Final Year Project Report

Doctor Appointment Booking System

**BS(CSITSE) (Session: 2019-23)**

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Designation  
University of Sahiwal

**Submitted by**

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DEPARTMENT OF COMPUTER SCIENCE

Preface

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ACknowledgment

First of all, we thank Almighty Allah who gives us the strength and ability to think, work and deliver what we are assigned to do. Secondly, we must be grateful to our internal supervisor **Mr. Umer Daraz** who guided us in this project. We also acknowledge our teachers who guided, taught and helped us during our study period. We would also like to thank all departmental staff and university staff, who had assisted us during our stay at the university.

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This is to certify that the following student

Muhammad Bilal BSIT-M2-19-42

have successfully completed their final year project titled

Doctor Appointment Booking System

in the partial fulfillment for the requirements of the Degree of Bachelor of Computer Science & Information Technology during the academic session 20xx-20xx.  
  
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Designation Chairman  
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Abstract

The Doctor Appointment Booking System is a web application built using the Django framework that facilitates the process of scheduling appointments between doctors and patients. The system aims to streamline the appointment booking process, providing an efficient and convenient way for patients to find and schedule appointments with doctors of their choice.

The system includes multiple entities such as doctors, patients, clinics, and administrators, each with their own specific roles and functionalities. Doctors can create profiles, manage their availability, and provide information about their specialization, experience, services, degrees, and awards. Patients can register and search for doctors based on various criteria such as specialization, location, and availability. They can book appointments, manage their profiles, and engage in chat communication with doctors. Administrators have control over system management, including user management and clinic management.

The system incorporates features like appointment booking, appointment management, profile management, clinic management, and chat communication between doctors and patients. It ensures data security, user authentication, and authorization to maintain confidentiality and privacy.

By implementing the Doctor Appointment Booking System, the aim is to improve the overall efficiency and accessibility of healthcare services. It provides a user-friendly platform for patients to find suitable doctors and book appointments, reducing waiting times and enhancing patient satisfaction. The system also offers convenience for doctors by automating the appointment scheduling process and allowing efficient management of their schedules.

Overall, the Doctor Appointment Booking System enhances the doctor-patient interaction, streamlines the appointment booking process, and contributes to a more efficient healthcare ecosystem.

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* “Figures” and “Tables” must be shown as Figure 1.1, Figure 1.2, Figure 2.1 and Table 1.1, Table 2.1 so on. Use these figure numbers [page number] where ever you want to reference it. Avoid redundancy in figures
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**SUMMARY OF REPORT TEMPLATE**

* Headings as you can see in report consist of many levels. When writing the report any heading at any level, if consist of sub heading, then you have to write the overview of what will be discussed in those sub headings.
* The report must refer the project in past tense and not continuous tense as the project is complete.
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* Chapter 1. Introduction: under this heading you have to give overview of what will be discussed in 1.1, 1.2, 1.3 so on. it will be introduction to report
* If you omit any section, you have to update the number accordingly
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* Chapter 3 main heading will only discuss the main theme of this section. The heading should mention what each underlying subsection will contain. This chapter is all about functionality of the system and type of information that flows through the system starting right from the input information leading up to output information. All the main transformation of input data will be mentioned in this section. 3.1.1 Will actually discuss the architecture of your system. 3.1 will only refer to the up coming sub sections. The Architecture of system must be represented in system diagram along with the description. The architecture must clearly mention both in writing and diagram, the subsystem /modules of your system. Note that subsystems are presented in this section as black box. Discuss inputs, outputs and processing of system in general and interconnectivity between different sub systems. 3.3.1 and 3.3.2 contains details of system interfaces to other systems if any and other machines if any.
* Chapter 4 discusses the subsystems presented in 3.1.2 in detail. Chapter 4 main heading will again discuss what sub sections this chapter contains. 4.1 will again discuss what 4.1.1, 4.1.2 so on contains. 4.1 must be written for every sub system i.e. if there are 2 sub systems A and B then 4.1 will discuss A and 4.2 discusses B. Numbering should be altered accordingly. 4.1.2 discusses both in description and suitable diagram the flow of information of sub system/ modules under discussion. E.g. DFD level 1. 4.1.3 will present only the components of sub system under discussion. 4.1.4 is like 4.1 just that it discusses components of each module in detail and repeated for every component. Please note that components are the core level details, do not mix it with sub system.
* Chapter 5 discusses behavior of the system. Depicted by event diagram. The different states the system can be found, and which important events shifts the state of system e.g. system is in idle state and on certain kind of event the system changes its state to running
* Chapter 6 is applicable if you built a prototype of your actual system or you simulated your system before you actually implemented it
* Chapter 7 discusses your estimations that you proposed earlier and the actual out comes after completion of projects. You have to give details of the estimation models you used and if you have used more then one model you have to give details for every model.
* Chapter 8 is all about testing you performed, test plan you developed, test cases you developed, testing methods you applied. Certain kind of testing is mandatory for certain projects. You have to analyze which best suits your requirement

1. PREFACE
2. ACKNOWLEDGEMENT
3. INTRODUCTION TO GROUP MEMBERS
4. CERTIFICATE OF COMPLETION BY PROJECT ADVISOR
5. ABSTRACT
6. TABLE OF CONTENTS
7. LIST OF FIGURES
8. LIST OF TABLES

*All the headings above must be included in Table of Contents (TOC) according to correct page numbers. Provided below is an exemplary TOC.*

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| Chapter # 1 Introduction |

## Introduction

The Doctor Appointment Booking System web application is a platform that enables patients to book appointments with doctors online. The application aims to streamline the appointment booking process and provide a convenient and efficient way for patients to schedule their medical consultations. This document serves as the complete project documentation for the Doctor Appointment Booking System web application.

## Goals and objectives

The goals and objectives of the Doctor Appointment Booking System web application are as follows:

**Goal 1**: Provide a user-friendly interface for patients to search for doctors and book appointments.

**Goal 2**: Enable doctors to manage their profiles, availability schedule, and appointments.

**Goal 3**: Facilitate efficient communication between doctors and patients through a chat feature.

**Objective 1**: Develop a responsive and visually appealing web frontend using the Doctor Appointment Booking System.

**Objective 2**: Implement user authentication and role-based access control to differentiate between doctors, patients, and administrators.

**Objective 3**: Create data models to represent entities such as users, doctors, clinics, appointments, and chat messages.

**Objective 4**: Design and implement the necessary subsystems and modules to support the functionalities of the application.

**Objective 5**: Conduct comprehensive testing to ensure the reliability, security, and performance of the system.

**Objective 6**: Provide documentation to guide users, developers, and administrators in understanding and utilizing the Doctor Appointment Booking System web application

## System statement of scope

The Doctor Appointment Booking System web application allows patients to browse and search for doctors based on various criteria such as specialization, location, and availability. Patients can view detailed information about doctors, including their profile, clinic details, services offered, and availability schedule. They can then book appointments with their chosen doctor at a convenient date and time. Doctors have access to a dedicated dashboard where they can manage their profiles, availability schedule, and appointments. Administrators can oversee the entire system and manage user accounts, doctor profiles, clinics, and appointments.

## System context

The Doctor Appointment Booking System web application is a standalone system that operates within the context of a web environment. It interfaces with web browsers used by patients, doctors, and administrators to access and interact with the application. The system stores and retrieves data from a relational database management system (DBMS) to manage user accounts, doctor profiles, clinics, appointments, and chat messages. The application utilizes the Django framework for web development, incorporating various libraries and tools to enhance functionality and user experience.

## Theoretical Background (of project)

The Doctor Appointment Booking System web application is built using the Django framework, which follows the Model-View-Controller (MVC) architectural pattern. The MVC pattern separates the application into three interconnected components:

• Model: Represents the data and business logic of the application.

• View: Handles the presentation layer and user interface.

• Controller: Manages the flow of data and coordinates interactions between the model and view components.

The Django framework provides a robust foundation for building web applications, offering features such as URL routing, template rendering, and database management. By utilizing Django, the Doctor Appointment Booking System benefits from a scalable and maintainable architecture that facilitates rapid development.

## Technology & Tools/hardware components (used in the Project)

### Front-end Technologies:

HTML**:**

The standard markup language for creating the structure and content of web pages.

CSS**:**

Used for styling and formatting the visual presentation of web pages.

Bootstrap**:**

A popular CSS framework that provides pre-designed components and a responsive grid system, enabling faster and consistent front-end development.

JavaScript**:**

A versatile programming language used for adding interactivity and dynamic functionality to web pages.

Jquery:

A lightweight JavaScript library that simplifies DOM manipulation, event handling, and Ninja template, streamlining front-end development tasks.

The chosen front-end technologies provide a solid foundation for building a responsive and visually appealing user interface, enhancing the user experience and facilitating efficient interaction within the Doctor Appointment Booking System platform.

### Back-end Technology:

Python Django**:**

Django is a high-level Python web framework that follows the Model-View-Controller (MVC) architectural pattern.

It provides a robust set of tools and functionalities for building web applications.

Django includes an ORM (Object-Relational Mapping) system, allowing developers to interact with the database using Python objects instead of SQL queries.

The framework also includes built-in support for user authentication, session management, URL routing, and form handling.

Django promotes the principle of "Don't Repeat Yourself" (DRY) and encourages rapid development by providing reusable components called "apps."

With Django's template engine, developers can easily create dynamic HTML pages by blending Python code and HTML templates.

Pillow:

Pillow is a Python Imaging Library (PIL) fork, used for working with images in various formats.

It extends the capabilities of Python's standard library 'PIL' and provides additional features and improvements.

Pillow allows developers to open, manipulate, and save images in different formats, such as JPEG, PNG, GIF, BMP, and more.

Image operations, such as resizing, cropping, rotating, filtering, and blending, can be easily performed using Pillow.

The library supports image processing tasks and is commonly used in Django applications for handling user-uploaded images or generating dynamic images on the fly.

MySQLclient:

MySQLclient is a MySQL database connector for Python that allows seamless interaction with MySQL databases.

It is a lightweight, efficient library that provides an interface to execute SQL queries and manage data in MySQL databases.

MySQLclient allows developers to connect to MySQL databases, perform CRUD (Create, Read, Update, Delete) operations, and execute complex SQL statements.

It is often used as the backend database driver for Django projects that use MySQL as the underlying database management system.

With MySQLclient, developers can efficiently handle database operations, including data retrieval, storage, and management in Django applications.

Database**:**

**MySQL:**

An open-source relational database management system (RDBMS) known for its performance, reliability, and ease of use. MySQL provides robust data storage and retrieval capabilities, making it a suitable choice for managing user data, project details, and other relational information within Doctor Appointment Booking System.

MySQL's widespread adoption, compatibility with Python Django, and support for essential database operations ensure efficient data management and scalability for the platform.

These technology choices are based on their popularity, extensive community support, and suitability for web application development. By leveraging these technologies, the Doctor Appointment Booking System project aims to deliver a stable, scalable, and feature-rich online platform for streamlined work.

Django Templates: Used for rendering dynamic HTML pages.

Web browsers: Users access the application through web browsers, such as Google Chrome, Mozilla Firefox, or Safari.

Deployment Platform: A server or hosting provider to deploy the web application.

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| Chapter # 2 Usage Scenario / User Interaction |

## Usage Scenario / User Interaction

This section provides a usage scenario for the system. It organized information collected during requirements elicitation into use-cases.

## User profiles

The Doctor Appointment Booking System web application supports the following user profiles:

### Patient:

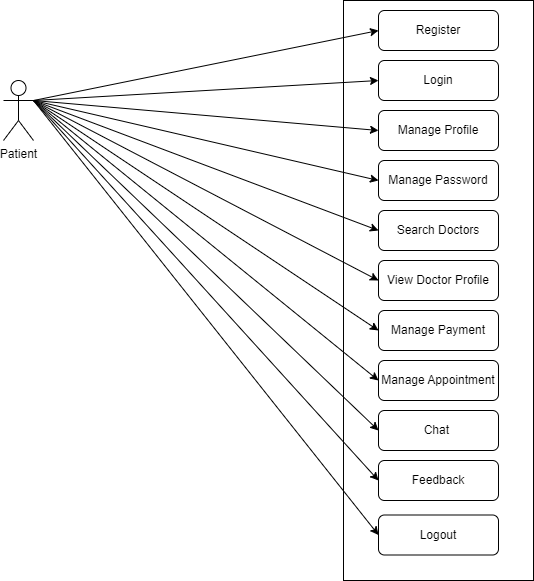
Users who are seeking medical appointments with doctors, Book Appointments, handle profile, change password, search doctor, chat with doctor, send feedback.

Figure: 2.1 Patient use case.

### Doctor:

Medical professionals who offer their services and manage appointments doctor profiles, clinics, Services Degrees, chat with patient, view feedback.

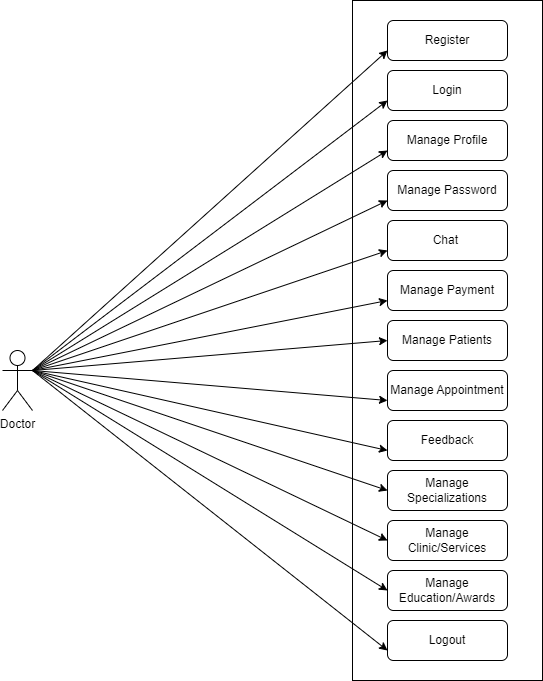


Figure: 2.2 Doctor use case.

### Administrator:

Responsible for managing user accounts, handle Specialization doctor profiles and appointments, manage doctors, manage patients, manage feedback.

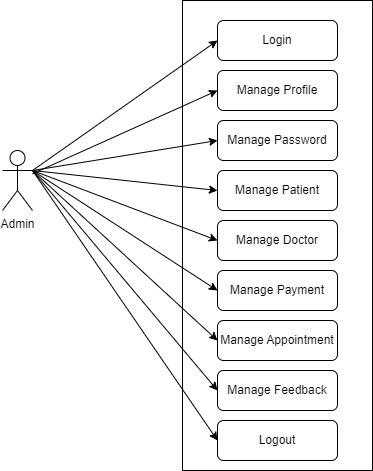


Figure: 2.3 Admin use case

## Use-cases

The Doctor Appointment Booking System web application facilitates the following use cases:

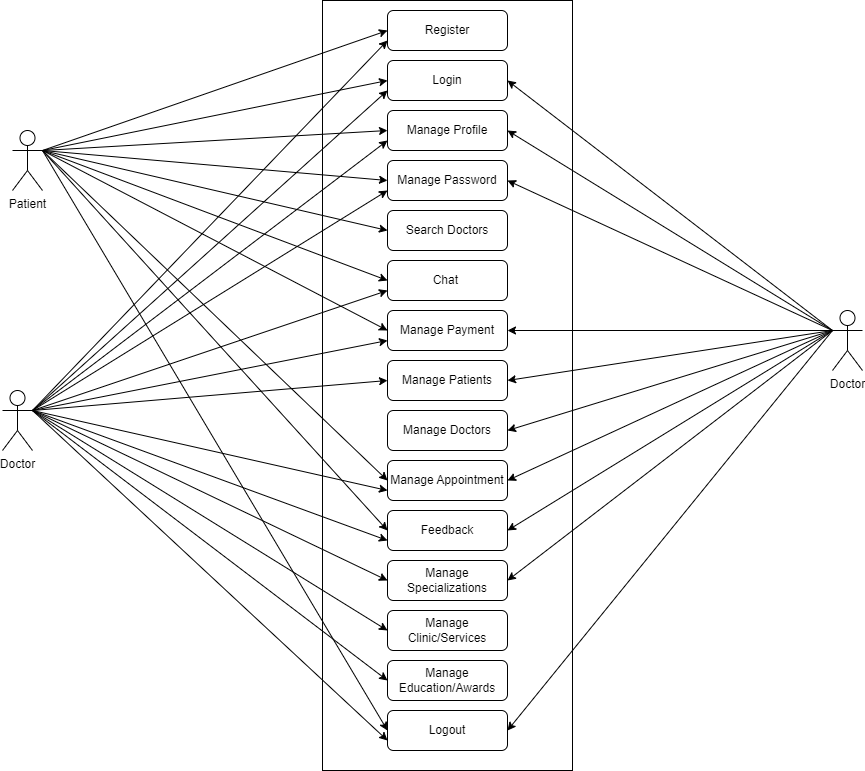


Figure: 2.4 Overall use cases

**Patient Registration**: Patients can create an account to access the system.

**Doctor Registration**: Doctors can register and create their profiles.

**User Authentication**: Users can log in to the system using their credentials.

**Search for Doctors**: Patients can search for doctors based on specialization, location, or name.

**View Doctor Profile**: Patients can view detailed information about doctors, including their profile, clinic details, services offered, and availability schedule.

**Book Appointment**: Patients can select a preferred date and time to book an appointment with a doctor.

**Manage Appointments**: Doctors can view and manage their appointments, including approving, rescheduling, or canceling appointments.

**View Chat Messages**: Doctors and patients can communicate with each other through the chat feature.

**Administrator Management**: Administrators can manage user accounts, doctor profiles, clinics, and appointments.

## Special usage considerations

The Doctor Appointment Booking System web application addresses the following special usage considerations:

**Security**: The application should ensure the privacy and confidentiality of user information, including personal details and medical history.

**Accessibility**: The application should be designed to accommodate users with disabilities and provide a seamless experience for all users.

**Scalability**: The system should be scalable to handle a large number of users, appointments, and chat messages concurrently.

**User-Friendly Interface**: The application should have an intuitive and user-friendly interface to facilitate easy navigation and interaction for all users.

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| Chapter # 3 Functional and Data Description |

Functional and Data Description

This section will provide an overview of the system model, its constituent’s parts and major data objects and their relation ship that flows in the system. Data object is any data that is being transformed by our system. It can be different forms of image or signal or software data or electronic signal etc. Only brief overview of what this section will contain should be mentioned in this heading

## System Architecture

The Doctor Appointment Booking System web application follows a three-tier architecture, consisting of the following components:

**Presentation Layer**: Handles user interaction and displays the user interface using HTML, CSS, and JavaScript. The Doctor Appointment Booking System is utilized for the frontend implementation.

**Application Layer**: Contains the business logic and processes user requests. It interacts with the presentation layer for receiving and returning data.

**Data Layer**: Manages data persistence and storage. It interacts with the application layer to perform database operations.

Architecture model

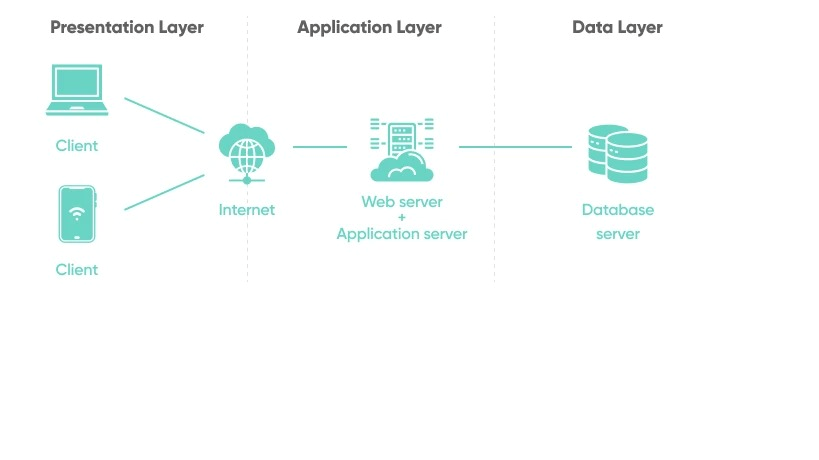
The architecture model used in the Doctor Appointment Booking System web application is the Model-View-Controller (MVC) pattern. This pattern separates the application into three interconnected components:

**Model**: Represents the data and business logic of the application. It includes the data models for user accounts, doctor profiles, clinics, appointments, and chat messages.

**View**: Handles the presentation layer and user interface. It includes HTML templates and frontend components for rendering data.

**Controller**: Manages the flow of data and coordinates interactions between the model and view components. It handles user requests, updates the model, and renders the appropriate view.

Figure: 3.1 Architecture model



Subsystem/modules overview

The Doctor Appointment Booking System web application consists of the following subsystems/modules:

**User Authentication**: Handles user registration, login, and session management.

**User Management**: Allows administrators to manage user accounts, including adding, updating, or deactivating user profiles.

**Doctor Profile Management**: Enables doctors to create and manage their profiles, including personal information, clinic details, specialization, services offered, experience, degrees, awards, and availability schedule.

**Clinic Management**: Supports the management of clinics associated with doctors, including clinic information and images.

**Appointment Booking**: Facilitates the booking, approval, rescheduling, and cancellation of appointments by patients and doctors.

**Chat**: Provides a chat feature for doctors and patients to communicate with each other securely and efficiently.

**Feedback Management:**

The Rating and Review Management module allows buyers and sellers to rate and review each other's work. Patients can send feedback about doctors degrres, communication, and professionalism. Doctor can also reply patients on their timeliness, responsiveness, and payment. This allows Patient and Doctors to make informed decisions about who to work with in the future.

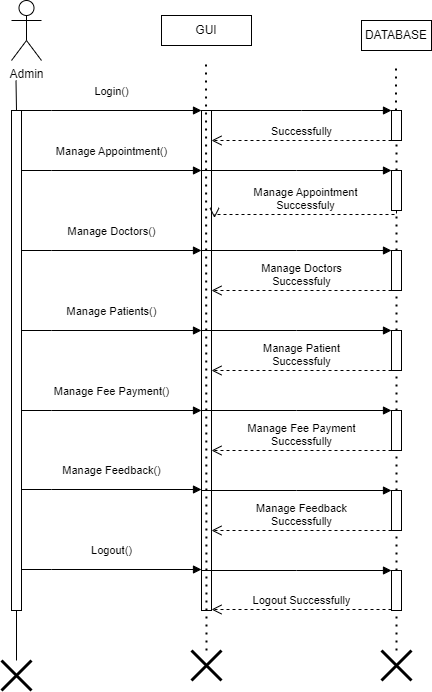


Figure: 3.2 subsystem

Data Description

Major data objects

The Doctor Appointment Booking System web application utilizes the following major data objects:

**User**: Represents user accounts with attributes such as username, password, and role.

**Doctor**: Stores information about doctors, including personal details, contact information, biography, address, city, country, state, postal code, date of birth, price, profile image, and status.

**Clinic**: Contains details about clinics associated with doctors, including clinic name, address, and images.

**Specialization**: Represents the specialization areas of doctors.

Experience: Stores information about the experience of doctors, including hospital name, designation, start and end dates.

**Services**: Represents the services offered by doctors.

**Degrees**: Stores information about the educational degrees of doctors, including degree name, institute, and year.

**Award**: Contains details about awards received by doctors, including award name and year.

**Patient**: Represents patient profiles with attributes such as personal details, contact information, address, city, country, state, postal code, date of birth, blood group, phone number, gender, and profile image.

**Subadmin**: Represents subadmin profiles with attributes similar to patient profiles.

**Appointment**: Stores information about appointments, including the doctor, patient, booking date, appointment date, and appointment time.

**Doctor Schedule**: Represents the availability schedule of doctors, including the doctor, day of the week, start time, and end time.

**Chat**: Stores chat messages between doctors and patients, including the doctor, patient, message content, and date time.

System level data model

The system level data model for the Doctor Appointment Booking System web application includes the aforementioned data objects and their relationships. The model represents the structure and associations between different entities in the application.

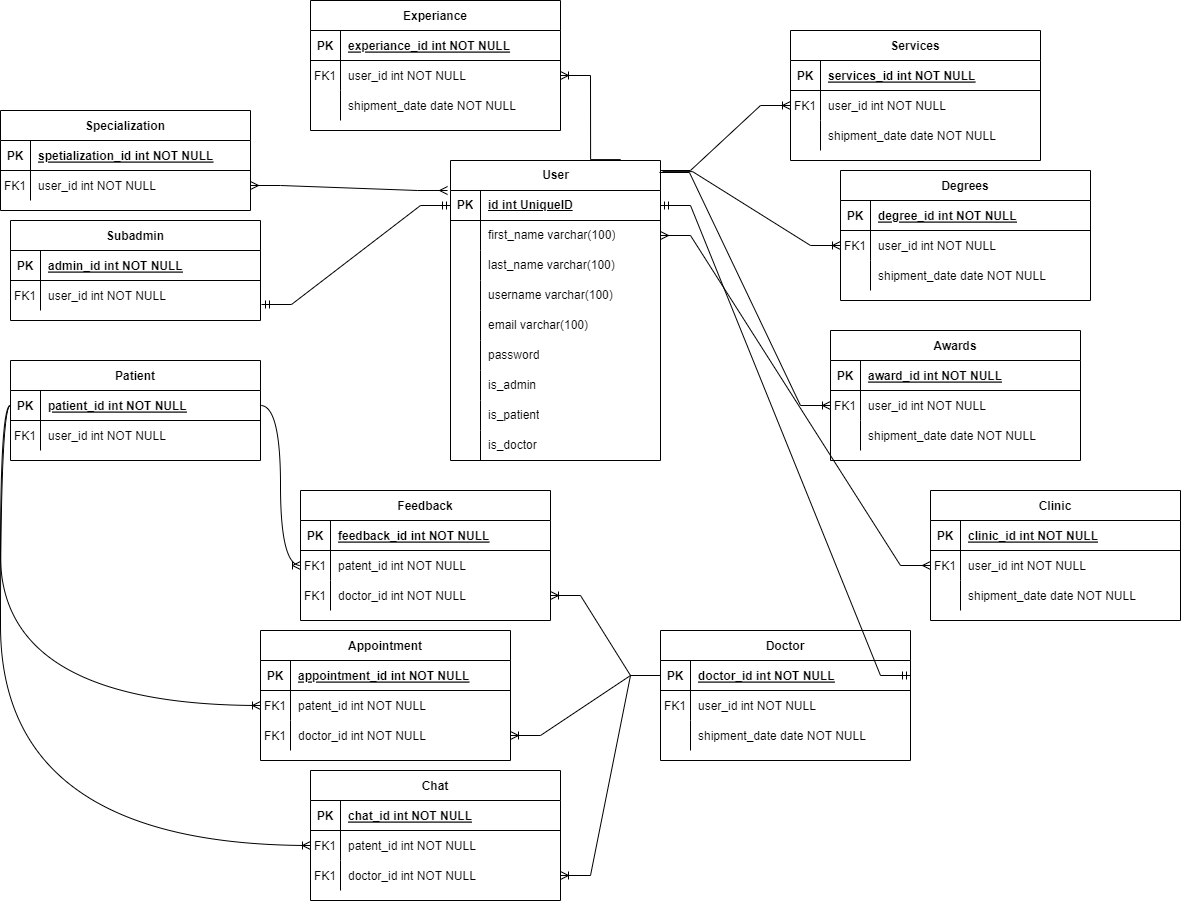


Figure: 3.3 ERD Diagram

System Interface Description

The System’s interface(s) to the outside world are described.

External machine interfaces

The Doctor Appointment Booking System web application interfaces with the following external machine interfaces:

**Web Browser**: Users interact with the application through a web browser, which sends HTTP requests to the server and receives HTML responses.

**Database Management System**: The application interfaces with a relational database management system MySQL to store and retrieve data related to user accounts, doctor profiles, clinics, appointments, and chat messages.

External system interfaces

The Doctor Appointment Booking System web application may integrate with external systems for additional functionalities, such as:

**Email Service**: The system can integrate with an email service provider to send notifications and reminders to users about their appointments.

|  |
| --- |
| Chapter # 4 **Subsystem/module Description** |

1. Subsystem/module Description

A description of each subsystem is presented.

Description for Subsystem ‘n’

A detailed description of each subsystem is presented. Section 4.1 is repeated for each of ‘n’ subsystems i.e. this section is repeated for all subsystems.

Subsystem scope

The Subsystem 'n' in the Doctor Appointment Booking System web application is responsible for managing the chat functionality between doctors and patients. It enables secure and efficient communication between the two parties within the application.

Subsystem flow diagram/ desired UML diagram

The subsystem flow diagram or UML diagram depicts the components and their relationships within the chat subsystem. Please refer to the following textual description and create the appropriate diagram:

Chat Manager: Manages the overall functionality of the chat subsystem, including message handling and communication between doctors and patients.

Message Model: Defines the data model for chat messages, including the doctor, patient, message content, and datetime.

User Interface: Provides a user-friendly interface for doctors and patients to view and send chat messages.

Chat Controller: Handles the incoming and outgoing chat messages, performs message validation, and triggers notifications for new messages.

Security Module: Implements security measures to ensure the privacy and confidentiality of chat messages, including encryption and access control.

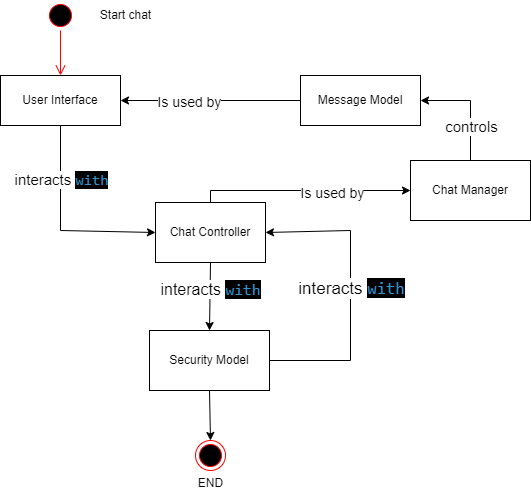


Figure: 4.1 Subsystem Module

Subsystem ‘n’ components

The chat subsystem includes the following components:

Chat Manager

Message Model

User Interface

Chat Controller

Security Module

Description for sub system ‘n’ Component ‘k’

A detailed description and diagram (if applicable) of each sub system component contained within the architecture is presented. Section 4.2 is repeated for each of (k) components.

Component ‘k’ interface description.

Chat Manager

start\_chat(doctor\_id: int, patient\_id: int) -> chat\_id: int: Initiates a chat session between a doctor and a patient and returns the unique chat identifier.

send\_message(chat\_id: int, sender\_id: int, message: str) -> success: bool: Sends a chat message from the sender (doctor or patient) to the specified chat.

get\_chat(chat\_id: int) -> chat\_data: dict: Retrieves the chat data, including the list of messages, participants, and chat details.

Message Model

doctor: ForeignKey(User): Reference to the doctor involved in the chat message.

patient: ForeignKey(User): Reference to the patient involved in the chat message.

message: CharField(max\_length=20): Content of the chat message.

datetime: DateTimeField: Date and time of the chat message.

User Interface

The user interface component provides a user-friendly chat interface for doctors and patients to view and send chat messages. It includes chat message display, input field, and options for sending messages and managing chat settings.

Chat Controller

The chat controller component handles incoming and outgoing chat messages. It performs message validation, ensures proper formatting, and triggers notifications for new messages. It interacts with the chat manager and message model to manage the flow of messages.

Security Module

The security module ensures the privacy and confidentiality of chat messages. It implements encryption algorithms and access control mechanisms to prevent unauthorized access to chat content.

Restrictions/limitations

The chat subsystem has the following restrictions/limitations:

Chat messages are limited to a maximum length of 20 characters.

The chat system does not support file attachments or multimedia messages.

Chat messages are not automatically translated or localized.

4.1.5 Performance issues

Performance issues related to the chat subsystem may include:

Handling a large number of concurrent chat sessions.

Ensuring real-time message delivery and synchronization.

Optimizing message retrieval and display for a smooth user experience.

4.1.6Design constraints

Design constraints for the chat subsystem may include:

Compatibility with different browsers and devices.

Integration with authentication and authorization mechanisms.

Ensuring scalability and high availability to handle increased chat load.

(Continue with subsystems/modules descriptions as needed)

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| Chapter # 5  **Behavioral Model and Description** |

1. Behavioral Model and Description

The Doctor Appointment Booking System web application exhibits the following system behavior:

Description for system behavior

User The doctor appointment booking system web application allows users (doctors and patients) to schedule and manage appointments. The system provides the following behaviors:

User Registration: Users can register as doctors, patients, or administrators.

User Authentication: Users can log in to the system using their credentials.

Doctor Profile Management: Doctors can update their personal information, such as contact details, biography, address, specialization, experience, services, degrees, awards, and clinic information.

Patient Profile Management: Patients can update their personal information, such as contact details, address, and medical history.

Patient Profile Management: Patients can update their personal information, such as contact details, address.

Appointment Booking: Patients can search for available doctors and book appointments based on doctor availability and specialization.

Appointment Management: Doctors and Patient can view and manage their appointments, including approving or rejecting appointment requests, rescheduling appointments, and marking appointments as completed.

Doctor-Patient Chat: The system provides a chat functionality for doctors and patients to communicate securely.

Change Password: Patients ,Doctors and Admin can change their password.

Feedback Management: Patients can send feedback on doctor performance, communication and Behavior admin monitoring the feedbacks.

Events/interrupts

User Registration Event: Triggered when a user registers a new account.

User Login Event: Triggered when a user logs in to the system.

Doctor Profile Update Event: Triggered when a doctor updates their profile information.

Patient Profile Update Event: Triggered when a patient updates their profile information.

Appointment Booking Event: Triggered when a patient books a new appointment.

Appointment Approval Event: Triggered when a doctor approves an appointment request.

Appointment Rejection Event: Triggered when a doctor rejects an appointment request.

Appointment Rescheduling Event: Triggered when a doctor reschedules an appointment.

Appointment Completion Event: Triggered when a doctor marks an appointment as completed.

Chat Message Event: Triggered when a doctor or patient sends a chat message.

States

User Registration State: The system is waiting for user registration information.

User Login State: The system is waiting for user login credentials.

Doctor Profile Update State: The system is waiting for doctor profile update information.

Patient Profile Update State: The system is waiting for patient profile update information.

Appointment Booking State: The system is waiting for appointment booking details.

Appointment Approval State: The system is waiting for the doctor's approval decision.

Appointment Rejection State: The system is waiting for the doctor's rejection reason.

Appointment Rescheduling State: The system is waiting for the new appointment details.

Appointment Completion State: The system is waiting for the doctor's confirmation of appointment completion.

Chat Message State: The system is waiting for the chat message content.

State Transition Diagrams

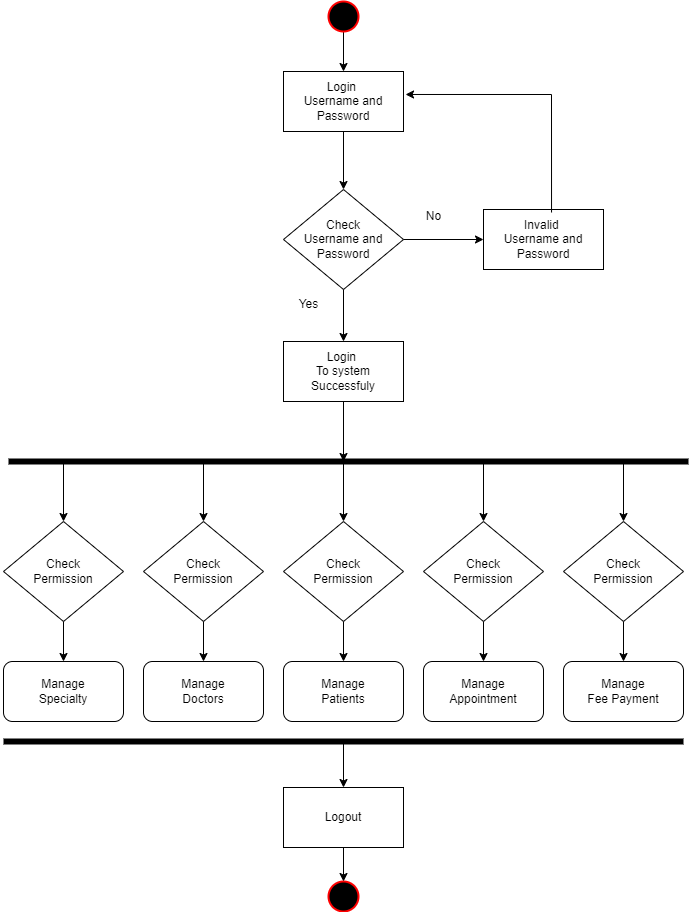


Figure: 5.1 State Transition Diagram

Control specification

The Doctor Appointment Booking System implements control specifications to govern system behavior. These include:

Appointment Validation: Ensuring the selected appointment date and time are within the doctor's availability schedule.

User Authentication: Verifying user credentials during login and restricting access to specific functionalities based on user roles.

Message Validation: Verifying the length and format of chat messages before sending or displaying them.

Appointment Status Updates: Updating the status of appointments based on doctor actions, such as approval, rescheduling, or cancellation.

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| Chapter # 6  **System Prototype Modeling and Simulation Results** |

1. System Prototype Modeling and Simulation Results

System prototype modeling and simulation results are used to evaluate the performance of a system before it is actually built. This can be done by creating a model of the system and simulating its behavior under different conditions. The results of the simulation can then be used to identify potential problems with the system and to make necessary changes before the system is built.

Description of system modeling approach (if used)

For the doctor appointment booking system web application, a prototype model was created using Django, a Python-based web framework. The model follows the Model-View-Controller (MVC) architectural pattern, where the data models represent the entities and their relationships, views handle the user interface, and controllers manage the business logic and interactions with the database.

Simulation results

The results of any system simulation some simulation results that could be used to evaluate the doctor appointment booking system web application:

**Performance:** The performance of the application could be evaluated by simulating the application with a large number of doctors and different types of Patients. The results of the simulation could then be used to determine how well the application scales and to identify any potential bottlenecks. For example, the simulation could be used to determine how long it takes for the application to load a appointment page when there are a large number of users logged in.

**Security:** The security of the application could be evaluated by simulating attacks on the application and evaluating how well the application's security features protect it from attack. For example, the simulation could be used to determine how easy it is for a hacker to gain access to the application's database.

**Usability:** The usability of the application could be evaluated by simulating users interacting with the application and evaluating how easy it is to use. For example, the simulation could be used to determine how long it takes for a user to complete a task in the application.

The results of the simulation to make changes to the application before it is built. This could help to ensure that the application is performance, secure, and easy to use.

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Special performance issues

The doctor appointment booking system web application should be designed and optimized to handle the following performance issues:

1. **Scalability**: The system should be able to handle a growing number of users, doctors, patients, and appointments without significant performance degradation.
2. **Response Time**: The system should provide quick response times for actions such as appointment booking, profile updates, and chat message delivery.
3. **Concurrent Usage**: The system should support multiple concurrent users accessing and interacting with the application without negatively impacting performance or data integrity.

Prototyping requirements

If The system prototype requires the following resources and dependencies:

1. **Django framework**: The web application is developed using the Django framework, which provides the necessary tools and libraries for building the application.
2. **Database Management System**: The system requires a database management system MySQL to store and retrieve data.
3. **Web Frontend**: The system utilizes a web frontend template (referenced in the project description) for the user interface.

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| Chapter # 7  **System Estimates and Actual Outcome** |

1. System Estimates and Actual Outcome

During the development of the "Doccur - An Online Platform for Doctor Appointment Booking system" application, it is important to establish estimates for various aspects of the system. These estimates serve as a basis for planning, resource allocation, and tracking progress. Here is an overview of the estimated and actual outcomes for the system:

Historical data used for estimates

The historical data was used to create a baseline estimate for the cost, time, and resources required for Doctor Appointment Booking system. This baseline estimate was then used to create a more detailed estimate. The detailed estimate took into account the specific features of Doctor Appointment Booking system and the specific needs of the project.

Estimation techniques applied and results

In the case of Doctor Appointment Booking system, the top-down estimation technique used to estimate the overall cost of the project. This estimate could then be broken down into smaller components, such as the cost of development, testing, and deployment.

In the case of Doctor Appointment Booking system, the bottom-up estimation technique used to estimate the cost of development, testing, and deployment. These estimates could then be added up to get the overall cost of the project.

In the case of Doctor Appointment Booking system, the parametric estimation technique used to estimate the cost of Doctor Appointment Booking system by using historical data from similar projects. This data could be used to estimate the cost of development, testing, and deployment.

In the case of Doctor Appointment Booking system, the Monte Carlo simulation technique used to generate a range of possible estimates for the cost of Doctor Appointment Booking system. This range of estimates could be used to get a better understanding of the uncertainty around the cost of the project.

Estimation technique ‘m’

Parametric estimation: Parametric estimation is a cost estimation technique that uses historical data to estimate the cost of a project. This technique is often used for projects that are similar to previous projects.

In the case of Doctor Appointment Booking system, the parametric estimation technique could be used to estimate the cost of Doctor Appointment Booking system by using historical data from similar projects. This data could be used to estimate the cost of development, testing, and deployment.

Estimate for technique ‘m’

Estimate generated for technique ‘m’.

Actual Results and Deviation from Estimates

The final cost for the project (at this point in time) is presented here. A deviation chart should be presented to illustrate the comparison between actual cost of system and estimated cost.

Table 7. Estimated Cost

|  |  |  |
| --- | --- | --- |
| ****Item**** | ****Estimated Cost**** | ****Actual Cost**** |
| Development | Rs.50,000 | Rs.10,000 |
| Testing |  |  |
| Deployment |  |  |
| Total |  |  |

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System Resources (Required and Used)

People, hardware, software, tools, and other resources proposed to build the software are noted here. On the bases of which cost estimations were performed

System Resources Required

System resources that could be required and used by the Doctor Appointment Booking system application:

* **Software:** The Doctor Appointment Booking system project required the following software:
  + MySQL
* **Tools:** The Doctor Appointment Booking system project required the following tools:
  + Visual Studio Code
* People: The Doctor Appointment Booking system project required
  + Developer
* Hardware:
  + Good Processor
  + Lot of RAM
  + Large Hard drive

System Resources Used

**People:** The Doctor Appointment Booking system project is actually built by one developer.

**Hardware:**

* Good processor
* **16GB** of RAM, and a
* 500GB hard drive.

**Software:** The Doctor Appointment Booking system project was built using the following software:

* + The MySQL database management system

**Tools:** The Doctor Appointment Booking system project was built using the following tools:

* + The Visual Studio code editor

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| Chapter # 8  **Test Plan** |

1. Test Plan

This section describes the overall testing strategy and issues that are required to properly execute effective tests. At least one of the testing strategy should be followed:

8.1 System Test and Procedure

To test the complete application as a whole, system testing has been used. It is beneficial to check whether the application meets its requirements and fulfill Quality Standards.

8.2Testing strategy

The overall strategy for software testing is described.

8.2.1Unit testing

The software units in an application are modules and routines that are assembled and integrated to perform a specific function. Unit testing focuses first on modules, independently of one another, to locate errors. This enables, to detect errors in coding and logic that are contained within each module. This testing includes entering data and ascertaining if the value matches to the type and size supported by python. The various controls are tested to ensure that each performs its action as required.

Commonly used method is White-Box Testing method. Every time a component of the program is changed, it can be run for testing that is the biggest and famous benefit of this testing phase. Issues that are arise during this phase, allowing to be resolved as quickly as possible. Unit testing is familiar by software developers. It allows them to test their application units before move them to testers for formal testing.

User Acceptance Testing:

User acceptance of an application is the key factor for the success of any application. The application under consideration is tested for user acceptance by constantly keeping in touch with the application users at time of developing and making changes whenever required.

**Test Cases**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Description** | **Expected Results** | **Actual Results** | **Pass/Fail** |
| A buyer from an international country posts a job or project. | A buyer from an international country creates a new job or project on Doctor Appointment Booking system. The buyer enters all of the required information, including the job title, description, budget, and deadline. The buyer then submits the job or project. | The job or project is successfully created and the buyer is redirected to the job or project page. | The job or project is not created or the buyer is not redirected to the job or project page. | Pass |
| A seller in Pakistan bids on a job or project. | A seller in Pakistan views a job or project that has been posted by a buyer from an international country. The seller reviews the job or project description and budget, and then submits a bid. | The bid is successfully submitted and the seller is notified that their bid has been received. | The bid is not submitted or the seller is not notified that their bid has been received. | Pass |
| A buyer and seller communicate with each other. | A buyer and seller who have worked together on a job or project communicate with each other through the Doctor Appointment Booking system messaging system. The buyer and seller send messages to each other and receive messages from each other. | The buyer and seller are able to communicate with each other through the Doctor Appointment Booking system messaging system. | The buyer and seller are not able to communicate with each other through the Doctor Appointment Booking system messaging system. | Pass |
| A buyer pays a seller for completed work. | A buyer pays a seller for completed work through the Doctor Appointment Booking system payment system. The buyer enters the amount to be paid and the seller's bank account information. The buyer then submits the payment. | The payment is successfully processed and the seller is notified that they have been paid. | The payment is not processed or the seller is not notified that they have been paid. | Pass |

Table 8. 1 Test Case

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Integration testing

The integration testing strategy and procedure is specified. This section includes a discussion of the order of integration by System function.

Validation testing

The validation testing strategy and procedure is specified. This section includes a discussion of the order of validation by system.

High-order testing (a.k.a. System Testing)

The high-order testing strategy for Doctor Appointment Booking system will focus on the following areas performance of Doctor Appointment Booking system will be tested to ensure that it can handle the expected load of users. The security of Doctor Appointment Booking system will be tested to ensure that it is protected from unauthorized access and malicious attacks

Security testing

**Security Testing** is a type of software testing that intends to uncover vulnerabilities of the system and determine that its data and resources are protected from possible intruders.

Focus Areas

There are four main focus areas to be considered in security testing (Especially for web sites/applications):

* **Network security:** This involves looking for vulnerabilities in the network infrastructure (resources and policies).
* **System software security:** This involves assessing weaknesses in the various software (operating system, database system, and other software) the application depends on.
* **Client-side application security:** This deals with ensuring that the client (browser or any such tool) cannot be manipulated.
* **Server-side application security:** This involves making sure that the server code and its technologies are robust enough to fend off any intrusion.
* Security Testing is defined as a type of Software Testing that ensures software systems and applications are free from any vulnerabilities, threats, risks that may cause a big loss. Security testing of any system is about finding all possible loopholes and weaknesses of the system which might result into a loss of information.
* The goal of security testing is to identify the threats in the system and measure its potential vulnerabilities, so the system does not stop functioning or is exploited. It also helps in detecting all possible security risks in the system and help developers in fixing the problems through coding.

Table 8. 2 Security Test

|  |  |
| --- | --- |
| **Test Type** | **Result (Pass or Fail)** |
| Security Scanning | Pass |
| Penetration Testing | Fail |
| Risk Assessment | Fail |
| Ethical Hacking | Pass |
| Security Auditing | Pass |

Stress testing

In the Stress testing involve loading testing. Load testing is carried out to know the behavior of the system under the specific expected load. Example: The software is tested in load of 20 users accessing resources at the same time; the system response time was good.

Load testing lets you measure your website's [quality of service](https://en.wikipedia.org/wiki/Quality_of_service) performance based on actual customer behavior. Nearly all the load testing tools and frame-works follow the classical load testing paradigm: when customers visit your web site, a script recorder records the communication and then creates related interaction scripts. A load generator tries to replay the recorded scripts, which could possibly be modified with different test parameters before replay. In the replay procedure, both the hardware and software statistics will be monitored and collected by the conductor, these statistics include the CPU, memory, disk IO of the physical servers and the response time, throughput of the system under test, etc. And at last, all these statistics will be analyzed and a load testing report will be generated. Load and performance testing analyzes [software](https://en.wikipedia.org/wiki/Software) intended for a multi-user audience by subjecting the software to different numbers of virtual and live users while monitoring performance measurements under these different loads. Load and performance testing is usually conducted in a test environment identical to the production environment before the software system is permitted to go live.

Table 8. 3 Street Testing

|  |  |  |
| --- | --- | --- |
| **Test Environment** | **No. of Users** | **Sustainability** |
| Web | 6 | Yes |

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| Chapter # 9  **Future Enhancements and Recommendations** |

1. Future Enhancements and Recommendations

* **Payment Gateway**: If payment processing is required for booking appointments or services, the application can integrate with a payment gateway service to securely handle online transactions.

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| Chapter # 10 **Conclusion / Summary** |

1. Conclusion / Summary

The doctor appointment booking system is an efficient and user-friendly web application developed using the Django framework. It provides a seamless experience for both doctors and patients, streamlining the appointment booking process and enhancing communication between healthcare providers and their patients.

Throughout the development of the system, various key features have been implemented to ensure its effectiveness. Users can register and log in as doctors, patients, or administrators, each with their own specific roles and functionalities. Doctors can create and manage their profiles, including personal information, contact details, biographies, and professional experiences. They can also add clinics, specify their availability, and offer specialized services.

Patients, on the other hand, can search for doctors based on various criteria such as specialization, location, and availability. They can view doctor profiles, check their schedules, and book appointments conveniently. The system provides an intuitive interface for appointment booking, allowing patients to select suitable dates and times.

The system also incorporates a chat functionality that enables direct communication between doctors and patients. This feature facilitates easy interaction, allowing patients to discuss their concerns, ask questions, and receive timely responses from doctors. Additionally, patients can provide feedback to doctors, helping to improve the quality of healthcare services.

Overall, the doctor appointment booking system enhances the efficiency and convenience of scheduling appointments in the healthcare industry. It reduces administrative tasks, improves communication, and enhances the patient experience. The system provides a reliable and secure platform for doctors and patients to connect, ensuring effective healthcare management.

In conclusion, the doctor appointment booking system proves to be a valuable tool for healthcare providers and patients alike. Its intuitive design, comprehensive features, and efficient functionality make it an essential component of modern healthcare services. With its successful implementation, it has the potential to revolutionize the way appointments are scheduled and managed, leading to improved patient care and satisfaction.

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Appendices

1. Project Schedule

This section presents an overview of project tasks and the output of a project scheduling tool.

* 1. Timeline chart / Gantt Chart

A project timeline chart is presented. This may include a time line for the entire project or for each staff member.

* 1. Project Group Organization / Work Load Distribution

The manner in which group is organized and the mechanisms for reporting are noted.

1. Working Session / Snap shots of deployed system

Labeled Graphical User Interface (GUI) snapshots of any one work session is presented If no GUI exist than this section can be omitted or if exist, provide actual snap shots of deployed system.

Glossary   
(Small definitions of terminology used in your report in alphabetical order)

|  |  |
| --- | --- |
| **AODV** | Ad-Hoc On-Demand Distance Vector Protocol |
| **BID** | Broadcast ID |
| **CBR** | Continuous Bit Rate |
| **CMMBCR** | Conditional Max-Min Battery Capacity Routing |
| **DCE** | Data Communication Equipment |
| **DIP** | Destination IP Address |
| **DREAM** | Distance Routing Effect Algorithm for Mobility |