

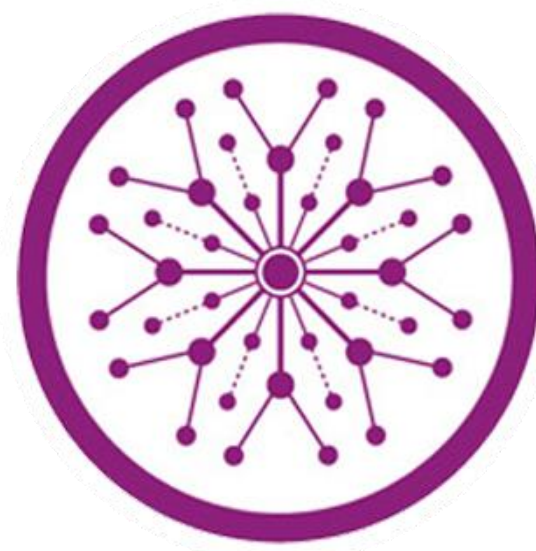
Final Year Project

SESSION 2018-2021

E-LEARNING APP (ALAMULAKA)

A project submitted in partial fulfillment of the degree of

BS in Computer Science



Department of Computer Science

Faculty of Computer Science & Information Technology

The Superior University, Lahore

Fall 2021

Type (Nature of project)	[<input checked="" type="checkbox"/>] Development [<input type="checkbox"/>] Research [<input type="checkbox"/>] R&D			
Area of specialization				
FYP ID	FYP-BCSM-S21-001			
Project Group Members				
Sr. #	Reg. #	Student Name	Email ID	*Signature
(i)	Bcsm-s18-020	Waheed Ahmad	ahmadwaheed359@gmail.com	
(ii)	Bcsm-s18-012	Zeeshan Siddique	zsiddique980@gmail.com	
(iii)	Bcsm-s18-050	Hammad Nadeem	hammadnadeem411@gmail.com	

*The candidates confirm that the work submitted is their own and appropriate credit has been given where reference has been made to work of others

Plagiarism Free Certificate

This is to certify that, I **Waheed Ahmad** S/D of Muhammad **Rasheed**, group leader of FYP under registration no **Bcsm-s18-020** at Computer Science Department, The Superior University Lahore. I declare that my FYP report is checked by my supervisor.

Date: _____ Name of Group Leader: Waheed Ahmad Signature: _____

Name of Supervisor: **Faiqa Masood**

Co-Supervisor: Mr..Mudassir

Designation: Lecturer

Designation: Associate Professor

Signature: _____

Signature: _____

HOD: Dr. Irfan Ud Din

Signature: _____

Project Report

E-Learning App (Alamulaka)

Change Record

Author(s)	Version	Date	Notes	Supervisor's Signature
	1.0		<Original Draft>	
			<Changes Based on Feedback from Supervisor>	
			<Changes Based on Feedback From Faculty>	
			<Added Project Plan>	
			<Changes Based on Feedback from Supervisor>	

APPROVAL

PROJECT SUPERVISOR

Comments: _____

Name: _____

Date: _____

Signature: _____

PROJECT MANAGER

Comments: _____

Date: _____

Signature: _____

HEAD OF THE DEPARTMENT

Comments: _____

Date: _____

Signature: _____

DEDICATION

First and foremost, we dedicate this project to Allah Almighty who has bestowed us with the support and strength throughout the work and to our beloved Holy Prophet Muhammad (S.A.W.W). We also dedicate this to our fathers, who have taught us that the best kind of knowledge to have been that which is learned for its own sake and to our mothers, who taught us that even the largest task can be accomplished if it is done one step at a time.

ACKNOWLEDGMENT

We are really thankful to our supervisor and our mentor who has gave us this golden opportunity to build our future and he is the most supportive person we have ever met; he guides us more We wish to express our immense gratitude to GOD Almighty for his mercy, guidance and protection towards us for seeing us through the rigors of this work. We are greatly indebted to our supervisor **Ma'am Faiqa Maqsood** and all the staff of our department of Computer Science both academic or nonacademic staff for their intellectual upbringing. Our special appreciation goes to our loving parents' brothers and sisters, whose moral and financial support cannot be overemphasized. Also, our sincere gratitude and special regards to our friends too many to mention whose encouragement also led to the success of this work.

Executive Summary

Alamulaka is an e-learning web-based platform that will provide its service to both the teachers and learners/parents. Parents can register on our platform and enroll their children in the different classes created by teachers. Our platform will provide a management dashboard for both the teachers and parents. Our platform is a Turkish e-learning app which provides online education to students of any age. Previous years the due to coronavirus pandemic people are forced to see and live life in a different way. Work from home and Online education were top of it. Students can't get the qualified tutors according to their need. So here comes the Alamulaka which is basically a management application for both parents and the tutors. Parents can choose the best tutors for their children by visiting the profile of the tutor and analyzing its rating and review from other learners/parents. Teachers can manage their classes and learners in our platform and make announcements in their respective classes. Our platform is responsible for the accountability of payments. Parents can pay a fee to our provided online payment transfer means. Teachers can provide their account details and Alamulaka will be responsible for transferring class fees to their accounts.

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Chapter 1

Introduction

Chapter 1: Introduction

Alamulaka is a Turkish e-learning app which provides online education to students of any age. In previous years due to the coronavirus pandemic, people are forced to see and live life differently. Work from home and Online education were top of it. Students can't get the qualified tutors according to their need. So here comes the Alamulaka which is basically a management application for both parents and the tutors. Parents can choose the best tutors for their children by visiting the profile of the tutor and analyzing its rating and review from other learners/ parents. Teachers can manage their classes and learners on our platform and make announcements in their respective classes.

1.1. Background

As there are some teachers in Turkey that operate their local setup and teach students in their academy and give different types of classes like language classes and some other special types of classes for childrens. The teacher now made their website in COVID and started giving online sessions.

1.2. Motivations and Challenges

Youtube is our main motivation but it is free of cost so the main challenge we face is the money.

How can we attract an audience more than youtube to pay money and learn?

1.3. Goals and Objectives

To provide perfect education in an easy way to students.

Teachers can easily teach and earn their desired amount on the same platform.

Parents can also easily check or view their children's study.

1.4. Existing Solutions

Youtube is one of our competitors as it provides education videos and tutorials for free to the students, but our platform is a bit different as it includes the real time queries by the student and teacher will provide the answer with a discussion in the meantime.

Coursera is an online website that provides build skills with courses, certificates, and degrees online from world-class universities and companies.

1.5. Gap Analysis

Actually, the main Gap is that there is no such website that will provide teaching and learning systems. The proposed system of our project will help to provide a single platform as a website.

Alamulaka which is basically a management application for both parents and the tutors. Parents can choose the best tutors for their children by visiting the profile of the tutor and analyzing its rating and review from other learners/ parents. Teachers can manage their classes and learners on our platform and make announcements in their respective classes.

1.6. Proposed Solution

Alamulaka is a management application for both parents and the tutors. Parents can choose the best tutors for their children by visiting the profile of the tutor and analyzing its rating and review from other learners/parents. Teachers can manage their classes and learners in our platform and make announcements in their respective classes. Tutors can get to create their private classes and sessions for specific learners. Teachers will get tuition fees from parents / learners. Teacher and Parent/Learner can communicate with each other on our platform for any kind of queries.

1.7. Project Plan

Our plan started with first gathering information from the people who lost their jobs and who are not able to learn their desired subjects.

Parents who are looking for an easy and virtual platform for their children to give them better and perfect education at home.

1.7.1. Work Breakdown Structure

Work breakdown structure will be clearly and well explained in the next field.

In the next section it is mentioned how and who performs which task.

1.7.2. Roles & Responsibility Matrix

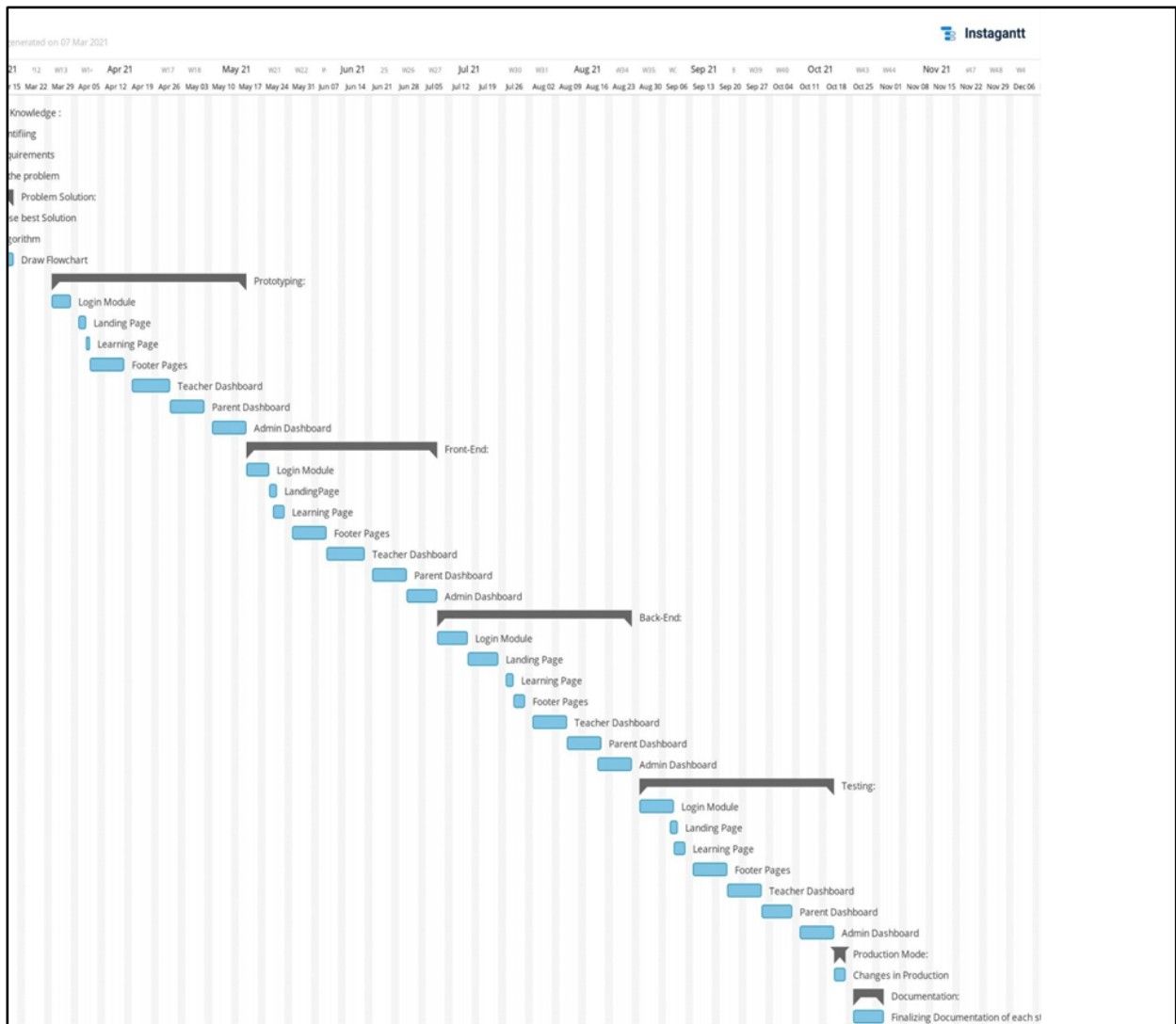
WBS #	WBS Deliverable	Activity #	Activity Complete to the Deliverable	Duration (# of Days)	Responsible Team Member(s) & Role(s)
1	Problem Knowledge	1.1	Identify the problem	1	waheed
		1.2	Specify requirements	2	zeeshan
		1.3	Analyze the problem	4	waheed
2	Problem Solution	2.1	Choose best Solution	2	waheed
		2.2	Draw Algorithm	5	hammad
		2.3	Draw Flowchart	3	hammad
3	Prototyping	3.1	Choose Design theme	1	zeeshan
		3.2	Login Module	5	hammad
		3.3	Landing Page	2	zeeshan

		3.4	Learning Page	1	zeeshan
		3.5	Footer Pages	7	hammad
		3.7	Parent Dashboard	5	waheed
		3.8	Admin Dashboard	5	hammad
4	Front-End	4.2	Login Module	5	hammad
		4.3	Landing Page	2	zeeshan
		4.4	Learning Page	1	zeeshan
		4.5	Footer Pages	7	hammad
		4.6	Teacher Dashboard	7	waheed
		4.7	Parent Dashboard	5	waheed
		4.8	Admin Dashboard	5	hammad
5	Back-End	5.2	Login Module	5	hammad

		5.3	Landing Page	2	zeeshan
		5.4	Learning Page	1	zeeshan
		5.5	Footer Pages	7	hammad
		5.6	Teacher Dashboard	7	waheed
		5.7	Parent Dashboard	5	waheed
		5.8	Admin Dashboard	5	hammad
6	Testing	6.2	Login Module	5	hammad
		6.3	Landing Page	2	zeeshan
		6.4	Learning Page	1	zeeshan
		6.5	Footer Pages	7	hammad
		6.6	Teacher Dashboard	7	waheed
		6.7	Parent Dashboard	5	waheed

		6.8	Admin Dashboard	5	hammad
7	Production Mode	7.1	changes to run app in production mode	2	waheed
8	Documentation	8.1	Finalizing Documentation of each step	6	hammad

17.3 Gantt Chart



1.8. Report Outline

Our platform is a Turkish e-learning app which provides online education to students of any age. Alamulaka is basically a management application for both parents and the tutors. Parents can choose the best tutors for their children by visiting the profile of the tutor and analyzing its rating and review from other learners/parents. Teachers can manage their classes and learners in our platform and make announcements in their respective classes. Our platform is responsible for the accountability of payments. Parents can pay a fee to our provided online payment transfer means. Teachers can provide their account details and Alamulaka will be responsible for transferring class fees to their accounts.

Chapter 2

Software Requirement Specifications

Chapter 2: Software Requirement Specifications

2.1 Introduction

Alamulaka is a Turkish e-learning app which provides online education to students of any age. Previous years due to coronavirus pandemic people are forced to see and live life in a different way. Work from home and Online education were top of it. Students can't get the qualified tutors according to their need. So here comes the Alamulaka which is basically a management application for both parents and the tutors . Parents can choose the best tutors for their children by visiting the profile of the tutor and analyzing its rating and review from other learners/ parents. Teachers can manage their classes and learners in our platform and make announcements in their respective classes.

2.2 Overall Description

2.2.1 Product Perspective

The product is supposed to be an open source, under the GNU general Public License. It is a web based system implementing a client-server model.

The system allows the user to create their accounts in the system and provide features of updating and viewing profiles.

2.2.2 User Classes and Characteristics

Users of the system should be able to see posts of different users who post on the web application, and comment on the post, like and dislike the post as well. Users should be able to sign up, sign in, sign out, if the user is logged in in that only case he is able to see the posts, means authorization.

2.2.3 Operating Environment

This is a web based system and hence will require the operating environment for a client and server GUI. The browser that will be used for operating website must be supported HTML5 like Google, Microsoft Edge, Safari etc.

2.2.4 Design and Implementation Constraints

1. Information of all the users should be stored in the database.
2. This application is running 24 hours.
3. User can access this from anywhere from any computer
4. Users must have their correct email addresses and passwords matching to it to use this application.

2.2.5 Assumptions and Dependencies

This software highly depends on the type and version of browser being installed in the system i.e. browser version should be used which have HTML5 support.

Various dependencies will used throughout in this project, but for now we used and install some of them, which are,

1. Body-Parser
2. Cookie-Parser
3. Dotenv
4. Express
5. JWT
6. Express jwt
7. Express-router
8. Express-validator
9. Nodemon
10. Uuid
11. Morgan
12. Mongoose and many more.

2.3 External Interface Requirements

2.2.1 User Interfaces

The application GUI provides menus, toolbars, buttons, panes, containers, navbar, grids allowing for easy control by a keyboard and a mouse.

2.2.2 Hardware Interfaces

Devices should be enabled with the internet and a browser installed in it that supports HTML5.

2.2.3 Software Interfaces

The user's browser should be HTML5 compatible for a satisfactory user experience.

2.2.4 Communications Interfaces

E-mail, web browser, network server, communications protocols.

HTTP used as a communication standard.

Messages and calls encrypted.

2.4 System Features

Two main features are included yet which are given below.

2.2.1 Login

1.4.1.1. Description and Priority

Login is must to get into the application or get connected by other people.

1.4.1.2. Stimulus/Response Sequences

First, you have to put your email and password to get signed up to use this application.

Secondly, email and password should be valid, meaning it meets the required criteria of them.

1.4.1.3. Functional Requirements

A user should be authorized to perform other functions of the application, like user profile, posts, courses, classes, etc.

2.2.2 Student/Teacher

1.4.2.1. Description and Priority

Teachers and Students are two main roles of this website.

1.4.2.2. Stimulus/Response Sequences

First you have to put your email and password to get signed up to use this application.

Secondly, email and password should be valid, meaning it meets the required criteria of them.

1.4.2.3. Functional Requirements

A user should be authorized to perform other functions of the application, like user profile, posts, courses, classes, etc.

2.5 Other Nonfunctional Requirements

2.2.1 Performance Requirements

The system must be interactive and the delays involved must be less .So in every action-response of the system, there are no immediate delays. In case of opening windows forms, of popping error messages and saving the settings or sessions there is delay much below 2 seconds.

2.2.2 Safety Requirements

Information transmission should be securely transmitted to the server without any changes in information.

2.2.3 Security Requirements

The main security concern is for users' accounts hence proper login mechanism should be used to avoid hacking. The tablet id registration is a way to spam check for increasing the security. Hence, security is provided from unwanted use of recognition software.

1.5.4 Usability Requirements

As the system is easy to handle and navigates in the most expected way with no delays. In that case the system program reacts accordingly and transverses quickly between its states.

1.5.5 Reliability Requirements

As the system provides the right tools for discussion, problem solving, it must be made sure that the system is reliable in its operations and for securing the sensitive details.

1.5.6 Maintainability/Supportability Requirements

If we talk about the maintainability of the application it can be easily maintainable. Because we use simple and simple things and things that we used are user friendly.

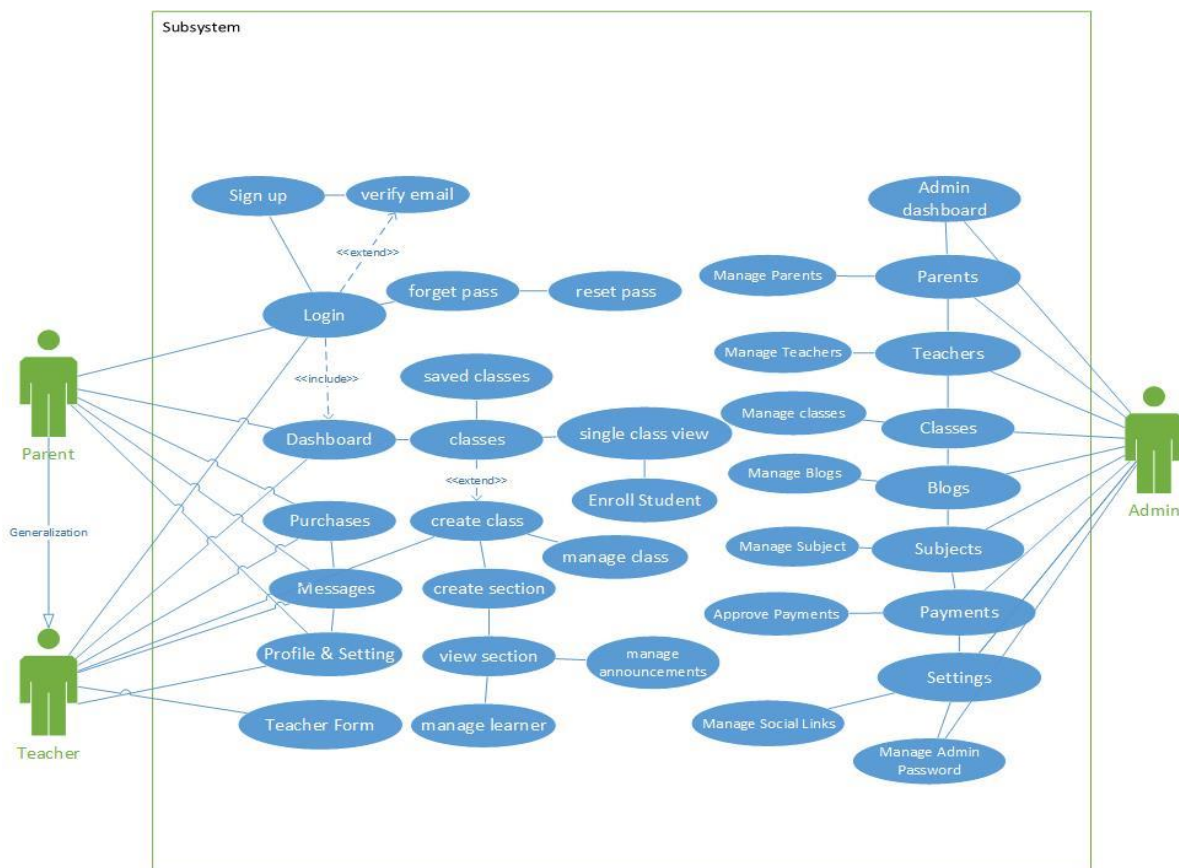
Chapter 3

Use Case Analysis

Chapter 3: Use Case Analysis

Functional requirements of the system are described using use case view. The Following use case diagrams summarize the functional requirements of the system and explain it in more convenient way.

3.1. Use Case Model



3.2. Use Case Descriptions

Use Case Name	Login/Signup
Use case Description	A user login to the system or web application to access the functionality of the system.
Actors	Parent , Teacher and Admin
Pre-Condition	System must be connected to the network.
Post-Condition	After getting a login, users get notification of successful login. And moved to the dashboard

Use case Name	Dashboard
Use case Description	A user can view its upcoming classes detail and manage it
Actors	Parent , Teacher and Admin
Pre-Condition	User's system must be authenticated while using the application.
Post-Condition	Users get notified after any operation is done by him/her.

Use case Name	Manage Classes
Use case Description	A user can create new classes and it goes for approval to the admin then after approval teacher can create sections and post announcement
Actors	Teacher and Admin
Pre-Condition	User's system must be authenticated while using the application.
Post-Condition	Users get notified after any operation is done by him/her.

Use case Name	Enroll Student
Use case Description	A user can enroll its student after selecting a time slot in a specific class after payment
Actors	Parent
Pre-Condition	User's system must be authenticated while using the application.
Post-Condition	Users get notified after any operation is done by him/her.

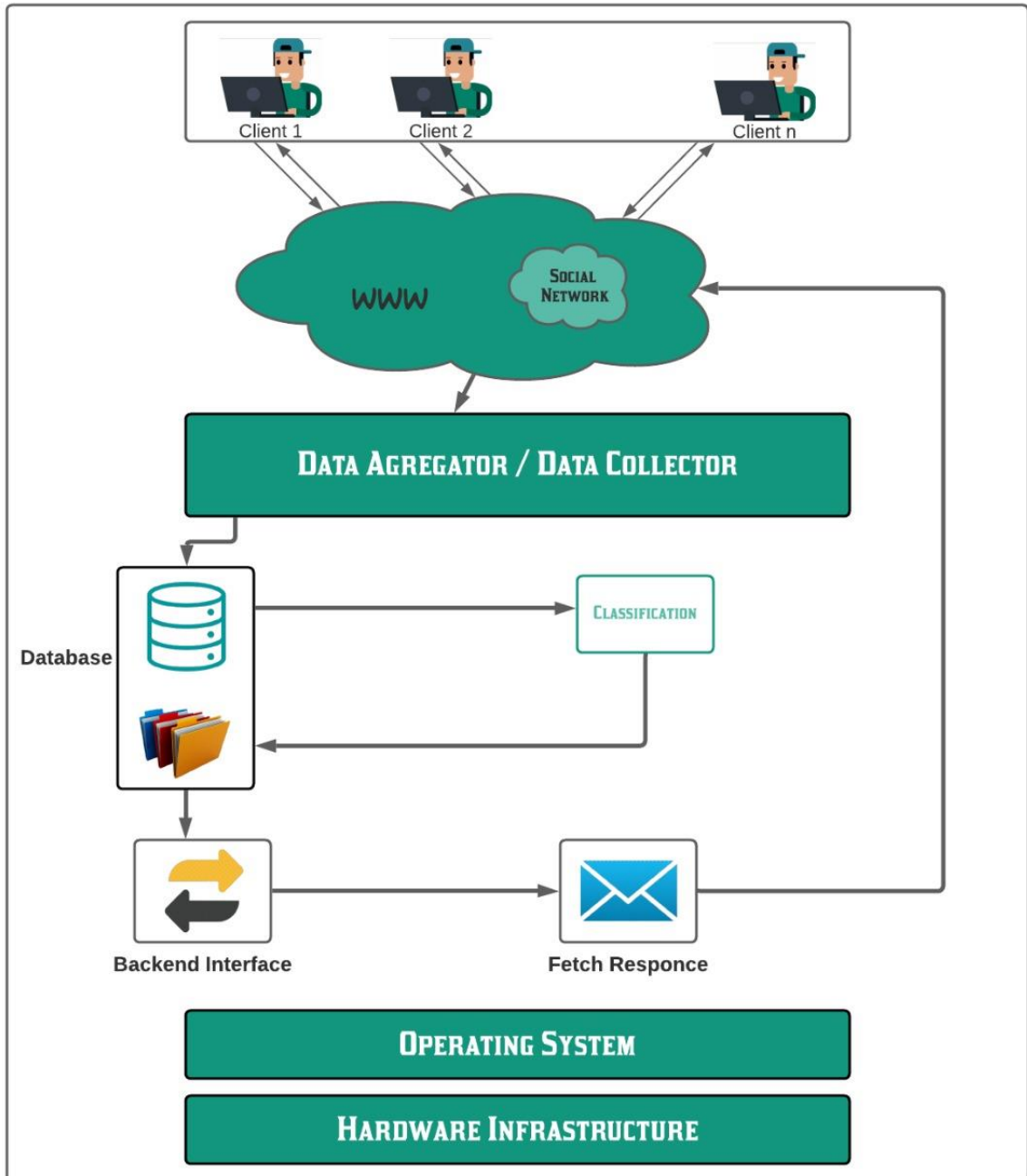
Chapter 4

System Design

Chapter 4: System Design

Design is a creative process requiring insight and flair on the part of the designer. It is the key to effective engineering. The design process involves several models of the system at different levels of abstraction. As a design is decomposed, errors and omissions in earlier stages are discovered. These feedbacks allow earlier design models to be improved. Object oriented design is concerned with developing an object-oriented model of application domain. The identified objects may or may not map directly into system objects.

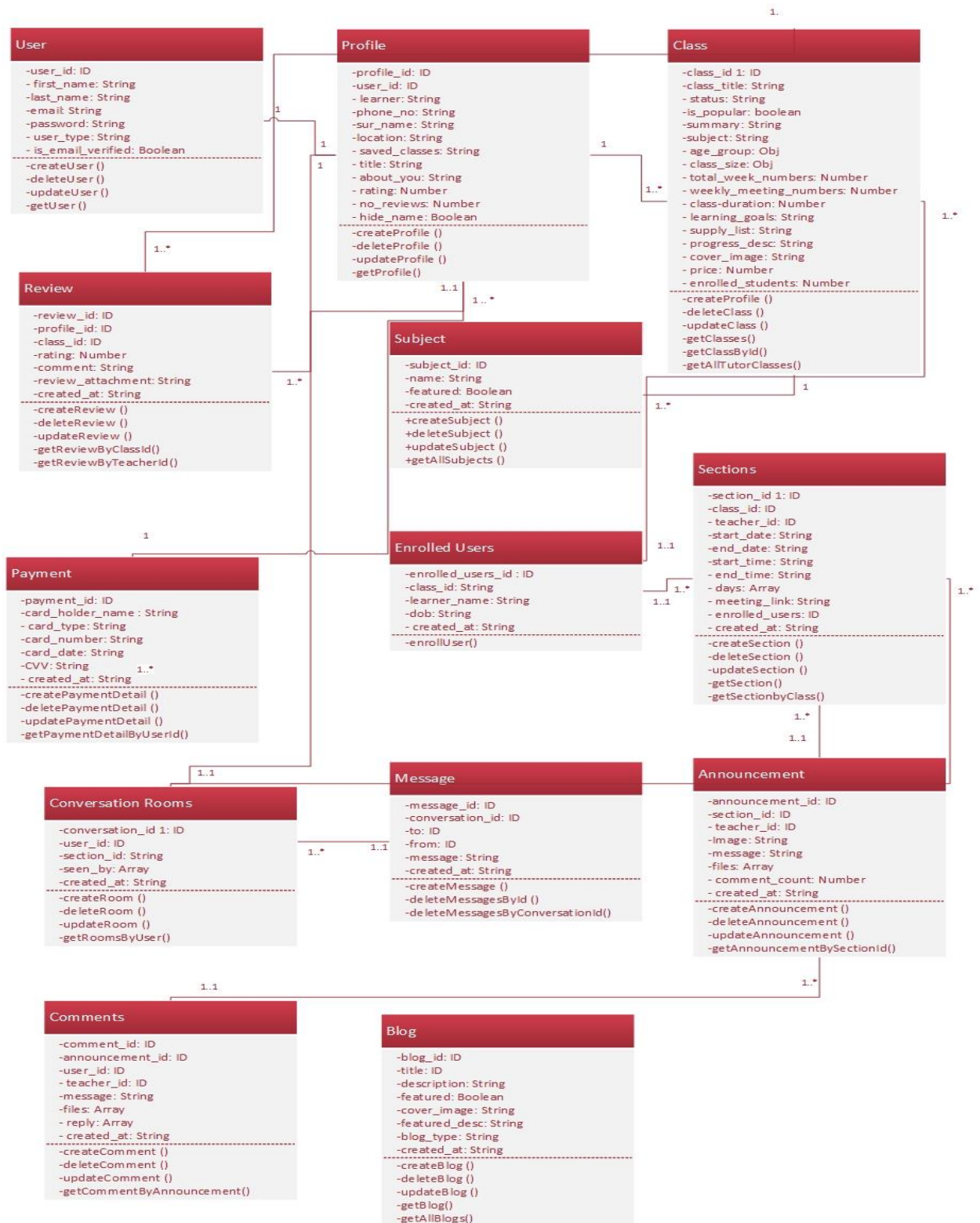
4.1. Architecture Diagram



4.2. Entity Relationship Diagram with data dictionary

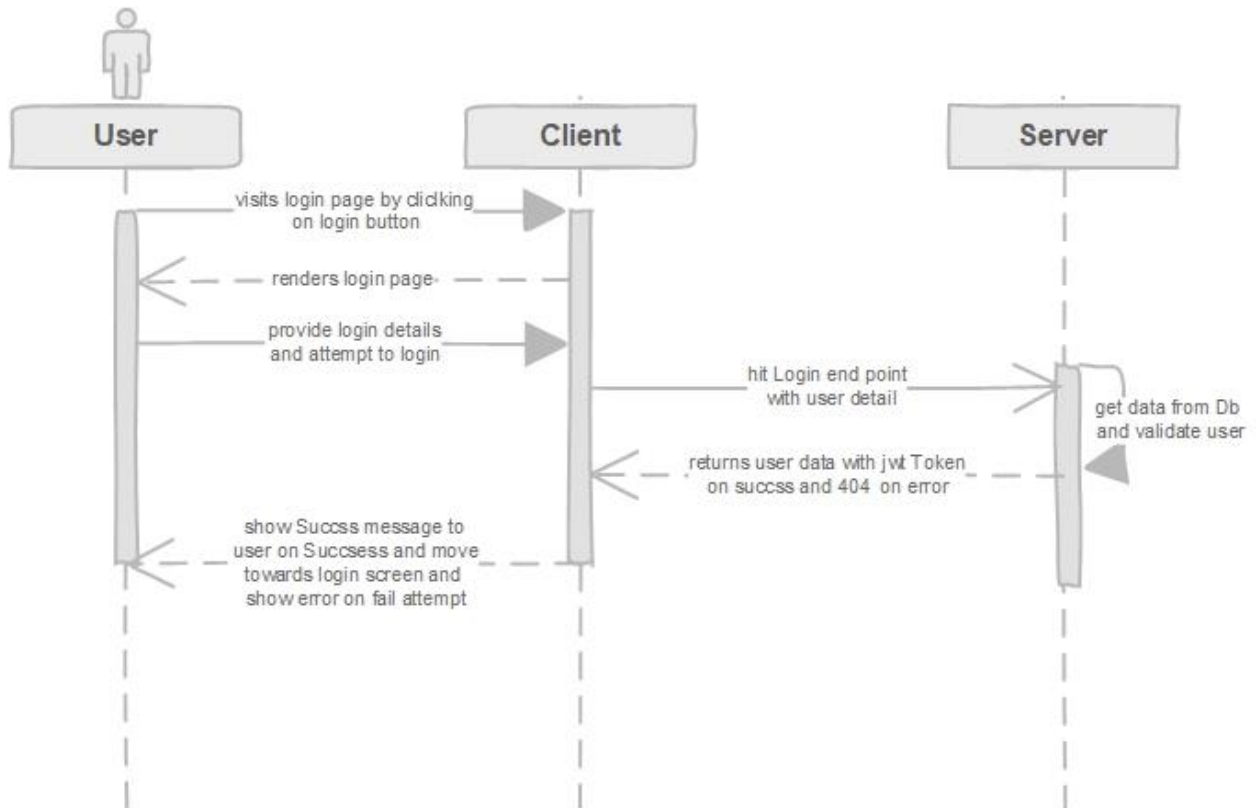


4.4 Class Diagram

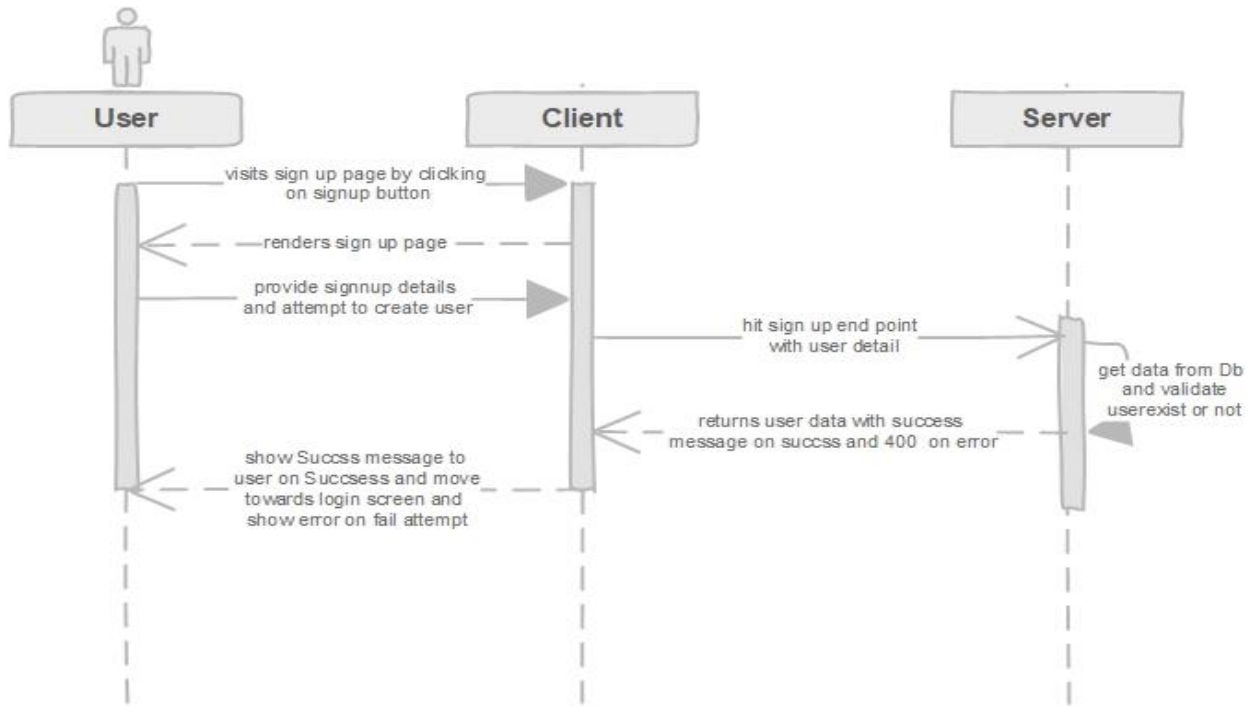


4.5 Sequence / Collaboration Diagram

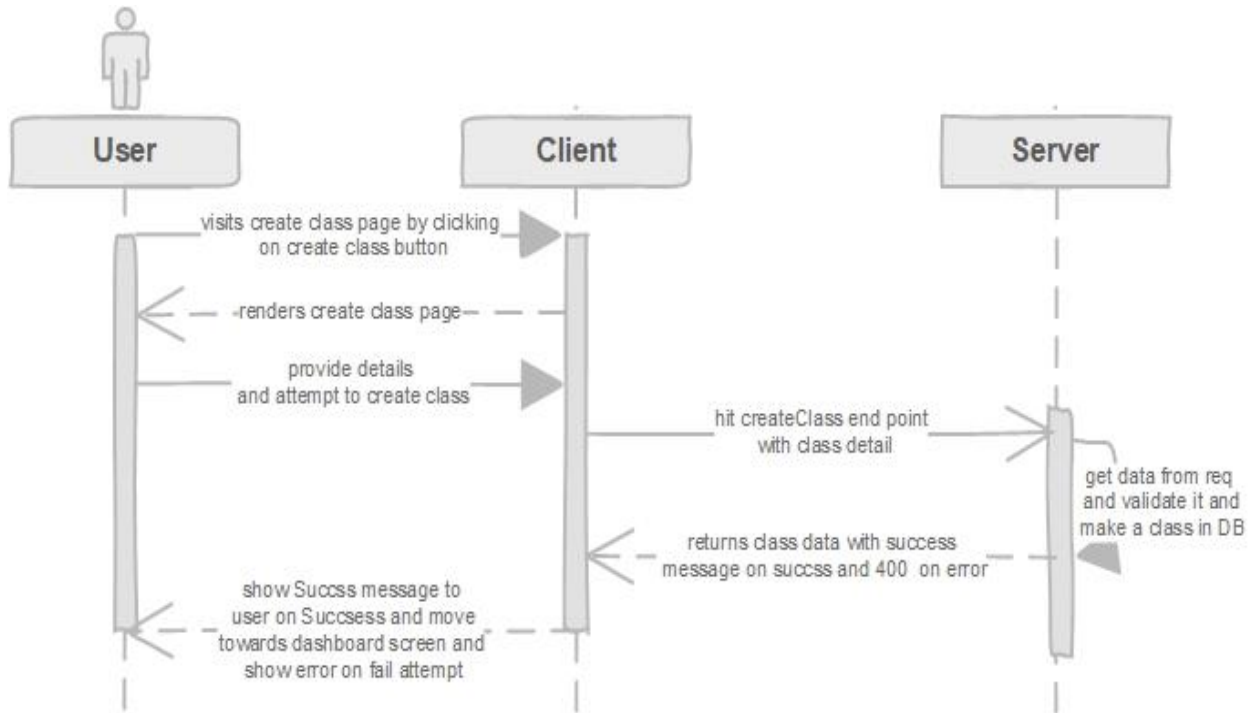
User login - sequence model.



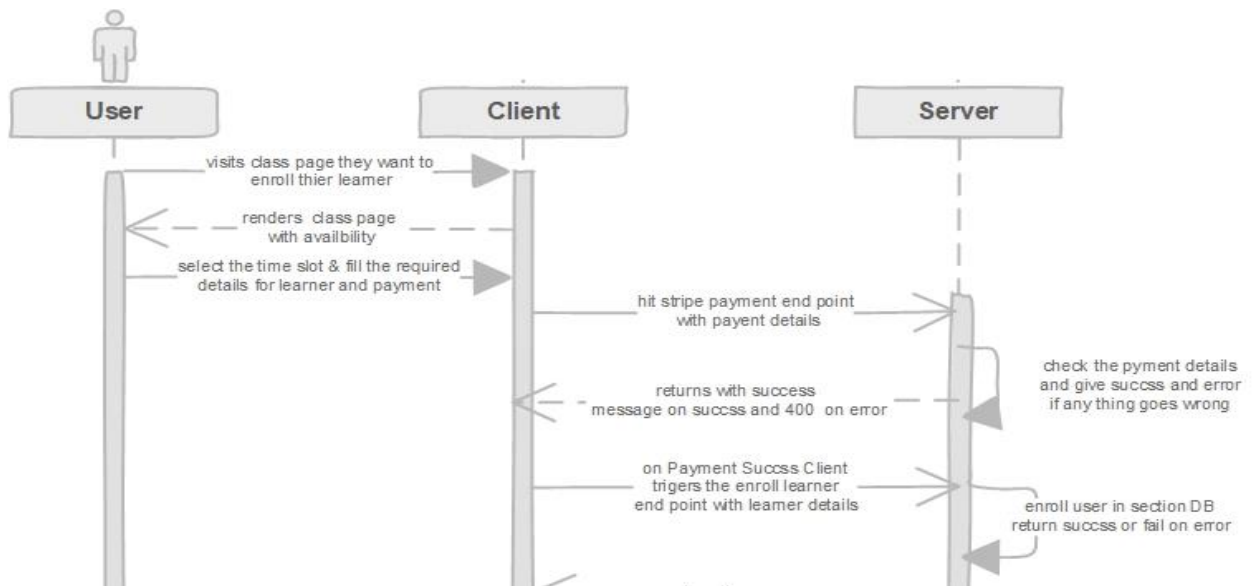
User signup - sequence model:



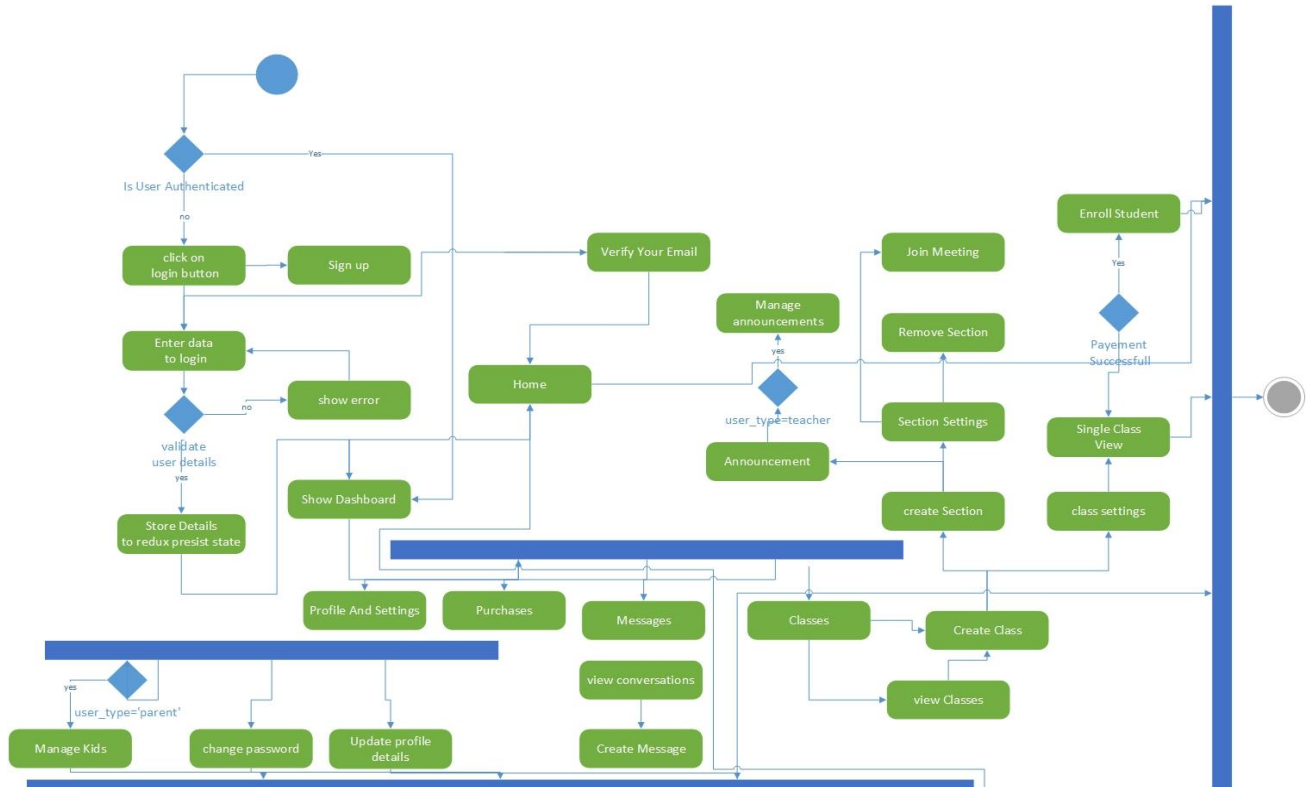
Create Class - sequence model:



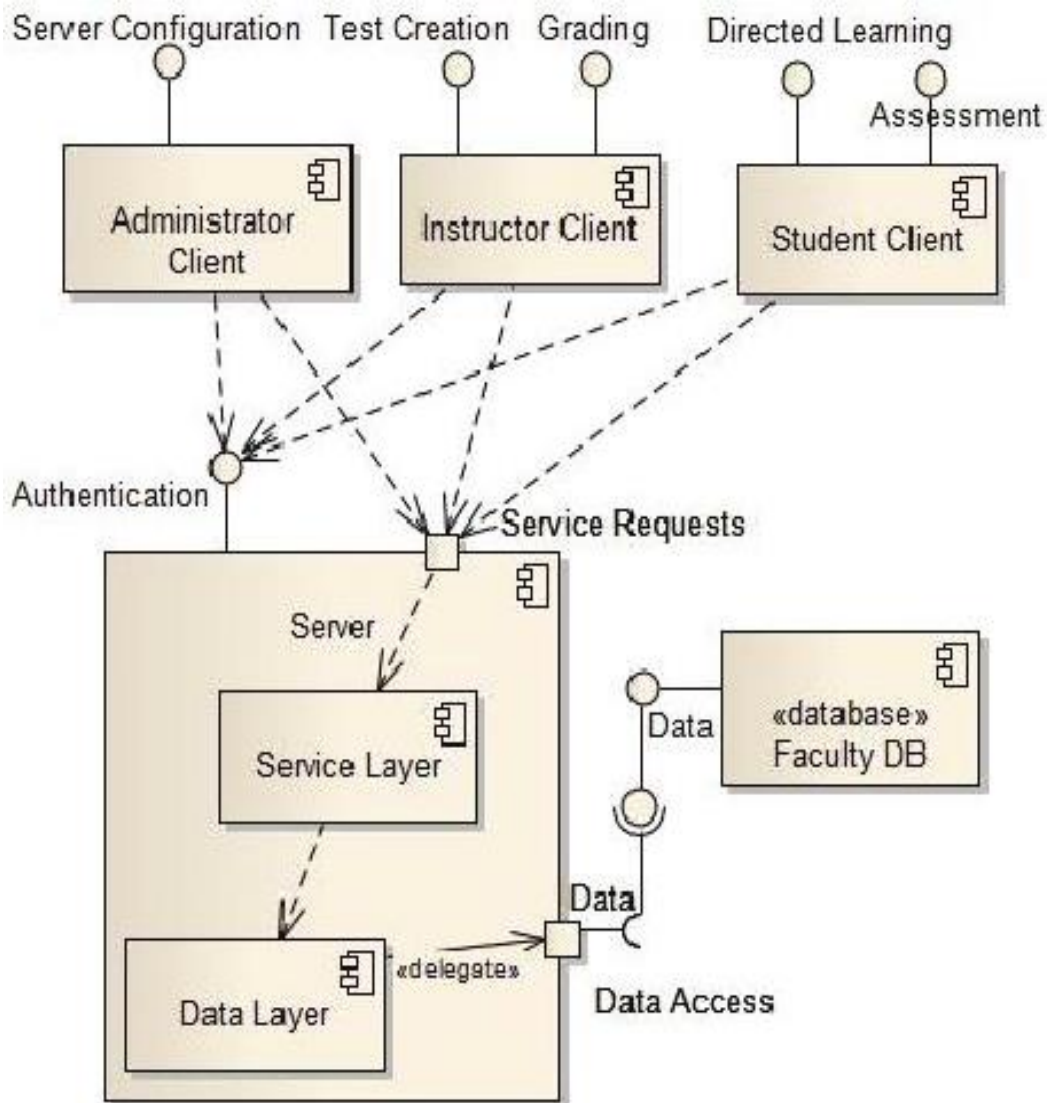
Enroll a student - sequence model :



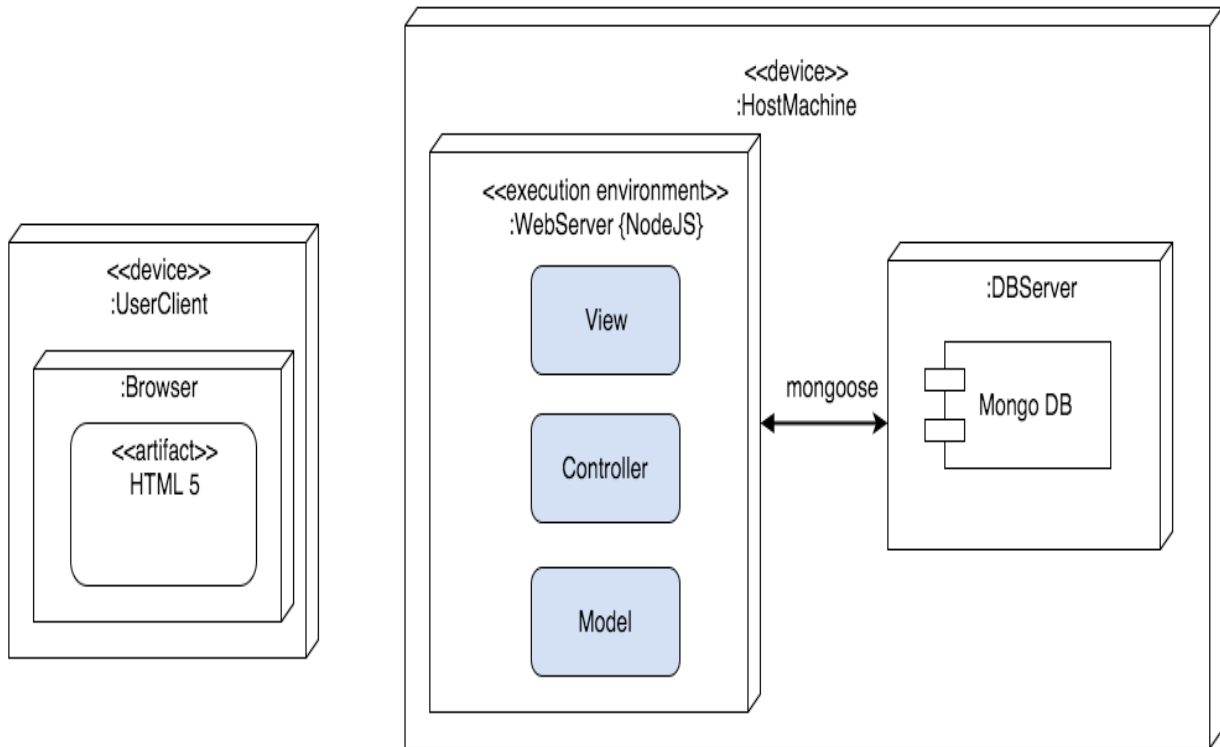
4.6 Activity Diagram



4.7 Component Diagram



4.8 Deployment Diagram



Chapter 5

Implementation

Chapter 5: Implementation

5.1. Important Flow Control/Pseudo codes

these are the following our important flow controls

- Payment process
- Enrollment process flow of a learner.
- Setting up a teacher profile.
- Teacher form and its approval.
- Teacher Details verifications.

5.2. Components, Libraries, Web Services and stubs

Components	Libraries
Navbar	React Icons
Home	React Router DOM
Chat	Bootstrap
Dashboard	Material UI
Footer	Owl Carousel

5.3. Deployment Environment

The deployment of first pilot test is on browser

Browser:

- Chrome
- Microsoft edge

Operating system:

Windows

5.4. Tools and Techniques

The basic tools in the development of the project are React JS, Node JS, MongoDB, Express JS by using the platform of Microsoft Visual Studio. We use mongo DB for efficiency of our results.

Tools

- Microsoft Visual Studio Code
- Adobe XD
- Postman

Technology

- React JS
- Node JS
- Express JS
- MongoDB Database

5.5. Best Practices / Coding Standards

Code readability is a universal subject in the world of computer programming. It is the first thing we learn as developers. The coding standards of the major portions are according to the concepts of Object-Oriented Programming. As we know the rules and values of coding worldwide is to code according to OOP concepts by using its terms and techniques.

Following are the Coding Standards:

Naming Conventions

The naming conventions in framework and android based technology we used:

Variables:

Begins with the lowercase or upper-case letters. The variables are used to store the application information about any aspects of any state of application.

Classes:

Some classes are declared with uppercase letters and some with lowercase letters. The classes are the collection of functions.

Functions:

Functions start with uppercase letters or lowercase letters and also use underscore in the name. Functions are collections of code, they are written once, and they can be used, as they need in a program.

Inline Comments:

Inline comments explaining the functionalities and codes of the application development.

Use of Braces:

- Braces are used to delimit the bodies of conditional statements, control constructs, and blocks of scope.
- Braces shall be used even when there is only one statement in the control block.

Spacing:

- A keyword followed by a parenthesis should be separated by a space.
- A blank space should appear after each comma in an argument list.

5.6. Version Control

We are using GitHub for version control for our code base in different environments. like staging , development and production

Chapter 6

Testing and Evaluation

Chapter 6: Testing and Evaluation

Software testing is a process, to evaluate the functionality of a software application with an intent to find whether the developed software met the specified requirements or not and to identify the defects to ensure that the product is defect free in order to produce the quality product.

6.1. Use Case Testing

We came across some issues during use case testing are following:

sign up process of a teacher:

At first, we were directly making teachers to do signup as per our use case flow. Then it occurred that we couldn't verify a teacher in the process, so we came with a teacher form that will be submitted to the admin, and it will manually verify the details.

6.2. Boundary value analysis

Boundary testing is the process of testing between extreme ends or boundaries between partitions of the input values.

We use boundary value analysis to test the errors that come at the boundary of input that the user enters in any field. We remove the errors of input that comes at the boundaries of input variables.

- The basic idea in boundary value testing is to select input variable values at their:
 1. Minimum
 2. Just above the minimum
 3. A nominal value
 4. Just below the maximum
 5. Maximum

6.3. Data flow testing

Data Flow testing is one of the testing strategies, which focuses on the data variables and their values, used in the programming logic of the software product, by making use of the control flow graph. The basic idea behind this form of testing is to reveal the coding errors and mistakes, which may result in improper implementation and usage of the data variables

or data values in the programming code. In this Project We have done static data flow testing in which We have studied and analyzed the code without performing the actual execution of the code such as wrong header files or library files use or syntax error. While testing this We have removed anomalies from the code like variables are defined but they are not used. Some variables are defined twice.

6.4. Unit testing

Testing is done to check whether the individual modules of the source code are working properly. i.e., testing each and every unit of the application separately by the developer in the developer's environment.

- We have done this testing by keeping in mind the goal of the system. In this testing We have carefully checked the naming conventions.
- We have clearly checked the flow is correct between inside and outside the module.
- Verify the check statements
- Check the extreme boundaries values of output
- Loops are correct or not

6.5. Performance testing

Performance testing plays a vital role. It is the only way to determine an application's behavior at different levels of load and users. The goal of Performance Testing is not to find bugs but to eliminate performance bottlenecks. I have performed performance testing manually. Many active sessions of the same application should be open for testing. Manually, we have determined the number of active sessions, number of database connections open, and number of threads running. The amount of CPU time, the memory being used and few more parameters can also be obtained. A quick preliminary database performance test is done manually to get the necessary information and we improve our performance after doing the same changes like break statement and using function return statement. In a way we minimize the memory leakage.

6.6. Stress Testing

Testing is defined as a type of Software Testing that verifies the stability & reliability of the system. This test mainly determines the system on its robustness and error handling under extremely heavy load conditions. The goal of stress testing is to analyze the behavior of the system after a failure. For stress testing to be successful, a system should display an appropriate error message while it is under extreme conditions. A quick check on the database for some preliminary database performance tests can also be done manually. We operate our website on different machines and perform functionality and take the website to extreme load and check the stress testing and come to know that our website keeps slow at high load then we do some performance tests and improve performance now it's working fine.

Chapter 7

Summary, Conclusion and Future Enhancements

Chapter 7: Summary, Conclusion & Future

Enhancements

7.1. Project Summary

Alamulaka is an e-learning web based platform that will provide its service to both the teachers and learners/parents. Parents can register on our platform and enroll their children to the different classes created by teachers. Our platform will provide a management dashboard for both the teachers and parents.

Our platform is a Turkish e-learning app which provides online education to students of any age. Previous years due to coronavirus pandemic people are forced to see and live life in a different way. Work from home and Online education were top of it. Students can't get the qualified tutors according to their need. So here comes the Alamulaka which is basically a management application for both parents and the tutors. Parents can choose the best tutors for their children by visiting the profile of the tutor and analyzing its rating and review from other learners/parents. Teachers can manage their classes and learners in our platform and make announcements in their respective classes. Our platform is responsible for the accountability of payments. Parents can pay a fee to our provided online payment transfer means. Teachers can provide their account details and Alamulaka will be responsible for transferring class fee to their accounts.

7.2. Achievements and Improvements

The website that we developed is very helpful for teachers and students. The students that are weak that are early ages and that are free, they take different types of classes from here according to their interest. They don't need to go somewhere to get the education they take from our platform. They take language classes and many more. In this way, they save time and parents have no need to take tension off their children's studies and find a tutor for them.

7.3. Critical Review

In order to be efficient and make a successful application without set back, we need to go through the requirements very carefully and understand it very well and should be ready for any change in module and make that change without affecting the other modules.

7.4. Lessons Learnt

Without teamwork, it was not possible to build this application, and besides that through this website. But We fully try to make the Website and complete the project. We learn so many things like: Our team has learned that Time Management decides the success and failure of the project so it is necessary to do the tasks on schedule time otherwise it will create burden and may lead the project towards failure. And also, smart way to handle bugs and error

7.5. Future Enhancements/Recommendations

We can integrate the more efficient audio/video calling modules for our future enhancement and make a separate server for handling the payments, socket and video calling section in order to perform server load balancing.

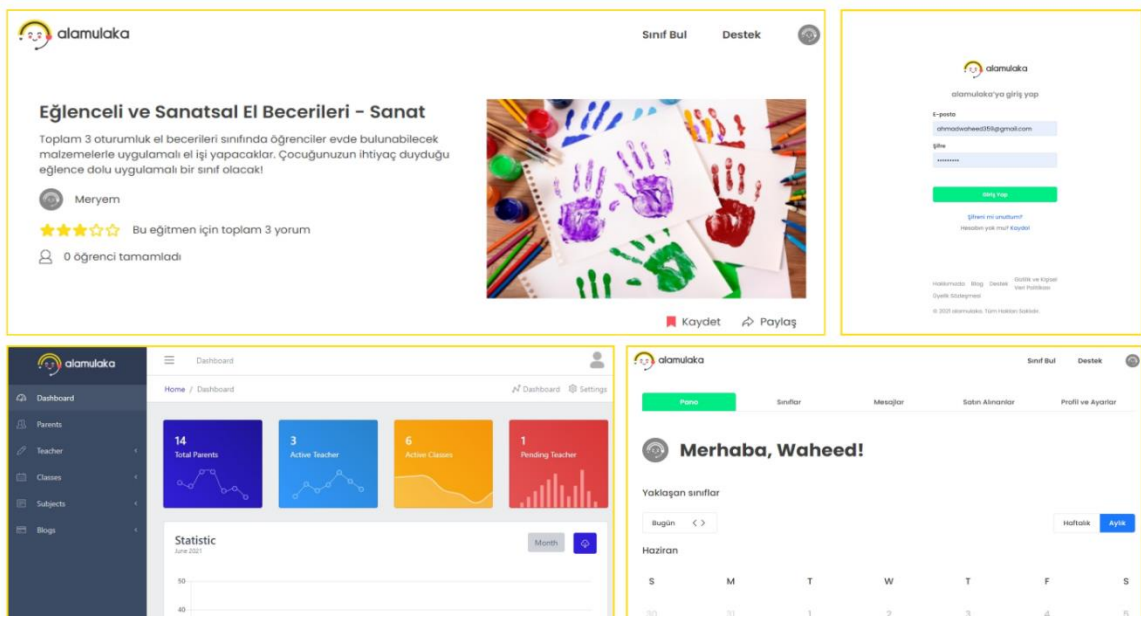
Appendices

Appendix A: User Manual

Appendix B: Administrator Manual

Appendix C: Information / Promotional Material

C.1. Broacher



C.2. Flyer

alamulaka

PROBLEM STATEMENT

Due to coronavirus pandemic people are forced for online education. Student can't get the tutors according to their need. Great number of tutor and teachers lost their jobs in a year.

SOLUTION

Due to coronavirus pandemic people are forced for online education. Student can't get the tutors according to their need. Great number of tutor and teachers lost their jobs in a year.

FEATURES

- People can search class by desired teacher
- Parent can enroll their child.
- Teacher can manage their classes.
- Parents can manage their children's schedule.
- Parents and teachers can communicate.
- Easy payment methods such as Credit/Debit card.
- Easy to use web app with a user-friendly interface.

TOOLS

- Visual Studio Code
- Postman
- Gitlab

TECHNOLOGY

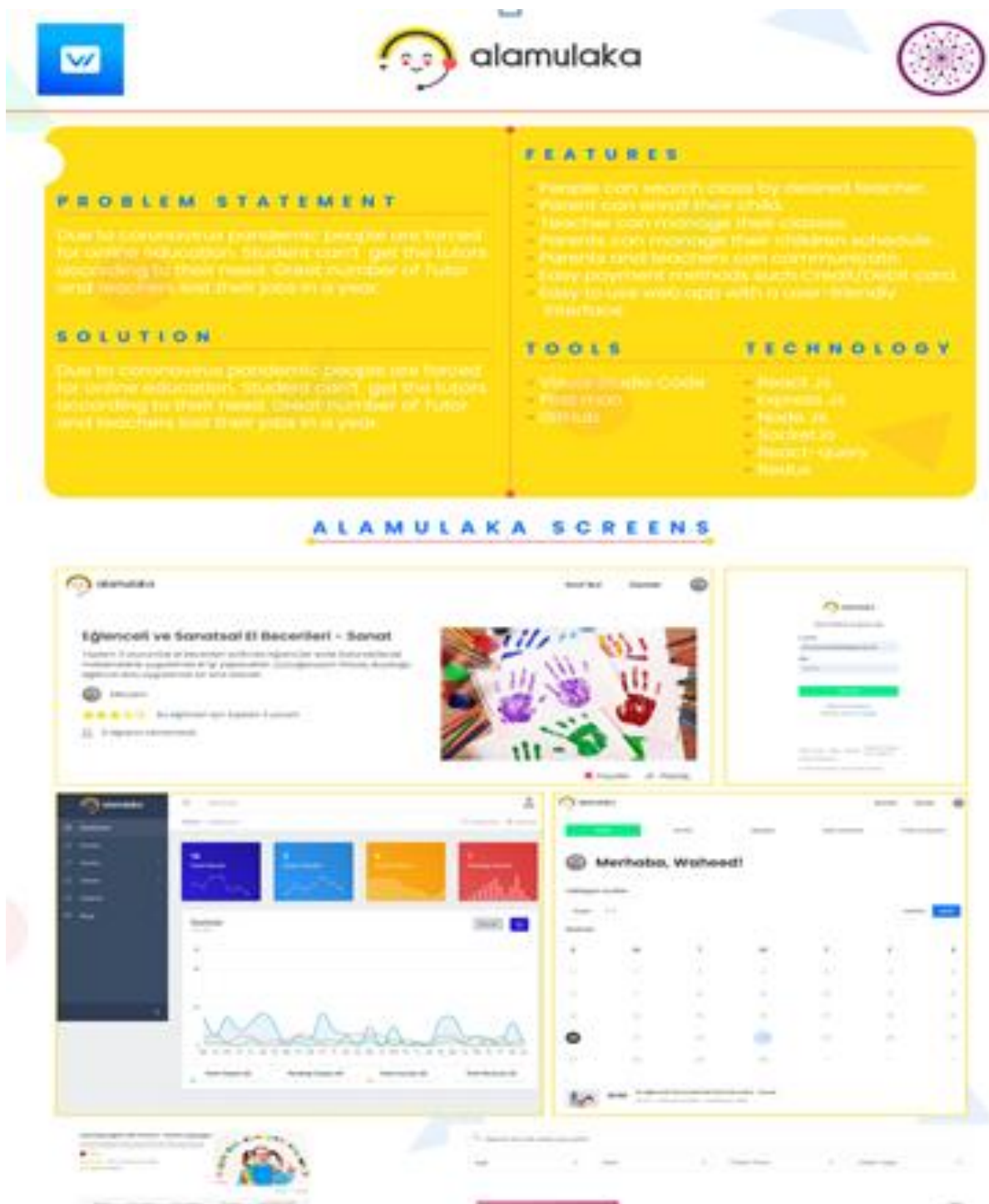
- React JS
- Express JS
- Node JS
- Socket.io
- React-Query
- Redux

ALAMULAKA SCREENS

The flyer displays four screenshots of the application:

- A course listing page for "Eğlenceli ve Sanatsal El Becerileri - Sanat" (Fun and Artistic Hand Skills - Art) with a colorful handprint illustration.
- A user registration or login form with fields for name, email, and password.
- A dashboard with a dark sidebar and several data visualization charts.
- A user profile page for "Merhaba, Waheed!" showing a list of courses or classes.

C.3. Standee



C.4. Banner

The banner features three logos at the top: a blue square with a white 'V' on the left, the 'alamulaka' logo in the center (a yellow smiley face with a rainbow arc above it), and a purple circular logo with a white starburst pattern on the right.

PROBLEM STATEMENT	FEATURES	
Due to coronavirus pandemic people are forced for online education. Student can't get the tutors according to their need. Great number of Tutor and teachers lost their jobs in a year.	<ul style="list-style-type: none"> - People can search class by desired teacher. - Parent can enroll their child. - Teacher can manage their classes. - Parents can manage their children schedule . - Parents and teachers can communicate. - Easy payment methods such Credit/Debit card. - Easy to use web app with a user-friendly interface. 	
SOLUTION	TOOLS	TECHNOLOGY
Due to coronavirus pandemic people are forced for online education. Student can't get the tutors according to their need. Great number of Tutor and teachers lost their jobs in a year.	<ul style="list-style-type: none"> - Visual Studio Code - Post man - GitHub 	<ul style="list-style-type: none"> - React Js - Express Js - Node Js - Socket.io - React-query - Redux

Reference and Bibliography

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[1]

[2]