ADMIN-ONLY HOSPITAL DATA AND STOCK MANAGEMENT SYSTEM

COMP50016: Server-Side Programming-2

Abstract

A Proposal for Streamlining Administrative Operations at the National Hospital of Sri Lanka

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1.0 PROBLEM STATEMENT

The National Hospital of Sri Lanka struggles to handle its large amount of hospital data well. This includes patient files, staff schedules, and lists of medical supplies. The old systems they use now lead to wrong data poor supply management, and slow choices. These problems can hurt patient care and how they use their resources. Also, the hospital can't see data right away or control who sees what information. This makes it more likely for things to go wrong or for people to see data they shouldn't. To fix these problems, the hospital needs a better, safer, and simpler way to work. This would help them run things better, have more correct data, and keep better track of what's going on.

The proposed web app for admins only tries to solve these issues. It gives the hospital a centralized platform to manage all its data and supplies. This should help them work better and make smarter choices, improving efficiency and patient care.

2.0 PROPOSED SOLUTION

To address the administrative challenges faced by the National Hospital of Sri Lanka, the proposed solution is a secure, web-based admin-only application designed for hospital data and stock management. This system will enhance the hospital's administrative tasks by providing a centralized platform that improves data accuracy, stock management, and decision-making capabilities. The system is intended for use by the hospital director, duty director, and other administrative staff.

Key features of the proposed system include:

- **Data Management:** The app will store and handle important hospital info, like patient files, employee details, and medical stock. This makes sure all data stays current and easy to find for people who have permission to see it.
- **Stock Management:** The system will keep an eye on medical supplies and gear as they're used letting admins see stock levels, cut down on running out or having too much, and order new supplies when needed.
- **Reporting and Analytics:** Full dashboards and live reports will give hospital admins useful info about how things are running helping them to make choices based on data to boost efficiency and patient care.
- **User Management with Role-based Access:** The system will use role-based access control making sure people with permission can see sensitive info. This will beef up data security and privacy guarding patient records and hospital operations.

By implementing this solution, the hospital will experience improved administrative efficiency, better resource management, and more accurate decision-making, leading to enhanced patient care and streamlined operations.

3.0 ASSUMPTIONS AND CONSTRAINTS

3.1. Assumptions of the system

- The following assumptions were made while the system was being developed: **Internet Connectivity**: It is assumed that the hospital will have reliable internet access, as the system is web-based and requires constant connectivity to function effectively.
- **Authorized Users**: Only authorized personnel, such as hospital administrators, the director, and duty directors, will use the system, ensuring that data remains secure and confidential.
- **Training**: The hospital staff will undergo adequate training to effectively use the system and its various features, such as data management, stock tracking, and reporting.
- **System Maintenance**: The hospital will provide necessary resources for regular maintenance and updates to the system to ensure its smooth operation.
- **Existing Infrastructure**: The hospital's current IT infrastructure will be sufficient to support the system without requiring major upgrades or changes.
- **Data Accuracy**: The inputted data (e.g., patient records, stock levels) will be accurate and timely to ensure that the system functions correctly and provides valid reports.

3.2. Constraints of the proposed system

The following constraints were considered when developing the system for NHSL:

- **Training and Adoption Time**: There may be a learning curve for staff to become proficient with the system, and the time required for training might impact the hospital's operations temporarily.
- **Data Security**: Since the system will store sensitive information (e.g., patient records), there is a critical need to ensure robust security measures, including data encryption and role-based access control.
- **Integration with Existing Systems**: If the hospital has any legacy systems or software, there may be compatibility issues that need to be addressed during the integration phase.
- **Compliance with Regulations**: The system must comply with national healthcare regulations and standards regarding data privacy, especially concerning patient records and medical information.
- **Technology Dependency**: The hospital will become reliant on the system for critical administrative functions, and any failure or unavailability could lead to disruptions in hospital operations.

4.0 SYSTEM

The admin-hospital data and stock management system we're proposing aims to boost productivity in administrative tasks. It offers a strong, protected, and easy-to-use platform to handle the various aspects of hospital management. Here's a detailed look at the system's key features and their sub-features:

4.1. Data Management

This feature is focused on securely managing and storing hospital-related data, including patient records, staff details, and medical information.

- Patient Records Management
  - **Secure Storage:** Patient data, including personal details, medical history, and current treatment plans, will be securely stored in the system.
  - **Search and Retrieval:** Administrators can easily search for and retrieve patient records using filters such as name, ID, or department.
  - **Edit and Update:** Patient records can be updated in real-time to reflect ongoing treatments or changes in personal information.
- Staff Information Management
  - **Profile Creation:** Each staff member, from doctors to administrative personnel, will have a profile containing their personal details, role, and schedule.
  - **Scheduling and Shifts:** Administrators can manage staff schedules, assign shifts, and ensure appropriate staffing for each department.
  - **Role Assignment:** Staff members can be assigned different roles (e.g., nurse, doctor, admin), which will define their access rights within the system.

4.2. Stock Management

This feature allows for the real-time monitoring and tracking of medical supplies and equipment, ensuring optimal stock levels.

- Inventory Tracking
  - **Real-Time Updates:** Medical supplies and equipment levels will be updated in real-time as items are used or replenished.
  - **Alerts and Notifications:** Automated notifications will alert administrators when stock levels reach critical low points or when there is an excess of inventory.
  - **Usage Reports:** The system will generate reports on stock usage trends, helping administrators predict future needs.
- Ordering and Restocking
  - **Automated Reordering:** Based on predefined thresholds, the system will suggest reordering supplies when stock levels are low.
  - **Vendor Management:** Administrators can store information on suppliers and automatically generate orders to preferred vendors for restocking.
  - **Inventory Audits:** The system will allow for periodic audits of stock levels to ensure accuracy and prevent discrepancies.

4.3. Reporting and Analytics

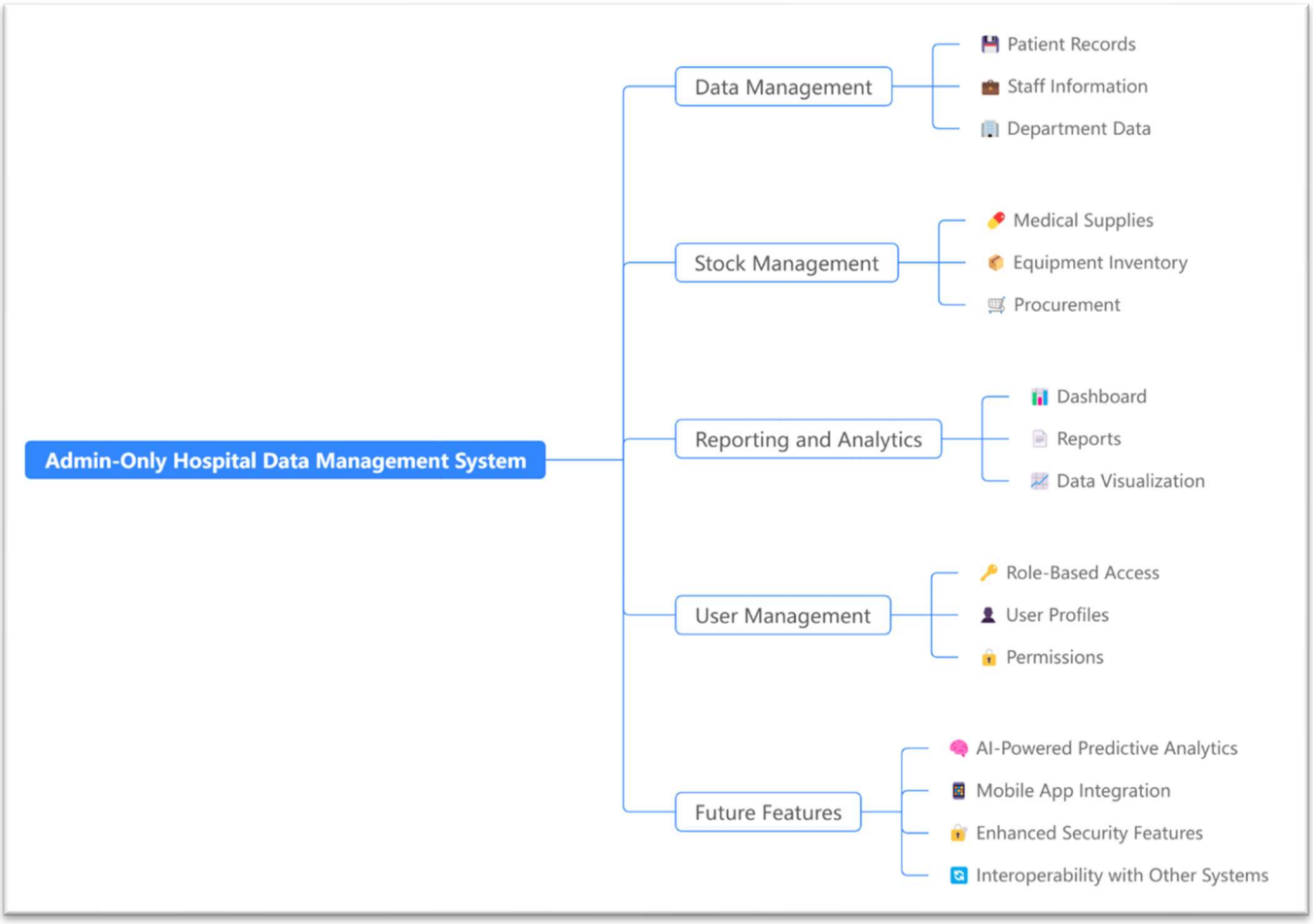
The system provides advanced reporting and analytics tools to help administrators make informed decisions and optimize hospital operations.

- Dashboard Overview
  - **Real-Time Data:** Administrators will have access to a dashboard showing key metrics like patient intake, staff schedules, and stock levels.
  - **Customizable Views:** Users can customize the dashboard to show specific data relevant to their role or department.
- Reports Generation
  - **Patient Reports:** Generate reports on patient demographics, treatment outcomes, and other relevant statistics.
  - **Inventory Reports:** Reports on stock usage, shortages, and reordering trends.
  - **Staff Reports:** Detailed reports on staff schedules, availability, and performance.

This feature ensures that only authorized personnel have access to certain data and functionalities, maintaining security and privacy.

- Role-Based Access Control (RBAC)
  - **Role Definitions:** Different roles (e.g., Director, Admin Staff, Duty Director) will be defined, with each role having specific access rights and privileges.
- User Profiles
  - **Personalized Dashboard:** Each user will have access to a customized dashboard that presents relevant information and tools based on their role.
  - **Profile Management:** Users can update their personal details, change passwords, and manage their settings within the system.
  - **Login and Authentication:** The system will feature a secure login process with multi-factor authentication (MFA) to prevent unauthorized access.

5.0 MIND MAP


Admin-Only Hospital Data Management System
Data Management
Patient Records
Staff Information
Department Data
Stock Management
Medical Supplies
Equipment Inventory
Procurement
Reporting and Analytics
Dashboard
Reports
Data Visualization
User Management
Role-Based Access
User Profiles
Permissions
Future Features
AI-Powered Predictive Analytics
Mobile App Integration
Enhanced Security Features
Interoperability with Other Systems

6.0 SYSTEM MODULES

The proposed system will utilize several key database tables (modules) to store and manage various types of hospital data, ensuring proper organization and secure access. Below is a detailed breakdown of the core database tables required for the system:

6.1 Patients Table

This table stores all patient-related information and is crucial for managing patient records and medical history.

Field Name	Data Type	Description
patient_id	INT (Primary Key)	Unique identifier for each patient.
first_name	VARCHAR	Patient's first name.
last_name	VARCHAR	Patient's last name.
dob	DATE	Patient's date of birth.
gender	VARCHAR	Patient's gender.
contact_number	VARCHAR	Patient's contact number.
address	TEXT	Patient's home address.
medical_history	TEXT	A summary of the patient's past medical history.
current_treatment	TEXT	Details of ongoing treatment.
admission_date	DATE	The date of patient admission (if applicable).

6.2 Staff Table

This table holds information about hospital staff members, including their roles and schedules.

Field Name	Data Type	Description
staff_id	INT (Primary Key)	Unique identifier for each staff member.
first_name	VARCHAR	Staff member's first name.
last_name	VARCHAR	Staff member's last name.
role	VARCHAR	Role of the staff (e.g., doctor, nurse, admin).
email	VARCHAR	Staff member's email for communication.
contact_number	VARCHAR	Staff member's phone number.
schedule	TEXT	Details about the staff member's work schedule.
department	VARCHAR	The department the staff member belongs to.
hire_date	DATE	The date the staff member was hired.

6.3 Inventory Table

This table tracks medical supplies, equipment, and other items within the hospital's inventory.

Field Name	Data Type	Description
item_id	INT (Primary Key)	Unique identifier for each item.
item_name	VARCHAR	Name of the inventory item (e.g., gloves, syringes).
item_category	VARCHAR	Category of the item (e.g., equipment, supplies).
quantity	INT	The current quantity of the item in stock.
reorder_level	INT	Minimum stock level at which reordering is triggered.
supplier_name	VARCHAR	Name of the supplier for the item.
last_ordered_date	DATE	The last date the item was ordered.
expiry_date	DATE	Expiry date for consumable items (if applicable).

6.4 Orders Table

This table stores details of stock orders placed for restocking hospital inventory.

Field Name	Data Type	Description
order_id	INT (Primary Key)	Unique identifier for each order.
item_id	INT (Foreign Key)	ID of the item being ordered (linked to Inventory table).
quantity_ordered	INT	Quantity of the item ordered.
supplier_name	VARCHAR	Supplier from whom the order was placed.
order_date	DATE	Date when the order was placed.
delivery_date	DATE	Expected or actual delivery date of the order.

6.5 User Accounts Table

This table manages login information and roles for system users (admin staff, directors, etc.).

Field Name	Data Type	Description
user_id	INT (Primary Key)	Unique identifier for each user
username	VARCHAR	User's login username
password	VARCHAR	User's login password
email	VARCHAR	User's login email
role	VARCHAR	User role
last_login	TIMESTAMP	Timestamp of the user's last login
account_status	VARCHAR	Account status (Active, Inactive)

7.0 TEST CASES

Test Case ID	Test Case Description	Test Steps	Expected Results	Actual Results	Status	Priority	Severity
TC001	Verify login with valid credentials	Enter valid username and password, click login	User should be logged in successfully	Pass	Pass	High	Critical
TC002	Verify login with invalid credentials	Enter invalid username and password, click login	Error message displayed	Pass	Pass	Medium	Major
TC003	Verify user logout functionality	Click on logout button	User should be logged out	Pass	Pass	High	Critical
TC004	Verify the dashboard displays correct data	Login and view the dashboard	Dashboard should display accurate data	Pass	Pass	Medium	Major
TC005	Verify adding a new patient record	Fill in patient details and click submit	New patient should be added	Pass	Pass	High	Critical
TC006	Verify editing a patient record	Edit details of an existing patient and click save	Patient details should be updated	Pass	Pass	Medium	Major
TC007	Verify deletion of a patient record	Select a patient and click delete	Patient record should be deleted	Pass	Pass	Medium	Major
TC008	Verify adding a new staff member	Fill in staff details and click submit	New staff member should be added	Pass	Pass	High	Critical

TC009	Verify editing a staff member record	Edit details of an existing staff member and click save	Staff details should be updated	Pass	Pass	Medium	Major
TC010	Verify deletion of a staff member record	Select a staff member and click delete	Staff member record should be deleted	Pass	Pass	Medium	Major
TC011	Verify real-time stock update after adding items	Add new stock items and verify stock levels	Stock levels should update in real-time	Pass	Pass	High	Critical
TC012	Verify low stock alert functionality	Set low stock threshold and monitor notifications	System should send a low stock alert	Pass	Pass	High	Critical
TC013	Verify reordering functionality when stock is low	Simulate low stock and reorder items	Reorder request should be triggered	Pass	Pass	High	Major
TC014	Verify report generation for patient data	Generate a report on patient records	Report should be generated with accurate data	Pass	Pass	Medium	Major
TC015	Verify report generation for inventory data	Generate a report on stock levels and usage	Report should be generated with accurate data	Pass	Pass	Medium	Major

TC016	Verify role-based access control for admin users	Login as admin and attempt to access different sections	Admin should have access to all sections	Pass	Pass	High	Critical
TC017	Verify role-based access control for staff users	Login as staff and attempt to access restricted sections	Staff should only have access to their role-specific sections	Pass	Pass	High	Critical
TC018	Verify password reset functionality	Attempt to reset password via the system	Password reset link should be sent	Pass	Pass	Medium	Major
TC019	Verify system performance under high load	Simulate multiple users logging in simultaneously	System should remain responsive without errors	Pass	Pass	High	Critical
TC020	Verify user account deactivation functionality	Deactivate an active user account and attempt login	Deactivated users should not be able to log in	Pass	Pass	High	Major

8.0 FUTURE UPGRADE PLAN

The Hospital Data and Stock Management System for admins, keeps meeting administrators' needs and boosts how things run. As things move forward, we've got to enhance its features to keep up with what's coming and the latest technology developments. This plan to upgrade plan covers important spots for making things better and stronger to make sure the system can grow, remain robust, and go parallelly with what the hospital will need down the line.

8.1 Integration with External Health Systems

One of the primary areas for further enhancement is getting our system integrated with external health systems, like those electronic health record systems, lab info systems, and the pharmacy management systems. This would allow seamless data flow between departments and external healthcare entities. By integrating with national and regional health networks, the system could automatically share patient information with other hospitals, clinics, and health professionals. This way even if patients have to go to different places for care, they can have continued care.

Furthermore, such integration would facilitate collaboration with external suppliers of medical equipment and pharmaceuticals, streamlining procurement processes and ensuring real-time updates on stock availability from suppliers. This would optimize inventory management, prevent stockouts, and reduce costs associated with emergency procurements.

8.2 Mobile Application Development

The mobile version of this system shall enable administrators and staff members to remotely access the platform for real-time reporting on patient records, inventory levels, and reports while on mobile. This therefore would enhance flexibility and responsiveness in managing operations at the hospital. In the case of emergency actions or critical situations, administrators could easily handle all operations and make fast decisions without necessarily being in the hospital.

It might also allow the workers to scan barcodes of medical supplies efficiently in order to update the inventory, send notifications when the stock is critical, and give out safe communication amongst departments. It will enhance operational efficiency and further improve coordination amongst the personnel at the hospital.

8.3 Artificial Intelligence and Predictive Analytics

Artificial intelligence and the use of predictive analytics will, therefore, provide great insight into patient care and hospital management by the administrators. Such analysis will grant the AI models the ability to predict future trends through the analysis of historical data, like future admission rates of patients, outbreaks of diseases, or use of stock. This will make the predictive capability of the hospital get ready for a high-demand period, manage efficiently its resources, and maintain stocks at their optimal level.

AI-driven insights can also be applied to patient records to help health professionals identify patterns that may reveal future health risks, thus improving patient outcomes. Predictive models can enable optimization of staff scheduling by forecasting peak periods and achieving correct staffing levels.

8.4 Kicking Up Security and Following the Rules

Since the system deals with sensitive patient information, it needs upgrades regarding its security features regularly to stay ahead of possible cyber threats. Future enhancements should consider advanced encryption protocols, multi-factor authentication, and continuous security monitoring. Integrating these into biometric authentication modes, such as fingerprint or facial recognition, would further enhance security yet remain accessible with ease to authorized personnel.

Compliance with changing healthcare regulations and standards, like HIPAA, along with local regulations, becomes very important. The periodic upgrade toward the latest legislation on data protection will ensure credibility for the system and avoid legal complications.

8.5 Telemedicine Integration

Telemedicine, especially with the COVID-19 global pandemic, shows that the system can be upgraded to include the telemedicine option in which patients will have opportunities for virtual appointment setting, consulting with healthcare professionals, and receiving care without actually being required to visit a hospital. This feature would not only improve patient satisfaction but also ease the burden of hospital resources and minimize the risk of infectious diseases.

Whereas the current system allows only basic reporting, future enhancements could provide for more sophisticated data presentation software, such as interactive dashboarding and real-time visual reporting. These would serve to allow administrators to understand key performance indicators intuitively and with little delay, with the ability to make timely decisions based upon such information. This is going to be further enhanced by customizable reports that have various filtering options.

In conclusion, the future upgrade plan for the Admin-Only Hospital Data and Stock Management System focuses on enhancing interoperability, improving user accessibility, incorporating advanced technology like AI, and ensuring long-term scalability and security. These upgrades will ensure that the system continues to meet the evolving needs of the hospital while maintaining high standards of operational efficiency and patient care.

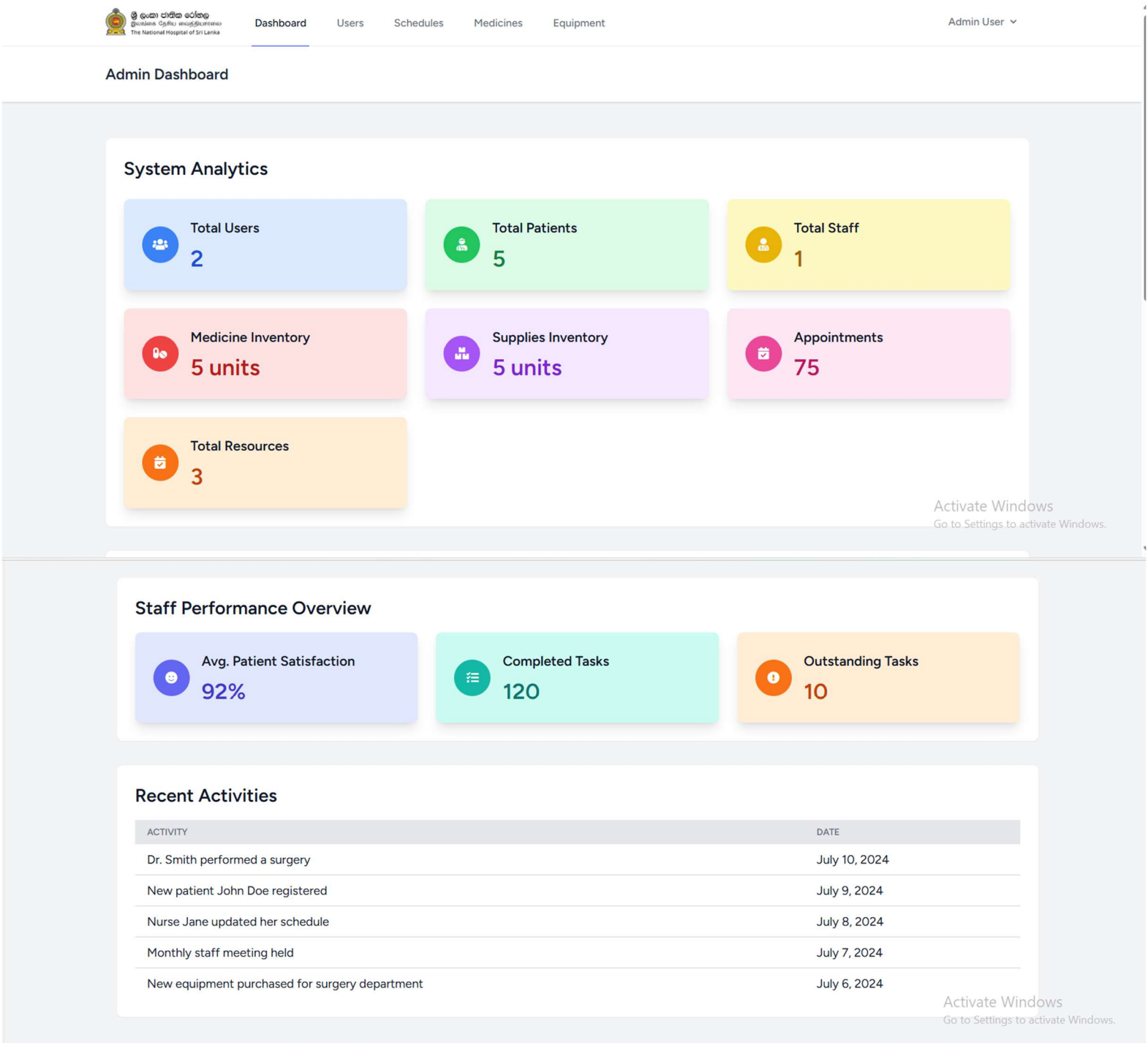
9.0 GITHUB LINK

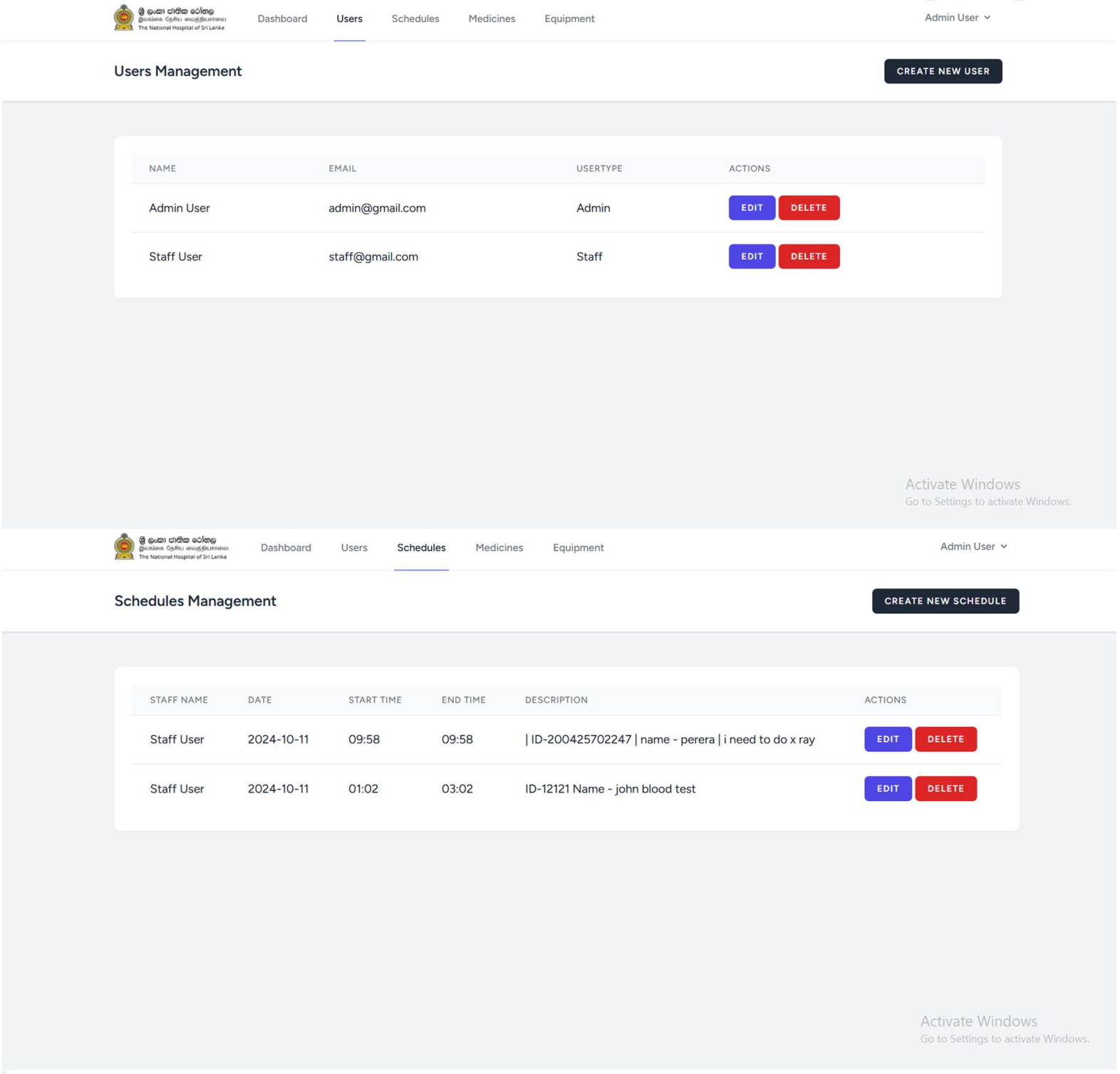
Github Link to Repo: https://github.com/cb012035/SSP-2.git

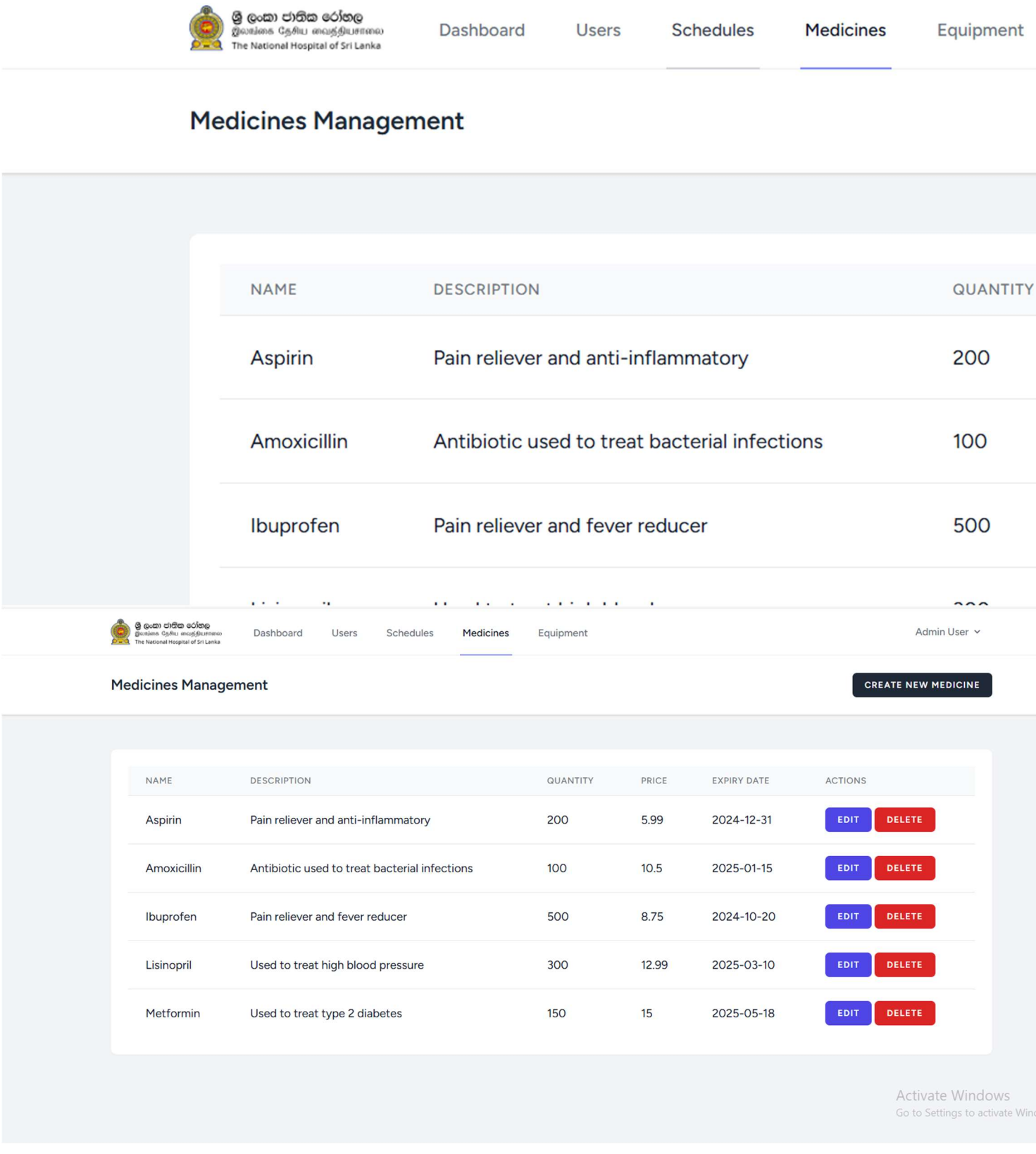
Instructions to run application

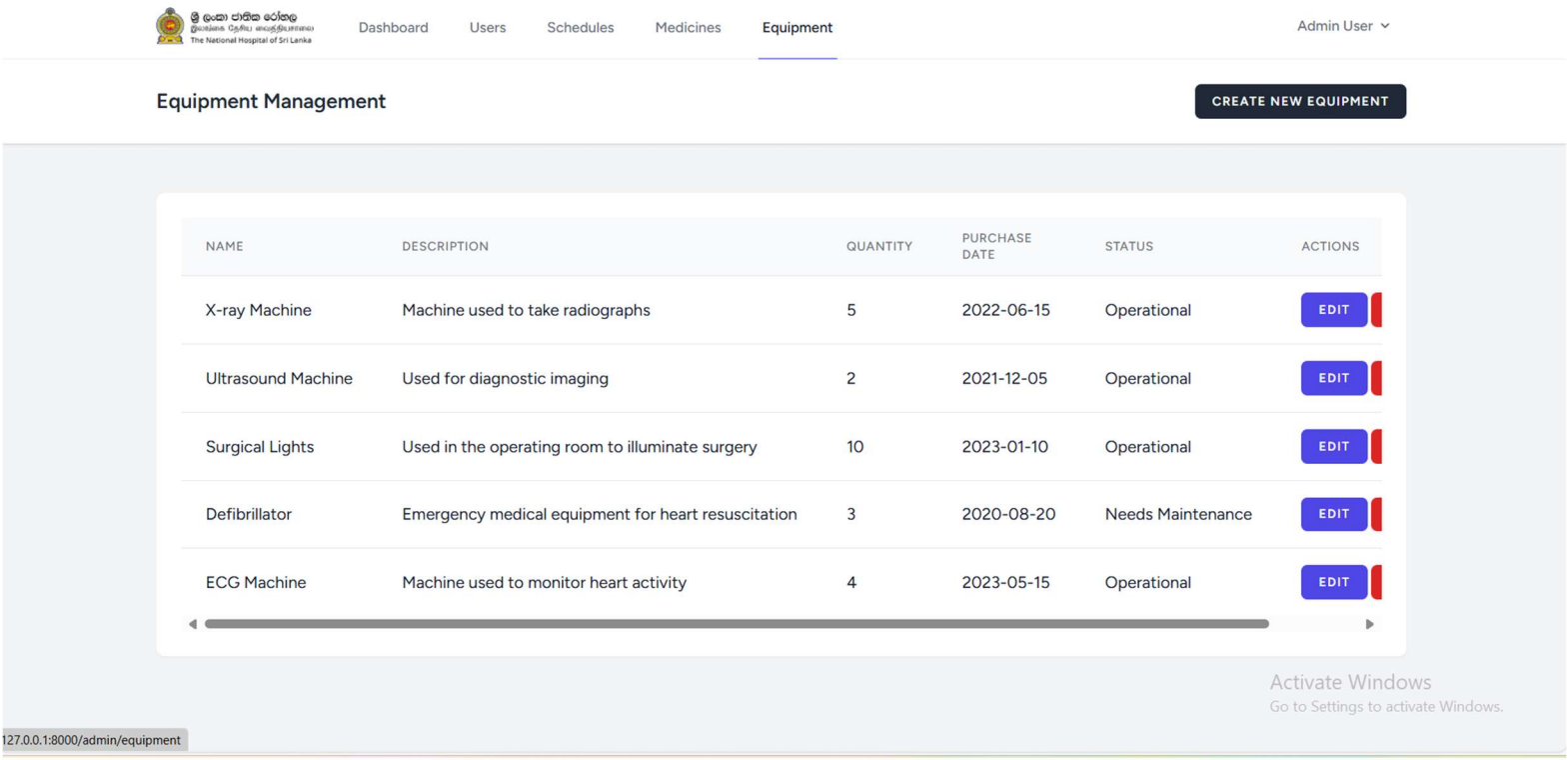
1. Clone the repository: *git clone https://github.com/cb012035/SSP-2.git*
2. Navigate into project directory: *cd SSP-2*
3. Install composer dependencies: *composer install*
4. Setup Environment Variables: *cp .env.example .env*
5. Generate Application Key: *php artisan key:generate*
6. Create and seed database: *composer refresh*
7. Install NPM dependencies: *npm install*
8. Compile Assets: *npm run dev*
9. Start Laravel Server: *php artisan serve*

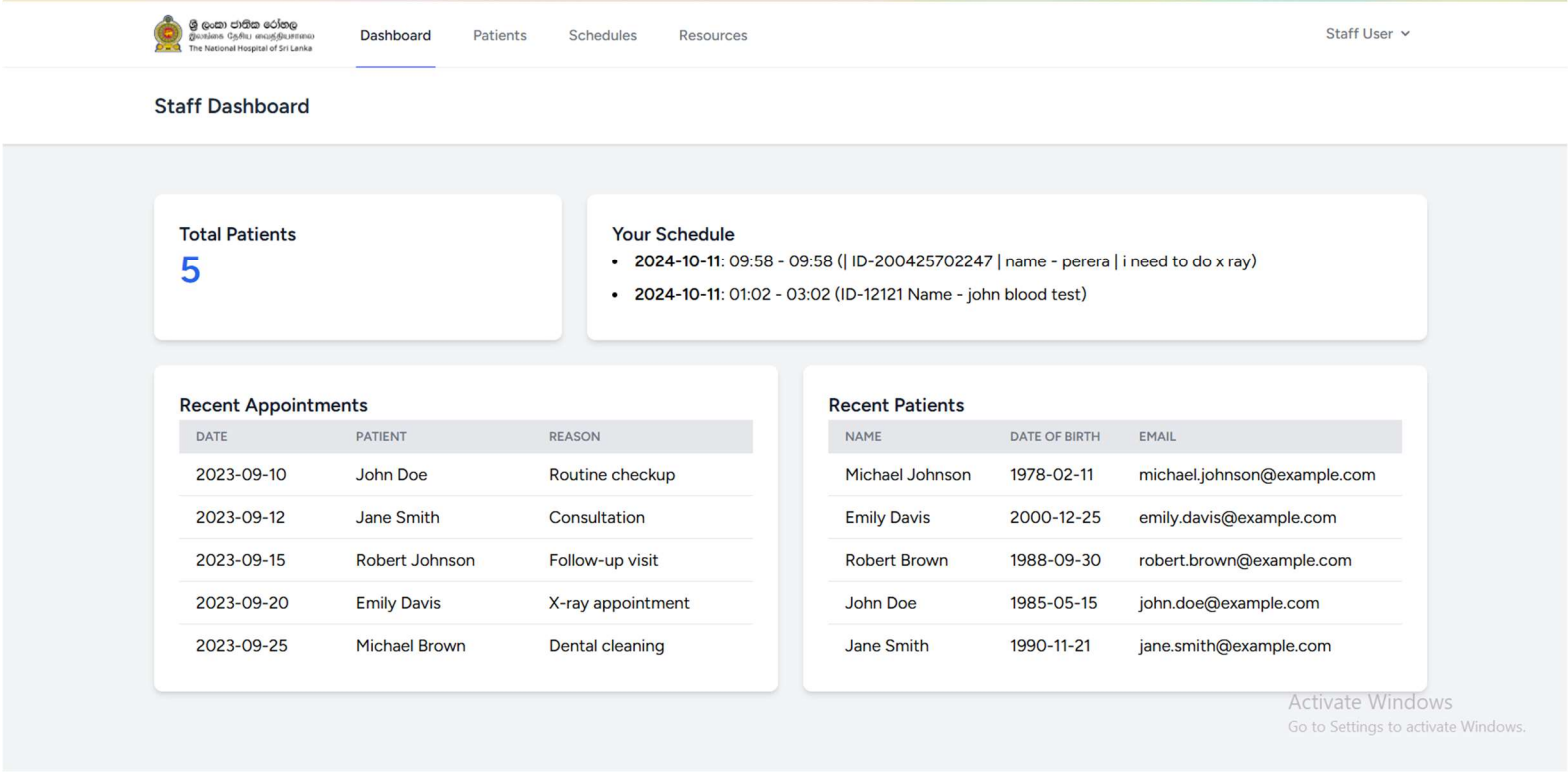
10.Screen short

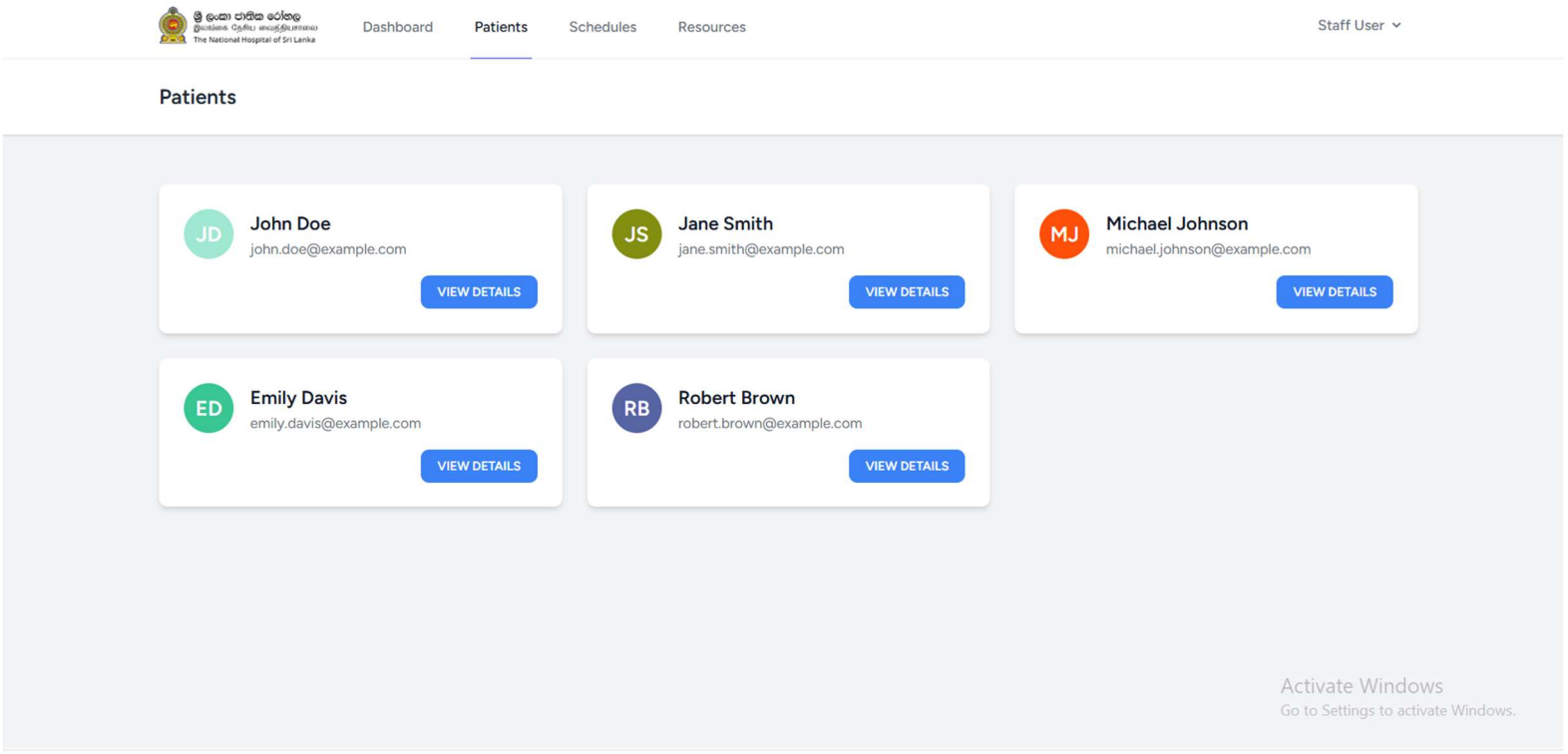


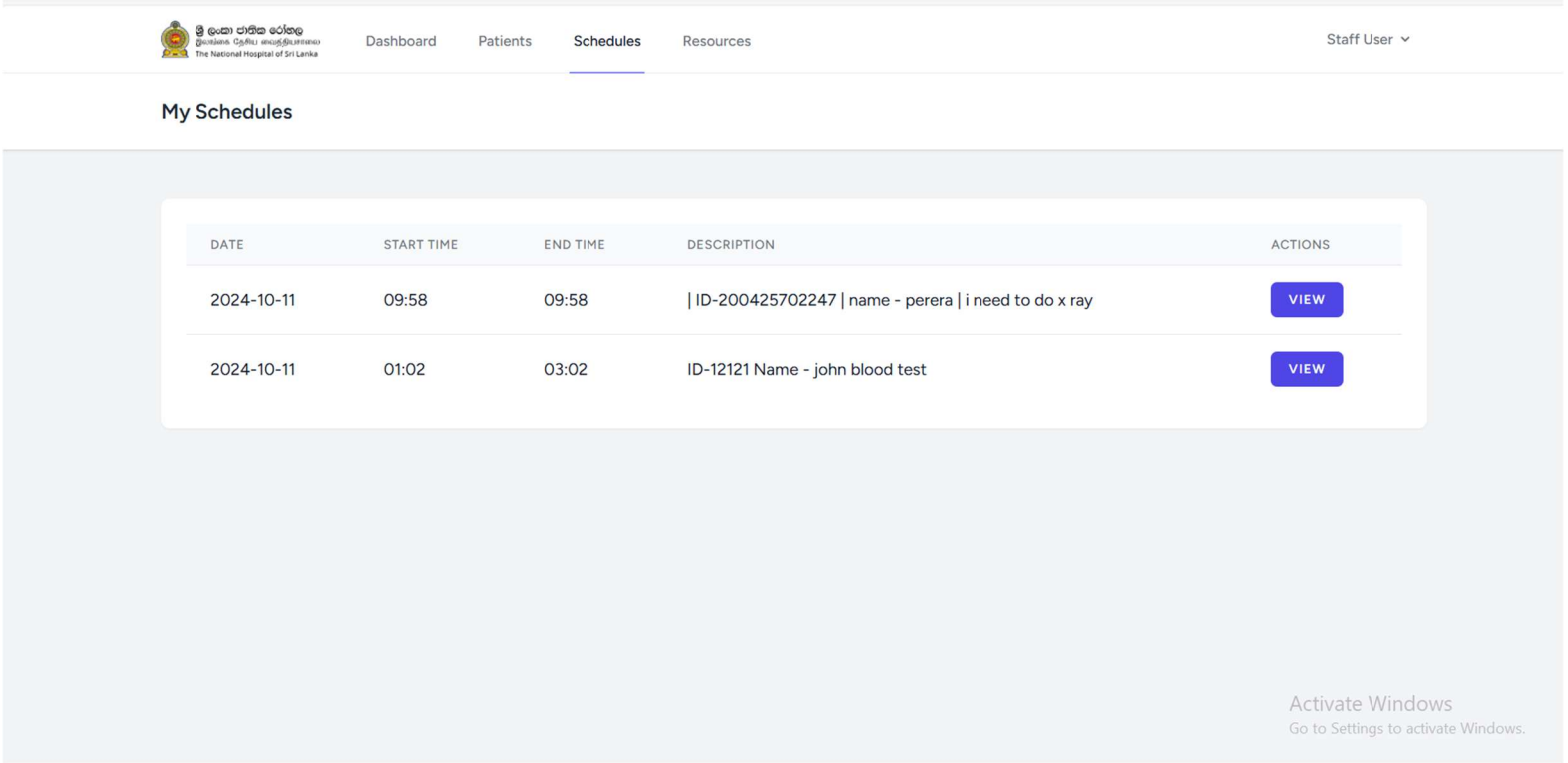

Dashboard
Users
Schedules
Medicines
Equipment
Admin User
Users Management
CREATE NEW USER
NAME
EMAIL
USERTYPE
ACTIONS
Admin User
admin@gmail.com
Admin
EDIT
DELETE
Staff User
staff@gmail.com
Staff
EDIT
DELETE
Activate Windows
Go to Settings to activate Windows.
Dashboard
Users
Schedules
Medicines
Equipment
Admin User
Schedules Management
CREATE NEW SCHEDULE
STAFF NAME
DATE
START TIME
END TIME
DESCRIPTION
ACTIONS
Staff User
2024-10-11
09:58
09:58
| ID-200425702247 | name - perera | i need to do x ray
EDIT
DELETE
Staff User
2024-10-11
01:02
03:02
ID-12121 Name - john blood test
EDIT
DELETE
Activate Windows
Go to Settings to activate Windows.


ශ්‍රී ලංකා ජාතික රෝහල
இலங்கை தேசிய வைத்தியசாலை
The National Hospital of Sri Lanka
Dashboard
Users
Schedules
Medicines
Equipment
Medicines Management
NAME
DESCRIPTION
QUANTITY
Aspirin
Pain reliever and anti-inflammatory
200
Amoxicillin
Antibiotic used to treat bacterial infections
100
Ibuprofen
Pain reliever and fever reducer
500
Admin User
CREATE NEW MEDICINE
NAME
DESCRIPTION
QUANTITY
PRICE
EXPIRY DATE
ACTIONS
Aspirin
Pain reliever and anti-inflammatory
200
5.99
2024-12-31
Amoxicillin
Antibiotic used to treat bacterial infections
100
10.5
2025-01-15
Ibuprofen
Pain reliever and fever reducer
500
8.75
2024-10-20
Lisinopril
Used to treat high blood pressure
300
12.99
2025-03-10
Metformin
Used to treat type 2 diabetes
150
15
2025-05-18
EDIT
DELETE
Activate Windows
Go to Settings to activate Windows.


Dashboard
Users
Schedules
Medicines
Equipment
Admin User
Equipment Management
CREATE NEW EQUIPMENT
NAME
DESCRIPTION
QUANTITY
PURCHASE DATE
STATUS
ACTIONS
X-ray Machine
Machine used to take radiographs
5
2022-06-15
Operational
EDIT
Ultrasound Machine
Used for diagnostic imaging
2
2021-12-05
Operational
EDIT
Surgical Lights
Used in the operating room to illuminate surgery
10
2023-01-10
Operational
EDIT
Defibrillator
Emergency medical equipment for heart resuscitation
3
2020-08-20
Needs Maintenance
EDIT
ECG Machine
Machine used to monitor heart activity
4
2023-05-15
Operational
EDIT
Activate Windows
Go to Settings to activate Windows.
127.0.0.1:8000/admin/equipment


Dashboard
Patients
Schedules
Resources
Staff User
Staff Dashboard
Total Patients
5
Your Schedule
2024-10-11: 09:58 - 09:58 (| ID-200425702247 | name - perera | i need to do x ray)
2024-10-11: 01:02 - 03:02 (ID-12121 Name - john blood test)
Recent Appointments
DATE
PATIENT
REASON
2023-09-10
John Doe
Routine checkup
2023-09-12
Jane Smith
Consultation
2023-09-15
Robert Johnson
Follow-up visit
2023-09-20
Emily Davis
X-ray appointment
2023-09-25
Michael Brown
Dental cleaning
Recent Patients
NAME
DATE OF BIRTH
EMAIL
Michael Johnson
1978-02-11
michael.johnson@example.com
Emily Davis
2000-12-25
emily.davis@example.com
Robert Brown
1988-09-30
robert.brown@example.com
John Doe
1985-05-15
john.doe@example.com
Jane Smith
1990-11-21
jane.smith@example.com
Activate Windows
Go to Settings to activate Windows.


Dashboard
Patients
Schedules
Resources
Staff User
Patients
JD
John Doe
john.doe@example.com
VIEW DETAILS
JS
Jane Smith
jane.smith@example.com
VIEW DETAILS
MJ
Michael Johnson
michael.johnson@example.com
VIEW DETAILS
ED
Emily Davis
emily.davis@example.com
VIEW DETAILS
RB
Robert Brown
robert.brown@example.com
VIEW DETAILS
Activate Windows
Go to Settings to activate Windows.


Dashboard
Patients
Schedules
Resources
Staff User
My Schedules
DATE
START TIME
END TIME
DESCRIPTION
ACTIONS
2024-10-11
09:58
09:58
| ID-200425702247 | name - perera | i need to do x ray
VIEW
2024-10-11
01:02
03:02
ID-12121 Name - john blood test
VIEW
Activate Windows
Go to Settings to activate Windows.

Online Resources