

## Software Engineering Coursework Report

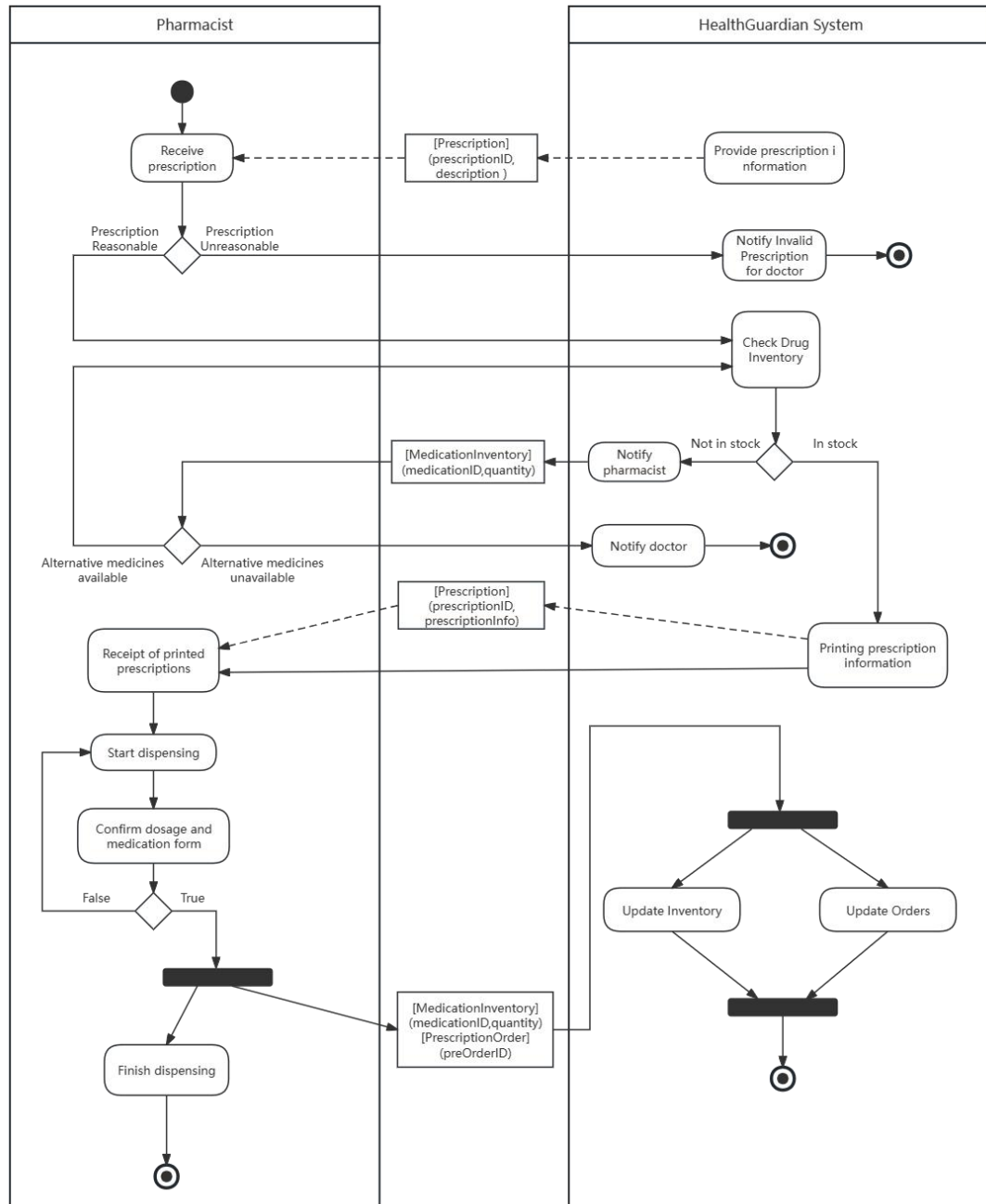
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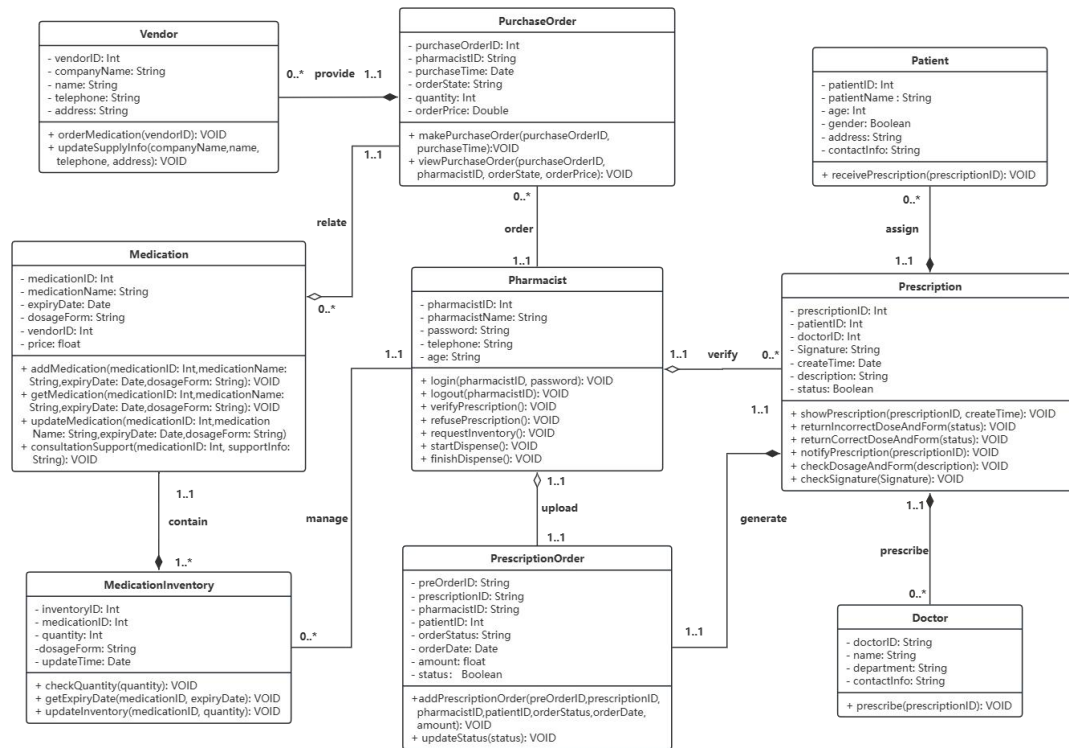
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# Task 1: Software Modelling and Specification

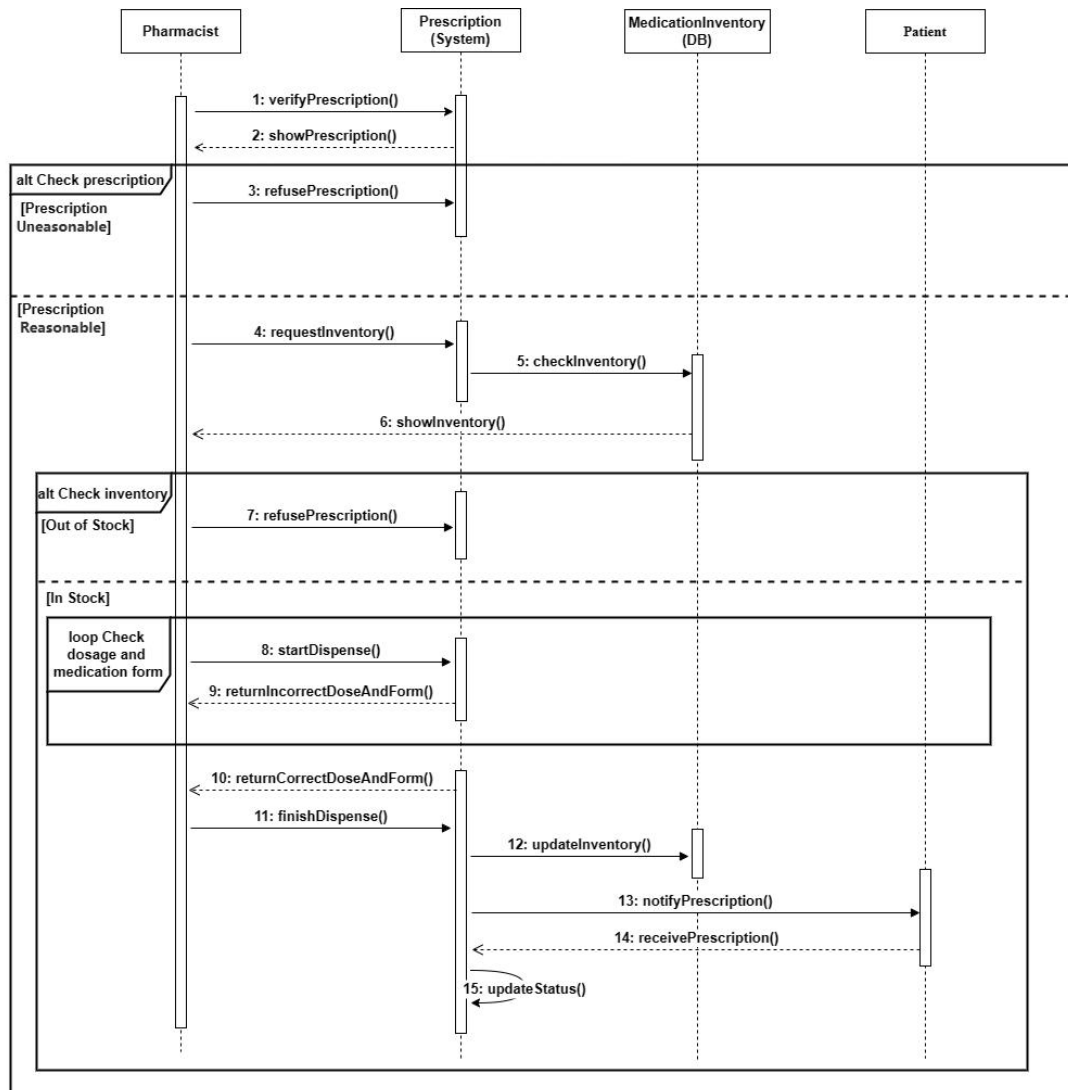
## Activity Model



# Structural Model

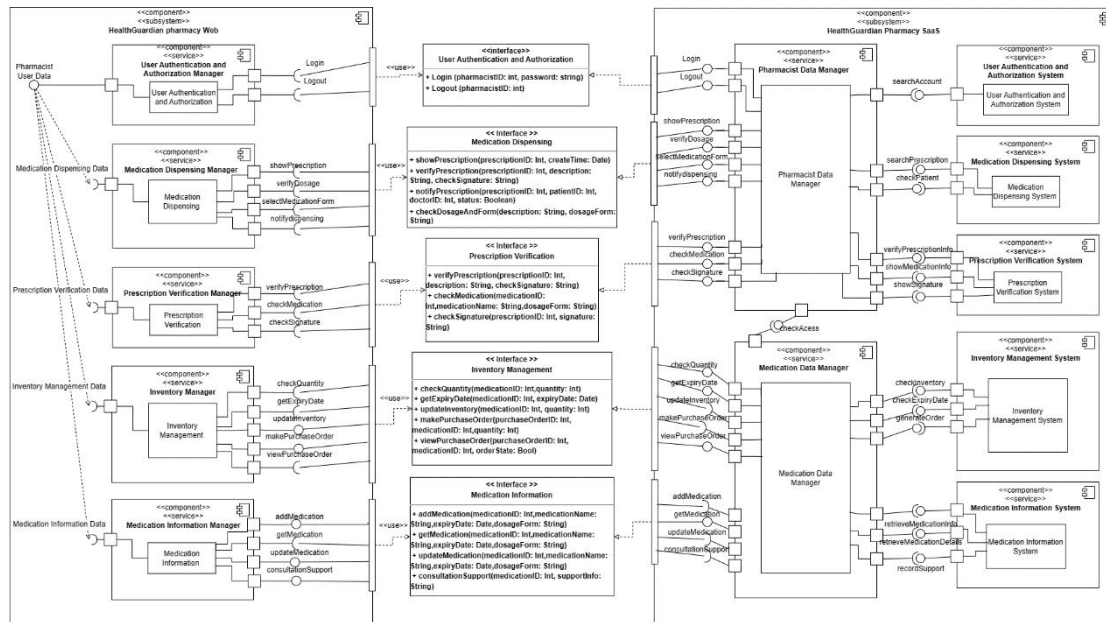


## Behaviour Model



# Task 2: Software Architectural Design

## Architecture of the subsystem



## Component Tables

<b>Component</b>	User Authentication and Authorization Manager
<b>Description</b>	Manages user login sessions and permissions for accessing different components of the system.
<b>Type</b>	HealthGuardian Pharmacy Web
<b>Required Interfaces:</b>	Login Logout
<b>Provided Interfaces:</b>	Pharmacist User Data(dataAccess)

<b>Component</b>	Medication Dispensing Manager
<b>Description</b>	Handles the dispensing of medication, including verification, selection, and notification processes.
<b>Type</b>	HealthGuardian Pharmacy Web
<b>Required Interfaces:</b>	showPrescription verifyDosage selectMedicationForm notifyDispensing

	Medication Dispensing Data (dataAccess)
<b>Provided Interfaces:</b>	None

<b>Component</b>	Prescription Verification Manager
<b>Description</b>	Verifies the validity of prescriptions by checking medication details and signatures.
<b>Type</b>	HealthGuardian Pharmacy Web
<b>Required Interfaces:</b>	verifyPrescription checkMedication checkSignature Prescription Verification Data (dataAccess)
<b>Provided Interfaces:</b>	None

<b>Component</b>	Inventory Manager
<b>Description</b>	Manages stock levels, checks for expired items, and processes purchase orders.
<b>Type</b>	HealthGuardian Pharmacy Web
<b>Required Interfaces:</b>	checkQuantity getExpiryDate viewPurchaseOrder Inventory Management Data (dataAccess)
<b>Provided Interfaces:</b>	updateInventory makePurchaseOrder

<b>Component</b>	Medication Information Manager
<b>Description</b>	Maintains and updates medication information and provides consultation support.
<b>Type</b>	HealthGuardian Pharmacy Web
<b>Required Interfaces:</b>	getMedication Medication Information Data (dataAccess)
<b>Provided Interfaces:</b>	addMedication updateMedication consultationSupport

<b>Component</b>	Pharmacist Data Manager
<b>Description</b>	Manages pharmacist user data for the system, including account creation and search.
<b>Type</b>	HealthGuardian Pharmacy SaaS
<b>Required</b>	Login

<b>Interfaces:</b>	Logout showPrescription verifyDosage selectMedicationForm notifydispensing verifyPrescription checkMedication checkSignature searchAccount searchprescription showMedicationInfo showSignature
<b>Provided Interfaces:</b>	checkAccess checkPatient verifyPrescriptionInfo

<b>Component</b>	User Authentication and Authorization System
<b>Description</b>	A system for managing user credentials and granting authorization to various services.
<b>Type</b>	HealthGuardian Pharmacy SaaS
<b>Required Interfaces:</b>	None
<b>Provided Interfaces:</b>	searchAccount

<b>Component</b>	Medication Dispensing System
<b>Description</b>	System dedicated to the process of dispensing medication, ensuring correct dosages and forms are provided.
<b>Type</b>	HealthGuardian Pharmacy SaaS
<b>Required Interfaces:</b>	searchPrescription
<b>Provided Interfaces:</b>	checkPatient

<b>Component</b>	Prescription Verification System
<b>Description</b>	System responsible for the verification of prescription details and authenticity.
<b>Type</b>	HealthGuardian Pharmacy SaaS
<b>Required Interfaces:</b>	verifyPrescriptionInfo
<b>Provided Interfaces:</b>	showMedicationInfo showSignature



<b>Component</b>	Medication Data Manager
<b>Description</b>	Manages the medication data including maintaining records, updating details, and facilitating the retrieval of medication information.
<b>Type</b>	HealthGuardian Pharmacy SaaS
<b>Required Interfaces:</b>	updateInventory makePurchaseOrder viewPurchaseOrder addMedication updateMedication consultationSupport
<b>Provided Interfaces:</b>	checkQuantity getExpiryDate viewPurchaseOrder getMedication

<b>Component</b>	Inventory Management System
<b>Description</b>	A system that manages inventory, including checking levels, expiry dates, and managing orders.
<b>Type</b>	HealthGuardian Pharmacy SaaS
<b>Required Interfaces:</b>	generateOrder
<b>Provided Interfaces:</b>	checkInventory checkExpiryDate

<b>Component</b>	Medication Information System
<b>Description</b>	Provides comprehensive information about medications and supports consultation services.
<b>Type</b>	HealthGuardian Pharmacy SaaS
<b>Required Interfaces:</b>	None
<b>Provided Interfaces:</b>	retrieveMedicationInfo retrieveMedicationDetails recordSupport

## Interface Tables

<b>Interface Name</b>	User Authentication and Authorization
<b>Provider</b>	HealthGuardian Pharmacy SaaS

	<b>Operation:</b>	Login
	<b>Request Parameters:</b> pharmacistID, password <b>Response Parameters:</b> accessCode (if successful); errorMessage (if failure) <b>Function:</b> Validates pharmacist's credentials. Returns an access code upon successful login, or an error message if credentials are invalid.	
	<b>Operation:</b>	Logout
	<b>Request Parameters:</b> pharmacistID <b>Response Parameters:</b> confirmationMessage <b>Function:</b> Logs out the pharmacist from the system and invalidates the current session.	

<b>Interface Name</b>	Medication Dispensing	
<b>Provider</b>	HealthGuardian Pharmacy SaaS	
	<b>Operation:</b>	showPrescription
	<b>Request Parameters:</b> prescriptionID, createTime <b>Response Parameters:</b> prescriptionDetails <b>Function:</b> Retrieves and displays comprehensive details of a specific prescription, including patient information, prescribed medication, dosages, and instructions, based on its ID and timestamp.	
	<b>Operation:</b>	verifyPrescription
	<b>Request Parameters:</b> prescriptionID, description, checkSignature <b>Response Parameters:</b> verificationStatus <b>Function:</b> Conducts a thorough verification of a prescription's authenticity by checking the prescription ID, detailed description, and doctor's signature against hospital records.	
	<b>Operation:</b>	notifyPrescription
	<b>Request Parameters:</b> prescriptionID, patientID, doctorID, status <b>Response Parameters:</b> notificationStatus <b>Function:</b> Notifies relevant parties (patients, doctors, etc.) about the status of a prescription, including approvals, rejections, or need for further information.	
	<b>Operation:</b>	checkDosageAndForm

	<b>Request Parameters:</b> description, dosageForm <b>Response Parameters:</b> dosageConfirmation <b>Function:</b> Examines the prescribed medication's dosage and form (e.g., tablet, liquid) to ensure it aligns with standard medical guidelines and is appropriate for the patient's condition.
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<b>Interface Name</b>	Prescription Verification	
<b>Provider</b>	HealthGuardian Pharmacy SaaS	
	<b>Operation:</b>	verifyPrescription
	<b>Request Parameters:</b> prescriptionID, description, checkSignature <b>Response Parameters:</b> verificationStatus <b>Function:</b> Performs a detailed validation of the prescription by cross-referencing it with medical records, ensuring the medication, dosage, and prescribing doctor's signature are accurate and legitimate.	
	<b>Operation:</b>	checkMedication
	<b>Request Parameters:</b> medicationID, medicationName, dosageForm <b>Response Parameters:</b> medicationStatus <b>Function:</b> Validates medication details against the hospital's pharmaceutical database, confirming the correct medication is being dispensed according to the prescription.	
	<b>Operation:</b>	checkSignature
	<b>Request Parameters:</b> prescriptionID, signature <b>Response Parameters:</b> signatureValidity <b>Function:</b> Authenticates the doctor's signature on the prescription, cross-checking it with a database of registered medical professionals to prevent fraudulent prescriptions.	

<b>Interface Name</b>	Inventory Management	
<b>Provider</b>	HealthGuardian Pharmacy SaaS	
	<b>Operation:</b>	checkQuantity
	<b>Request Parameters:</b> medicationID, quantity <b>Response Parameters:</b> quantityStatus <b>Function:</b> Monitors and reports the current stock levels of medications in the pharmacy, ensuring adequate supply and flagging items for reorder as needed.	
	<b>Operation:</b>	getExpiryDate

	<b>Request Parameters:</b> medicationID, expiryDate <b>Response Parameters:</b> expiryInformation <b>Function:</b> Retrieves and displays the expiry dates of medications, crucial for maintaining the safety and effectiveness of the pharmaceutical inventory.	
	<b>Operation:</b>	updateInventory
	<b>Request Parameters:</b> medicationID, quantity <b>Response Parameters:</b> updateStatus <b>Function:</b> Adjusts inventory records, either adding or subtracting stock as medications are received or dispensed, ensuring accurate and up-to-date inventory tracking.	
	<b>Operation:</b>	makePurchaseOrder
	<b>Request Parameters:</b> purchaseOrderID, medicationID, quantity <b>Response Parameters:</b> orderStatus <b>Function:</b> Facilitates the creation of purchase orders for medications, specifying quantities and details, to maintain adequate stock levels.	
	<b>Operation:</b>	viewPurchaseOrder
	<b>Request Parameters:</b> purchaseOrderID, medicationID, orderState <b>Response Parameters:</b> orderDetails <b>Function:</b> Provides detailed views of purchase orders, including medication details, quantities, and current processing status, aiding in inventory management.	

<b>Interface Name</b>	Medication Information	
<b>Provider</b>	HealthGuardian Pharmacy SaaS	
	<b>Operation:</b>	addMedication
	<b>Request Parameters:</b> medicationID, medicationName, expiryDate, dosageForm <b>Response Parameters:</b> additionStatus <b>Function:</b> Introduces new medications into the system, recording essential details like ID, name, expiry date, and dosage form for future reference and dispensing.	
	<b>Operation:</b>	getMedication

	<p><b>Request Parameters:</b> medicationID, medicationName, expiryDate, dosageForm</p> <p><b>Response Parameters:</b> medicationDetails</p> <p><b>Function:</b> Retrieves detailed information on specific medications, including their name, expiry date, and form, aiding pharmacists in dispensing and consultation.</p>	
	<p><b>Operation:</b></p>	<p>updateMedication</p>
	<p><b>Request Parameters:</b> medicationID, medicationName, expiryDate, dosageForm</p> <p><b>Response Parameters:</b> updateStatus</p> <p><b>Function:</b> Updates existing medication records in the system, ensuring that all information remains current and accurate for safe dispensing practices.</p>	
	<p><b>Operation:</b></p>	<p>consultationSupport</p>
	<p><b>Request Parameters:</b> medicationID, supportInfo</p> <p><b>Response Parameters:</b> consultationDetails</p> <p><b>Function:</b> Provides pharmacists with additional support and information regarding medications, aiding in patient consultations and ensuring effective medication management.</p>	

## Task 3: Software Testing

### Unit Test Plan for Medication Dispensing Interface

Based on the interface details for Medication Dispensing, here is the Unit Test Plan and System Test Plan for the use case of Medication Dispensing.

Test case interface:

<< Interface >> Medication Dispensing	
<b>+ showPrescription(prescriptionID: Int, createTime: Date)</b> <b>+ verifyPrescription(prescriptionID: Int, description: String, checkSignature: String)</b> <b>+ checkDosageAndForm(description: String, dosageForm: String)</b> <b>+ notifyPrescription(prescriptionID: Int, patientID: Int, doctorID: Int, status: Boolean)</b>	

Test Cases for **showPrescription** Method

Test Case	Method and Parameters	Expected Output
View Existing Prescription	showPrescription(101, "2023-09-01")	Display prescription details
View Non-Existent Prescription	showPrescription(999, "2023-09-01")	Error message

Test Cases for **verifyPrescription** Method

Test Case	Method and Parameters	Expected Output
Verify Valid Prescription	verifyPrescription(101, "Antibiotic", "Dr. Smith")	true
Verify Invalid Prescription	verifyPrescription(101, "Antibiotic", "Imposter")	false

Test Cases for **checkDosageAndForm** Method

Test Case	Method and Parameters	Expected Output
Correct Dosage and Form	checkDosageAndForm("Antibiotic", "Tablets")	true
Incorrect Dosage and Form	checkDosageAndForm("Antibiotic", "Liquid")	false

Test Cases for **notifyPrescription** Method

Test Case	Method and Parameters	Expected Output
Successful Prescription Notification	notifyPrescription(101, 201, 301, true)	true
Failed Prescription Notification	notifyPrescription(101, 201, 301, false)	false

## System Test Plan for Use Case: Medication Dispensing

**Use case:** Dispensing Medication

**Scenario:** Dispensing Medication successfully

**Test Progress for Dispensing Medication:**

Actor (Pharmacist)	System (Pharmacy Management Software)
1.Receives a prescription and enters the prescription ID and creation time.	2.Retrieves and displays the prescription details.
3.Verifies the prescription with the doctor's signature and prescription description.	4.Validates the signature and confirms prescription authenticity.
5.Checks the dosage and form of the prescribed medication.	6.Confirms the correct dosage and medication form.

7. Dispenses the medication and notifies the system of the dispensing status.	8. Records the dispensing event and updates the prescription status.
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Actor (Pharmacist)	System (Pharmacy Management Software)
1. Request the data of medication dispensing information about prescription ID: 101, creation time: "2023-09-01".	2. Find the data of medication dispensing information about prescription ID: 101, creation time: "2023-09-01".
3. Get the data of medication dispensing information about prescription ID: 101, creation time: "2023-09-01".	4. Return the data of medication dispensing information about prescription ID: 101, creation time: "2023-09-01".
5. View the data of medication dispensing information about prescription ID: 101, creation time: "2023-09-01".	6. Confirm the data viewed is correct and the medication prescribed is available.
7. Remove the medication from inventory for dispensing about prescription ID: 101, creation time: "2023-09-01".	8. Manage the inventory data and update the quantity of medication about prescription ID: 101.
9. Update the prescription status to "dispensed" for prescription ID: 101, creation time: "2023-09-01".	9. Update the prescription status to "dispensed" for prescription ID: 101, creation time: "2023-09-01".

#### Test Data:

- Input:
  - prescriptionID = 101
  - createTime = "2023-09-01"
  - description = "Antibiotic"
  - checkSignature = "Dr. Smith"



- dosageForm = "Tablets"
- patientID = 201
- doctorID = 301
- status = true
- Expected Output: Confirmation of medication dispensing

These test plans are designed to ensure that the system supports the high-priority use case of accurate medication dispensing by pharmacists. The unit tests validate the functionality of each method in the Medication Dispensing interface, ensuring that each step in the dispensing process is performed correctly. The system tests simulate the real-world workflow of dispensing medication, confirming that pharmacists can rely on the software to support their critical role in patient care.