

Database Modeling for Small Business Co.

Project Name - Bake O'Clock Co. Ltd.

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 O'Clock Limited produces bread and pastries using a modern manufacturing process. It has ten employees, including its owner, and several 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.

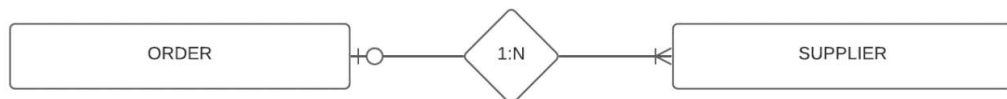
The issues related to the *lack* of organized and efficient data management in personnel, clients, financial, production, sales, and marketing areas are analyzed in this project. Recommendations are made to produce information via a data modeling process, resulting in more competitiveness and the best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

Assumptions about Cardinality and Participations

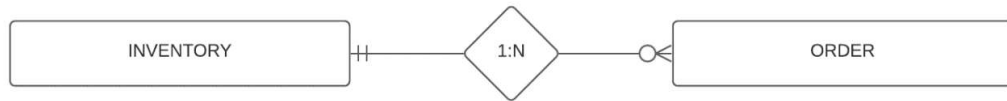
ASSUMPTIONS:

- Our database design consists of 2 facets:
 - **Internal views** prevent departments from viewing supplier details and agent contact information for their accounting purposes to customers' sensitive material
 - **External views** 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.
- 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.

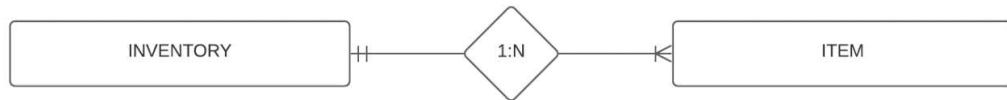
CARDINALITY:



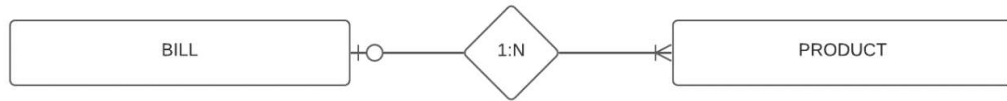
Weak Entity Relationship
SUPPLIER is ID-Dependent on ORDER



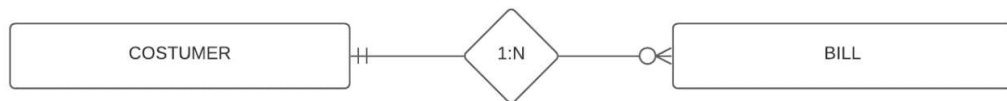
Weak Entity Relationship
ORDER is ID-Dependent on INVENTORY



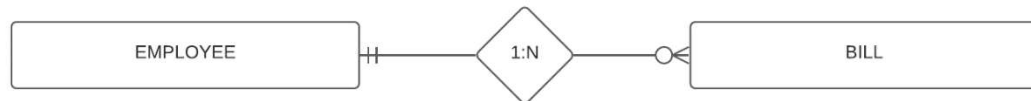
Weak Entity Relationship
ITEM is ID-Dependent on INVENTORY



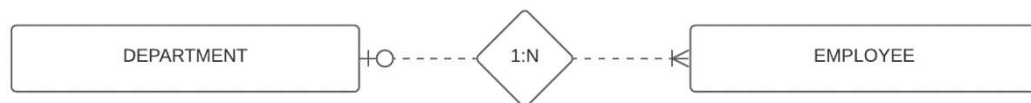
Weak Entity Relationship
PRODUCT is ID-Dependent on BILL



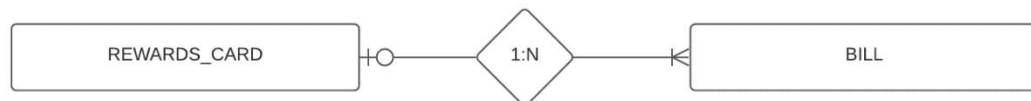
Weak Entity Relationship
BILL is ID-Dependent on COSTUMER



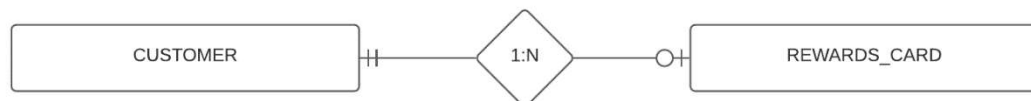
Weak Entity Relationship
BILL is ID-Dependent on EMPLOYEE



Strong Entity Relationship
Nonidentifying Relationship



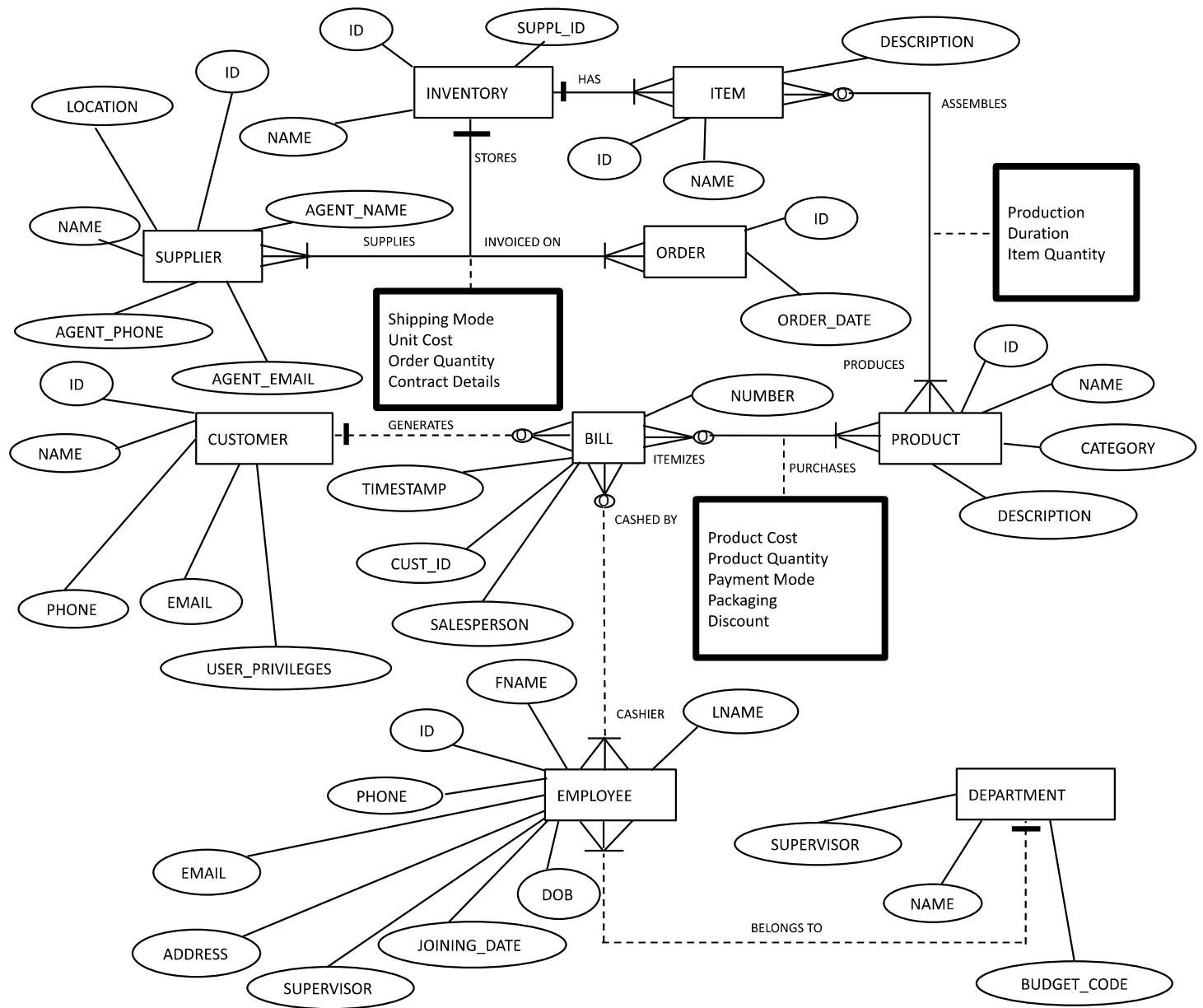
Weak Entity Relationship
REWARDS_CARD is ID-Dependent on BILL



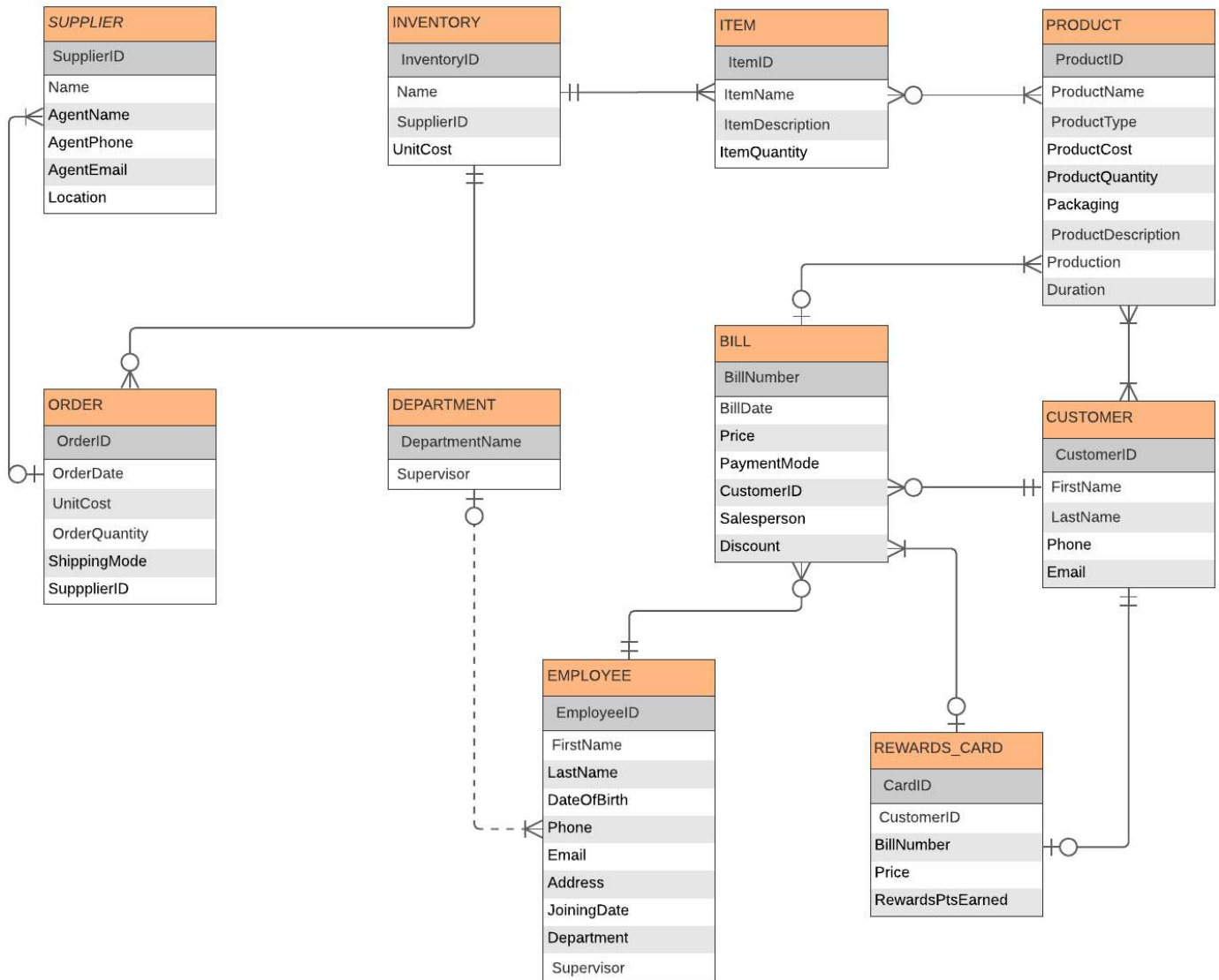
Weak Entity Relationship
REWARDS_CARD is ID-Dependent on CUSTOMER

EER Modeling Diagram

In the following drawing canvas, EER Modeling shapes have been provided. You can copy and replicate them (Ctrl+C to copy and Ctrl+V to paste. You can also select a shape, then press Ctrl button and drag and drop to copy a shape) and edit them to build your 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.

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
10014	David	09/05/91	Admin	200	David
			HR	152	Charlotte
			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	-

1NF Normalization:

EMPLOYEE	<u>Emp_ID</u>	Emp_Name	DOB	<u>Department</u>	Budget	Supervisor
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BILL	<u>ID</u>	Timestamp	<u>Items</u>	Price	Category	Description	<u>Customer</u>	<u>Salesperson</u>
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ORDER	<u>Order_ID</u>	Order_Date	<u>Shipment</u>	Unit_Cost	Quantity	<u>Supplier</u>	Agent_Contact	Agent_Email	Location
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Emp_ID -> (Emp_Name, DOB)

Department -> (Budget, Supervisor)

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

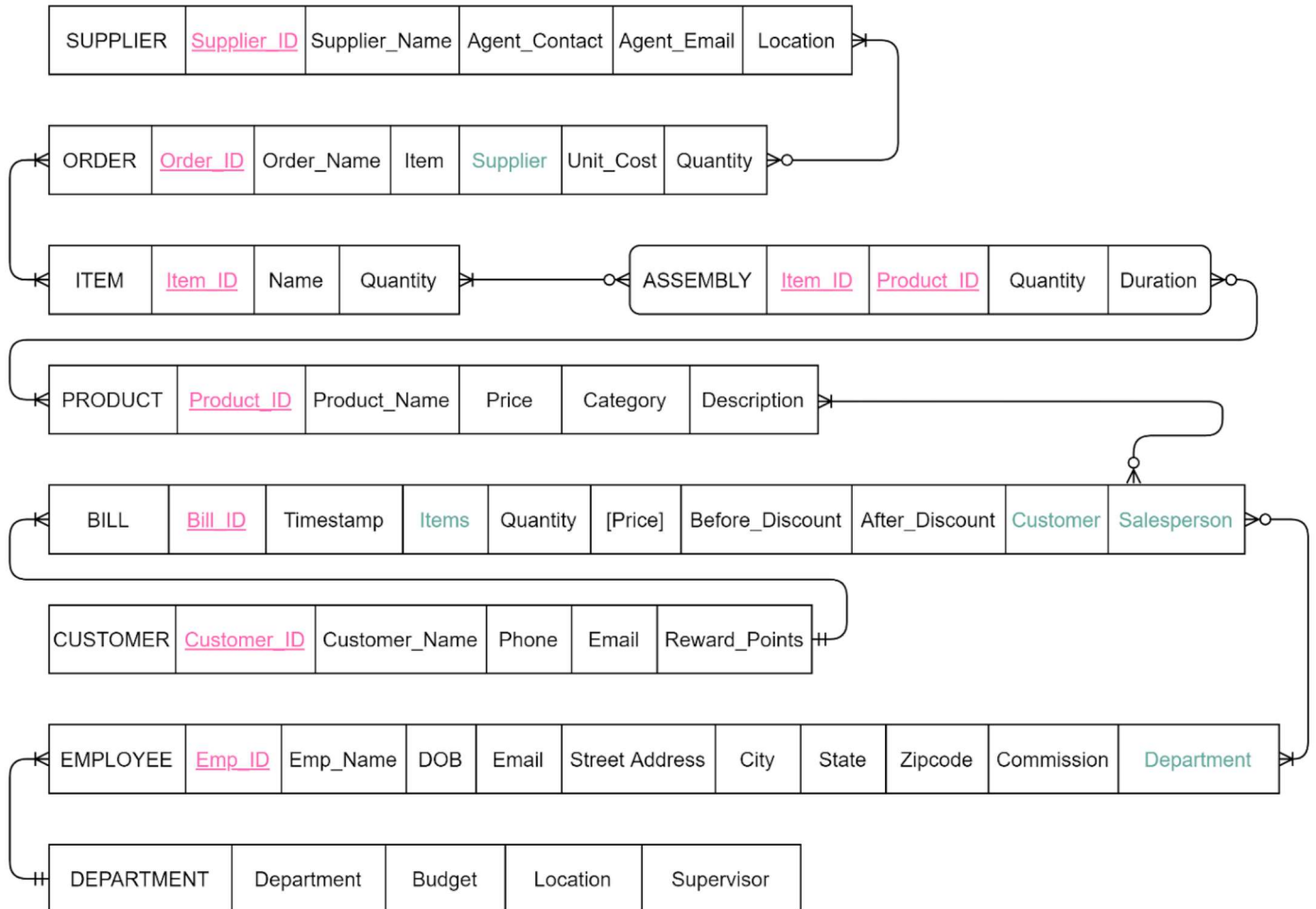
Items -> (Name, Quantity)

Product_ID -> (Price, Category, Description)

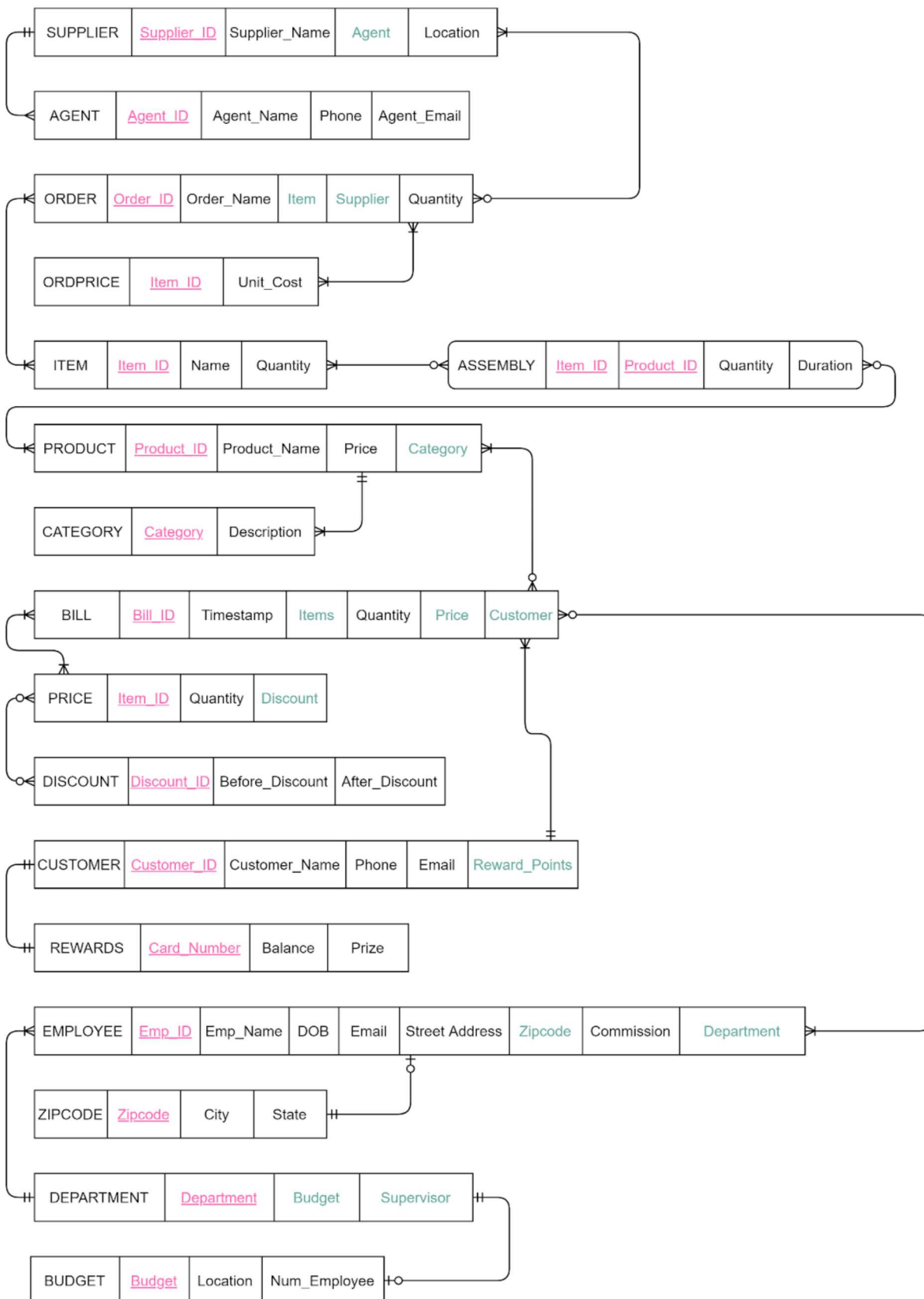
Customer_ID -> (Customer_Name, Phone, Email)

Order_ID -> (Order_Date, Shipment, Quantity)

2NF Normalization:



3NF Normalization:



BCNF Normalization:

