



# CAPSTONE PROJECT REPORT

## Report 3 – Software Requirement Specification

– Ho Chi Minh City, October 2025 –

## Table of Contents

I. Record of Changes .....	3
II. Software Requirement Specification .....	4
1. Product Overview .....	4
2. User Requirements .....	5
2.1 Actors .....	5
2.2 Use Case .....	5
2.2.1 Use Case Diagram .....	5
2.2.2 Descriptions .....	7
3. Functional Requirements .....	12
3.1 System Functional Overview .....	12
3.1.1 Screens Flow .....	13
3.1.2 Screen Descriptions .....	14
3.1.3 Screen Authorization .....	15
3.1.4 Non-Screen Functions .....	16
3.1.5 Entity Relationship Diagram .....	17
4. Non-Functional Requirements .....	21
4.1 Security .....	21
4.2 Performance & Scalability .....	21
4.3 Interoperability & Compatibility .....	21
4.4 Availability & Reliability .....	21
5. Business Rules .....	21

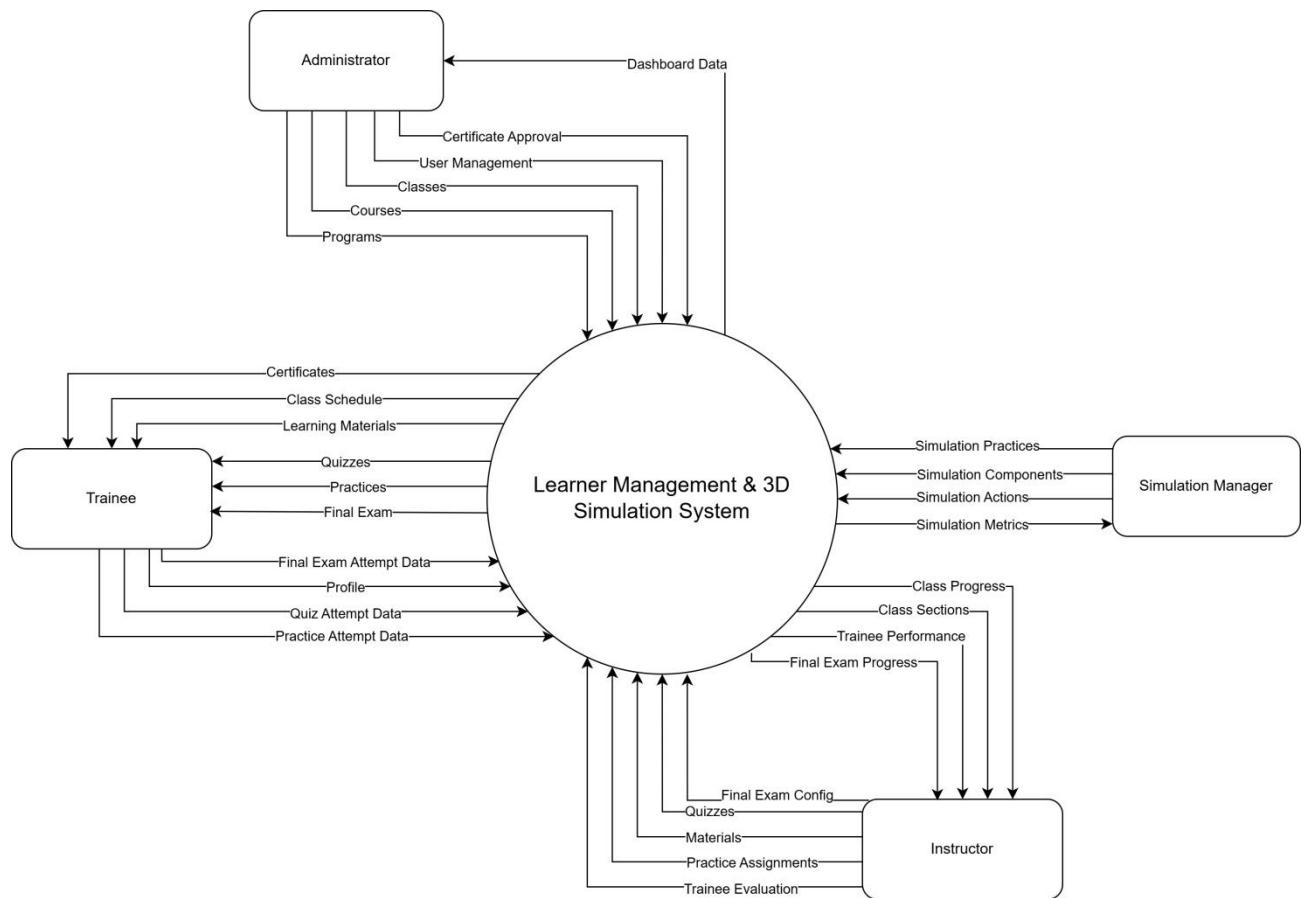
## I. Record of Changes

\*A - Added M - Modified D - Deleted

## II. Software Requirement Specification

### 1. Product Overview

The Learner Management and 3D Simulation System for Crane Training Center (LSSCTC) is an integrated software suite designed to address the high costs, significant safety risks, and logistical challenges of traditional crane operation training. The system provides a unified solution for both theoretical and simulated practical training.



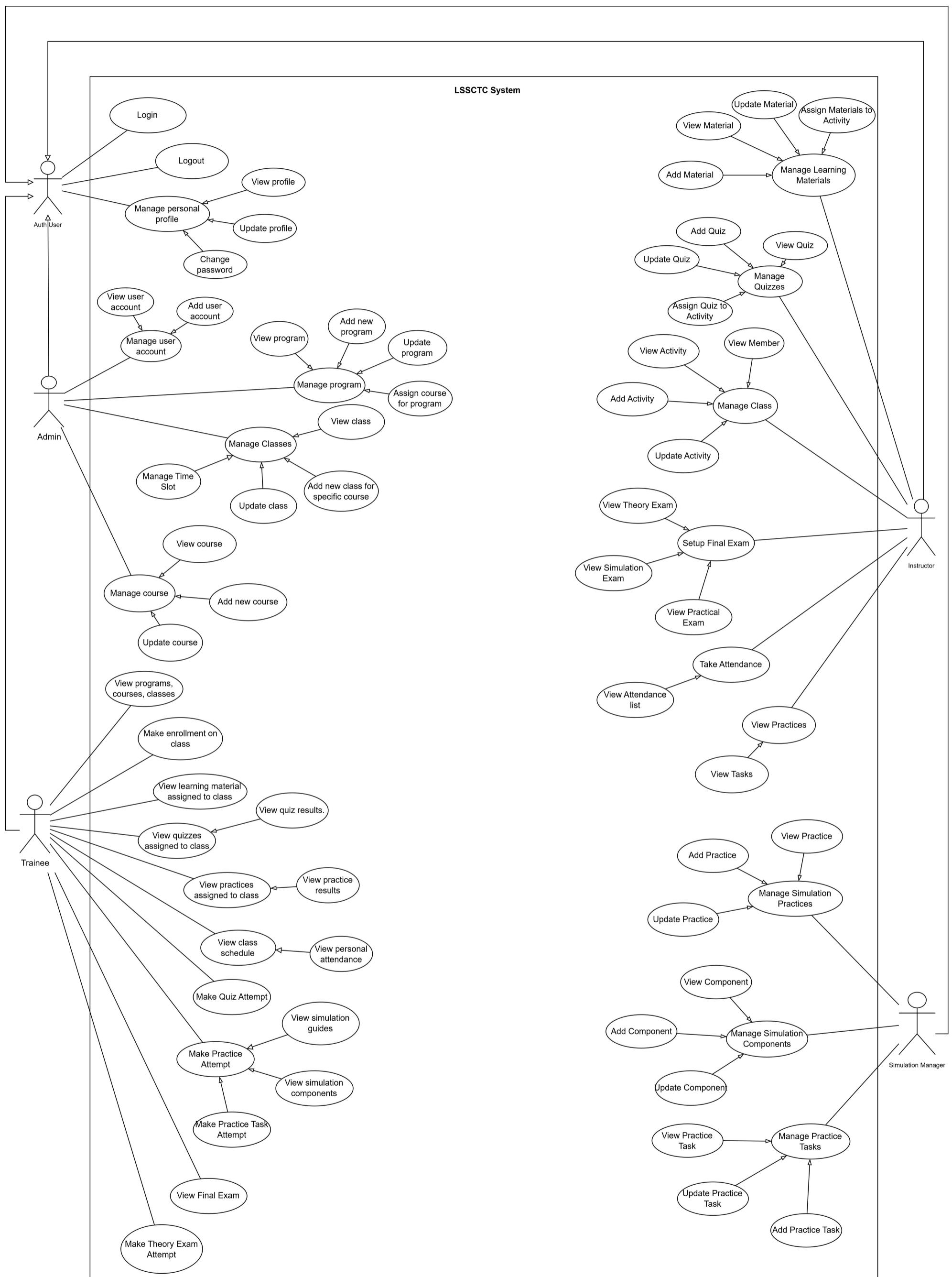
## 2. User Requirements

### 2.1 Actors

#	Actor	Description
1	Administrator	The Administrator is the top-level user responsible for the overall system setup and user management. Using the web application, they manage all user accounts, create and organize the academic structure by managing programs, courses, and classes.
2	Simulation Manager	The Simulation Manager is responsible for defining all aspects of the 3D simulation content. They manage the simulation practices, including simulation components, actions , and warnings.
3	Instructor	The Instructor is responsible for managing the content and trainees within their assigned classes. Using the web application, they manage class members, organize class sections, and upload learning materials and quizzes. They also assign simulation practices to the class and are responsible for tracking trainee results, providing feedback , and confirming the final status for each trainee.
4	Trainee	The Trainee is the primary learner in the system. They use the web application to manage their profile, enroll in classes, access learning materials, and complete theoretical quizzes. They also use the separate 3D simulation desktop application to log in and perform practical crane simulation exercises.

### 2.2 Use Case

#### 2.2.1 Use Case Diagram



### 2.2.2 Descriptions

ID	Use Case	Actors	Use Case Description
UC-01	Add Material	Instructor	This feature allows instructor add a new learning material (PDF, video, link) for teaching.
UC-02	Update Material	Instructor	This feature allows instructor update an existing learning material's info or file.
UC-03	View Material	Instructor	This feature allows instructor view the list and details of learning materials.
UC-04	Assign Materials to Section	Instructor	This feature allows instructor link selected materials to a section/partition for trainees to access.
UC-05	Add Quiz	Instructor	This feature allows instructor create a new quiz with basic information.
UC-06	Update Quiz	Instructor	This feature allows instructor edit a quiz's information.
UC-07	View Quiz	Instructor	This feature allows instructor view quizzes and their details.
UC-08	Assign Quiz to Section	Instructor	This feature allows instructor attach a quiz to a specific section/partition for delivery.
UC-09	Add Member	Instructor	This feature allows instructor add a trainee to the class roster.
UC-10	View Member	Instructor	This feature allows instructor view trainee profiles and class membership.
UC-11	Track Member Process	Instructor	This feature allows instructor track each trainee's study progress and results.
UC-12	View Section	Instructor	This feature allows instructor track each trainee's study progress and results.
UC-13	Add Section	Instructor	This feature allows instructor create a new section for the class.
UC-14	Update Section	Instructor	This feature allows instructor edit section information.
UC-15	Assign Practices to Section	Instructor	This feature allows instructor link practice activities to a section/partition.

UC-16	View Practices	Instructor	This feature allows instructor view practice list and details in the class/section.
UC-17	Confirm Pass/Fail Results	Instructor	This feature allows instructor view practice list and details in the class/section.
UC-18	Add Practice	Instructor	This feature allows instructor create a new practice activity.
UC-19	Update Practice	Instructor	This feature allows instructor edit an existing practice activity.
UC-20	View Practices	Instructor	This feature allows instructor view details of a specific practice activity.
UC-21	Add Component	Instructor	This feature allows instructor add a simulation component needed for practice.
UC-22	Update Component	Instructor	This feature allows instructor update a simulation component's information.
UC-23	View Component	Instructor	This feature allows instructor view the list and details of simulation components.
UC-24	Add Action	Instructor	This feature allows instructor add a simulation action/step used in practices.
UC-25	Update Action	Instructor	This feature allows instructor update a simulation action/step.
UC-26	View Action	Instructor	This feature allows instructor view the list and details of simulation actions.
UC-27	Add Component	Simulation Manager	This feature allows the simulation manager to add a new simulation component to the system.
UC-28	Update Component	Simulation Manager	This feature allows the simulation manager to edit or update existing simulation component information.
UC-29	View Component	Simulation Manager	This feature allows the simulation manager to view the list and details of simulation components.
UC-30	Add Action	Simulation Manager	This feature allows the simulation manager to add a new simulation action used in training practices.
UC-31	Update Action	Simulation Manager	This feature allows the simulation manager to edit or update existing simulation actions.

UC-32	View Action	Simulation Manager	This feature allows the simulation manager to view the list and details of simulation actions.
UC-33	Add Slot	Simulation Manager	This feature allows the simulation manager to create a new simulation timeslot for scheduling practices.
UC-34	Update Slot	Simulation Manager	This feature allows the simulation manager to update or reschedule an existing simulation timeslot.
UC-35	View Slot	Simulation Manager	This feature allows the simulation manager to view all simulation timeslots and their details.
UC-36	Assign Practice to Slot	Simulation Manager	This feature allows the simulation manager to assign a specific practice activity to a simulation timeslot.
UC-37	Add Practice Step	Simulation Manager	This feature allows the simulation manager to define and add new steps for a practice scenario.
UC-38	Update Practice Step	Simulation Manager	This feature allows the simulation manager to modify or reorder steps within a practice scenario.
UC-39	View Practice Step	Simulation Manager	This feature allows the simulation manager to view practice steps assigned to each practice activity.
UC-40	Add Warning	Simulation Manager	This feature allows the simulation manager to create new warning messages or alerts for simulation steps.
UC-41	Update Warning	Simulation Manager	This feature allows the simulation manager to modify or remove existing simulation warnings.
UC-42	View Warning	Simulation Manager	This feature allows the simulation manager to view all defined warnings and their details.
UC-43	Make enrollment programs/courses/classes	Trainee	This feature allows trainee submit an enrollment request to a program, course, or class.
UC-44	View programs, courses, classes	Trainee	This feature allows trainee view the catalog and details of available programs, courses, and classes.
UC-45	Access learning material	Trainee	This feature allows trainee access learning materials provided for their study.

UC-46	View learning material assigned to class section	Trainee	This feature allows trainee view materials specifically assigned to their class section.
UC-47	Download material	Trainee	This feature allows trainee download learning files for offline use.
UC-48	View quizzes assigned to class section	Trainee	This feature allows trainee see newly assigned quizzes for their section.
UC-49	Make attempt quizzes	Trainee	This feature allows trainee start and submit a quiz attempt.
UC-50	View recorded results	Trainee	This feature allows trainee view their quiz scores and attempt history.
UC-51	View practices assigned to class section	Trainee	This feature allows trainee view the list of practices assigned to their section.
UC-52	Select a practice to make a new attempt	Trainee	This feature allows trainee choose a practice and create a new attempt.
UC-53	View list practices	Trainee	This feature allows trainee browse the practice list available to them.
UC-54	Settings simulation guides	Trainee	This feature allows trainee configure guidance options and hints for simulation.
UC-55	View simulation guides	Trainee	This feature allows trainee read the simulation guidance before or during practice.
UC-56	View practice steps and step details	Trainee	This feature allows trainee review each step and its detailed instructions.
UC-57	View simulation components	Trainee	This feature allows trainee view components used in the simulation scenario.
UC-58	Perform simulation actions	Trainee	This feature allows trainee perform the required actions in the simulator.
UC-59	View post-practice result	Trainee	This feature allows trainee see overall results after completing a practice.
UC-60	View step result and warning message	Trainee	This feature allows trainee check each step's result and any warning messages.
UC-61	View user account	Admin	This feature allows admin view the list and details of user accounts in

			the system.
UC-62	Add user account	Admin	This feature allows admin create a new user account and assign a role.
UC-63	Deactivate user account	Admin	This feature allows admin deactivate or disable a user account.
UC-64	Manage user account	Admin	This feature allows admin manage all user accounts, including creating, viewing, and deactivating users.
UC-65	View program	Admin	This feature allows admin view the list and details of existing training programs.
UC-66	Add new program	Admin	This feature allows admin create a new training program in the system.
UC-67	Update program	Admin	This feature allows admin edit information of an existing training program.
UC-68	Assign course for program	Admin	This feature allows admin assign specific courses to a training program.
UC-69	Manage program	Admin	This feature allows admin manage all training programs, including viewing, updating, and course assignment.
UC-70	View class	Admin	This feature allows admin view the list and details of all classes in the system.
UC-71	Add new class for specific course	Admin	This feature allows admin create a new class linked to a selected course.
UC-72	Update class	Admin	This feature allows admin modify class information such as schedule or instructor.
UC-73	Manage classes	Admin	This feature allows admin manage all classes, including creating, updating, and viewing them.
UC-74	View course	Admin	This feature allows admin view the list and details of all courses in the system.
UC-75	Add new course	Admin	This feature allows admin create a new course record in the system.
UC-76	Update course	Admin	This feature allows admin edit the

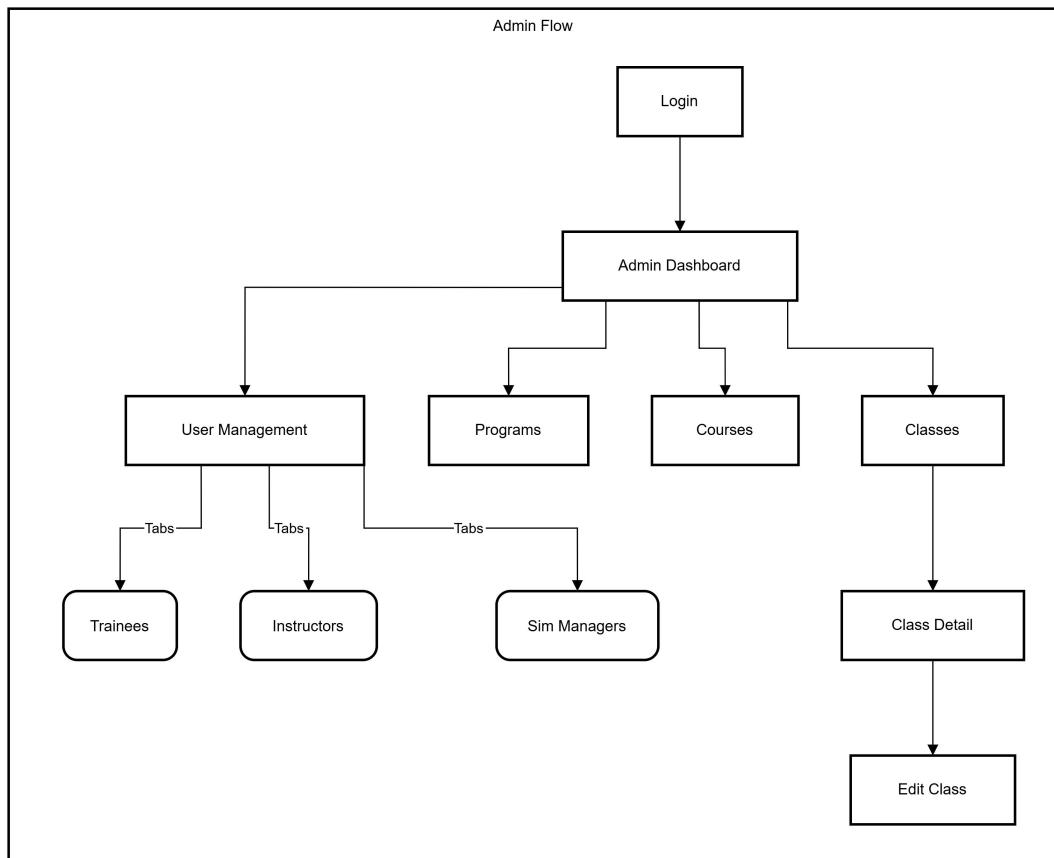
			details of an existing course.
UC-77	Manage course	Admin	This feature allows admin manage all courses, including adding, updating, and viewing them.
UC-78	View programs, courses, classes	Admin	This feature allows admin view an overview list of all programs, courses, and classes in the system.
UC-79	Login	Auth User	This feature allows user login to the system by verifying their credentials and accessing authorized functions.
UC-80	Logout	Auth User	This feature allows user logout from the system securely and end their session.
UC-81	View profile	Auth User	This feature allows user view their personal profile information stored in the system.
UC-82	Update profile	Auth User	This feature allows user edit and update their personal profile details.
UC-83	Change password	Auth User	This feature allows user change their password for account security.
UC-84	Manage personal profile	Auth User	This feature allows user manage their personal profile, including viewing, editing, and changing password.

### 3. Functional Requirements

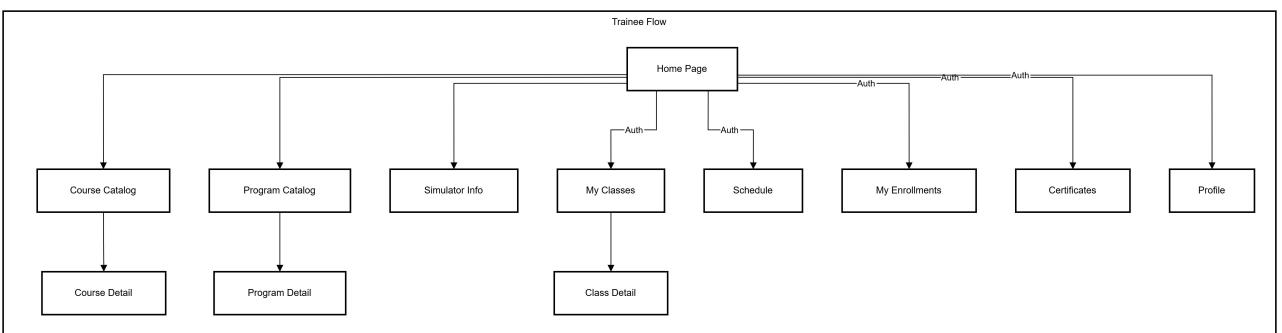
#### 3.1 System Functional Overview

### 3.1.1 Screens Flow

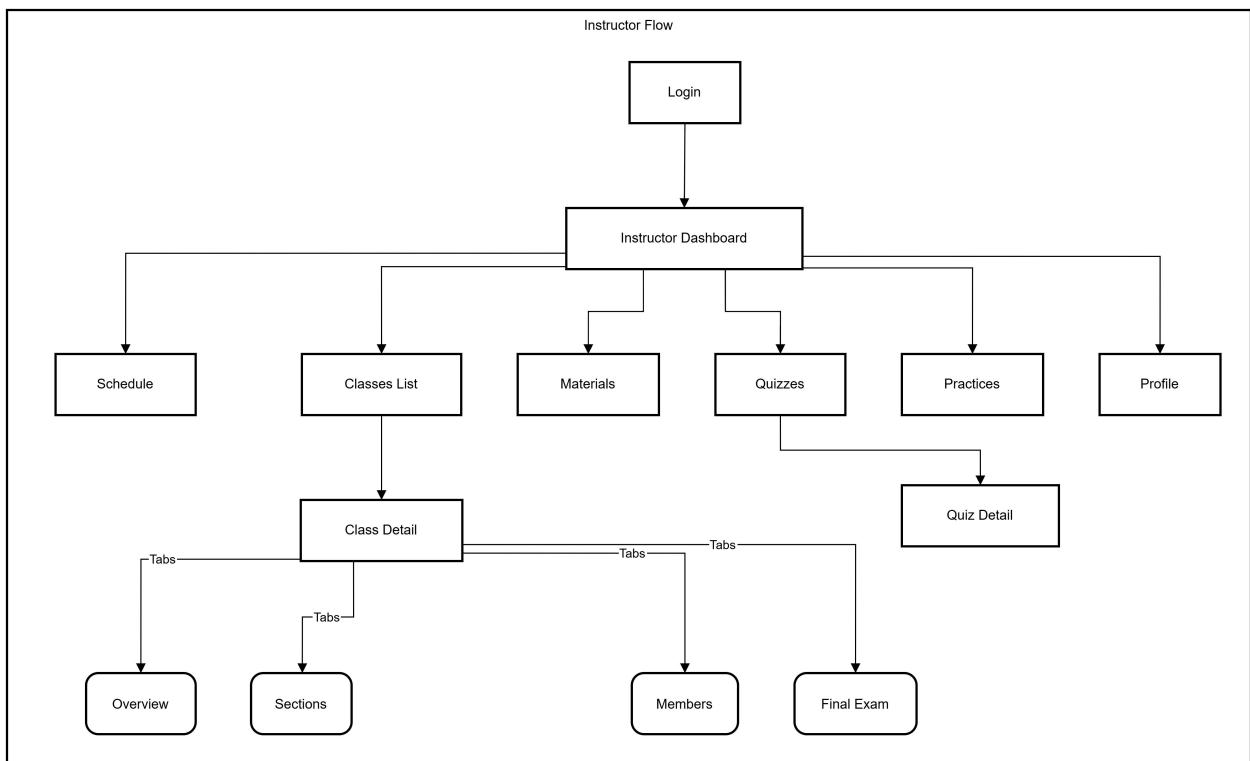
#### 3.1.1.1 Admin Flow



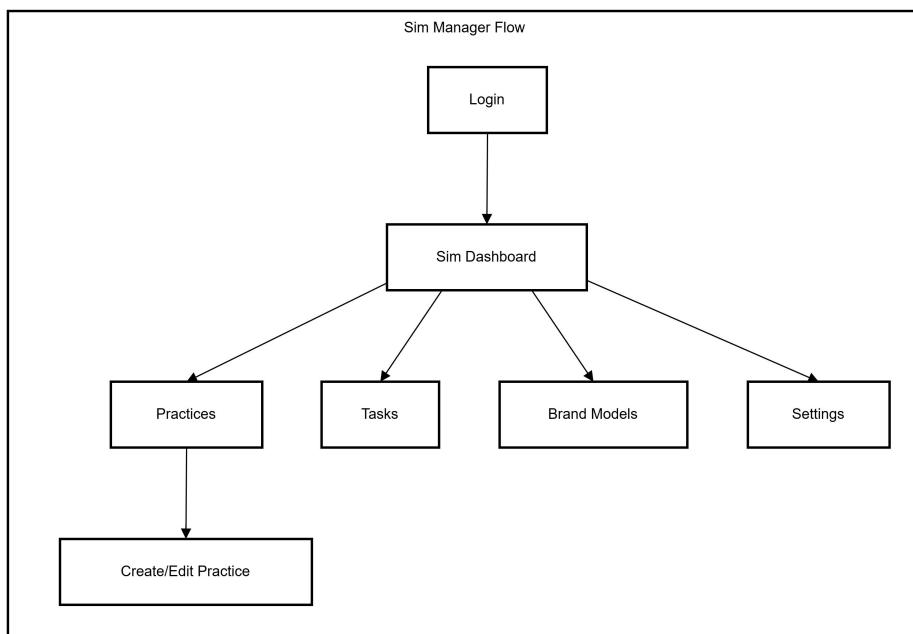
#### 3.1.1.2 Trainee Flow



### 3.1.1.2 Instructor Flow



### 3.1.1.2 Simulation Manager Flow



### 3.1.2 Screen Descriptions

[Provide the descriptions for the screens in the Screens Flow above]

#	Feature	Screen	Description
1	Dashboard	Admin	Overview of system statistics, user counts, and recent

		Dashboard	activities for Administrators.
2	Dashboard	Instructor Dashboard	Overview of assigned classes, upcoming schedules, and student performance metrics.
3	Dashboard	Sim Manager Dashboard	Status overview of active simulations, practice scenarios, and system health.
4	User Management	User Lists	Interfaces to view and manage Trainees, Instructors, and Simulation Managers (tabs/tables).
5	Program Management	Program List	Management of training programs, including creation and modification.
6	Program Management	Program Catalog	Public view for trainees to browse available training programs.
7	Course Management	Course List (Admin)	Administrative list of all courses to manage details and curriculum.
8	Course Management	Course Catalog	Public view for trainees to browse and view details of specific courses.
9	Class Management	Class Management (Admin)	List of classes for admins to create, edit, or view detailed class information.
10	Class Management	Instructor Classes	List of classes assigned to the instructor for teaching.
11	Class Management	My Classes (Trainee)	List of classes the trainee is currently enrolled in.
12	Class Management	Class Detail	Detailed view of a specific class (Overview, Sections, Members, Schedule, Exams).
13	Class Management	Schedule	Calendar view of teaching (Instructor) or learning (Trainee) sessions.
14	Class Management	Quizzes	Management of quizzes, including creation and editing questions (Instructor).
15	Class Management	Final Exam	Management and grading of final exams for a class.
16	Simulation	Practices Management	Creation and configuration of simulation practice scenarios and steps.
17	Simulation	Brand Models	Configuration of brand models used within simulations.
18	Class Management	Materials	Management of learning materials and resources for courses.
19	User Management	User Profile	View and edit personal account information.

### 3.1.3 Screen Authorization

Screen	Admin	Instructor	Trainee	Sim Manager
Admin Dashboard	X			

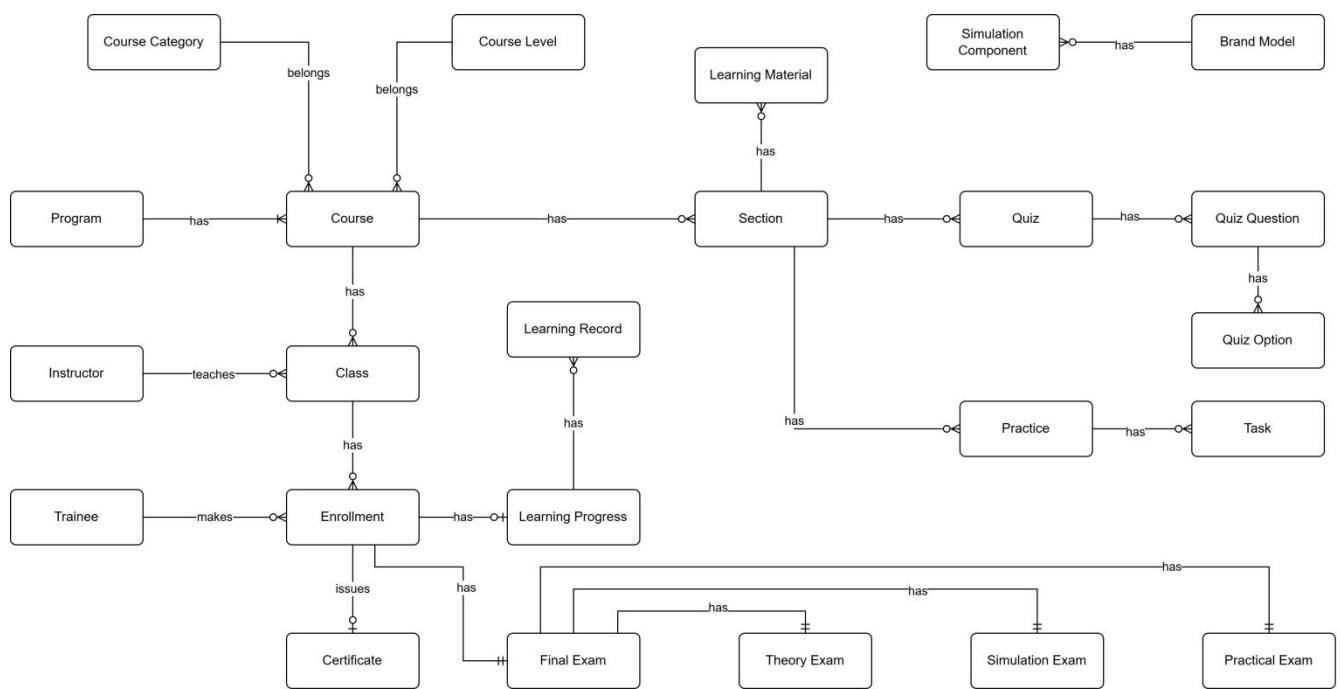
Manage Users (Trainees, Instructors, etc.)	X			
Manage Programs & Courses (Admin)	X			
Manage Classes (Admin)	X			
Instructor Dashboard		X		
Instructor Schedule		X		
Teaching Classes (List & Detail)		X		
Class Attendance & Grading		X		
Content Management (Materials, Sections)		X		
Assessment Management (Quizzes, Practices)		X		
My Classes (Trainee)			X	
My Enrollments			X	
Trainee Schedule			X	
Certificates			X	
Sim Manager Dashboard				X
Manage Practices & Tasks				X
Manage Brand Models				X
Simulation Settings				X

### 3.1.4 Non-Screen Functions

#	Feature	System Function	Description
1	<b>Authentication</b>	Token Interception & Injection	Automatically intercepts outgoing API requests to inject the JWT authentication token into the headers, ensuring secure communication with the backend.
2	<b>Security</b>	Role-Based Access Control (RBAC)	Validates the current user's role against the allowed roles defined for each protected route. If the user lacks permission, it automatically redirects them to the login page or a forbidden page.
3	<b>State Management</b>	Global Session Store	Maintains the user's active session state (including profile data, role, and avatar URL) across different pages without requiring repeated API calls, using a client-side store (Zustand).

4	<b>Localization</b>	Dynamic Language Switching	Manages the application's locale settings, dynamically swapping text resources between English (en) and Vietnamese (vi) and persisting the preference without reloading the page.
5	<b>Data Persistence</b>	Cookie Management	Handles the secure storage and retrieval of authentication tokens and user preferences in browser cookies, allowing sessions to persist across browser restarts.
6	<b>Utility</b>	Time Slot Status Calculation	Automatically calculates the status of a schedule slot (e.g., "Present", "Past", "Future") based on the current system time compared to the slot's start and end times, used for rendering calendar interfaces.

### 3.1.5 Entity Relationship Diagram



### Entities Description

#	Entity	Description
1	Course Category	Classification or categorization of courses by subject area or domain (e.g., Basic Crane Operations, Safety Procedures, Advanced Techniques). Provides organizational structure for grouping related courses. Each course belongs to one category.
2	Course Level	Defines the difficulty or skill level of a course (e.g., Entry Level, Intermediate, Advanced). Used to establish learning progression paths and prerequisite requirements. Each course is assigned one level to indicate target trainee proficiency.

3	Program	Comprehensive training program consisting of multiple courses designed to achieve specific certification or skill objectives. Programs define structured learning paths for trainees, combining courses in a logical sequence to build competencies for crane operator certification.
4	Course	Individual training course representing a specific subject or skill area within the crane training curriculum. Contains course content structured into sections, can be assigned to multiple programs, and serves as the foundation for class creation. Belongs to one category and one level.
5	Instructor	Teaching staff member responsible for delivering course instruction, managing class activities, creating learning materials and assessments, and evaluating trainee performance. Instructors are assigned to teach specific classes and provide guidance throughout the learning process.
6	Class	Scheduled instance of a course with defined start/end dates, assigned instructor, and enrolled trainees. Represents the actual delivery of course content to a specific group of trainees. Classes are where learning activities, assessments, and instruction occur.
7	Trainee	Student or learner enrolled in training programs to become certified crane operators. Trainees make enrollments in classes, access learning materials, complete quizzes and practices, take final exams, and track their learning progress toward certification.
8	Enrollment	Record of a trainee's registration in a specific class. Creates the relationship between trainee and class, enabling access to course materials, activities, and assessments. Enrollment triggers creation of learning progress tracking and final exam records.
9	Learning Material	Educational content resources such as videos, documents, presentations, or external links used to deliver course instruction. Materials are assigned to sections to provide trainees with reference and study resources. Can be reused across multiple sections.
10	Section	Logical unit or module within a course syllabus representing a specific topic or learning objective. Sections organize course content into manageable chunks and contain learning materials, quizzes, and practices. Defines the structure and sequence of course curriculum.
11	Quiz	Assessment tool containing multiple questions used to evaluate trainee understanding of theoretical concepts. Quizzes are assigned to sections, have defined pass criteria and time limits, and contribute to overall learning progress. Results are tracked through quiz attempts.

12	Quiz Question	Individual question within a quiz presenting a problem or prompt for trainees to answer. Questions are assigned point values (contributing to total quiz score of 10 points) and can support single or multiple correct answers through associated quiz options.
13	Quiz Option	Possible answer choice for a quiz question. Each option is marked as correct or incorrect and may have associated explanations. Multiple options per question enable various question types (multiple choice, select all that apply).
14	Practice	Simulation-based training scenario performed in the 3D crane simulator environment. Practices consist of ordered tasks that trainees must complete to demonstrate hands-on skills. Assigned to sections as practical learning activities with defined difficulty levels and attempt limits.
15	Task	Individual step or action within a simulation practice that trainees must perform correctly. Tasks define expected results for validation, and task completion is tracked during practice attempts. Tasks are reusable components across different practices.
16	Simulation Component	3D virtual representation of crane parts, controls, or environment objects used in simulation practices. Components are linked to brand models to represent real-world equipment and are referenced in tasks for interaction requirements.
17	Brand Model	Specification of real crane equipment brands and models being simulated in the training system. Defines manufacturer information, specifications, and links to simulation components that represent the physical equipment in virtual environment.
18	Learning Record	Historical record of trainee interactions with course sections, tracking what content has been accessed and when. Maintains audit trail of learning activities for compliance, reporting, and progress monitoring purposes.
19	Learning Progress	Comprehensive tracking of trainee advancement through enrolled courses. Records overall progress percentage, theory and practical scores, completion status, and timestamps. Central entity for monitoring trainee performance and determining certification readiness.
20	Certificate	Official document template awarded to trainees upon successful course or program completion. Defines certificate design, content structure, and requirements. Issued certificates are permanent records of trainee achievement for verification and credentialing purposes.
21	Final Exam	Comprehensive assessment conducted at course completion to evaluate trainee readiness for certification. Consists of three components (Theory, Practical, Simulation) that are weighted and combined for total score. Results determine pass/fail status and

		certificate eligibility.
22	Theory Exam	Written assessment component of final exam evaluating trainee understanding of theoretical concepts and safety knowledge. Implemented using the quiz system with defined pass criteria. One of three partial exams that compose the final exam.
23	Simulation Exam	Performance-based assessment component conducted in 3D simulator requiring trainees to demonstrate crane operation skills. Uses practice system with task-by-task evaluation. One of three partial exams contributing to final exam score and certification decision.
24	Practical Exam	Hands-on assessment component where trainees demonstrate physical crane operation skills evaluated by instructors using predefined checklists. Assesses real-world competencies beyond simulation environment. One of three partial exams required for certification.

## 4. Non-Functional Requirements

### 4.1 Security

- NFR-SEC-01 (Authentication): The system must use JWT (JSON Web Tokens) for stateless, secure API authentication.
- NFR-SEC-02 (Token Management): The system must support token revocation (blacklist) using Distributed Cache to prevent usage of compromised tokens before expiry.
- NFR-SEC-03 (Data Protection): Sensitive data (like passwords) must be hashed. The API must communicate over HTTPS (though RequireHttpsMetadata is currently false for dev, production requires true).
- NFR-SEC-04 (Access Control): API endpoints must be protected by Role-Based Authorization policies ensuring users can only access data pertinent to their role.

### 4.2 Performance & Scalability

- NFR-PERF-01: The system uses Distributed Memory Cache to handle high-frequency data access like token validation and OTP storage.
- NFR-PERF-02: Database interactions must use asynchronous operations (async/await) to prevent thread blocking under load.
- NFR-PERF-03: Large data sets (Users, Classes, Enrollments) must be returned via Pagination (PagedResult) to reduce network payload and database load.

### 4.3 Interoperability & Compatibility

- NFR-INT-01: The API must expose a Swagger/OpenAPI documentation interface for client integration.
- NFR-INT-02: The system must support CORS (Cross-Origin Resource Sharing) to allow requests from specific web clients (e.g., lssctc.site, localhost).
- NFR-INT-03: The system must support standard file formats for imports/exports, specifically Excel (.xlsx) and CSV.

### 4.4 Availability & Reliability

- NFR-REL-01: The system is built on .NET Core and Entity Framework Core, designed for cross-platform deployment.
- NFR-REL-02: External integrations (e.g., Email Service) must be implemented as Transient services to ensure fresh connections and reliability.

## 5. Business Rules

ID	Category	Rule Definition
BR-01	Authentication	Upon successful login to the web app, the system must redirect users to their role-based landing page: - Admin: Admin Dashboard - Simulation Manager: Simulation Manager Dashboard - Instructor: Instructor Dashboard - Trainee: Trainee Home Page
BR-02	Authentication	Upon successful login to the <b>simulation app</b> , users with the 'Trainee' role <b>must</b> be redirected to the home screen.

BR-03	Authentication	Deactivated accounts <b>cannot</b> log in or interact with the system.
BR-04	Authentication	The Username, Email, and Phone Number fields <b>must</b> be unique for each user account.
BR-05	Authentication	A user's Phone Number <b>must</b> be between 4 and 15 digits.
BR-06	Authentication	The Email field <b>must</b> adhere to a standard email format (e.g., user@domain.com).
BR-07	Authentication	A user's account profile <b>can</b> only be updated by the account owner.
BR-07	Authentication	A password reset request <b>must</b> require email verification.
BR-08	Permissions	The 'Admin' role has exclusive permissions to manage 'Simulation Manager', 'Instructor', and 'Trainee' accounts.
BR-09	Permissions	The 'Admin' role has exclusive permissions to: <ul style="list-style-type: none"> <li>- Create and update programs.</li> <li>- Assign courses to a program.</li> <li>- Create and update courses.</li> <li>- Create and update course syllabi.</li> <li>- Manage classes.</li> </ul>
BR-10	Permissions	Instructors <b>can</b> only manage content for classes to which they are assigned.
BR-11	Programs	A new program <b>must</b> be created with a Name and an Active Status.
BR-12	Programs	A program <b>cannot</b> contain duplicate course assignments.
BR-13	Programs	A program <b>cannot</b> be assigned more than 10 courses.
BR-14	Courses	Each course <b>must</b> have a unique Name and a unique Course Code.
BR-15	Courses	A new course <b>must</b> be created with a Name, Course Code.
BR-16	Courses	A course's learning section <b>can</b> only be updated if no classes are currently assigned to that course.
BR-17	Classes	Each class <b>must</b> have a unique Name and a unique Class Code.
BR-18	Classes	A class <b>must</b> be linked to a specific course upon creation.
BR-19	Classes	A class <b>must</b> have exactly one assigned 'Instructor'.
BR-20	Classes	Before a class starts, its learning content <b>must</b> mirror the learning sections of its parent course.
BR-21	Classes	Class content <b>can</b> only be updated when class status is 'Draft' or 'Open'.
BR-22	Classes	A class <b>can</b> only be started if all conditions are met: <ul style="list-style-type: none"> <li>- At least one 'Trainee' is enrolled.</li> <li>- One 'Instructor' is assigned only.</li> <li>- Every class section contains at least one activity.</li> </ul>
BR-23	Classes	Each class <b>must</b> have a unique Name and a unique Class Code.
BR-24	Trainee	A 'Trainee' <b>must</b> have a valid account before enrolling in any program.
BR-25	Trainee	A 'Trainee' <b>cannot</b> be enrolled in the same class more than once.
BR-26	Trainee	A 'Trainee' <b>cannot</b> be enrolled in two different classes that have conflicted schedules.
BR-27	Trainee	'Trainees' <b>can</b> only attempt quiz and practice when their session is valid.
BR-28	Class Activities	Each learning activity <b>must</b> be one of the following types: 'Material', 'Quiz', or 'Practice'.
BR-29	Class Activities	A new activity <b>must</b> be created with a Name, Type, and Order (sequence) number.
BR-30	Class Activities	A new learning material (e.g., 'Video', 'Document') <b>must</b> include a Name and either a Source File or Source URL.

BR-31	Class Activities	A Source File for learning material <b>cannot</b> exceed 50MB in size.
BR-32	Quizzes	A new quiz <b>must</b> be created with a Name and a Max Attempts value.
BR-33	Quizzes	A quiz <b>must</b> contain one or more questions.
BR-34	Quizzes	Each question <b>must</b> include answer options, and each option <b>must</b> be flagged as 'Correct' or 'Incorrect'.
BR-35	Quizzes	A quiz <b>cannot</b> contain more than 100 questions.
BR-36	Quizzes	A quiz question <b>cannot</b> have more than 20 answer options.
BR-37	Quizzes	The total score for every quiz <b>must</b> be exactly 10 points.
BR-38	Quizzes	The score of any single question <b>must</b> be greater than 0 and less than 10.
BR-39	Quizzes	The sum of all question scores within a quiz <b>must</b> equal 10.
BR-40	Quizzes	Only users with the 'Trainee' role <b>can</b> attempt a quiz.
BR-41	Quizzes	Every quiz attempt by a 'Trainee' <b>must</b> be recorded.
BR-42	Quizzes	A 'Trainee's' final quiz score <b>must</b> be determined by their latest attempt.
BR-43	Quizzes	'Trainees' <b>cannot</b> retake a quiz after reaching the Max Attempts limit.
BR-44	Simulation Practices	A simulation practice <b>must</b> contain between 1 and 20 tasks.
BR-45	Simulation Practices	Each practice task <b>must</b> have a unique 'task_code'.
BR-46	Simulation Practices	Each practice must have a unique 'practice_code'.
BR-47	Simulation Practices	A task cannot be assigned to a practice more than once.
BR-48	Simulation Practices	A new practice task <b>must</b> be created with a Name, Description, and Task Code.
BR-49	Simulation Practices	A new simulation practice <b>must</b> have a unique Name and a unique Practice Code.
BR-50	Simulation Practices	A new simulation Component <b>must</b> have a unique Name, and a unique Component Code.
BR-51	Simulation Practices	'Trainees' <b>must</b> be authenticated before accessing a simulation practice.
BR-52	Simulation Practices	'Trainees' <b>can</b> only start practices that are marked as 'Active' and are part of their assigned class.
BR-53	Simulation Practices	'Trainees' <b>must</b> complete all simulation tasks to finish a practice.
BR-54	Simulation Practices	While a 'Trainee' is taking a simulation practice: <ul style="list-style-type: none"> <li>- The system <b>must</b> display guides and step descriptions.</li> <li>- The system <b>must</b> automatically advance to the next step upon successful completion of the current step.</li> <li>- The system <b>must</b> record the result of every step for evaluation.</li> </ul>
BR-55	Simulation Practices	'Trainees' <b>cannot</b> retake a simulation practice after reaching the Max Attempts limit.
BR-56	Simulation Practices	'Trainees' <b>must</b> be authenticated before accessing a simulation practice.
BR-57	Simulation Practices	'Trainees' <b>can</b> only start a simulation final exam after input a correct Exam Code.

BR-58	Simulation Practices	'Trainees' <b>can</b> only access to the simulation final exam belongs to their enrolled classes.
BR-59	Simulation Practices	While a 'Trainee' is taking a simulation final exam: - The system <b>must</b> display guides and step descriptions. - The system <b>must</b> automatically advance to the next task upon successful completion of the current step. - The system <b>must</b> record the result of every task for evaluation.
BR-60	Simulation Practices	'Trainees' <b>cannot</b> retake a simulation final exam after reaching the Max Attempts limit.