Declaration of Original Work for CE/CZ2002 Assignment

We hereby declare that the attached group assignment has been researched, undertaken, completed, and submitted as a collective effort by the group members listed below. We have honored the principles of academic integrity and have upheld the Student Code of Academic Conduct in the completion of this work. We understand that if plagiarism is found in the assignment, then lower marks or no marks will be awarded for the assessed work. In addition, disciplinary actions may be taken.

Name	Course (CE2002 or CZ2002)	Lab Group	Signature/Date
Gong Yuelong	CE2002	SCED	17/11/2024
Huang Yuxuan	CE2002	SCED	17/11/2024 
Joshua Tan (Chen Kaijun)	CE2002	SCED	17/11/2024 
Rizq Harith Bin Abdul Razak	CE2002	SCED	17/11/2024 
Sim Jian An	CE2002	SCED	17/11/2024 

Important notes:

1. Name must **EXACTLY MATCH** the one printed on your Matriculation Card.
2. Student Code of Academic Conduct includes the latest guidelines on usage of Generative AI and any other guidelines as released by NTU.

Introduction

https://github.com/YellowO2/HospitalManagementSystem

The Hospital Management System (HMS) is designed to manage key hospital operations such as user roles, medical records, and inventory using Object-Oriented Programming (OOP) principles. The system supports multiple user roles, including Patients, Doctors, Pharmacists, and Administrators, each with tailored functionalities.

Design Considerations and Approach

This section outlines the core design principles and rationale behind our Hospital Management System, highlighting how various components and classes work together to ensure modularity, maintainability, and scalability. The primary components of the system include:

- **Authentication**
- **User Roles**
- **Menus for User Interaction**
- **Database Integration and CRUD Operations**
- **Medical Records Management**
- **Inventory Management**
- **Appointment Management**

The design of these components has been guided by the principles of SOLID.

Authentication

When the HMS application starts, users are greeted with a login prompt where they enter their credentials. The **Authentication Manager** validates these credentials against records stored in the database. Once authenticated, the application determines the user's role (Patient, Pharmacist, Doctor, Administrator) and displays the relevant interface (e.g., **PatientMenu**, **DoctorMenu**, **PharmacistMenu**). This separation of concerns ensures that user authentication and role-based access are clear and secure, laying the foundation for the system's structure.

User Roles

The system employs inheritance to model different user roles through the **User** abstract class. Roles like **Patient**, **Doctor**, **Pharmacist**, and **Administrator** extend this class, inheriting common attributes such as name, password, and email, hence minimising code duplication. It also allows the system to scale easily when introducing new user roles in the future, promoting code reusability.

Menus

Each **Menu** class is dedicated to a specific user role. By separating user interaction logic from the core functionality (e.g., database management or medical records handling), we ensure a **clear separation of concerns**. For example, the **PatientMenu** interacts with the **Patient** class to allow patients to view their medical records or book appointments, while the **DoctorMenu** focuses on doctor-specific operations like updating patient records or confirming appointments. This approach leads to **easier debugging** and **cleaner code**, as the Menu class focuses solely on user interaction, while the User class encapsulates the data.

Managers

To decouple the user-facing menus from the complexity of data manipulation, we use **Managers** as intermediaries. The **Managers** are responsible for:

1. **Business logic**: Handling user requests by invoking the appropriate methods to process data.
2. **Data manipulation**: Interacting with the database to fetch, update, or delete records.

For example, when a DoctorMenu requests to view a patient's medical records, the MedicalRecordManager is called, which in turn interacts with the MedicalRecordDB to retrieve and display the data. Similarly, when a PharmacistMenu requests inventory updates, the InventoryManager is responsible for processing this request by accessing the InventoryDB. By using Managers as the intermediary, the Menus are kept focused on user interaction, and the Database access is handled separately by the managers, ensuring that each part of the system

only deals with what it's supposed to do. This approach keeps the code modular and easy to maintain.

DataBases and CSV

The system uses an abstract **Database** class to manage data storage and operations. This class is extended by specialized subclasses like **UserDB**, **MedicalRecordDB**, and **InventoryDB**, each handling specific data classes and their respective CSV. Each **Database<T>** subclass defines CRUD operations (Create, Read, Update, Delete) tailored to its data type. For example, **UserDB** manages user data, while **MedicalRecordDB** handles patient records. Using method overriding for CRUD operations allows easy extension: new data classes or storage systems can be added by creating new subclasses and implementing the necessary methods, keeping the system flexible and allowing future integration with other data storage solutions.

SOLID Design Principle

The HMS adheres to the **SOLID** design principles to ensure that the system is maintainable, flexible, and scalable. These principles guide the system architecture, ensuring each component has a clear responsibility, and the system can be easily extended as new features or roles are added.

1. Single Responsibility Principle

Each class in the system has one distinct responsibility:

- User classes (e.g., Patient, Doctor) handle user data and attributes.
- Managers (e.g., MedicalRecordManager, InventoryManager) handle specific business logic.
- Database classes (e.g., MedicalRecordDB, UserDB) abstract data storage operations.

By focusing on a single responsibility, the system becomes easier to maintain and extend, as each class can evolve independently without affecting others.

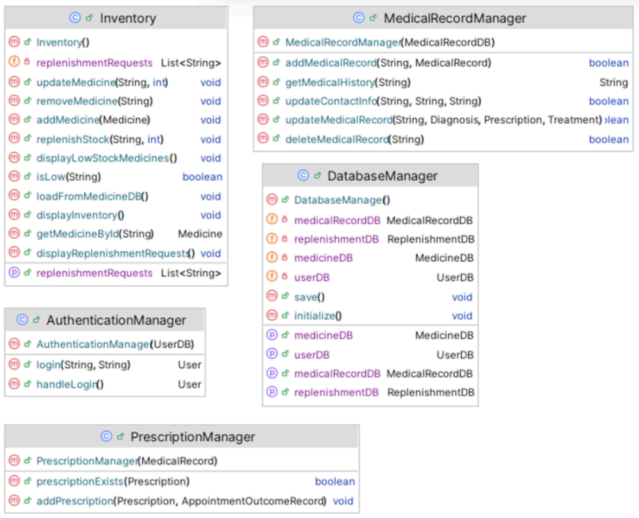


Figure 1. Management Classes

2. Open-Close Principle

The system is designed to be easily extended without modifying existing code. In our HMS:

- New **User roles** can be added by simply creating new subclasses of the **User** class without altering the existing codebase.
- New **Managers** can be added to handle new functionalities. For instance, if billing functionalities were needed, a Billing Manager could be introduced without causing much modifications to the existing managerial structure.

This ensures that the system can evolve over time while preserving stability and minimizing the risk of introducing bugs.

3. Liskov Substitution Principle

The Liskov Substitution Principle dictates that objects of a superclass should be interchangeable with objects of its subclasses without affecting the program's behaviour. In the context of our Hospital Management System, the User class provides essential attributes and methods common to all user types, Doctor, Pharmacist, Administrator, and Patient. Each subclass inherits these attributes and behaviours from the User, ensuring uniformity across the system.
For example, each subclass inherits methods like changePassword() and various setters, guaranteeing consistent functionality. As a result, we can use any subclass object (like Doctor or Pharmacist) wherever a User object is expected, without introducing inconsistencies or errors.

This flexibility allows the system to seamlessly interact with different user types while maintaining predictability and stability.

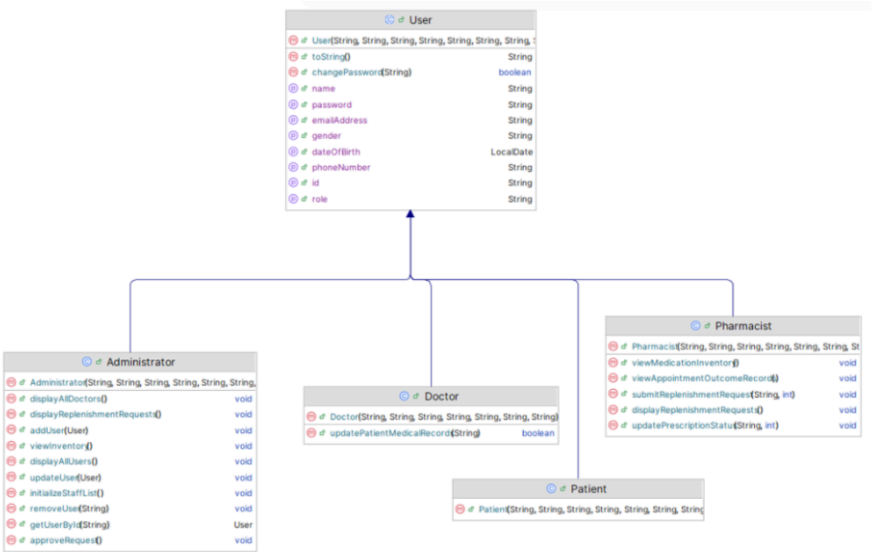


Figure 2. User and subclasses

4. Interface Segregation

The Interface Segregation Principle (ISP) suggests that instead of forcing classes to implement large, all-encompassing interfaces, it is better to create smaller, specific interfaces that provide only the methods a particular client needs. In this system, rather than having a single, broad interface or class with unrelated functions, we have distinct classes such as PrescriptionManager, MedicalRecordManager, and PharmacyInventoryManager. Each of these classes is focused on a particular area—prescriptions, medical records, and inventory—ensuring that they only provide the functionalities relevant to their specific domain. This approach allows each class to use only the methods it needs without depending on unnecessary functionality. Consequently, this design is more modular and adaptable, as each component can be expanded or modified independently, ensuring other classes are not burdened with unused or irrelevant methods.

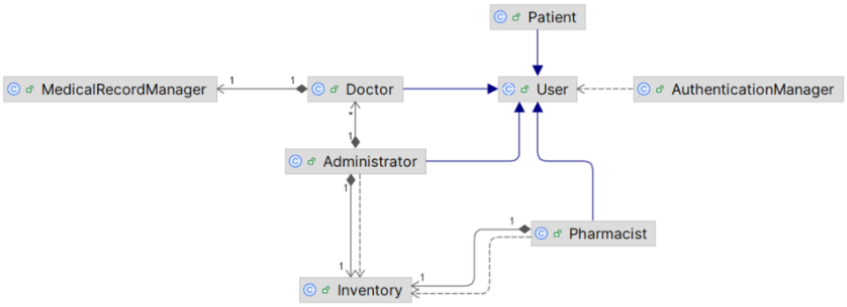


Fig. 3 Users and Manager classes

5. Dependency Injection

The dependency injection principle states that high-level modules should not depend on lower level modules. Classes should not depend on other concrete classes, but on higher level interfaces instead. Dependency Inversion Principle (DIP) is applied by making DatabaseManager and other classes work with general database types instead of specific types. The Database<T> class is a generic template that defines basic actions like load, save, create, and delete. Meanwhile, specific databases like MedicineDB, ReplenishmentDB, and MedicalRecordDB follow this general template, allowing them to be used in place of Database<T>. Through this way, DatabaseManager can manage any type of database through the same methods, without needing to know the exact details of other databases. This makes it easy to change or add new database types without altering the main logic, keeping the code flexible and easier to update.

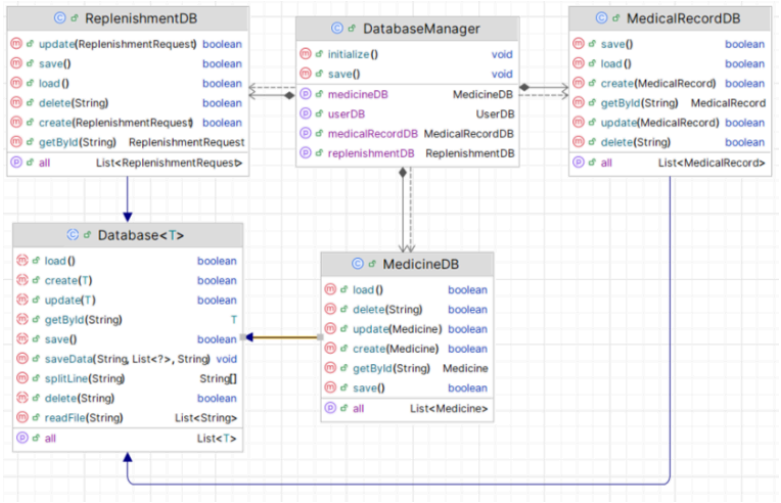
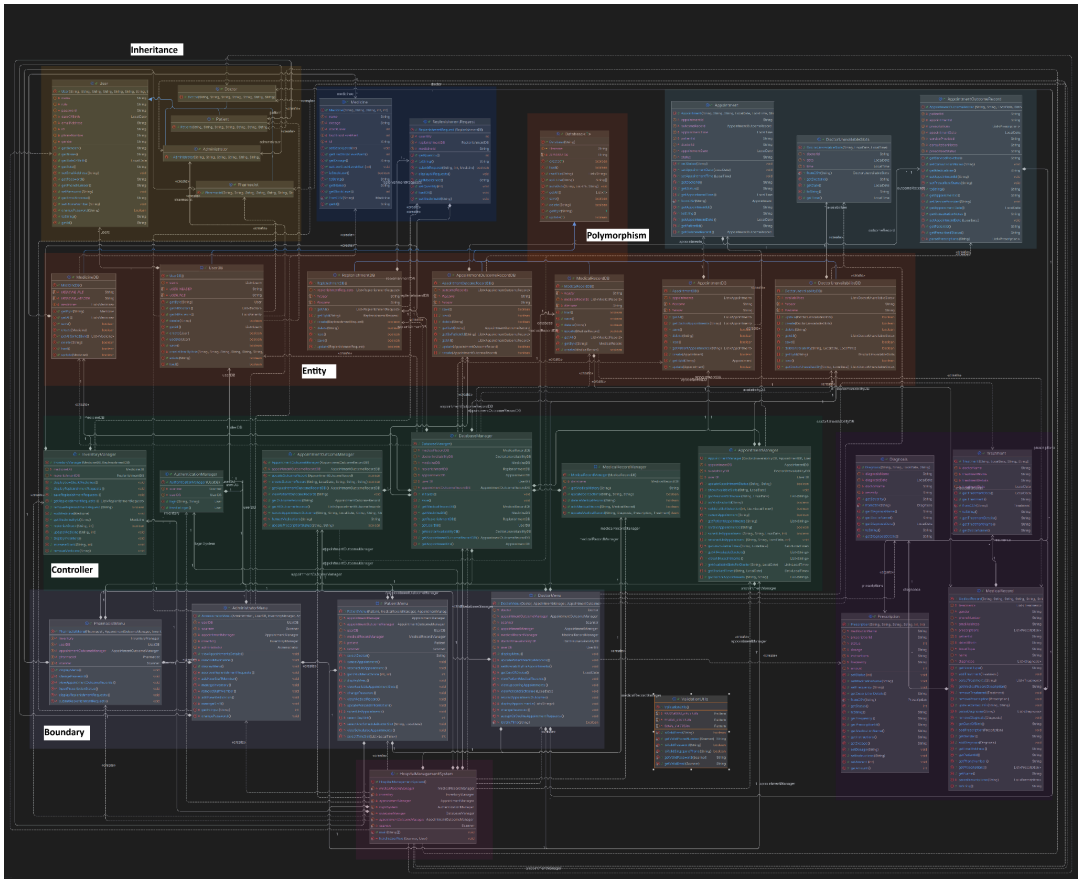


Figure 4. Database Management

Assumptions Made

1. There is only 1 user logging in at a time.
2. Assuming that the hospital operates from 9 am to 5 pm every day.
3. Assume medications have no expiry dates.
4. Users are responsible for maintaining the confidentiality of their passwords to prevent unauthorized access. No additional multi-factor authentication will also be implemented.
5. We assumed that doctors would write all medicine needed in a single prescription.
6. Doctors and patients can only access appointments 7 days from the day itself.
7. Any appointment slot that is selected is considered booked, lest it's canceled.

UML Diagram



Reflection

Difficulties Encountered and Conquering It

During the project, one challenge we encountered was the software used for creating the UML diagram. It is very hard to navigate and we had to take time to figure out how to use it. Additionally, to make the UML diagram neat, we had to fix the dependency so that the interconnecting lines do not look like a spider-web. We also found it difficult to apply the concepts we had learned in lectures while working on the project. This is especially so for topics related to object-oriented design and the SOLID principles. We had to go through several iterations of the UML diagram that was generated from our code in order to match these principles with our implementation.

Knowledge Learned

The SOLID design principles and object-oriented (OO) concepts learnt from the lectures were important to our project development . We prioritized designing our project in a way that allowed for seamless adjustments without significant disruption to other classes. In order to complete the task effectively, we also learned the value of delegating the work amongst us, which helped us to manage the execution of a sizable project within a short timeline. Furthermore, in order to improve the functionality and resilience of our program, we took the initiative to self-learn and make use of libraries and built-in functions like java.time and CSV read/write methods utilizing java.io.

Area of Improvement

In the future, we could include a secure way for storing passwords in our CSV file, such as encrypting them to enhance data protection. Additionally a notification system could be implemented to alert Pharmacists of low inventory or to remind Doctors and Patients of upcoming appointments. If allowed to, this project could also be implemented through a graphical user interface which would be much more interactive and easy to use compared to the command line interface. These enhancements would significantly improve user engagement and the overall functionality of the HMS application.

Test Cases

Patient Actions

```
Welcome to the Hospital Management System
Enter user ID: P1005
Enter password: password
Login successful for user: P1005

===== Patient Menu =====
1. View Medical Record
2. Update Personal Information
3. View Available Appointment Slots
4. Schedule Appointment
5. Reschedule an Appointment
6. Cancel an Appointment
7. View Scheduled Appointments
8. View Past Appointment Outcome Records
9. Change Password
10. Logout
Enter the number corresponding to your choice: 1

Viewing medical record for Yu Xuan
Patient ID: P1005
Name: Yu Xuan
Date of Birth: 1980-05-15
Gender: Female
Blood Type: O+
Phone Number: 11111111
Email Address: yx@gmail1.com

-----Diagnoses-----
Diagnosis: Flu
Severity: Mild
Date: 2023-10-01
Doctor: Dr. Smith

Diagnosis: Allergy
Severity: Severe
Date: 2023-09-15
Doctor: Dr. Brown

-----Treatments-----
Treatment: Physical Therapy
Date: 2023-11-01
Doctor: Dr. Johnson
Details: 10 sessions bi-weekly
```

1.View Medical Record

```
===== Patient Menu =====
1. View Medical Record
2. Update Personal Information
3. View Available Appointment Slots
4. Schedule Appointment
5. Reschedule an Appointment
6. Cancel an Appointment
7. View Scheduled Appointments
8. View Past Appointment Outcome Records
9. Change Password
10. Logout
Enter the number corresponding to your choice: 2

Do you want to update your email or phone number?
1. Email
2. Phone Number
1
Enter new email: test@example.com
Personal information updated successfully.

===== Patient Menu =====
1. View Medical Record
2. Update Personal Information
3. View Available Appointment Slots
4. Schedule Appointment
5. Reschedule an Appointment
6. Cancel an Appointment
7. View Scheduled Appointments
8. View Past Appointment Outcome Records
9. Change Password
10. Logout
Enter the number corresponding to your choice: 1

Viewing medical record for Yu Xuan
Patient ID: P1005
Name: Yu Xuan
Date of Birth: 1980-05-15
Gender: Female
Blood Type: O+
Phone Number: 11111111
Email Address: test@example.com
```

2. Update Personal Information

```
Enter the number corresponding to your choice: 3

Viewing available appointment slots...

Select a doctor...
1. John Smith - D001
2. Alladin - D002
Please enter the number corresponding to the doctor: 1
Viewing available appointment slots for Doctor John Smith
==================================================
1. Date: 2024-11-17  1. 12:00  2. 13:00  3. 14:00  4. 16:00
--------------------------------------------------
2. Date: 2024-11-18  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
3. Date: 2024-11-19  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
4. Date: 2024-11-20  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
5. Date: 2024-11-21  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
6. Date: 2024-11-22  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
7. Date: 2024-11-23  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
==================================================
Return to menu? (Y/N)
```

3. View Available Appointment Slots

```
Enter the number corresponding to your choice: 4


Scheduling an appointment...

Select a doctor...
1. John Smith - D001
2. Alladin - D002
Please enter the number corresponding to the doctor: 1
Viewing available appointment slots for Doctor John Smith
==================================================
1. Date: 2024-11-17  1. 12:00  2. 13:00  3. 14:00  4. 16:00
--------------------------------------------------
2. Date: 2024-11-18  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
3. Date: 2024-11-19  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
4. Date: 2024-11-20  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
5. Date: 2024-11-21  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
6. Date: 2024-11-22  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
7. Date: 2024-11-23  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
==================================================

Select an available slot ...
Please select a day (1 to 7): 1
Available Time Slots:
1. 12:00
2. 13:00
3. 14:00
4. 16:00
Please select a time slot (1 to 4): 1
Appointment scheduled to 2024-11-17 at 12:00.
Appointment scheduled successfully.
```

```
Appointment ID: f3d5954c-d2e5-4ef7-a311-1f1b9f25bb4e
Doctor: John Smith
Patient ID: P1005
Date: 2024-11-17
Time: 12:00
Status: Confirm
--------------------------
```

```
Enter the number corresponding to your choice: 3

Viewing available appointment slots...

Select a doctor...
1. John Smith - D001
2. Alladin - D002
Please enter the number corresponding to the doctor: 1
Viewing available appointment slots for Doctor John Smith
==================================================
1. Date: 2024-11-17  1. 13:00  2. 14:00  3. 16:00
--------------------------------------------------
2. Date: 2024-11-18  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
3. Date: 2024-11-19  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
4. Date: 2024-11-20  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
5. Date: 2024-11-21  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
6. Date: 2024-11-22  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
7. Date: 2024-11-23  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
==================================================
Return to menu? (Y/N)
```

4. Schedule an Appointment

```
Enter the number corresponding to your choice: 5

Rescheduling an appointment...
Enter old Appointment ID: 2cf3daf2-39c4-4eeb-a8e8-02f73f103b66

Select a doctor...
1. John Smith - D001
2. Alladin - D002
Please enter the number corresponding to the doctor: 1
Viewing available appointment slots for Doctor John Smith
==================================================
1. Date: 2024-11-17  1. 13:00  2. 14:00  3. 16:00
--------------------------------------------------
2. Date: 2024-11-18  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
3. Date: 2024-11-19  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
4. Date: 2024-11-20  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
5. Date: 2024-11-21  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
6. Date: 2024-11-22  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
7. Date: 2024-11-23  1. 09:00  2. 10:00  3. 11:00  4. 12:00  5. 13:00  6. 14:00  7. 15:00  8. 16:00
--------------------------------------------------
==================================================
==== Select a new appointment ====
Please select a day (1 to 7): 1
Available Time Slots:
1. 13:00
2. 14:00
3. 16:00
Please select a time slot (1 to 3): 1
Appointment scheduled to 2024-11-17 at 13:00.
Success: Appointment rescheduled successfully.
```

5. Reschedule an Appointment

```
Enter the number corresponding to your choice: 6

Canceling an appointment...
Enter Appointment ID: 3a92a7a0-8c9f-4e6a-b4e8-3b982b9d36af
Appointment canceled successfully.
```

6. Cancel an Appointment

```
Enter the number corresponding to your choice: 7

Viewing scheduled appointments...

Appointment ID: de42c5d9-4494-44ed-9ace-787a5e39abcb
Doctor: John Smith
Patient ID: P1005
Date: 2024-11-16
Time: 12:00
Status: Accepted
```

7. View Scheduled Appointments

```
Enter the number corresponding to your choice: 8

Viewing past appointment outcome records...
========================================
Appointment outcome records for patient P1005:
----------------------------------------
Appointment ID: testappointmentID
Date: 2024-11-13
Service Provided: Consultation
Prescribed Medications: - Paracetamol
Prescription Status: Fulfilled
Consultation Notes: This patient very good
```

8. View Past Appointment Outcome Records

Doctor Actions

```
=== Doctor Menu ===
1. View Patient Medical Records
2. Update Patient Medical Records
3. View Personal Schedule
4. Set Availability for Appointments
5. Confirm or Cancel Appointment Requests
6. View Upcoming Appointments
7. Record Appointment Outcome
8. Change Password
9. Logout
Enter the number corresponding to your choice: 1

Enter the patient ID to view their medical record: P1005
Viewing medical record for P1005:
Patient ID: P1005
Name: Yu Xuan
Date of Birth: 1980-05-15
Gender: Female
Blood Type: O+
Phone Number: 11111111
Email Address: test@gmail

-----Diagnoses-----
Diagnosis: Flu
Severity: Mild
Date: 2023-10-01
Doctor: Dr. Smith

Diagnosis: Allergy
Severity: Severe
Date: 2023-09-15
Doctor: Dr. Brown
```

9. View Patient Medical Records

```
Enter the number corresponding to your choice: 2

Enter the patient ID to update their medical record: P1005
Enter the diagnosis name: Test Diagnosis
Enter the severity (Mild, Moderate, Severe): Mild
Do you want to add a prescription? (Yes/No): Yes
Enter medication name: Test
Enter the dosage to be taken per administration: 25
Enter instructions for patient: Test
Enter how often the medication should be taken: 2
Enter the total quantity to prescribe: 2
Do you want to add a treatment? (Yes/No): Y
Medical record updated successfully.
```

```
-----Diagnoses-----
Diagnosis: Flu
Severity: Mild
Date: 2023-10-01
Doctor: Dr. Smith

Diagnosis: Allergy
Severity: Severe
Date: 2023-09-15
Doctor: Dr. Brown

Diagnosis: Test Diagnosis
Severity: Mild
Date: 2024-11-17
Doctor: John Smith
```

10. Update Patient Medical Records

```
Enter the number corresponding to your choice: 3

Viewing personal schedule...
Select the day to view schedule:
1. Monday (18-11-2024)
2. Tuesday (19-11-2024)
3. Wednesday (20-11-2024)
4. Thursday (21-11-2024)
5. Friday (22-11-2024)
6. Saturday (23-11-2024)
7. Sunday (17-11-2024)
Enter the day (e.g., 1 for Monday, 2 for Tuesday): 1
Viewing personal schedule for: 18-11-2024
09:00 - 10:00
10:00 - 11:00
11:00 - 12:00
12:00 - 13:00
13:00 - 14:00
14:00 - 15:00
15:00 - 16:00
16:00 - 17:00
```

11. View Personal Schedule

```
Enter the number corresponding to your choice: 4

Select the day to set availability:
1. Monday (18-11-2024)
2. Tuesday (19-11-2024)
3. Wednesday (20-11-2024)
4. Thursday (21-11-2024)
5. Friday (22-11-2024)
6. Saturday (23-11-2024)
7. Sunday (17-11-2024)
Enter the day (e.g., 1 for Monday, 2 for Tuesday): 1
Setting availability for: 18-11-2024
Viewing personal schedule for: 18-11-2024
09:00 - 10:00
10:00 - 11:00
11:00 - 12:00
12:00 - 13:00
13:00 - 14:00
14:00 - 15:00
15:00 - 16:00
16:00 - 17:00
Enter the time range you are unavailability on this day (e.g., 09:00 - 12:00), or type 'back' to return:
09:00 - 10:00
Unavailability for 09:00 - 10:00 updated successfully.
```

```
2. Date: 2024-11-18  1. 10:00  2. 11:00  3. 12:00  4. 13:00  5. 14:00  6. 15:00  7. 16:00
```

12. Set Availability for Appointments

```
Enter the number corresponding to your choice: 5

Confirming or cancelling appointment requests...

Appointment ID: 2828410f-cdcf-4fc6-ba34-5c6a1190d96d
Doctor ID: D001
Patient ID: P1005
Date: 2024-11-17
Time: 10:00
Status: Pending
------------------------

Appointment ID: b19049d0-638f-4778-8b25-354fd1b5327f
Doctor ID: D001
Patient ID: P1005
Date: 2024-11-17
Time: 15:00
Status: Pending
------------------------
Choose an appointment to confirm or cancel (enter the appointment number or type 'exit' to return to the menu): 2828410f-cdcf-4fc6-ba34-5c6a1190d96d

Appointment ID: 2828410f-cdcf-4fc6-ba34-5c6a1190d96d selected.

Do you wish to:
1.Confirm this appointment
2.Cancel this appointment.
3.Return to list of Pending appointment

Enter your choice (1, 2 or 3): 1
You have confirmed the appointment.
```

```
===== Patient Menu =====
1. View Medical Record
2. Update Personal Information
3. View Available Appointment Slots
4. Schedule Appointment
5. Reschedule an Appointment
6. Cancel an Appointment
7. View Scheduled Appointments
8. View Past Appointment Outcome Records
9. Change Password
10. Logout
Enter the number corresponding to your choice: 7

Viewing scheduled appointments...

Appointment ID: 2828410f-cdcf-4fc6-ba34-5c6a1190d96d
Doctor: John Smith
Patient ID: P1005
Date: 2024-11-17
Time: 10:00
Status: Confirm
```

13. Accept or Decline Appointment Requests

```
Enter the number corresponding to your choice: 6

Viewing upcoming appointments...

Appointment ID: 2828410f-cdcf-4fc6-ba34-5c6a1190d96d
Doctor ID: D001
Patient ID: P1005
Date: 2024-11-17
Time: 10:00
Status: Confirm
```

14. View Upcoming Appointments

```
Enter the number corresponding to your choice: 7

Recording the outcome of today's appointments...
Appointment ID: 2828410f-cdcf-4fc6-ba34-5c6a1190d96d, Patient ID: P1005, Time: 10:00

Choose an appointment to record the outcome (enter the appointment number or type 'exit' to return to the menu): 2828410f-cdcf-4fc6-ba34-5c6a1190d96d
Recording appointment outcome...
Enter the Service provided: Test
Enter prescription details in the following format:
<Medication Name>|<Dosage>|<Dosage Frequency>|<Amount>|<Instructions>|<Status>
Example: Paracetamol|250mg|1 time per day|15|Take after meals|1
Separate each parameter with '|' and multiple prescriptions with ';' if needed:
Paracetamol|250mg|1 time per day|15|Take after meals|1
Enter the consultation notes: Test
Appointment outcome recorded successfully.
```

15. Record Appointment Outcome

```
Viewing past appointment outcome records...
========================================
Appointment outcome records for patient P1005:
----------------------------------------
Appointment ID: 2828410f-cdcf-4fc6-ba34-5c6a1190d96d
Date: 2024-11-17
Service Provided: Test
Prescribed Medications: - Paracetamol
Prescription Status: Pending
Consultation Notes: Test
========================================
```

Pharmacist Actions

```
=== Pharmacist Menu ===
1. View Appointment Outcome Records
2. Update Prescription Status
3. View Medication Inventory
4. Submit Replenishment Request
5. View Replenishment Requests
6. Change Password
7. Logout
Enter your choice: 1
testappointmentID,P1005,2024-11-13,Consultation,Paracetamol|250mg|1 time per day|15|Take after meals|1,Pending,This patient very good
```

16. View Appointment Outcome Record

```
Enter your choice: 2
Enter the Appointment ID: testappointmentID
Enter the new status (0 for Pending, 1 for Dispensed): 1
Prescription status updated and saved successfully.
```

```
Enter your choice: 1
testappointmentID,P1005,2024-11-13,Consultation,Paracetamol|250mg|1 time per day|15|Take after meals|1,Dispensed,This patient very good
```

17. Update Prescription Status

```
Enter your choice: 3
Medicine ID: M1003, Name: Amoxicillin, Dosage: 35 ml, Stock Level: 30, Low Stock Alert Level: 20
Medicine ID: M1001, Name: Paracetamol, Dosage: 50 ml, Stock Level: 55, Low Stock Alert Level: 20
Medicine ID: M1004, Name: Aderall, Dosage: 10ml, Stock Level: 10, Low Stock Alert Level: 30
```

18. View Medication Inventory

```
Enter your choice: 4
Enter the medication ID: M1004
Enter the quantity to replenish: 5
Stock check for medicine ID M1004: true
Existing request found: null
Created new request and saved.
Replenishment request submitted successfully for Aderall.
```

19. Submit Replenishment Request

Administrator Actions

```
=== Administrator Menu ===
1. View, Add, or Remove Hospital Staff
2. View Appointment Details
3. View, Add, or Remove Medication Inventory
4. Approve Replenishment Requests
5. Change Password
6. Logout
Enter your choice: 1

=== Hospital Staff ===
ID: D001, Name: John Smith, Role: Doctor
ID: PH1001, Name: Dr Strange, Role: Pharmacist
ID: A1001, Name: James, Role: Administrator
ID: D002, Name: Alladin, Role: Doctor

Select an action:
1. Add New Staff Member
2. Remove Staff Member
3. Go Back
Enter your choice: 2

Enter the ID of the staff member to remove: D002
Staff member removed successfully.
```

```
Enter your choice: 1

=== Hospital Staff ===
ID: D001, Name: John Smith, Role: Doctor
ID: PH1001, Name: Dr Strange, Role: Pharmacist
ID: A1001, Name: James, Role: Administrator
```

20. View and Manage Hospital Staff

```
Enter your choice: 2
=== Viewing All Appointments ===
657d1d41-78d7-4829-914e-b22421b3323b,D001,P1001,2024-11-16,09:00,Pending
b91f3a73-90be-49dd-96de-387246d45239,D001,P1002,2024-11-16,11:00,Pending
949f6830-0ee4-429a-8fb8-7de3dc0b05c1,D001,P1003,2024-11-16,13:00,Pending
6af6b9e1-eeef-44f0-b445-e19d512a27c1,D001,P1004,2024-11-16,10:00,Pending
de42c5d9-4494-44ed-9ace-787a5e39abcb,D001,P1005,2024-11-16,12:00,Accepted
cf0806ed-4deb-4f76-b30d-887506bcb16b,D001,P1001,2024-11-17,09:00,Accepted
d311abe1-e9c7-4d57-b598-a22e89e94765,D001,P1002,2024-11-17,11:00,Pending
```

21. View Appointments Details

```
Enter your choice: 3
=== Inventory ===
Medicine ID: M1003, Name: Amoxicillin, Dosage: 35 ml, Stock Level: 30, Low Stock Alert Level: 20
Medicine ID: M1001, Name: Paracetamol, Dosage: 50 ml, Stock Level: 55, Low Stock Alert Level: 20
Medicine ID: M1004, Name: Aderall, Dosage: 10ml, Stock Level: 10, Low Stock Alert Level: 30

Select an action:
1. Add New Medication
2. Remove Medication
3. Go Back
Enter your choice: 2

Enter the ID of the medication to remove: M1003
Removed medicine with ID: M1003
```

```
Enter your choice: 3
=== Inventory ===
Medicine ID: M1001, Name: Paracetamol, Dosage: 50 ml, Stock Level: 55, Low Stock Alert Level: 20
Medicine ID: M1004, Name: Aderall, Dosage: 10ml, Stock Level: 10, Low Stock Alert Level: 30
```

22. View and Manage Medication Inventory

```
Enter your choice: 4
Stock for Aderall increased by 5 units.
Replenishment request for M1004 processed and removed.
```

```
=== Inventory ===
Medicine ID: M1001, Name: Paracetamol, Dosage: 50 ml, Stock Level: 55, Low Stock Alert Level: 20
Medicine ID: M1004, Name: Aderall, Dosage: 10ml, Stock Level: 15, Low Stock Alert Level: 30
```

23. Approve Replenishment Requests

Login and Password

```
Welcome to the Hospital Management System
Enter user ID: P1001
Enter password: password
Login successful for user: P1001

===== Patient Menu =====
1. View Medical Record
2. Update Personal Information
3. View Available Appointment Slots
4. Schedule Appointment
5. Reschedule an Appointment
6. Cancel an Appointment
7. View Scheduled Appointments
8. View Past Appointment Outcome Records
9. Change Password
10. Logout
Enter the number corresponding to your choice: 9

Changing password...
Enter password (minimum 6 characters):
test123
Password changed successfully.
```

```
Welcome to the Hospital Management System
Enter user ID: P1001
Enter password: test123
Login successful for user: P1001

===== Patient Menu =====
1. View Medical Record
2. Update Personal Information
3. View Available Appointment Slots
4. Schedule Appointment
5. Reschedule an Appointment
6. Cancel an Appointment
7. View Scheduled Appointments
8. View Past Appointment Outcome Records
9. Change Password
10. Logout
Enter the number corresponding to your choice:
```

25. First-Time Login and Password Change

```
Welcome to the Hospital Management System
Enter user ID: P1001
Enter password: password
Login failed for user: P1001
Invalid credentials. Please try again.
Welcome to the Hospital Management System
Enter user ID:
```

26. Login with Incorrect Credentials