Database Design of a Hospital

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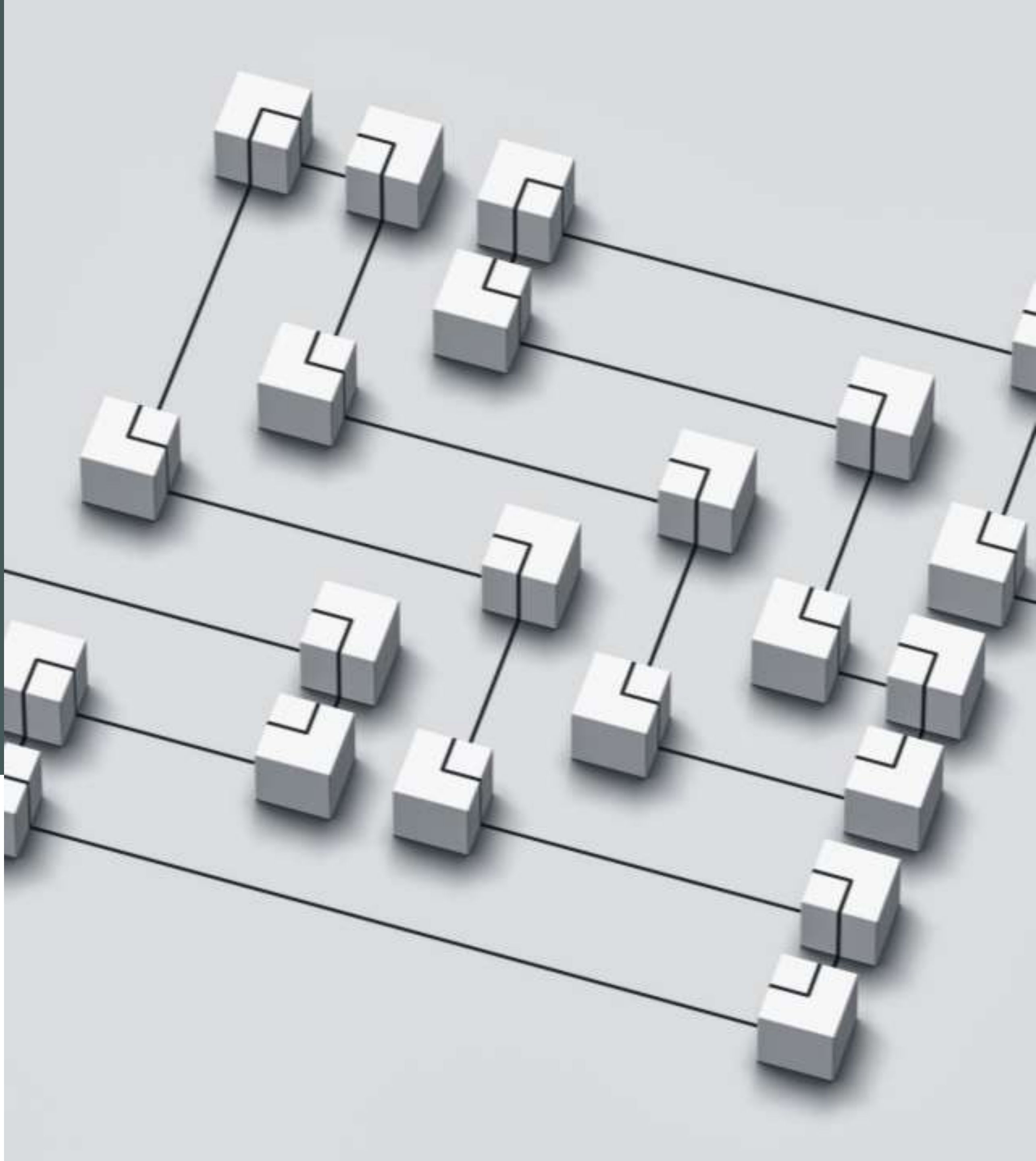

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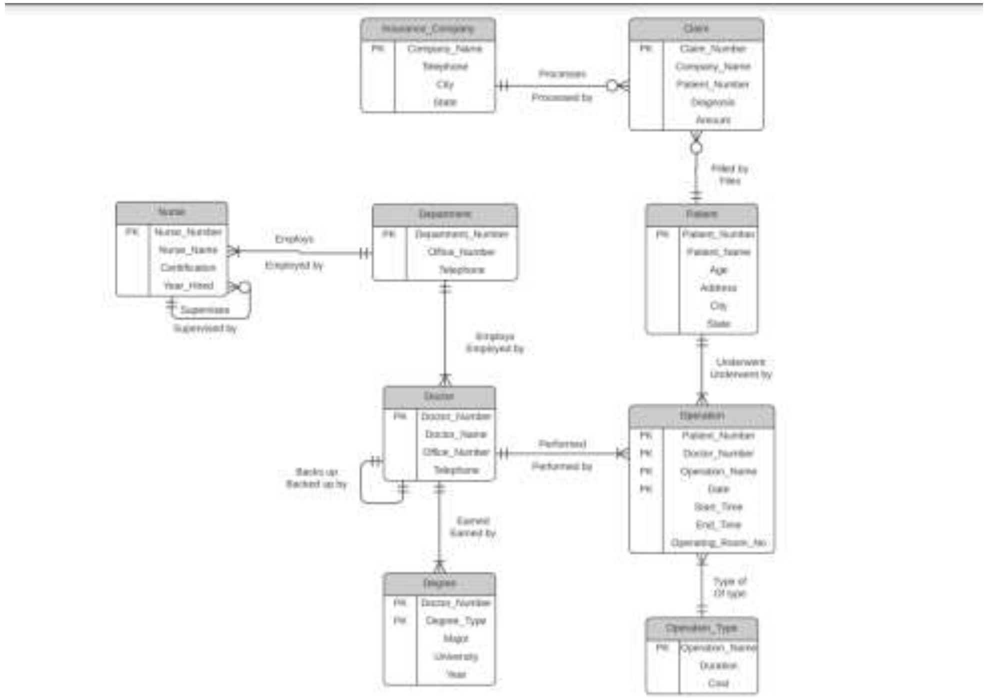
Introduction

- A hospital database is a comprehensive and organized collection of information related to a hospital's operations, patient care, medical procedures, and other healthcare-related activities.
- The database is designed to manage and store large amounts of data securely, accurately, and efficiently. It serves as a critical tool for healthcare providers to access and manage patient records, medical histories, diagnostic test results, and other relevant information to provide high-quality care.

ER Diagram


Insurance_Company
PK
Company_Name
Telephone
City
State
Processes
Processed by
Claim
PK
Claim_Number
Company_Name
Patient_Number
Diagnosis
Amount
Filed by
Files
Nurse
PK
Nurse_Number
Nurse_Name
Certification
Year_Hired
Supervises
Supervised by
Employs
Employed by
Department
PK
Department_Number
Office_Number
Telephone
Patient
PK
Patient_Number
Patient_Name
Age
Address
City
State
Employs
Employed by
Underwent
Underwent by
Doctor
PK
Doctor_Number
Doctor_Name
Office_Number
Telephone
Backs up
Backed up by
Performed
Performed by
Operation
PK
Patient_Number
PK
Doctor_Number
PK
Operation_Name
PK
Date
Start_Time
End_Time
Operating_Room_No
Earned
Earned by
Degree
PK
Doctor_Number
PK
Degree_Type
Major
University
Year
Type of
Of type
Operation_Type
PK
Operation_Name
Duration
Cost

Database Creation

The hospital database consists of 9 tables and they are created by using Normalization and indexing techniques

Added primary key and foreign key constraints to database tables.

Performance Tuning- Indexing

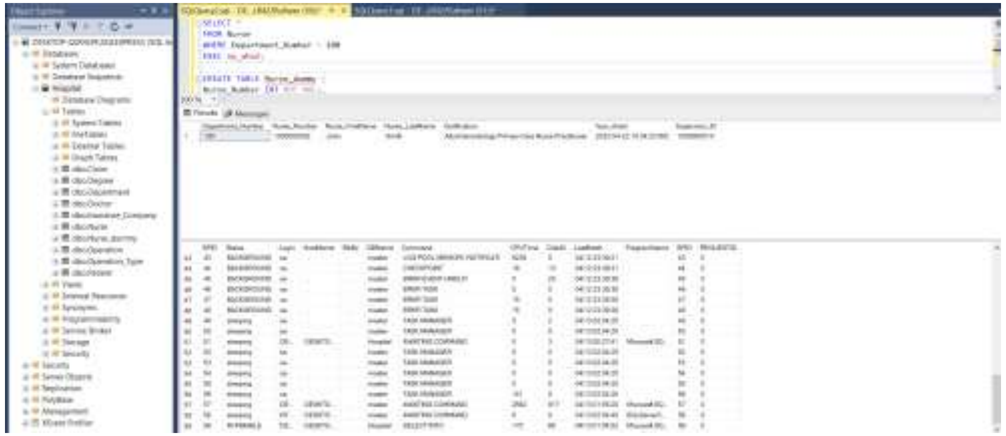
Created indexing on the below tables:

Table-1: “Nurse” Table in Hospital

Table-2: “Nurse_Dummy” Table in Hospital

Process:

- Create an Index on “Nurse_Number” in the new table “Nurse_Dummy”
- CREATE INDEX idx_Nurse_Number ON Nurse_dummy(Nurse_Number);
- TO Get the CPUTime we used a query called EXEC sp_who2;

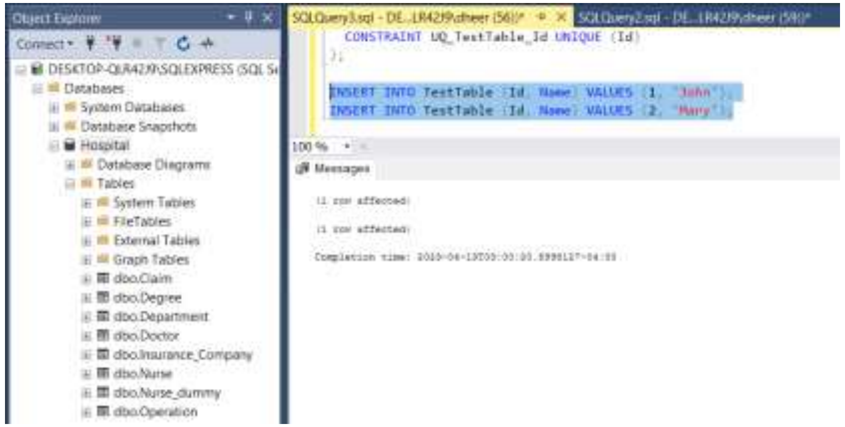


```
SELECT *
FROM Nurse
WHERE Department_Number = 100
EXEC sp_who2

CREATE TABLE Nurse_dummy (
Nurse_Number INT NOT NULL,
```

Performance Tuning- Constraints

- In order to find the performance, we have created a test table and inserted some sample data so that we can be able to check the performance before adding a primary key below are some of the results.



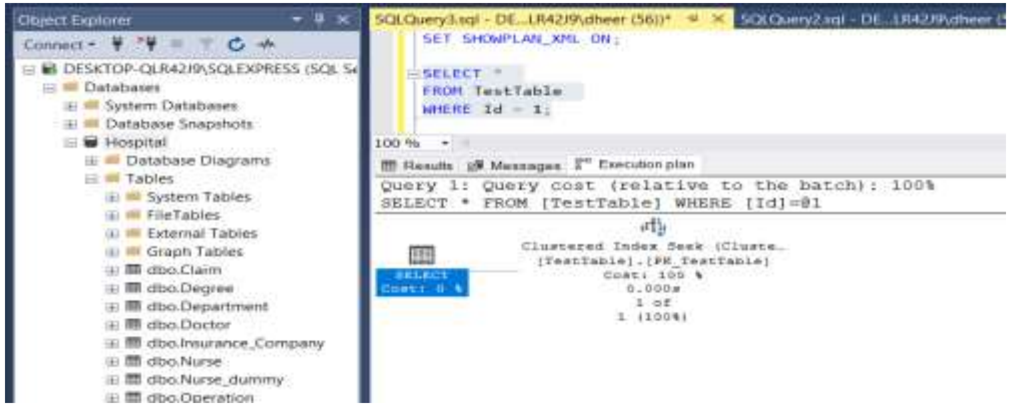
```
    CONSTRAINT UQ_TestTable_Id UNIQUE (Id)
);

INSERT INTO TestTable (Id, Name) VALUES (1, 'John');
INSERT INTO TestTable (Id, Name) VALUES (2, 'Mary');
```

```
(1 row affected)

(1 row affected)

Completion time: 2019-06-13T03:03:03.8998127-04:00
```



```
SET SHOWPLAN_XML ON;

SELECT *
FROM TestTable
WHERE Id = 1;
```

```
Query 1: Query cost (relative to the batch): 100%
SELECT * FROM [TestTable] WHERE [Id]=@1
```

Query writing

Below are the queries which we have run to check if database is giving accurate results or not.

Total number of doctors studied at Harvard University

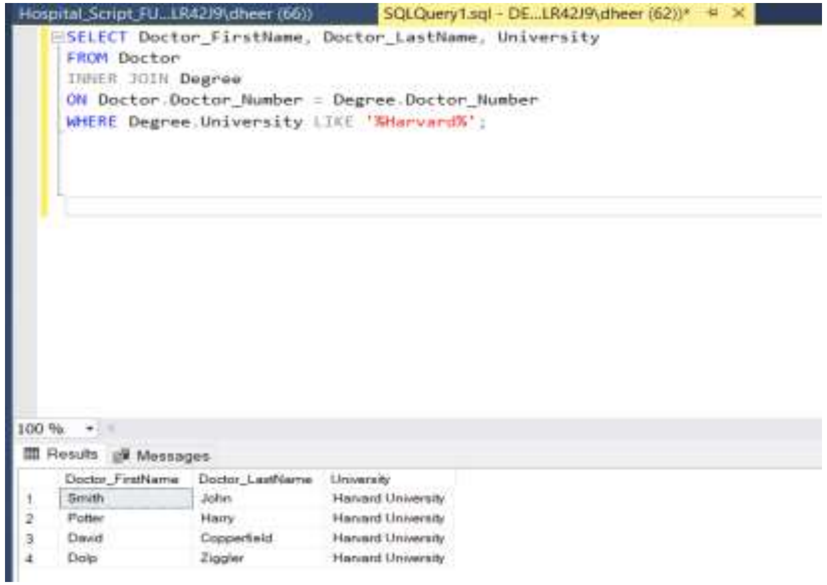
SELECT Doctor_FirstName, Doctor_LastName, University

FROM Doctor

INNER JOIN Degree

ON Doctor.Doctor_Number = Degree.Doctor_Number

WHERE Degree.University LIKE '%Harvard%';



Hospital_Script_FU...LR42J9\dheer (66))
SQLQuery1.sql - DE...LR42J9\dheer (62))*
100 %
Results
Messages

```
SELECT Doctor_FirstName, Doctor_LastName, University
FROM Doctor
INNER JOIN Degree
ON Doctor.Doctor_Number = Degree.Doctor_Number
WHERE Degree.University LIKE '%Harvard%';
```

	Doctor_FirstName	Doctor_LastName	University
1	Smith	John	Harvard University
2	Potter	Harry	Harvard University
3	David	Copperfield	Harvard University
4	Dolp	Ziggler	Harvard University

Query writing (Cont…)

Patients who have operation Dilation and curettage:

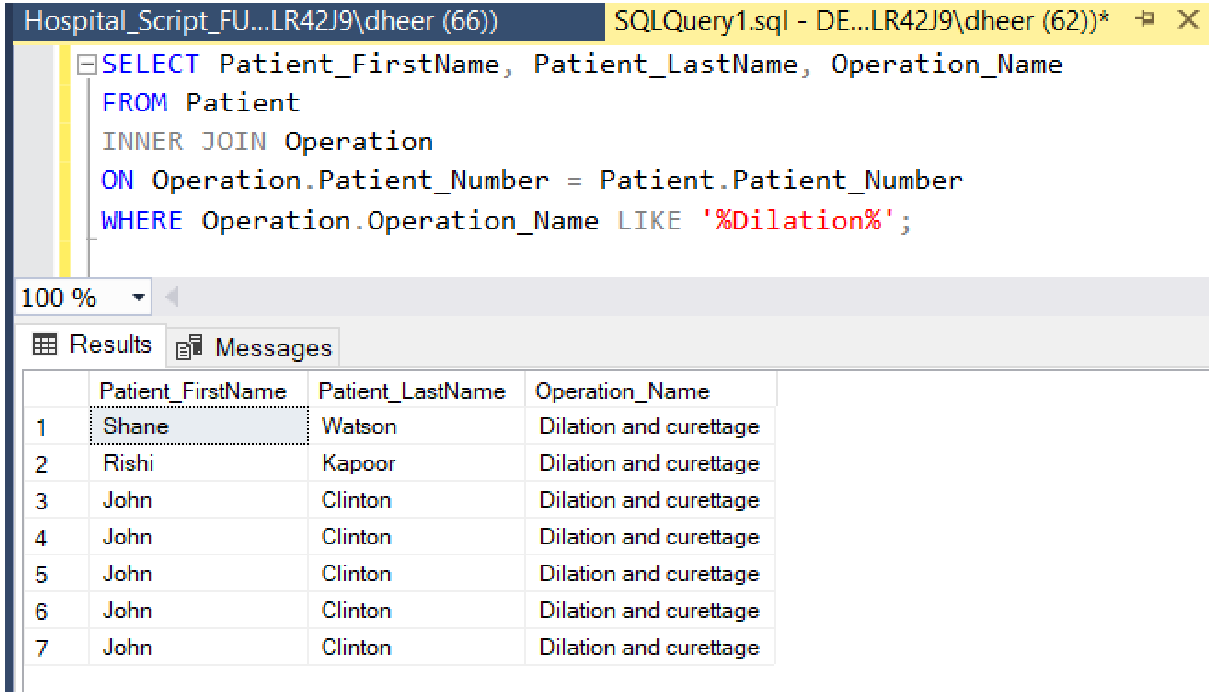
SELECT Patient_FirstName, Patient_LastName, Operation_Name

FROM Patient

INNER JOIN Operation

ON Operation.Patient_Number = Patient.Patient_Number

WHERE Operation.Operation_Name LIKE '%Dilation%';

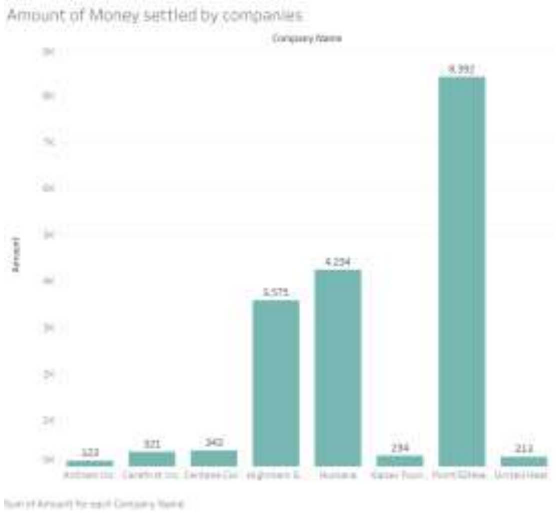

Hospital_Script_FU...LR42J9\dheer (66))
SQLQuery1.sql - DE...LR42J9\dheer (62))*
100 %
Results
Messages

```
SELECT Patient_FirstName, Patient_LastName, Operation_Name
FROM Patient
INNER JOIN Operation
ON Operation.Patient_Number = Patient.Patient_Number
WHERE Operation.Operation_Name LIKE '%Dilation%';
```

	Patient_FirstName	Patient_LastName	Operation_Name
1	Shane	Watson	Dilation and curettage
2	Rishi	Kapoor	Dilation and curettage
3	John	Clinton	Dilation and curettage
4	John	Clinton	Dilation and curettage
5	John	Clinton	Dilation and curettage
6	John	Clinton	Dilation and curettage
7	John	Clinton	Dilation and curettage

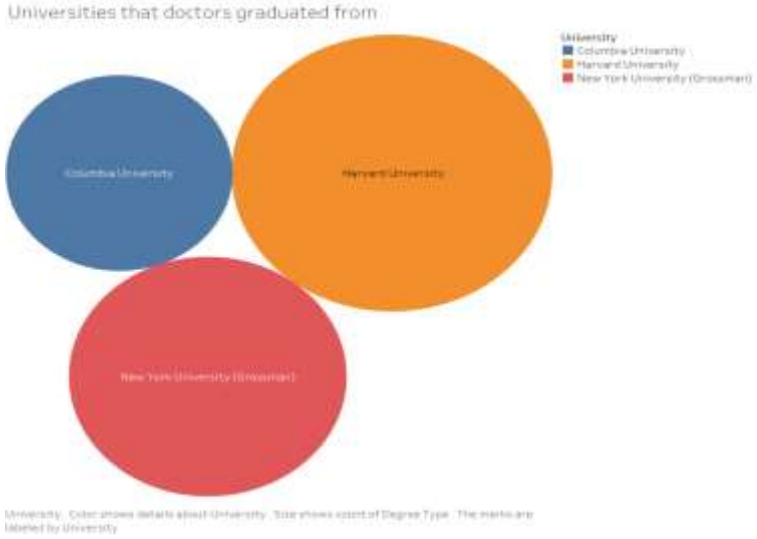
Visualization

- Below are the visualizations for the various tables in the Hospital database.



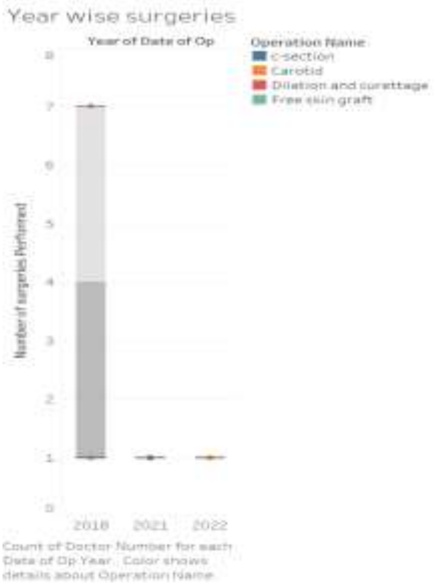
Amount of Money settled by companies

Sum of Amount for each Company Name



Universities that doctors graduated from

University. Color shows details about University. Size shows count of Degree Type. The marks are labeled by University



Year wise surgeries

Count of Doctor Number for each Date of Op Year. Color shows details about Operation Name.

Conclusion

- In Summary, this database design on the hospital data has the potential to contribute to the advancement of healthcare by providing valuable insights into patient demographics, medical procedures, and clinical outcomes.
- Further work is needed to refine the database design and fully utilize its potential to the maximum extent. This project represents an important step forward in the field of healthcare data analysis.

Thank you !!!