Supply Chain Database Systems Management

Company Name

Bake Eats

Objective

This project aims to collaborate with a small business company on developing and applying concepts and tools of database management, focusing on evolving its decision and strategic processes.

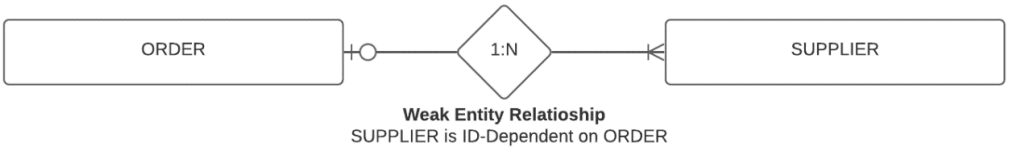
Bake Eats produces bread and pastries using a modern manufacturing process. It has ten employees, including its owner, and a number of clients not defined or analyzed since its foundation in 2019. The costs and earnings are managed in an empirical way. The suppliers' information and credit limit evaluation are very incipient. The company uses an Access file as the primary tool to conduct its related issues business.

The issues related to the *lack* of organized and efficient data management in personnel, clients, financial, production, sales, and marketing areas are analyzed in this project. Recommendations are made to produce information via a data modeling process, resulting in more competitiveness and the best economic and financial results. All steps are presented and consolidated in the technical work in this project.

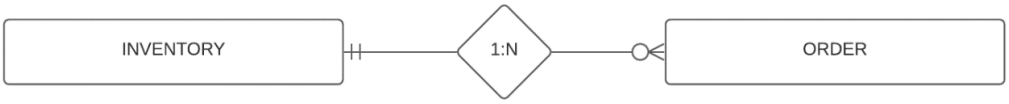
Assumptions

- Our database design consists of 2 facets: internal and external views.
    - The internal facet doesn't allow departments from viewing supplier details and agent contact information for their accounting purposes. Mainly hidden from general view.
    - The external view can be accessed by all departments. Used to study the customers buying patterns and perform analysis to increase profit.
- Within the business model, there is an inventory housing the raw materials a small-medium scaled bakery would require. A single inventory will be considered as there are several suppliers (mandatory) fulfilling orders (mandatory) for raw materials. The supply schedule is a weak entity with details of the
- An assembly line is a weak entity controlling the production of bakery goods. Each raw ingredient is fetched from the inventory and depending on the requirements will go into baking.
- A billing items list is a weak entity including goods purchased from the store. It can have one item or more or multiple items of each.

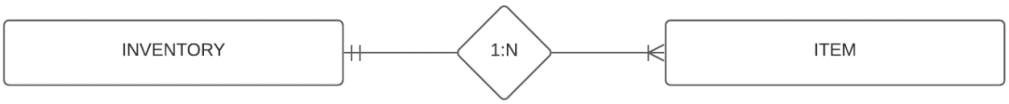
Assumptions about Cardinality and Participation



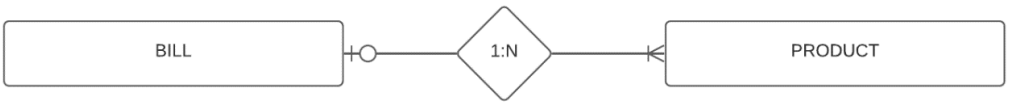
Weak Entity Relatioship
SUPPLIER is ID-Dependent on ORDER



Weak Entity Relatioship
ORDER is ID-Dependent on INVENTORY

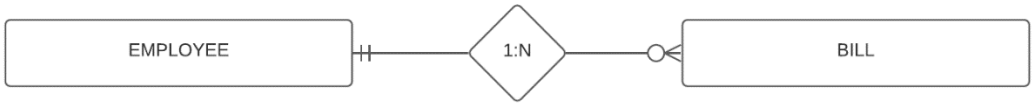


Weak Entity Relatioship
ITEM is ID-Dependent on INVENTORY

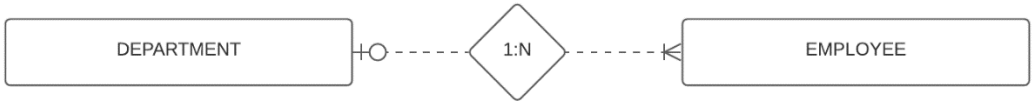


Weak Entity Relatioship
PRODUCT is ID-Dependent on BILL

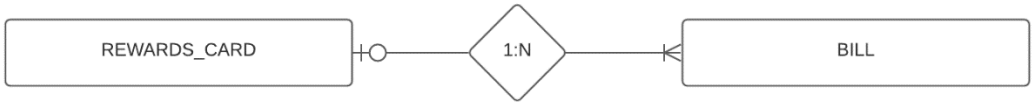
Weak Entity Relatioship
BILL is ID-Dependent on COSTUMER



Weak Entity Relatioship
BILL is ID-Dependent on EMPLOYEE



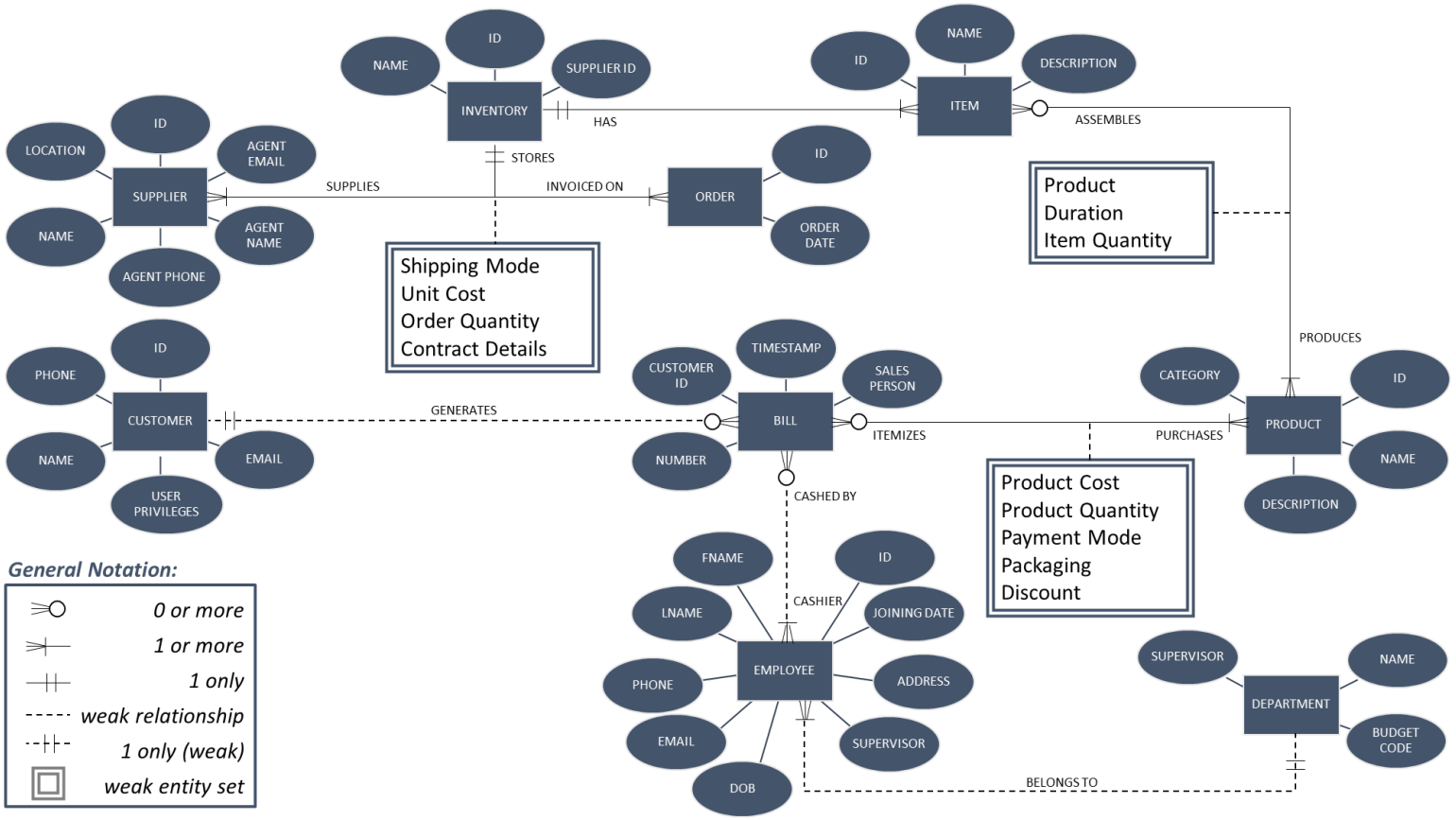
Strong Entity Relatioship
Nonidentifying Relationship



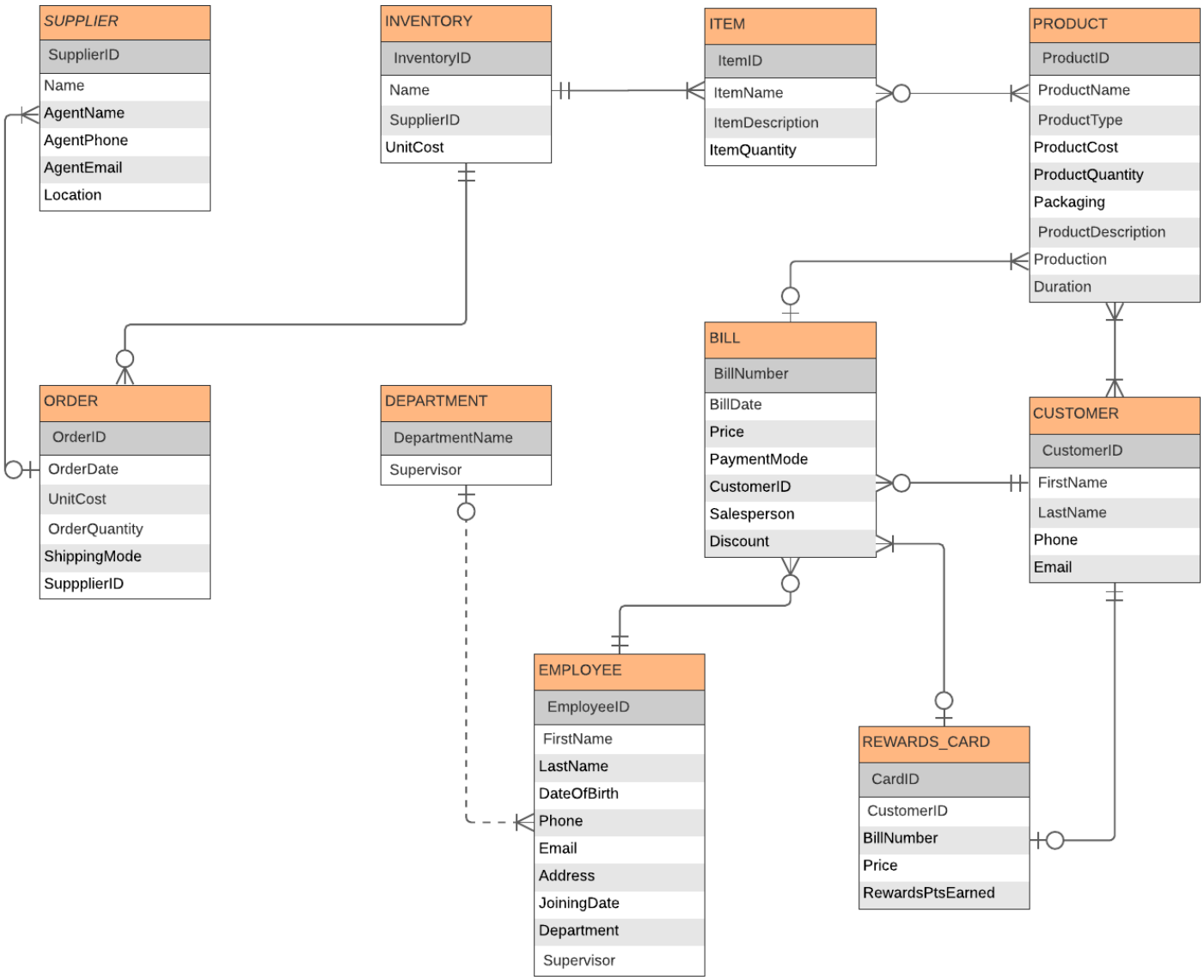
Weak Entity Relatioship
REWARDS_CARD is ID-Dependent on BILL

Weak Entity Relatioship
REWARDS_CARD is ID-Dependent on CUSTOMER

EER Modeling Diagram



ER-Model Mapping to Database Relational Schema



Normalization

All relations must be normalized up to BCNF. You must explain why you believe every relation in your database is normalized

1NF Normalization

Before Normalization:

Emp_ID	Emp_Name	DOB	Department	Budget	Supervisor
10011	Raymond	10/08/91	Accounting	545	Georgina
10012	Cathy	20/05/01	Finance	569	Brennan
10013	Jennifer	09/12/94	Accounting	545	Georgina
			Admin	200	David
			HR	152	Charlotte
10014	David	09/05/91	Admin	200	-

After 1NF:

Emp_ID	Emp_Name	DOB	Department	Budget	Supervisor
10011	Raymond	10/08/91	Accounting	545	Georgina
10012	Cathy	20/05/01	Finance	569	Brennan
10013	Jennifer	09/12/94	Accounting	545	Georgina
10013	Jennifer	09/12/94	Admin	200	David
10013	Jennifer	09/12/94	HR	152	Charlotte
10014	David	09/05/91	Admin	200	-

EMPLOYEE	Emp_ID	Emp_Name	DOB	Department	Budget	Supervisor

BILL	ID	Timestamp	Items	Price	Category	Description	Customer	Salesperson

ORDER	Order_ID	Order_Date	Shipment	Unit_Cost	Quantity	Supplier	Agent_Contact	Agent_Email	Location

Emp_ID -> (Emp_Name, DOB)

Department -> (Budget, Supervisor)

Bill_ID -> (Timestamp, Items, [Price], Customer, Salesperson)

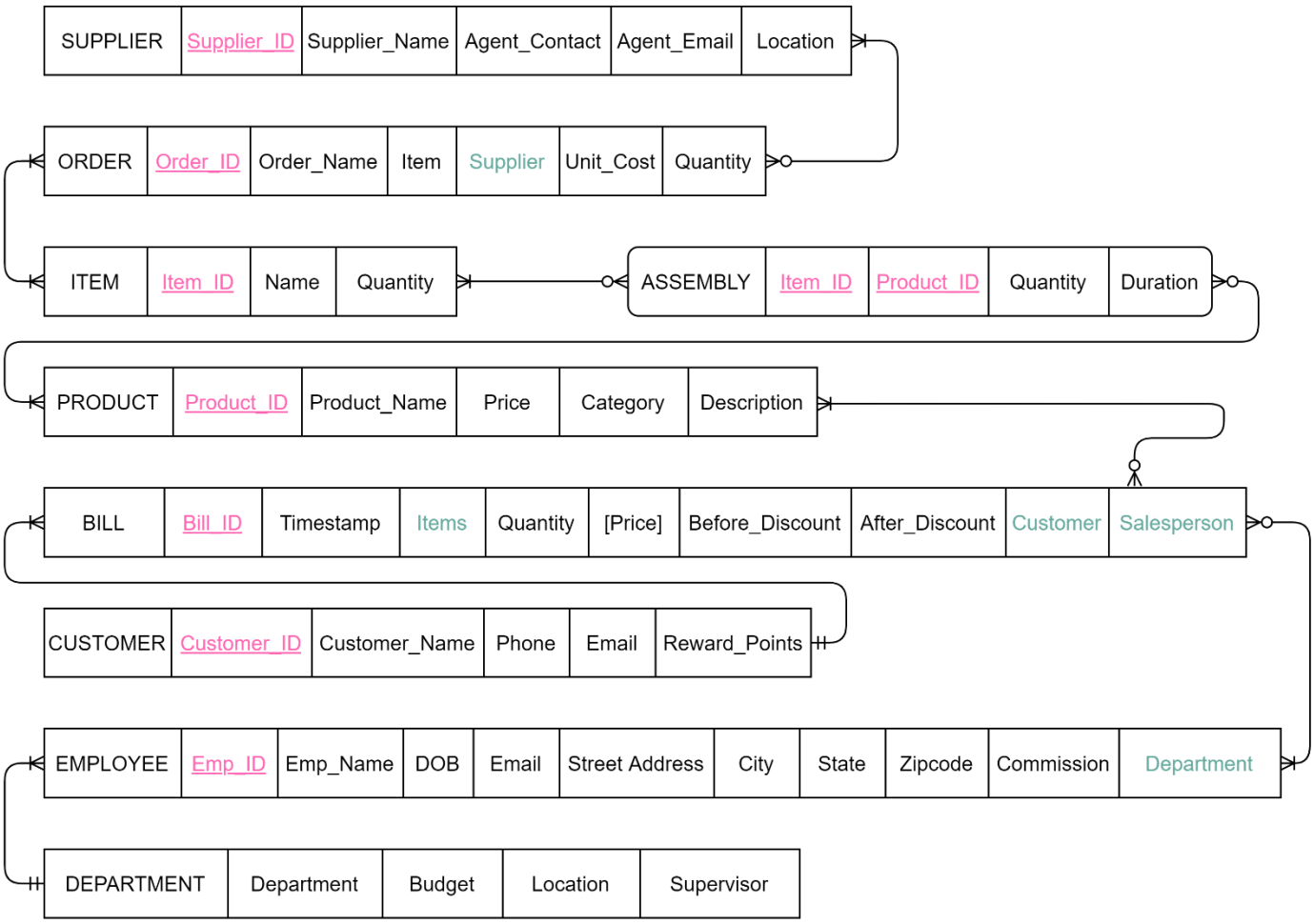
Items -> (Name, Quantity)

Product_ID -> (Price, Category, Description)

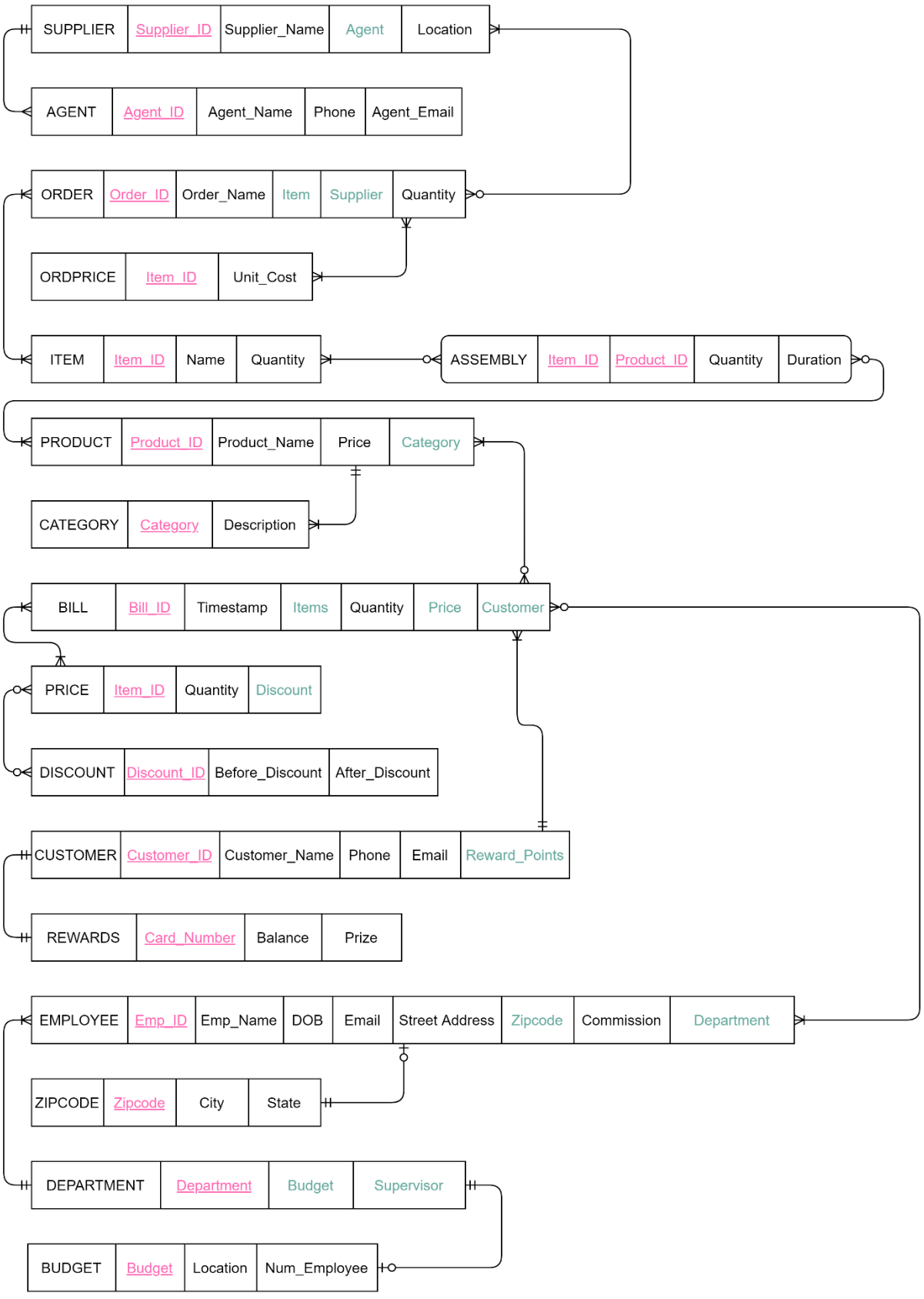
Customer_ID -> (Customer_Name, Phone, Email)

Order_ID -> (Order_Date, Shipment, Quantity)

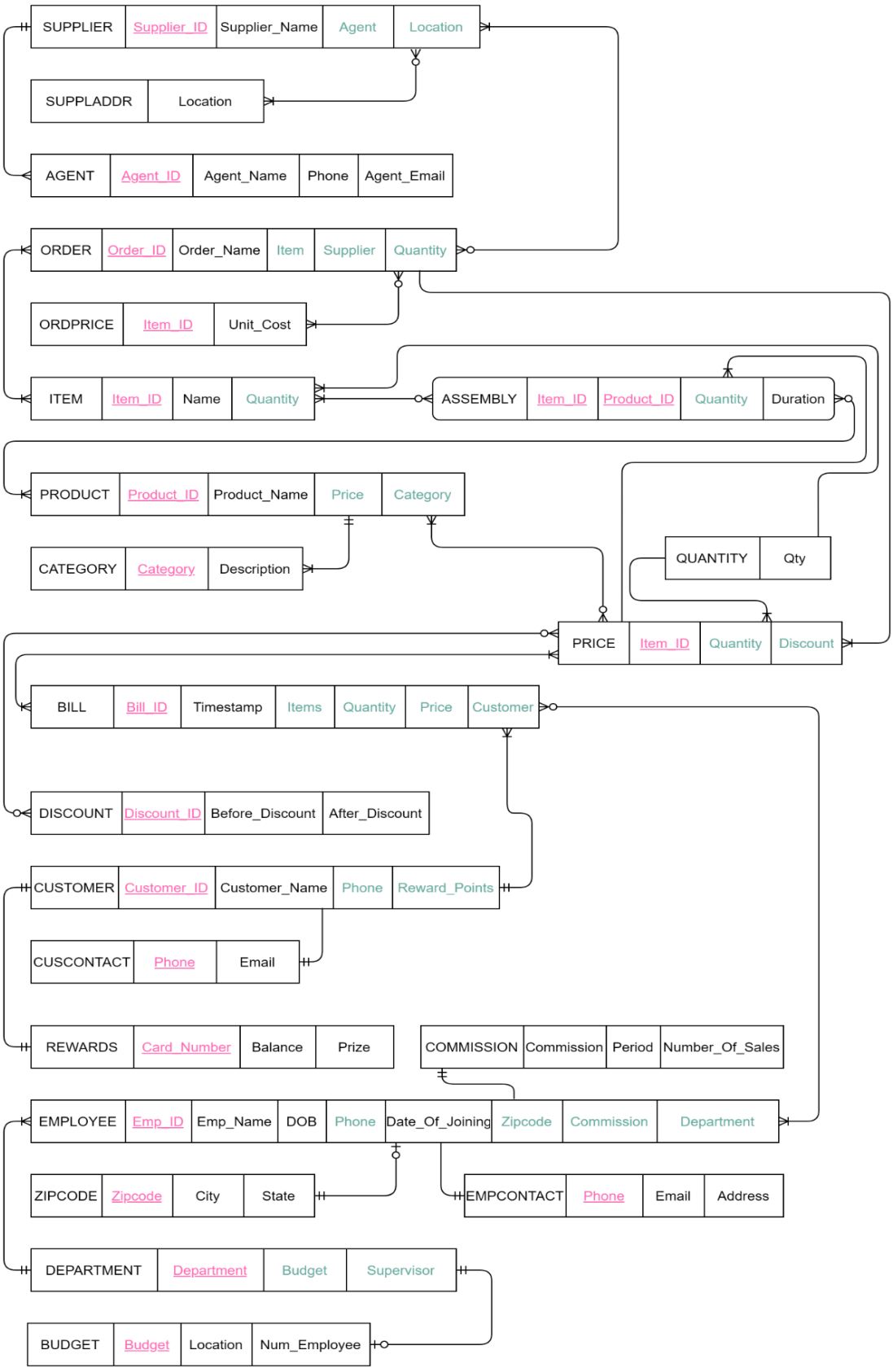
2NF Normalization



3NF Normalization



BCNF Normalization


SUPPLIER
Supplier_ID
Supplier_Name
Agent
Location
SUPPLADDR
Location
AGENT
Agent_ID
Agent_Name
Phone
Agent_Email
ORDER
Order_ID
Order_Name
Item
Supplier
Quantity
ORDPRICE
Item_ID
Unit_Cost
ITEM
Item_ID
Name
Quantity
ASSEMBLY
Item_ID
Product_ID
Quantity
Duration
PRODUCT
Product_ID
Product_Name
Price
Category
CATEGORY
Category
Description
QUANTITY
Qty
PRICE
Item_ID
Quantity
Discount
BILL
Bill_ID
Timestamp
Items
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Price
Customer
DISCOUNT
Discount_ID
Before_Discount
After_Discount
CUSTOMER
Customer_ID
Customer_Name
Phone
Reward_Points
CUSCONTACT
Phone
Email
REWARDS
Card_Number
Balance
Prize
COMMISSION
Commission
Period
Number_Of_Sales
EMPLOYEE
Emp_ID
Emp_Name
DOB
Phone
Date_Of_Joining
Zipcode
Commission
Department
ZIPCODE
Zipcode
City
State
EMPCONTACT
Phone
Email
Address
DEPARTMENT
Department
Budget
Supervisor
BUDGET
Budget
Location
Num_Employee

References

Kroenke, D. M., Auer, D. J., Vandenberg, S. L., & Yoder, R. C. (2020). *Database concepts*. Pearson.