Capstone Project 3 — Patient Health Records & Analytics System

MODULE-WISE BREAKDOWN

1. CRUD + Database Module — Patient & Doctor Management

`patients.csv`

```
PatientID,Name,Age,Gender,Condition
P001,Neha,32,Fever
P002,Arjun,45,Diabetes
P003,Sophia,28,Hypertension
P004,Ravi,52,Asthma
P005,Meena,38,Arthritis
```

`doctors.csv`

```
DoctorID,Name,Specialization
D101,Dr. Patel,General Physician
D102,Dr. Khan,Endocrinologist
D103,Dr. Verma,Cardiologist
D104,Dr. Rao,Pulmonologist
```

Exercise:

- Create tables: `patients` and `doctors`.
- Perform basic CRUD:
    - Add a new patient record
    - Update a doctor's specialization
    - Delete a patient
    - Fetch all patients above age 40

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2. REST API Module — Expose CRUD Operations

Exercise:

- Create endpoints:
    - `GET /patients` – fetch all patients
    - `POST /patients` – add a new patient
    - `PUT /patients/{id}` – update patient info
    - `DELETE /patients/{id}` – remove patient
- Do the same for doctors.

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3. ETL Module — Patient Visit Analytics

📄 `visits.csv`

```
VisitID,PatientID,DoctorID,Date,Cost
V001,P001,D101,2025-10-01,800
V002,P002,D102,2025-10-02,1200
V003,P003,D103,2025-10-03,1500
V004,P001,D101,2025-10-05,600
V005,P004,D104,2025-10-06,1100
V006,P005,D103,2025-10-07,1300
```

📝 **Exercise:**

- Join `patients`, `doctors`, and `visits`
- Add calculated columns:

    - `Month` (from Date)
    - `FollowUpRequired` (if patient visited more than once)

- Save `processed_visits.csv`

🔹 **4. Queue Module — Async Processing for Visit Records**

📝 **Exercise:**

- Producer: Push visit data into a queue as JSON.
- Consumer: Listen to queue, run ETL, save report.
- Log processing time and success/failure.

🔹 **5. Logging & Error Handling Module**

📝 **Exercise:**

- Log all API calls
- Log errors during CSV processing (e.g., missing DoctorID)
- Log when follow-up patients are identified

🔹 **6. Analytics Module — Healthcare KPIs**

📝 **Exercise:**

- Using Pandas:

    - Average cost per visit
    - Most visited doctor
    - Number of visits per patient
    - Monthly revenue

- Save `kpi_report.csv`

🔹 **7. Scheduling Module — Daily Reporting**

📝 **Exercise:**

- Schedule ETL script to run daily at 9 AM

- Generate `daily_visits_report_YYYYMMDD.csv`