Software Requirements Specification

for

Online Education Platform

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1. Introduction

1.1 Purpose

The purpose of this Software Requirement Specification (SRS) document is for the development of a Learning Management System like Udemy. This document outlines the features and requirements relevant to online course purchasing, data management, content delivery, user registration, course browsing, authorization policies and any other relevant aspects specific to the online learning experience.

1.2 Document Conventions

This document adheres to a standardized and structured formatting approach. Arial font is selected for all kinds of texts in the document, while descriptive paragraphs have a font size of 12, titles are differentiated with a bold text appearance and a larger font size of 14 providing a distinct look to them and emphasizing key points in the document.

1.3 Intended Audience and Reading Suggestions

The primary intended audience for this Software Requirement Specification include developers, project managers, users, testers, and marketing staffs. Each group will find tailored information to address their specific responsibilities in the project life cycle.

a. **Overview Section:**
   In order to get a high-level understanding of the system, project's context and goals readers may focus on the introduction and purpose of document section.

b. Developers:

The developers can investigate the system architecture and design section of the project to get a better understanding of the whole workflow of the system.

c. Project Managers:

Being an important part of software development life cycle project managers can get meaningful insights from looking at scope of project and objectives to align project goals with organizational objectives.

d. Marketing Staff:

Marketing staff may benefit from user requirements and features section that provides insights about system's marketable features and make the product more appealing to the intended audience.

e. Users:

Users will benefit from reading functionality section of this document that explains the system's expected functionalities.

1.4 Product Scope

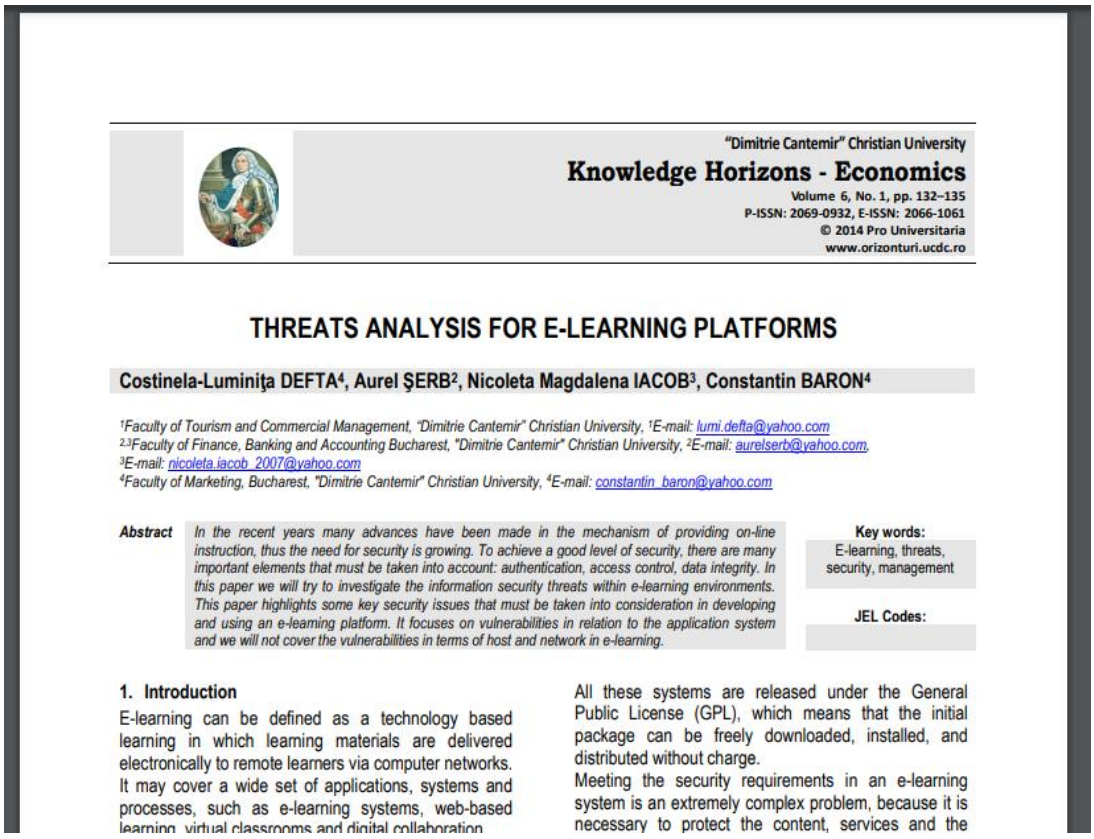
A fully functional Learning Management System is discussed in this SRS document. This system is designed to facilitate online learning, content management and its delivery, a software akin to Udemy, Coursera, LinkedIn Learning whose primary purpose is to provide a user-friendly and efficient platform for students to discover, enroll and access a variety of courses and its related resources such as videos, notes and quizzes. In addition to these features, this software aims to streamline the process of course-selection, payment and content delivery, and unlike any other learning management system, encourage its students to study more effectively with engaging forums, chat groups and certification system.

Objectives:

i. **User Accessibility**
ii. **Course Management**
iii. **Secure Content Delivery**
iv. **Secure Transactions**
v. **Scalability**

1.5 References

Reference: 1



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THREATS ANALYSIS FOR E-LEARNING PLATFORMS

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Abstract: In the recent years many advances have been made in the mechanism of providing on-line instruction, thus the need for security is growing. To achieve a good level of security, there are many important elements that must be taken into account: authentication, access control, data integrity. In this paper we will try to investigate the information security threats within e-learning environments. This paper highlights some key security issues that must be taken into consideration in developing and using an e-learning platform. It focuses on vulnerabilities in relation to the application system and we will not cover the vulnerabilities in terms of host and network in e-learning.

Key words: E-learning, threats, security, management

JEL Codes:

1. Introduction

E-learning can be defined as a technology based learning in which learning materials are delivered electronically to remote learners via computer networks. It may cover a wide set of applications, systems and processes, such as e-learning systems, web-based learning, virtual classrooms and digital collaboration.

All these systems are released under the General Public License (GPL), which means that the initial package can be freely downloaded, installed, and distributed without charge.
Meeting the security requirements in an e-learning system is an extremely complex problem, because it is necessary to protect the content, services and the

This paper looks at the security risks involved with e-learning platforms and online educational systems that have become increasingly popular in recent years. As more institutions and companies adopt these digital learning environments, making sure they are secure is critical. The authors point out key areas like user authentication, controlling access, and protecting data integrity that

can't be overlooked for a truly secure e-learning setup. Rather than getting too technical about network vulnerabilities, they focus specifically on threats related to the actual e-learning applications and platforms themselves.

Reference: 2

LMS projects: A platform for intergenerational e-learning collaboration

Published: 11 June 2014

Volume 19, pages 495–513, (2014) Cite this article

Maria Sergeyevna Lyashenko & Natalja Hidarovna Frolova

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Abstract

Intergenerational learning (IGL) is the process of bringing seniors and juniors together in a collaborative space. Universities have been known to create a stimulating context for generations to share and acquire skills. The purpose of this paper is to present the results of research in the field of intergenerational learning and skills sharing. The topic is important as the ideas of teacher-student (T-S) and teacher-teacher (T-T) collaboration based on the principles of interdependence and reciprocity between generations have

Figure 1: Similar Journal 1

The paper proposes that Learning Management System (LMS) projects can be effective tools for intergenerational learning collaborations. It also presents the results of projects aimed at increasing ICT competence of teachers, highlighting the potential of LMS projects as a suitable platform for intergenerational e-learning in universities (Maria Segeyevna Lyashenko, 2014).

Reference: 3

The Use of Learning Management System Projects for Teaching a Foreign Language in the University ☆

M.S. Lyashenko, I.A. Malinina

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Abstract

The rapid penetration of web-based technologies into our social life creates challenges both for teachers and students to face. The purpose of the paper to dwell upon the implementation of social media as web-based technologies into the educational environment in the university. Social media application is considered at macro and micro levels within the university structure. Particular

Figure 2: Similar journal 2

The paper discusses the implementation of social media in university education, focusing on macro and micro levels. It emphasizes the importance of creating specific pedagogical conditions and a participative approach for successful technology deployment, highlighting the challenges faced by teachers and students (M.S. Lyashenko, 2015).

Research: 4

Student Learning Contribution through E-learning Dimension at Course "Management Information Systems"

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Abstract: - E-learning offers great opportunities for education quality improvement in both - the classical teaching combined with e-learning, and distance learning. Zagreb School of Economics & Management (ZSEM) is one of the few higher education institutions in Croatia that systematically uses e-learning in teaching. Systematically means that all courses are developed in e-learning form and that among all courses is used the same LMS (Learning Management System) WebCT. School management played an important role in the systematic introduction of e-learning in the educational process. At ZSEM we use a combination of traditional teaching methods with intensive use of e-learning. Each teacher is required to develop an e-learning course in accordance with default 11 standards developed by the e-learning group. In this way at ZSEM we currently have about 1,200 students and about 120 advanced e-learning courses. Course named Management Information System (MIS) is on the list of obligatory courses for the 7th semester. In this paper we will show how to connect all the elements of Course Syllabus with e-learning system: online tests, discussions, WebCT activities, exercises, etc. Special attention is given to group projects and ability to project groups to jointly discuss, submit weekly reports and to project documentation within the LMS system. The research will show whether there is a correlation between the activities of students in a closed discussion among project groups and final grade.

Key-Words: - discussion, project, e-learning, student activity, information and communication technologies, learning management system, management information systems

Figure 3: Similar Journal 3

Zagreb School of Economics & Management (ZSEM) uses e-learning for classical and distance learning, with 1,200 students and 120 advanced courses. Research aims to determine if closed discussion activities correlate with final grade (KARMELA ALEKSIC-MASLAC, 2010).

2. Overall Description

2.1 Product Perspective

The system detailed in this document represents a new product, specifically developed for online course management and purchasing. This system is

neither a follow-on member of an existing product family nor a replacement for any existing system implying that this is an independent operating system providing a dedicated learning platform to its users, either instructors or student.

Even if this system exists within its own ecosystem, it integrates with external systems for functionalities such as payment processing, which ensures a better and secure online experience. This system has its own content storage and distribution system and authentication system.

2.2 Product Functions

Some of the core functionalities of this system are:

i. **User authentication and authorization**
ii. **Course Management**
iii. **Course Browsing**
iv. **User Profiles**
v. **Content Delivery**
vi. **Course Enrollment**
vii. **Payment Processing**
viii. **Notification and Communication**
ix. **Pricing control**

2.3 User Classes and Characteristics

This system is designed to deliver data to a diverse user base each with unique characteristics and requirements. There are three distinct user classes in this system which are defined by their roles. These role variables control the range of access a user has over the system. They are:

i. **User:**

   Users considered as students, they may or may not purchase any course, basically any authenticated entity is a user. They have the

least control over the business model of the system as their primary functions include course browsing, enrollment, content access and progress tracking.

ii. **Instructor:**
Instructors are responsible for creating and uploading various study materials. Their primary functions include course creation, content management, communication, creating offers on their courses and student interaction.

iii. **Admin:**
Admin users are system administrators that oversee the overall LMS functionality. Their primary functionalities include collecting user reviews, overseeing bug reports, user management and managing system configurations.

2.4 Operating Environment

This system leverages various technologies to ensure seamless functionality. The key components of the operating environment are:

i. **Database:** PostgreSQL
ii. **ORM:** Prisma
iii. **Language:** Typescript
iv. **Backend Framework:** ExpressJS
v. **Frontend Framework:** NextJS
vi. **Styling:** Tailwind CSS
vii. **API Protocols:** WS for Sockets, HTTP for RESTful API

Hosting type required:

i. **Backend**: VPS or any cloud hosting.
ii. **Storage:** Object Storage / Local Server Directory.

iii. **Frontend:** Any that support sockets and node environment.

External Components:

i. **Payment gateway:** Khalti Wallet Payment

2.5 Design and Implementation Constraints

i. **Hardware limitations:**

The system needs to be able to upload multiple course contents such as videos which takes a lot of time and since this system implements HTTP Live Streaming approach to deliver content, it needs huge computing requirements. In addition to that, this system requires a fast storage server that can read and write large volume of data.

ii. **Security Considerations:**

Course contents being the major source of revenue for the system are required to be protected through various measures. In addition to that user data, and financial transactions must be protected.

3. Functional Requirements

3.1 User Management:

REQ-1: User Registration

a. The system shall provide a user registration page accessible from the main interface.
b. The user shall be required to provide a valid email address, a unique username, and a strong password during registration.
c. The system shall validate the email format, ensuring it is unique and not associated with an existing account.
d. If any validation fails, the system shall provide appropriate error messages, guiding the user to correct the input.

REQ-2: User Authentication

a. The system shall provide a secure login page requiring users to enter their registered email and password.
b. The system shall hash and securely store user passwords using industry-standard encryption algorithms.
c. After successful authentication, the system shall redirect the user to their respective dashboard or landing page.
d. In case of unsuccessful authentication, the system shall display an error message, indicating either incorrect credentials or account lockout status.

REQ-3: Authorization Check (Role-Based)

a. The system shall implement role-based access control to define user roles and associated permissions.
b. Each user shall be assigned a specific role (e.g., Student, Instructor, Administrator) with predefined permissions.
c. The system shall deny access to specific features or pages if the user's role does not have the necessary permissions.

3.2 Course Management:

REQ-1: Instructors Create Courses

a. Instructors shall have access to a dedicated interface for creating new courses.
b. The system shall prompt instructors to specify course details such as title, description, and duration.
c. Instructors shall be able to upload and attach multimedia content, including documents, videos, and images.
d. The system shall enforce mandatory fields and validate the entered information during course creation.

REQ-2: Course Editing and Updating

a. Instructors shall have the capability to edit existing courses, modifying details and attached content.

3.3 Course Discovery and Enrollment:

REQ-1: User-Friendly Interface

a. The system shall provide a user-friendly interface for users to explore available courses.
b. Courses shall be categorized and displayed in an organized manner for easy navigation.
c. The interface shall be responsive and accessible across various devices.

REQ-2: Filters and Search Functionalities

a. The system shall implement filters for users to refine course searches based on categories, duration, or popularity.
b. A search functionality shall be provided, allowing users to find specific courses using keywords or phrases.
c. The system shall display search results in a clear and prioritized manner.

REQ-3: Streamlined Enrollment Process

a. Users shall be able to enroll in courses with a streamlined and intuitive enrollment process.
b. The system shall verify prerequisites and eligibility criteria before allowing user enrollment.
c. Upon successful enrollment, the system shall provide a confirmation message and update the user's enrollment status.
d. If enrollment fails, the system shall display relevant error messages and guidance.

3.4 User Profiles:

REQ-1: Profile Customization and Personalization

a. The system shall allow users to customize their profiles by adding personal information, interests, and preferences.
b. Users shall have the option to set profile privacy settings, controlling the visibility of certain information.
c. The system shall provide a user-friendly interface for managing and updating user profiles.

REQ-2: User Progress Tracking

a. The system shall track and display user progress within enrolled courses.
b. Users shall have access to a progress dashboard showing completed modules, quizzes, and achievements.
c. The system shall award badges and achievements based on user accomplishments and milestones.

3.5 Content Delivery:

REQ-1: Seamless Content Delivery

a. The system shall ensure the seamless and timely delivery of course content to users.
b. Course content, including documents, videos, and quizzes, shall be accessible in a user-friendly format.
d. The system shall support various multimedia formats to enhance the learning experience.

REQ-2: Real-Time Communication

a. The system shall implement a real-time communication system for users to engage in course-related discussions.
b. Users shall have access end-to-end encrypted to chat features, including direct messaging and group discussions.
c. The system shall prioritize the security and efficiency of messaging functionalities, ensuring real-time updates.

3.6 Payment Processing:

REQ-1: Secure Online Transactions

a. The system shall facilitate secure online transactions for course purchases.
b. Users shall be guided through a secure checkout process, providing payment details.
c. The system shall integrate with external payment gateways to process payments securely.

3.7 Notification and communication:

REQ-1: Notification System

a. The system shall send notifications to users regarding course updates, announcements, and achievements.
b. Users shall have the option to customize notification preferences, specifying the types and frequency of notifications.

REQ-2: Communication Channels

a. The system shall provide communication channels for instructors and students within the platform.

REQ-3: Bug Reporting Interface

a. The system shall provide a dedicated bug reporting interface accessible to all users.
b. Users, including administrators, shall have the ability to submit detailed bug reports through the interface.
c. The bug reporting interface shall include fields for bug summary, description, steps to reproduce, and attachments.
d. Bug reports shall be timestamped and categorized based on severity and priority.
e. Administrators shall have access to a centralized dashboard for managing and tracking reported bugs.

4. Other Nonfunctional Requirements

4.1 Performance Requirements

a. Faster API response time.
b. High concurrent user handle.
c. Database query performance

4.2 Security Requirements

User Authentication:

a. Passwords shall be hashed and stored using industry-standard encryption algorithms.

Data Encryption:

a. All communication between the system components, including user interfaces and the backend, shall be encrypted using SSL/TLS.
b. Sensitive data, such as payment information (only payment id), shall be encrypted during storage and transmission.
c. Sensitive external system data such as payment information must not be saved in the system.

4.3 Business Rules

a. Only administrators shall have the authority to configure system settings and manage user roles.
b. Instructors shall have the capability to create, edit, and manage courses within their assigned domains.
c. Payment transactions shall be processed securely, and user payment information shall not be stored within the system.
d. Users must complete the payment process before gaining access to premium course content.

e. A course may have multiple percentiles of discounts available to it through itself, category, sub-category, or all-categories, which, on purchasing only the one with highest percentile will be applied and as for course coupon, it cannot be stacked upon regular discount.