PROJECT

HURRICANIX
eLEARNING

COMSATS University Islamabad

Abbottabad Campus

Project: HURRICANIX e-LEARNING (SRS)

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1 Introduction:

Our HURRICANIX eLEARNING platform is designed to make learning accessible and convenient for everyone. With our online platform, you can access a wide range of courses and materials on various subjects, all in one place. Whether you're a student looking to supplement your education, a working professional looking to upgrade your skills, or simply someone who wants to learn something new, our app has something for you. With interactive features, quizzes, attempting assignment in real-time with integrated applications and progress tracking, our app makes it easy to stay engaged and motivated as you learn.

1.1 Purpose:

"The fundamental goal of our E-Learning platform is to revolutionize education accessibility and engagement by:

➢ Providing a diverse range of courses and materials accessible from anywhere, catering to students, professionals, and lifelong learners.
➢ Fostering interactive and engaging learning experiences through quizzes, real-time assignments, and integrated applications.
➢ Tracking individual progress to personalize learning journeys and enhance motivation.
➢ Offering a seamless learning experience that transcends geographical limitations, making education convenient and adaptable to varying schedules.
➢ Empowering learners by simplifying the learning process, thereby promoting continuous personal and professional development."

1.2 Project Scope:

- **Objective:** Develop an E-Learning Platform to revolutionize accessibility and engagement in online education.
- **Features:**

  ➢ Centralized repository for diverse courses and study materials.
  ➢ User-centric interface catering to students, professionals, and lifelong learners.
  ➢ Offline learning functionality allowing video lecture downloads.
  ➢ Interactive tools like real-time assignments, quizzes, and progress tracking.
  ➢ Personalized user profiles for tailored learning experiences.

- **Target Audience:** Students, working professionals, and knowledge enthusiasts seeking versatile educational resources.
- **Out of Scope:**

  ➢ Hardware development or physical learning tool creation.

> ➢ Content creation; the platform focuses on hosting existing educational materials.

- **Constraints:**

  - ➢ Stringent security measures for data privacy.
  - ➢ Compatibility across devices and operating systems.
  - ➢ Compliance with educational standards and regulations.

- **Deliverables:**

  - ➢ Fully functional E-Learning Platform meeting specified requirements.
  - ➢ Comprehensive user documentation for ease of use.
  - ➢ Testing reports ensuring platform reliability.

- **Milestones:**

  - ➢ Development Phase: Platform creation, feature integration, rigorous testing.
  - ➢ Implementation Phase: Platform launch, user onboarding, feedback incorporation.

- **Success Criteria:**

  - ➢ High user engagement rates and positive feedback.
  - ➢ Minimal post-launch technical issues.
  - ➢ Positive user adoption reflected in usage metrics.

1.3   Document Conventions:

1.3.1   Naming Conventions

- **Entities and Attributes**: Use PascalCase for entity names (e.g., User, Course) and camelCase for attributes (e.g., courseId, enrollmentDate).
- **File Naming**: Name files using descriptive, lowercase names separated by hyphens (e.g., user-profile.html, course-details.css).

1.3.2 Formatting Guidelines

- **Headers and Titles**: Apply Heading 1 (#) for main sections, Heading 2 (##) for subsections, and so forth for clear hierarchy.
- **Text Formatting**: Use bold (**) for emphasis and code backticks (`) for inline code or technical terms.
- **Lists**: Employ bullet points for lists of items and numbers for step-by-step procedures or sequences.

1.3.3 Data Representation

- **Attributes**: Specify attributes in tables, including data types, keys (PK, FK), and any constraints or validations.
- **Entity Relationships**: Represent relationships using ERDs (Entity-Relationship Diagrams) with clear labels and cardinality.

1.3.4 Documentation Structure

- **Introduction**: Begin with an overview explaining the purpose, scope, and objectives of the document.
- **Main Body**: Organize content logically into sections and subsections for ease of understanding.
- **Appendices**: Include additional supporting materials, such as sample data, glossary, or technical specifications.

1.3.5 Language and Style

- **Tone and Voice**: Maintain a professional and consistent tone throughout the documentation.
- **Language Clarity**: Use simple and concise language, avoiding jargon whenever possible.
- **Consistency**: Ensure consistency in spelling, grammar, and terminology throughout the document.

1.3.6 Version Control and Revisions

- **Versioning**: Use version numbers (e.g., v1.0, v1.1) to track document revisions and updates.
- **Revision History**: Maintain a section detailing changes made in each version, including dates and contributors.

1.3.7 References and Citations

- **External Sources**: Properly cite and reference external sources or materials used in the documentation following a standardized citation style (e.g., APA, MLA).

1.3.8 Review and Approval Process

- **Review Cycle**: Establish a review process involving stakeholders or subject matter experts to ensure accuracy and completeness.
- **Approval**: Define an approval workflow outlining who can approve the document for finalization.

1.3.9   Accessibility and Readability

- **Accessibility Guidelines**: Ensure the documentation is accessible, considering readability, use of color, and accommodating various reading aids.
- **Navigation**: Include a table of contents, hyperlinks, or navigation aids for easy access to different sections.

1.3.10 Document Maintenance

- **Regular Updates**: Schedule periodic reviews and updates to keep the documentation current and reflective of project changes.
- **Archival Process**: Define procedures for archiving obsolete versions or retired documents.

1.4   References:

This Software Requirements Specification (SRS) document references the following documents:

Document Title	Author	Version	Date	Source	URL
Scope and Vision Document	Syed Shah Hussain and Mahad Wajid	1.0	20-10-2023	SRS E-Learning Repository	https://github.com/ShahxHussain/SRS-E-Learning-Platform

Throughout the development of the E-Learning Platform project, the following references will be consulted:

- ➢ Academic research on educational psychology and pedagogy, focusing on online learning and engagement strategies.
- ➢ Industry best practices and guidelines for user interface design in e-learning systems.
- ➢ Reports and studies on educational technology trends and innovations, particularly in online course delivery and learner interaction.
- ➢ Publications and resources highlighting effective methods for content curation and instructional design in e-learning environments."

These references can serve as a foundation for understanding the pedagogical, technological, and design aspects essential for developing a robust and engaging E-Learning Platform. When using

these references, it's important to properly cite and integrate them within the project documentation to support the platform's development and functionalities.

2 Overall Description:

2.1 Product Perspective:

The E-Learning Platform exists within the realm of online educational technologies. It functions as a centralized system aimed at providing a diverse range of courses and learning materials across various subjects. The platform operates as a standalone system, yet it may integrate with external tools or learning management systems for enhanced functionality or content sourcing.

2.2 User Classes and Characteristics:

The platform caters to different user classes:

- **Students:** Seeking supplemental education or specific course completion.
- **Professionals:** Looking to upskill or expand their knowledge base.
- **Lifelong Learners:** Individuals interested in continuous learning and personal development. Each class possesses varying degrees of technical proficiency and learning objectives, driving the need for a user-friendly interface and personalized learning experiences.

2.3 Operating Environment:

The E-Learning Platform operates in an online environment, accessible via web browsers across multiple devices such as desktops, laptops, tablets, and smartphones. It requires a stable internet connection for regular usage, with provisions for offline access to downloaded course materials.

2.4 Design and Implementation Constraints:

- **Security Measures:** Stringent data protection protocols to ensure user privacy and safeguard sensitive information.
- **Compatibility:** Ensuring compatibility across different operating systems and devices for a seamless user experience.
- **Educational Standards:** Compliance with educational guidelines and standards governing online learning.

2.5 Assumptions and Dependencies:

- **Assumptions:** The platform assumes a certain level of user engagement and motivation in completing courses.
- **Dependencies:** Dependence on reliable internet connectivity for real-time usage; offline access feature reliant on device storage capabilities.

3 System features:

Feature	Description	Requirements
User Profile Management	Manage user accounts and store information securely.	1. Allow users to create, update, and delete profiles. 2. Ensure secure storage of user information.
Course Catalog	Display available courses with descriptions and categorization.	1. List courses with details, objectives, and prerequisites. 2. Categorize courses for easy navigation.
Content Management System (CMS)	Upload, organize, and manage course materials (lectures, quizzes, resources).	1. Support multiple formats for content. 2. Enable organization and easy access.
Learning Management System (LMS)	Track student progress, grading, feedback, and performance analytics.	1. Record student progress and grades. 2. Provide performance insights and analytics.
Discussion Forums	Facilitate communication between students and instructors.	1. Enable forums, chats, or messaging systems. 2. Support collaboration tools for group discussions.
Assessment and Evaluation	Create quizzes, exams, and assessments; automate grading and feedback.	1. Develop various types of assessments. 2. Implement automated grading and feedback mechanisms.
Progress Tracking and Reporting	Allow students to monitor their progress; provide analytics for administrators.	1. Provide progress tracking tools for students. 2. Generate reports for platform usage and course effectiveness.
Certification and Credentials	Issue certificates or badges upon course completion; maintain credential records.	1. Generate and issue completion certificates. 2. Store earned credentials securely.
Mobile Compatibility	Ensure platform accessibility and functionality across devices.	1. Develop a responsive design for different screen sizes. 2. Optimize usability on mobile devices.
Payment and Subscription	Manage payments for course enrollment or subscriptions.	1. Implement secure payment processing. 2. Offer subscription management if applicable.

Accessibility Features	Ensure compliance with accessibility standards for users with disabilities.	1. Adhere to ADA and other relevant accessibility standards. 2. Provide features for users with disabilities.
Content Recommendation	Suggest courses based on user preferences, history, and learning goals.	1. Utilize user data to recommend relevant courses. 2. Implement personalization algorithms.
Security and Privacy	Implement robust security measures to protect user data.	1. Ensure data encryption and secure user authentication. 2. Prevent unauthorized access to user information.
Technical Support and Helpdesk	Offer assistance to users facing technical issues or needing guidance.	1. Provide helpdesk support for technical queries. 2. Offer resources for user guidance and troubleshooting.

4 Data requirements:

4.1 Logical data model:

Entity	Attributes	Relationships
User	user_id (PK), usertype, username, email, password, other_user_attributes	-
Course	course_id (PK), title, description, other_course_attributes	-
Enrollment	enrollment_id (PK), user_id (FK - User), course_id (FK - Course), enrollment_date, other_enrollment_attributes	User (One-to-Many), Course (One-to-Many)
Video	video_id (PK), course_id (FK - Course), title, video_url, other_video_attributes	Course (One-to-Many)
Quiz	quiz_id (PK), course_id (FK - Course), title, questions, other_quiz_attributes	Course (One-to-Many)
Assignment	assignment_id (PK), course_id (FK - Course), title, description, other_assignment_attributes	Course (One-to-Many)
Project	project_id (PK), course_id (FK - Course), title, description, other_project_attributes	Course (One-to-Many)
Certificate	certificate_id (PK), user_id (FK - User), course_id (FK - Course), issue_date, other_certificate_attributes	User (One-to-Many), Course (One-to-Many)

4.2   Data dictionary

Attribute	Description	Data Type
course_id	Unique course identifier	Integer
title	Course title	String
description	Course description	String
instructor_id	Unique instructor identifier	Integer
category	Course category or subject area	String
price	Course price	Decimal
duration	Course duration (in hours)	Integer
level	Difficulty level (e.g., beginner, intermediate)	String
instructor_id	Unique instructor identifier	Integer
name	Instructor name	String
bio	Instructor biography	String
email	Instructor email	String
specialization	Instructor expertise area	String
student_id	Unique student identifier	Integer
name	Student name	String
email	Student email	String
address	Student address	String
enrolled_courses	List of enrolled course_ids for the student	List of Integers
lesson_id	Unique lesson identifier	Integer
content	Lesson content (text, video, documents)	String
sequence_number	Lesson order or sequence number	Integer
enrollment_id	Unique enrollment identifier	Integer
enrollment_date	Date of student enrollment in the course	Date
completion_status	Status of course completion	String
quiz_id	Unique quiz identifier	Integer
questions	Quiz questions	String
difficulty	Quiz difficulty level	String
attempt_id	Unique quiz attempt identifier	Integer
submission_date	Date of quiz attempt submission	Date
score	Score achieved in the quiz attempt	Decimal

4.3   Reports

4.3.1   Course Enrollment and Completion Report

➢ Overview of course enrollments, completions, and dropout rates.
➢ Breakdown of popular courses based on enrollment numbers.
➢ Insights into courses with the highest completion rates.

4.3.2   Instructor Performance Report

➢ Analysis of instructor effectiveness based on student feedback and course completion rates.
➢ Comparison of instructor ratings and their respective course performance.

4.3.3   Student Progress and Engagement Report

➢ Tracking student progress, including lessons completed, quizzes taken, and average scores.
➢ Engagement metrics such as time spent per course or lesson and frequency of logins.

4.3.4   Course Category Analysis Report

➢ Overview of the popularity of course categories or subjects.
➢ Insights into which categories attract more enrollment and completion rates.

4.3.5   Revenue and Profitability Report

➢ Revenue generated from course sales, broken down by course and instructor.
➢ Identification of top-performing courses in terms of profitability.

4.3.6   Customer Demographics and Behavior Report

- ➢ Analysis of student demographics, including age groups, geographic locations, and learning preferences.
- ➢ Insights into customer behavior, such as preferred course types or interaction patterns.

4.3.7   Course Feedback and Ratings Report

- ➢ Aggregated feedback from students, including ratings, comments, and suggestions for improvement.
- ➢ Identification of courses with the highest and lowest satisfaction rates.

4.3.8   Platform Performance Report

- ➢ System metrics like uptime, user traffic, and platform responsiveness.
- ➢ Identification of peak usage times and performance bottlenecks.

4.3.9   Retention and Churn Report

- ➢ Analysis of student retention rates and reasons for churn or dropout.
- ➢ Insights into factors influencing continued subscription or enrollment.

4.3.10 Completion Time Analysis Report

- ➢ Average time taken by students to complete courses.
- ➢ Identification of courses that are either completed quickly or take longer than average.

4.4   Data acquisition, integrity, retention, and disposal

Data Type	Data Acquisition	Data Integrity	Data Retention	Data Disposal
User Profile	User registration	Validate against internal database for accuracy	As long as user	Securely delete from all systems upon account deletion
Course Information	Instructor uploads, admin input	Regular checks against course metadata and content	As long as	Securely delete or archive upon course deletion
Enrollment Records	User enrolls in courses	Ensure alignment with available course catalog	Until course	Securely delete or archive upon course completion
Learning Progress	User interaction with course materials	Tracking of progress, completion, and assessment data	Until course	Securely delete or archive upon course completion
Feedback and Ratings	User-submitted feedback and ratings	Moderation and validation for authenticity	As needed for	Securely delete or archive after specified time period

5   External interface Requirements:

5.1   User interfaces

5.1.1   User-Friendly Interface

➢ Easy navigation for users with varying technical abilities.
➢ Clear and intuitive design for seamless interaction.

5.1.2   Visual Appeal

➢ Visually appealing design using appropriate colors and fonts.
➢ Tailored aesthetics for the target audience.

5.1.3 Responsiveness

> ➢ Compatibility across multiple devices (smartphones, tablets, computers).
> ➢ Responsive design ensuring optimal viewing and interaction.

5.1.4 Clear Instructions and Feedback

> ➢ Concise and clear instructions guiding users through the app.
> ➢ Real-time feedback to acknowledge user actions.

5.2 Software interfaces

5.2.1 Database Connectivity
Interface with a database containing course details, user information, etc.

5.2.2 Secure Payment Processing
Integration with secure payment gateways for transaction processing.

5.2.3 Order Fulfillment and Tracking
Interaction with shipping systems for order fulfillment.

Real-time tracking updates for users.

5.3 Hardware interfaces

5.3.1 Compatibility with Hardware Devices
Support for external devices like cameras, microphones, or interactive boards.

Integration with devices such as barcode scanners or payment terminals.

5.3.2 Printer Connectivity
Interface with printers for receipt and invoice printing.

5.4 Communications interfaces

5.4.1   Push Notifications
Sending and receiving push notifications to inform users about updates or events.

5.4.2   Email Communication
Automated emails for order confirmations, shipping updates, and notifications.

5.4.3   Analytics and Tracking
Capture user interactions for analytics and reporting purposes.

6   Quality attributes

6.1   Usability

6.1.1   Ease of Use

> - **Intuitive Interface:** User-friendly design with easy navigation and clear layouts.
> - **Accessibility:** Ensuring usability for users with diverse technical abilities.

6.1.2   Search Functionality

> - **Robust Search Features:** Effective search options by course title, category, or keywords.
> - **Filtering Options:** Facilitating filtering by price, duration, level, or popularity.

6.1.3   Information

> - **Comprehensive Course Details:** Detailed course descriptions, objectives, and prerequisites.
> - **Interactive Content:** Engaging multimedia content supplemented with additional resources.

6.2   Performance

6.2.1   Speed

> **Responsive Design:** Fast loading times for pages and course materials.

> **Optimized Performance:** Efficient resource utilization for seamless user experience.

6.2.2   Reliability

- **Stability:** Ensuring the platform's stability without frequent downtime or technical glitches.

- **Consistency:** Maintaining consistent performance across different devices and browsers.

6.2.3   Scalability

- **Capacity to Scale:** Ability to handle increased user traffic and growing content demands.

6.2.4   Availability

- **24/7 Accessibility:** Ensuring continuous access to course materials and platform functionalities.

6.3   Security

6.3.1   Data Protection
- **Secure Handling:** Protection of user data from unauthorized access or breaches.

6.3.2   Payment Security
- **Secure Transactions:** Implementing secure payment gateways for financial transactions.

6.3.3   Content Access Control
- **User Authentication:** Ensuring authorized access to paid or restricted content.

6.4   Safety

6.4.1   Content Reliability
- **Accurate Information:** Ensuring educational content adheres to factual accuracy and reliability.

6.4.2   Privacy Compliance
- **GDPR and Data Privacy:** Compliance with data protection laws to safeguard user privacy.

6.4.3   Content Safety
- **Moderation:** Monitoring content for inappropriate or misleading information.

6.5   Other Attributes

6.5.1   Sustainability
- **Eco-friendly Practices:** Promoting sustainability in content creation and platform operations.

6.5.2   Community Engagement
- **Interactive Forums:** Providing a platform for users to interact, share insights, and collaborate.

6.5.3   Educational Impact
- **Learning Outcomes:** Measuring and ensuring the effectiveness of courses in achieving learning objectives.

7   Internationalization and Localization Requirements:

7.1   Internationalization Requirements:

1. **Currency Handling:** Support multiple currencies and implement localized currency formatting, including symbols, decimals, and placement.
2. **Language Support**: Design the platform architecture to accommodate multiple languages seamlessly.
3. **Cultural Adaptability**: Develop features that can adapt to different cultural preferences, date formats, and numeric systems.
4. **Content Separation**: Separate user interface elements from content to facilitate easy translation without altering the system's functionality.
5. **Dynamic Content Handling**: Enable dynamic content adjustments based on language preferences without altering the system's core structure.
6. **Responsive Design**: Ensure the platform's design is adaptable to different screen sizes and orientations, considering diverse devices used globally.

7.2   Localization Requirements:

1. **Translation Support**: Facilitate easy translation of platform content into different languages by providing translation management tools or integration with translation services.
2. **Cultural Adaptation**: Customize content to suit local norms, values, and cultural sensitivities of various regions or countries.
3. **Localized Content**: Offer region-specific content or courses tailored to the needs and interests of different user demographics.
4. **Date, Time, and Currency Formats**: Customize date, time, and currency formats based on regional preferences.
5. **Localized Media**: Provide support for localized images, videos, and audio content, considering cultural references and preferences.
6. **User Interface Adaptation**: Adjust the user interface elements such as buttons, menus, and labels to match the language and cultural context of users.

8 Appendences:

8.1 Appendix A: Glossary

TERMS	DEFINITION
API	Application Programing Interface
GDPR	General Data Protection Regulation
HTTP	Hyper Text Transfer Protocols
HTTPs	Hyper Text Transfer Protocol Secure
JSON	JavaScript Object Notation
TLS	Transport Layer Security
SSL	Secure Socket Layer
DB	Database
SQL	Structured Query Language
XML	Extensible Markup Language
GCP	Google Cloud Platform (GCP).
AWS	Amazon Web Services
iOS	IPhone Operating System

8.2   Appendix B: Analysis Model

8.2.1   Use Case Diagram
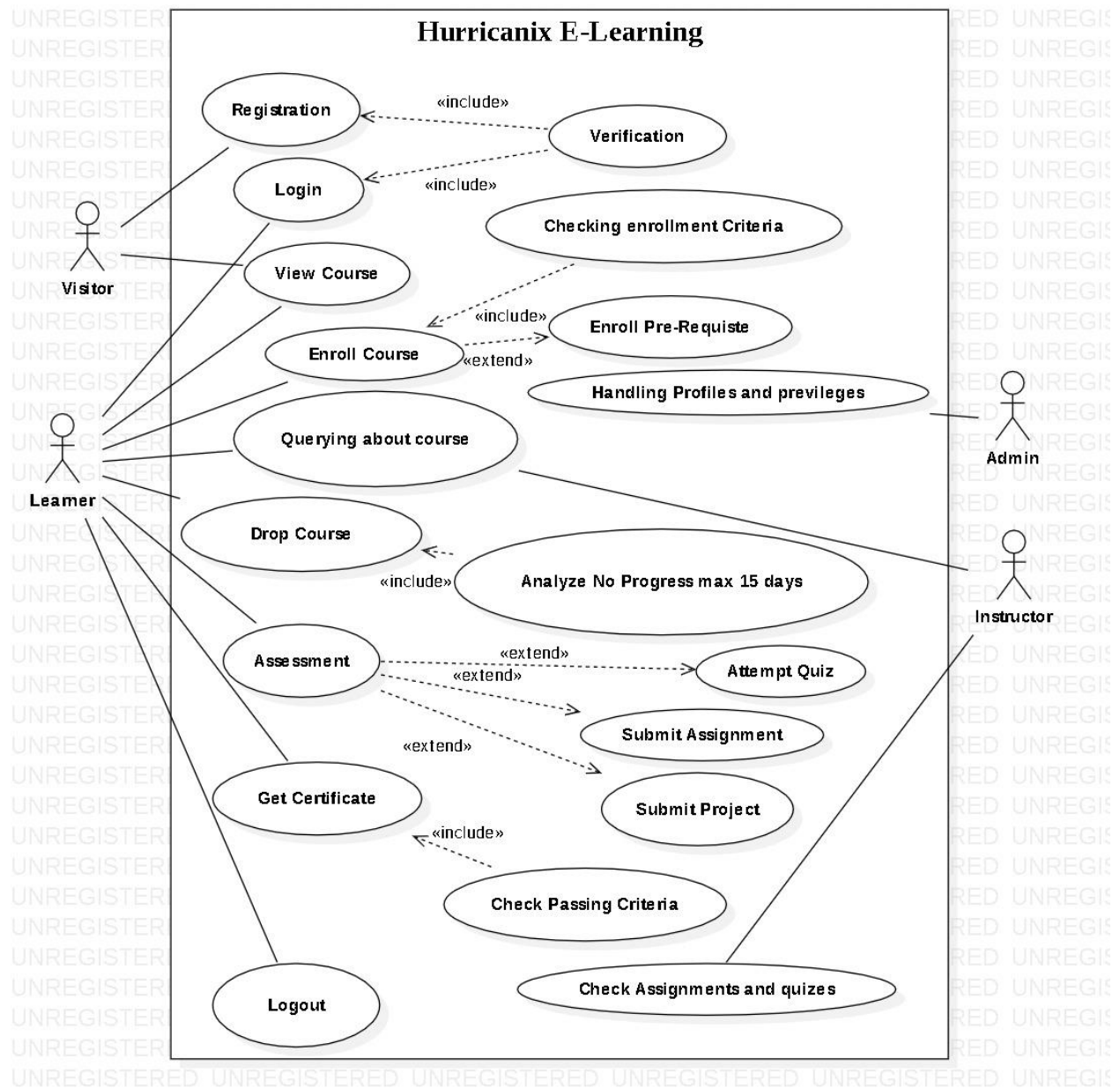
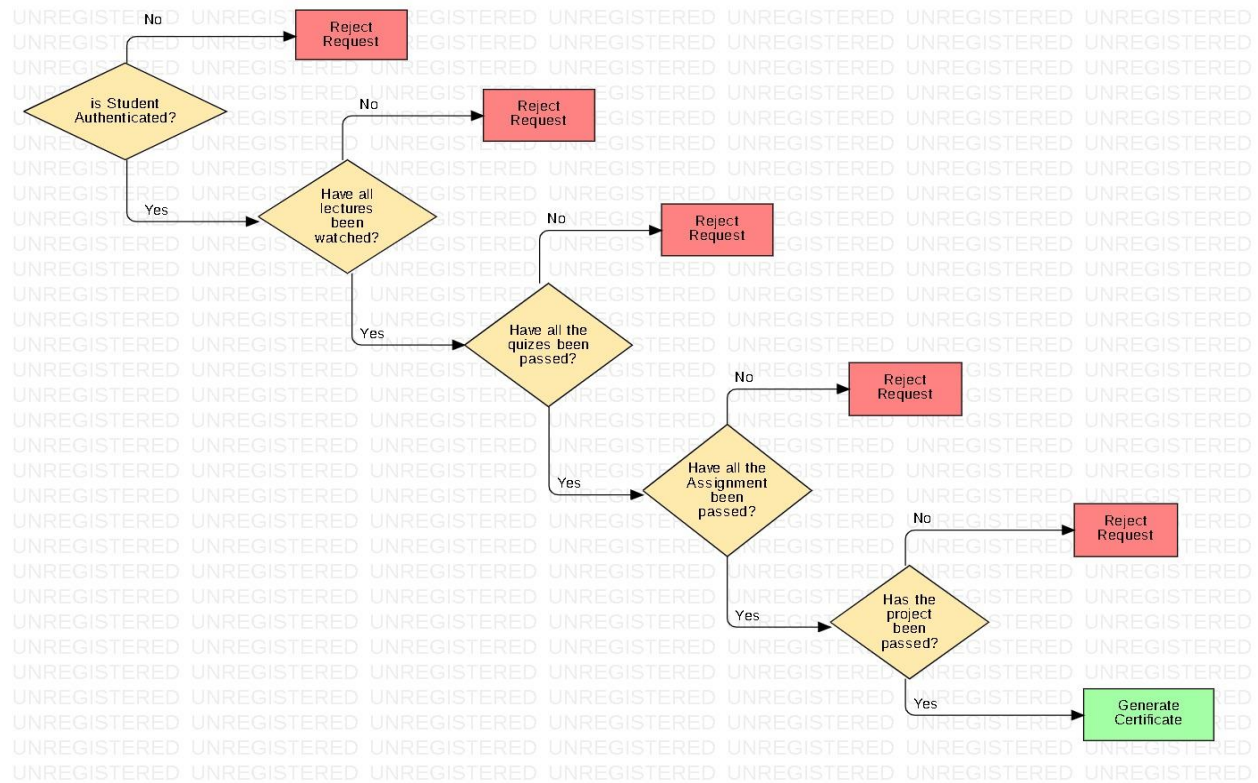## 8.2.2 DFD:
8.2.2.1 Level 0:
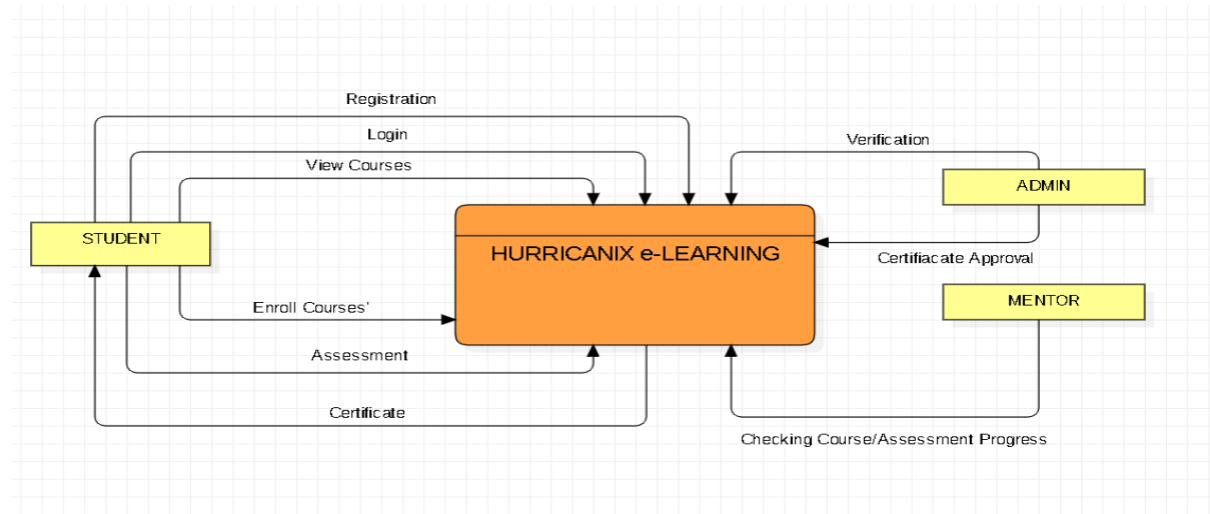
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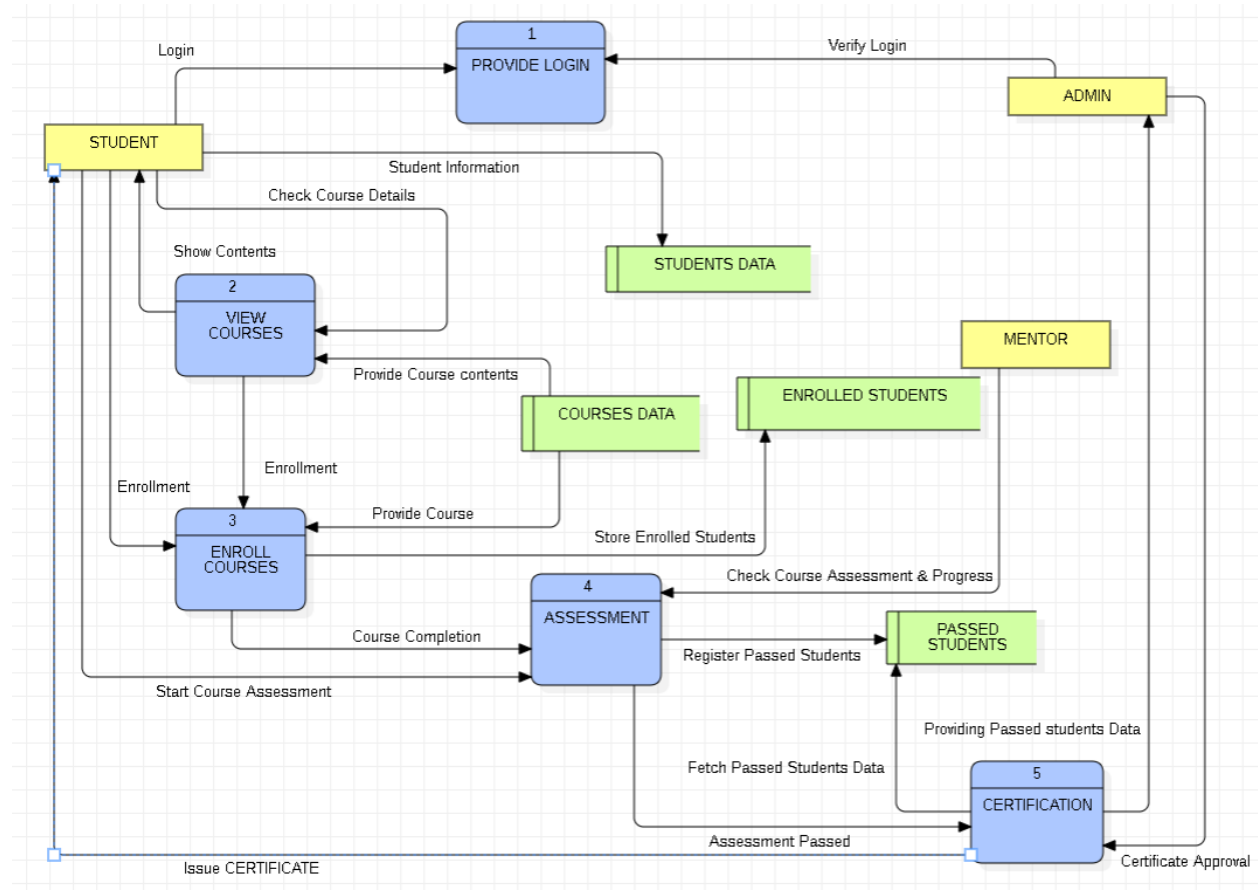
8.2.2.3   Level 2:
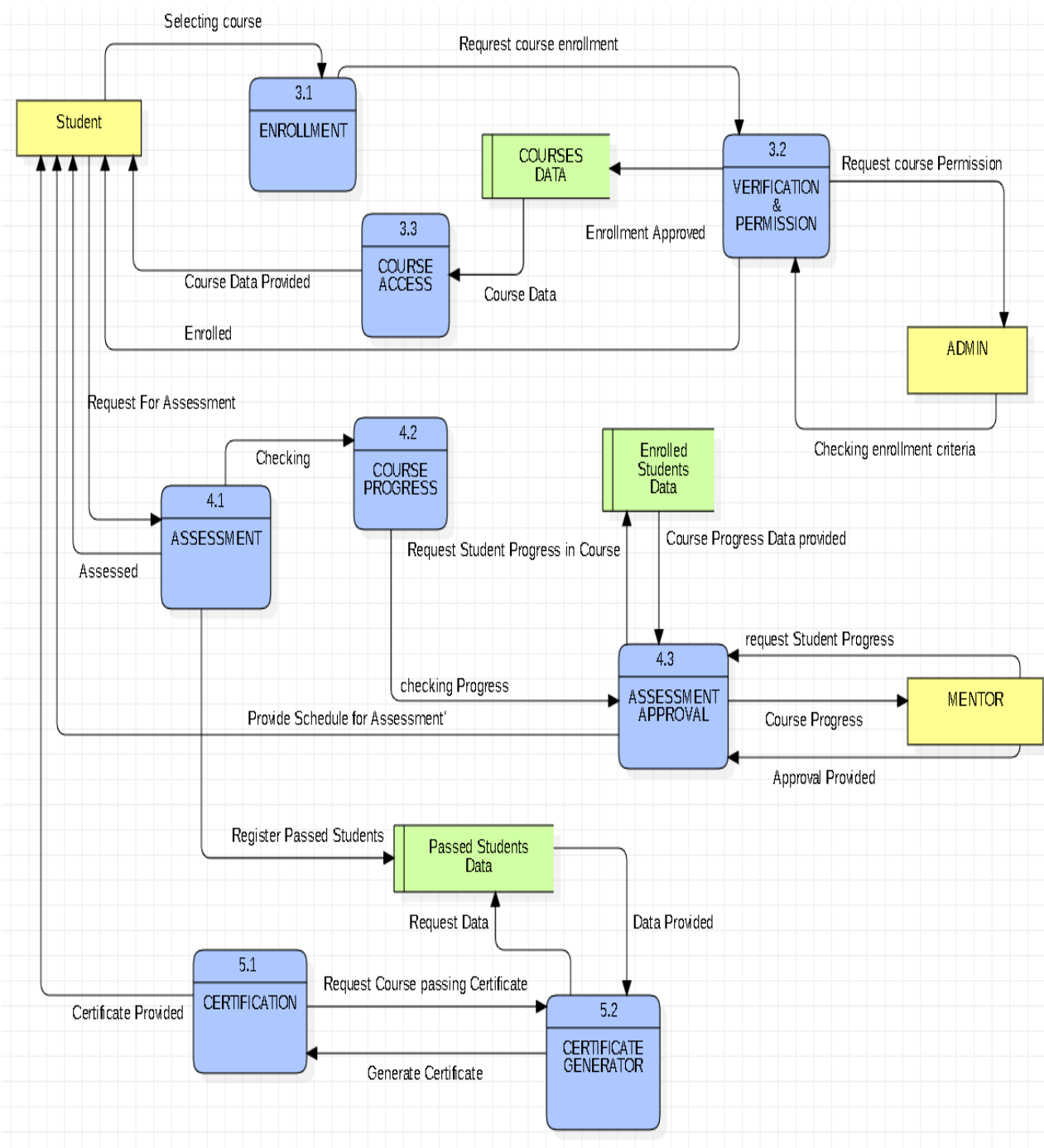
8.2.3 Decision Tree:

8.2.4 Decision Table:

Condition	1	2	3	4	5
Student is Authenticated	True	True	True	True	True
All lectures watched	True	False	True	True	True
All quizzes are passed	True	False	True	True	True
All Assignments are passed	True	True	False	True	True
Project passed	True	False	False	True	True
Action					
Generate Certificate	Yes			Yes	Yes
Criteria not Met		Yes	Yes		

8.2.5   Response Table:

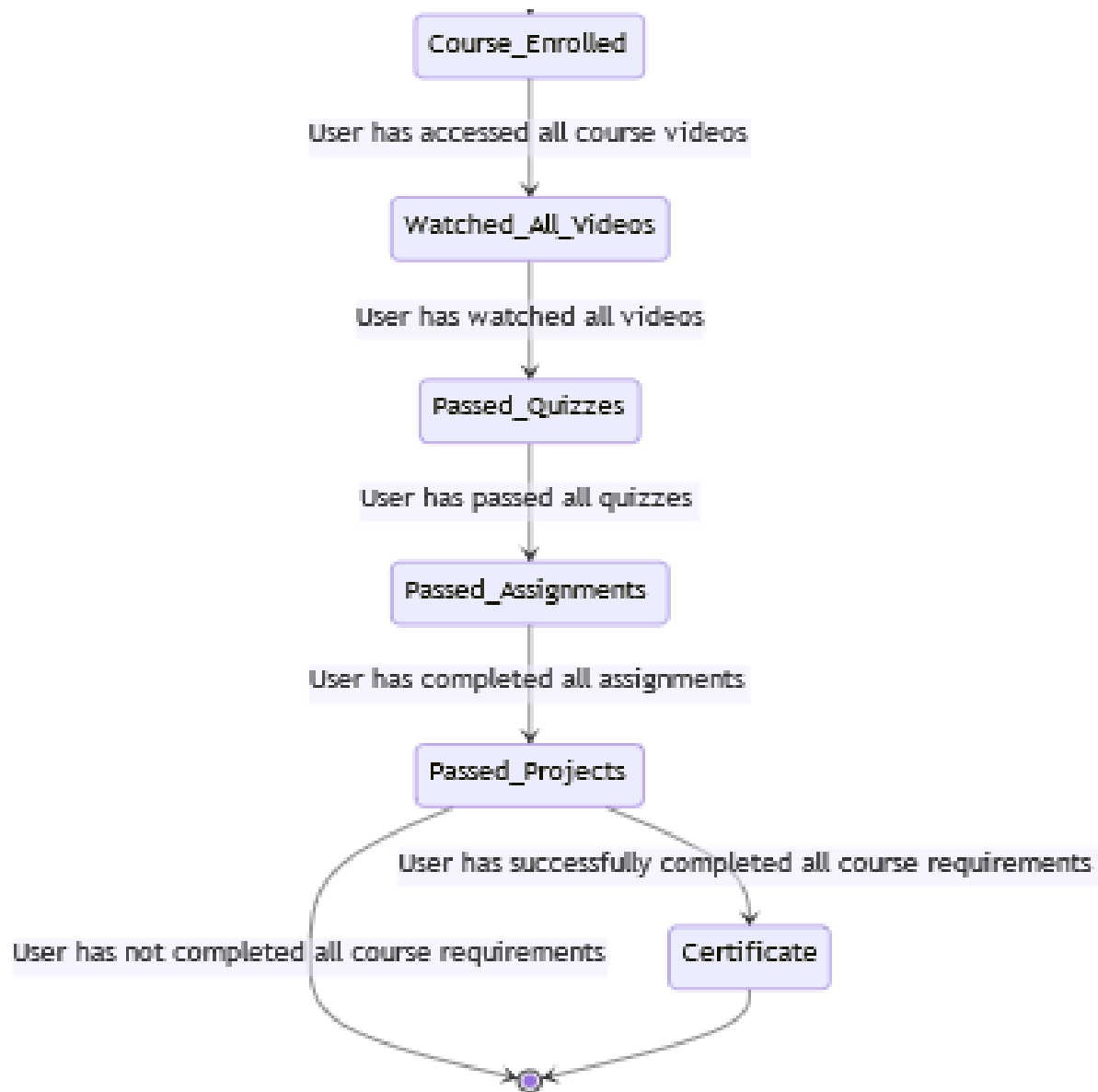| ID	Event	System State	System Response
1	User attempts to login	User is on the login page	Prompt user to enter their credentials
2	User enters valid credentials	User is on the login page	Verify user credentials against the database
3	Credentials are valid	User is on the login page	Grant user access to the platform
4	Credentials are invalid	User is on the login page	Display error message indicating invalid credentials
5	User clicks on a course	User is on the home page or browsing courses	Display detailed information about the selected course
6	User clicks on the "Enroll" button	User is viewing a course	Check if the user is already enrolled in the course
7	User is not enrolled in the course	User is viewing a course	Display payment options for enrollment
8	User selects a payment method	User is viewing a course	Process payment and enroll the user in the course
9	Payment is successful	User is viewing a course	Enroll the user in the course
10	Payment is unsuccessful	User is viewing a course	Display payment failure message and prompt user to try again
11	User clicks on an assessment	User is enrolled in a course	Check if the user has completed the prerequisite assessments
12	User has completed prerequisite assessments	User is enrolled in a course	Display the assessment
13	User completes the assessment	User is enrolled in a course	Record the user's assessment score
14	User clicks on the "Generate Certificate" button	User has completed all course requirements	Verify if the user has completed all course requirements
15	User has completed all course requirements	User has completed all course requirements	Generate and display the certificate
16	User has not completed all course requirements	User has completed all course requirements	Display message informing the user that they have not completed all course requirements
17	User clicks on the "Logout" button	User is logged in	Terminate the user's session and redirect them to the login page

8.2.6   State Transition Matrix/ Table:

Current State	Select Course	Enroll Request	Confirm Enrollment	Enrollment Rejected	Cancel Enrollment
Initial State	Course Selection	-	-	-	-
Course Selection	-	Enrollment Pending	-	-	-
Enrollment Pending	-	-	Enrolled	Enrollment Failed	Cancelled
Enrolled	-	-	-	-	Cancelled
Enrollment Failed	-	-	-	-	-
Cancelled	-	-	-	-	-

8.2.7   Dialogue Map
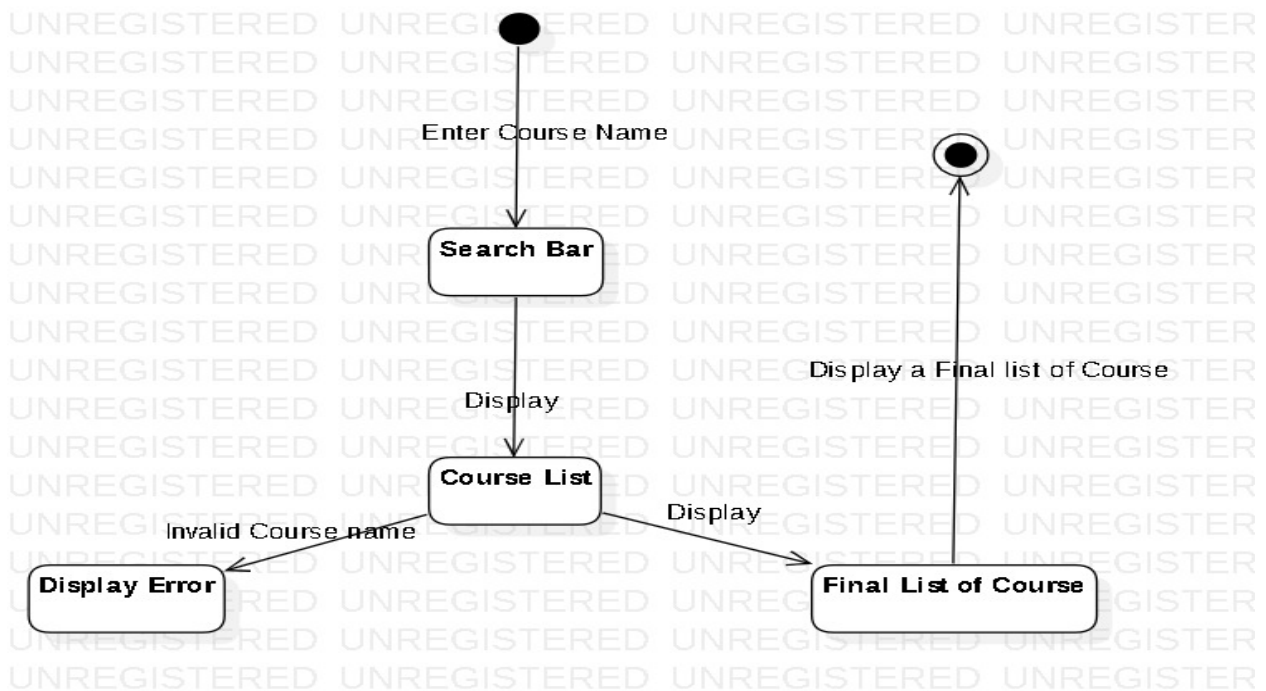
8.2.8 State Transition Diagram

Course_Enrolled

User has accessed all course videos

Watched_All_Videos

User has watched all videos

Passed_Quizzes

User has passed all quizzes

Passed_Assignments

User has completed all assignments

Passed_Projects

User has successfully completed all course requirements

User has not completed all course requirements

Certificate

8.2.9 Activity Diagram:
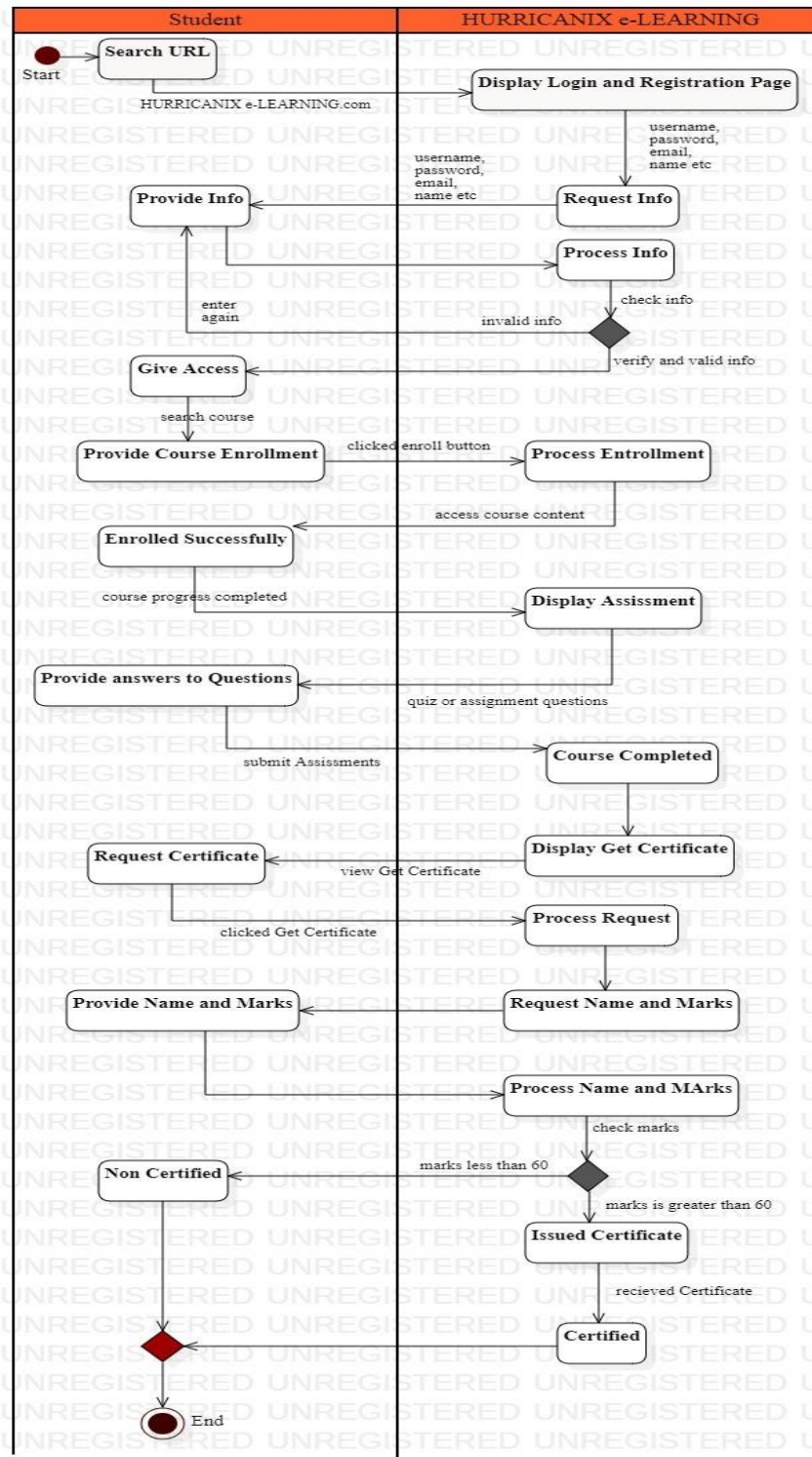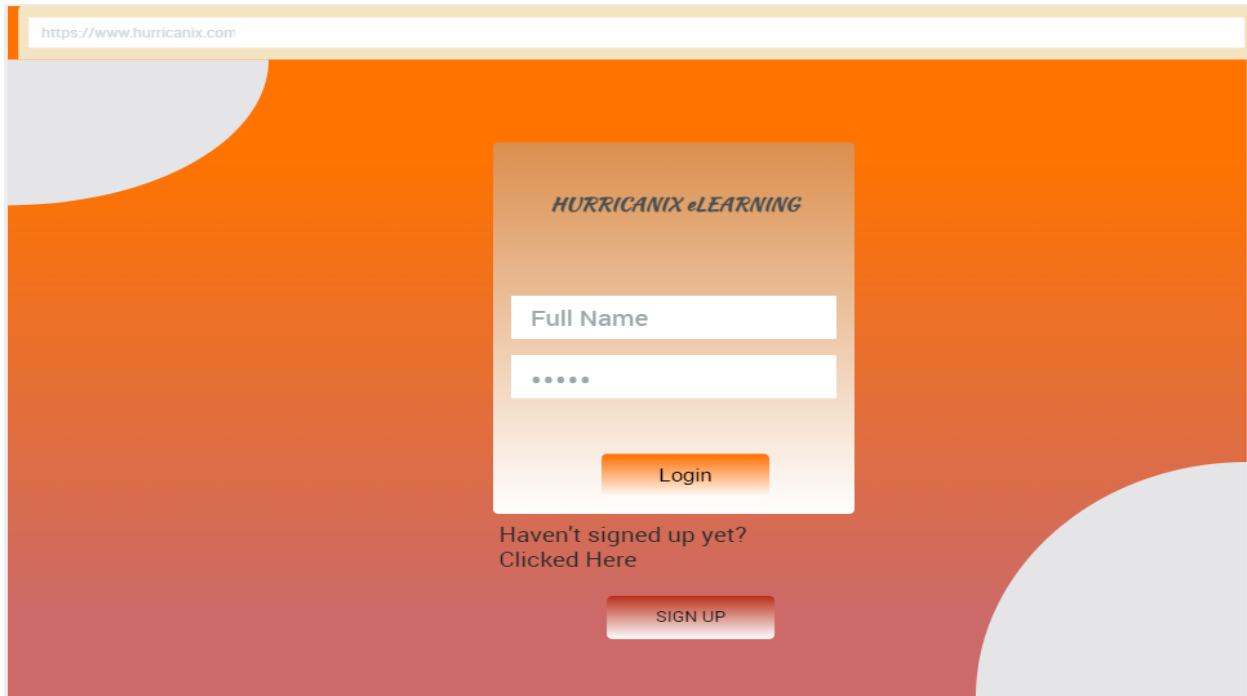
8.2.10 Prototype:
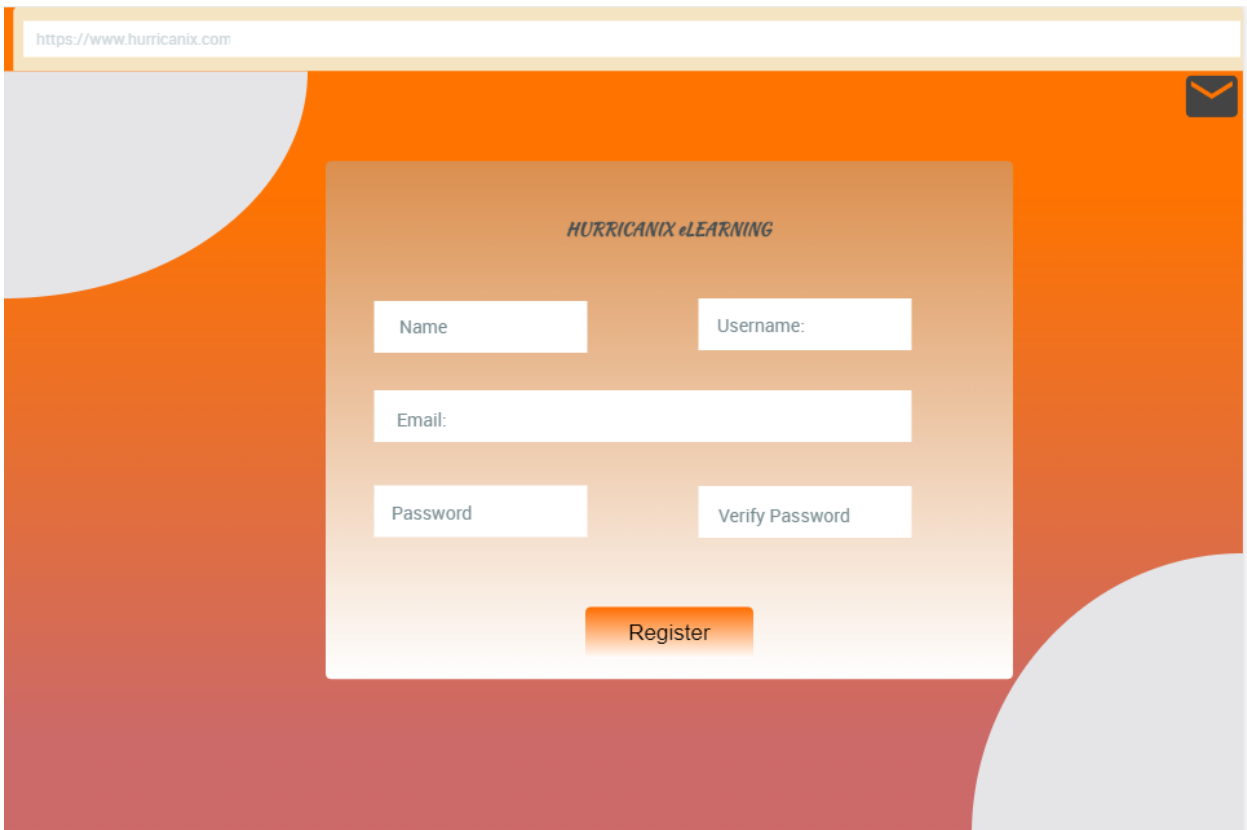
8.2.10.1   Login UI with Flutter:
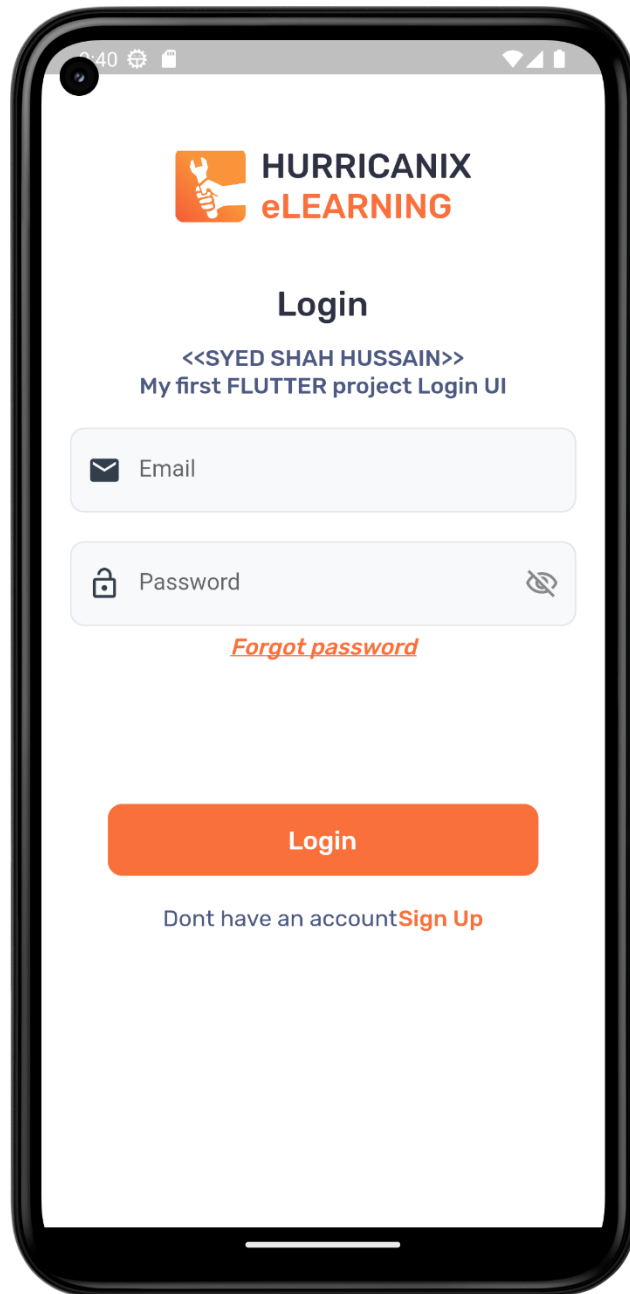
8.2.10.2   Prototype (Web Based):

https://www.hurricanix.com

Search

Dark Mode

Welcome to the
HURRICANIX eLEARNING

Courses

IT Courses

Graphics Courses

Islamic courses

Enrolled Courses

Assessments

Certificate

https://www.hurricanix.com

Search

Enrolled Courses

Courses Progress

Assessment Details

Certificate

Back