Computer Science Program
Sino-British Collaborative Education
CDUT

Software Engineering
Group Coursework
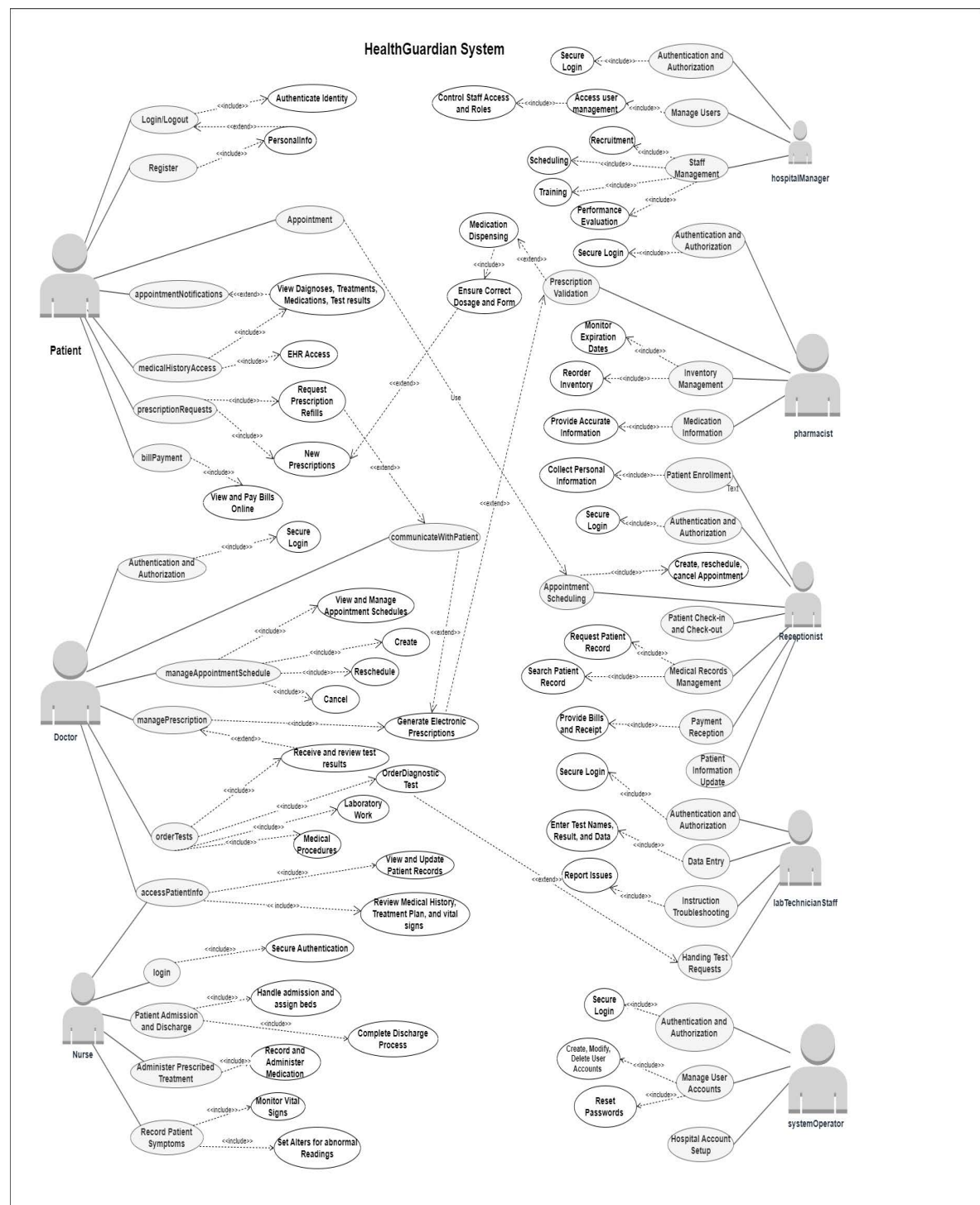

C6-4
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Contents

GitHub Link: https://github.com/FischerWu/CHC6001.git

Task 1

Use Case Model

Task 2

Overall architecture of the whole system

Specification of Component

Component	Pharmacist Interface
Description	Manages pharmacist interactions with the system for prescription processing and consultation.
Type	Microservice
Required Interfaces	Prescription Data Access, User Authentication Access, Drug Information Access
Provided Interfaces	Prescription Verification, Medication Dispensing, Consultation Services

Component	Medication Order Management
Description	Handles the ordering process of medications from suppliers to the pharmacy.
Type	Microservice
Required Interfaces	Supply Chain Access, Inventory Management Access
Provided Interfaces	Order Placement, Order Tracking, Supplier Communication

Component	Authentication
Description	Provides authentication services to verify the identity of users within the system.
Type	Microservice
Required Interfaces	User Credentials Access
Provided Interfaces	Login, Logout, Security Token Generation

Component	Inventory Management
Description	Manages the stock levels of medications and supplies in the pharmacy inventory.
Type	Microservice
Required Interfaces	Medication Information Access, Supply Chain Access
Provided Interfaces	Stock Level Monitoring, Inventory Update, Inventory Reporting

Component	Prescription Management
Description	Manages the lifecycle of prescriptions from creation to fulfillment.
Type	Microservice
Required Interfaces	Pharmacist Interface Access, Doctor's Orders Access
Provided Interfaces	Prescription Creation, Prescription Update, Prescription Cancellation

Component	Medication Information
Description	Provides detailed information about medications, including usage, side effects, and contraindications.
Type	Microservice
Required Interfaces	Medical Database Access
Provided Interfaces	Medication Lookup, Medication Advisory

Component	Reporting
Description	Generates reports based on data from various system components for analysis and decision-making.
Type	Microservice
Required Interfaces	System Data Access, Analytics Access
Provided Interfaces	Report Generation, Report Customization, Report Distribution

Component	Electronic Health Records (EHR) System
Description	Central repository for patient health records, accessible by authorized personnel.
Type	Microservice
Required Interfaces	Patient Data Access, User Authentication Access
Provided Interfaces	EHR Access, EHR Update, Health Data Analysis

Component	User Authentication and Authorization
Description	Manages user login credentials and permissions for system access.
Type	Microservice
Required Interfaces	Credential Verification, Security Policy Enforcement
Provided Interfaces	Login, Logout, User Session Management

Component	Medical Database
Description	Stores and retrieves all medical records and drug information.
Type	Microservice
Required Interfaces	Database Access, Data Security
Provided Interfaces	Medical Record Retrieval, Drug Information Lookup

Component	Supply Chain Management
Description	Oversees inventory, supplier interactions, and purchase orders.
Type	Microservice
Required Interfaces	Inventory Monitoring, Order Processing
Provided Interfaces	Supply Ordering, Inventory Updates, Supplier Management

Component	Reporting and Analytics
Description	Generates analytical reports and insights from system data.
Type	Microservice
Required Interfaces	Data Analysis, Report Generation
Provided Interfaces	Custom Reports, Analytics Dashboards

Component	Patient Data Management
Description	Handles storage, retrieval, and updates to patient data.
Type	Microservice
Required Interfaces	Data Storage, Patient Information Retrieval
Provided Interfaces	Patient Record Update, Data Synchronization

Component	Prescription Data Management
Description	Manages the processing and fulfillment of patient prescriptions.
Type	Microservice
Required Interfaces	Prescription Verification, Medication Inventory Access
Provided Interfaces	Prescription Processing, Prescription Status Update

Component	Doctor's Orders Management
Description	Processes and validates orders and prescriptions issued by doctors.
Type	Microservice
Required Interfaces	Order Validation, Clinical Data Access
Provided	Order Fulfillment, Treatment Plan Integration
Component	Patient User Accounts Manager
Description	This is a subsystem of the HealthGuardian Patient APP running on the cloud to manage and register patient user information.
Type	Health Guardian Patient APP
Required Interfaces:	Register/Update, Login/Logout
Provided Interfaces:	Patient data

Component	Patient Appointment Manager
Description	This is a subsystem of the Health Guardian Patient APP running on the cloud to manage patient and doctor appointment information.
Type	Health Guardian Patient APP
Required Interfaces:	Manager Appointment
Provided Interfaces:	Patient data

Component	Patient Medical Record Manager
Description	This is a subsystem of the Health Guardian Patient APP running on the cloud to manage information for patient medical records.
Type	Health Guardian Patient APP
Required Interfaces:	Manage Medical Record
Provided Interfaces:	Patient data

Component	Patient Bill Manager
Description	This is a subsystem of the Health Guardian Patient APP running on the cloud, which is used to manage patient billing information and provide billing processing services.
Type	Health Guardian Patient APP
Required Interfaces:	Manage Bill
Provided Interfaces:	Patient data

Component	Patient Prescription Manager
Description	This is a subsystem of the Health Guardian Patient APP that runs on the cloud and is used to manage patient prescription requests.
Type	Health Guardian Patient APP
Required Interfaces:	Manage Prescription Requirement
Provided Interfaces:	Patient data

Component	Notification System
Description	This is a subsystem of the Health Guardian Patient APP that runs on the cloud and is used for system notification of patient information.
Type	Microservice
Required Interfaces:	updateNotificationStatus, createNotification
Provided Interfaces:	sentNotification, getNotification

Component	Authority Verification
Description	This is a subsystem of the Health Guardian Patient APP running on the cloud for user authentication.
Type	Microservice
Required Interfaces:	Verify
Provided Interfaces:	Register/Update, Login/Logout

Component	Patient Data System
Description	This is a subsystem of the Health Guardian Patient APP that runs on the cloud and handles the transfer of different data.
Type	Microservice
Required Interfaces:	Manage Appointment, Manage Medical Record, Manage Prescription Requirement, Manage Bill, verify, ReciveAppointment, RecivePrescription, RecivePrecord, ReciveBill
Provided Interfaces:	SentAppointment, SentPrescription, SentRecord, SentBill, verify, updateNotification, createNotification, processAppointment, processPrescription, processRecord, processBill

Component	Appointment System
Description	This is a subsystem of the Health Guardian Patient APP running on the cloud to process information about appointments and resolve conflicts.
Type	Microservice
Required Interfaces:	processAppointment
Provided Interfaces:	Appointment relative data

Component	Prescription System
Description	This is a subsystem of the Health Guardian Patient APP running on the cloud that handles Prescription content.
Type	Microservice
Required Interfaces:	processPrescription
Provided Interfaces:	Prescription relative data, updatePrescription

Component	Record System
Description	This is a subsystem of the Health Guardian Patient APP running on the cloud that processes information for Records.
Type	Microservice
Required Interfaces:	processRecord, updatePrescription
Provided Interfaces:	Record relative data

Component	Bill System
Description	This is a subsystem of the Health Guardian Patient APP that runs on the cloud and is used to inform patients.
Type	Microservice
Required Interfaces:	processBill
Provided Interfaces:	Bill relative data

Component	DataBase
Description	This is a subsystem of the Health Guardian Patient APP that runs on the cloud and is used to store all data.
Type	Microservice
Required Interfaces:	SentData
Provided Interfaces:	ReceiveData

Specification of Connector (Interfaces)

Interface Name	Inventory
Provider	Inventory Management System
Operation	checkInventoryLevels
Request Parameters	itemID, quantityRequested
Response Parameters	quantityAvailable, errorMessage if Failure
Function	Checks current inventory levels for a specific item and quantity.

Interface Name	Prescription
Provider	Prescription Handling Service
Operation	validatePrescription
Request Parameters	prescriptionID, patientID
Response Parameters	isValid, errorMessage if Failure
Function	Validates the authenticity and accuracy of a patient's prescription.

Interface Name	Report
Provider	Reporting Service
Operation	generateFinancialReport
Request Parameters	timeFrame, departmentID
Response Parameters	reportFile, errorMessage if Failure
Function	Generates financial reports for a specified time frame and department.

Interface Name	Medication Information
Provider	Medication Database
Operation	retrieveMedicationInfo
Request Parameters	medicationID
Response Parameters	medicationDetails, errorMessage if Failure
Function	Provides detailed information about medications including dosages and side effects.

Interface Name	Authentication
Provider	Security Service
Operation	authenticateUser
Request Parameters	username, password
Response Parameters	authenticationToken, errorMessage if Failure
Function	Authenticates user credentials and issues a token for session management.

Interface Name	Inventory
Provider	Inventory Management Service
Operation	queryInventory
Request Parameters	itemID, requiredQuantity
Response Parameters	availableQuantity, confirmationCode if successful; errorMessage if failed

Function	Checks inventory levels and returns the available quantity for the requested item.

Interface Name	Prescription
Provider	Prescription Processing Service
Operation	processPrescription
Request Parameters	prescriptionDetails
Response Parameters	processingStatus, prescriptionID if successful; errorMessage if failed
Function	Processes prescription requests and returns a status along with a unique prescription ID.

Interface Name	Report
Provider	Reporting Service
Operation	generateReport
Request Parameters	reportCriteria
Response Parameters	reportContent, reportID if successful; errorMessage if failed
Function	Generates reports based on the specified criteria and returns the report content or an error message.

Interface Name	Medication Information
Provider	Medication Database Service
Operation	getMedicationDetails
Request Parameters	medicationID
Response Parameters	medicationData, validity if successful; errorMessage if failed
Function	Retrieves detailed information about a medication from the database.

Interface Name	Authentication
Provider	Security Service
Operation	authenticate
Request Parameters	username, password, twoFactorCode
Response Parameters	authenticationToken, sessionID if successful; errorMessage if failed
Function	Authenticates the user and provides a token for session management.

Component	Medical & Record Manager
Description	Manages patient medical records, including patient history, diagnosis, treatment, and other related information.
Type	Service
Required Interfaces:	Patient Record, Prescription
Provided Interfaces:	Medical Record

Component	Patient Info Manager
Description	Manages patient information, such as name, address, insurance information, and other contact details.
Type	Service
Required Interfaces:	Patient
Provided Interfaces:	Patient Info

Component	Account Manager
Description	Manages account information, such as username, password, and other security information.
Type	Service
Required Interfaces:	Account
Provided Interfaces:	Account Info

Component	Appointment
Description	Represents a scheduled appointment between a patient and a doctor.
Type	Instance
Required Interfaces:	-
Provided Interfaces:	Appointment

Component	Prescription Manager
Description	Manages prescriptions, including medication, dosage, and other instructions.
Type	Service
Required Interfaces:	Prescription
Provided Interfaces:	Prescription

Component	Schedule Manager
Description	Manages schedules for patients and doctors.
Type	Service
Required Interfaces:	Appointment
Provided Interfaces:	Schedule

Component	Test Manager
Description	Manages tests, such as blood tests, imaging tests, and other diagnostic tests.
Type	Service
Required Interfaces:	Test
Provided Interfaces:	Test Result

Component	Lab App
Description	Provides a web-based interface for doctors to view test results.
Type	Deployment
Required Interfaces:	-
Provided Interfaces:	Test Report

Component	Doctor Account Manager
Description	Manages doctor accounts, such as name, license number, and other professional information.
Type	Service
Required Interfaces:	Account
Provided Interfaces:	Doctor Account

Interface Name	Medicine Orders
Provider	Medicine Order Management System
Operation	createOrder
Request Parameters	medicineList, quantities, patientID
Response Parameters	orderConfirmation, estimatedDelivery if successful; errorMessage if failure
Function	Processes new orders for medicines, associating them with patient records, and provides confirmation and estimated delivery times.

Interface Name	UserAuth
Provider	User Authentication Service
Operation	validateCredentials
Request Parameters	username, password, sessionID
Response Parameters	validationStatus, userRole if successful; errorMessage if failure
Function	Validates user login credentials and retrieves the role for access control within the system.

Interface Name	DatabaseAccess
Provider	Central Database Service
Operation	queryDatabase
Request Parameters	query, parameters
Response Parameters	queryResults, executionTime if successful; errorMessage if failure
Function	Provides a generic interface for querying the central database with custom parameters and returns results.

Interface Name	CloudStorageService
Provider	Cloud Data Management System
Operation	storeData
Request Parameters	data, metadata, userID
Response Parameters	storageConfirmation, dataID if successful; errorMessage if failure
Function	Stores data securely in the cloud, returning a confirmation and a unique identifier for the data.

Interface Name	SupplyChainOperations
Provider	Supply Chain Coordination Service
Operation	trackShipment
Request Parameters	shipmentID, destination, expectedArrival
Response Parameters	shipmentStatus, currentLocation if successful; errorMessage if failure
Function	Tracks the progress of shipments within the supply chain, providing current status and location.

Interface Name	PatientDataAccess

Provider	Patient Information System
Operation	retrievePatientData
Request Parameters	patientID, dataFields, accessLevel
Response Parameters	patientData, accessLogs if successful; errorMessage if failure
Function	Retrieves patient data based on the specified fields and access level, ensuring compliance with privacy regulations.

Interface Name	Register/Update
Provider	Health Guardian Saas
	Operation: register
	Request Parameters: String userName, String phoneNumber, String password, String photo, String email, String address, DateTime dateOfBirth, Boolean gender. Response parameters: user information, successful; error message, if Failure Function: Add new user information to verify the validity of user information. If there is no conflict with the database information, add new user information. If there is a conflict, an error message is returned.
	Operation: updateProfile
	Request Parameters: String userName, String phoneNumber, String password, String photo, String email, String address, DateTime dateOfBirth, Boolean gender. Response parameters: User informationif, successful; error message, if Failure. Function: The user enters new data, updates the user's information, and checks the data in the database. If there are no conflicts, update the data. If there is a conflict, an error message is returned.

Interface Name	Login/Logout
Provider	Health Guardian Saas
	Operation: login
	Request Parameters: String name, String password. Response parameters: accessCode, if Successful; errorMessage, if Failure. Function: The user enters the user name and password and matches the data in the database. If the match is successful, the login is successful. If no matching data is found, an error message is returned.
	Operation: logout
	Request Parameters: void Response parameters: cancel accessCode. Function: This command can be executed only after the user logs in. After the command is executed, the login status will be cancelled.

Interface Name	Manage Appointment
Provider	Health Guardian Saas
	Operation: createAppointment
	Request Parameters: int patientId, int doctorId, DateTime appointmentDate. Response parameters: paramenter form, create successful; error message, if Failuse. Function: The user requests a new appointment, fills in the information, and sends it. Conflict detection occurs when someone makes an appointment at the same time. If there is no conflict, the form information is entered successfully. If there is a time conflict, an error message is returned.
	Operation: updateAppointment
	Request Parameters: int patientId, int doctorID, DateTime appointmentDate. Response parameters: paramenter form, update successful; error message, if Failuse. Function: The user updates the appointment information, fills in the information and sends it. If the time does not change and a conflict occurs, an error message is returned. If correct, the information is submitted successfully.
	Operation: deleteAppointment
	Request Parameters: void Response parameters: cancel code Function: Users can delete appointment information after selecting the appointment information.
	Operation: getPatientAppointment
	Request Parameters: int patientId Response parameters: list of patient information. Function: The user obtains information about appointment.

Interface Name	Manage Medical Record
Provider	Health Guardian Saas
	Operation: createMedicalRecord
	Request Parameters: int patientId, int prescriptionId Response parameters: create successful; error message, if Failuse. Function: The user creates a new blank health card. If patient ids conflict, an error message is returned.
	Operation: getMedicalRecord
	Request Parameters: int recordId Response parameters: Get medical record information. Function: The user obtains the information of the corresponding medical record, if the record is selected successfully. If the obtaining fails, an error message is displayed.
	Operation: deleteMedicalRecord
	Request Parameters: int recordId Response parameters: cancel code Function: Users can delete health cards and medical records.
	Operation: updateMedicalRecord
	Request Parameters: int patientId, int prescriptionId Response parameters: new form, update successful; error message, if Failuse. Function: Users can refresh their medical records.

Interface Name	Manage Prescription Requirement
Provider	Health Guardian Saas
	Operation: createPrescription
	Request Parameters: int patientId, int doctorId, String medicationName, String dosage, String notes, String status Response parameters: prescription form Function: Users can create prescriptions for doctors to check.
	Operation: updatePrescription
	Request Parameters: int patientId, int doctorId, String medicationName, String dosage, String notes Response parameters: prescription form Function: Users can update their prescription for a doctor to check.
	Operation: deletePrescription
	Request Parameters: int prescriptionId Response parameters: cancel code Function: Users can delete the prescription for the doctor to pass, and the doctor can delete the prescription directly.
	Operation: getPrescription
	Request Parameters: int prescriptionId Response parameters: prescription information Function: If a prescription is successfully selected, the user gets information about the corresponding prescription. If the command fails to be obtained, an error message is displayed.

Interface Name	Manage Bill
Provider	Health Guardian Saas
	Operation: createBill
	Request Parameters: int patientId, String billStatement, double amountDun Response parameters: Bill form, if create successful; error message, if make mistake. Function: It's used to create new bills for users, to make transactions
	Operation: updatePayment
	Request Parameters:int billID, String paymentStatus Response parameters: new bill form, if update successful; error message, if make mistake. Function: Users can update the billing information only by operating on an existing bill, otherwise sending an error message.
	Operation: getBill
	Request Parameters: int patientID Response parameters: bill information Function: Users can get information about the bill.
	Operation: processPayment
	Request Parameters: int billingID, double amount Response parameters: payment code Function: Used to verify whether the user has successfully paid, the payment code is returned if the payment is successful, and the error message is returned if the payment fails.

Interface Name	Sent Notification
Provider	Health Guardian Saas
	Operation: getNotification
	Request Parameters: int notificationId Response parameters: notification information Function: Users can obtain notification information
	Operation: sentNotification
	Request Parameters: int notificationId Response parameters: notification code Function: Can verify that the message was successfully sent

Login Interface

Operation	Request Parameters	Response Parameters	Function Description
login	userName: string, password: string	void	Checks the user's credentials and logs them into the system.
logout	None	void	Logs the user out of the system.

Patient Record Interface

Operation	Request Parameters	Response Parameters	Function Description
viewPatientRecord	PatientId: int	PatientRecord object or error message	Retrieves the patient's medical record using their ID.
updatePatientRecord	PatientId: int, record: PatientRecord	bool: true if successful, false or error message if failed	Updates the patient's medical record with new information.

Prescription Interface

Operation	Request Parameters	Response Parameters	Function Description
managePrescription	prescription: Prescription	bool: true if successful, false or error message if failed	Manages prescription details.

Appointment Interface

Operation	Request Parameters	Response Parameters	Function Description
viewAppointment	appointId: int	Appointment object or error message	Retrieves appointment details using the appointment ID.
createAppointment	appointment: Appointment	bool: true if successful, false or error message if failed	Schedules a new appointment.
cancelAppointment	appointId: int	bool: true if successful, false or error message if failed	Cancels an existing appointment.
manageAppointment	appointment: Appointment	bool: true if successful, false or error message if failed	Manages appointment details.

Test Interface

Operation	Request	Response Parameters	Function Description

	Parameters		
orderTest	newTest: MedicalTest	bool: true if successful, false or error message if failed	Orders a new medical test.
viewTestResult	testId: int	TestResult object or error message	Retrieves the result of a medical test using the test ID.

Communicate Interface

Operation	Request Parameters	Response Parameters	Function Description
sendMessage	None	void	Sends a message.
receiveMessage	None	String: message content or error message	Receives a message.

Specification of Component (Database)

Database Name:	Pharmacy Inventory
Description	A repository of all patients' medical records and treatment histories.
Type	Relational Database
Design	Tables: HealthRecords, Prescriptions
Table: HealthRecords	Fields: RecordID, PatientID, VisitDate, Symptoms, Diagnosis, Treatment, FollowUp
Table: Prescriptions	Fields: PrescriptionID, RecordID, Medication, Dosage, AdministrationRoute, StartDate, EndDate

Database Name:	Appointment Scheduling
Description	Manages scheduling and tracking of all patient appointments.
Type	Relational Database
Design	Tables: Appointments
Table: Appointments	Fields: AppointmentID, PatientID, DoctorID, Date, Time, Duration, Status, Notes

Database Name:	Employee Data
Description	Contains information about hospital staff including doctors, nurses, and administrative personnel.
Type	Relational Database
Design	Tables: StaffDetails, Credentials
Table: StaffDetails	Fields: EmployeeID, Name, Position, Department, ContactInfo, Salary, HireDate
Table: Credentials	Fields: EmployeeID, Username, Password, Role, LastLogin

Database Name:	Patient Data
Description	Stores all patient-related information including personal details, medical history, and treatment records.
Type	Relational Database
Design	Tables: PatientInfo, MedicalHistory, Appointments
Table: PatientInfo	Fields: PatientID, FullName, DateOfBirth, Address, ContactNumber, EmergencyContact, InsuranceDetails
Table: MedicalHistory	Fields: PatientID, ConditionID, DiagnosisDate, ConditionStatus, TreatmentHistory
Table: Appointments	Fields: AppointmentID, PatientID, DoctorID, AppointmentDate, AppointmentTime, Purpose

Database Name:	Patient Billing
Description	Manages all financial transactions, billing records, and insurance claims for services rendered.
Type	Relational Database
Design	Tables: Invoices, InsuranceClaims, Payments
Table: Invoices	Fields: InvoiceID, PatientID, DateIssued, DueDate, TotalAmount, Status
Table: InsuranceClaims	Fields: ClaimID, PatientID, InsuranceCompanyID, ClaimAmount, DateFiled, Status
Table: Payments	Fields: PaymentID, InvoiceID, AmountPaid, PaymentDate, PaymentMethod

Database Name:	**Supply Chain Inventory**
Description	Manages inventory for medical supplies, purchase orders, and vendor information.
Type	Relational Database
Design	Tables: Supplies, Vendors
Table: Supplies	Fields: SupplyID, Name, Description, InStock, ReorderLevel
Table: Vendors	Fields: VendorID, Name, ContactInfo, ReliabilityRating