**Domain 6: Healthcare Management System – Domain Description & Initial Modeling**

**1. Domain Description**

The Healthcare Management System serves medical facilities through its functionality which includes patient record management together with appointment planning and therapy monitoring along with billing features. Through the healthcare management system patients find the ability to schedule appointments and access information about their medical history as well as receive services from multiple providers. The platform permits healthcare providers to maintain records along with medication prescription and diagnostic review tasks. Patient information remains secure by this system and it enables data exchange with laboratory services and insurance platforms and matches healthcare standards at HIPAA and other regulations.

Features:

* Patient registration and health records
* Appointment scheduling and treatment tracking
* Healthcare provider management
* Secure medical billing and payment processing
* Integration with labs, prescriptions, insurance
* Real-time notifications and reminders
* Role-based access (patients, doctors, admins)
* Data security and privacy enforcement

**2. Initial Object Identification Table**

| Object Name | Description |
| --- | --- |
| Patient | Represents individuals receiving care |
| HealthcareProvider | Doctors, nurses, specialists involved in patient care |
| Appointment | Scheduled visits for patients with providers |
| MedicalRecord | Historical and current medical data |
| Treatment | Specific treatment plans or procedures |
| Diagnosis | Identified health conditions |
| Prescription | Medication prescribed to patients |
| Billing | Tracks charges for services rendered |
| Payment | Payment transactions made by or on behalf of patients |
| InsuranceClaim | Insurance submissions and processing |
| Notification | Appointment or treatment alerts |
| ExternalLabResult | Lab data from integrated systems |
| AdminUser | System administrator for management and security |

**3. Initial Attribute and Method Tables**

* **Patient**

***Attributes:***

| Attribute |  | Type | Visibility | Rationale |
| --- | --- | --- | --- | --- |
| patientID |  | int | private | Unique patient identifier |
| name |  | String | private | Full name |
| dateOfBirth |  | Date | private | Used for age calculation |
| gender |  | String | private | Biological data |
| contactInfo |  | String | private | Email or phone |
| address |  | String | private | For correspondence and verification |
| allergies |  | String[] | private | Important for medical safety |

***Methods:***

| Method | Return Type | Visibility | Rationale |
| --- | --- | --- | --- |
| viewMedicalHistory() | MedicalRecord[] | public | Allows patients to review history |
| scheduleAppointment() | Appointment | public | Book a new appointment |

* **HealthcareProvider**

***Attributes***:

| Attribute | Type | Visibility | Rationale |
| --- | --- | --- | --- |
| providerID | int | private | Unique staff ID |
| name | String | private | Name of provider |
| specialization | String | private | Area of expertise |
| contactInfo | String | private | Work contact details |

***Methods:***

| Method | Return Type | Visibility | Rationale |
| --- | --- | --- | --- |
| updateMedicalRecord() | void | public | Add or edit patient data |
| prescribeMedication() | Prescription | public | Create new prescriptions |

* **Appointment**

***Attributes:***

| Attribute | Type | Visibility | Rationale |
| --- | --- | --- | --- |
| appointmentID | int | private | Unique ID |
| patient | Patient | private | Associated patient |
| provider | HealthcareProvider | private | Doctor assigned |
| dateTime | DateTime | private | Scheduled time |
| reason | String | private | Purpose of visit |
| status | String | private | Scheduled, Cancelled, Completed |

***Methods:***

| Method | Return Type | Visibility | Rationale |
| --- | --- | --- | --- |
| reschedule() | void | public | Change appointment time |
| cancel() | void | public | Cancel the appointment |

* **MedicalRecord**

***Attributes:***

| Attribute | Type | Visibility | Rationale |
| --- | --- | --- | --- |
| recordID | int | private | Unique ID |
| patient | Patient | private | Owner of the record |
| entries | String[] | private | Summary notes, history |
| lastUpdated | DateTime | private | For tracking updates |

* **Billing**

***Attributes:***

| Attribute | Type | Visibility | Rationale |
| --- | --- | --- | --- |
| billingID | int | private | Unique ID |
| appointment | Appointment | private | Billing linked to visit |
| amount | double | private | Cost of service |
| status | String | private | Paid, Pending, Refunded |

***Methods:***

| Method | Return Type | Visibility | Rationale |
| --- | --- | --- | --- |
| generateInvoice() | String | public | Create bill summary |
| processPayment() | Payment | public | Log new payment |

* **Prescription**

***Attributes:***

| Attribute | Type | Visibility | Rationale |
| --- | --- | --- | --- |
| prescriptionID | int | private | Unique ID |
| patient | Patient | private | Recipient |
| provider | HealthcareProvider | private | Who prescribed it |
| medication | String | private | Drug name |
| dosage | String | private | How much to take |
| duration | int | private | Days to take |

4. Initial UML Class Diagram

