UNIVERSITY OF WESTMINSTER

INFORMATICS INSTITUTE OF TECHNOLOGY

University of Westminster

Module: 5COSC020C: Database

SystemsModule leader:

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Coursework parts A & B

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PART A

QUESTION 1: CONCEPTUAL EERD

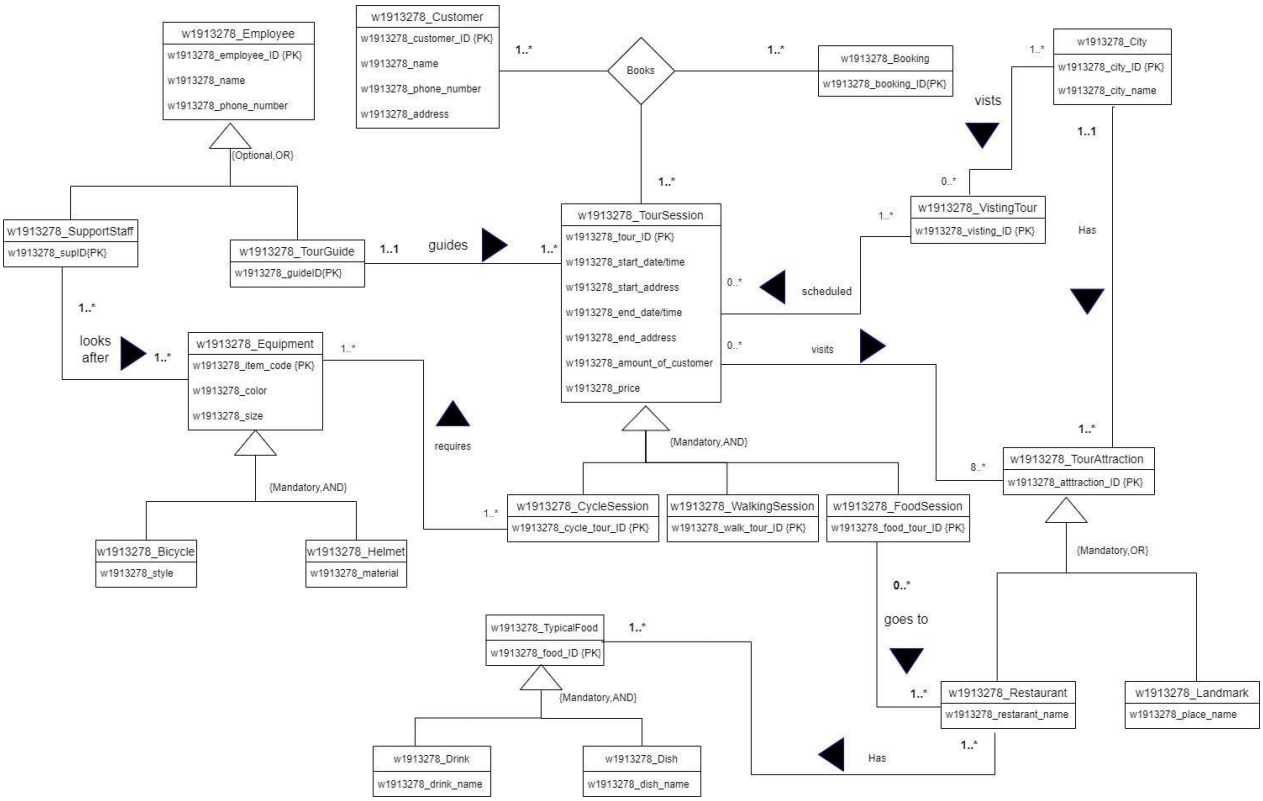

Figure 1: Conceptual EERD

QUESTION 2.1: ENTITY NAME AND DESCRIPTION

Table 1

Entity Name	Description
w1913278_Booking	The booking entity stores the IDs of the customers who booked the tour session.
w1913278_VisitingTour	When a Visiting tour is scheduled, it is called a tour session.
w1913278_TypicalFoods	This entity stores all the different types of dishes and drinks IDs.
w1913278_Employee	This entity shows all details of employees working at Tourmato (support staff and tour guide).
w1913278_Customer	The customer entity shows all details about the customers.
w1913278_Equipment	Stores all the equipment IDs used in the cycle session.
w1913278_TourAttraction	Tour attraction store the attraction IDs (restaurant and landmark).
w1913278_City	Stores all details about the city.
w1913278_TourSession	This holds up all the tour session IDs (walking, cycling, and food IDs).

QUESTION 2.2: GENERAL ENTITY NAME, SPECIALIZED ENTITY, AND EXPLANATION

Table 2

General Entity	Specialized Entity	Explanation
w1913278_TourSession	w1913278_CycleSession	This specialized entity shows details about the customers who have selected the cycle session.
	w1913278_WalkingSession	This specialized entity shows all details about the customers who have selected the walking session
	w1913278_FoodSession	This specialized entity shows details about the customers who have selected the food session
w1913278_Equipment	w1913278_Bicycle	This entity is representing the several styles, colors, and sizes of the bicycle and all bicycles.
	w1913278_Helmet	This entity represents the different sizes and colors of the helmets.
w1913278_Employee	w1913278_ SupportStaff	support staff IDs are stored in this entity.
	w1913278_TourGuide	guide IDs are stored in this entity.

w1913278_TypicalFoods	w1913278_Dish	Dishes' names are stored in this entity.
	w1913278_Drink	Drink names are stored in this entity.
w1913278_ TourAttraction	w1913278_Restaurant	This holds the name of the restaurant.
	w1913278_Landmark	This holds the name of the location.

QUESTION 3: ENTITY NAME, RELATIONSHIPS, MULTIPLICITY, AND 4 STATEMENTS FOR EACHRELATIONSHIP

Table 03

Entity name	Multiplicity	Relationship	Multiplicity	Entity Name	Brief Justification for the Multiplicity (4 statements for each relationship)
w1913278_Customer	1.. *	Books	1.. *	w1913278_Booking	One customer can book at least one booking in one tour session.
			1.. *	w1913278_ Tour Session	One customer can book many bookings in many tour sessions.

w1913278_Booking	1..*	Books	1..*	w1913278_Customer	One booking can have at least one customer for one tour session.
			1.. *	w1913278_ Tour Session	One booking can have many Customers in many tour sessions.
w1913278_ TourSession	1.. *	Books	1.. *	w1913278_Booking	One Tour Session can Be booked by at least one booking with one customer.
			1.. *	w1913278_Customer	One customer can book many bookings in many tour sessions.
We used a ternary relationship because booking, customer, and tour session have a common relationship (Books). The reason we use the multiplicity (1..*) is that in order to have a tour session there mustbe a booking and in order to have a booking there must be customers.					
w1913278_ TourSession	0..*	Scheduled	1..*	w1913278_VisitingTour	One Tour Session can have at leastone visiting tour.
					One Tour Session can have at most many visiting tours.
					One visiting tour does not have any Tour

					Sessions.
					One visiting tour can have at most many Tour Sessions.
w1913278_ TourSession	0..*	visit	8..*	w1913278_TourAttraction	One tour session can visit at least 8 attractions.
					One tour session can visit many attractions.
					One attraction can have no tour sessions
					One attraction can have many tour sessions.
w1913278_VisitingTour	0.. *	visit	1.. *	w1913278_City	One visiting tour can visit at least one city.
					One visiting tour can visit At most many cities.
					One city may not have any visiting tours.
					One city can have many visiting tours.
Every visiting tour must have at least one city because every tourist attraction place is in a certain city.					
w1913278_City	1..1	has	1.. *	w1913278_TourAttraction	One city can have at least one attraction.
					One city can have at most many attractions.

					One attraction can have at least one city.
					One attraction can have at most one city.
w1913278_Restaurant	1.. *	has	1.. *	w1913278_TypicalFood	One restaurant can have at least one typical food.
					One restaurant can have at most many typical foods.
					One typical food can have at least one restaurant.
					One typical food can have many restaurants.
w1913278_FoodSession	0.. *	Goes to	1.. *	w1913278_ Restaurant	One food session can go to at least one restaurant.
					One food session can go tomany restaurants.
					One restaurant does not have any food sessions.
					One restaurant can have at most many food sessions.

Because food tour mention they go to restaurants, you must go to at least one restaurant Several food tours can come to the same restaurant on the same day and at the same time					
w1913278_ TourGuide	1..1	guides	1.. *	w1913278_ TourSession	One tour guide can have at least one tour session.
					One tour guide can have most tour sessions.
					One tour session can have at least one tour guide.
					One tour session can have at most one tour guide.
Every tour session should have at least one tour guide to guide the tourists because they don't know the destinations.					
w1913278_SupportStaff	1.. *	Looks after	1.. *	w1913278_Equipment	One support staff can take care of at least one item of equipment.
					One support staff can take care of many items of equipment.
					One piece of equipment can have at least one support staff.
					One piece of equipment can have at most many support staff.
This is because one piece of equipment can be used multiple times in different cycle sessions.					

QUESTION: ENTITY NAME, ATTRIBUTES, PRIMARY KEYS, AND DESCRIPTION

Table 04

Entity name	Attributes for this entity (include PK)	Justification
w1913278_Customer	w1913278_customer_ID {PK}	This holds the details of every ID of the customer. Every ID isunique; therefore, it is a primary key.
	w1913278_name	The name attribute stores all the customer names.
	w1913278_ phone_number	This stores the phone numbers of each customer.
	w1913278_address	This stores every address ofeach customer.
w1913278_Booking	w1913278_booking_ID{PK}	A booking ID is given to customers who book a tour section, this given ID is unique.
w1913278_TourSession	w1913278_tour_ID {PK}	Tour ID is given to customers who booked a booking. This is unique.
	w1913278_start_date/time	A tour session is given a start date/time. This Attribute stores the start date/time.
	w1913278_start_address	This stores the starting address.
	w1913278_end_date/time	A tour session is given an end date/time. This Attribute stores the end date/time.

	w1913278_end_address	This stores the ending address.
	w1913278_amount_of_customer	This stores the maximum number of customers that canfit a tour session.
	w1913278_price	The price of each tour session is stored.
w1913278_CycleSession	w1913278_cycle_tour_ID {PK}	An ID is given to the customers who have selected the cycle session.
w1913278_WalkingSession	w1913278_walk_tour_ID {PK}	An ID is given to the customers who have selected the walking session.
w1913278_FoodSession	w1913278_food_tour_ID {PK}	An ID is given to the customers who have selected the food session.
w1913278_VisitingTour	w1913278_ visiting_ID {PK}	Visiting ID is given to customers who booked a tour. This is unique.
w1913278_Employee	w1913278_employee_ID {PK}	A unique ID is given to employees.
	w1913278_name	This attribute stores the name of the support staff.
	w1913278_phone_number	This attribute stores the phone number of the support staff.
w1913278_ SupportStaff	w1913278_supID{PK}	Stores the IDs of the support staff.
w1913278_TourGuide	w1913278_guideID{PK}	This attribute stores the IDs of the tour guide.
w1913278_Equipment	w1913278_item_code {PK}	A unique code is given to every piece of equipment used in Tourmato.
	w1913278_color	Stores the color of the bicycles
	w1913278_ size	Stores the size of the bicycles

w1913278_Bicycle	w1913278_style	The style attribute stores the different styles of bicycles.
w1913278_Helmet	w1913278_ material	Stores the type of materials used in the helmet
w1913278_City	w1913278_city_ID {PK}	This contains a unique code that is given to every city. Because it is unique it becomes a primary key.
	w1913278_city_name	This stores the city name.
w1913278_TourAttraction	w1913278_attraction_ID {PK}	Like city ID, attraction ID is also a code given to every attraction.
w1913278_Restaurant	w1913278_restaurant_name	This attribute holds the name of the restaurant.
w1913278_Landmark	w1913278_place_name	This attribute holds the name of the landmark.
w1913278_TypicalFoods	w1913278_food_ID {PK}	Food ID holds up the ID given to each food served at these restaurants.
w1913278_Dish	w1913278_dish_name	This attribute holds the name of each dish served at the restaurant.
w1913278_Drink	w1913278_drink_name	This attribute holds each name of each drink served at the restaurant.

PART B

QUESTION 05: LOGICAL ERD

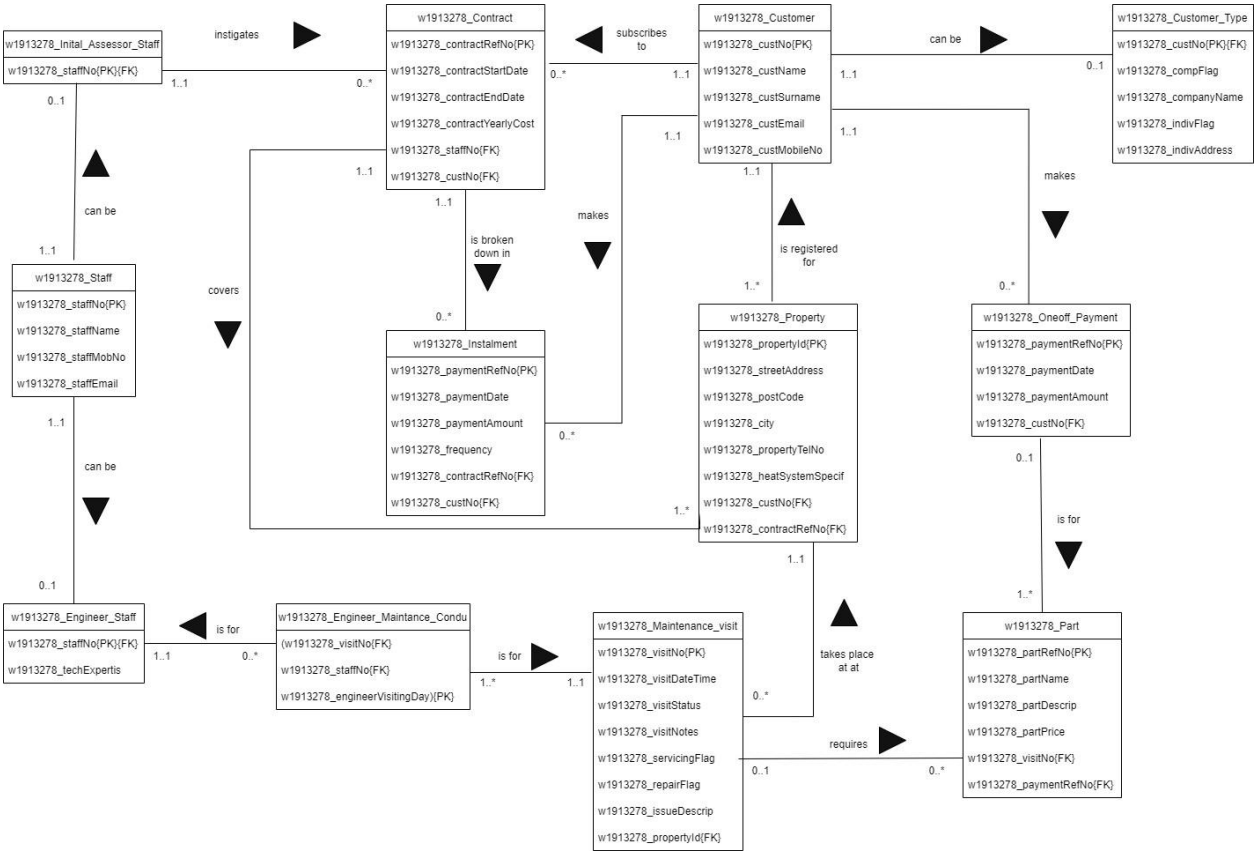

Figure 1 : Logical ERD for BoilHeater

QUESTION 06: WRITE SQL QUERIES

- Customer table
    - *Create the customer table*

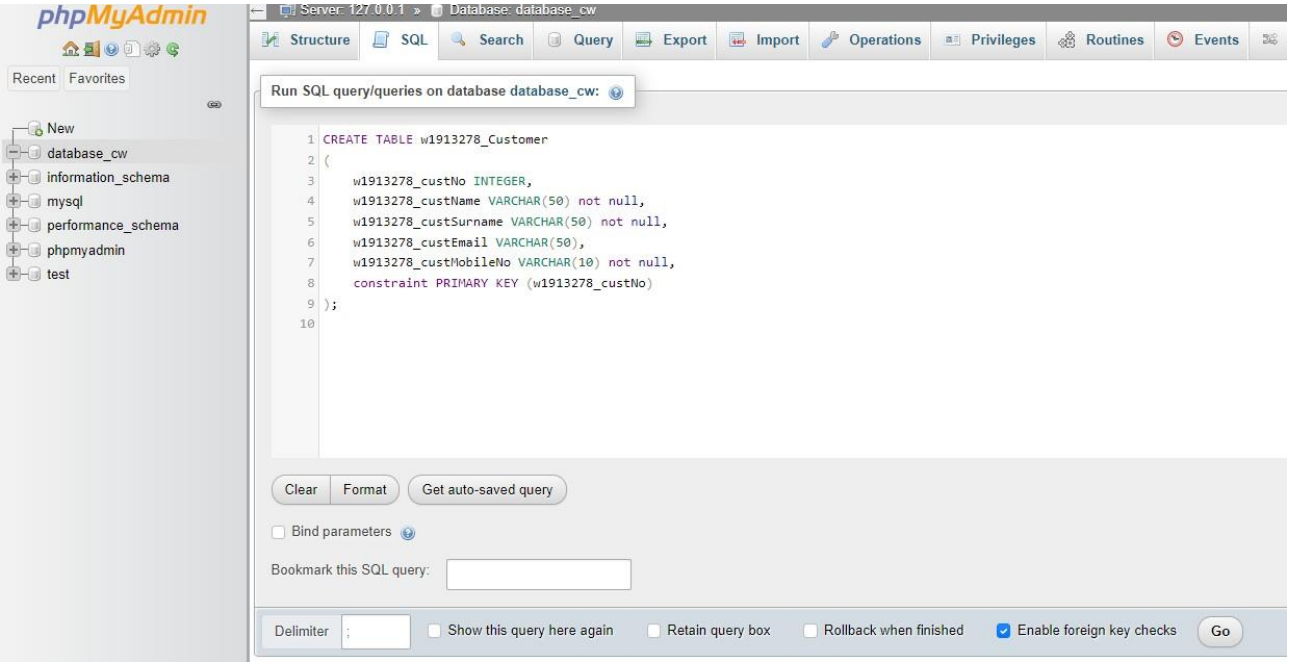

Figure 3: query for the customer table

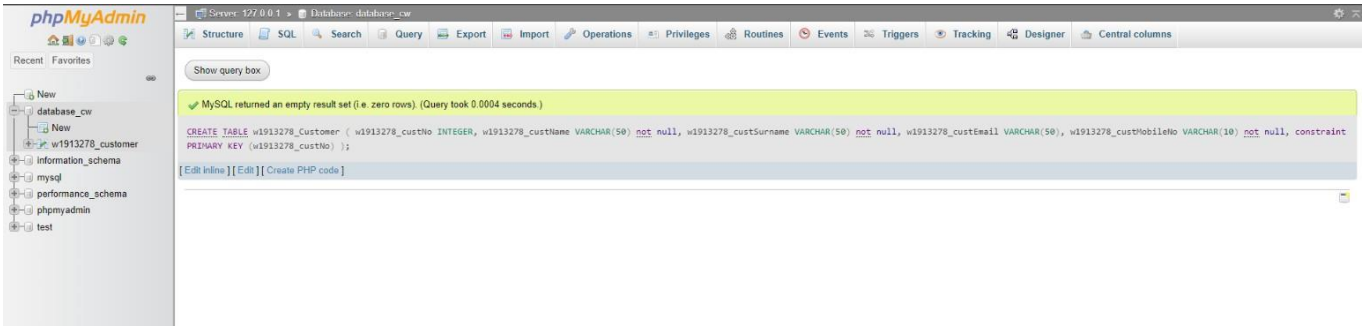

Figure 2 : The customer table

- *Insert data into the customer table*

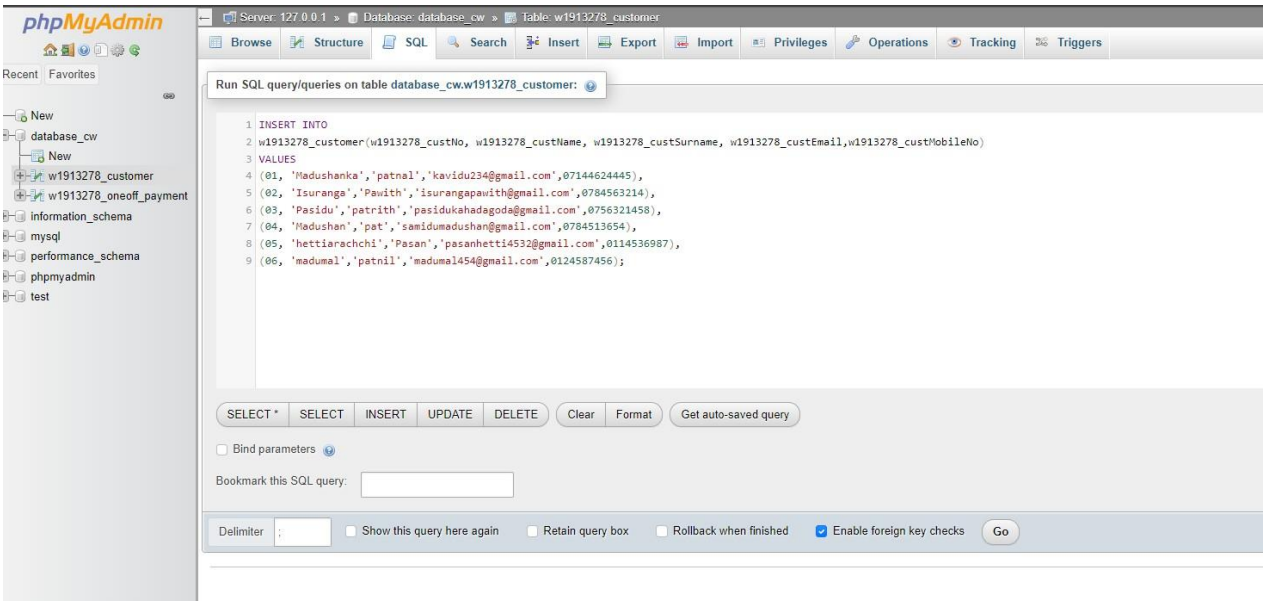

Figure 4 :Insert data into the customer table

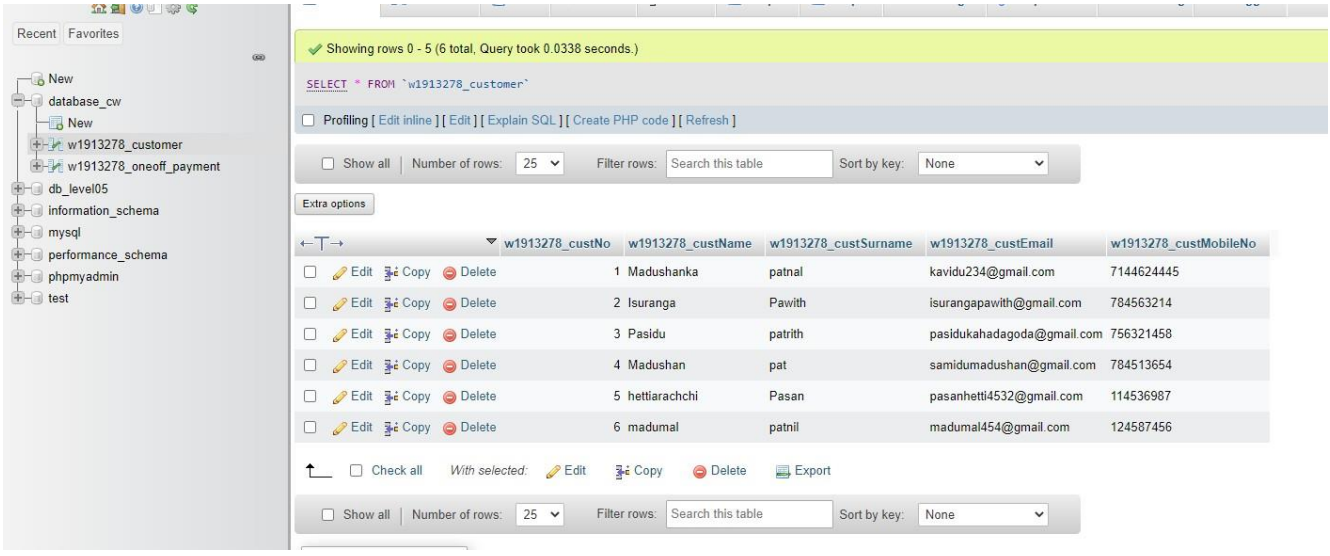

Figure 5 : After adding data to the customer table

- one-off payments table
- *Create the one-off payment table*

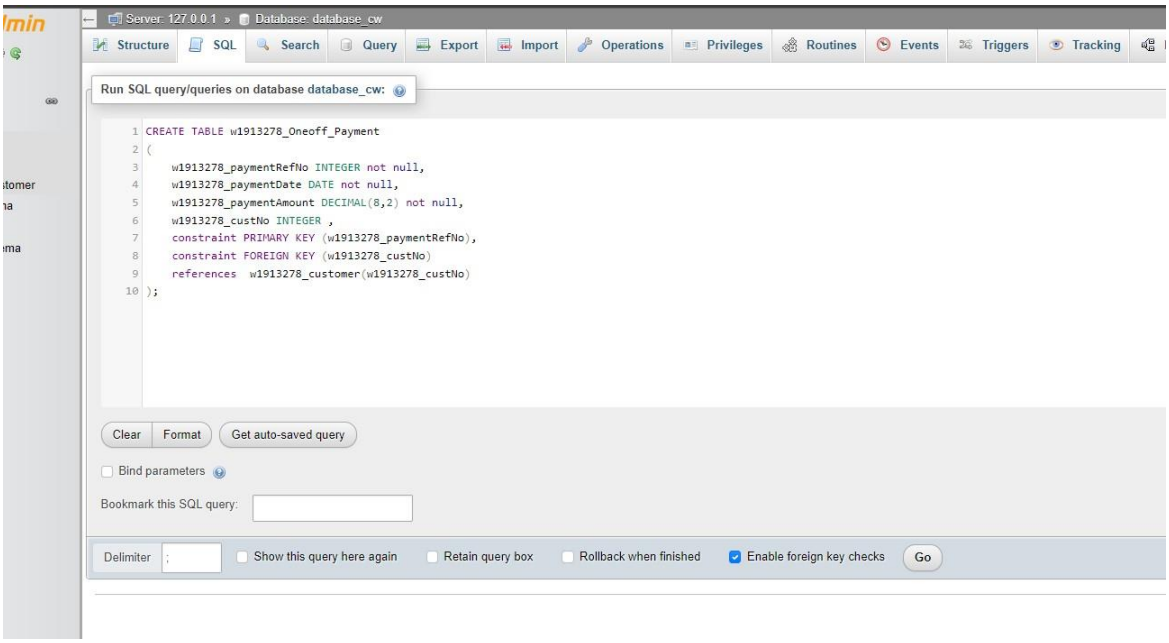

Figure 6: query of one-off payment table

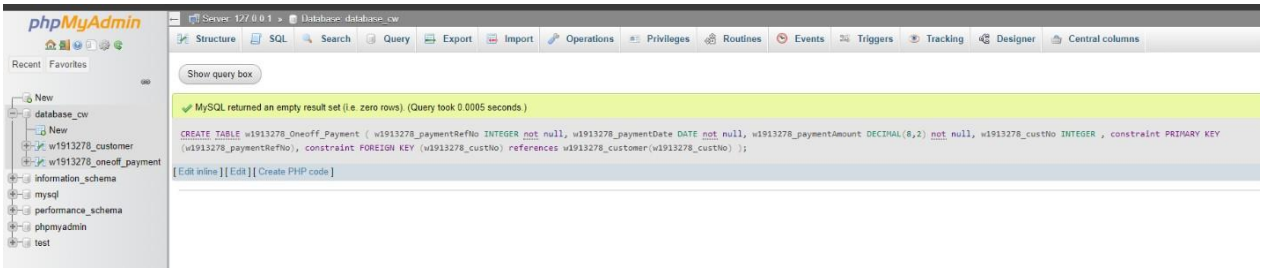

Figure 7: one-off payment table

- *Insert data into the one-off payment table*

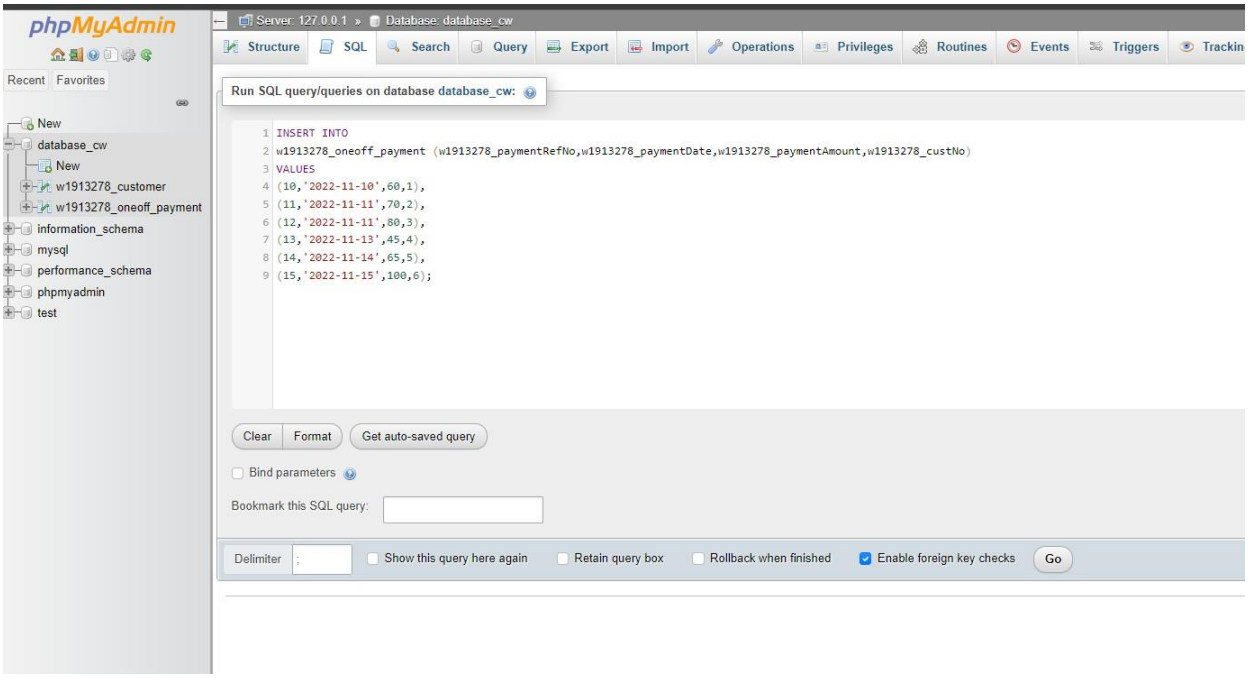

Figure 8:Insert data into the one-off payment table

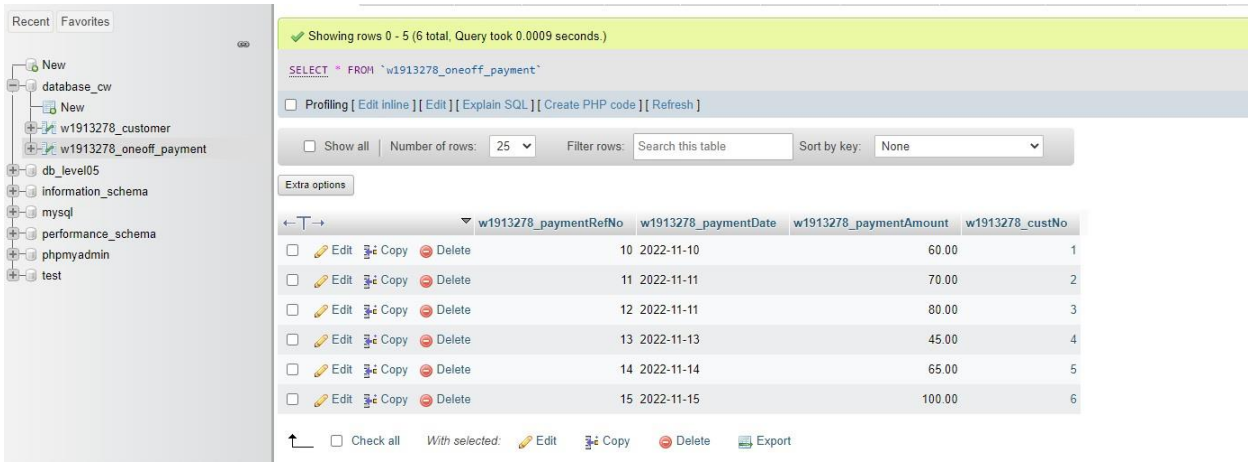

Figure 9: After adding data to the one-off payment table

- SQL query to retrieve a list

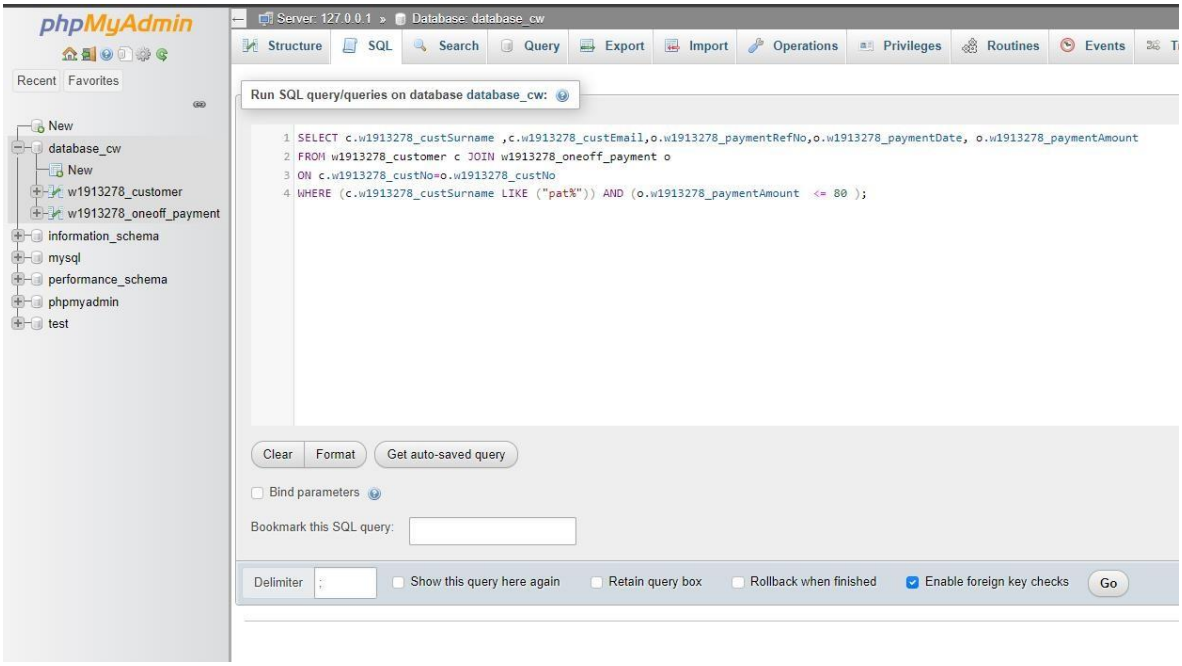

Figure 11: : query to retrieve a list

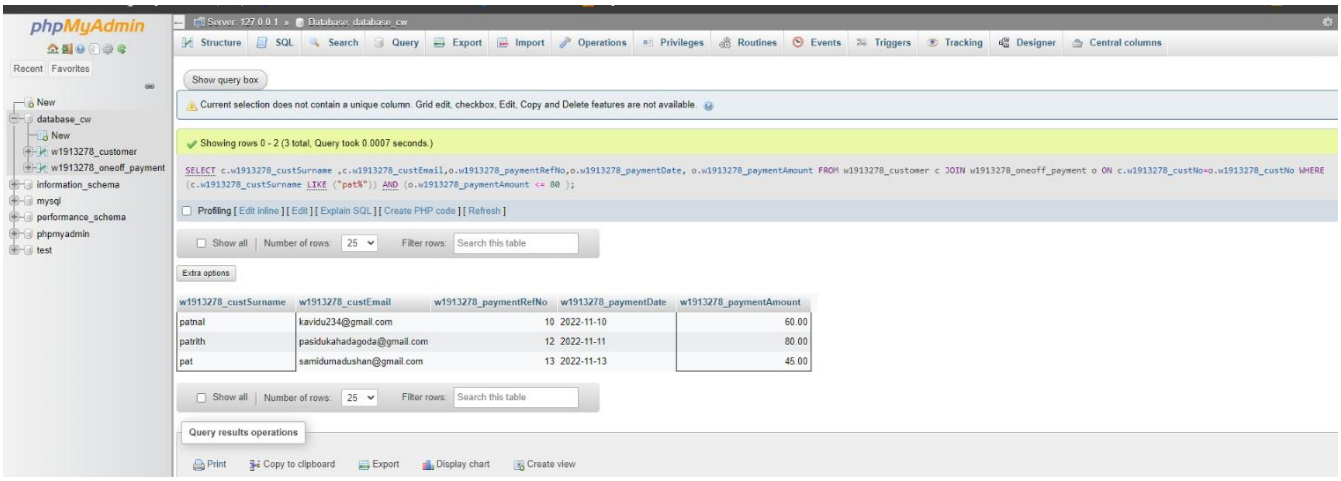

Figure 10:Result of query

QUESTION 07: COMPARISON ANALYSIS TABLE TO COMPARE MYSQL AND MONGODB

	MySQL	MongoDB
schemas	MySQL schema can't be changed. Only entries conforming to the given scheme will be accepted. (MongoDB vs SQL server | 20 Most Successful Differences To Learn, 2018)	mongo DB stores data in a collection with a schema. (The input data can have a predefined structure and adhere to it. However different documents in the same collection can have different structures.) (MongoDB vs SQL server | 20 Most Successful Differences To Learn, 2018)
Storage	All individual records are stored as rows in a table. (MongoDB vs MySQL - GeeksforGeeks, no date)	All individual recodes are stored as document. (MongoDB vs MySQL - GeeksforGeeks, no date)
Performance	MySQL is slow than mongo DB (Hooda, n.d.)	Mongo DB is faster than MySQL (Hooda, n.d.)
infrastructures	Although the MySQL architecture doesn't support effective replication and distribution, one can access related data through MySQL's joins, which reduces duplication. (MongoDB vs MySQL: Know the Difference, 2021)	mongo DB supports replication and distribution out of the box and is built with high availability and scalability in mind. (MongoDB vs MySQL: Know the Difference, 2021)
security	Vulnerability to SQL injection attacks exists due to the programming design, so MySQL is less secure than mongo DB (MongoDB vs MySQL: Know the Difference, 2021)	The risk of attacks is reduced because of its design as it doesn't require schema definition mongo DB is more secure than SQL due to its schema-less design. (MongoDB vs MySQL: Know the Difference, 2021)

workload	The internal representation of a MySQL tale has a maximum row size limit of 65,535 bytes, the storage engine can support larger rows. Blobs and columns contribute only 9 to 12 bytes to the row size limit because their contents are stored separately from the rest of the row. (MySQL :: MySQL 8.0 Reference Manual :: 8.4.7 Limits on Table Column Count and Row Size, no date)	The maximum document size is 16 megabytes. The maximum document size helps ensure that a single document can't use too much ram or too much bandwidth during transmission.to store documents larger than the maxim size, MongoDB provides the GridFS API. (MongoDB Limits and Thresholds — MongoDB Manual, no date)

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