Hospital Management System Using MERN Stack

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Abstract —India has achieved many scientific advancements in the field of medicine in the last few decades, but these modern hospitals still deploy the old and traditional system of booking appointments in which you visit the hospital, book an appointment, and wait for your turn. The COVID 19 pandemic has made us realize how inefficient and time consuming this traditional method is. Taking these issues into account, we designed something that is particularly relevant to today's time to reduce excessive hospital overpopulation. We developed a website that allows users to arrange appointments at the hospital with any doctor of their choosing with the touch of a button. The patient can just login into the website by entering their details, then search for the desired doctor or expertise with the help of the search bar and book the appointment. We have used different tools like Web development stack and the MERN stack to create the website. The website will use all these tools to execute all the commands given to it by the users. The website also has a database wherein all the data from the users like their personal information like contact details, mail IDs and addresses can be stored. The database also stores information regarding the patient appointments

Keywords — Database, Hospital Management, API, Interface, MERN Stack, JSON.

I. INTRODUCTION

The majority of hospitals in India continue to employ the time-honored practice wherein patients visit the hospital to make an appointment and wait there till their name is called. This process takes a lot of time and is quite inefficient. Additionally, this approach is not very sensible in the case of pandemics like the COVID 19 scenario as we must minimize crowding. We had the notion to create a website to address this issue. We can reduce hospital overcrowding and spare the patients' time by using the website. Overall, it will make a patient's experience enjoyable and stress-free.

Many research articles have affected the design of this project. Their description is as follows:

[1] MERN-A full stack development: The study assisted us in comprehending the utility and significance of the MERN stack in web development.

[2]Intelligent Hospital Management System by B.Koyuncu and H.Koyuncu : Helped to define the types of tasks to be completed and managed without increasing the task's complexity.

[3]Hospital Management System Using Web Technologies by REVA University:

The paper helped us to decide the layout and element placements and their interconnections with each other via technologies and languages so as to boost the UI/UX experience.

[4]Study of Advanced Hospital Management System by Anna University:
The paper helped us the implementation of our project via different approach of operating systems.

[5]Hospital Management System by Digvijay.H.Gadhari,Yadnesh.P.Kadama,Prof.Parineeta Suman:
The paper helped us to secure login window and its operations.

[6]RFID Based Smart Hospital System:
The paper helped us to look upon a newer approach of Radio Frequency Identification technology to provide reliable services.

[7]E-commerce web application using MERN Technology:
The paper helped us to explore the applications of MERN stack and its interconnections of overall stack with its technologies.

After conducting extensive research on the subject, we concluded that every other method involved complex user interactions. To address this issue, we focused on keeping our user interface as simple as possible and incorporating simple but effective database integrations into the website.

II. METHODOLOGY/EXPERIMENTAL

The hospital management system website consists of three models or three parts.

1. Patient module.
2. Doctor module.
3. Admin module.

In the patient section, the patient is requested to share some of their personal data to make their experience easy which is taken with help of HTML forms and is stored in Mongodb database with the help of Mongoose and Node.js wherein Mongoose is schema-based solution to model our application

data in Mongodb since problem with Mongodb is that Mongodb is a document oriented database thus there are no restrictions to order of data inserted. Mongoose here helps us by creating a schema that helps in maintaining our database.Node.js is backend JavaScript runtime which helps to run JavaScript outside browser and it also helps to create a web server. Now, when user hits signup Express.js(web framework based on node.js) redirects the user to its dashboard where in jQuery (A JavaScript Library) and its plugin DataTables are used to create responsive table which then helps the user to search either the respective doctor or the respective specialty by simply just typing it. This overall enriches the experience of the user.
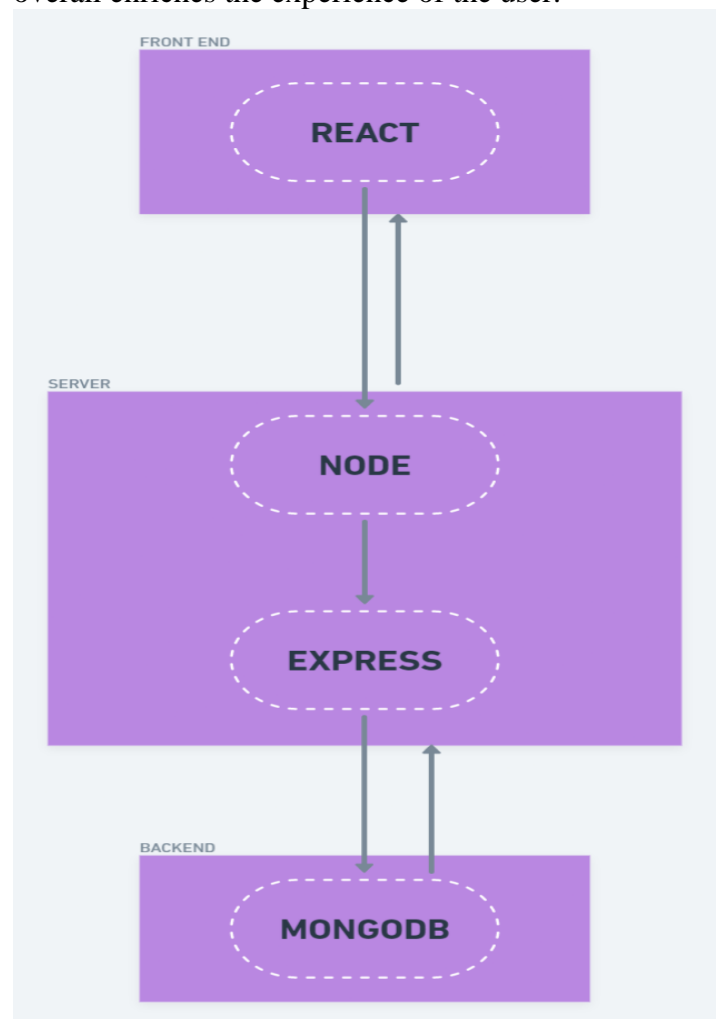

Fig1.FlowChart

In the admin section, the admin can also login in a similar manner as a doctor by giving the login ID

and password. Similar to the doctor login, the authenticity is checked with the help of ExpressValidator that performs basic checks on the conditions of username and password and then matches the entered data with database. Use of ExpressValidator is taken so as to avoid multiple request of the same user and thus save the server resources. After the login, the admin has control over the entire website. He/she can add doctors and remove them from the list. The admin also has the power to schedule or cancel the appointments of the patients after which all the data is updated in the database. Basically, application of CRUD is all we are doing here, i.e., Create, Read, Update and Delete. In this project, all the technologies, that are HTML, CSS, JavaScript work simultaneously in unison to make the website work. Here, React.js acts as a JavaScript front-end framework that helps in rendering website data at client side without any reload/delay. Using React helps us to structure our website into components that can be reused multiple times in our web pages. Tailwind CSS framework boosts the UI/UX experience of this website and increases the aesthetics of the website. Thus, JavaScript helps in rendering frontend and maintaining backend of the website.

In the doctor's section, the user who will be a doctor in this case will login with the help of user ID and password. The authenticity of the user ID and password is checked and after the login procedure is complete, the doctor will be able to see their dashboard where they will see the lined-up appointments as well as the appointments that are completed.

III. RESULTS AND DISCUSSIONS

The hospital management system retrieves data from the database and adds it to the database with the user's permission. Whenever an API endpoint is hit, respective results are served or parsed according to GET/POST request and database data is fetched or new data is inserted. Basically, it is an application of CRUD, i.e., Create, Read, Update and Delete. The user proceeds to book an appointment by clicking on the 'book an appointment' button where more data regarding the contact and address of the patient is taken. After

this, the patient is then redirected to the slot booking page. The slot booking page shows the patient all the available slots of the given doctor. The patient can then choose the slot according to their convenience.

The password is stored in the database in hashed format due to the use of bcrypt package which helps to increase the security of the authentication system implemented. The authtoken provided after the login is stored locally on the user's end which helps the user to get logged in automatically every time it hits the same url/endpoint. This authtoken is implemented with the help of jsonwebtoken package.

Fig2.AuthToken Dashboard

The JavaScript library jQuery and its plugin DataTables helps in creating responsive grid table which is shown to the user by fetching data from the database created with the help of Mongodb and Mongoose. User can book an appointment with just one click wherein the data is stored in the database and the doctors and admin can access the data with the help of MERN stack, which is an application of 'R' Of CRUD, which is read, i.e., reading the data. The patient can even fill the responsive feedback forms like the one present in the 'contact us' page which helps the hospital management to make improvements in the concerned services. User can also pay the fees using Razorpay payment gateway integrated in the 'donate us' page.

IV. FUTURE SCOPE

Regarding the enhancement of the website and the addition of new features, we have several ideas. Among them are:

1. In the future, authentication via one time password (OTP) can be implemented for increasing authenticity of the user.
2. Getting a PDF of appointment and prescription is also a feature that can be added. After the appointment with the doctor, the prescription will automatically be sent on the user's profile.
3. Increasing security of overall website parameters since we are handling sensitive user data.
4. Making website responsive so as user can also book the appointments via a mobile phone with same ease as on a desktop.

V. CONCLUSION

The study is primarily concerned with the optimization and efficient use of hospital resources and time. The goal of the paper is to make patients' lives easier and more comfortable by providing appointment solutions with the click of a button. It also contributes to social distancing and efficient healthcare resource management, both of which are critical currently. Our website uses an intuitive and user-friendly design. The experience of the users is improved through easy navigation. The user also has the ability to manage their appointments. From scheduling to pdf reports, our online scheduling system has all the facilities that makes it easy for the users. Overall, our website contributes to the reduction of inefficiencies in today's hospital management systems.

VI. ACKNOWLEDGEMENT

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