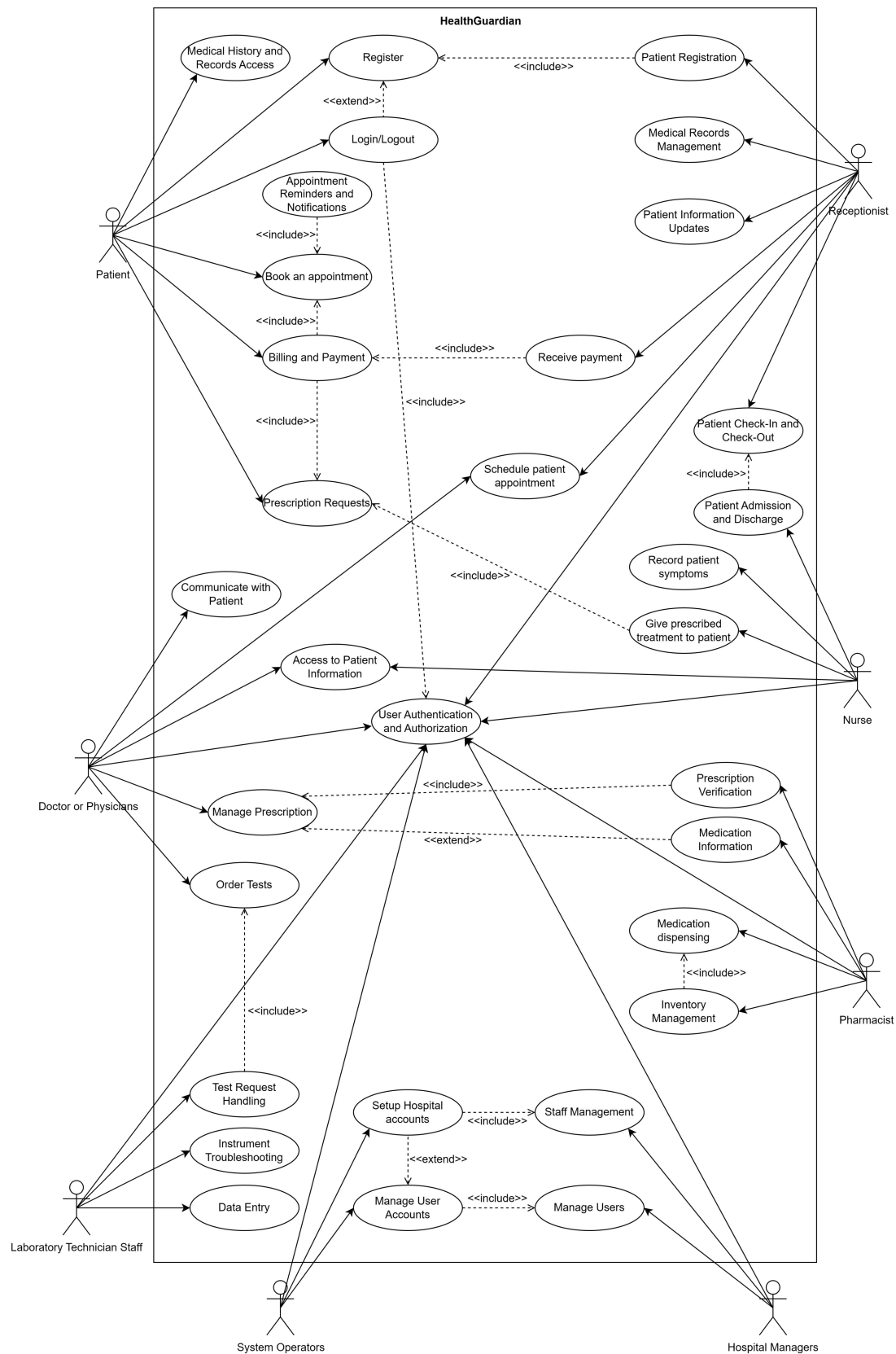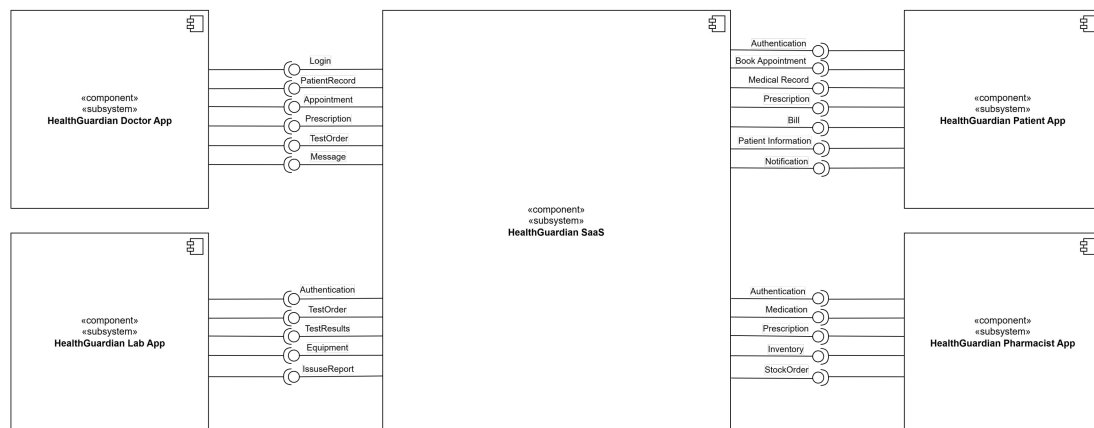# Task 1: Software Modelling and Specification

a) Use Case Model

Task 2: Software Architectural Design

a) Overall architecture of the whole system

Component Tables

Component	HealthGuardian Patient App
Description	This is a microservice running on the Cloud to process function provided to patients.
Type	Microservice
Required Interfaces	Authentication, Book Appointment, Medical Record, Prescription, Bill, Patient Information, Notification
Provided Interfaces	None

Component	HealthGuardian Doctor App
Description	This is a microservice running on the Cloud to process function provided to doctors.
Type	Microservice
Required Interfaces	Login, PatientRecord, Appointment, Prescription, TestOrder, Message
Provided Interfaces	None

Component	HealthGuardian Lab App

Description	This is a microservice running on the Cloud to process function provided to lab technician staffs.
Type	Microservice
Required Interfaces	Authentication, TestOrder, TestResults, Equipment, IssuseReport
Provided Interfaces	None

Component	HealthGuardian Pharmacist App
Description	This is a microservice running on the Cloud to process function provided to pharmacists.
Type	Microservice
Required Interfaces	Authentication, Medication, Prescription, Inventory, StockOrder
Provided Interfaces	None

Component	HealthGuardian SaaS
Description	This is a microservice running on the Cloud to process function provided to every subsystem.
Type	Microservice
Required Interfaces	None
Provided Interfaces	Authentication, Book Appointment, Medical Record, Prescription, Bill, Patient Information, Notification, PatientRecord, Message, TestOrder, TestResults, Equipment, IssuseReport, Medication, Inventory, StockOrder

HealthGuardian Patient Interface Tables

Interface Name	Authentication
Provider	Health Guardian SaaS

	Operation: login
	Request Parameters: String username String password
	Response parameters: Boolean (return true if login is successful, return false if failure)
	Function: This operation checks if the provided username and password match the credentials stored in the system. If they match, the operation returns true, indicating a successful login. If they do not match, it returns false.
	Operation: logout
	Request Parameters: None
	Response parameters: void (no direct response, but the system will log out the user)
	Function: This operation logs out the user from the system, terminating any active session.
	Operation: register
	Request Parameters: String name ,String phoneNumber, String photo, String email,Date dateOfBirth, String address, String gender
	Response parameters: Boolean (ture if the patient register successfully, if the patient register failure because the name have been used or other some errors, return flase)
	Function: This operation registers a new user with the provided information after checking if the username (which could be assumed to be part of the email or a separate field) is already in use. If the username is available, the user's information is stored in the system

Interface Name	Book Appointment
Provider	Health Guardian Saas
	Operation: bookAppointment
	Request Parameters: int patientID, int doctorID , DateTime scheduledDate, String appointmentType ,String reasonForVisit,
	Response parameters: Boolean (true if the appointment is successfully booked, false and return to appoint another time or doctor)
	Function: his operation schedules a new appointment for a patient with a specific doctor on a specified date, appointment type, and reason for the visit. It returns true if the booking is successful.
	Operation: cancelAppointment
	Request Parameters: int appointmentID
	Response parameters: Boolean (true if the appointment is successfully canceled, false return to)
	Function: This operation cancels an existing appointment. It returns true if the cancellation is successful.

	Operation: rescheduleAppointment
	Request Parameters: int appointmentID, DateTime newDate Response parameters: Boolean (true if the appointment is successfully reschedule, false and return to appoint another time or doctor) Function: This operation reschedules exsited appointment for a patient on a specified date, It returns true if the booking is successful.
	Operation: requestAppointment
	Request Parameters: int patientID Response parameters: Boolean (true if the appointment request is successfully registered, false jump to error message) Function: Allows a patient to request an appointment without specifying a date. The system will acknowledge the request. Returns true if the request is processed successfully.

Interface Name	Medical Record
Provider	Health Guardian Saas
	Operation: checkRecordHistory
	Request Parameters: int patientID Response parameters: List<Medical Record>A list of medical records noted before in a patient record. Function: Retrieves the entire history of medical records for a patient.
	Operation: getEHRs
	Request Parameters: int patientID Response parameters: The electronic healthy PatientRecor. Function: Fetches a specific Electronic Health PatientRecords (EHRs) based on the provided patientRecordID.

Interface Name	Prescription
Provider	Health Guardian Saas
	Operation: NewPrescription
	Request Parameters: int doctorID int patientID ,String medication,int quantit,String frequency DateTime startDate,DateTime endDate,String notes Response parameters: Boolean (true if the prescription is successfully created, false otherwise) Function: Creates a new prescription with the specified details. Returns true if the prescription is successfully added to the system.
	Operation: askForRefill
	Request Parameters: int patientID Response parameters:void Function: Fetches a specific Electronic Health PatientRecords

	(EHRs) based on the provided patientRecordID.

Interface Name	Bill
Provider	Health Guardian Saas
	Operation: makePayment
	Request Parameters: int billID int patientID ,String medication,int quantit,String frequency DateTime startDate,DateTime endDate,String notes Response parameters: Boolean: Returns true if the payment is successfully processed and the bill status is updated to "paid" or "settled". Returns false if the payment fails due to reasons such as invalid bill ID, insufficient funds, incorrect billing details, expired credit card, network issues, or payment gateway errors. Function: carries out a bill payment transaction using the billID. The system will process the payment, carry out validations, and provide the outcome of the operation.
	Operation: viewBillsDetails
	Request Parameters: int billID Response parameters: Billing includes: amount, medicationName, issueDate, status, paymentMethod String notes: Any additional notes or comments related to the bill, such as payment plan arrangements or discounts applied. Function: Uses the supplied billingID to obtain the full billing details for a specific bill. Bill data are displayed to patients or administrative personnel via this process.

Interface Name	Patient information
Provider	Health Guardian Saas
	Operation: veiwAppointment
	Request Parameters: int patientID Response parameters: List<Appointment>: A list of Appointment objects containing details of all appointments associated with the patientID. Function: Obtains a patient's complete appointment schedule. The list of Appointment objects contains information about the doctor, purpose, date, and time of each appointment.
	Operation: viewPatientInfo
	Request Parameters: int patientID Response parameters: List<appointment>: A list of appointment objects containing detailed personal and medical information for the patient Function: Retrieves detailed personal and medical information for a specific patient. This could include demographics, contact information, medical history, allergies, and current medications.

Interface Name	Notification
Provider	Health Guardian Saas
	Operation: sendReminder
	Request Parameters: int billID String patientID ,String appointmentID, String message Response parameters: void Function: Notifies the patient via email that they have an appointment coming up. The message contains information about the appointment, including the date, time, and any prep guidelines.
	Operation: sendBillNotification
	Request Parameters: int billID Response parameters: void String notes: Notifies the patient or the person in charge of any new or unpaid bills. Details like the bill amount, the due date, and payment instructions are included in the message.

HealthGuardian Doctor Interface Tables

Interface Name	login
Provider	Health Guardian Saas
	Operation: login
	Request Parameters: String username, String password. Response parameters: void Function: Check if the doctor's password matches the stored password, and if so, return accessCode; Otherwise, an error message will be displayed
	Operation: logout
	Request Parameters: none Response parameters: void Function: After the doctor clicks on exit, execute exit

Interface Name	PatientRecord
Provider	Health Guardian Saas
	Operation: viewRecordDetail
	Request Parameters: int recordId Response parameters: void Function: By calling this method, doctors can obtain specific records and information about patients in order to better understand their medical history, condition, and treatment plan
	Operation: docUpdateRrecords

	Request Parameters: recordId: int, patientId: int, medications: List<String>, testResults: List<String>, treatments: List<String> Response parameters: void Function: Through this method, doctors can update data, including treatment courses, test results, etc., based on the selected patients and their corresponding patient records.

Interface Name	Appointment
Provider	Health Guardian Saas
	Operation: viewAppointmentDetails
	Request Parameters: none Response parameters: void Function: This method is mainly used by doctors when viewing appointments, and the system calls the data to display the appointment information of the doctor.
	Operation: createAppointment
	Request Parameters: patientID, doctorID, scheduledDate, appointmentType, reasonForVisit. Response parameters: Boolean Function: This method is mainly used by doctors when creating appointments, and doctors need to input corresponding information to create appointments.
	Operation: rescheduleAppointment
	Request Parameters: appointmentID, newDate Response parameters: Boolean Function: This method is mainly used by doctors when modifying appointments. Doctors modify appointment data by entering corresponding information.
	Operation: cancelAppointment
	Request Parameters: appointmentId Response parameters: Boolean Function: This method is mainly used when doctors cancel appointments. Doctors cancel appointments by entering their appointment ID, and then the database will delete appointment.

Interface Name	Prescription
Provider	Health Guardian Saas
	Operation: generatePrescription
	Request Parameters: doctorID: int, patientID: int, medicationID: int, quantity: int. Response parameters: void

	Function: This method is mainly used by doctors when generating prescriptions. Doctors create electronic prescriptions by inputting patient, drug, and other information.

Interface Name	TestOrder
Provider	Health Guardian Saas
	Operation: setOrder
	Request Parameters: doctorID: int, patientID: int, staffID: int, testName: String, description: String. Response parameters: void Function: This method is mainly used when doctors request testing, where doctors create a test by entering corresponding information.
	Operation: reviewTestResults
	Request Parameters: testID: int Response parameters: void Function: This method is mainly used by doctors to view test results, where they enter TestID to view the test results.

Interface Name	Message
Provider	Health Guardian Saas
	Operation: GetMessage
	Request Parameters: none Response parameters: String Function: This method is mainly used by doctors to communicate with patients and obtain information transmitted by users through this method.
	Operation: SendMessage
	Request Parameters: Receiver ID, content Response parameters: void Function: This method is mainly used for doctors to communicate with patients, and to send user transmitted information through this method.

HealthGuardian Lab Interface Tables

Interface Name	Authentication
Provider	HealthGuardian SaaS
	Operation: login;

	Request Parameters: username, password *Response Parameters*: None *Function*: Check the inputed username and password, if the lab staff username exists and the password is correct, authorize the staff access to the HealthGuardian Lab App.
	Operation: logout;
	Request Parameters: None *Response Parameters*: None *Function*: Delete the session of the staff, disable the function of the HealthGuardian Lab App.

Interface Name	TestOrder
Provider	HealthGuardian SaaS
	Operation: showIncompleteTests;
	Request Parameters: None *Response Parameters*: incompleteTestList *Function*: Show a list of all incomplete test orders.
	Operation: receiveTest;
	Request Parameters: staffID *Response Parameters*: None *Function*: Receive the test order from the doctor, set the staffID attribute of the test order instance to the id of the received staff.
	Operation: tested;
	Request Parameters: None *Response Parameters*: None *Function*: Set the tested Boolean attribute of the test order

	instance from false to true.

Interface Name	TestResults
Provider	HealthGuardian SaaS
	Operation: toEnterResults;
	Request Parameters: testID *Response Parameters*: None *Function*: To show the result input form page and store the testID into the system.
	Operation: enterResults;
	Request Parameters: testName, results, data *Response Parameters*: testResults *Function*: To submit the form with testName, results, and data, then create the test results instance.

Interface Name	Equipment
Provider	HealthGuardian SaaS
	Operation: showEquipmentList;
	Request Parameters: None *Response Parameters*: equipmentList *Function*: Show a list of all equipments.
	Operation: viewEquipment;
	Request Parameters: None *Response Parameters*: None *Function*: Display the name, model, and brand of the

	equipment.

Interface Name	IssueReport
Provider	HealthGuardian SaaS
	Operation: createReport;
	Request Parameters: equipmentID, description *Response Parameters*: issueReport *Function*: Enter the equipmentID and description of the broken equipment and create the issue report instance.
	Operation: showUntreatedReports;
	Request Parameters: None *Response Parameters*: untreatedReportsList *Function*: Show a list of all untreated issue reports.
	Operation: fixed;
	Request Parameters: None *Response Parameters*: None *Function*: Set the fixed Boolean attribute of the issue report instance from false to true.

HealthGuardian Parmacist Interface Tables

Interface Name	Authentication
Provider	HealthGuardian SaaS
	Operation: login;
	Request Parameters: username, password *Response Parameters*: None *Function*: Authentication the username and password then

	login the HealthGuardian Pharmacist.

Interface Name	Medication
Provider	HealthGuardian SaaS
	Operation: getMedicationList;
	Request Parameters: None *Response Parameters*: medicationList *Function*: Display all the medications.
	Operation: sendToDoctor;
	Request Parameters: None *Response Parameters*: None *Function*: Send medication information to the doctor.

Interface Name	Prescription
Provider	HealthGuardian SaaS
	Operation: getPrescriptionList;
	Request Parameters: None *Response Parameters*: prescriptionList *Function*: Display all the prescriptions.
	Operation: verify;
	Request Parameters: None *Response Parameters*: None *Function*: Verify the prescription send from doctor and set the status to true.
	Operation: dispense;

	Request Parameters: None Response Parameters: None Function: Dispense the prescription and set the status to false.

Interface Name	Inventory
Provider	HealthGuardian SaaS
	Operation: getInventoryList;
	Request Parameters: None Response Parameters: inventoryList Function: Display all the inventories.
	Operation: checkExpired;
	Request Parameters: None Response Parameters: expiry Function: Check the inventory is expired or not.
	Operation: setQuantity;
	Request Parameters: quantity Response Parameters: None Function: Set the quantity of the inventory.

Interface Name	StockOrder
Provider	HealthGuardian SaaS
	Operation: setStockOrder;
	Request Parameters: medicationID, quantity Response Parameters: None

	Function: Set the medicationID and quantity of the stock order.
	Operation: reorderStock;
	Request Parameters: None *Response Parameters*: None *Function*: Reorder the stock by set the status from false to true.