MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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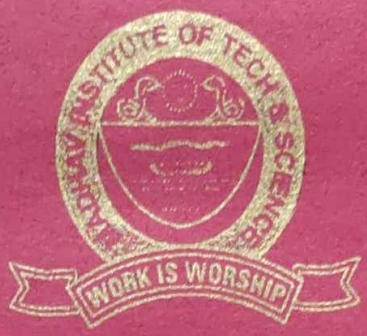

Project Report

on

Learning Management System

Submitted By:

Himanshu Singh Tomar

0901CA201021

Mentor:

Mr. Yashvant Singh, CEO, Perfectice Eduventure

Dr. R.S Jadon, Professor, MITS

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE

GWALIOR - 474005 (MP) est. 1957

MAY-JUNE 2022

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Project Report

on

Learning Management System

A project report submitted in partial fulfilment of the requirement for the degree of

MASTER OF COMPUTER APPLICATION

in

COMPUTER SCIENCE AND ENGINEERING

Submitted by:

Himanshu Singh Tomar

(0901CA201021)

Mentor:

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Submitted to:

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GWALIOR - 474005 (MP) est. 1957

MAY-JUNE 2022

myperfectice
www.myperfectice.com

28th May 2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Himanshu Singh Tomar** is doing his internship in **Quality Analyst** Role at Perfectice Eduventure Pvt. Ltd, from **February 01.02.2022 to 28.02.2022**.

He is working on a project titled **Learning Management System**. As a part of the project, he is working in QA Team as a **Tester** with us.

During his internship he is demonstrating his skills with self-motivation to learn new skills. His performance is exceeding our expectations.

We wish him all the best for his upcoming career!

Regards
Rakesh Kumar Sharma
COO, Co-founder

91 9850696969, 7586035806, +1 8478485798 hello@myperfectice.com | CIN: U74120UP2016PTC075832
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Registered Office: House No. 706, Tower No. 11, Plot No GH-05, Sector 110, Noida, UP 201301
Offices At - Atlanta, Chicago

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CERTIFICATE

This is certified that **Himanshu Singh Tomar** (0901CA201021) has submitted the project report titled **Learning Management System** under the mentorship of **Yashvant Singh**, in partial fulfilment of the requirement for the award of degree of Master of Computer Application of Computer Science and Engineering from Madhav Institute of Technology and Science, Gwalior.

Dr. R. S. Jadon
Faculty Coordinator
Professor
Computer Science and Engineering

Dr. Manish Dixit
Professor and Head
Computer Science and Engineering

Dr. Manish Dixit
Professor & HOD
Department of CSE
M.I.T.S. Gwalior

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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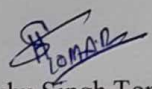
DECLARATION

I hereby declare that the work being presented in this project report, for the partial fulfilment of requirement for the award of the degree of Master of Computer Application in Computer Science and Engineering at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of **Yashvant Singh (CEO)**, **Perfectice Eduventure Pvt. Ltd.**

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.



Himanshu Singh Tomar

0901CA201021

2020 Batch,

Master of Computer Application,

Computer Science and Engineering

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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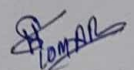
ACKNOWLEDGEMENT

The full semester project has proved to be pivotal to my career. I am thankful to my institute, **Madhav Institute of Technology and Science** to allow me to continue my disciplinary project. I extend my gratitude to the Director of the institute, **Dr. R. K. Pandit** and Dean Academics, **Dr. Manjaree Pandit** for this.

I would sincerely like to thank my department, **Department of Computer Science and Engineering, for allowing** me to explore this project. I humbly thank **Dr. Manish Dixit**, Professor and Head, Department of Computer Science and Engineering, for his continued support during the course of this engagement, which eased the process and formalities involved.

I would like to express my sincere gratitude to **Yashvant Singh** at The Perfectice Eduventure Pvt. Ltd. Their guidance has been a significant motivation for me to learn new skills and excel at work. The regular meetings and interactions have improved my technical skills to more than a level of self-satisfaction. I am glad that I have received such an opportunity to collaborateand enhance my inter and intrapersonal skills.

I am sincerely thankful to my faculty coordinator. I am grateful to the guidance of **Dr. R. S. Jadon**, Professor, Computer Science and Engineering, for his continued support and guidance throughout the project. I am also very thankful to the faculty and staff of the department.



Himanshu Singh Tomar

0901CA201021

2020 Batch,

Master of Computer Application,

Computer Science and Engineering

ABSTRACT

This document specifies the details of the project I am working on. The name of the project is "Learning Management", and we are making it for the instance known as Codemode.

The project is completely related to how a company manages its products. The products must reach the customers via several routes. One of them is through sales executives. The chain involves publishing the course by adding assessment, quizzes and notes at different instances for different countries and allocating them to the teachers and students. There are several internal processes that take place to maintain the whole system efficiently.

Some of the operations include creating assessment and quizzes, adding and deleting them from the course, allocating or deallocating course to and from the sales executives, and creating purchase orders that aremade by different types of students and teachers and some industry professional who wants to develop some new skills for the betterment of their professional life. People purchase these courses from our site, generating invoices, accepting order,etc. Before all these tasks were handled manually or with the help of Google docs which was a very hecticand lengthy process, to make this repetitive task simple we developed multiple microservices. This document breaks down every functionality we have developed till the date of submission of this reportand clearly explains it.

TABLE OF CONTENT

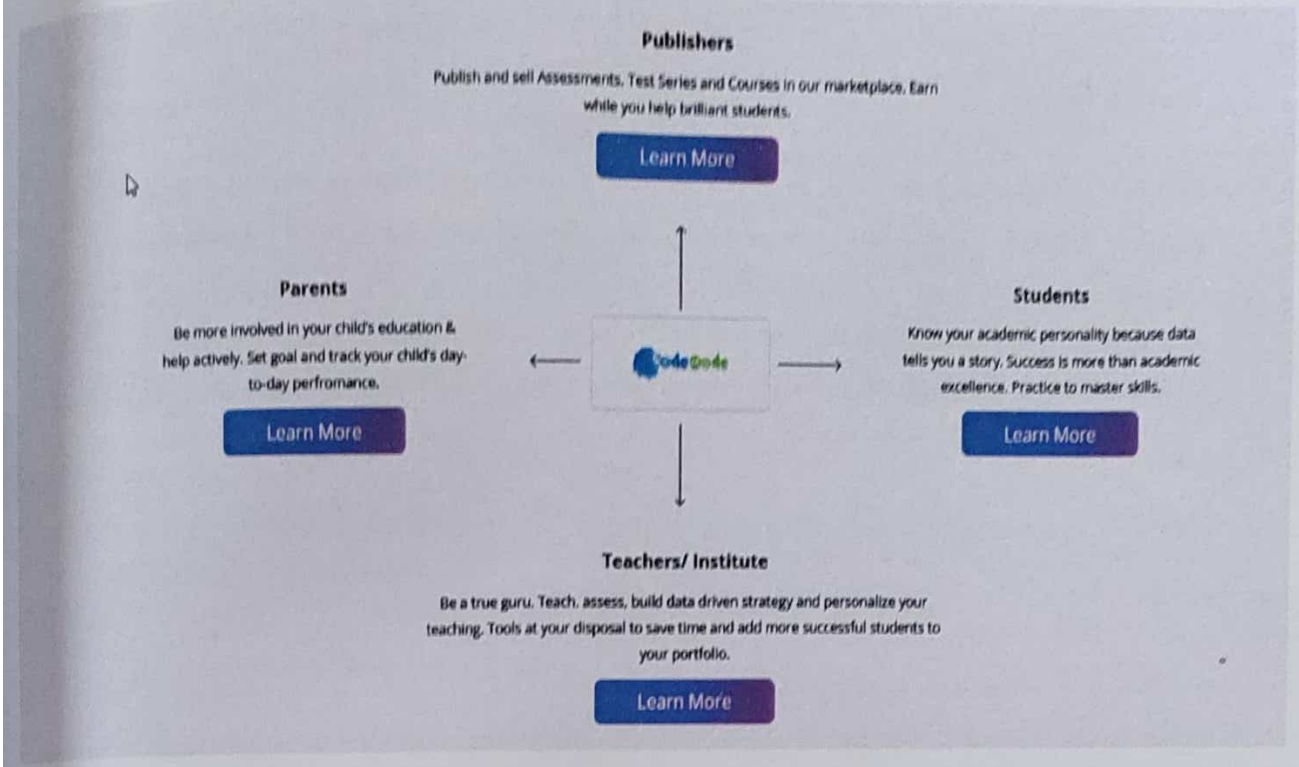
CHAPTER 1. INTRODUCTION

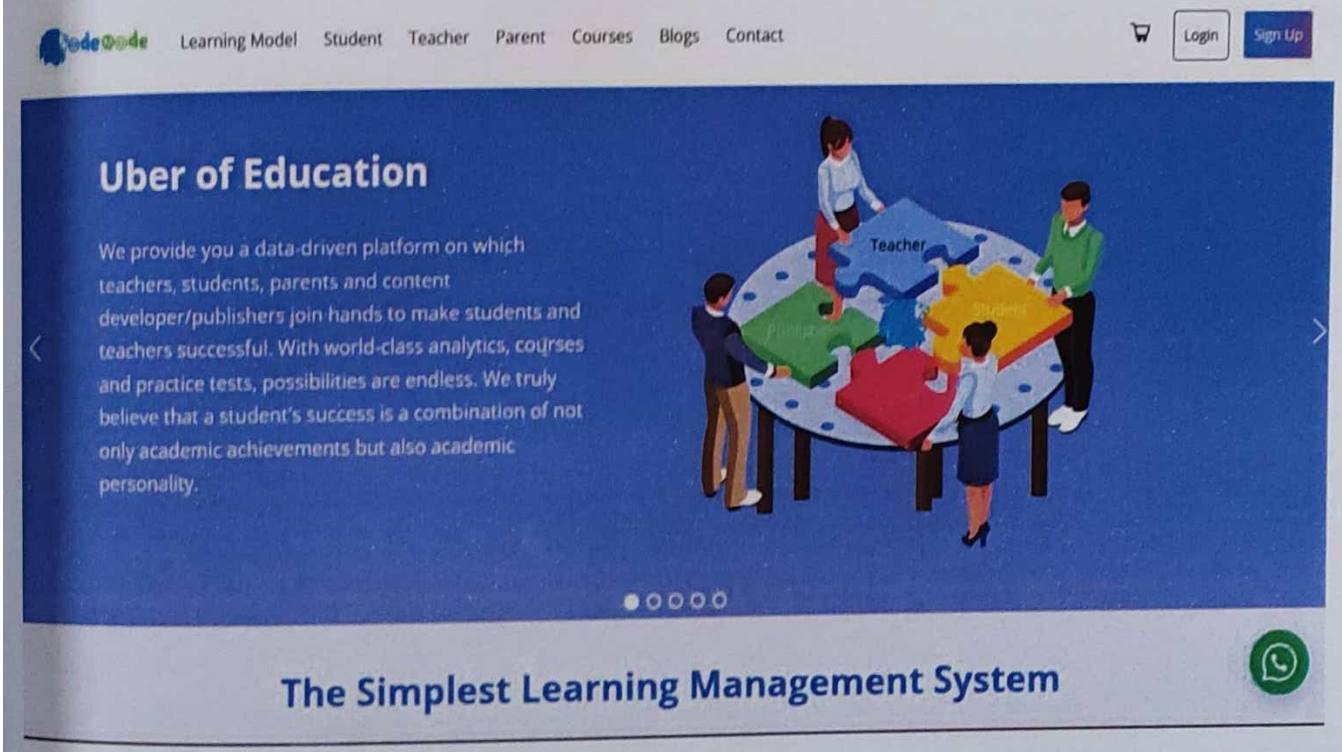
This project is a complete web-based application, and the main aim of the project is to develop a model in which all the information regarding course and the buyers in the organization will be presented.

1.1 About Company

For any company to sustain itself, the relationship and engagement with its customers play a vital role. One of the significant tasks in accomplishing so is satisfying the **customer's** demand within a possible short time and with greater efficiency. **Perfectice Eduventure** Pvt. Ltd, Perfectice is an educational technology startup with a small but strong team of visionaries who want to change how students take exams - one student at a time. Perfectice makes students self-aware by crunching data and generating useful insights. With a heavy focus on student and data analytics, we strive to become a student-oriented, data-driven marketplace in a test or an assessment. The lifeblood of Perfectice is our people. As a tight-knit team of educators, parents, and technologists, we're devoted to a culture that cultivates and works. Our associates are from all over the world. Whoever said that people get along best with similar people didn't get the business value to be gained from ethnic and geographic diversity. A diverse team can bring together individuals with different backgrounds, different approaches, and different ways of thinking. We are always open to talking to someone bright who brings fresh ideas to the table, small or big.

Our flagship and state-of-the-art product is built for engineering institutes. Our experience with engineering students has continuously evolved and the same is reflected in the platform as well as content (tests, eLearning, analytics).


Publishers
Publish and sell Assessments, Test Series and Courses in our marketplace. Earn while you help brilliant students.
Learn More
Parents
Be more involved in your child's education & help actively. Set goal and track your child's day-to-day perfromance.
Learn More
Students
Know your academic personality because data tells you a story. Success is more than academic excellence. Practice to master skills.
Learn More
Teachers/ Institute
Be a true guru. Teach, assess, build data driven strategy and personalize your teaching. Tools at your disposal to save time and add more successful students to your portfolio.
Learn More


Learning Model
Student
Teacher
Parent
Courses
Blogs
Contact
Login
Sign Up
Uber of Education
We provide you a data-driven platform on which teachers, students, parents and content developer/publishers join hands to make students and teachers successful. With world-class analytics, courses and practice tests, possibilities are endless. We truly believe that a student's success is a combination of not only academic achievements but also academic personality.
Teacher
The Simplest Learning Management System

1.2 Problem Identification & Objective

1.2.1 Identification

Some companies deliver different kinds of products and provide services to their customers. They must keep track of all the internal working of the course movements. This chain includes other processes like creating and publishing course and assessments at instance, allocating course to the respective teacher, importing questions from the question bank or directly create a question, generating test, etc. Manual systems are quite tedious, time consuming, less efficient, and accurate in comparison to the modern computerized system. So, following are some disadvantages of the old system:

- Slow data processing
- Lots of paperwork.
- Time consuming
- Less accurate & efficient

This system will provide a good service to the students and teachers like better doubt asking process, easymaintainability that brings bigger profit.

1.2.2 Objective

- **General Objective**

  The main objective of this project is to improve the manual system of checking and keeping track of every single student. The new proposed system can fix the problem in managing records for easier monitoring in how one student relates to another as well as keeping track of every single transaction done by every single student in the whole instance.

- **Specific Objective**
  - To develop a microservice that tracks every single transaction.
  - To accurately record, compute and produce reports of test and course done by student.
  - To develop a system that enables moving courses from one instance to multiple as wellas assigning courses to teachers.
  - To develop an application that deals with the day-to-day requirement of any teacher or student.

- **Functional Objective**
  - **High Priority**

    Note: Any reference to deductions or additions to the course sections to the use of the database.

    - The system should be robust and able to handle any type of exceptions and send specific error/ response messages to the admin.
    - The microservice shall process the addition or update of the course with the details in the payload. It should be able to fetch the course details based on the student id, teacher, subject, or name.
    - The microservice shall add or update the course to the database with the details in the payload. It should be able to fetch the course details basedon different variables such as assessment, course id, student id.
    - The teacher should be able to move course from Draft to Published. The microservice shall deduct the course from the instance based on the orders received from teacher.
    - There is a feature where the teacher can add the assessment and quiz to the course from an excel file. The format of the file to be uploaded is specified in the UI and canonly be added if the received data is not in the given format.
    - The system shall allow the teacher to add or update the course details with the details provided in the request payload. It should also be able to get the assessment details based on the course id.
    - The microservice shall fetch all the details based on multiple parameterssuch as create date, course id, published date, and created by, and filter the response to a certain limit, start date, or end date.
    - The student can give the assessment for their selected subjects and can enroll in the respective course of their choice
    - The system should be able to approve and accept new teacher after passing through certain validations. Their is a feature where admin can add or delete the account of a certain teacher if he/she is not verified.
    - The student should be able to create invoice details for the required buy mode course.

- The system shall reflect new or updated changes within x seconds to the database. This will reduce the number of incorrect records displayed by x%.
- The system shall return orders based on the user's request.
- The system shall validate all the data concerning the design and sends a response to the client in case of any error.

- **Medium Priority**
  - The system shall send the saved data in the response body.
  - The system shall always send a specific error message to the user.

- **Low Priority**
  - Validate every request for the student id and teachers details in one go rather than validating in each method or steps, this increases code readability.

- **Non-Functional Objective**
  - **Reliability**
    - The system shall work at least x% of the time.
    - Downtime of a system shall not exceed x hours.
  - **Usability**
    - The teacher and admin can see the daily report of the student.
    - The Parents and mentors can see the progress and efforts done by student on every course and test.
  - **Performance**
    - The system should be able to support x simultaneous users.
    - The mean time to view the webpage (User Interface of the system) over an x kbps connection shall not exceed y seconds.
  - **Security**
    - The system offers password-protected access to the web pages that are to be viewed only by a set of users.
    - The non-disclosable information from the backend will be hidden from the user.
  - **Compatibility**
    - The system should be able to accommodate new functionalities and features without major engineering on the back end.
    - The system shall be viewed from —- SYSTEM REQUIREMENTS.

1.3 Project Scope

This system that we are developing isn't limited to a single user, it can be used by every student and teacher who deals with learning management operations. The scope of this system is to provide a user efficient learning environment and more output can be generated through this. This system provides a user-friendly interface resulting in knowing each and every usability features of thesystem. It helps in tracking records so that past records can be verified through them, and one can make decisions based on the past records, and thus this completes the work in a very lesstime resulting in less time consumption and high level of efficiency.

This system is developed in such a way that even a naïve user can also operate it easily. Also, this system provides a high level of security for data leaking as only limited people can access the database and no change can be made in it until it verifies the user by login-id and password.

1.4 Hardware & Software Specification

1.4.1 Software requirements

a. Java 8 (Language)
b. Spring boot (Framework)
c. IntelliJ (IDE)
d. Linux (Deployment server)
e. MySQL (Database)
f. Apache Subversion (SVN) (Version Control System)
g. Postman (Testing)
h. Microsoft Excel (For keeping record of test cases & working)
i. Microsoft Word (Reports)
j. Notepad++ (Scripting)

1.4.2 Hardware requirements

a. Developed on an intel CORE i7 computer with 16 GB RAM x64 architecture
b. Server details are non-disclosable.
c. Users only need a modern web browser.

1.5 Methodology

We have followed the agile methodology of software development to make sure every requirement is met. We had continuous development, meetings, and discussions.

A bigger project is divided into smaller chunks of functionalities, and they are periodically allocated to us. We are guided to complete them in a continuous flow, test them, and deploy them eventually. The non-functional objectives are considered in every phase of the cycle as they are never described but expected.

- **Phase I: Requirements**

  This is the phase where we get the requirements from the students and teachers. Since we do not directly interact with the client, our superiors will be discussing the requirements with us. We have weekly meetings to interact with our mentor and exchange details like progress and new requirements for the project. We note down the necessary information with clear understanding and proceed further to plan the work.

- **Phase II: Planning**

  This is the phase where we discuss the scope of the problem and allocate the resources, time, and work among us. When we are allocated the functionalities to add to the service, we divide them between the teams and complete the work in the given time.

- **Phase III: Design**

  In this phase, we make both low-level and high-level designs. The former discusses the detailed flow of every feature in the project and the later describes the future architecture of the project. We even create the data models for the database and design key components such as structure, processing, and evaluation to meet the stated goal.

- **Phase IV: Development**

  This is the phase where the requirements are transformed into a tangible solution. We code and develop the service based on the requirements. We develop the microservice and show a demo of the work to our mentor so that he can evaluate and suggest changes if any.

- **Phase V: Testing and Deployment**

  In this phase, we test the software (microservice in our case) for any bugs or malfunctions. The test cases are written and tested if all the validations are passed. We performed the tests both locally and on the live service. We solved the bugs and made the application robust. Once the service is thoroughly tested, the same is deployed to the company's servers for further processing like linking them to the User Interface, etc.

- **Phase VI: Maintenance**

  Once the service or application is deployed, it is crucial to maintain and update the service on a timely basis to accommodate any future requirements. We have been enhancing the code with different possibilities to increase the performance of the service.

CHAPTER 2. SYSTEM ANALYSIS

2.1 Problem Analysis

We started research by identifying the need for an online Learning management system in the organization. Initially we bounded our research to find the general reasons that emerged the needs of Learning Management System. We used various techniques to collect the data that can clearly give us the overall image of the internal working. However, it wasn't just us as a team, our mentor who interacted with the organization had an opportunity to visit their organization and see how they initially handled the management. After visiting their online system, use of excel and so forth. Basically, the following factors forced them to have an online web system developed for their needs.

- ✓ Cost and affordability
- ✓ Lack of learning Management
- ✓ Effective flow of course transfer and management
- ✓ Difficulty in monitoring the students.
- ✓ No effective way to handle student problem and doubts.

2.2 Feasibility Study

This software has been tested for various feasibility criterions from various points of view.

- **Economic Feasibility**

  This system is estimated to be economically affordable. This system is a high scale web application and has low-cost maintenance. The benefits include increased efficiency, effectiveness, and better performance and is less prone to human errors. Comparing the cost and benefits the system is found to be economically feasible.

- **Technical Feasibility**

  The system that will develop needs users to have knowledge in using a web browser, fortunately, most of the students and teachers are familiar with the internet and have used modern browser, and thus it meets our requirement of having "A modern browser."

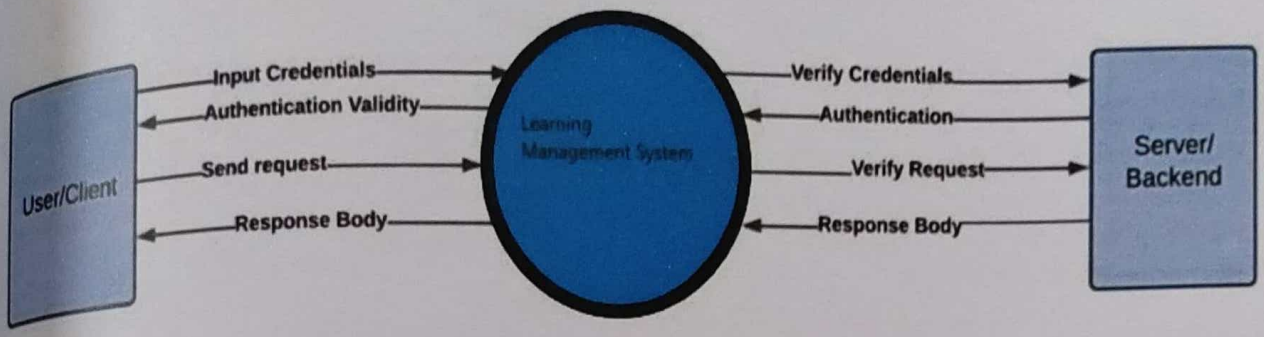
- **Social & Operation Feasibility**

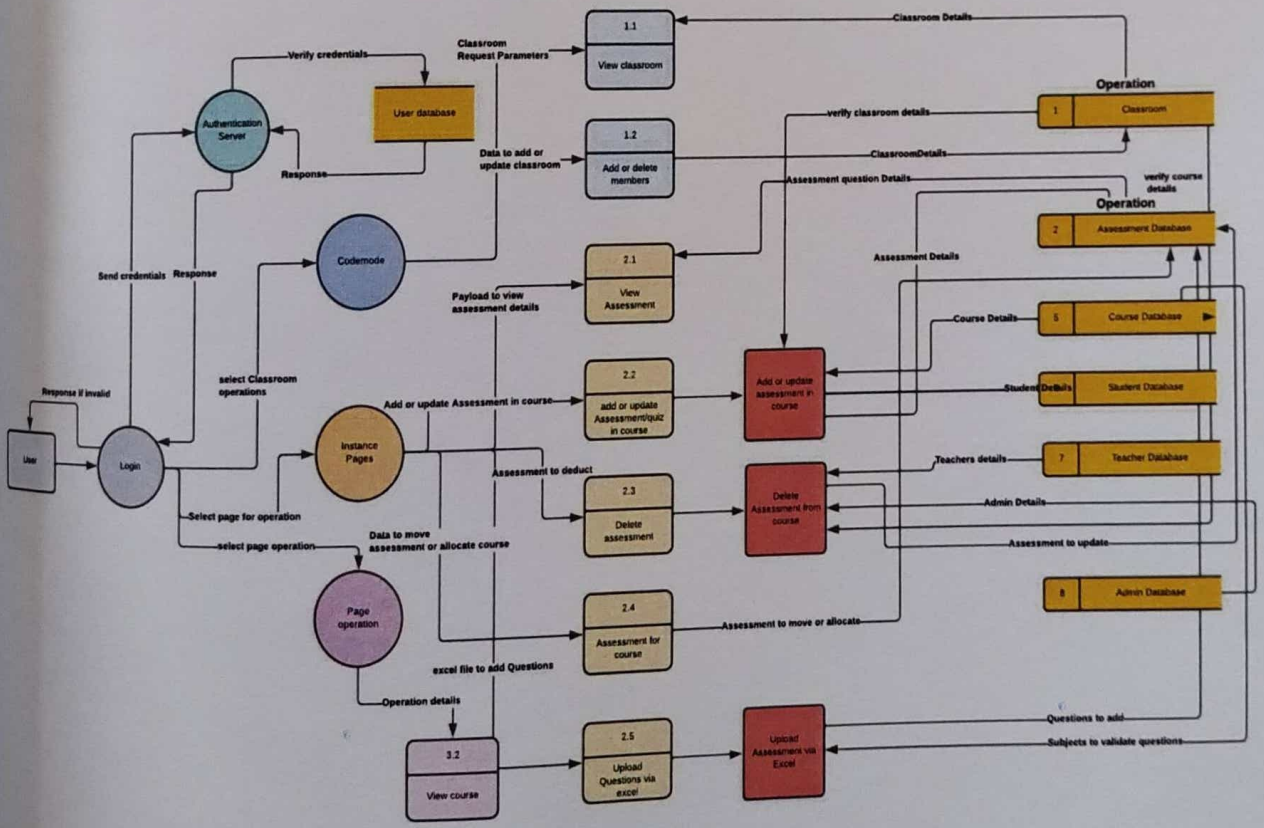
  The system that will be developed will solve the problem that the company encounters. The necessary solution is applied so that the user will be more at ease in their day-to-day operations. The demanding tasks that are efficient time consuming are minimized and lessened by applying an efficient method with the use of the system. Security and measure are applied in the system.

- **Schedule Feasibility**

  The organized schedule for the development of the system is presented in the schedule sub-section and we're using SDLC to develop the said system. The reasonable timeline reveals that the system development can be finished on the desired time framework.

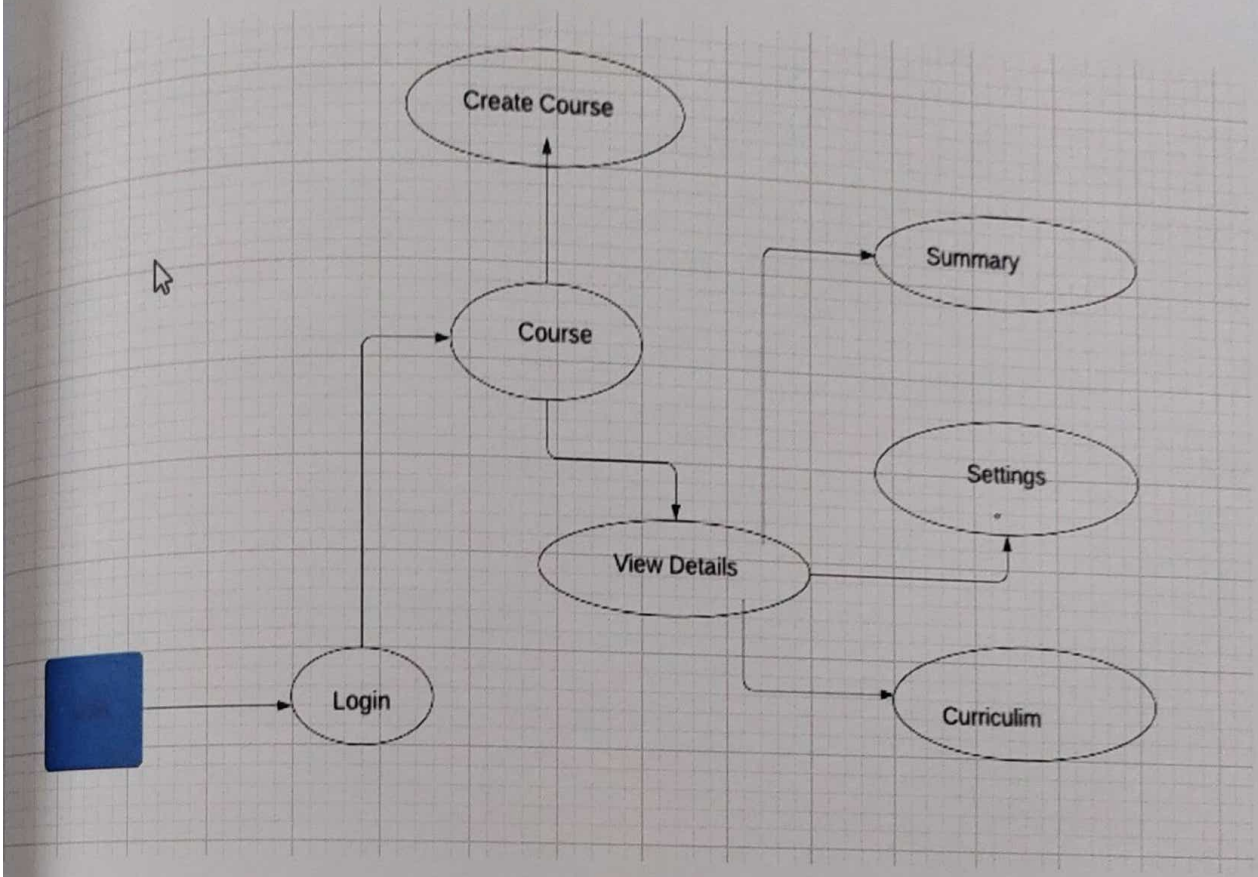
2.3 Data Flow Diagram



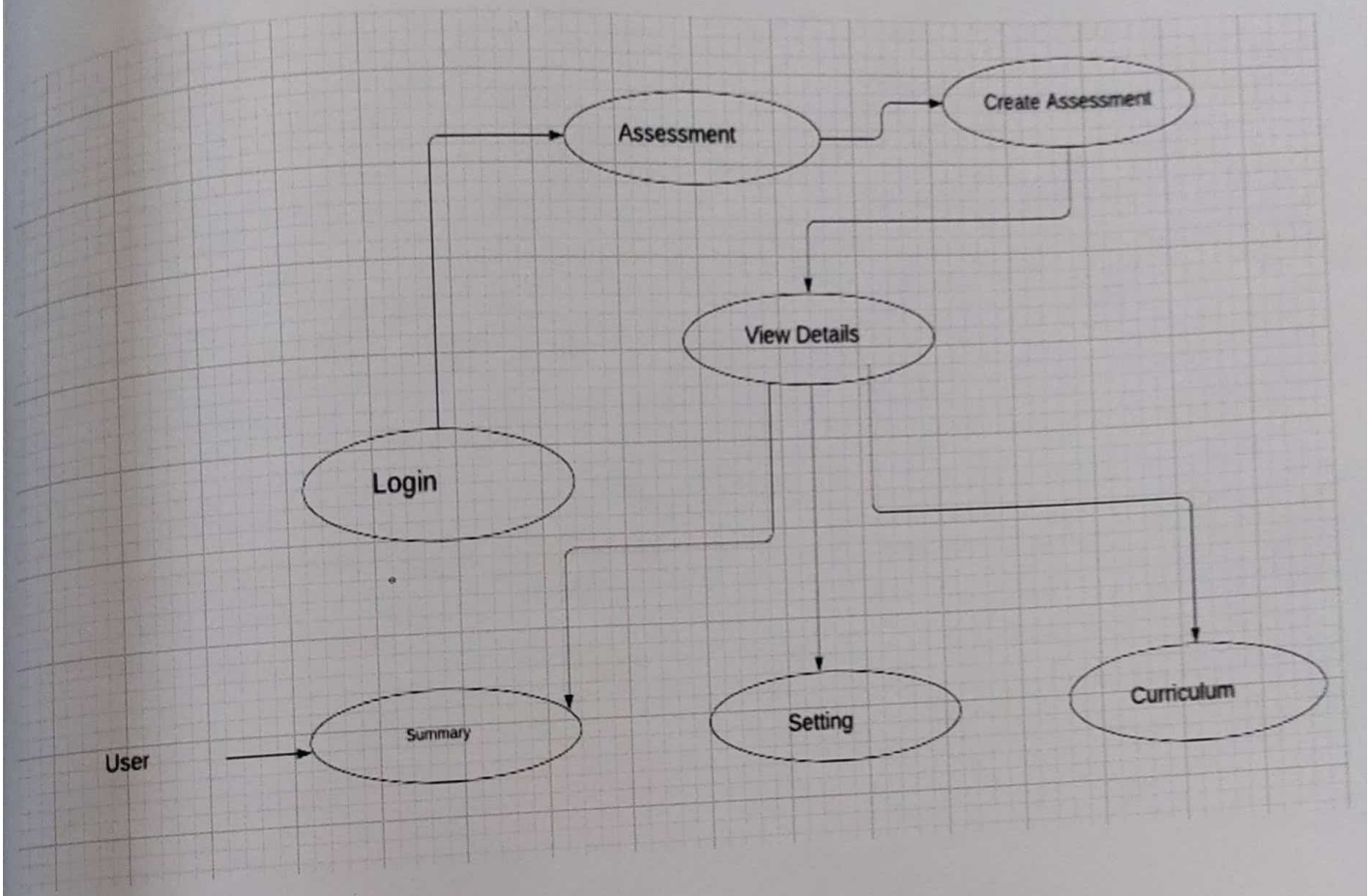


2.4 Use Case Model/Diagrams

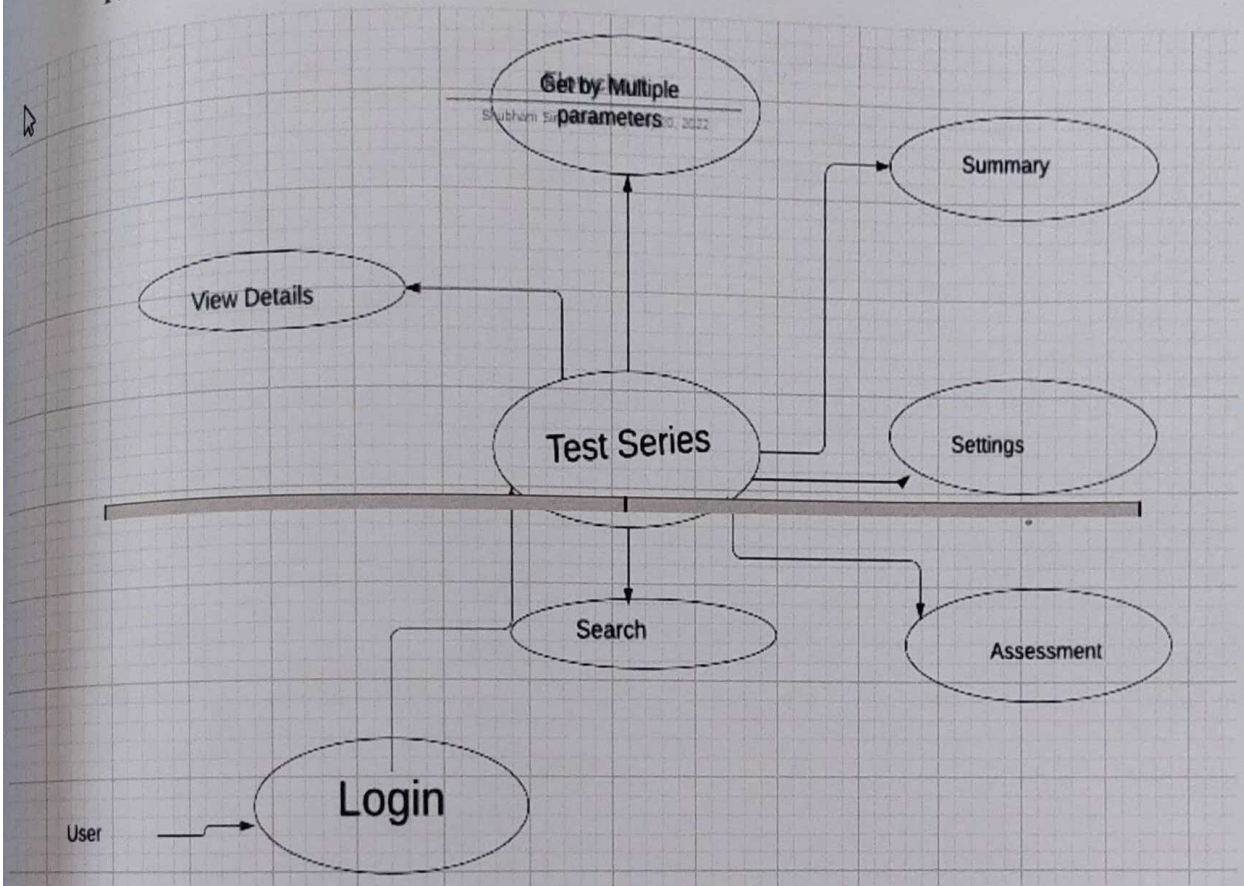
Course-



- **Assessment**


Assessment
Create Assessment
View Details
Login
Summary
Setting
Curriculum
User

Test Series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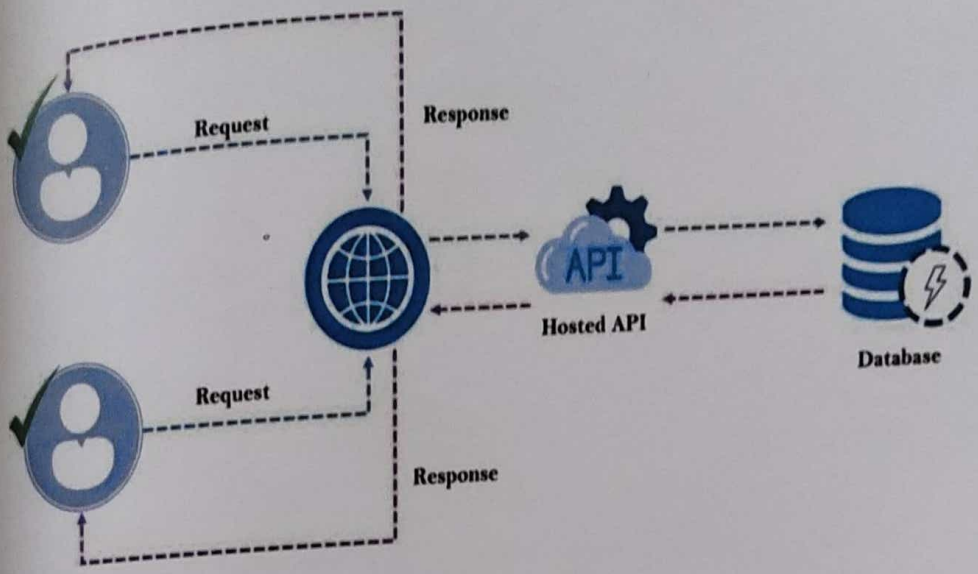
Settings
Search
Assessment
Login
User

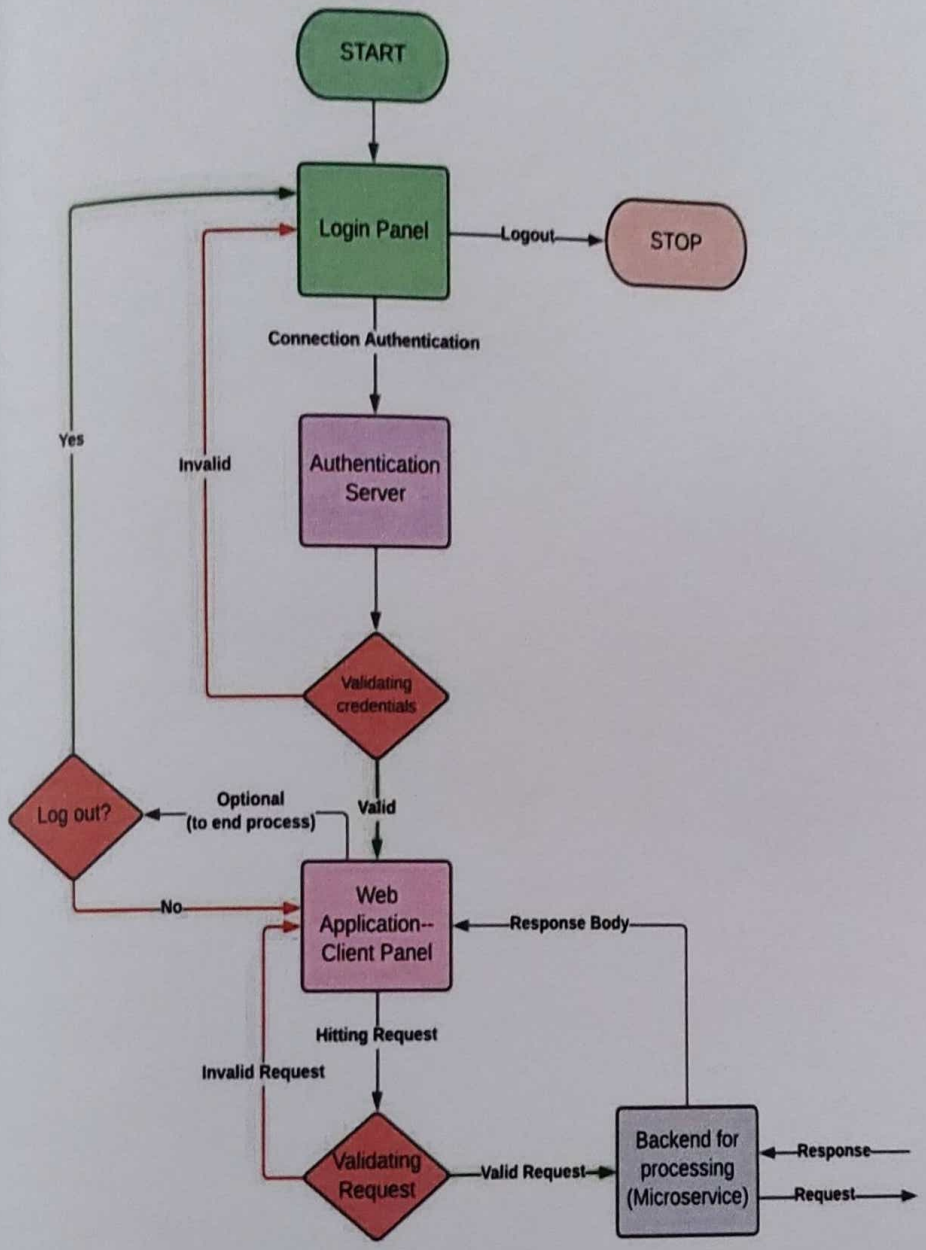
CHAPTER 3. SYSTEM DESIGN

3.1 System Architecture

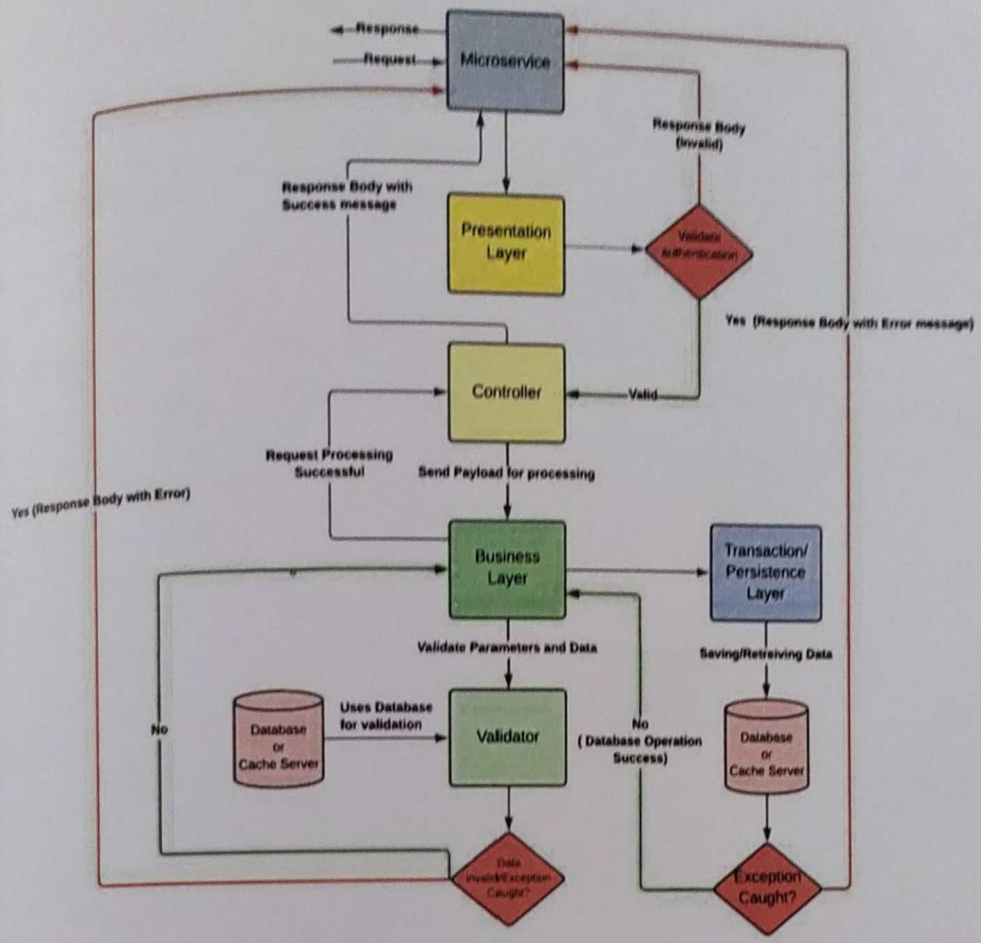


3.2 System Flow Chart

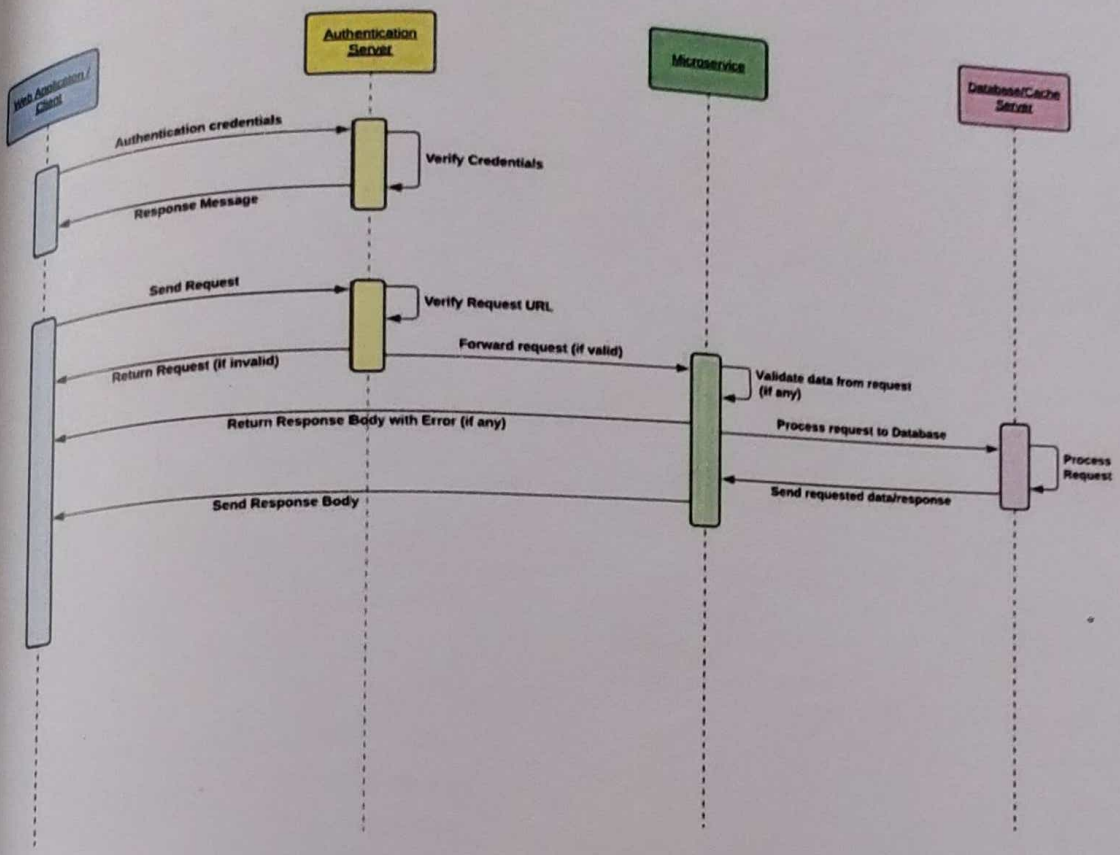
- User Interface



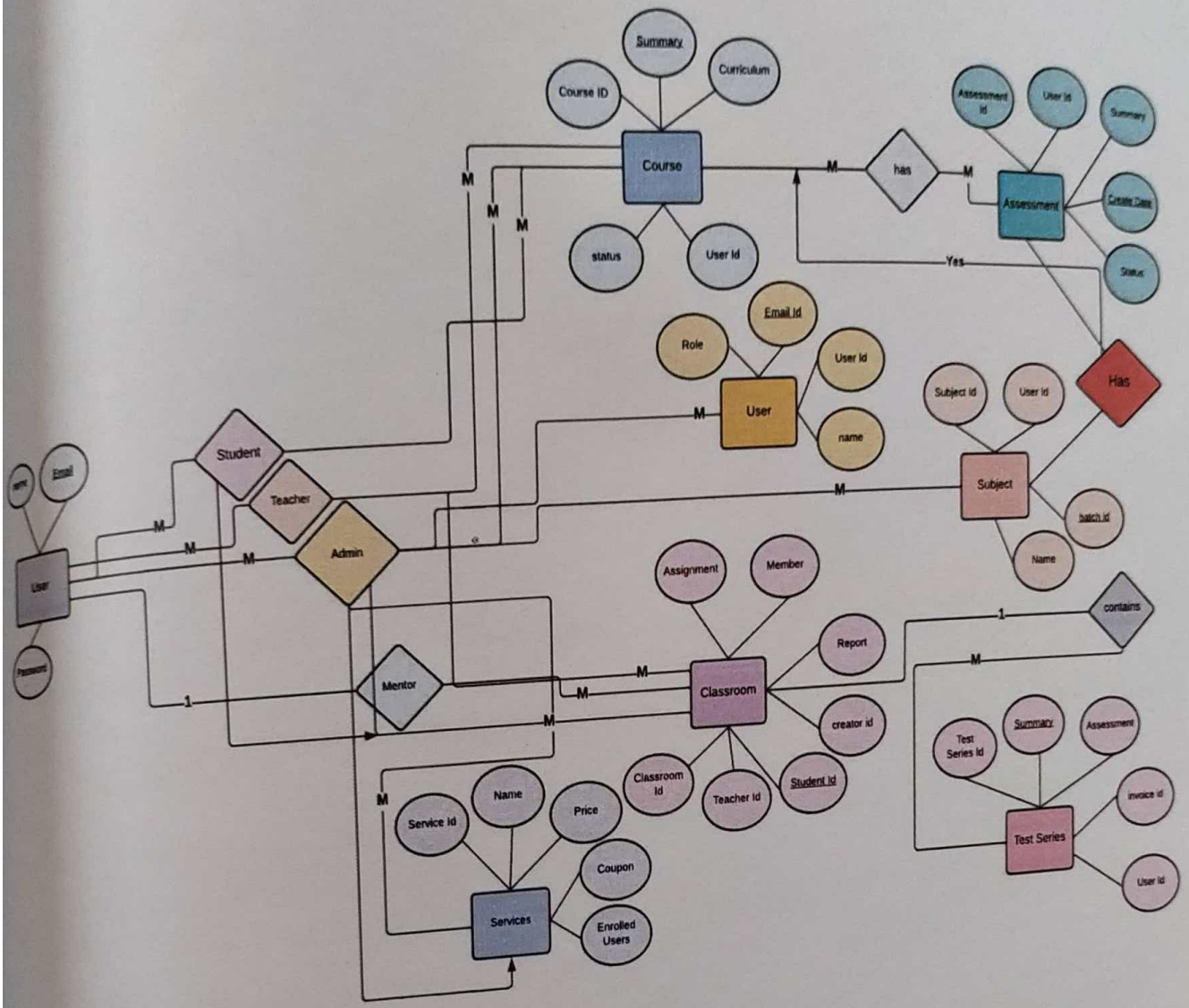
- **Backend**


Response
Request
Microservice
Response Body (Invalid)
Response Body with Success message
Presentation Layer
Validate Authentication
Yes (Response Body with Error message)
Controller
Valid
Request Processing Successful
Send Payload for processing
Yes (Response Body with Error)
Business Layer
Transaction/ Persistence Layer
Validate Parameters and Data
Saving/Retreiving Data
No
Database or Cache Server
Uses Database for validation
Validator
No (Database Operation Success)
Database or Cache Server
Data Invalid/Exception Caught?
Exception Caught?

- **Sequence Diagram**



3.3 E.R Diagram



CHAPTER.4 CODING & TESTING

4.1 Coding

- **Classroom**

```
<!doctype html>
<html lang="en">

<head>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <title>CodeMode</title>
  <base href="/">
  <link rel="icon" type="image/x-icon" href="./assets/images/ico.ico" id="appIcon">
  <link
href="https://fonts.googleapis.com/css2?family=Karla:ital,wght@0,400;0,700;1,400;1,700&dis
play=swap"
    rel="stylesheet">
  <link
href="https://fonts.googleapis.com/css2?family=Open+Sans:wght@300;400;600;700&display=swap
" rel="stylesheet">
  <link
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rel="stylesheet">
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ic"
    rel="stylesheet" />
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type="font/woff">

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    integrity="sha384-lZN37f5QGtY3VHgisS14W3ExzMWZxybE1SJSEsQp9S+oqd12jhcu+A56Ebc1zFSJ"
crossorigin="anonymous">

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    crossorigin="anonymous"></script>
  <script type="text/javascript" src="https://d15aq2mos7k6ox.cloudfront.net/lib/sticky-
kit.min.js" defer></script>
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player.js"></script>
  <script src="https://checkout.razorpay.com/v1/checkout.js"></script>
  <script src="./assets/lib/custom.js"></script>
  <script src="./constant.js"></script>

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<body>
  <div id="wrapper">
    <app-root></app-root>
```

```
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untime-es5.cf10a666539da94fc675.js" nomodule defer></script><script src="polyfills-
9201cdd9473ff8bc13f.js" nomodule defer></script><script src="polyfills-
5.92efefcd3b39266091c3.js" type="module"></script><script
scripts.8b99d681efa13326797f.js" defer></script><script src="main-
5.bbb7f116393d6003d732.js" type="module"></script><script src="main-
bb7f116393d6003d732.js" nomodule defer></script></body>
```

rm (Employee Key updation and frontend validation) ~ JS Code

```
function updateEmpRegKey(regIdArry, islogout) {

    setCookie("chrome_browser_chk", "0", 1);
    setCookie("chrome_browser_notifi", "0", 1);

    updateFCMEmpRegKey(regIdArry, islogout);

}
function updateFCMEmpRegKey(regIdArry, islogout) {
    $.ajax({
        url:  "/user/update-fcm-registration-key",type:
        "post",
        data: "key=" + regIdArry,
        success: function(msg) {
            console.log(msg);
            if (islogout) {
                if (typeof beforeLogOut == 'function') {
                    beforeLogOut();
                }
                window.location = '/wllogin/employee-
logout.html';
            }
        }
    });
}
$('#logout').on('click', function() {
    updateEmpRegKey('', true);
});
```

4.2 Testing

Testing is vital for the success of any software; no system design is ever perfect. We carried testing in two phases. First phase is during the development of modules, and the second is after completion of the software.

- **White Box Testing**

  This approach allows testers to inspect and verify the inner workings of a software system — its code, infrastructure, and integration with external systems. We created multiple tests for POSTMAN to test our APIs.

  - Check course for add or update

```
var courseReq = pm.environment.get("req-bodies-addUpdate-
course");
var courseRes = pm.environment.get("res-body-addUpdate-
course");

if (courseReq != null && courseReq.length > 0){
    postman.setNextRequest("Add or update course");
} else {
    postman.setNextRequest(null);
}

const postRequest = {
  "url": `localhost:8070/APIURL/ADDUPDATE`,
  "method": "POST",
  header: {
    'Content-Type': 'application/json'
  },
  "body": {
    mode: 'raw',
    raw: pm.environment.get("req-body-addUpdate-course"),
        },
    };

pm.test("Validate course response", function () {
     var body = JSON.parse(responseBody);
     console.log(body);
//     pm.sendRequest(postRequest, (error, response) => {
//console.log(error ? error : response.json());
  pm.response.to.have.status(200);
  pm.expect(body).to.deep.include(courseRes);
});
```

- Check Assessment for courseId

```
pm.test("Verify get batch by course-id", function () {
    //response body from the test json file
    var responseTest =
JSON.parse(JSON.stringify(pm.iterationData.get("batch-
response")));

    //response body from the API
    var response = JSON.parse(responseBody);

    if (response != null && response.length > 0) {
        for (var i = 0; i < response.length; i++) {
            console.log(i);

pm.expect(response[i].batch.courseId).to.eql(responseTest.courseI
d);
        }
    } else {
        console.log("Empty body found");
       // pm.expect(response).deep.include(responseTest);
    }
})
```

- **Black Box Testing**

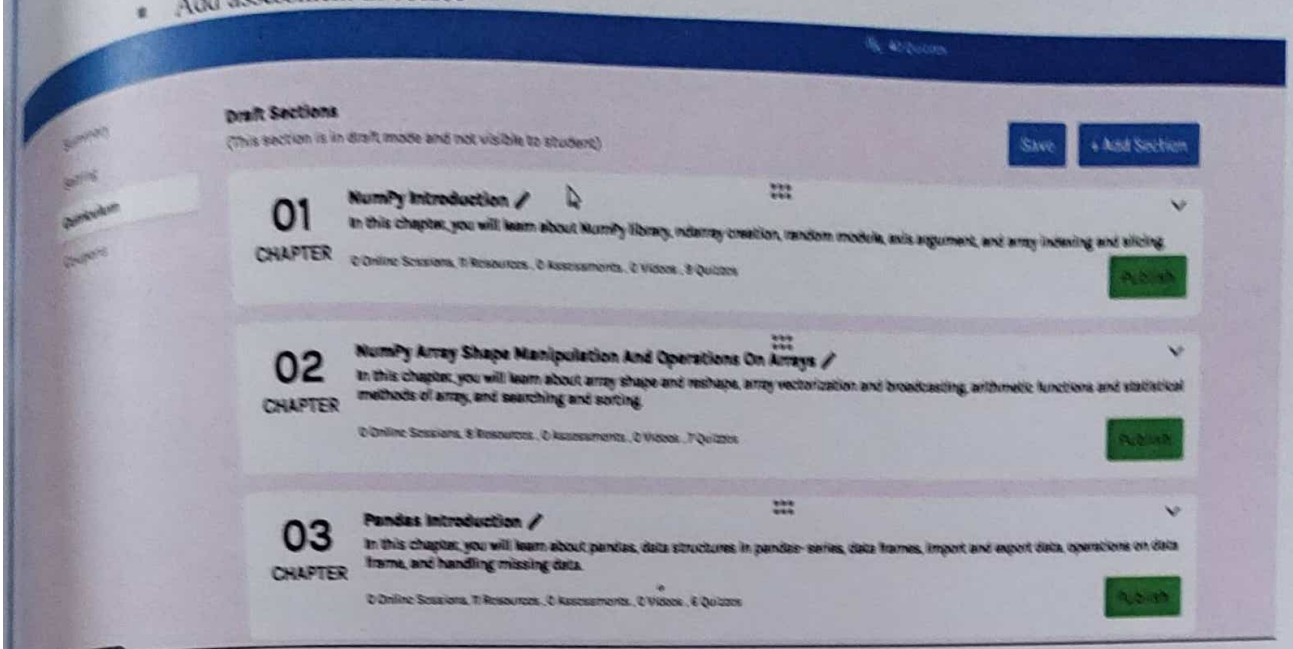
For Blackbox testing which involves testing an application from the user's perspective without any knowledge of its implementation: We ended up assigning an employee from the organization to input sample data and check if the result is as expected.

Steps followed for Blackbox testing: -

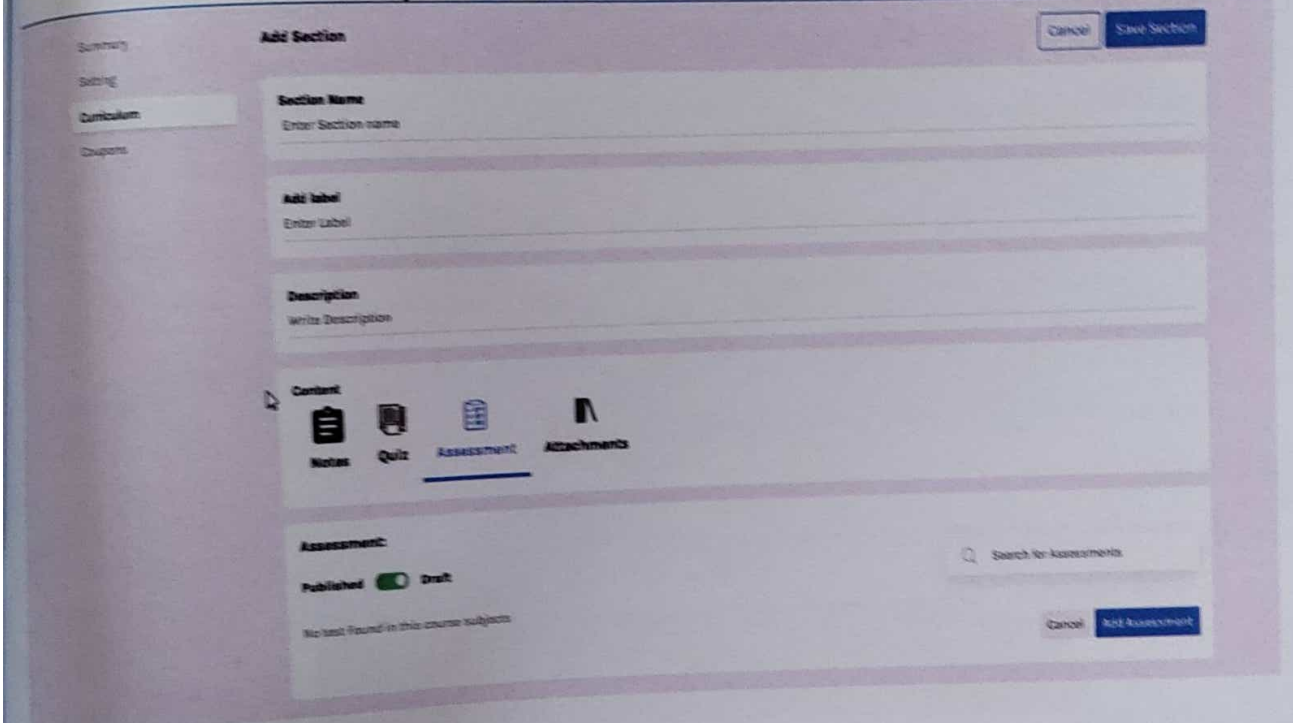
- Initially, the requirements and specifications of the system were examined.
- Then we choose valid inputs (positive test scenario) to check whether our project processes them correctly. Also, some invalid inputs (negative test scenario) are chosen to verify that it is able to detect them.
- Tester then constructs and determines expected outputs for all those inputs.
- The test cases are executed.
- Software tester compares the actual outputs with the expected outputs.
- Defects if any are fixed and re-tested.

CHAPTER 5. SAMPLE FORMS AND REPORTS

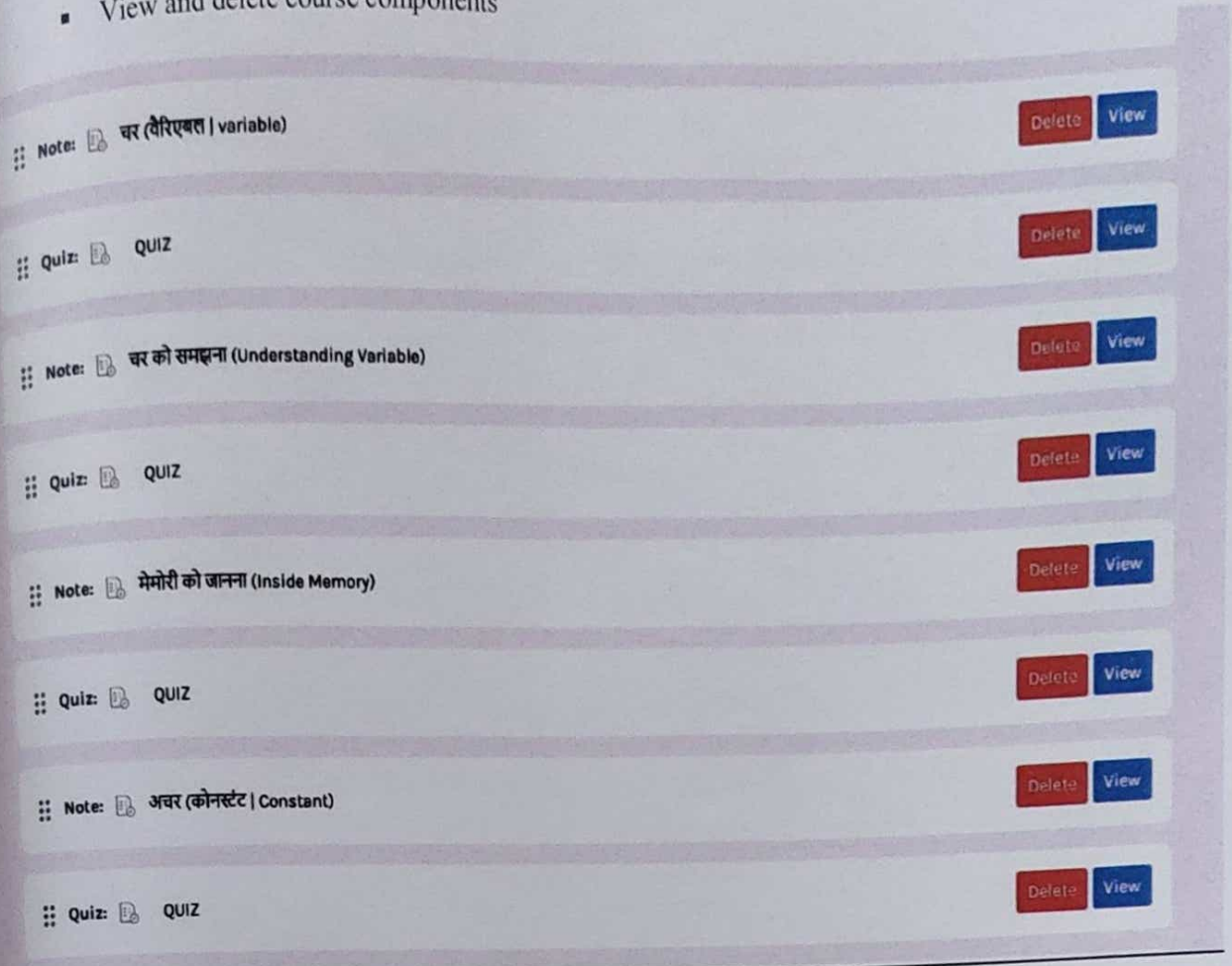
- Add assessment in course



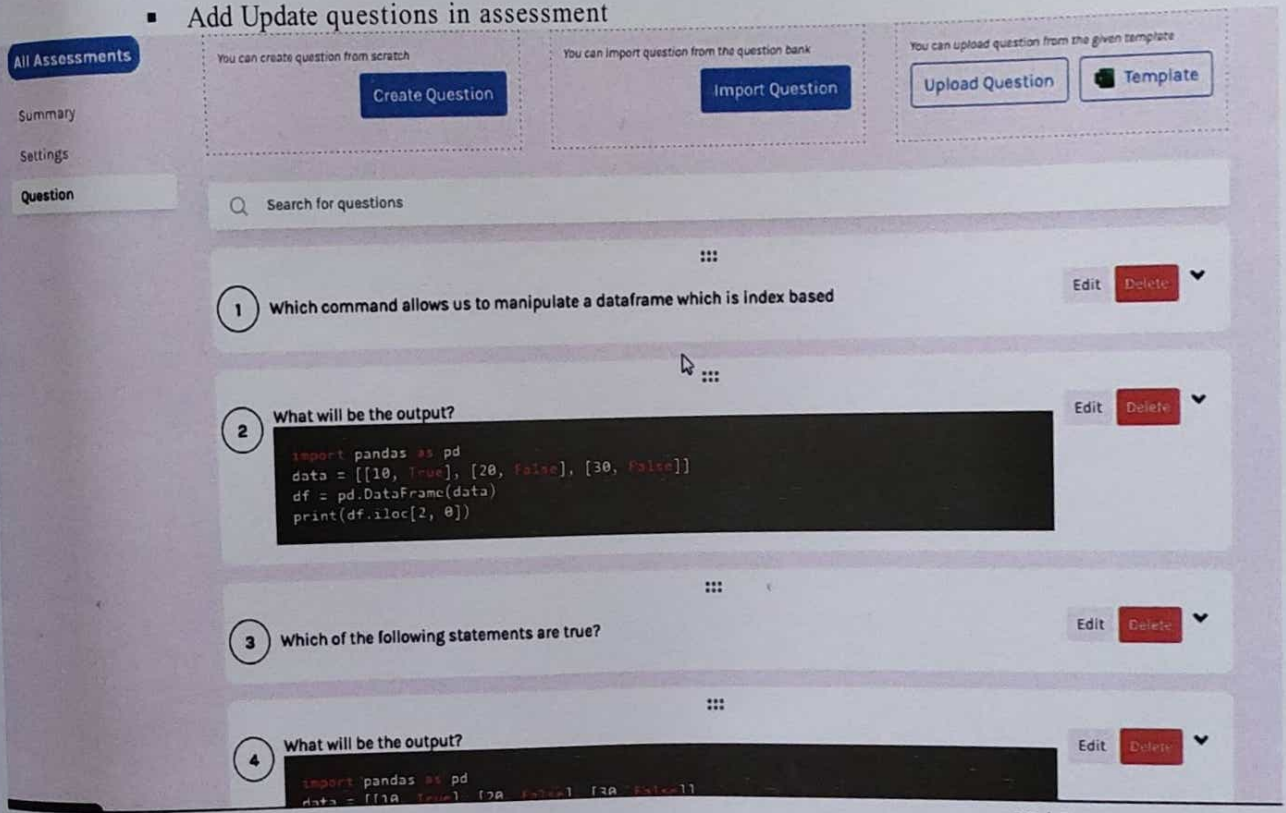
- Add assessment/quiz in course



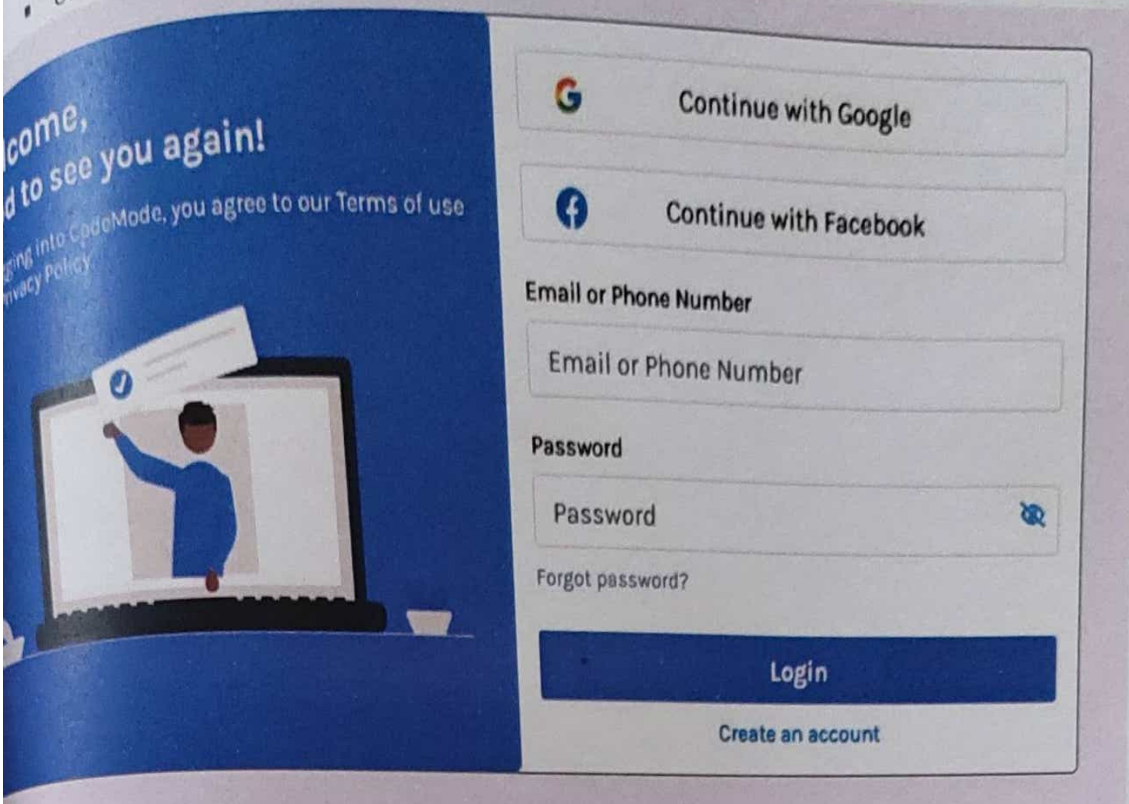
- View and delete course components



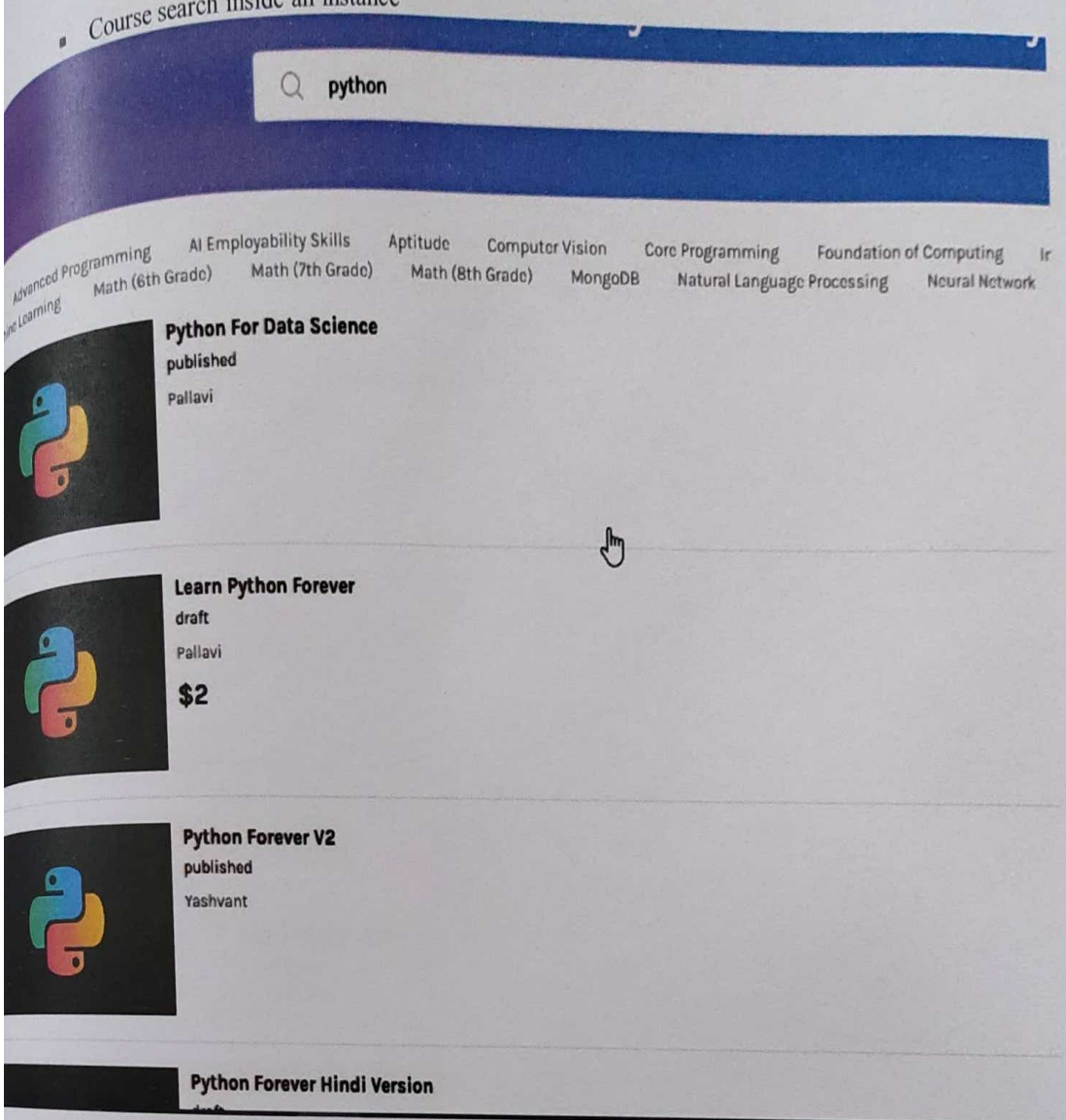
- Add Update questions in assessment



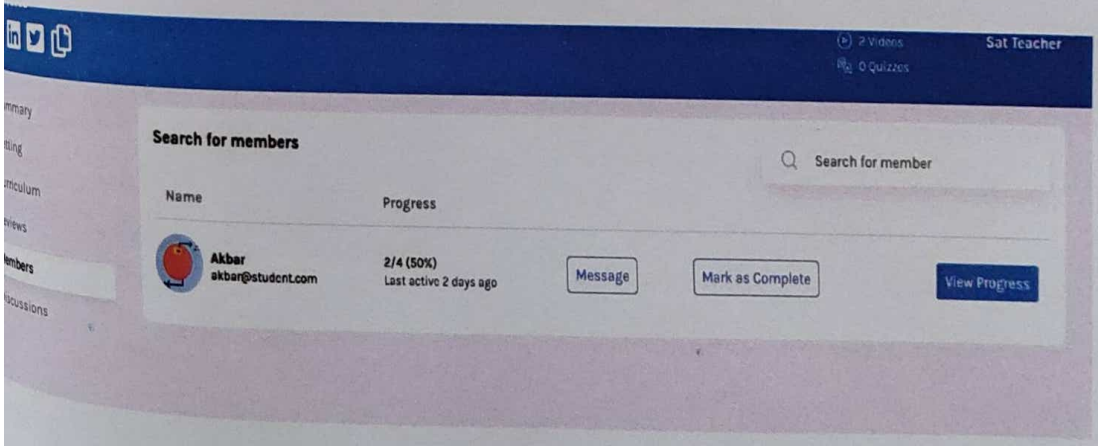
- User Login


come,
d to see you again!
ing into CodeMode, you agree to our Terms of use
ivacy Policy
Continue with Google
Continue with Facebook
Email or Phone Number
Email or Phone Number
Password
Password
Forgot password?
Login
Create an account

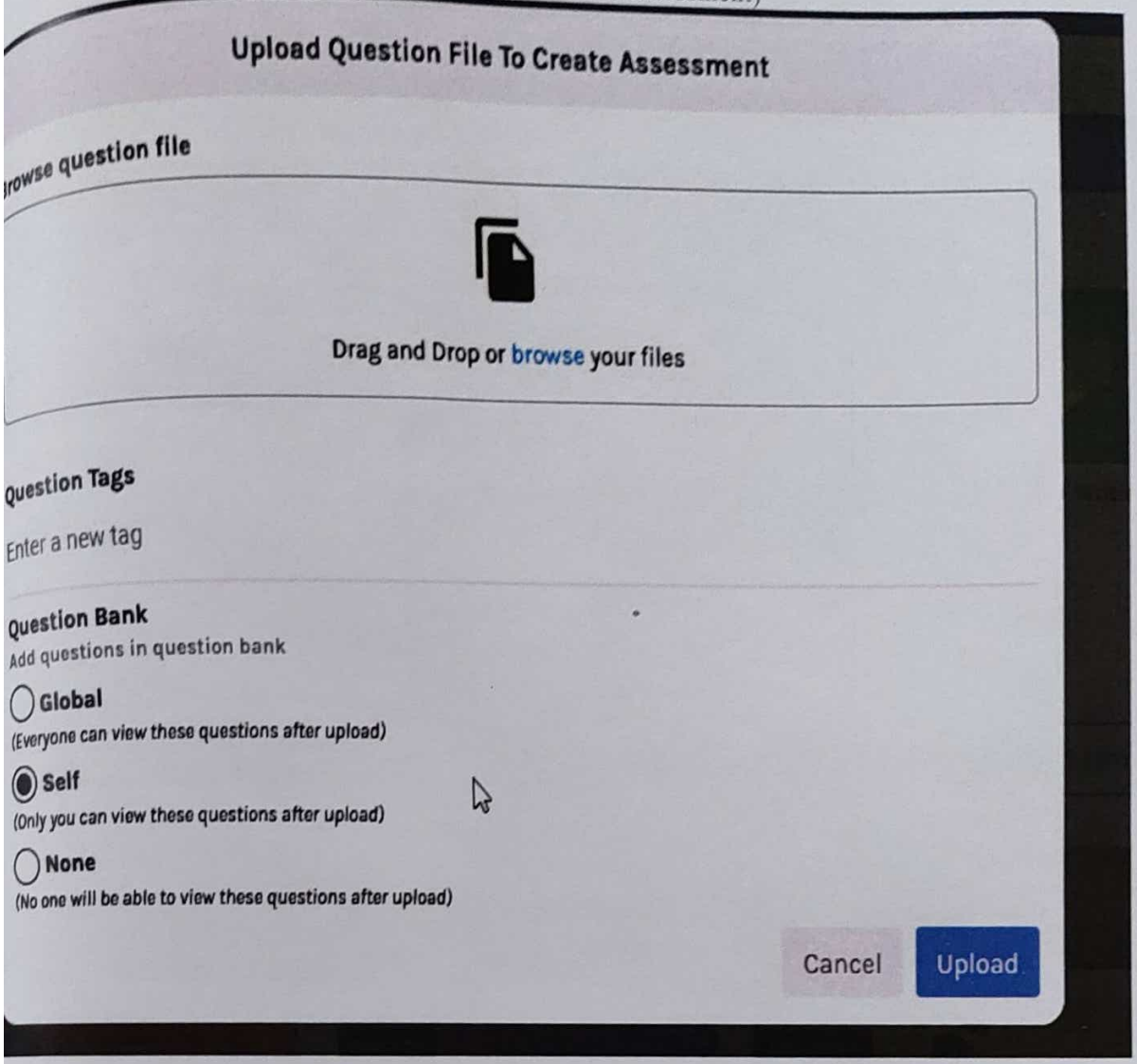
- Course search inside an instance



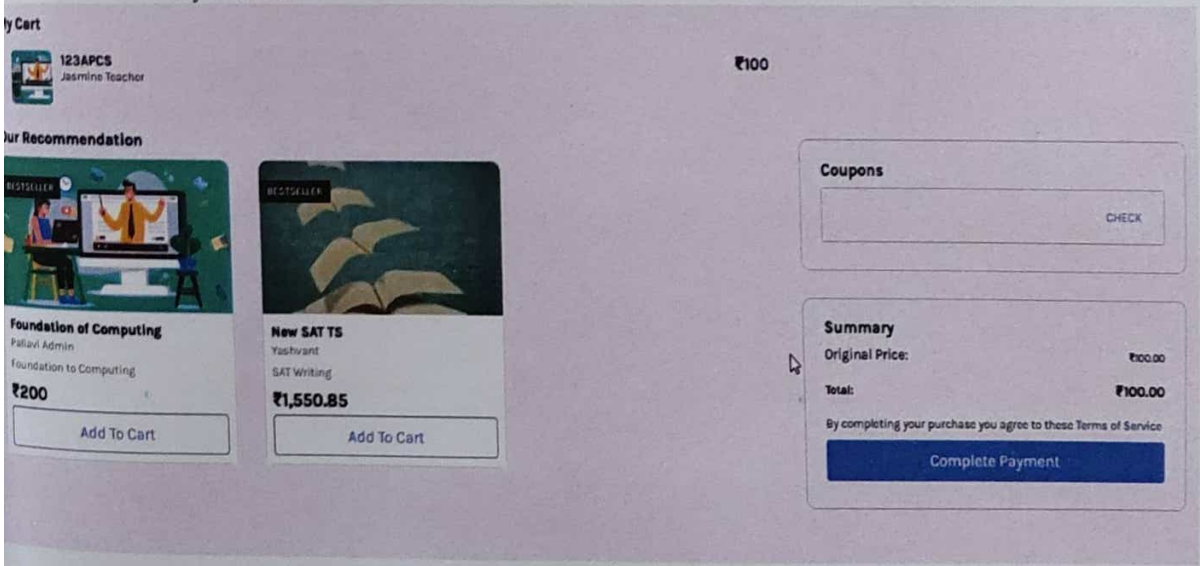
Members in a course



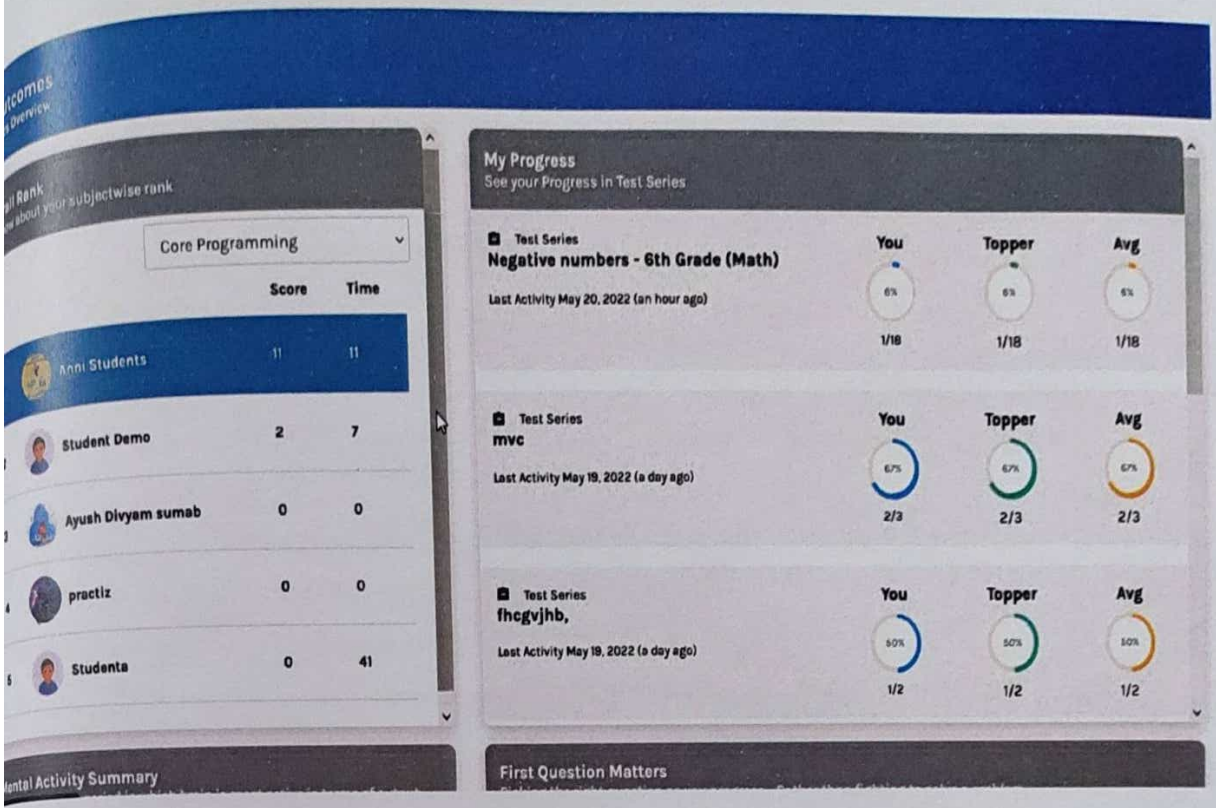
- Excel uploaded (can update multiple questions for assessment)



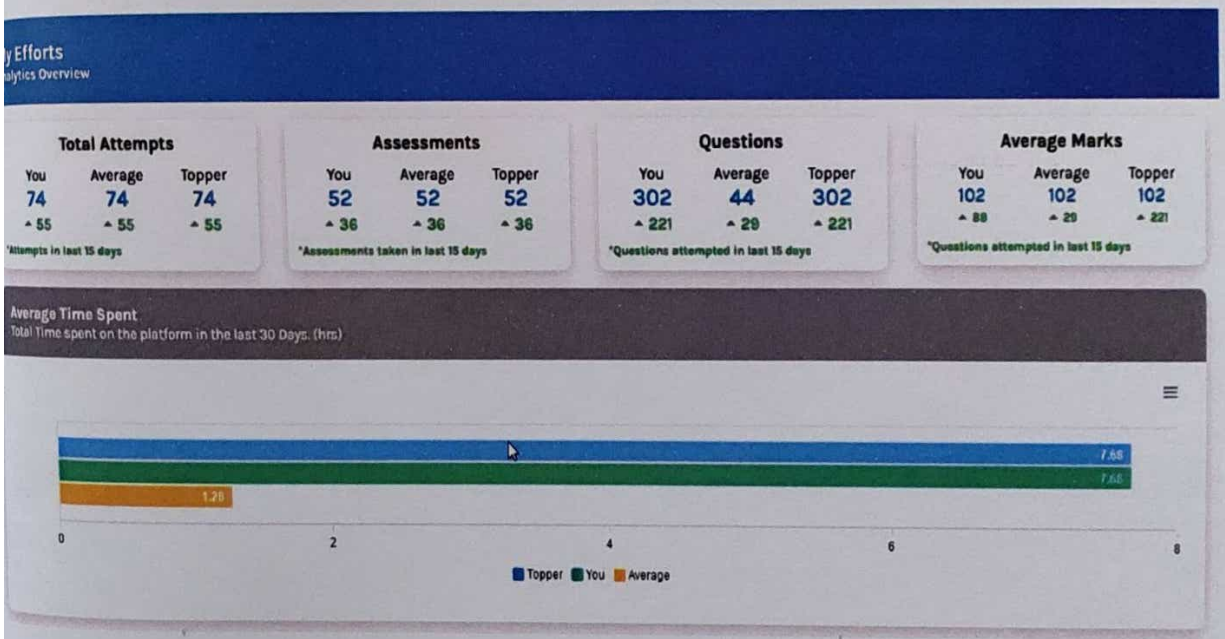
- Buy a course



tcomes



My Efforts



CHAPTER 6. CONCLUSION

Our project is only a humble venture to satisfy the needs of our students and teachers. Several user-friendly coding has also been adopted. This project shall prove to be a powerful package in satisfying all the requirements of the organization. The objective of software planning is to provide a framework that enables the manager to make reasonable estimates made within a limited time frame at the beginning of the software project and should be updated regularly as the project progresses.

At the end it is concluded that we have tried on the following points.

- A description of the background and context of the project and its relation to work already done in the area.
- Made statement of the aims and objectives of the project
- The description of Purpose, Scope, and applicability
- We define the problem on which we are working in the project.
- We describe the requirement specifications of the system and can be done on these things.
- We understand the problem domain and produce a model of the system which describes operations that can be performed on the system.
- We included features and operations in details, including screen layouts.
- We designed user interface and security issues related to the system- Finally the system is implemented and tested according to the test cases.

Future Scope of the project.

- We will host the platform on multiple online servers to make it accessible worldwide with low latency and high performance.
- Implement the backup mechanism for taking backup of codebase and database on a regular basis on an offload server.
- Integrate multiple load balancers to distribute the load of the system.

The above-mentioned points are the enhancements which can be done to increase the applicability and usage of this project. Here we can maintain the records courses enrolled by students.

CHAPTER 7. LEARNING OUTCOMES

This internship semester and the opportunity has been an amazing experience to progress both technically and personally. Though there are times of difficulties in adaption, I was able to cope with the barriers and accomplish my tasks. Below are my learning outcomes through the internship period:

7.1 Personality Development Outcomes

- I have learned the office etiquette and attitude required to sustain in the industry.
- I was able to enhance my interpersonal skills, and other significant skills during the period.
- I have communicated and collaborated effectively with professionals in the workplace through virtual and physical means.
- I was able to recommend ideas to improve efficiency by considering viable alternatives.
- I gained the confidence and skillset to try for opportunities in the domain I was working.
- I have been appreciated for the work and was directly led to a full-time opportunity at the company following graduation from college.

7.2 Technical Outcomes

- I was able to integrate theory into practice and differentiate the applicational knowledge from just theory.
- I was able to break down complex problems into smaller pieces to implement the function more effectively.
- I can demonstrate the ability to utilize resources by considering different opportunities.
- I was able to adapt user-friendly and readable coding practices.
- I was able to grasp the knowledge of the latest technologies in place to achieve the project goal.
- I have learned new skills like spring boot, and was able to apply MySQLand other technologies learned at the college level.
- I was able to take down requirements and other necessary background information that is further put together to develop the project.
- I have learned how to analyze the system for bugs and fix them.
- I was able to write test cases to check the system for any vulnerabilities and errors in functionalities.
- I have learned how to deploy the microservice on servers and test them.
- I have learned how the industry works and was able to adapt to their coding practices with reasonable modifications from my end.
- I was able to create mock servers to mimic the backend system and test the service.

- I was able to handle communication of the microservice with a remote database server running on Virtual Private Servers.
- I was able to create VPS and use it learn to Linux and as well deploy any service that requires synchronization of data on two clients.
- I learned how to make use of Version Control Systems to collaborate and raise issues to create tasks.
- I have learned to make use of the File Transfer Protocol to transfer files from one server to the other server or local storage.
- I have learned how documentation is done and was able to prepare one for the system/project we are working on.

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