Health Management System

This project is a Health Management System designed to streamline the registration of patients, management of appointments, and auditing of user activity within a healthcare environment. The system is implemented as a web application using Node.js and Express.js for server-side logic, MySQL as the database, and EJS for dynamic HTML rendering. The primary objective of the project is to provide a secure and efficient platform for administrative staff to manage patient information and appointment scheduling while ensuring proper authentication and auditing of user interactions.

The system is structured around several key modules. The first module handles **user authentication and authorisation**. Users are categorised as either administrative staff or patients, with different levels of access. Passwords are securely hashed using bcrypt before storage, and session management is implemented to track logged-in users. Access control is enforced via middleware functions, ensuring that sensitive routes are accessible only to authorised staff members. An audit table records every login attempt, including username, timestamp, IP address, and whether the login was successful. This provides transparency and accountability, supporting compliance with data security standards.

The second core module is **patient management**, which allows administrators to register, view, edit, and delete patient records. Each patient record includes a name, date of birth, email, phone number, and an associated username in the system. For user-friendly data entry, server-side validation ensures all required fields meet formatting and content requirements, preventing invalid or malicious input from being stored in the database. Patient information is displayed in tabular format within the web interface, with search and export functionality to facilitate data management. The system also maintains a “registered” table, linking users to their roles and enabling tracking of active system users.

The third module focuses on **appointment booking**. Staff can schedule appointments by selecting a patient from a dynamically generated list that includes names and dates of birth while internally storing the corresponding patient ID in the database. Appointments include a date, time, reason for the visit, and status (confirmed or cancelled). Server-side validation ensures appointments are entered correctly, maintaining data integrity. This module provides a seamless way to organise patient visits, minimising scheduling errors and improving operational efficiency.

The front-end design leverages **EJS templating** to dynamically generate HTML pages, providing administrators with forms for registration, appointment booking, and search functionality. Error messages from failed validations are displayed inline, allowing users to correct mistakes without losing the data they have entered. Tables are used to present search results and registered patient information clearly, enhancing usability.

Overall, the Health Management System demonstrates a robust combination of security, data validation, and usability. By integrating session-based authentication, detailed logging, dynamic

data rendering, and relational database management, the project ensures that both staff and patients can interact with the system efficiently and securely. Future enhancements include role-based dashboards, real-time notifications for upcoming appointments, and integration with external health records for a more comprehensive healthcare solution.