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E-Learning

By

Venkata Sivateja Tanneru

Bachelor of Information Technology, VVIT University, 2018

GRADUATE CAPSTONE SEMINAR PROJECT

Submitted in partial fulfillment of the requirements

For the Degree of Master of Science,

With a Major in Computer Science



Governors State University
University Park, IL 60484

2021

ABSTRACT

In this Digital world, the traditional class-based learning system copes with many challenges to accommodate learners. The conventional platforms have major issues accommodating learners from every corner of the globe. It is impossible to accommodate every learner as per their requirements and feasibilities, such as time and pace of learning.

In this Digital world, the traditional class-based learning system copes with many challenges to accommodate learners. The conventional platforms have major issues accommodating learners from every corner of the globe. It is impossible to accommodate all learners as per their requirements and feasibilities, such as time and pace of learning.

Traditional classrooms also faced many challenges during the pandemic. Measurements such as lockdowns and social distancing have created challenges for teachers and learners worldwide. Soon it was vital for everyone to have a platform to resolve all these problems.

The e-Learning platform provides a solution to all the above-stated problems by offering its users a platform that is easily accessible from any part of the world. It replaces traditional classroom-based learning with a more user-friendly and intelligent learning system. The platform supports all learners by helping them achieve their goals through education. It also enables people from different backgrounds to learn new skills without having any prerequisites through its course modules, thus catering to everyone at any given time.

There are many e-learning platforms available to educational institutes. The problem starts with integrating the e-Learning system into an innovative educational environment based on the users' requirements. The e-learning services rely on a software system that allows access to all the materials for the educational process and makes them electronically available to all the students on the Internet whenever they need and wherever they are.

Version Details:

Stable Release V1.0 (Date: 11/30/2021)

Maintenance releases (Date: Every 1st Sunday of the month)

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1 Project Description

The e-Learning project provides a robust, safe, and secure platform for all users to collaborate learning. It facilitates learning in an intelligent environment with much-needed functionalities for students and teachers. A well-thought scope for each operational module and user. The dynamically built platform uses web hosting and provides many functionalities to users such as registration and login, Course search, and instructor details with ratings—a secure Cart option to make purchases. Q&A forums and OTP-based forgot password functionalities.

1.1 Competitive Information

A survey performed by the team indicates the existence of many competitor applications such as Udemy and Coursera, and the website aims to compete with them directly in an open market. The project plans to add more features to compete and place itself strategically to gain more users.

1.2 Relationship to Other Applications/Projects

The project has been coded in-house and does not relate to other applications. A user-oriented approach and industry-standard practices were adopted used by the programming fraternity.

1.3 Assumptions and Dependencies

- The website's primary objective is to provide its users with a Secure Cookie-based authentication., it allows them to authenticate the request and maintain session information. This system is very secure and does not compromise keys in a cyber-attack.
- The project uses the following services/packages for its operations:
 - bcryptjs, cloudinary, cookie-parser, cors, datauri, dotenv, express, gravatar, jsonwebtoken, mongoose, morgan, multer, nodemailer, passport, passport-jwt, Razorpay, UUID, validator, material-ui, Axios, body-parser, bootstrap, classnames, jwt-decode, react, react-dom,react-redux, react-responsive-modal, react-router-dom, react-scripts, redux, redux-thunk, web-vitals
- The project adheres to the SDLC process during its entire life cycle and does not deviate from its description scope.

1.4 Future Enhancements

The project revolves around the SDLC steps of Planning, Analysis, Designing, Developing, Testing, Implementing, and maintenance. It follows a waterfall model in which each previous step needs to complete before proceeding to the next. It utilizes the same methodology to provide any updates to the platform.

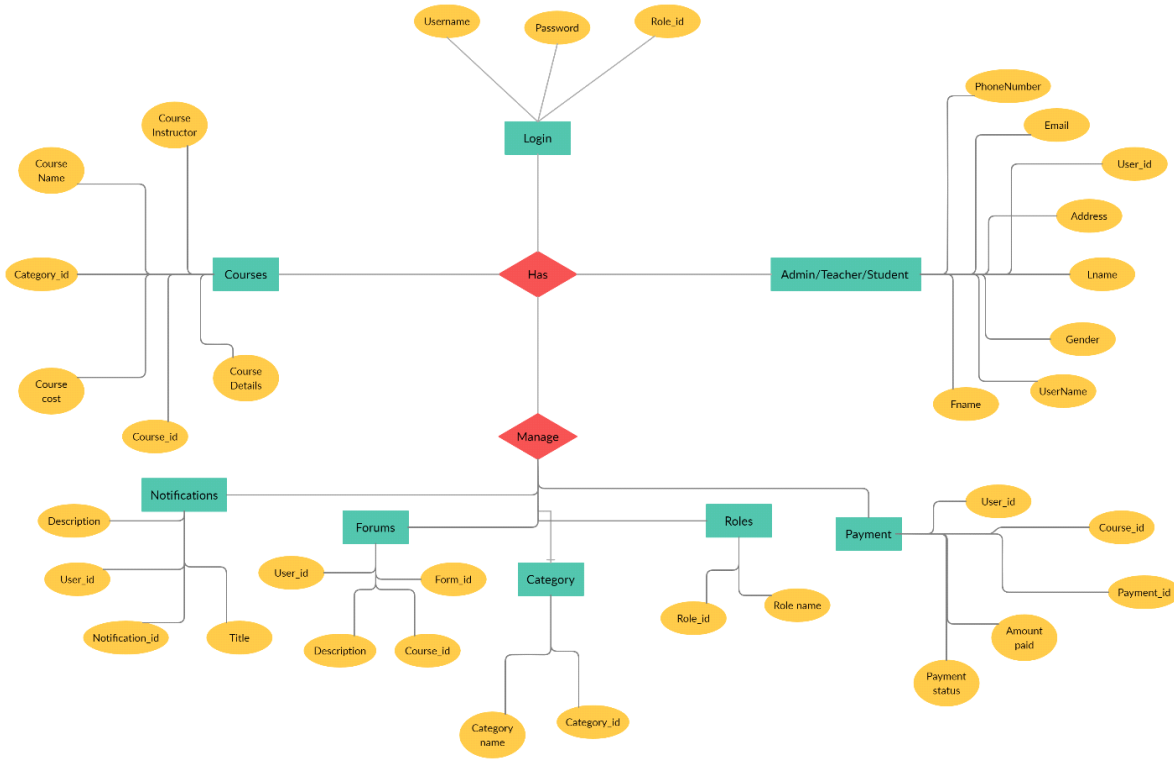
1.5 Definitions and Acronyms

SDLC: Software development life cycle.
HTTP: Hypertext Transfer Protocol
HTML: Hypertext Markup language
JS: Java Script
API: Application Programming Interfaces

2 Project Technical Description

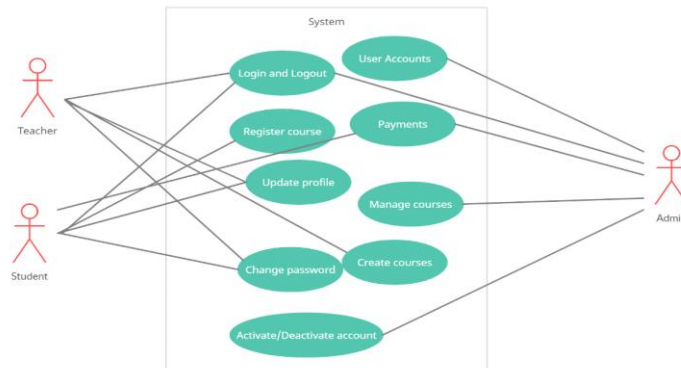
The main objective of creating an online learning platform is to provide users with a robust, secure, easy to use, and budget-friendly option. The project will develop a website using JavaScript, HTML, CSS, Bootstrap, Node JS, React JS, and web frameworks and SQL databases.

2.1 Application Architecture

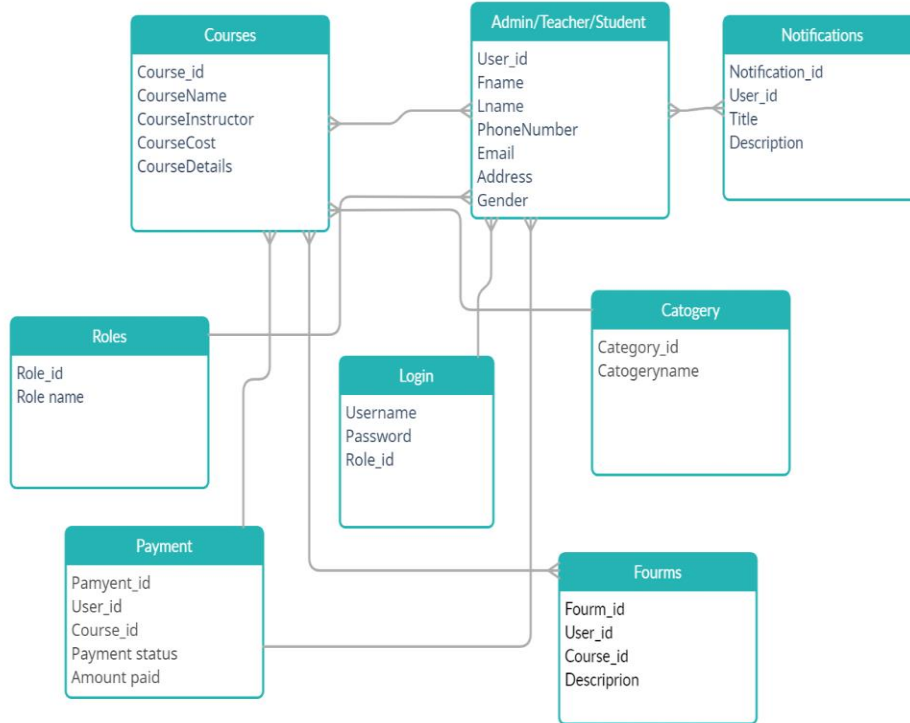


ER Diagram
Figure:1

2.2 Application Information flows



User Process
Figure:2



Database Design
Figure: 3

2.3 Interactions with other Applications

Web browser APIs are used under the project's client-side environment to help ease complex development processes. These APIs are supported by all web browsers regardless of the platform or device model.

2.4 Capabilities

The project is a database application and provides capabilities to support business applications in retrieving, adding, deleting, updating user data.

2.5 Risk Assessment and Management

Recent years have been a critical factor in determining the need for and importance of e-Learning. Undoubtedly, the three main entities of the E-Learning system are Student, Teacher & Controlling Authority, and there will be a different level. Still, a sound E-Learning system needs total integrity among all entities at every level. Security issues on the whole platform needs to be address and incorporated making sure no loopholes are preset. The Internet is the backbone of the entire system, inheriting vulnerabilities and hacker attacks. The E-Learning system can be compromised using loopholes. So additional security measures need to endure the system.

3 Project Requirements

3.1 Identification of Requirements

The project requirements depend on the project flow and the goals list. The primary objective is to provide good quality content and ensure learner satisfaction.

The Main language or the tool utilized is the "REACT" to develop all the functionalities in the front end.
React.js-Version-16.8.6-Requirement1

The Other Important Tool used in the backend project is "Node.js."
Node.js-Version11.2-Requirement2

For the database, we have used "Mango DB"
MongoDB-Version5.0-Requirement3

The Editor Visual Studio Code
VisualStudioCode-Version1.52-Requirement4

3.2 Operations, Administration, Maintenance and Provisioning (OAM&P)

The users receive an option to recover the password when forgotten, using the forgot password link,
The admin maintains the application, can always clean the site and will be able to manage both user and tutor data.

3.3 Security and Fraud Prevention

An alert is displayed when a user tries to login into the application with incorrect credentials repeatedly on the website.
A logout occurs when the user stands still on a particular page in the application without any activity.

3.4 Release and Transition Plan

A notification pops up to the users during maintenance or downtimes of the web application.

4 Project Design Description

The Design and the architecture of the project are simple and easy to create. It has three roles to control the application: user, Tutor, and admin. The admin is the one who can perform all the CRUD operations on the user and the Tutor. Whereas Tutor can perform all the CRUD operations on the lectures, they would like to publish.

5 Internal/external Interface Impacts and Specification

The application uses an SSL certificate to secure the data rendered through the front and backend. The web browser APIs makes it a sure and reliable mode of transfer. As all modern browsers support these functionalities, the data is secured and prevented from any internal or external impacts and made available to the concerned user only through logins.

6 Design Units Impacts

The entire project follows a single design unit of client/server architecture. The requests made are HTTP, and the code uses GET and POST on-demand to help with the application usage.

6.1 Functional Area A/Design Unit A

6.1.1 Functional Overview

The structure of an e-learning website consists of three main categories:

The Student, the Teacher, and the administrator.

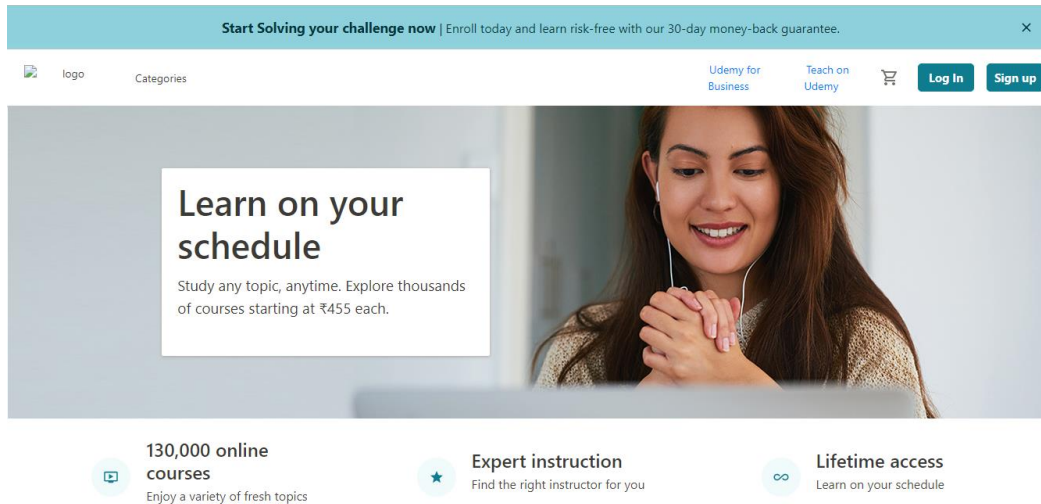
A teacher's role is to post videos/lectures to the courses.

The admin controls the website's entire flow and maintenance tasks.

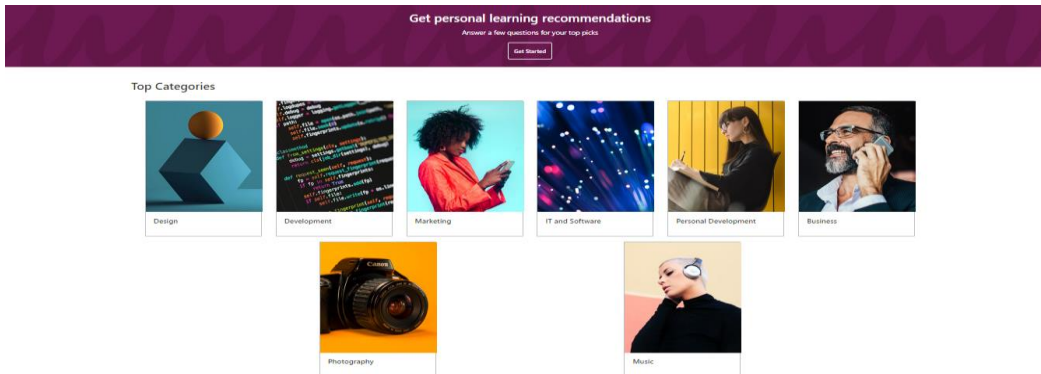
Each module has specific rights and privileges to manage.

The Teacher role is a follow:

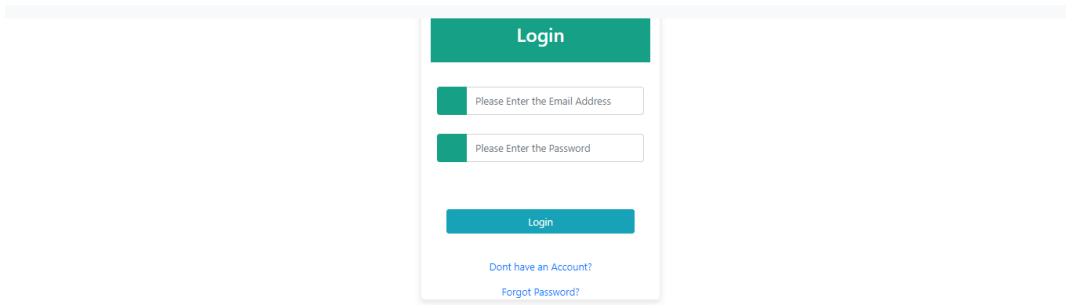
- Creation of courses, tests, and standard courses.
- Management of the course materials (indexing, classification, updates, etc.).
- Management of the Q&A forum between learners and teachers.
- Monitoring of the learner's learning and evaluation.
- Management of the learner's education.
- Providing the information/tools to the learner (specific editors, download tools, simulation tools, etc.).
- Ensuring that the communications tools and the procedures for management are available (forums, messaging, chat, videoconferencing, etc.).



Home Page
Figure: 4

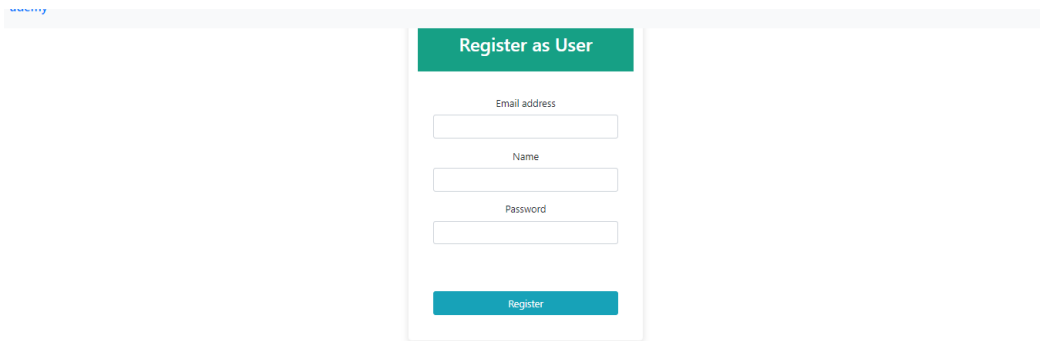


Course Category Page
Figure: 5



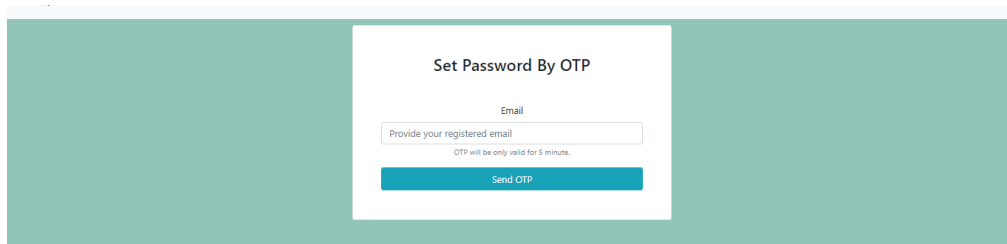
The image shows a login form titled "Login" in a green header. It contains two input fields: "Please Enter the Email Address" and "Please Enter the Password". Below these fields is a blue "Login" button. At the bottom, there are two links: "Dont have an Account?" and "Forgot Password?".

***User Login Page
Figure:6***



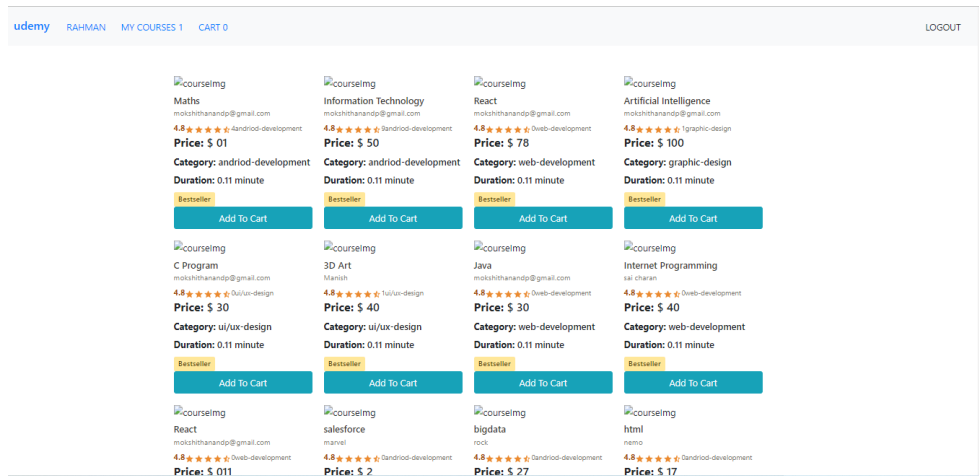
The image shows a registration form titled "Register as User" in a green header. It contains three input fields: "Email address", "Name", and "Password". Below these fields is a blue "Register" button.

***User Registration Page
Figure: 7***

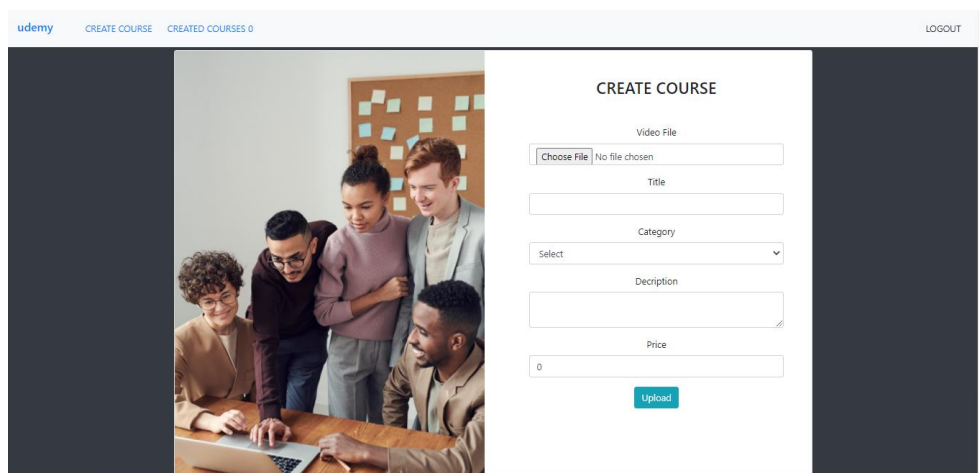


The image shows a form titled "Set Password By OTP" in a white box with a green background. It contains one input field: "Email" with the placeholder text "Provide your registered email". Below the field is a blue "Send OTP" button. A small note below the field states: "OTP will be only valid for 5 minute."

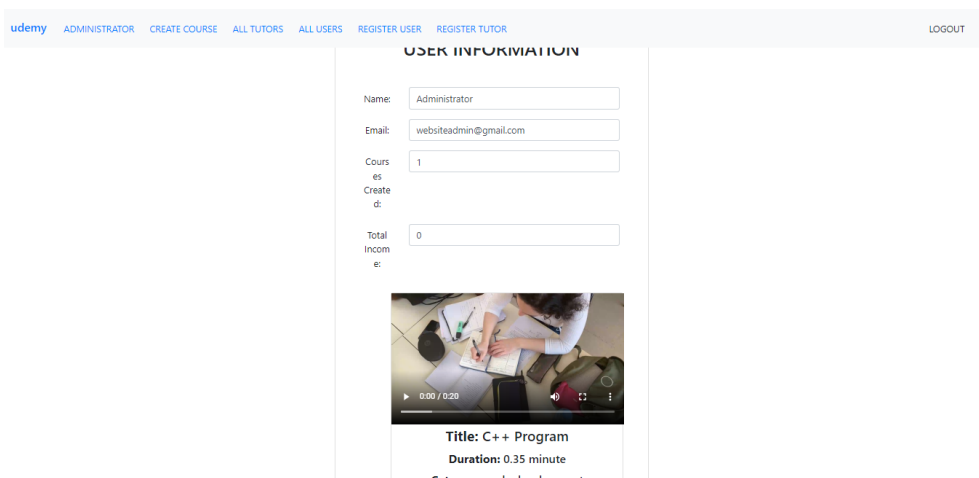
***Password Reset Page
Figure: 8***



**User Dashboard
Figure:9**



**Tutor Dashboard/Create Course Page
Figure:10**



**Admin Dashboard Page
Figure: 11**

6.1.2 Impacts

The project's impacts are limited to implementing new features with high memory usage. Developers need to consider the data transfer and regularly handle it with the data engine. Using any Big Data tools in the future version will have to divide the data into chunks and reuse it more frequently to save the memory.

6.1.3 Requirements

E-learning is a popular platform among the new tech-savvy students and instructors; they eliminate geographical barriers and spread knowledge around the globe. A reason for their popularity is the ability to engage learners.

It has become possible due to the advancements in technologies used by both the content creators and the learners.

· The Basic Requirements are the Computer and an Internet Connection,

Besides that, the website needs to give a provision to upload quality content to ensure the learner's knowledge gained on the course.

Creating videos and lessons: To develop compelling videos for e-learning courses, creators require superior audio/video hardware and software. They would require an understanding of the content creation process and graphic Design to indulge the users. The instructor needs to use all his subject knowledge and presentation skills to make his courses easy to learn and understand.

Adding interactive elements: It is essential to add interactive details to the system, such as a comment or question feature, images and multimedia, games, quizzes, and assessment tests.

7 Acknowledgements

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8 References

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- [2] Harasini L., et al. (2001). The Virtual University: A State of the Art. Advances in Computers, Vol. 55, PP 1-47.