Part 1: SGD Selection and Problem Definition.

SGD 3: Good Health and Well-being (my SGD of choice)

- The problem I will be solving is: (**Improving Access to Healthcare in Rural Areas)**
  - This will help identify underserved populations and connect them to available healthcare services using data driven insights, I will also develop an app that will help the patients connect with their doctors easily.

1. Defining the Problem.

Objective: Improve healthcare access in rural areas by identifying gaps and creating solutions to connect underserved populations with healthcare services.

Challenges:

- Limited number of healthcare facilities and providers in rural areas.
- Geographic isolation and long travel times.
- Lack of real-time data on healthcare needs and resource distribution.

2. Data Collection

A. Gathering Data:

1. **Healthcare Facilities:** Collect information on the location, type, capacity, and services provided by healthcare facilities in rural areas.
2. **Patient Demographics:** Obtain data on the population, including age, health conditions, and geographic locations.
3. **Doctor Availability:** Compile data on doctor specialties, availability, and locations.
4. **Appointment Records:** Collect historical appointment data to understand healthcare utilization patterns.

B. Sources:

- **Government Health Departments:** Obtain data on healthcare infrastructure and demographics.
- **Healthcare Providers:** Request data from local clinics and hospitals.
- **Surveys and Field Reports:** Conduct surveys to gather on-the-ground insights.

3. Data Analysis

A. Geographic and Facility Analysis:

5. **Map Distribution:** Create maps showing the locations of healthcare facilities and the population distribution in rural areas.
6. **Identify Gaps:** Analyze areas with low healthcare facility density compared to population size. Identify regions that are underserved or lack essential services.

B. Access and Utilization Analysis:

7. **Travel Time Calculation:** Estimate average travel times from rural communities to healthcare facilities. Identify areas where travel times exceed acceptable limits.
8. **Service Availability:** Determine if certain services (e.g., emergency care, specialized treatments) are lacking in specific regions.

C. Provider Analysis:

9. **Doctor-to-Patient Ratio:** Calculate the ratio of doctors to patients in each region. Identify regions with a shortage of healthcare providers.
10. **Specialty Distribution:** Assess the distribution of different specialties across regions to ensure diverse healthcare services are available.

4. Developing Solutions

A. Facility Expansion:

11. **New Facilities:** Propose establishing new healthcare facilities or mobile clinics in underserved regions based on the gap analysis.
12. **Optimize Existing Facilities:** Recommend reallocating resources and improving service delivery at existing facilities.

B. Improve Access:

13. **Telemedicine:** Implement telemedicine services to offer remote consultations and follow-ups. This can reduce the need for travel.
14. **Transportation Services:** Partner with local transportation providers to offer patient transport services to healthcare facilities.

C. Enhance Provider Availability:

15. **Incentives for Providers:** Develop incentive programs to attract and retain healthcare providers in rural areas, such as financial incentives, housing allowances, and professional development opportunities.
16. **Training Programs:** Train local healthcare workers to expand their skills and improve service delivery in rural communities.

5. Data Visualization and Dashboard

A. Visualization Tools:

17. **Heat Maps:** Create heat maps to visualize healthcare facility locations and patient density. Highlight underserved areas.
18. **Bar and Pie Charts:** Display the number of facilities, doctors, and patients by region. Show the distribution of healthcare services.

B. Interactive Dashboard:

19. **Filters:** Include interactive filters to view data by region, facility type, and service availability.

20. **Real-Time Updates:** Ensure the dashboard reflects up-to-date information on healthcare access and resource availability.
21. **Key Metrics:** Feature metrics such as average travel time, patient-to-doctor ratios, and facility coverage.

6. Implementation and Monitoring

A. Pilot Programs:

22. **Launch Pilot Initiatives:** Implement pilot programs in selected rural areas to test new facilities, telemedicine, and transportation solutions.
23. **Evaluate Effectiveness:** Assess the impact of pilot programs on healthcare access and patient outcomes.

B. Ongoing Monitoring:

24. **Track Performance:** Continuously monitor key performance indicators (KPIs) to measure the success of implemented solutions.
25. **Collect Feedback:** Gather feedback from patients and healthcare providers to identify areas for improvement.

7. Reporting and Communication

A. Prepare Reports:

26. **Detailed Analysis:** Provide in-depth reports on data findings, proposed solutions, and implementation results.
27. **Executive Summary:** Summarize key insights and recommendations for stakeholders.

B. Presentation:

28. **Stakeholder Meetings:** Present findings and recommendations to stakeholders, including healthcare providers, policymakers, and community leaders.
29. **Public Awareness:** Share insights with the public to raise awareness and support for improving healthcare access in rural areas.

SQL SCRIPTS.

Part 2: Database Design.

- The ERD diagram is in the repo.
- Here are the SQL statements to populate the tables according to my ERD diagram.
  - Starts from creation of the database.
  - And also the sample data.

```
CREATE DATABASE MediLink;

USE medilink

Regions Table

CREATE TABLE Regions (
   RegionID INT AUTO_INCREMENT PRIMARY KEY,
   RegionName VARCHAR(100) NOT NULL
);


Healthcare Facilities Table

CREATE TABLE HealthcareFacilities (
   FacilityID INT AUTO_INCREMENT PRIMARY KEY,
   FacilityName VARCHAR(100) NOT NULL,
   RegionID INT,
   Address VARCHAR(255),
   FOREIGN KEY (RegionID) REFERENCES Regions(RegionID)
);


Doctors Table

CREATE TABLE Doctors (
   DoctorID INT AUTO_INCREMENT PRIMARY KEY,
```

```
    FirstName VARCHAR(50) NOT NULL,
    LastName VARCHAR(50) NOT NULL,
    Specialty VARCHAR(100),
    FacilityID INT,
    FOREIGN KEY (FacilityID) REFERENCES HealthcareFacilities(FacilityID)
);

Patients Table
CREATE TABLE Patients (
    PatientID INT AUTO_INCREMENT PRIMARY KEY,
    FirstName VARCHAR(50) NOT NULL,
    LastName VARCHAR(50) NOT NULL,
    DateOfBirth DATE,
    Gender ENUM('Male', 'Female', 'Other'),
    Address VARCHAR(255)
);

Appointments Table
CREATE TABLE Appointments (
    AppointmentID INT AUTO_INCREMENT PRIMARY KEY,
    PatientID INT,
    DoctorID INT,
    FacilityID INT,
    AppointmentDate DATETIME,
    Notes TEXT,
    FOREIGN KEY (PatientID) REFERENCES Patients(PatientID),
```

```
    FOREIGN KEY (DoctorID) REFERENCES Doctors(DoctorID),
    FOREIGN KEY (FacilityID) REFERENCES HealthcareFacilities(FacilityID)
);
Insert Data into Regions
INSERT INTO Regions (RegionName) VALUES
('Central Highlands'),
('Coastal Plains'),
('Mountain Valley'),
('Desert Oasis');

-- Insert Data into HealthcareFacilities
INSERT INTO HealthcareFacilities (FacilityName, RegionID, Address) VALUES
('Highlands Community Hospital', 1, '12 Summit Way'),
('Coastal Care Clinic', 2, '58 Seaside Blvd.'),
('Valley Health Center', 3, '23 Canyon Rd.'),
('Oasis Medical Pavilion', 4, '90 Desert Dr.');

-- Insert Data into Doctors
INSERT INTO Doctors (FirstName, LastName, Specialty, FacilityID) VALUES
('Rhea', 'Bennett', 'Cardiologist', 1),
('Orson', 'Harper', 'Pediatrician', 2),
('Selena', 'Vega', 'Dermatologist', 3),
('Damian', 'Nash', 'General Practitioner', 4);

-- Insert Data into Patients
```

INSERT INTO Patients (FirstName, LastName, DateOfBirth, Gender, Address) VALUES

('Elara', 'Trevino', '1990-04-25', 'Female', '35 Birch Grove'),

('Jaxon', 'Larsen', '1987-07-13', 'Male', '47 Aspen Court'),

('Mira', 'Hawke', '2002-02-19', 'Female', '89 Redwood Circle'),

('Kai', 'Roscoe', '1975-09-07', 'Male', '11 Cedar Ridge');

-- Insert Data into Appointments

INSERT INTO Appointments (PatientID, DoctorID, FacilityID, AppointmentDate, Notes) VALUES

(1, 1, 1, '2024-08-10 10:00:00', 'Annual heart check-up'),

(2, 2, 2, '2024-08-11 14:00:00', 'Child wellness visit'),

(3, 3, 3, '2024-08-12 09:30:00', 'Consultation for eczema'),

(4, 4, 4, '2024-08-13 16:00:00', 'Routine physical examination');

Part 3: SQL Programming.

- Data retrieval – SQL queries to retrieve data.
  - Getting all healthcare facilities in a specific region.

```
2  SELECT
3      r.RegionName,
4      h.FacilityName,
5      h.Address
6  FROM
7      Regions r
8  JOIN
9      HealthcareFacilities h ON r.RegionID = h.RegionID
10 WHERE
11     r.RegionName = 'Central Highlands';
12
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

RegionName	FacilityName	Address
Central Highlands	Highlands Community Hospital	12 Summit Way

- Getting doctors working in a specific region

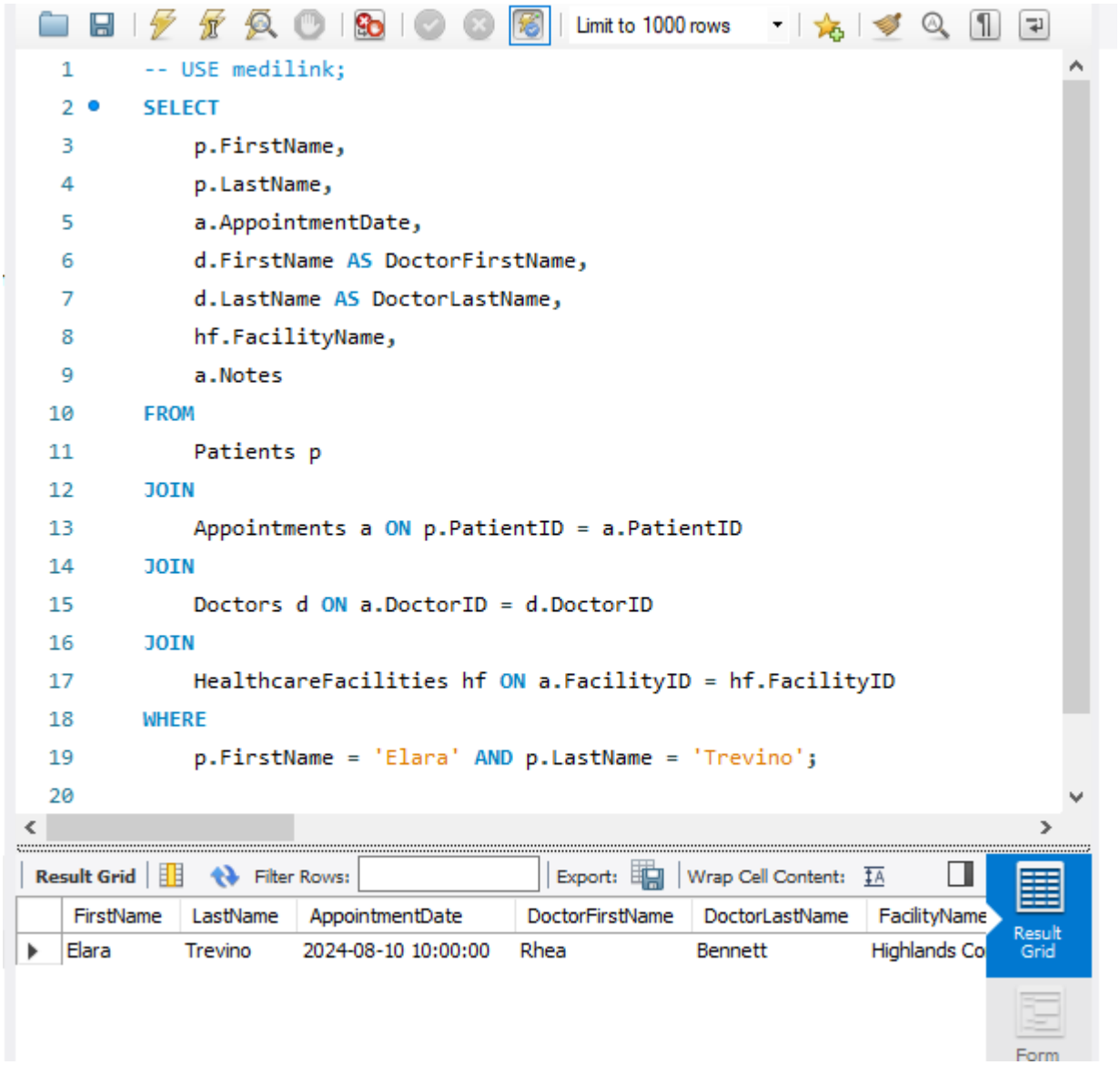
```
2  •  SELECT
3         hf.FacilityName,
4         d.FirstName,
5         d.LastName,
6         d.Specialty
7     FROM
8         HealthcareFacilities hf
9     JOIN
10        Doctors d ON hf.FacilityID = d.FacilityID
11    WHERE
12        hf.FacilityName = 'Highlands Community Hospital';
13
14
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

FacilityName	FirstName	LastName	Specialty
Highlands Community Hospital	Rhea	Bennett	Cardiologist

J

- Getting all appointments for a specific patient.

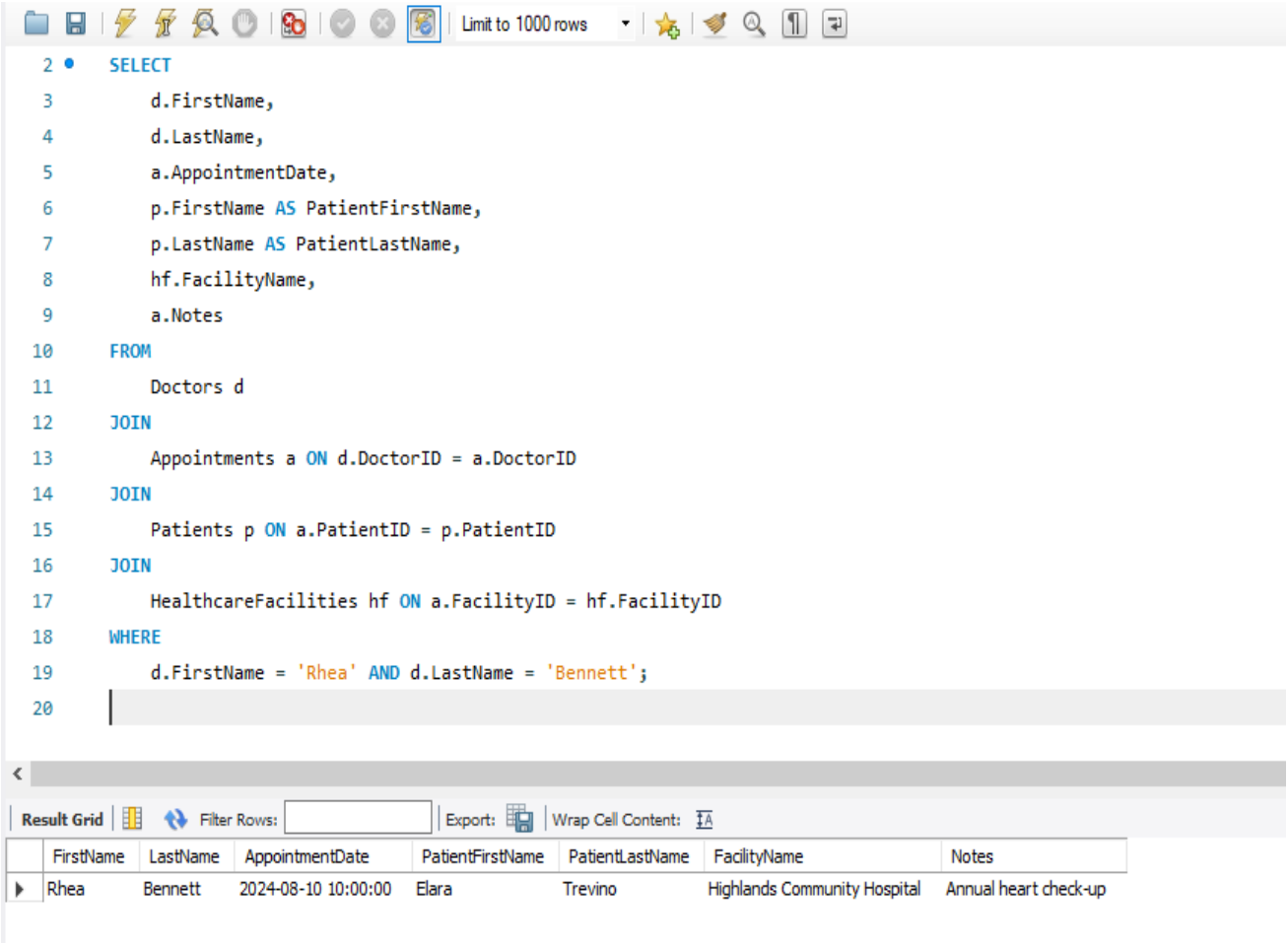


```
-- USE medilink;
SELECT
    p.FirstName,
    p.LastName,
    a.AppointmentDate,
    d.FirstName AS DoctorFirstName,
    d.LastName AS DoctorLastName,
    hf.FacilityName,
    a.Notes
FROM
    Patients p
JOIN
    Appointments a ON p.PatientID = a.PatientID
JOIN
    Doctors d ON a.DoctorID = d.DoctorID
JOIN
    HealthcareFacilities hf ON a.FacilityID = hf.FacilityID
WHERE
    p.FirstName = 'Elara' AND p.LastName = 'Trevino';
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

FirstName	LastName	AppointmentDate	DoctorFirstName	DoctorLastName	FacilityName
Elara	Trevino	2024-08-10 10:00:00	Rhea	Bennett	Highlands Co

- Getting all appointments for a specific doctor.

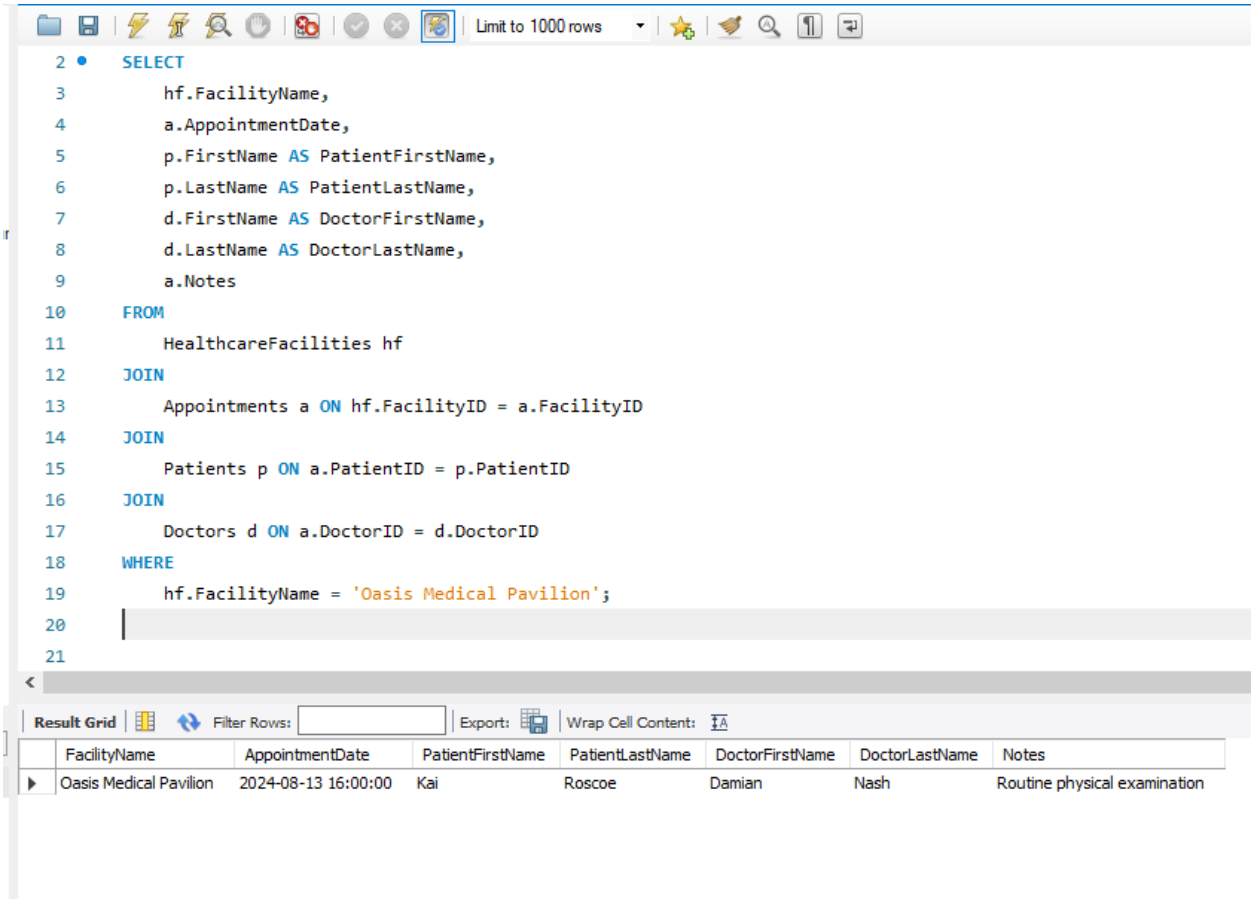


```sql
SELECT
    d.FirstName,
    d.LastName,
    a.AppointmentDate,
    p.FirstName AS PatientFirstName,
    p.LastName AS PatientLastName,
    hf.FacilityName,
    a.Notes
FROM
    Doctors d
JOIN
    Appointments a ON d.DoctorID = a.DoctorID
JOIN
    Patients p ON a.PatientID = p.PatientID
JOIN
    HealthcareFacilities hf ON a.FacilityID = hf.FacilityID
WHERE
    d.FirstName = 'Rhea' AND d.LastName = 'Bennett';
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

FirstName	LastName	AppointmentDate	PatientFirstName	PatientLastName	FacilityName	Notes
Rhea	Bennett	2024-08-10 10:00:00	Elara	Trevino	Highlands Community Hospital	Annual heart check-up

- Getting all appointments scheduled at a specific healthcare facility.



```sql
SELECT
    hf.FacilityName,
    a.AppointmentDate,
    p.FirstName AS PatientFirstName,
    p.LastName AS PatientLastName,
    d.FirstName AS DoctorFirstName,
    d.LastName AS DoctorLastName,
    a.Notes
FROM
    HealthcareFacilities hf
JOIN
    Appointments a ON hf.FacilityID = a.FacilityID
JOIN
    Patients p ON a.PatientID = p.PatientID
JOIN
    Doctors d ON a.DoctorID = d.DoctorID
WHERE
    hf.FacilityName = 'Oasis Medical Pavilion';
```

Result Grid

FacilityName	AppointmentDate	PatientFirstName	PatientLastName	DoctorFirstName	DoctorLastName	Notes
Oasis Medical Pavilion	2024-08-13 16:00:00	Kai	Roscoe	Damian	Nash	Routine physical examination