CIS 421- Database Management Systems

Relational Database Project Report

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CIS 421

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April 5, 2023

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Description

The database created for the purpose of this project is a small restaurant chain with three branches. We started the process by first identifying our database requirements. We created a series of tables that realistically capture all aspects of the restaurant, from the staff to supplies, to the inventory, etc. We then added the necessary attributes to each table, identifying any primary or foreign keys. We then connected these tables and created an ER diagram to depict the connection of the created tables, as well as an extended description of the ER diagram.

We then created the relational database schema and added arbitrary values to fill our database. Following this step, we worked on creating the database instance with the use of sqlite3. All the attributes were identified by their value type (INT, VARCHAR, BOOLEAN), and optional key type (PRIMARY KEY, FOREIGN KEY), and whether they were NOT NULL or not. The values from our schema are put into the instance via insert statements.

Lastly, we generated a series of SQL queries and update statements and ran them within SQL Developer, an integrated development environment. We were able to confirm that all the queries and update statements were able to run successfully and included screenshots of the results in the document below.

Database Requirements

Tables

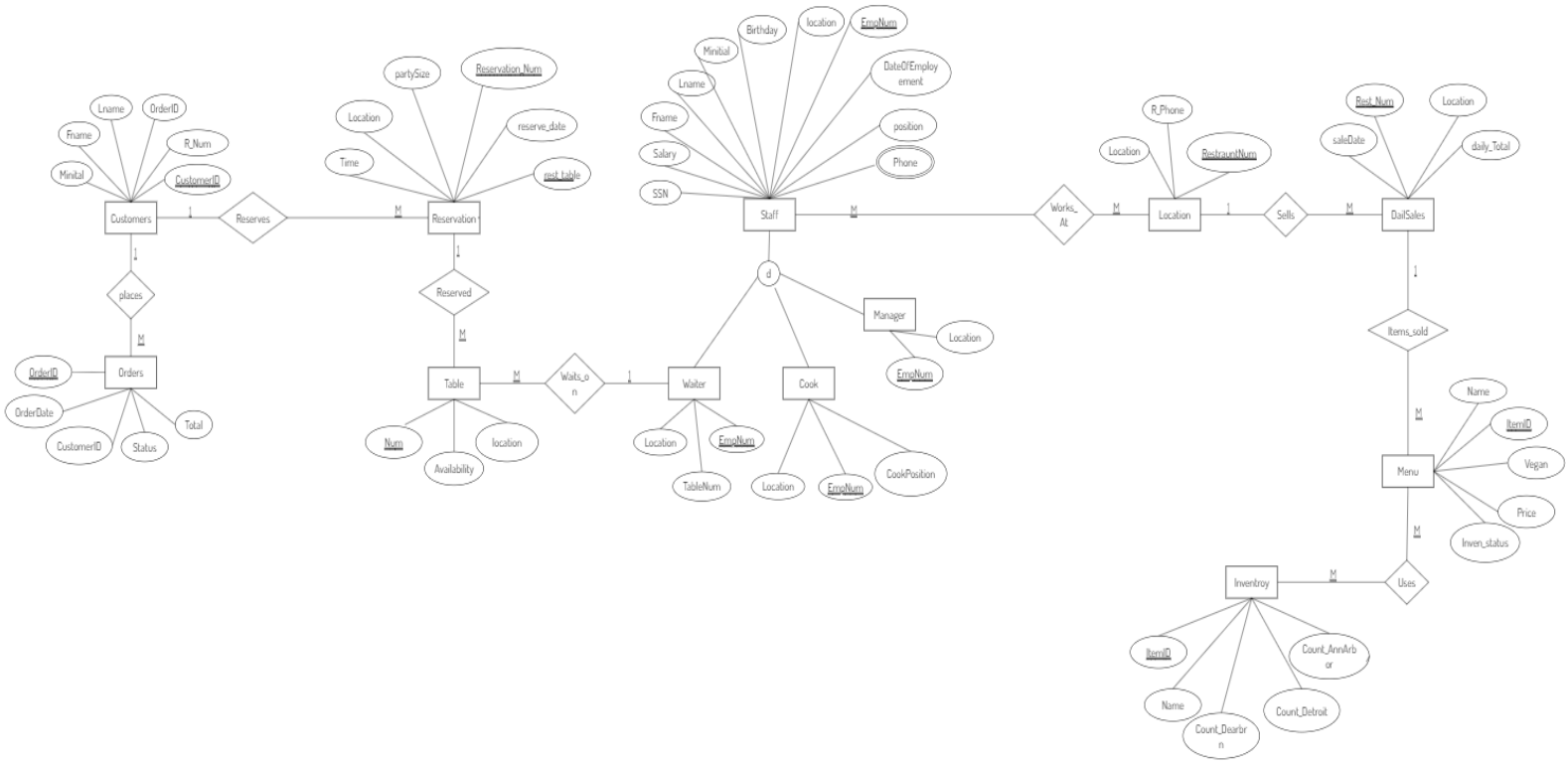
- Customer(customerID, Fname, MInitial, LName,R_Num,OrderID)
- Staff(Fname, MInitial, LName,SSN,EmpNum,Salary, Birthdate, Position, Location, Dateofemployment)
    - Waiters(EmpNum,Location, TableNum)
    - Cooks(EmpNum, location, CookPosition)
    - Manager (EmpNum, Location)
- Inventory(Name, Count_Dearborn, Count_Dearborn, Count_AnnArbor, ItemID)
- Tables(Num, Availability, location)
- Locations(location, R_phone, RestaurantNum)
- Reservations(RestaurantNum, PartySize, Time, Location, reserve_date, rest_table)
- Menu(ItemId, Name, Vegan, Price, Inven_Status)
- Daily_sales(Rest_Num, location, saleDate, daily_total)
- Orders(OrderID, OrderDate, CustomerID, Status, Total)
- phone(EmpNum, PhoneNum)

Relationships

- Customer RESERVES Reservation (1:M)
- Staff WORKS_AT Location (M:M)
- Menu USES Inventory (M:M)
- Waiter WAITS_ON Table (1:M)

- Location SELLS DailySales (1:M)
- Customer PLACES Orders (1:M)
- Reservation RESERVED Table (1:M)
- Daily_Sales ITEMS_SOLD Menu (1:M)

ER Diagram



ER Description

A small restaurant chain has asked a tech company to create a database system. The following is a description of the ER diagram requirements:

Each restaurant has multiple staff members. For each staff member, the database stores their first name, middle initial, last name, unique SSN, unique employee number, position, 1 or more phone number, and date of employment.

There are three positions that staff members can hold: cooks, waiters, and managers. But each staff member can only hold one position. Cooks are identified by their sub position (head chef, sous chef, line chef). Waiters are identified by the table number that they wait on. Each waiter can wait on multiple tables, and each table is waited on by a single waiter. Each table has a unique number, availability status (available, or not available), and a location assigned to it.

The restaurant chain has 3 locations: Ann Arbor, Dearborn, and Detroit. Each location has its own phone number and a unique number. Each location has multiple staff members. Every location does share the same items on a single shared menu, a unique item number tracks each item, whether the item is vegan or not (yes or no), its price, and inventory status (in-stock or out-of-stock). Each location's daily sales are tracked. The database stores the sale date, and the total number of sales.

Within the database, the restaurant chain wants to store an inventory of all items that are on its menu. A manager should be able to look up an item and the system should display the item's unique ID, name, and quantity/count in all locations.

The restaurant chain also wants to keep track of the customers they serve, and their reservations and orders. All customers have a customer ID, first name, last name, and middle initial. Customers can have multiple reservations and multiple orders. However, each order and reservation is made by one customer.

Each reservation a customer makes has a unique number. A reservation contains the size of the party, the time of dining, the restaurant location, the table(s) reserved, and the date. Reservations are to be identified by the restaurant location, part size, time, date, unique reservation number, and restaurant number. Each order is identified by the total cost, status (in progress, completed, canceled), order date, and a unique order ID number.

Relational Database Schema

Staff

Fname	Min ital	Lname	SSN	EmpNum	Salary	Birthday	Position	location	Date of employment
Mary	D	Ann	2238	5681	800.00	1987-07-12	Manager	Dearborn	2018-05-02
Loid	F	Forger	3367	1298	900.00	1982-04-21	Manager	Ann Arbor	2015-02-15
Noe	V	Archiv iste	4425	7032	1000.00	1990-06-05	Manager	Detroit	2017-09-01
Elena	K	Lee	2356	4466	500.00	1995-04-11	Waiter	Dearborn	2019-08-18
Felix	Y	Pace	1122	0325	900.00	2000-09-15	Cook	Ann Arbor	2020-03-15
Sophie	H	Parker	7887	8976	300.00	1992-05-01	Waiter	Detroit	2022-02-13

Howl	F	Pret	6655	1111	450.00	1982-11-21	Cook	Ann Arbor	2018-07-01
Mamba	B	Aespa	2244	3333	500.00	1992-02-14	Cook	Detroit	2019-03-15
momo	C	Twice	8898	2234	700.00	1998-04-01	Cook	Dearborn	2019-05-10
William	M	Moriarty	2938	1283	700.00	1997-03-02	Cook	Ann Arbor	2020-04-01
Francis	S	Fitzgerald	2738	8721	900.00	1998-05011	Cook	Dearborn	2019–03-12
sasha	A	Braus	0923	0192	560.00	1995-06-13	Cook	Dearborn	2022-04-01
Nana	O	Osaki	3901	3920	600.00	1997-03-12	Cook	Detroit	2019-04-13
Miroh	D	Levy	2092	2304	500.00	1998-10-02	Cook	Detroit	2018-07-19
Yuta	F	Okkotsu	8372	1920	600.00	1992-08-11	Waiter	Ann Arbor	2019-06-11
Gege	D	akutami	0192	1988	600.00	1998-10-04	Waiter	Ann Arbor	2018-07-19
Mustafa	S	Ali	0387	1972	600.00	1996-04-09	Waiter	Ann Arbor	2019-07-21
Yuqi	A	idle	0738	1928	600.00	1998-10-02	Waiter	Ann Arbor	2021-05-17
Conan	E	Gray	2390	1092	600.00	1998-07-01	Waiter	Dearborn	2022-08-01
Vash	G	Stampede	3902	3982	600.00	1996-07-12	Waiter	Dearborn	2021-10-02
Lu	J	Fang	3820	1997	600.00	1998-07-09	Waiter	Detroit	2021-09-15
Fyodor	Y	Vamp	3204	1993	600.00	1998-02-20	Waiter	Detroit	2021--02-11

Cooks

EmpNum	location	cookPosition
1283	Ann arbor	Line Cook
1111	Ann arbor	Sous Chef

0325	ann arbor	Head Chef
2234	dearborn	Line Cook
8721	dearborn	Sous Chef
0192	dearborn	Head Chef
3333	detroit	Line Cook
3920	detroit	Sous Chef
2304	detroit	Head Chef

Waiters

EmpNum	location	TableNum
1920	Ann Arbor	12
1988	Ann Arbor	6
1972	Ann Arbor	11
1928	Ann Arbor	8
4466	Dearborn	1
1092	Dearborn	3
3982	Dearborn	5
8976	Detroit	4
1997	Detroit	7
1993	Detroit	8

Inventory

Name	count_Detroit	count_Dearborn	count_AnnArbor	itemID
water	788	663	500	221

chicken	304	203	506	301
tofu	100	293	99	203
heavy cream	200	202	170	100
parmesan cheese	86	56	69	109
beef	203	405	304	129
butter	404	444	450	293
soda	2040	1299	1596	300
rice	50	39	55	299
pita bread	505	300	204	315
pickles	90	79	59	506
onions	405	304	292	455
oil	302	209	399	555
garlic	201	306	292	111
pasta	1034	1029	1849	309
lemons	220	394	201	330

Orders

OrderID	OrderDate	CustomerID	Status	Total
8789	06-22-2022	34	Complete	0.99
9876	03-04-2022	23	In progress	92.02
0987	06-04-2022	12	Complete	30.00
2345	03-21-2022	45	canceled	12.57
9087	01-04-2022	67	In progress	180.30
7654	12-03-2022	89	Complete	25.00
3456	06-11-2022	33	Complete	25.55

0123	03-04-2022	55	In progress	7.99
7800	12-05-2022	77	Complete	100.00
5678	11-03-2022	98	In progress	36.90

Customer

CustomerID	Fname	Minit	Lname	R_Num #	orderID
34	John	J	Smith	321	8789
23	bang	C	han	123	9876
12	mika	S	end	456	0987
45	Alice	B	johnson	789	2345
67	David	L	Kim	555	9087
89	Emily	K	Lee	222	7654
33	Jack	T	Chen	445	3456
55	Finnick	H	Odair	667	0123
77	Kaz	S	Brekker	688	7800
98	Inej	J	Ghafa	336	5678

Manager

Emp#	location
5681	Dearborn
1298	Ann Arbor
7032	Detroit

Menu

ItemID	Name	Vegan	price	Inven_status
221	water	yes	0.99	In-stock
849	Alfredo	no	12.99	out-of-stock
758	Tofu stir fry	yes	12.99	in-stock
853	Shawarma	no	8.99	In-stock
563	Butter chicken	no	13.99	In-Stock
213	Soda	yes	2.99	In-Stock

Daily_sales

Rest_Num	Location	saleDate	daily_total
343	Ann Arbor	2022-06-22	5600.00
765	Dearborn	2022-06-22	4000.00
082	Detroit	2022-06-22	3800.00

Locations

location	R_phone	RestaurantNum
Ann Arbor	(734) 753-1920	343
Dearborn	(313) 504-2202	765
Detroit	(313) 920-4039	082

Reservation

Reservation_ Num	partySize	Time	location	reserve_date	rest_table

321	1	1:00 pm	Ann Arbor	2022-06-22	12
123	8	3:00pm	Ann Arbor	2022-04-03	6
456	1	2:00pm	Ann Arbor	2022-06-04	11
789	4	7:00pm	Ann Arbor	2022-03-21	8
555	5	3:00pm	Dearborn	2022-04-01	1
222	2	5:30pm	Dearborn	2022-04-12	3
445	1	6:00pm	Dearborn	2022-04-06	5
667	7	8:45pm	Detroit	2022-04-03	4
688	8	3:00pm	Detroit	2022-05-12	7
336	4	7:00pm	Detroit	2022-03-11	8

Rest_Tables

Num	Availability	location
12	Not available	Ann Arbor
6	available	Ann Arbor
11	Not available	Ann Arbor
8	available	Ann Arbor
1	Not available	Dearborn
3	Not available	Dearborn
5	Not available	Dearborn
4	Not available	Detroit
7	Not available	Detroit
9	Not available	Detroit
13	Available	Detroit

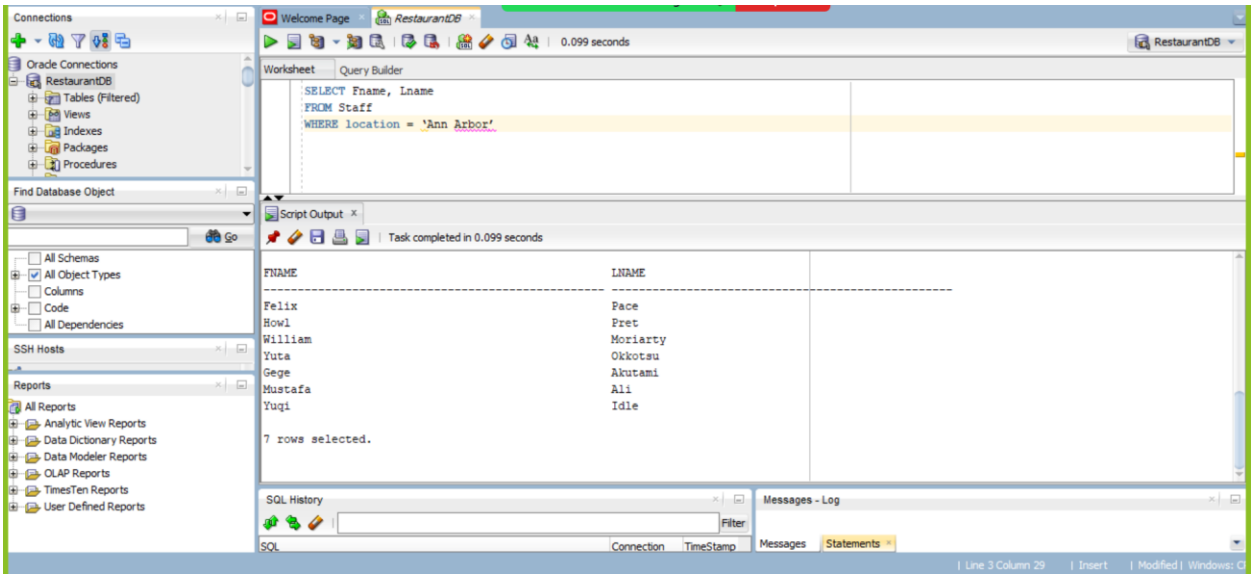
Phone

emp#	PhoneNum
5681	313-206-1645
1298	734-228-0258
7032	248-228-1952
4466	313-336-4179
0325	734-249-6853
8976	248-232-9978
1111	734-260-1537
3333	248-242-6427
2234	313-337-6146
1283	734-274-0781
8721	313-374-5198
0192	313-390-6909
3920	248-295-9430
2304	248-283-4544
1920	734-249-6853
1988	734-302-0870
1972	734-327-3684
1928	734-358-3747
1092	313-425-9257
3982	313-561-6113
1997	248-319-9055
1993	248-567-3495

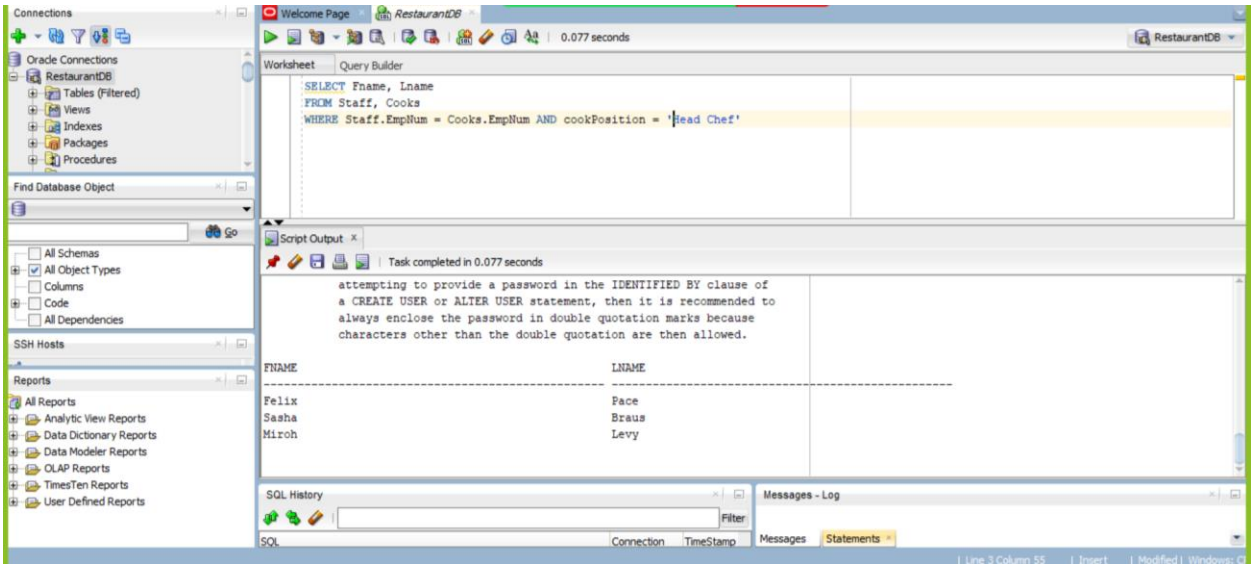
SQL Statements & Results

SQL Query Statements

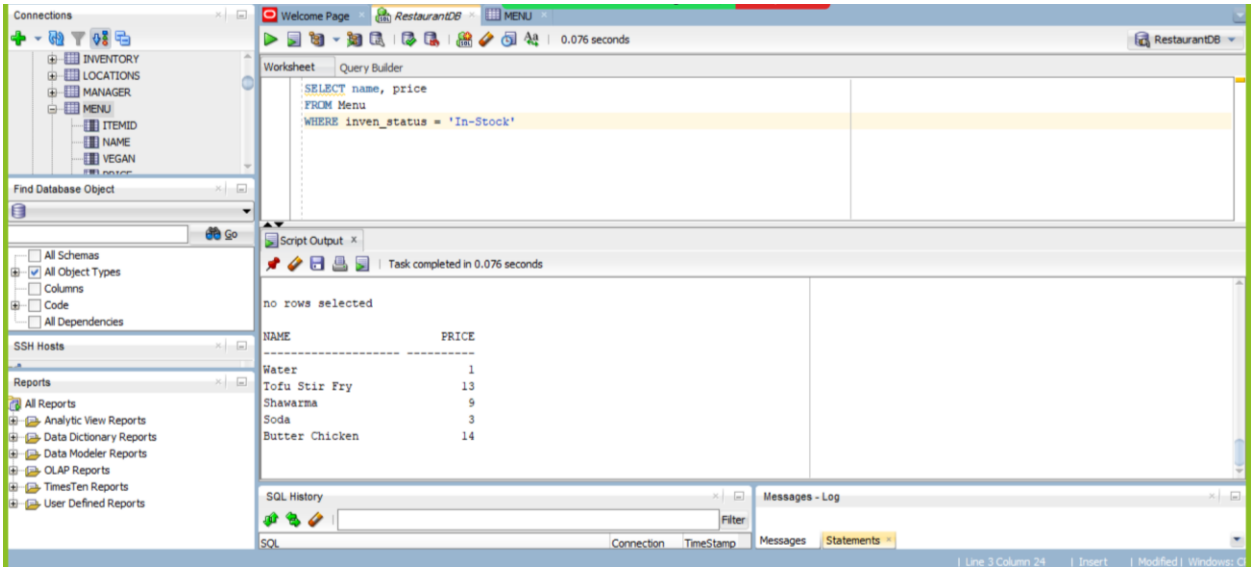
1. Fetching the first and last names of staff members at the Ann Arbor location.
   SELECT Fname, Lname
   FROM Staff
   WHERE location = ‘Ann Arbor’



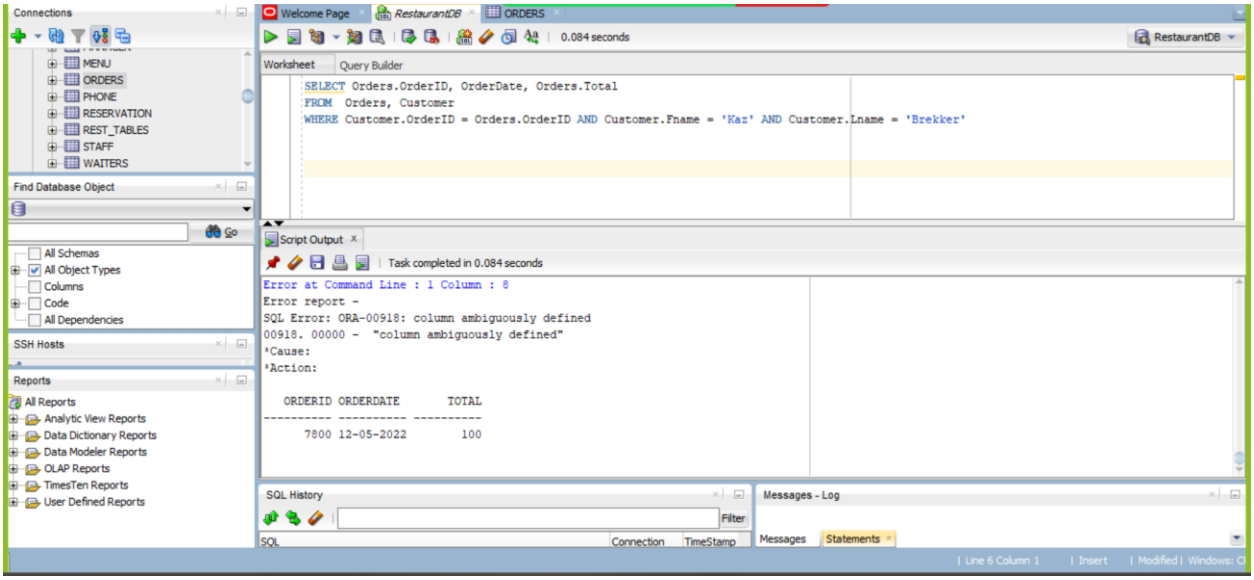
2. Fetching the first and last names of Staff members whose position is head chef.
   SELECT Fname, Lname
   FROM Staff, Cooks
   WHERE Staff.EmpNum = Cooks.EmpNum AND cookPosition = ‘Head Chef’



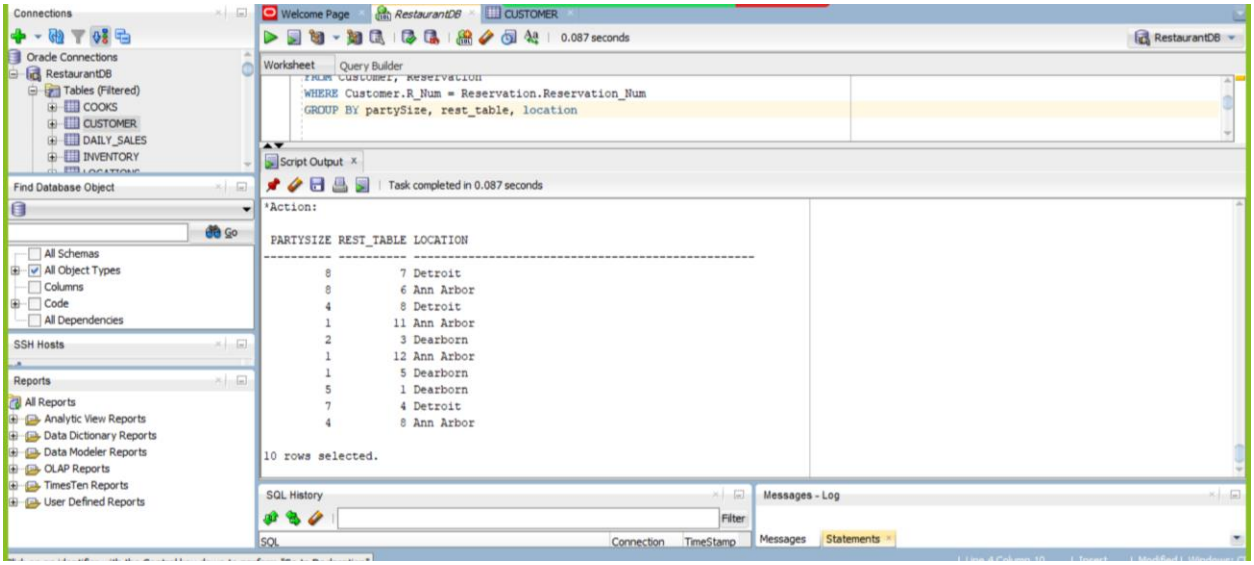
3. Retrieve the name and price of all in-stock menu items
   SELECT name, price
   FROM Menu
   WHERE inven_status = ‘In-Stock’



4. Retrieve the orderId, order data, and total for the customer Kaz Brekker.
   SELECT Orders.OrderID, OrderDate, Orders.Total
   FROM Orders, Customer
   WHERE Customer.OrderID = Orders.OrderID AND Customer.Fname = 'Kaz' AND
   Customer.Lname = 'Brekker'

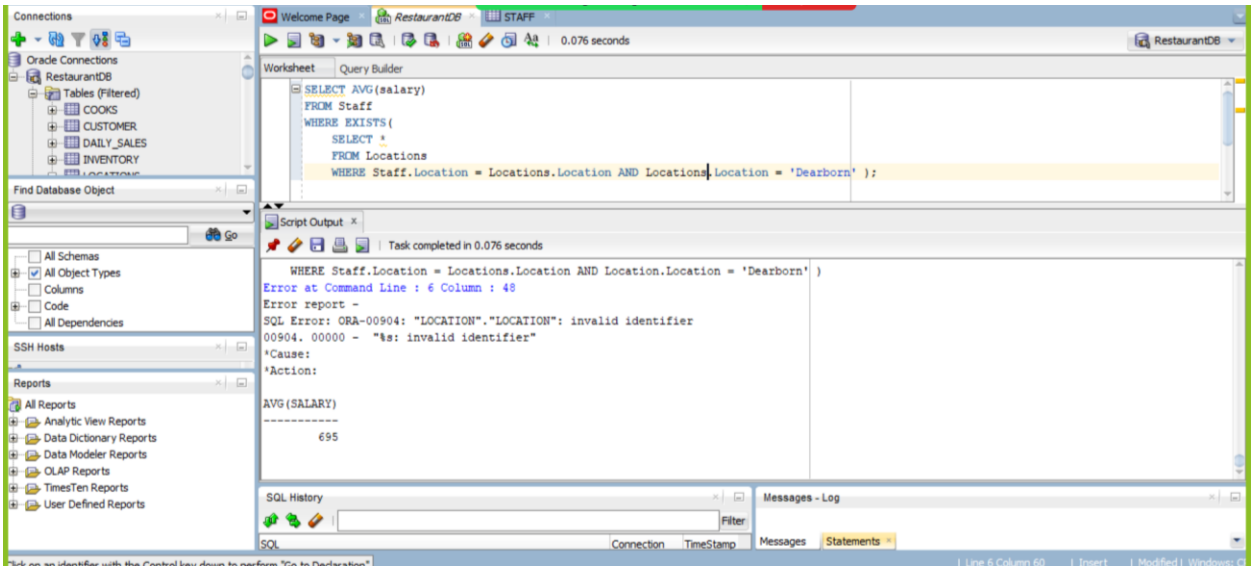


5. For each customer, retrieve the party size, table, and location.
   SELECT partySize, rest_table, location
   FROM Customer, Reservation
   WHERE Customer.R_Num = Reservation.Reservation_Num
   GROUP BY partySize, rest_table, location



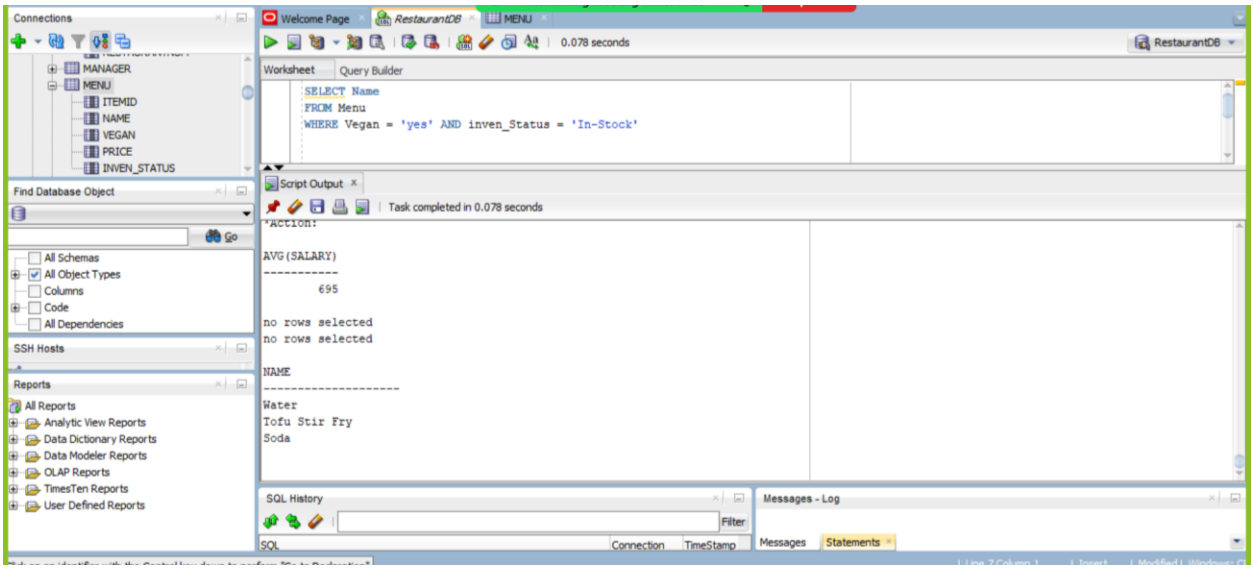
6. Retrieve the average salary of all Staff members at the Dearborn location

```
SELECT AVG(salary)
FROM Staff
WHERE EXISTS(
        SELECT *
        FROM Locations
        WHERE Staff.Location = Locations.Location AND Locations.Location =
        'Dearborn' );
```

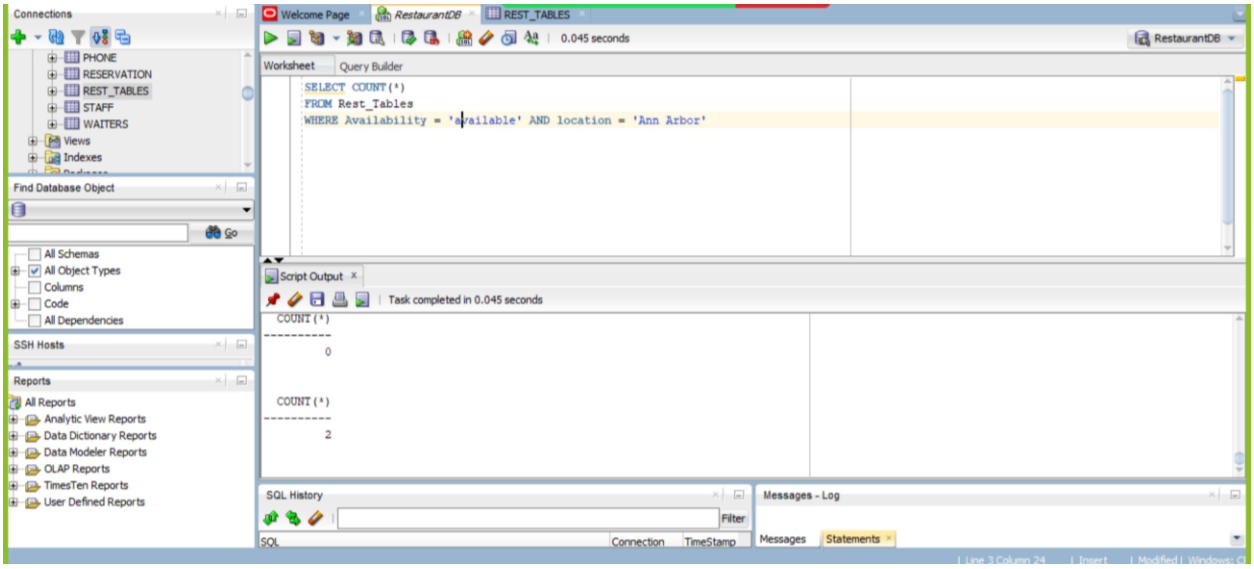


7. Retrieve the name of all vegan items that are also in stock.

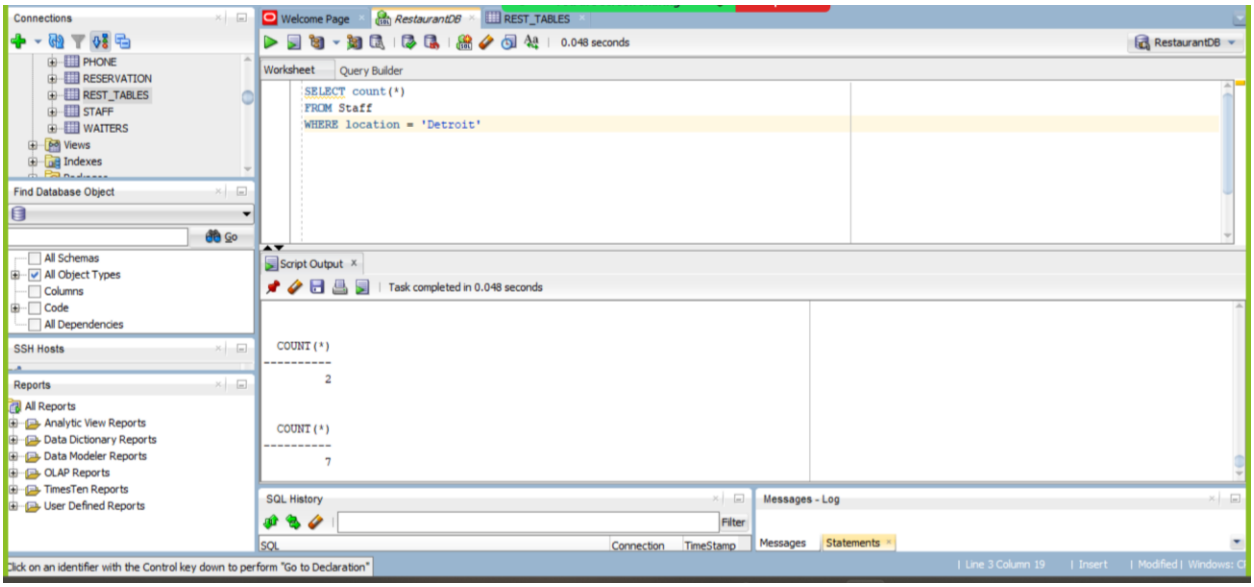
```
SELECT Name
FROM Menu
WHERE Vegan = 'yes' AND inven_Status = 'In-Stock'
```



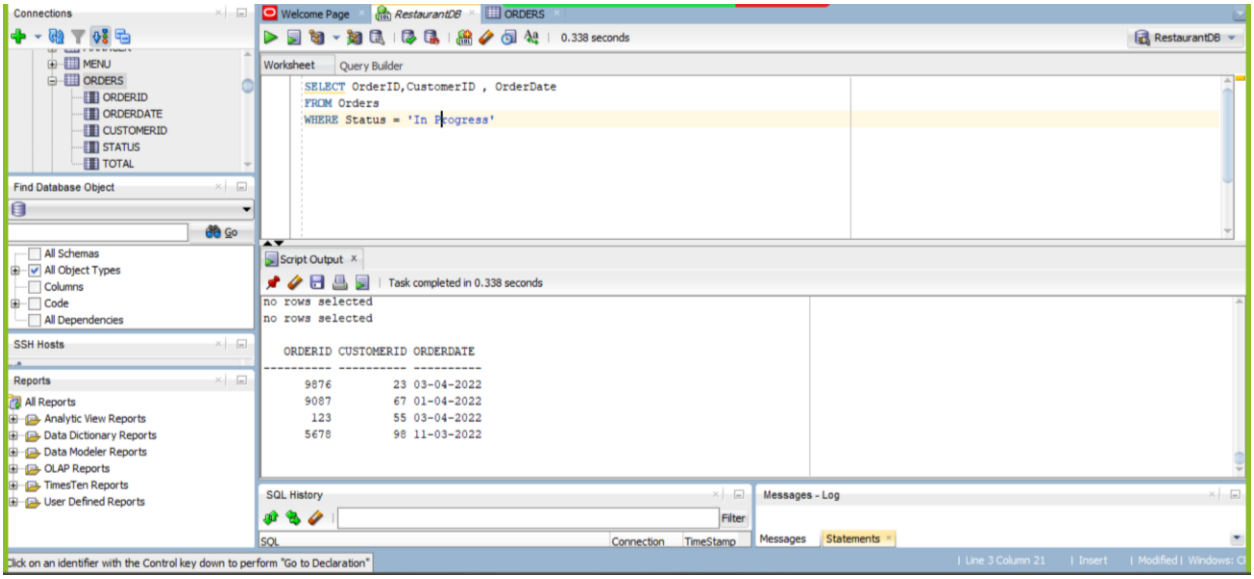
8. Retrieve the number of available tables at the Ann Arbor location.
   SELECT COUNT(*)
   FROM Rest_Tables
   WHERE Availability = 'available' AND location = 'Ann Arbor'



9. Retrieve the number of staff at the Detroit location
   SELECT count(*)
   FROM Staff
   WHERE location = 'Detroit'

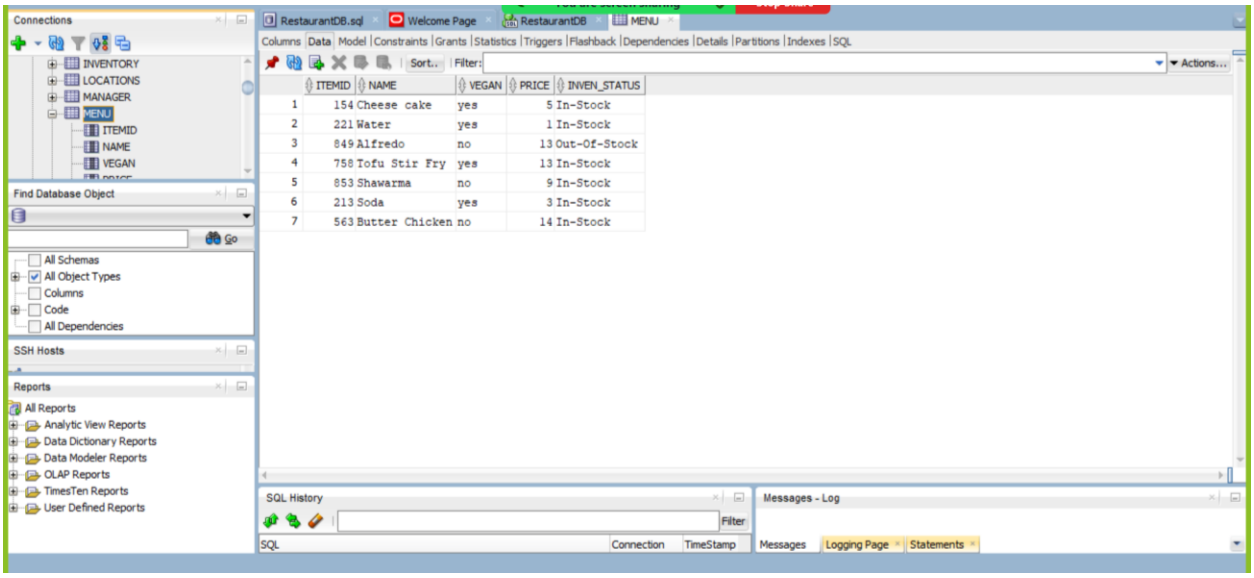


10. Retrieve OrderID, customerID, and order date of all orders that are in progress.
    SELECT OrderID,CustomerID , OrderDate
    FROM Orders
    WHERE Status = 'In Progress'

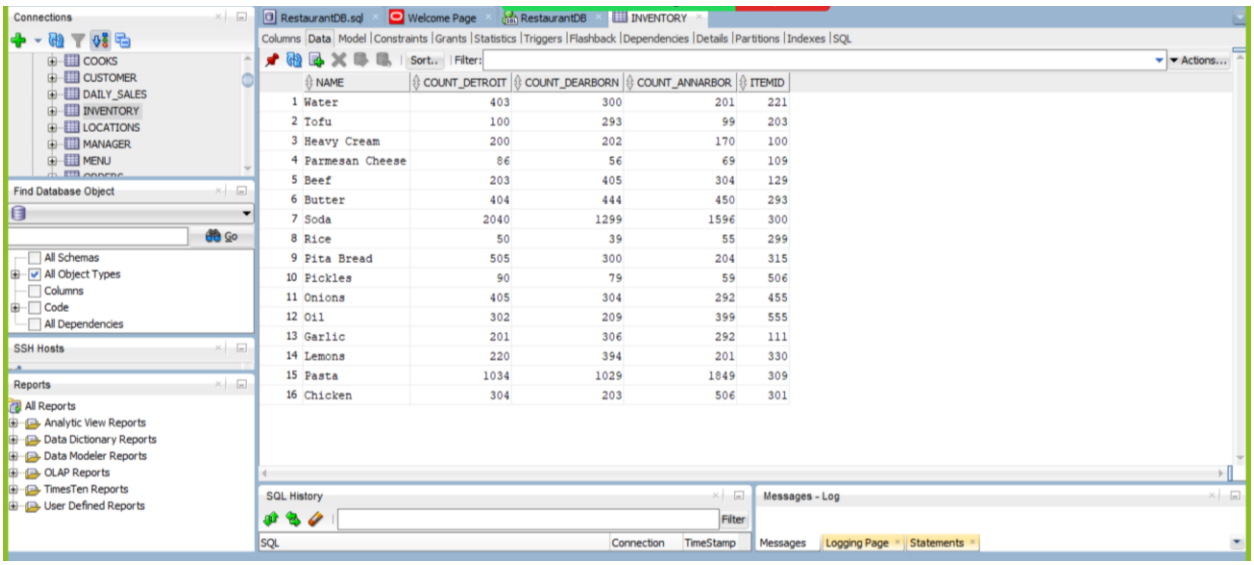


SQL Update Statements

1. Insert a new menu item <154, ‘Cheese cake, 'yes', 4.99, 'In-Stock'>
   INSERT INTO Menu VALUES(154, ‘Cheese cake’, 'yes', 4.99, 'In-Stock');

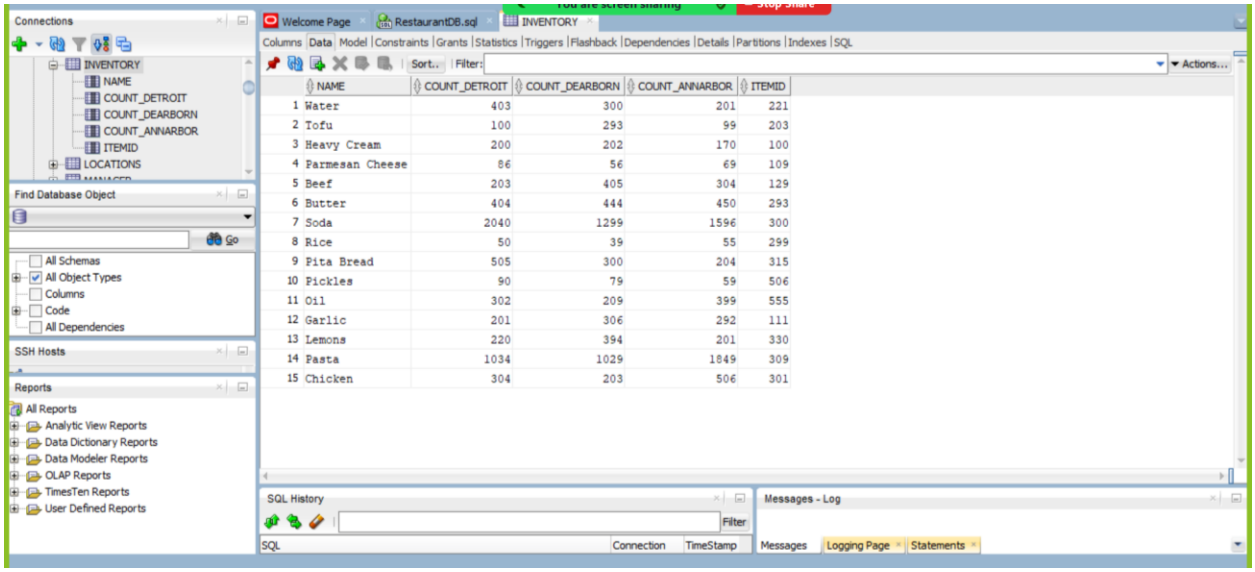


2. Update water stock under Inventory
   UPDATE Inventory SET Count_Detroit = 403 Count_Dearborn = 300, Count_AnnArbor = 201 WHERE Name = ‘Water’;



3. Delete the inventory item ‘Onions’ and whose item id is 455.

   DELETE FROM Inventory
   WHERE name = ‘Onions’ AND itemID = 455



Responsibilities

Shahd

- Wrote SQL update statements
- Wrote SQL query statements
- Created the ER diagram
- Created the Cooks, Waiters, Customers, and Reservation tables for relational schema and instance.

Taylor

- Wrote the ER diagram description
- Wrote first draft of description
- Created database under SQL Developer and Sqlite3
- Inserted all DDL/SQL statements into the database
- Created Phone, Rest_Tables, Locations, Daily_sales, Staff tables for relational schema and instance
- Contributed to project presentation

Meher

- Wrote the description
- Wrote the ER diagram description
- Created inventory, order, manager, and menu tables for relational schema and instance
- Formatted/polished the report
- Wrote SQL update statements

- Reviewed and finalized SQL statements