PART – 1

GitHub Link: https://github.com/harshitjain17/Database-Management-Systems-CMPSC-431W-Final-Project

PART – 2

<u>HOSPITAL MANAGEMENT SYSTEM CLI DOCUMENTATION</u>

Table of Contents

A. Introduction

The Hospital Management System CLI is a Python-based interface for interacting with a PostgreSQL database. It allows users to perform various operations related to patient management, including adding new patients, updating billing information, searching for patients by doctor, and more.

B. Getting Started

Prerequisites:

- Python 3.x ([Download Python](#))
- PostgreSQL database server ([Download PostgreSQL](#))
- psycopg2 library (installation using pip install psycopg2)

1. Clone the Repository:

- Sign up for a free GitHub account at [GitHub](#) if you don't have one already.
- Once logged in, navigate to the repository containing the hospital management system code.
- Click on the green "Clone or download" button and select "Clone with HTTPS".
- Use the provided URL to clone the repository to your local machine using a Git client or the command line:
  git clone https://github.com/harshitjain17/Database-Management-Systems-CMPSC-431W-Final-Project.git

2. Database Script:

- Locate the file named project.sql within the repository. This file contains the SQL statements to create the database schema.
- Open the project.sql file in a text editor and use those commands in PostgreSQL to create the tables.
- Run the following command to execute the dump.sql script and create the database schema in your newly created database:
  psql -U <your_username> -d <your_database_name> < project.sql

3. Start Using the CLI:

- To start the CLI, run the main.py script in your terminal using the following command: python main.py
- Refer to Section C for detailed instructions on using the CLI interface functionalities.

C. Main Menu Options

1. Insert a new patient

This option allows users to insert information for a new patient into the database.

Usage:

- Choose option 1 from the main menu.
- Follow the prompts to enter the required information for the new patient, such as name, age, gender, etc.
- Press Enter for optional fields or provide the requested information.

Interpretation of Query Output:

- Upon successful insertion, the CLI will display the patient ID and admission ID of the newly inserted patient.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 1
Enter Name: Harshit Jain
Enter Age: 20
Enter Gender: Male
Enter Blood Type: A+
Enter Medical Condition (optional): Lower Back Pain
Enter Date of Admission (MM/DD/YYYY): 03/20/2024
Enter Admission Type: Elective
Enter Doctor Name (optional): Jake Cole
Enter Hospital Name: Hospital ABC Inc.
Enter Insurance Provider (optional): UnitedHealthCareSR
Enter Room Number (optional): 202
Enter Discharge Date (MM/DD/YYYY) (optional): 04/01/2024
Enter Medication (optional): Yoga
Enter Test Results (optional): Normal
Enter Billing Amount (optional): 1200
New patient added successfully!
```

2. Delete the expired insurance on file for a patient

This option allows users to delete the expired insurance information for a specific patient.

Usage:

- Choose option 2 from the main menu.
- Enter the patient ID for which you want to delete the expired insurance.
- Press Enter to execute the deletion.

Interpretation of Query Output:

- The CLI will confirm the deletion of the expired insurance provider for the specified patient.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 2
Enter the Patient ID: 10004
Insurance provider for Patient ID 10004 deleted successfully!
```

3. Update the billing amount for a patient

This option allows users to update the billing amount for a patient's admission.

Usage:

- Choose option 3 from the main menu.
- Enter the admission ID for which you want to update the billing amount.
- Enter the new billing amount.
- Press Enter to execute the update.

Interpretation of Query Output:

- The CLI will confirm the successful update of the billing amount for the specified admission.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 3
Enter the Admission ID: 10003
Enter the new Billing Amount: 1300
Billing amount for Admission ID 10003 updated successfully!
```

4. Search for patients by the doctor assigned to them

This option allows users to search for patients based on the doctor assigned to them.

Usage:

- Choose option 4 from the main menu.
- Enter the full name of the doctor.
- Press Enter to execute the search.

Interpretation of Query Output:

- The CLI will display the patient ID, name, admission ID, doctor name, admission date, and discharge date for each patient found.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 4
Enter the doctor's full name: Jake Cole

Search results for patients:
 patientid        name  admissionid  doctorid doctorname admissiondate dischargedate
     10004 Harshit Jain        10003     10004  Jake Cole    2024-03-20    2024-04-01
```

5. Aggregate Functions on Patient table

This option provides various aggregate functions on the patient table, such as counting total patients and finding the average age of patients.

Usage:

- Choose option 5 from the main menu.
- Select the desired option from the sub-menu.
- Press Enter to execute the chosen aggregate function.

Interpretation of Query Output:

- The CLI displays the result of the chosen aggregate function, such as total patients or average patient age.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 5
1. Count Total Patients
2. Find Average Age of Patients
Enter your choice (1-2): 1
Total Patients: 10001
```

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 5
1. Count Total Patients
2. Find Average Age of Patients
Enter your choice (1-2): 2
Average Patient Age: 51.4490550944905509
```

6. Sort patients by age in descending order

This option allows users to sort patients by age in descending order.

Usage:

- Choose option 6 from the main menu.
- The CLI will display the sorted list of patients along with their details.

Interpretation of Query Output:

- The CLI displays the sorted list of patients with details including name, age, gender, etc., arranged in descending order of age.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 6

Patients Sorted by Age (Descending):
 patientid                name  age gender  bloodtypeid
      3933      Scott Underwood   85 Female            6
       997      Joshua Phillips   85   Male            3
      4399        George Steele   85 Female            1
      5265         Robert Bates   85   Male            2
       107        Amber Solomon   85   Male            5
      6812         Craig Bryant   85 Female            2
      7383        Thomas Bishop   85 Female            3
      9671       Yesenia Marks   85 Female            5
      9665         George Smith   85 Female            6
      1964         Craig Jensen   85   Male            4
      1316      Gregory Russell   85 Female            4
      6540       Joseph Stevens   85 Female            8
      6835        Tabitha Gray   85 Female            7
      5737           Todd Cross   85 Female            2
      5188      Michael Harding   85   Male            1
      2802        Lisa Ferguson   85 Female            5
      6935       James Richard   85   Male            1
```

7. Joins Patients and Admission tables for emergency admissions with O- blood type

This option joins the Patients and Admission tables to find emergency admissions with O- blood type.

Usage:

- Choose option 7 from the main menu.
- The CLI will display emergency admissions with patients having O- blood type along with their details.

Interpretation of Query Output:

- The CLI will display emergency admissions with details including patient name, blood type, admission date, and admission type.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 7

Emergency Admissions with Patients having Blood Type O-:
               name bloodtype admissiondate admissiontype
  Mrs. Caroline Farrell     O-    2019-06-09     Emergency
           Sally Shaw       O-    2019-07-10     Emergency
      Rachael Davidson      O-    2022-03-29     Emergency
        Angela Sanchez      O-    2021-06-13     Emergency
         Tyler Rosario      O-    2021-07-07     Emergency
          Joyce Vaughn      O-    2021-09-22     Emergency
         Zachary Wood       O-    2021-06-23     Emergency
          Paula Knight      O-    2020-03-04     Emergency
           Ryan Cross       O-    2019-05-18     Emergency
       William Mahoney      O-    2023-10-28     Emergency
         Laurie Turner      O-    2023-07-02     Emergency
         Whitney Garza      O-    2021-12-10     Emergency
        Victor Gardner      O-    2019-11-12     Emergency
       Amanda Smith MD      O-    2019-02-02     Emergency
     Christopher Duffy      O-    2019-02-09     Emergency
         Kayla Jackson      O-    2023-01-24     Emergency
```

8. Group patients based on user-specified columns

This option allows users to group patients based on user-specified columns and find the average age of each group.

Usage:

- Choose option 8 from the main menu.
- Enter the column name to group by.
- The CLI will display the average age of patients in each group.

Interpretation of Query Output:

- The CLI will display the average age of patients in each group along with the specified column.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 8
Enter the column to group by: BloodTypeID

Grouping results:
               avg  bloodtypeid
52.2290996784565916          8
50.7552504038772213          7
51.1382636655948553          1
52.1143317230273752          5
51.3529411764705882          4
51.3990384615384615          2
51.7623529411764706          6
50.8362619808306709          3
```

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 8
Enter the column to group by: Gender

Grouping results:
               avg  gender
51.6084729064039409 Female
51.2848152659358506   Male
```

9. Find patients with a length of stay exceeding a threshold using a subquery

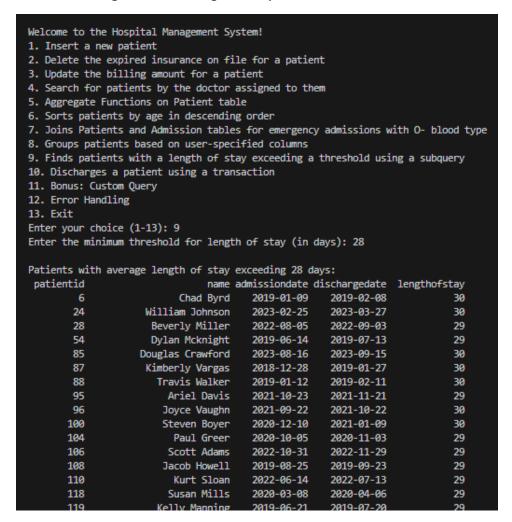This option finds patients with a length of stay exceeding a user-specified threshold using a subquery.

Usage:

- Choose option 9 from the main menu.
- Enter the minimum threshold for length of stay in days.

- The CLI will display patients with a length of stay exceeding the specified threshold.

Interpretation of Query Output:

- The CLI will display patients with details including patient ID, name, admission date, discharge date, and length of stay.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 9
Enter the minimum threshold for length of stay (in days): 28

Patients with average length of stay exceeding 28 days:
 patientid                    name admissiondate dischargedate  lengthofstay
         6             Chad Byrd    2019-01-09    2019-02-08            30
        24        William Johnson   2023-02-25    2023-03-27            30
        28         Beverly Miller   2022-08-05    2022-09-03            29
        54         Dylan Mcknight   2019-06-14    2019-07-13            29
        85       Douglas Crawford   2023-08-16    2023-09-15            30
        87        Kimberly Vargas   2018-12-28    2019-01-27            30
        88          Travis Walker   2019-01-12    2019-02-11            30
        95            Ariel Davis   2021-10-23    2021-11-21            29
        96           Joyce Vaughn   2021-09-22    2021-10-22            30
       100           Steven Boyer   2020-12-10    2021-01-09            30
       104             Paul Greer   2020-10-05    2020-11-03            29
       106            Scott Adams   2022-10-31    2022-11-29            29
       108           Jacob Howell   2019-08-25    2019-09-23            29
       110             Kurt Sloan   2022-06-14    2022-07-13            29
       118            Susan Mills   2020-03-08    2020-04-06            29
       119          Kelly Manning   2019-06-21    2019-07-20            29
```

10. Discharge a patient using a transaction

This option allows users to discharge a patient using a transaction.

Usage:

- Choose option 10 from the main menu.
- Enter the patient ID of the patient to be discharged.
- The CLI will confirm the successful (or failed) discharge of the patient.

Interpretation of Query Output:

- The CLI will confirm the successful discharge of the patient (if the admission was active) or the transaction will rollback if the admission is not active.

If there was an active admission:

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 10
Enter Patient ID: 10004
Patient ID 10004 discharged successfully!
```

If the admission wasn't active:

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 10
Enter Patient ID: 10004
An error occurred: Patient not found or has no active admission.
Transaction rolled back.
```

11. Bonus: Custom Query

This option allows users to execute custom SQL queries on the database.

Usage:

- Choose option 11 from the main menu.
- Enter the desired SQL query when prompted.
- The CLI will execute the query and display the results, if any.

Interpretation of Query Output:

- The CLI will display the query results if applicable.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 11
Enter your desired SQL query:
> SELECT * FROM BloodGroup;

Query Results:
 bloodtypeid bloodtype
           1        O-
           2        O+
           3        B-
           4       AB+
           5        A+
           6       AB-
           7        A-
           8        B+
```

12. Error Handling

Error handling is performed throughout the CLI is all the features to handle various exceptions and provide informative error messages. Some of the examples are here:

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 2
Enter the Patient ID: 1ST452FGSW
An error occurred: invalid literal for int() with base 10: '1ST452FGSW'
```

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 3
Enter the Admission ID: 1AW235F3
An error occurred: invalid literal for int() with base 10: '1AW235F3'
```

13. Exit

This option exits the CLI and closes the database connection.

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 13
Exiting the system...
PS F:\US Documents_2\Classes\7_Spring 2024\CMPSC 431W\Project>
```

D. Conclusion

The Hospital Management System CLI provides a convenient interface for managing patient data in a PostgreSQL database. With a range of functionalities available through simple CLI commands, users can efficiently perform operations such as patient insertion, update, search, and more. For any queries or issues, refer to the documentation or contact the system administrator.

> **PART – 3**

Video Link: https://drive.google.com/file/d/1P_QlvCr5tPafjXjriwXs-g_PcotAUeUP/view?usp=sharing