Google.

4.2 Role and Domain Selection

1. **Role Selection:**

- Upon login, users are presented with a list of non-technical roles to choose from.
- Users can select a desired role for self-assessment.

2. **Domain Selection:**

- After selecting a role, users are directed to a domain selection page.
- Users can choose specific domains relevant to their chosen role.

4.3 CV Analysis and Question Generation

1. **CV Upload:**

- Users can upload their CVs in various formats (e.g., PDF, Word).
- The system parses and extracts relevant information from the CV.

2. **Question Generation:**

- Based on CV analysis and selected domains, the system generates tailored assessment questions.
- Users are presented with questions related to their chosen domains.

4.4 Assessment Process

1. **Assessment Conduct:**

- Users can complete the assessment by answering generated questions.
- AI Proctoring monitors the assessment process for integrity.

2. **Personality Assessment:**

- After domain-specific questions, users undergo a personality assessment.
- The system generates personality-related questions.

3. **Job Scenario Questions:**

- Users answer job scenario questions based on their past experiences.
- The system generates these questions using relevant prompts.

4.5 Assessment Evaluation and Feedback

1. Answer Evaluation:

- The system evaluates user responses using AI algorithms.
- Scores are calculated based on the quality of responses.

2. Feedback Generation:

- CogniAssess compiles detailed feedback reports for users.
- Feedback includes performance analysis and suggestions for improvement.

4.6 User Rankings and Integration

1. User Ranking:

- User scores from assessments contribute to overall rankings.
- Recruiters can access rankings to identify potential candidates.

2. Integration with HR Systems:

- The system integrates with existing HR systems and databases for data exchange.
- Integration ensures secure and efficient communication between CogniAssess and external systems.

These functional requirements define the core capabilities and features of the CogniAssess project, enabling it to deliver comprehensive candidate assessments and rankings for non-technical roles.

4.7 Functional Hierarchy

The functional hierarchy of CogniAssess includes user management, assessment creation and administration, AI-driven analysis, and reporting. These functions are structured to provide a seamless experience from user registration to result analysis.

5 Use Cases

5.0.1 Candidate assessment process use case

This table outlines the "Candidate assessment process" use case with detailed steps and alternative scenarios.

UC001: Candidate Assessment Process		
Actors:	Candidate, System, AI Proctoring	
Feature:	Feature from which the use case is driven	
Pre-condition:	The candidate has successfully registered and logged in to the CogniAssess platform.	
Scenarios		
Step#	Action	Software Reaction
1.	accesses the platform using their credentials	Validates user credentials and presents the role selection interface.
2.	selects the desired non-technical role and domain for assessment.	Retrieves assessment parameters based on the candidate's selections.
3.		The system, integrating with LLM, generates a tailored assessment for the candidate.
4.	Candidate completes the assessment, with AI Proctoring monitoring for integrity.	Monitors the assessment process, ensuring the integrity of the responses
5.	The system evaluates the candidate's responses and calculates a competency score.	Analyzes the responses using the LLM and AI algorithms to generate scores.
6.	The system displays personalized feedback and the competency score to the candidate.	Compiles a detailed feedback report based on the candidate's performance.
Alternate Scenarios:		
1a: Invalid Login: 2a: AI Proctoring Flags Cheating	Candidate inputs invalid credentials and is prompted to retry or reset their password If cheating is detected, the candidate's assessment is halted, and a review process is initiated.	
Pre Conditions	The candidate receives personalized feedback and a competency score.	
Use Case Cross referenced	Domain Selection, Question Generation, AI Proctoring, and Feedback Compilation	

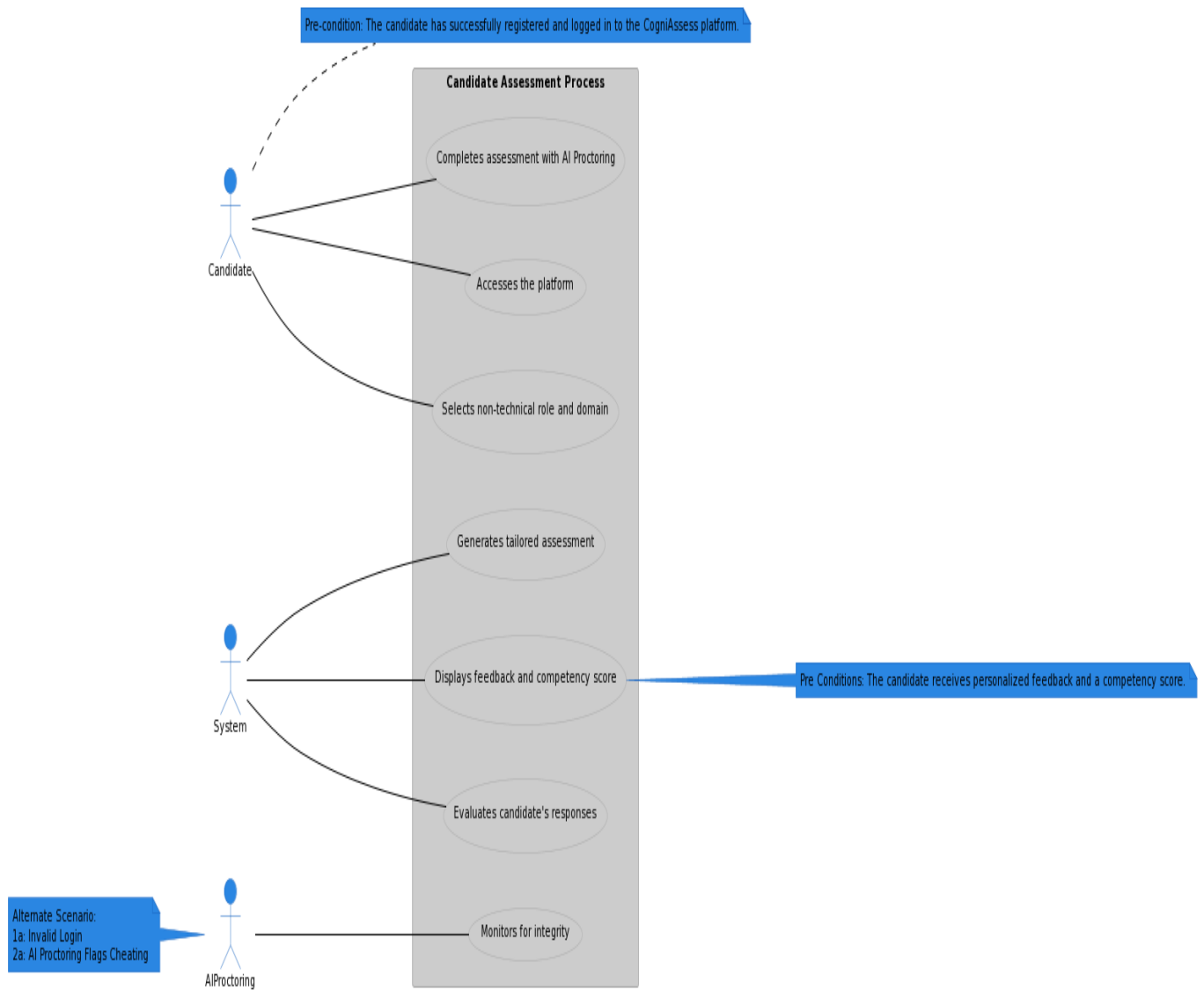


Figure 1: UC001

5.0.2 Candidate Registration use case

This table outlines the "Candidate Registration" use case with detailed steps and alternative scenarios.

UC002: User Registration Process		
Actors:	Prospective User, Registration System	
Feature:	Detailed User Registration and Account Creation	
Pre-conditions:	Prospective user has internet access and reaches the registration portal.	
Primary Scenario		
Step#	User Action	System Response
1.	User navigates to the registration page.	System displays the registration form.
2.	Enters required personal information (name, email, password).	Validates input and prompts for any missing information.
3.	Chooses a username.	Checks for username availability and confirms selection.
4.	Fills out contact details (address, phone number).	Validates and saves contact information.
5.	Agrees to terms and conditions.	Records user's consent.
6.	Clicks on 'Submit' to complete registration.	Creates user account and sends a confirmation email.
Alternate Scenarios		
1a: Page Load Error	-	System displays an error message and suggests to refresh the page.
2a: Missing Information	User omits required fields.	System prompts to fill in all required fields.
3a: Username Taken	Chooses an already taken username.	System prompts to select a different username.
4a: Invalid Contact Info	Enters invalid phone number or address.	System requests valid contact information.
6a: Registration Failure	-	System shows an error message and suggests trying again later.
Post-conditions:	User account is created and the user can log in to the system.	
Use Case Cross-referenced:	N/A	

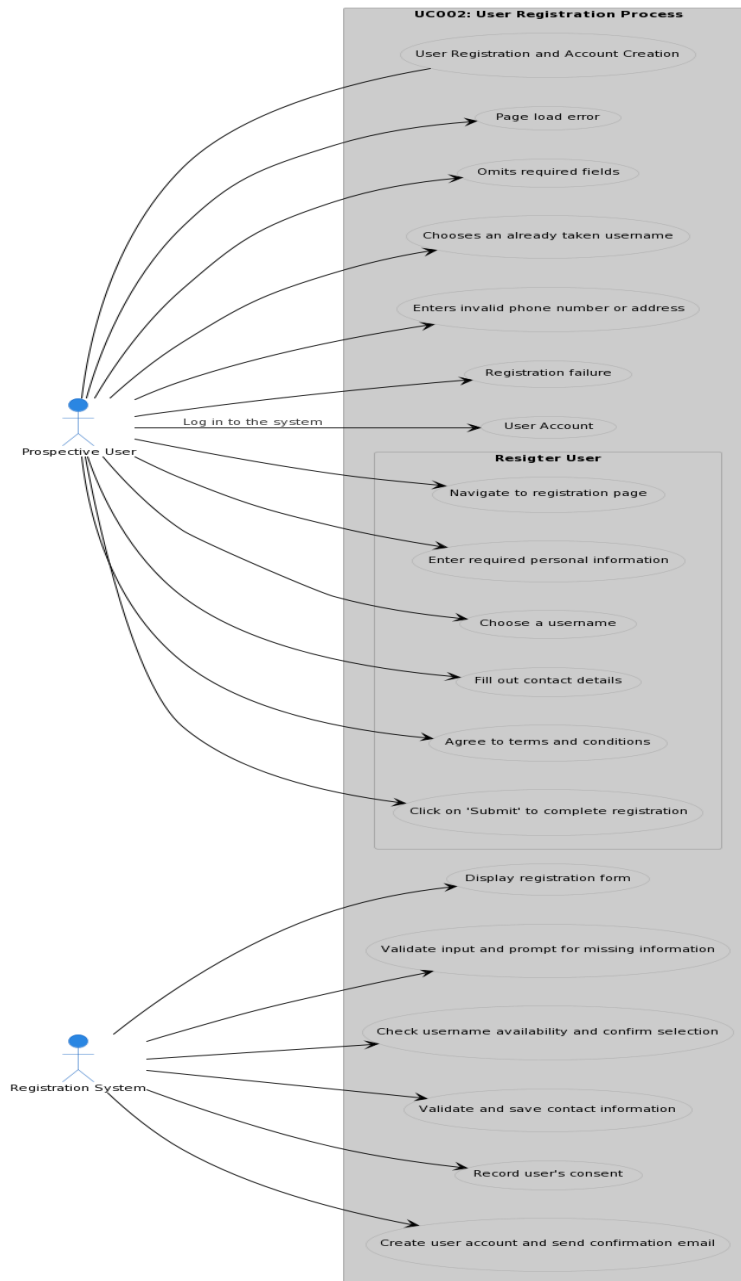


Figure 2: UC002

5.0.3 Role and Domain Selection use case

This table outlines the "Role and Domain Selection" use case with detailed steps and alternative scenarios.

UC003: Role and Domain Selection		
Actors:	User, System	
Feature:	Role Selection and Domain Specification	
Pre-conditions:	User is verified and logged in to the system.	
Primary Scenario		
Step#	User Action	System Response
1.	User is presented with role options.	Displays five non-technical roles for selection.
2.	Selects a specific role.	Directs user to domain selection page.
3.	Chooses relevant domains.	Records domain selections and prepares for next step.
Alternate Scenarios		
2a: Role Unavailable	User selects an unavailable role.	System notifies and prompts for another selection.
3a: No Domain Selection	User does not select any domain.	System prompts to choose at least one domain.
Post-conditions:	User's role and domain selections are recorded for further assessment.	

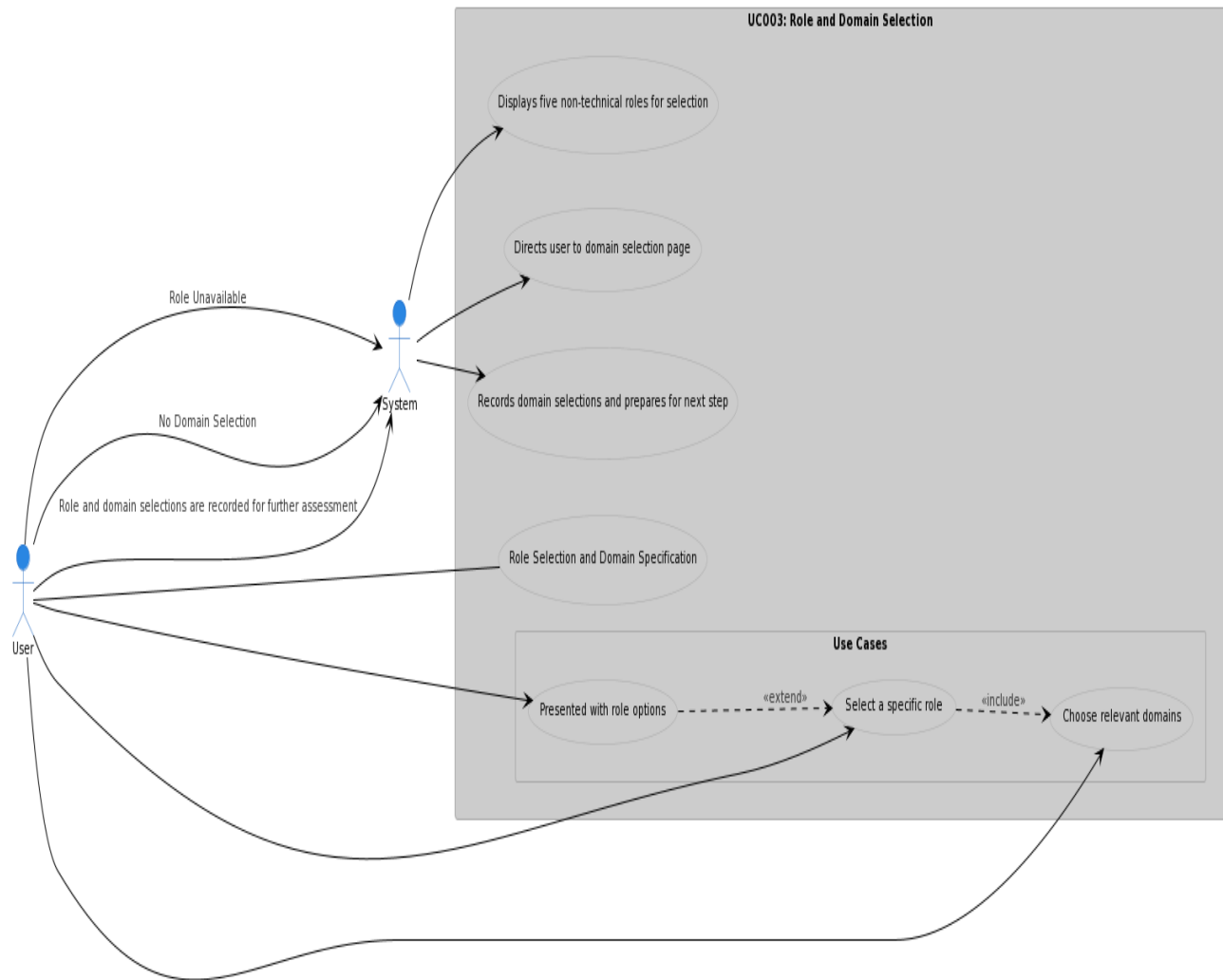


Figure 3: UC003

5.0.4 Assessment and Feedback Generation

This table outlines the "Assessment and Feedback Generation" use case with detailed steps and alternative scenarios.

UC004: Assessment and Feedback Generation		
Actors:	User, System, Large Language Model (LLM)	
Feature:	CV Analysis, Question Generation, and Feedback	
Pre-conditions:	User has selected role and domains.	
Primary Scenario		
Step#	User Action	System Response
1.	Uploads CV.	Analyzes CV and extracts relevant information.
2.	-	LLM generates tailored questions for each domain.
3.	Answers the assessment questions.	Records responses and initiates personality assessment.
4.	Completes personality assessment.	LLM evaluates answers and prepares feedback.
5.	-	Generates and presents personalized feedback and ranking.
Alternate Scenarios		
1a: CV Upload Failure	User faces issues uploading CV.	System prompts to retry uploading.
3a: Incomplete Responses	User leaves some questions unanswered.	System prompts to complete all questions.
Post-conditions:	User receives feedback and ranking, contributing to their profile for recruiters.	

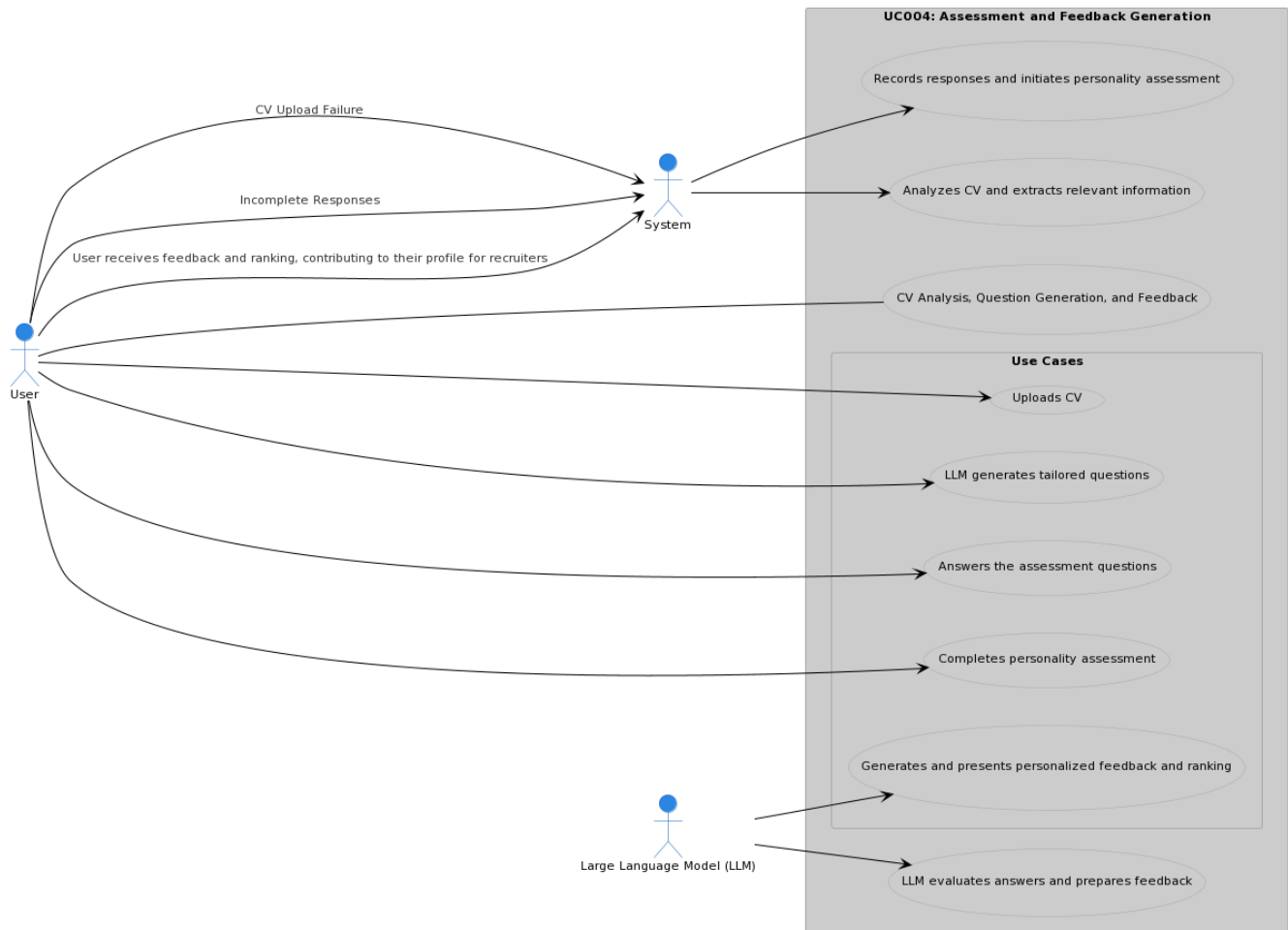


Figure 4: UC004

6 Nonfunctional Requirements

6.1 Performance Requirements

CogniAssess will be optimized for high performance, including fast loading times and efficient handling of simultaneous user sessions. The system will ensure precise and accurate assessment scoring, capable of handling a high volume of users concurrently. The application will be designed for scalability, ensuring consistent performance even as user numbers grow.

6.2 Safety Requirements

The platform will incorporate safeguards to prevent any harm or loss of data. Regular backups, error-handling mechanisms, and compliance with relevant safety regulations and certifications, such as ISO standards for software safety, will be integral. The system will prevent dangerous actions such as unauthorized data access or misuse.

6.3 Security Requirements

Security is a priority, with robust measures for data protection and user privacy. This includes secure data encryption, user authentication, and authorization controls. CogniAssess will adhere to privacy laws like GDPR, ensuring the confidentiality and integrity of user data. Security audits and certifications will be part of the ongoing maintenance.

6.4 User Documentation

Comprehensive user manuals, online help resources, and context-sensitive tutorials will be provided. These documents will guide users through the functionalities of CogniAssess, ensuring they can effectively utilize the platform. The documentation will be accessible, user-friendly, and regularly updated to reflect any changes or new features.

References

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7 Appendices

1. Use Case Diagrams
2. Data Flow Diagrams
3. System Architecture Diagram
4. User Interface Mockups
5. Sample Assessment Questions
6. Code Samples
7. Glossary of Terms