

Medical Appointment Booking Platform

Applied Database Technologies (DSCI - D532)

Web Application Design Document

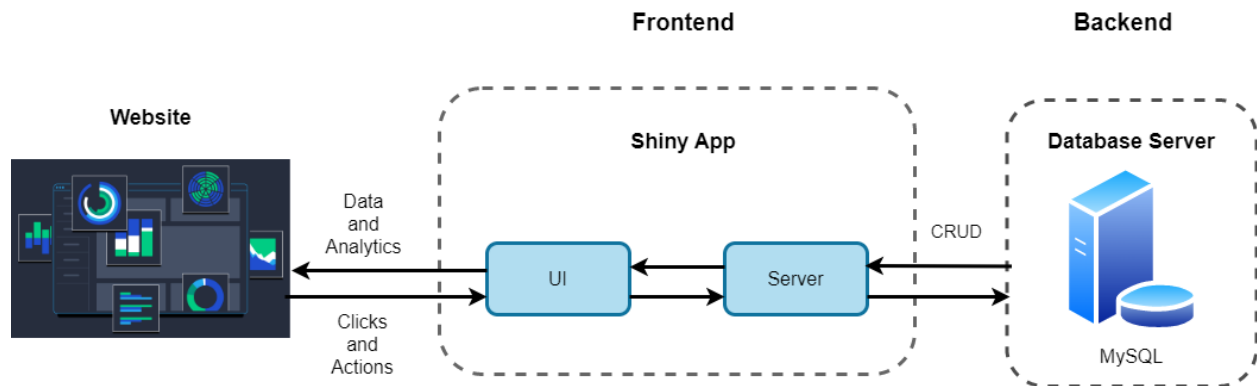
by

Ameya Dattaram Parab

Trishna Patil

Indiana University Bloomington

1. Web App Architecture



1.1 MVC Architecture

Our web application follows the Model-View-Controller (MVC) architecture, which is a software design pattern that separates an application into three interconnected parts: the Model, the View, and the Controller. This report outlines our use of this architecture for our web app, as well as our use of MySQL as the Model, R for the back-end, and Shiny as the View and Controller. In addition, we will discuss the use of R Shiny themes for customization and our deployment plan.

The application is structured using the MVC architecture, which allows us to separate concerns and make our application more scalable and maintainable. The Model is responsible for storing all the business logic and data of the application. We are using MySQL as our database server to manage data consistency and integrity. The View is responsible for displaying the data to the user in an intuitive and understandable way. We are using the Shiny app as our View. The Controller acts as an intermediary between the Model and the View, receiving input from the user and processing it. In our case, the Shiny app acts as our Controller as well. This separation of concerns allows us to manage the application more effectively and efficiently.

1.2. Database

The data of doctors and patients is stored in a MySQL database. MySQL is an open-source database that can support large volumes of data and is optimized for performance, stability, and reliability. It also provides several security features, including encryption, authentication, and access control. This allows us to encrypt passwords and restrict access to authorized users.

1.3. Backend

We are using R for our back-end, which provides several advantages, including powerful statistical analysis, easy integration with data sources, rapid prototyping, cross-platform compatibility, cost-effectiveness, and easy visualization. Our back-end will query the MySQL database using CRUD operations to retrieve and modify data.

1.4. Frontend

The application will have a user-friendly interface, with a search box for doctors, a tab to view all doctors, filters for plots, and a notification bar for upcoming appointments. User information will be displayed, and there will be a clickable logout button at the top right. To book appointments, users can view doctor details, including name, address, degree, and specialty, and select a time for the appointment. Furthermore, in Shiny, there are themes that allow us to customize the appearance of our application. These themes are pre-designed stylesheets that we can apply to our Shiny app to change its appearance. We will also customize certain aspects of the theme by modifying the CSS code.

1.5. Deployment

We will deploy our application to the Shiny server. To do so, we will first prepare our application, ensure all necessary packages are installed, and perform unit and integration testing. Then, we will set up the Shiny server environment and move our application to the server.

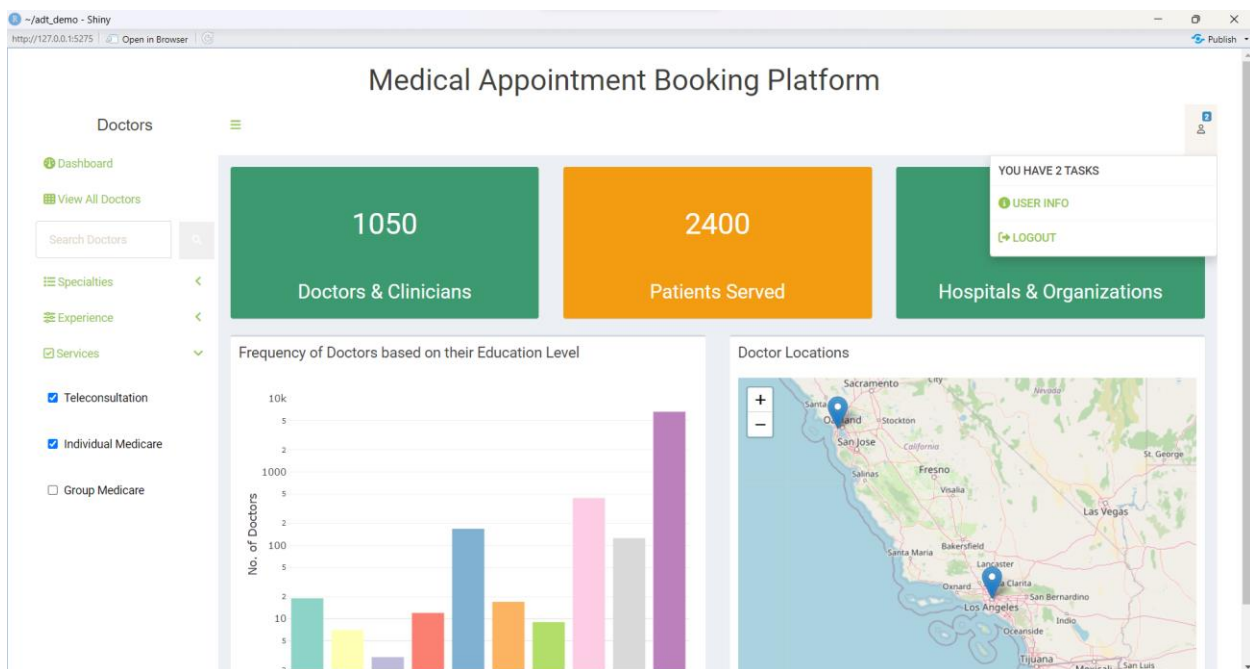
In this way, our web application follows the MVC architecture, with MySQL as the Model, R as the back-end, and Shiny as the View and Controller. We will use R Shiny themes for customization, and we will deploy our application to the Shiny server. With this architecture and these tools, our application will be modular, maintainable, and user-friendly.

2. Web App Layout

The Medical Appointment Booking System includes web pages for patients to log in, view various attributes of doctors, filter data, book appointments, view their appointments, and cancel them. We have implemented this system using the R Shiny framework, which provides various ways to display information in the form of a dashboard and to take input from users.

The screenshots below showcase the mock UI of the application, where data and plots are displayed for representation purposes.

2.1.Dashboard Page



The dashboard page is the first page the user lands on after logging into the platform. It follows the standard layout of any Shiny Dashboard, consisting of a header, sidebar, and body. The dashboard features various visualizations and statistics that help patients identify which region has the most suitable doctors for their treatment and their qualifications. Additionally, the statistics displayed establish trust among users to use the platform.

There are additional plots that display statistics of doctors in the system. Users can modify the results on the plots based on filters available in the sidebar. These filters include checkboxes for filtering services, sliders to adjust doctor experience, and a dropdown to choose specialty. Users can navigate to the Doctor Details page and User Details page from the sidebar and dropdown menu in the header, respectively. Once the user completes their required actions, they can close the session by logging out of the application.

2.2.Doctors Search Page:

Medical Appointment Booking Platform

Doctors

Search:

	DoctorID	DoctorName	SpecialtyName	Credential	GraduationYear	Teleconsultation	Appointments
1	1396787263	DAVID ROSS GELLER	GENERAL SURGERY	MD	1995		View & Book
2	1396810032	JAMES R EDWARDS	CHIROPRACTIC	DC	1982		View & Book
3	1396718292	LINDA FELWELL ABELS	INTERNAL MEDICINE	MD	1989		View & Book
4	1396701157	WILLIAM R BRODERICK	CHIROPRACTIC	DC	1980		View & Book
5	1396742441	BETH L FINEBERG	CLINICAL PSYCHOLOGIST	CP	1972	Y	View & Book
6	1396727558	RONALD THOMAS MCDANIEL	OPTOMETRY	OD	1972		View & Book
7	1386790954	JASON HARRISON	CHIROPRACTIC	DC	2006		View & Book
8	1033158688	AHMAD ANJAK	NEPHROLOGY	MD	2018	Y	View & Book
9	1033298880	JAMES P SCHALLIOL	PSYCHIATRY	MD	1967		View & Book
10	1023080553	KEITH A LA VALLEE	OPTOMETRY	OD	1997		View & Book

Showing 1 to 10 of 10 entries

Previous 1 Next

After visualizing the data on the dashboard page, users can navigate to the Doctors Search page to view a list of available doctors and their basic details. This page includes a search and sort functionality on the columns of the table, which helps users find an appropriate match for their needs. We used the Datatable package in Shiny to create the tables, which represent the information from a dataframe or database query result.

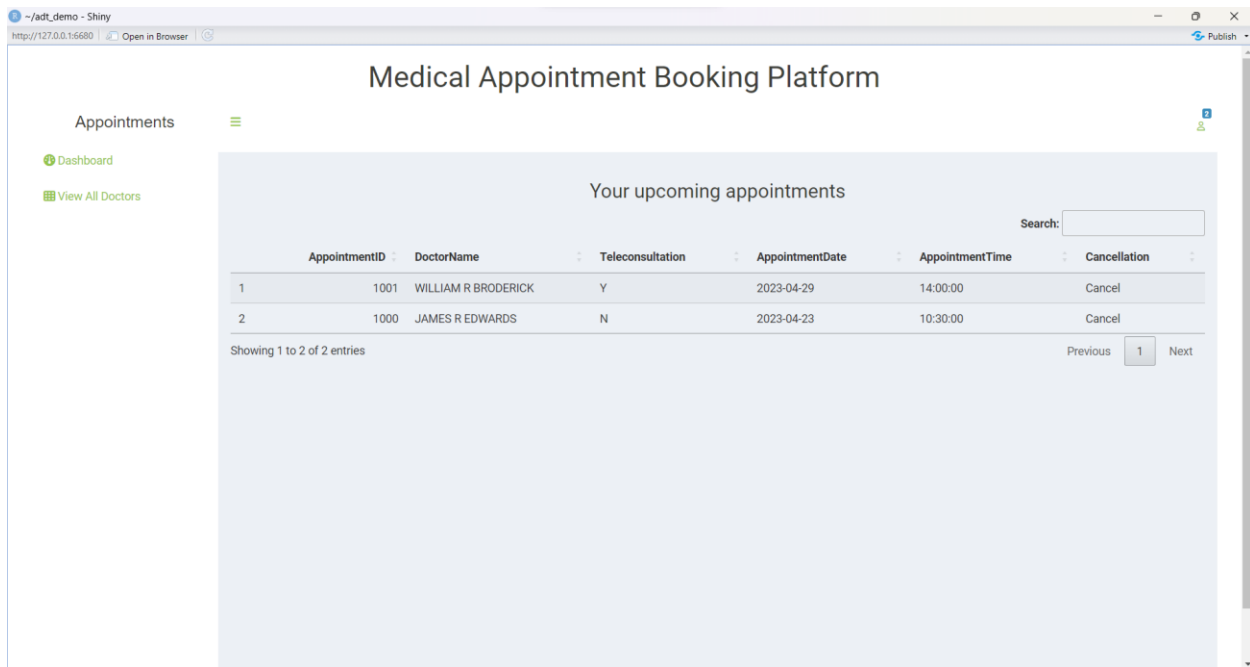
Once users decide on which doctor to consult, they can click on the button next to the respective doctor to view additional details. This leads them to the appointment booking page.

2.3.Appointment Booking Page:

The Appointment Booking Page displays all the details of the doctors, including their address, secondary specialties, and contact information. This information can help users reconsider their choices and go back to the Doctor Search page, or proceed with the booking.

To book an appointment, the patient can select a suitable time slot from the dropdown menu and submit the booking. This action results in the insertion of the appointment details into the database.

2.4.View Appointments Page:



Users can view their booked appointments on the Appointment Booking Page, which can be accessed through the dropdown menu containing the user icon in the top right corner of the header. On this page, users can view their future appointments, which are displayed along with the doctor's name, teleconsultation option, date and time, and a button to cancel the appointment. Additionally, users can navigate back to the Dashboard or Doctor Search page from this page.

Although the mock UI currently does not adhere to a specific color scheme, our plan is to implement the Sandstone Shiny theme in our web application. This theme will feature a uniform color scheme consisting of dark and light colors, along with olive green, which is representative of the healthcare domain of the application. Moreover, the chosen color scheme will be color-blind friendly to ensure that users with color vision deficiencies can use the application effectively.

In addition to the color scheme, we will incorporate Gestalt Principles of Design to create the visualization dashboard. Gestalt principles are a set of ideas that can greatly improve the aesthetics, functionality, and user-friendliness of a design. Some of the Gestalt principles that we plan to incorporate into the website's design include similarity, proximity, and alignment. By adhering to these principles, we aim to create a visually appealing and intuitive interface that is easy for users to navigate.