5COSC002W – DATABASE SYSTEMS

COURSEWORK SUBMISSION

PART A & B (FULL)

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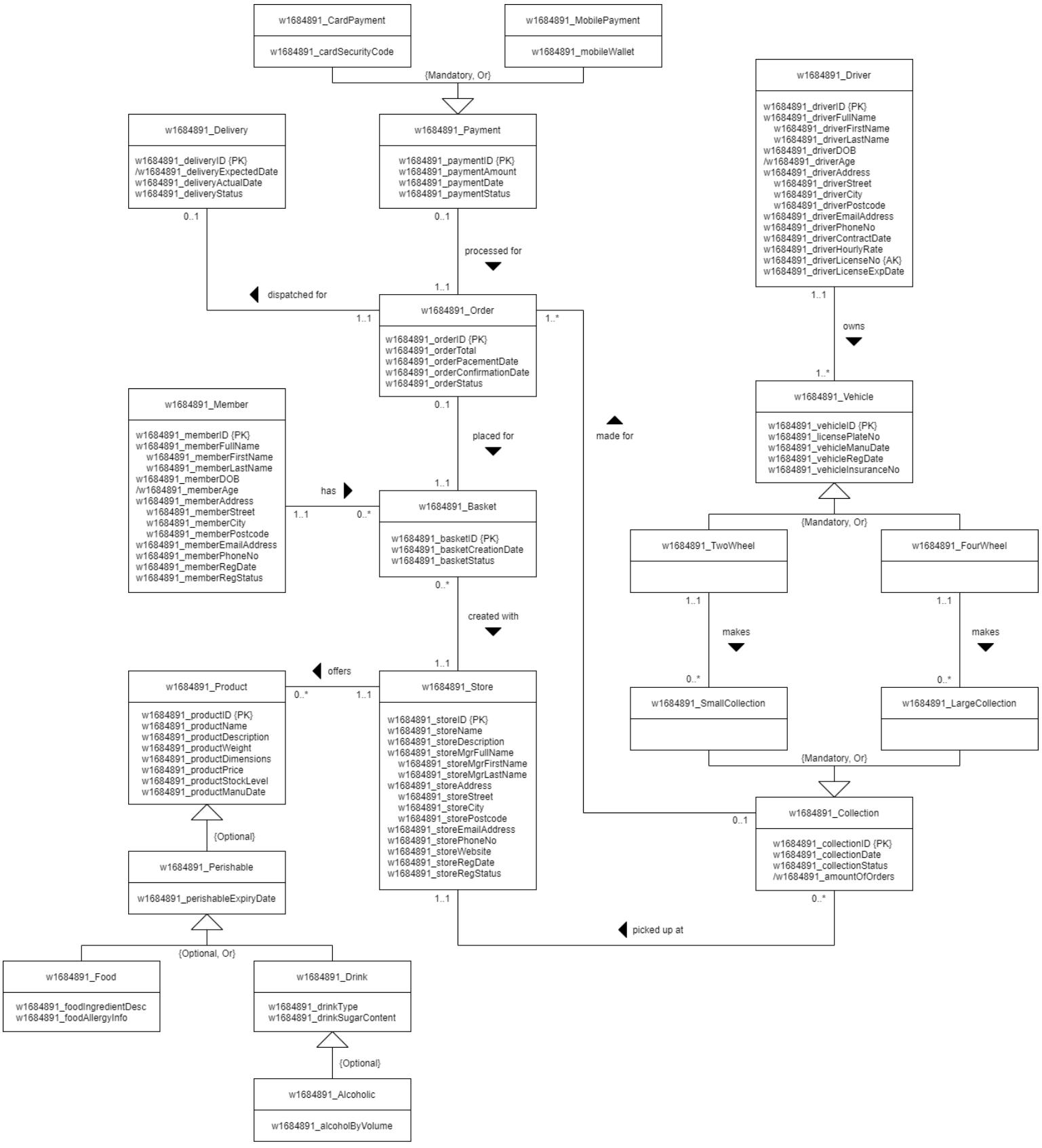
GROUP: 5CS05; 5CS06 – 4:00pm to 6:00pm (Tuesday)

FOODTOOYOO - Conceptual ERD



Data Dictionaries

Entities

Entity Name	Description
w1684891_Member	A 'Member' is a customer that is registered with the FOODTOOYOO business.
w1684891_Store	A 'Store' represents a retailer that is registered with the business and offers products for members to purchase.
w1684891_Product	A 'Product' is an item offered by a retailer that is available to be purchased by members.
w1684891_Basket	A 'Basket' is what a member creates in order to shop with a specific store. It is what will contain the members chosen products for that particular store.
w1684891_Order	An 'Order' is what a customer places once they have confirmed and finalised their basket and would like to check out.
w1684891_Payment	A 'Payment' represents the transaction a member makes to pay for their shopping order.
w1684891_Driver	A 'Driver' is a person contracted by FOODTOOYOO to collect orders and deliver them to members.
w1684891_Vehicle	A 'Vehicle' is what is used by the driver to make collections and deliver orders.
w1684891_Collection	A 'Collection' is the process of a driver picking up an order (or multiple) from a store.
w1684891_Delivery	A 'Delivery' represents the process of a driver delivering an order to a member.

General Entity	Specialised Entity	Description
w1684891_Product	w1684891_Perishable	A 'Perishable' product is one that has an expiry date and cannot be stored indefinitely.
w1684891_Perishable	w1684891_Food	A 'Food' item represents a perishable product of solid substance; one for which it is necessary to store the ingredient description and allergy information.
w1684891_Perishable	w1684891_Drink	A 'Drink' item represents a perishable product of liquid substance; one with a specified type and sugar content.

w1684891_Drink	w1684891_Alcoholic	An 'Alcoholic' item represents a drink which contains some percentage of alcohol.
w1684891_Payment	w1684891_CardPayment	A 'Card Payment' is a payment made specifically with a credit/debit card.
w1684891_Payment	w1684891_MobilePayment	A 'Mobile Payment' represents a digital payment made via a mobile wallet.
w1684891_Vehicle	w1684891_TwoWheel	A 'Two Wheel' vehicle is one that has a two wheels and is only capable of making smaller collections.
w1684891_Vehicle	w1684891_FourWheel	A 'Four Wheel' vehicle is one that has a four wheels; better suited to making larger collections.
w1684891_Collection	w1684891_SmallCollection	A 'Small Collection' is a collection for an order (or multiple) small enough to be picked up by a two-wheeled driver.
w1684891_Collection	w1684891_LargeCollection	A 'Large Collection' is a collection for an order (or multiple) that requires a four-wheeled driver to collect it.

Relationships and Multiplicities

Entity	Multiplicity	Relationship	Multiplicity	Entity	Justification
w1684891_Member	1..1	has	0..*	w1684891_Basket	A single member might not necessarily have a basket.
					A single member could have many baskets.
					A single basket must belong to a member, as basket that does not belong to a client would be redundant.
					A single basket cannot belong to more than one registered member, as each member creates their own baskets.
w1684891_Basket	0..*	created with	1..1	w1684891_Store	A single basket will be created for at least one store. A basket created for no store would have no purpose.
					A single basket can only be created for one store. The brief specifies that a basket cannot be used between different stores.

					A single store might not have any baskets created with it; it could be a newly registered store.
					A single store might have many baskets created with it.
w1684891_ Store	1..1	offers	0..*	w1684891_ Product	A single store might not offer any products yet. It could be only just registered or even recently closed.
					A single store might be offering many products for sale.
					A single product has to be offered by at least one store; if a product were not offered by anyone then there would be no way to sell it.
					A single product can only be offered by a single store, as the brief specifies that the stores sell unique, branded products.
w1684891_ Order	0..1	placed for	1..1	w1684891_ Basket	A single order cannot be placed for 0 baskets. If there was no basket, there would be no need to place an order in the first place.
					A single order can only be placed for one basket; as specified by the managing director.
					A single basket might not necessarily have on order placed for it yet. It might not be finalised yet, as the member is still in the process of shopping.
					A single basket can only have one order placed for it; as specified by the managing director.
w1684891_ Order	1..1	dispatch ed for	0..1	w1684891_ Delivery	A single order might not necessarily be dispatched for delivery yet. It could still be pending for confirmation.
					A single order might be dispatched for only one delivery. A single order cannot be delivered twice.
					A single delivery will consist of at least one order. It makes no sense to record a delivery of nothing.
					A single delivery will be recorded for a maximum of one order, as it is a record of the delivery of that specific order.
w1684891_ Payment	0..1	process ed for	1..1	w1684891_ Order	A single payment that is made must be processed for at least one order. A payment cannot be processed without an order to pay for.

					A single payment cannot be processed for more than one order. As specified by the managing director, each payment can only be made for a single order.
					A single order might not necessarily be paid for yet. The payment could still be pending.
					A single order will only have one payment placed for it. As specified by the managing director, the payment cannot be split and must be made in full for the order.
w1684891_ TwoWheel	1..1	makes	0..*	w1684891_ SmallCollection	A single two-wheeled driver might not make any small collections yet. Could be a new driver.
					A single two-wheeled driver could make many small collections; they are contracted for that purpose.
					A single small collection will be made by at least one two-wheeled driver. A collection cannot be made by nobody.
					A single small collection can only be made by one two-wheeled driver. A single collection cannot be made by multiple drivers.
w1684891_ FourWheel	1..1	makes	0..*	w1684891_ LargeCollecition	A single four-wheeled driver might not make any collections yet. Similarly to above, could be a new driver.
					A single four-wheeled driver might make many collections as they are contracted to do just that.
					A single large collection must be made by at least one four-wheel driver. A collection cannot be picked up by no one.
					A single large collection will be made by only one four-wheeled driver. A collection cannot be made by multiple drivers.
w1684891_ Collection	0..1	made for	1..*	w1684891_ Order	A single collection is made for at least one order. If there were no orders to pick up, there would be no need for a collection.
					A single collection can handle many orders, as specified in the FOODTOOYOO brief.
					A single order might not necessarily have a collection made for it yet. It could still be a pending order.

					A single order will only have one collection made for it. It can only be picked up from the store once.
w1684891_ Collection	0..*	picked up at	1..1	w1684891_ Store	A single collection will be picked up at at least one store. You cannot make a collection from nowhere.
					A single collection will not be picked up at more than one store; that would require multiple different collections.
					A single store might have no collections picked up at it. It could be a brand-new store, or one that has not managed to sell anything yet.
					A single store might have many collections made at it for the many orders that customers will place while buying from it.
w1684891_ Driver	1..1	owns	1..*	w1684891_ Vehicle	A single driver has to own at least one vehicle to make his collections/deliveries. A collection or delivery cannot be made without a vehicle.
					A single driver could own many different vehicle which they might use to make collections/deliveries.
					A single vehicle will be owned by at least one driver. It makes no sense for the business to store details of a vehicle owned by nobody.
					A single vehicle will only be owned by a maximum of one driver, as drivers sign up to FOODTOOYOO with their own vehicles.

Attributes & Primary Keys

Entity Name	Attributes for this Entity	Justification
w1684891_ Member	w1684891_memberID {PK}	An identification number assigned to each registered member that will help to uniquely identify them. This would be the primary key for this entity.
w1684891_ Member	w1684891_memberFullName	A composite attribute made from the members first name and last name. It may be important to store their names separately, as well as together, for different levels of formality in different types of correspondences.

w1684891_Member	w1684891_memberFirstName	One of the attributes that makes up the full name. This will store just a member's first name.
w1684891_Member	w1684891_memberLastName	Another attribute that makes up a member's full name. This will store the member's last name.
w1684891_Member	w1684891_memberDOB	This attribute will hold the members date of birth. Necessary to store as some of the products that can be purchased may require an age check.
w1684891_Member	/w1684891_memberAge	An attribute derived from the memberDOB which is a more convenient way to store the member age for above mentioned checks.
w1684891_Member	w1684891_memberAddress	A composite attribute containing the members full home address. It may be important to keep the full address for ease of deliveries, and to have it split for efficiently assigning drivers to make these deliveries.
w1684891_Member	w1684891_memberStreet	One of the attributes that make up the full address. This attribute stores the street name that the user lives on.
w1684891_Member	w1684891_memberCity	Another attribute that makes up the full address. This attribute stores the use's home city.
w1684891_Member	w1684891_memberPostcode	Another attribute that makes up the full address. This one stores the member's home postcode.
w1684891_Member	w1684891_memberEmailAddress	This attribute stores the email address that a member has registered with.
w1684891_Member	w1684891_memberPhoneNo	This attribute stores a member's preferred phone number, in case there is need for direct contact.
w1684891_Member	w1684891_memberRegDate	This attribute stores a member's date and time of registration with the FOODTOOYOO business.
w1684891_Member	w1684891_memberRegStatus	This attribute will store a member's registration status, like whether their account has been created, their email address confirmed, or whether they have deactivated their account.
w1684891_Store	w1684891_storeID {PK}	This attribute is an identification number generated for each registered retail store, used to uniquely identify them within the FOODTOOYOO system. This attribute is the primary key for the store entity.
w1684891_Store	w1684891_storeName	This attribute contains the name of the retailing store.
w1684891_Store	w1684891_storeDescription	This attribute contains the description text for a store and could be used to identify what the store specialises in, or what sort of products it might offer.

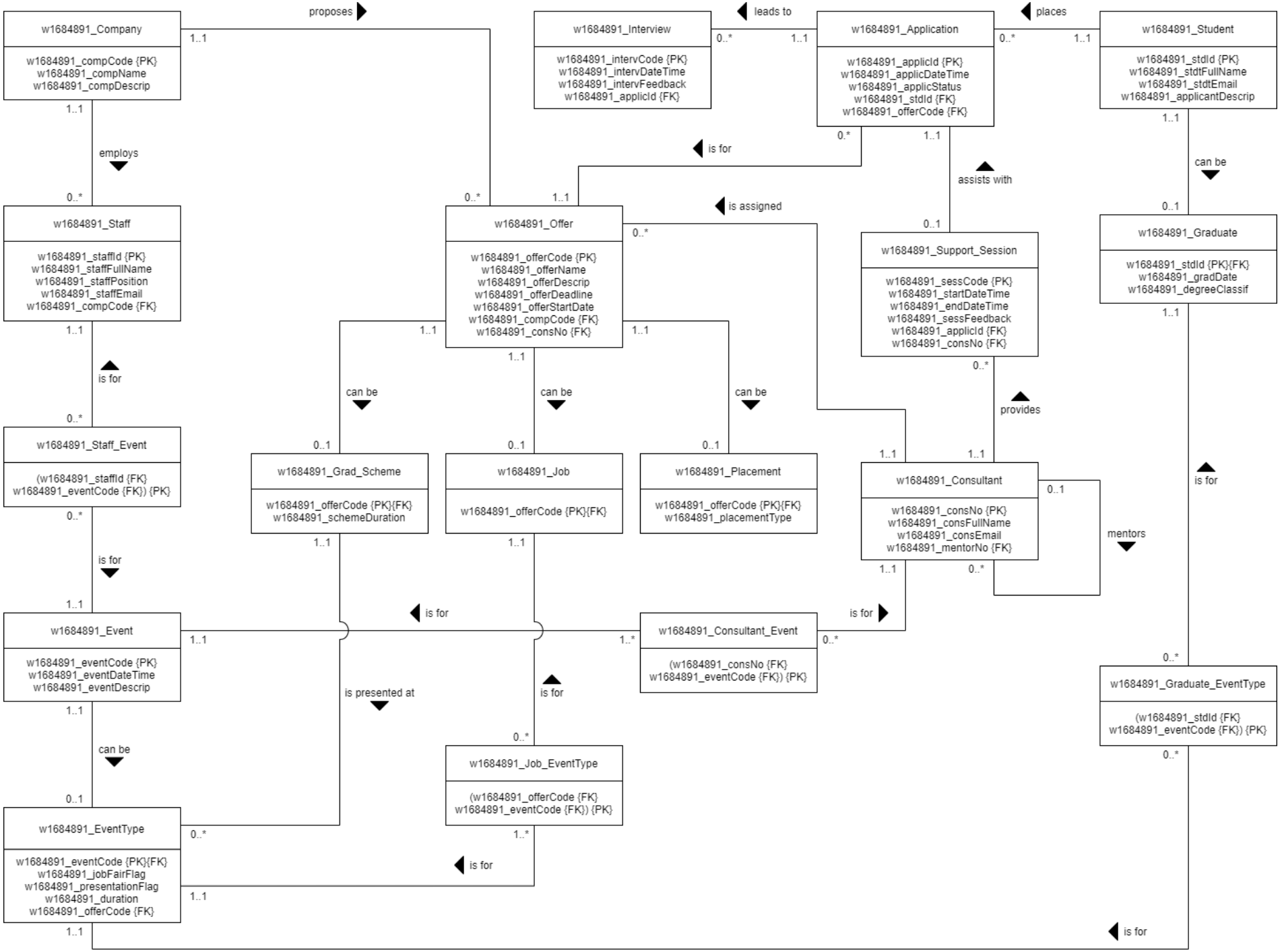
w1684891_Store	w1684891_storeMgrFullName	This is a composite attribute that contains the store manager's full name. Similarly to member, it may be a good idea to store the name in full, or separately, for different levels of correspondence formality.
w1684891_Store	w1684891_storeMgrFirstName	Attribute containing the store manager's first name. One of the attributes that makes up the store manager's full name.
w1684891_Store	w1684891_storeMgrLastName	Attribute containing the store manager's last name. One of the attributes that makes up the store manager's full name.
w1684891_Store	w1684891_storeAddress	Similar to a member's full address. This is an attribute that is composite and stores a store's full address together.
w1684891_Store	w1684891_storeStreet	This attribute contains the street name that the store is located on. It is one of the attributes that makes up the full address.
w1684891_Store	w1684891_storeCity	This attribute contains the city that the store is located in. It is one of the attributes that makes up the full address.
w1684891_Store	w1684891_storePostcode	This attribute contains the store's post code. It is one of the attributes that makes up the full address.
w1684891_Store	w1684891_storeEmailAddress	The email address that the store is registered with.
w1684891_Store	w1684891_storePhoneNo	This is the main phone number that the registered store operates under.
w1684891_Store	w1684891_storeWebsite	This attribute contains a link to the store's website address.
w1684891_Store	w1684891_storeRegDate	This attribute stores the date and time at which the retailer has registered with the FOODTOOYOO business.
w1684891_Store	w1684891_storeRegStatus	This attribute contains the registration status of the retailing store. For example, if the store is only just signed up, if it is certified and confirmer or if it has been deactivated.
w1684891_Product	w1684891_productID {PK}	This attribute is the primary key for this entity. It is a unique identification number for each product.
w1684891_Product	w1684891_productName	This attribute stores the name of this branded product.
w1684891_Product	w1684891_productDesc	This attribute stores the description of the product provided by the retailer.
w1684891_Product	w1684891_productWeight	This attribute stores the products weight. It is additional information about the product that might be crucial in determining the order size.
w1684891_Product	w1684891_productDimensions	This attribute stores the products physical dimensions. Another piece of additional information that may be crucial in determining the order size.

w1684891_Product	w1684891_productPrice	This attribute stores the sale price of a product.
w1684891_Product	w1684891_productStockLevel	This attribute stores the level of available stock for a particular product.
w1684891_Product	w1684891_productManuDate	This attribute stores the date of manufacture of a product.
w1684891_Perishable	w1684891_perishableExpiryDate	This attribute stores the expiry date of products which are perishable.
w1684891_Food	w1684891_foodIngredientDesc	This attribute stores the description of ingredients that a specific food consists of.
w1684891_Food	w1684891_foodAllergyInfo	This attribute stores information about the any allergens that this food might contain.
w1684891_Drink	w1684891_drinkType	This attribute stores the type of the drink product, as required by the brief.
w1684891_Drink	w1684891_drinkSugarContent	This attribute stores the sugar contents of a specific drink product.
w1684891_Alcoholic	w1684891_alcoholByVolume	This attribute stores the alcohol by volume contained in an alcoholic drink.
w1684891_Basket	w1684891_basketID {PK}	This attribute is the primary key for this entity. It stores a unique identification number for every basket.
w1684891_Basket	w1684891_basketCreationDate	This attribute stores a basket's creation date and time.
w1684891_Basket	w1684891_basketStatus	This attribute stores the status of a basket. For example, whether the user is still in the process of shopping with this basket, or whether it is confirmed and ready for an order to be placed for it.
w1684891_Order	w1684891_orderID {PK}	This is the primary key for this entity. It stores a unique identification number for each order.
w1684891_Order	w1684891_orderTotal	This attribute stores the total price of the order that the member has to pay.
w1684891_Order	w1684891_orderPlacementDate	This attribute stores the date and time that the order was placed.
w1684891_Order	w1684891_orderConfirmationDate	This attribute stores the date and time of when the order is confirmed.
w1684891_Order	w1684891_orderStatus	This attribute stores the status of the order, such as pending, confirmed, in transit, delivered.
w1684891_Payment	w1684891_paymentID {PK}	This is the primary key for the payment entity. It is a unique identification number for each payment made.
w1684891_Payment	w1684891_paymentAmount	This is the total amount that this payment is made for.
w1684891_Payment	w1684891_paymentDate	This is the date and time at which the payment is processed.
w1684891_Payment	w1684891_paymentStatus	This attribute stores that status of the payment, such a pending, processed, or cancelled.

w1684891_CardPayment	w1684891_cardSecurityCode	This attribute stores the security of the credit/debit card that this payment is made with.
w1684891_MobilePayment	w1684891_mobileWallet	This attribute stores the information of the mobile wallet that was used to make this payment.
w1684891_Delivery	w1684891_deliveryID {PK}	This attribute is the primary key for this entity. A unique identification number given to each deliver made.
w1684891_Delivery	/w1684891_deliveryExpectedDate	This is the expected delivery date and time which is calculated upon order confirmation.
w1684891_Delivery	w1684891_deliveryActualDate	This attribute stores the actual date that the delivery took place.
w1684891_Delivery	w1684891_deliveryStatus	This attribute contains the status of the delivery i.e. in transit, delivered.
w1684891_Driver	w1684891_driverID {PK}	This is the primary key for this entity. This attribute stores the unique identification number created for each driver registered with FOODTOOYOO.
w1684891_Driver	w1684891_driverFullName	This is a composite attribute that stores the full name of the driver.
w1684891_Driver	w1684891_driverFirstName	This is one of the attributes that makes up the driver's full name. It stores the driver's first name.
w1684891_Driver	w1684891_driverLastName	This attribute stores the driver's last name and is the other attribute that makes up the driver's full name.
w1684891_Driver	w1684891_driverDOB	This attribute is the drivers date of birth. It is important to store this to ensure that the driver is of legal driving age.
w1684891_Driver	/w1684891_driverAge	This attribute is derived from the driverDOB and stores the driver's age for the convenience of checking whether they fit the legal driving age.
w1684891_Driver	w1684891_driverAddress	This is a composite attribute that stores the driver's full home address. It might be necessary to store this for the efficiency of driver assignment.
w1684891_Driver	w1684891_driverStreet	This attribute stores the driver's home street and is used as one of the attributes to make up the full address.
w1684891_Driver	w1684891_driverCity	This attribute is the driver's home city and is also an attribute used to comprise the full address.
w1684891_Driver	w1684891_driverPostcode	This attribute stores the driver's postcode and is also an attribute which makes up the full address.
w1684891_Driver	w1684891_driverEmailAddress	This attribute stores the email address that the driver has registered with.

w1684891_Driver	w1684891_driverPhoneNo	This attribute stores the driver's preferred phone number for any essential contact.
w1684891_Driver	w1684891_driverContractDate	This attribute stores the drivers contract date and time to track when the driver has started working with the business.
w1684891_Driver	w1684891_driverHourlyRate	This attribute stores the driver's agreed-upon hourly rate.
w1684891_Driver	w1684891_driverLicenseNo {AK}	This attribute stores the driver's license number. It could also be used as an alternate key to uniquely identify the driver.
w1684891_Driver	w1684891_driverLicenseExpDate	This attribute stores the expiry date of the driver's license, to ensure that the driver can legally drive.
w1684891_Vehicle	w1684891_vehicleID {PK}	The primary key for the vehicle entity. It is a unique identification number given to each vehicle registered with the business.
w1684891_Vehicle	w1684891_licensePlateNo	If the vehicle has a license plate number, it will be stored here. Might be necessary for vehicles such as cars, vans or motor bikes.
w1684891_Vehicle	w1684891_vehicleManuDate	If relevant, the vehicles manufacture date will be stored here. Might be necessary for vehicles such as cars, vans, or motor bikes.
w1684891_Vehicle	w1684891_vehicleRegDate	This will store the date and time that the vehicle has been registered with the FOODTOOYOO business.
w1684891_Vehicle	w1684891_vehicleInsuranceNo	If applicable, this attribute will store the vehicles insurance number.
w1684891_Colleciton	w1684891_collectionID {PK}	This is the primary key for the collection entity. It is a unique identification number assigned to every collection that is made.
w1684891_Colleciton	w1684891_collectionDate	This attribute stores the date of when a collection is made. This is useful to track the status of orders.
w1684891_Colleciton	w1684891_collectionTime	This attribute stores the time of when a collection is made.
w1684891_Colleciton	w1684891_collectionStatus	This is the status of a collection; could be prepared or collected.
w1684891_Colleciton	/w1684891_amountOfOrders	This is an attribute derived from the orders linked to the collection. It specifies the amount of orders included in this collection.

Futuro Logical ERD



Futuro Logical ERD Mapping – Step-by-Step Guide

0. This is not one of the 10 mapping rules, but a short explanation of how I began the logical mapping process. Firstly, I've re-created all the entities from the conceptual ERD in draw.io (diagrams.net). Secondly, I've listed out all the relationships and specialisations/generalisations and ordered them by how disruptive they are (according to Lecture 4). Below I will list and describe each rule that I've implemented, in the order of implementation. As I applied the rules, I have re-created the resolved relationships between the recreated entities, using the Conceptual ERD as reference. As a result, there was no need to adjust any existing relationships between applying the rules.

✓ 1. Offer optional,or Grad_Scheme, Job, Placement - Generalisation {Optional, Or}

✓ 2. Event optional,and Presentation, Job_Fair - Generalisation {Optional, And}

✓ 3. Student optional Graduate - Generalisaiton {Optional}

✓ 4. Staff 0..* takes part in 0..* Event - Many to Many

✓ 5. Consultant 1..* is allocated 0..* Event - Many to Many

✓ 6. Job 1..* is advertised at 0..* Job_Fair - Many to Many

✓ 7. Graduate 0..* attends 0..* Presentation - Many to Many

✓ 8. Support_Session 0..1 assists with 1..1 Application - One to One {Optional one side}

✓ 9. Company 1..1 proposes 0..* Offer - One to Many

✓ 10. Company 1..1 employs 0..* Staff - One to Many

✓ 11. Grad_Scheme 1..1 is presented at 0..* Presentation - One to Many

✓ 12. Student 1..1 places 0..* Application - One to Many

✓ 13. Application 1..1 leads to 0..* Interview - One to Many

✓ 14. Application 0..* is for 1..1 Offer - One to Many

✓ 15. Consultant 1..1 provides 0..* Support_Session - One to Many

✓ 16. Consultant 1..1 is assigned 0..* Offer - One to Many

✓ 17. Consultant 0..1 mentors 0..* Consultant - One to Many (Recursive)

FIGURE 3 - LIST OF RELATIONSHIPS TO RESOLVE.

1. **Rule 10 Generalisation with {Optional, Or}** – *Offer* specialises into: *Grad_Scheme, Job, Placement* - I decided to resolve all the specialisations/generalisations first, as they are usually the most disruptive. Offer was specialised into the most sub-entities and had the most relationships, so I decided to resolve it first. I've applied rule 10, by making Offer the parent entity, and creating 3 child entities for Grad_Scheme, Job and Placement. I've used the PK from Offer to act as the PK and FK for each of the child entities, while keeping their original attributes as they were. The children have been connected with a 'can be' relationship to the parent as follows: Offer 1..1 can be 0..1 ChildEntity.

2. **Rule 8 Generalisation with {Optional, And}** – *Event* specialises into: *Presentation, Job_Fair* – As the specialisation/generalisation with the second most sub-entities and relationships, I decided to resolve this one next. I've applied rule 8, by making Event the parent entity, while creating a single child entity called EventType for both of the specialised sub-entities Presentation and Job_Fair. I've used the parent PK as the PK and FK of the child entity, and created flag attributes for Presentation and Job_Fair, while adding the attributes of both specialisation sub-entities into the child entity. Finally, I've created a 'can be' relationship between the parent and child entities as follows: Event 1..1 can be 0..1 EventType.

3. **Rule 10 Generalisation with {Optional, And}** – *Student* specialises into: *Graduate* – This specialisation had the least amount of sub-entities and relationships involved, so I chose to resolve it after all the other generalisations. As this generalisation is with {Optional} without and 'or' or an 'and', it doesn't really matter whether we use rule 10 or rule 8, as they should both provide a similar resolution. As such, I've applied rule 10, making Student the parent entity and Graduate the child entity. As before, I've used the parent PK and the child PK and

FK, while keeping all the original attributes in the child entity. As before, I linked these entities with a 'can be' relationship as follows: Student 1..1 can be 0..1 Graduate.

4. **Rule 5 Many-to-Many** – *Staff* 0..* takes part in 0..* *Event* – As there were no one-to-one mandatory or complex relationships, I moved directly to resolving all many-to-many relationships. I started in no particular order for these, and just began with the relationship between Staff and Event. I started by applying rule 5 to create an additional entity called Staff_Event, making it the child entity to both Staff and Event. The child entity has both parent PKs as FKs, and a compound PK created from a combination of these FKs. I decided to go with a compound PK, as opposed to composite with an additional attribute, as I assume that a single staff member will either take part in an event or won't, so there will not be any repeatable records. I've linked the child entity with a 1..1 to many (keeping the participations of this many from the original relationship) relationships 'is for' to the parent entities.

5. **Rule 5 Many-to-Many** – *Consultant* 1..* is allocated 0..* *Event* – Moving onto the next many-to-many relationship that links the Consultant and Event entities, I've once again applied rule 5 to resolve it similarly as in the step above. I created a new entity called Consultant_Event which is a child to both Consultant and Event. I once again used a compound PK for the child that is made from a combination of it's parents PKs, which act as FKs in the child. It makes sense for a consultant to either be allocated to an event or not, so I decided that a composite PK was not necessary. As above, I linked the child to it's parents with 'is for' relationships as follows: Consultant_Event (_..*) is for 1..1 Parent. (Many participations kept from original relationship).

6. **Rule 5 Many-to-Many** – *Job* 1..* is advertised at 0..* *Job_Fair(EventType)* – Tackling the next many to many between Job and Job_Fair (which has now become EventType within a previous step), I've once again applied rule 5. A new entity called Job_EventType was created as the child of both Job and EventType. Once again, I chose a compound PK for the child, as a single Job either will or will not be advertised at a single event. As such, I see no reason to use a composite key. Relationships between the child and both parents were created in a similar fashion to those in the steps above.

7. **Rule 5 Many-to-Many** – *Graduate* 0..* attends 0..* Presentation*(EventType)* – Moving onto the final many to many relationship, between Graduate and Presentation (which has also now become EventType in a previous step), I am once again applying rule 5. In a similar fashion to the 3 steps above, a child entity called Graduate_EventType is created in between the parents. This entity also uses a compound key as opposed to a composite one, as a single graduate student either attends a presentation or doesn't.

8. **Rule 3 One-to-One Optional on One Side** – *Support_Session* 0..1 assists with 1..1 *Application* – Moving on to 1:1 relationships that are optional or one or both sides, I am applying rule 3 to the above relationship. As such, I am simply making the entity on the 'mandatory' side of the relationship the parent, so in this case it is Application, and the entity on the 'optional' side the child, so in this case Support_Session. As such, I am putting the parent entity's PK as a FK in the child entity.

9. **Rule 1 One-to-Many** – Company 1..1 proposes 0..* Offer – Having resolved all of the more disruptive relationships, we can move onto our One-to-Many relationships. Resolving these in no particular order, I begin with the one between Company and Offer. I apply the first rule and in this case Company, on the side of the one, is the parent and Offer, on the side of the many, is the child. As a result, I simply add the PK of the parent entity as a FK in the Child entity.

10. **Rule 1 One-to-Many** – Company 1..1 employs 0..* Staff – Another one-to-many relationships for which I'm applying rule 1, Company being the parent and Staff being the child. As such, the PK of Company goes into Staff as a FK.

11. **Rule 1 One-to-Many** – Grad_Scheme 1..1 is presented at 0..* Presentation (EventType) – Once again using rule one to make Grad Scheme the parent and Presentation (now EventType) into the child. The PK from the parent becomes a FK in the child entity. In this case, since Grad_Scheme was a specialisation, its PK is also the same as the Offer entity's PK.

12. **Rule 1 One-to-Many** – Student 1..1 places 0..* Application – Once again applying rule 1 to resolve this relationship. Student is the parent entity and Application is the child. The PK of the Student entity becomes a FK in the Application entity.

13. **Rule 1 One-to-Many** – Application 1..1 leads to 0..* Interview – Another use of rule 1. Application is the parent entity while Interview, on the side of the many, is the child entity. Interview gains a FK referencing the PK in Application.

14. **Rule 1 One-to-Many** – Application 0..* is for Offer 1..1 – Once again applying rule 1. Offer becomes the parent entity while Application is the child entity, gaining a FK attribute equivalent to the PK of the Offer entity.

15. **Rule 1 One-to-Many** – Consultant 1..1 provides 0..* Support_Session – Another application of rule 1. Consultant, on the side of the one, being the parent and Support_Session, on the side of the many, being the child. The PK from Consultant becomes a FK for Support_Session.

16. **Rule 1 One-to-Many** – Consultant 1..1 is assigned 0..* Offer – Applying rule 1, I made Consultant the parent entity and Offer the child entity. The PK of Consultant becomes a FK in Offer.

17. **Rule 1 One-to-Many** – Consultant 0..1 mentors 0..* Consultant – The final application of rule 1. In this case, the relationship is recursive and only consists of one entity. This entity simultaneously becomes the parent and the child. As such, its own PK will become a FK for it. I decided to name this FK as mentorNo, which essentially references consNo (the PK).

Futuro Table Creation and Data Insertion SQL

Full Script

```
-- By Tomasz Dawid Wasowski - w1684891 - Part B Table Creation and Data
Insertion SQL code

-- ##### DROP TABLES ################################################

-- Drop tables if the already exist (drops child tables first)
DROP TABLE IF EXISTS w1684891_Staff;
DROP TABLE IF EXISTS w1684891_Offer;
DROP TABLE IF EXISTS w1684891_Company;

-- ##### CREATE TABLES ##############################################

-- Create the w1684891_Company table

CREATE TABLE w1684891_Company (

        w1684891_compCode INT(6),
        w1684891_compName VARCHAR(50) UNIQUE NOT NULL,
        w1684891_compDescrip VARCHAR(250) NOT NULL,

        CONSTRAINT w1684891_c_compCode_pk PRIMARY KEY (w1684891_compCode)

);

-- Create the w1684891_Staff table

CREATE TABLE w1684891_Staff (

        w1684891_staffId INT(6),
        w1684891_staffFullName VARCHAR(50) NOT NULL,
        w1684891_staffPosition VARCHAR(50) NOT NULL,
        w1684891_staffEmail VARCHAR(50) UNIQUE NOT NULL,
        w1684891_compCode INT(6) NOT NULL,

        CONSTRAINT w1684891_s_staffId_pk PRIMARY KEY (w1684891_staffId),
        CONSTRAINT w1684891_s_compCode_fk FOREIGN KEY (w1684891_compCode)
        REFERENCES w1684891_Company(w1684891_compCode)

);

-- Create the w1684891_Offer table

CREATE TABLE w1684891_Offer (

        w1684891_offerCode INT(8),
        w1684891_offerName VARCHAR(50) NOT NULL,
        w1684891_offerDescrip VARCHAR(250) NOT NULL,
        w1684891_offerDeadline DATE NOT NULL,
        w1684891_offerStartDate DATE NOT NULL,
```

```
        w1684891_compCode INT(6) NOT NULL,

        CONSTRAINT w1684891_o_offerCode_pk PRIMARY KEY
(w1684891_offerCode),
        CONSTRAINT w1684891_o_compCode_fk FOREIGN KEY (w1684891_compCode)
        REFERENCES w1684891_Company(w1684891_compCode)

);

-- ##### INSERT DATA ################################################

-- Insert data into w1684891_Company table

INSERT INTO
w1684891_Company (
        w1684891_compCode,
        w1684891_compName,
        w1684891_compDescrip
) VALUES
(000123, 'InstaFlex', 'Global producer of plastics that flex instantly'),
(000124, 'GigaBrainz', 'International consulting company; hires only the
brainiest'),
(000125, 'BasicallyPrawns', 'World-wide leading prawn mongers');

-- Insert data into w1684891_Staff table

INSERT INTO
w1684891_Staff (
        w1684891_staffId,
        w1684891_staffFullName,
        w1684891_staffPosition,
        w1684891_staffEmail,
        w1684891_compCode
) VALUES
(002245, 'Jerry Jackson', 'Tensile Flexibility Tester',
'jerryJaaaay@flex.com', 000123),
(002246, 'Stacy Stevens', 'Tensile Flexibility Manager',
'stacysMum@flex.com', 000123),
(012345, 'Goobie Wobble', 'International Brain Harvester',
'gWobbz@braaains.co.uk', 000124),
(054321, 'Bubba Gump', 'Chief Prawnster', 'bubGWizzle@prawns.de',
000125);

-- Insert data into w1684891_Offer table

INSERT INTO
w1684891_Offer (
        w1684891_offerCode,
        w1684891_offerName,
        w1684891_offerDescrip,
        w1684891_offerDeadline,
        w1684891_offerStartDate,
        w1684891_compCode
) VALUES
(88882212, 'Corporate Prawn Consumer', 'We need someone to proffesionally
consume prawns',
```

```
'2020-12-20', '2021-01-12', 000125),
(88882213, 'Ultimate Hive Mind', 'Looking for the biggest brain',
'2020-12-19', '2021-02-08', 000124),
(88882214, 'Chief Flexinator', 'Need someone to flex in a chiefly
manner',
'2021-01-01', '2021-03-22', 000123),
(88882215, 'Adquate Brain Processor', 'Looking for candidate to
adequately process brains',
'2020-11-29', '2020-12-12', 000124),
(88882216, 'Head Prawn Muncher', 'Searching for someone that has a head
and can munch prawns',
'2021-03-21', '2021-04-01', 000125);
```

Table Creation

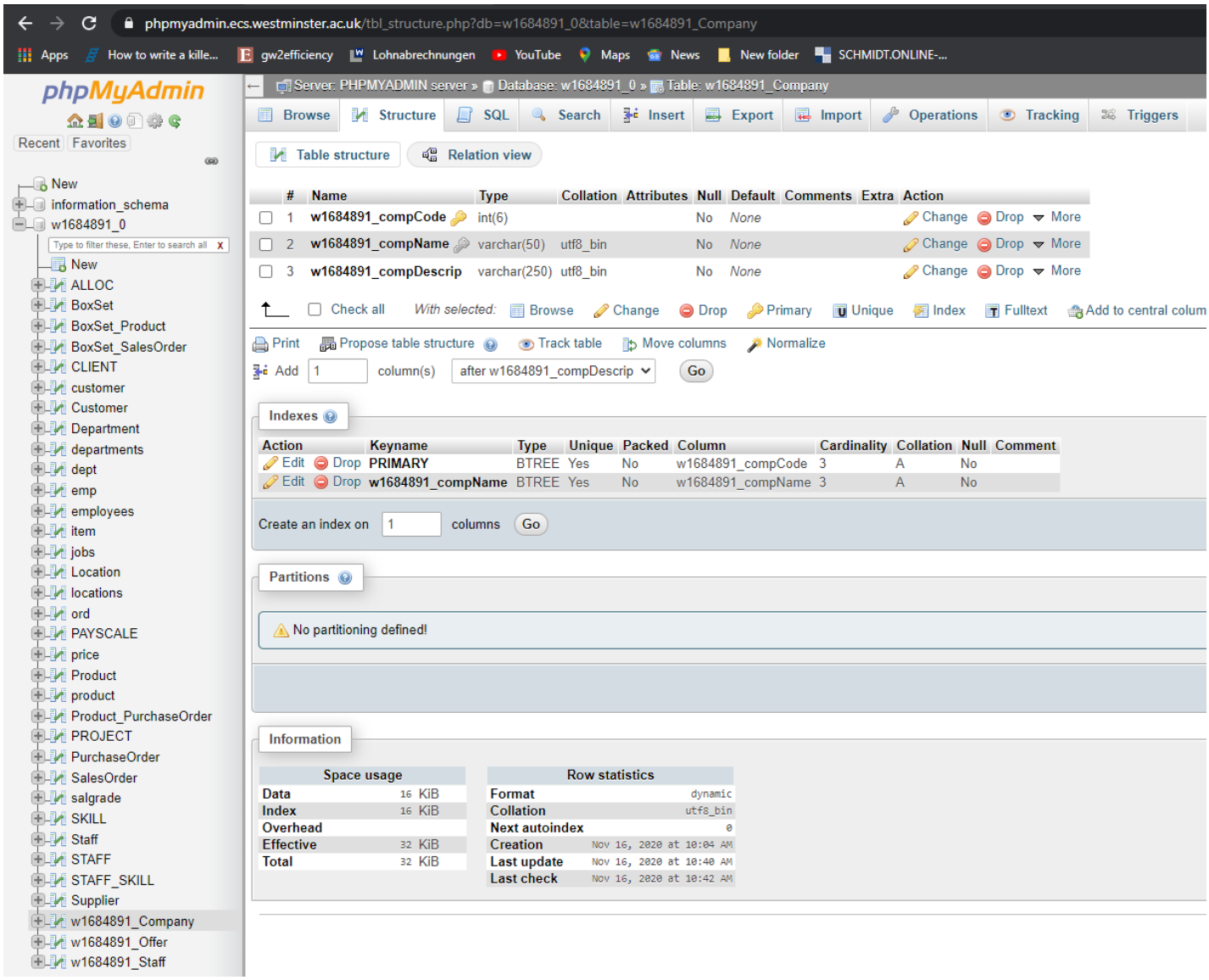
Script

```
-- Create the w1684891_Company table

CREATE TABLE w1684891_Company (

        w1684891_compCode INT(6),
        w1684891_compName VARCHAR(50) UNIQUE NOT NULL,
        w1684891_compDescrip VARCHAR(250) NOT NULL,

        CONSTRAINT w1684891_c_compCode_pk PRIMARY KEY (w1684891_compCode)

);

-- Create the w1684891_Staff table

CREATE TABLE w1684891_Staff (

        w1684891_staffId INT(6),
        w1684891_staffFullName VARCHAR(50) NOT NULL,
        w1684891_staffPosition VARCHAR(50) NOT NULL,
        w1684891_staffEmail VARCHAR(50) UNIQUE NOT NULL,
        w1684891_compCode INT(6) NOT NULL,

        CONSTRAINT w1684891_s_staffId_pk PRIMARY KEY (w1684891_staffId),
        CONSTRAINT w1684891_s_compCode_fk FOREIGN KEY (w1684891_compCode)
        REFERENCES w1684891_Company(w1684891_compCode)

);

-- Create the w1684891_Offer table

CREATE TABLE w1684891_Offer (

        w1684891_offerCode INT(8),
        w1684891_offerName VARCHAR(50) NOT NULL,
        w1684891_offerDescrip VARCHAR(250) NOT NULL,
        w1684891_offerDeadline DATE NOT NULL,
        w1684891_offerStartDate DATE NOT NULL,
        w1684891_compCode INT(6) NOT NULL,
```

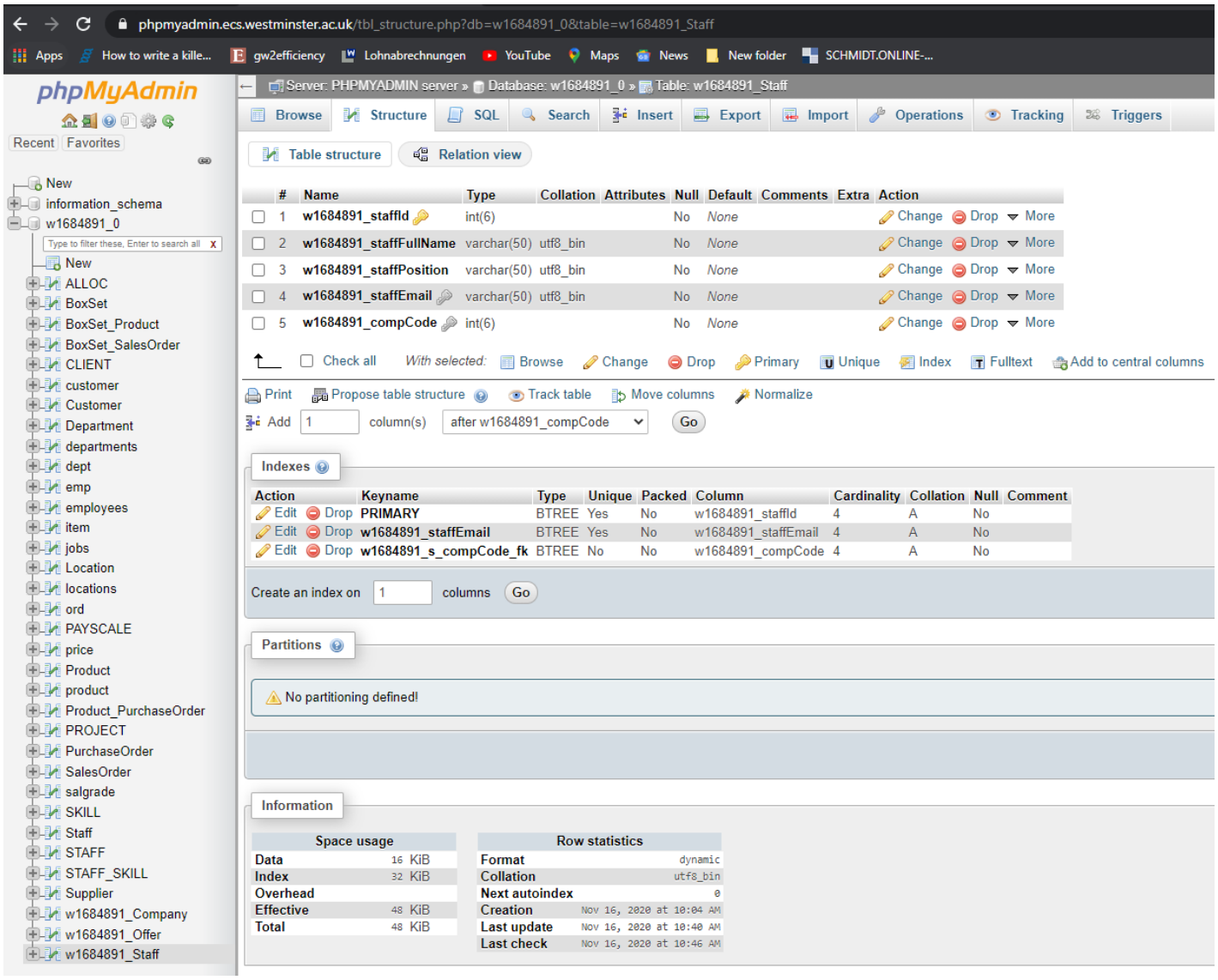
```
        CONSTRAINT w1684891_o_offerCode_pk PRIMARY KEY
(w1684891_offerCode),
        CONSTRAINT w1684891_o_compCode_fk FOREIGN KEY (w1684891_compCode)
        REFERENCES w1684891_Company(w1684891_compCode)

);
```

Screenshots

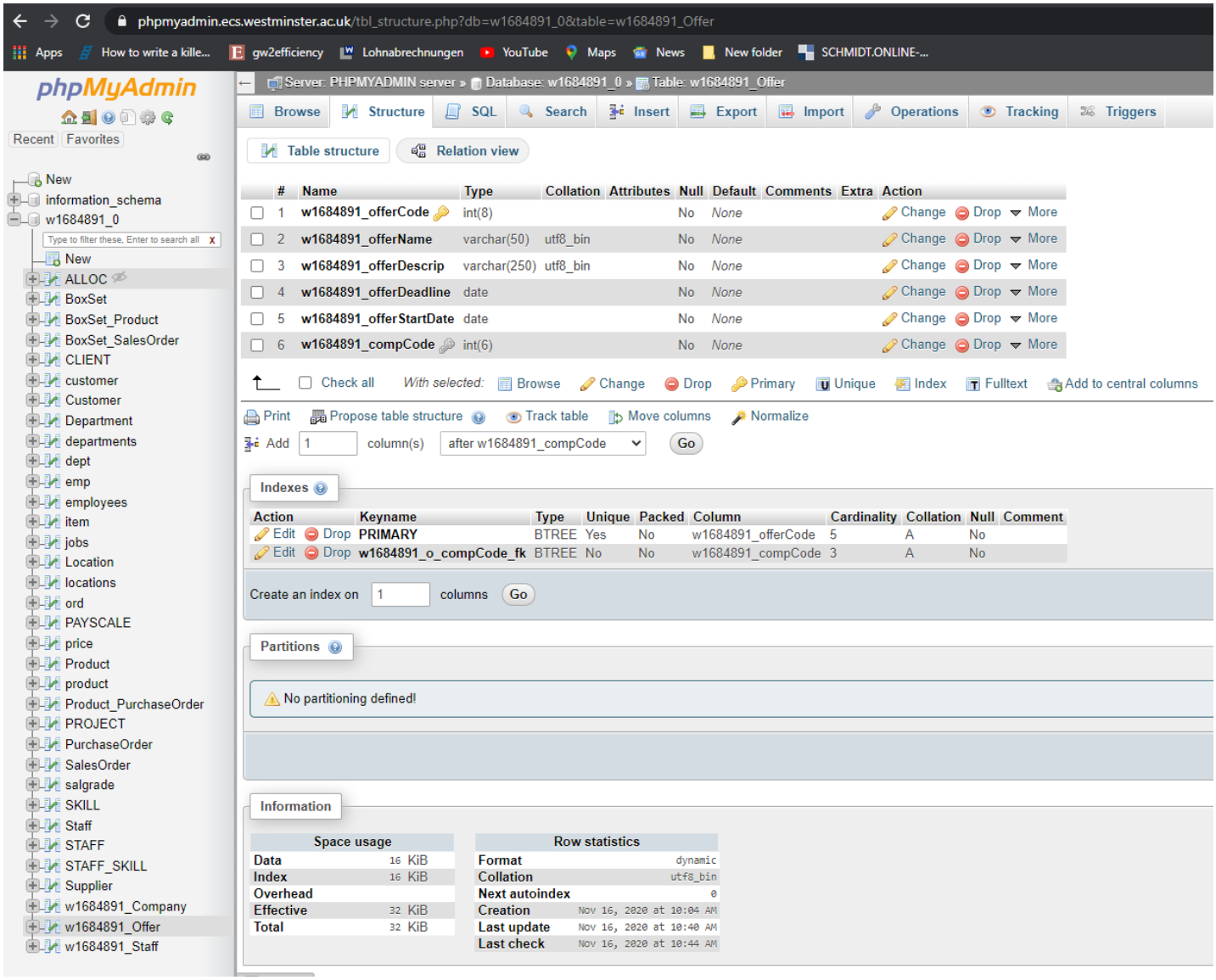
w1684891_Company Structure



w1684891_Staff Structure



w1684891_Offer Structure



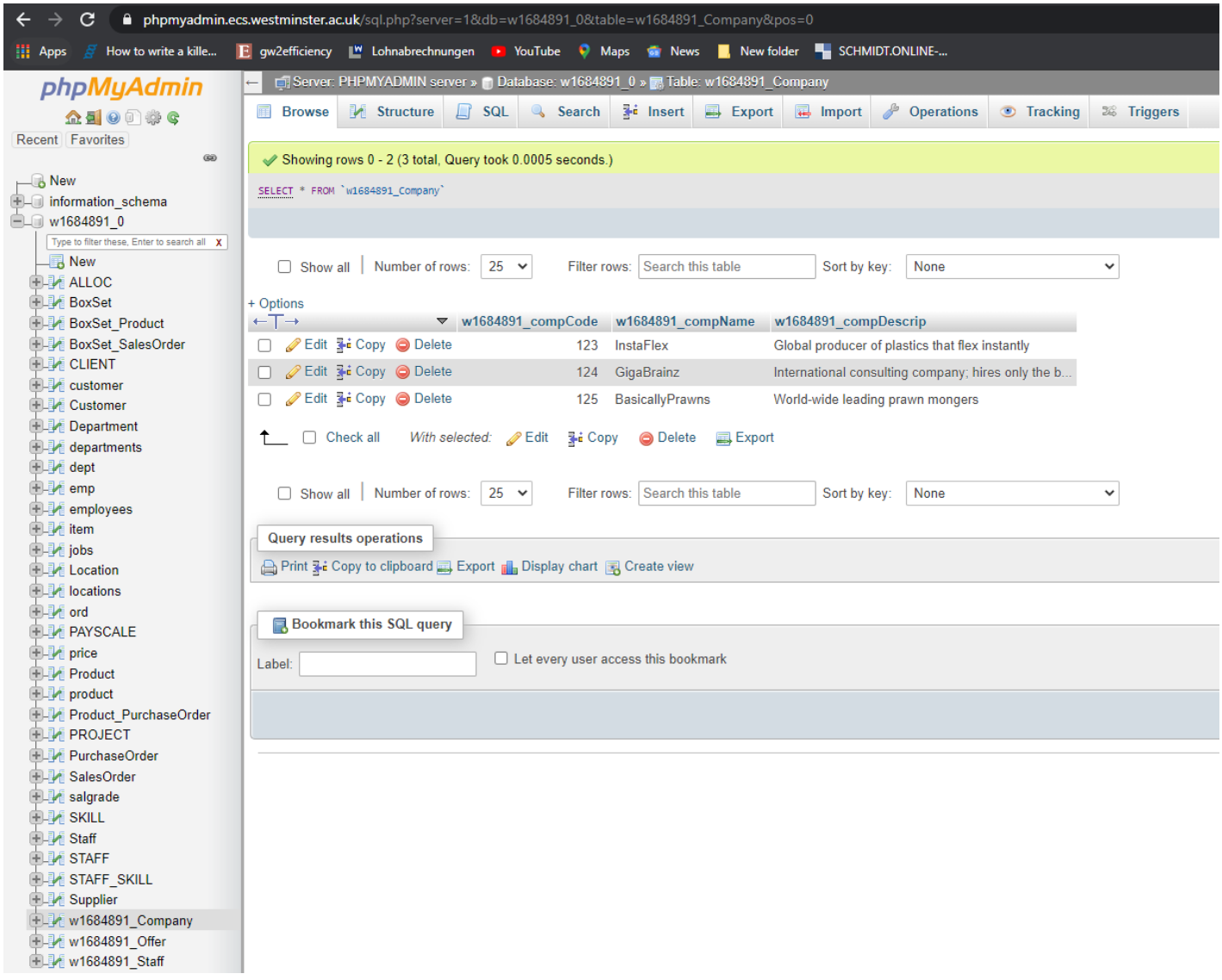
Data Insertion

w1684891_Company

Script

```
-- Insert data into w1684891_Company table

INSERT INTO
w1684891_Company (
        w1684891_compCode,
        w1684891_compName,
        w1684891_compDescrip
) VALUES
(000123, 'InstaFlex', 'Global producer of plastics that flex instantly'),
(000124, 'GigaBrainz', 'International consulting company; hires only the
brainiest'),
(000125, 'BasicallyPrawns', 'World-wide leading prawn mongers');
```

Content Screenshot

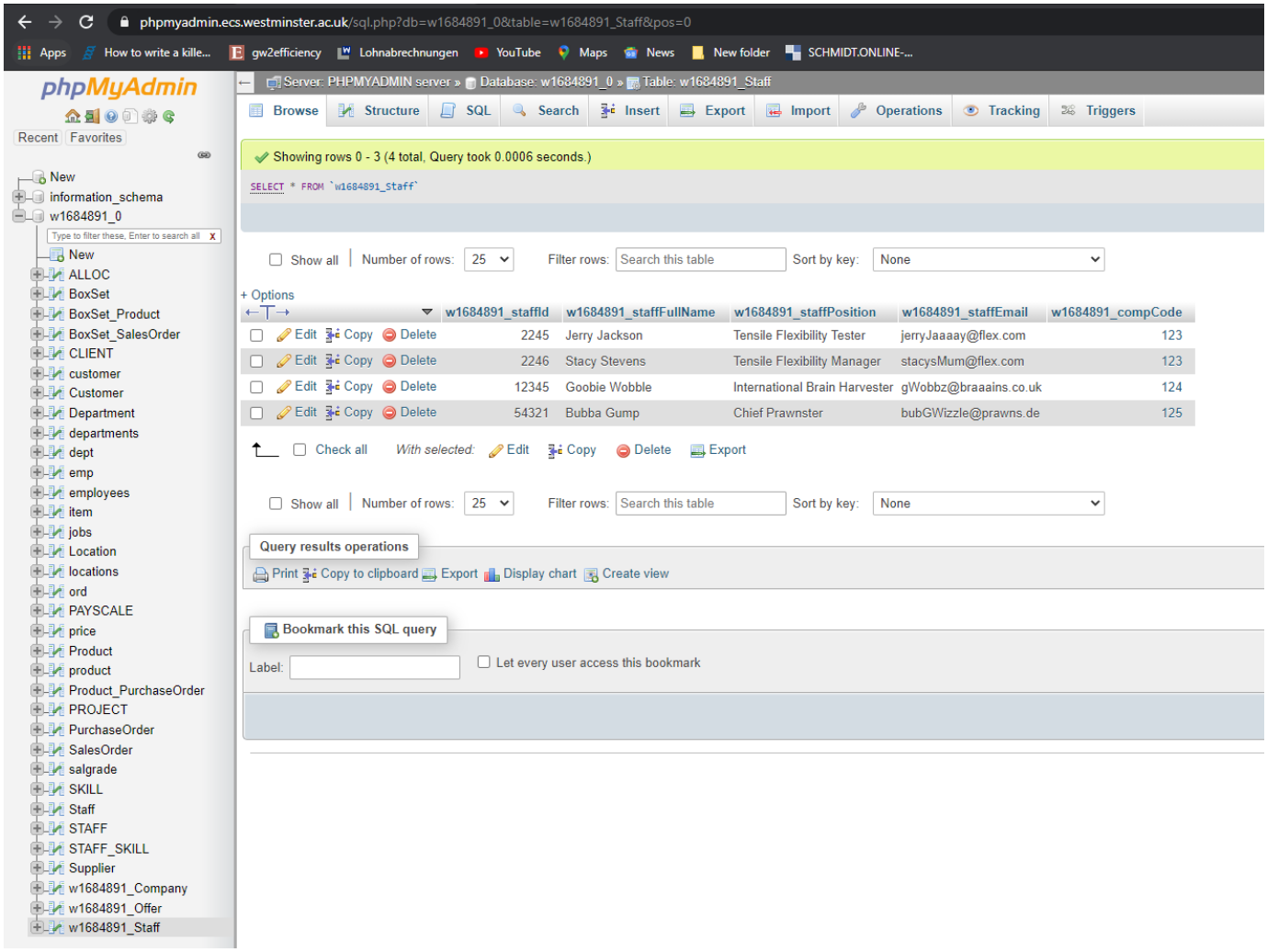


w1684891_Staff

Script

```
-- Insert data into w1684891_Staff table

INSERT INTO
w1684891_Staff (
        w1684891_staffId,
        w1684891_staffFullName,
        w1684891_staffPosition,
        w1684891_staffEmail,
        w1684891_compCode
) VALUES
(002245, 'Jerry Jackson', 'Tensile Flexibility Tester',
'jerryJaaaay@flex.com', 000123),
(002246, 'Stacy Stevens', 'Tensile Flexibility Manager',
'stacysMum@flex.com', 000123),
(012345, 'Goobie Wobble', 'International Brain Harvester',
'gWobbz@braaains.co.uk', 000124),
(054321, 'Bubba Gump', 'Chief Prawnster', 'bubGWizzle@prawns.de',
000125);
```

Content Screenshot

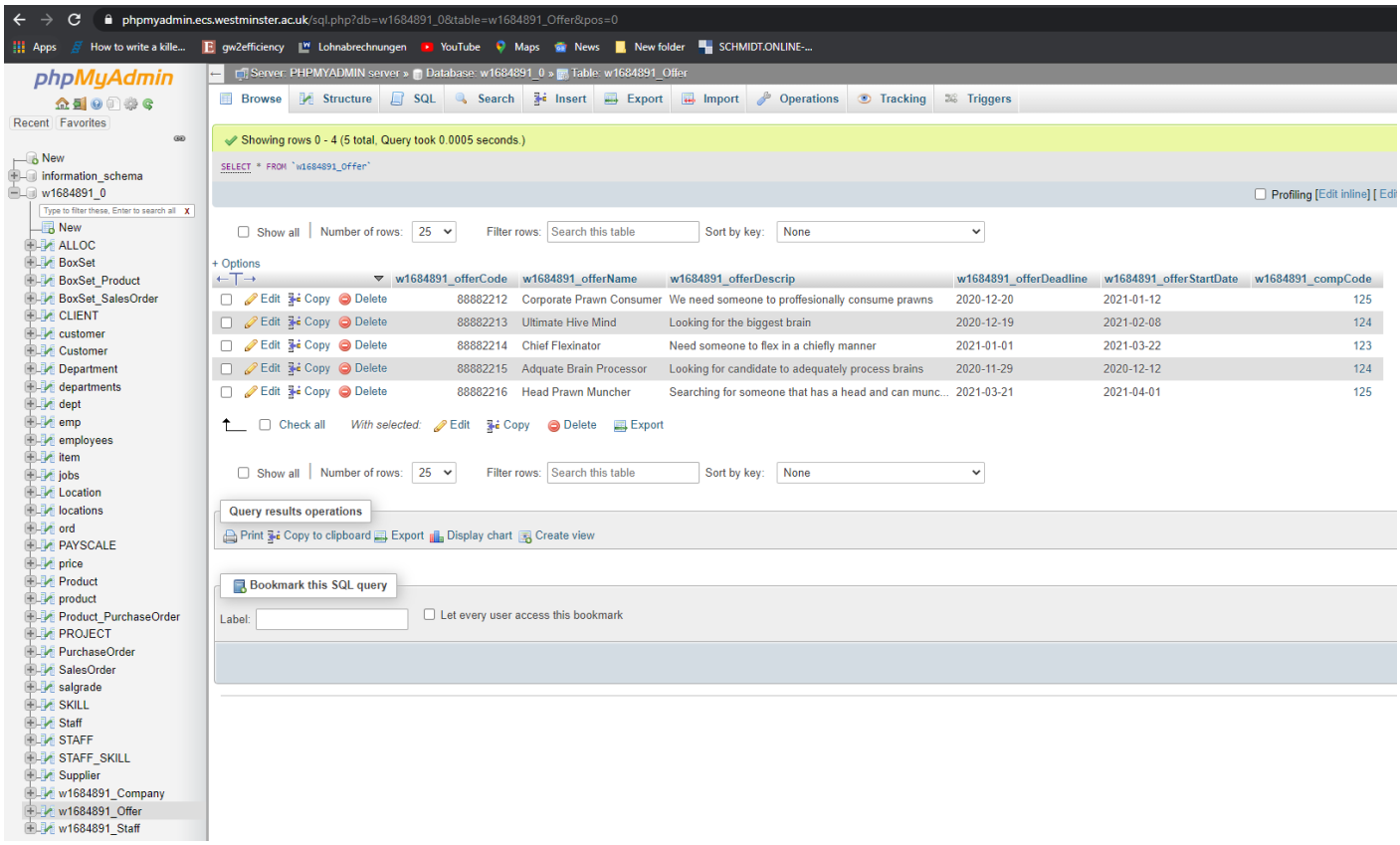


w1684891_Offer

Script

```
-- Insert data into w1684891_Offer table

INSERT INTO
w1684891_Offer (
        w1684891_offerCode,
        w1684891_offerName,
        w1684891_offerDescrip,
        w1684891_offerDeadline,
        w1684891_offerStartDate,
        w1684891_compCode
) VALUES
(88882212, 'Corporate Prawn Consumer', 'We need someone to proffesionally
consume prawns',
'2020-12-20', '2021-01-12', 000125),
(88882213, 'Ultimate Hive Mind', 'Looking for the biggest brain',
'2020-12-19', '2021-02-08', 000124),
(88882214, 'Chief Flexinator', 'Need someone to flex in a chiefly
manner',
'2021-01-01', '2021-03-22', 000123),
(88882215, 'Adquate Brain Processor', 'Looking for candidate to
adequately process brains',
'2020-11-29', '2020-12-12', 000124),
(88882216, 'Head Prawn Muncher', 'Searching for someone that has a head
and can munch prawns',
'2021-03-21', '2021-04-01', 000125);
```

Content Screenshot



SQL Queries (TASK 8 & 9)

Full Script

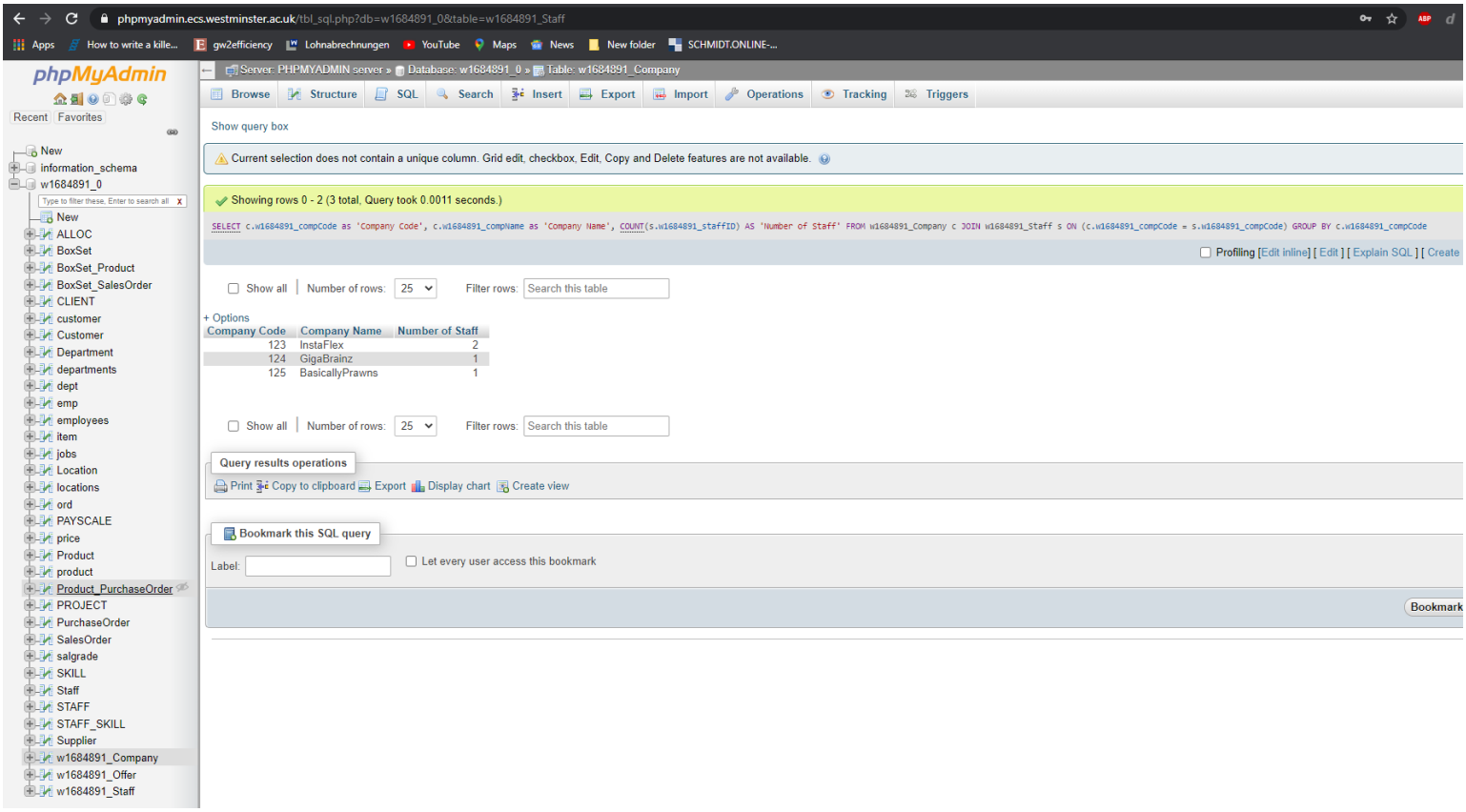
```
-- By Tomasz Dawid Wasowski - w1684891 - Part B Queries SQL code

-- ##### Task 8 Query ################################################

SELECT
        c.w1684891_compCode AS 'Company Code',
        c.w1684891_compName AS 'Company Name',
        COUNT(s.w1684891_staffID) AS 'Number of Staff'
FROM w1684891_Company c JOIN w1684891_Staff s
ON (c.w1684891_compCode = s.w1684891_compCode)
GROUP BY c.w1684891_compCode;

-- ##### Task 9 Query ################################################

SELECT
        c.w1684891_compName AS 'Company Name',
        s.w1684891_staffFullName AS 'Staff Name',
        s.w1684891_staffPosition AS 'Staff Position',
        o.w1684891_offerName AS 'Offer Name',
        o.w1684891_offerDescrip AS 'Offer Description'
FROM w1684891_Company c
JOIN w1684891_Staff s
ON (c.w1684891_compCode = s.w1684891_compCode)
JOIN w1684891_Offer o
ON (c.w1684891_compCode = o.w1684891_compCode);

-- ALTERNATIVE

SELECT
        c.w1684891_compName AS 'Company Name',
        s.w1684891_staffFullName AS 'Staff Name',
        s.w1684891_staffPosition AS 'Staff Position',
        null AS 'Offer Name',
        null AS 'Offer Description'
FROM w1684891_Company c
JOIN w1684891_Staff s
ON (c.w1684891_compCode = s.w1684891_compCode)
UNION
SELECT
        c.w1684891_compName AS 'Company Name',
        null AS 'Staff Name',
        null AS 'Staff Position',
        o.w1684891_offerName AS 'Offer Name',
        o.w1684891_offerDescrip AS 'Offer Description'
FROM w1684891_Company c
JOIN w1684891_Offer o
ON (c.w1684891_compCode = o.w1684891_compCode)
ORDER BY `Company Name`, `Staff Name` DESC;
```

Task 8

Script

```
-- ##### Task 8 Query ################################################

SELECT
        c.w1684891_compCode AS 'Company Code',
        c.w1684891_compName AS 'Company Name',
        COUNT(s.w1684891_staffID) AS 'Number of Staff'
FROM w1684891_Company c JOIN w1684891_Staff s
ON (c.w1684891_compCode = s.w1684891_compCode)
GROUP BY c.w1684891_compCode;
```

Screenshot

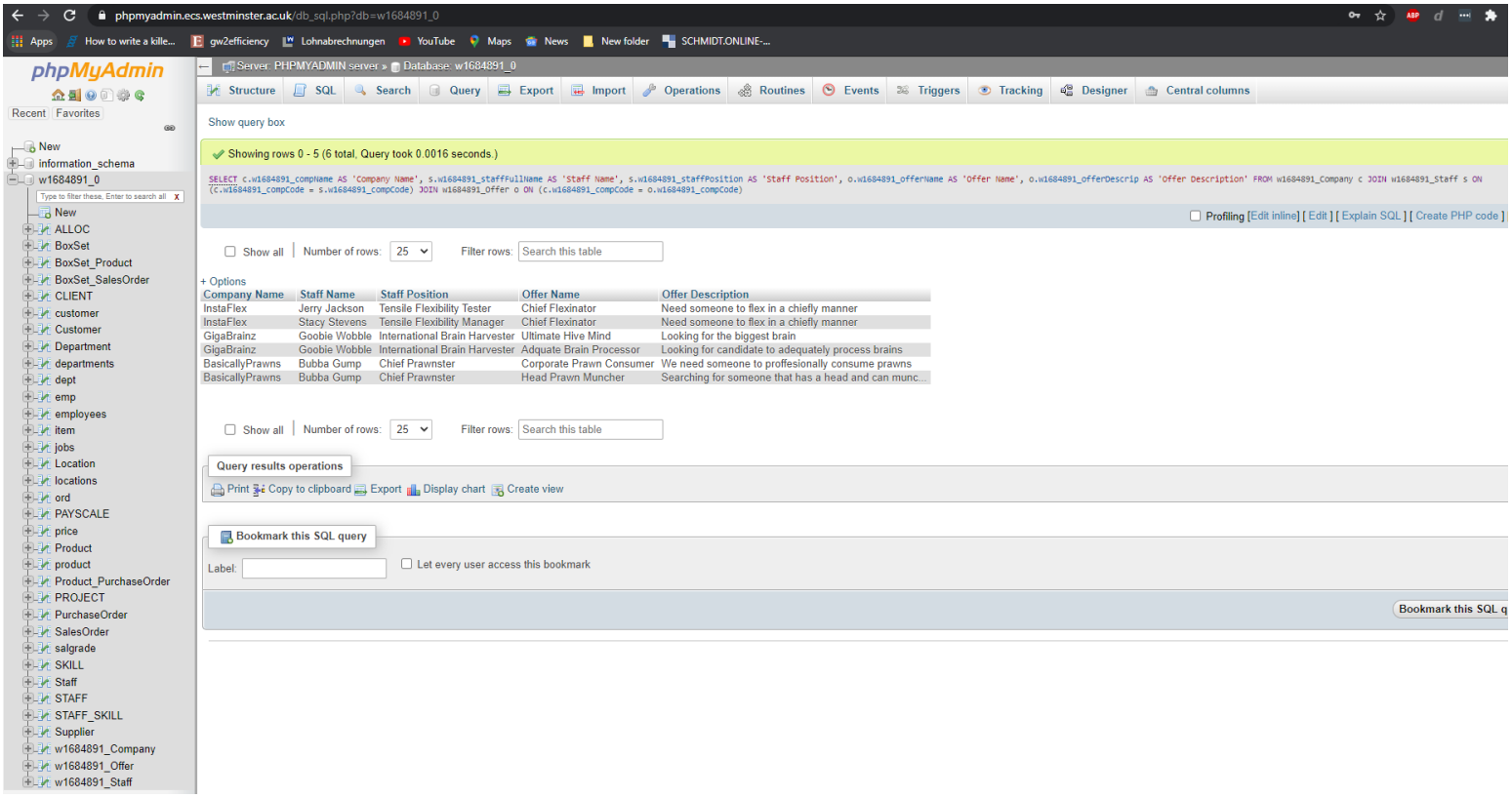


Task 9

Script

```
-- ##### Task 9 Query ################################################

SELECT
        c.w1684891_compName AS 'Company Name',
        s.w1684891_staffFullName AS 'Staff Name',
        s.w1684891_staffPosition AS 'Staff Position',
        o.w1684891_offerName AS 'Offer Name',
        o.w1684891_offerDescrip AS 'Offer Description'
FROM w1684891_Company c
JOIN w1684891_Staff s
ON (c.w1684891_compCode = s.w1684891_compCode)
JOIN w1684891_Offer o
ON (c.w1684891_compCode = o.w1684891_compCode);

-- ALTERNATIVE (Clearer Display - Use this one)

SELECT
        c.w1684891_compName AS 'Company Name',
        s.w1684891_staffFullName AS 'Staff Name',
        s.w1684891_staffPosition AS 'Staff Position',
        null AS 'Offer Name',
        null AS 'Offer Description'
FROM w1684891_Company c
JOIN w1684891_Staff s
ON (c.w1684891_compCode = s.w1684891_compCode)
UNION
SELECT
        c.w1684891_compName AS 'Company Name',
        null AS 'Staff Name',
        null AS 'Staff Position',
        o.w1684891_offerName AS 'Offer Name',
        o.w1684891_offerDescrip AS 'Offer Description'
FROM w1684891_Company c
JOIN w1684891_Offer o
ON (c.w1684891_compCode = o.w1684891_compCode)
ORDER BY `Company Name`, `Staff Name` DESC;
```

Screenshot (First Method – Basic Joins)



Screenshot (Alternative Method – UNION for Clearer Display)