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UML Class Diagram

The above UML (Unified Modeling Language) class diagram describes the structural composition and functionality of such classes and their relationship of Java based application, where composition and functionality of different classes and modules that comprise the booking system, and also depicts how different classes and modules interact with each other, how they go to work etc.

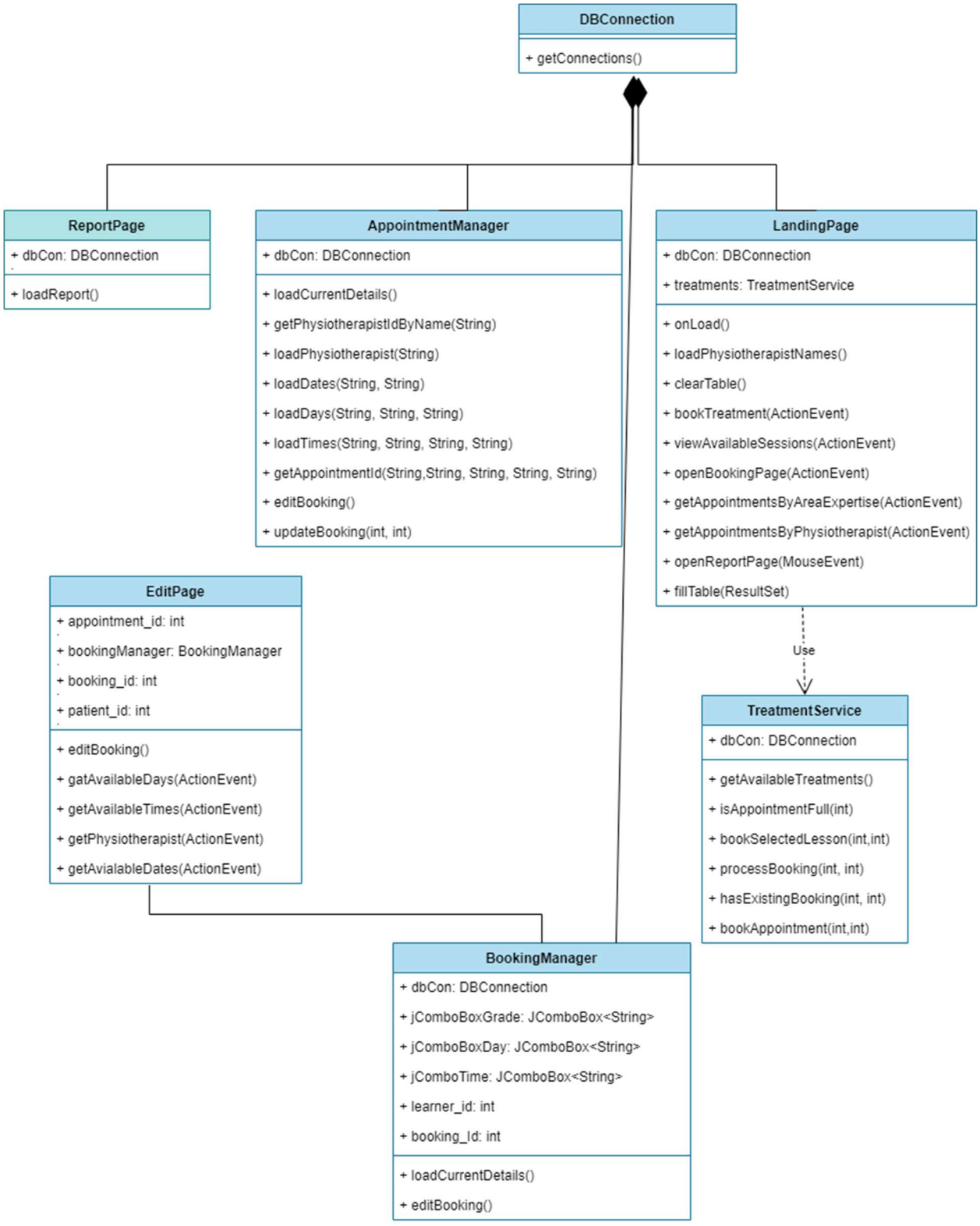


Figure 1: Class Diagram

The UML diagram depicts a group of classes that team up in order to manage appointments, treatment selections, reservation updates, and a report. The DBConnection class is the core of it and gives access to the connections to the database across the system through the getConnections() method. TreatmentService is being integrated with LandingPage, which serves as the user interface to book treatments, view sessions, filter appointments, generate reports using... bookTreatment() and getAppointmentByAreaExpertise() methods.

TreatmentService handles back end functionality, i.e checking availibity, booking.If treatment is not avaialbe for chosen date then it would return false, else it is true. It ensures accurate treatment scheduling using methods like isAppointmentFull() and hasExistingBooking(). AppointmentManager loads the appointement data for retrieving/ filtering and modifies it in real time such as with methods loadTimes(), updatedBooking().

In the meantime, EditPage and BookingManager collaborate to process user driven booking change and provide clean UI interactions and logic separation. Lastly, ReportPage provides an option for administrators to fetch historical booking data from publishReport() in order to support clinical decision making and engagement tracking.

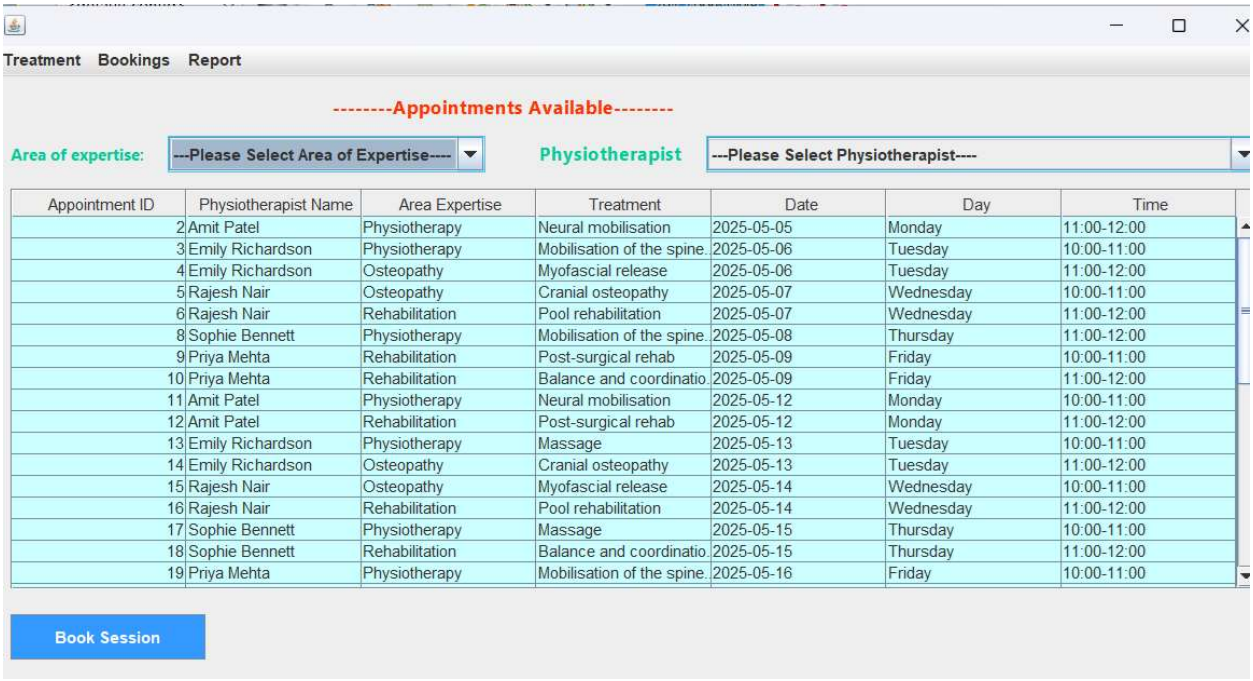
System Functions

This includes the implementation of an advanced software system to the Boost Physio Clinic to help its service streamline the management of physiotherapy appointments to improve the efficiency and convenience of its services to patients, as well as other physiotherapy staff. This wide system brings into play a series of features meant to enhance the booking process, improve real time appointment availability and simplify the treatment schedule managing. The system will facilitate automation of core operations in terms of appointment booking, updating, cancellation

and report generating in efforts to align the experience of the users and administrative workflow in the clinic.

Lesson Booking and Management

This feature in the Boost Physio Clinic system is very simple to view and filter the assigned treatment sessions according to available schedules. In Figure 2, the users can see all the available appointments as well as physiotherapist name, area of expertise, treatment type, day, date and time of the session. It gives a clear overall view of upcoming sessions and is more streamlined to be planned efficiently.



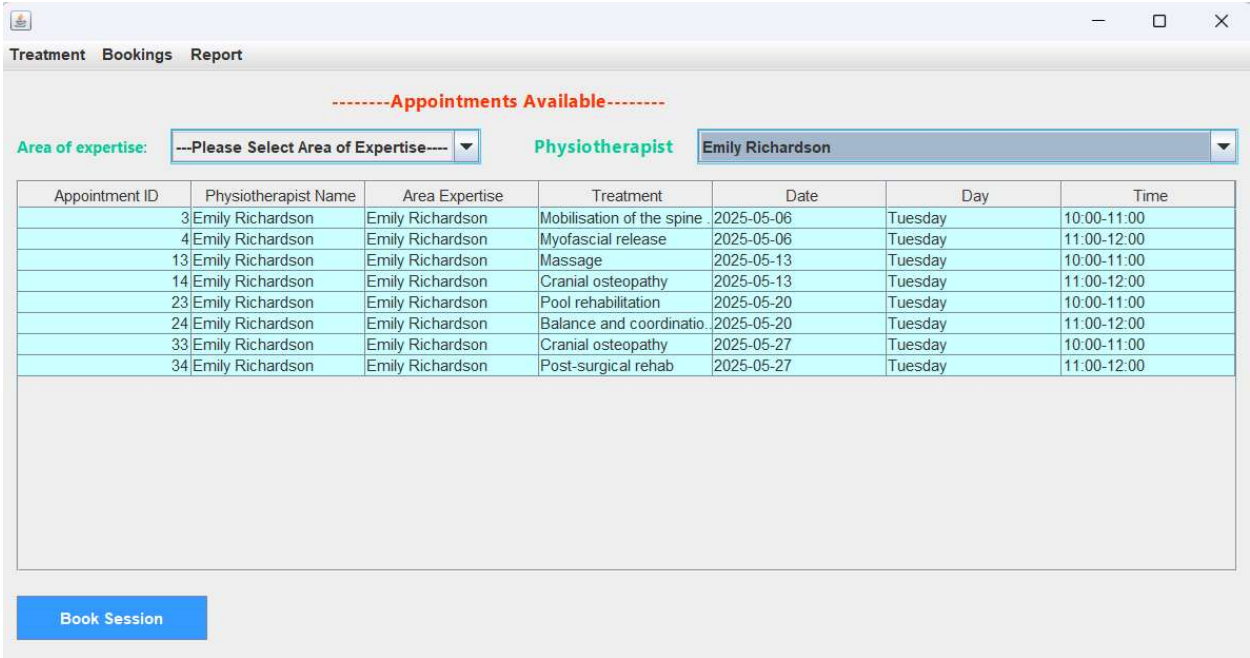
Appointment ID	Physiotherapist Name	Area Expertise	Treatment	Date	Day	Time
2	Amit Patel	Physiotherapy	Neural mobilisation	2025-05-05	Monday	11:00-12:00
3	Emily Richardson	Physiotherapy	Mobilisation of the spine.	2025-05-06	Tuesday	10:00-11:00
4	Emily Richardson	Osteopathy	Myofascial release	2025-05-06	Tuesday	11:00-12:00
5	Rajesh Nair	Osteopathy	Cranial osteopathy	2025-05-07	Wednesday	10:00-11:00
6	Rajesh Nair	Rehabilitation	Pool rehabilitation	2025-05-07	Wednesday	11:00-12:00
8	Sophie Bennett	Physiotherapy	Mobilisation of the spine.	2025-05-08	Thursday	11:00-12:00
9	Priya Mehta	Rehabilitation	Post-surgical rehab	2025-05-09	Friday	10:00-11:00
10	Priya Mehta	Rehabilitation	Balance and coordinatio	2025-05-09	Friday	11:00-12:00
11	Amit Patel	Physiotherapy	Neural mobilisation	2025-05-12	Monday	10:00-11:00
12	Amit Patel	Rehabilitation	Post-surgical rehab	2025-05-12	Monday	11:00-12:00
13	Emily Richardson	Physiotherapy	Massage	2025-05-13	Tuesday	10:00-11:00
14	Emily Richardson	Osteopathy	Cranial osteopathy	2025-05-13	Tuesday	11:00-12:00
15	Rajesh Nair	Osteopathy	Myofascial release	2025-05-14	Wednesday	10:00-11:00
16	Rajesh Nair	Rehabilitation	Pool rehabilitation	2025-05-14	Wednesday	11:00-12:00
17	Sophie Bennett	Physiotherapy	Massage	2025-05-15	Thursday	10:00-11:00
18	Sophie Bennett	Rehabilitation	Balance and coordinatio	2025-05-15	Thursday	11:00-12:00
19	Priya Mehta	Physiotherapy	Mobilisation of the spine.	2025-05-16	Friday	10:00-11:00

Figure 2: Appointments available for booking

View by Physiotherapist

The system is equipped with dynamic filtering capabilities to increase user convenience. For instance, patients can choose a particular physiotherapist to see which of their sessions are

available (see Figure 3). Continuity of care is a great help for patients who want to have continuity or who have had a positive past experience with a given practitioner.

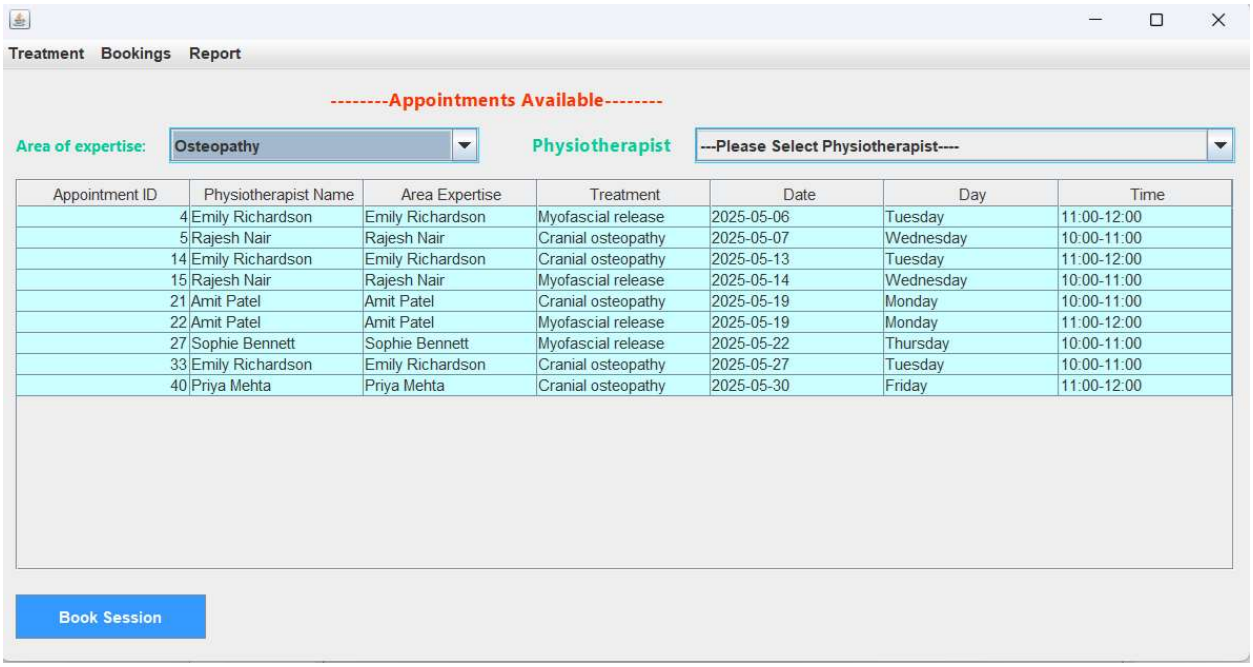


Appointment ID	Physiotherapist Name	Area Expertise	Treatment	Date	Day	Time
3	Emily Richardson	Emily Richardson	Mobilisation of the spine	2025-05-06	Tuesday	10:00-11:00
4	Emily Richardson	Emily Richardson	Myofascial release	2025-05-06	Tuesday	11:00-12:00
13	Emily Richardson	Emily Richardson	Massage	2025-05-13	Tuesday	10:00-11:00
14	Emily Richardson	Emily Richardson	Cranial osteopathy	2025-05-13	Tuesday	11:00-12:00
23	Emily Richardson	Emily Richardson	Pool rehabilitation	2025-05-20	Tuesday	10:00-11:00
24	Emily Richardson	Emily Richardson	Balance and coordinatio..	2025-05-20	Tuesday	11:00-12:00
33	Emily Richardson	Emily Richardson	Cranial osteopathy	2025-05-27	Tuesday	10:00-11:00
34	Emily Richardson	Emily Richardson	Post-surgical rehab	2025-05-27	Tuesday	11:00-12:00

Figure 3: Filter by physiotherapist

View by Area of Expertise

Furthermore, users can narrow by category of expertise for example ‘Osteopathy’ or ‘Physiotherapy’ as shown in Figure 4. This guarantees that appointments match particular treatment requirements and professional expertise. These filtering options greatly help in reducing the booking time and increasing the overall user satisfaction.



Appointment ID	Physiotherapist Name	Area Expertise	Treatment	Date	Day	Time
4	Emily Richardson	Emily Richardson	Myofascial release	2025-05-06	Tuesday	11:00-12:00
5	Rajesh Nair	Rajesh Nair	Cranial osteopathy	2025-05-07	Wednesday	10:00-11:00
14	Emily Richardson	Emily Richardson	Cranial osteopathy	2025-05-13	Tuesday	11:00-12:00
15	Rajesh Nair	Rajesh Nair	Myofascial release	2025-05-14	Wednesday	10:00-11:00
21	Amit Patel	Amit Patel	Cranial osteopathy	2025-05-19	Monday	10:00-11:00
22	Amit Patel	Amit Patel	Myofascial release	2025-05-19	Monday	11:00-12:00
27	Sophie Bennett	Sophie Bennett	Myofascial release	2025-05-22	Thursday	10:00-11:00
33	Emily Richardson	Emily Richardson	Cranial osteopathy	2025-05-27	Tuesday	10:00-11:00
40	Priya Mehta	Priya Mehta	Cranial osteopathy	2025-05-30	Friday	11:00-12:00

Figure 4: Results after filtering by area of expertise

Real-time Schedule Display

A timetable is maintained in the Boost Physio Clinic system. It is updated in a real-time manner, the aim of which is to allow us to plan effectively and avoid overbooking or conflicts with the timetable. This dynamic update mechanism ensures that the booking appointments users are always up to date with current availability information. This real-time functionality not only leads to increased user assurance and gratification but also promotes readily accessible and clean scheduling to all services, thus facilitating convenient clinic operation.

Flexible Booking Options

Patients can view their booking status by navigating to the Bookings tab. Recognizing the importance of flexibility, the system is designed to easily accommodate changes in users' schedules. As illustrated in Figure 2, users can browse available sessions and select a desired

appointment by clicking on it. Once selected, clicking the Book Session button confirms the booking and a success message is displayed, as shown in Figure 5.

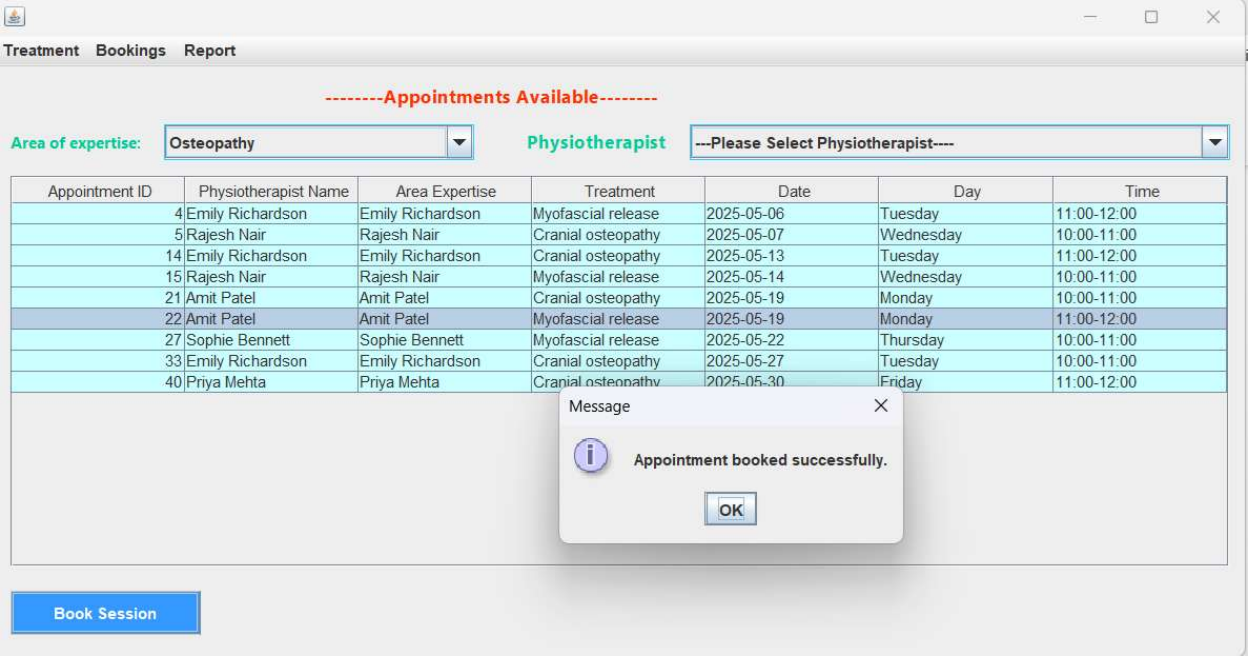


Figure 5: Appointments booked successfully

If a user attempts to book a session that has already reached full capacity, the system prevents overbooking and instead displays a notification, as shown in Figure 6. This ensures appointments remain properly managed and reduces the chance of scheduling conflicts. The immediate feedback mechanism enhances user experience by clearly indicating booking outcomes in real-time.

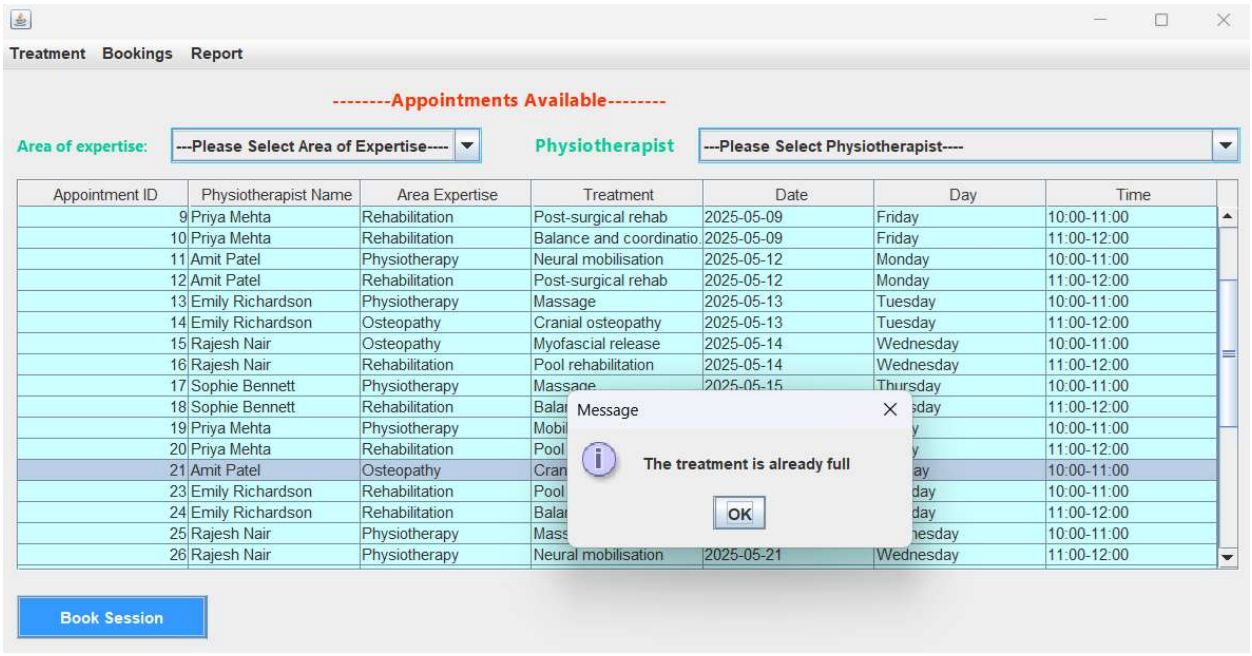


Figure 6: Treatment is already booked

Modifications

If a patient needs to reschedule an appointment that was already booked, the system allows easy change of appointment as long as a new time slot is available. The patient then can select the booking from the list and click on Edit Booking to initiate the change. Opening this action shows the edit interface, as in Figure 8, with fields to choose the user, such as a new area of expertise, physiotherapist, date, day, and time.

Figure 7: Booked appointments

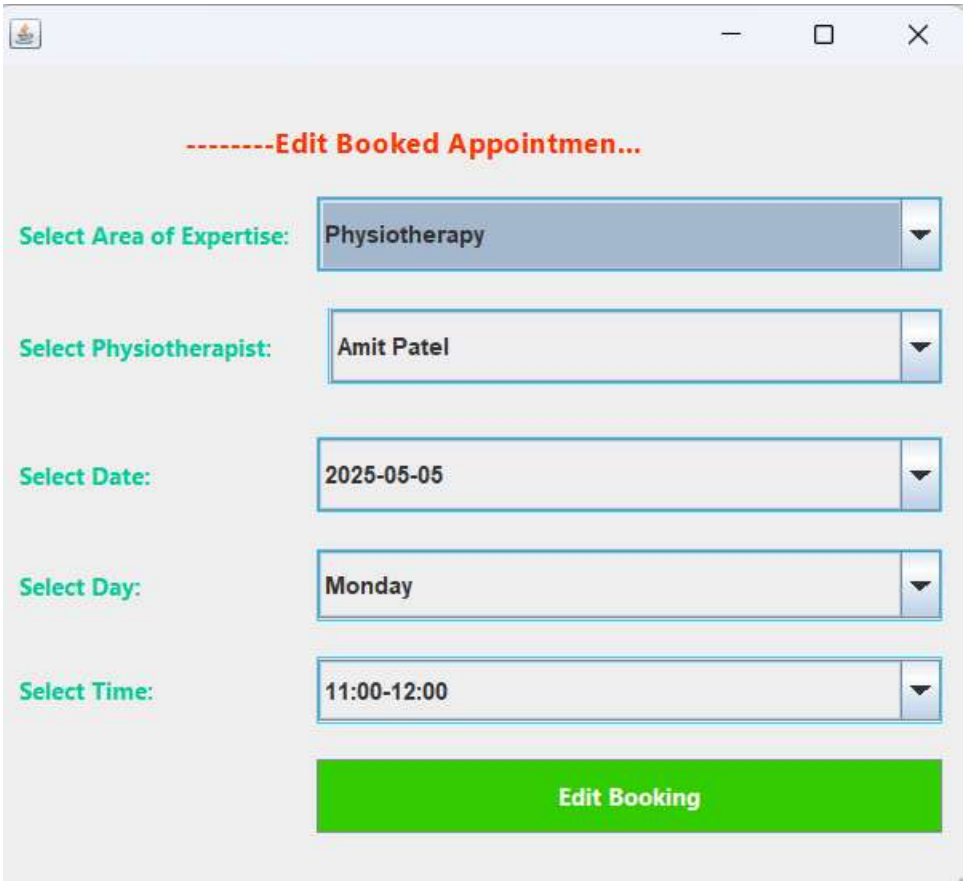


Figure 8: Edit booked appointments page

The critical feature of this flexible rescheduling is that it allows for a sudden change in a patient's schedule. This means that appointment management becomes hassle-free and doesn't need to be canceled altogether. On selecting the new details and confirming them, a success message is displayed, as shown in Figure 9 confirm whether the booking has been updated successfully or not.

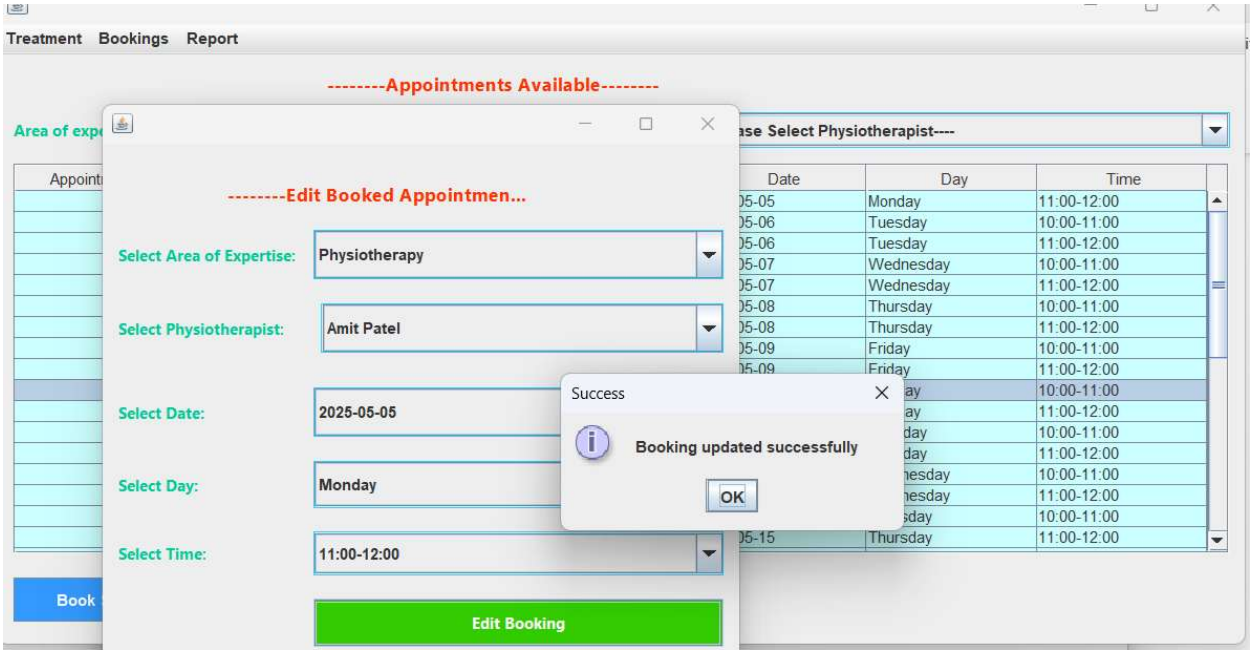


Figure 9: Booking update successfully message

Cancellations

Control over patients' schedules is also given as the system allows patients to cancel their bookings anytime. However, if an appointment is canceled once, then it will not be canceled again; instead, it is locked, which makes the appointment locked and cannot be canceled again due to the integrity of treatment records. During the cancellation, the status would be updated automatically by the system and make the appointment slot available to others, with the optimal use of clinic resources.

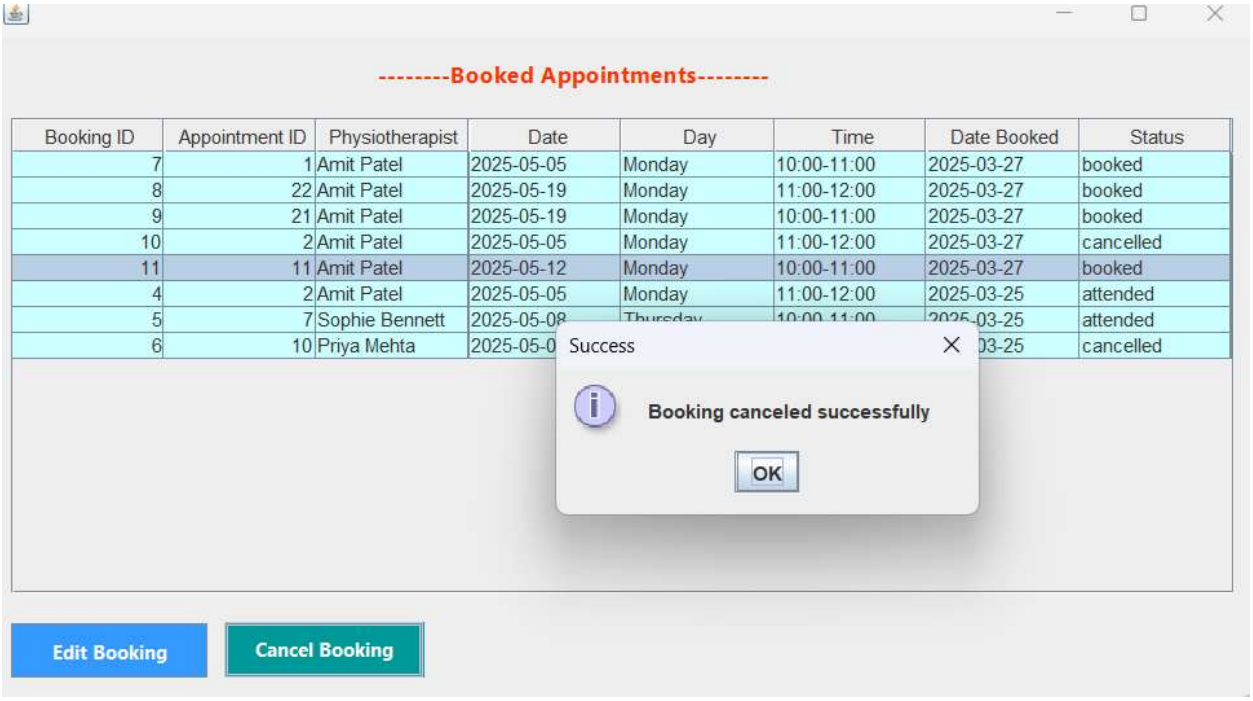
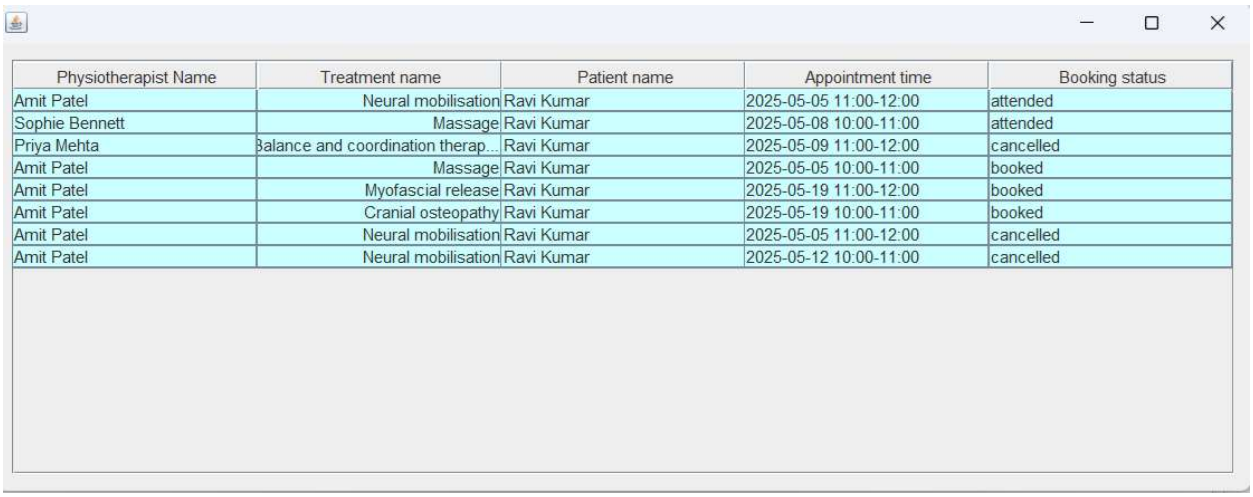


Figure 10: Booking canceled successfully

Once a user selects a booking and clicks the Cancel Booking button, then it will show a confirmation message as shown in Figure 10 that it successfully cancels bookings, the efficient cancellation process increases user satisfaction and helps the clinic's scheduling system keep its schedule updated and avoid resource wastage.

Report View

In the Boost Physio Clinic System, the View Report summarizes every activity related to the specific patient's appointment. It shows the name of a physiotherapist, treatment type, patient name, appointment time, and current booking status of attended, book, and cancel, as shown in Figure 11.



Physiotherapist Name	Treatment name	Patient name	Appointment time	Booking status
Amit Patel	Neural mobilisation	Ravi Kumar	2025-05-05 11:00-12:00	attended
Sophie Bennett	Massage	Ravi Kumar	2025-05-08 10:00-11:00	attended
Priya Mehta	Balance and coordination therap...	Ravi Kumar	2025-05-09 11:00-12:00	cancelled
Amit Patel	Massage	Ravi Kumar	2025-05-05 10:00-11:00	booked
Amit Patel	Myofascial release	Ravi Kumar	2025-05-19 11:00-12:00	booked
Amit Patel	Cranial osteopathy	Ravi Kumar	2025-05-19 10:00-11:00	booked
Amit Patel	Neural mobilisation	Ravi Kumar	2025-05-05 11:00-12:00	cancelled
Amit Patel	Neural mobilisation	Ravi Kumar	2025-05-12 10:00-11:00	cancelled

Figure 11: Report View

This is an administrative and clinical feature. It gives staff a clear view of patient engagement and what follow-up should be made, and when. It helps keep the records transparent for patients with appointment histories. Furthermore, since the status changes are captured in real-time, the report helps keep an accurate record of the treatment and accurate scheduling decisions.

Appropriate Design and Implementation

Boost Physio Clinic Software is a comprehensive system that was made to manage physiotherapy appointment booking and help interaction efficiently. It operates with the support of a solid SQLite database architecture that guarantees fluid, safe, and accessible operations for patients and clinic staff. However, this is structured such that it can deliver reliable scheduling, booking updates, and tracking of treatments, which in turn improves the delivery of service delivery in a clinic.

Database Management

A relational database in SQLite is used at the heart of the system to manage and store data further according to the key entities, patients, physiotherapists, treatments, appointments, and

bookings, among others. The data is tabulated on each table with stringent constraints to ensure accuracy, consistency, and integrity of the data. These constraints are used for error prevention, such as preventing overbooking, invalid appointment times, and duplicate records.

Patients Table

We are going to store the patient's name and contact info, i.e., phone number, and email ID, along with personal identification details in the patient's table. This will link people to appointments and output personalized booking reports for the system. Patient information is protected by using privacy-sensitive fields that are handled securely.

Physiotherapists

This table records details, like their names and areas of expertise. The application allows rapid and effective allocation of physiotherapists to free treatment spots and filtering for users who want to choose their preferred specialist.

Appointments

There is a table called the appointments table that stores available session information such as date, day, time, area of expertise, etc., and the appointed physiotherapist. In addition, capacity limits are indicated for each appointment entry to ensure there are no more than the allowed appointments in a period. Hence, appointments are not overbooked, and time is managed efficiently across the clinic's operations.

Bookings

Patients are linked to a specific appointment through bookings. The system also stores the status and booking date for each booking and tracks the bookings that are booked, attended, or

canceled. This structure allows for real-time scheduling and accurate reporting to users and administrators.

Reports

Patients may often submit feedback, such as comments and satisfaction ratings, following an appointment. The feedback is recorded in a special database and associated with certain visit numbers so that clinic service quality can be monitored and improved where necessary in the future.

Structured SQL scripts are used to manage all database tables and it incorporates transaction management. It guarantees that all manipulation done will be applied atomically and that should there be an error, everything will be rolled back, thereby preserving data integrity and operational stability.

User Interface

Java Swing has been used to develop the user interface, which allows the user to interact in an intuitive way no matter their technical level. It uses components like JComboBox to simplify the filtering experience by expertise, physiotherapist, or date and then supplies tables dynamically according to appointment availability. The layout is designed to optimize the booking process and save the time that users spend searching for and confirming the sessions.

Security and Integrity

Security is a high priority for the system. Every database query uses prepared statements, protecting from the SQL injection attack, which is a very common database security threat in such applications. In addition, the transaction management guarantees that in case of operation for

booking, cancellation, or update, it is fully and securely performed, and the data remains consistent even when the system fails partially.

Error Handling

Strong error-handling mechanisms are included in the system to improve reliability. They detect and respond to the usual types of problems, such as invalid input, database disconnection, or no available appointments. Clear, user-friendly messages are displayed for users, guiding them with issue resolution without confusion or frustration, providing a trustworthy and seamless experience.

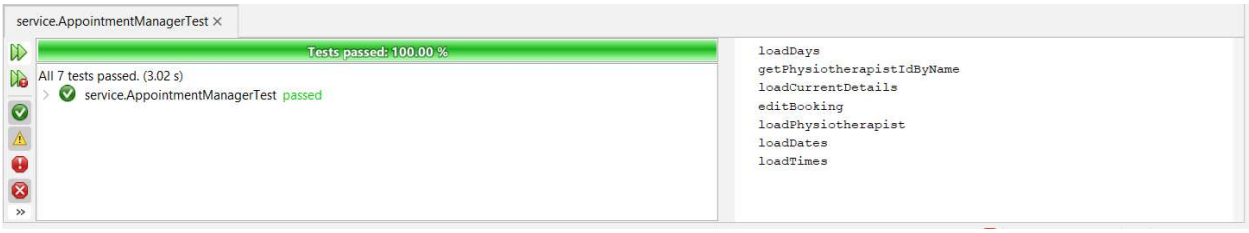
The best example is the Boost Physio Clinic booking system, which is all about diversified software solutions: a solid database, intuitiveness, rock-solid security, and reacting to error handling. This affords a structured and supportive platform to manage physiotherapy services that allows both patients and practitioners to enjoy efficient, flexible, and satisfying healthcare services.

JUnit Testing

Strategically applied JUnit testing has been done on the core classes of the Boost Physio Clinic system, such as BookingManager, Treatment, AppointmentManager, and TreatmentService, among others. These tests how the system works and are meant to ensure that both the frontend and backend act the way they should.

The first tests for the Booking Manager class concentrated on the methods loadGrades, loadDays, loadTimes, and editBooking. Some of these tests were written using assertions such as assertEquals. However, most of them used null or placeholder values, which implies they were at the beginning of sorts. testLoadGrades() is an example of trying to test Grade retrieval from a

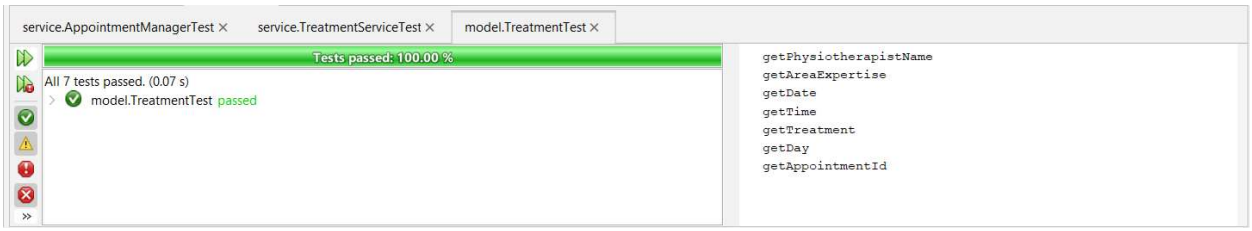
learner ID, but it can't do so when the BookingManager instance is not set up for meaningful test coverage.



On the other hand, the complete and working tests for getter and setter methods were present in the TreatmentTest class. The assertEquals confirmed that the actual return value should be equal to the expected input for each test, such as testGetAndSetPhysiotherapistName and testGetAndSetDate. These tests guarantee that correct encapsulation and data manipulation are taking place inside the Treatment model class.

The AppointmentManagerTest contains more functional tests, and existing methods such as loadCurrentDetails, loadPhysiotherapist, loadDates, loadTimes, and editBooking() were verified. An example of the tests is successful booking update tests, such as testEditBooking(), and load times for physiotherapists being loaded without exceptions, as confirmed by assertions like size and assertNotNull().

Last but not least, the TreatmentServiceTest test runner from the application backend was tested regarding session availability and booking. testGetAvailableTreatments() and testIsAppointmentFull() were tested to ensure appointments weren't booked too full. The appointment reservation logic was verified in the testBookSelectedLesson() method, where the proper appointments were booked without throwing exceptions.



These JUnit tests collectively act as a good quality assurance process for the Boost Physio Clinic system, confirming data operations and user interaction and also setting up a base for further improvements in test coverage.

Appendix