

CLASS HUB

*A project submitted in partial fulfillment of the
requirements for the award of the degree of*

Bachelor of Technology
In

COMPUTER SCIENCE AND ENGINEERING



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I am overwhelmed in all humbleness and gratefulness to acknowledge my depth to all those who have helped me to put this idea, well above the level of simplicity and into something concrete.

I would like to thank Prof **(Dr) Mukesh Mann**, Assistant Professor -CSE, and IIIT Sonapat for giving us the opportunity to undertake this project. Also I would like to thank our batch mates who guided me, helped me and gave ideas and motivation at each step.

Shivansh Joshi(12011042)

SELF DECLARATION

I hereby declare that work contained in the project file titled “**CLASS HUB**” is original. I have followed the standards of research/project ethics to the best of my abilities. I have acknowledged all sources of information which I have used in the project.

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CERTIFICATE

This is to certify that **Mr. Shivansh Joshi** has worked on the project entitled “**CLASS HUB**” under my supervision and guidance.

The contents of the project, being submitted to the Department of Computer Science and Engineering, IIIT Sonapat, for the award of the degree of B.Tech in Computer Science and Engineering, are original and have been carried out by the candidate himself. This project has not been submitted in full or part for the award of any other degree or diploma to this or any other university.

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ABSTRACT

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In the online world it's a difficult task to keep all the things up to date and in an ordered way , like keeping the records of the students in an educational institution. To solve this issue and provide an all-in-one advanced, admin controlled, user-friendly experience ,I have proposed the idea of the **Class Hub** (Online College Management Webapp).

Class Hub, is the web application which helps college students and faculties to connect with each other. In this web application facilities can perform live classes ,upload daily lectures, daily attendance, time table and upload complete syllabus plans. Students can view their attendance report, daily syllabus , topic plan, uploaded video lectures and attend live classes.The Students can even discuss doubts with their facilities related to the subject and faculty has the option to reply to the questions sent by students.

The platforms and programming languages used till now are HTML, JS, React, NodeJS and MongoDB.

LIST OF ABBREVIATIONS

JS	JavaScript
HTML	Hyper Text Markup Language
CSS	Cascading Style Sheets
IDE	Integrated Development Environment
UI	User Interface
PUW	Project Under Work
Application programming Interface	Application programming Interface
UI	User Interface

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CHAPTER 1 : INTRODUCTION

1.1 INTRODUCTION

Brief Introduction to the Topic:

The project under work is an Online College Management WebApp that goes by the name Class Hub to solve the omnipresent problem of mismanagement of college data by implementing an admin controlled management system in the form of WebApp using the latest technologies and a user-friendly interface.

The basic reason in choosing this topic for our practicum project is to remove the difficulty faced by students and teachers in an online environment. Thus, making the work a lot easier, quicker and flawless for the students and teachers, which otherwise would be laborious and disordered.

1.2 PROBLEM OUTLINE

1.2.1 Distance Learning (E-Learning)

Distance learning, also called distance education, e-learning, and online learning, is a form of education in which the main elements include physical separation of teachers and students during instruction and the use of various technologies to facilitate student-teacher and student-student communication.

Although distance learning offers more people an opportunity to attain higher education, it is not all advantages and benefits. Distance learning has costs, requires compromises and self-motivation is essential for success.

The basic outline or an idea to choose this project was to remove the distance barrier which was causing hindrance for the students in their studies, and for the teacher as well as their way of teaching was changed. We also try to solve the problem by eliminating use of varied softwares such as Video Conferencing App, Attendance App , Chat App by integrating them into one place.

1.2.2 Data Management

Data management is the practice of collecting, keeping, and using data securely, efficiently, and cost-effectively. The goal of data management is to help people, organizations, and connected things optimize the use of data within the bounds of policy and regulation so that they can make decisions and take actions that maximize the benefit to the organization.

A robust data management strategy is becoming more important than ever as organizations increasingly rely on intangible assets to create value. Storing the data at a single place makes the task of data management a lot easier, this is a key feature that our webApp would provide.[1]

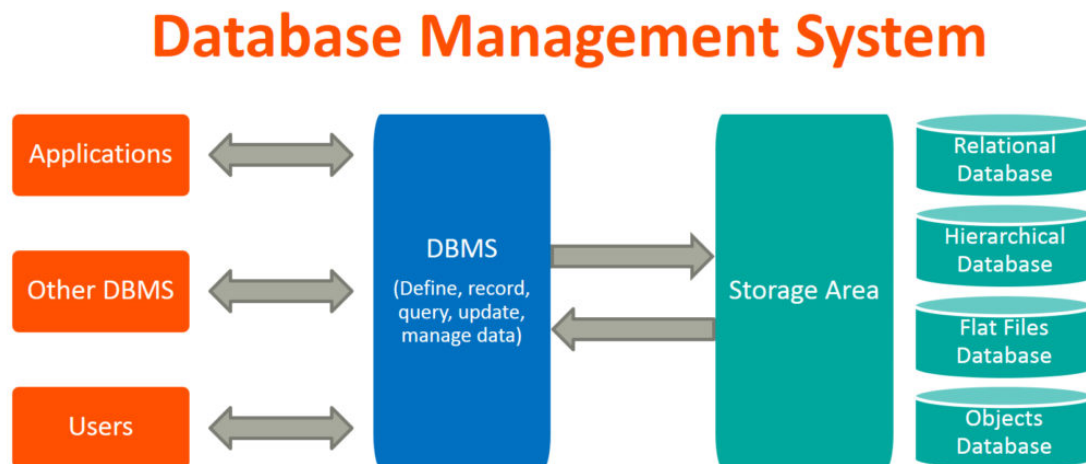


Fig (1.1): Database Management System

1.2.3 Human Errors

Now-a-days, education is playing a very significant role in society. Day-by-day, the percentage of illiterates is decreasing and the percentage of literates is increasing. Education will change society in all aspects and everyone wants to study higher professional degrees. Admissions are increasing day by day so the ratio of establishment of new colleges and schools are also increasing. But the actual challenge is starting from now. Most of the schools and colleges maintain student information in records.

When the number of records increased, it was difficult to maintain the information of each student in the old manual system. Maintaining the records manually leads to error prone and requires more man power and it consumes more time for processing the records.

1.3 PROJECT OBJECTIVES

1.3.1 Build a fully equipped webApp for all college related stuff

The main project objective is to deliver the application as a platform where students and teachers have one platform for all college related works and tasks whether it be homework distribution or authenticated attendance system.

The prime objectives of the project are an easy to use or user-friendly interface and easy accessible webApp which can help our users to achieve their desired goals and to overcome the limitations of distance and online learning with proper data management.

1.3.2 Data Management made easy

Managing the data in a structured and easy to manage way is quite important. Here in our application we provide safe, systematic and easy to handle data record management with authentication and admin control.

1.4 PROJECT METHODOLOGY

The methodology used to achieve the upcoming objectives are as follows: - The PUW will have a user-friendly interface and it would be achieved by making interface a bit modern and different from the existing interfaces and it is achieved by using JS, React, CSS, Sass also with Backend services such as Redis and MongoDB.

We will be providing the most secure environment using famous authenticated services in the backend leaving no fun space for the hackers. Our platform would be one stop place for the students and teachers providing every feature they would need for running online classes efficiently.

1.5. SCOPE OF THE PROJECT

This project can be used in various fields in the future by making small enhancements in the software. It is a low cost solution for various problems in different fields.

1.5.1 Educational institutions

Storing and keeping a record of students and faculty at one place with other real time class related features of live classes, doubt section, uploading study materials and video lectures. In a nutshell, providing all the administration and teacher controlled features for better learning.

1.5.2 Business Organizations

Organizations also need to maintain the data record of their employees and carry out meetings and discussions which with some basic changes can be carried out in this application. Also the addition of task distribution and status update features can make this application ready for the commercial world.

1.5(A) Limitations

But every project has some Limitations and here are some for our project:

Students can give their Id, password to other users or students who can mark their proxy attendance . Another major requirement is an active internet connection for accessing the features of the webApp which may be a problem for a bunch of users.

1.6 ORGANISATION OF PROJECT

1.6.1 Team Members

- Bharat Kumar(12011040, CSE)
- Shivansh Joshi (12011042, CSE)
- Prakhar Srivastav(12011022, CSE)

1.6.2 Technologies Used

- Asana(for working from different locations)
- Github(for Code Management)
- VS Code(IDE)
- Figma(for UI design)
- ReactJS(for Frontend)
- NodeJS(for Backend)
- MongoDB(for Database)

1.6.3 Workflow

All the team members are working remotely in this project. Technologies like GitHub and Asana helped us a lot to collaborate actively for the project. Reading through the documentation of various technologies like SocketIO(for chat and video conferencing features), NodeJS(for routing) gave us an in-depth knowledge about the working of a web application in the real world.

The organization of the project mentioned is being done by dividing the work into several phases to make the project work more organized.

Phase-1 Idea and Research: This is the initial phase of the project. This is all about thinking of the features and learning about technologies that can be implemented.

Phase-2 UI / Designing: In this phase, the complete front-end work will be done, and practice will be carried out to enhance the UI and to make it interactive using Figma and implementing it using ReactJS.

Phase-3 API / Backend: In this phase, the part of the backend along with the API will be developed, and the initial phase testing will be done. Integrating the APIs with the database.

Phase-4 Deployment and Connection: In this phase, the frontend and backend will be deployed separately and then integrated to make the webApp functional and ready to use.

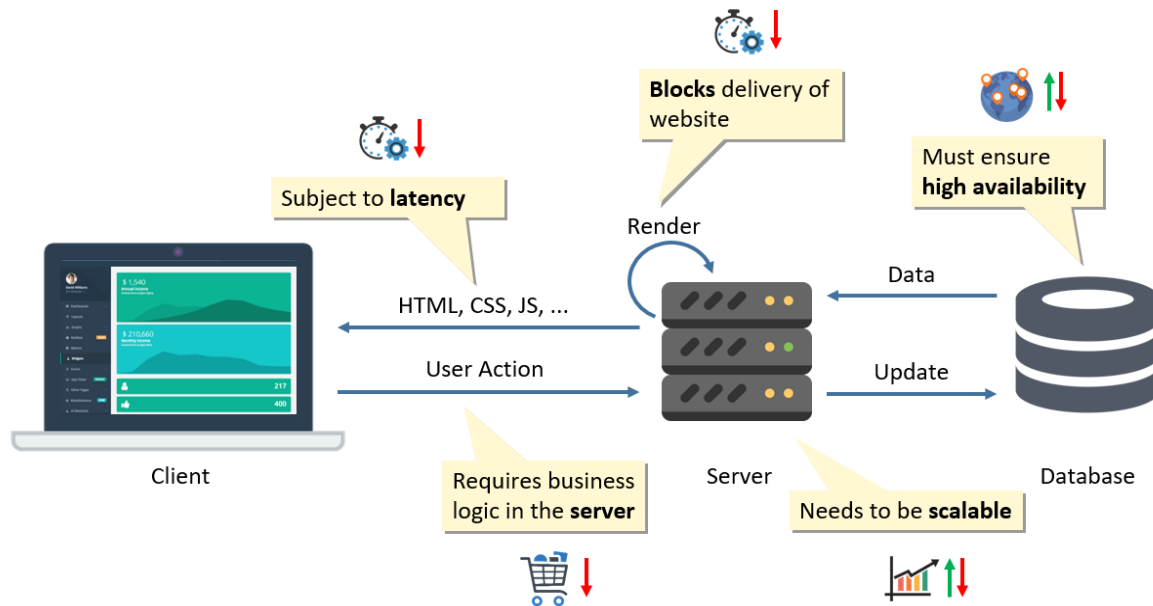


Fig (1.2): Connection Requests of Web Application

1.7 SUMMARY

1.7.1 About the project and its objectives

This web application for online college management goes by the name of **Class Hub**. The main aim of this project is to shift the load from manpower to the online world for error free data handling and online class management. Also eliminating the usage of various apps with distinct features and presenting all those features at a single place with a user-friendly interface.

1.7.2 Approach

The approach of the project is simple but effective. Educational institutions that face the challenge of increasing their online course offerings despite limited resources and limited faculty experience with technology. While some have begun to hire instructional technology personnel to facilitate faculty efforts, which are costly, and none have provided a systematic method for providing that support while maintaining faculty control over course content. So we thought of building an application with faculty control, with user friendly interface and all the real time classroom features all at one place.

CHAPTER 2 : Study and Review of Literature

2.1 INTRODUCTION

Educational institutions that face the challenge of increasing their online course offerings despite limited resources and limited faculty experience with technology. While some have begun to hire instructional technology personnel to facilitate faculty efforts, which are costly, and none have provided a systematic method for providing that support while maintaining faculty control over course content. So we thought of building an application with faculty control, with user friendly interface and all the real time classroom features all at one place.

2.2 FRONT-END

Front-end web development, also known as client-side development, is the practice of producing HTML, CSS and JavaScript for a website or Web Application so that a user can see and interact with them directly. The front end of a website is the part that users interact with. Everything that users see when navigating around the Internet, from fonts and colors to dropdown menus and sliders, is a combo of HTML, CSS, and JavaScript being controlled by the user's computer's browser. The challenge associated with front end development is that the tools and techniques used to create the front end of a website change constantly and so the developer needs to constantly be aware of how the field is developing.

HTML AND CSS

HTML and CSS HTML stands for Hyper Text Markup Language. It is used as the standard markup language for building web applications and web pages. It was originally developed by Tim Berners-Lee in 1991. HTML5 is the latest version of HTML.

CSS stands for Cascading Style Sheet. It is used to style web pages for different kinds of devices and screen sizes. It also saves a lot of time and stress since it can be used to style multiple web pages simultaneously. Its latest version is CSS3.

SASS

Sass stands for Syntactically awesome style sheets. It was designed by Hampton Catlin and SASS first appeared in November 2006 but its stable version was released on March 23' 2018. Sass is a pre-processor scripting language that is interpreted or compiled into Cascading Style Sheets. Sass Script is the scripting language itself. Sass consists of two syntaxes. The original syntax, called "the indented syntax," uses a syntax similar to Html.[2]

2.3 UI DEVELOPMENT

“User Interface Development” is the development of websites, web applications, mobile applications and software development. “User Interface” plays a key role in the software development life cycle [SDLC]. Most people assume user interface development solutions are creating the websites and writing HTML, CSS and JavaScript, but User Interface goes far beyond these technical terms. The goal of the user interface is to make the user’s interaction as simple and efficient as possible, in terms of accomplishing user goals.

- **Virtual design** : Visual design is the use of imagery, color, shapes, typography, and form to enhance usability and improve the user experience. Visual design as a field has grown out of both UI design and graphic design.
- **Interactive design** : Interactive design is a user-oriented field of study that focuses on meaningful communication of media through cyclical and collaborative processes between people and technology. Successful interactive designs have simple, clearly defined goals, a strong purpose and intuitive screen interface.
- **Information Architecture** : Information architecture is designed to help users find the info they need to complete various tasks. It, therefore, involves labelling, structuring, and organizing the web content in a manner that makes it easily accessible and sustainable. The services and technologies used in the building of the web user interface (UI) are mentioned below.

JAVASCRIPT

JavaScript is the world's most popular programming language. JavaScript is the most popular programming language in the world. JavaScript helps users in developing great front-end as well as back-end software's using different JavaScript based frameworks like Node.JS, React etc.

REACT JS

It is an open-source JavaScript library used in web development for building user interfaces and interactive elements and was first deployed in 2011. React makes it easier to create interactive UIs. React helps to create Declarative views which make the code more predictable and easier to debug. React is a front-end library and it runs on a browser like apache and rails. We used react to create the basic front-end framework of the project.[3]

JSX

JSX stands for JavaScript XML. JSX allows us to write HTML in React. JSX makes it easier to write and add HTML in React. JS is standard JavaScript while JSX is an HTML-like syntax that users can use with React to (theoretically) make it easier and more intuitive to create React components. Without JSX, creating large, nested HTML documents using JS syntax would be a difficult task. JSX simply makes that process easier.

BABEL

Babel is used to make sure that everyone will be able to run user code. Babel was released on 27th February' 2020. Babel is a JavaScript transpiler that converts edge JavaScript into plain old ES5 version of JavaScript that can run in any browser (even the old ones). It makes available all the options that were added to JavaScript with the new ES6 specification, including classes, fat arrows and multiline strings. Basically, Babel will convert +ES6 code into ES5 without waiting for browser support. We use babel to use the newest react and JavaScript syntax with old technologies and in old browsers.[4]

FIGMA

Figma is a vector graphics editor and prototyping tool which is primarily web-based, with additional offline features enabled by desktop applications for macOS and Windows. The Figma Mirror companion apps for Android and iOS allow viewing Figma prototypes in real-time on mobile devices. The feature set of Figma focuses on use in user interface and user experience design, with an emphasis on real-time collaboration.

2.4 BACK-END DEVELOPMENT

Backend website development consists of those tasks that allow users to optimize the website. The database, content, plugins, and other elements that make the website operate are all part of its backend. The backend ensures that the website is fully functional and applies to business websites, blogs, ecommerce sites, and others. The needs of the backend development will depend on the nature of the website and the functionality it offers to its users. This is distinct from the website's frontend, which consists of the coding languages used to create the site's pages, navigation, and other parts that result in the visual display with which users interact when engaging content.

The backend and frontend of the website play different roles, but they work together to create the sum total experience of the website. Backend development utilizes the applications that access data and deliver it to the frontend for the audiences. The services and tools which were utilized to prepare the back end of the web application have been briefly mentioned below.

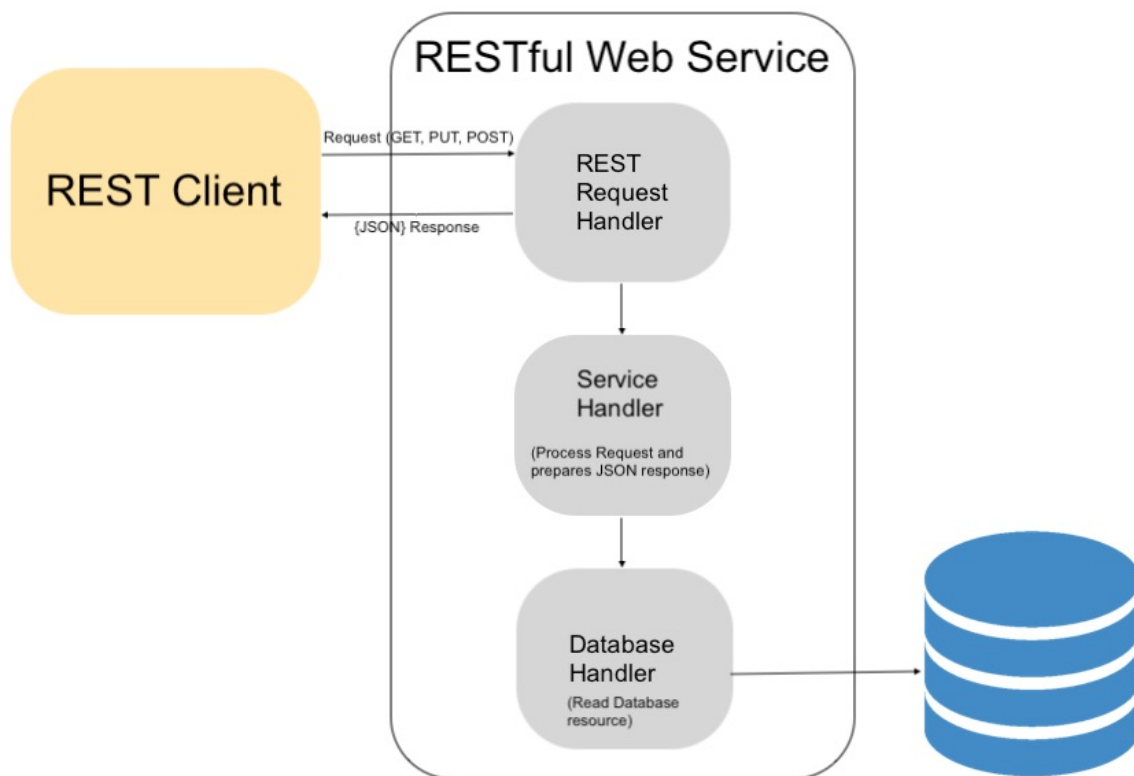


Fig (2.1): REST API Working

NODE.JS

Node.js is an open-source, cross-platform, back-end, JavaScript runtime environment that executes JavaScript code outside a web browser. It was initially released on May 27th, 2009 and is written in c, c++, JavaScript. The main developers or authors are Ryan Dahl and Bryan Cantrill. Node.js is a lot faster, lightweight and less complex from its competitors like Django and php. Node.js excels from python in the back-end in web services and real time applications. **[5]**

Node.js is used by users mainly in server-side scripting to produce dynamic web page content before the page is sent to the user's browser window. Node.js represents a "JavaScript everywhere" architecture, unifying web-application development around a single programming language, rather than using different languages for server- side and client-side scripting. Corporate users of Node.js software include companies like Netflix, PayPal, LinkedIn, Walmart, UBER, Twitter, Yahoo, IBM, Rakuten and Amazon web services.

REDDIS

Redis is an open source (BSD licensed), in-memory data structure store, used as a database, cache, and message broker. Redis provides data structures such as strings, hashes, lists, sets, sorted sets with range queries, bitmaps, hyperloglogs, geospatial indexes, and streams. Redis has built-in replication, Lua scripting, LRU eviction, transactions, and different levels of on-disk persistence, and provides high availability via Redis Sentinel and automatic partitioning with Redis Cluster.[6]

MONGODB

MongoDB is an open-source document database and leading NoSQL database. MongoDB is written in C++. This tutorial will give you great understanding on MongoDB concepts needed to create and deploy a highly scalable and performance-oriented database.[7]

2.5 DEPLOYMENT

Software deployment includes all of the steps, processes, and activities that are required to make a software system or update available to its intended users. The general deployment process consists of several interrelated activities with possible transitions between them. These activities can occur at the server side or at the client side or both. Today, most IT organizations and software developers deploy software updates, patches and new applications with certain technologies mentioned below.

Software deployment is one of the most important aspects of the software development process. Deployment is the mechanism through which applications, modules, updates, and patches are delivered from developers to users. The methods used by developers to build, test and deploy new code will impact how fast a product can respond to changes in customer preferences or requirements and the quality of each change.

HEROKU

Heroku is a container-based cloud Platform as a Service (PaaS). Developers use Heroku to deploy, manage, and scale modern apps. Our platform is elegant, flexible, and easy to use, offering developers the simplest path to getting their apps to market.

Heroku is fully managed, giving developers the freedom to focus on their core product without the distraction of maintaining servers, hardware, or infrastructure. The Heroku experience provides services, tools, workflows, and polyglot support—all designed to enhance developer productivity.[8]

NETLIFY

Netlify is a San Francisco-based cloud computing company that offers hosting and serverless backend services for web applications and static websites. Netlify was founded by Mathias Biilmann along with Christian Bach on 7th February, 2014. Netlify is a platform users can use to automatically build, deploy, serve, and manage web apps. It also provides a variety of other features like form processing, serverless functions, and split testing. We can deploy modern static websites with Netlify and get CDN and continuous deployment.

GITHUB

GitHub is a web-based interface that uses Git, the open source version control software that lets multiple people make separate changes to web pages at the same time. As Carpenter notes, because it allows for real-time collaboration, GitHub encourages teams to work together to build and edit their site content.

2.6 Summary

This chapter presents some discussions about the relevant tools and technologies used to develop an online management web application. JavaScript helps users in developing great front-end as well as back-end software's using different JavaScript based frameworks like Node.JS, React etc. that allows users to make web pages interactive. Whereas HTML and CSS are languages that give structure and style to web pages. React makes it easier to create interactive UIs. While for back-end Node.js was used for executing JavaScript code outside a web browser with the help of ExpressJS routing and setting up server was made easy and MongoDB used as a database which provides flexible schema, supports dynamic queries on documents using a document-based query language that's very powerful. Heroku and Netlify make deployment easy and Github helps in collaboration and code management.

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