

Full Stack Development For Open Web Learning Management Portal

BE-CE Semester- VIII

Prepared at



ISO 9001:2008
ISO 27001:2013
CMMI LEVEL-5

**Bhaskaracharya National Institute for Space Applications & Geo-informatics
Ministry of Electronics and Information Technology, Govt. of India.**

Gandhinagar

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SUBMITTED TO



SHREE SWAMINARAYAN INSTITUTE OF TECHNOLOGY-, BHAT

Gujarat Technological University, Ahmedabad

2023-2024



ISO 9001:2008
ISO 27001:2013
CMMI LEVEL-5

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CERTIFICATE

*This is to certify that the project report compiled by **Mr. Vedant Patel** student of 8th Semester **BE -CE** from **Shree Swaminarayan Institute of Technology, Gandhinagar, Gujarat Technological University, Ahmedabad** has completed his final Semester internship project satisfactorily. To the best of our knowledge this is an original and bonafide work done by him. He has worked on Web-based application for “**Full Stack Development For Open Web Learning Management Portal**”, starting from January 24th, 2024 to May 24th, 2024.*

During his tenure at this Institute, he was found to be sincere and meticulous in his work. We appreciate his enthusiasm & dedication towards the work assigned to him.

We wish him every success.

Dr Yagnesh Vyas
Project Director,
BISAG- N, Gandhinagar

Punit Lalwani
CISO,
BISAG- N, Gandhinagar



**SHREE SWAMINARAYAN INSTITUTE OF
TECHNOLOGY**
Bhat, Gandhinagar-382428

CERTIFICATE

This is to certify that the project reports, submitted along with the project entitled "**Full Stack Development For Open Web Learning Management Portal In Module “Assignment And Exam”**" has been carried out by **Vedant P Patel (201250107058)** under my guidance in fulfilment for the degree of **Bachelor of Engineering in Computer Engineering (8 Semester)** of Gujarat Technological University, Ahmadabad during the academic Year **2023-2024**. These students have successfully completed project activity under my Guidance.

PROF. Pratiksha Singhania

PROF. NIRAJKUMAR

THAKOR

PROF. DARSHAN

PATEL

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Computer engineering

SSIT, Bhat, Gandhinagar

Joining Letter

Bhaskaracharya National Institute for Space Applications & Geo-Informatics (BISAG-N).

Date: 24-Jan-2024

Sub: Confirmation Letter for Project Training

Respected Sir,

As per of recent discussion, we are delighted to offer you Project Training with BISAG-N in Gandhinagar starting from 24-Jan-2024 to 24-May 2024.

We would like to offer you Project Training on Java.

Sr. No	Student Name
1	PATEL VEDANT PRAMESHKUMAR

Punit
Training Cell,

BISAG-N, Gandhinagar



About BISAG- N



ABOUT THE INSTITUTE

Modern day planning for inclusive development and growth calls for transparent, efficient, effective, responsive and low cost decision making systems involving multi-disciplinary information such that it not only encourages people's participation, ensuring equitable development but also takes into account the sustainability of natural resources. The applications of space technology and Geo-informatics have contributed significantly towards the socio-economic development. Taking cognizance of the need of geo-spatial information for developmental planning and management of resources, the department of Ministry of Electronics and Information Technology, Government of India, established "Bhaskaracharya National Institute for Space Applications and Geo-informatics" (BISAG- N). BISAG- N is an ISO 9001:2008, ISO 27001:2005 and CMMI: 5 certified institute. BISAG- N which was initially set up to carryout space technology applications, has evolved into a centre of excellence, where research and innovations are combined with the requirements of users and thus acts as a value added service provider, a technology developer and as a facilitator for providing direct benefits of space technologies to the grass root level functions/functionaries.

BISAG- N's Enduring Growth

Since its foundation, the Institute has experienced extensive growth in the sphere of Space technology and Geo-informatics. The objective with which BISAG- N was established is manifested in the extent of services it renders to almost all departments of the State. Year after year the institute has been endeavouring to increase its outreach to disseminate the use of geo-informatics up to grassroots level. In this span of nine years, BISAG- N has assumed multi-dimensional roles and achieved several milestones to become an integral part of the development process of the Gujarat State.

BISAG-N

2003-04



Gujarat
SATCOM
Network

2007-08



Centre for
Geo-
informatics
Applications

2010-11



Academy of
Geo-
informatics
for
Sustainable
Developmen
t

2012-13

A full-
fledged
Campus

Activities



Satellite Communication..

for promotion and facilitation of the use of broadcast and teleconferencing networks for distant interactive training, education and extension.



Remote Sensing..

for Inventory, Mapping, Developmental planning and Monitoring of natural & man-made resources.



Geographic Information System..

for conceptualization, creation and organization of multi purpose common digital database for sectoral/integrated decision support systems.



Global Navigation Satellite System..

for Location based Services, Geo-referencing, Engineering Applications and Research.



Photogrammetry..

for Creation of Digital Elevation Model, Terrain Characteristic, Resource planning.



Cartography..

for thematic mapping, value added maps.



Software Development..

for wider usage of Geo-spatial applications, Decision Support Systems (desktop as well as web based), ERP solutions.



Education, Research and Training..

for providing Education, Research, Training & Technology Transfer to large number of students, end users & collaborators.

Applications of Geospatial Technology for Good Governance: Institutionalization

Through the geospatial technology, the actual situation on the ground can be accessed. The real life data collected through the technology forms the strong foundation for development of effective social welfare programs benefiting directly the grass root level people. The geospatial data collected by the space borne sensors along with powerful software support through Geographic Information System (GIS), the vital spatio-temporal maps, tables, and various statistics are being generated which feed into Decision Support System (DSS).

A multi-threaded approach is followed in the process of institutionalization of development of such applications. The 5 common threads which run through all the processes are: *Acceptability, Adaptability, Affordability, Availability and Assimilability*.

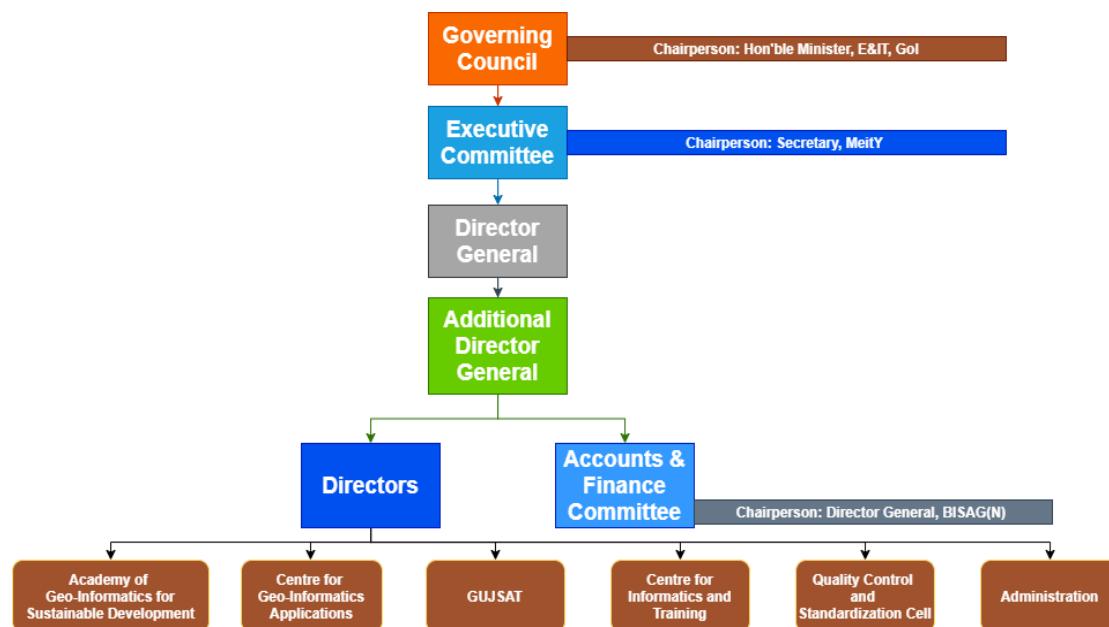
These are the “Watch Words” which any application developer has to meet. The “acceptability” addresses the issue that the application developed has met the wide acceptability among the users departments and the ultimate end beneficiary by way of providing all necessary data and statistics required. The “affordability” addresses the issue of the application product being cost effective. The “availability” aspect looks into aspect of easily accessible across any platform, anywhere and anytime. The applications should have inbuilt capability of easy adaptability to the changing spatio- and temporal resolutions of data, new aspects of requirements arising from time to time from users. The assimilability aspect ensures that the data from various sources / resolutions and technologies can be seamlessly integrated.

ACCEPTABILITY	<ul style="list-style-type: none">▪ Problem definition by users▪ Proof of Concept development without financial liability on users▪ Execution through collaboration under user's ownership
ADOPTABILITY	<ul style="list-style-type: none">▪ Applications as per present systems & database▪ Maximum Automation▪ Minimum capacity building requirement at the user end
AFFORDABILITY :	<ul style="list-style-type: none">▪ Multipurpose geo-spatial database, common, compatible, standardized (100s of layers)▪ In house developed/open source software▪ Full Utilization of available assets
AVAILABILITY:	<ul style="list-style-type: none">▪ Departmental /Integrated DSS▪ Desired Product delivery anytime, anywhere in the country
ASSIMILABILITY	<ul style="list-style-type: none">▪ Integration of Various technologies like RS, GIS, GPS, Web MIS, Mobile etc.

Organizational Setup

The Institute is responsible for providing information and technical support to different Departments and Organizations. The Governing Body and the Empowered Executive Committee govern the functioning of BISAG- N. The Institute is registered under the Societies Registration Act 1860. Considering the scope and extent of activities of BISAG- N, its organizational structure has been charted out with defined functions.

Organizational Setup of BISAG- N



Governing Body

For smoother, easier and faster institutionalization of Remote Sensing and GIS technology, decision makers of the state were brought together to form the Governing Body. It is the supreme executive authority of the Institute. The Governing Body comprises of ex-officio members from various Government departments and Institutes.

- ◆ Hon'ble Minister of Electronics and Information Technology..... Chairperson (Ex-Officio)
- ◆ Hon'ble Minister of State Electronics and Information Technology..... Deputy Chairperson (Ex-Officio)
- ◆ Secretary of Government of India: Ministry of Electronics and Information Technology..... Executive Vice Chairperson (Ex-Officio)
- ◆ Chief Executive Officer, Niti Aayog..... Member (Ex-Officio)
- ◆ Chairman, Indian Space Research Organization Member (Ex-Officio)
- ◆ Secretary to Government of India: Department of Science and Technology Member (Ex-Officio)
- ◆ Additional Secretary to Government of India: Ministry of Electronics and Technology Member (Ex-Officio)
- ◆ Chief Secretary to Government of Gujarat..... Member (Ex-Officio)
- ◆ President & Chief Executive Officer, National e-Governance Division, Ministry of Electronics and Information Technology Member (Ex-Officio)
- ◆ Financial Advisor to Government of India: Ministry of Electronics and Information Technology Member (Ex-Officio)
- ◆ Distinguished Professionals from the GIS field-Three (3) (To be nominated by the Chairperson)
- ◆ Director-General, Bhaskaracharya National Institute for Space Application and Geo-Informatics {BISAG(N)} Member Secretary (Ex-Officio)

Centre for Geo-informatics Applications

Introduction



The objective of this technology group is to provide decision support to the sectoral stakeholders through scientifically organized, comprehensive, multi-purpose, compatible and large scale (village level) geo-spatial databases and supporting analytical tools. These activities of this unit are executed by a well-trained team of multi-disciplinary scientists. The government has provided a modern infrastructure along with the state-of-the-art hardware and software. To study the land transformation and development over the years, a satellite digital data library of multiple sensors of last twenty years has been established and conventional data sets of departments have been co-registered with satellite data. The geo-spatial databases have been created using conventional maps, high resolution satellite 2D and 3D imagery and official datasets (attributes). The geo-spatial databases include terrain characteristics, natural and administrative systems, agriculture, water resources, city survey maps, village maps with survey numbers, water harvesting structures, water supply, irrigation, power, communications, ports, land utilization pattern, infrastructure, urbanization, environment data, forests, sanctuaries, mining areas, industries. They also include social infrastructure like the locations of schools, health centres, institutions, aganwadi, local government infrastructure etc. The geospatial database of nagar-palikas includes properties and amenities captured on city and town planning maps with 1000 GIS layers. Similar work for villages has been initiated as a pilot project.

The applications of space technology and geo-informatics have been operational in almost all the development sectors of the state. Remote sensing and GIS applications have provided impetus to planning and developmental activities at grass root level as well as monitoring and management in various disciplines.

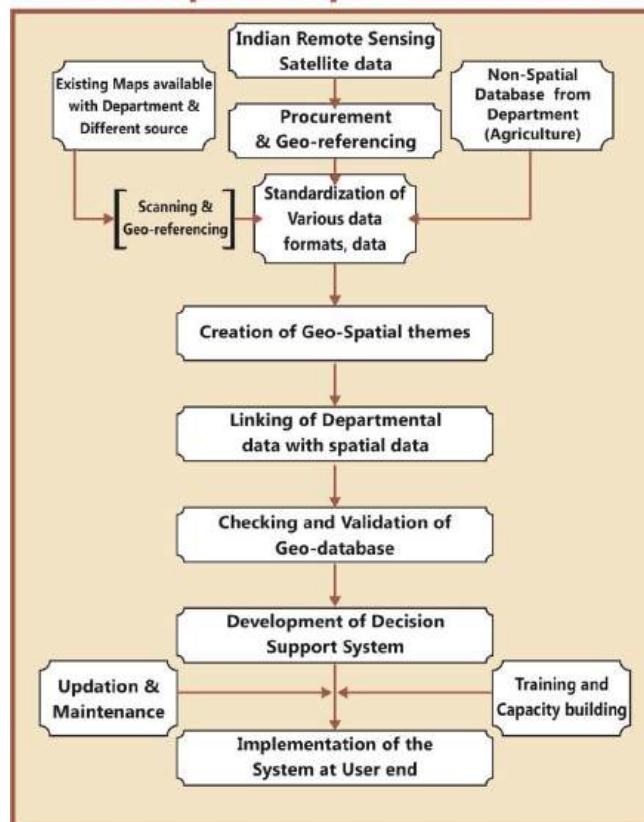
The GIS based Applications Development

The GIS software is a powerful tool to handle, manipulate and integrate both the spatial and non-spatial data. The GIS system operates on the powerful backend data base and Sequential Query Language (SQL) to inquiry the data bases. It has the capability to handle large volume of data and process to yield values of parameters which can be input to very important government activity as Decision Support System (DSS). Its mapping capabilities help the users and specialists in generating single and multi-theme wise maps.

The GIS based applications development has been institutionalized in BISAG- N. This process can be listed as (Refer Figure for Details)

- Making the users aware of the GIS capabilities through introductory training programme and by exposing to already developed projects as success stories.
- Helping the users in defining the GIS based projects.
- Digitizing the data available with the users and encouraging them to collect any additional data as may be required.
- Generating the appropriate data bases with the full involvement of the users following the data bases standards

Concept of Departmental GIS



Remote Sensing and GIS Sectoral Applications:

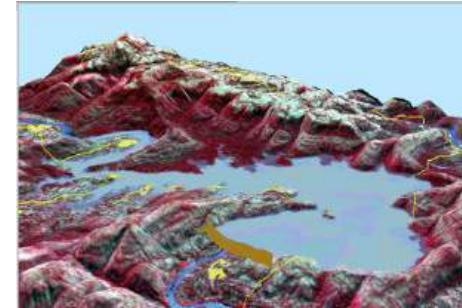
Geo-informatics based Irrigation Management and Monitoring System

- The Geo-spatial information system for Irrigation water Management and Monitoring system for command areas in Sardar Sarovar Narmada Nigam Limited (SSNL) has been developed. Satellite image-based Irrigation monitoring system has been developed in GIS. From the multi-spectral Satellite images of every month, the irrigated areas were extracted.
- The irrigated area were overlaid on the geo-referenced cadastral maps and the statistics of area irrigated has been estimated.
- The user friendly Customized Decision Support System (DSS) has been developed.



Preparation of DPR of Par-Tapi-Narmada Link using Geo-informatics for National Water development Agency (NWDA)

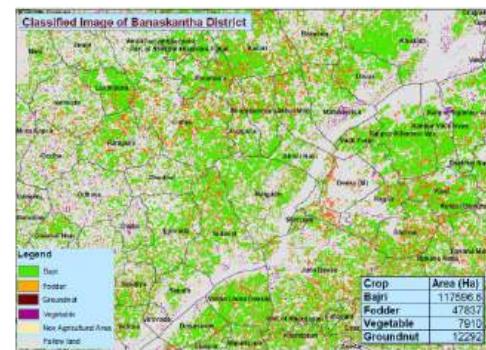
- The main objective of Par-Tapi-Narmada Link project is to divert surplus water available in west flowing rivers of south Gujarat and Maharashtra for utilization in the drought prone Saurashtra and Kachcha. On the request from NDWA, preparation of various maps for proposed DPR work was undertaken by the BISAG- N. Land use and submergence maps of proposed dams along with its statistics have been prepared by the BISAG- N. The detailed work consisted of generation of Digital Elevation Model (DEM), contour generation, Land use mapping, forest area generation of submergence extent at different levels etc.



Agriculture

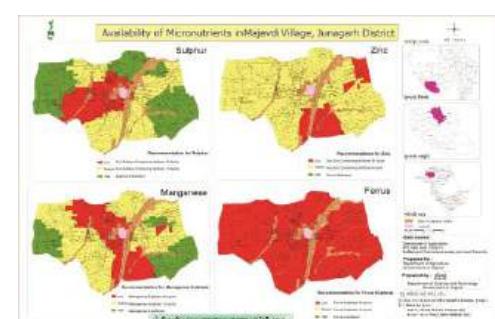
District and Village-level Crop Inventory

- Remote Sensing (RS) based Village-level Crop Acreage Estimation was taken up in two villages of Anand and Mehsana districts of Gujarat state. The major objective of this study was to attempt village-level crop inventory during two crop seasons of Kharif (monsoon season) and Rabi (winter season) using single-date Indian Remote Sensing (IRS) LISS-III and LISS-IV digital data of maximum vegetative growth stage of major crops during each season.
- District-level crop acreage estimation during three cropping seasons namely Kharif, Rabi and Zaid (summer) seasons was also carried out in all the 26-districts of Gujarat State. Summer crop acreage estimation Gujarat State was carried out during 2012.



Spatial Variability Mapping of Soil Micro-Nutrients

- The spatial variability of soil micro-nutrients like Fe, Mn, Zn and Cu in various villages of different districts, Gujarat state was mapped using geo-informatics technology. The major objectives of this study were i) to quantify the variability of Mn, Fe, Cu and Zn concentration in soil; ii) to map the pattern of micro-nutrient variability in cadastral maps, iii) suggest proper application of micro-nutrients based on status of deficiency for proper crop management and iv) preparation of village-level atlases showing spatial variability of micro-nutrients.



Geo-spatial Information System for Coastal Districts of Gujarat

- The project on development of Village-level Geo-spatial Information System for Shrimp Farms in Coastal Districts of Gujarat, was taken with major objective of development of Village-level Geo-spatial Information System for Shrimp/Scampi areas using Remote Sensing (RS) and GIS. This project was sponsored by the Marine Products Export Development Authority (MPEDA), Ministry of Commerce & Industry, Government of India for scientific management of Scampi farms in the coastal districts which can help fishermen to better their livelihood and increase the economic condition on sustainable basis. The customized query shell was developed using the open source software for sharing the information amongst the officers from MPEDA and potential users. This has helped the farmers to plan their processing and marketing operations so as to achieve better remunerations.



Environment and Forest

Mapping and Monitoring of Mangroves in the Coastal Districts of Gujarat State

- Gujarat Ecology Commission, with technical inputs from the Bhaskaracharya National Institute for Space Applications and Geo-informatics - N (BISAG- N) made an attempt to publish Mangrove Atlas of the Gujarat state. Mangrove atlas for 13-coastal districts with 35-coastal talukas in Gujarat, have been prepared using Indian Remote sensing satellite images. The comparison of mangrove area estimates carried out by BISAG- N and Forest Survey of India (FSI) indicates a net increase in the area under mangrove cover. The present assessment by BISAG- N, has recorded 996.3 sq. km under mangrove cover, showing a steep rise to the tune of 88.03 sq. km. In addition to the existing Mangrove cover, the present assessment also gives the availability of potential area of 1153 sq. km, where mangrove regeneration program can be taken up.



Academy of Geo-informatics for Sustainable Development

Introduction

- Considering the requirement of high end research and development in the areas having relevance of geo-informatics technology for sustainable development, a separate infrastructure has been established. In collaboration with different institutes in the state as well as in the country, R&D activities are being carried out in the areas of climate change, environment, disaster management, natural resources management, infrastructure development, resources planning, coastal hazard and coastal zone management studies, etc. under the guidance of eminent scientists.
- Various innovative methodologies/models developed in this academy through the research process have helped in development of various applications. There are plans to enhance R&D activities manifold during coming years.
- This unit also provides training to more than 600 students every year in the field of Geo-informatics to the students from various backgrounds like water resources, urban planning, computer Engineering, IT, Agriculture in the areas of Remote sensing, GIS and their applications.
- This Academy has been established as a separate infrastructure for advanced research and development through following schools:
 - School of Geo-informatics
 - School of Climate & Environment
 - School of Integrated Coastal Zone Management



- School of Sustainable Development Studies
- School of Natural Resources and Bio-diversity
- School of Information Management of Disasters
- School of Communication and Society

During XIIth Five year Plan advance applied research through above schools shall be the main thrust area. Already M. Tech and Ph.D. students of other Universities/ Institutes are doing research in this academy in applied sciences under various collaborative programmes.

M. Tech. Students' Research Programme

The academy started M. Tech. students' research programme in a systematic way. It admitted 11 students from various colleges and universities in Gujarat, Rajasthan and Madhya Pradesh for period of 10 months from August 2011 to May 2012. All the students were paid stipend of Rs. 6000 per month during the tenure. The research covered the following areas:

- Cloud computing techniques
- Mobile communication
- Design of embedded systems
- Aquifer modelling
- Agricultural and Soils Remote Sensing
- Digital Image processing Techniques (Data Fusion and Image Classification).

The research resulted in various dissertations and publications in national and international journals.

- Now nine students, one from IIT, Kharagpur, three from GTU, one from M. S University, Vadodara and four from GU, are undergoing their Ph. D programme. Out of nine, two thesis have been submitted. Two students are from abroad. One each from Vietnam and Yemen. Since then (after approval of research programme from the Governing Body), 200+ papers have been published by the Academy.

CANDIDATE'S DECLARATION

I declare that 8th semester internship project report entitled **Full Stack Development for Open Web Learning Management Portal In Module “Assignment And Exam”** is my own work conducted under the supervision of the external guide **Dr Yagnesh Vyas** from BISAG-N (**Bhaskaracharya National Institute for Space Applications & Geoinformatics**). I further declare that to the best of my knowledge the report for this project does not contain any part of the work which has been submitted previously for such project either in this or any other institutions without proper citation.



Candidate Signature:

Vedant Patel
Student ID: 121

Submitted To:

SHREE
SWAMINARAYAN
INSTITUTE OF
TECHNOLOGY,
BHAT

ACKNOWLEDGMENT

I am grateful to **Shri T.P. Singh**, Director General (BISAG-N) for giving me this opportunity to work under the guidance of renowned people of the field of MIS Based Portal also providing us with the required resources in the company.

I would like to express my endless thanks to our external guide **Dr Yagnesh Vyas** and to Training Cell **Mr. Sidhdharth Patel** at Bhaskaracharya National Institute of Space Application and Geoinformatics for their sincere and dedicated guidance throughout the project development.

Also, my hearty gratitude to our Head of Department, **Darshan Patel** and our internal guide **Prof. Pratiksha Singhania** for giving us encouragement and technical support on the project.

Vedant Patel

Student ID: 121

ABSTRACT

This Thesis presents the design and implementation of a Learning Management System (LMS) developed using modern web technologies, with a focus on enhancing the learning experience and management efficiency within educational or organizational settings. The system is built on a robust backend framework using Spring Boot, while the frontend utilizes HTML, CSS, and JavaScript that eventually uses Thymeleaf Engine to provide a user-friendly interface.

The LMS caters to various user roles, including Organization, Nodal Officers, Superadmin, and Users (trainees) etc. each with distinct privileges and responsibilities tailored to their respective roles. This hierarchical structure ensures efficient management and streamlined communication within the system.

Key features of the LMS include functionalities such as Quizzes, assignments, and video lectures. These features aim to facilitate interactive learning experiences, promote engagement, and cater to diverse learning styles. Quizzes allow users to assess their understanding of course material, while assignments provide opportunities for hands-on practice and skill development. Additionally, video lectures offer an alternative mode of content delivery, catering to auditory and visual learners.

The LMS incorporates robust security measures to safeguard user data and ensure confidentiality. Access controls and authentication mechanisms are implemented to regulate user permissions and maintain data integrity.

Furthermore, the system is designed with scalability and flexibility in mind, allowing for seamless integration with existing infrastructure and adaptability to evolving educational or organizational requirements. Modular architecture and well-defined APIs enable easy extension and customization, facilitating future enhancements and feature additions.

In conclusion, the developed Learning Management System offers a comprehensive solution for efficient management and delivery of educational content. By leveraging modern technologies and user-centric design principles, the system aims to enhance the learning experience, foster collaboration, and empower users to achieve their learning goals effectively.

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1. Introduction

The advent of digital technologies has revolutionized the landscape of education, prompting the widespread adoption of Learning Management Systems (LMS). These systems serve as comprehensive platforms for the delivery, management, and administration of educational content in both traditional and online settings. By providing a centralized hub for course materials, assessments, and communication tools, LMSs offer educators and learners unparalleled flexibility and accessibility. This thesis explores the fundamental principles and functionalities of LMS development, aiming to uncover insights into their effectiveness, usability, and impact on teaching and learning outcomes. Through an in-depth analysis of LMS architecture, features, and user experiences, this research seeks to contribute to the ongoing discourse surrounding digital education and instructional technology.

1.1 Project Details

The Learning Management System (LMS) is a sophisticated online platform tailored to modern educational needs. It serves as a comprehensive solution for organizing and delivering course materials, facilitating communication between instructors and learners. By integrating features such as quizzes, assignments, and video lectures, the LMS aims to enhance the learning experience and promote engagement across diverse learning environments.

1.2 Purpose

The purpose of the Learning Management System (LMS) project is to revolutionize educational delivery by providing a centralized platform for managing courses, fostering collaboration between educators and learners, and enhancing the overall learning experience. Through features such as customizable content delivery, interactive assessments, and communication tools, the LMS aims to accommodate diverse learning styles and facilitate personalized learning pathways. By streamlining administrative workflows and promoting engagement, the project seeks to optimize the educational process and promote student success in today's digital age.

1.3 Scope

The scope of the Learning Management System (LMS) encompasses a broad range of functionalities aimed at revolutionizing educational delivery. It includes features such as course management, assessment and grading tools, communication and collaboration tools, and reporting and analytics capabilities. Additionally, the scope extends to user management, access controls, and customization options to cater to diverse educational settings and user needs. The LMS can be adapted for use in various contexts, including K-12 education, higher education, corporate training, and professional development. Overall, the scope of an LMS is comprehensive, aiming to streamline administrative processes, enhance teaching and learning experiences, and promote student engagement and success.

1.4 Tools and Technologies

Technologies:

- Spring boot
- Thyme leaf
- HTML
- JavaScript
- JQuery
- CSS
- Bootstrap

Tools:

- Git
- Spring Tool Suite
- MySQL Workbench
- Postman

Platform:

- Local development server
- MySQL

2. Project Management

2.1 Feasibility Study:

2.1.1 Technical Feasibility:

The technical feasibility of your project is high, given the use of Spring Boot, Thyme leaf, JavaScript, jQuery, CSS, and Bootstrap for development, along with tools like Git, Spring Tool Suite, MySQL Workbench, and Postman.

These technologies enable rapid development, robust frontend and backend functionality, efficient collaboration, version control, database management, API testing, and a reliable local development environment with MySQL as the database platform.

2.1.2 Time Schedule Feasibility:

This examines whether the project can be completed within the specified time frame, considering resource availability, project scope, and complexity.

2.1.3 Operational Feasibility:

This assesses whether the project aligns with operational processes and can be smoothly integrated into existing systems or workflows.

2.1.4 Implementation Feasibility:

This evaluates the practicality of implementing the project, including factors such as costs, resources, and potential challenges.

2.2 Project Planning:

2.2.1 Project Development Approach and Justification:

We adopted the Waterfall model for our project development approach. This involved gathering requirements, designing the system, implementing it using Spring Boot, Thyme leaf, JavaScript, jQuery, CSS, and Bootstrap, testing thoroughly, deploying on a local server with MySQL, and planning for maintenance. The Waterfall model was chosen for its clear structure, risk management, stakeholder involvement, documentation, and suitability for our well-defined project scope.

2.2.2 Milestone & Deliverables

Milestone 1: Planning & Requirements Gathering

- Deliverable 1: Project Scope Document
- Deliverable 2: Analysis Report
- Deliverable 3: Project Plan

Milestone 2: Design & Architecture

- Deliverable 4: System Architecture Document.
- Deliverable 5: Database Schema
- Deliverable 6: User Interface Design

Milestone 3: Development

- Deliverable 7: User Interface Design Mock-ups
- Deliverable 8: Frontend Implementation (HTML /CSS)
- Deliverable 9: Client-side Validation Scripts (JavaScript)
- Deliverable 10: Version Control Repository.
- Deliverable 11: Codebase
- Deliverable 12: Demo and Prototype

Milestone 4: Backend Development

- Deliverable 13: Admin Dashboard
- Deliverable 14: User Management
- Deliverable 15: Course Management
- Deliverable 16: Content Management
- Deliverable 17: Enrolment Management
- Deliverable 18: Analytics and Reporting
- Deliverable 19: Notification System
- Deliverable 20: Security Features
- Deliverable 21: Documentation
- Deliverable 22: Quiz Management
- Deliverable 23: Assignment Management

Milestone 5: Testing

- Deliverable 22: Test Plan
- Deliverable 23: Test Cases
- Deliverable 24: Test Scripts
- Deliverable 25: Test Data

Each milestone represents a significant stage of development, and the associated deliverables ensure that the project progresses systematically towards completion.

2.3 Project Scheduling:

Project scheduling involves creating a detailed plan outlining the timeline and sequence of tasks required to complete the LMS project. Given the complexity of the project and the various modules involved, a well-structured scheduling approach is essential for effective project management.

1. Backend Development:

- Define tasks related to setting up the backend infrastructure using Spring Boot.
- Break down tasks further into specific components such as user authentication, database design, API development, etc.
- Estimate time required for each task based on its complexity and dependencies.

2. Frontend Development:

- Identify tasks related to frontend development using Thyme leaf, JavaScript, jQuery, CSS, and Bootstrap.
- Divide tasks into frontend layout design, user interface (UI) components development, client-side validation, etc.

Estimate time for each task considering design complexity, responsiveness requirements, and integration with backend services.

3. Database Setup and Management:

- Allocate time for setting up the MySQL database using MySQL Workbench.
- Define tasks for database schema design, table creation, data migration, and indexing.
- Estimate time based on the complexity of the data model and the volume of data to be managed.

4. Integration and Testing:

5. Deployment and Launch:

- Define tasks for deploying the LMS on a local development server and later on the production server.
- Plan for data migration, configuration setup, and environment testing.
- Allocate time for user training, documentation preparation, and post-launch support.

Estimating Time and Resources:

- **Task Dependencies:** Identify dependencies between tasks and sequence them accordingly. For example, backend development tasks must be completed before frontend integration can begin.
- **Resource Allocation:** Assign resources (developers, designers, testers) to each task based on their expertise and availability.
- **Time Estimates:** Use historical data, expert judgment, and best practices to estimate the duration of each task. Consider factors such as learning curve, potential setbacks, and external dependencies.
- **Buffer Time:** Allocate buffer time for unforeseen delays or changes in project scope. This ensures that the project remains on track even if unexpected issues arise.

3. Database Setup and Management:

- Allocate time for setting up the MySQL database using MySQL Workbench.
- Define tasks for database schema design, table creation, data migration, and indexing.
- Estimate time based on the complexity of the data model and the volume of data to be managed.

4. Integration and Testing:

- Plan tasks for integrating frontend and backend components.
- Define testing tasks such as unit testing, integration testing, and user acceptance testing (UAT).
- Allocate time for debugging, bug fixing, and performance optimization.

5. Deployment and Launch:

- Define tasks for deploying the LMS on a local development server and later on the production server.

- Plan for data migration, configuration setup, and environment testing.

Estimating Time and Resources:

- **Task Dependencies:** Identify dependencies between tasks and sequence them accordingly. For example, backend development tasks must be completed before frontend integration can begin.
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- **Buffer Time:** Allocate buffer time for unforeseen delays or changes in project scope. This ensures that the project remains on track even if unexpected issues arise

3. Functional Requirement:

3.1 Study of Learning Management Systems

A study of the Learning Management System (LMS) involves an in-depth analysis of the platform used to manage and deliver educational content within an organization or institution. This study aims to evaluate the functionality, usability, effectiveness, and user satisfaction of the LMS to identify strengths, weaknesses, and areas for improvement.

Components of the Study:

1. Functionality Analysis:

- Evaluate the features and capabilities of the LMS, including course creation, content management, user management, assessment tools, video features, and reporting capabilities.
- Assess the comprehensiveness and flexibility of the LMS in meeting diverse learning needs, such as synchronous and asynchronous learning, blended learning, and personalized learning paths.

2. Usability Evaluation:

- Conduct usability testing to assess the ease of use and user experience of the LMS interface.
- Evaluate navigation, layout, accessibility, responsiveness, and clarity of instructions to determine the platform's usability for administrators, instructors, and learners.

3. Effectiveness Assessment:

- Measure the effectiveness of the LMS in achieving learning objectives, improving learner engagement, and enhancing knowledge retention.
- Analyse learning outcomes, completion rates, assessment scores, and learner feedback to gauge the impact of the LMS on educational outcomes.

4. User Satisfaction Survey:

- Administer surveys to administrators, instructors, and learners to gather feedback on their satisfaction levels with the LMS.
- Solicit opinions on features, performance, support services, and overall experience with the platform to identify areas of satisfaction and areas needing improvement.

5. Technical Evaluation:

- Assess the technical infrastructure supporting the LMS, including server reliability, uptime, scalability, and security measures.
- Evaluate integration capabilities with other systems, compatibility with different devices and browsers, and adherence to technical standards and best practices.

Analysis and Reporting:**1. Data Analysis:**

- Analyse collected data to identify trends, patterns, correlations, and outliers related to LMS usage, performance, and user satisfaction.
- Use statistical methods, data visualization techniques, and qualitative analysis approaches to interpret findings and draw meaningful conclusions.

2. Reporting and Recommendations:

- Prepare a comprehensive report summarizing the findings of the LMS study, including strengths, weaknesses, opportunities, and threats.
- Provide actionable recommendations for improving the LMS based on study results, user feedback, and best practices in instructional design and educational technology.

3.2 Problems and Weaknesses of System:

1. Limited Feature Set:

- **Basic Feature Set:** The current system may lack advanced features commonly found in modern LMS platforms, such as interactive quizzes, multimedia support, or gamification elements.
- **Inadequate Collaboration Tools:** Collaboration features such as discussion forums, group projects, or real-time chat functionality may be lacking, hindering collaborative learning experiences.

2. Scalability Issues:

- **Performance Bottlenecks:** The current system may struggle to handle a large number of concurrent users or courses, resulting in slow loading times, system crashes, or downtime during peak usage periods.
- **Limited Course Capacity:** Capacity constraints may limit the number of courses or learners that can be accommodated within the system, hindering scalability as the organization grows.

3. Data Fragmentation and Redundancy:

- **Isolated Data Silos:** Data related to courses, users, and learning materials may be stored in isolated silos or disparate systems, leading to data redundancy and inconsistency.
- **Integration Challenges:** Lack of integration between the current LMS and other organizational systems (e.g., HR, CRM) may result in manual data entry efforts and synchronization issues.

4. Insufficient Support and Maintenance:

- **Lack of Vendor Support:** The current system may be no longer supported by the vendor, resulting in a lack of updates, patches, or technical support services.
- **Difficulty in Maintenance:** Maintenance tasks such as system upgrades, bug fixes, or security patches may be challenging to perform due to outdated technologies or lack of documentation.

5. Compliance and Security Risks:

- **Data Security Vulnerabilities:** The current system may be susceptible to security breaches, data leaks, or unauthorized access due to outdated security protocols or lack of encryption measures.
- **Non-Compliance with Regulations:** The system may fail to meet regulatory compliance requirements such as GDPR, FERPA, or HIPAA, exposing the organization to legal and reputational risks.

3.3 User Characteristics

- **Introduction to Learning Management System (LMS):** The advent of Learning Management Systems (LMS) has transformed the landscape of education and training, offering a centralized platform for delivering, managing, and tracking learning experiences. From educational institutions to corporate organizations, LMS platforms have become indispensable tools for facilitating effective teaching and learning practices.
- **Role of Super Admins:** Super Admins serve as the backbone of LMS administration, entrusted with the crucial responsibility of managing the overall system functionality. Their diverse array of tasks spans user management, course creation, content curation, and system configuration. With their expertise, Super Admins ensure the seamless operation of the LMS, thereby laying the foundation for engaging and impactful learning experiences.
- **Responsibilities of Super Admins:** Super Admins shoulder a myriad of responsibilities, encompassing the intricate details of LMS administration. From overseeing user onboarding processes to fine-tuning system configurations, they play a pivotal role in shaping the user experience. Their duties include managing user accounts, creating and organizing courses, curating content libraries, and optimizing system performance to meet the evolving needs of stakeholders.

- **Technical Proficiency of Super Admins:** Super Admins are expected to possess a robust understanding of LMS functionality and configuration options. While they may require training on specific system administration tasks, their proficiency in managing user accounts, courses, and system settings is essential. Continuous learning and professional development initiatives enable Super Admins to stay abreast of emerging trends and best practices, empowering them to leverage the full potential of the LMS ecosystem.
 - **Needs and Preferences of Super Admins:** Super Admins demand a user-friendly interface equipped with features that streamline administrative tasks. Customizable dashboards, role-based access controls, and comprehensive reporting tools are paramount to their operational efficiency. By prioritizing user-centric design principles, LMS providers can enhance the user experience for Super Admins, thereby optimizing system performance and facilitating seamless administration
 - **Conclusion:** Super Admins play a pivotal role in managing the overall functionality of the LMS, ensuring smooth operation and optimal user experience. Their technical proficiency, coupled with user-centric design principles, lays the groundwork for effective administration and enhances the efficacy of the LMS ecosystem. As we delve deeper into the roles and responsibilities of other stakeholders, we unravel the intricate fabric of the LMS landscape.
- **Instructors and Students**
- **Role of Instructors:** Instructors are instrumental in designing engaging and effective learning experiences within the LMS. Their responsibilities include creating and delivering course content, assessing student performance, and facilitating interactions. By leveraging the capabilities of the LMS, instructors can foster collaboration, critical thinking, and knowledge retention among students.
 - **Technical Proficiency of Instructors:** Instructors must possess a comfortable level of proficiency in using the LMS platform. From course creation and organization to assignment management and communication with students, they rely on the LMS to deliver rich and interactive learning experiences. Familiarity with multimedia tools, enhances their ability to create dynamic and engaging courses.
 - **Needs and Preferences of Instructors:** Instructors value intuitive course authoring tools, multimedia support, and discussion forums for student collaboration. Additionally, grading tools with customizable rubrics enable instructors to provide

timely and constructive feedback, fostering student engagement and academic success. By incorporating these features into the LMS, providers can empower instructors to deliver impactful and personalized learning experiences.

- **Role of Students:** Students are the primary beneficiaries of the LMS, accessing course materials, participating in activities, and tracking their progress. The design and usability of the platform significantly influence their engagement and learning outcomes. By providing an intuitive and accessible interface, LMS providers can enhance student satisfaction and facilitate seamless navigation, content discovery, and interaction with course materials.
- **Technical Proficiency of Students:** Students may have varying levels of technical proficiency, ranging from digital natives to those who require additional support and guidance. Mobile-friendly design, personalized learning paths, and progress tracking tools cater to diverse learning styles and preferences, empowering students to take control of their learning journey and achieve academic success.
- **Needs and Preferences of Students:** Students expect an intuitive and accessible interface that facilitates easy navigation, content discovery, and interaction with course materials. Personalized learning paths, progress tracking tools, and mobile-friendly design features enhance their learning experience and foster a sense of autonomy and empowerment. By prioritizing student-centric design principles, LMS providers can enrich the educational experience and drive positive learning outcomes.
- **Conclusion:** Instructors and students play pivotal roles in the LMS ecosystem, shaping the teaching and learning experiences within the digital realm. By understanding their needs, preferences, and technical proficiency, LMS providers can design solutions that empower instructors to create engaging courses and enable students to achieve academic success. As we explore the roles and responsibilities of nodal officers, we gain further insights into the intricate dynamics of the LMS landscape.
- **Role of Nodal Officers:** Nodal Officers oversee LMS usage within organizations or institutions, playing a crucial role in ensuring the smooth operation and effective utilization of the platform. Their responsibilities encompass user onboarding, support and training, monitoring system usage, and generating reports. By providing administrative oversight and support, nodal officers contribute to the success and sustainability of the LMS ecosystem.

- **Technical Proficiency of Nodal Officers:** Nodal Officers should be familiar with LMS functionality relevant to their administrative roles. While they may require training on specific tasks such as user management, reporting tools, and compliance requirements, their proficiency in navigating the LMS ecosystem is essential. By staying abreast of industry trends and best practices, nodal officers can optimize system performance and drive continuous improvement initiatives.
- **Needs and Preferences of Nodal Officers:** Nodal Officers demand access to administrative features and reports that enable them to monitor system performance, track user activity, and identify areas for improvement. Customizable user roles, activity logs, and exportable reports facilitate data-driven decision-making and strategic planning. By providing nodal officers with the tools and resources they need to fulfil their responsibilities effectively, LMS providers can enhance system governance and ensure compliance with regulatory standards.

Conclusion of Page 3: In conclusion, the success of an LMS hinges on the collaborative efforts of SuperAdmin, instructors, students, and nodal officers. By understanding the unique roles, responsibilities, and needs of each stakeholder, LMS providers can design solutions that foster engagement, facilitate learning, and drive positive outcomes. As technology continues to evolve, the role of the LMS in education and training will only become more pronounced, underscoring the importance of user-centric design principles and continuous innovation.

3.4 System Requirement

The system requirements for an Learning management system will depend on the specific features and functionalities that are required. However, here are some general requirements to consider:

- **Hardware:** A computer or server with sufficient processing power and memory to handle the system. The hardware requirements will depend on the number of users and the amount of data that the system will handle.
- **Operating System:** The system should be compatible with the operating system used in the organization. For example, Windows, macOS, or Linux.

- **Database:** A database management system (DBMS) should be used to store and manage the data. Commonly used DBMS include MySQL, Microsoft SQL Server, and Oracle.
- **Web Server:** If the system is web-based, a web server such as Apache or Microsoft IIS is required.
- **Development Platform:** The system should be developed on a platform that is compatible with the chosen programming language. Commonly used development platforms include Java, .NET, and PHP.
- **Software Dependencies:** The system may require specific software dependencies such as libraries or frameworks to function properly.
- **Security:** The system should be secure and protect user data from unauthorized access. This may involve implementing user authentication and access control mechanisms.
- **Backup and Recovery:** The system should have backup and recovery mechanisms to prevent data loss in case of hardware or software failures.
- **Scalability:** The system should be able to handle an increasing number of users and data as the organization grows.

3.5 Hardware Requirements

Server: A dedicated server with a minimum of 4 CPU cores and 8GB RAM for hosting the application.

Storage: Sufficient storage space for storing trainee documents, and related data. Minimum 64GB SSD recommended.

Network Interface: Stable internet connection with adequate bandwidth to support concurrent user access.

3.6 Software Requirements:

Here's the essential software you'll need for development:

- *Java Development Kit (JDK):*

A recent version of JDK is required to run Spring Boot applications. You can download it from the official Oracle website [Java SE Downloads]

- *Integrated Development Environment (IDE):*

An IDE like Spring Tool Suite with Spring Boot plugins provides a powerful development environment for building spring applications. Other options include Spring Tool Suite with Eclipse or Visual Studio Code with spring extensions.

- *MySQL Database Server:*

A local MySQL instance can be used for development. For deployment, you can choose a managed MySQL database service offered by cloud providers.

- *Web Browser:*

Any modern web browser like Chrome, Firefox, or Edge will be used to access your web application during development and testing.

- *Database Management Tool:*

A graphical tool like MySQL Workbench can simplify database administration tasks.

- *Maven or Gradle:*

These build automation tools are used to manage dependencies, compile code, and package your application.

- *MySQL Database Server:*

A local MySQL instance can be used for development. For deployment, you can choose a managed MySQL database service offered by cloud providers.

- *Web Browser:*

Any modern web browser like Chrome, Firefox, or Edge will be used to access your web application during development and testing.

- *Database Management Tool:*

A graphical tool like MySQL Workbench can simplify database administration tasks.

3.7 Constraints:

3.7.1 Technical Constraints:

User Roles and Permissions:

Compatibility

Ensure compatibility with various web browsers, operating systems, and devices to accommodate diverse user preferences.

Integration

Address technical constraints related to integrating with external systems or services, such as authentication providers or content repositories.

Document Management:

The system should handle various document types like Transcript File, Assignment, and Question Bank securely.

Search and Filtering:

Implement functionalities for users to search and filter student data based on enroll program, course, organization etc.

Reporting:

Generate reports on enrolled user performance, program participation metrics, and other valuable data to the Organization.

Scalability:

Modular Design: Design the system with modular components that can be easily scaled up or down based on user growth.

Database Optimization: Optimize the database structure and queries for efficient performance with a large number of users and data entries.

Workflow Management:

Automated Notifications: Set up automatic email or system notifications for application updates, deadline reminders, or feedback requests.

Task Management: Allow Superadmin to assign roles created dynamic roles based on his/her needs

Technical Constraints:

Security: User Authentication: Implement secure user authentication methods with strong password policies and potential multi-factor authentication.

Data Encryption: Encrypt sensitive data like resumes and evaluations when stored at rest and in transit.

Access Control: Implement access controls to restrict unauthorized access to data based on user roles and permissions.

Performance:

Caching Mechanisms: Utilize caching mechanisms to improve response times for frequently accessed data.

Database Indexing: Properly index database tables to allow for efficient searching and filtering of data.

Integration:

APIs: If integration with existing systems is needed, utilize APIs (Application Programming Interfaces) to facilitate smooth data exchange.

Standardized Data Formats: Ensure data transferred between systems adheres to standardized formats like JSON or XML.

Technical Expertise:

Development Team Skills: The development team should have expertise in Spring Boot, Thyme leaf, MySQL, and potentially other relevant technologies like security frameworks.

Ongoing Maintenance: Maintaining and updating the system might require ongoing technical expertise.

3.7.2 Non-Technical Constraints Budget:

Prioritize Features: Carefully choose the functionalities to be implemented initially based on budget constraints. Consider a phased approach to rollout features over time.

Open-Source Alternatives: Explore open-source Learning management systems to potentially reduce development costs. However, customization and ongoing support might be limited.

Timeline:

Phased Implementation: Break down the development process into phases with achievable milestones to meet tight deadlines. Focus on core functionalities first and add additional features later.

Agile Development: Consider an agile development methodology that allows for adapting to changing priorities within the project timeline.

User Adoption:

User-Friendly Interface: Design an intuitive and user-friendly interface that encourages user adoption.

Training and Support: Provide training materials and ongoing support for users to learn and effectively utilize the system.

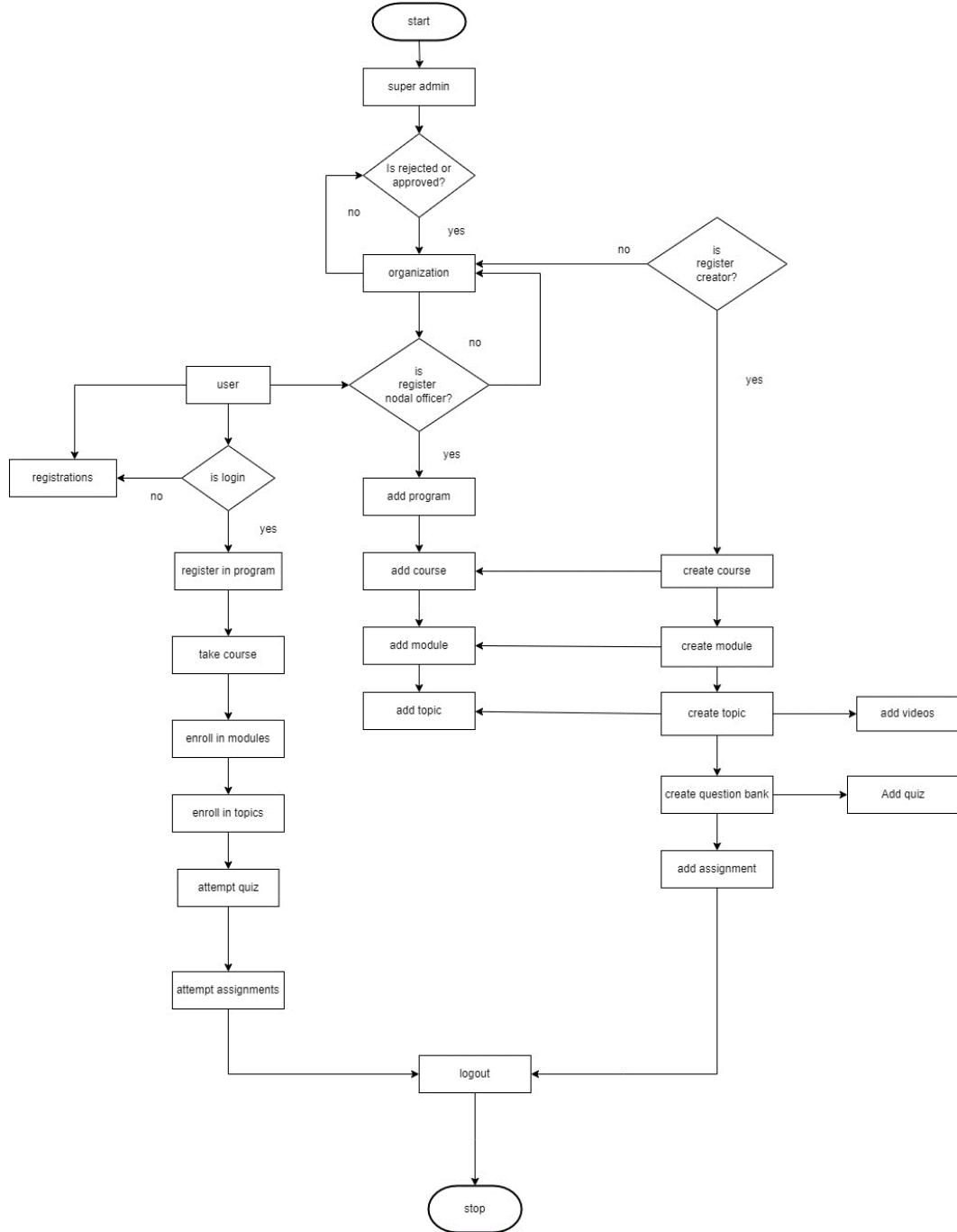
Regulations:

Data Privacy Compliance: Ensure the system adheres to relevant data privacy regulations like GDPR (General Data Protection Regulation) or CCPA (California Consumer Privacy Act).

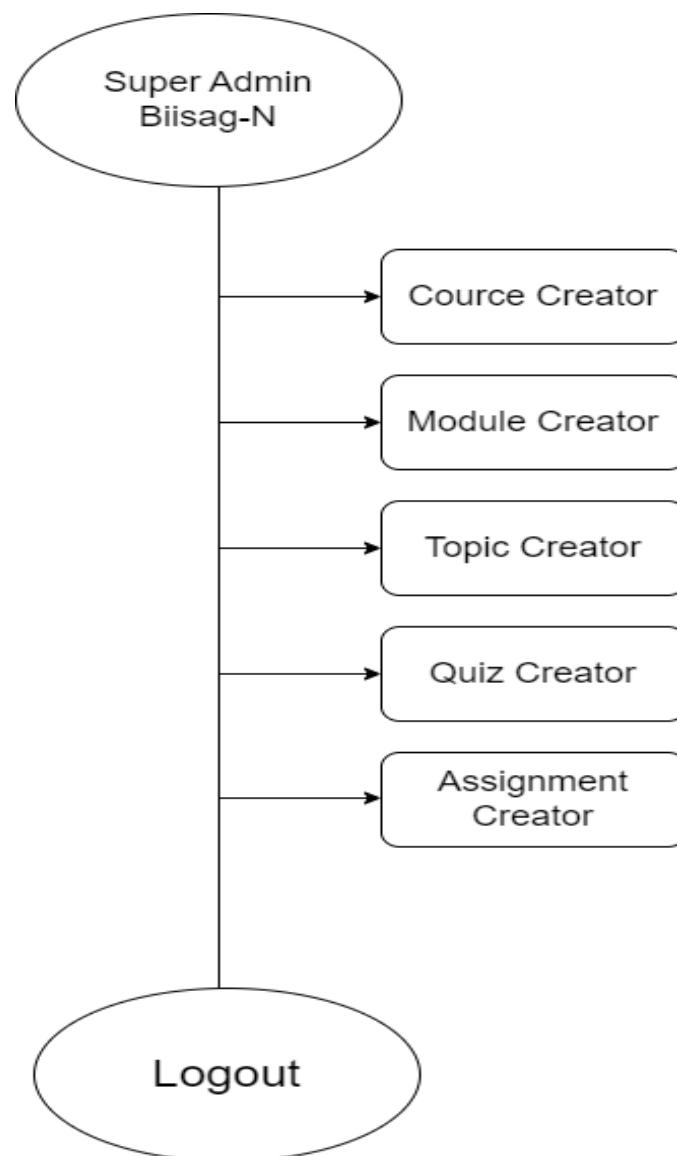
Institutional Policies: Comply with any data security or privacy policies established by the university or company using the system.

4. System Design:

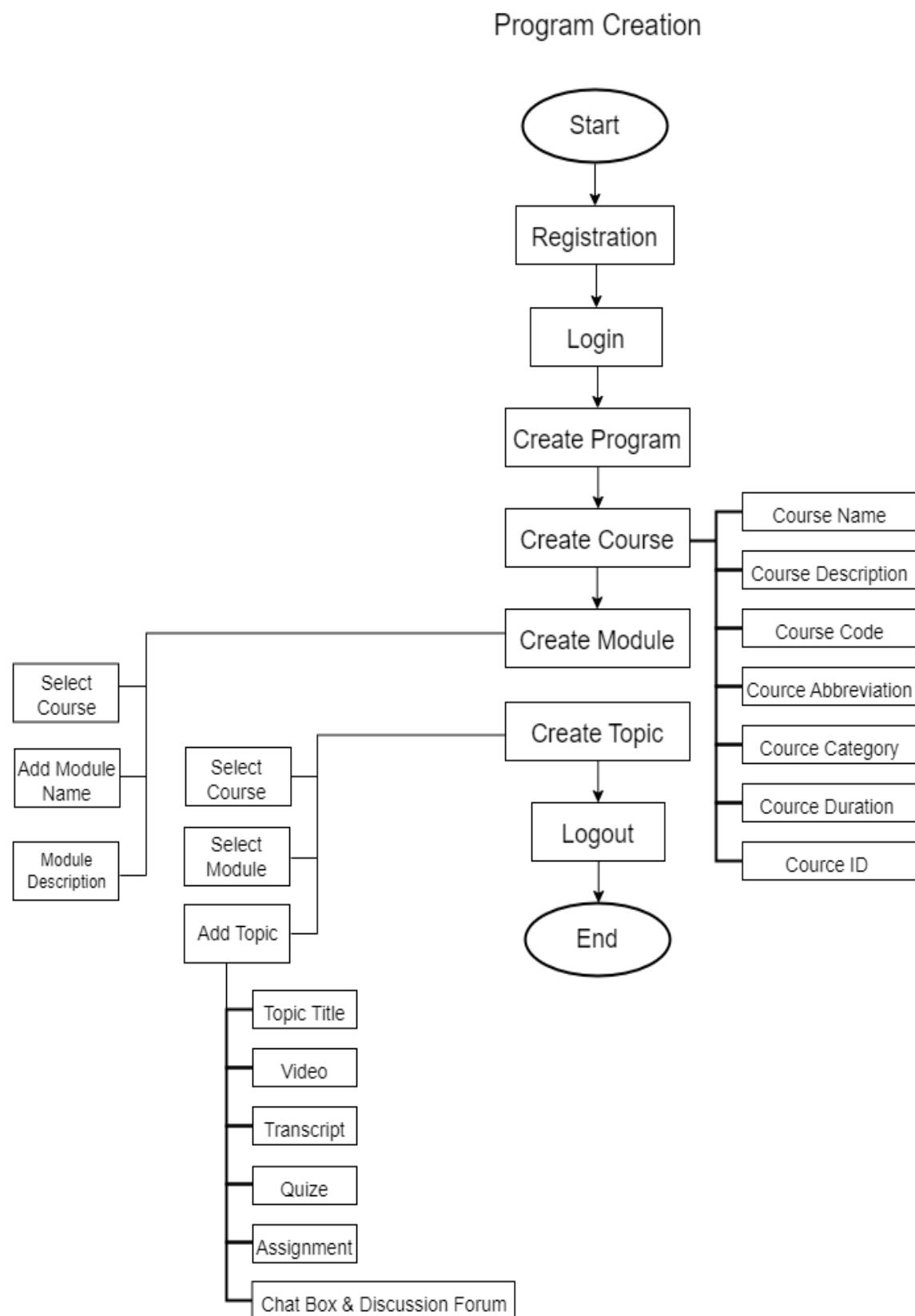
4.1 Flowcharts::



[4.1.1 System Flow Chart]

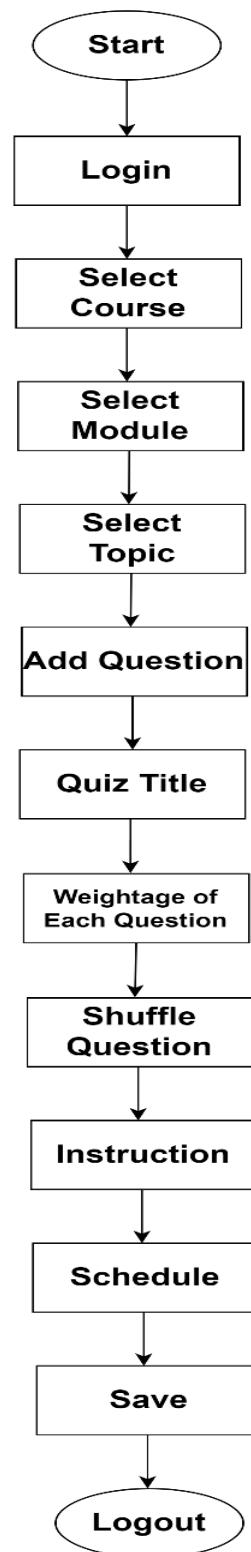


[4.1.2 Admin Flowchart]



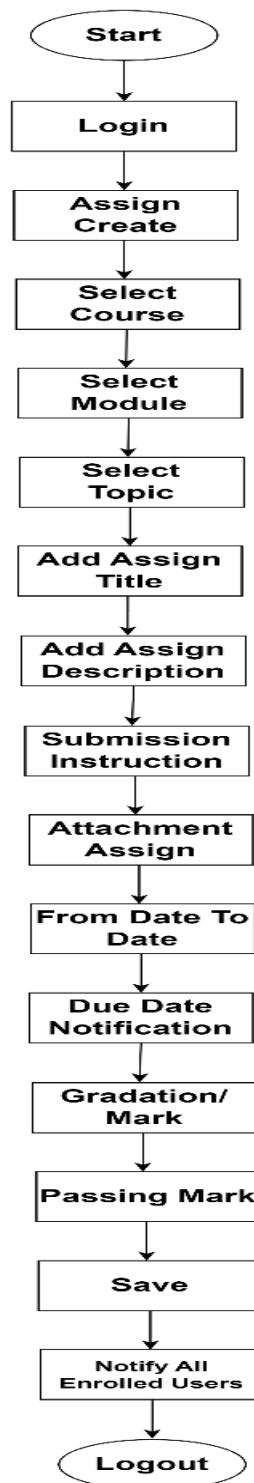
[4.1.3 Program, Course, module and topic Creation Flow Diagram]

Quiz Creation

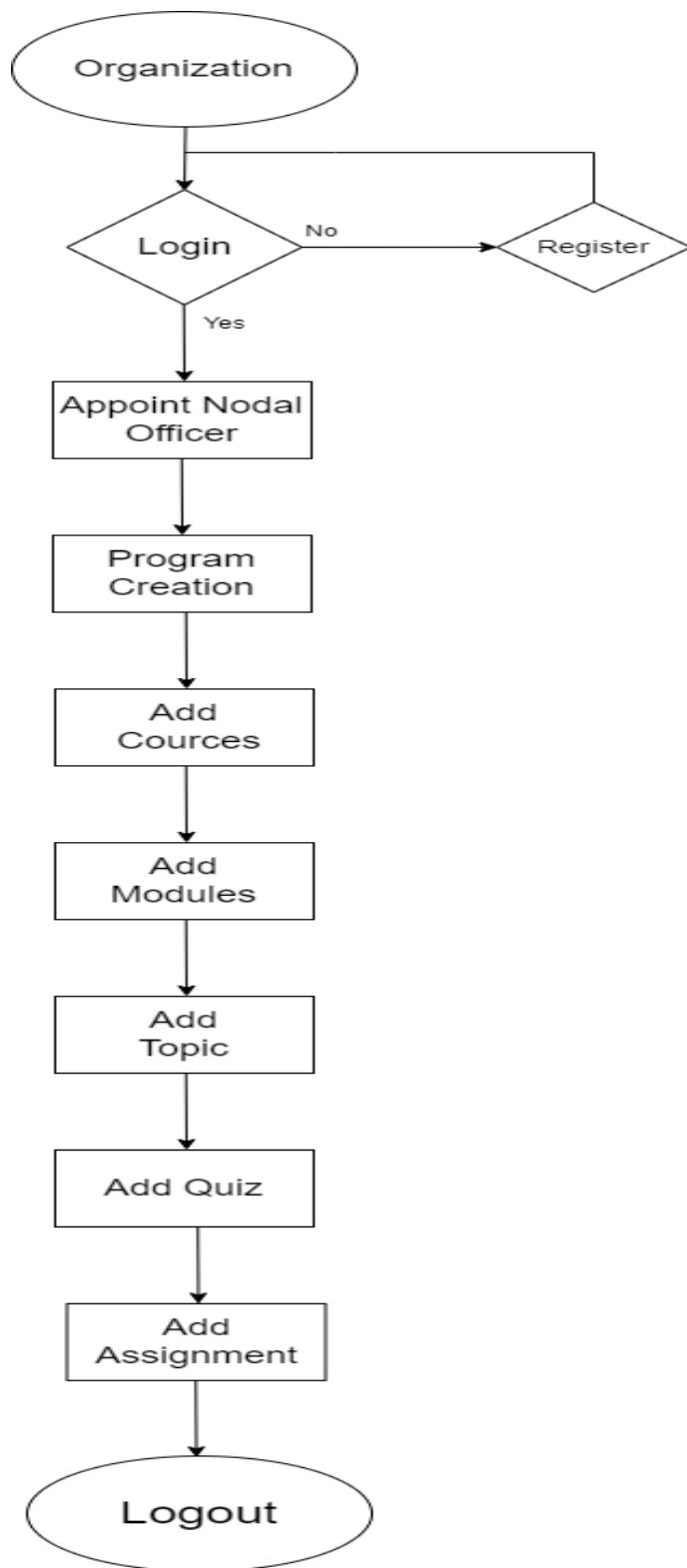


[4.1.4 Quiz Creation Flow Diagram]

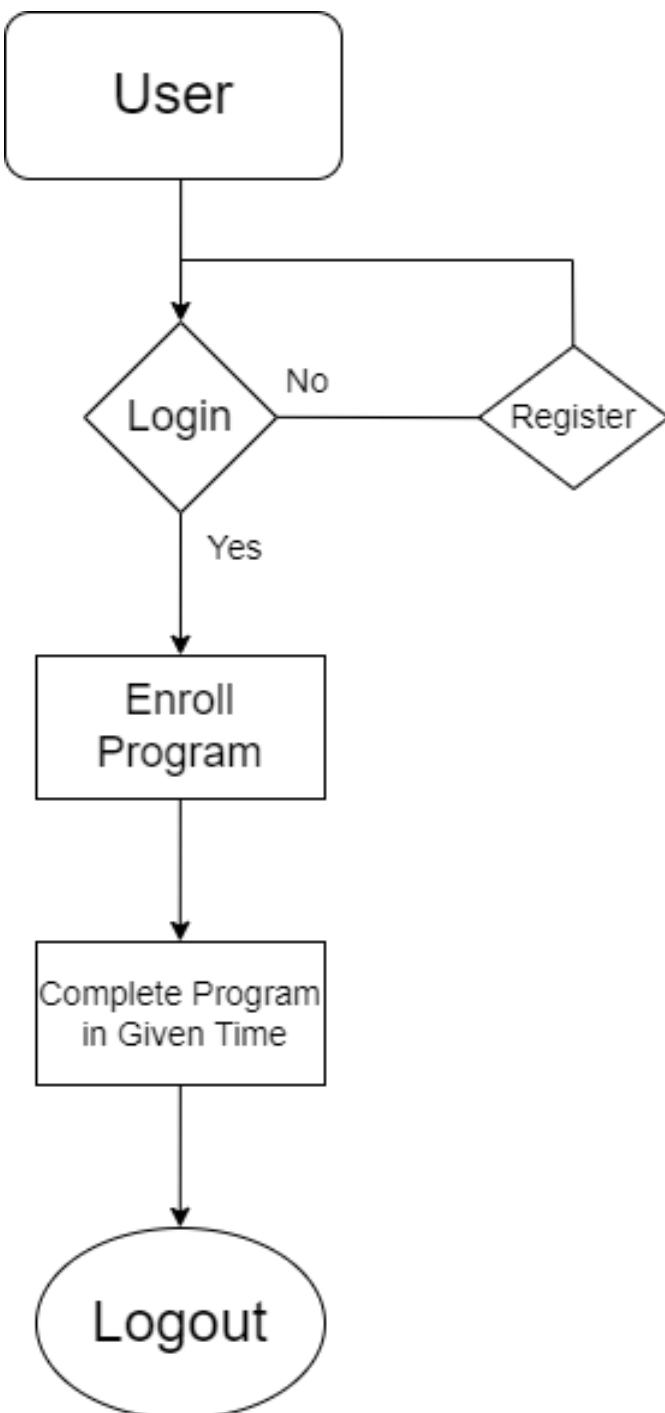
Assignment Creation



[4.1.5 Assignment Creation Flow Diagram]



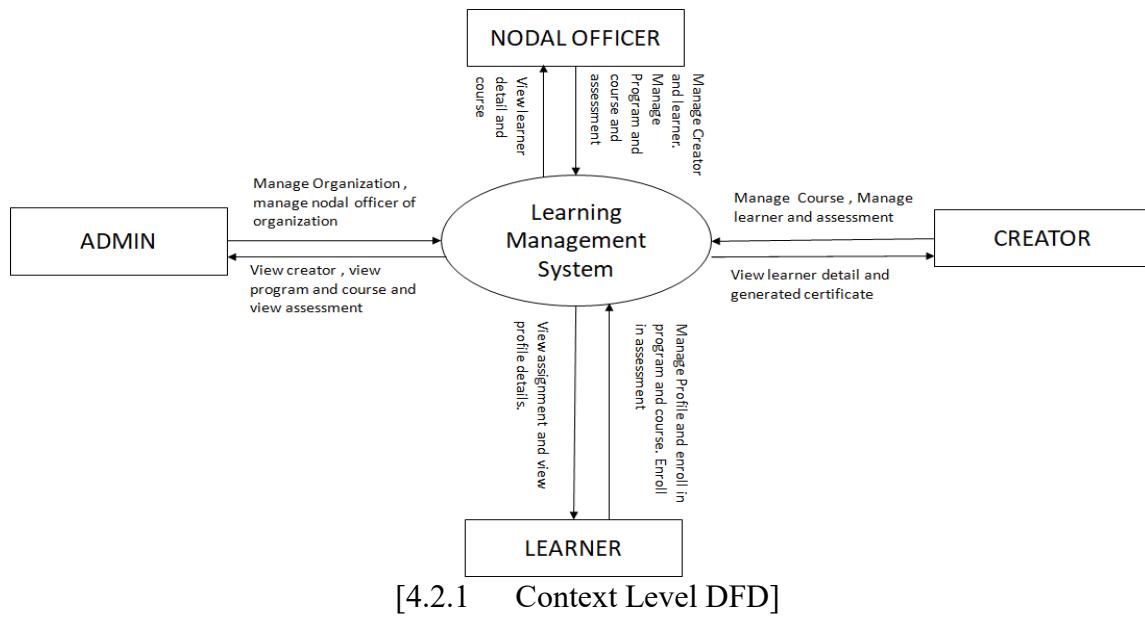
[4.1.6 Organization Flow Diagram]



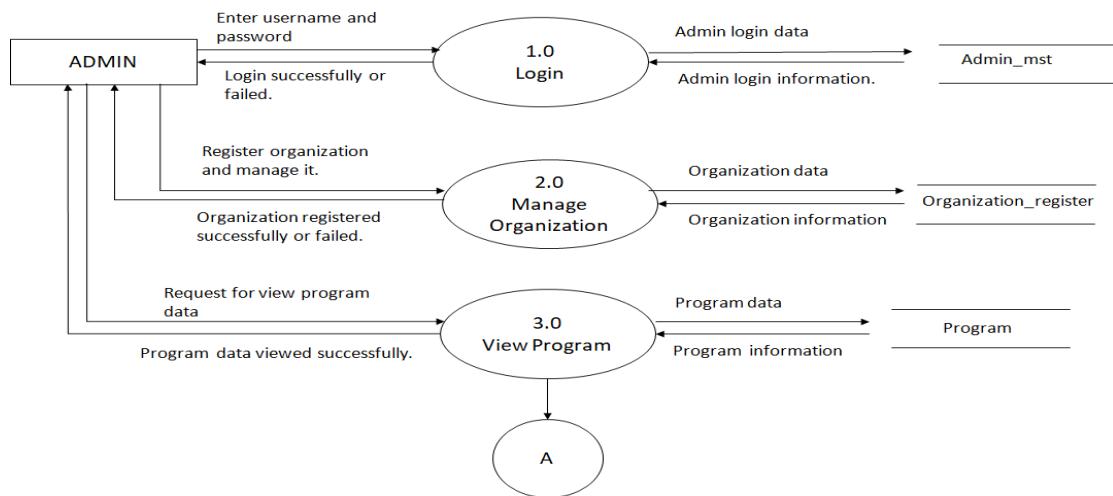
[4.1.7 Learner (End User) Flow Diagram]

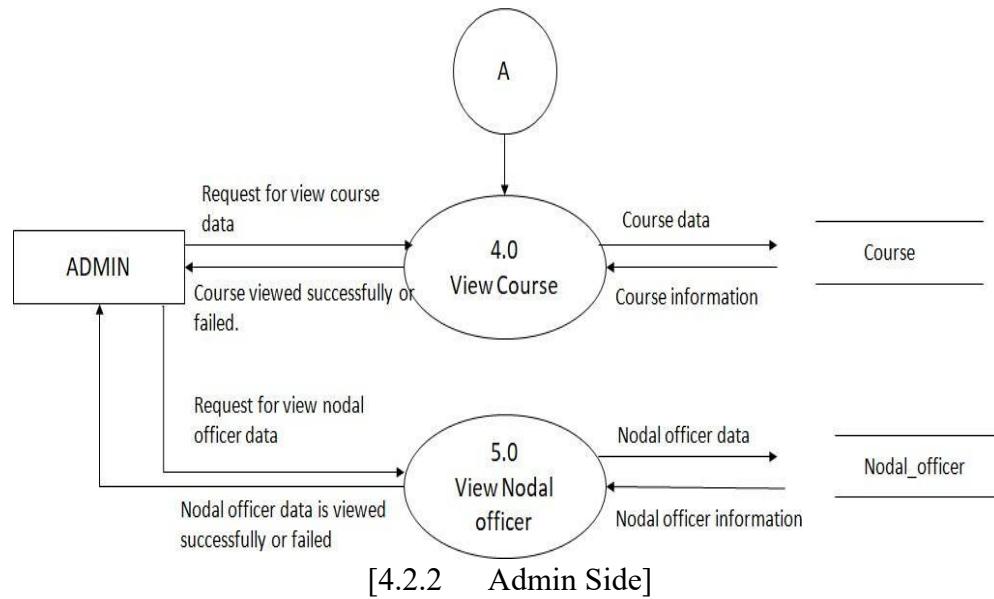
4.2 Data Flow Diagram's:

1) Context Level DFD:

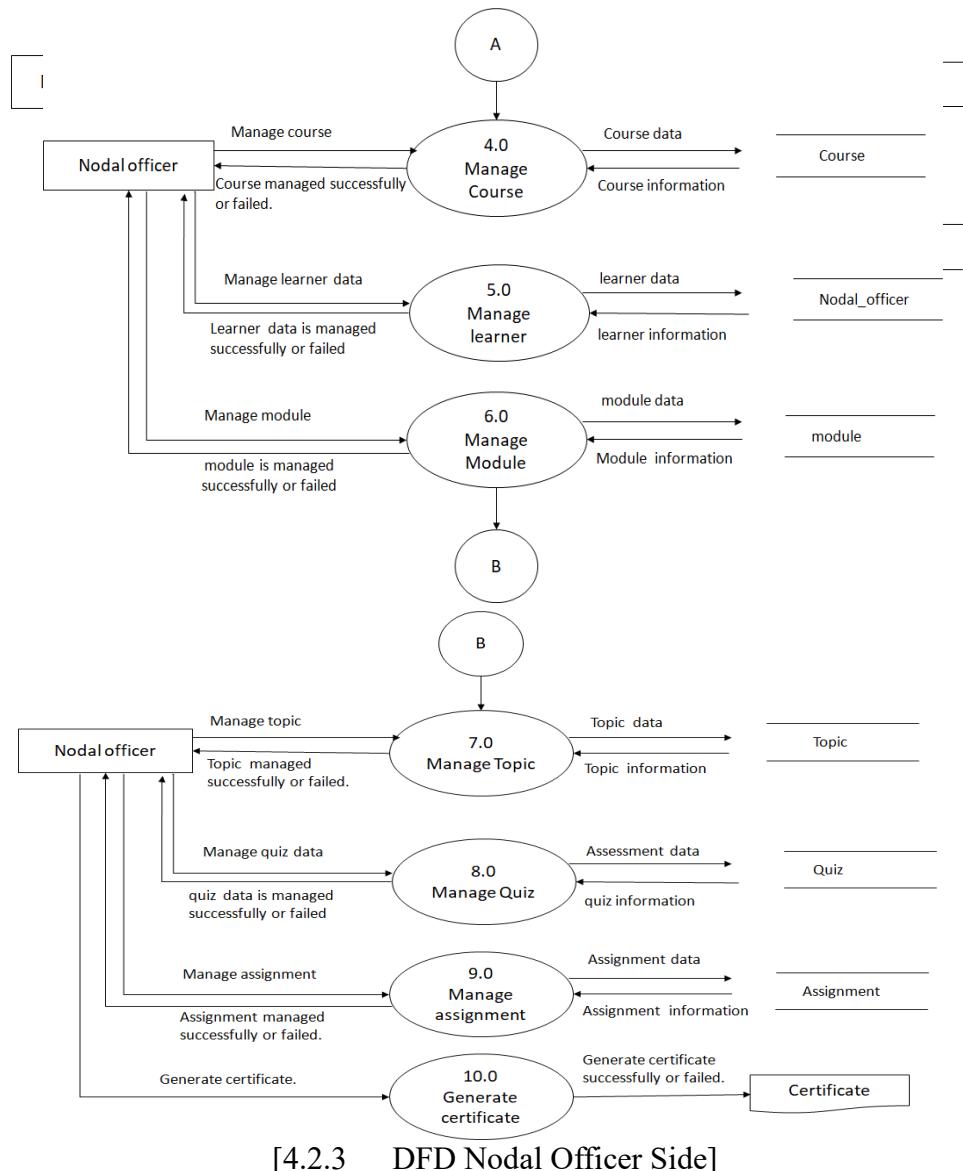


2) First Level DFD Admin Side

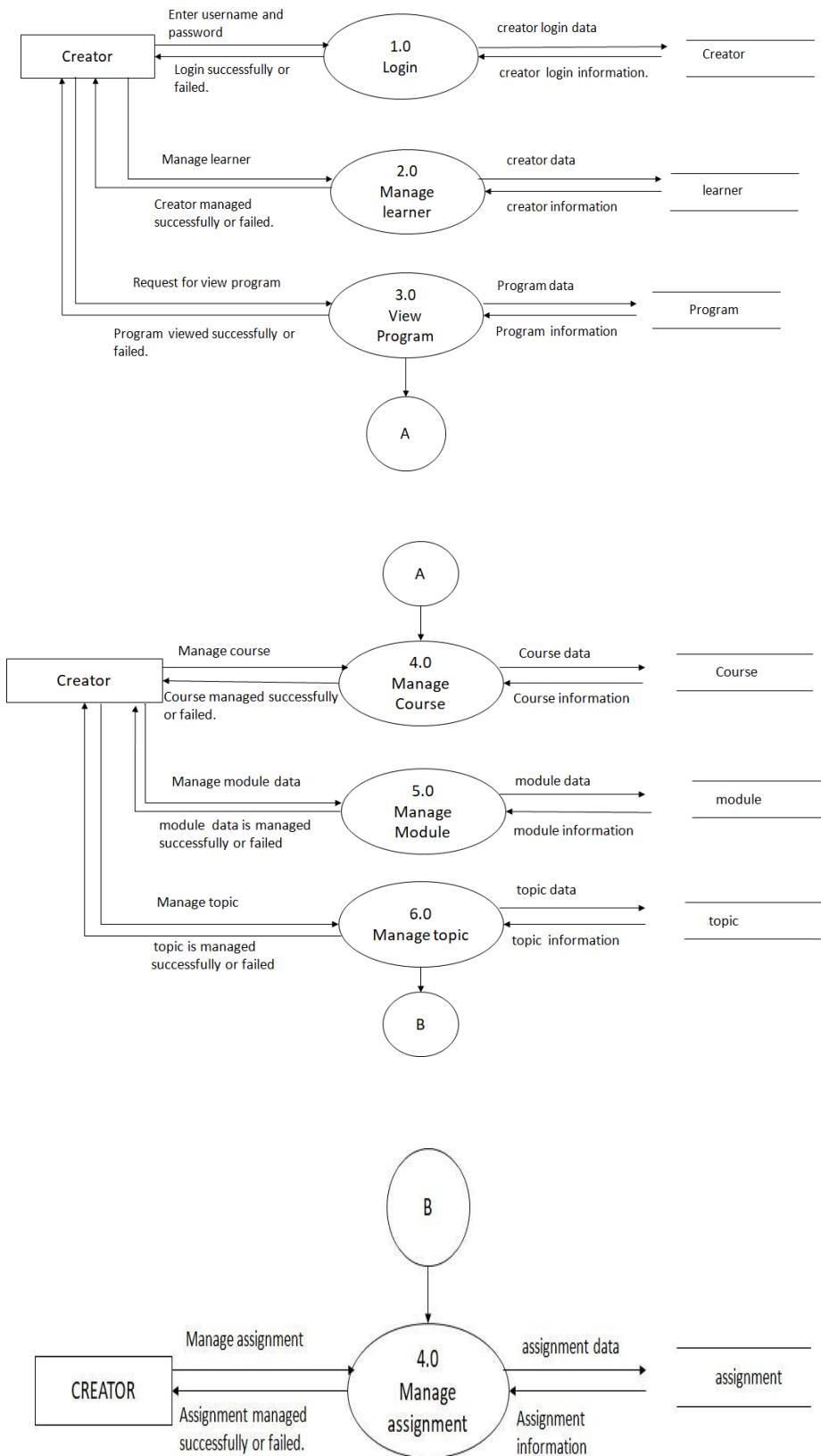




3) First Level DFD Nodal Officer Side



4) First Level DFD Creator Side



[4.2.4 DFD Creator Side]

4.3 Data Dictionary:

- Table name: Registration organization Table
- Description: Stores information about Registration organization

No.	Field Name	Data Type	Constraint	Description
1.	Organization_ID	Integer	Primary Key	Organization Unique ID
2.	Organization_Name	Varchar(255)	Not Null	Organization name
3.	Registration_Date	Datetime	Not Null	Auto generated registered date
4.	Email_ID	Email	Unique	E-mail of the Organization
5.	Description	Varchar(256)	Not Null	Description of organization
6.	Password	Varchar(255)	Not Null	Auto generated password send through mail
7.	Address	String	Not Null	Address of Organization
8.	City	Varchar(255)	Not Null	City of Organization
9.	State	Varchar(255)	Not Null	State of Organization
10.	Country	Varchar(255)	Not Null	Country of Organization
11.	Contact_no	Varchar(255)	Not Null	Contact no of Organization

[4.3.1- Registration Organization]

- Table name: Register_Programme Table
- Description: Stores information about Register_Programme

No.	Field Name	Data Type	Constraint	Description
1.	Organization_ID	Integer	Foreign Key	Organization Unique ID
2.	Nodal_Officer_ID	Integer	Foreign Key	Nodal Officer Unique ID
3.	Program_ID	Integer	Primary Key	Unique Id of Program
4.	Programme_Title	Varchar(255)	Not Null	Not Null
5.	Programme_Description	Varchar(255)	Not Null	Not Null
6.	Program_Duration	Float	Not Null	Not Null

[4.3.2 Registration of program]

- Table name: Enroll_course Table
- Description: Stores information about Enroll_course

No.	Field Name	Data Type	Constraint	Description
1.	Organization_ID	Integer	Foreign Key	Organization Unique ID
2.	Nodal_Officer_Id	Integer	Foreign Key	Unique Id of Nodal Officer
3.	Program_Id	Integer	Foreign Key	Program Unique Id
4.	Course_Id	Integer	Foreign Key	Course Unique Id

[4.3.3 -Enroll Course]

- Table name: Creators Table
- Description: Stores information about Creators

No.	Field Name	Data Type	Constraint	Description
1.	Creator_ID	Integer	Primary Key	Unique Id of Creator
2.	Name	Varchar(255)	Not Null	Creator's Name
3.	Email_ID	Integer	Unique	e-mail Id of Creator
4.	Password	Integer	Not Null	Password of creator (Predefined)

[4.3.4- Creator's Table]

- Table name: Enroll_Quiz Table
- Description: Stores information about Enroll_quiz

No.	Field Name	Data Type	Constraint	Description
1.	Creator_ID	Integer	Foreign Key	Unique ID of Creator
2.	Topic_id	Integer	Foreign Key	Unique ID of Topic
3.	Quiz_Id	Integer	Primary Key	Unique ID of Quiz
4.	Question_Id	Integer	Foreign Key	Unique Id of Question

[4.3.5 Enroll quiz Table]

- Table name : Verification_status_org
- Description : Stores information about verification_status_org

No.	Field	Datatype	Constraint	Description
1	Organization_id	Integer	Foreign Key	Unique ID of Organization
2	Verified_date	Datetime	Not Null	Organization Verified Date
3	Verification_status	Boolean	Not Null	Organization Check Box to verified

[4.3.6 - Verification status]

- Table name : Course_Registration
- Description : Stores information about course_registration

No.	Field	Datatype	Constraint	Description
1	Course_id	Integer	Primary Key	Unique ID of Course
2	Creator_id	Integer	Foreign Key	Unique ID of Creator
3	Course_name	Varchar(255)	Not Null	Name Of the Course
4	Course_abbreviation	Varchar(255)	Not Null	Course Abbreviation
5	Course_description	Varchar(255)	Not Null	Course Discription
6	Course_category	Varchar(255)	Not Null	Course Category
7	Create_date	Datetime	Not Null	Course created date

[4.2.7 - Course Registration]

- Table name : Enroll_module
- Description : Stores information about Enroll_module

No.	Field	Datatype	Constraint	Description
1	Course_Creator_id	Integer	Foreign Key	Unique ID of creator
2	Course_id	Integer	Foreign Key	Unique ID of course
3	Module_id	Integer	Foreign Key	Unique ID of module

[4.3.8- Enroll Course Table]

- Table name: Role Table
- Description: Stores information about Role

No.	Field Name	Data Type	Constraint	Description
1.	Creator_ID	Integer	Foreign Key	Unique ID of creator
2.	Role_id	Varchar(255)	Primary Key	Unique ID of roles

[4.3.9 -Role]

- Table name : Verification_Status_Program
- Description : Stores information about Verification_Status_program

No.	Field	Datatype	Constraint	Description
1	Program_id	Integer	Foreign Key	Unique ID of program
2	Verified_date	Datetime	Not Null	program Verified Date
3	Verification_Status	Boolean	Not Null	Program Verified Status

[4.3.10 -VERIFICATION STATUS PROGRAM]

- Table Name : Topic_Registration
- Description : stores information about Topic_Registration

No.	Field	Datatype	Constraint	Description
1	Sequence_No	Integer	Not Null	Sequence no of topics
2	Topic_Creator_id	Integer	Foreign Key	Unique ID of creator
3	Topic_Id	Integer	Primary Key	Unique ID of Topic
4	Topic_Name	Varchar(255)	Not Null	Name of Topic
5	Topic_Description	Varchar(255)	Not Null	Topic Discription
6	Video_file	File	Not Null	Topic Video
7	Transcript_File	File	Not Null	Topic Transcript
8	PDF_File	File	Not Null	Topic PDF

[4.3.11-TOPIC REGISTRATION]

- Table Name : Nodel_officer
- Description : stores information about Nodel_Officer

No.	Field	Datatype	Constraint	Description
1	Organization_Id	Integer	Foreign Key	Unique ID of Organization
2	Nodal_officer_Id	Integer	Foreign Key	Unique ID of Nodal Officer
3	Nodal_officer_name	Varchar(255)	Not Null	Name of Nodal Officer
4	Phon_number	Bigint	Not Null	Nodal Officer Phone number
5	Designation_of_nodal_officer	Varchar(255)	Not Null	Designation of Nodal Officer
6	Address		Not Null	Address Of Nodal Officer
7	Ward	Varchar(255)	Not Null	Ward Of Nodal Officer
8	Email_Id	Email	Unique	Email Of Nodal Officer
9	Password	Varchar(255)	Not Null	Password Of Nodal Officer
10	Register_date	datetime	Not Null	Registered Date Of Nodal Officer

[4.3.12- NODAL OFFICER]

- Table Name : Module_Registration
- Description : stores information about Module_Registration

No.	Field	Datatype	Constraint	Description
1	Sequence_no	Integer	Not Null	Sequence of the topics
2	Module_id	integer	Primary Key	Unique ID of Module
3	Creator_id	Integer	Foreign Key	Unique ID of creator
4	Course_name	Varchar(255)	Not Null	Name of Course
5	Course_category	Varchar(255)	Not Null	Cours Category
6	Module_name	Varchar(255)	Not Null	Module Name
7	Module_description	Varchar(255)	Not Null	Module Discription
8	Weightage	integer	Not Null	Weightage of each modules

[4.3.13 - MODULE REGISTRATION]

- Table Name : ENROLL_TOPIC
- Description : stores information about ENROLL_TOPIC

No.	Field	Datatype	Constraint	Description
1	Topic_id	Integer	Foreign Key	Unique ID of topic
2	Creator_id	integer	Foreign Key	Unique ID of Topic

[4.2.14- ENROLL TOPIC]

- Table Name: Exam
- Description: stores information about Exam

No.	Field	Datatype	Constraint	Description
1	Question_id	Integer	Primary Key	Unique ID of Question
2	Question_name	Varchar(255)	Not Null	Question
3	Option_1	Varchar(255)	Not Null	Option A for Question
4	Option_2	Varchar(255)	Not Null	Option B for Question
5	Option_3	Varchar(255)	Not Null	Option C for Question
6	Option_4	Varchar(255)	Not Null	Option D for Question
7	answer	choice	Not Null	Answer of the question

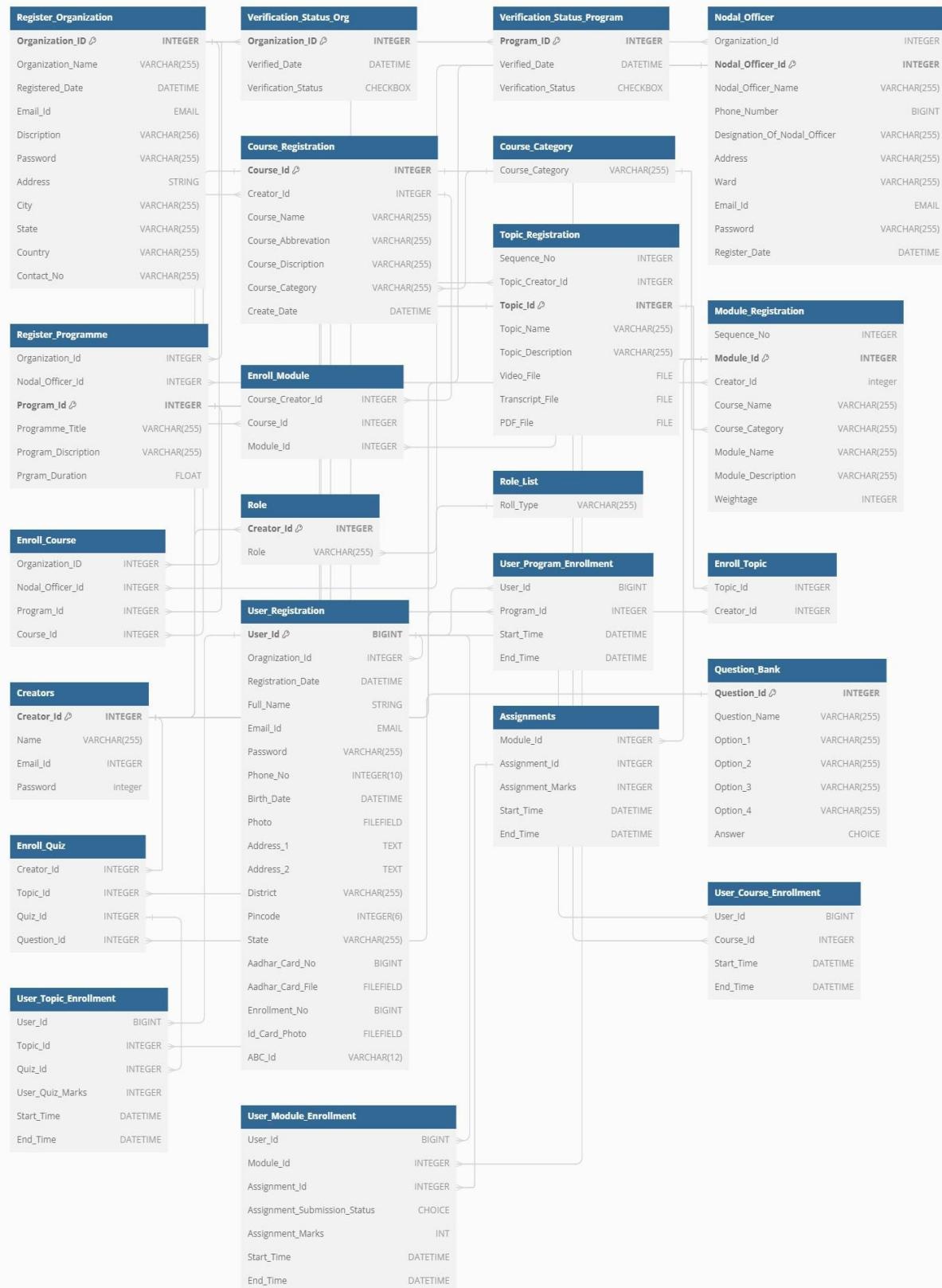
[4.3.15- Exam]

Table Name:Assignment

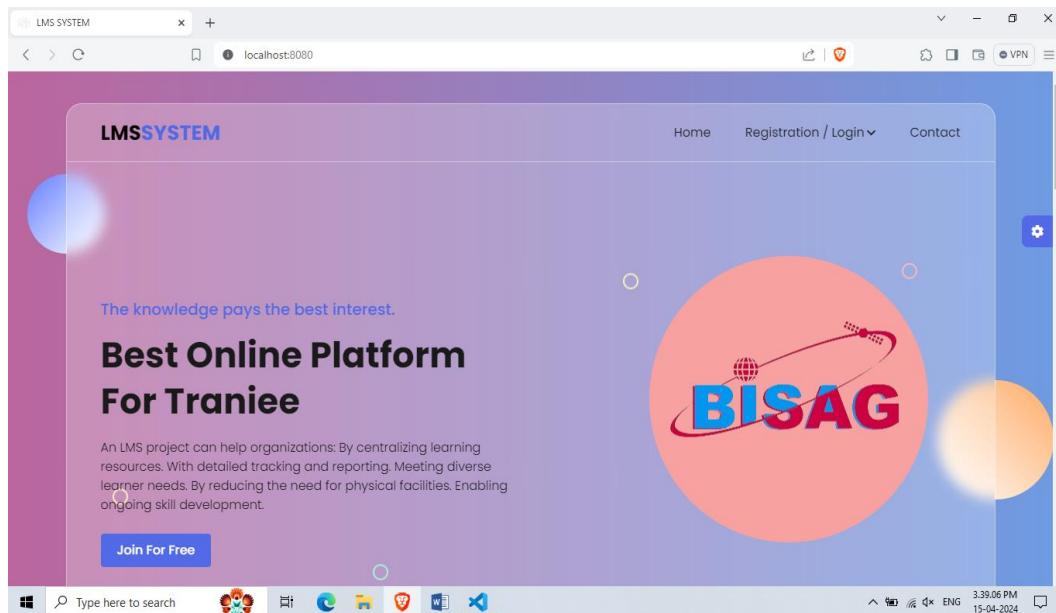
No.	Field	Datatype	Constraint	Description
1	Assignment_id	int	Primary key	Unique ID of assignment
2	Topic_id	integer	Not Null	Foreign key topic table
3	Module_id	Integer	Not Null	Foreign key module table
4	Assignment_name	Varchar(255)	Not Null	Name of Assignment
5	assdes	Varchar(255)	Not Null	Description of Assignment
6	marks	Varchar(255)	Not Null	Total marks of Assignment
7	Due_date	Date	Not Null	Last date of the assignment solution submission
8	Upload_assignment	Varchar(255)	Not Null	Admin side of the assignment upload
9	View_assignment	Varchar(255)	Not Null	User side of the assignment solution upload

[4.3.16- Assignment]

4.4 Database Diagram

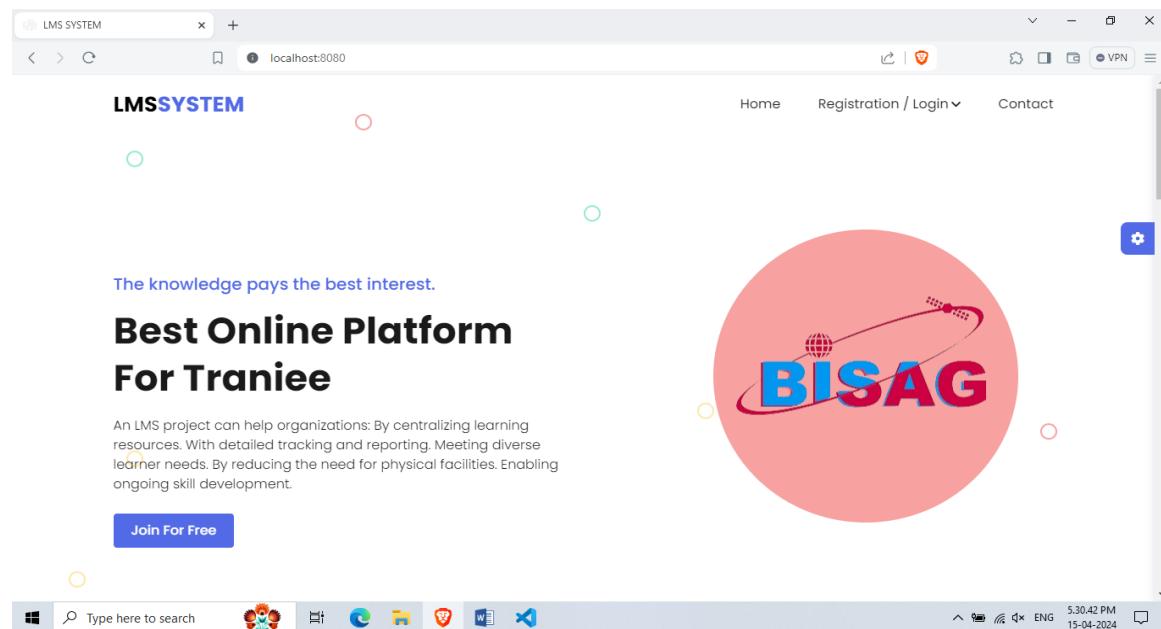


4.5 Screenshots: - This all Screenshots are home page with different themes

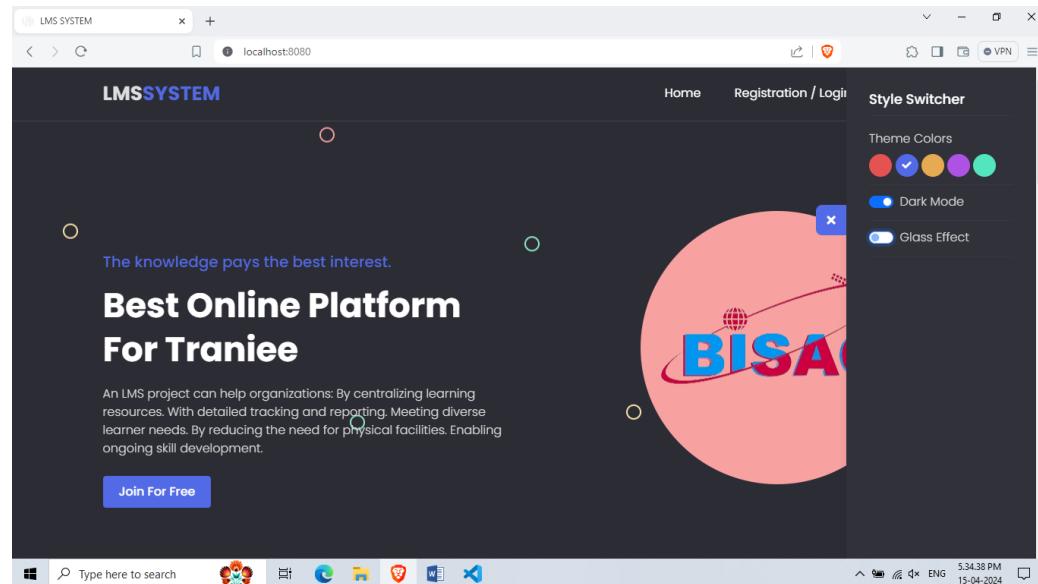


[4.5.1 Home Page-1]

Home Page1 (Gradient Theme): This is the homepage in the gradient theme of the LMS. It seems like this homepage is designed with various sections like login and contact.



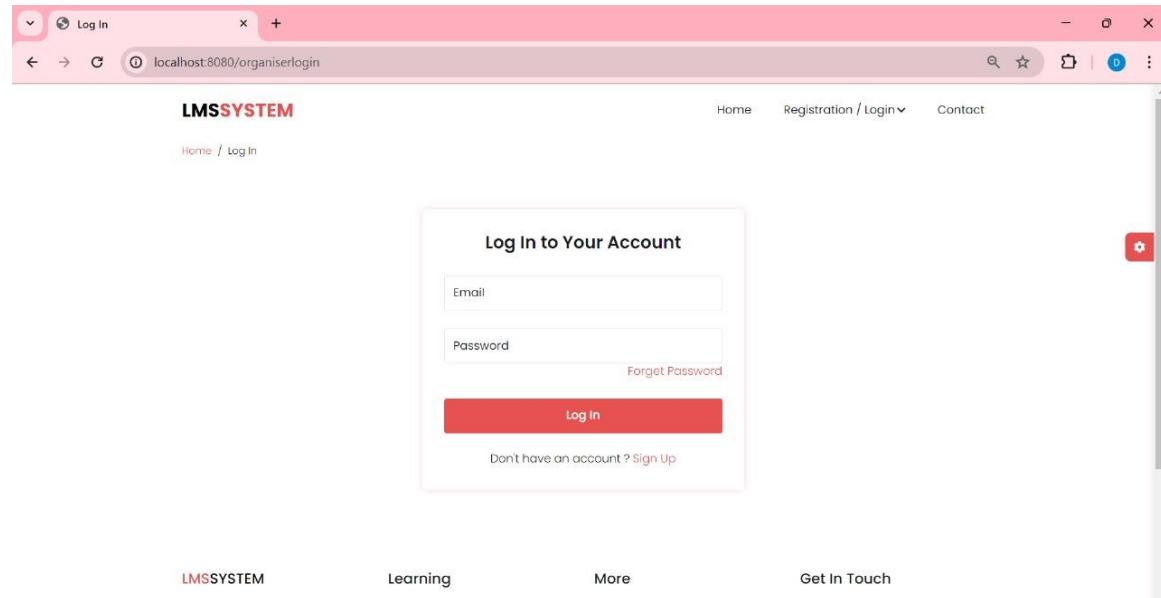
[4.5.2 Home Page-2]



[4.5.3 Home Page-3]

Home Page (Dark Theme): This is the homepage in the Dark theme of the LMS. It seems like this homepage is designed with various sections like login and contact.

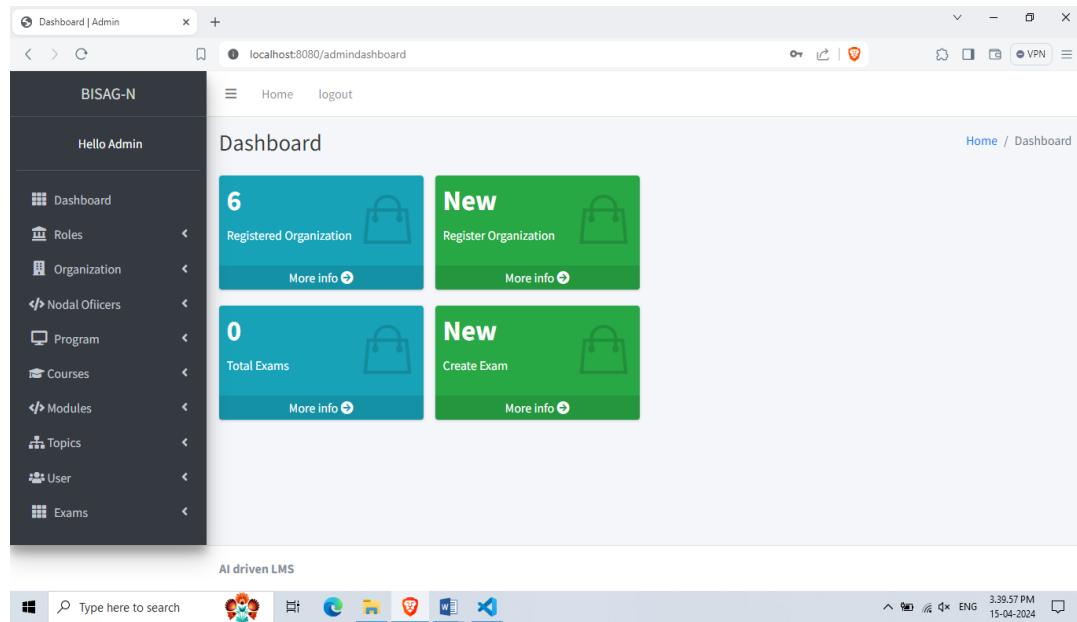
Login Page :-



[4.5.4 Login Page]

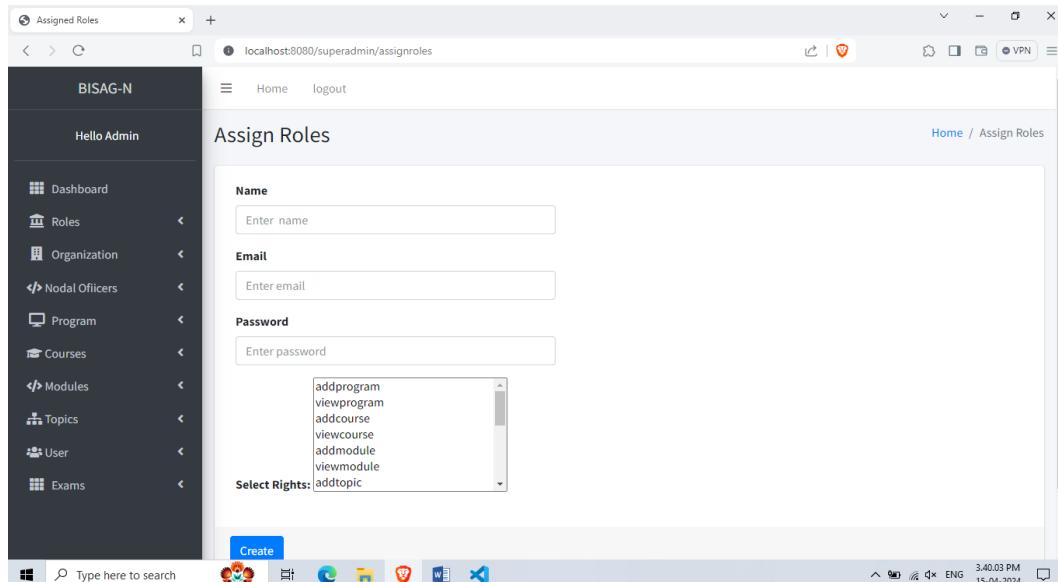
Login Page (Gradient Theme): This is the Login in the Gradient theme of the LMS. In this login page user can do login and access some extra sections.

Super Admin –



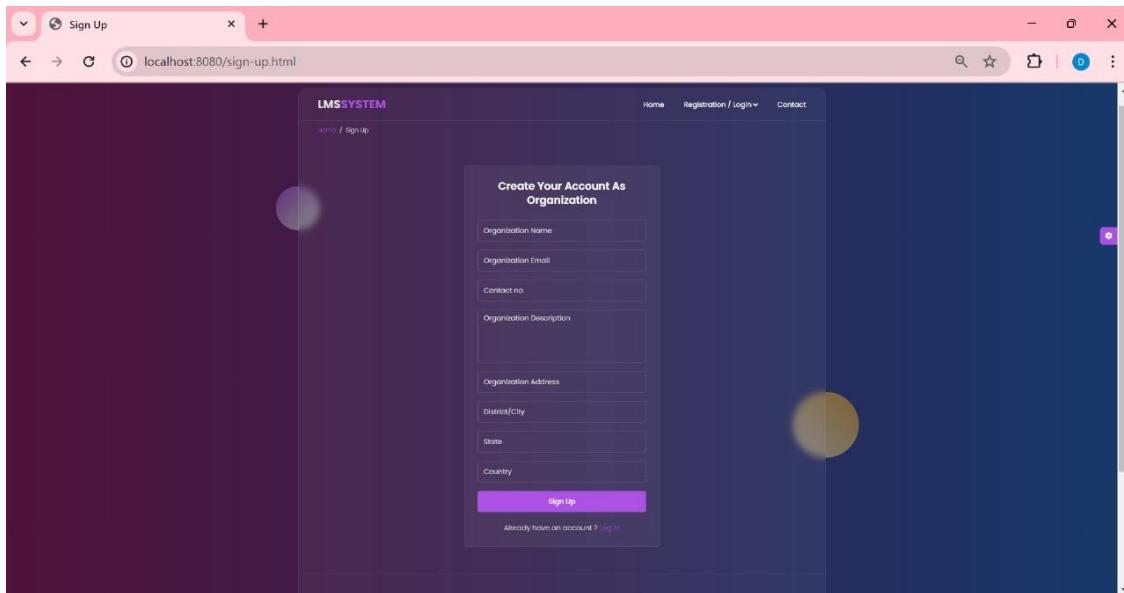
[4.5.5 Super Admin]

Admin Dashboard: This is the admin dashboard page in the super admin page. In this page admin dashboard user can do manage and add data, in admin dashboard user can easy to see and manage all data using this page.



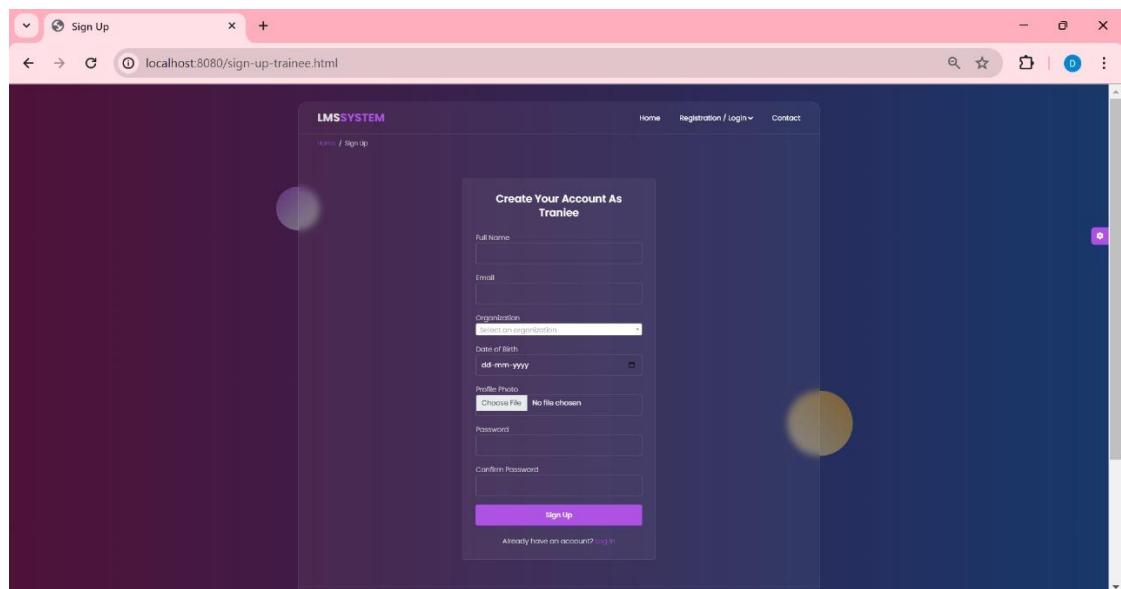
[4.5.6 Assign Roles]

Admin – Assign Roles: It allows super admin users to assign roles in the user registration side page.



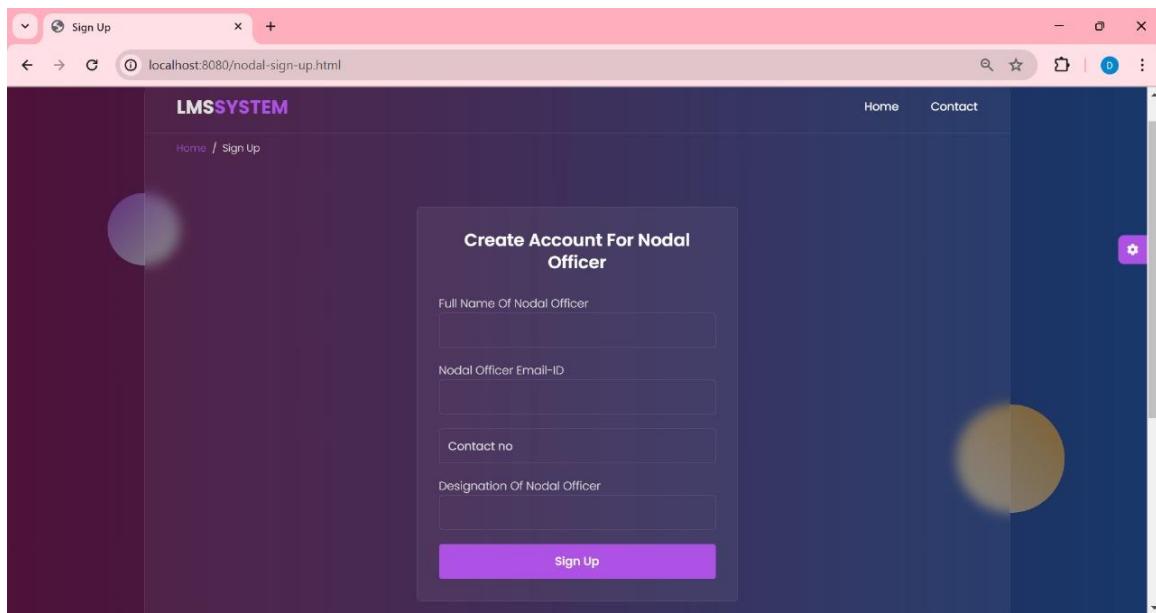
[4.5.7 - Organization Registration]

Organization Registration: This is the Organization side registration page in this page. Organization can create page using registration process.



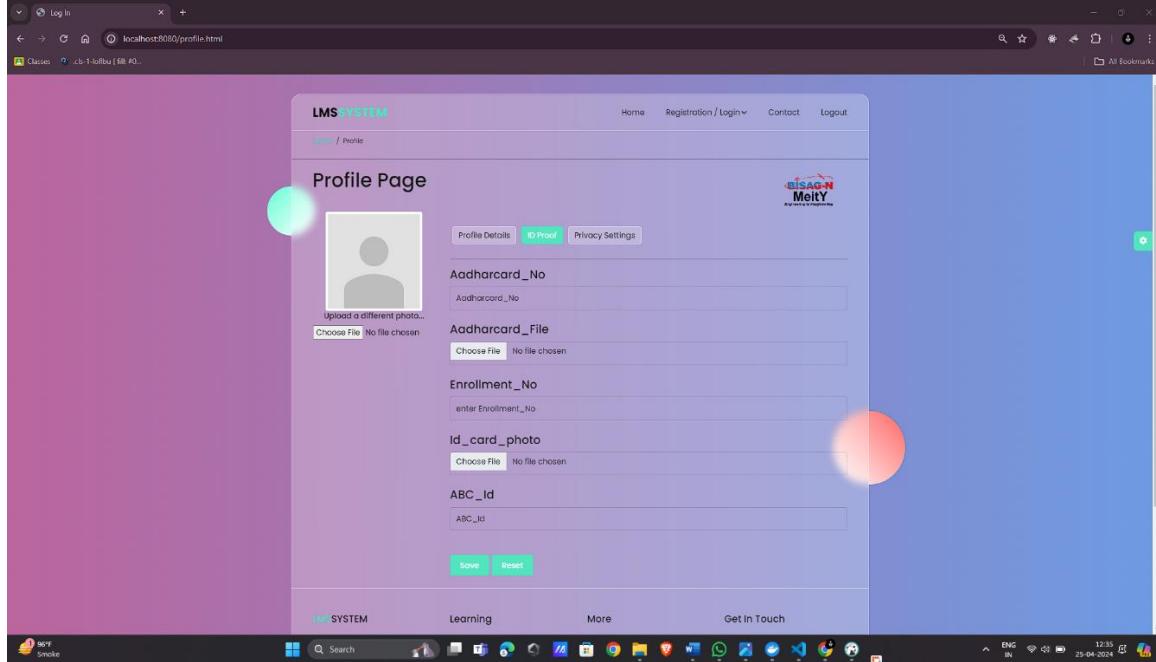
[4.5.8 - Trainee Registration Page]

Trainee Registration page: This is the Trainee Registration page. In this page user can do registration.



[4.5.9 Nodal Registration Page]

Nodal Registration page: This is the Nodal officer registration page. In this nodal officer do registration by the organization.



[4.5.10 - User profile page at user side]

User profile page: This is user profile page in this page user can create profile and add proof in this page.

5. Backend work:

5.1 Screenshots:

The screenshot shows the 'Register New Topic' form. The left sidebar shows a navigation menu with 'Topics' selected. The main form has fields for 'Topic Name' (with error message 'Topic Name cannot be empty'), 'Description' (with error message 'Description have to at least 15 characters'), and 'Video File', 'Transcript File', and 'Pdf File' (each with 'No file chosen'). A 'Create' button is at the bottom.

[5.1.1 Topic Validation]

Topic Validation: Showing Server side validation in topic registration after clicking create without filling up the form

The screenshot shows the 'Register New Module' form. The left sidebar shows a navigation menu with 'Modules' selected. The main form has fields for 'Module Name' (with error messages 'Module name cannot be blank' and 'Module name must contain minimum 5 letters'), 'Weightage' (set to 0), 'Description' (with error message 'Module description cannot be blank'), and a dropdown 'Topics' (with error message 'Please select atleast one topic') containing 'OOP Concepts'. A 'Create' button is at the bottom.

[5.1.2 Module validation]

Module Validation: Showing Server side validation in Module Registration after clicking create without filling up the form.

Name
Enter Course Name
Course name cannot be blank
Course name must not contain more than 7 letters

Abbreviation
Enter Course Abbreviation
Course abbreviation cannot be blank
Course abbreviation must not contain more than 15 letters

Description
Enter Course Description
Course description cannot be blank
Course description must have atleast 15 characters and maximum 30 characters

Modules
Java Jigsaw

Please select atleast one module

- Enter the course CourseAbbreviation
- Enter the Course Course Description
- Course description must be at least 15 characters long.
- Enter the course name

[5.1.3 Validation in Course]

Course Validation: Showing Server side and client side validation in Course registration after clicking create without filling up the form.

Program Title
Enter program name
Program title cannot be blank
Program title must not contain more than 7 letters

Program Description
Enter description
Program description cannot be blank
Program description must have atleast 15 characters and maximum 30 characters

Program Duration:
1 Month

Courses
Java

- Programme name is required
- Description is required
- Description has to be at least 15 chracters

Create

[5.1.4 Validation in Program]

Program Validation: Showing Server side and client side validation in Program registration after clicking create without filling up the form.

The screenshot shows a web application interface for managing organizations. On the left is a dark sidebar menu titled 'BISAG-N' with various administrative options like Dashboard, Roles, Organization, Nodal Officers, Program, Courses, Modules, Topics, Assignment, User, and Exams. The main content area is titled 'View Organization' and displays the following information for an organization with ID 1:

Organization ID:	1
Organization Name:	Shree Swaminarayan Institute of Technology
Email:	vedant2709patel@gmail.com
Registered Date:	2024-05-10
Description:	We are an academic excellent Technical College made up of committed scholar students, old collegians and staff members our rich history is the foundation for our values.
Address:	Near Agora Mall & Indira Bridge, Sardar Patel Ring Road, Bhat Circle Ahmedabad Airport-Gandhinagar Highway, Bhat, Gandhinagar-382428
City:	Gandhinagar
State:	Gujarat
Country:	India
Contact No:	9099662709

At the bottom are two buttons: 'Accept' (green) and 'Discard' (red).

[5.1.5 Registered Organization]

Registered Organization: After the registration of the organization it goes for the Approval of the superadmin

The screenshot shows a list of registered organizations. The sidebar is identical to the previous view. The main content area is titled 'Registered Organization' and contains a table with one entry:

Select	Id	Name	ContactNo	Email	Registration Date	Action
<input type="checkbox"/>	1	Shree Swaminarayan Institute of Technology	9099662709	vedant2709patel@gmail.com	2024-05-10 21:24:24,599	Approved

Below the table, it says 'Showing 1 to 1 of 1 entries'. At the bottom right are navigation buttons for 'Previous' (disabled), '1', and 'Next'.

[5.1.6 Approved Organization]

Approved Organization: After accepting the request the password will be sent on the registered mail of the organization.

The screenshot shows the 'Create New Assignment' page. On the left is a sidebar with navigation links: Dashboard, Roles, Organization, Nodal Officers, Program, Courses, Modules, Topics, Assignment, User, and Exams. The main area has sections for 'Assignment Name' (with a placeholder 'Enter Assignment Name'), 'Assignment Description' (placeholder 'Enter Assignment Description'), 'Topic' (dropdown menu showing 'Topic Name' and 'Topic Name'), 'Module' (dropdown menu showing 'Module' and 'Module name'), 'Marks' (placeholder 'Enter Marks'), 'Due Date' (date input field), and an 'Upload Assignment' section with a 'Choose file' button.

[5.1.7 Assignment Creation]

Assignment Creation: Assignment Created by the admin of assignment creation

The screenshot shows the 'Courses Details' page for the 'Java' course. At the top, it displays the course title 'Java', its rating '(4.8) ★★★★☆ (230 Reviews)', the number of enrolled students '220', the creator 'Vedant Patel', the last update date '09/05/2024', and the language 'Programming'. Below this, there are tabs for Curriculum, Description, Assignment (which is selected and highlighted in blue), Exam, and Reviews. A table below the tabs lists assignments with columns: Assignment No., Module name, Topic Name, Submit, Due Date, and Actions. One row is shown: Assignment No. 1, Module name Java Jigsaw, Topic Name OOP Concepts, Submit checked, Due Date 2024-05-15, Actions (button for 'Upload Assignment' and 'View Assignment').

[5.1.8 Shown on the user side]

Created Assignment: Created Assignment shown on the user side so He/she can download and upload the solution of it.

The screenshot shows the 'Assignment Creation' page of the BISAG-N application. The left sidebar contains a navigation menu with items like Dashboard, Roles, Organization, Nodal Officers, Program, Courses, Modules, Topics, Assignment, User, and Exams. The main content area has a title 'Assignment Creation' and a table listing two assignments. The table columns are: Select, Assignment Id, Topic Id, Module Id, Assignment Name, View Assignment, Upload Assignment, Due date, and Action. The first assignment has Assignment Id 2, Topic Id OOP Concepts, Module Id Java Jigsaw, Assignment Name OOPS assignment, and Due date 2024-05-15. The second assignment has Assignment Id 3, Topic Id OOP Concepts, Module Id Java Jigsaw, Assignment Name Python learning Programme, and Due date 2024-05-17. Both rows have a 'View Assignment' button and an 'Approved' status indicator.

[5.1.9 Admin can view solution]

Upload assignment Solution: The uploaded assignment solution from the user side will be viewed on the admin side on view assignment.

The screenshot shows the 'Create a new exam' page of the BISAG-N application. The left sidebar contains a navigation menu with items like Dashboard, Roles, Organization, Nodal Officers, Program, Courses, Modules, Topics, Assignment, User, and Exams. The main content area has a title 'Create a new exam' and a table listing one exam entry. The table columns are: Id, Title, Questions, Users, Start Date, Status, and Actions. The entry has Id JCC-1, Title Java concepts check, Questions 2, Users 2, Start Date 2024-05-11 00:27:00.0, Status Started, and Actions (an edit icon). Below the table, it says 'Showing 1 to 1 of 1 entries'.

[5.1.10 exam view]

Created exam view: after creating exam the view of the exam will be like this.

The screenshot shows a web application interface for managing exams. On the left, a sidebar menu titled 'BISAG-N' lists various administrative functions: Dashboard, Roles, Organization, Nodal Officers, Program, Courses, Modules, Topics, Assignment, User, and Exams. The 'Exams' option is currently selected. The main content area is titled 'View Exam' and displays the following exam details:

Exam Code :	JCC-1
Exam Title :	Java concepts check
Exam Description :	You need to check the oops concepts most .
Date Of Exam :	2024-05-11 00:27:00.0
Exam Time :	3
Marks (Per Question) :	5
Negative Marks (Per Question) :	-1

Below the details, there is a section titled 'Manage Questions' with a button labeled 'Add Question'. A CSV file upload form is present, with a 'Choose file' button and a 'No file chosen' message. An 'Import Quiz' button is also visible. A sample question is shown:

1. What is oops? * *

- it is a object oriented programming
- it is b
- it is c
- it is d

Answer : it is a object oriented programming

2. what is your purpose? * *

- to learn
- to seek
- to remember
- to fight

Answer : to remember

(5.1.11 Question add)

Question add: Exam admin can add question manually or he/she can upload csv file of the question that automatically adds to the database

The screenshot shows a web application interface for managing users. On the left, a sidebar menu titled 'BISAG-N' lists various administrative functions: Dashboard, Roles, Organization, Nodal Officers, Program, Courses, Modules, Topics, Assignment, User, and Exams. The 'User' option is currently selected. The main content area is titled 'Manage Users' and displays the following user information:

Name	Email	Password	Actions
Vedant Patel	forampatel@gmail.com	Z8IMj1Rq	✉
Vedant Patel	dev@gmail.com	zijR7URg	✉

Below the table, there is a section titled 'Manage Users' with fields for 'Name' and 'Email', and buttons for 'Add User' and 'Mail Users'. A CSV file upload form is present, with a 'Choose file' button and a 'No file chosen' message. An 'Import Users' button is also visible.

[5.1.12 User add]

User add for the exam: Exam admin can add user for that particular exam and also the csv file of the user and mails the password of the exam.

General Instructions:

- Attempt all the question and also submit exam on time ,each question has 1 marks and 1 negative mark.
- Total duration of Java concepts check exam is 3 Minutes.
- Total number of Marks(per Question) = 5 Marks.
- Negative Marking of -1 Mark.
- The clock will be set at the server. The countdown timer in the top right corner of screen will display the remaining time available for you to complete the examination.
- The Questions Palette displayed on the left side of screen will show the status of each question.

To Answer a question, do the following:

- Click on the question number in the Question Palette at the left of your screen to go to that numbered question directly. Note that using this option does NOT save your answer to the current question.
- Click on Save & Next to save your answer for the current question and then go to the next question.
- Click on Reset Answer to reset your answer for the current question, and then go to the next question.

Answering a Question:

- Procedure for answering a question:
 - Question Answered will show Green colored.
 - Question Not Answered will show Red colored.
 - To deselect your chosen answer, click on the button of the **Reset Answer**.
 - To change your chosen answer, click on the button of another option.
 - To save your answer, you **MUST** click on the **Save & Next** button.
- To change your answer to a question that has already been answered, first select that question for answering and then follow the procedure for answering that type of question.

[Next](#)

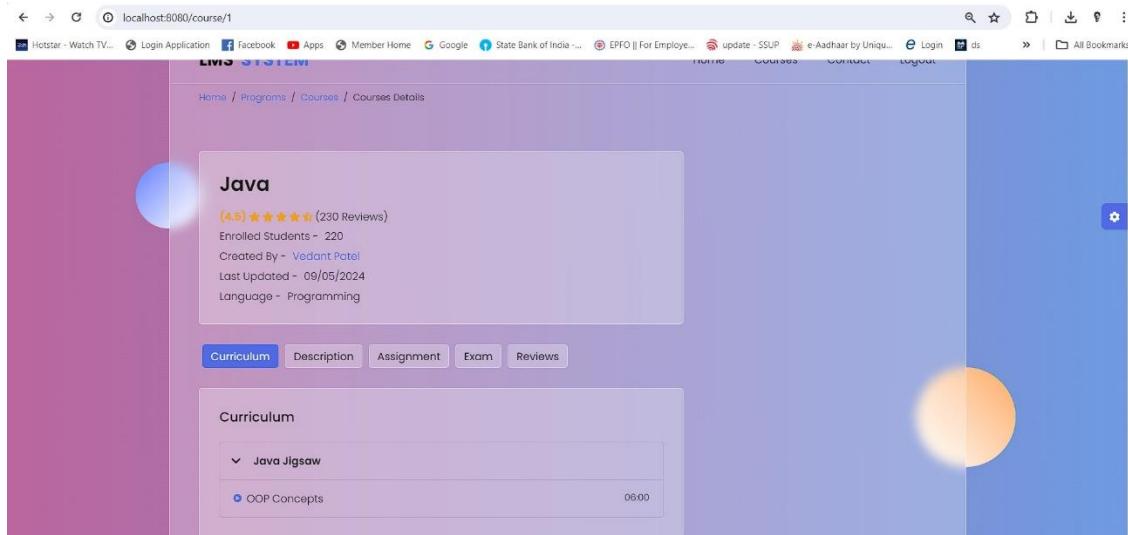
[5.1.13 Exam Starter Page]

Exam Starter page: The user can see the custom exam starter page of the created by the exam admin.

Name	Email	Present/Absent	Result	Score
Vedant Patel	forampatel@gmail.com	Present	Pass	5
Vedant Patel	dev@gmail.com	Absent	Fail	0

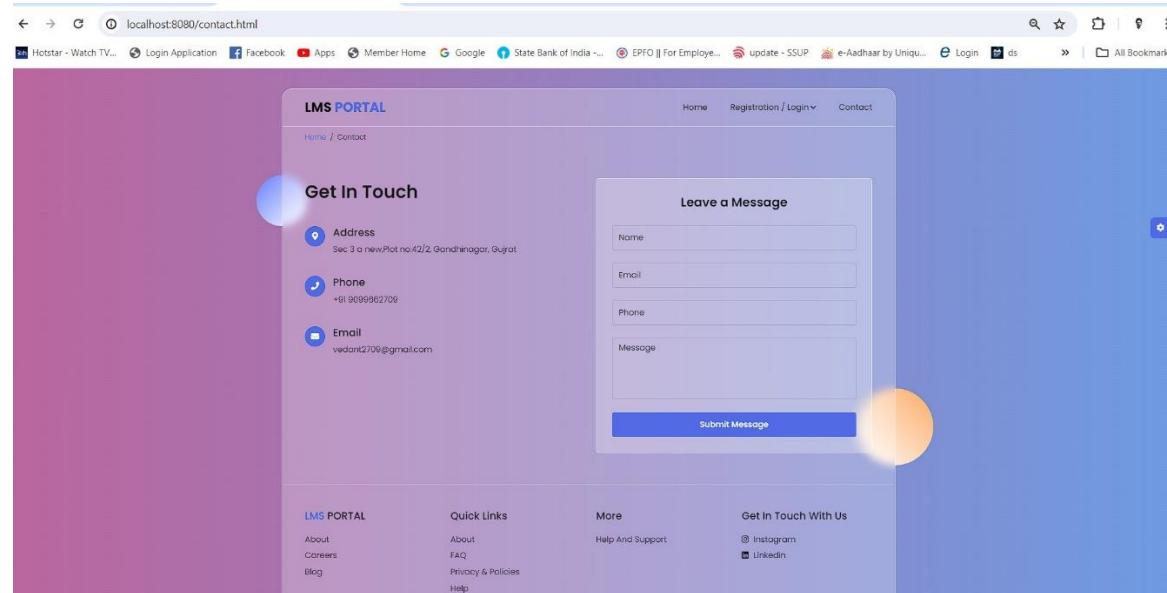
[5.1.14 Exam Result]

Exam Result: Exam admin can see that particular exam result that how many students give the exam, how many students had absent how many question attempted by the user?



[5.1.15 Topic content on that particular Course]

Topic content show: User can see the topic content of that particular module of the particular course of that particular program.



[5.1.16 Contact us]

Contact us: The user or the organization can send the message to the admin to contact the admin.

The screenshot shows a web application interface titled 'BISAG-N'. On the left is a dark sidebar menu with various administrative options like 'Dashboard', 'Roles', 'Organization', 'Nodal Officers', 'Program', 'Courses', 'Modules', 'Topics', 'Assignment', 'User', and 'Exams'. The main content area is titled 'Registered User' and contains a table with one row of data. The columns are labeled 'Select', 'Id.', 'Organization Id', 'Name', 'Email', 'Date of Birth', 'District', 'Aadhar Card No', 'ABC ID', and 'Action'. The data row shows: Id. 1, Organization Id 1, Name Rohit Peswani, Email rohitpeswani28@gmail.com, Date of Birth 2002-09-27, and Action (button).

[5.1.17 Enrolled user Show]

Registered User Show: Registered User shown in the admin side

The screenshot shows a 'View User' page. The left sidebar is identical to the previous one. The main content area is titled 'View User' and displays a grid of user details. The columns include Name, Email, Organization, Phone No., Date of Birth, Residential Address, Permanent Address, District, State, Pin Code, Aadhar Card No., and Enrollment No. The data for the user 'Rohit Peswani' is listed.

Name:	Rohit Peswani
Email:	rohitpeswani28@gmail.com
Organization:	Shree Swaminarayan Institute of Technology
Phone No.:	9099662709
Date of Birth:	2002-09-27
Residential Address:	Sec 3 a, Plot no 42/2, Gandhinagar, Gujarat
Permanent Address:	sec 17, Plot no : 21/2, gandhinagar, gujrat
District:	Gandhinagar
State:	Gujarat
Pin Code:	382006
Aadhar Card No.:	
Enrollment No.:	2323232323

[5.1.18 Enrolled User show in grid view]

Enrolled user view: Enrolled user shown in grid view and also show the data after user fill up the detail

6. Implementation Planning:

6.1 Implementation Environment:

In the implementation environment for a Learning management system, we utilize Spring Boot as the foundational framework for developing the application logic and backend functionality. Spring Boot offers a comprehensive set of tools and features for rapidly building web applications, enabling efficient development and deployment processes. With its dependency injection and auto-configuration capabilities, Spring Boot simplifies the setup and configuration of the Learning management system, enhancing development productivity and code maintainability.

Thyme leaf serves as the templating engine for generating dynamic web pages and user interfaces within the Learning management system. Its integration with Spring Boot facilitates seamless data binding and rendering, enabling the presentation of Learning profiles, project details, and performance evaluations in an intuitive and interactive manner. Thyme leaf's support for HTML5 and CSS3 enables the creation of modern and responsive user interfaces, ensuring a consistent and user-friendly experience across different devices and browsers.

MySQL is employed as the backend database management system, providing a reliable and scalable storage solution for storing crucial data related to Learning profiles, assignments, and program analytics. With its robust relational database capabilities, MySQL enables efficient data management, retrieval, and manipulation, supporting the core functionalities of the Learning management system. Integration with Spring Data JPA simplifies database operations and ensures seamless interaction between the application and the underlying database, enhancing overall system performance and reliability.

Together, the combination of Spring Boot, Thyme leaf, and MySQL forms a powerful and cohesive implementation environment for the Learning management system. Leveraging these technologies enables organizations to develop a scalable, efficient, and user-friendly system for managing Learnings' activities, fostering collaboration, and enhancing productivity within the organization

7. Testing:

7.1 Testing Strategies:

For the testing our application, a mixed approach of integration testing and regression testing is used.

Integration testing:

Integration testing ensures that individual components of the application function correctly when combined. It validates the interaction between different modules or functions to guarantee seamless operation of the entire system.

Regression testing:

Regression testing verifies that the addition of new components or changes to existing ones do not negatively impact the functionality of the entire system. It ensures that previously working features remain unaffected after modifications.

Manual testing:

Manual testing involves human testers executing tests without automated tools to identify and resolve bugs in the application. It allows for thorough examination of user interfaces, user experiences, and functionalities that may not be easily automated.

7.2 Testing Results Table

Organization Section:

Sr No.	Test Scenario	Expected Result	Actual Result	Status
1	Register Organization	New Organization should be created	Created Successfully	Success
2	Check CRUD on Organization list	Should update and delete Organization details	Working fine	Success
3	Check mail API on Organization Request Approved	Mail with respective password should be send	Sending Successfully	Success
4	Appoint Nodal Officer	Organization respective Nodal Officer	Appointed Successfully	Success

Nodal officer:

Sr. No	Test Scenario	Expected Result	Actual Result	Status
1	Register nodal officer	New nodal officer should be created	Created Successfully	Success
2	Create Program by the nodal officer	New Program has been created	Created Successfully	Success

Topic Section:

Sr No.	Test Scenario	Expected Result	Actual Result	Status
1	Register Topic by the topic creator	New Topic should be Registered	Created Successfully	Success
2	Video Uploaded successfully	Video should be shown	Video playing successfully	Success

Program Section:

Sr No.	Test Scenario	Expected Result	Actual Result	Status
1	Course Creation by the creator	Showing the Course details to the Nodal Officer so he can approve it.	Nodal Officer can see the course	Success
2	User enrolling the programme	User should see the particular programme related to the organization he/she enrolled	User can't see the related to the Programme	Fail
3	Crud operation related to the programme	Enrolled programme should be delete by the Nodal Officer	User can't see the programme related to the Programme	Success

Course Section:

Sr No.	Test Scenario	Expected Result	Actual Result	Status
1	Course Creation by the creator	Showing the Course details to the Nodal Officer so he can approve it.	Nodal Officer can see the course	Success
2	Enrolling the Course to the programme by the Nodal Officer	Nodal Officer should select/enroll the course to the particular programme.	Course admin can enroll the course	Success

3	User enrolling the Course of the programme	User should see the particular Courses related to the programme he/she enrolled	User can't see the Courses related to the Programme	Success
4	Crud operation related to the Course	Enrolled Course should be delete by the Course creator	User can't see the Courses deleted by the Course creator	Success

Module Section:

Sr No.	Test Scenario	Expected Result	Actual Result	Status
1	Register Module by the module creator	Nodal officer can see module	Created Successfully	Success
2	Showing module list with weightage and perform update	It should be update according to requirement	Working fine	Success
3	In module can select many topic	Topic are associated with respective module	Working fine	Success

User Section:

Sr No.	Test Scenario	Expected Result	Actual Result	Status
1	Register user by the creator	New user should be created	Can't create	fail
2	Register user can be seen	Sign-up user details can be seen on the admin side	Admin can see all the details filled by the user	Success

Assignment Section:

Sr No.	Test Scenario	Expected Result	Actual Result	Status
1	Register assignment by the assignment creator	New assignment should be Registered	Created Successfully	Success
2	Uploaded assignment will be seen on the user side	User can see the upload assignment in that particular topic	User can see the assignment	Success
3	Upload solution of the assignment	User can upload the solution of the assignment	User can upload the solution	Success

8. Limitation and Future Extension:

8.1 Limitations:

Performance Optimization: Enhancing the system's performance through optimization techniques such as database indexing, caching mechanisms, and load balancing to ensure optimal response times and scalability as the user base grows.

Advanced Reporting: Implementing advanced reporting functionalities, such as customizable dashboards, data visualization tools, and predictive analytics, to provide deeper insights into trainee performance, program effectiveness, and resource utilization.

Mobile Application: Developing a mobile application companion to the web-based system would enhance accessibility and allow trainee to access the system from anywhere, providing greater flexibility and convenience.

Slow email service: Slow email service can lead to delays in communication, hindering timely notifications and updates within the learning management system, potentially impacting productivity and responsiveness.

8.2 Future Extensions:

The current project effectively fulfils all primary requirements for learning management. Future extensions could include:

Assignment Management Enhancement: Develop advanced assignment management features to allow instructors to create, distribute, and grade assignments more efficiently. This includes features such as:

Automated assignment creation and distribution workflows.

Enhanced grading tools with customizable rubrics and feedback options.

Integration with plagiarism detection software to ensure academic integrity

Question Bank Integration: Integrate a centralized question bank system within the LMS to streamline quiz and assessment creation. Key features include:

Repository for storing and organizing a wide range of question types.

Tagging and categorization functionalities for easy search and retrieval.

Ability to create and share question templates among instructors.

Effective User Management Tools: Implement tools and features to enhance user management capabilities within the LMS, including:

- Role-based access control (RBAC) with granular permissions settings.
- User activity tracking and reporting for administrators.
- Single sign-on (SSO) integration for seamless user authentication across multiple systems.

9. Conclusion & Reference:

9.1 Conclusion:

In the dynamic landscape of modern education, the integration of multimedia elements such as videos, quizzes, and assignments within a Learning Management System (LMS) signifies a pivotal shift towards engaging and interactive learning experiences. Through the incorporation of video content, learners are afforded the opportunity to engage with rich, multimedia resources that cater to diverse learning styles and preferences. By harnessing the power of visual and auditory stimuli, videos within the LMS serve as an effective medium for delivering complex concepts, fostering deeper understanding, and enhancing retention rates among students.

Moreover, the inclusion of quizzes within the LMS facilitates formative assessment and knowledge reinforcement, allowing instructors to gauge student comprehension and progress in real-time. Quizzes serve as valuable tools for assessing learning outcomes, identifying areas of strength and improvement, and providing timely feedback to learners. With the flexibility to create various question types and customize assessment parameters, instructors can tailor quizzes to align with course objectives and learner needs, thereby promoting active participation and self-assessment within the learning environment.

Furthermore, the incorporation of assignments within the LMS empowers learners to apply theoretical knowledge to real-world scenarios, fostering critical thinking, problem-solving skills, and creativity. Assignments serve as opportunities for students to demonstrate mastery of course concepts, engage in project-based learning, and, assignments within the LMS encourage autonomy, accountability, and ownership of learning outcomes, ultimately fostering a culture of lifelong learning and academic excellence. Through the seamless integration of video content and assignments within the LMS, educational institutions and organizations are equipped with platform for delivering immersive, personalized, and impactful learning experiences that empower learners to succeed in an ever-evolving world.

9.2 References:

<https://spring.io/guides/gs/spring-boot> <https://spring.io/projects/spring-security>

<https://www.thymeleaf.org/documentation.html>

<https://docs.spring.io/spring-framework/reference/web/webmvc-view/mvc-document.html>

<https://getbootstrap.com/> <https://fontawesome.com/>

Bhaskaracharya National Institute for Space Applications and Geo-informatics



ISO 9001:2008

ISO 27001:2013

MeitY, Government of India

Phone: 079 - 23213081 Fax: 079 - 23213091

E-mail: info@bisag.gujarat.gov.in, website: <https://bisag-n.gov.in/>

Report Verification Procedure

Date:

Project Name: Full Stack Development For AI-Driven Open Web Learning Management in module “assignment & exam”

Student Name & ID: Vedant Patel (121)

Soft Copy Hard Copy

Report Format:

Project Index:

Sign by Training Coordinator Sign by Project Guide