

PART – 1

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

PART – 2

HOSPITAL MANAGEMENT SYSTEM CLI DOCUMENTATION

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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

Before using the CLI, ensure that you have Python installed on your system along with the required dependencies listed in the requirements.txt file. Additionally, make sure you have PostgreSQL installed and running, with the database schema set up according to the provided SQL scripts.

To start the CLI, run the `main.py` script in your terminal.

```
`python main.py`
```

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