A Project Report

on

Learning Management System using Django

Submitted in partial fulfillment of the

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Under The Supervision of
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SCHOOL OF COMPUTING SCIENCE AND ENGINEERING
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CANDIDATE'S DECLARATION

I/We hereby certify that the work which is being presented in the project, entitled " **Learning Management System using Django** " in partial fulfillment of the requirements for the award of the **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING** submitted in the **School of Computing Science and Engineering** of Galgotias University, Greater Noida, is an original work carried out during the period of **JULY-2021 to DECEMBER-2021**, under the supervision of **Dr. J.N. Singh, Professor, Department of Computer Science and Engineering** of School of Computing Science and Engineering , Galgotias University, Greater Noida.

The matter presented in the project has not been submitted by me/us for the award of any other degree of this or any other places.

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This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Supervisor
(Dr. J.N. Singh, Professor)

CERTIFICATE

The Final Thesis/Project/ Dissertation Viva-Voce examination of **18SCSE1010054 – AVNEESH PATHAK, 18SCSE1010375 – ARUN SNGHAL** has been held on __________________and his/her work is recommended for the award of **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING**.

Signature of Examiner(s) **Signature of Supervisor(s)**

Signature of Project Coordinator **Signature of Dean**

Date:

Place:

ABSTRACT

In the recent years, there has been increase in joining of new technologies into educational management. Learning Management System (LMS) is a web-based technology that is playing a very important role in education, nowadays many schools and colleges started online system of learning because of the past critical situation like COVID-19. Many students got benefitted with these platforms. It has many advantages and disadvantages. With the learning management student can study online, get important notices, submit their assignments with in their preferred places. Teachers can upload their study material like recorded lectures, lecture documents, quizzes etc., for their students. This material can have unlimited access to their audiences whenever they need. This gives the ability to check the learner's performance graphically. It helps students, teachers and management up-to-date with upcoming notices. With the help of these learning systems, student saves their time and manage their to do other practices. It can be accessible remotely from desktop as well as mobile also. Getting indulged in these platform helps in reducing the managing costs and time as well.

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CHAPTER-1

Introduction

The “Learning Management System” has been developed to overcome the problems which are prevailing in the manual system of learning. This web-based application is designed for the school/college students to carry out an effective way of learning in a very smooth manner.

The application is reduced as much as possible to avoid errors while entering the data. It also provides an error message while entering invalid data. A responsive UI is designed which require no formal language to operate it. Thus, by this all it proves it is a user-friendly. It can assist the user to concentrate on other activities rather than wasting their time in record keeping. This will help the organizing in better utilization of resources.

1.1 Problem in current system:

The current situation is very limited too few resources, students are unable to get knowledge more than that the lecture provides to them. This in the end limits student’s performances, because everything a student gets is collected from lectures in class. Students are provided with hardcopy of notes, assignments etc. which they have to organize physically in their documents. Student are required to physical be in the classroom in order to gain knowledge thereby sacrificing all other responsibilities. Students only get help from lectures if the lectures are in, they’re office. New lectures to a course have to get materials on their own. Students are unable to share resources effectively and hold group discussions that are monitored or supervised by lectures.

1.2 Proposed system:

The system will hopefully serve as a centralized database of syllabus for the courses offered at the school/college allowing students and faculties (current, past and prospective), to view them. The system will end up bringing an effective communication among students, lectures, and the administration, by accessing information and other resources anytime, anywhere. Lectures to upload assignments and resources for their units. Students to download the resources and upload assignments. It provides an easy-to-use way to manage course websites that include schedule information, announcements, as well as course discussions. Students and teachers can comment and reply for better coordination in lessons.

1.3 Software model:

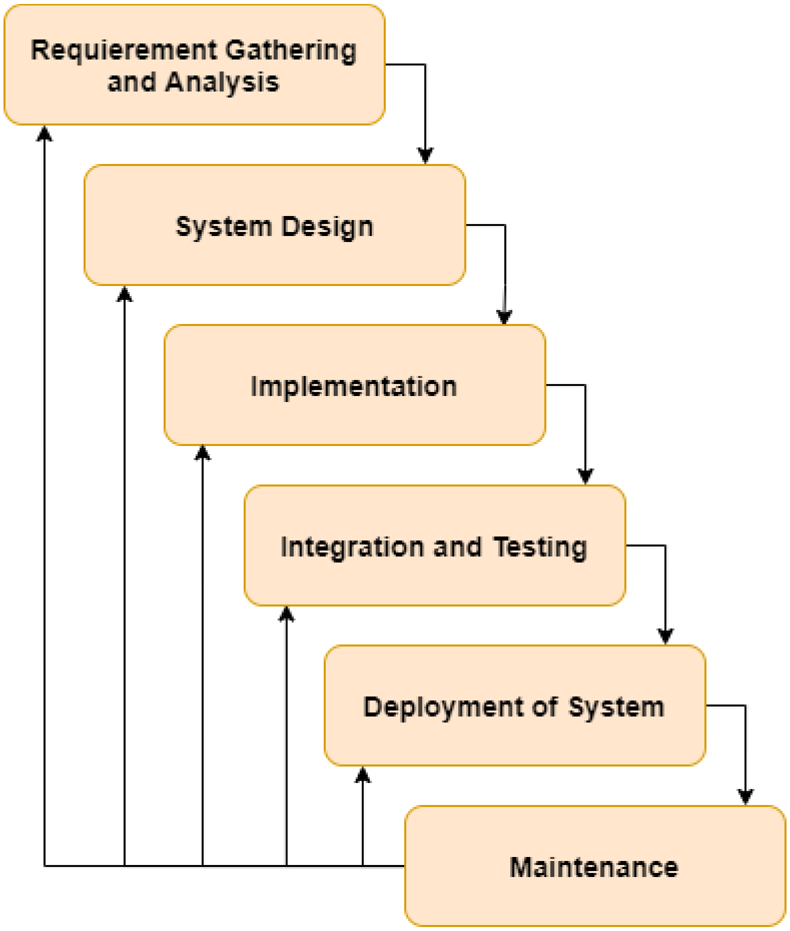


Fig. 1.1 Waterfall Model

Waterfall model is a sequential model that divides software development into pre-defined phases. Each phase must be completed before the next phase can begin with no overlap between the phases. Each phase is designed for performing specific activity during the SDLC phase. It was introduced in 1970 by Winston Royce.

CHAPTER-2

Literature Survey

Learning Management System is among the most important explosion propelled by the internet transformation. Although it has the inability to handle all functions of the institution such as some courses that require practical skills and supervision but it also increases the interaction among students and lectures which in turn will lead to achieve the learning goal as students are able to access anywhere and anytime (Noeline,2010). E-learning delivers content through electronic information and communications technologies (ICTs). According to, the use of these facilities, involves various methods which includes systematized feedback system, computer-based operation network, video conferencing and audio conferencing, internet worldwide websites and computer assisted instruction. This delivery method increases the possibilities for how, where and when employees can engage in lifelong learning. Therefore, Learning Management system has more advantages than it has limitations.

Different authors use different terminologies including online learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, computer-assisted learning, web-based learning and distance learning interchangeably with the term e-learning, making it difficult to come up with a generic term to define e-learning. The common factor in all these terms is the use of technology in the delivery of teaching and learning.

One author by the name of Naidu breaks e-learning down into the following modalities:

- Individualized self-paced online e-learning where an individual learner accesses learning material online.
- Individualized self-paced offline e-learning where an individual learner

accesses learning material offline.

- Synchronous group-based e-learning where a group of learners work together in real time via intranet or Internet.

There are two main aims to this literature review. The first aim is to establish the characteristics and importance of formative, coursework assessment. The second aim is to identify e-learning techniques, tools and approaches for this type of assessment, to discuss what is known about their effectiveness and to uncover factors influencing uptake.

The second journal was: - The Educational Value of Integrating a Learning Management System and a Social Networking Platform by Chikumbutso David Gremu. The use of LMSs at universities and in different organizations is very wide spread because of the features they provide which simplify the management and delivery of course content to students. Regardless of their wide use, their focus is more on the delivery of content than on the learner. LMSs offer little or no opportunities for learners to interact and collaborate on different works and to author content which can contribute to the knowledge which is already available in the systems. The third journal was: - Academic and student use of a learning management system: Implications for quality Debbi Weaver Christine Spratt and Chenicheri Sid Nair. Many higher education institutions have implemented a learning management system (LMS) to manage online learning and teaching, with varying levels of support provided to staff and students, but often there is little subsequent investigation into the quality of the online sites or the use made of the support structures provided.

The concept of e-learning is defined in many different ways fundamentally because the actors that use it are very diverse, each with its idiosyncrasy and scope of application. From the perspective of its conception and development as a training tool, e-learning systems have a pedagogical and technological duality. Pedagogical in that these systems should not be mere containers of digital information, but should be transmitted according to pedagogically defined models and patterns to face the challenges of these new contexts. Technological in that the entire teaching-learning process is based on software applications, mainly developed in web environments. From the perspective of its use, one could distinguish the vision that its final users have, that regardless of their maturity and training, they will see the e-learning system as a source of services to achieve their educational commitment. The scope of e-learning may be limited by reducing it exclusively to the Internet, as (Rosenberg, 2001) defines it as: “the use of Internet technologies for the delivery of a wide range of solutions that improve knowledge and performance. It is based on three fundamental criteria:

- The e-learning network works, which makes it capable of being instantly updated, stored, retrieved, distributed and allows to share instruction or information.
- It is delivered to the end user through the use of computers using standard Internet technology.
- It focuses on the broader vision of learning that goes beyond traditional training paradigms.”

After browsing some e learning platforms and applications on the web, some questions came to mind about the design:

1. Do the websites have the same engagement from the learners?
2. Do they offer the same ease of access and learning ability?

After much review, three of these websites, Khan Academy (https://www.khanacademy.org/), Moodle (https://moodle.org/) and Memrise (https://www.memrise.com/) had the design attributes and features which I would like to be implemented in my project. According to (Patel, 2019), there are some features of educational websites that play a critical role which I would like to implement based on Khan Academy, Moodle and Memrise:

1. **Online Enrolment:** An e learning website must have a sign up or login page for students and teachers.
2. **Reports and Analytics:** By analyzing data with online reports of the user online behavior and activities, an assessment can be made to determine if the site is providing the users with the environment and content as desired.
3. **Student Evaluation and Feedback:** Use tests and quizzes built into a course for continuous evaluation. According to (Hattie & Timperley, 2007), feedback should provide answers to three questions: “Where am I going? (What are the goals?), How am I going? (What progress is being made toward the goal?), and where to next? (What activities need to be undertaken to make better progress?)”.
4. **High Quality Content:** Limiting the size of modules for courses will ensure more engagement from learners as smaller modules will have a better feel of making progress, ensure hands on learning by incorporating interactions and activities and make the website more engaging by use of images and graphics visuals
5. **Gamification and Triggers:** Use gaming mechanics to capture learner interest and increase engagement and retention.
6. **Social Community:** Most people spend a great amount of time on social media. Including a discussion forum for all users will enhance their social interactions with each other.
7. **Support to Learners in a timely manner:** Details of technical support and email contacts must be included so as to provide support for all users (Wang, 2019).

2.1 Supervisory Meetings: The supervisor assigned to me for this project is Dr. J.N. Singh. We have had numerous discussions via email. Our discussions included the project idea and the requirements for the project. I plan to complete scheduled Skype meetings as well as constant email communication to provide feedback on my progress thus far. Using the feedback provided by the supervisor, my project will have to be thought of from a developers view and not building a website to teach a specific topic.

2.2 Functional Requirements: The main actors in the use of the proposed website will be the administrator, teacher and student. In this E-Learning system you will be able to add a student in a class, upload a file, a course, department, subject and video. This project will contain a lot of advanced modules which makes the backend system very powerful. The list of requirements for this project was also influenced by the work done in the background research section above.

Table 1 below gives a description of the modules proposed for the E-Learning system.

Module	Objective	Features
ACTIVITY LOGS	Manage activity logs	• Admin can manage the activity logs • Admin can edit/delete the activity logs • Admin can see the list of all activity logs • Teacher can see his activity logs
CLASS	Tracks all the information and details of classes.	• Admin can add new classes • Admin can see the list of classes details • Only admin can edit and update the record of the classes • Admin will be able to delete the records of the classes

		• All classes’ forms are validated on client side using Django
TEACHER	Tracks all the information of the teacher. Create, Read, Update and Delete (CRUD) operations will be developed for teachers. This is a role-based module where admin can perform each and every operation on data but the teacher will be able to view only his/her data. Access level restrictions will be implemented for students.	• Admin can add new teacher records • Admin can see the list of teacher details • Only admin can edit and update the record of the teacher • Admin will be able to delete the records of the teacher • All teacher forms are validated on client side using Django
ASSIGNMENTS	Administrator to manage Assignments	• Admin can manage the assignment • Admin can edit/delete the assignment • Admin can see the list of all assignments • Teacher can see his assignment

DEPARTMENTS	Administrator to manage departments	• Admin can manage the departments • Admin can edit/delete the departments • Admin can see the list of all departments • Teacher can see his departments
EVENTS	Provides all the functionality related to events and tracks all the information and details of events	• Admin can add new events • Admin can see the list of events details • Only admin can edit and update the record of the events • Admin will be able to delete the records of the events • All events forms are validated on client side using Django
SUBJECTS	Administrator can add subjects and a teacher can see subjects	• Admin can manage the subjects • Admin can edit/delete the subjects • Admin can see the list of all subjects
STUDENTS	Tracks all the information and details of the students. Create, Read, Update and Delete (CRUD) will be developed for operations of the	• Admin can add new students • Admin can see the list of student’s details • Only admin can edit and update the records of the students • Admin will be able to delete the records of the students

	students.	• All Students publication forms will be validated on the client side using Django

Table 1. Proposed Modules

Based on the modules to be created, Table 2 below gives a description of the functional requirements for each user.

User	Functional Requirements
ADMIN	• Login for Admin • Forgot password for Admin • Edit Profile for Admin • Change password for Admin • Logout functionality • Dashboard for Admin User • MANAGE ACTIVITY LOG: Add New Activity log, edit the existing activity log, view details of the activity log and see a listing of all activity logs • MANAGE TEACHER: Add new teacher, edit existing teacher, view details of teacher and see a listing of all teachers • MANAGE CLASS: Add new class, edit existing class, view details of a class and see a listing of all classes • MANAGE ASSIGNMENTS: Add new assignment, edit the existing assignment, view details of the assignments and see a listing of all assignments • MANAGE DEPARTMENTS: Add a new department, edit the existing department, view details of the department

	and see a listing of all departments • MANAGE EVENT: Add a new event, edit the existing event, view details of events and see a listing of all events • MANAGE FILES: Add new files, edit existing files, view details and a listing of all files • MANAGE STUDENT: Add new student, edit the existing student, view details of the student and see a listing of all students • MANAGE SUBJECT: Add a new subject, edit the existing subject, view details of a subject and see a listing of all subjects. • REPORTS OF THE E-LEARNING MAMAGEMENT SYSTEM: Reports of Activity logs, Teachers, Classes, Assignments, Departments, Events, Files, Students and Subjects.
TEACHER	• TEACHER REGISTRATION: Any Teacher can register on the website using the registration module • TEACHER LOGIN: This is the login form from where the Teacher can login into the system • TEACHER ADDS CLASS: This is the Teacher Add Class form • TEACHER ASSIGNMENTS ADD: This is the Teacher assignments add form of the project • TEACHER CLASS: This is the Teacher class in this project • TEACHER EVENT: This is the Teacher Event where a

	teacher will be able to add an event and see an event report • TEACHER SEND MESSAGE: This is the teacher Send Message form where the teacher will be able to send a message • TEACHER QUIZ SCREEN: This is the teacher quiz screen form where a teacher can add a quiz and see a quiz report • CHANGE PASSWORD: This is the change password module from where a teacher can change his account password. • VIDEO UPLOADING for teachers: Teachers can also upload videos to aid in teaching.
STUDENT	• STUDENT REGISTRATION: Any Students can register on the website using the registration module • STUDENT LOGIN: This is the login form from where students can login to the system • STUDENT COMPOSE MESSAGE SCREEN: Student compose message screen • STUDENT EVENT SCREEN: A student will be able to see an event report • STUDENT INBOX SCREEN: A student will be able to see a message • STUDENT QUIZ SCREEN: Student can see the quiz report • CHANGE PASSWORD: A student can change his account password from this module.

Table 2. Functional Requirements of Users

2.3 Non-Functional Requirement: Table 3 below gives a description of non-functional requirements proposed for the e learning management system.

Non-Functional Requirement	**Objective**
Application Security	The system should be protected in such a manner that one registered user should not be able to access another registered user's information ensuring privacy of information.
Database Security	Users of the system should not have direct access to the database to query it nor view data in it. The only access to the database should be via the application interface.
Browser Compatibility	The application should be accessible on Google Chrome, Mozilla Firefox and Internet Explorer browsers on any device.
Maintainability	The application should be developed so that one can easily add new products and easily facilitate changes to product information.
Consistency	The appearance and delivery of the content should be consistent to reduce the learning curve. Layouts, buttons and the positioning of key elements should be consistent in each page.
Usability	How difficult it will be to learn and operate the system.
Scalability	Number of users supported will mainly depend on the server load, server processing capacity and its memory. It should scale maximum number of users.
Availability	24 X 7 availability should be there so that student can use it at any time according to his/her convenience.

Table 3. Non-Functional Requirements of the System

CHAPTER-3

Requirements and Feasibility

3.1 Requirements:

3.1.1 HTML: HTML stands for Hypertext Markup Language. It allows the user to create and structure sections, paragraphs, headings, links, and blockquotes for web pages and applications. HTML is not a programming language, meaning it doesn’t have the ability to create dynamic functionality. Instead, it makes it possible to organize and format documents, similarly to Microsoft Word. The average website includes several different HTML pages. For instance, a home page, an about page, and a contact page would all have separate HTML files. HTML documents are files that end with a .html or .htm extension. A web browser reads the HTML file and renders its content so that internet users can view it. All HTML pages have a series of HTML elements, consisting of a set of tags and attributes. HTML elements are the building blocks of a web page. A tag tells the web browser where an element begins and ends, whereas an attribute describes the characteristics of an element.

To understand "HTML" from front to back, let's look at each word that makes up the abbreviation:

- **Hypertext:** text (often with embeds such as images, too) that is organized in order to connect related items
- **Markup:** a style guide for typesetting anything to be printed in hardcopy or soft copy format
- **Language:** a language that a computer system understands and uses to interpret commands.

3.1.2 CSS: CSS stands for Cascading Style Sheets. CSS describes how HTML elements are to be displayed on screen, paper, or in other media. CSS saves a lot of work. It can control the layout of multiple web pages all at once. External stylesheets are stored in CSS files. It is a style sheet language which is used to describe the look and formatting of a document written in markup language. It provides an additional feature to HTML. It is generally used with HTML to change the style of web pages and user interfaces. It can also be used with any kind of XML documents including plain XML, SVG and XUL. If HTML were the engine components of a car, CSS would be the body style and the paint job. A website can run without CSS, but it certainly isn't pretty. CSS makes the front-end of a website shine and it creates a great user experience. Without CSS, websites would be less pleasing to the eye and likely much harder to navigate. In addition to layout and format, CSS is responsible for font color and more.

There are a number of benefits of CSS, including:

- **Faster Page Speed:** More code means slower page speed. And CSS enables you to use less code. CSS allows you to use one CSS rule and apply it to all occurrences of a certain tag within an HTML document.
- **Better User Experience:** CSS not only makes web pages easy on the eye, it also allows for user-friendly formatting. When buttons and text are in logical places and well organized, user experience improves.
- **Quicker Development Time:** With CSS, you can apply specific formatting rules and styles to multiple pages with one string of code. One cascading style sheet can be replicated across several website pages. If, for instance, you have product pages that should all have the same formatting, look, and feel, writing CSS rules for one page will suffice for all pages of that same type.
- **Easy Formatting Changes:** If you need to change the format of a specific set of pages, it's easy to do so with CSS. There's no need to fix every individual page. Just edit the corresponding CSS stylesheet and you'll see changes applied to all the pages that are using that style sheet.

- **Compatibility Across Devices:** Responsive web design matters. In today’s day and age, web pages must be fully visible and easily navigable on all devices. Whether mobile or tablet, desktop, or even smart TV, CSS combines with HTML to make responsive design possible.

3.1.3 Django: Django is a high-level Python web framework that enables rapid development of secure and maintainable websites. Built by experienced developers, Django takes care of much of the hassle of web development, so you can focus on writing your app without needing to reinvent the wheel. It is free and open source, has a thriving and active community, great documentation, and many options for free and paid-for support. Django is a free and open-source web application framework, written in Python. A web framework is a set of components that helps you to develop websites faster and easier. When you're building a website, you always need a similar set of components: a way to handle user authentication (signing up, signing in, signing out), a management panel for your website, forms, a way to upload files, etc. Frameworks exist to save you from having to reinvent the wheel and to help alleviate some of the overhead when you’re building a new site. There are several benefits of using Django: Starting a Django project allows you to build your application’s entire data model in Python without needing to use SQL. Using an object-relational mapper (ORM), Django converts traditional database structure into Python classes to make it easier to work within a fully Python environment. Django-MySQL supports the JSON data type and related functions. In Django, your database tables become Python classes. Web applications access and manage data through Django models. The fields of the database are simply converted into class attributes. If you’re familiar with class attribute definition in Python, you can easily design and manage a Django database. Django Web Framework offers a shortcut to full integration with your application’s database. It provides CRUD (create, read, update, delete) functionality, HttpResponse and cross-site scripting, supplies user management capabilities, offers software administration features and more. You import the packages, connect to your database and then get back to work developing the parts of your application that make your product unique. Because Django is designed to be used for web app development, it needs a way to easily create dynamic HTML that displays your user’s unique data. The Django application produces that dynamic HTML with a built-in templating engine called the Django template language (DTL). An HTML template allows Django developers to combine static elements (including design elements such as colors, logos, or text) with data (such as user names or locations) to create a new web page on the fly. With model-view-controller (MVC), if you want your application to greet a user by name when they log in, you can build a template that displays the static text (“Welcome to the site, X”) then use a dynamic placeholder to automatically display the user’s first name from your database. When the page renders, it will combine the dynamic elements with the static ones to create a seamless user experience. When answering, "What is Django", we must talk about what special features Django offers for security. Web apps are frequent targets of hackers, especially applications that store user login information or financial data. Django offers features to help protect your application and your users. Web developers can also count on Django APIs to automatically use cross-site request forgery (CSRF) protection to insert user-specific secret tokens into POST requests. As a result, web developers can prevent malicious users from duplicating other POST requests to masquerade as authorized users. The protection of Django goes beyond its explicit security features: security efforts are enhanced by the extensive experience and expertise of the Django user base. If you build your entire web app from scratch, you run the risk of accidentally introducing a security vulnerability into your module. Django packages are widely used, open source and well-reviewed by web developers, so you can be more confident that they’ll protect your data.

3.1.4 Bootstrap: Bootstrap is a massive collection of reusable and versatile pieces of code which are written in CSS, HTML and JavaScript. Since it is also a framework, all the foundations are already laid for responsive web development, and all developers have to do is insert the code into the pre-defined grid system. There are some free tools that come as part of the package, which permit designers to build the more common website interface components, as well as more responsive ones, adding to the versatility of the framework. Responsive design makes it possible for a web page or app to detect the visitor’s screen size and orientation and automatically adapt the display accordingly; the mobile first approach assumes that smartphones, tablets and task-specific Mobile apps are employees' primary tools for getting work done and addresses the requirements of those technologies in design. Bootstrap includes user interface components, layouts and JS tools along with the framework for implementation. The software is available precompiled or as source code. Mark Otto and Jacob Thornton developed Bootstrap at Twitter as a means of improving the consistency of tools used on the site and reducing maintenance. The software was formerly known as Twitter Blueprint and is sometimes referred to as Twitter Bootstrap. In computers, the word bootstrap means to boot: to load a program into a computer using a much smaller initial program to load in the desired program (which is usually an operating system). In the physical world, a bootstrap is a small strap or loop at the back of a leather boot that enables you to pull the entire boot on and in general usage, bootstrapping is the leveraging of a small initial effort into something larger and more significant. There is also a common expression, "pulling yourself up by your own bootstraps," meaning to leverage yourself to success from a small beginning.

3.1.5 SQLite: SQLite is an in-process library that implements a self-contained, serverless, zero-configuration, transactional SQL database engine. It is a database, which is zero-configured, which means like other databases you do not need to configure it in your system. SQLite engine is not a standalone process like other databases, you can link it statically or dynamically as per your requirement with your application. SQLite accesses its storage files directly. SQLite is a software library that implements a self-contained, serverless, zero-configuration, transactional SQL database engine. SQLite is one of the fastest-growing database engines around, but that's growth in terms of popularity, not anything to do with its size. The source code for SQLite is in the public domain. SQLite is used in a spacious variety of software and products. It is also used in Apple’s Mac OS operating system as a part of their Core Data application framework. and also used in the system’s Safari web browser, Mail.app email program, RSS manager, as well as Apple’s Aperture photography software. SQLite can be viewed in Sun’s Solaris OS (operating system) environment, specifically the database backing the Service Management Facility that debuted with Solaris 10, a core component of its predictive is self-healing technology. SQLite, has been added as a part of PHP 5 standard library. There are several benefits of using SQLite database are as follows:

- SQLite does not require a separate server process or system to operate (serverless).
- SQLite comes with zero-configuration, which means no setup or administration needed.
- A complete SQLite database is stored in a single cross-platform disk file.
- SQLite is very small and light weight, less than 400KiB fully configured or less than 250KiB with optional features omitted.
- SQLite is self-contained, which means no external dependencies.
- SQLite transactions are fully ACID-compliant, allowing safe access from multiple processes or threads.
- SQLite supports most of the query language features found in SQL92

(SQL2) standard.

- SQLite is written in ANSI-C and provides simple and easy-to-use API.
- SQLite is available on UNIX (Linux, Mac OS-X, Android, iOS) and Windows (Win32, WinCE, WinRT).

3.2 Feasibility: The best LMS solution is defined in this study as one in which all LMS components are considered within the total learning infrastructure of college such that maximum student success is ensured from both an institutional and System perspective. Aspects of these components within the frame work of student success were assessed by the following attributes:

- **Cost effectiveness:** The total cost figures included in this report represent a current snapshot of the LMS expenditures excluding self-hosting and migration cost, is reported to the Assessment team. The benefits of the LMS are expected to be more than cost such as hosting maintenance and other cost that may be incurred.
- **Support and Training:** The system must have a virtual learning community provides students orientates templates and professionals, development resources for faculty by providing online help desk services for students and faculty that includes chat, email, telephone and a personalized support portal available 24/7/365.
- **Ease of Use:** The LMS must have ease of use components and no additional instrument questions were developed the system should have a higher level of instructor and administrator perceived application functionality.
- **Scalability:** The LMS must be able to report on the number of active courses, users, and average course size and storage capacity on their LMS. It should be able to hold a lot of actives but still be able to use a less storage capacity.

CHAPTER-4

Analysis and Design

Design is the first step in the development phase for any techniques and principles for the purpose of defining a device, a process or system in sufficient detail to permit its physical realization. Design is the place where quality is fostered in development. Software design is a process through which requirements are translated into a representation of software. Software design is conducted in two steps. Preliminary design is concerned with the transformation of requirements into data.

3.1 System Design of Learning Management System: In this phase, logical structure of system will be built which fulfils the given requirements. Design phase of software development deals with the customer’s requirement into a logical working system.

3.2 Architecture Diagram:

The architecture diagram is a schematic representation of a collection of ideas that are part of an architecture including its principles, elements and materials. Architecture diagram will support designers and engineers in visualizing a system or application's high-level, overarching layout to ensure the framework addresses the needs of their customers. Architecture is nothing but an abstract description of entities in a system. It defines the relations between them and involves a series of decision-making processes. The architecture is a vision and a structure. A system architecture diagram is the distribution of the functional correspondences. These are formal elements, the embodiment of concepts and information. Architecture defines the relations between elements, amongst features, and the surrounding elements. Creating an Architecture diagram is not easy. The examples aim to make things easy for people to understand. Diagrams can be classified into many categories. One popular type of diagram is the 4+1 view, which includes the scenario, logical, physical, process, and development views of the architecture. A diagram much like a picture is worth a thousand words. In other words, an architectural diagram must serve several different functions. To allow relevant users to understand a system architecture and follow it in their decision-making, we need to communicate information about the architecture. Architectural diagrams provide a great way to do this. To put down some major functions, an architectural diagram needs to:

- Break down communication barriers
- Reach a consensus
- Decrease ambiguity

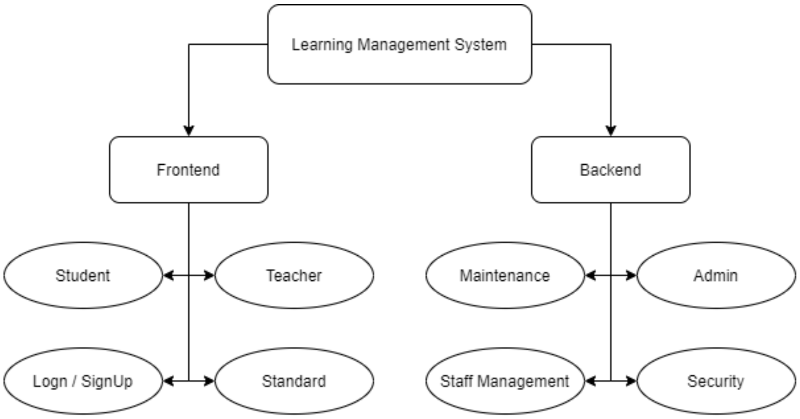


Fig. 4.1 Architecture Diagram

3.3 ER Diagram:

An Entity–relationship model (ER model) describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram (ER Diagram). An ER model is a design or blueprint of a database that can later be implemented as a database. The main components of E-R model are: entity set and relationship set. ER diagrams help to explain the logical structure of databases. ER diagrams are created based on three basic concepts: entities, attributes and relationships. ER Diagrams contain different symbols that use rectangles to represent entities, ovals to define attributes and diamond shapes to represent relationships. At first look, an ER diagram looks very similar to the flowchart. However, ER Diagram includes many specialized symbols, and its meanings make this model unique. The purpose of ER Diagram is to represent the entity framework infrastructure. ER Model stands for Entity Relationship Model is a high-level conceptual data model diagram. ER model helps to systematically analyze data requirements to produce a well-designed database. The ER Model represents real-world entities and the relationships between them. Creating an ER Model in DBMS is considered as a best practice before implementing your database. ER Modeling helps you to analyze data requirements systematically to produce a well-designed database. So, it is considered a best practice to complete ER modeling before implementing your database. Here, are prime reasons for using the ER Diagram:

- Helps you to define terms related to entity relationship modeling
- Provide a preview of how all your tables should connect, what fields are going to be on each table
- Helps to describe entities, attributes, relationships
- ER diagrams are translatable into relational tables which allows you to build databases quickly
- ER diagrams can be used by database designers as a blueprint for implementing data in specific software applications
- The database designer gains a better understanding of the information to be contained in the database with the help of ERP diagram
- ERD Diagram allows you to communicate with the logical structure of the database to users

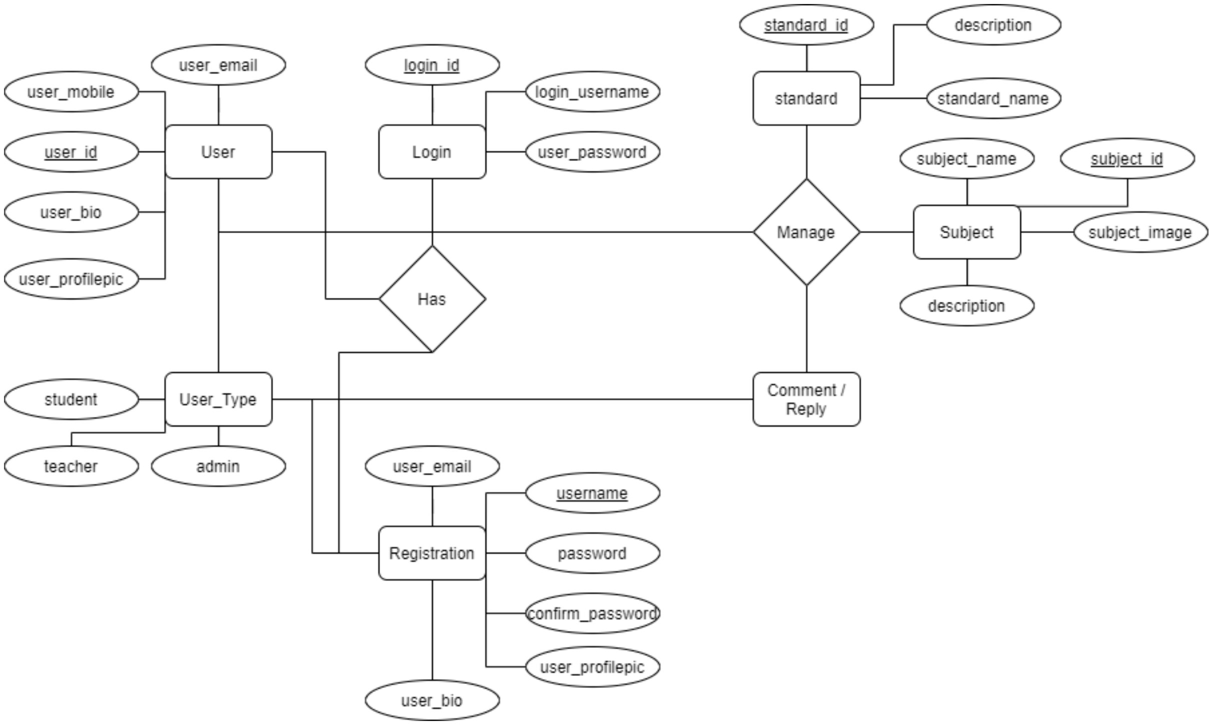


Fig. 4.2 ER Diagram

3.4 Use Case Diagram:

A use case diagram is a dynamic or behavior diagram in UML. Use case diagrams model the functionality of a system using actors and use cases. Use cases are a set of actions, services, and functions that the system needs to perform. In this context, a "system" is something being developed or operated, such as a web site. The "actors" are people or entities operating under defined roles within the system. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation (i.e., use case diagram). It is an effective technique for communicating system behavior in the user's terms by specifying all externally visible system behavior. A use case diagram is usually simple. It does not show the detail of the use cases, it only summarizes some of the relationships between use cases, actors, and systems, it does not show the order in which steps are performed to achieve the goals of each use case. Use case diagrams are valuable for visualizing the functional requirements of a system that will translate into design choices and development priorities. They also help identify any internal or external factors that may influence the system and should be taken into consideration. They provide a good high-level analysis from outside the system. Use case diagrams specify how the system interacts with actors without worrying about the details of how that functionality is implemented. Basic Use Case Diagram Symbols and Notations are as follows:

- **System:** Draw your system's boundaries using a rectangle that contains use cases. Place actors outside the system's boundaries.
- **Use Case:** Draw use cases using ovals. Label the ovals with verbs that represent the system's functions.
- **Actors:** Actors are the users of a system. When one system is the actor of another system, label the actor system with the actor stereotype.
- **Relationships:** Illustrate relationships between an actor and a use case with a simple line. For relationships among use cases, use arrows labeled either "uses" or "extends." A "uses" relationship indicates that one use case is needed by another in order to perform a task. An "extends" relationship indicates alternative options under a certain use case.

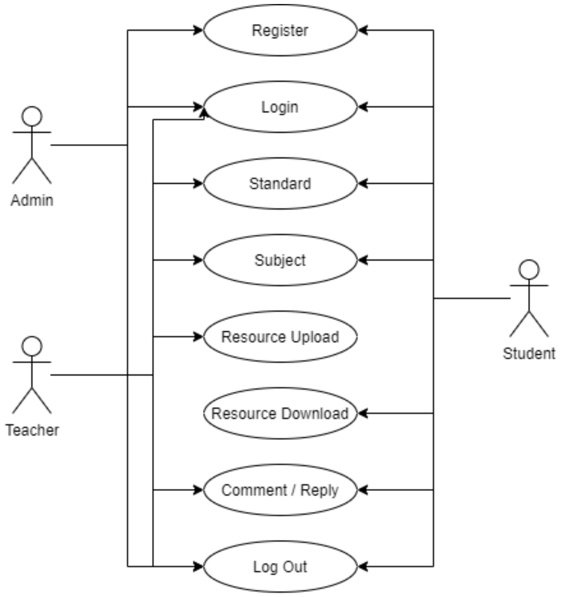


Fig. 4.3 Use Case Diagram

3.5 Data Flow Diagram:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It can be manual, automated, or a combination of both. It shows how data enters and leaves the system, what changes the information, and where data is stored. The objective of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communication tool between a system analyst and any person who plays a part in the order that acts as a starting point for redesigning a system. The DFD is also called as a data flow graph or bubble chart. The Data Flow Diagram has 4 components:

- **Process:** Input to output transformation in a system takes place because of process function. The symbols of a process are rectangular with rounded corners, oval, rectangle or a circle. The process is named a short sentence, in one word or a phrase to express its essence
- **Data Flow:** Data flow describes the information transferring between different parts of the systems. The arrow symbol is the symbol of data flow. A relatable name should be given to the flow to determine the information which is being moved. Data flow also represents material along with information that is being moved. Material shifts are modeled in systems that are not merely informative. A given flow should only transfer a single type of information. The direction of flow is represented by the arrow which can also be bi-directional.
- **Warehouse:** The data is stored in the warehouse for later use. Two horizontal lines represent the symbol of the store. The warehouse is simply not restricted to being a data file rather it can be anything like a folder with documents, an optical disc, a filing cabinet. The data warehouse can be viewed independent of its implementation. When the data flow from the warehouse it is considered as data reading and when data flows to the warehouse it is called data entry or

data updating.

- **Terminator:** The Terminator is an external entity that stands outside of the system and communicates with the system. It can be, for example, organizations like banks, groups of people like customers or different departments of the same organization, which is not a part of the model system and is an external entity. Modeled systems also communicate with terminator.

DFD has often been used due to the following reasons:

- Logical information flow of the system
- Determination of physical system construction requirements
- Simplicity of notation
- Establishment of manual and automated systems requirements

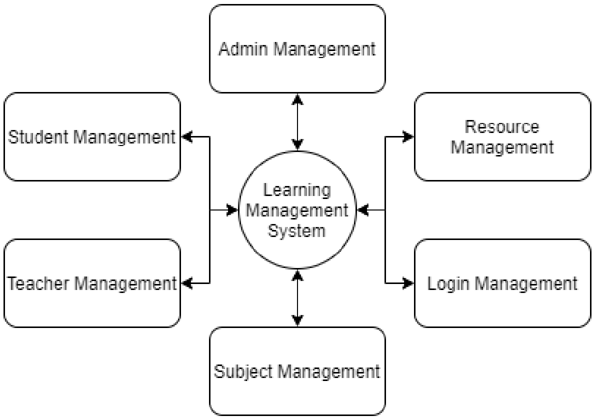


Fig. 4.4 Data Flow Diagram

3.6 Activity Diagram:

An activity diagram visually presents a series of actions or flow of control in a system similar to a flowchart or a data flow diagram. Activity diagrams are often used in business process modelling. They can also describe the steps in a use case diagram. Activities modelled can be sequential and concurrent. In both cases an activity diagram will have a beginning (an initial state) and an end (a final state).

The various components used in the diagram and the standard notations are explained as follows:

- **Initial State:** The starting state before an activity takes place is depicted using the initial state.
- **Activity State:** An activity represents execution of an action on objects or by objects. We represent an activity using a rectangle with rounded corners. Basically, any action or event that takes place is represented using an activity.
- **Action Flow or Control flows:** Action flows or Control flows are also referred to as paths and edges. They are used to show the transition from one activity state to another. An activity state can have multiple incoming and outgoing action flows. We use a line with an arrow head to depict a Control Flow. If there is a constraint to be adhered to while making the transition it is mentioned on the arrow.
- **Decision node and Branching:** When we need to make a decision before deciding the flow of control, we use the decision node.
- **Guards:** A Guard refers to a statement written next to a decision node on an arrow sometimes within square brackets.
- **Fork:** Fork nodes are used to support concurrent activities. When we use a fork node when both the activities get executed concurrently i.e., no decision is made before splitting the activity into two parts. Both parts need to be executed in case of a fork statement. We use a rounded solid rectangular bar to represent a Fork notation with incoming arrow from the parent activity state and outgoing arrows towards the newly created activities.
- **Join:** Join nodes are used to support concurrent activities converging into one. For join notations we have two or more incoming edges and one outgoing edge.
- **Merge or Merge Event:** Scenarios arise when activities which are not being executed concurrently have to be merged. We use the merge notation for such scenarios. We can merge two or more activities into one if the control

proceeds onto the next activity irrespective of the path chosen.

- **Swimlanes:** We use swimlanes for grouping related activities in one column. Swimlanes group related activities into one column or one row. Swimlanes can be vertical and horizontal. Swimlanes are used to add modularity to the activity diagram. It is not mandatory to use swimlanes. They usually give more clarity to the activity diagram. It's similar to creating a function in a program. It's not mandatory to do so, but it is a recommended practice.
- **Time Event:** We can have a scenario where an event takes some time to complete. We use an hourglass to represent a time event.
- **Final State or End State:** The state which the system reaches when a particular process or activity ends is known as a Final State or End State. We use a filled circle within a circle notation to represent the final state in a state machine diagram. A system or a process can have multiple final states.

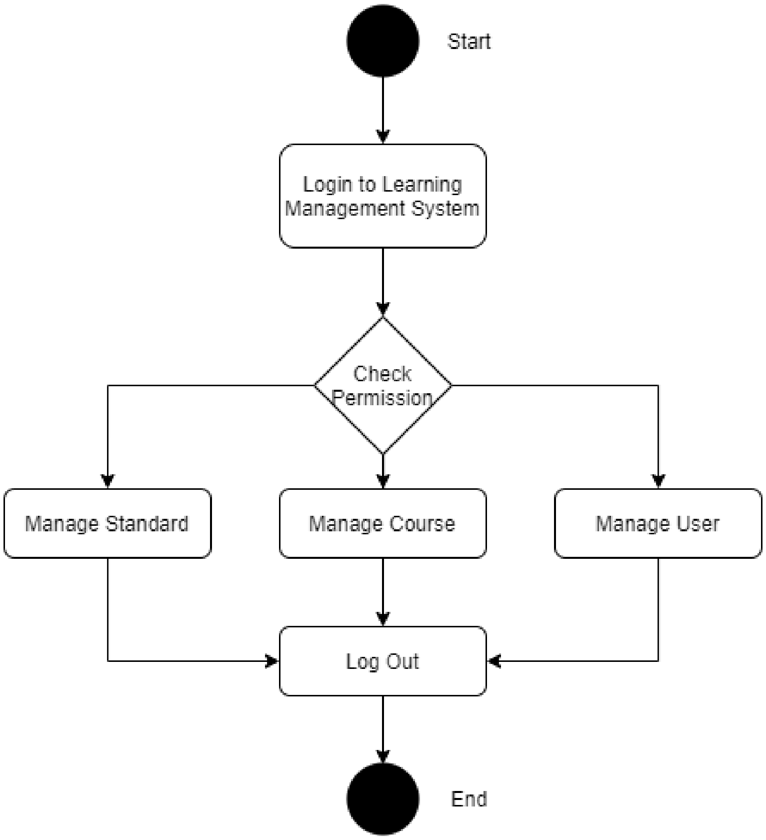


Fig. 4.5 Activity Diagram

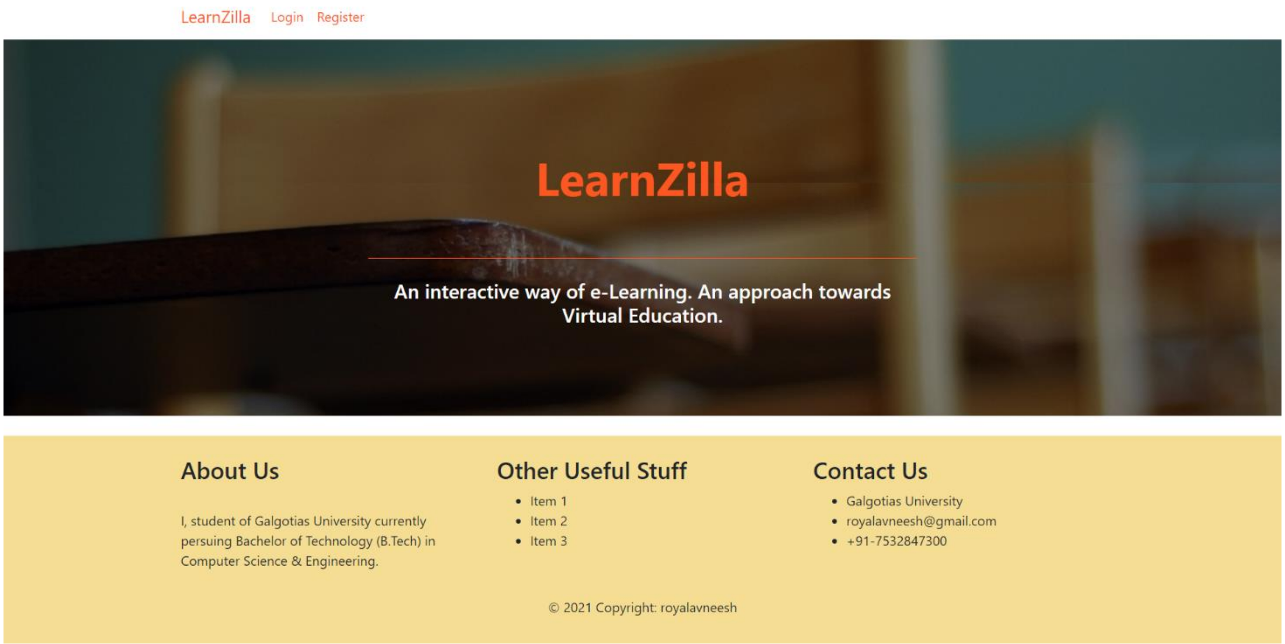
CHAPTER-5

Implementation

5.1 Output Screens:

This phase will explain the real agenda of this project by showing the proper snapshots of the project. There will be several modules which are explained below.

Let's talk about the front display page of the project. It consists of very basic function like Login and Register. It contains the logo of the project "LearnZilla". In the header section, the logo and a quote are provided. In the footer section, some details are provided by the developer. On clicking the top-left corner logo "LearnZilla", it will redirect the website to the homepage. Beside that logo, the Login and Register button are provided in the navigation bar, which will redirect the user to login and registration page respectively.



LearnZilla

An interactive way of e-Learning. An approach towards Virtual Education.

About Us

I, student of Galgotias University currently persuing Bachelor of Technology (B.Tech) in Computer Science & Engineering.

Other Useful Stuff

- Item 1
- Item 2
- Item 3

Contact Us

- Galgotias University
- royalavneesh@gmail.com
- +91-7532847300

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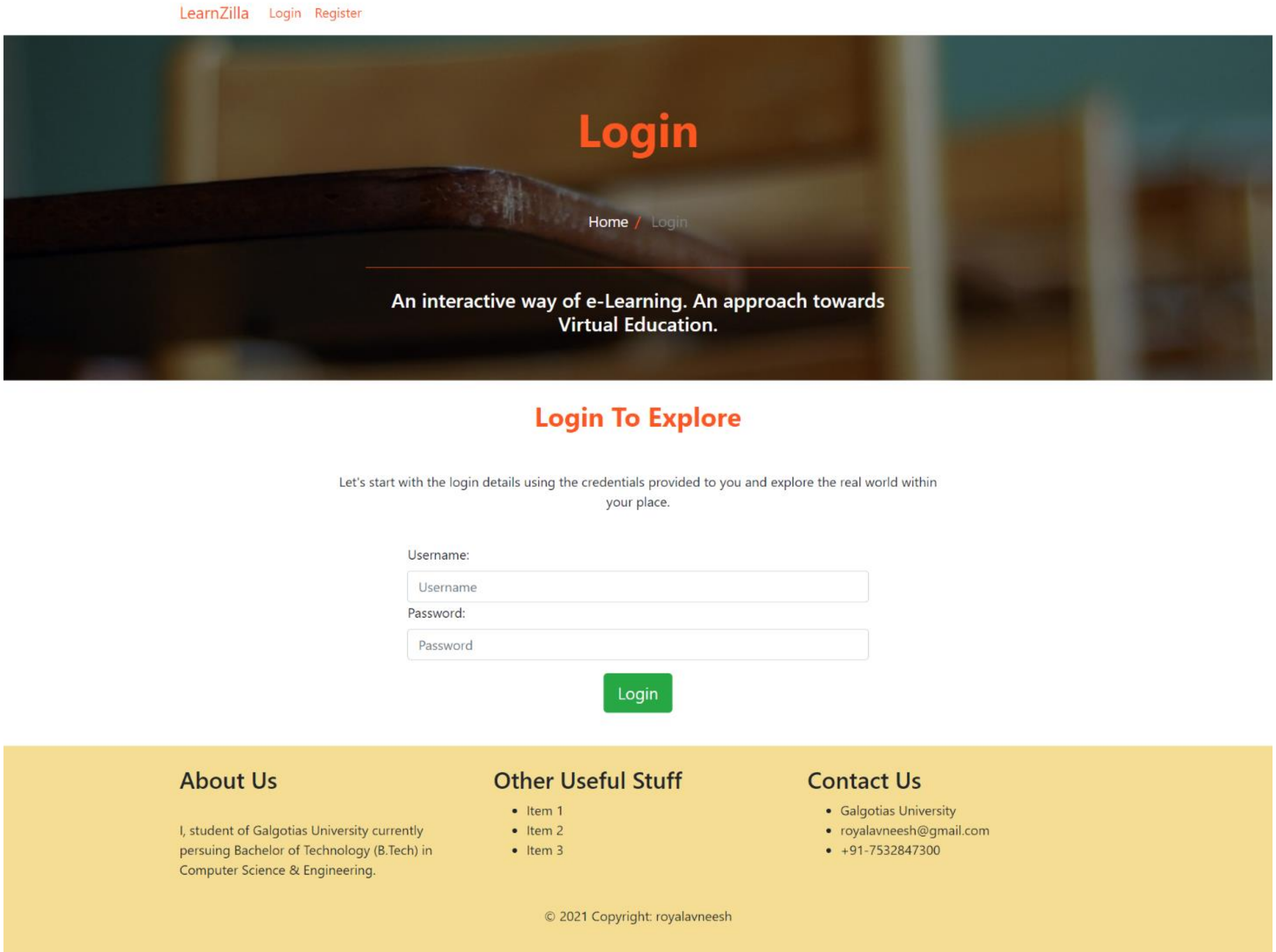
Fig. 5.1 Homepage

The figure below shows the login module of this project. The tracking of the webpage can be seen above the login form. This is a type of slug field which is beautifully shown in the website. Next, there are two types of inputs are provided, username and password. User have to input their credentials in the username and passwords. Any user whether it is student, parent, teacher or admin, they all will login through the same page. No other login page is provided for the high-end authority like Admin. The “Login” button is provided below the inputs. This button verifies the credentials from the database with all its security essentials. After verification, the user will be redirected to its appropriate platform.



Login

An interactive way of e-Learning. An approach towards Virtual Education.

Login To Explore

Let's start with the login details using the credentials provided to you and explore the real world within your place.

Username: Username

Password: Password

About Us

I, student of Galgotias University currently persuing Bachelor of Technology (B.Tech) in Computer Science & Engineering.

Other Useful Stuff

- Item 1
- Item 2
- Item 3

Contact Us

- Galgotias University
- royalavneesh@gmail.com
- +91-7532847300

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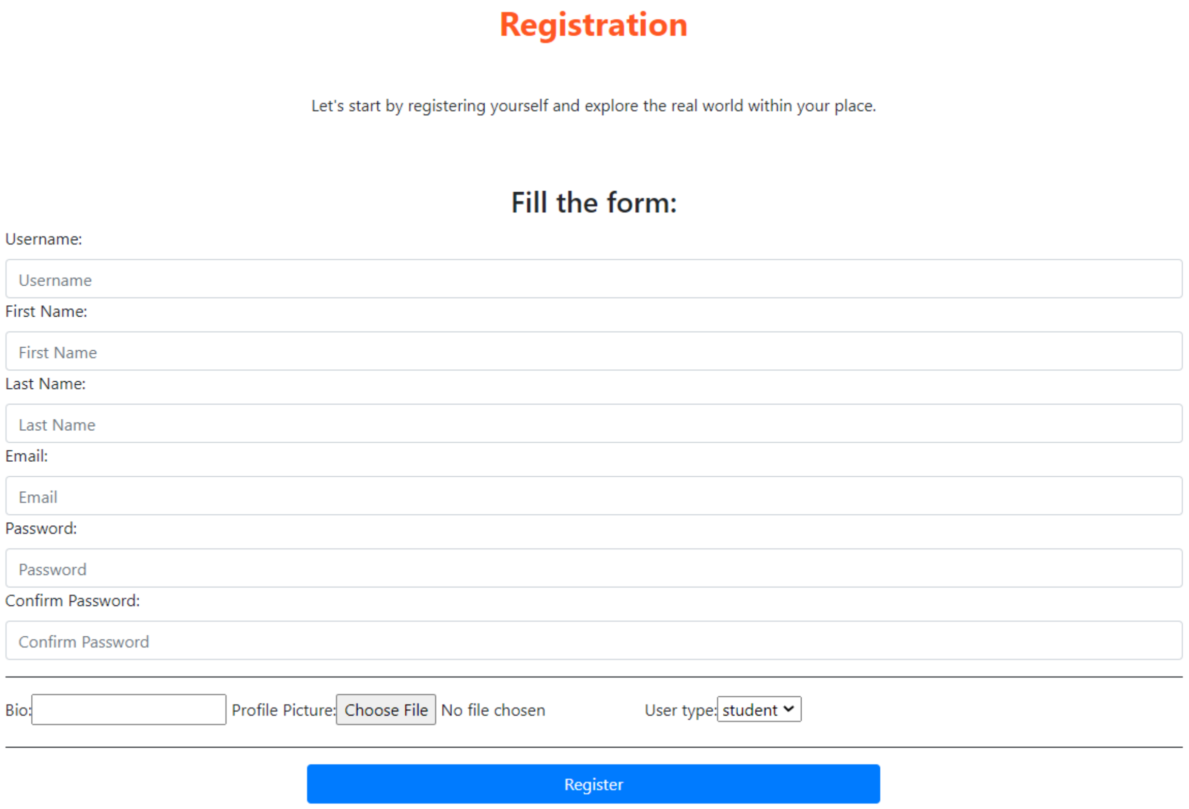
Fig. 5.2 Login Page

From the homepage, on clicking the Register button, it will redirect to the registration page. The following inputs are provided like username, first name, last name, email, password, confirm password and some multifunction inputs like profile picture and user type. After submitting the details in the registration form, the details are checked for the validation of parameters, if the criteria meets then user has been registered successfully. A message on being successful registration will be displayed on the screen.



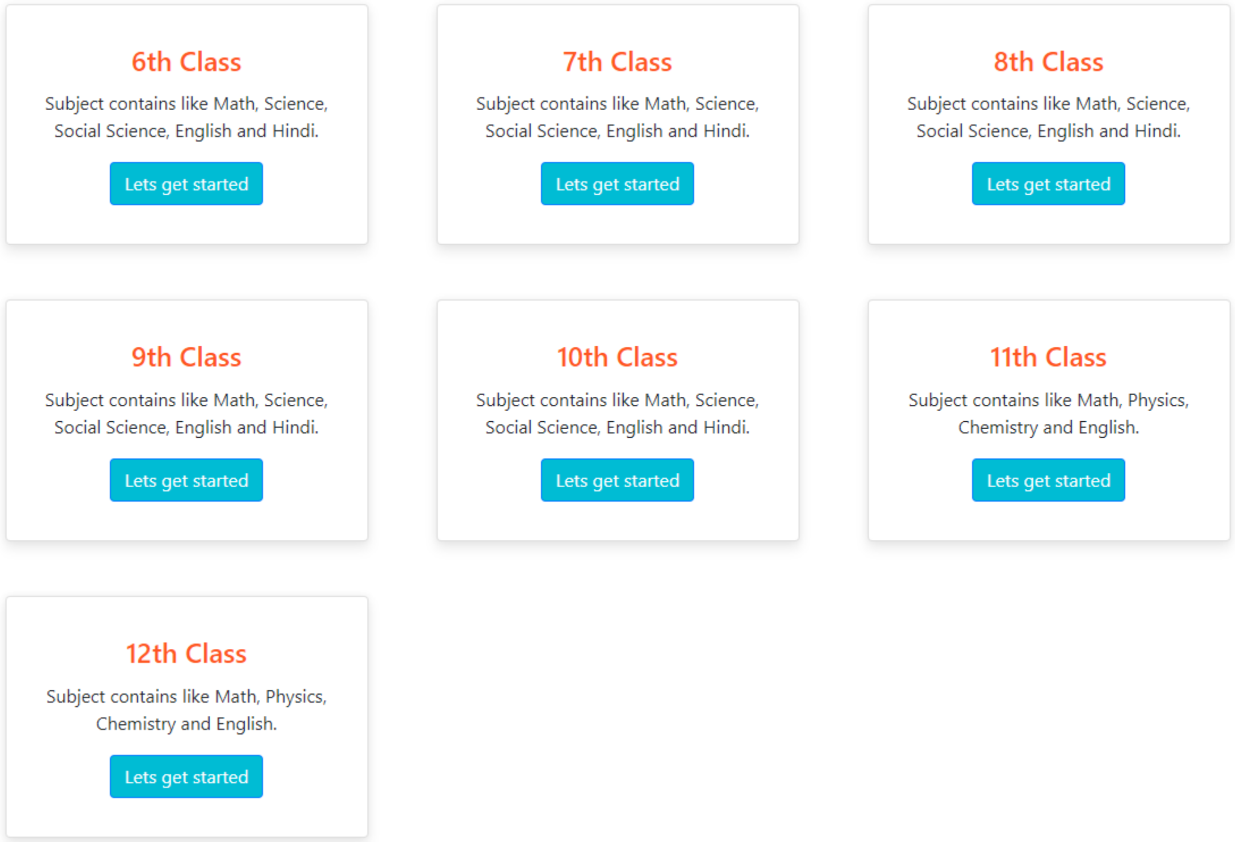
Registration

Let's start by registering yourself and explore the real world within your place.

Fill the form:

Fig. 5.3 Registration Page

Now we talk about out next module i.e., Standards. After the successful login, it will be redirected to the “Standards” page. Here, all the respective standards with their information are provided. This page is accessible to anyone but only admin can add, update or delete the standards.



6th Class

Subject contains like Math, Science, Social Science, English and Hindi.

7th Class

Subject contains like Math, Science, Social Science, English and Hindi.

8th Class

Subject contains like Math, Science, Social Science, English and Hindi.

9th Class

Subject contains like Math, Science, Social Science, English and Hindi.

10th Class

Subject contains like Math, Science, Social Science, English and Hindi.

11th Class

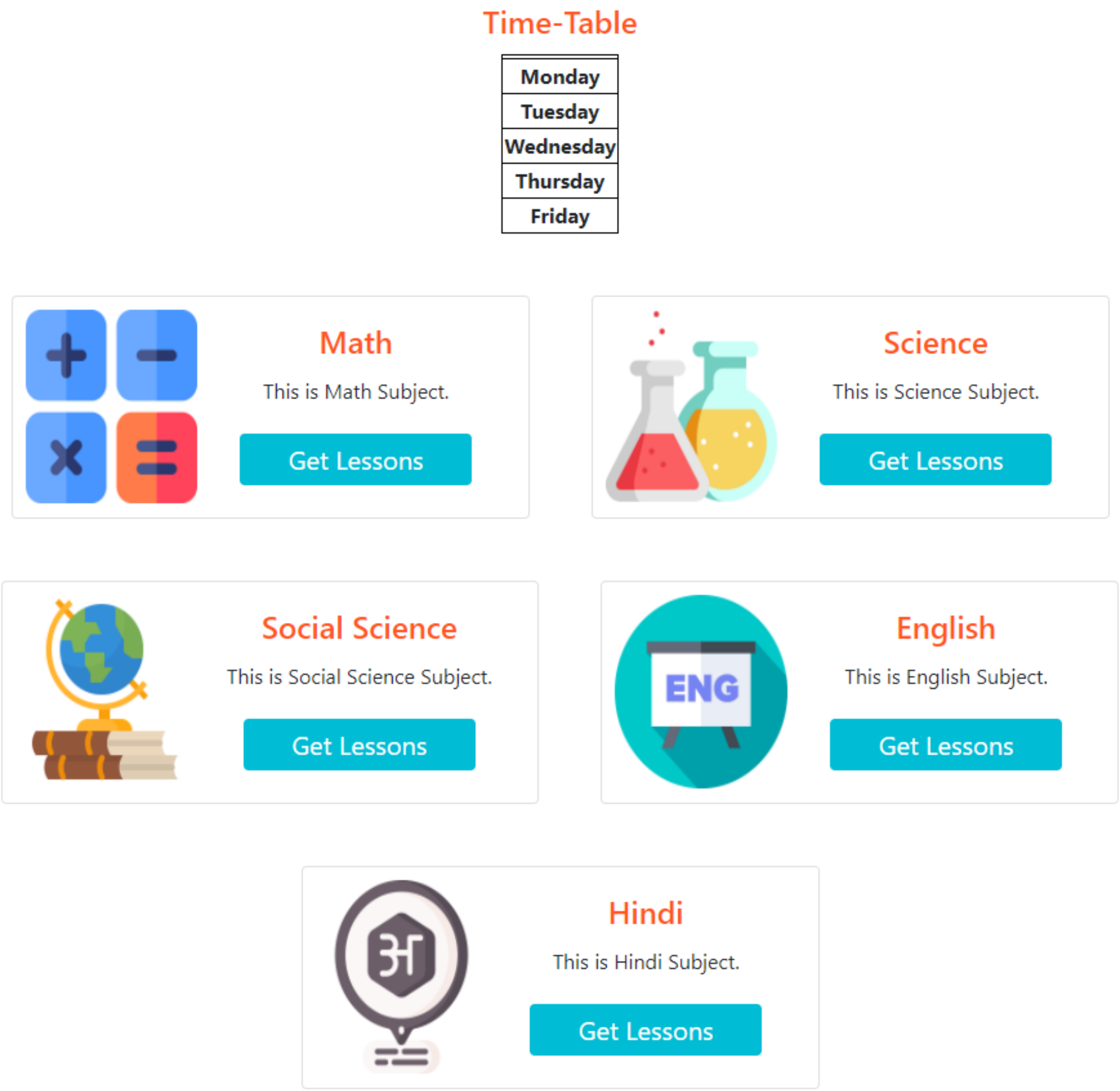
Subject contains like Math, Physics, Chemistry and English.

12th Class

Subject contains like Math, Physics, Chemistry and English.

Fig. 5.4 Standards Page

Next module which comes after clicking on any of the standards is "Subjects" module. This is accessible to all the users. Student can have the access to the subjects they want. Time-Table and details of the subjects are provided.



Time-Table

Monday
Tuesday
Wednesday
Thursday
Friday

Math

This is Math Subject.

Science

This is Science Subject.

Social Science

This is Social Science Subject.

English

This is English Subject.

Hindi

This is Hindi Subject.

Fig. 5.5 Subjects Page

Next module which comes after clicking on any of the subjects is Chapters. In this all the chapter are provided with respect to the class. Here, chapter number with their names are provided. This module has limited functions to different users as only admin and teacher have authority to add or delete the chapters from the subjects.

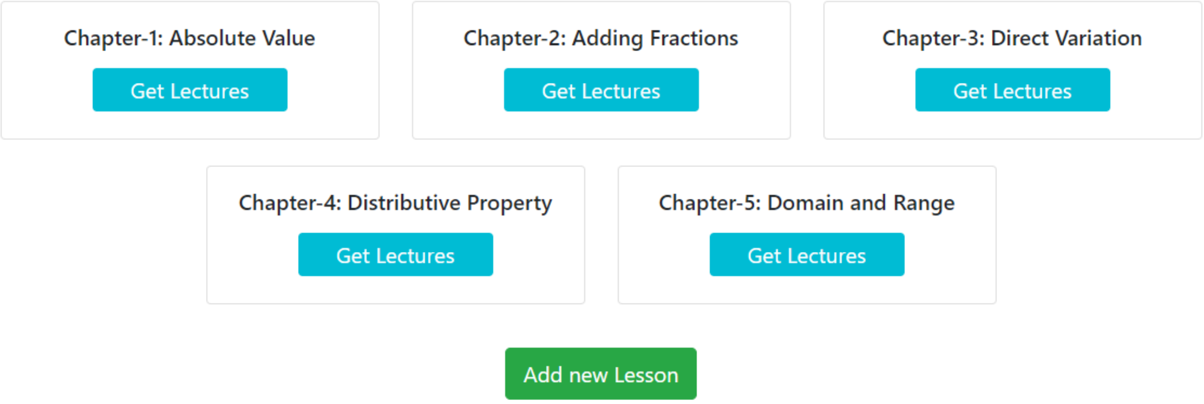
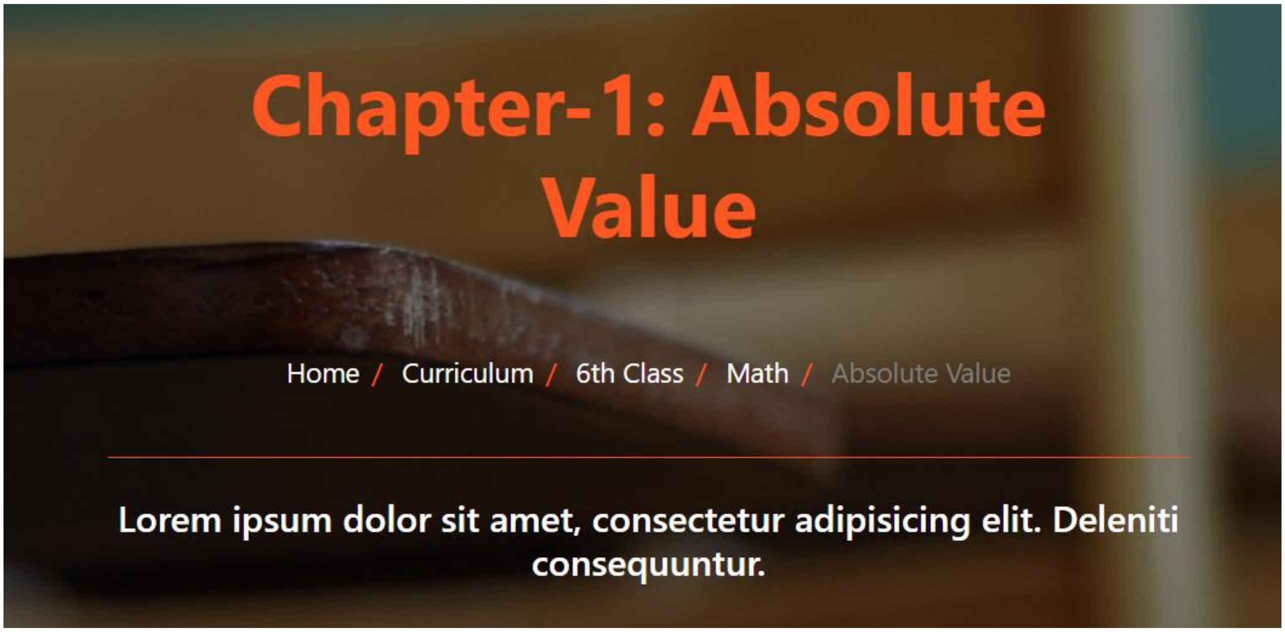

Chapter-1: Absolute Value
Get Lectures
Chapter-2: Adding Fractions
Get Lectures
Chapter-3: Direct Variation
Get Lectures
Chapter-4: Distributive Property
Get Lectures
Chapter-5: Domain and Range
Get Lectures
Add new Lesson

Fig. 5.6 Chapter Page

Let’s come to the next module, it gives all the materials inside the chapters. It will start with the chapter number and name. After that slug fields are provided for the better tracking of the website.

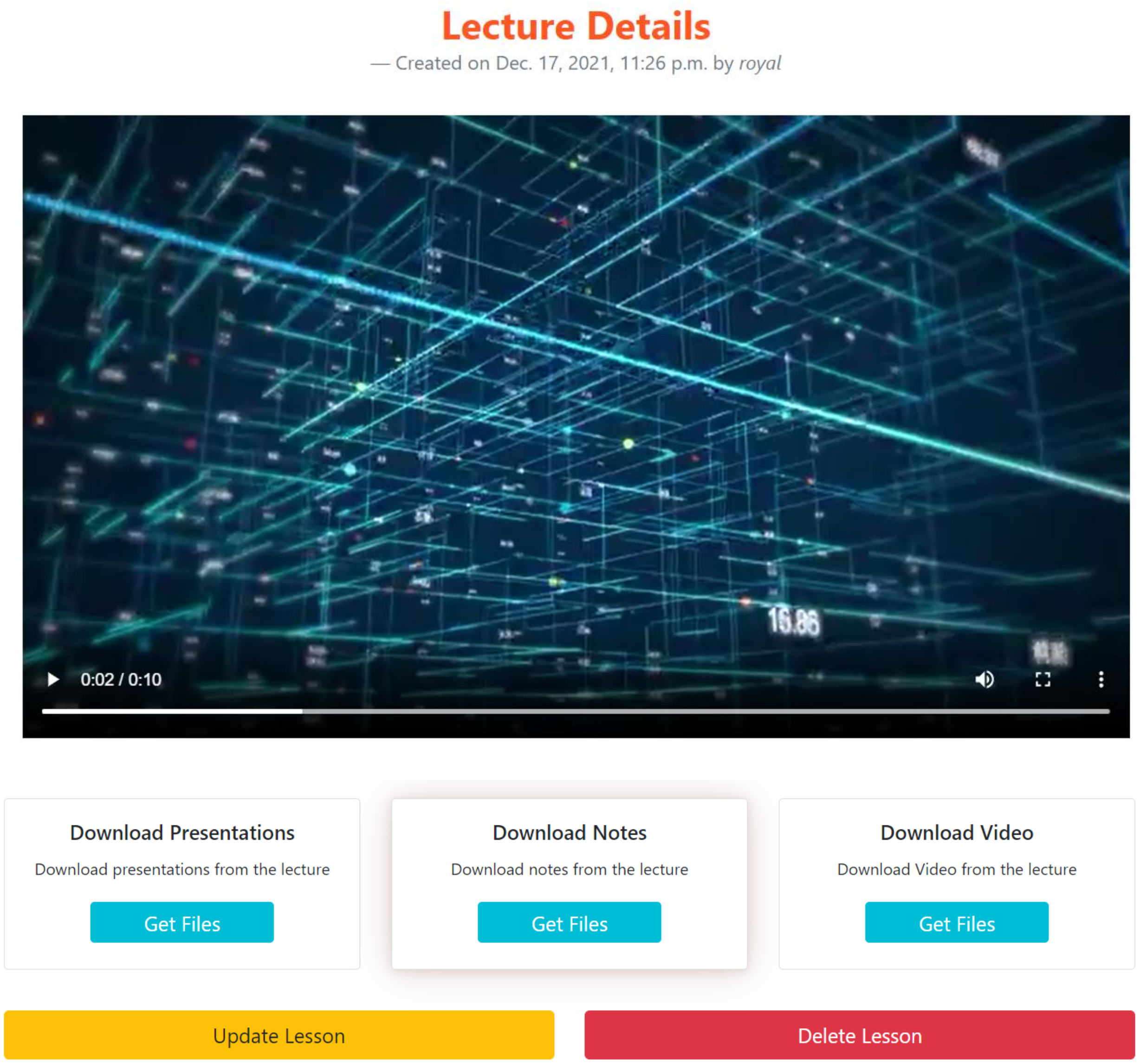

Chapter-1: Absolute Value

Home / Curriculum / 6th Class / Math / Absolute Value

Lorem ipsum dolor sit amet, consectetur adipisicing elit. Deleniti consequuntur.

Fig. 5.7 Chapter Detail

In the next figures, this will show the details of the chapter created like date, time, user etc. This date-time is automatically saved to the database from the server timings. After that, the video material is shown below. Student can see the full resolution video as per the quality student wants. Student can have the authority to download all these materials for the future practices. Students have access to view the lecture notes, presentations and videos also. The options like “Update Lesson” and “Delete Lesson” are only operable by admin and teacher only.



Lecture Details

— Created on Dec. 17, 2021, 11:26 p.m. by *royal*

Download Presentations

Download presentations from the lecture

Download Notes

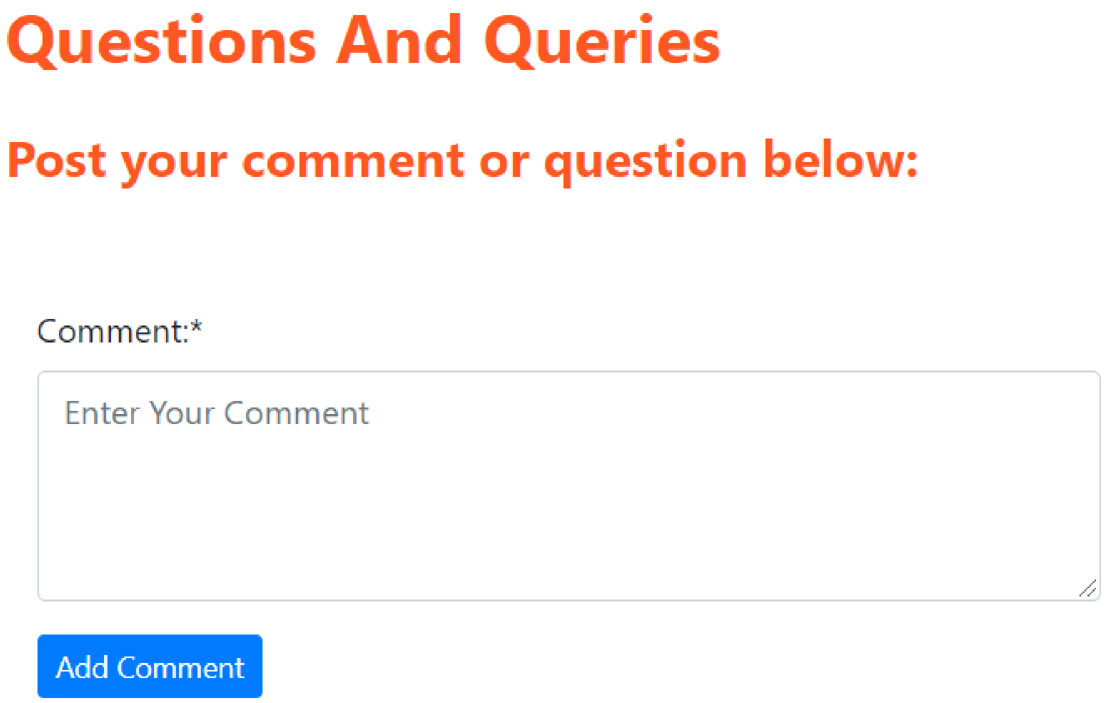
Download notes from the lecture

Download Video

Download Video from the lecture

Fig. 5.8 Chapter Materials

Below these options, a comment box will be appeared. Here, anyone like teacher, student, admin can comment on any matter. These comments are recorded in the database for some analytical purposes. These comments can be created in a threaded view.



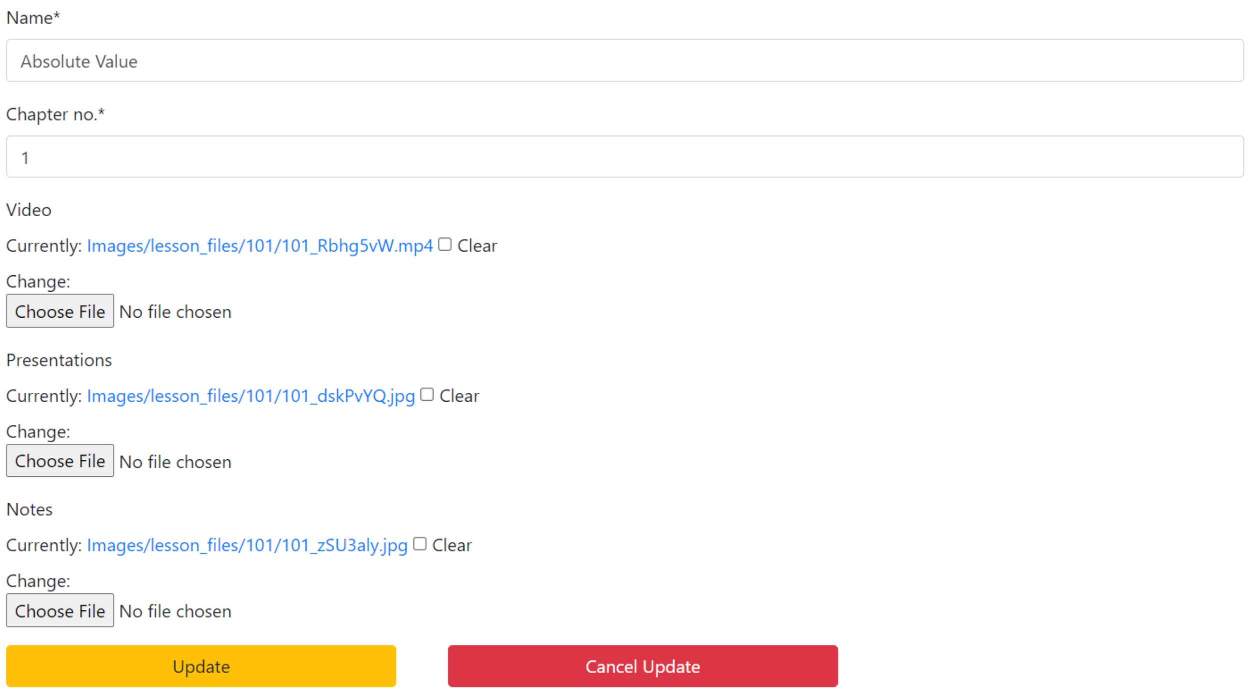
Questions And Queries

Post your comment or question below:

Comment:*

Fig. 5.9 Comment Box

Next module is “Update Lesson Detail”. The teacher who wants to update the details of the chapters. All the details of the chapters will be prefilled in the update form. Teachers can change the information as per their choices. After clicking the “Update” button, the details will be saved to the database successfully. The teacher will have the choice to cancel the update also.



Name*

Absolute Value

Chapter no.*

1

Video

Currently: Images/lesson_files/101/101_Rbhg5vW.mp4 □ Clear

Change:

Choose File No file chosen

Presentations

Currently: Images/lesson_files/101/101_dskPvYQ.jpg □ Clear

Change:

Choose File No file chosen

Notes

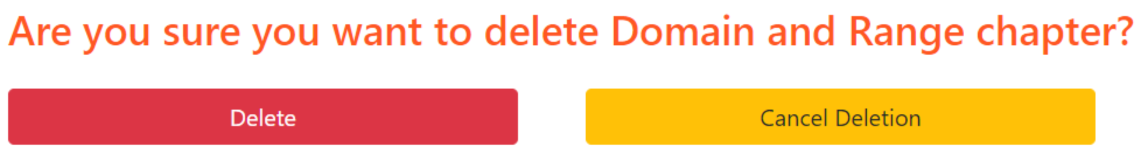
Currently: Images/lesson_files/101/101_zSU3aly.jpg □ Clear

Change:

Choose File No file chosen

Fig. 5.10 Update Page

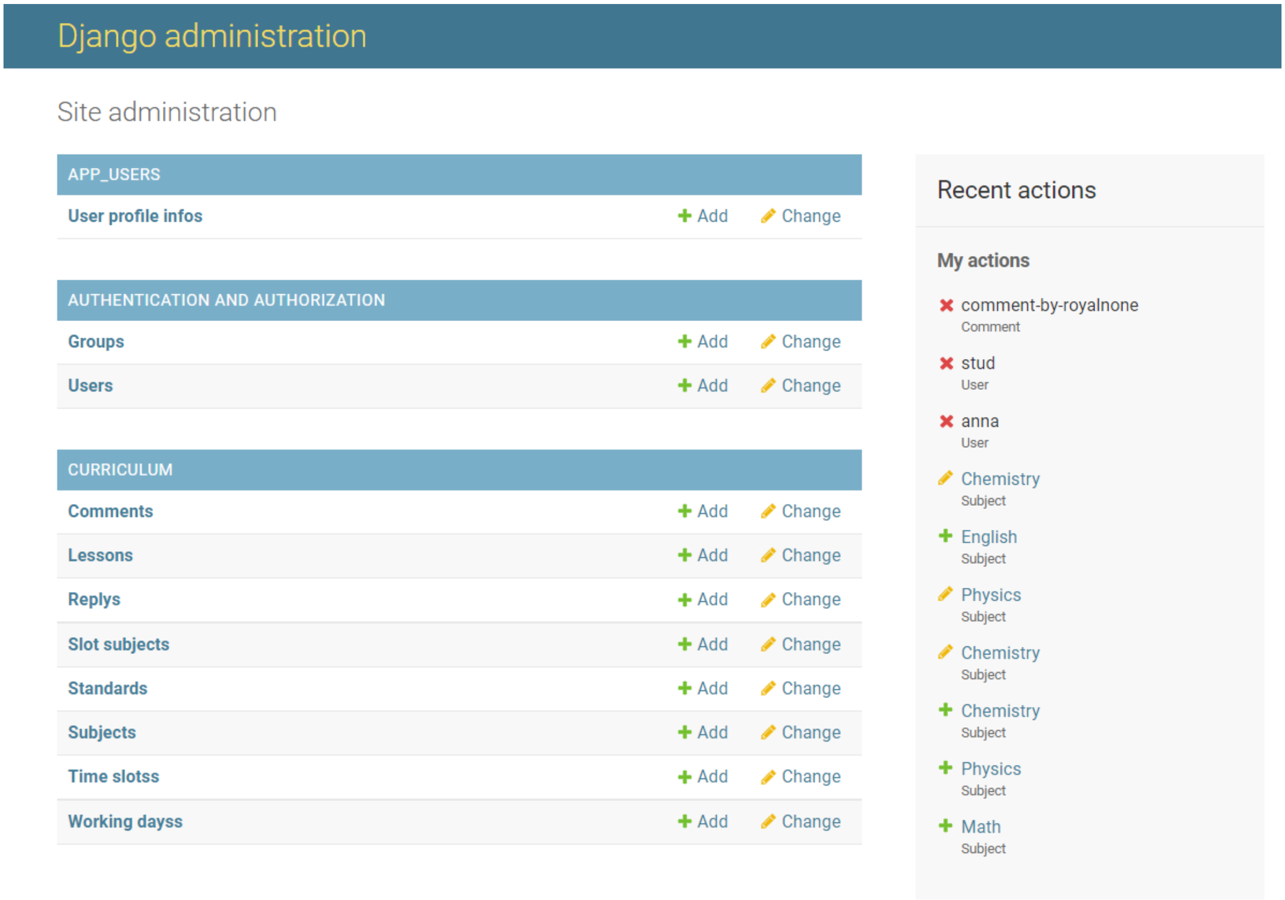
The teacher will have the “Delete” option to delete the chapters. It will ask for the confirmation whether you want to delete or cancel it.



Are you sure you want to delete Domain and Range chapter?

Fig. 5.11 Confirm Update

This is a very important module specially designed for the “Admin”. This admin panel consists of the database and their function. All the types of entities, their primary key, their storage structure will be defined here. Admin have the authority to Grant and Revoke the users of this system. Only admin can create the teacher’s data. Teacher cannot register themselves using the registration form provided in the website.



Django administration

Site administration

APP_USERS		
User profile infos	✚ Add	✎ Change

AUTHENTICATION AND AUTHORIZATION		
Groups	✚ Add	✎ Change
Users	✚ Add	✎ Change

CURRICULUM		
Comments	✚ Add	✎ Change
Lessons	✚ Add	✎ Change
Replys	✚ Add	✎ Change
Slot subjects	✚ Add	✎ Change
Standards	✚ Add	✎ Change
Subjects	✚ Add	✎ Change
Time slotss	✚ Add	✎ Change
Working dayss	✚ Add	✎ Change

Recent actions

My actions

✖ comment-by-royalnone
Comment

✖ stud
User

✖ anna
User

✎ Chemistry
Subject

✚ English
Subject

✎ Physics
Subject

✎ Chemistry
Subject

✚ Chemistry
Subject

✚ Physics
Subject

✚ Math
Subject

Fig. 5.12 Admin Panel

5.2 Code Snippet:

Now, we are adding some important code resources. So, that you can easily understand the way we have made the project. The snippet given below is the code of Homepage.

```
<!DOCTYPE html>
{% load static %}
<html lang="en">
<head>
    <meta charset="UTF-8">
    <link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/bootstrap/4.5.2/css/bootstrap.min.css"
        integrity="sha384-JcKb8q3iqJ61gNV9KGb8thSsNjpSL0n8PARn9HuZOnIxN0hoP+VmmDGMN5t9UJ0Z"
crossorigin="anonymous">
    <link rel="stylesheet" href="{% static 'css/master_css.css' %}">
    <title>{%block title%}{%endblock%}</title>
</head>
<body>
    <!-- Navigation bar -->
    <nav class="navbar navbar-expand-lg navbar-light bg-light scrolling-navbar">
```

```
        <div class="container">
            <a class="navbar-brand" href="{% url 'index' %}" style="color:#ff5722;">LearnZilla</a>
            <button class="navbar-toggler" type="button" data-bs-toggle="collapse"
                data-bs-target="#navbarSupportedContent" aria-controls="navbarSupportedContent" aria-
expanded="false"
                aria-label="Toggle navigation">
                <span class="navbar-toggler-icon"></span>
            </button>
            <div class="collapse navbar-collapse" id="basicExampleNav">
                <ul class="navbar-nav me-auto smooth-scroll">
                    {% if user.is_authenticated %}
                    <li class="nav-item">
                        <a class="nav-link" href="{% url 'curriculum:standard_list' %}">Curriculum</a>
                    </li>
                    {% endif %}
                    {% if user.is_superuser %}
                    <li class="nav-item">
                        <a class="nav-link" href="{% url 'admin:index' %}">Admin</span></a>
                    </li>
                    {% endif %}
                    {% if user.is_authenticated %}
                    <li class="nav-item">
                        <a class="nav-link" href="{% url 'user_logout' %}">Logout</a>
                    </li>
                    {% else %}
                    <li class="nav-item">
                        <a class="nav-link" href="{% url 'user_login' %}">Login</a>
                    </li>
                    <li class="nav-item">
                        <a class="nav-link" href="{% url 'register' %}">Register</span></a>
                    </li>
                    {% endif %}
                </ul>
            </div>
        </div>
    </nav>
    {% block image_block %}
    <header class="info-header">
        <div id="page-intro" class="container-fluid d-flex align-items-center justify-content-center ">
            <div class="row d-flex justify-content-center text-center">
                <div class="col-md-10 text-white">
                    <!-- heading -->
                    <h2 class="display-4 font-weight-bold  p-5 " style="color:#ff5722;"> LearnZilla </h2>
                    <!-- divider -->
                    <hr style="color:#ff5722;">
                    <!-- description -->
                    <h4 class="white-text my-4">An interactive way of e-Learning. An approach towards
Virtual Education.
                    </h4>
                </div>
    </header>
    {% endblock %}

    <div class="container">
        {%block content%}
        {%endblock%}
    </div>
    <footer class="page-footer" style="background-color:#f5de94;">
        <div class="container">
            <div class="row mt-4">
                <div class="col-md-4 mt-4">
                    <h3>About Us</h3> <br>
                    <p>I, student of Galgotias University currently persuing Bachelor of Technology (B.Tech)
in Computer
                        Science & Engineering. </p>
                </div>
                <div class="col-md-4 mt-4">
                    <h3>Other Useful Stuff</h3>
                    <ul>
                        <li>Item 1</li>
                        <li>Item 2</li>
                        <li>Item 3</li>
                    </ul>
                </div>
                <div class="col-md-4 mt-4">
                    <h3>Contact Us</h3>
                    <ul>
                        <li>Galgotias University</li>
                        <li>royalavneesh@gmail.com</li>
                        <li>+91-7532847300</li>
                    </ul>
                </div>
            </div>
            <div class="footer-copyright text-center py-3">
                <p>© 2021 Copyright: royalavneesh</p>
            </div>
        </div>
    </footer>
    <script src="https://cdn.jsdelivr.net/npm/@popperjs/core@2.10.2/dist/umd/popper.min.js"
        integrity="sha384-7+zCNj/IqJ95wo16oMtfsKbZ9ccEh31eOz1HGyDuCQ6wgnyJNSYdrPa03rtR1zdB"
crossorigin="anonymous">
    </script>
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/js/bootstrap.min.js"
```

```
        integrity="sha384-QJHtvGhmr9XOIpI6YVutG+2QOK9T+ZnN4kzFN1RtK3zEFEIsxhlmWl5/YESvpZ13"
crossorigin="anonymous">
    </script>
</body>

</html>
```

The Snippet given below is taken by the URL.py file.

```
from django.contrib import admin
from django.urls import path
import app_users
from django.conf.urls import include

urlpatterns = [
    path('admin/', admin.site.urls),
    path('', include('app_users.urls')),
    path('curriculum/', include('curriculum.urls')),
]

from django.conf import settings
from django.conf.urls.static import static
if settings.DEBUG:
    urlpatterns += static(settings.MEDIA_URL,document_root=settings.MEDIA_ROOT)
```

5.3 Testing:

Testing is a process of executing a program with the intent of finding an error. Testing is a crucial element of software quality assurance and presents ultimate review of specification, design and coding. System Testing is an important phase. Testing represents an interesting anomaly for the software. Thus, a series of testing are performed for the proposed system before the system is ready for user acceptance testing. A good test case is one that has a high probability of finding an as undiscovered error. A successful test is one that uncovers an as undiscovered error.

5.3.1 Testing Objectives:

- Testing is a process of executing a program with the intent of finding an error.
- A good test case is one that has a probability of finding an as yet undiscovered error.

- A successful test is one that uncovers an undiscovered error.

5.3.2 Testing Principles:

- All tests should be traceable to end user requirements
- Tests should be planned long before testing begins
- Testing should begin on a small scale and progress towards testing in large
- Exhaustive testing is not possible
- To be most effective testing should be conducted by a independent third party

The primary objective for test case design is to derive a set of tests that has the highest livelihood for uncovering defects in software. To accomplish this objective two different categories of test case design techniques are used. They are:

- White-box testing
- Black-box testing

5.3.3 White-box testing: White box testing focus on the program control structure. Test cases are derived to ensure that all statements in the program have been executed at least once during testing and that all logical conditions have been executed.

5.3.4 Black-box testing: Black box testing is designed to validate functional requirements without regard to the internal workings of a program. Black box testing mainly focuses on the information domain of the software, deriving test cases by partitioning input and output in a manner that provides through test coverage. Incorrect and missing functions, interface errors, errors in data structures, error in functional logic are the errors falling in this category.

CONCLUSION AND FUTURE WORKS

The package was designed in such a way that future modifications can be done easily. The following conclusions can be deduced from the development of the project. Automation of the entire system improves the efficiency It provides a friendly graphical user interface which proves to be better when compared to the existing system. It gives appropriate access to the authorized users depending on their permissions. It effectively overcomes the delay in communications. Updating of information becomes so easier. System security, data security and reliability are the striking features. The System has adequate scope for modification in future if it is necessary.

This application avoids the manual work and the problems concern with it. It is an easy way to obtain the information regarding the various courses offered in Learning Management System using Django. Well, I and my team members have worked hard in order to present an improved website better than the existing one's regarding the information about the various activities. Still, we found out that the project can be done in a better way. Primarily, when we request information about a particular course it just shows the details of the courses and different colleges, fees information and exam schedule. The next enhancement that we can add the link button which directly links to the respective colleges and online exam registration policy. These are the two enhancements that we could think of at present.

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