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eLearning

Minal Patel

eLearning

By

Minal Patel
B.E., Gujarat Technological University, 2020

GRADUATE CAPSTONE SEMINAR PROJECT

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For the Degree of Master of Science,

With a Major in Computer Science

Governors State University
University Park, IL 60484

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ABSTRACT

During the pandemic season, learning and teaching through offline is getting difficult for both teachers and students. Keeping this in mind, we want to design a web application which will be providing the services for both teachers and learners. If the services of E-learning want to be used by the students and trainers, then they need to register with the application. Every user will be having their own dash boards to do the operations. Learner will be having the courses, he can be able to select the courses, he can select the schedule i.e., live or self-pacing etc., he can be able to communicate with the teacher if he is having any doubts etc. Students can create their profile at the time of the registration, he will be having the edit facilities to his/her profile. Similarly, teachers can register with the application. They will be having the dashboards with the operations like creating the course, communicating with the students, scheduling the class, teaching the class etc.

Main objective of the application is to provide the teaching and learning with enhanced features in the application. It should meet the expectations of the teachers and learners; it should provide user accessibility to learn and to teach. This application will be replacing the existing system and provides the better services to all the users. As the application needs 3 months of time to complete it and will be released by the end of November 2021.

To implement the above application, we have selected the software as HTML, CSS, Bootstrap, JavaScript, jQuery as front end and the database we are going to use is SQL Server Management studio. IDE (Integrated development environment) we are using is Visual studio community 2019.

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1   Project Description

E-Learning application will be used by different types of users. As the existing system is not providing the dynamic information to the users, all of them are facing the issues with the current system. To overcome those issues, a new system needs to be developed to satisfy the needs of all the users. This application will be used by different users like learner, Instructor, and admin. As the admin is a privileged user who will be having more rights when compared to the other users. He will be adding the courses, he can view the details of the learners and the instructors. Following wireframes provide us a brief idea about the workflow of the administrator. Instructor can be able to register with the application, he will be logging into it, he can add the course into the application, he can view his profile, he can be able to view the schedule etc. Coming to the learner services, he can be able to register, login into the application.

1.1   Competitive Information
All the requirements of the application are gathered, and clarity of the requirements is achieved. Apart from the gathering of the requirements, different web applications are considered to know the working functionality, user interfaces, designing the application, flow of the application etc. Based on the gathered information, and the existing functionality of the current application. Existing applications are not satisfying all the needs of the users, that is the reason, this application will be different from all other applications.

1.2   Relationship to Other Applications/Projects
As there is no direct relationship with any other applications, but some of the requirements of this application will be matching with the other different applications.

1.3   Assumptions and Dependencies
Assumptions:

- It is assumed that this application will be used by different types of users like learner, instructor and admin.
- Information of user should not be viewed by the other users.
- To use this application, they need to register with the application.
- All the data should be present in the application so that it can be visible to the users.

Dependencies:
- To use the application, user need to login into it. For this they need to register with the application.
- If the data is present like the courses, then only students will be able to select them or else they will not be available with the system.

1.4   Future Enhancements
In future it can be transformed into the mobile applications, so that students can operate it any time.

1.5   Definitions and Acronyms
HTML – Hyper Text Markup Language.
SQL – Structure Query Language
CSS – Cascading Style Sheets.

2   *Project Technical Description*

As the project is developed using Java, CSS, HTML and SQL databases. To have the operations, user friendly interfaces are developed. To store the operational data, MySQL is used. Application was designed by using the wireframes so that a prototype can see from it. By seeing it, one can assume whether all the requirements are achieved or not. If there are any modifications are needed, then it will be done at the time of designing the application. Later, application coding will be done to achieve the implementation of all the requirements.

2.1   *Application Architecture*

To implement the above system, one need to establish the system architecture. As the application needs the devices, application system and the storage structure to run the system. Based on these needs, architecture has been divided into 3 layers. These layers include Client Interaction (Presentation layer), application framework (Business layer) and database framework (data layer).

Presentation Layer: In this layer, all the information will be presented to the users and by using these interfaces one can interact with the system. To implement the interfaces, generally people will be using the markup languages. Here, we have used HTML, CSS etc. By using different technologies, we can write both server-side code and then client-side code. All the users and devices will be connected by using this layer to establish the interaction with the application.

Business Layer: This is the middle layer where all the code will be there that are needed to implement the business operations of the application. All the validations will be done under this layer and workflow of the application will be handled properly. In the business layer, different management will be done like state management, session management, providing the services, accessing the services etc.

Database layer:
The main functionality of this layer will be storing and retrieving the information from the data sources. It will be taking the plain data and after applying different technologies on it, it will be converted to the information which can be directly used by the stakeholders. We can use different kind of technologies like SQL, MySQL, NoSQL etc.
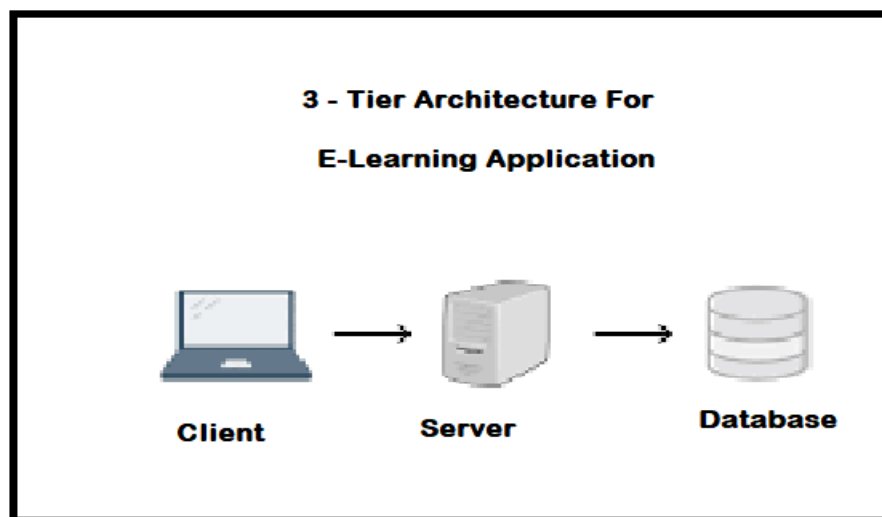

Figure 1 Tier Application Architecture

2.2   Application Information flows

To use this application, one should run this application in the browser. They need to type the address of the application and then it will be calling the home page of the application.

To use this application, there will be 3 different users will be there. A learner, Instructor, and administrator. Every user needs to register with the application, and they should login into the application. After logging into the application, every user will be having their own dashboard which provides different services to the user. He can use those options and perform the intended operations, so that his needs to be satisfied. In the same way, all the users need to be done the same process. When we talk about the administrator, he is having more privileges when compared to the other users. He is having the right to view the details of the users; he can add the user and able to delete the users.

2.3   Capabilities

Based on the requirements of the users, following capabilities are identified.

Learner Capabilities:
a. A facility will be provided to the learner to register with the application.
b. He should have the feature to know the details of the courses.
c. He should be given the facility to select the course.
d. He can be able to select the course schedule.
e. System should provide the facility to communicate with the teacher.
f. If there is any change in their profile then they need to have a facility to edit the facility.

Instructor capabilities:
a. Instructor can register with the application.
b. He can log into the application.
c. he can add a new course.
d. He can schedule the course.
e. He can communicate with the students.
f. He can post the information.
g. He can edit his profiles.

Admin capabilities:
a. He can restrict the access to the learners.
b. He can add/delete learners.
c. He can add/ delete instructors.
d. He can be able to view data.
e. He can communicate with the other users.

2.4   Risk Assessment and Management

This is one of the mechanisms which need to know different types of risks that are associated with the application implementation. Risk identifications need to be done in the initial stages, which helps the development to identify the issues in the early stage. If they are identified in the early stage, then there will be possibility to avoid or to remove them. To manage the risk, there will be different risk handling mechanisms will be there which includes

Risk Identification: Risks will be come at any stage in the implementations. If they are expected in the initial stages, then there will be a chance to handle them. One need to implement the risk management in different phases of the development, so that there won't be any higher impact when they are removed.

Prioritization of risks: After identification of the risk, one need to prioritize the risks to reduce the impact of the risks. One need to remove the risks which are having the higher loss. This helps in preventing the heavy damage to the organization.

Reducing the Impact of the risk: To mitigate the risk, one need to identify the cause of the risk and then some mitigation mechanisms will be applied, so that impact of the risk will be reduced.

3   Project Requirements

3.1   Identification of Requirements

Based on the need, all the requirements are identified and presented in the following sections

GSU-GS_SP2021 – 001-Admin_account_maintenance: Admin will be having the facility to view the details of the instructors and learners.

GSU-GS_SP2021 – 002-Admin_info_retrieval: He will be having the rights to view any of the information.

GSU-GS_SP2021 – 003-Delete_instructor: He will be having the right to delete the instructors from the list of instructors.

GSU-GS_SP2021 – 004-Delete_Learner: Admin will be having the right to delete the learner at any point of time.

GSU-GS_SP2021 – 005-Create_course: Instructor will be having this feature, after logging into his dashboard, whenever he wants to start new course, then he will be creating the course.

GSU-GS_SP2021 – 006-Register_course: Created courses will be stored in the database and they will be viewed by the learners to register.

GSU-GS_SP2021 – 007-schedule _course: Instructor will be having the facility to schedule the courses, so that people can see the schedule and they can be able to register.

GSU-GS_SP2021 – 008-select_course: Learner will be having the facility to select the course.

GSU-GS_SP2021 – 009-Communication: This feature should be provided to both the instructor and learner so that they can establish the communication whenever it is needed.

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

This application will be utilized by learners and instructors. They will be doing different operations by using this application. All the operational data will be stored by the database. Enough security is provided to the database that unauthorized user will not be able to access the data. They will not be allowed to log into the application as every user will be checked with their username and password. Application is

having another type of the user known as Admin. He will be maintaining the application, if there is any issue then it will be handled by the admin.

3.3   Security and Fraud Prevention

To provide the security, application is implemented using authentication and authorization mechanism. First step of security is achieved through the implementation of username and password. After logging into the application, every user is not allowed to have the access of entire database. Based on the type of the user, access rights are applied and only the legitimate user will have the access to the database.

3.4   Release and Transition Plan

Following table shows the series of steps that are implemented in chronological order.

No.	Development Phase	Initial date	Final date	Status
1	Requirements Analysis	02-09-2021	12-09-2021	Finished
2	SRS preparation	13-09-2021	20-09-2020	Finished
3	UI and DB Design	21-09-2021	05-10-2020	Finished
4	Coding	06-10-2021	010-11-2020	Finished
5	Testing	11-11-2021	20-11-2020	Finished
6	Record keeping	21-11-2021	30-11-2020	Finished
7	Presentation			

4   Project Design Description

Database Design:

The E-learning database tables

Figure 2 The E-learning database tables

Figure 3 Admin_tbl table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐ 1	Course_Id 🔑	int(11)			No	None		AUTO_INCREMENT	🖉 Change ⊖ Drop ▼ More
☐ 2	Instructor_Id	int(11)			No	None			🖉 Change ⊖ Drop ▼ More
☐ 3	Running_Topic	varchar(225)	utf8mb4_general_ci		No	None			🖉 Change ⊖ Drop ▼ More
☐ 4	Progress	int(11)			No	None			🖉 Change ⊖ Drop ▼ More
☐ 5	Status	int(11)			No	None			🖉 Change ⊖ Drop ▼ More

Figure 4 Course_tbl table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐ 1	Id 🔑	int(11)			No	None		AUTO_INCREMENT	🖉 Change ⊖ Drop ▼ More
☐ 2	Course_Id 🔑	int(11)			No	None			🖉 Change ⊖ Drop ▼ More
☐ 3	Instructor_Id 🔑	int(11)			No	None			🖉 Change ⊖ Drop ▼ More

Figure 5 Instructor_Course table

Actions	Constraint properties		Column ⓘ	Foreign key constraint (INNODB)		
				Database	Table	Column
⊖ Drop	instructor_course_ibfk_1 ON DELETE RESTRICT ▾ ON UPDATE RESTRICT ▾		Instructor_Id ▾ + Add column	e-learning ▾	instructor_tbl ▾	Instructor_Id ▾
⊖ Drop	instructor_course_ibfk_2 ON DELETE RESTRICT ▾ ON UPDATE RESTRICT ▾		Course_Id ▾ + Add column	e-learning ▾	course_tbl ▾	Course_Id ▾
	Constraint name ON DELETE RESTRICT ▾ ON UPDATE RESTRICT ▾		▾ + Add column	e-learning ▾	▾	▾
+ Add constraint						

Figure 6 Relation view of Instructor_course table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐ 1	Instructor_Id 🔑	int(11)			No	None		AUTO_INCREMENT	🖉 Change ⊖ Drop ▼ More
☐ 2	Instructor_Email	varchar(225)	utf8mb4_general_ci		No	None			🖉 Change ⊖ Drop ▼ More
☐ 3	Instructor_UserName	varchar(225)	utf8mb4_general_ci		No	None			🖉 Change ⊖ Drop ▼ More
☐ 4	Instructor_Phone	int(11)			No	None			🖉 Change ⊖ Drop ▼ More
☐ 5	Instructor_Password	varchar(225)	utf8mb4_general_ci		No	None			🖉 Change ⊖ Drop ▼ More
☐ 6	Instructor_Address	varchar(225)	utf8mb4_general_ci		No	None			🖉 Change ⊖ Drop ▼ More
☐ 7	Instructor_Photo	varchar(225)	utf8mb4_general_ci		No	None			🖉 Change ⊖ Drop ▼ More

Figure 7 Instructor_tbl table

Figure 8 Reg_course_Users table

Figure 9 Relation-view of Reg_course_user table

Figure 10 Schedule_tbl table

Figure 11 Relation-view table of Schedule_tbl table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
☐ 1	User_Id 🔑	int(11)			No	None		AUTO_INCREMENT	🖉 Change	⊝ Drop	▼ More
☐ 2	User_Name	varchar(225)	utf8mb4_general_ci		No	None			🖉 Change	⊝ Drop	▼ More
☐ 3	User_Phone	int(11)			No	None			🖉 Change	⊝ Drop	▼ More
☐ 4	User_Email	varchar(255)	utf8mb4_general_ci		No	None			🖉 Change	⊝ Drop	▼ More
☐ 5	User_Password	varchar(255)	utf8mb4_general_ci		No	None			🖉 Change	⊝ Drop	▼ More
☐ 6	User_Address	varchar(255)	utf8mb4_general_ci		No	None			🖉 Change	⊝ Drop	▼ More
☐ 7	User_Photo	varchar(225)	utf8mb4_general_ci		No	None			🖉 Change	⊝ Drop	▼ More

Figure 12 User_tbl table
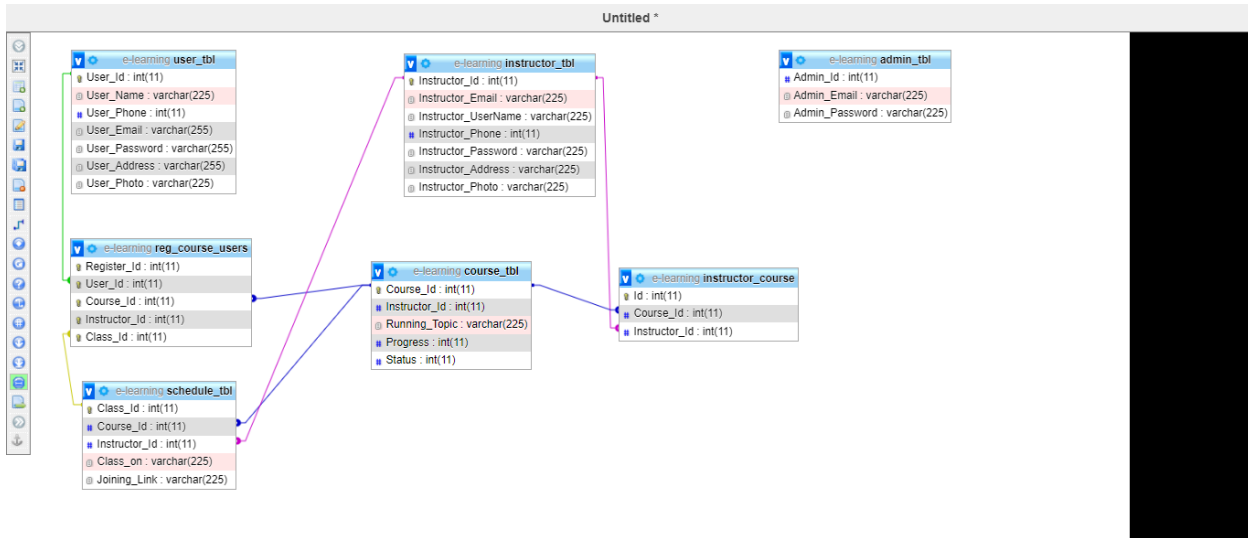
Figure 13 E-R diagram of an E-Learning database

User Interfaces:
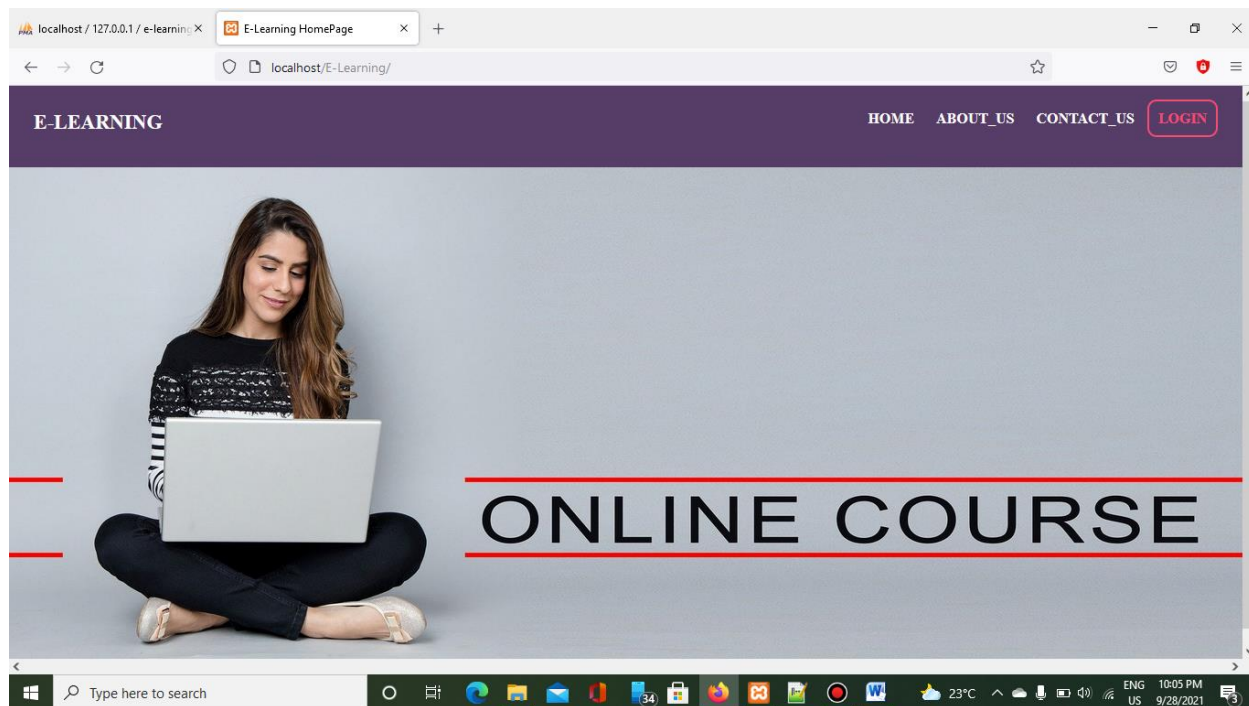
Figure 14 Home page
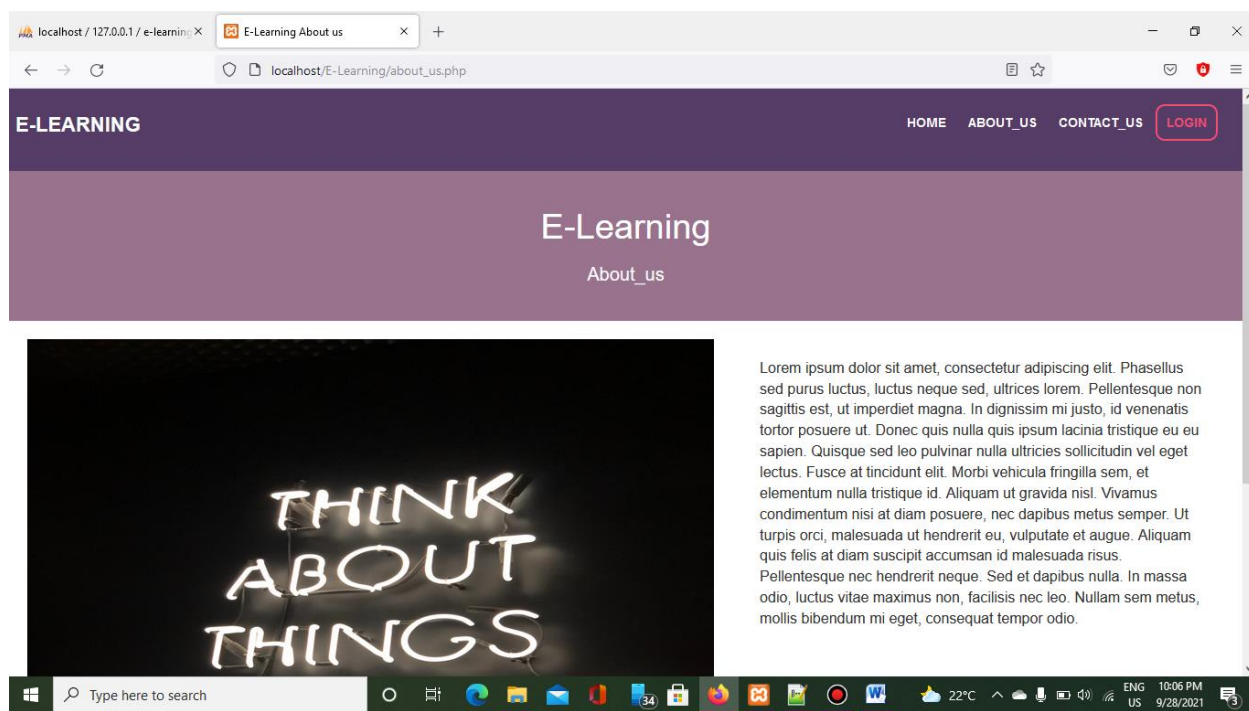
Figure 15 About Us page
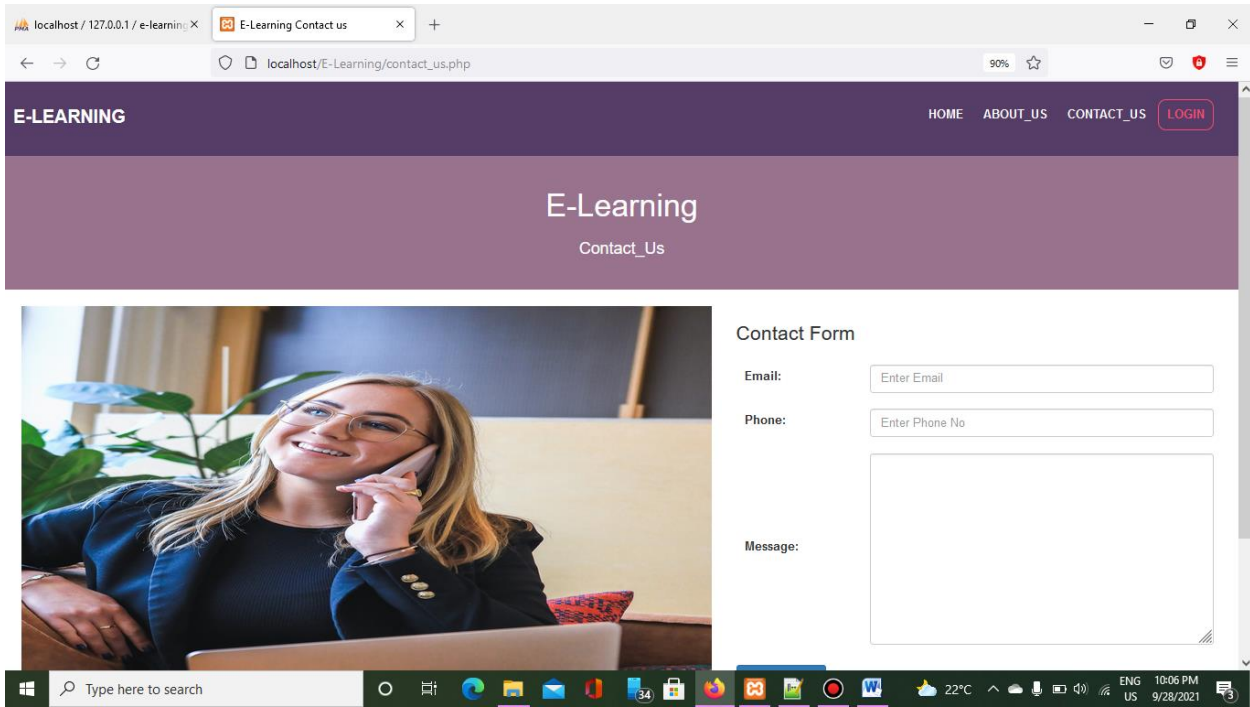
Figure 16 Contact Us Page
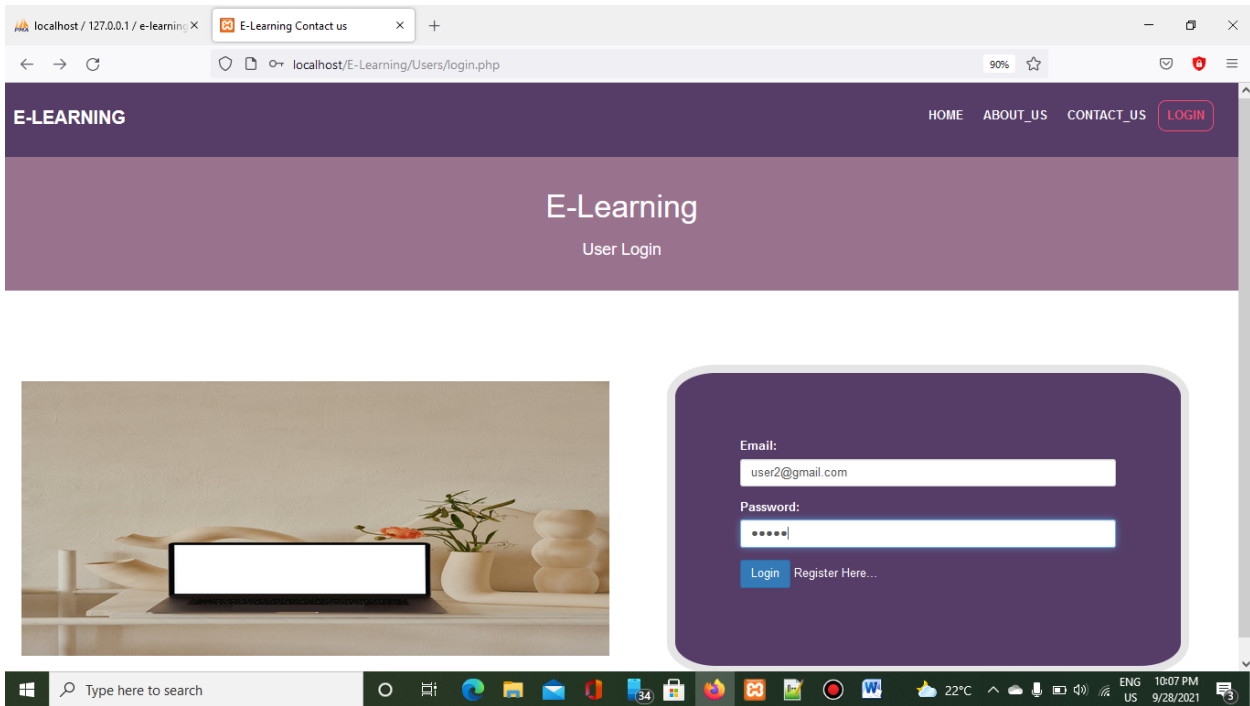
Figure 17 User login page
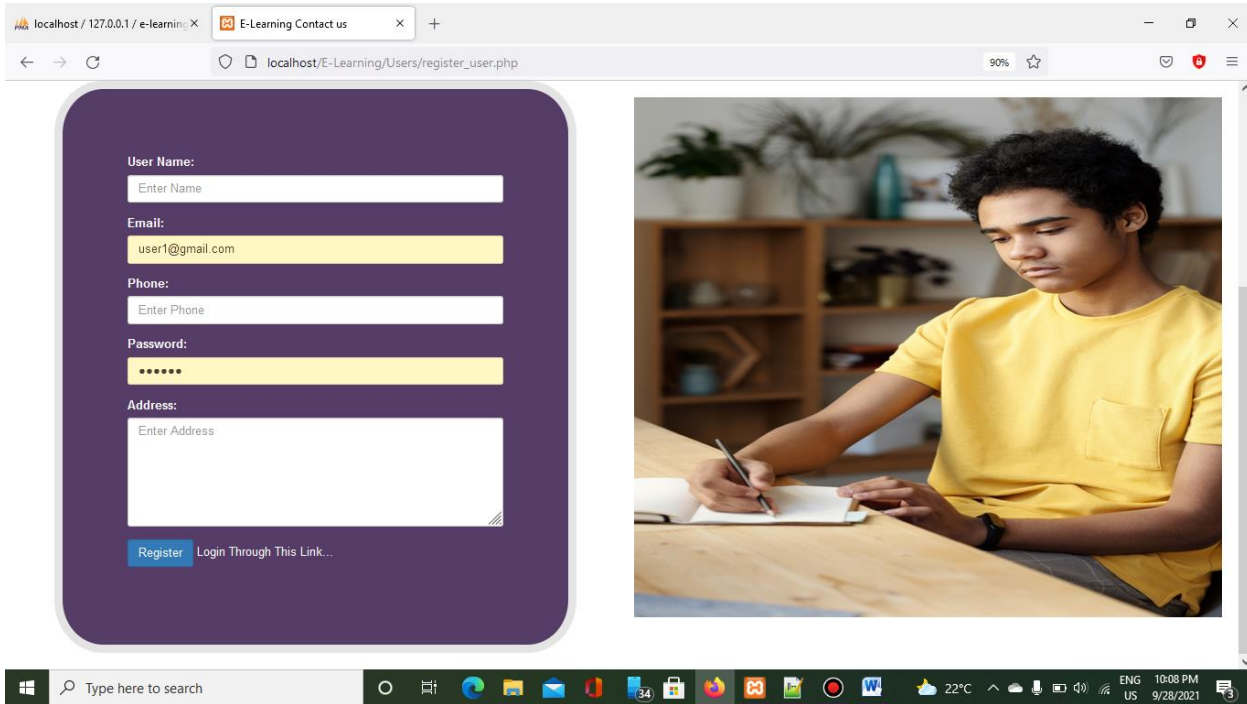
Figure 18 User Registration
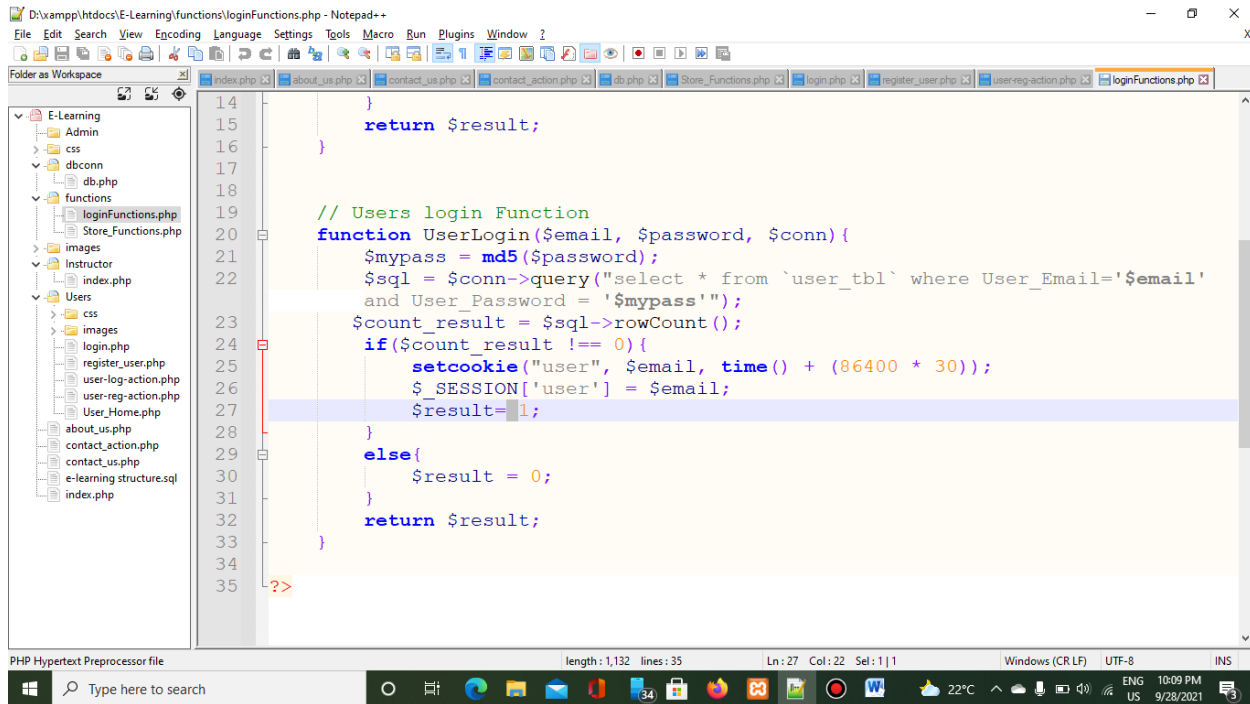
Figure 19 File structure
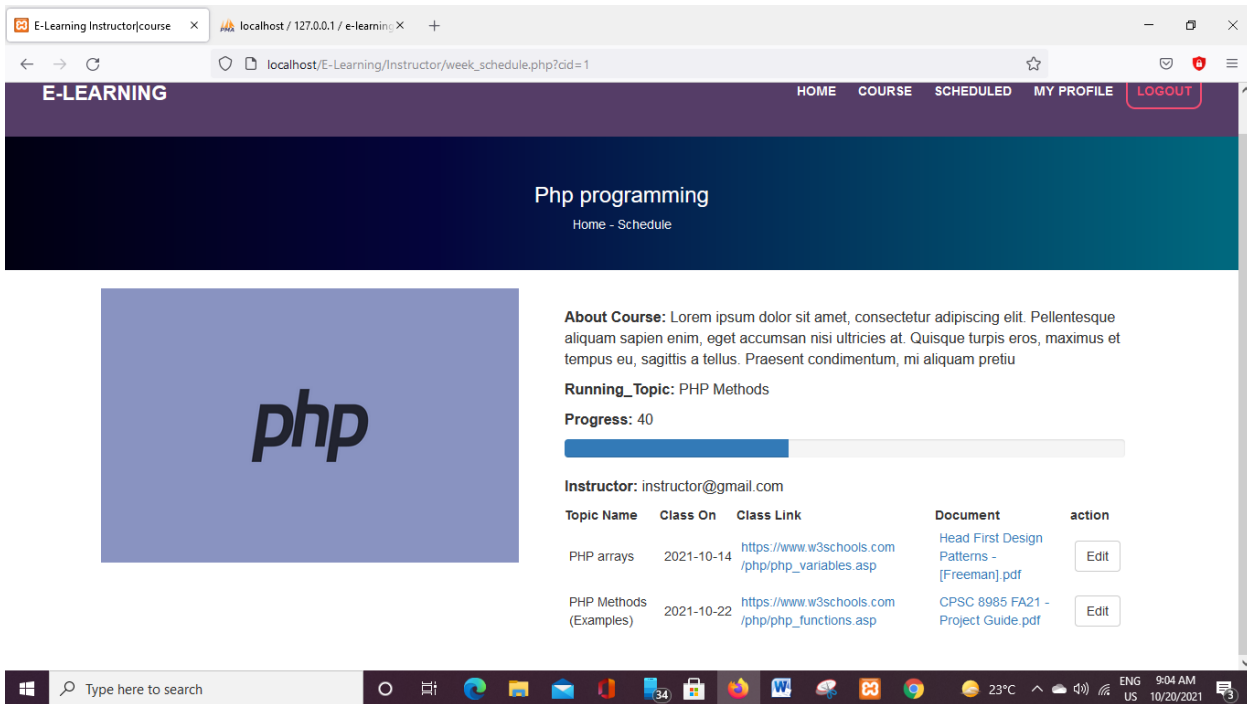
Figure 20 Week schedule page
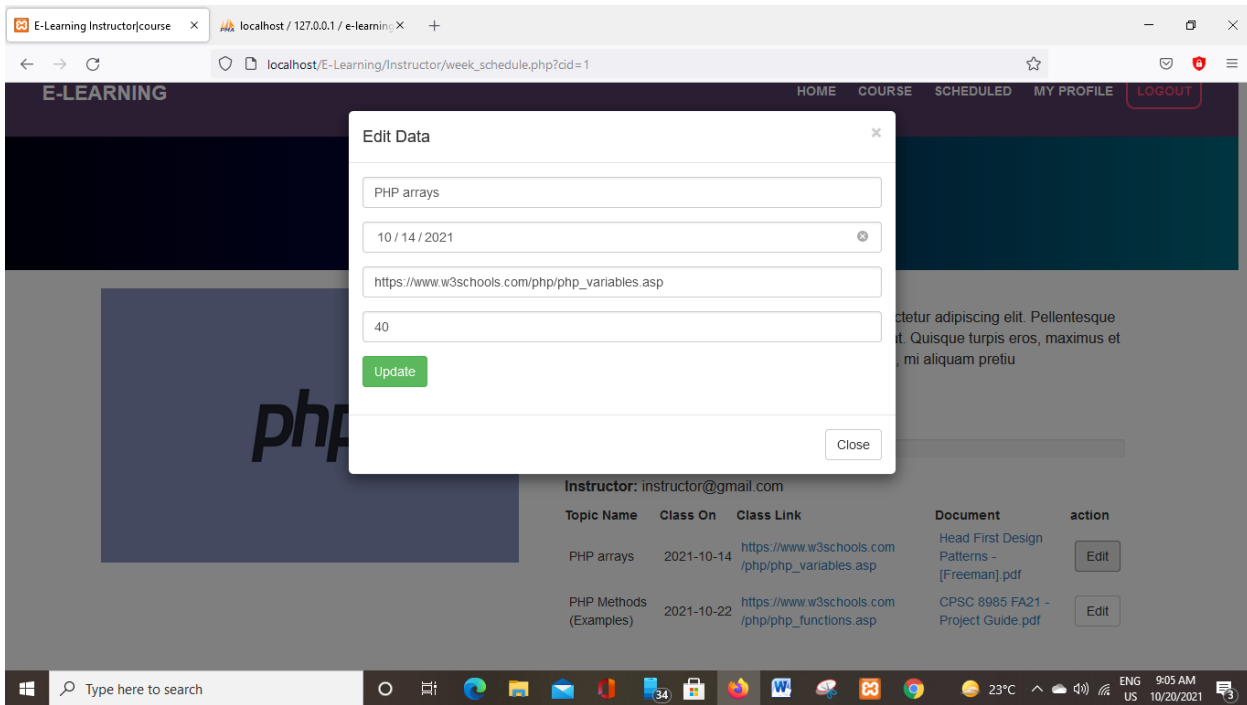
Figure 21 Edit class of the week
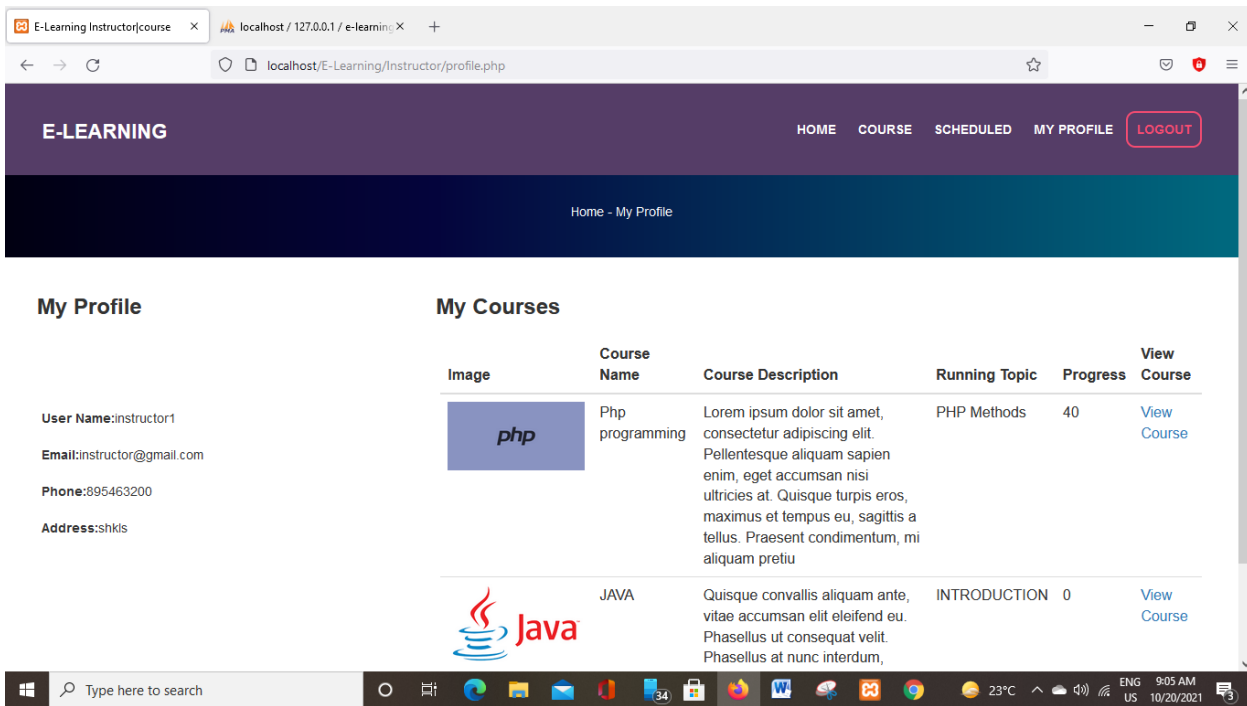
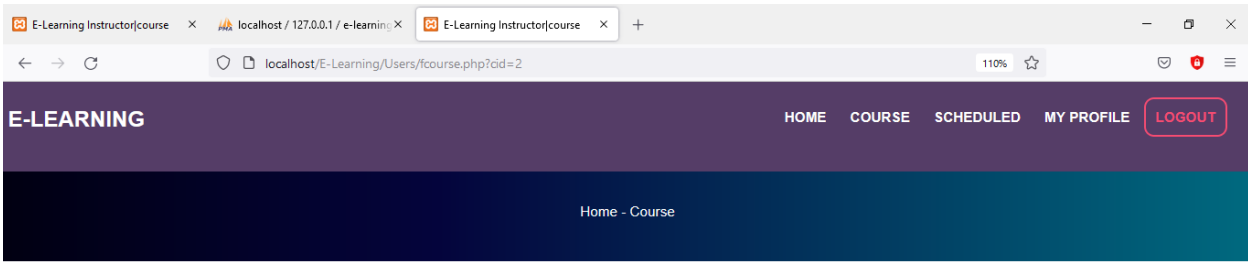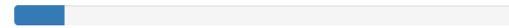Figure 22 My profile
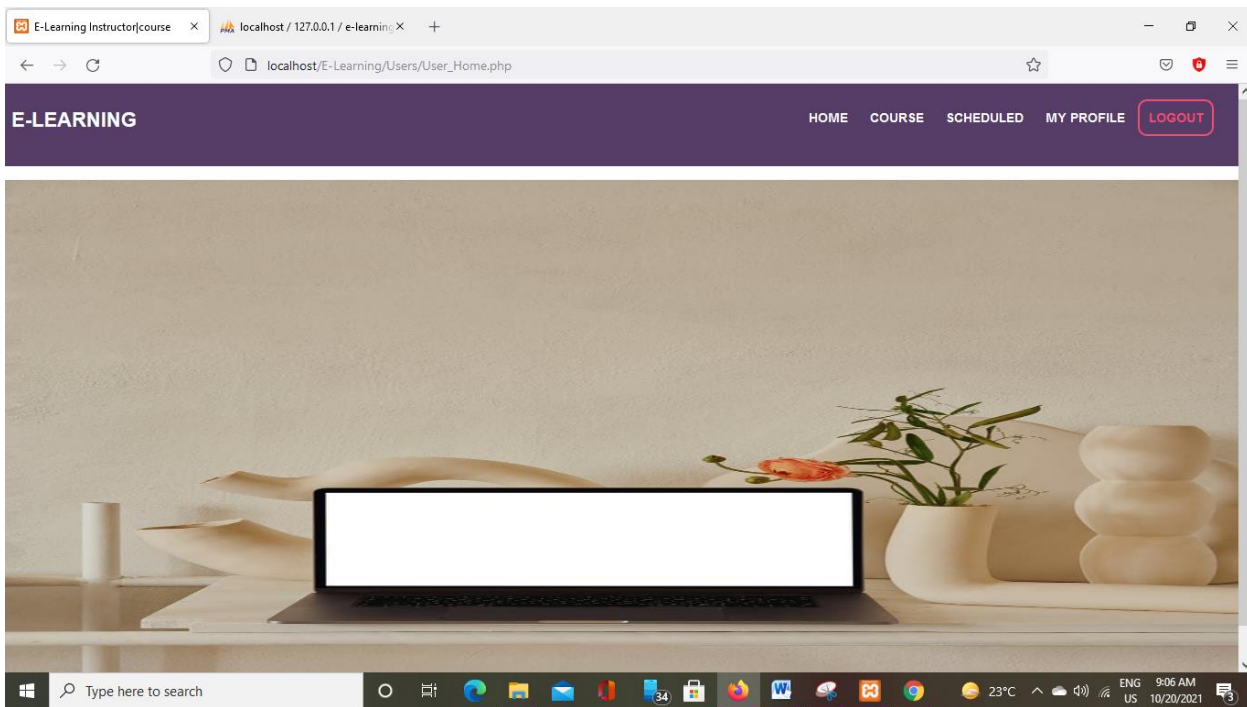
Figure 23 User's home page
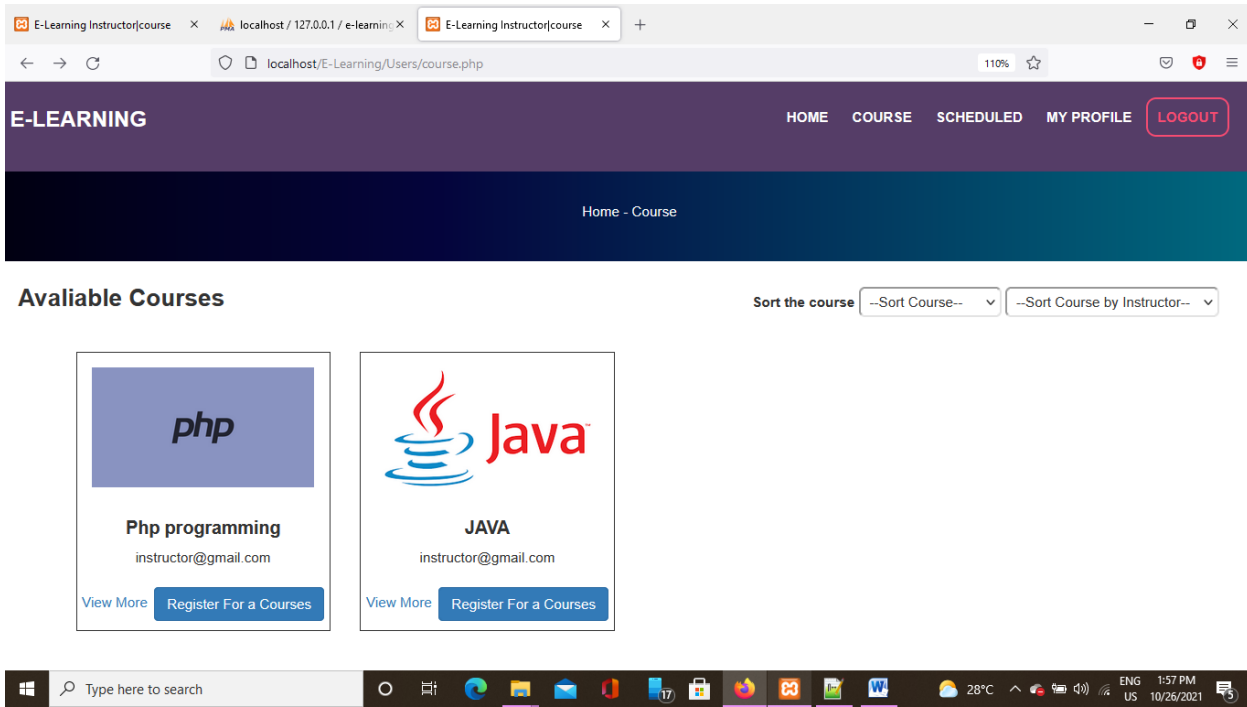
Figure 24 View course
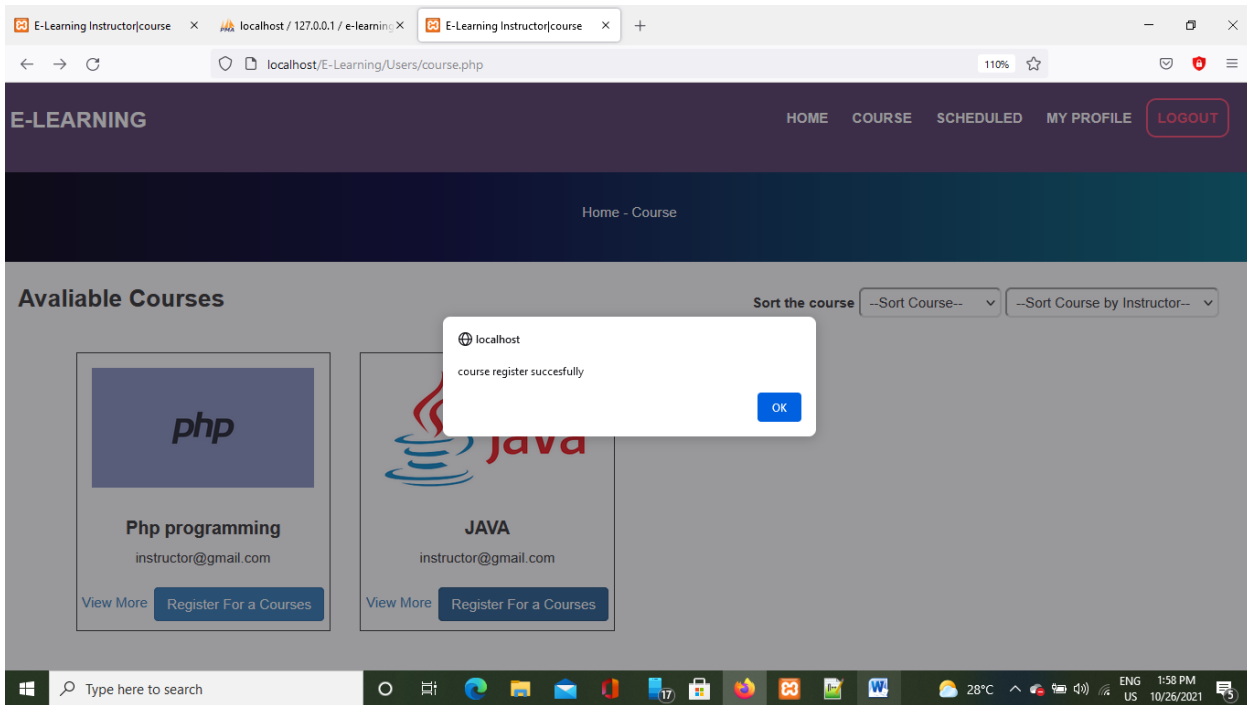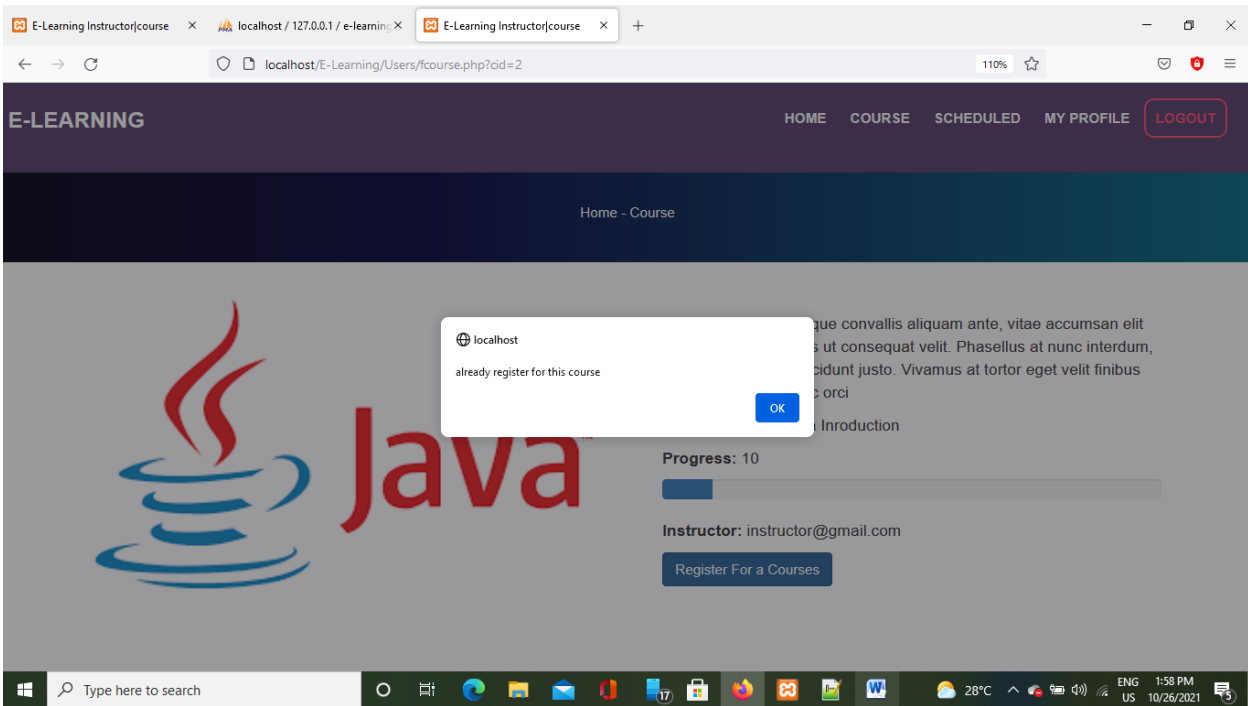

Figure 25 Register for courses

Figure 26 View course details

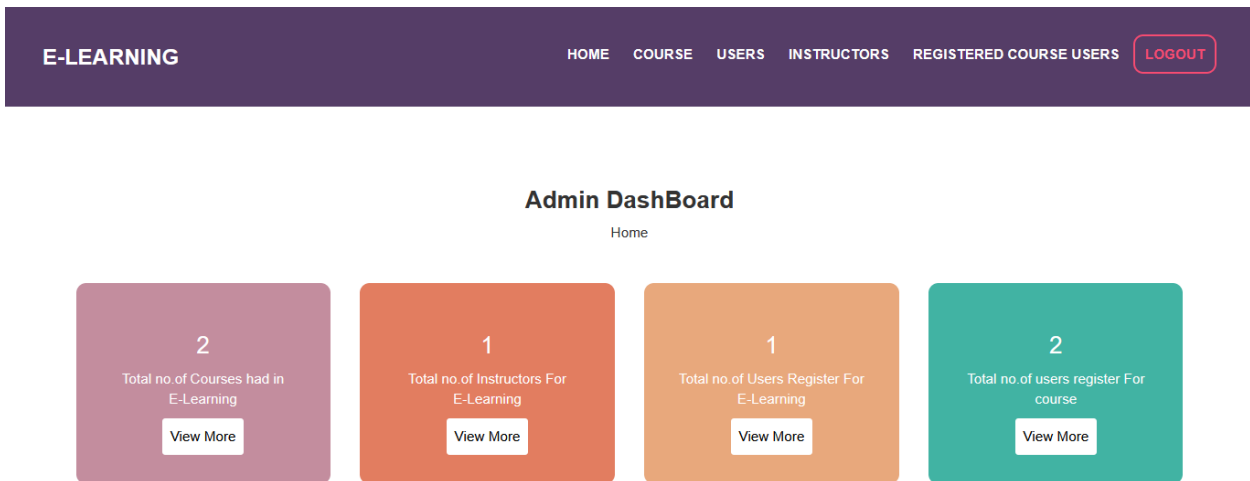Figure 27 Register validation
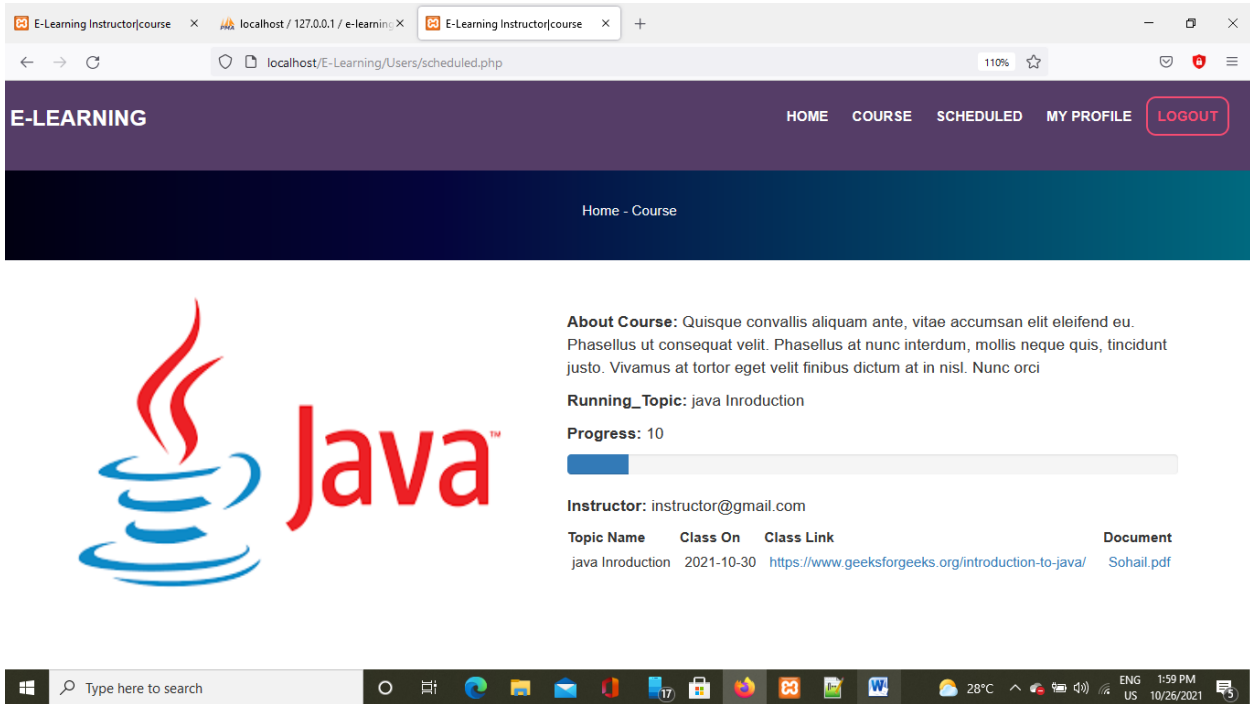
Figure 28 View scheduled data

Figure 29 Admin home

HOME   COURSE   USERS   INSTRUCTORS   REGISTERED COURSE USERS   LOGOUT

Admin DashBoard

Home - course

Search data..

Image	Course Name	Descriiption	Progress	Instructor
php	Php programming	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Pellentesque aliquam sapien enim, eget accumsan nisi ultricies at. Quisque turpis eros, maximus et tempus eu, sagittis a tellus. Praesent condimentum, mi aliquam pretiu	40% completed	instructor@gmail.com
java	JAVA	Quisque convallis aliquam ante, vitae accumsan elit eleifend eu. Phasellus ut consequat velit. Phasellus at nunc interdum, mollis neque quis, tincidunt justo. Vivamus at tortor eget velit finibus dictum at in nisl. Nunc orci	10% completed	instructor@gmail.com

Figure 30 Course

HOME   COURSE   USERS   INSTRUCTORS   REGISTERED COURSE USERS   LOGOUT

Admin DashBoard

Home - Users

Search data..

UserId	User Name	User Email	User Phone	Address
1	users56	user1@gmail.com	2147483647	us

Figure 31 Users

Figure 32 Instructor

Figure 33 Users how are register for course

5   Internal/external Interface Impacts and Specification

After identifying the requirements, this application is developed based on the needs of different types of the users. Interfaces which are developed are user friendly and is having the good navigation. By seeing the user interfaces one can know the operations that will be performed by the application. Any person who is not even having the

computer literacy can be able to understand the operations of the interface. People who use this application will save the time and resources and makes their work more comfortable.

6   Design Units Impacts

As this application is developed based on good design. Database which is designed is concentrated on eliminating the redundancy. No data duplication is done in the designed database. To have the good user interfaces, initially wireframes are designed, and these wireframes are treated like a prototype so that development team can understand how the application looks like.

6.1   Functional Area A/Design Unit A

6.1.1   Functional Overview

As there are three different types of the users who will be using the application. Every user will be having their own dashboards and they will be provided with different services. All these services are clearly presented in the user interfaces. By seeing these services one can understand the functionalities that can be offered by the application to the concerned user. This application is user friendly application, and any person will be understanding the process and flow of the operations that are implemented.

6.1.2   Impacts

Before implementation of this application, instructor and learner use to face different issues. Keeping in mind all those issues, application will be providing solutions for both instructor and learner. They can provide the course, schedule the course, register to the course etc., can be done through online mechanism. This kind of feature reduces the burden of the instructor and the learner.

6.1.3   Requirements

7   Open Issues

There are no open issues, as per the requirements, application development is completed.

8   References

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Z1din7cH0AhWkSWwGHbTxDEkQFnoECA8QAQ&url=https%3A%2F%2Felearn.bits-
pilani.ac.in%2F&usg=AOvVaw1ZVhNKgdZyU25rZoFBfWlu

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learning%2F&usg=AOvVaw04UOYFVWUrcx7588_tts-U

https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwi
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got_password.php&usg=AOvVaw1XJ00jlxa4-0uyC_wGek27

9   Appendices

E-Learning website will be used by 3 different types of users. They are
a. Admin.
b. Instructor.
c. Learner.

Admin: He is the privileged user who will be having more rights when compared to the other users. He
will be adding the courses, he can view the details of the learners and the instructors. Following
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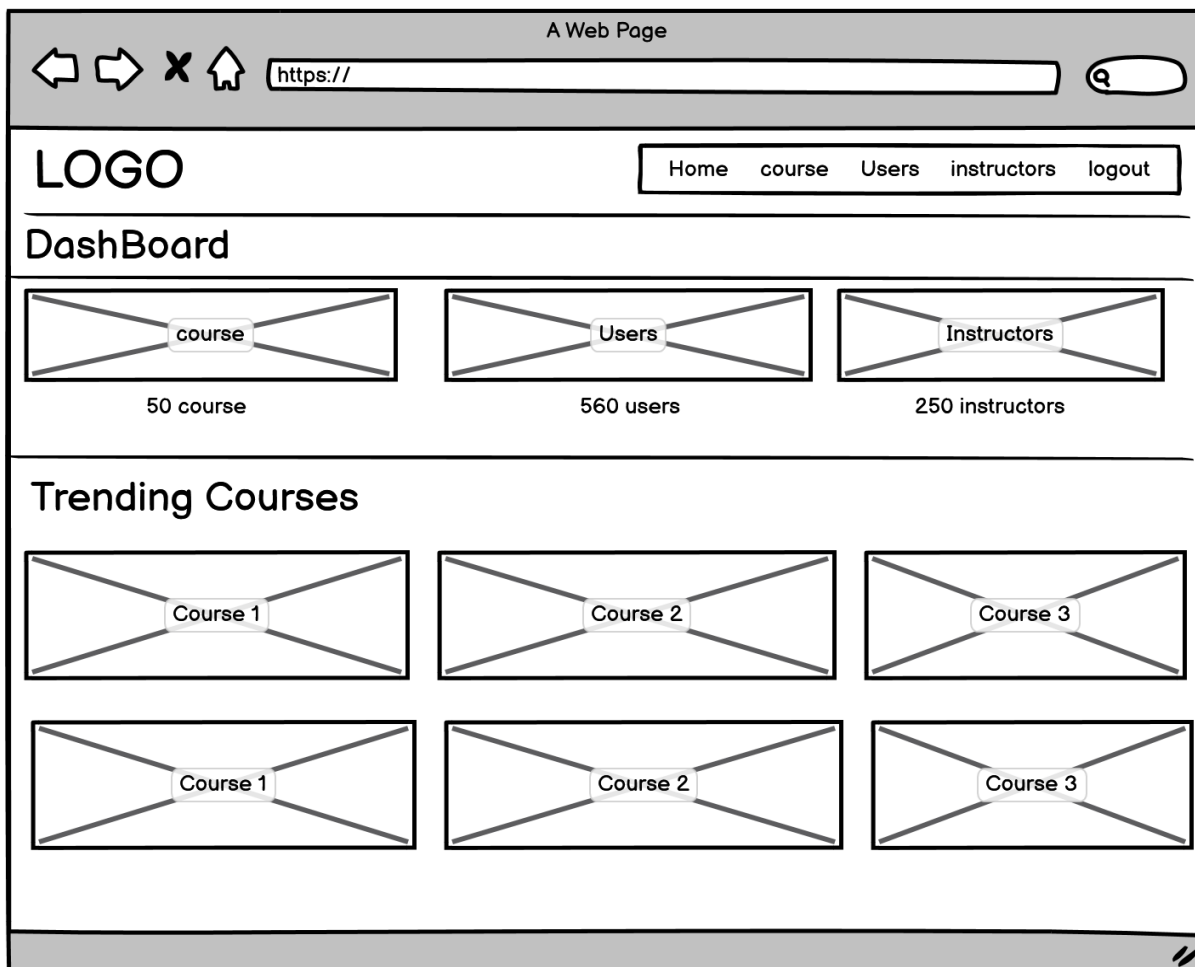
Figure 34 Admin Dashboard
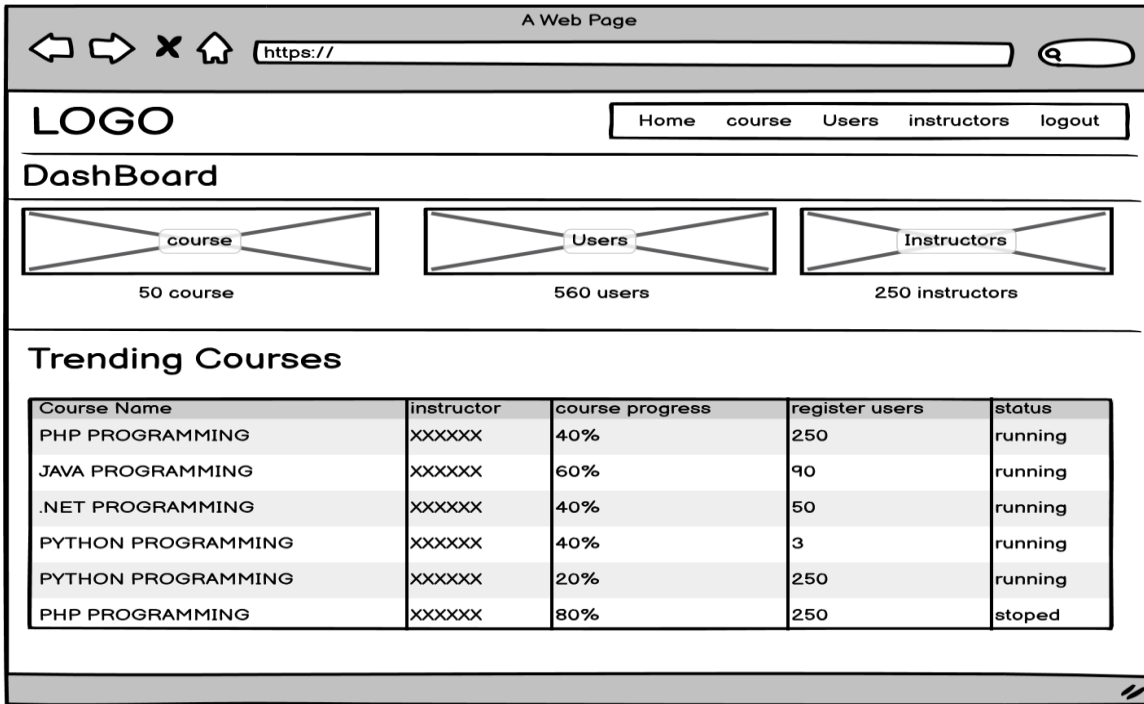
Figure 35 Courses
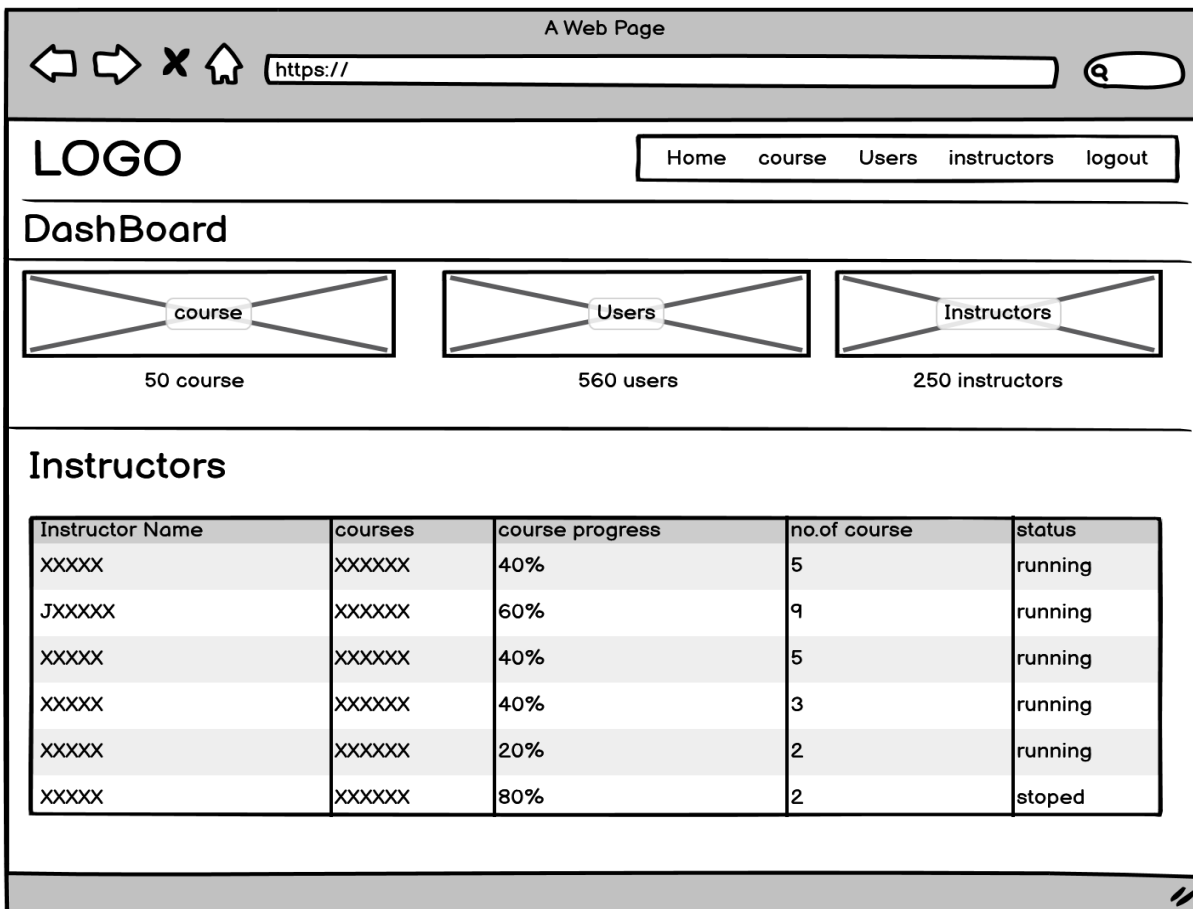
Figure 36 Instructor
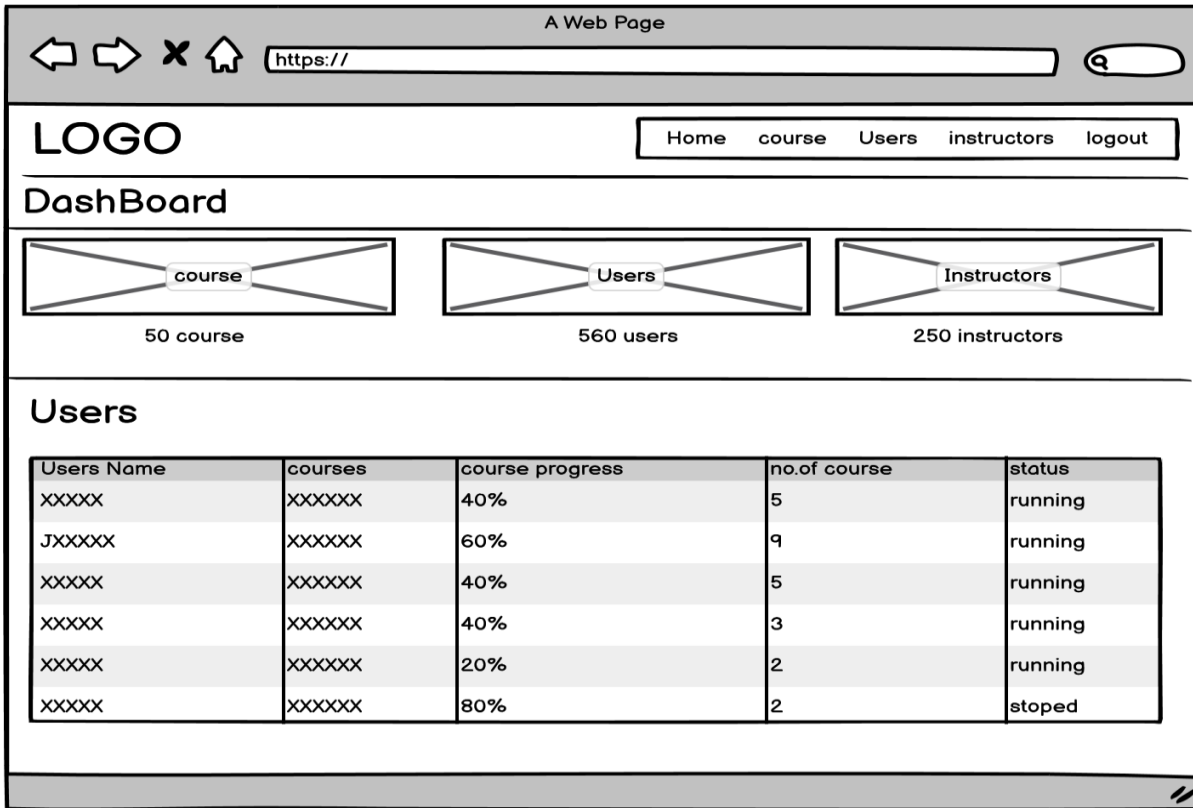
Figure 37 Users

Instructor dashboard: Following wireframes presents the instructor workflow in the application. By viewing it one can understand the operations that will be performed by the instructor.
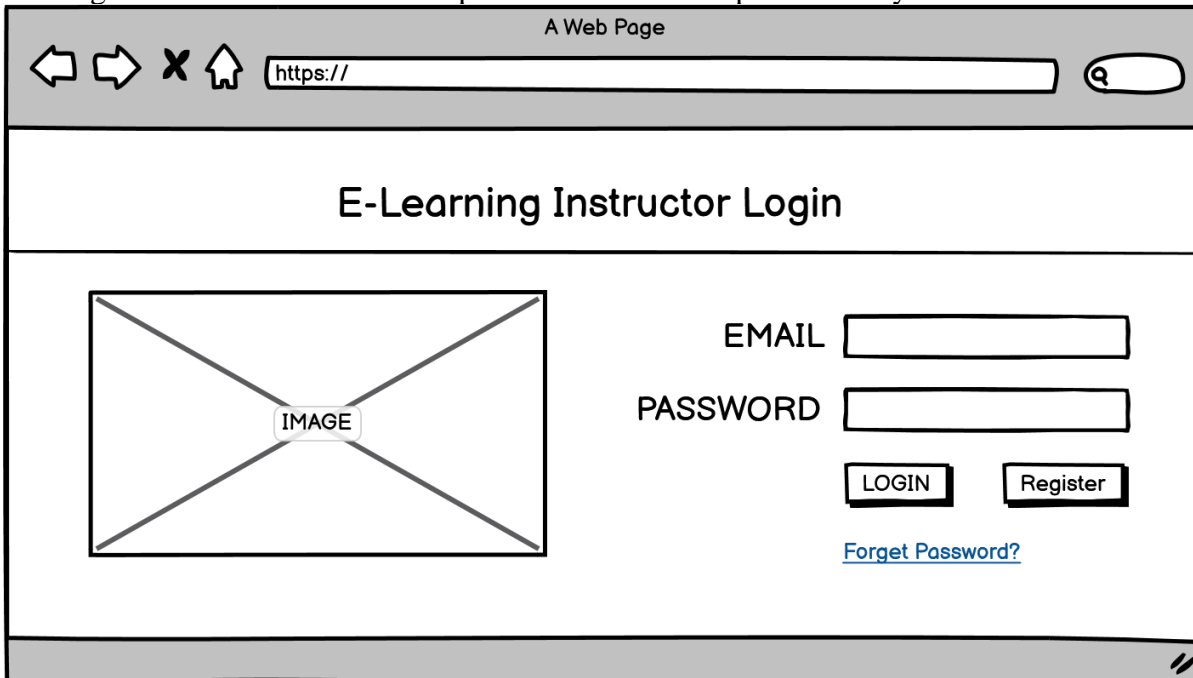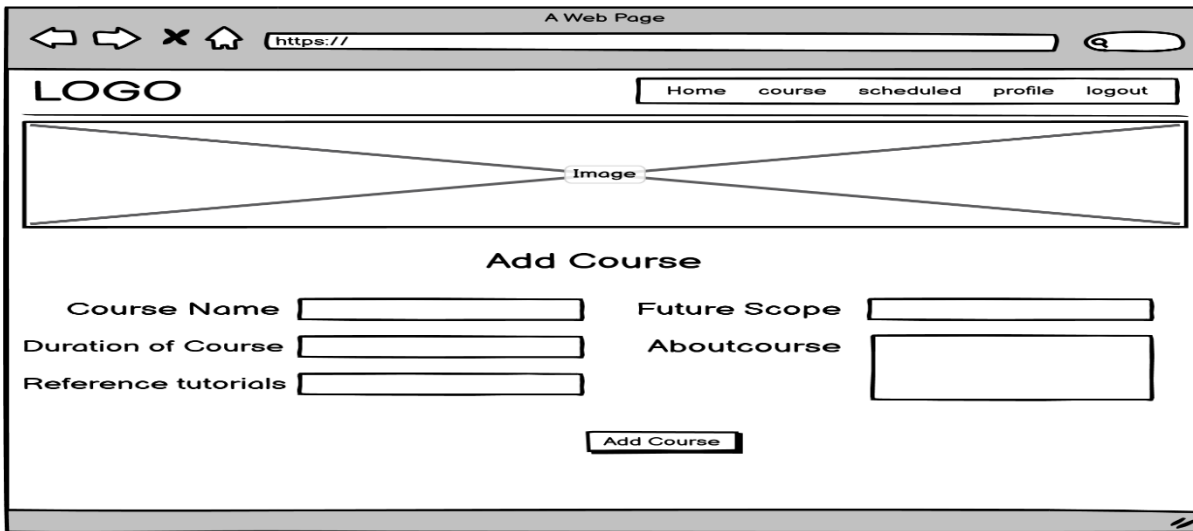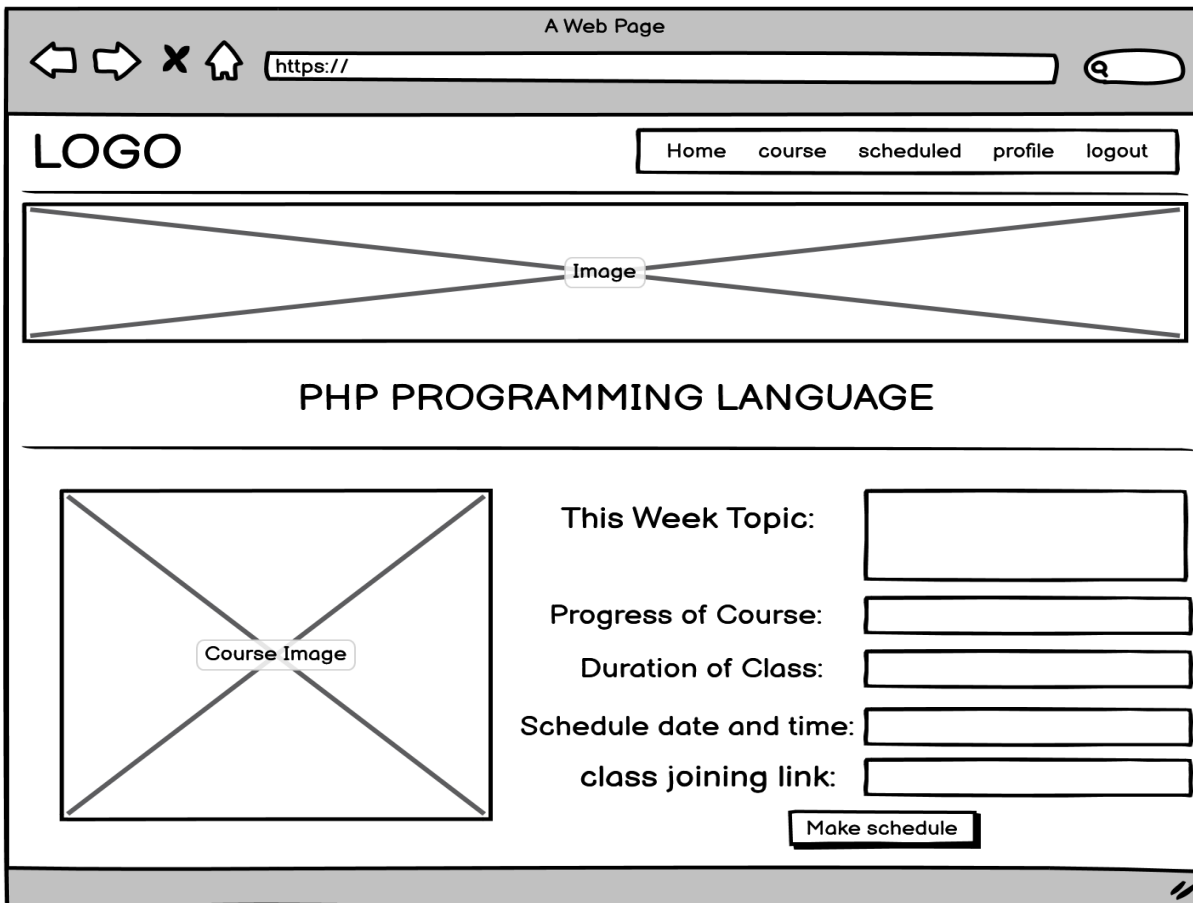

Figure 38 Login

Figure 39 Add course

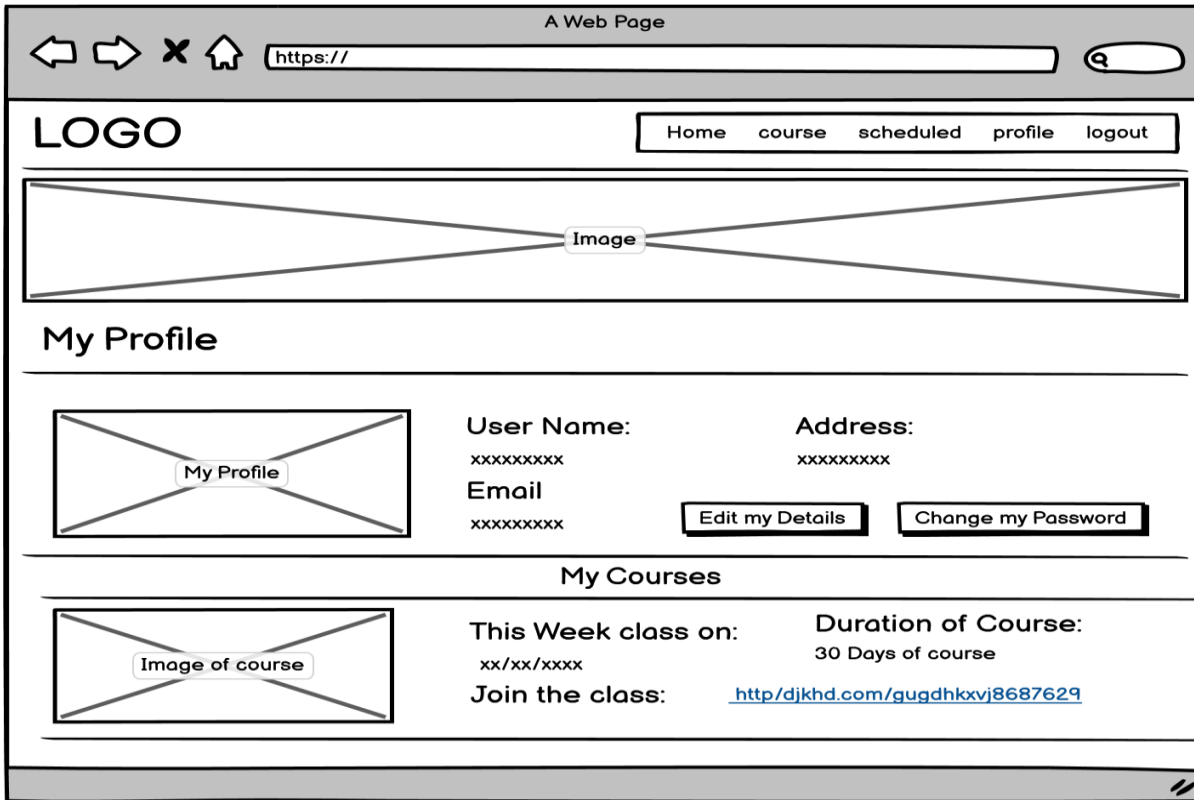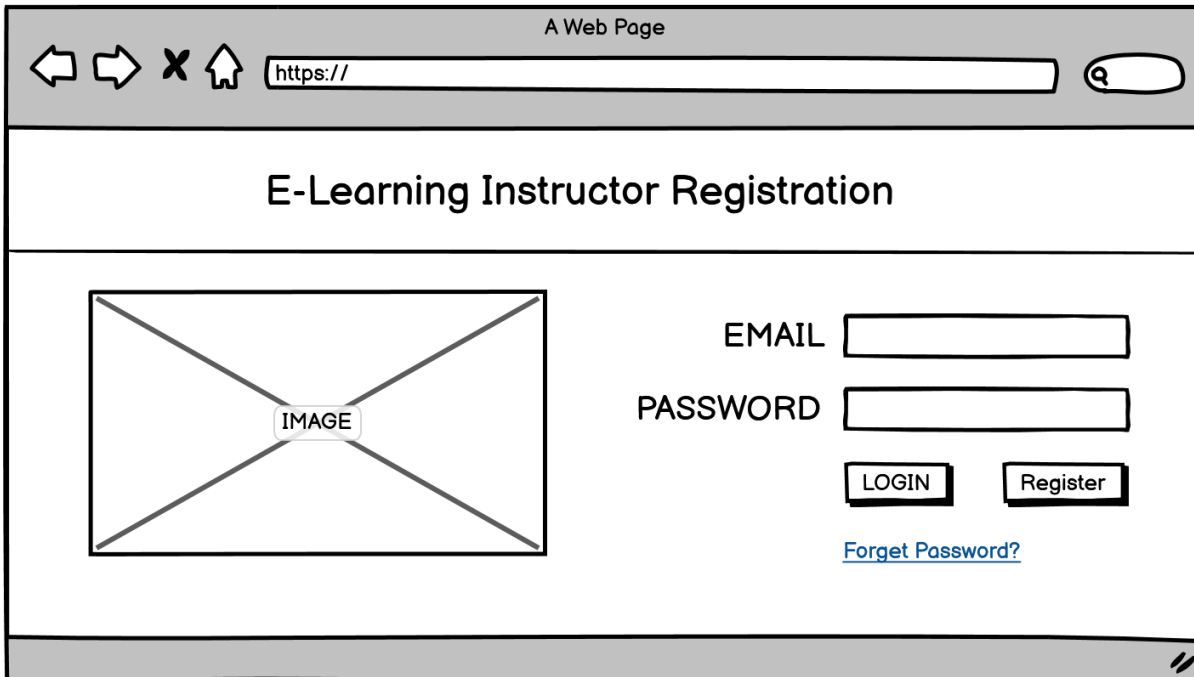
Figure 40 Make schedule
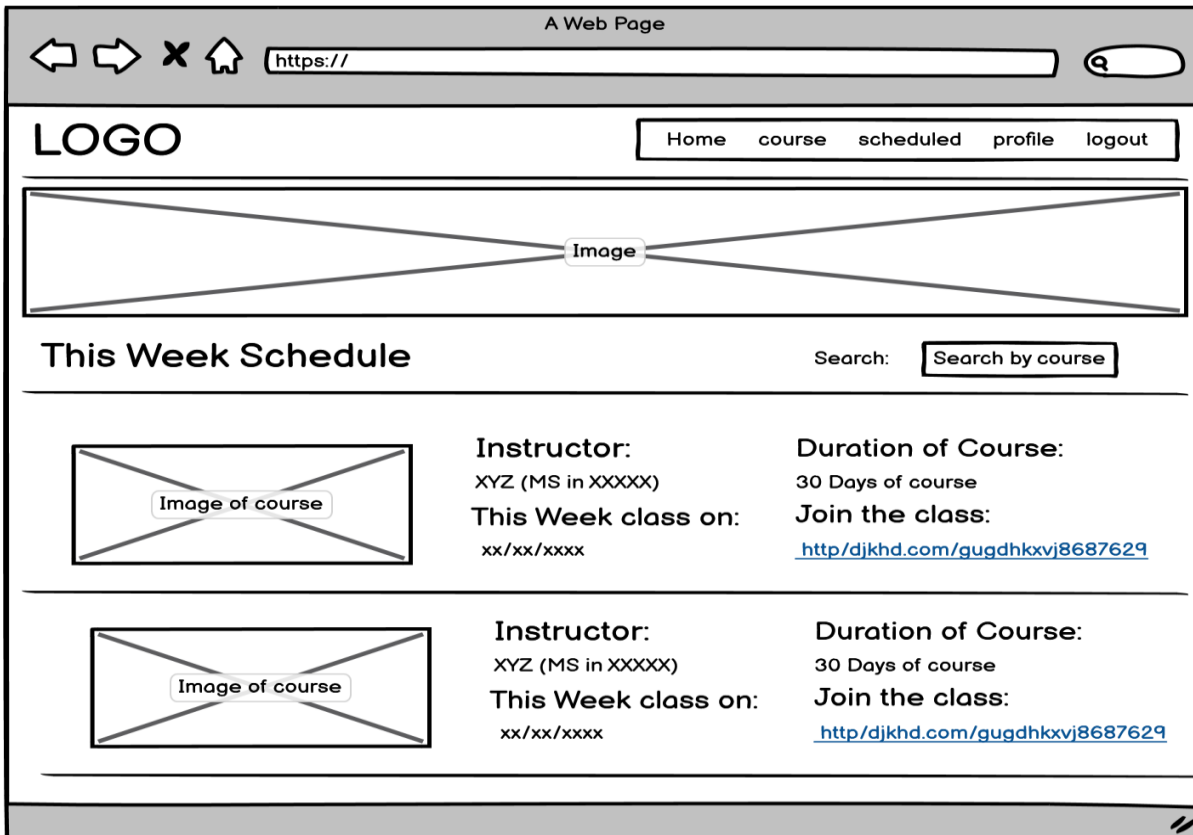
Figure 41 My profile

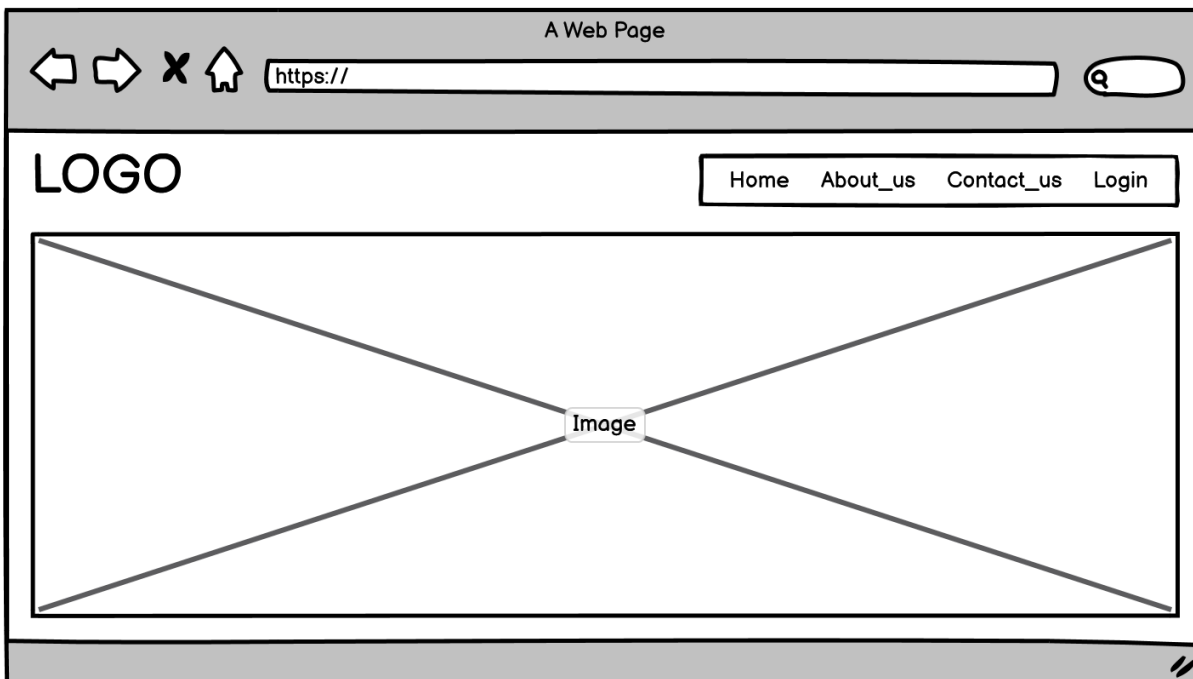
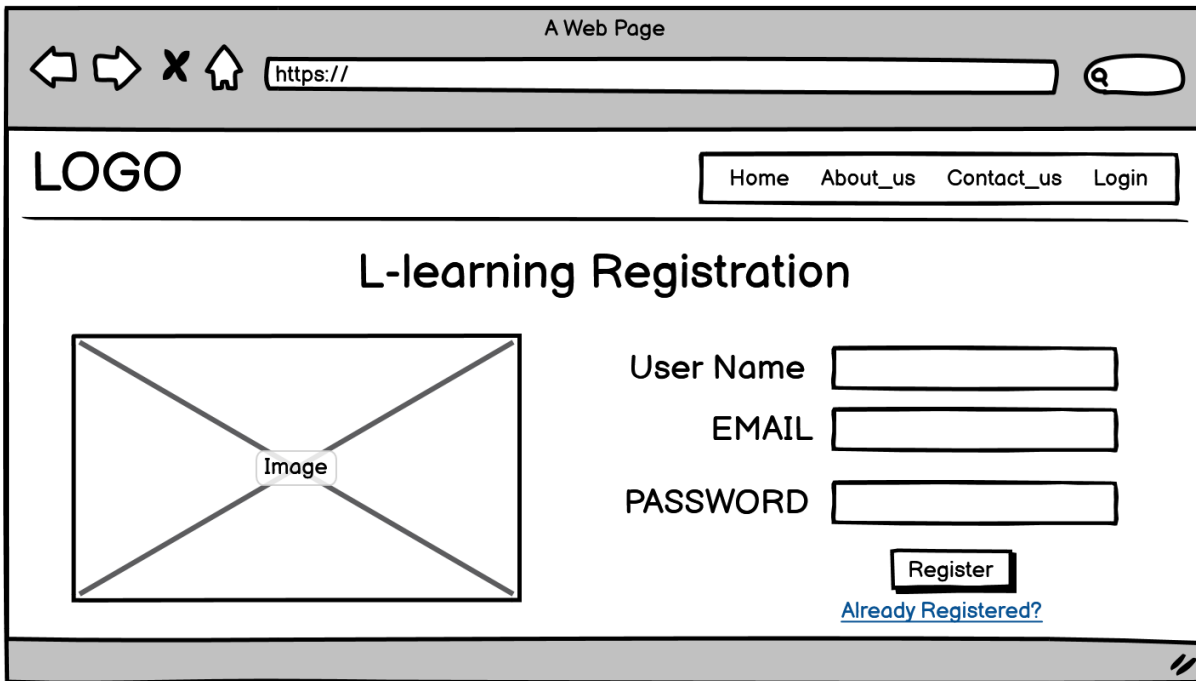Figure 42 Registration

Figure 43 Schedule

Learner Dashboard:
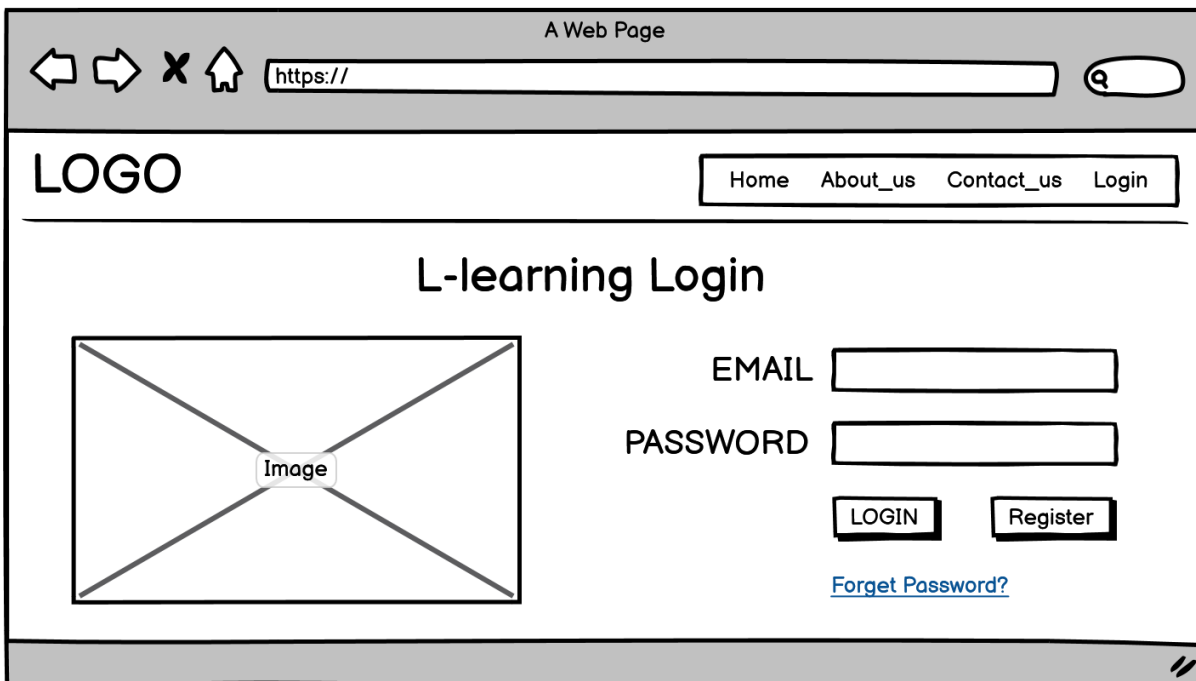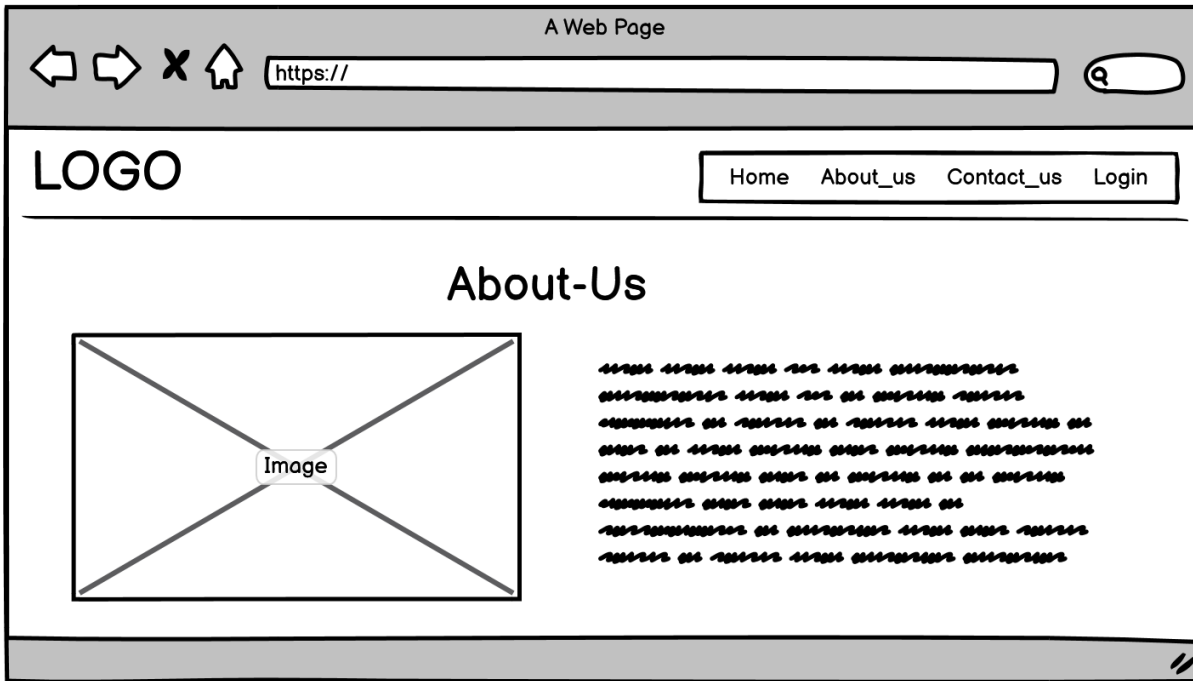

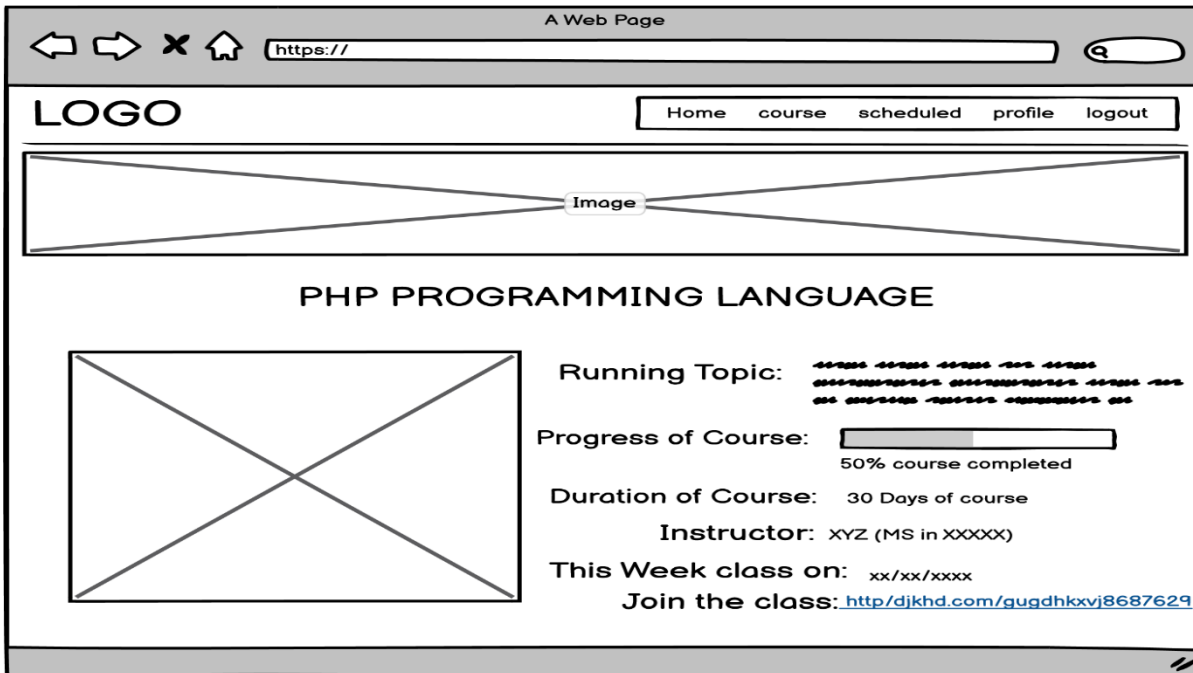Figure 44 Home

Figure 45 Learner's registration
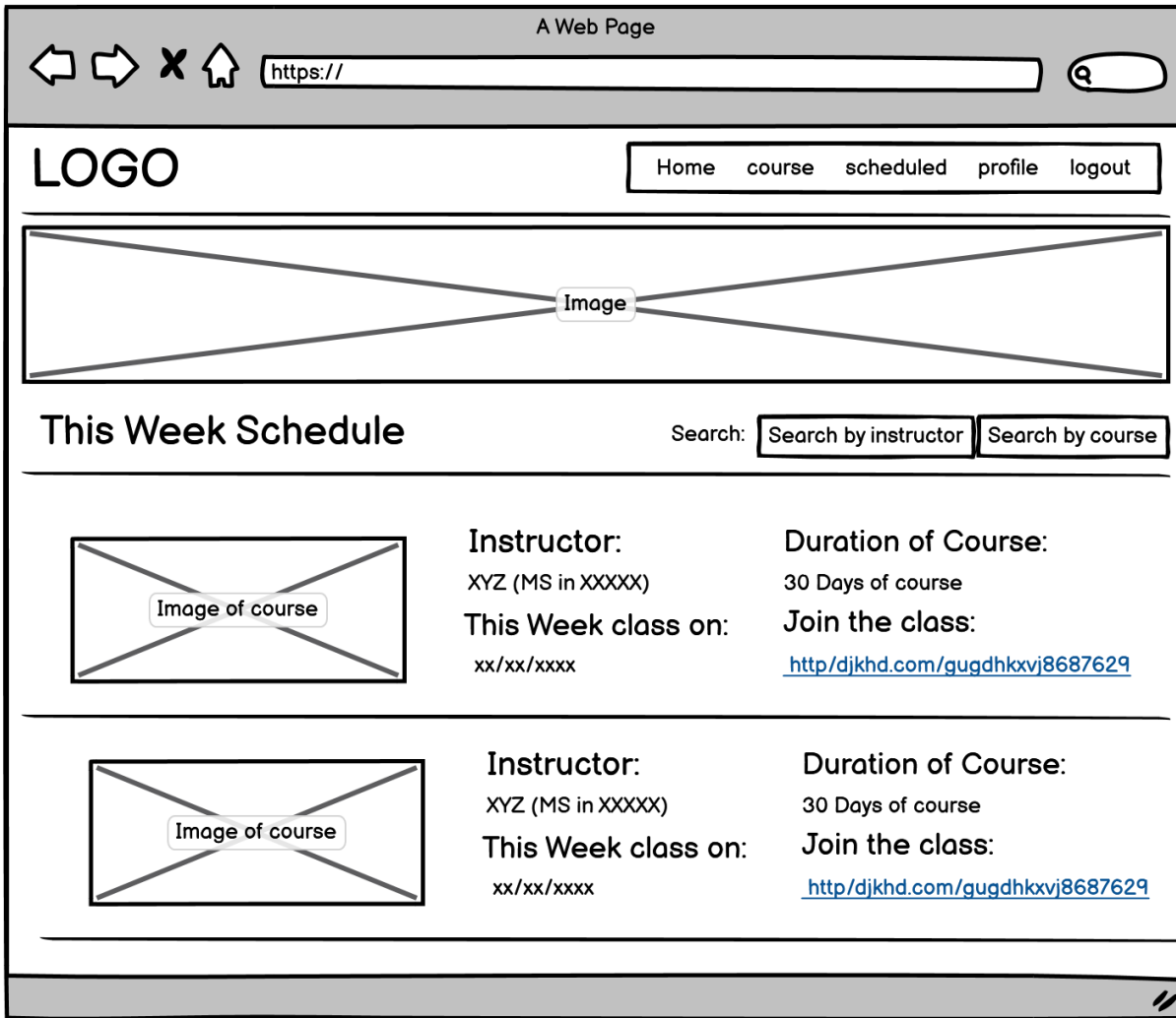

Figure 46 Login

Figure 47 About us

Figure 48 Courses

Figure 49 Schedule