

Database Management Project Proposal

Pizza Shop Database Application

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Dr. Cheng, Wayne for IST 634

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Executive Summary (Defining the Mission Statement)

Our goal in this project is to develop a sophisticated database and a respective application for a pizza shop. Information would be primarily stored offline to allow for a more privatized collection of the pizza shop's customer information. The database will collect the appropriate details regarding customer and order information, as well as any details involving employees interspersed within every process in the company. With this information, the application will allow for a complex view within the many facets of the company, involving the micro and macro levels of the ordering system. The initial goal is to set up the database and develop a simple application. The end goal is to allow said application to view as many other details as possible that may be nestled in the database.

05/30 Update:

Mission Statement

The purpose of J's Pizza is to provide a wide arrange of quality pizza products with a significant focus on excellent customer service.

Mission Objectives

- Track and maintain employee schedules and hours.
- Make customers' orders.
- Maintain customer records.
- Conjure possible future promotion ideas.
- Track amount of customer orders.
- Maintain and track labor vs sales daily records.

Mission Statement Discussion Dialogue

Me: *"How would you describe the purpose of your organization?"*

Owner: *"Our purpose is to deliver quality food products to the customers that seek out our services. Whether it be our great pizza or the amazing customer service a customer wants, they will receive it every time they order."*

Me: *"What is the main focus of your organization?"*

Owner: *"To carry on the tradition of the aforementioned qualities, while allowing for enough products to suit every customer who is hungry."*

Me: *"Can you tell me how a database helps you achieve those prior mentioned goals?"*

Owner: *"It allows us to achieve that excellent customer service by referencing prior orders for customers to quell any issues with their food, as well as creating promotional campaigns based on their history."*

Mission Objectives Discussion Dialogue

Me: *"What kind of work do you perform on a daily basis?"*

Manager: *“First, I keep track of the employees on clock for the day. Next, we make orders based on what each customer has ordered. By keeping track of the customers’ info in a database, we can easily derive important insights.”*

Me: *“You mentioned that you can easily derive important insights, what do you mean by that?”*

Manager: *“Well, each customers’ information is stored in our database, ranging from personal information like name to order information such as the items within it. By important insights derived, I mean I look at customers’ orders to see if there is any potential for future promotions based on trends. This is keeps us up to date an allows us to target customers with promotions based around the food they want. As well, it can help keep business up during slow seasons.”*

Me: *“Thank you. Following that, what types of things do you keep track of on a standard shift?”*

Manager: *“Like mentioned beforehand, the first one is always employees that work that day, their position, and their hours. Other things I keep track of include the order count for the day and important measures such as labor versus sales. It gives us an insight on how much the collective hourly rate of our employees fares against our sales for the day. The lower the percentage the better.”*

Project Description & Milestones (Investigation current system or business model)

- Identify standard Pizza Shop business model
- Estimate how many tables needed for Database
- Discover important features to include in application
- Create sophisticated database
- Application worthy of improving business operations
- Etc, etc...

Technical Background (Methodology and Implementation Plan)

For the methodology and implementation plan, it will involve a significant number of steps to make sure that the database and application is developed in the best way possible. The first thing to make note of is that this project will be using the RAD methodology and will make significant changes along the whole of the development process. The first step in the development process will require the creation of a few requirements analysis diagrams. This project more so is hoping to make use of use/case scenarios, activity diagram, and queries. Afterwards, an ER diagram will be developed to get a more logical view of the setup of the database being created. With that being noted, it is not decided on which DBMS will be used yet, the options are indicative of the process that will be used to create the application. It seems as if the DBMSs’ to be used will most likely be either “MySQL” or “Microsoft Access.” Microsoft Access looks as to be the likely winner for the reasons of accessibility, convenience, and ease of use. More of the technical, methodological, and implementation plan will be more decided as the application and database are developed.

05/30 Update:

Tables Discussion Dialogue

Me: *“How would you break down your typical workdays and the duties required?”*

Manager: *“As a manager, I start by clocking in and checking which employees will be working and possibly which role that each employee will assume for their shift. This is followed up by checking if there are any food preorders. Afterward, prep is finished in which the store opens. Once the store opens, we receive orders in two ways, online or over the phone. If over the phone, we take down all the customer’s basic information and if it is a delivery, home location information as well. If the order is completed online, the customer provides prior information themselves. The next part involves taking the customer’s order, followed by their method of payment and order completion. The order is cooked and completed in the method the customer preferred whether delivery or pickup. Finally, once the workday approaches close, necessary cleaning is done and all employees clock out.”*

Me: *“Starting out with the customer’s information, which details are taken exactly for each order for both pickup and delivery?”*

Manager: *“Well, for pickup, we just need the phone number to enter into each customer’s account, and then enter their first and last name. For delivery, we will need that prior information as well as their city and address. Once the information is on file for each account, it is saved for each customer under their given phone number. With that we can check prior orders and even their order count.”*

Me: *“Interesting, in regard to each individual order, is their other information provided?”*

Manager: *“Oh sure, when checking the customer’s prior and current orders, info such as the order id, day of week, month, type of order and what time the order was placed is available. This also includes the food items actually ordered, such as a pizza with its number of toppings and price and other food items, such as breadsticks, with their price.”*

Me: *“Does the system store employees’ information as well? If so, what details are included?”*

Manager: *“Yes, in fact it does. Each employee has their own ID which further includes their phone number and first and last name. Also, what position they are, and hourly rate is included as well.”*

06/06 Update:

List of Subjects

Client

Orders

Labor

Employee

Position

Sales

Pizza

Other

List of Characteristics

Name
Number
Address
Order Number
Date
Time
Order Type
Position Type
Hourly Wage
Topping Count
Price
Item
Order ID
Employee ID

Preliminary Table List

Customer
Orders
Employee
Position
Pizza
Other

Preliminary Field List

First Name
Last Name
Phone Number
Address
City
Order Count
Order ID
Day of Week
Month
Time
Type
Employee ID
Position Type
Hourly Rate
Topping Count
Price
Item

Tables Verification and Description Discussion Dialogue

Me: *“Before we start discussing the core of what each table we have is, are you able to confirm that preliminary table and field list look accurate for what the company should use?”*

Manager: *“From my initial impressions of each list, they look as accurate as the list can honestly be.”*

Me: *“Thank you for confirming that for me. Now we will go over each table and you will give me an honest assessment of how each table is detailed. First, how would you describe a ‘Customer’ and what is the purpose of its own table?”*

Manager: *“A customer is essential and the lifeblood of our business. They keep us in operation and allow us to serve the purpose we set out to achieve when opening the business. We keep track of our customer information to allow us to serve them as well as we possibly can. It allows to also do things such as running promotions via mail in accordance with a customer’s prior orders and location.”*

Me: *“Next, how would you describe ‘Orders’ and its purpose?”*

Manager: *“Alongside customers, orders are just as essential. This allows us to track the order correctly and keep the required items in a neat, concise manner. The extra information also allows us to time the order out correctly and leaves the ability for customers to plan when they want to receive it. The point of keeping track of this information is to allow us to understand specific trends in ordering habits in a micro “single customer” way and macro “totality” of all customers way. It allows us to home in more specific promotions and derive data for other purposes.”*

Me: *“How about everything involving the ‘Employee’ table? Is there correlation with the ‘Position’ table?”*

Manager: *“Employees can be almost as important as the customer since they control every component of the operations within a business. That includes making the orders and keeping track of sales. Keeping track of their name and phone number will allow us to keep basic information available for if it is needed in certain circumstances. As well, it is great that you mentioned possible correlation between the employee and position table, because the position table is a subset of the employee table. The position table gives the specific information of what position the employee is and what their wages will be. By keeping track of this table, it allows the business to better organized and allows for the leniency of the schedule creation structure.”*

Me: *“Finally, what about the ‘Pizza’ and ‘Other’ tables?”*

Manager: *“Both of these tables are based on specific food items and are important. The pizza table is based on just the pizza side of the menu in which the table keeps track of the topping count and the price of the pizza. The other table is based on items that are not pizza. These items are things such as breadsticks and desserts. These are each individually important because it keeps track of what items are included in the order and allow for how much those orders will total out too.”*

06/13 Update:**Final Database Table Structures**Table: CustomerFields: **PK Customer ID**, First Name, Last Name, Phone Number, Address, City

Type: Data Table

Description: The individuals who order the food within our establishment and allow us to stay in business. The information provided by the 'Customer' table allows the business to store customer information and commit to smarter promotion campaigns.

Table: OrdersFields: **PK Order ID**, Date, Order Type, **FK Customer ID**, **FK Employee ID**, **FK Pizza ID**, **FK Other ID**

Type: Data Table

Description: The object that allows us to keep track of the items a customer place. The information provided in the 'Orders' table allows orders to be timed out correctly and leaves the door open for better promotion campaigns.

Table: EmployeeFields: **PK Employee ID**, First Name, Last Name, Phone Number, **FK Position ID**

Type: Data Table

Description: The individual that performs the standard and sophisticated operations of a business. The information provided in the 'Employee' table allows for the use of basic worker information in case it is needed in any circumstance.

Table: PositionFields: **PK Position ID**, Position Type, Hourly Rate

Type: Subset Table

Description: The title of the individual who is an employee for the business. The information provided in the 'Position' table allows for better organization and an easier method of scheduling.

Table: PizzaFields: **PK Pizza ID**, Topping Count, Price

Type: Data Table

Description: The object that is used for the pizza part of an order. The information provided in the 'Pizza' table allows for easier tracking of topping count and price.

Table: OtherFields: **PK Other ID**, Item, Price

Type: Data Table

Description: The object that is used for the non-pizza part of an order. The information provided in the 'Other' table allows for easier tracking of any non-pizza item.

Field Specifications**Customer Table - Address Field Specification***General Elements:*

Field Name: Address

Parent Table: Customer

Specification Type: Unique

Description: The bit of information that provides the location of an ordering customer. This information is important because it allows for the shop to know where to send their drivers to drop off deliveries for customers.

Physical Elements:

Data Type: Alphanumeric

Character Support: Letters (A-Z), Numbers (0-9)

Length: 30

Decimal Places: 0

Logical Elements:

Key Type: Non

Uniqueness: Non-Unique

Null Support: Nulls Allowed

Values Entered By: User

Required Value: No

Edit Rule: Edit Later, Edits Allowed

Orders Table – Order ID Field Specification

General Elements:

Field Name: Order ID

Parent Table: Orders

Specification Type: Unique

Description: The unique number identifier to identify an order. This helps with quickly locating an order and possibly addressing any problems if needed.

Physical Elements:

Data Type: Numeric

Character Support: Numbers (0-9)

Length: 5

Decimal Places: 0

Logical Elements:

Key Type: Primary

Key Structure: Simple

Uniqueness: Unique

Null Support: No Nulls

Values Entered By: System

Required Value: Yes

Edit Rule: Enter Now, Edits Not Allowed

Employee Table – Position ID Field Specification

General Elements:

Field Name: Position ID

Parent Table: Employee

Specification Type: Replica

Shared By: Position

Description: The unique number to identify an employee's position id. This will help with locating a specific employee's position type quickly.

Physical Elements:

Data Type: Numeric

Character Support: Numbers (0-9)

Length: 5

Decimal Places: 0

Logical Elements:

Key Type: Foreign

Uniqueness: Unique

Null Support: No Nulls

Values Entered By: System

Required Value: Yes

Edit Rule: Enter Now, Edits Not Allowed

*Position Table – Position Type Field Specification**General Elements:*

Field Name: Position Type

Parent Table: Position

Specification Type: Unique

Description: This is the title, or role for an employee within a company. This is important because it allows for managers to know what role a specific employee will be filling in that day's shift.

Physical Elements:

Data Type: Alphanumeric

Character Support: Letters (A-Z)

Length: 15

Decimal Places: 0

Logical Elements:

Key Type: Non

Uniqueness: Non-Unique

Null Support: No Nulls

Values Entered By: User

Required Value: Yes

Edit Rule: Enter Now, Edits Allowed

Pizza Table – Topping Count Field Specification

General Elements:

Field Name: Topping Count

Parent Table: Pizza

Specification Type: Unique

Description: This bit of information is as the title says, it is the number of toppings for an ordered pizza. This is important because it allows the employee to know what and how many of toppings are needed on a pizza. It also helps figure out how much the order costs.

Physical Elements:

Data Type: Numeric

Character Support: Numbers (0-9)

Length: 2

Decimal Places: 0

Logical Elements:

Key Type: Non

Uniqueness: Non-Unique

Null Support: Nulls Allowed

Values Entered By: User

Required Value: No

Edit Rule: Enter Later, Edits Allowed

*Other Table – Price Field Specification**General Elements:*

Field Name: Price

Parent Table: Other

Specification Type: Unique

Description: This bit of information is the price of any items that fall in the ‘other’ category, such as breadsticks. This is important because it allows one to total out the price for the collection of items within this table.

Physical Elements:

Data Type: Alphanumeric

Character Support: Numbers (0-9), Keyboard (./,\$#%)

Length: 6

Decimal Places: 0

Logical Elements:

Key Type: Non

Uniqueness: Non-Unique

Null Support: Nulls Allowed

Values Entered By: User

Required Value: No

Edit Rule: Enter Later, Edits Allowed

Program Coding

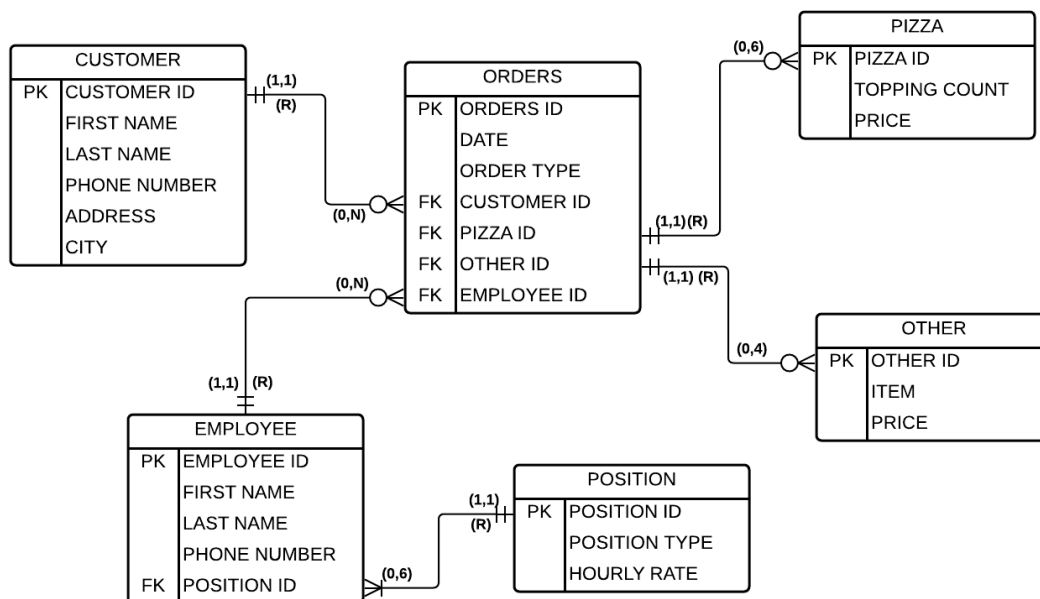
When it comes to the coding component of this application, things seem to be at a steady and somewhat error-free process. The main bugs come from any codes that usually involve the database, whether this be by queries or actual C# code. The biggest issue that we have had with coding this project was making it possible to merge multiple tables together and receive the results we wanted. This mainly entails that when adding a new record, it would give the illusion of creating a new entry, but upon checking the actual database, no records were found. We had to simplify the data grid to its most atomic-form table wise so that the information would store within the database correctly.

06/20 Update:

Tables Relationship Matrix

	Customer	Orders	Employee	Position	Other	Pizza
Customer		1:N				
Orders	1:1		1:1		1:N	1:N
Employee		1:N		1:1		
Position			1:N			
Other		1:1				
Pizza		1:1				

Entity Relationship Diagram



Regarding the deletion rule, I have selected “Restrict” for all the qualifying relationships. The reason for this is because the record in the parent will not delete if there is an entry within the child table. As well, all entries in the child table must be deleted for the related records in the parent table to be deleted as well.

Business Rules

- A customer can place many orders over the phone.
- A single order can only be placed by one customer.
- A customer does not need an order to exist.
- An order requires a customer.
- A single order can only be taken by one employee.
- One employee can take many orders.
- An employee does not need an order to exist.
- An order requires an employee.
- Every employee can only have one position.
- A single position can have many employees.
- An employee must have a position assigned.
- A position needs to be assigned to an employee.
- An order can have many “other” food items added.
- One “other” food item can only have one order.
- An order does not require a “other” food item.
- A “other” food items require an order.
- An order can have many pizzas added.
- A single pizza can only have one order.
- An order does not require a pizza on it.
- A pizza requires an order.
- One employee can have no role at the start of their hiring and cannot assume more than 6 roles in a shift.

Field-Specific Business Rules Specification

Rule Information:

Statement: Order dates cannot be earlier than June 2, 2021, since that was the date in which the business was created.

Constraint: An entry must be selected in the Date field; it cannot be null.

Type: Application Oriented

Category: Field Specific

Test On: Insert, Update

Structures Affected:

Field Names: Date

Table Names: Orders

Field Elements Affected:

Physical Elements: Data Type

Logical Elements: Null Support, Required Value, Edit Rule

Relationship-Specific Business Rules Specification

Rule Information:

Statement: An employee can have no role but cannot assume more than 6 roles in a shift.

Constraint: The role of an employee within the relationship is not mandatory. They cannot assume more than 6 roles.

Type: Database Oriented

Category: Relationship Specific

Test On: Insert, Update, Delete

Structures Affected:

Table Names: Employee, Position

Relationship Characteristics Affected:

Deletion Rule, Type of Participation, Degree of Participation

06/25 Update

Analyzing Views in Database

Within our application development, we really did not have an actual need for a view, but we made a theoretical use of one for the sake of this documentation. This view revolves around an up-to-date overall picture of each individual order made within the pizza shop.

View Specification

General Information:

Name: Complete Order Info

Type: Data

Description: This view lets us know all the important information within each individual order. It will help us get an overall picture of what an order is and what it entails.

Base Tables:

Orders, Customer, Pizza, Other, Employee

Fields Included:

Customer – First Name, Last Name

Orders – Date, Order Type

Pizza – Topping Count, Price

Other – Item, Price

Employee – First Name, Last Name

Expected Results: The Deliverables

When it comes to the deliverables at the finish of the project, it is hard to know exactly what things will be used to deliver the report. Otherwise, there are a few things that are expected to be made available. The known info that would be deliverables would be things such as five tables within

the database, a list of queries, reports, user training, and the designed application. Otherwise, this list should grow as development progresses, with the final product giving context as to what deliverables will be used.

06/25 Update

While there may be documents that might not be included in the final deliverables that were initially listed, the information that were to be included within those documents lie within this general one.

Personnel (Student's Information)

The primary and only person who took over this project was Jason Ward. Jason's success with the development of this database project was his expertise within the subjects that are needed to be successful. This includes his understanding of how databases need to be setup, including knowing how relationships work, data types, and the importance of keys. As well, while a SQL database was not used in this example, he has that skillset on his belt. Other skills that helped him was his knowledge of C#, Microsoft Access, and understanding what it takes to develop a visually appealing application.

Supporting Facilities (Tools)

The primary tools that were used for this project have partially been listed within this documentation at different points. To bring it together the main tools included Microsoft Access, Visual Studio, Microsoft Word, and Microsoft PowerPoint. To construct the diagrams, more specifically the ER Diagram, we used Lucid Chart online to develop it as appropriately as possible. Outside of that, resources including coding help online and things such as solution for problems in every facet of the project were used. This helped really pull this whole thing together in neat and concise order.