Dhirubhai Ambani
Institute of Information and Communication Technology

Vaccination or Other Health Drives Database

IT214 - Database Management System (2022)
Prof. Minal Bhise

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Section 1
Final version of SRS

A. Introduction

1.1 Purpose:

The main purpose of this system is to create an improved and efficient management system for the vaccination drives and other disease control drives. The system will be able to manage all the details about users, vaccine centers, employees & managers of respective vaccine centers, etc. The system can be used in general-purpose for other types of vaccines or disease control systems also.

1.2 Intended Audience:

This srs document is intended for database engineers, project managers, section managers, the system design team, and developers. This will also be available as a reference for Health scientists and researchers and government officers.

1.3 Product Scope:

The software intends to make the process of Vaccination Drives and Disease control Drives simple. It has the following functionalities :

- Keeps track of all vaccination centers, stock of the vaccines, vaccine requirements per center, and also other disease control drives.
- Improves the efficiency of the vaccination process or Disease control drives.
- Keeps track of the user details who are already vaccinated or registered.
- Managing the database, related to the details of the users, strength of the vaccinated persons.

Description

In earlier times when we didn't have enough technologies like today, so global diseases or pandemic situations lead to world crises and economic falls, hospitals can be flooded by patients and people would also lose financial support, due to these technological limitations, we were not able to organize well-managed vaccination drives. At that time people managed to take vaccines from the available hospitals or from local health centers. At that time all the people were not able to take vaccines, also there was not a well-managed database for the people who have already been vaccinated, there was not any management about stocks of vaccines, also there was not any kind of schedule for vaccination, etc.

If we take the reference of the COWIN online vaccination drive, if some users will request a vaccine slot then the system will provide all the available centers in an unordered way, but we can implement some functionality in the system such that the system will always provide the nearest available center with the available slots, whenever the user request for a slot. Also in the COWIN vaccination system, the user is not able to pre-register the slot for vaccines. These would lead to the idea of creating a better and well-managed efficient vaccination system.

This system will keep the database of the vaccination drives or disease control programs. The system will keep track of the details of all the vaccination centers along with their locations and stock of the vaccines at respective vaccination centers, also this will keep records of all the managers and employees working at respective vaccination centers.

The system will also keep a record of all the user information of the patients along with the age groups, and other details. The manager of the respective vaccination center will also be able to generate the report about all the users who are vaccinated at that particular vaccination center, and also the system can generate the report about all the vaccinated persons.

Prominent features/working flow:

- **Administration signup -** The administration (Government officials) first have to sign up in the system using their details such as admin name, admin gender, admin city, etc. Here the admins have all the privileges regarding all the functionalities and features in the system.

- **Slot booking through the query** - First of all, the users have to sign up into the system, using their details such as user-name, user age, user-gender, user-city, etc. After signing up the Users can book slots according to their convenience and availability of slots, and the system will provide information about the booked slot such as slot timings.

- **Displaying the nearest available vaccination centers** - The system will be able to display the vaccination centers with available slots along with their details (i.e center-name, center-city, etc.) based on their ascending order of the distance from the particular user's location who requested a vaccination slot.

- **Certification and User report** - Each center will have some employees, the manager of the particular center will assign the employees. At first, the employees assigned to the respective vaccination centers have to sign up into the system with their details such as employee-name, employee-gender, etc. After that, the employees will be given some privileges in the system. The employees of a particular center will also be able to issue the certificates and also be able to generate the report about all the users who have been vaccinated or registered at the particular center.

- **Manager details** - All the managers first have to sign up in the system using their details such as manager-name,manager-gender, manager-center name, etc. Each center will have a manager, and The administration assigns the managers and also will be able to generate the details about all the managers of particular city centers. Also

- **Latest Guidelines and registration process** - The system will contain updated guidelines about the vaccines or medicines for particular diseases, proper steps for the registration process for booking particular vaccine slots.

- **Ordering of vaccines based on center requirements** - The system will take care of the total availability of the vaccines per center and managers of the respective centers can request the administration about the requirement of the vaccines and administration can order the vaccines from the inventory based on requirements.

- **Displaying the nearest inventories** - The system will be able to display the inventories details such as inventory name, inventory city, etc. based on their ascending order of distance from the particular administration location, which has requested the vaccine stock.

- **Slot vaccine quantity updation** - The system will be able to update the center's vaccine stock based on the order and the number of vaccines per slot on a daily basis.

- **Well-managed Inventory** - The system has a well-managed inventory tracking system for ordering, delivering, classifying the classes of the vaccines.

  Ordering of the vaccines for the particular center will be done by the manager, he has decided the particular threshold values to reorder the vaccines, if the current stock of the vaccines will drop to that threshold value then the manager will request the upper level (i.e Administration) for more stocks about the vaccines, and the Administration (Government official) has all the order details such as order id, vaccine-type, etc.. and admin is allowed to order the vaccines directly from the main inventory.

  To distinguish between the types of vaccines to order, each of the vaccines will be marked by a particular vaccine type. So the manager can get an idea about the particular vaccines to order. According to that, the manager keeps a record of different vaccines.

B. Fact-Finding phase

1. Background readings with Description:

- **Websites:**
  1. CoWIN
  2. COVID-19 vaccination in India

In recent days, India and other countries have encountered the worldwide pandemic of coronavirus. In order to overcome this pandemic situation, governments of all the countries are collaborating with self-finance companies to start vaccination drives all over the world. Here we have discussed the working flow and limitations of, particularly covid-19 vaccination drive.

Specifically talking about India, the Indian government started COVID-19 Vaccination for the frontline workers in phase I, after phase I the government started the vaccination for all the residents through the online platform named COWIN. COWIN is the Indian government web portal for COVID19 vaccine registration and it is operated by India's Ministry of Health and Health Welfare.

- **Working flow and limitations of COWIN vaccination system**

For getting vaccinated every individual has to first register himself/herself to the COWIN portal, after that he/she has to be authenticated by OTP sent in one's phone number, after that one has to book a slot for the vaccines at a particular vaccination center on the COWIN web portal, the individual will get the vaccination date and the name of the vaccine with which he/she will be vaccinated, and after the vaccination, the individual will be provided a certificate of vaccination on the COWIN web portal itself. But here this system has some limitations, when an individual requests a vaccination slot, the system will sometimes provide all the vaccination centers without any concern of the availability or non-availability of a particular vaccination center's vaccines availability, also regardless of the vaccination center's distance from the individual's location. Also, the individual was not able to pre-register the vaccination slots based on their convenience.

Document References:

- Software Requirements Specification Personal Health Monitoring Application (PHMA)
  This document describes SRS for a project for the personal health monitoring application (PHMA). This document gives a broad idea about the functional and non-functional requirements along with design phases of the system, assumptions regarding the system, features, etc. for developing such health systems.

- (PDF) Software Requirements Specification of E-Health Architecture for Nepal
  This document was prepared for developing the complete E-Health architecture for Nepal, this SRS document gives the general idea about the functional and non-functional requirements for developing efficient E-Health systems.

Requirements Gathered from Background readings

- The system should not display the unavailable slots for the vaccination.
- The system should show the nearest vaccination centers.
- The user should be able to pre-register for the slots.

2 Interviews:

2.1 Interview1:

System: Vaccination Drive Management
Project Reference: SF/SJ/2021/10

Interviewee: Dhairya Rupala **Designation**: Head at civil health center
Interviewer: Satyam Bhut **Designation**: Developer
Date: 05/10/2021
Duration: 40 mins **Mode**: Online (Google meet)

Purpose of Interview: Meeting for sharing our ideas of the project and discussion about the requirements and features required as an admin(Head of programs) of the system.

Agenda:

- Problems regarding the currently existing system as an admin.
- What are the challenges faced or can rise, in conducting the disease control drives or vaccination drives?
- What are the expectations or privileges as an admin, in conducting the drives?
- Any new ideas regarding the system.

Documents to be brought to the interview:

- Rough plan of resources required for the system
- Rough plan of features and functionalities we will be implementing in the system.

Interview1 Summary:

System: Vaccination Drive Management
Project Reference: SF/SJ/2021/10

Participants: Dhairya Rupala (Head at civil health center)
Satyam Bhut (Developer)

Date: 05/10/2021 **Time**: 40 mins
Place: Online (Google meet)

Purpose of Interview:

1. The UI should be more user-friendly and should be more efficient in terms of slot booking and vaccine information.
2. The User faces authentication issues sometimes (i.e OTP detection,...)
3. Backend-related problems.
4. Improvement is needed in authentication.

2.2 Interview2:

System: Vaccination Drive Management
Project Reference: SF/SJ/2021/10

Interviewee: Hiten Padaliya **Designation**: Manager at Civil Health center
Interviewer: Jenish Rathod **Designation**: Developer
Date: 05/10/2021
Duration: 40 mins **Mode**: Online (Zoom)

Purpose of Interview: Meeting for sharing our ideas of the project and discussion about the requirements and features required as a manager of the system.

Agenda:

- Problems regarding the currently existing system as a manager.
- Current development in the Vaccination management system
- How technology can help to manage the disease control drives or vaccination drives better
- Any new ideas regarding the system.

Documents to be brought to the interview:

- Rough plan of resources required for the system
- Rough plan of features and functionalities we will be implementing in the system.

Interview2 Summary:

System: Vaccination Drive Management

Project Reference: SF/SJ/2021/10

Participants: Hiten Padaliya (Manager at Civil Health center)
Jenish Rathod (Developer)

Date: 05/10/2021 **Time**: 40 mins
Place: Online (Zoom)
Purpose of Interview:

1. Improve the features like current guidelines and news updates about the diseases or vaccines.
2. The interface should be more comprehensive.
3. Some features are cluttered.

2.3 Interview3:

System: Vaccination Drive Management
Project Reference: SF/SJ/2021/10

Interviewee: Hiten Padaliya **Designation**: Employee at a health center
Interviewer: Dhairya Rupala **Designation**: Developer
Date: 06/10/2021
Duration: 30 mins **Mode**: Online (Google meet)

Purpose of Interview: Meeting for sharing our ideas of the project and discussion about the requirements and features required as an employee of the system.

Agenda:

- Problems regarding the currently existing system as an employee.
- How smoothly can you conduct the drive if you use this system?
- What are the new ideas about the system?

Documents to be brought to the interview:

- Rough plan of resources required for the system
- Rough plan of features and functionalities we will be implementing in the system.

Interview3 Summary:

System: Vaccination Drive Management
Project Reference: SF/SJ/2021/10

Participants: Hiten Padaliya (Employee at health center)
Dhairya Rupala (Developer)

Date: 06/10/2021 **Time**: 30 mins
Place: Online (Google meet)

Purpose of Interview:

1. A role-based system should be very helpful.
2. The roles have their own privileges and features to work with.
3. The system should have features to handle concurrent access issues.
4. The system has the ability to handle power failure.

2.4 Interview4:

System: Vaccination Drive Management
Project Reference: SF/SJ/2021/10

Interviewee: Jenish Rathod **Designation**: User (Civilians)
Interviewer: Hiten Padaliya **Designation**: Developer
Date: 07/10/2021
Duration: 40 mins **Mode**: Online (Google meet)

Purpose of Interview: Meeting about sharing ideas about the existing system and the need for improvement.

Agenda:

- To discuss the challenges that the user was facing in the current system.
- To take feedback regarding the current system.
- To discuss the new system and their implementation
- Any new ideas regarding the system

Documents to be brought to the interview:

- Pros and cons of the current systems.
- Rough plan of features and functionalities we will be implementing in the system.

Interview4 Summary:

System: Vaccination Drive Management
Project Reference: SF/SJ/2021/10

Participants: Jenish Rathod(User)
Hiten Padaliya (Developer)

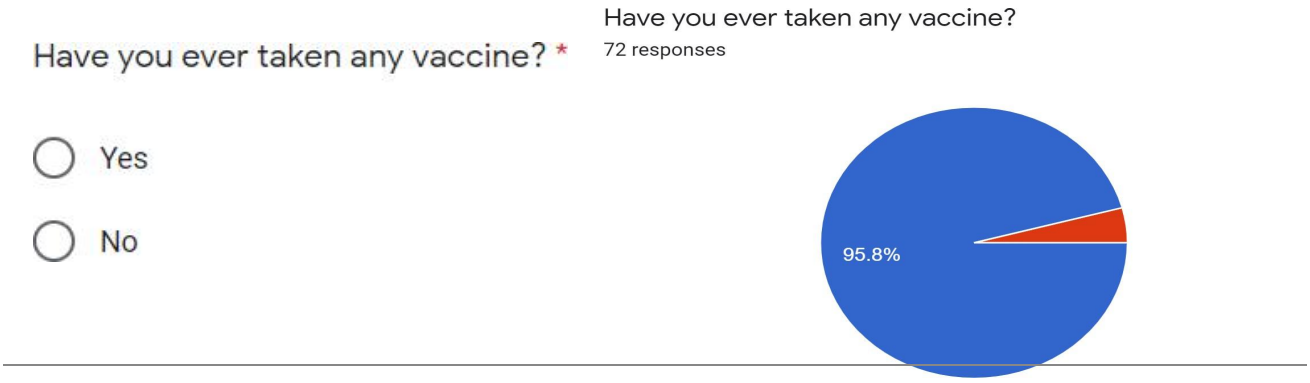
Date: 07/10/2021 **Time**: 40 mins
Place: Online (Google meet)

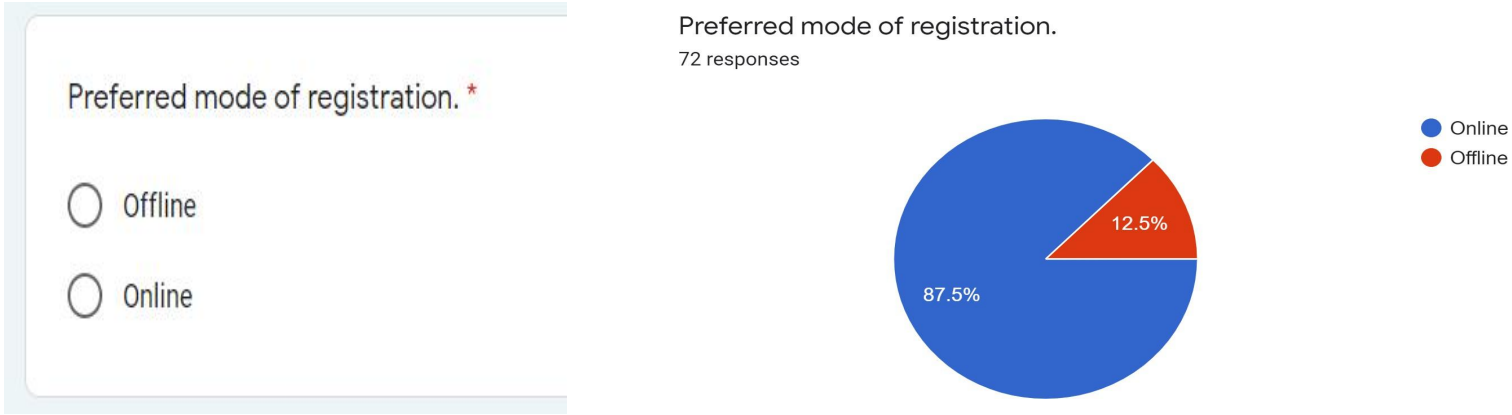
Purpose of Interview:

1. There should be some feature about showing the registration process for the slot bookings.
2. The system should display the nearest available vaccination centers from the user's area.

3. Questionnaires:

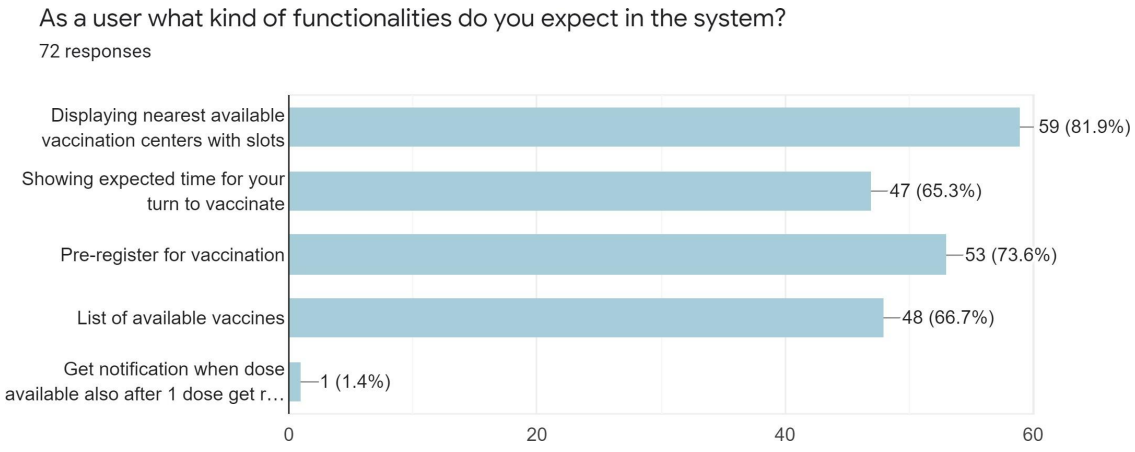
Below are the questions and responses gathered in the google form. We collected the responses from 3 types of designations who might possibly use the system, which are Users, Managers of health centers, and Administration (Government) of the vaccination drives/disease control programs.





As a user what kind of functionalities do you expect in the system? *

- [ ] Displaying nearest available vaccination centers with slots
- [ ] Showing expected time for your turn to vaccinate
- [ ] Pre-register for vaccination
- [ ] List of available vaccines
- [ ] Other:

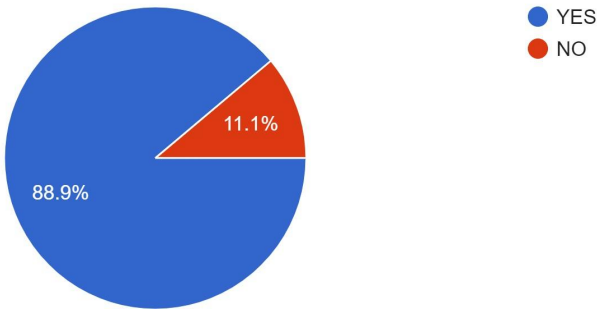


Would you like to receive notification when there is some available slots for vaccines? *

- ◯ YES
- ◯ NO

Would you like to receive notification when there is some available slots for vaccines?

72 responses

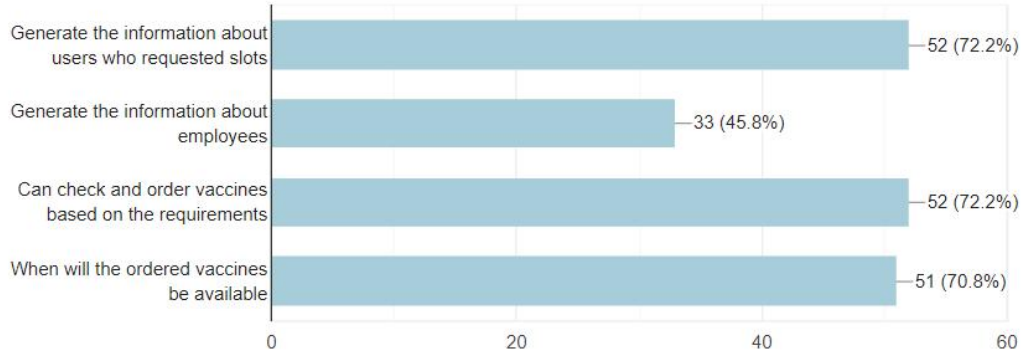


As a manager of particular vaccination center what kind of functionalities do you want in the system? *

- [ ] Generate the information about users who requested slots
- [ ] Generate the information about employees
- [ ] Can check and order vaccines based on the requirements
- [ ] When will the ordered vaccines be available
- [ ] Other: _____

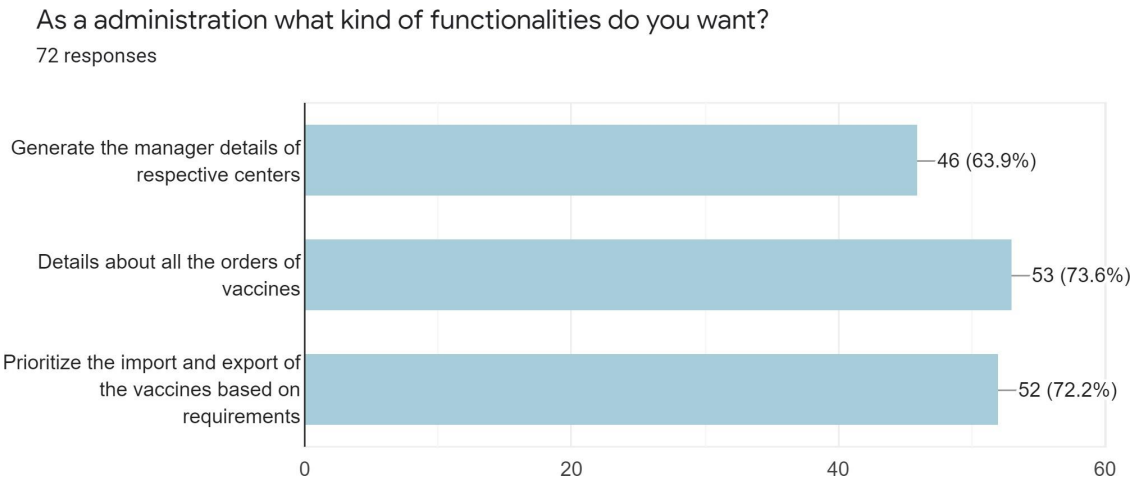
As a manager of particular vaccination center what kind of functionalities do you want in the system?

72 responses



As a administration what kind of functionalities do you want? *

- [ ] Generate the manager details of respective centers
- [ ] Details about all the orders of vaccines
- [ ] Prioritize the import and export of the vaccines based on requirements
- [ ] Other: _____

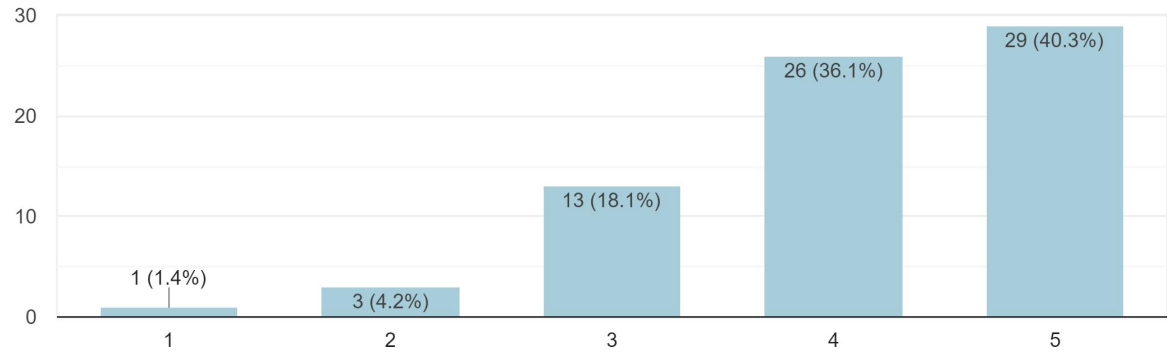


Rate the vaccination process. *

	1	2	3	4	5	
Lowest	○	○	○	○	○	Highest

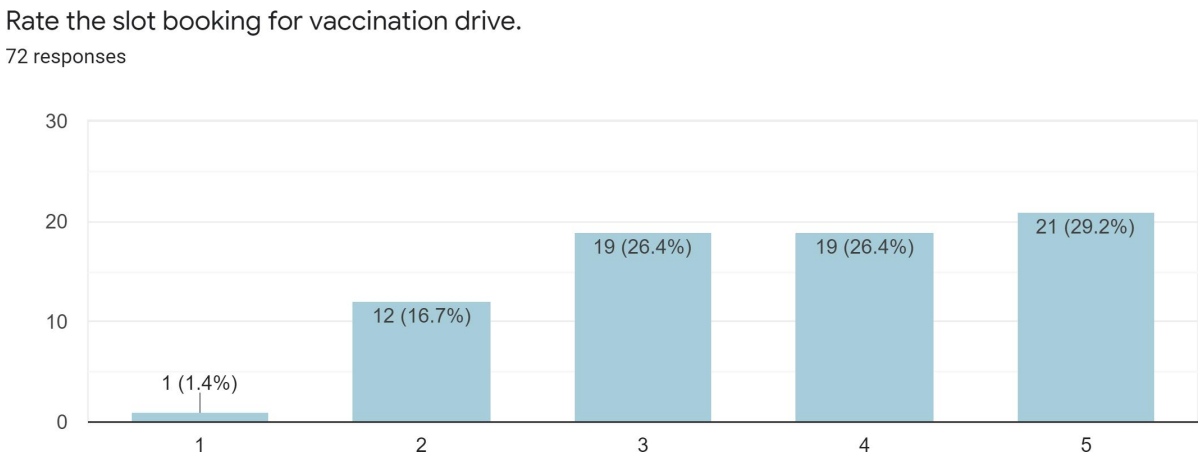
Rate the vaccination process.

72 responses



Rate the slot booking for vaccination drive. *

	1	2	3	4	5	
Lowest	○	○	○	○	○	Highest



Requirements Gathered from QnA:

- Most of the users are familiar with the online registration systems and it was also more flexible to use.
- Most of the people are faced with issues in finding the nearest vaccination slots and also recommended the pre-registration process and get notified so they don't have to wait for vaccination availability.
- The majority of the users are quite satisfied with the current slot booking process but few of them are not much satisfied and it has to be improved.
- With respect to the manager, it would be better if the system is able to generate the final list of the users who requested slots and also generate the information regarding the status of the vaccines and the list of the employees working in the center.
- With respect to the administration, it would be better if the system has the functionality to prioritize the orders of the vaccines and can monitor the information about the managers.
- The overall performance of the existing system is good, but it has some considerable issues to take care into account.

4. Observation:

Infosoft Softwares: Observations **System:**

Vaccination Management System**Project**

Reference: SF/SJ/2021/10

Observations by: Mitul Dave (Head developer at Infosoft software)

Date: 14/8/2003 **Time:** 14:30

Duration: 45 minutes **Place:** Microsoft Teams (Online)

Observation:

- The core idea of the system is very intuitive and innovative.
- The system can be very useful for the Online management of vaccination drives/disease control programs.
- The current system has some bugs in the authentication procedure for the registration, it should be fixed.
- The overall architecture, performance, and functionality of the system are quite admirable.

Requirements Gathered from Observation

- Solve the issues regarding authentication while registering.

C. Fact-Finding Chart:

Objective	Technique	Subjects(s)	Time commitment
To get the ideas about workflows and management of existing systems	Background readings	Similar readings, few existing projects	1 Day
To gain understanding about the role of the administrator/corporation of the vaccine management drives/disease control programs	Interview	Admin(Head of drives/programs)	40 Minutes
To gain an understanding of the role of the manager of particular vaccination centers	Interview	Manager of a health center	40 Minutes
To gain an understanding of the role of the employees of particular vaccination centers	Interview	An employee of the health center	30 Minutes
To gain an understanding of the role of the users, who might use the system	Interview	Civilians	40 Minutes
To collect the information about the requirements	Questionnaire	Civilians	1 Day

D. Requirements

Requirements in the system for Users

- The system should display the nearest available vaccination center from the user's area.
- The user should be able to pre-register for the vaccination.
- The user should be able to see the list of the available vaccines/medicines and their information, also the user can update their personal details.
- The user should get a notification about the available vaccination slots.
- The system should display the expected time for the user's turn for the vaccination.
- The system's UI should be more user-friendly and comprehensive, also the authentication system should be improved.
- The system should have features like current guidelines or news updates for users.
- The system should show the registration steps to the users for the registration procedure.

Requirements in the system for Managers

- As a manager, the system should generate information about the users and their respective slots which are booked.
- The manager should be able to check the stock of the vaccines/medicines and can order based on the requirements for respective vaccination centers.
- Also, the manager should be able to see the expected arrival time for the ordered vaccines/medicines.
- As a manager, the system should also generate a list of the employees working in the center and can manipulate it. Also, the manager should be able to update his/her personal details.

Requirements in the system for Administrator

- Admin should be able to generate the details about the ordered vaccines/medicines which are requested from the manager and can manipulate with it or which admin ordered from the inventory itself.
- As an administrator, the system should be able to prioritize the orders of the vaccines based on the requirements.
- As an administrator, the system should be able to generate the details of the managers of particular centers and the admin should be able to manipulate it, also the administrator is able to update his/her own personal details.

E. User Classes and Characteristics:

- **Government Officials (Administrator/Head of programs):**

  Government Officials use this system, to manage the vaccination drives/disease control programs, to handle the different vaccination centers, to assign managers, and give them privileges of the system to manage their assigned vaccination centers, also government officials use the system to handle the ordering of vaccines, update the stocks and also, update the current news and guidelines for the users.

- **Managers of the program:**

  Managers use this system for handling the health programs in their vaccination centers, also managing the resources and ordering the required resources based on the needs in their respective vaccination centers, along with handling all the

employees working in the vaccination centers. Managers provide some privileges to the employee working in the vaccination center to handle some tasks.

- **Employees:**
  Employees working in the respective centers use the system for updating the information about the users who are vaccinated, also the employees have the privilege to provide the certificate or vaccination report to the users who are vaccinated.

- **Users (Civilians):**
  Users or civilians use the system for registering themselves for vaccination, and they can book the slots based on their convenience and slots availability.

F. Operating Environment:

This system will run on an online platform, the main communication interface between the user's view and the database will be managed by SQL scripts.

1. Hardware, Software or connectivity requirements:

➢ **Hardware:**
- Processor: Intel i3 (minimum)
- Clock speed: 1.2GHz
- Memory: 50GB
- RAM: 2GB
- Operating System: Windows 7/8/10

➢ **Software:**
- Database Handler: SQL
- Software Building Tool/ Host language: Python

➢ **Connectivity:**
- Internet Speed: 15Mbps

2. External Interface Requirements:

- We need a Google Maps API to track the locations and to find the nearest centers of the various vaccination centers, also we will require an API for current guidelines about the diseases and vaccine information.

G. Product Functions

- **Register/ Sign up:**
  Through this functionality, users or managers or employees, or admin can register themselves in the system. Users/managers/admin/Employees have to provide the details required for the registration process and password for signing up. The system will also provide the steps as a guideline to register on the system.

- **Sign In:**
  Through the details provided in the sign-up process and password, the managers/users/employees or admin can sign in to the system.

- **Current_Guidlines:**
  This functionality will provide the current news and guidelines about the diseases.

- **Retrieve_details**
  This functionality can be used by the admin/managers or the employees,the admin will be able to see all the details about the managers, the manager will be able to see all the details about the employees, employees will be able to see all the details about the users.

- **Order_vaccines:**
  This functionality is for both the managers and admins of the system, the manager can request the order of the vaccine from the admin and the admin can order the vaccines from the inventory based on the requirements.

- **update_vaccineStock:**
  This functionality will help the manager and admins to see the vaccine stock and update the stock based on the orders.

- **add_manager:**
  Using this functionality the admin can assign or recruit the manager for the respective vaccination center.

- **update_managerDetails** :
  With this functionality, an admin can manipulate the information of managers. But the manager can update his/her own personal details only.

- **add_employee:**
  This functionality will help the managers of the particular center to recruit or add employees.

- **update_employeeDetails:**
  With the functionality Managers can update the information about all the employees but, a particular employee will be able to update his/her own details only.

- **update_userInfo:**
  With this functionality, Employees/Users users will be able to update the user details and the employee will be able to update the status as vaccinated or not vaccinated only, but the user can update his/her own details only like name, location, etc.

- **provide_certificate:**
  With this functionality, the Employees will be able to provide the certificates to the users who are vaccinated.

- **Search_vaccines:**
  With the functionality, the user will be able to search for the required medicines or vaccines.

- **find_nearest:**
  This filter/functionality will show the nearest available vaccination slot with center details to the users.

- **Book_slot:**
  Using this functionality the user will be able to book the slot, at first, the user has to select the vaccine and the system will show the available slots along with centers, and if the user selects the filter *find_nearest* then the system will show the available slots and sort them according to the distance with respect to the user's location. Also, the user will be able to pre-register the slots.

H. Privileges:

Functions	Privileges
Sign Up, Sign in	Administration, Manager, Employee, User
Search_Vaccines	User
Slot_Booking	User
Provide Certificate	Employee
Manipulating with User_Details	Employee, User
Manipulating with Employees or Employee_Details	Manager, Employee
Manipulating with Managers or Manager details	Administration, Manager
Orders/Update of Vaccines	Administration, Manager
Guidelines related to Disease	Administration, Manager, Employee, User

** here the admin of the system will be able to access all the modules but, there is a specific role assigned for all the small tasks.*

I. Assumptions:

- Here the architecture will be focusing on providing better management for vaccination drives/disease control programs online.
- So it is presumed that the internet facility, power supply, internet speed/bandwidth is always up and running, also it is assumed that all the information and data is up to date.
- Also, the server of the system will be live 24x7, and the server has enough capability to handle large amounts of data.
- Also, it is assumed that all the users of this system will have the required hardware and software specifications.

J. Business constraints

- The system will contain all the updated information about the data of the users vaccinated, stocks of vaccines, availability of particular vaccines/medicines, etc.
- Also, all the information/data can be recovered and will not be corrupted in case any system failures or power shortage occurs.
- Also, the data should be flexible and consistent in case any migration occurs.
- The system will be secured in a way, such that all the personal details of the users, managers, or admin will not be compromised.

Section 2
Noun Analysis

Final Problem Description

In earlier times when we didn't have enough technologies like today, so global diseases or pandemic situations lead to world crises and economic falls, hospitals can be flooded by patients and people would also lose financial support, due to these technological limitations, we were not able to organize well-managed vaccination drives. At that time people managed to take vaccines from the available hospitals or from local health centers. At that time all the people were not able to take vaccines, also there was not a well-managed database for the people who have already been vaccinated, there was not any management about stocks of vaccines, also there was not any kind of schedule for vaccination, etc.

If we take the reference of the COWIN online vaccination drive, if some users will request a vaccine slot then the system will provide all the available centers in an unordered way, but we can implement some functionality in the system such that the system will always provide the nearest available center with the available slots, whenever the user request for a slot. Also in the COWIN vaccination system, the user is not able to pre-register the slot for vaccines. These would lead to the idea of creating a better and well-managed efficient vaccination system.

This system will keep the database of the vaccination drives or disease control programs. The system will keep track of the details of all the vaccination centers along with their locations and stock of the vaccines at respective vaccination centers, also this will keep records of all the managers and employees working at respective vaccination centers.

The system will also keep a record of all the user information of the patients along with the age groups, and other details. The manager of the respective vaccination center will also be able to generate the report about all the users who are vaccinated at that particular vaccination center, and also the system can generate the report about all the vaccinated persons.

Prominent features/working flow:

- **Administration signup -** The administration (Government officials) first have to sign up in the system using their details such as admin name, admin gender, admin city, etc. Here the admins have all the privileges regarding all the functionalities and features in the system.

- **Slot booking through the query** - First of all, the users have to sign up into the system, using their details such as user-name, user-age, user-gender, user-city, etc. After signing up the Users can book slots according to their convenience and availability of slots, and the system will provide information about the booked slot such as slot timings.

- **Displaying the nearest available vaccination centers** - The system will be able to display the vaccination centers with available slots along with their details (i.e center-name, center-city, etc.) based on their ascending order of the distance from the particular user's location who requested a vaccination slot.

- **Certification and User report** - Each center will have some employees, the manager of the particular center will assign the employees. At first, the employees assigned to the respective vaccination centers have to sign up into the system with their details such as employee-name, employee-gender, etc. After that, the employees will be given some privileges in the system. The employees of a particular center will also be able to issue the

certificates and also be able to generate the report about all the users who have been vaccinated or registered at the particular center.

- **Manager details** - All the managers first have to sign up in the system using their details such as manager-name,manager-gender, manager-centername, etc. Each center will have a manager, and The administration assigns the managers and also will be able to generate the details about all the managers of particular city centers. Also

- **Latest Guidelines and registration process** - The system will contain updated guidelines about the vaccines or medicines for particular diseases, proper steps for the registration process for booking particular vaccine slots.

- **Ordering of vaccines based on center requirements** - The system will take care of the total availability of the vaccines per center and managers of the respective centers can request the administration about the requirement of the vaccines and administration can order the vaccines from the inventory based on requirements.

- **Displaying the nearest inventories** - The system will be able to display the inventories details such as inventory name, inventory city, etc. based on their ascending order of distance from the particular administration location, which has requested the vaccine stock.

- **Slot vaccine quantity updation** - The system will be able to update the center's vaccine stock based on the order and the number of vaccines per slot on a daily basis.

- **Well-managed Inventory** - The system has a well-managed inventory tracking system for ordering, delivering, classifying the classes of the vaccines.

Ordering of the vaccines for the particular center will be done by the manager, he has decided the particular threshold values to reorder the vaccines, if the current stock of the vaccines will drop to that threshold value then the manager will request the upper level (i.e Administration) for more stocks about the vaccines, and the Administration (Government official) has all the order details such as order id, vaccine-type, etc.. and admin is allowed to order the vaccines directly from the main inventory.

To distinguish between the types of vaccines to order, each of the vaccines will be marked by a particular vaccine type. So the manager can get an idea about the particular vaccines to order. According to that, the manager keeps a record of different vaccines.

I. Noun (& Verb) Analysis:

(1) Nouns (Entities) and verbs (relationships) in the description.

Noun	Verb
Final problem description	can
technologies	Like
Global diseases	read
Pandemic situations	Be
World crisis	Would
Economic falls	lose
hospitals	support
patients	organize
Financial supports	classifying
Technological limitations	take
Vaccination drives	schedule
vaccines	reference
time	drive
time	will
hospitals	request
Local health centers	provide
vaccines	Implement
database	Register
Stocks of vaccines	Control
Schedule for vaccination	Track
reference	Keep
Cowin	Generate
Managers	Assigns
Vaccination drive	Record

users	Report
Order details	allowed
Order id	Delivering
vaccine slots	Flow
Main inventory	Query
Available centers	Display
system	order
Nearest available center	issue
administration	Assigns
Available slots	Process
user	Update
Cowin	Reorder
Vaccination system	Drop
user	Fall
slot	Is
vaccines	Programs
Vaccination system	Groups
database	steps
Vaccination drives	features
Disease control drives	Has
details	values
Vaccination centers	types
The stock of the vaccines	flooded
respective vaccination centers	managed
records	was
Manager	vaccinated
employees	based
Respective vaccination centers	requested

User information	decided
patients	allowed
manager	marked
Respective vaccination centers	ascending
report	creating
users	booking
Particular vaccination center	delivering
Vaccinated person	according
users	working
slot	using
Prominent features	book
slots	displaying
Nearest available vaccination centers	allocate
vaccination centers	
Available slots	
Vaccination slots	
User report	
employees	
Particular center	
certificates	
users	
manager	
administration	
managers	
Latest guidelines	
Registration process	
medicines	
vaccines	

Particular diseases	
Proper steps	
Vaccine slots	
managers	
administrations	
inventory	
administrations	
inventories	
Administration location	
Vaccine stock	
order	
Daily basis	
Classes of vaccines	
manager	
Threshold values	
Current stock of the vaccine	
Manager	
Upper level	
Administration	
stock	
vaccines	
administration	
government official	
Admin name	
Admin gender	
Admin city	
privileges	
functionalities	

User name	
User age	
User gender	
User city	
information	
Slots timings	
Center name	
Center city	
User’s location	
Employee name	
Employee gender	
Manager name	
Manager gender	
Manager centername	
Inventory name	
Inventory city	

(2) Accepted Noun and verbs list

Candidate Entity Set	Candidate Attribute Set	Candidate Relationship Set
Admin	Admin name Admin gender Admin city	Order, assigns
Manager	Manager name Manager gender Manager centerName	Order, assigns
Users	User name User gender User age User city	book
Employee	Employee name Employee gender	Certify
Centers	Center name Center city	
Slots	Slots timings	
Inventory	Inventory name Inventory city	
Order details	Order id, vaccine type	

(3) Truncating Initial Noun List:

Noun	Reason
vaccination	Duplicates, General
vaccines	Duplicates, General
Available	Vague
stock	General, duplicate
drives	Vague, duplicate
system	general

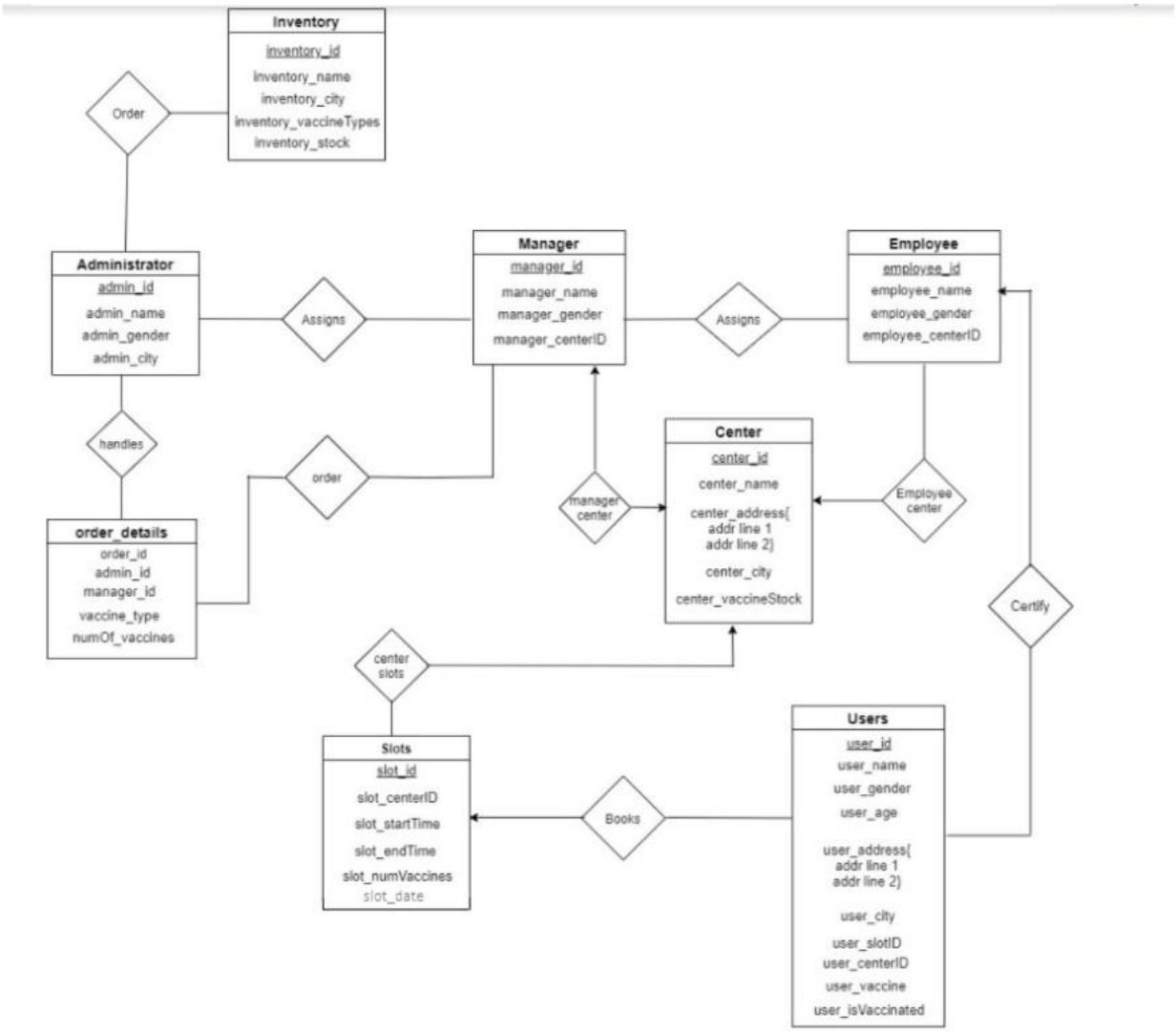
respective	Irrelevant
Particular	Irrelevant
diseases	General, duplicates
hospitals	General, duplicates
patients	general
time	vague
database	general
Cowin	Duplicates
Nearest available centers	vague
report	general
Details	Associations
Final problem description	vague

technologies	irrelevant
Pandemic situation	general
World crisis	general
Financial supports	vague
Technological limitations	vague
Local health centers	General
Stocks of vaccines	vague
Reference	vague
details	General
Records	vague
User information	Vague
Prominent features	irrelevant
User report	general
Latest guidelines	General
Registration process	General

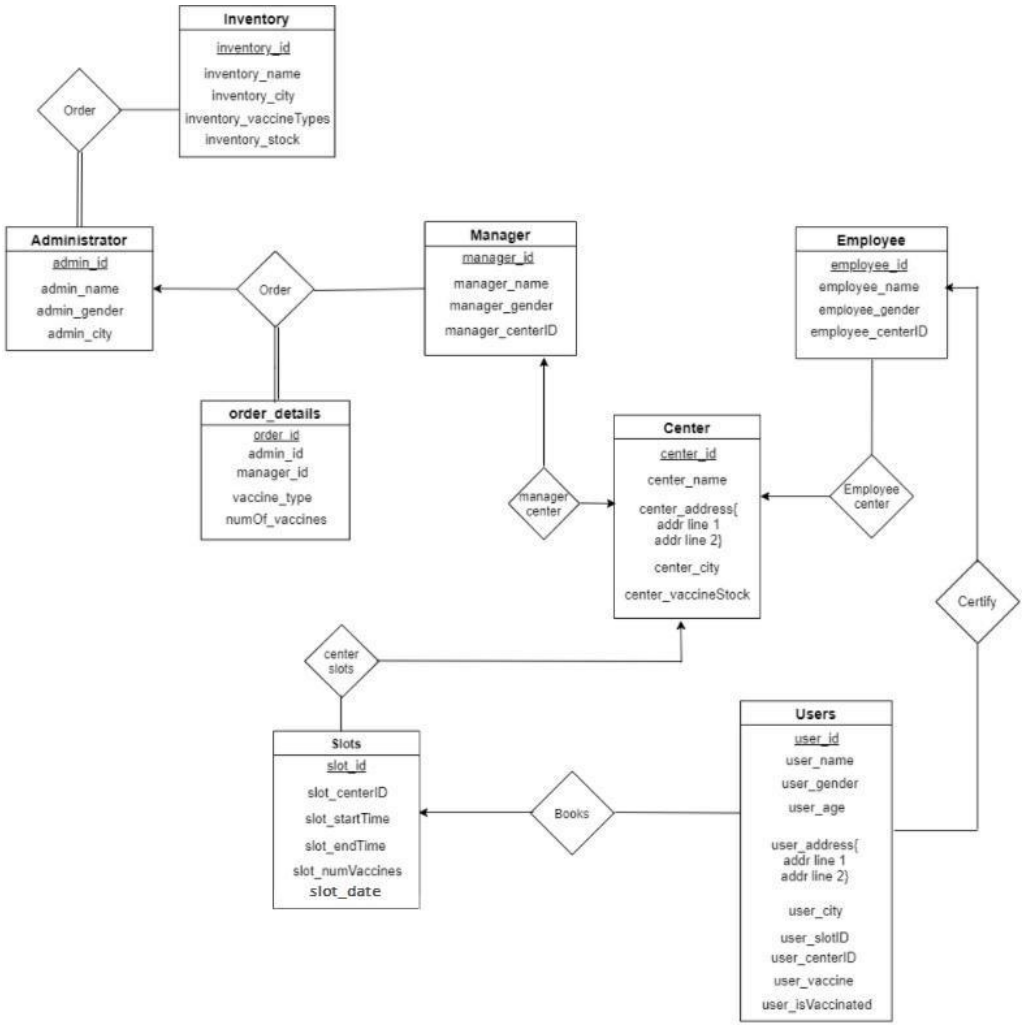
Proper steps	Vague
Administration location	attribute
Daily basis	Vague
Threshold values	Irrelevant
Upper level	vague

Section 3
ER Diagrams All versions

Develop the ER Diagram (ERD):

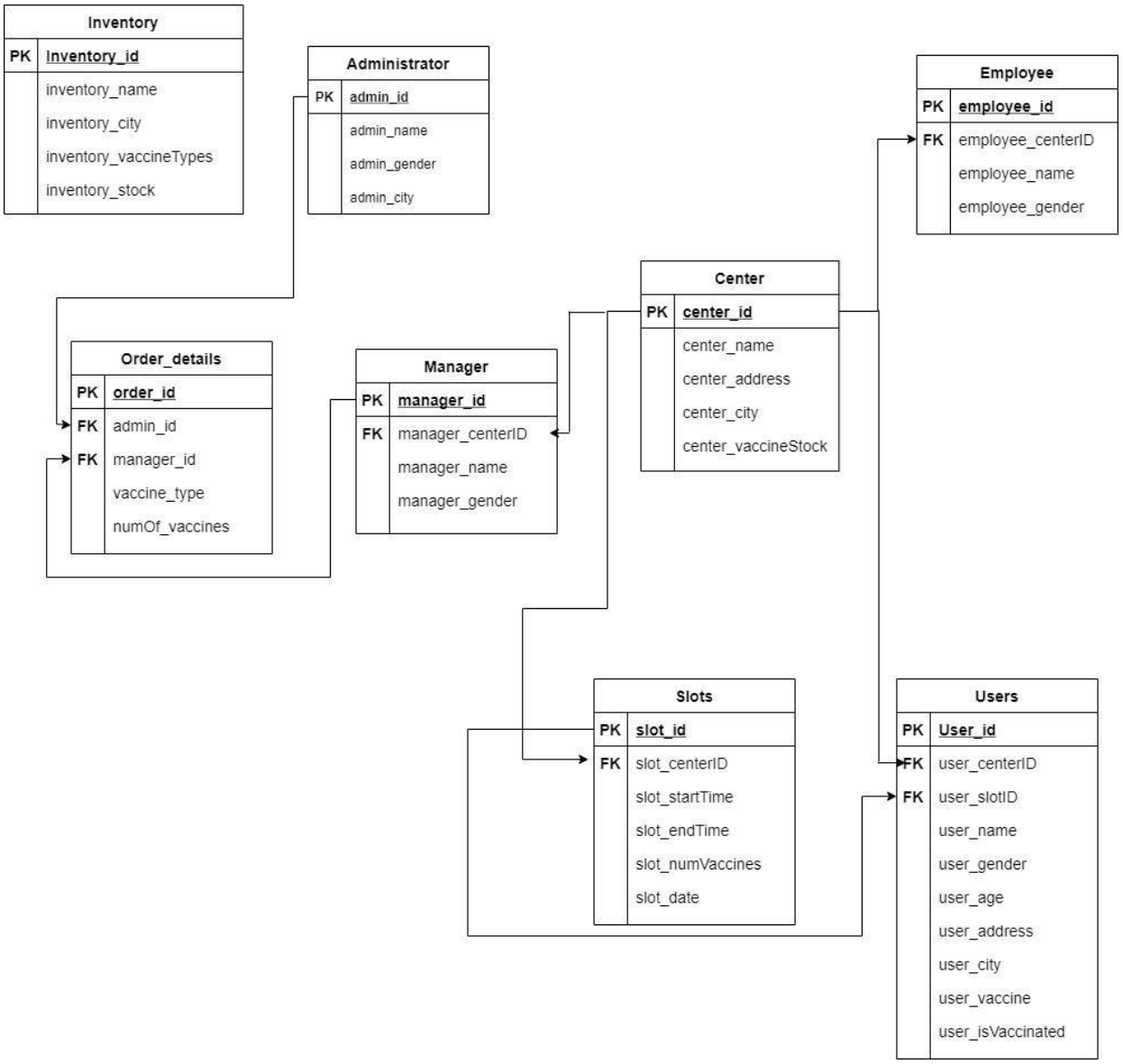


ER Diagram Final:



Section 4
Conversion of Final ER-Diagram to Relational Model

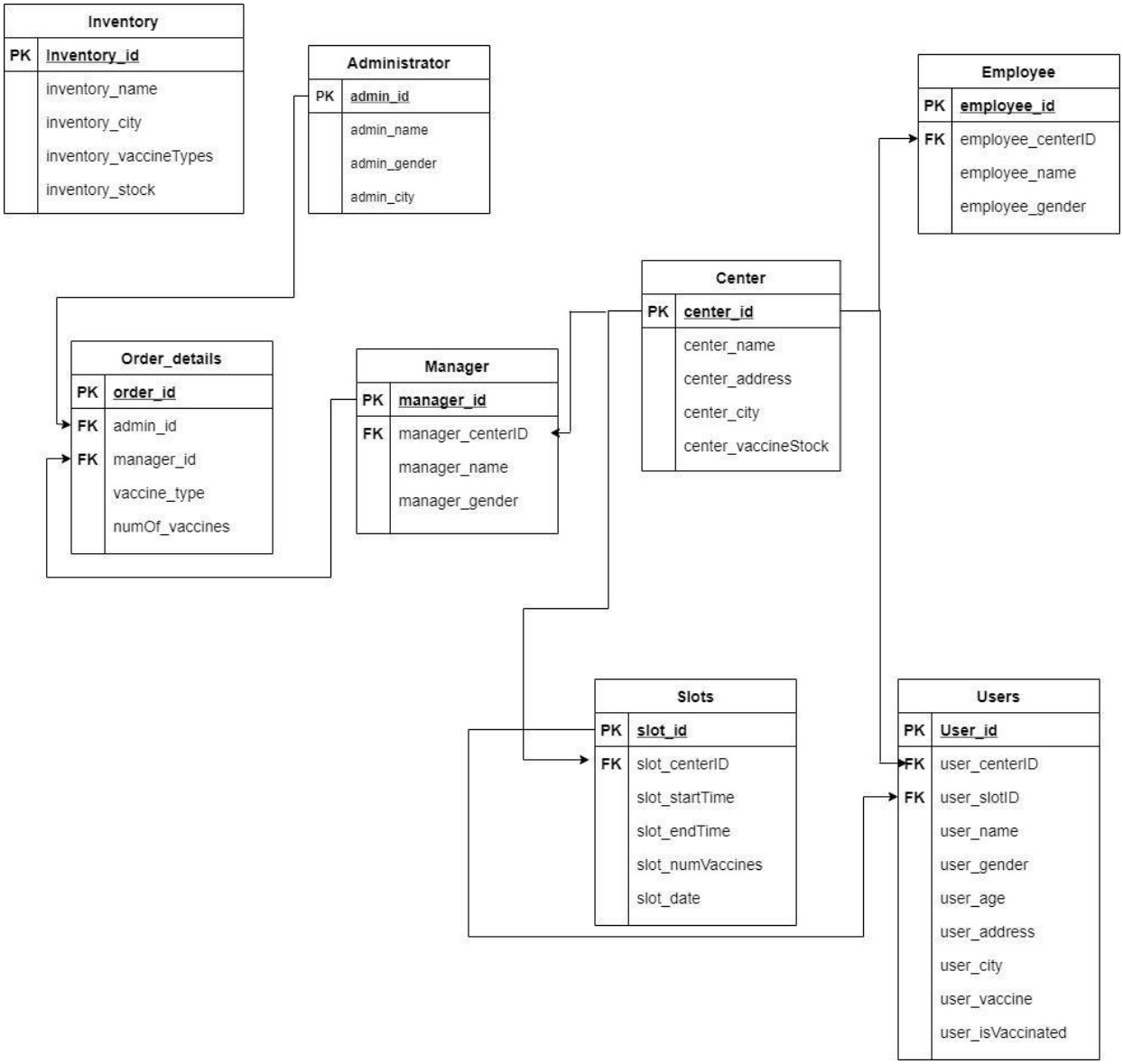
Relational Model:



Section 5
Normalization
And
Schema Refinement

Original Design of Database

Relational Schema



Documentation of Normalization & Schema Refinement

Functional Dependencies:

Administrator
Primary Key = admin_id
Admin_id -> admin_name
Admin_id -> admin_gender
Admin_id -> admin_city

Center
Primary key = center_id
Center_id -> center_name
Center_id -> center_address
Center_id -> center_city
Center_id -> center_vaccineStock

Employee
Primary key = employee_id
Foreign key = employee_centerID
Employee_id -> employee_name
Employee_id -> employee_gender

Manager
Primary key = manager_id
Foreign key = manager_centerID
Manager_id -> manager_name
Manager_id -> manager_gender

Order details
Primary key = order_id
Foreign key = admin_id, manager_id
Order_id -> vaccine_type
Order_id -> numOf_vaccines

Inventory
Primary key = Inventory_id
Inventory_id -> inventory_name
Inventory_id -> inventory_city
Inventory_id -> inventory_vaccineTypes
Inventory_id -> inventory_stock

Slots
Primary key = slot_id
Foreign key = slot_centerID
Slot_id -> slot_startTime
Slot_id -> slot_endTime
Slot_id -> slot_numVaccines
Slot_id -> slot_date

Users
Primary key = user_id
Foreign key = user_centerID, user_slotID
User_id -> user_name
User_id -> user_gender
User_id -> user_age
User_id -> user_address
User_id -> user_city
User_id -> user_vaccine
User_id -> user_isVaccinated

Normalization to 1NF:

In the 1NF form in each and every relation of the Database, there should not be any repeating columns within a row or not multivalued columns.

Here, in our database design, all the listed attributes in the relations are atomic, also wherever we have the address attribute in the relation, we stored the address in a single string. We are also considering only one entry of each of the attributes. So the above database design is the 1NF normalized form.

Normalization to 2NF:

In the 2NF normalized form, each and every relationship should be in the 1NF form also there should not be any partial dependencies in the relations. Partial dependency means that no nonprime attributes are dependent on any proper subset of the candidate key of the relation.

For any database design relations with only one Primary key (not composite) are already in the 2NF form.

Here from the above functional dependencies, it is clear that this database design has no composite primary keys, hence no partial dependencies. So this design is already in the 2NF normalized form.

Normalization to 3NF

For the relations to be in the 3NF, all the relations at first have to be 2NF form, and for the 3NF there should not be any transitive functional dependencies in the relations for the non-prime attributes. So there are not any functional dependencies such as non-prime -> non-prime. So this database design is already in the 3NF normalized form.

Normalization to BCNF

For the relation to be in BCNF form, iff all the functional dependencies have a super key as its left-hand side, no non-prime attribute can be on the left-hand side. In our database, all the functional dependencies have a primary key(i.e prime attribute) as their left-hand side. Also, all the foreign keys included in all the relations are the primary keys of the referenced tables.

Relation/Schema	Update	Delete
Inventory	It'll not affect the relation	It'll not affect the relation
Administrator	It'll update the foreign keyed entries of the order_detail relation.	It'll delete the foreign keyed entries of the order_detail relation.
Center	It'll update the slot, employee, manager, and user relations.	It'll delete the foreign keyed entries of all the relations except users.
Slots	It'll update the users foreign keyed entries.	It'll set the null value to the foreign keyed entries of the users relation.
Manager	It'll update the foreign keyed entries of the order_detail relation.	It'll delete the foreign keyed entries of the order_detail relation.
Order_details	It'll not affect the relation	It'll not affect the relation
Employee	It'll not affect the relation	It'll not affect the relation
Users	It'll not affect the relation	It'll not affect the relation

NOTE - Here there are no insertion anomalies in any of the relations.

Section 6
SQL

Final DDL Scripts:

- **Inventory Table**

```
CREATE TABLE Inventory
(
    inventory_id int not null,
    inventory_name varchar(100) not null,
    inventory_city varchar(100) not null,
    inventory_vaccineTypes varchar(200) not null,
    inventory_stock Int not null default 0,
    primary key (inventory_id),
    check(inventory_stock>=0)
);
```

- **Administrator Table**

```
CREATE TABLE Administrator
(
    admin_id int not null,
    admin_name varchar(50) not null,
    admin_gender varchar(6) not null,
    admin_city varchar(30) not null,
    primary key (admin_id),
    check(admin_gender in ('Female','Male'))
);
```

- **Center Table**

```
CREATE TABLE Center
(
    center_id int not null,
    center_name varchar(50) not null,
    center_address varchar(200) not null,
    center_city varchar(30) not null,
    center_vaccineStock int not null default 0,
    primary key (center_id),
    check(center_vaccineStock>=0)
);
```

- **Slots Table**

```
CREATE TABLE Slots
(
    slot_id int not null,
    slot_centerID int,
    slot_startTime varchar not null default '00:00',
    slot_endTime varchar not null default '00:00',
    slot_numVaccines int not null default 0,
```

```
    Slot_date varchar not null default '00.00.0000',
    check (slot_numVaccines>=0),
    primary key (slot_id),
    foreign key (slot_centerID) references Center(center_id) on delete cascade on update cascade
);
```

- ## Manager Table

```
CREATE TABLE Manager
(
    manager_id int not null,
    manager_centerID int,
    manager_name varchar(50) not null,
    manager_gender varchar(6) not null,
    primary key (manager_id),
    foreign key (manager_centerID) references Center(center_id) on delete cascade on update cascade,
    check(manager_gender in ('Female','Male'))
);
```

- ## Order_details Table

```
CREATE TABLE Order_details
(
    order_id int not null,
    admin_id int,
    manager_id int,
    vaccineType varchar(200),
    numOf_vaccines int default 0,
    primary key (order_id),
  foreign key (admin_id) references administrator(admin_id) on delete cascade on update cascade,
  foreign key (manager_id) references manager(manager_id) on delete cascade on update cascade );
```

- ## Employee Table

```
CREATE TABLE Employee
(
    employee_id int not null,
    employee_centerID int,
    employee_name varchar(50) not null,
    employee_gender varchar(6) not null,
    primary key (employee_id),
    foreign key (employee_centerID) references Center(center_id) on delete cascade on update cascade,
    check(employee_gender in ('Female','Male'))
);
```

- **Users Table**

```
CREATE TABLE Users
(
    user_id int not null,
    user_centerID int,
    user_slotID int,
    user_name varchar(50) not null,
    user_gender varchar(6) not null,
    user_age int,
    user_address varchar(200) not null,
    user_city varchar(30) not null,
    user_vaccine varchar(200) default null,
    user_isVaccinated char(1) default 'N',

    primary key (user_id),
    foreign key (user_centerID) references Center(center_id) on delete set null on update cascade,
    foreign key (user_slotID) references Slots(slot_id) on delete set null on update cascade,
    check(user_gender in ('Female','Male')),
    check(user_age>0),
    check (user_isVaccinated in ('Y','N','y','n'))
);
```

Final Table Schema

Inventory(<u>Inventory_id,</u> inventory_name, inventory_city, inventory_vaccineTypes, inventory_stock**)**

Administrator(<u>admin_id,</u> admin_name ,admin_gender, admin_city)

Center(<u>center_id</u>, center_name, center_address, center_city, center_vaccineStock)

Slots(<u>slot_id</u>, slot_centerID, slot_startTime, slotendTime, slot_numVaccines)

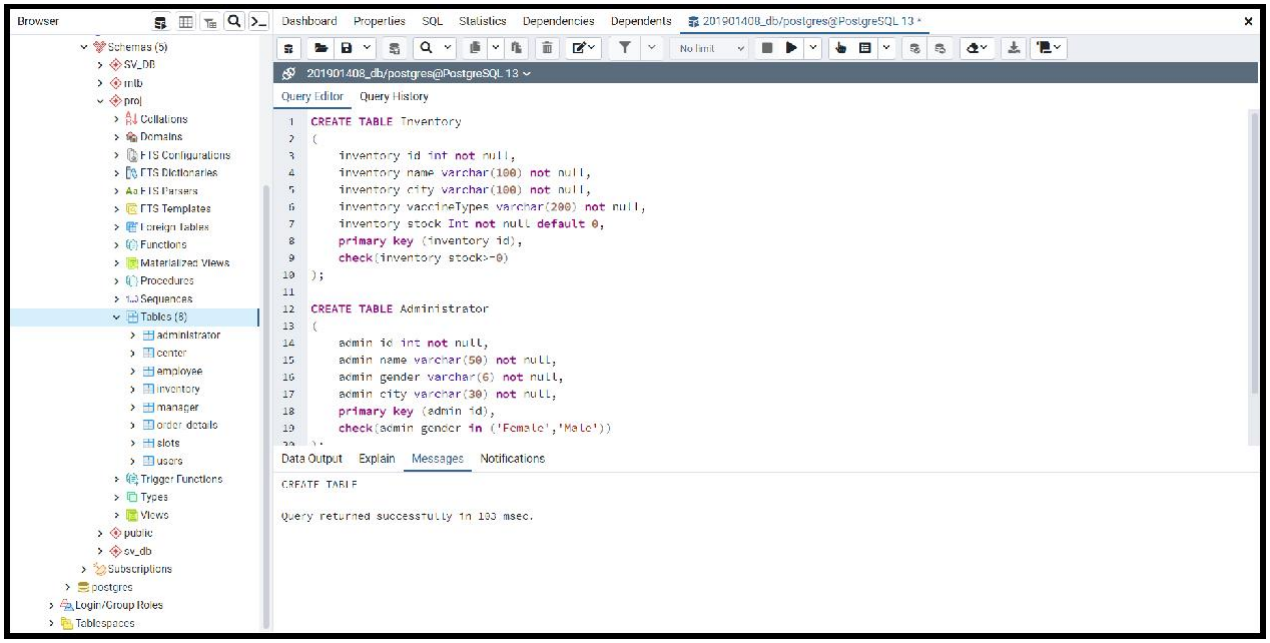
Manager(<u>manager_id,</u> manager_centerID, manager_name, manager_gender)

Order_details(<u>order_id,</u> admin_id, manager_id, vaccineType, numOf_vaccines)

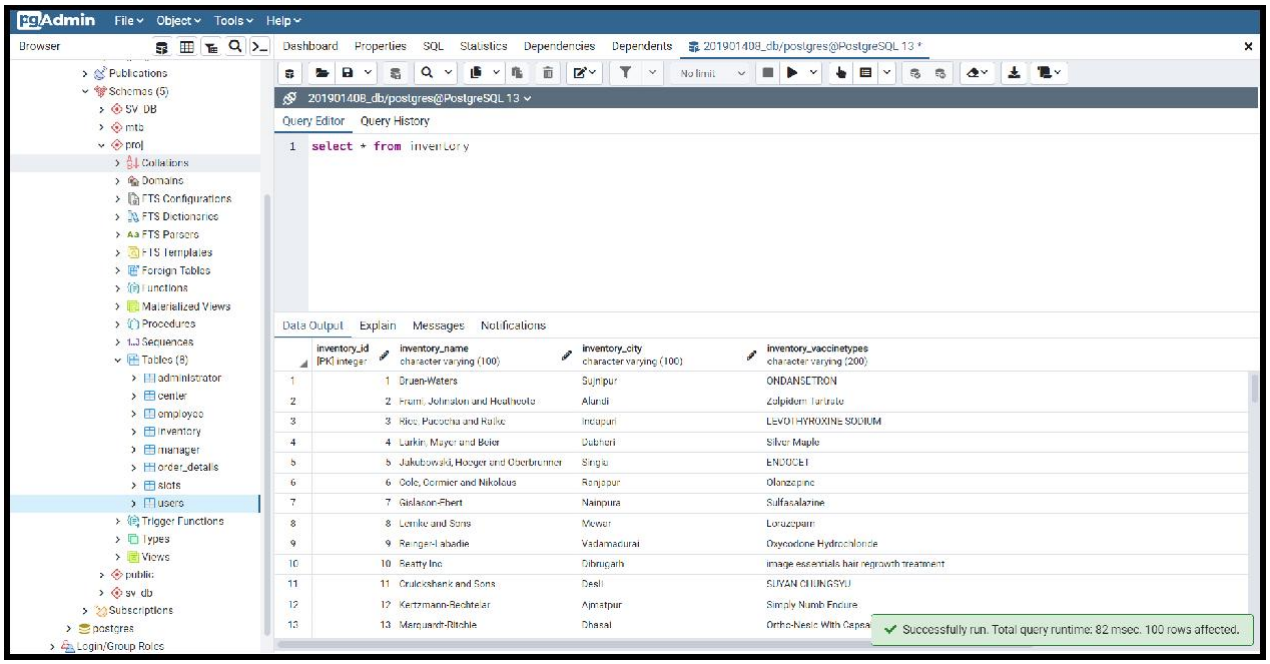
Employee(<u>employee_id,</u> employee_centerID, employee_name, employee_gender)

Users(<u>user_id</u>, user_centerID, user_slotID, user_name, user_gender, user_age, user_address, user_city, user_vaccine, user_isVaccinated)

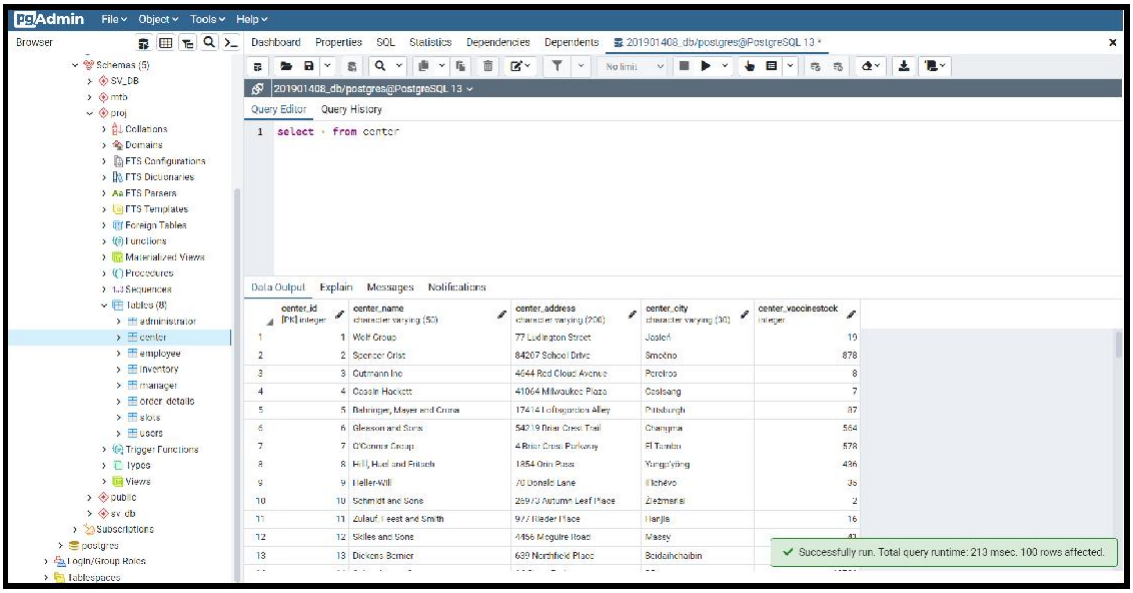
Creation of Tables



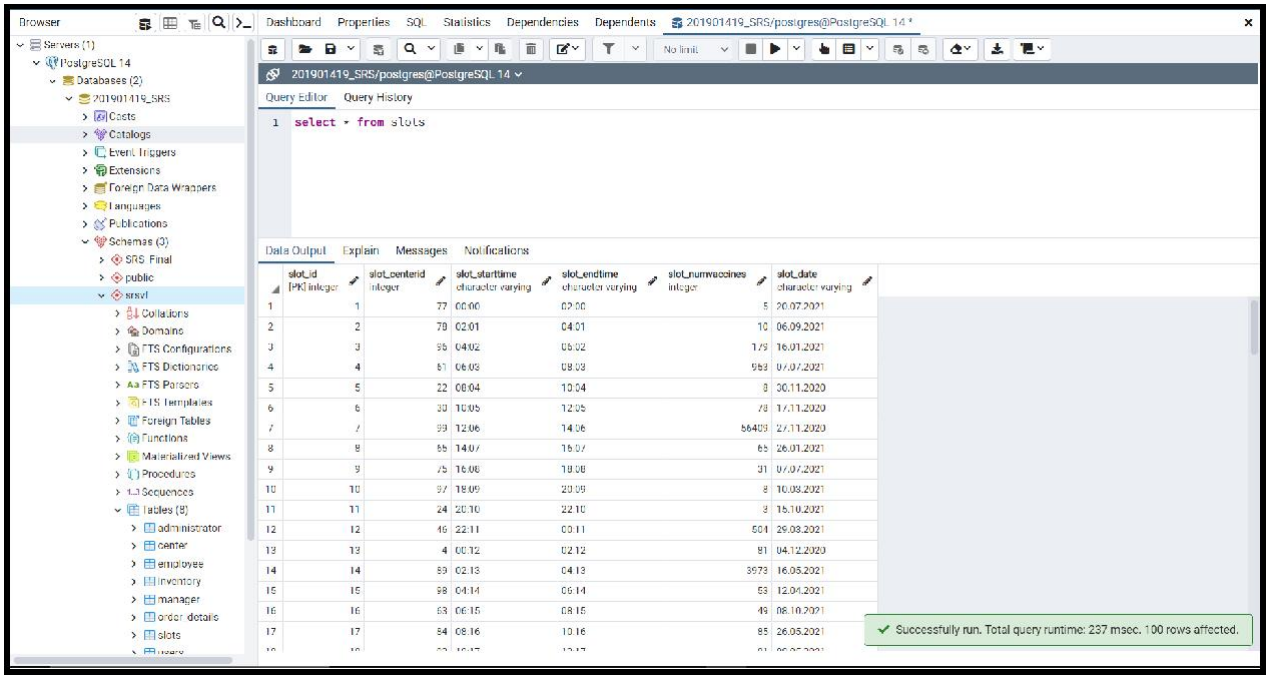
Inventory Data



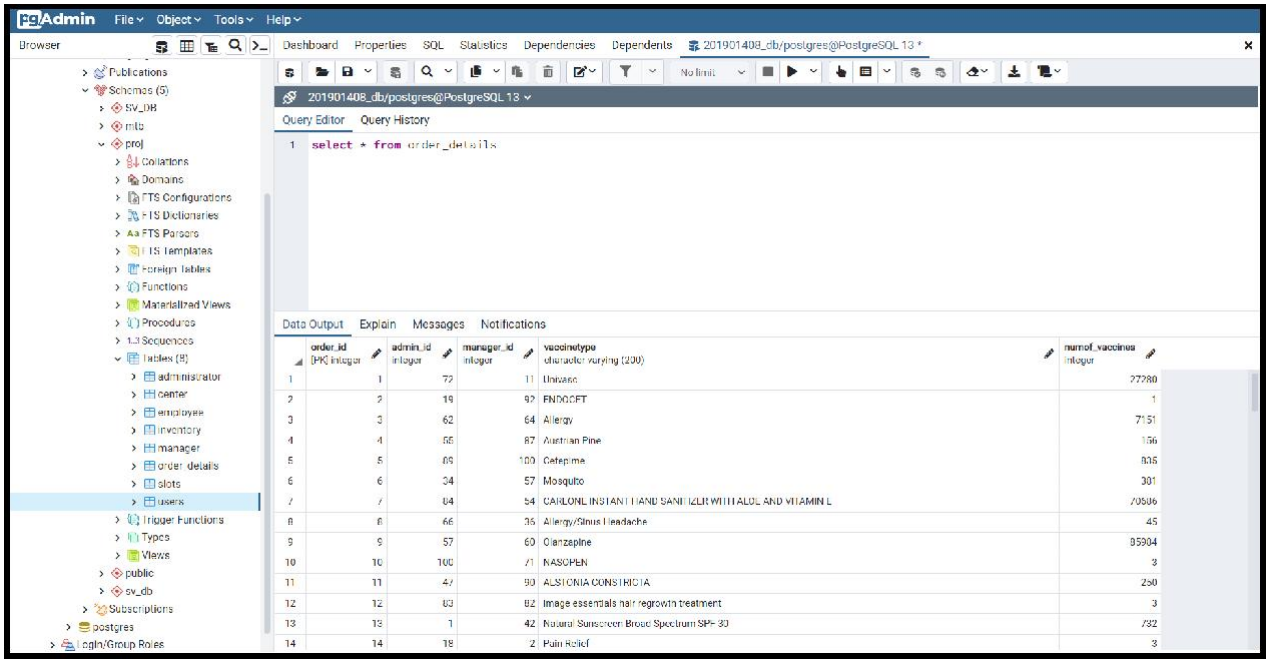
Center Data



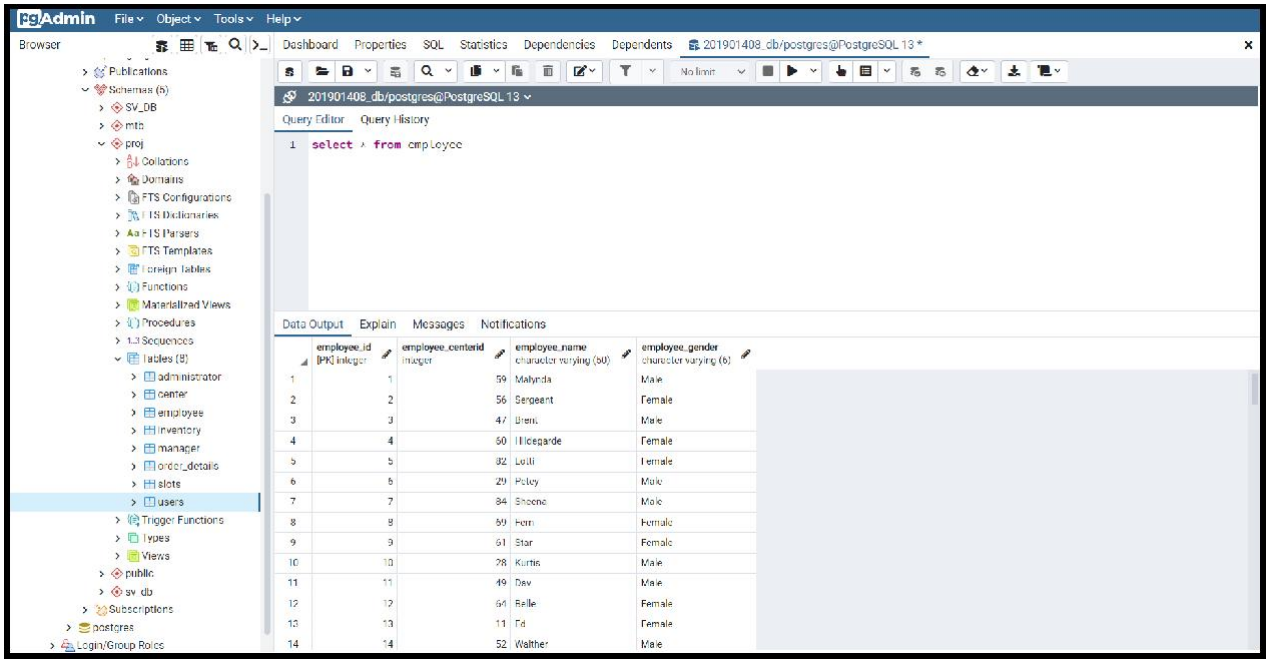
Slots Data



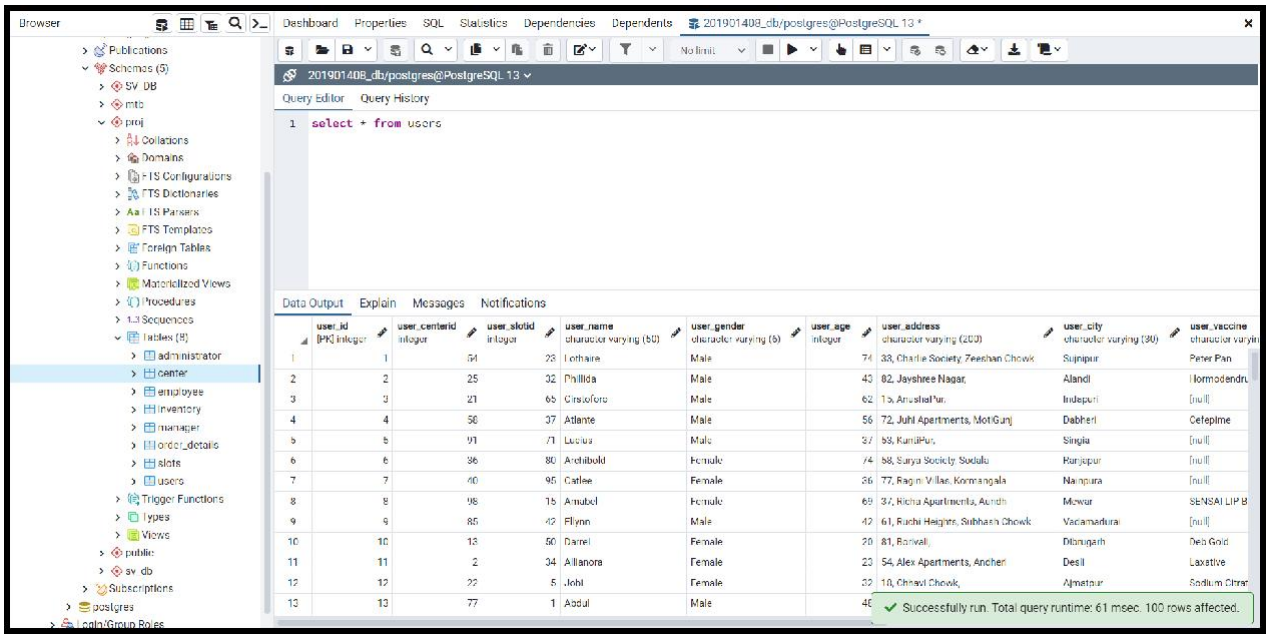
Order Details Data



Employee Data



Users Data

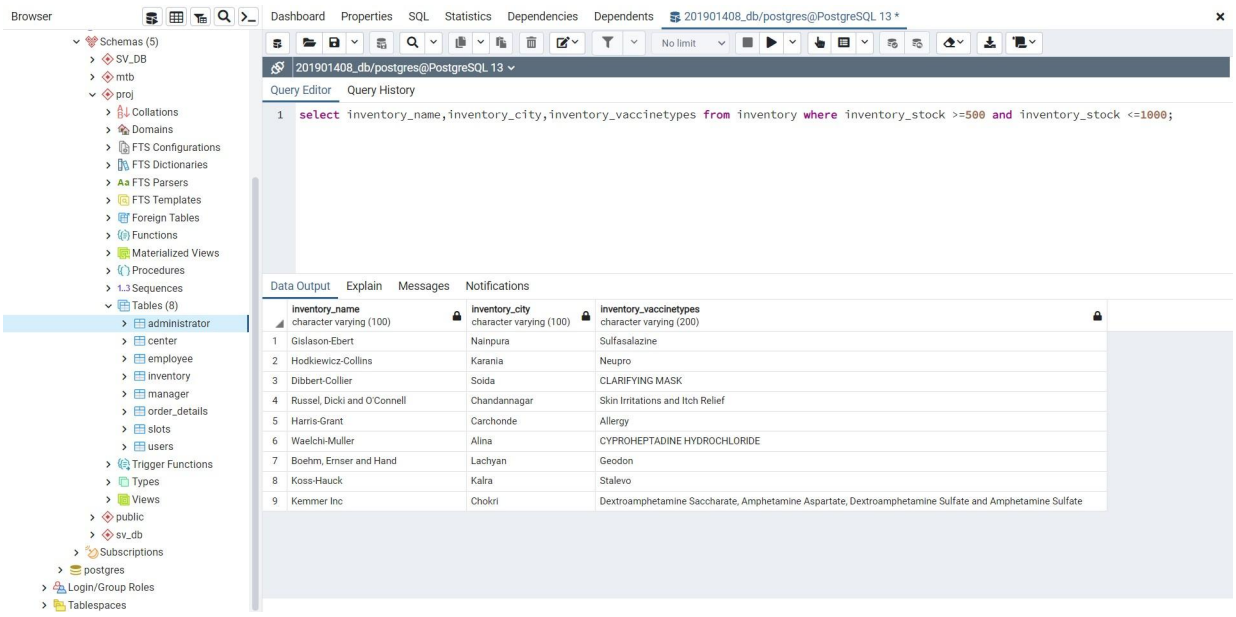

Browser
Dashboard
Properties
SQL
Statistics
Dependencies
Dependents
201901408_db/postgres@PostgreSQL 13 *
No limit
201901408_db/postgres@PostgreSQL 13
Query Editor
Query History
1 select * from users
Data Output
Explain
Messages
Notifications
user_id [PK] integer
user_centerid integer
user_slotid integer
user_name character varying (50)
user_gender character varying (5)
user_age integer
user_address character varying (200)
user_city character varying (30)
user_vaccine
1 1 54 23 Lothaire Male 74 33, Charlie Society, Zeeshan Chowk Sujnipur Peter Pan
2 2 25 32 Phillida Male 43 82, Jayshree Nagar, Alandi Normodendru
3 3 21 65 Cristoforo Male 62 15, Anushal Nir, Indepuri [null]
4 4 56 37 Atlante Male 56 72, Juhi Apartments, Moti Gunj Dabheri Cefepime
5 5 91 71 Lucius Male 37 93, Kunal Pur, Singia [null]
6 6 36 80 Archibold Female 74 58, Surya Society, Sodala Ranjapur [null]
7 7 40 95 Carlee Female 36 77, Ragini Villas, Kormangala Nanpura [null]
8 8 98 15 Amabel Female 69 37, Richa Apartments, Aundh Mewar SENSAI LIP B
9 9 85 42 Flynn Male 42 61, Ruchi Heights, Subhash Chowk Vadamadurai [null]
10 10 13 50 Darrel Female 20 81, Borivali, Dhanigarh Deb Gold
11 11 2 34 Allanora Female 23 54, Alex Apartments, Andheri Desil Laxative
12 12 22 5 Jobi Female 32 10, Chaval Chowk, Almatpur Sodium Chlor
13 13 77 1 Abdul Male 48
Successfully run. Total query runtime: 61 msec. 100 rows affected.

SQL Queries

1. List all the Inventories which have vaccine stock in between 500 and 1000.

SQL Query :

select inventory_name,inventory_city,inventory_vaccinetypes from inventory where inventory_stock >=500 and inventory_stock <=1000;

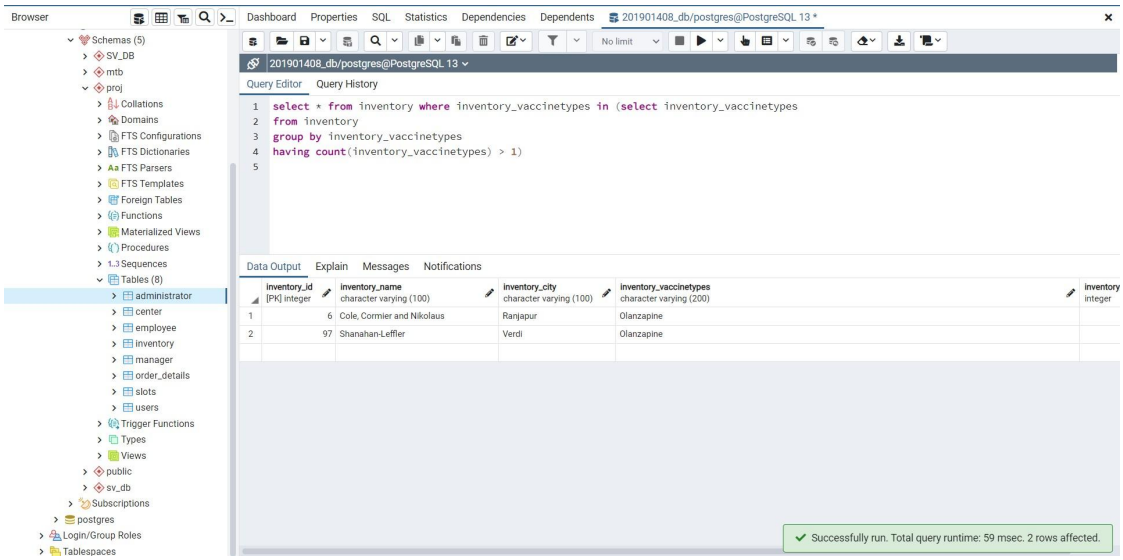


	inventory_name character varying (100)	inventory_city character varying (100)	inventory_vaccinetypes character varying (200)
1	Gislason-Ebert	Nainpura	Sulfasalazine
2	Hodkiewicz-Collins	Karania	Neupro
3	Dibbert-Collier	Soida	CLARIFYING MASK
4	Russel, Dicki and O'Connell	Chandannagar	Skin Irritations and Itch Relief
5	Harris-Grant	Carchonde	Allergy
6	Waelchi-Muller	Alina	CYPROHEPTADINE HYDROCHLORIDE
7	Boehm, Ernser and Hand	Lachyan	Geodon
8	Koss-Hauck	Kalra	Stalevo
9	Kemmer Inc	Chokri	Dextroamphetamine Saccharate, Amphetamine Aspartate, Dextroamphetamine Sulfate and Amphetamine Sulfate

2. List all the inventories which have the same vaccine Types in stock.

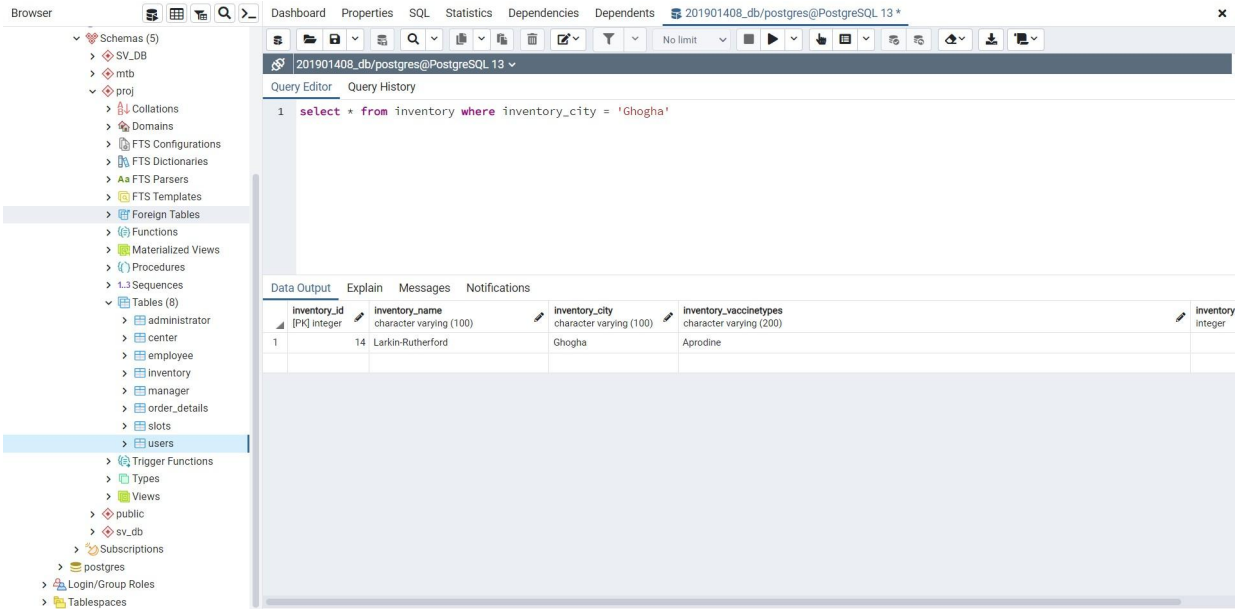
SQL Query :

select * from inventory where inventory_vaccinetypes in (select inventory_vaccinetypes
from inventory group by inventory_vaccinetypes having count(inventory_vaccinetypes) > 1)



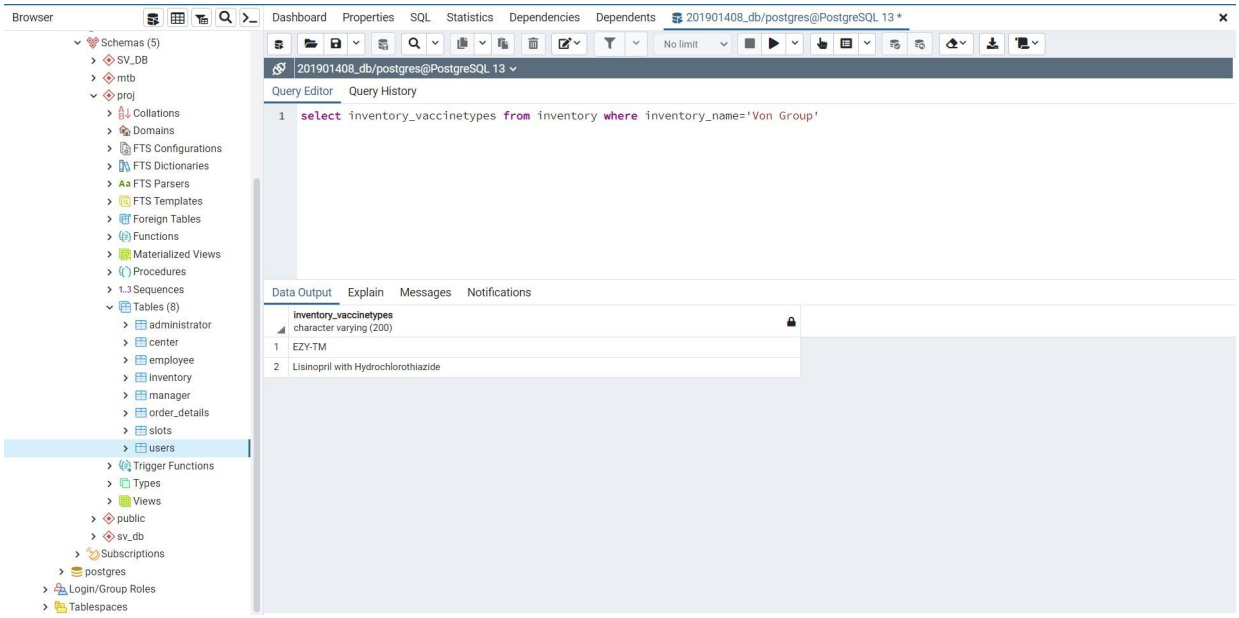
3. Provide the inventory details of the inventory which is located in Ghogha City.

SQL Query = select * from inventory where inventory_city = 'Ghogha'



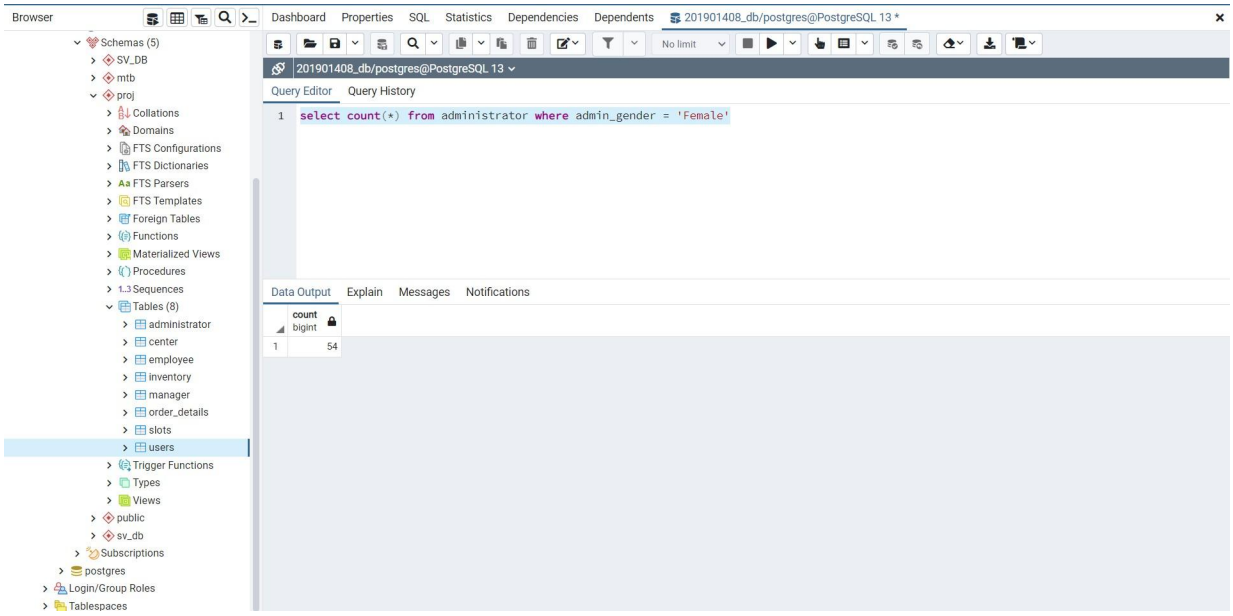
4. List all the vaccine types which are available at Von group inventory.

SQL Query = select inventory_vaccinetypes from inventory where inventory_name='Von Group'



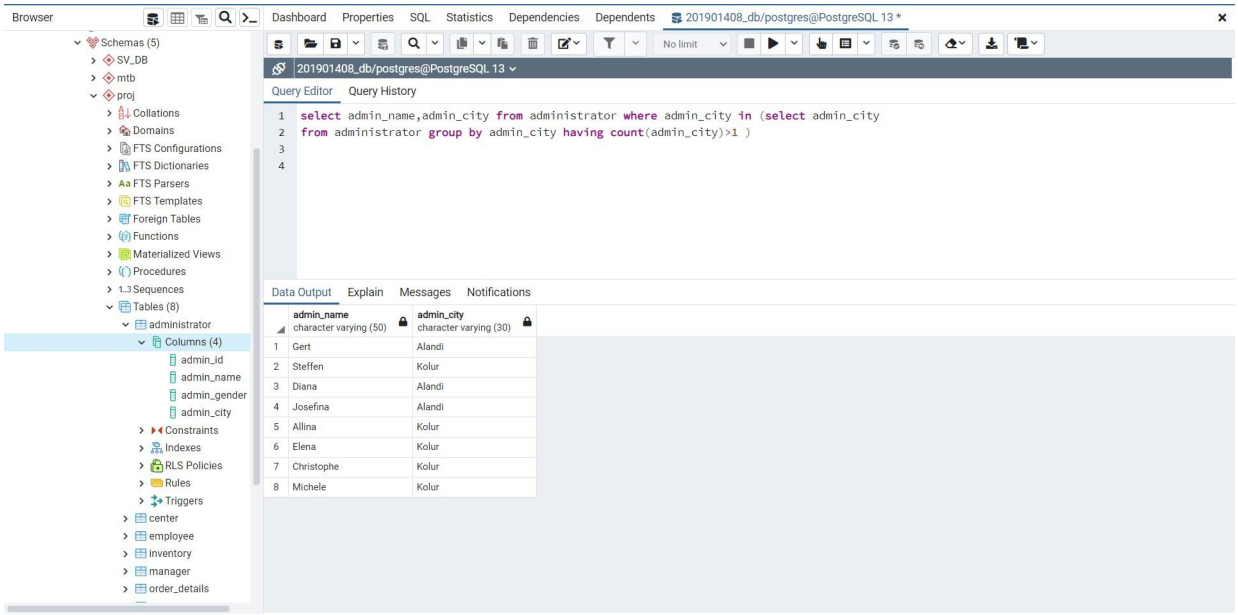
5. Give the count of the male administrator.

SQL Query = select count(*) from administrator where admin_gender = 'Male'



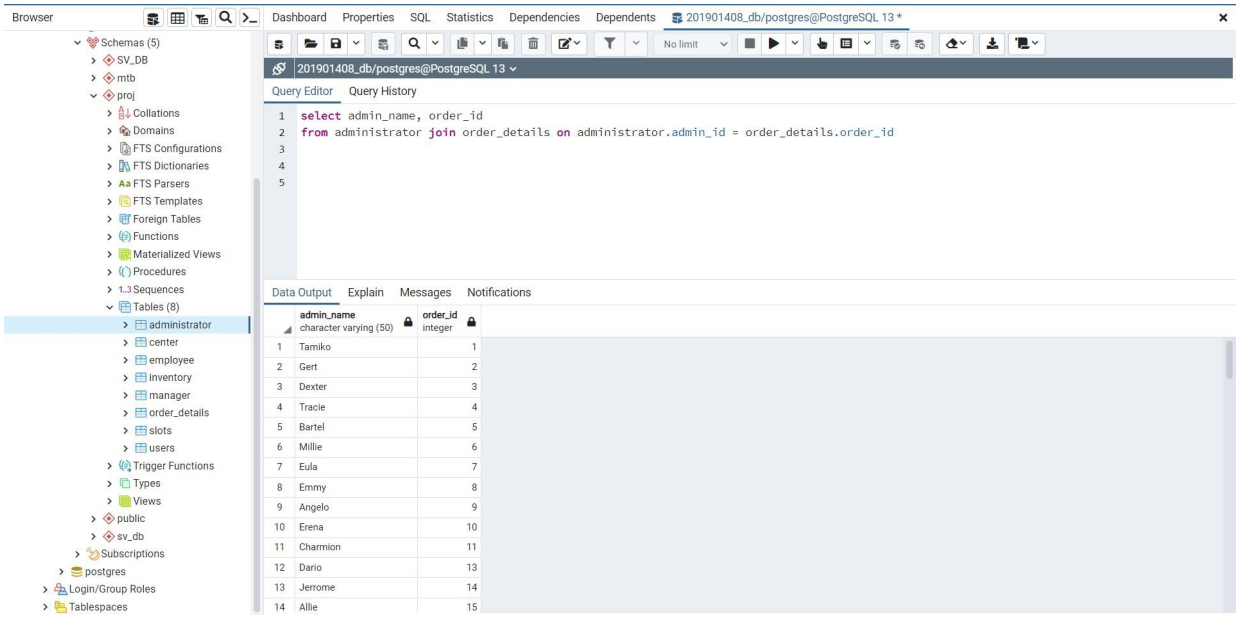
6. List all the admin cities having at least two administrators.

SQL Query - select admin_name,admin_city from administrator where admin_city in (select admin_city from administrator group by admin_city having count(admin_city)>1)



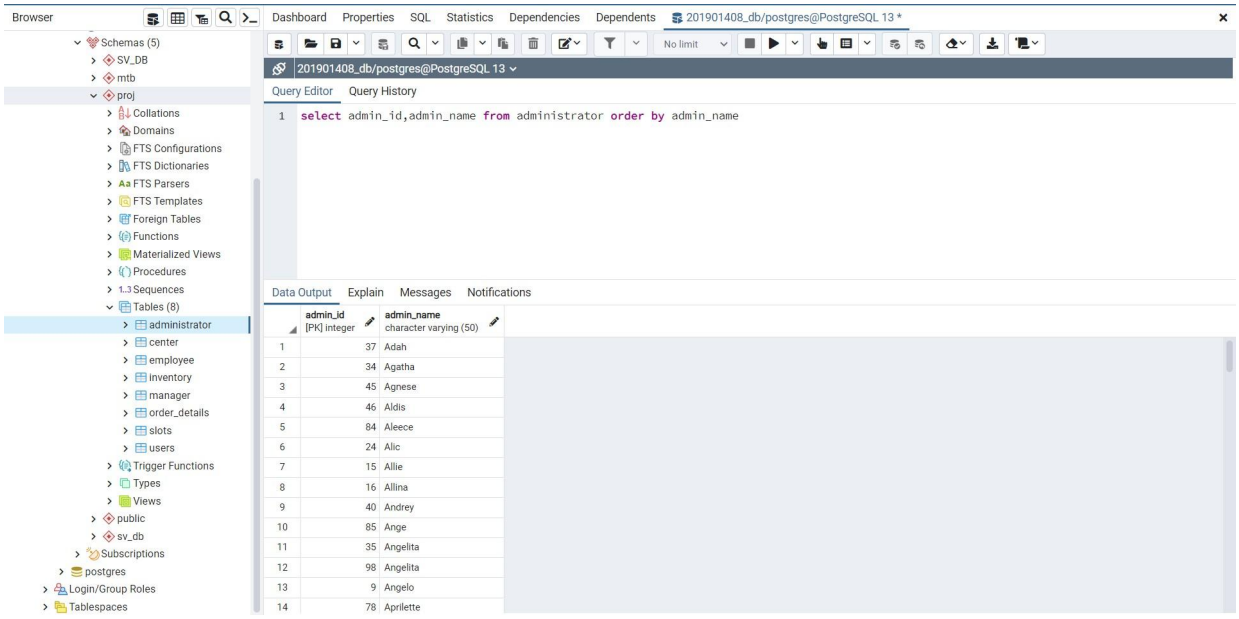
7. Provide the administrator names who have ordered some vaccines.

SQL Query - select admin_name, order_id
from administrator join order_details on administrator.admin_id = order_details.order_id



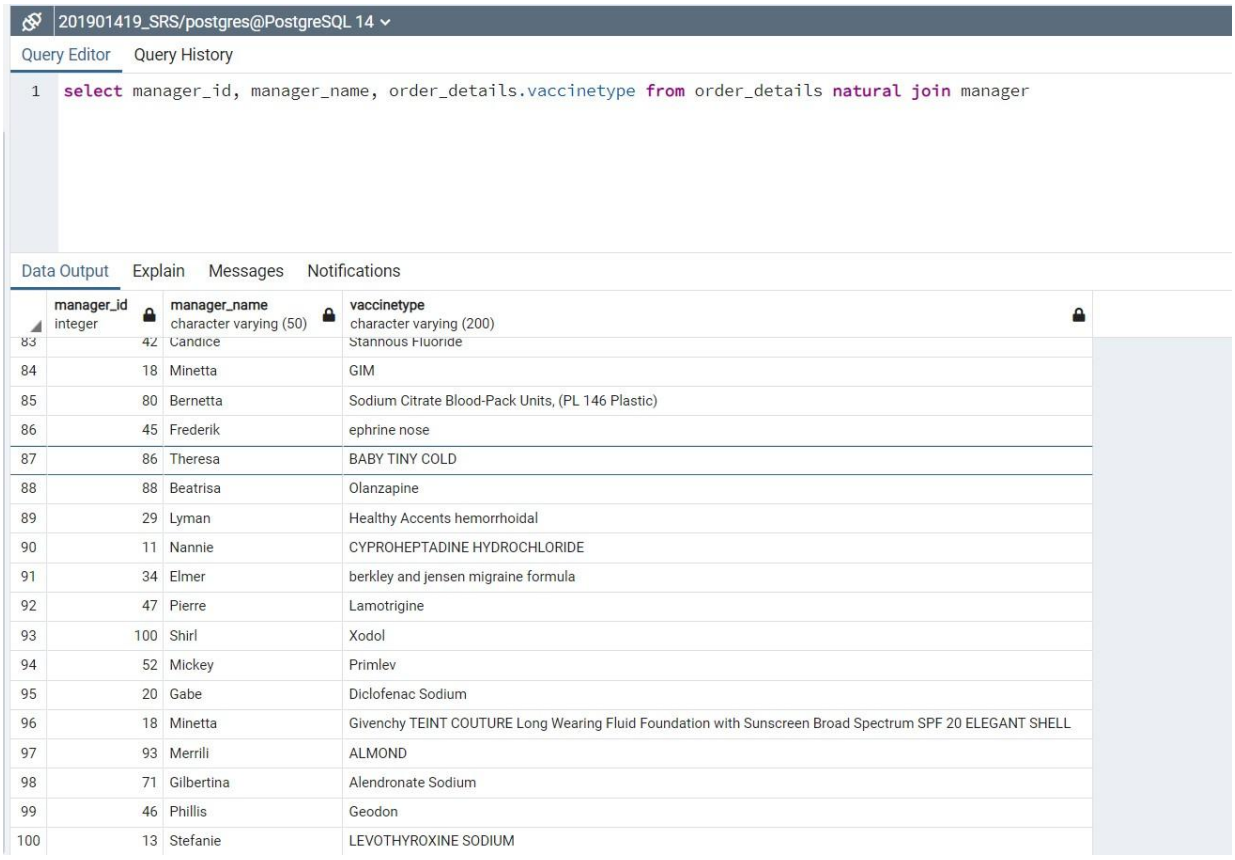
8. Provide the administrator id and administrator name in ascending order of their names.

SQL Query - select admin_id,admin_name from administrator order by admin_name



9. **Find out which manager has requested the order of which vaccine and the quantity of the vaccine.**

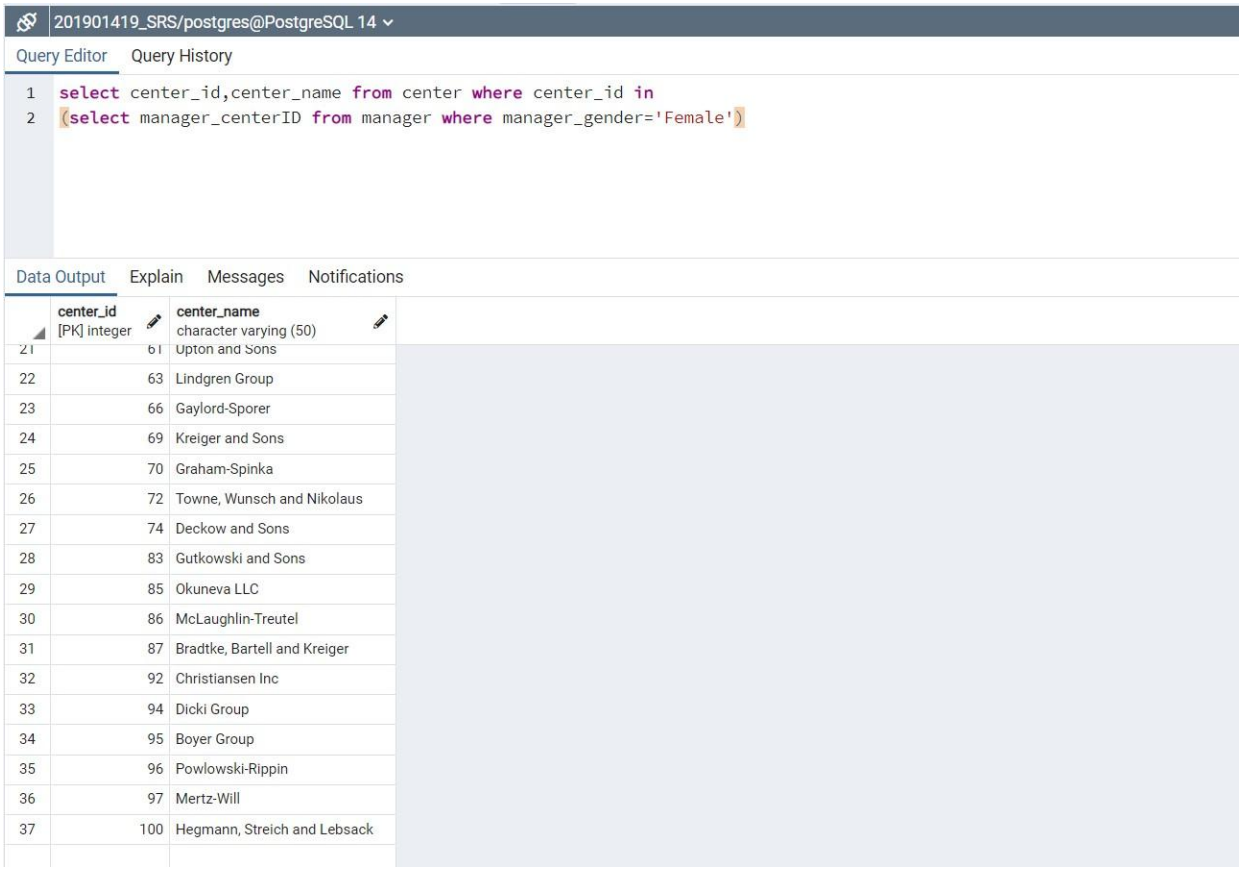
SQL Query = select manager_id, manager_name, order_details.vaccinetype from order_details natural join manager



	manager_id integer	manager_name character varying (50)	vaccinetype character varying (200)
83	42	Candice	Stannous Fluoride
84	18	Minetta	GIM
85	80	Bernetta	Sodium Citrate Blood-Pack Units, (PL 146 Plastic)
86	45	Frederik	ephrine nose
87	86	Theresa	BABY TINY COLD
88	88	Beatrisa	Olanzapine
89	29	Lyman	Healthy Accents hemorrhoidal
90	11	Nannie	CYPROHEPTADINE HYDROCHLORIDE
91	34	Elmer	berkley and jensen migraine formula
92	47	Pierre	Lamotrigine
93	100	Shirl	Xodol
94	52	Mickey	Primlev
95	20	Gabe	Diclofenac Sodium
96	18	Minetta	Givenchy TEINT COUTURE Long Wearing Fluid Foundation with Sunscreen Broad Spectrum SPF 20 ELEGANT SHELL
97	93	Merrili	ALMOND
98	71	Gilbertina	Alendronate Sodium
99	46	Phillis	Geodon
100	13	Stefanie	LEVOTHYROXINE SODIUM

10. Find the centers which have female managers.

SQL Query - select center_id,center_name from center where center_id in
(select manager_centerID from manager where manager_gender='Female')



11. Count the respective number of employees to the respective centers.

SQL Query = select center_id,center_name,count(employee_id) as Employees from center join employee on center_id=employee_centerid group by center_id

Query Editor | Query History

```
1  select center_id,center_name,count(employee_id) as Employees from center join employee on center_id=empl
```

Data Output | Explain | Messages | Notifications

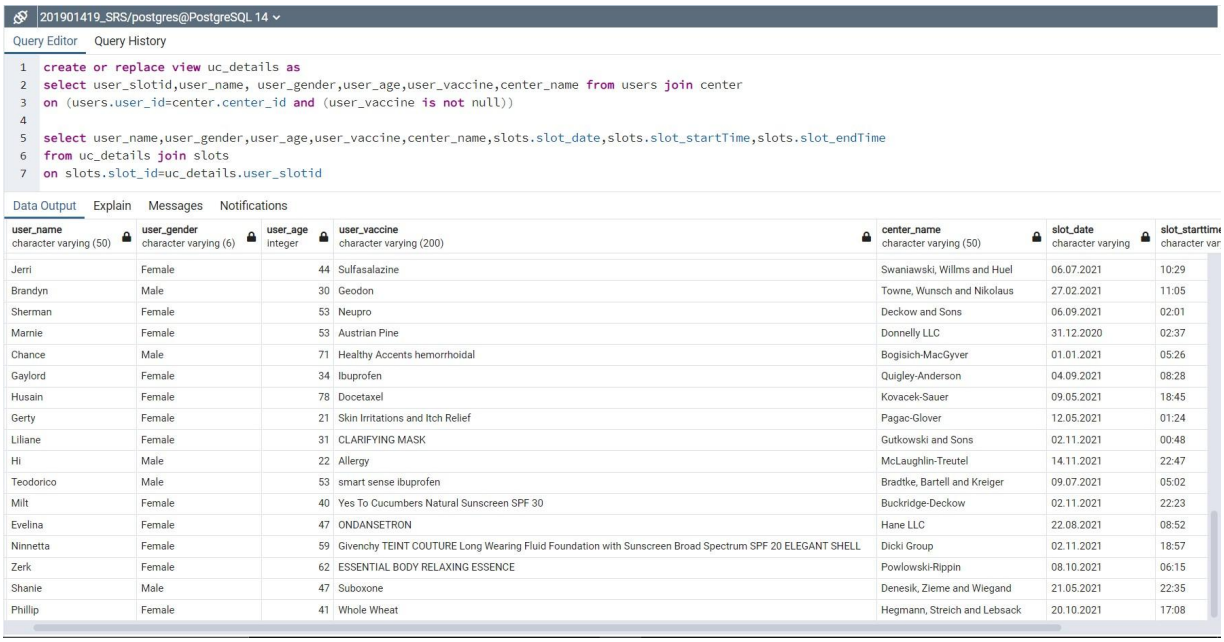
	center_id [PK] integer	center_name character varying (50)	employees bigint
1	87	Bradtke, Bartell and Kreiger	2
2	29	McKenzie-Hammes	1
3	71	Swaniawski, Willms and Huel	2
4	68	Murray, Ratke and Goldner	1
5	34	Braun, Thompson and Leffler	1
6	51	Wilkinson Group	1
7	96	Powlowski-Rippin	1
8	70	Graham-Spinka	1
9	52	Kihn, Cartwright and Waters	1
10	67	Price Group	1
11	63	Lindgren Group	1
12	90	Kautzer-Zieme	1
13	10	Schmidt and Sons	1
14	45	Emard, Waelchi and Howell	1
15	6	Gleason and Sons	1
16	84	Wolf Group	3
17	39	Ortiz Group	1
18	89	Hane LLC	1

12. Provide the details of the users along with their center name and slot start time with end time, date who have taken the vaccination.

SQL Query

```
create or replace view uc_details as
select user_slotid,user_name, user_gender,user_age,user_vaccine,center_name from users
join center on (users.user_id=center.center_id and (user_vaccine is not null))


Select user_name,user_gender,user_age,user_vaccine,center_name,slots.slot_date,slots.slot_startTime,
slots.slot_endTime
from uc_details join slots
on slots.slot_id=uc_details.user_slotid
```



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Query Editor | Query History

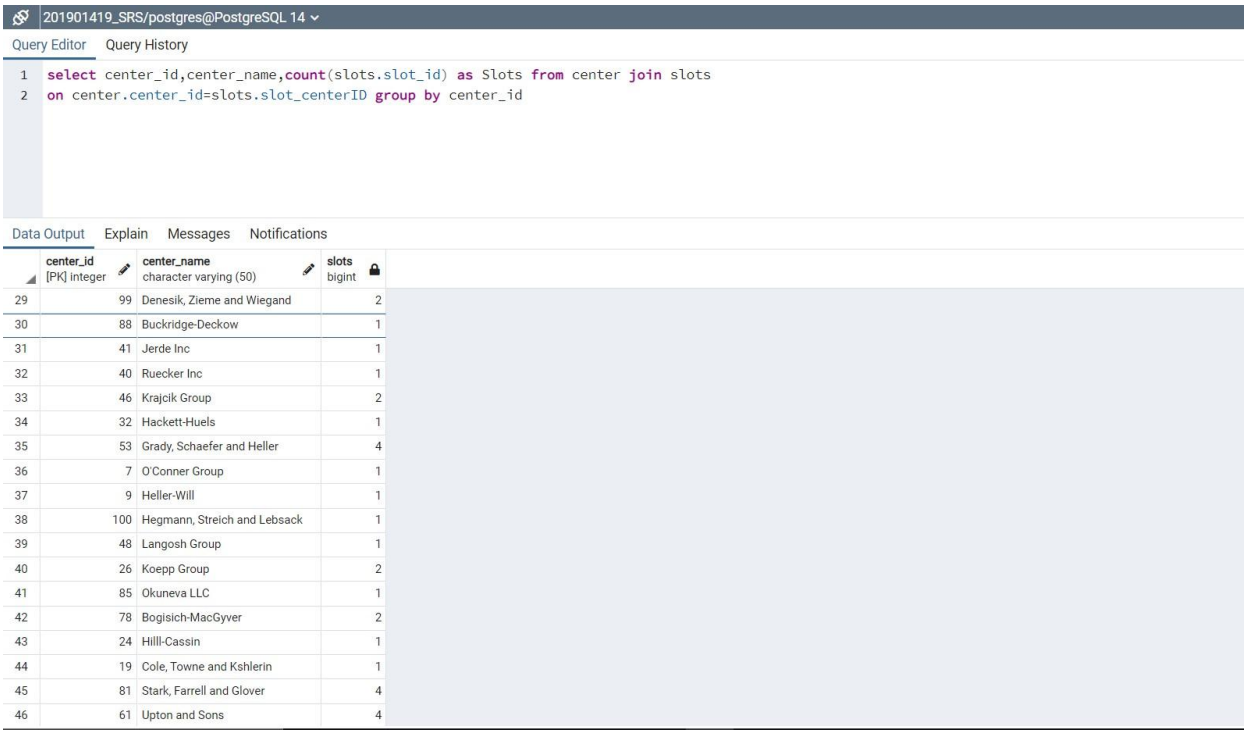
```
1  create or replace view uc_details as
2  select user_slotid,user_name, user_gender,user_age,user_vaccine,center_name from users join center
3  on (users.user_id=center.center_id and (user_vaccine is not null))
4
5  select user_name,user_gender,user_age,user_vaccine,center_name,slots.slot_date,slots.slot_startTime,slots.slot_endTime
6  from uc_details join slots
7  on slots.slot_id=uc_details.user_slotid
```

Data Output | Explain | Messages | Notifications

user_name character varying (50)	user_gender character varying (6)	user_age integer	user_vaccine character varying (200)	center_name character varying (50)	slot_date character varying	slot_starttime character var
Jerri	Female	44	Sulfasalazine	Swaniawski, Willms and Huel	06.07.2021	10:29
Brandyn	Male	30	Geodon	Towne, Wunsch and Nikolaus	27.02.2021	11:05
Sherman	Female	53	Neupro	Deckow and Sons	06.09.2021	02:01
Marnie	Female	53	Austrian Pine	Donnelly LLC	31.12.2020	02:37
Chance	Male	71	Healthy Accents hemorrhoidal	Bogisich-MacGyver	01.01.2021	05:26
Gaylord	Female	34	Ibuprofen	Quigley-Anderson	04.09.2021	08:28
Husain	Female	78	Docetaxel	Kovacek-Sauer	09.05.2021	18:45
Gerty	Female	21	Skin Irritations and Itch Relief	Pagac-Glover	12.05.2021	01:24
Liliane	Female	31	CLARIFYING MASK	Gutkowski and Sons	02.11.2021	00:48
Hi	Male	22	Allergy	McLaughlin-Treutel	14.11.2021	22:47
Teodorico	Male	53	smart sense ibuprofen	Bradtke, Bartell and Kreiger	09.07.2021	05:02
Milt	Female	40	Yes To Cucumbers Natural Sunscreen SPF 30	Buckridge-Deckow	02.11.2021	22:23
Evelina	Female	47	ONDANSETRON	Hane LLC	22.08.2021	08:52
Ninnetta	Female	59	Givenchy TEINT COUTURE Long Wearing Fluid Foundation with Sunscreen Broad Spectrum SPF 20 ELEGANT SHELL	Dicki Group	02.11.2021	18:57
Zerk	Female	62	ESSENTIAL BODY RELAXING ESSENCE	Powlowski-Rippin	08.10.2021	06:15
Shanie	Male	47	Suboxone	Denesik, Zieme and Wiegand	21.05.2021	22:35
Phillip	Female	41	Whole Wheat	Hegmann, Streich and Lebsack	20.10.2021	17:08

13. Count the center wise number of slots available.

SQL Query - select center_id,center_name,count(slots.slot_id) as Slots from center join slots on center.center_id=slots.slot_centerID group by center_id



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Query Editor | Query History

```
1  select center_id,center_name,count(slots.slot_id) as Slots from center join slots
2  on center.center_id=slots.slot_centerID group by center_id
```

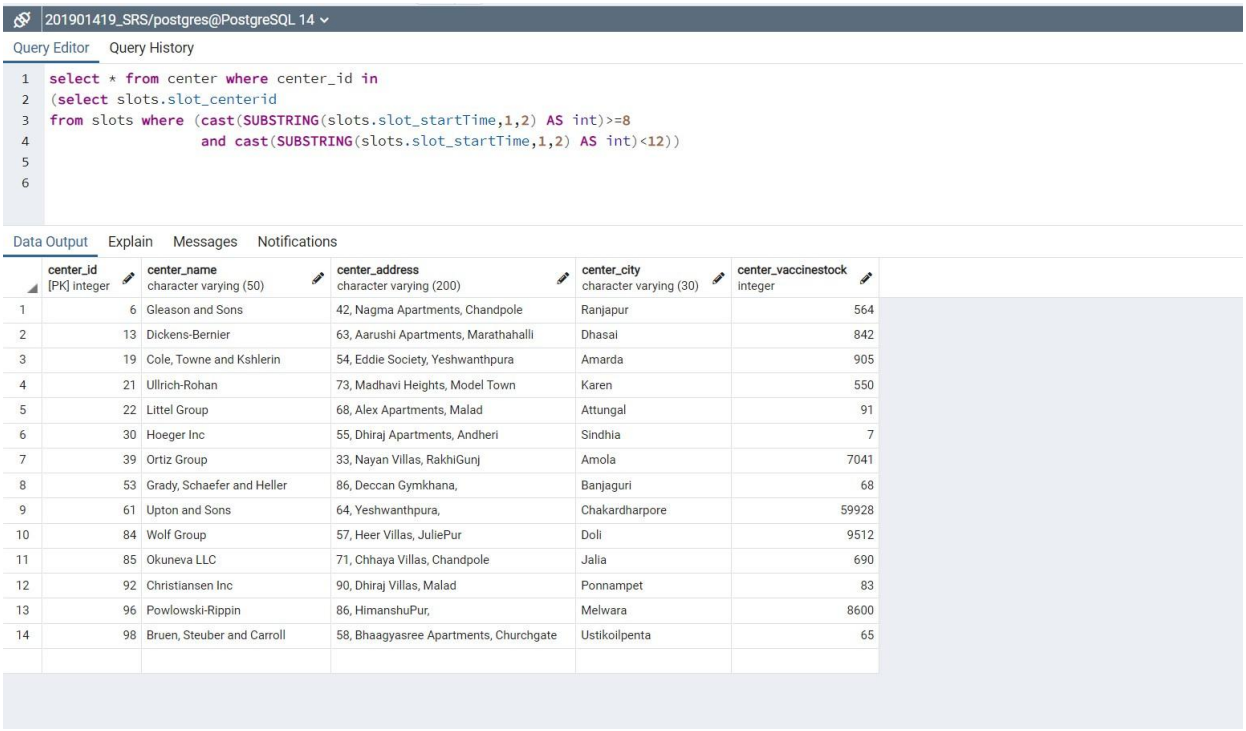
Data Output | Explain | Messages | Notifications

	center_id [PK] integer	center_name character varying (50)	slots bigint
29	99	Denesik, Zieme and Wiegand	2
30	88	Buckridge-Deckow	1
31	41	Jerde Inc	1
32	40	Ruecker Inc	1
33	46	Krajcik Group	2
34	32	Hackett-Huels	1
35	53	Grady, Schaefer and Heller	4
36	7	O'Conner Group	1
37	9	Heller-Will	1
38	100	Hegmann, Streich and Lebsack	1
39	48	Langosh Group	1
40	26	Koepp Group	2
41	85	Okuneva LLC	1
42	78	Bogisich-MacGyver	2
43	24	Hilll-Cassin	1
44	19	Cole, Towne and Kshlerin	1
45	81	Stark, Farrell and Glover	4
46	61	Upton and Sons	4

14. Provide the center details which have slots between 8.00 AM to 12 PM.

SQL Query

```
select * from center where center_id in
(select slots.slot_centerid
from slots where (cast(SUBSTRING(slots.slot_startTime,1,2) AS int)>=8
                                    and cast(SUBSTRING(slots.slot_startTime,1,2) AS int)<12))
```



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Query Editor | Query History

```
1  select * from center where center_id in
2  (select slots.slot_centerid
3  from slots where (cast(SUBSTRING(slots.slot_startTime,1,2) AS int)>=8
4                   and cast(SUBSTRING(slots.slot_startTime,1,2) AS int)<12))
5
6
```

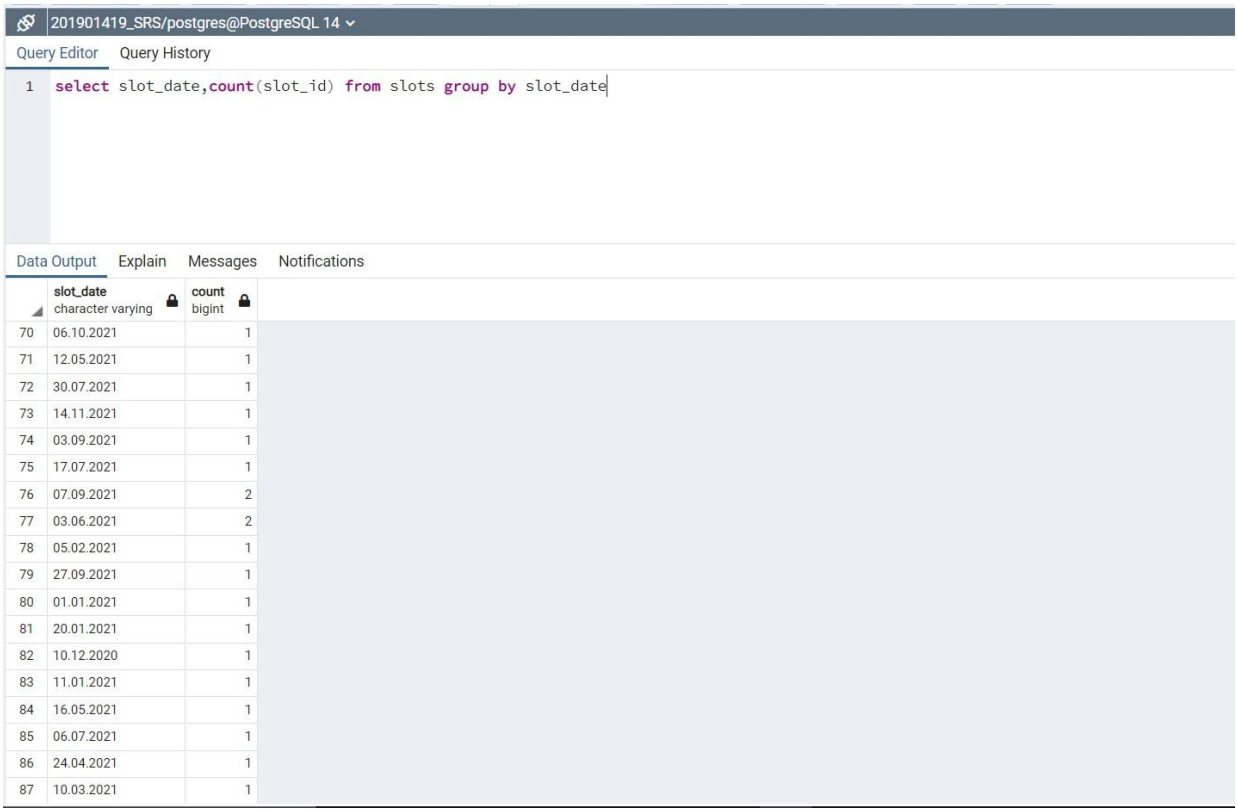
Data Output | Explain | Messages | Notifications

	center_id [PK] integer	center_name character varying (50)	center_address character varying (200)	center_city character varying (30)	center_vaccinestock integer
1	6	Gleason and Sons	42, Nagma Apartments, Chandpole	Ranjapur	564
2	13	Dickens-Bernier	63, Aarushi Apartments, Marathahalli	Dhasai	842
3	19	Cole, Towne and Kshlerin	54, Eddie Society, Yeshwanthpura	Amarda	905
4	21	Ullrich-Rohan	73, Madhavi Heights, Model Town	Karen	550
5	22	Littel Group	68, Alex Apartments, Malad	Attungal	91
6	30	Hoeger Inc	55, Dhiraj Apartments, Andheri	Sindhia	7
7	39	Ortiz Group	33, Nayan Villas, RakhiGunj	Amola	7041
8	53	Grady, Schaefer and Heller	86, Deccan Gymkhana,	Banjaguri	68
9	61	Upton and Sons	64, Yeshwanthpura,	Chakardharpore	59928
10	84	Wolf Group	57, Heer Villas, JuliePur	Doli	9512
11	85	Okuneva LLC	71, Chhaya Villas, Chandpole	Jalia	690
12	92	Christiansen Inc	90, Dhiraj Villas, Malad	Ponnampet	83
13	96	Powlowski-Rippin	86, HimanshuPur,	Melwara	8600
14	98	Bruen, Steuber and Carroll	58, Bhaagyasree Apartments, Churchgate	Ustikoilpenta	65

15. Count the date wise available slots.

SQL Query

select slot_date,count(slot_id) from slots group by slot_date



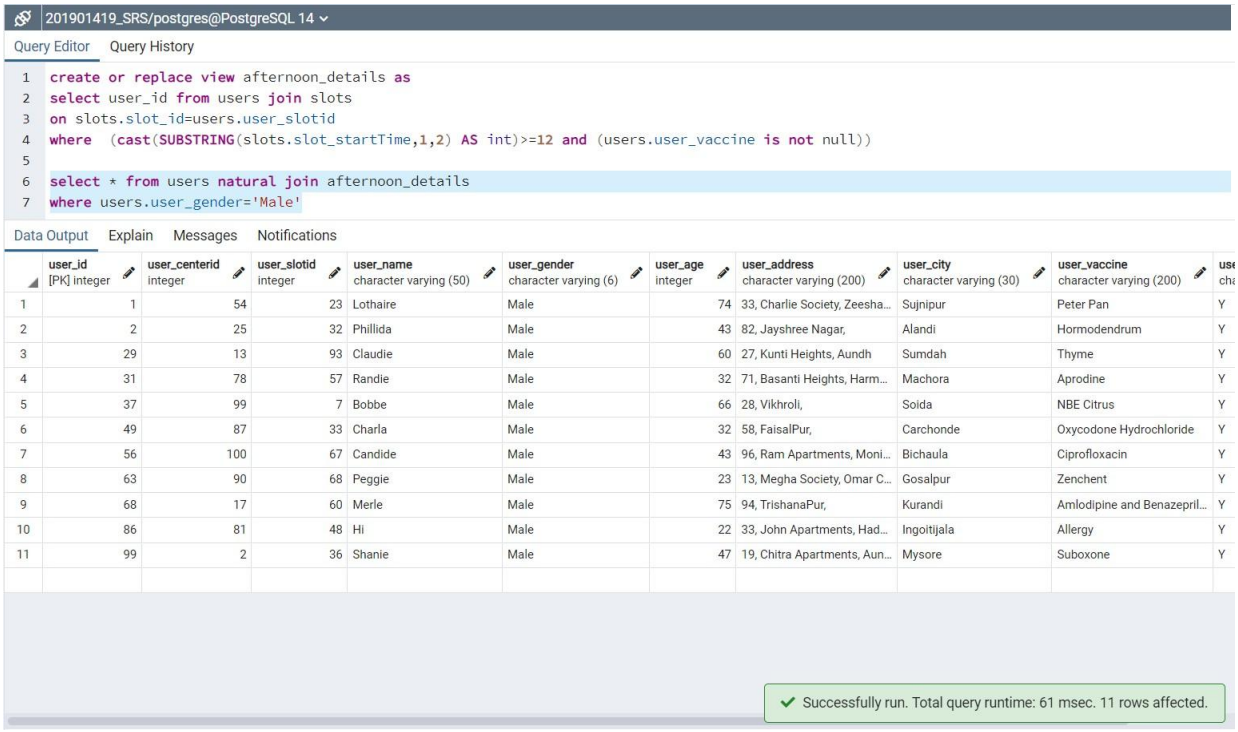
	slot_date character varying	count bigint
70	06.10.2021	1
71	12.05.2021	1
72	30.07.2021	1
73	14.11.2021	1
74	03.09.2021	1
75	17.07.2021	1
76	07.09.2021	2
77	03.06.2021	2
78	05.02.2021	1
79	27.09.2021	1
80	01.01.2021	1
81	20.01.2021	1
82	10.12.2020	1
83	11.01.2021	1
84	16.05.2021	1
85	06.07.2021	1
86	24.04.2021	1
87	10.03.2021	1

16. Find the Male users who are vaccinated afternoon.

SQL Query

```
create or replace view afternoon_details as
select user_id from users join slots
on slots.slot_id=users.user_slotid
where (cast(SUBSTRING(slots.slot_startTime,1,2) AS int)>=12)

select * from users natural join afternoon_details
where users.user_gender='Male'
```



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Query Editor | Query History

```
1  create or replace view afternoon_details as
2  select user_id from users join slots
3  on slots.slot_id=users.user_slotid
4  where  (cast(SUBSTRING(slots.slot_startTime,1,2) AS int)>=12 and (users.user_vaccine is not null))
5
6  select * from users natural join afternoon_details
7  where users.user_gender='Male'
```

Data Output | Explain | Messages | Notifications

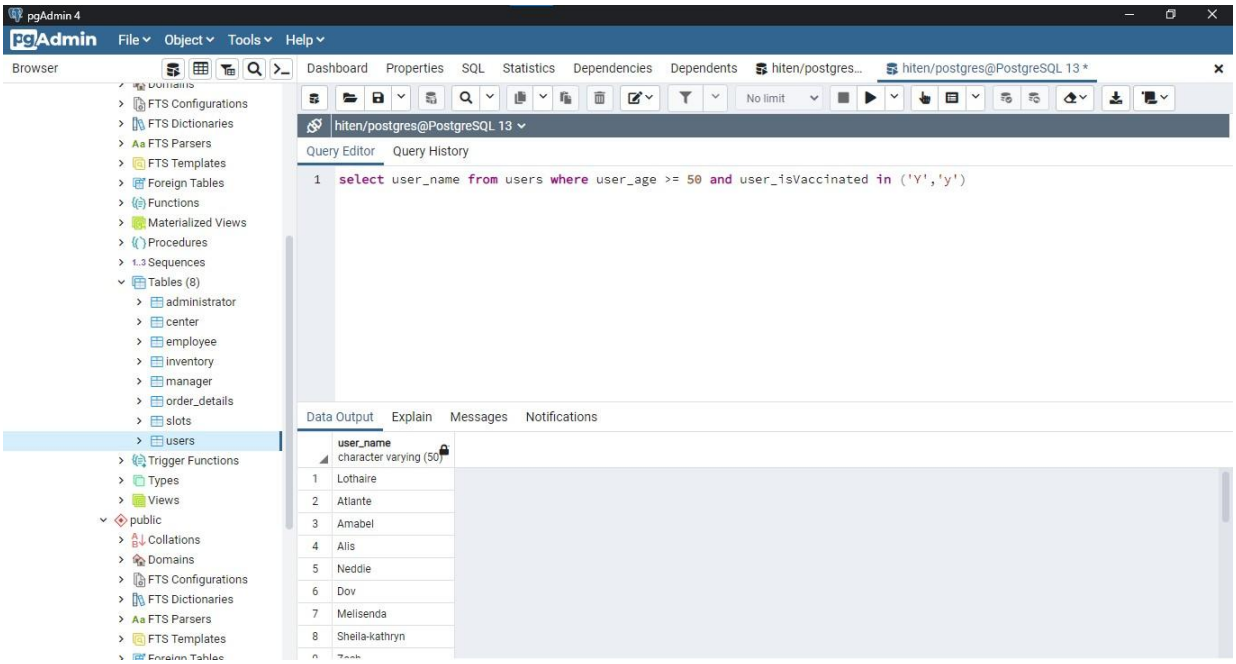
	user_id [PK] integer	user_centerid integer	user_slotid integer	user_name character varying (50)	user_gender character varying (6)	user_age integer	user_address character varying (200)	user_city character varying (30)	user_vaccine character varying (200)	use cha
1	1	54	23	Lothaire	Male	74	33, Charlie Society, Zeesha...	Sujnipur	Peter Pan	Y
2	2	25	32	Phillida	Male	43	82, Jayshree Nagar,	Alandi	Hormodendrum	Y
3	29	13	93	Claudie	Male	60	27, Kunti Heights, Aundh	Sumdah	Thyme	Y
4	31	78	57	Randie	Male	32	71, Basanti Heights, Harm...	Machora	Aprodine	Y
5	37	99	7	Bobbe	Male	66	28, Vikhroli,	Soida	NBE Citrus	Y
6	49	87	33	Charla	Male	32	58, FaisalPur,	Carchonde	Oxycodone Hydrochloride	Y
7	56	100	67	Candide	Male	43	96, Ram Apartments, Moni...	Bichaula	Ciprofloxacin	Y
8	63	90	68	Peggie	Male	23	13, Megha Society, Omar C...	Gosalpur	Zenchent	Y
9	68	17	60	Merle	Male	75	94, TrishanaPur,	Kurandi	Amlodipine and Benazepril...	Y
10	86	81	48	Hi	Male	22	33, John Apartments, Had...	Ingoitjala	Allergy	Y
11	99	2	36	Shanie	Male	47	19, Chitra Apartments, Aun...	Mysore	Suboxone	Y

Successfully run. Total query runtime: 61 msec. 11 rows affected.

17. Find the people who are vaccinated and have an age above 50 years.

SQL Query

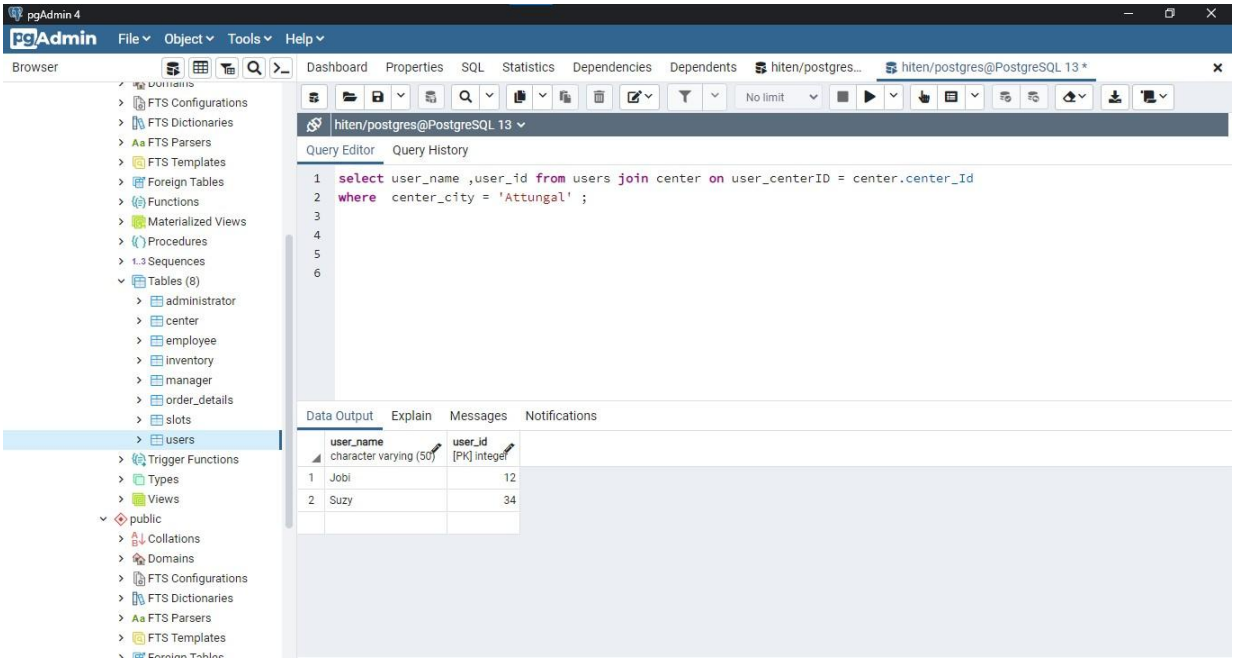
select user_name from users where user_age >= 50 and user_isVaccinated in ('Y','y')



18.Find the user name and user id who have taken vaccines from ‘Attungal’.

SQL Query

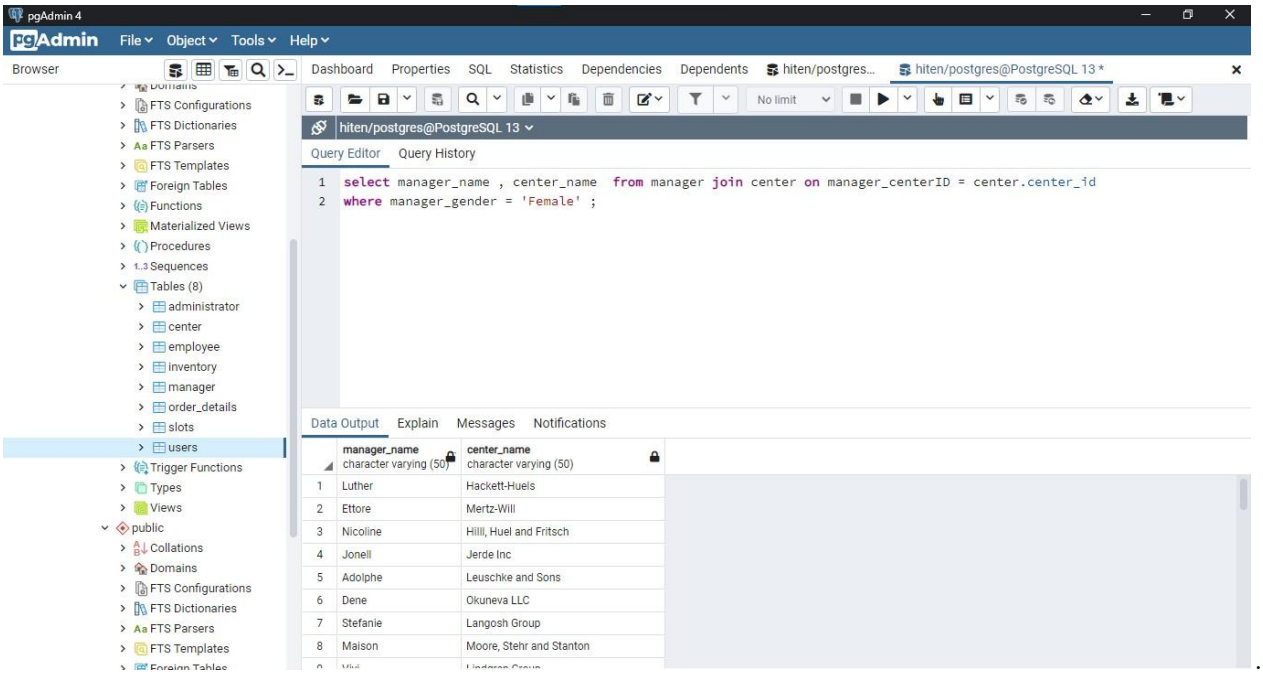
```
select user_name ,user_id from users join center on user_centerID = center.center_Id
where  center_city = 'Attungal' ;
```



19.Find the manager name and center name where the Female manager controls the center.

SQL Query

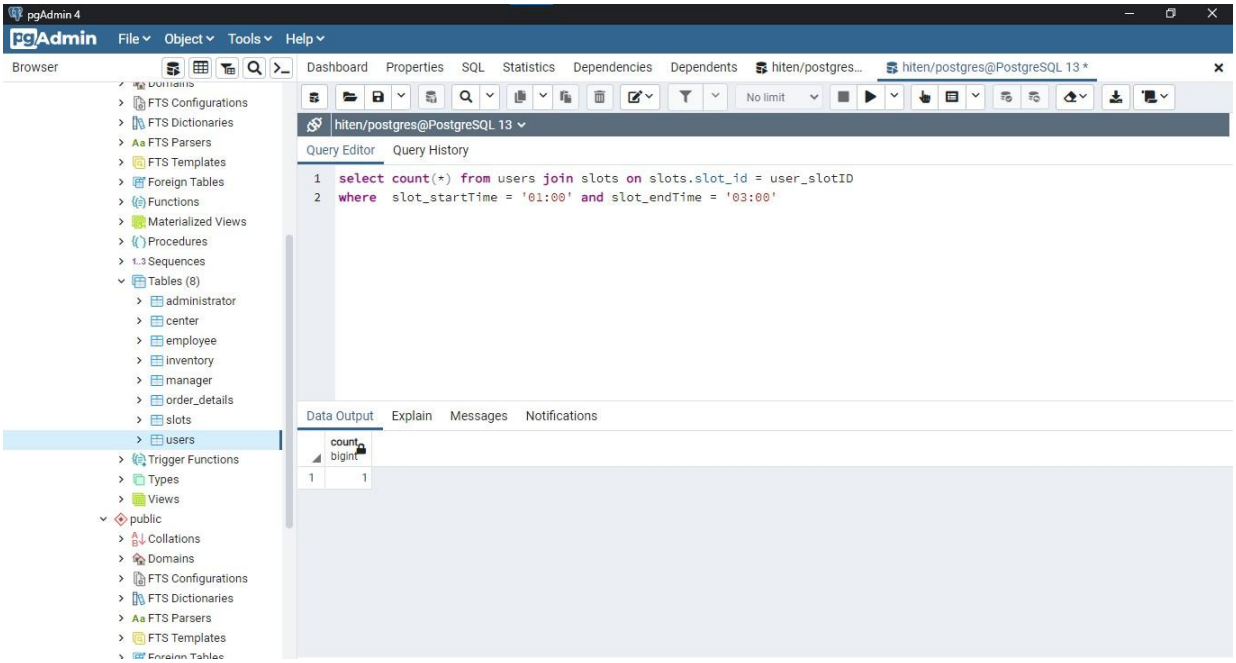
```
select manager_name , center_name from manager join center on manager_centerID = center.center_id
where manager_gender = 'Female' ;
```



20.Count the number of people who have taken vaccines between 1:00 to 3:00.

SQL Query

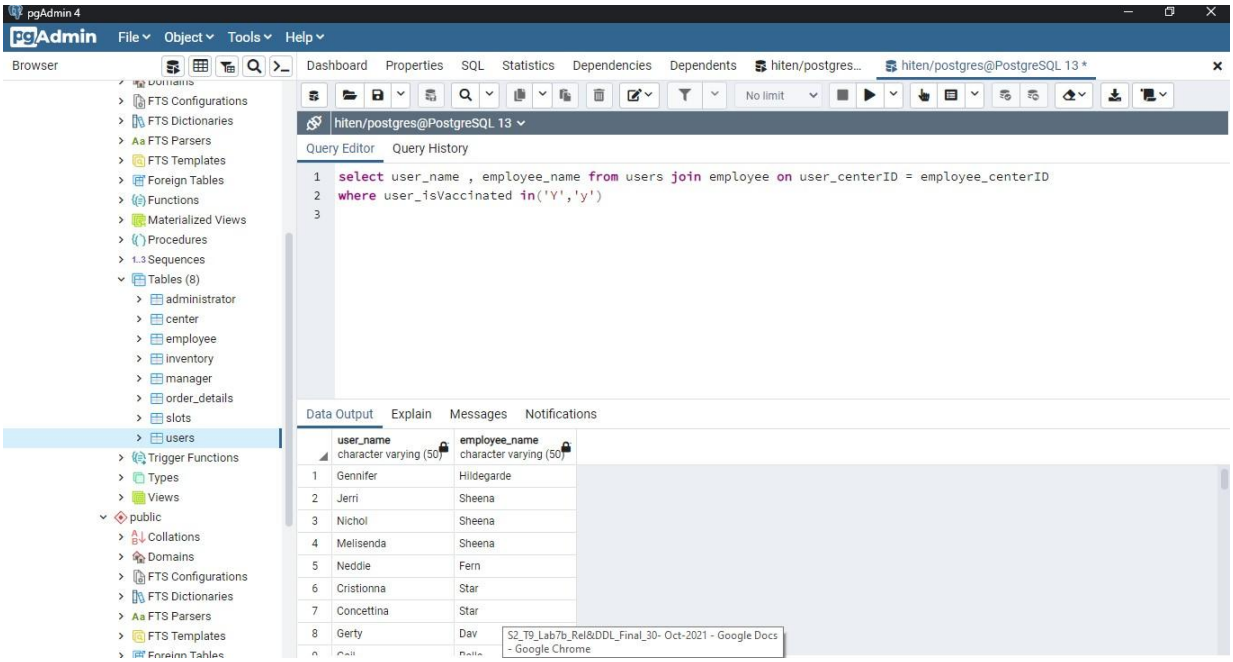
```
select count(*) from users join slots on slots.slot_id = user_slotID
where  slot_startTime = '01:00' and slot_endTime = '03:00'
```



21. Give the user details along with the employee from whom they get vaccinated.

SQL Query

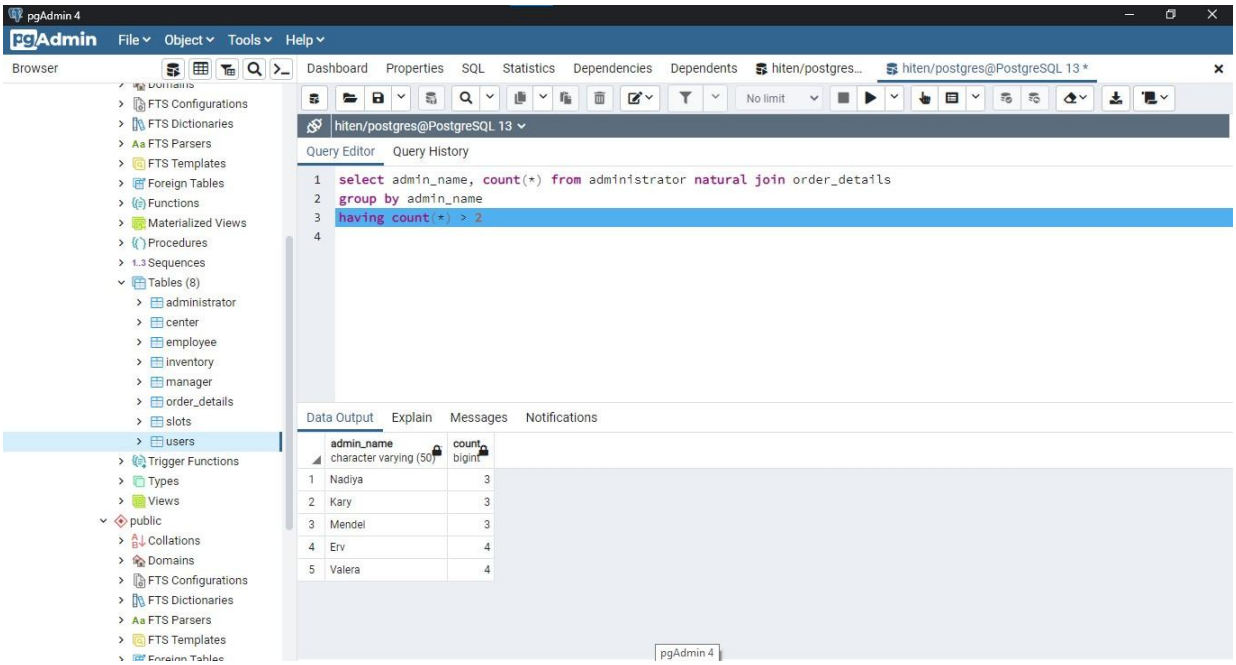
select user_name , employee_name from users join employee on user_centerID = employee_centerID
where user_isVaccinated in('Y','y')



22. Find the name of the admin who has ordered vaccines more than two times.

SQL Query

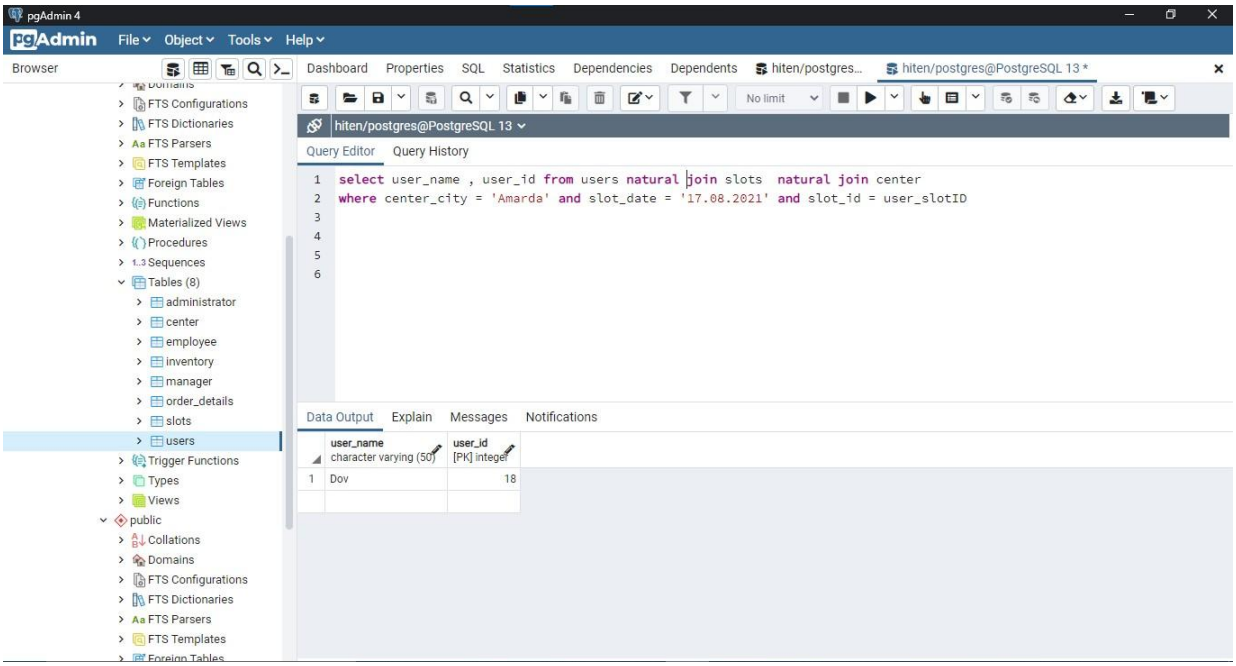
```
select admin_name, count(*) from administrator natural join order_details
group by admin_name
having count(*) > 2
```



23. Find the details of all users who have taken vaccines at Amarda center on 17th august 2021.

SQL Query

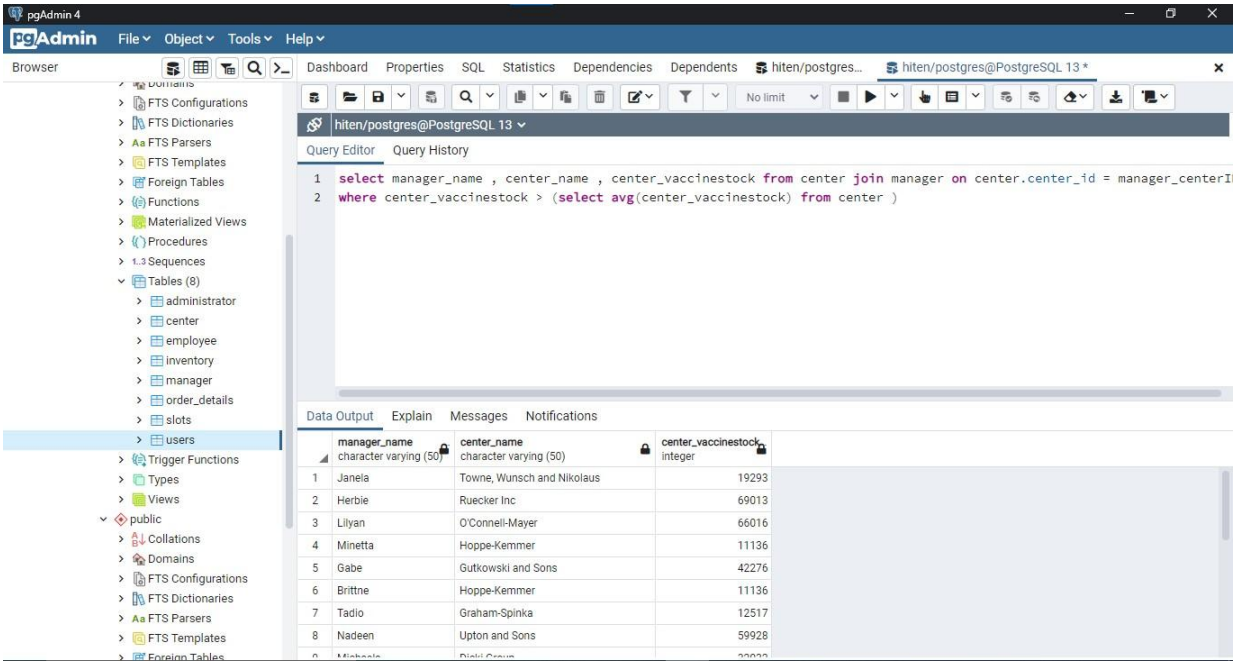
select user_name , user_id from users natural join slots natural join center
where center_city = 'Amarda' and slot_date = '17.08.2021' and slot_id = user_slotID



24. Find the manager name and center name where the center's vaccine stock is greater than the average vaccine stock.

SQL Query

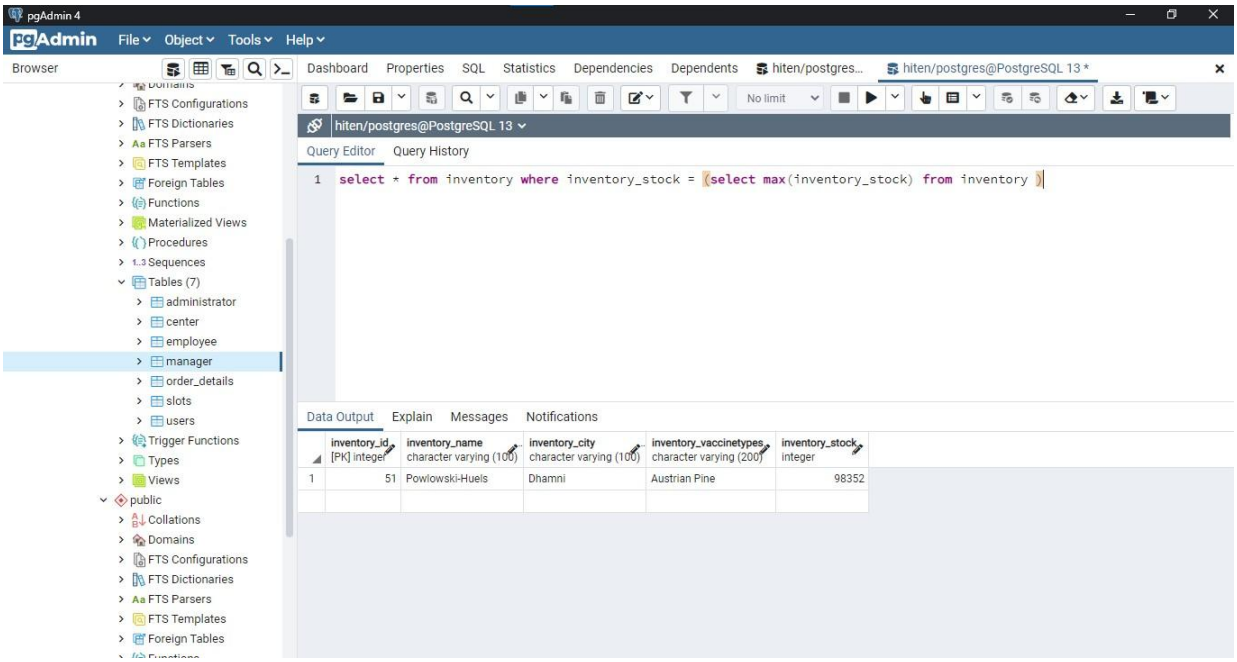
select manager_name , center_name , center_vaccinestock from center join manager on center.center_id = manager_centerID
where center_vaccinestock > (select avg(center_vaccinestock) from center)



25.Find the inventory details which have the maximum vaccine stock.

SQL Query

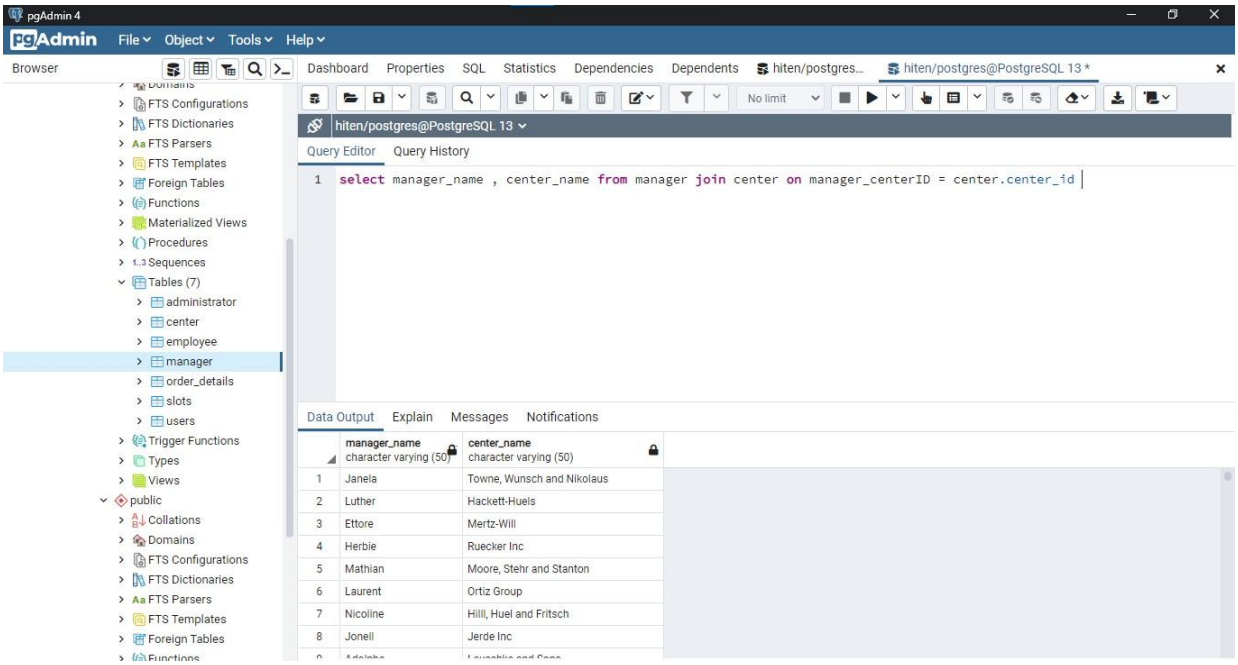
select * from inventory where inventory_stock = (select max(inventory_stock) from inventory)



26.List all the center name along with it’s manager name.

SQL Query

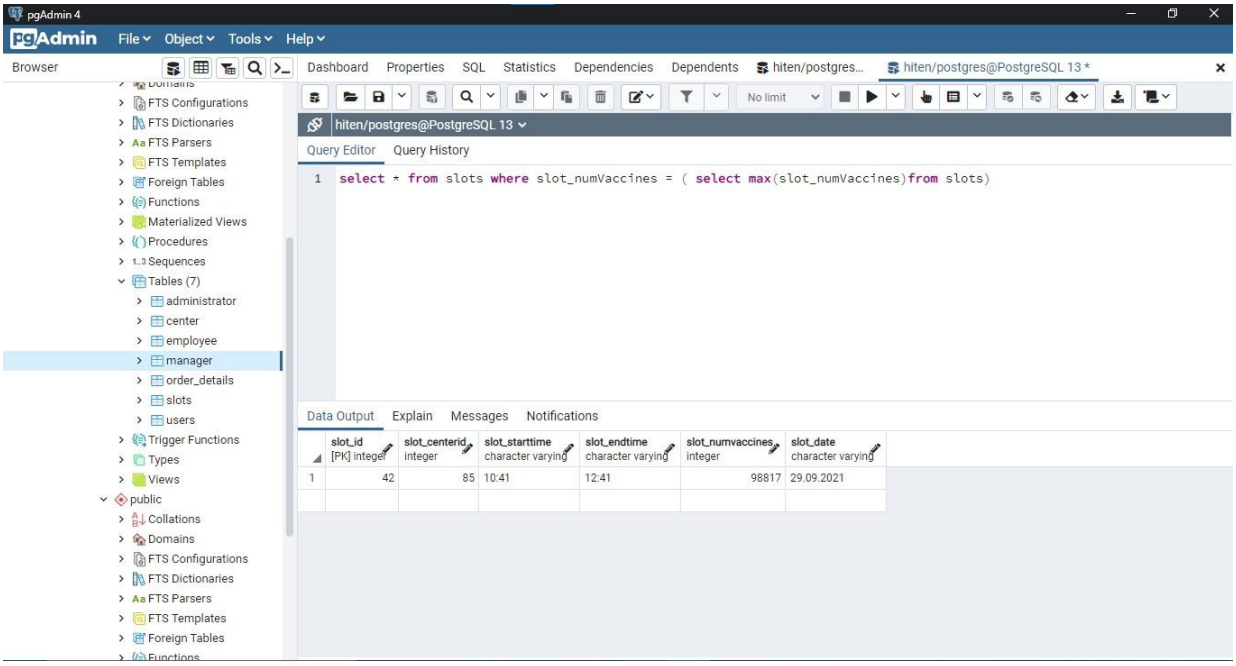
select manager_name , center_name from manager join center on manager_centerID = center.center_id



27.Print the details of the slot which has the highest vaccine stock.

SQL Query

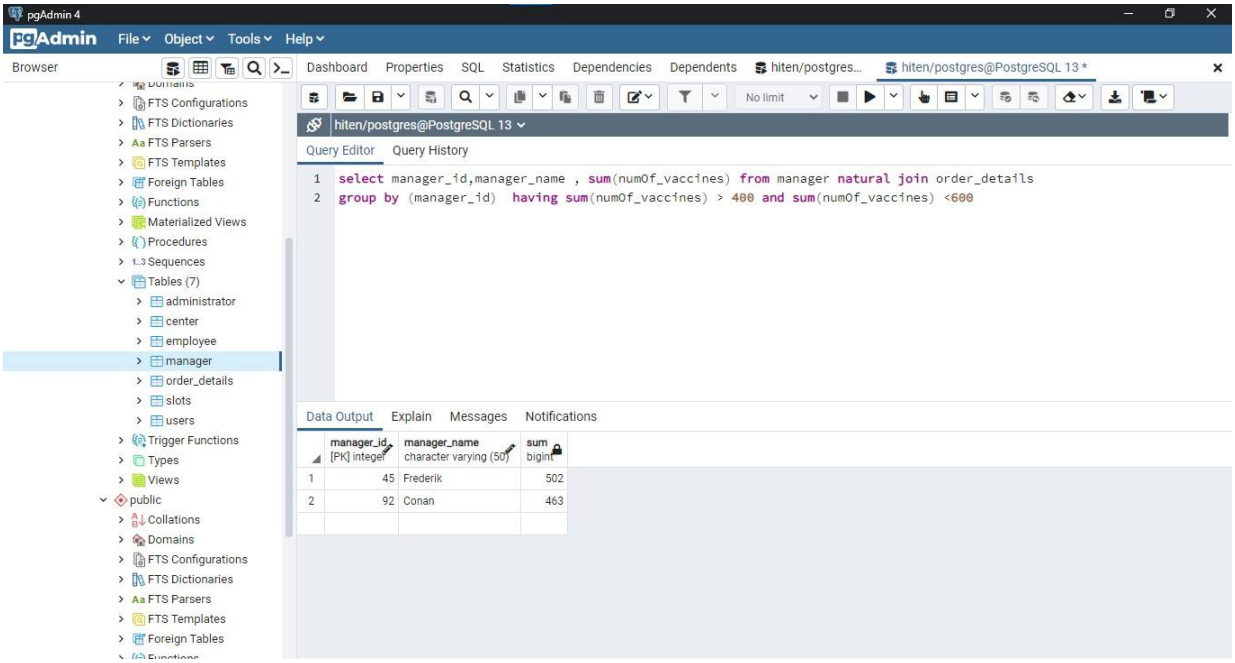
select * from slots where slot_numVaccines = (select max(slot_numVaccines) from slots)



28.Find the manager's name and who ordered the total number of vaccines between 400 and 600.

SQL Query

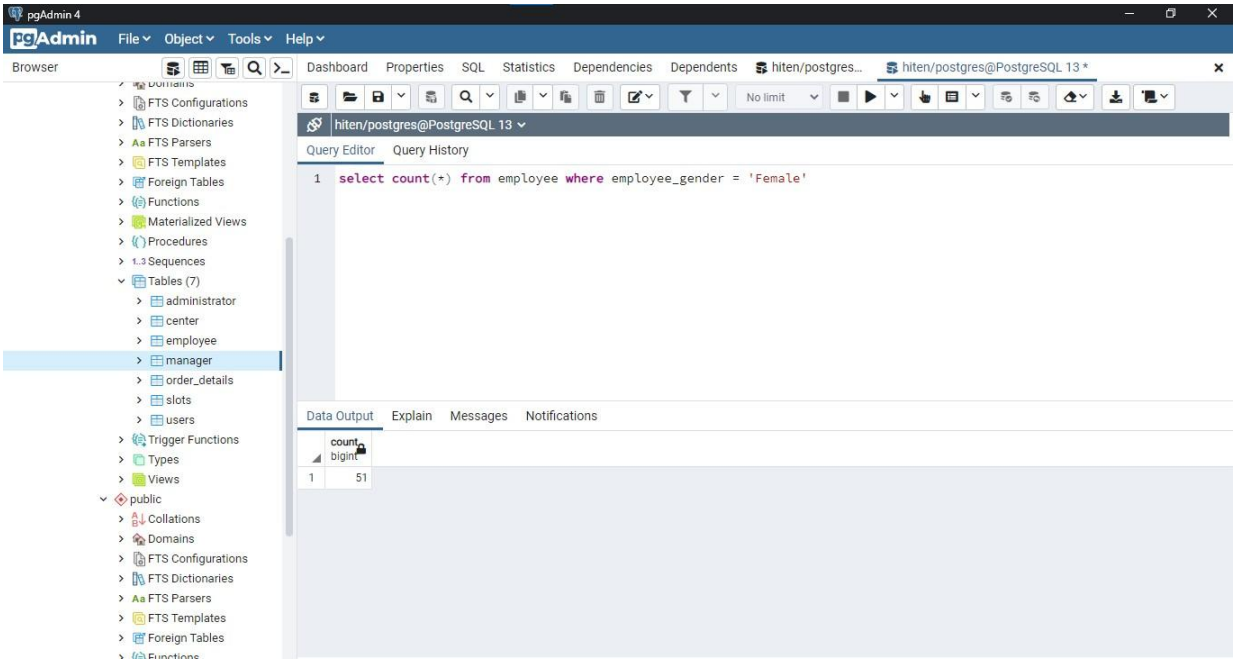
```
select manager_id,manager_name , sum(numOf_vaccines) from manager natural join order_details
group by (manager_id)  having sum(numOf_vaccines) > 400 and sum(numOf_vaccines) <600
```



29.Find the total number of female employees.

SQL Query

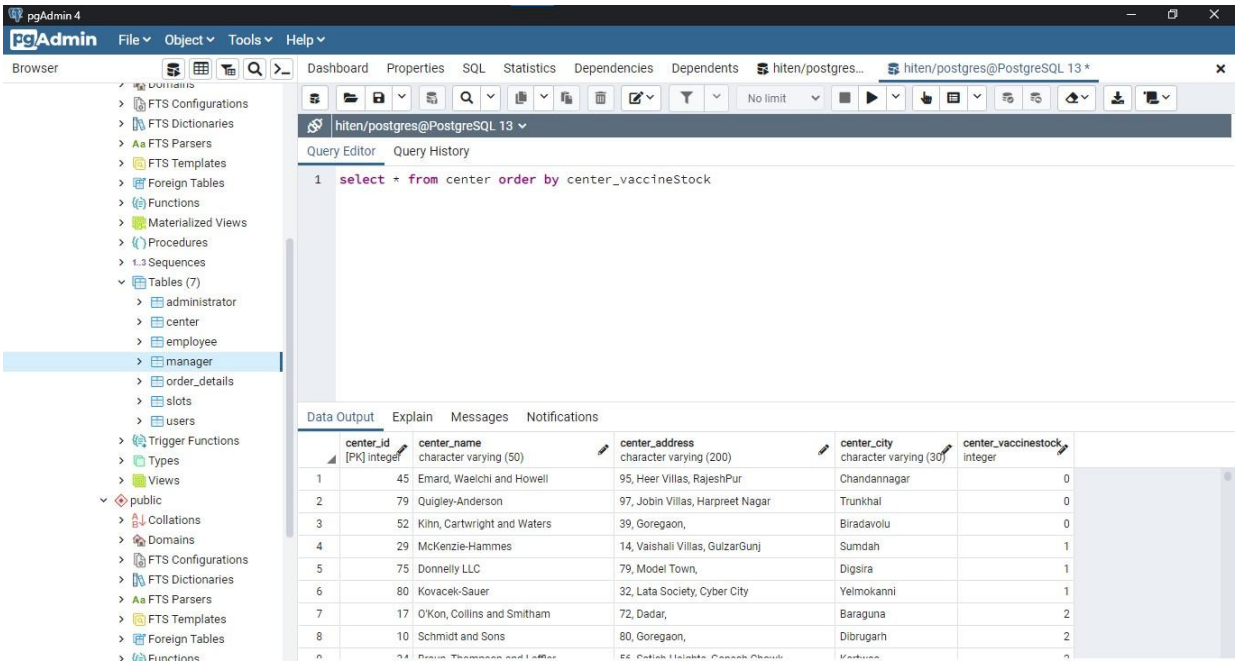
select count(*) from employee where employee_gender = 'Female'



30.Sort the centers in ascending order of available vaccines stock.

SQL Query

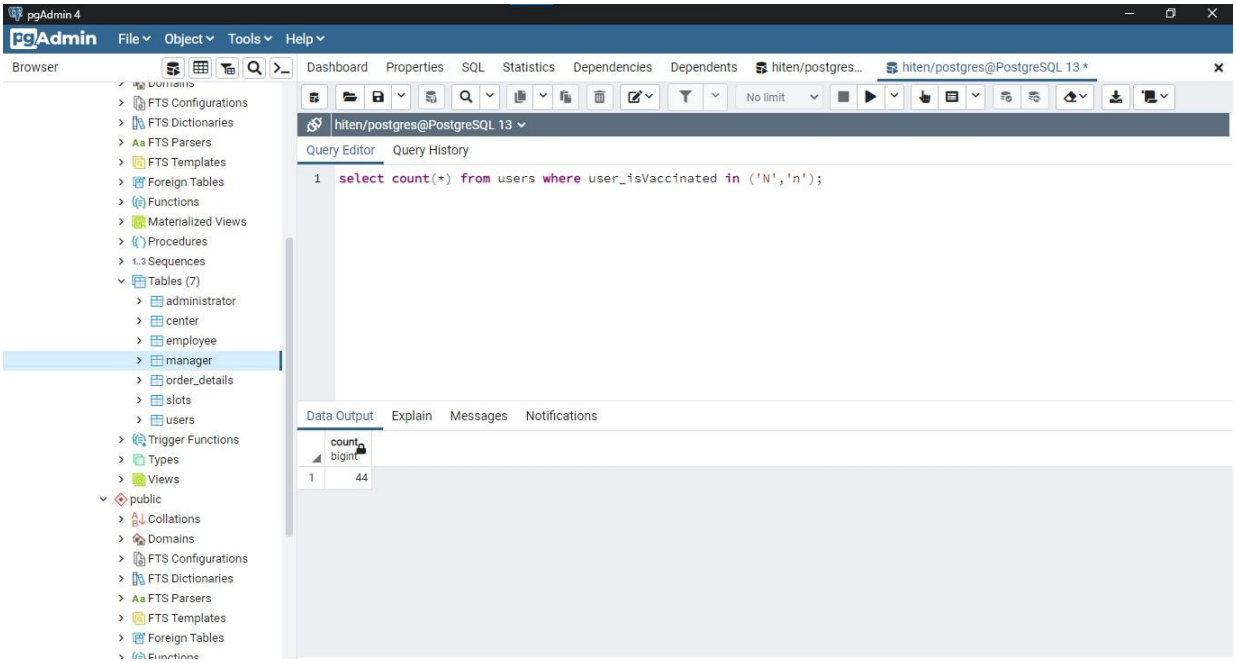
select * from center order by center_vaccineStock



31.Count the total number of unvaccinated users.

SQL Query

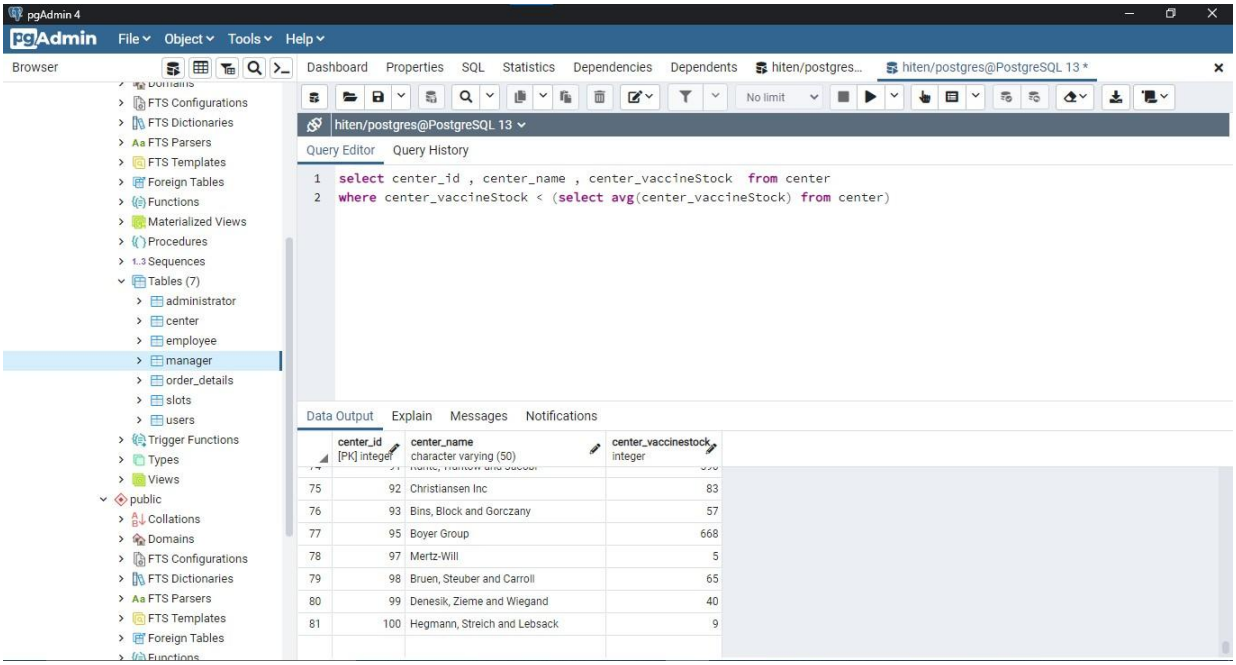
select count(*) from users where user_isVaccinated in ('N','n');



32.List all the center name and center id which has vaccine stock less than all center's average vaccine stock.

SQL Query

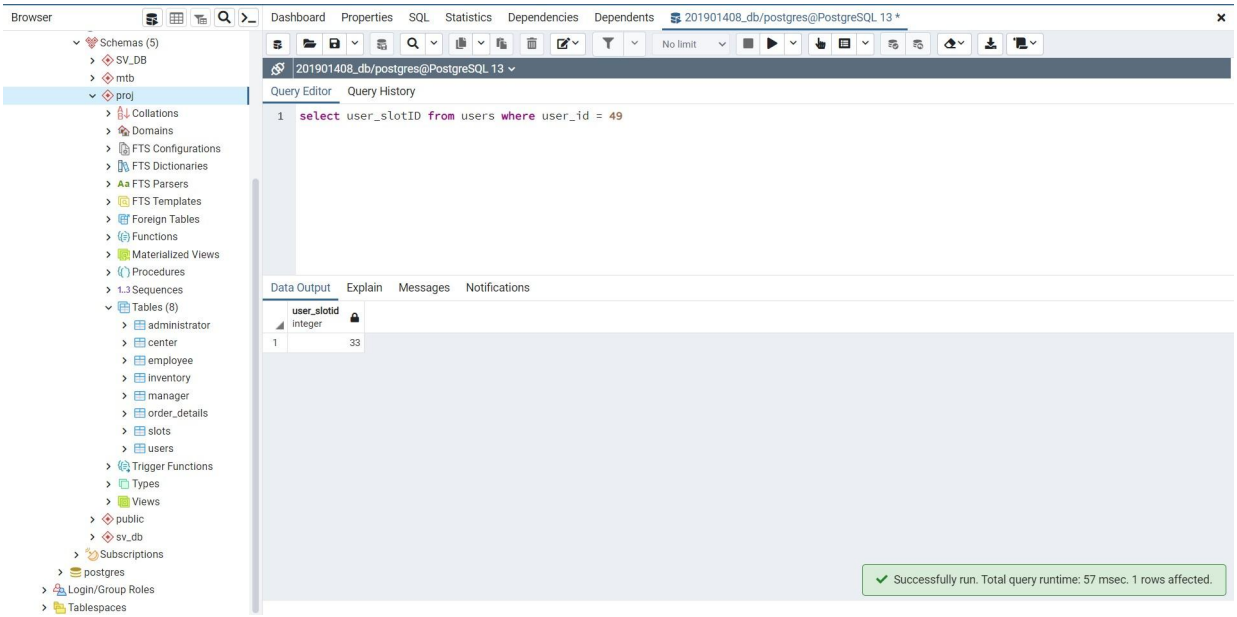
```
select center_id , center_name , center_vaccineStock  from center
where center_vaccineStock < (select avg(center_vaccineStock) from center)
```



33. Give the slotID of the user with user_id = 49

SQL query:

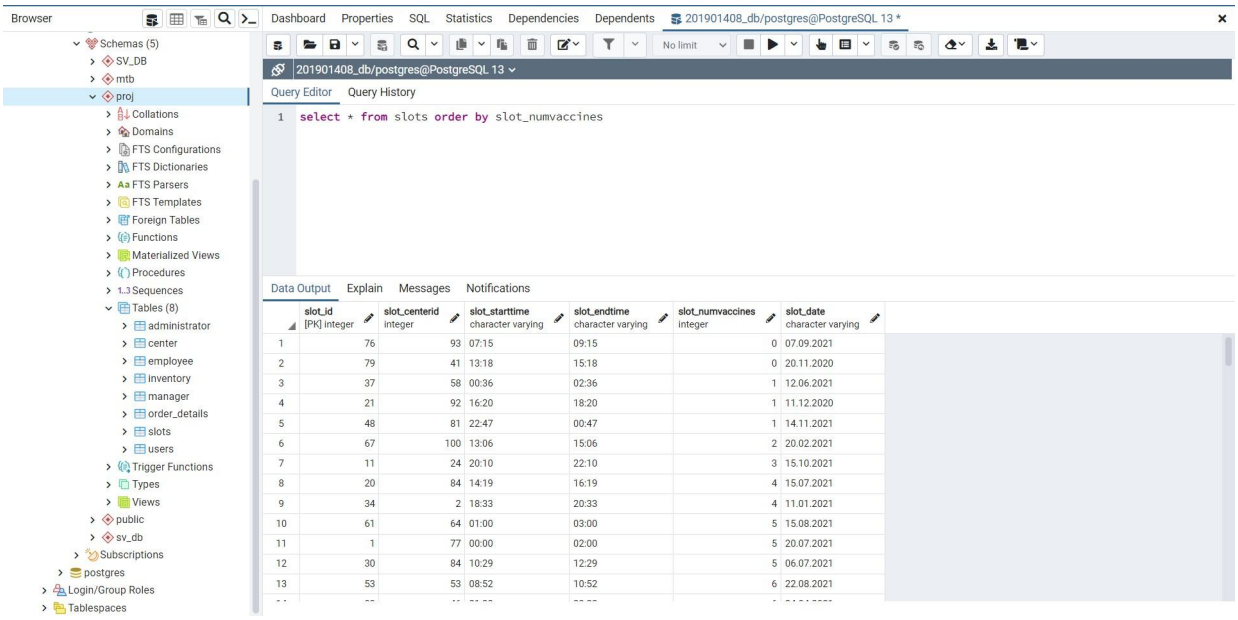
select user_slotID from users where user_id = 49



34. List the slots in the ascending order of their stock.

SQL query:

select * from slots order by slot_numvaccines

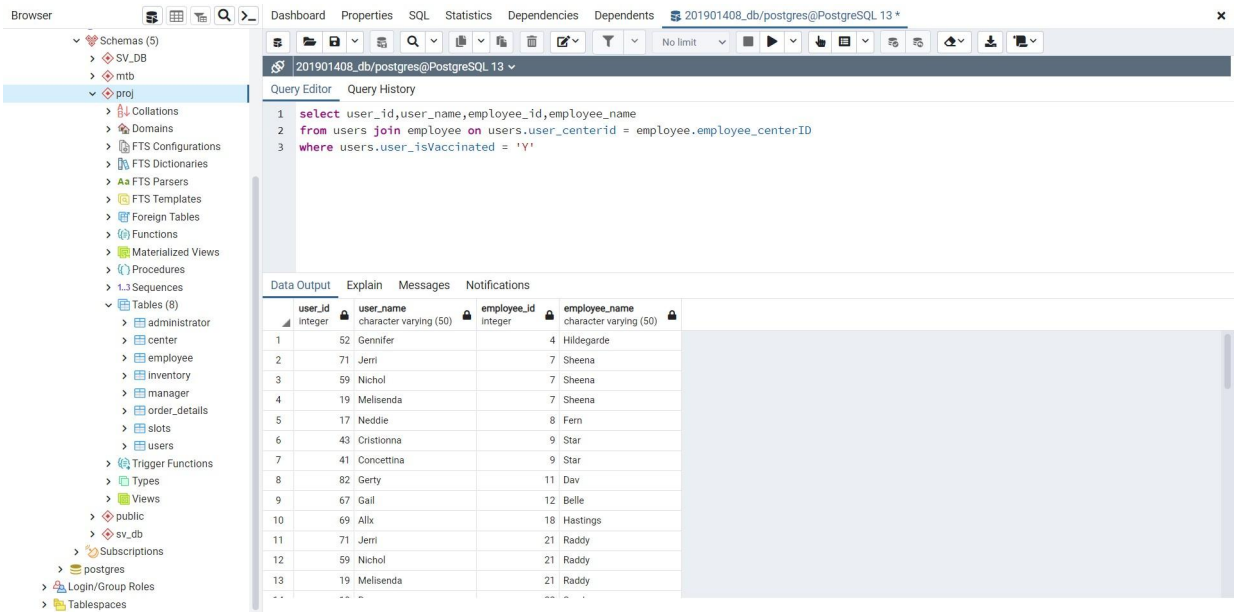


	slot_id [PK] integer	slot_centerid integer	slot_starttime character varying	slot_endtime character varying	slot_numvaccines integer	slot_date character varying
1	76	93	07:15	09:15	0	07.09.2021
2	79	41	13:18	15:18	0	20.11.2020
3	37	58	00:36	02:36	1	12.06.2021
4	21	92	16:20	18:20	1	11.12.2020
5	48	81	22:47	00:47	1	14.11.2021
6	67	100	13:06	15:06	2	20.02.2021
7	11	24	20:10	22:10	3	15.10.2021
8	20	84	14:19	16:19	4	15.07.2021
9	34	2	18:33	20:33	4	11.01.2021
10	61	64	01:00	03:00	5	15.08.2021
11	1	77	00:00	02:00	5	20.07.2021
12	30	84	10:29	12:29	5	06.07.2021
13	53	53	08:52	10:52	6	22.08.2021

35. Give the user details along with the center name from where they get vaccinated

SQL query:

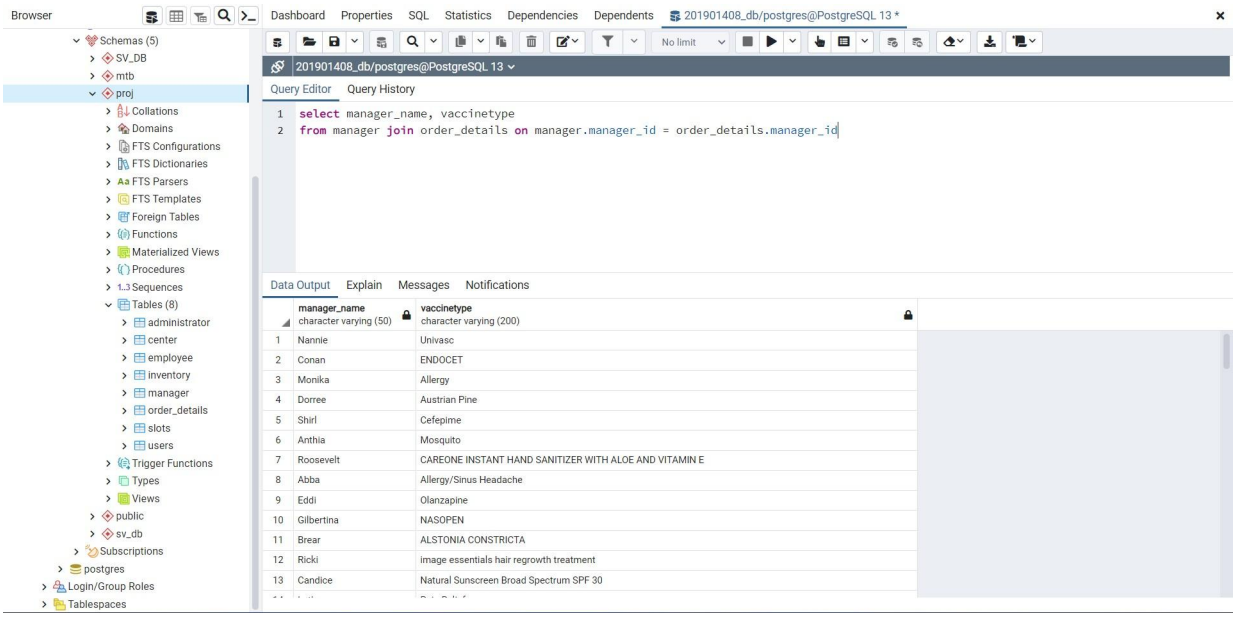
```
select user_id,user_name,center_id,center_name
from users join center on users.user_centerid = center.center_id
where users.user_isVaccinated = 'Y'
```



36. Give the manager's name along with the vaccine types they ordered.

SQL query:

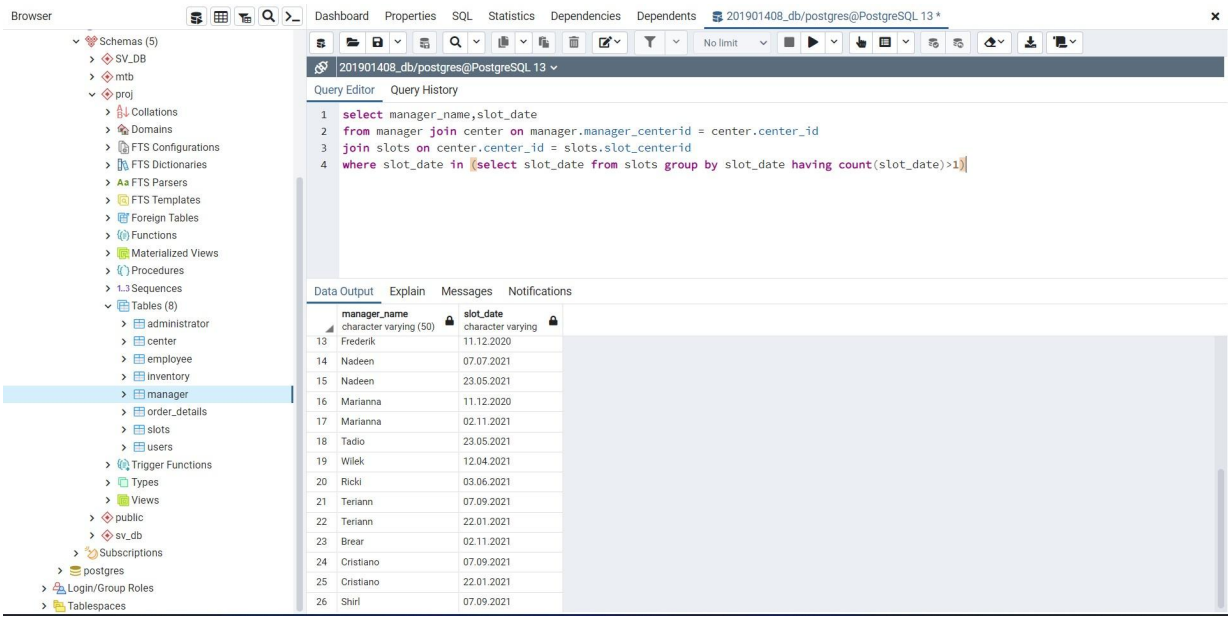
select manager_name, vaccinetype
from manager join order_details on manager.manager_id = order_details.manager_id



37. Give information about the manager who worked on the same day.

SQL query:

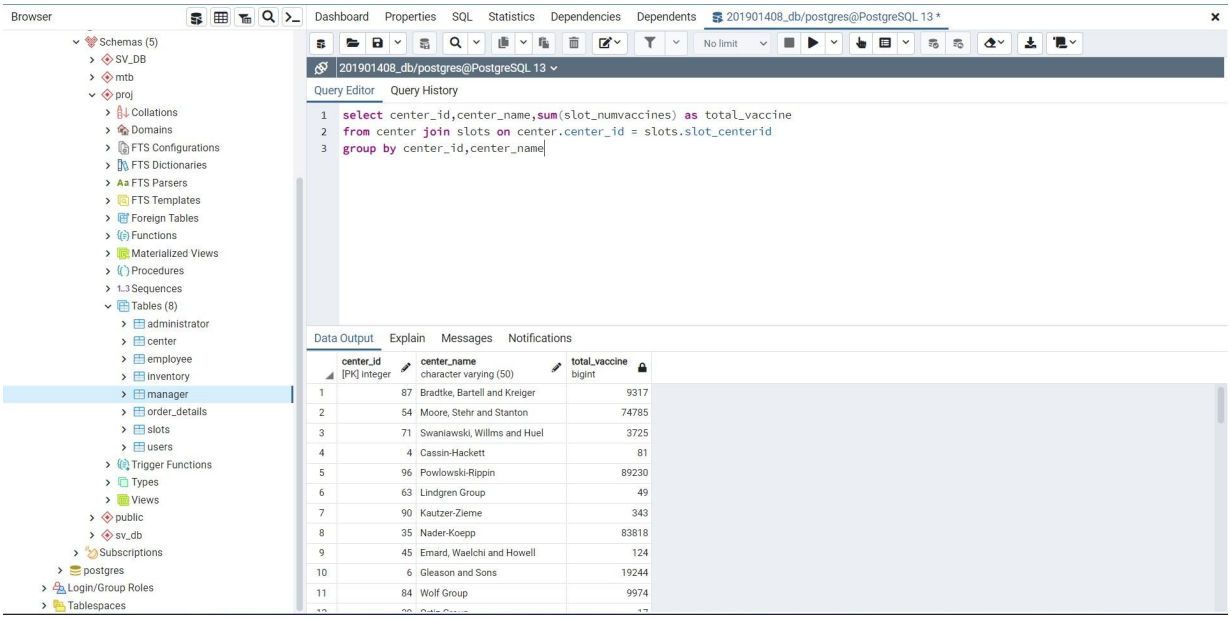
```
select manager_name,slot_date
from manager join center on manager.manager_centerid = center.center_id
join slots on center.center_id = slots.slot_centerid
where slot_date in (select slot_date from slots group by slot_date having count(slot_date)>1)
```



38. Give the total number of vaccines at the particular center along with the center name.

SQL query:

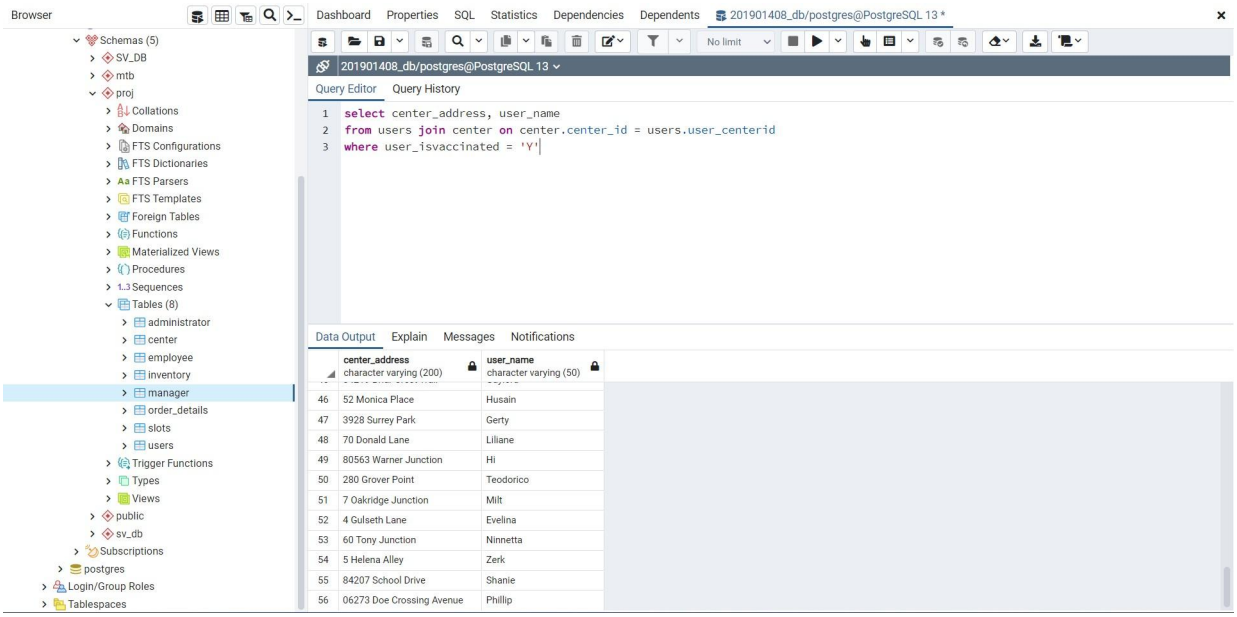
```
select center_id,center_name,sum(slot_numvaccines) as total_vaccine
from center join slots on center.center_id = slots.slot_centerid
group by center_id,center_name
```



39. Give the center address where the particular user was vaccinated.

SQL query:

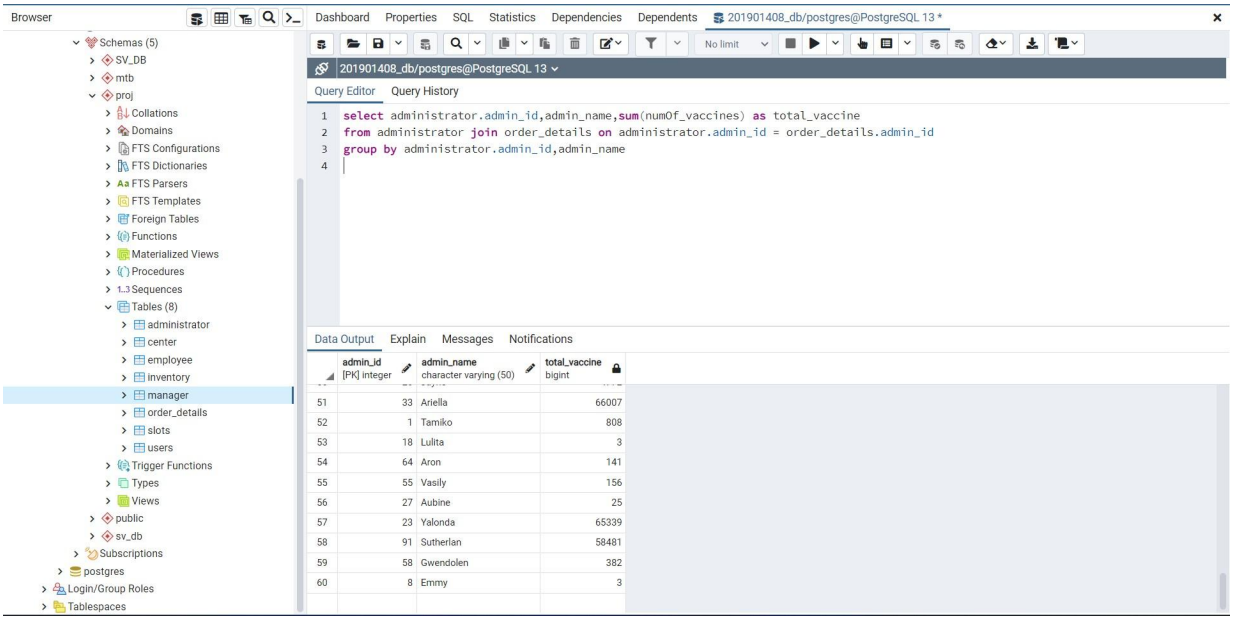
```
select center_address, user_name
from users join center on center.center_id = users.user_centerid
where user_isvaccinated = 'Y'
```



40. Give the total number of vaccines ordered by a particular admin along with the admin name.

SQL query:

```
select administrator.admin_id,admin_name,sum(numOf_vaccines) as total_vaccine
from administrator join order_details on administrator.admin_id = order_details.admin_id
group by administrator.admin_id,admin_name
```



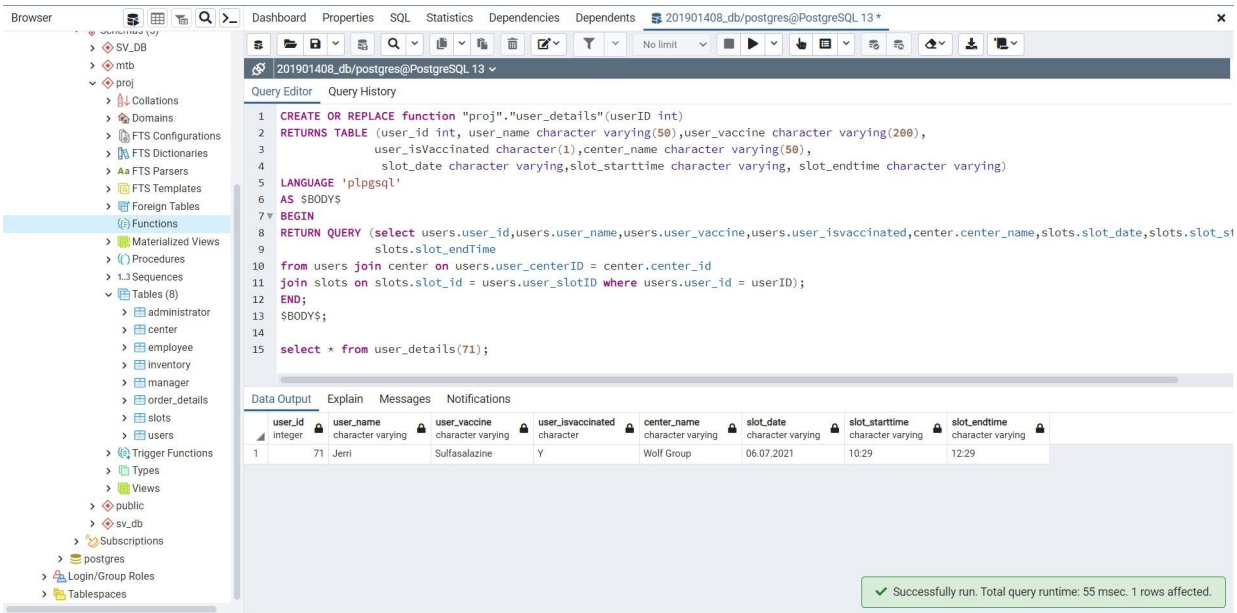
Functions:

1. Function returns all the necessary user details, for the provided user id.

Function

CREATE OR REPLACE function "proj"."user_details"(userID int)
RETURNS TABLE (user_id int, user_name character varying(50),user_vaccine character varying(200),
user_isVaccinated character(1),center_name character varying(50),
slot_date character varying,slot_starttime character varying, slot_endtime character varying)
LANGUAGE 'plpgsql'
AS $BODY$
BEGIN
RETURN QUERY (select users.user_id,users.user_name,users.user_vaccine,users.user_isvaccinated,center.center_name,slots.slot_date,slots.slot_startTime,
slots.slot_endTime
from users join center on users.user_centerID = center.center_id
join slots on slots.slot_id = users.user_slotID where users.user_id = userID);
END;
$BODY$;

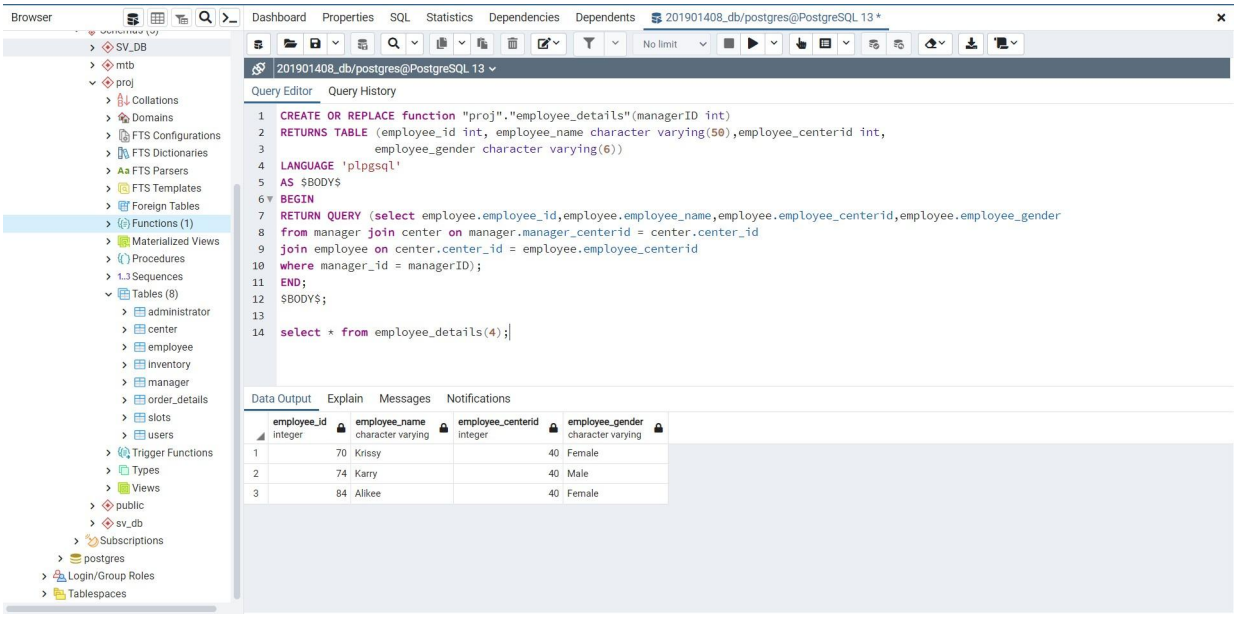
select * from user_details(71);



2. Function for providing the employees details working under the given manager id.

Function

```
CREATE OR REPLACE function "proj"."employee_details"(managerID int)
RETURNS TABLE (employee_id int, employee_name character varying(50),employee_centerid int,employee_gender character varying(6))
LANGUAGE 'plpgsql'
AS $BODY$
BEGIN
RETURN QUERY
(select employee.employee_id,employee.employee_name,employee.employee_centerid,employee.employee_gender
from manager join center on manager.manager_centerid = center.center_id
join employee on center.center_id = employee.employee_centerid
where manager_id = managerID);
END;
$BODY$;

select * from employee_details(4);
```



Triggers:

1. Trigger function and trigger call for inserting new tuple in inventory.

Trigger Function

```
CREATE OR REPLACE FUNCTION "proj"."Inventory_Update"()
RETURNS trigger
LANGUAGE 'plpgsql'
AS
$BODY$ DECLARE
i_ID numeric;
BEGIN
SELECT inventory.inventory_id INTO i_ID FROM inventory
WHERE inventory.inventory_id=NEW.inventory_id;
IF(i_ID=NEW.inventory_id) THEN
RAISE NOTICE 'Inventory_ID already exists. Violates the primary key constraints.';
RETURN null;
ELSE
RAISE NOTICE 'Data inserted successfully.';
RETURN new;
END IF;
END
$BODY$
```

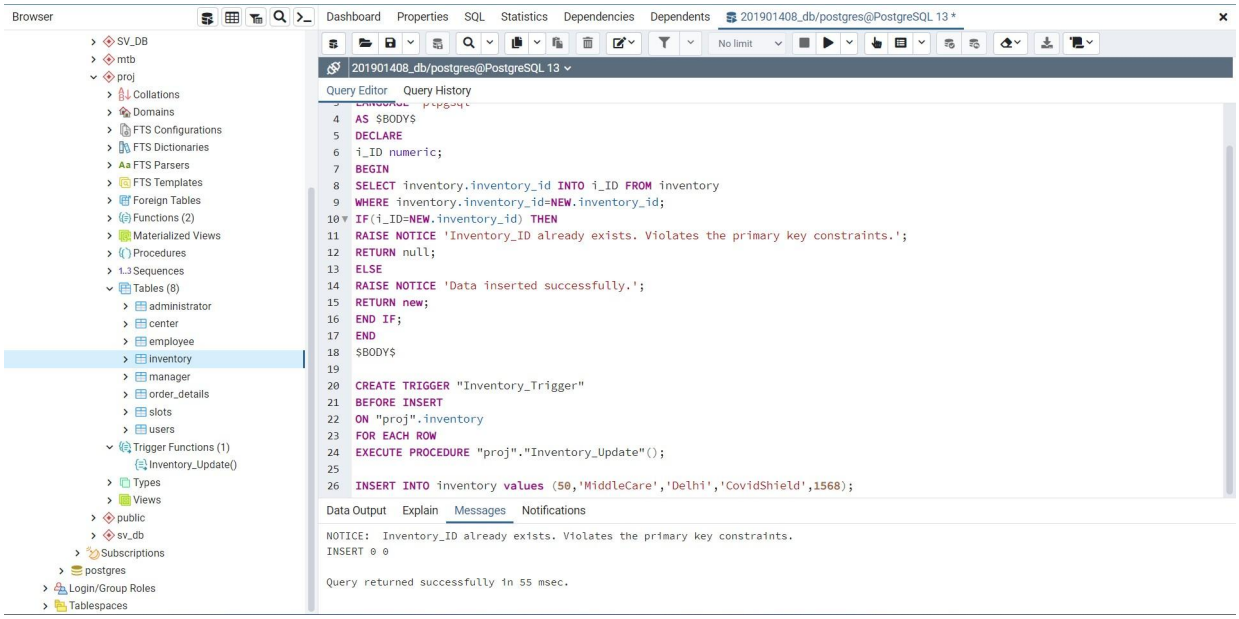
Trigger Call

```
CREATE TRIGGER "Inventory_Trigger"
BEFORE INSERT
ON "proj".inventory
FOR EACH ROW
EXECUTE PROCEDURE "proj"."Inventory_Update"();
```

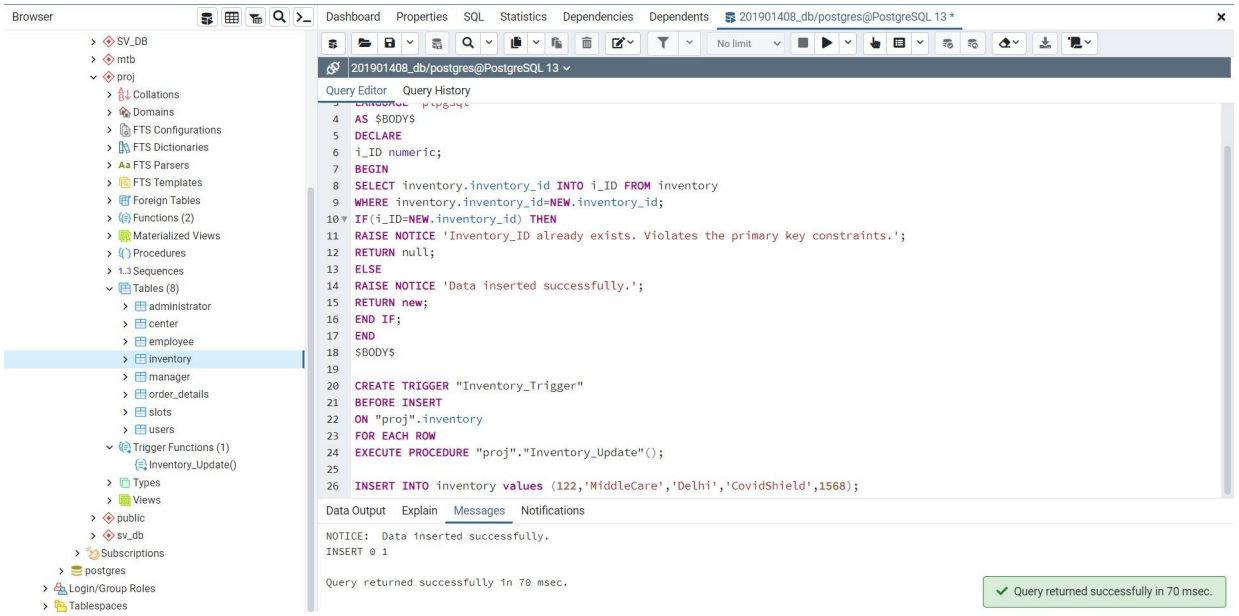
SQL Query

```
INSERT INTO inventory values (50,'MiddleCare','Delhi','CovidShield',1568);
```

Violation case



Successful Case:



2. Trigger function for inserting new employees.

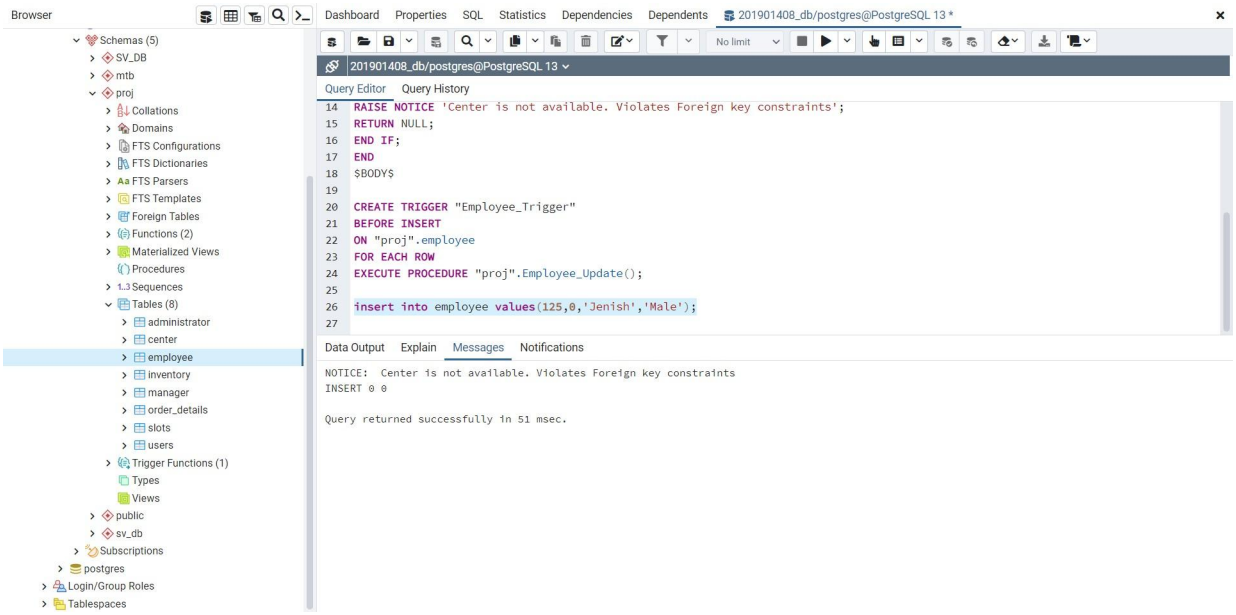
Trigger Function

```
CREATE OR REPLACE function "proj".Employee_Update()
RETURNS trigger
LANGUAGE 'plpgsql'
AS
$BODY$ DECLARE
c_id numeric;
BEGIN
SELECT center.center_id INTO c_id FROM center
where center.center_id=NEW.employee_centerID;
IF(c_id=NEW.employee_centerID) THEN
RAISE NOTICE 'Data Inserted Successfully';
RETURN NEW;
ELSE
RAISE NOTICE 'Center is not available. Violates Foreign key constraints';
RETURN NULL;
END IF;
END
$BODY$
```

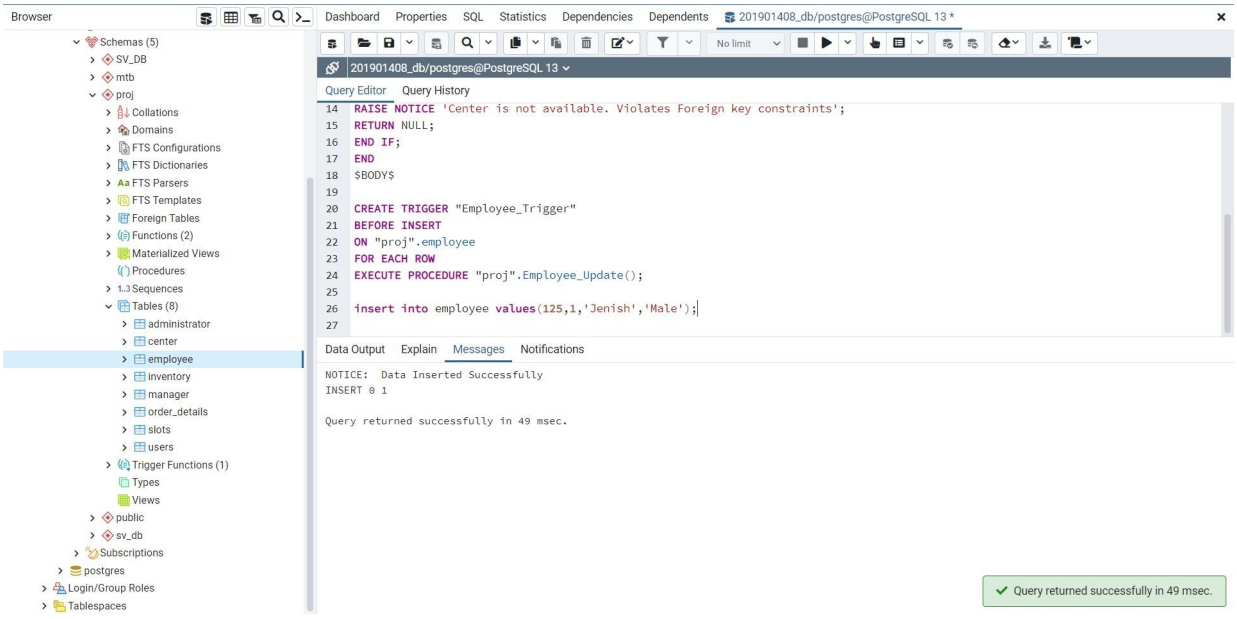
Trigger call

```
CREATE TRIGGER "Employee_Trigger"
BEFORE INSERT
ON "proj".employee
FOR EACH ROW
EXECUTE PROCEDURE "proj".Employee_Update();

insert into employee values(125,1,'Jenish','Male');
```

Unsuccessful case (violation case):



Successful Case:



Section 7
Front End development Code

Backend Handling Program:

views.py

Vaccination > views.py

```python
from django.http.response import HttpResponse
from django.shortcuts import redirect, render
import psycopg2

# Setting up the connection to the Local database
connection = psycopg2.connect(host="localhost",database="201901419_SRS",user="postgres",password="admin",options='-c
cursor = connection.cursor()


# Method for Home page
def Home(request):
    return render(request,'Vaccination/index.html')

```

```python
# Method for Inventory handling
def addInventory(request):
    try:
        if request.method=="POST":
                if request.POST.get('i_insert'):
                    # Handling post request for insertion
                    i_ID = int(request.POST.get('i_ID'))
                    Name = "'"+request.POST.get('i_Name')+"'"
                    City = "'"+request.POST.get('i_City')+"'"
                    VaccineType = "'"+request.POST.get('i_type')+"'"
                    Stock = "'"+request.POST.get('i_stock')+"'"

                    querr = f'insert into inventory values({i_ID},{Name},{City},{VaccineType},{Stock})'
                    cursor.execute(querr)
                    connection.commit()

                    querr = 'select * from inventory'
                    cursor.execute(querr)
                    connection.commit()
                    tuples = cursor.fetchall()
                    context = {'tuples':tuples}
                    return render(request,'Vaccination/print_inventory.html',context)
                elif request.POST.get('i_search'):
                    # Handling post request for searching
                    querr = 'select * from inventory'
                    cursor.execute(querr)
                    connection.commit()
                    tuples = cursor.fetchall()
                    context = {'tuples':tuples}
                    return render(request,'Vaccination/print_inventory.html',context)
```

```
                elif request.POST.get('i_delete'):
                    # Handling post request for deletion
                    print('Delete func')
                    iid = request.POST.get('i_delete')
                    querr = f'delete from inventory where inventory_id={iid}'
                    cursor.execute(querr)
                    connection.commit()
                    print('Deleted successfully')
                    querr = 'select * from inventory'
                    cursor.execute(querr)
                    connection.commit()
                    tuples = cursor.fetchall()
                    context = {'tuples':tuples}
                    return render(request,'Vaccination/print_inventory.html',context)

    except:
        return HttpResponse('<p>Some Error Occured</p>')


    return render(request,'Vaccination/inventory.html')


```

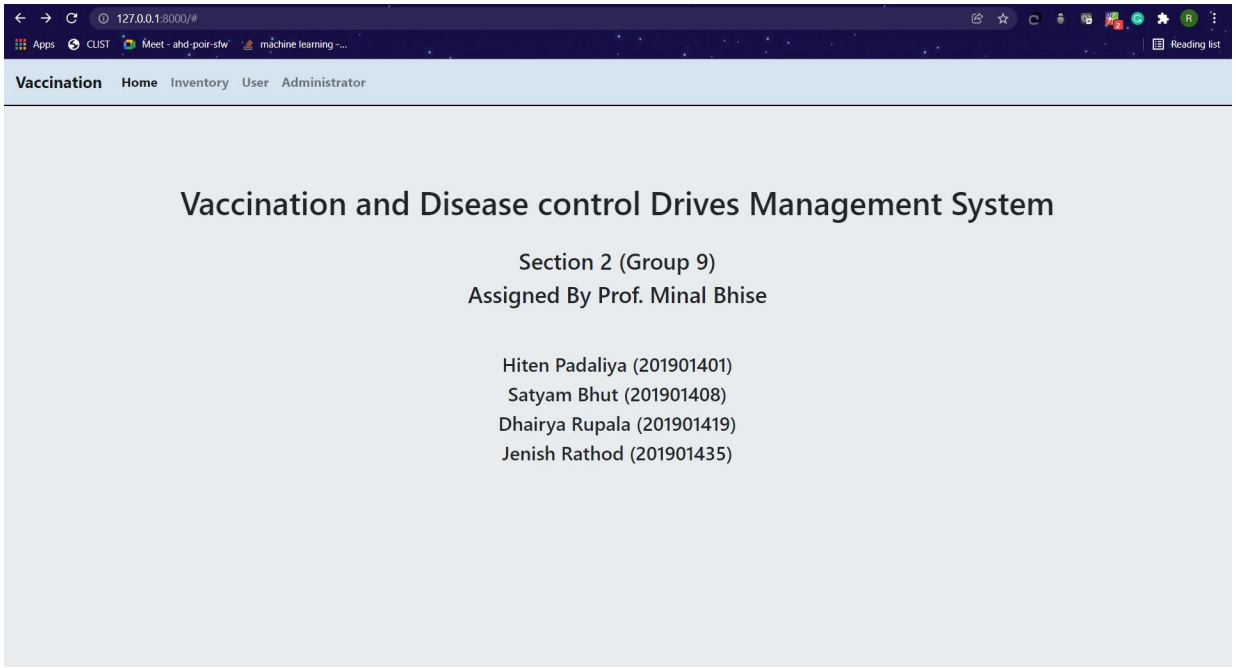
```
# Method for User handling
def addUser(request):
    try:
        if request.method=="POST":
                if request.POST.get('u_insert'):
                    # Handling post request for insertion
                    u_ID = int(request.POST.get('u_ID'))
                    u_CID = int(request.POST.get('u_Center_Id'))
                    u_SID = int(request.POST.get('u_Slot_ID'))
                    u_Name = "'"+request.POST.get('u_Name')+"'"
                    u_Gender = "'"+request.POST.get('u_Gender')+"'"
                    u_Age = int(request.POST.get('u_Age'))
                    u_Add = "'"+request.POST.get('u_Address')+"'"
                    u_City = "'"+request.POST.get('u_City')+"'"
                    u_VaccineType = "'"+request.POST.get('u_Vaccine')+"'"
                    u_IS = "'"+request.POST.get('u_Is_Vaccinated')+"'"

                    querr = f'insert into users values({u_ID},{u_CID},{u_SID},{u_Name},{u_Gender},{u_Age},{u_Add},{u_
                    cursor.execute(querr)
                    connection.commit()

                    querr = 'select * from users'
                    cursor.execute(querr)
                    connection.commit()
                    tuples = cursor.fetchall()
                    context = {'tuples':tuples}
                    return render(request,'Vaccination/print_user.html',context)
```

```
                elif request.POST.get('u_search'):
                    # Handling post request for searching
                    querr = 'select * from users'
                    cursor.execute(querr)
                    connection.commit()
                    tuples = cursor.fetchall()
                    context = {'tuples':tuples}
                    return render(request,'Vaccination/print_user.html',context)
                elif request.POST.get('u_delete'):
                    # Handling post request for deletion
                    u_id = request.POST.get('u_delete')
                    querr = f'delete from users where user_id={u_id}'
                    cursor.execute(querr)
                    connection.commit()

                    querr = 'select * from users'
                    cursor.execute(querr)
                    connection.commit()
                    tuples = cursor.fetchall()
                    context = {'tuples':tuples}
                    return render(request,'Vaccination/print_user.html',context)
    except:
        return HttpResponse('<p> Some error occured</p>')

    return render(request,'Vaccination/user.html')


```

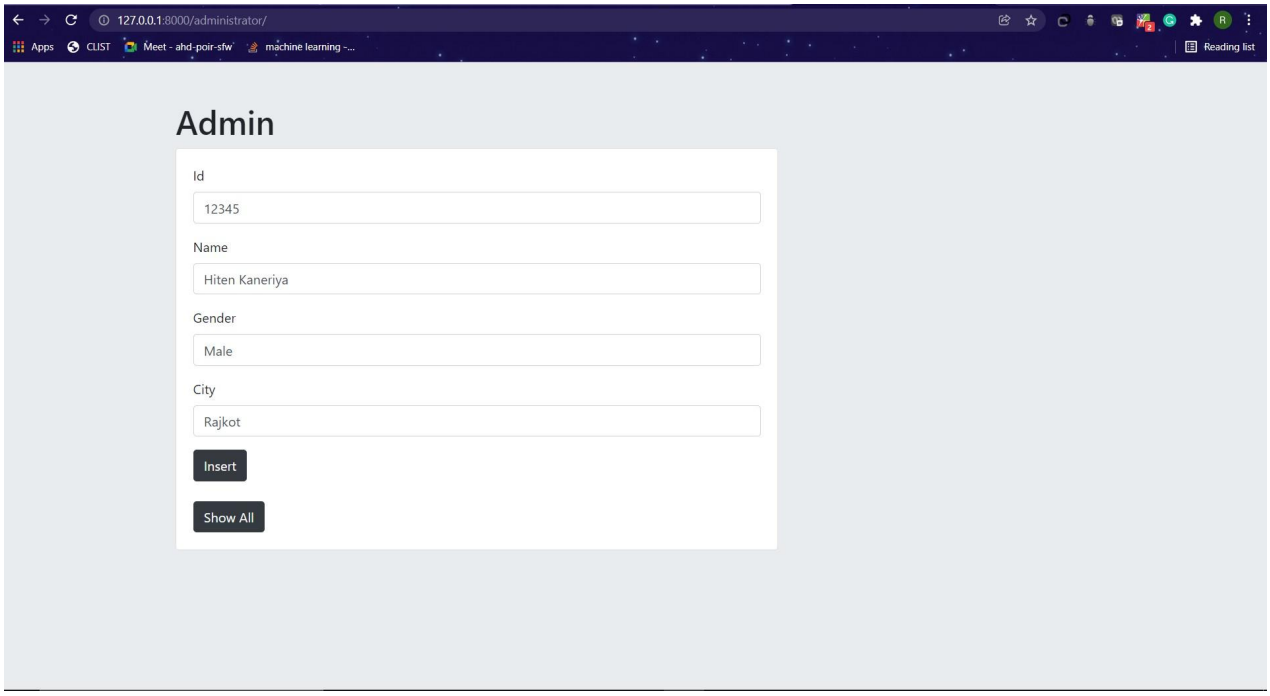
```
# Method for Admin handling
def addAdmin(request):
    try:
        if request.method=="POST":
                if request.POST.get('a_insert'):
                    # Handling post request for insertion
                    a_ID = int(request.POST.get('a_ID'))
                    Name = "'"+request.POST.get('a_Name')+"'"
                    Gender = "'"+request.POST.get('a_Gender')+"'"
                    City = "'"+request.POST.get('a_City')+"'"
                    querr = f'insert into administrator values({a_ID},{Name},{Gender},{City})'
                    cursor.execute(querr)
                    connection.commit()

                    querr = 'select * from administrator'
                    cursor.execute(querr)
                    connection.commit()
                    tuples = cursor.fetchall()
                    context = {'tuples':tuples}
                    return render(request,'Vaccination/print_admin.html',context)
                elif request.POST.get('a_search'):
                    # Handling post request for searching
                    querr = 'select * from administrator'
                    cursor.execute(querr)
                    connection.commit()
                    tuples = cursor.fetchall()
                    context = {'tuples':tuples}
                    return render(request,'Vaccination/print_admin.html',context)
```

```
148                 elif request.POST.get('a_delete'):
149                     # Handling post request for deletion
150                     a_id = request.POST.get('a_delete')
151                     querr = f'delete from administrator where admin_id={a_id}'
152                     cursor.execute(querr)
153                     connection.commit()
154 
155                     querr = 'select * from administrator'
156                     cursor.execute(querr)
157                     connection.commit()
158                     tuples = cursor.fetchall()
159                     context = {'tuples':tuples}
160                     return render(request,'Vaccination/print_admin.html',context)
161     except:
162         return HttpResponse('<p> Some error occured</p>')
163 
164     return render(request,'Vaccination/admin.html')
165 
```

Home Page of the Website:



Admin Form of the Website:



Showing the Admin Data: