

IT 235 Final: Database Design Report Package

Lorenzo Mateo

Mrs. Frances C. Ijeoma

IT 235: Database Design

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### **Requirement Gathering: Purpose, Goals and Objectives**

Dylan and Samantha Morgan have conceptualized a new business model in pizza delivery. For 20 years the Morgans have served high-class specialty pieces. They have now decided to turn their business into a high-volume, late-night pizza business which will serve approximately 38,000 college students in and around the Atlanta area. Specifically serving the college of Atlanta United University. The new restaurant would have no seating and only cater to delivery and or pick up a pizza. Delivery hours range from midnight to around 4 AM. The new restaurant will only have a limited choices of pizza types (thin, regular, or pan). The menu will also have unlimited topping choice also (pepperoni, sausage, ham, and extra cheese).

The purpose of the database would be to keep track of pizza orders, customers who ordered pizza, addresses pizza was delivered to, customers contact information, contact information of employee who delivered pizza, contact information of employee took actual order. They would also like to keep track of delivery status within various points of the night. This database will help validate and determine if the late-night pizza business is profitable. If the new business model is profitable the Morgans are thinking about opening the business in new locations.

### **Requirement Gathering: User Requirements**

The main user requirements for the tracking database are as follow:

Keep Track of

- Customers who ordered pizza
- Pizza orders including toppings added

- Address pizza was delivered to
- Name and phone number of employees who delivered the pizza
- Name of employees who took pizza order
- Sales per hour, day, week, and month
- Delivery status details at various points of the night. Each order should have a status along with the order date and time and the delivery date and time. Note that if a customer picks up the pizza, the pickup time is the delivery time.

The Morgans also have some other additional considerations which should be implemented as business rules for the database such as: given the customer flexibility to order more than one pizza, customers within the database can order from more than one location, but within a database they can only have one preferred address. They would also like the database to contain an area where they can add customer notes to the orders regarding special cooking instructions or any other preferred delivery options.

### **Requirement Gathering: Business Processes and Restrictions**

The Morgans business process is to organize and keep track of all their late-night pizza orders. The Morgans will not maintain any kind of seating within their establishment so the business is strictly a pickup and delivery service. The database will track customer contacts with the business from the start of the ordering process (where customers will order pizza from limited selected menu items) to end for the ordering process where customer pickup or the pizza is delivered. Along the flow of the process customers will come in contact with employees who are taking their orders and employees which will deliver the actual pizza to their residents. The

database should have some kind of graphical user interface for consistent flow of clean data going into the database.

Restriction could be placed on addresses certain miles away from the university's locality because this may interfere their delivery promise of an hour time frame. Customers can send order to another location but within the database system the customer should have a preferred address. The Morgans also place restrictions on the types of pizzas that can be ordered with limited pizza type and topping choice they can manage a higher volume of prints output throughout the night.

### **Requirement Gathering: End Results**

The end results for pizza shop owners Dylan and Samantha Morgan late-night pizza business is structurally sound and user friendly database tracking system. The system will be equipped for them to track customer orders, track the employee who had contact with the customers, track the time of delivery and who delivered the pizza, the database will also maintain any special accommodations and or instructions as per the customer's preferences. The database will also track sales per hour, day, week and month. The database will also incorporate delivery status information tracked throughout the delivery process. With all the clean data in the database the Morgans will be able to analyze any and all aspects of their business. Reports garnered from the database could be:

- Sales by day, week and month
- Knowing frequent customer orders place
- Best pizza combination in delivery in area

- Knowing and maintaining current customer base for possible outreach

The Morgans have a clear and concise plan for the database they would like to implement for their new business venture. If all user requirements are implemented to their specification. The database should produce the validation needed for the Morgans to continue and expand or re-evaluate and conceptualize a newer business model.

### **Conceptual Design: Design Applicability & Appropriate ERM**

The Entity Relationship Models(ERM) considered for the Cougar Pizza Pies database design were Chen's notation and Crow's Foot notation. These particular models were chosen due to their visual representation of relationships(1:1 ,1:M, and M:M) using various shapes and lines that defines entities and attributes.

The ERM chosen for this database design project was the Crow's Foot notation. The rationale for the crow's foot notation was it has a better relationship visualization. This notation uses one rectangle to represent entities and attributes and line markings to represent the various relationships among the entities. On the contrary Chen's notation uses rectangles and diamond shapes to represent attributes and entities, the visualization using this ER model can become a bit cumbersome when you have multiple tables and are trying to display cross relationships between them.

Based on the analysis of Cougar Pizza Pies database requirements several entities and attributes have been determined:

- Customer (Entity) attributes: Cust\_ID, Cust\_FirstName, Cust\_LastName, Cust\_Phone, Cust\_Address1, Cust\_Address2, Cust\_City, Cust\_State

- Employee (Entity) attributes: Emp\_ID, Store\_ID, Emp\_FirstName, Emp\_LastName, Emp\_Title
- Orders (Entity) attributes: Orders\_ID, Cust\_ID, Emp\_ID, Order\_Type, Order\_DateTime, Delivery\_DateTime, Pickup\_DateTime, Total\_Order\_Cost
- Pizza\_Ordered (Entity) attributes: Pizza\_Ordered\_ID, Order\_ID, Pizza\_Type\_ID
- Pizza\_Type (Entity) attributes: Pizza\_Type\_ID, Pizza\_Price, Pizza\_Type\_Desc
- Sales\_Transaction (Entity) attributes: Transaction\_ID, sales\_hours, sales\_wk, sales\_month
- Pizza\_Toppings (Entity) attributes: Toppings\_ID, Orders\_ID, Pizza\_Ordered\_ID, Toppings\_code
- Delivery (Entity) attributes: Delivery\_ID, Cust\_ID, Emp\_ID, Delivery\_Status
- Store\_Location (Entity) attributes: Store\_ID, Store\_Address1, Store\_City, Store\_State

Most of the determined entities and attributes will be used for the design of The Cougar Pizza Pies database with the exception of the Sales\_Transaction entity. The original creation of this entity was to track sales data by hours, days, weeks, months. This would create redundancy as the orders table with its specific attributes (*Order\_DateTime*, *Delivery\_DateTime*, *PickUp\_DateTime*, *Total\_Order\_Cost*) could be queried to provide the same sales information for reporting purposes.

### Conceptual Design: Data Sets

Entity	Attributes	Attributes desc
<b>Customer</b>	(PK) Cust_ID	Customer ID
	Cust_FirstName	Customer First Name
	Cust_LastName	Customer Last Name
	Cust_Phone	Customer Phone
	Cust_Address1	Customer Main Address
	Cust_Address2	Customer Secondary Address
	Cust_City	Customer City
	Cust_State	Customer State

Entity	Attributes	Attributes desc
<b>Employee</b>	(PK) Emp_ID	Employee ID
	(FK) Store_ID	Store ID where Employee works
	Emp_FirstName	Employee First Name
	Emp_LastName	Employee Last Name
	Emp_Title	Employee's job title (cook,cashier,driver, etc..)

Entity	Attributes	Attributes desc
<b>Orders</b>	(PK) Orders_ID	Order ID
	(FK) Cust_ID	ID of Customer who ordered
	(FK) Emp_ID	ID of Employee who took order
	Order_Type	Order Type (1: Delivery or 2: Pickup)
	Order_DateTime	Order Date Time
	Delivery_DateTime	Delivery Date Time
	PickUp_DateTime	Pick Up Date Time
	Total_Order_Cost	Total Cost of Order

Entity	Attributes	Attributes desc
<b>Pizza_Ordered</b>	(PK)Pizza_Ordered_ID	ID of Ordered Pizza
	(FK) Order_ID	ID of Orders
	(FK)Pizza_Type_ID	ID of type of Pizza Ordered

Entity	Attributes	Attributes desc
<b>Pizza_Type</b>	(PK) Pizza_Type_ID	Pizza Type ID
	Pizza_Price	Price of Pizza



	Pizza_Type_Desc	Pizza Type description
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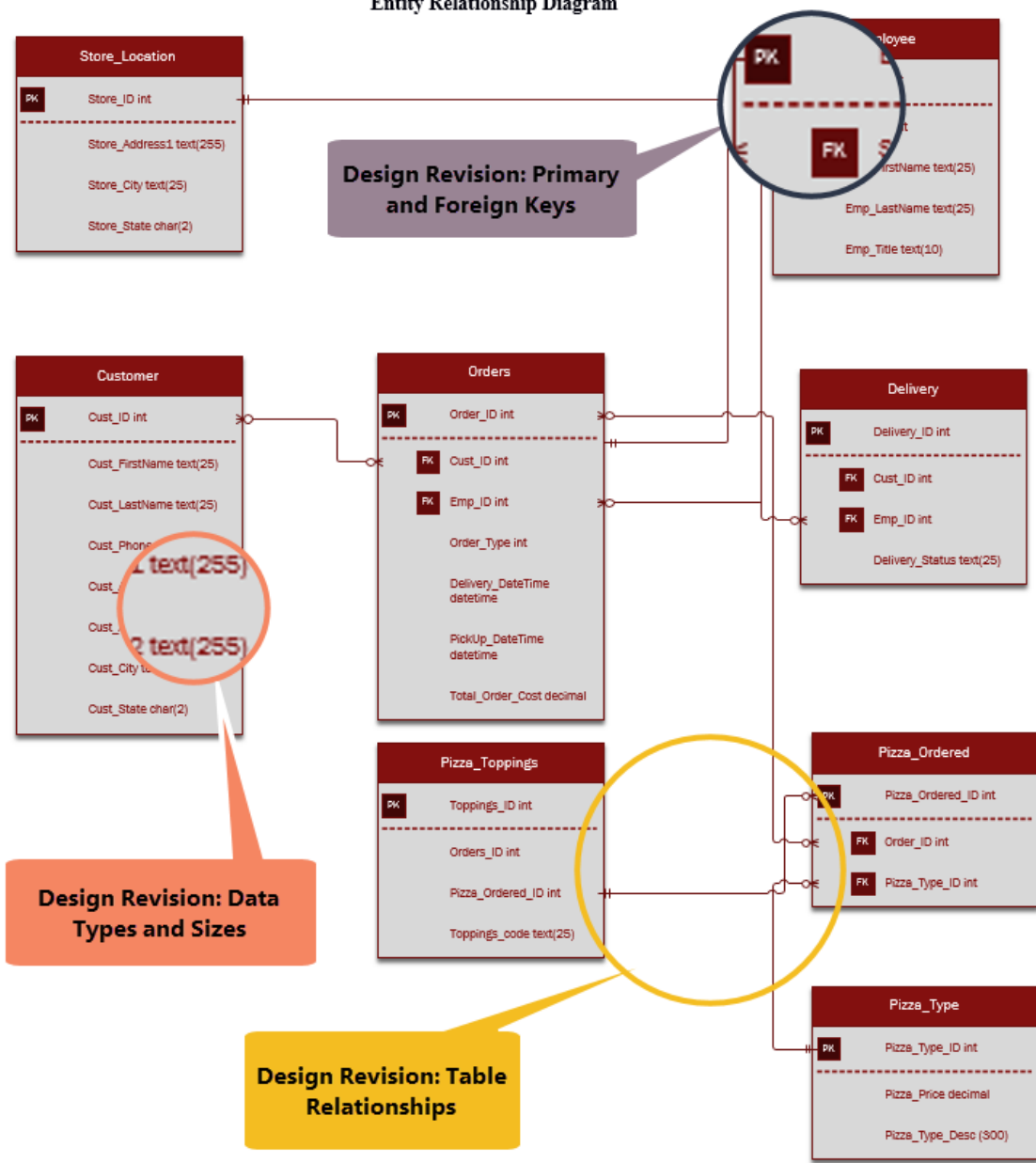
Entity	Attributes	Attributes desc
<b>Pizza_Toppings</b>	(PK) Toppings_ID	Pizza Toppings ID
	(FK) Orders_ID	ID of Orders
	(FK) Pizza_Ordered_ID	ID of Pizza Ordered
	Toppings_code	Code to identify selected toppings

Entity	Attributes	Attributes desc
<b>Delivery</b>	(PK) Delivery_ID	Delivery ID
	(FK) Cust_ID	ID of Customer who ordered
	(FK) Emp_ID	ID of Employee who will deliver order
	Delivery_Status	Status of Delivery

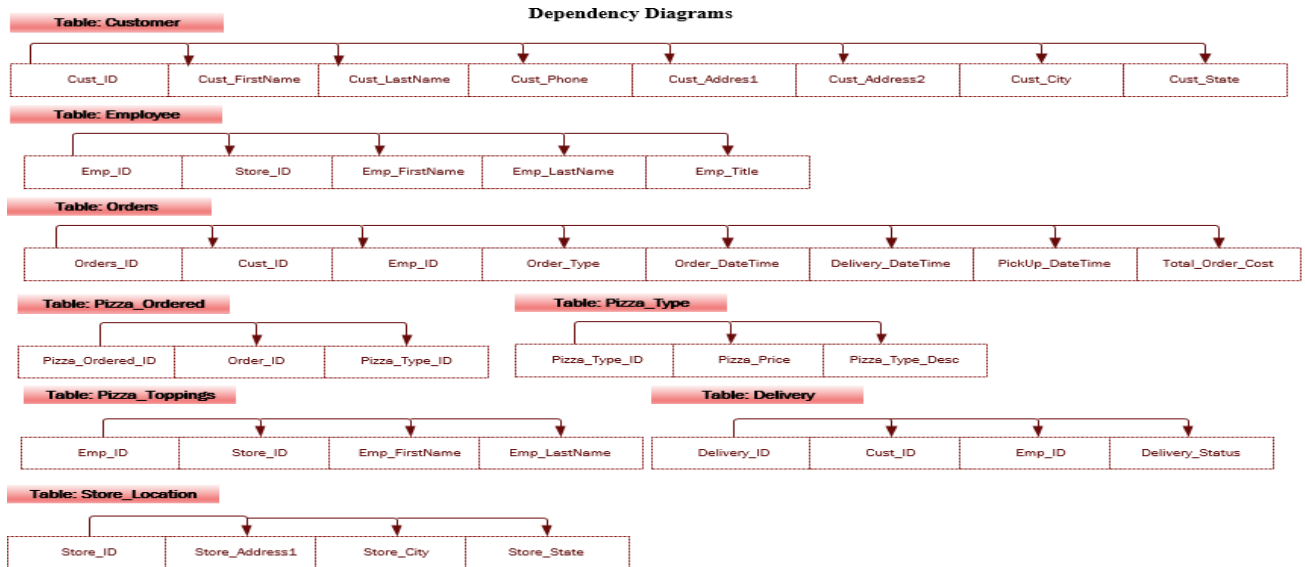
Entity	Attributes	Attributes desc
<b>Store_Location</b>	(PK) Store_ID	Store's Location ID
	Store_Address1	Store's Main Address
	Store_City	Store's City Location
	Store_State	Store's State Location

### Design Revision: ERD

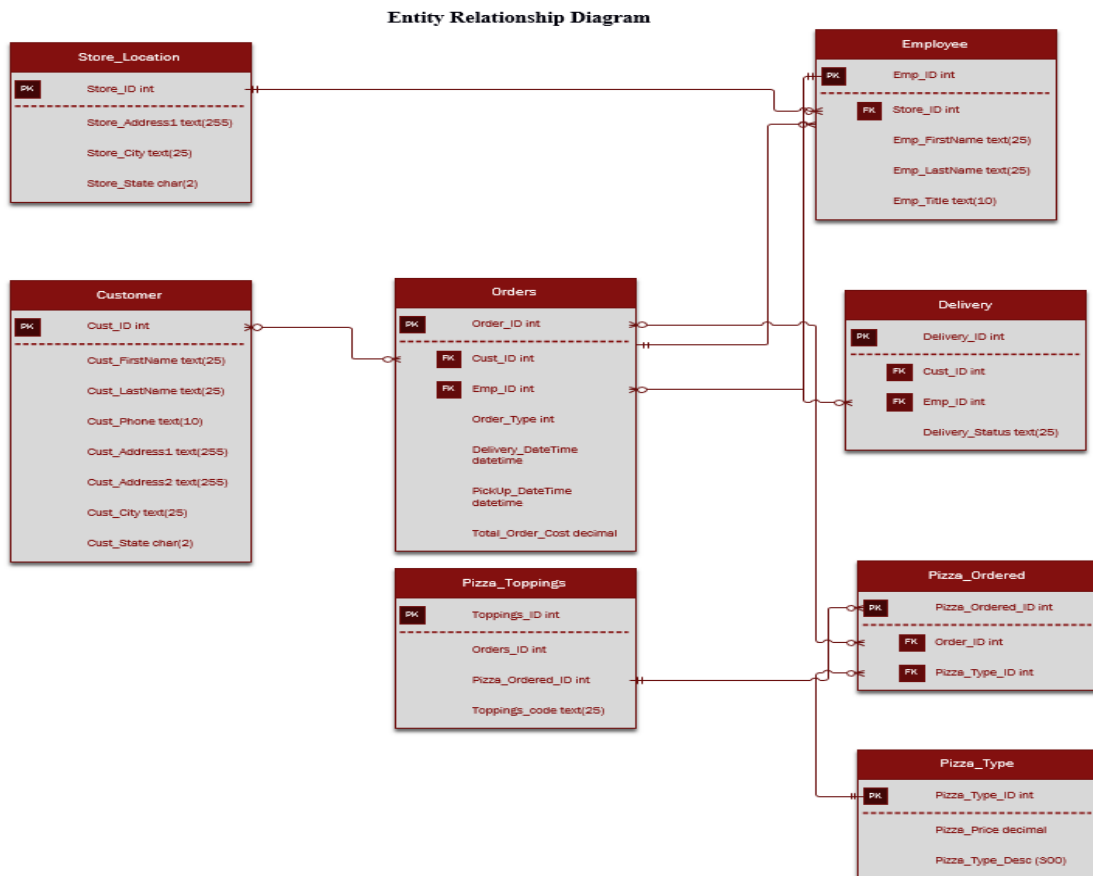
Entity Relationship Diagram



## Design Revision: Normalization Process



## Design Finalization: Final ERD



### **Design Finalization: Process**

The database design process for Cougar Pizza Pies was planned from the users requirement documentation. The business owners has several goals and objectives they would like to achieve through their new business model. Noted within the requirement documentation the business owners would like to keep track of pizza orders, customers who ordered pizza, address pizza was delivered to, customer contact information, contact information of employees who delivered pizza, contact information of employees who took actual orders. With these specific main processes the determination was to create several tables and link them via primary keys and foreign keys within a one to many and many to many database structure.

In establishing the entity relationship diagram(ERD) several tables were produced: Customer, Employee, Orders, Pizza\_Ordered, Pizza\_Type, Pizza\_Toppings, Delivery, Sales\_Transaction and Store\_Location. These tables will keep track of all incoming and outgoing information generated by the business. After completing third normalization the only adjustment that made was to eliminate the table Sales\_Transaction as the entities attributes and dependencies will have created redundancy within the database structure.

### **Design Finalization: Achieve End Result**

This database design will allow the Morgans to keep track of customer contacts, employee contacts, ordering, pick up, and delivery status. The database will also track employee store location for when the business wants to expand to other locations. The orders table when queried for reporting purposes can provide transactional information such as sales by day, week and month, and knowing the frequency of customer's who placed orders. The database design

features a Customer table which will store all customer information and be the preferred address as noted in the requirements documentation.

The Morgans will also be able to keep track of menu item pricing and toppings selected for each pizza. The database upon implementation will also feature a notes section where employees can add special cooking instructions to the orders. In conclusion the end results from implementing this design would be a structurally sound database that will help the business owners determine the success of their new business venture.

## References

Coronel, C., & Morris, S. (2017). Database Systems: Design, Implementation, and Management. Boston: Cengage Learning.