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Module: Database Systems

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Database Systems Coursework (2020/2021)

Coursework Part A: Conceptual ERD

Part A Project: FOODTOOYOU

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Introduction

The main idea of doing this coursework is to create a Conceptual ER diagram individually. FOODTOOYOU is a company where delivers grocery items ordered by the registered members of the company from registered retailing stores. It will be delivered on the same day or on the following day. The idea was initiated during the COVID-19 lockdown that was put in UK from March to June 2020 when access to the groceries become challenging.

Part A first question is to create a database architecture to undertake a database project to support the needs of the company. It needs to include all the entities, relationships, multiplicities, attributes and primary keys that has been identified

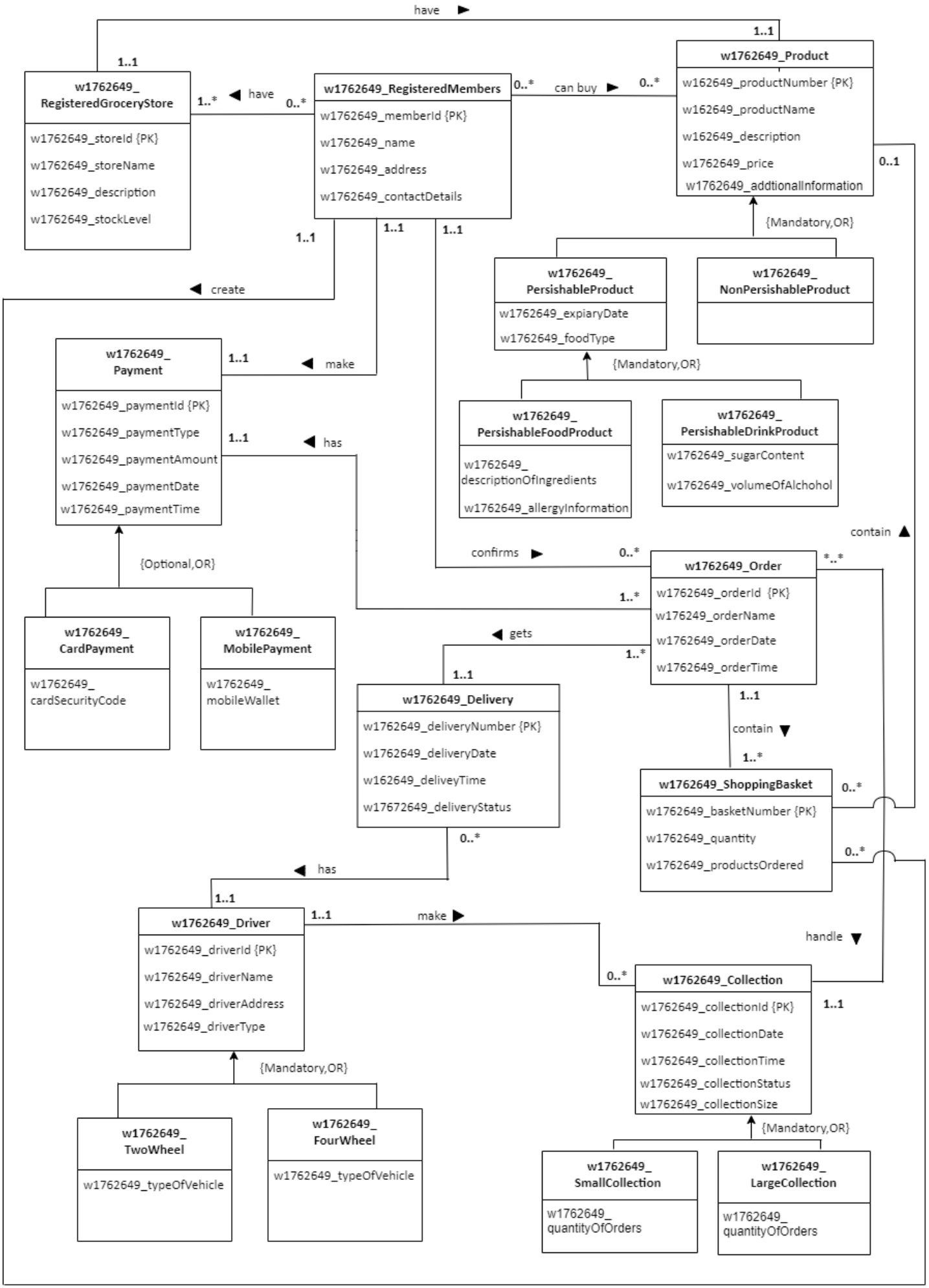
Part A second question is to create a data dictionary to document how the entities have been identified for FOODTOOYOU.

Part A third question is to create a data dictionary to document how the relationships and multiplicities are identified for FOODTOOYOU.

Part A last question is to create a data dictionary to document how the attributes and primary keys for each entity have been identified for FOODTOOYOU.

1)

Produce a complete CONCEPTUAL ERD for FOODTOOYOU.


have
1..1
w1762649_Product
w162649_productNumber {PK}
w162649_productName
w162649_description
w1762649_price
w1762649_addtionalInformation
0..1
1..1
w1762649_
RegisteredGroceryStore
w1762649_storeId {PK}
w1762649_storeName
w1762649_description
w1762649_stockLevel
1..*
have
0..*
w1762649_RegisteredMembers
w1762649_memberId {PK}
w1762649_name
w1762649_address
w1762649_contactDetails
0..*
can buy
0..*
{Mandatory,OR}
w1762649_
PersishableProduct
w1762649_expiaryDate
w1762649_foodType
w1762649_
NonPersishableProduct
1..1
create
1..1
1..1
w1762649_
Payment
w1762649_paymentId {PK}
w1762649_paymentType
w1762649_paymentAmount
w1762649_paymentDate
w1762649_paymentTime
1..1
make
1..1
has
{Mandatory,OR}
w1762649_
PersishableFoodProduct
w1762649_
descriptionOfIngredients
w1762649_allergyInformation
w1762649_
PersishableDrinkProduct
w1762649_sugarContent
w1762649_volumeOfAlchohol
contain
confirms
0..*
w1762649_Order
w1762649_orderId {PK}
w176249_orderName
w1762649_orderDate
w1762649_orderTime
..
{Optional,OR}
1..*
w1762649_
CardPayment
w1762649_
cardSecurityCode
w1762649_
MobilePayment
w1762649_
mobileWallet
gets
1..*
1..1
w1762649_Delivery
w1762649_deliveryNumber {PK}
w1762649_deliveryDate
w162649_deliveyTime
w17672649_deliveryStatus
1..1
contain
1..*
w1762649_ShoppingBasket
w1762649_basketNumber {PK}
w1762649_quantity
w1762649_productsOrdered
0..*
0..*
0..*
has
1..1
w1762649_Driver
w1762649_driverId {PK}
w1762649_driverName
w1762649_driverAddress
w1762649_driverType
1..1
make
handle
0..*
w1762649_Collection
w1762649_collectionId {PK}
w1762649_collectionDate
w1762649_collectionTime
w1762649_collectionStatus
w1762649_collectionSize
1..1
{Mandatory,OR}
{Mandatory,OR}
w1762649_
TwoWheel
w1762649_typeOfVehicle
w1762649_
FourWheel
w1762649_typeOfVehicle
w1762649_
SmallCollection
w1762649_
quantityOfOrders
w1762649_
LargeCollection
w1762649_
quantityOfOrders

2) Create a data dictionary to document how you identified the entities for FOODTOOYOU.

Entity name	*Description*
w1762649_RegisteredGroceryStore	General term describing all the grocery stores in the FOODTOOYOU where the registered members buy their products.
w1762649_RegisteredMembers	General term describing all the registered members in the FOODTOOYOU who buy products from the grocery stores, who confirm orders and make payments.
w1762649_Product	General term describing all the products including perishable products and non-perishable products. Perishable products contain two types as perishable food products and perishable drink products in the grocery stores of FOODOOYOU where the registered members can access and put to the shopping baskets.
w1762649_Payment	General term describing the payments including card payments and mobile payments done by the registered members of FOODTOOYOU for their orders.
w1762649_Order	General term describing all the orders ordered by the registered members of FOODTOOYOU which makes a collection.
w1762649_ShoppingBasket	General term describing all the shopping baskets which are contained in an order owned by the registered members of FOODTOOYOU.
w1762649_Collection	General term describing all the collections including small collections and large collections which are formed by all the orders altogether which are done by the drivers of FOODTOOYOU and where the products ordered by the registered members contain.
w1762649_Delivery	General term describing all the deliveries of the orders, done by the drivers of FOODTOOYOU.
w1762649_Driver	General term describing all the drivers in FOODTOOYOU who delivers orders to the houses of the registered members and who do the collections in FOODTOOYOU. Drivers include two-wheel drivers and four-wheel drivers.

General entity	*Specialized entity*	*Explanation*
w1762649_Product	w1762649_PerishableProduct	Product can be divided into two as perishable and non-perishable. Products must be either perishable or Non-Perishable products. In the coursework specification it has mentioned that most products are perishable products. Other than perishable products there are non-perishable products where the coursework specification mentioned that not all products are perishable.
	w1762649_NonPerishableProduct	
w1762649_PerishableProduct	w1762649_PerishableFoodProduct	Perishable Products must be either divided as food products or drink products. Food products and Drink products are identified as perishable products because they have attributes that a perishable product should have.
	w1762649_PerishableDrinkProduct	
w1762649_Payment	w1762649_CardPayment	Payments can be either done by card or by mobile. Those are the main types of payments that FOODTOOYOU accept. Other than the main types of payments there can be payments through cash also.
	w1762649_MobilePayment	
w1762649_Driver	w1762649_FourWheel	Drivers must use either four wheel or two wheel vehicles for their delivery services in FOODTOOYOU where there are no other vehicle types in FOODTOOYOU.
	w1762649_TwoWheel	
w1762649_Collection	w1762649_SmallCollection	Collections are varying size as small collection and large collection in FOODTOOYOU delivery service. Collection must be divided as either small or large. By dividing the collection as large and small it is easy to track and manage the collection process.
	w1762649_LargerCollection	

3) Create a data dictionary to document how you identified the relationships and multiplicities for FOODTOOYOU.

Entity name	*Multiplicity*	*Relationship*	*Multiplicity*	*Entity name*	*Justifications for the multiplicity (4 statements for each relationship)*
w1762649_ RegisteredGroceryStore	1..*	have	0..*	w1762649_ RegisteredMembers	One registered grocery store may not have any registered member.
					One registered grocery store may have maximum of many registered members.
					One registered member may have minimum of one registered grocery store.
					One registered member may have maximum of many registered grocery stores.
w1762649_ RegisteredGroceryStore	1..1	has	1..1	w1762649_Poduct	One registered grocery store has at least of one unique product.
					One registered grocery store has a maximum of one unique product.
					One Product may have a minimum of one registered grocery store.
					One product may have maximum of one registered grocery store.
w1762649_ RegisteredMembers	0..*	can buy	0..*	w1762649_Product	One registered member may not buy any product.
					One registered member can buy maximum of many number of products.
					One product may not be bought by any registered member.
					One product can be bought by maximum of many registered members.

Entity name	*Multiplicity*	*Relationship*	*Multiplicity*	*Entity name*	*Justifications for the multiplicity (4 statements for each relationship)*
w1762649_ RegisteredMembers	1..1	create	0..*	w1762649_ ShoppingBasket	One registered member may not create any shopping basket.
					One registered member create maximum of many shopping baskets.(Members have to create separate shopping baskets for each grocery store)
					One shopping basket is created by minimum of one registered member.
					One shopping basket is created by maximum of one registered member.
w1762649_ ShoppingBasket	0..*	contain	0..1	w1762649_ Product	One shopping basket may not contain any product.
					One shopping basket contain maximum of one product (As products are unique to each store and registered members have to create separate shopping baskets to every store.)
					One Product may not be contained in any shopping basket. (Because members may not put any product into a shopping basket.)
					One product is contained in maximum of many shopping baskets.
w1762649_ RegisteredMember	1..1	confirms	0..*	w1762649_Order	One registered member may not confirm any order.
					One registered member may confirm maximum of many orders.
					One order is confirmed by at least one registered member.
					One order is confirmed by maximum of one registered member.

Entity name	*Multiplicity*	*Relationship*	*Multiplicity*	*Entity name*	*Justifications for the multiplicity (4 statements for each relationship)*
w1762649_Order	1..*	has	1..1	w1762649_ Payment	One order has a minimum of one payment.
					One order has maximum of one payment.
					One payment is had by a minimum of one order.
					One payment is had by maximum of many orders.
w1762649_ Order	1..1	contain	1..*	w1762649_ ShoppingBasket	One order contains a minimum of one shopping basket.
					One Order contains a maximum of many shopping baskets.
					One shopping basket is contained in at least of one order.
					One shopping basket is contained in maximum of one order.
w1762649_Order	1..*	gets	1..1	w1762649_ Delivery	One order gets minimum of one delivery.
					One order gets maximum of one delivery.
					One delivery has a minimum of one order.
					One delivery has a maximum of many orders.
w1762649_ Collection	1..1	handle	*..*	w1762649_Order	One collection is handled by minimum of many orders.
					One collection is handled by maximum of many orders.
					One order handles minimum of one collection.
					One order handles maximum of one collection.
w1762649_Delivery	0..*	has	1..1	w1762649_Driver	One delivery has a minimum of one driver.
					One delivery has a maximum of one driver.
					One driver may not have any deliveries.
					One driver may have maximum of many deliveries.

Entity name	*Multiplicity*	*Relationship*	*Multiplicity*	*Entity name*	*Justifications for the multiplicity (4 statements for each relationship)*
w1762649_Driver	1..1	make	0..*	w1762649_-Collection	One driver may not make any collections.
					One driver make maximum of many collections.
					One Collection is made by at least one driver.
					One collection is made by maximum of one driver.

4) Create a data dictionary to document how you identified the attributes and primary keys for each entity for FOODTOOYOU.

Entity name	*Attributes for this entity (include PK)*	*Justification*
w1762649_ RegisteredGroceryStore	w1762649_storeId {PK} w1762649_storeName w1762649_description w1762649_stockLevel	**storeID** is recognized as a primary key because each store can be uniquely identified. **storeName** is used to store the name of each Store, **decription** stores the information of each store while the **stockLevel** stores the level of stock to maintain the stocks easily.
w1762649_ RegisteredMembers	w1762649_memberId {PK} w1762649_name w1762649_address w1762649_contactDetails	**memberID** is unique to each registered member because it is necessary when the member visits to buy products. **name** attribute is used to store the name of each member, **address** stores the address of each member which helps when delivering the orders and the **contactDetails** store the telephone numbers etc. where the member can be contacted.

Entity name	*Attributes for this entity (include PK)*	*Justification*
w1762649_Product	w1762649_productNumber {PK} w1762649_productName w1762649_description w1762649_price W1762649_additionalInformation	**productNumber** is use to identify each product uniquely when billing and buying products.(Helpful in member side and from the shop side.) **productName** is used to save the name of each product, **description** attribute is used to store the product information, **price** attribute is used store the prices of each product. **aditionalInformation** attribute is used to give some additional information such as discounts etc.
w1762649_PerishableProduct	w1762649_expiaryDate w1762649_foodType	**(expiaryDate** attribute stores the date of expiry of perishable products. **foodType** attribute stores the type of perishable food. Example: Biscuit, Soft drinks) Useful for the members who buy the product.
w1762649_PerishableFoodProduct	w1762649_descriptionOfIngredients W1762649_allergyInformation	**(descriptionOfIngredients** stores the information of the ingredients which made up that product. **allergyInformation** attribute saves about the information, that if there is an allergy containing ingredients in the particular product) Useful for the members who buy the product.
w1762649_PerishableDrinkProduct	w1762649_sugarContent w1762649_volumeOfAlchohol	**sugarContent** stores the amount of sugar included in that particular drink product. **volumeOfAlchohol** saves the information of the alcoholic percentage of that particular drink product.

Entity name	*Attributes for this entity (include PK)*	*Justification*
w1762649_Payment	w1762649_paymentId {PK} w1762649_paymentType w1762649_paymentAmount w1762649_paymentDate w1762649_paymentTime	**paymentID** is uniquely identified and it is useful when a member pay their amount and when in any case of trouble regarding the payment. **paymentType** is used to store the type of payment namely card payment, mobile payment. **paymentAmount** is used to store the amount paid by the member, **paymentDate** and **paymentTime** is used store date and time of the payment is done and to make convenient o the member.
w1762649_CardPayment	w1762649_cardSecurityCode	**cardSecurityCode** stores the security code of a card either credit or debit card.
w176264_MobilePayment	w176264_mobileWallet	**mobileWallet** stores the information about the payments which are done through the mobile device.
w1762649_Order	w1762649_orderId {PK} w1762649_orderName w1762649_orderDate w1762649_orderTime	**orderID** is use to identify each order uniquely and orderID is very useful when delivering the products and when doing collections. **orderName** saves the name of each order, **orderDate** and **orderTime** stores the date and time of the order, which is confirmed and to make convenient to the member.

Entity name	*Attributes for this entity (include PK)*	*Justification*
w1762649_ShoppingBasket	w1762649_basketNumber {PK} w1762649_quantity w1762649_productsOrdered	**basketNumber** is uniquely identified because it is very useful when billing and when putting products to the basket by the member. **quantity** stores the amount of products included in a basket and **productsOrdered** attribute store the names of each products in the shopping basket.
w1762649_Collection	w1762649_collectionId {PK} w1762649_collectionDate w1762649_collectionTime w1762649_collectionStatus w1762649_collectionSize	**collectionID** is identified as a primary key because each collection can be uniquely identified and it is very useful when doing collection by the drivers. **CollectionDate** and **collectionTime** is used make an accuracy when doing collection(date and time that collection is done) and **collectionStatus** stores the status of the collection as pending, confirmed, in process, delivered, etc. **collectionSize** saves the information of the size of the collection whether it is small or large.
w1762649_SmallCollection	w1762649_quantityOfOrders	As mentioned in the coursework specification collection is divided into small and large. To identify a collection as a small collection there should be an amount that shows the quantity of orders should be contained in small collection should end.(Ex: Small collection –> 1-10 orders) **quantityOfOrders** stores the quantity of orders that contained in small collection.

Entity name	*Attributes for this entity (include PK)*	*Justification*
w1762649_LargeCollection	w1762649_quantityOfOrders	As mentioned in the coursework specification collection is divided into small and large. To identify a collection as a large collection there should be an amount that shows the quantity of orders should be contained in large collection. .(Ex: Large collection –> upward 10) **quantityOfOrders** stores the quantity of orders that contained in large collection.
w1762649_Delivery	w1762649_deliveryNumber {PK} w1762649_deliveryDate w1762649_deliveryTime w1762649_deliveryStatus	**deliveryNumber** is uniquely identified because it is useful for the member who request a delivery as well as for the company side. **deliveryDate** and **deliveryTime** stores the date and time of the delivery and **deliveryStatus** stores the status of the delivery as pending, confirmed, in process or delivered.
w1762649_Driver	w1762649_driverId {PK} w1762649_driverName w1762649_driverAddress w1762649_driverType	**driverID** is identified as a primary key because driver can be uniquely identified. **driverName** stores the name of the drivers of FOODTOOYOU, **driverAddress** stores the address of each driver while **driverType** saves the type of the driver whether the driver is four wheel driver or two wheel driver.

Entity name	*Attributes for this entity (include PK)*	*Justification*
w1762649_TwoWheel	w1762649_typeOfVehicle	**typeOfVehicle** stores the information of the vehicle type whether it is a bike or moped when considering two wheel drivers.
w1762649_FourWheel	w1762649_typeOfVehicle	**typeOfVehicle** stores the information of the vehicle type whether it is a car or van when considering four wheel drivers.

Conclusion

As this is an individual coursework, it helps to clearly learn about the conceptual ER diagram in a further manner. Using sub classes and super classes helps to further elaborate the scenario given. Usefulness and how to apply data dictionaries in a workplace is learnt from this coursework. Data dictionaries help to clearly clarify about the entities, attributes, primary keys, subclasses and super classes and why those were identified as the entities, attributes, primary keys, subclasses and super classes.

Main areas learnt from this coursework,

- To produce a complete **CONCEPTUAL ERD** for FOODTOOYOU.
- To create a **data dictionary** to document how we identified the **entities** for FOODTOOYOU.
- To create a **data dictionary** to document how we identified the **relationships** and **multiplicities** for FOODTOOYOU.
- To create a **data dictionary** to document how we identified the **attributes** and **primary keys** for each entity for FOODTOOYOU.

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