

### **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 honoured the principles of academic integrity and have upheld 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	Lab Group	Signature/Date
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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.

### **Github Repository**

<https://github.com/fazli1702/SC2002-HMS-Project>

## **1 Design Approach**

### **1.1 Assumptions**

The system was developed with the following assumptions to simplify the design and implementation while meeting the core functional requirements:

#### **1.1.1. Monthly Booking Restriction**

Patients can only book appointments within the current calendar month. This simplifies the scheduling system and avoids complexities related to long-term bookings or handling rolling time windows for availability

#### **1.1.2. One Appointment per Time slot**

A patient can only book one appointment per time slot, and no overlapping appointments are allowed for the same doctor. This ensures clarity in scheduling and avoids conflicts.

#### **1.1.3. No Recurring Appointments**

The system assumes that all appointments are one-time events. There is no support for recurring appointments (e.g., weekly or monthly sessions).

#### **1.1.4. Default Availability for doctors**

When a new doctor is added to the system, they are assumed to be available for all time slots throughout the month. This eliminates the need to manually define their availability initially, making onboarding faster.

#### **1.1.5. Fixed Roles**

The system supports predefined roles: Patient, Doctor, Pharmacists and Administrator. It is assumed to be sufficient for our current operational needs.

#### **1.1.6. Single service provided per appointment**

Each appointment outcome will only contain 1 service provided, prescription and consultation note

### **1.2 Considerations**

When designing the Hospital Management System (HMS), we considered several factors carefully to ensure the system's functionality and usability.

#### **1.2.1. Ease of use**

Each user role (Patient, Pharmacist, Doctor, Administrator) has their own dedicated views tailored to their responsibilities and actions. This simplifies navigation and minimises confusion. The views will prompt users for the data step by step to reduce risk of incorrect information.

#### **1.2.2. Security**

User authentication ensures that only authorised individuals can access sensitive operations such as viewing medical records.

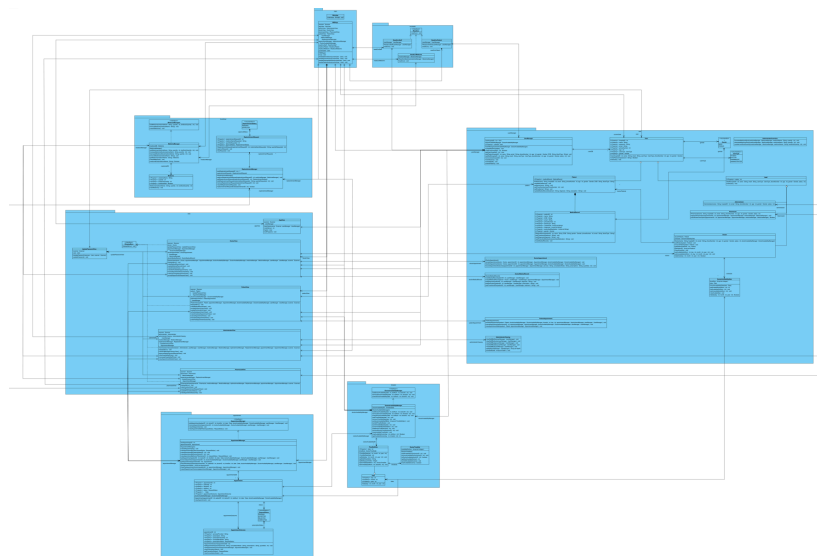
### **1.2.3. Performance**

The appointment system should minimise conflicts and overlaps in schedules by checking availability before scheduling or rescheduling.

### **1.2.4 Expandability**

The system should allow for future extension and not be limited to the current use case.

## **1.3 Detailed UML Class Diagram**



## **1.4 SOLID Design Principles**

### **1.4.1 Single Responsibility Principle**

The Single Responsibility Principle(SRP) is defined such that each class should not have more than one reason to change. That is to say that each class should have a clear and singular responsibility. This reduces the amount of changes a class requires should its responsibility change, and to avoid creating a ‘god’ class.

Each package has individual classes built to perform one specific function, each with a manager class to handle calls to the classes. For example, within the DoctorAvailability package, the TimeSlotDate class is used to maintain the availability of doctors, and is managed by the DoctorAvailabilityManager class, which handles all calls to modify the availability of doctors.

### **1.4.2 Open/Closed Principle**

The Open/Closed Principle(OCP) states that classes should be open for extension but closed for modification. That is to say, classes should readily allow for new features or attributes to

be added without needing to modify the existing class. OCP helps facilitate inheritance and abstraction, where subclasses can extend the functionality of superclass, but the superclass should be abstracted such that it does not contain features that will not be reflected in the subclass.

In this project, OCP is illustrated by the User class and its subclasses. The subclasses such as the Patient class and Doctor class, among others, have very different functionalities and attributes. The subclasses inherit and extend the User class such that they can perform the roles the class requires.

### **1.4.3 Liskov Substitution Principle**

The Liskov Substitution Principle(LSP) states that a user of a base class should continue to function without error when the base class is replaced by the subclass. This principle is widely practised in the project to ensure that methods are not broken should a subclass call said method. The User class illustrates LSP with the viewUserInfo method, where each subclass implements the method to ensure functionality

### **1.4.4 Interface Segregation Principle**

The Interface Segregation Principle(ISP) states that it is better to have many specific interfaces rather than one general interface. This prevents classes from depending on interfaces they do not use, or having to implement methods that they do not need. This also reduces the level of coupling and reduces the ripple effect should the interfaces change.

Our project considers ISP when creating the manager interfaces. While all the Manager interfaces share a managerial role, they manage very different classes hence require very different functionality. Instead of implementing one singular Manager interface, we create separate interfaces to each specific managerial role, such as the IUserManager interface or the IAppointmentManager.

### **1.4.5 Dependency Injection Principle**

The Dependency Injection Principle states that high level modules should not depend on low level modules, but instead depend on abstraction. This can be seen with the Date class. Instead of depending on individual modules requiring their own fragmented implementation of a date field, the project instead implements or extends the Date class. Thus when needing to alter or call the date attribute of any class, they instead go through the abstracted Date class.

## **1.5 Object Oriented Programming Principles**

### **1.5.1 Abstraction**

Abstraction simplifies complex systems by focusing only on essential details and hiding the implementation specifics. It allows developers to interact with objects through well-defined interfaces without needing to understand the inner workings.

Abstraction plays a crucial role in defining a base/generalised structure that subclasses can specialise or extend. This can be seen in the TimeSlotDate class that extends Date class. The Date class represents the idea of a date, without imposing specific details about how the date might be used in different scenarios like scheduling and event tracking. The child class TimeSlotDate takes the generalised concept from Date and extends it for a specific purpose which is to represent a date associated with time slots. New attributes like DoctorTimeSlots[] and methods like getTimeSlot(int slotNum) and getDateReadable() are added to handle specialised behaviour. The relationship between these two classes is an “is-a” relationship as TimeSlotDate is a type of Date, allowing a hierarchical structure, where the base Date class abstracts common functionality that all date-related classes share.

### **1.5.2 Inheritance**

Inheritance enables the creation of new classes (subclasses) from existing ones (superclasses). Subclasses inherit attributes and behaviours from their parent class, allowing for code reuse and the establishment of a hierarchical relationship.

The Doctor, Pharmacist, and Administrator classes all explicitly extend the Staff superclass, inheriting its properties (name, hospitalID, userType, etc.) and methods (getSalary(), viewUserInfo()). The hierarchical relationship shown where Staff as the parent class and others as its children, is the hallmark of inheritance, which is about reusing and specialising behaviour and attributes in child classes.

### **1.5.3 Encapsulation**

Encapsulation restricts direct access to an object's internal state and enforces controlled access through methods. This protects data integrity and promotes modularity by separating an object's interface from its implementation.

The User class demonstrates encapsulation by controlling access to its internal attributes and providing methods to interact with them. The attributes such as name, hospitalID, password, email, phoneNumber, age, and gender, are private or protected. The provided accessor and mutator methods encapsulate the access to the private attributes by providing a controlled interface for reading and updating the values.

### **1.5.4 Polymorphism**

Polymorphism allows objects to take on many forms, enabling a single interface to represent different underlying types. A key aspect is method overriding, where a subclass provides its own implementation of a method defined in its parent class. This ensures that the appropriate behaviour is executed based on the actual object's type at runtime.

The User class has `viewUserInfo`, which is also implemented in Patient and Staff classes. The User class provides a base implementation of the `viewUserInfo()` method, which can display general information about a user. However, the Patient and Staff classes override this method to provide specialised implementations that display details specific to their respective roles. Override extends or replaces the base functionality to include patient-specific details like medical record, or staff-specific details like salary.

## **2. Reflection**

We faced many difficulties designing and implementing the Hospital Management System. One of the problems we faced was standardising our design. After drawing out our UML diagram, there were some of us who did not follow the diagram exactly. This led to many syntax errors. Some examples of the errors include wrong spelling of methods and wrong order of method parameters. To conquer the problem, we had to go through files to edit the error and also through testing of our system to make sure it can run smoothly.

The materials taught throughout the course have greatly helped us in designing and creating the project. Concepts like upcasting have been used extensively throughout our project which allows ease transferring between parent and child classes

### 3. Test Cases and Results

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5	Patient reschedule an appointment.	<div> Patient Menu:  1. View Medical Record  2. Update Personal Information  3. View Available Appointment Slots  4. Schedule an Appointment  5. Reschedule an Appointment  6. Cancel an Appointment  7. View Schedule Appointment  8. View Past Appointment Outcome Records  9. Change Password  10. Logout  Enter your choice: 5  ApptID DocID PatID Status SlotNum Date  1 1001 1005 PENDING 1 01-12-2024  Enter appointment id: 1  Doctor of ID: 1001 added to Slot 1 on 1/12/2024  Appointment removed  Date 0900-1000 1000-1100 1100-1200 1300-1400 1400-1500 1500-1600 1600-1700  01-12-2024 1 1 1 1 1 1 1  02-12-2024 1 1 1 1 1 1 1  03-12-2024 1 1 1 1 1 1 1  04-12-2024 1 1 1 1 1 1 1  05-12-2024 1 1 1 1 1 1 1  06-12-2024 1 1 1 1 1 1 1  07-12-2024 1 1 1 1 1 1 1  Date  Enter day: 2  Enter month: 12  Enter year: 2024  Timeslot  1. 0900-1000  2. 1000-1100  3. 1100-1200  4. 1300-1400  5. 1400-1500  6. 1500-1600  7. 1600-1700  Enter choice: 3  Doctor of ID: 1001 removed from Slot 3 on 2/12/2024  Appointment added </div> <div> Patient Menu:  1. View Medical Record  2. Update Personal Information  3. View Available Appointment Slots  4. Schedule an Appointment  5. Reschedule an Appointment  6. Cancel an Appointment  7. View Schedule Appointment  8. View Past Appointment Outcome Records  9. Change Password  10. Logout  Enter your choice: 3  Date 0900-1000 1000-1100 1100-1200 1300-1400 1400-1500 1500-1600 1600-1700  01-12-2024 1 1 1 1 1 1 1  02-12-2024 1 1 0 1 1 1 1  03-12-2024 1 1 1 1 1 1 1  04-12-2024 1 1 1 1 1 1 1  05-12-2024 1 1 1 1 1 1 1  06-12-2024 1 1 1 1 1 1 1  07-12-2024 1 1 1 1 1 1 1 </div>
6	Patient cancel appointment	<div> Patient Menu:  1. View Medical Record  2. Update Personal Information  3. View Available Appointment Slots  4. Schedule an Appointment  5. Reschedule an Appointment  6. Cancel an Appointment  7. View Schedule Appointment  8. View Past Appointment Outcome Records  9. Change Password  10. Logout  Enter your choice: 6  ApptID DocID PatID Status SlotNum Date  2 1001 1005 PENDING 3 02-12-2024  Enter appointment id: 2  Doctor of ID: 1001 added to Slot 3 on 2/12/2024  Appointment removed </div> <div> Patient Menu:  1. View Medical Record  2. Update Personal Information  3. View Available Appointment Slots  4. Schedule an Appointment  5. Reschedule an Appointment  6. Cancel an Appointment  7. View Schedule Appointment  8. View Past Appointment Outcome Records  9. Change Password  10. Logout  Enter your choice: 3  Date 0900-1000 1000-1100 1100-1200 1300-1400 1400-1500 1500-1600 1600-1700  01-12-2024 1 1 1 1 1 1 1  02-12-2024 1 1 1 1 1 1 1  03-12-2024 1 1 1 1 1 1 1  04-12-2024 1 1 1 1 1 1 1  05-12-2024 1 1 1 1 1 1 1  06-12-2024 1 1 1 1 1 1 1  07-12-2024 1 1 1 1 1 1 1 </div>
7	Patient view scheduled appointment	<div> Patient Menu:  1. View Medical Record  2. Update Personal Information  3. View Available Appointment Slots  4. Schedule an Appointment  5. Reschedule an Appointment  6. Cancel an Appointment  7. View Schedule Appointment  8. View Past Appointment Outcome Records  9. Change Password  10. Logout  Enter your choice: 7  ApptID DocID PatID Status SlotNum Date  1 1001 1005 PENDING 1 01-12-2024 </div>
8	Patient view past appointment records	<div> Patient Menu:  1. View Medical Record  2. Update Personal Information  3. View Available Appointment Slots  4. Schedule an Appointment  5. Reschedule an Appointment  6. Cancel an Appointment  7. View Schedule Appointment  8. View Past Appointment Outcome Records  9. Change Password  10. Logout  Enter your choice: 8  ApptID DocID PatID Status SlotNum Date ServiceProvided ConsultationNotes Prescription Paracetamol Qty  1 1001 1005 COMPLETED 1 01-12-2024 checkup fever 1 5 PENDING </div>
9	Doctor view patient medical records	<div> Doctor Menu:  1. View Patient Medical Records  2. Update Patient Medical Records  3. View Patient Appointment Slots  4. Accept or Decline Appointment Request  5. View Appointment Outcome  6. Change Password  10. Logout  Enter your choice: 1  Name Doctor Email ID PhoneNumber EmailType Treatment Notes Diagnosis Medications  1001 Alice Brown FEMALE alice.brown@example.com 10-05-2024 123456789 01 None None None </div>



10	Doctor Update Patient Medical Records	<div>Doctor Menu: 1. View Patient Medical Records 2. Update Patient Medical Records 3. View Personal Schedule 4. Set Availability for Appointments 5. Accept or Decline Appointment Request 6. View Upcoming Appointments 7. Record Appointment Outcome 8. Change Password 9. Logout Enter your choice: 2</div> <table><thead><tr><th>ID</th><th>Name</th><th>Gender</th><th>Email</th><th>DOB</th><th>PhoneNumber</th><th>BloodType</th><th>Treatments</th><th>Diagnoses</th><th>Medications</th></tr></thead><tbody><tr><td>1005</td><td>Alice Brown</td><td>FEMALE</td><td>alice.brown@example.com</td><td>10-05-2020</td><td>123456789</td><td>O+</td><td></td><td></td><td></td></tr></tbody></table> <div>Enter patient ID: 1005 Which medical information to be updated: 1. Treatment 2. Diagnosis 3. Prescribed Medication Enter treatment: medicine</div> <div>Doctor Menu: 1. View Patient Medical Records 2. Update Patient Medical Records 3. View Personal Schedule 4. Set Availability for Appointments 5. Accept or Decline Appointment Request 6. View Upcoming Appointments 7. Record Appointment Outcome 8. Change Password 9. Logout Enter your choice: 1</div> <table><thead><tr><th>ID</th><th>Name</th><th>Gender</th><th>Email</th><th>DOB</th><th>PhoneNumber</th><th>BloodType</th><th>Treatments</th><th>Diagnoses</th><th>Medications</th></tr></thead><tbody><tr><td>1005</td><td>Alice Brown</td><td>FEMALE</td><td>alice.brown@example.com</td><td>10-05-2020</td><td>123456789</td><td>O+</td><td>medicine</td><td></td><td></td></tr></tbody></table>	ID	Name	Gender	Email	DOB	PhoneNumber	BloodType	Treatments	Diagnoses	Medications	1005	Alice Brown	FEMALE	alice.brown@example.com	10-05-2020	123456789	O+				ID	Name	Gender	Email	DOB	PhoneNumber	BloodType	Treatments	Diagnoses	Medications	1005	Alice Brown	FEMALE	alice.brown@example.com	10-05-2020	123456789	O+	medicine																																																																										
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11	Doctor View Personal Schedule	<div>Doctor Menu: 1. View Patient Medical Records 2. Update Patient Medical Records 3. View Personal Schedule 4. Set Availability for Appointments 5. Accept or Decline Appointment Request 6. View Upcoming Appointments 7. Record Appointment Outcome 8. Change Password 9. Logout Enter your choice: 3</div> <table><thead><tr><th>Date</th><th>0900-1000</th><th>1000-1100</th><th>1100-1200</th><th>1300-1400</th><th>1400-1500</th><th>1500-1600</th></tr></thead><tbody><tr><td>01-12-2024</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>02-12-2024</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>03-12-2024</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>04-12-2024</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>05-12-2024</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>06-12-2024</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>07-12-2024</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr></tbody></table>	Date	0900-1000	1000-1100	1100-1200	1300-1400	1400-1500	1500-1600	01-12-2024	0	1	1	1	1	1	02-12-2024	1	1	1	1	1	1	03-12-2024	1	1	1	1	1	1	04-12-2024	1	1	1	1	1	1	05-12-2024	1	1	1	1	1	1	06-12-2024	1	1	1	1	1	1	07-12-2024	1	1	1	1	1	1																																																								
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13	Doctor Accept or Decline Appointment Requests	<div>Doctor Menu: 1. View Patient Medical Records 2. Update Patient Medical Records 3. View Personal Schedule 4. Set Availability for Appointments 5. Accept or Decline Appointment Request 6. View Upcoming Appointments 7. Record Appointment Outcome 8. Change Password 9. Logout Enter your choice: 5</div> <table><thead><tr><th>ApptID</th><th>DocID</th><th>PatID</th><th>Status</th><th>SlotNum</th><th>Date</th></tr></thead><tbody><tr><td>1</td><td>1001</td><td>1005</td><td>PENDING</td><td>1</td><td>01-12-2024</td></tr></tbody></table> <div>Enter appointment ID: 1 1. Accept 2. Decline Enter your choice: 1 Doctor of ID: 1001 removed from Slot 1 on 1/12/2024</div>	ApptID	DocID	PatID	Status	SlotNum	Date	1	1001	1005	PENDING	1	01-12-2024																																																																																																				
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		<pre> HMS LOGIN PAGE  Hospital ID: 1005 Password: password Login successful. Welcome Alice Brown  Patient Menu: 1. View Medical Record 2. Update Personal Information 3. View Available Appointment Slots 4. Schedule an Appointment 5. Reschedule an Appointment 6. Cancel an Appointment 7. View Schedule Appointment 8. View Past Appointment Outcome Records 9. Change Password 10. Logout Enter your choice: 7 ApptID DocID PatID Status SlotNum Date 1 1001 1005 ACCEPTED 1 01-12-2024 </pre>
14	Doctor View Upcoming Appointments	<pre> Doctor Menu: 1. View Patient Medical Records 2. Update Patient Medical Records 3. View Personal Schedule 4. Set Availability for Appointments 5. Accept or Decline Appointment Request 6. View Upcoming Appointments 7. Record Appointment Outcome 8. Change Password 9. Logout Enter your choice: 6 ApptID DocID PatID Status SlotNum Date 1 1001 1005 ACCEPTED 1 01-12-2024 </pre>
15	Doctor Record Appointment Outcome	<pre> Doctor Menu: 1. View Patient Medical Records 2. Update Patient Medical Records 3. View Personal Schedule 4. Set Availability for Appointments 5. Accept or Decline Appointment Request 6. View Upcoming Appointments 7. Record Appointment Outcome 8. Change Password 9. Logout Enter your choice: 7 ApptID DocID PatID Status SlotNum Date 1 1001 1005 ACCEPTED 1 01-12-2024 Enter Appointment ID: 1 Enter service provided: checkup Enter consultation notes: fever  Name Quantity LowStockQty LowStockAlert ----- Paracetamol 100 20 NO Ibuprofen 50 10 NO Amoxicillin 75 15 NO  Enter prescription: Paracetamol Enter prescription quantity: 5  Patient Menu: 1. View Medical Record 2. Update Personal Information 3. View Available Appointment Slots 4. Schedule an Appointment 5. Reschedule an Appointment 6. Cancel an Appointment 7. View Schedule Appointment 8. View Past Appointment Outcome Records 9. Change Password 10. Logout Enter your choice: 8 ApptID DocID PatID Status SlotNum Date ServiceProvided ConsultationNotes Prescription Qty Status 1 1001 1005 COMPLETED 1 01-12-2024 checkup fever Paracetamol 5 PENDING </pre>
16	Pharmacist View Appointment Outcome Record	<pre> Pharmacist Menu: 1. View Appointment Outcome 2. Update Prescription Status 3. View Inventory 4. Submit Replenishment Request 5. Update Password 6. Logout Enter your choice: 1 ApptID DocID PatID Status SlotNum Date ServiceProvided ConsultationNotes Prescription Qty Status 1 1001 1005 COMPLETED 1 01-12-2024 checkup fever Paracetamol 5 PENDING </pre>
17	Pharmacist Update Prescription Status	<pre> Enter your choice: 2 ApptID DocID PatID Status SlotNum Date 1 1001 1005 COMPLETED 1 01-12-2024 Enter appointment id: 1 Stock decrease  Pharmacist Menu: 1. View Appointment Outcome 2. Update Prescription Status 3. View Inventory 4. Submit Replenishment Request 5. Update Password 6. Logout Enter your choice: 1 ApptID DocID PatID Status SlotNum Date ServiceProvided ConsultationNotes Prescription Qty Status 1 1001 1005 COMPLETED 1 01-12-2024 checkup fever Paracetamol 5 ACCEPTED </pre>
18	Pharmacist View Medication Inventory	<pre> Main Menu 1. Login 2. Exit Enter choice:1 HMS LOGIN PAGE  Hospital ID: 1003 Password: password Login successful. Welcome Mark Lee  Pharmacist Menu: 1. View Appointment Outcome 2. Update Prescription Status 3. View Inventory 4. Submit Replenishment Request 5. Update Password 6. Logout Enter your choice: 3 Name Quantity LowStockQty LowStockAlert ----- Paracetamol 100 20 NO Ibuprofen 50 10 NO Amoxicillin 75 15 NO </pre>

19	Pharmacist Submit Replenishment Request	<pre> Pharmacist Menu: 1. View Appointment Outcome 2. Update Prescription Status 3. View Inventory 4. Submit Replenishment Request 5. Update Password 6. Logout  Enter your choice: 4 Name      Quantity  LowStockQty  LowStockAlert ----- Paracetamol    100      20          NO Ibuprofen      50       10          NO Amoxicillin    75       15          NO -----  Enter requested name of medicine: Paracetamol Enter requested quantity: 20 </pre>
20	Admin View and Manage Hospital Staff	<pre> Administrator Menu: 1. View Hospital Staff by filter 2. Manage Hospital Staff 3. View Appointment Details 4. View and Manage Medication Inventory 5. Approve Replenishment Request 6. Update password 7. Logout  Enter your choice: 1 Filter by 1. Hospital ID 2. User Type 3. Gender 4. Age 5. Salary  Enter your choice: 3 StaffID  Name      Role      Salary  Age  Gender  email      contactNum  Password ----- 1801    John Smith DOCTOR    \$5000   20   MALE   john@mail.com  12345678   password 1803    Mark Lee   PHARMACIST \$7000   30   MALE   mark@mail.com  43212345   password 1802    Emily Clarke DOCTOR    \$6000   25   FEMALE emily@mail.com  87654321   password 1804    Sarah Lee  ADMINISTRATOR \$8000   35   FEMALE sarah@mail.com  98765432   password </pre>
21	Admin View Appointments Details	<pre> Administrator Menu: 1. View Hospital Staff by filter 2. Manage Hospital Staff 3. View Appointment Details 4. View and Manage Medication Inventory 5. Approve Replenishment Request 6. Update password 7. Logout  Enter your choice: 3 ApptID  DocID  PatID  Status      SlotNum  Date ----- 2       1001   1005   ACCEPTED    4        06-12-2024 3       1001   1006   ACCEPTED    1        01-12-2024 </pre>
22	Admin View and Manage Medication Inventory	<pre> Administrator Menu: 1. View Hospital Staff by filter 2. Manage Hospital Staff 3. View Appointment Details 4. View and Manage Medication Inventory 5. Approve Replenishment Request 6. Update password 7. Logout  Enter your choice: 4 Name      Quantity  LowStockQty  LowStockAlert ----- Paracetamol    120      20          NO Ibuprofen      50       10          NO Amoxicillin    75       15          NO -----  1. Add new medicine 2. Remove medicine 3. Update medicine 4. Exit  Enter your choice: 1 Enter new medicine name: Test Enter current quantity: 35 Enter low stock quantity: 10 New medicine added successfully Name      Quantity  LowStockQty  LowStockAlert ----- Paracetamol    120      20          NO Ibuprofen      50       10          NO Amoxicillin    75       15          NO Test          35       10          NO -----  Administrator Menu: 1. View Hospital Staff by filter 2. Manage Hospital Staff 3. View Appointment Details 4. View and Manage Medication Inventory 5. Approve Replenishment Request 6. Update password 7. Logout  Enter your choice: 4 Name      Quantity  LowStockQty  LowStockAlert ----- Paracetamol    120      20          NO Ibuprofen      50       10          NO Amoxicillin    75       15          NO Test          35       10          NO -----  1. Add new medicine 2. Remove medicine 3. Update medicine 4. Exit  Enter your choice: 3 Enter medicine name: Ibuprofen 1. Increase stock 2. Decrease stock  Enter choice: 2 Enter quantity: 41 Stock decrease Name      Quantity  LowStockQty  LowStockAlert ----- Paracetamol    120      20          NO Ibuprofen      9        10          YES Amoxicillin    75       15          NO Test          35       10          NO ----- </pre>

23	Admin Approve Replenishment Requests	<pre> Pharmacist Menu: 1. View Appointment Outcome 2. Update Prescription Status 3. View Inventory 4. Submit Replenishment Request 5. Update Password 6. Logout  Enter your choice: 4 Name      Quantity  LowStockQty  LowStockAlert ----- Paracetamol 180      20          NO Ibuprofen   50       10          NO Amoxicillin 75       15          NO  Enter requested name of medicine: Paracetamol Enter requested quantity: 20  Administrator Menu: 1. View Hospital Staff by filter 2. Manage Hospital Staff 3. View Appointment Details 4. View and Manage Medication Inventory 5. Approve Replenishment Request 6. Update password 7. Logout  Enter your choice: 5 ID      MedicineName      Quantity ----- 1       Paracetamol         20 Enter replenishmentID to approve: 1 Stock increase approved  Administrator Menu: 1. View Hospital Staff by filter 2. Manage Hospital Staff 3. View Appointment Details 4. View and Manage Medication Inventory 5. Approve Replenishment Request 6. Update password 7. Logout  Enter your choice: 4 Name      Quantity  LowStockQty  LowStockAlert ----- Paracetamol 120      20          NO Ibuprofen   50       10          NO Amoxicillin 75       15          NO </pre>
24	Admin First-Time Login and Password Change	<pre> Initializing Hospital Management System... Welcome to HMS  Main Menu 1. Login 2. Exit  Enter choice:1 HMS LOGIN PAGE  Hospital ID: 1001 Password: password Login successful. Welcome John Smith  Doctor Menu: 1. View Patient Medical Records 2. Update Patient Medical Records 3. View Personal Schedule 4. Set Availability for Appointments 5. Accept or Decline Appointment Request 6. View Upcoming Appointments 7. Record Appointment Outcome 8. Change Password 9. Logout  Enter your choice: 8 Enter current password: password Enter new password: test Password updated  Doctor Menu: 1. View Patient Medical Records 2. Update Patient Medical Records 3. View Personal Schedule 4. Set Availability for Appointments 5. Accept or Decline Appointment Request 6. View Upcoming Appointments 7. Record Appointment Outcome 8. Change Password 9. Logout  Enter your choice: 9 Main Menu 1. Login 2. Exit  Enter choice:1 HMS LOGIN PAGE  Hospital ID: 1001 Password: test Login successful. Welcome John Smith </pre>
25	Admin Login with Incorrect Credentials	<pre> Initializing Hospital Management System... Welcome to HMS  Main Menu 1. Login 2. Exit  Enter choice:1 HMS LOGIN PAGE  Hospital ID: 1001 Password: test Login failed. Invalid Hospital ID or Password. Try again HMS LOGIN PAGE  Hospital ID: 1001 Password: password Login successful. Welcome John Smith </pre>