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School of informatics Department of Information Technology

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CHAPTER ONE

CONCEPTUAL DATABASE DESIGN

1. Introduction

1.1 Entities

Table 1 Entities

Strong Entities	Weak Entities
Product	
Order	
Employee	
Order Detail	
Payment	
Category	
Shipper	
Supplier	
Customer	

1.1.1 Product

Product entity represents the real-world object-**items** that customer make order to get and suppliers supply to meet their order.

Product entities have the following attributes: Pro ID, Size, Unit weight, Unit price, Type, Discount, Description, Picture, and their Colors.



Figure 1.0.1 Product

1.1.2 Order

Order entity represents the customer's request to get selected products and have the following attributes: Order ID, Order Date, Quantity.



Figure 1.0.2 Order

1.1.3 Employee

Employee entity represents the persons that works on customer order processing and delivering their orders according to their specification.

Employee entity have the following attributes: Social Security Number (SSN), Name (Fname, Mname, Lname), Phone, Email address, Salary, Age, Date of Birth (DoB), Gender, and Address (Country, City, ZIP Code).

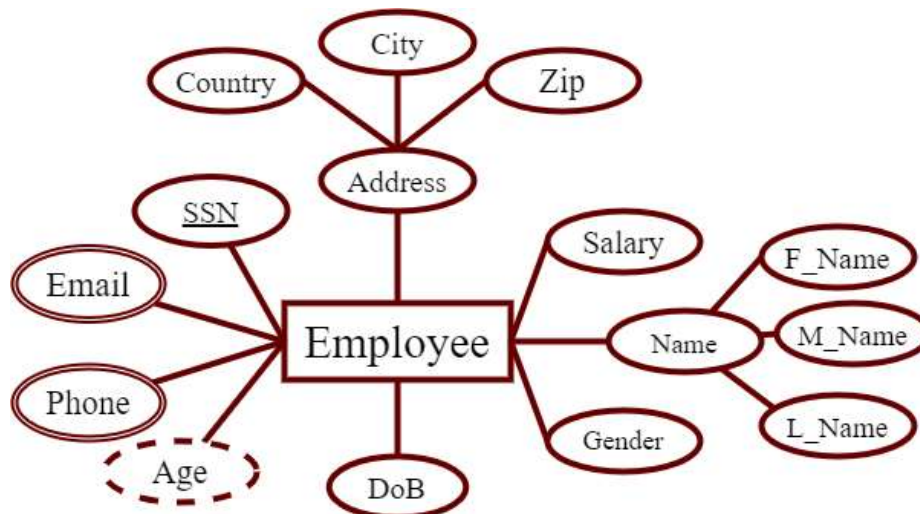


Figure 1.0.3 Employee

1.1.4 Order Detail

Order Detail entity represents the details of the order that have made by customers and it has the following attributes: Order Detail ID, Required Date.



Figure 1.0.4 Order Detail

1.1.5 Payment

Payment is an entity that represents the real-world payment system that one customer can make for his order.

Payment have the following attributes: Payment ID, Payment Type, Payment Status, and Payment Date.

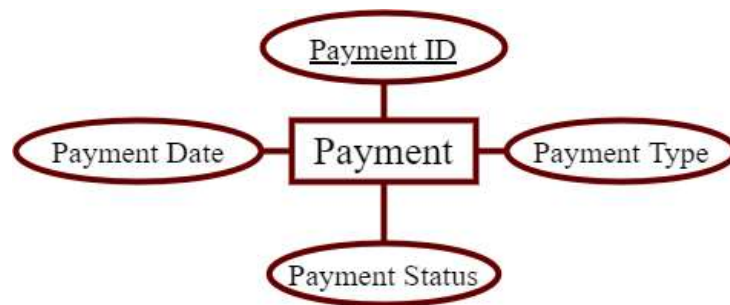


Figure 1.0.5 Payment

1.1.6 Category

Category entity represents different types (Category) of the **products** and it has the following attributes: Cat ID, Cat Name, Picture, Description.

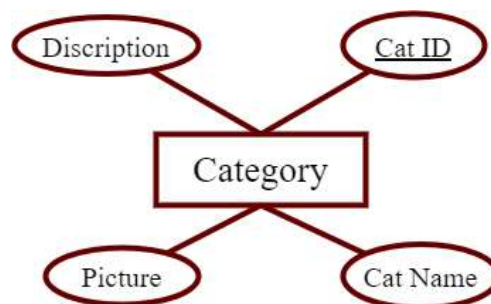


Figure 1.0.6 Category

1.1.7 Shipper

Shipper entity represents the persons which are works on packing and delivering the ordered products to customers.

Shipper have the following attributes: Social Security Number (SSN), Name (Fname, Mname, Lname), Phone, Email address, Salary, Age, Date of Birth (DoB), Gender, and Address (Country, City, ZIP Code).



Figure 1.0.7 Shipper

1.1.8 Supplier

Supplier entity represents the company that process and supply the products to their customers through their employees.

Supplier have the following attributes: Supplier ID, Company Name, Email address, Phone Numbers, and Physical addresses (Country, City, Postal Codes).

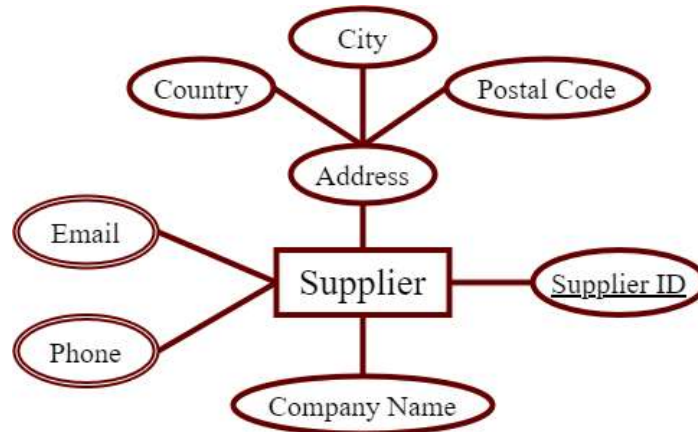


Figure 1.0.8 Supplier

1.1.9 Customer

Customer is an entity that represents the users of the services given by supplier company through their employees.

Customer entity have the following attributes: Cust ID, Name (Fname, Mname, Lname), Phone, Email address, Age, Date of Birth (DoB), Gender, and Address (Country, City, ZIP Code).



Figure 1.0.9 Customer

1.2 Entities Relationship

1.2.1 Customer to Order

In Customer-to-Order relationship customer will make (Have) the order in order to get products.



Figure 1.0.10 Customer-to-Order

1.2.2 Customer to Payment

Customer must have to pay for his/her order in order to get the ordered product.



Figure 1.0.11 Customer-to-Payment

1.2.3 Employee to Order

The company's employee should have to process the orders and ordered products to get into customers.



Figure 1.0.12 Employee-to-Order

1.2.4 Employee (Supervisor) to Employee (Supervisee)

Employee who are supervisors supervises supervisee under them

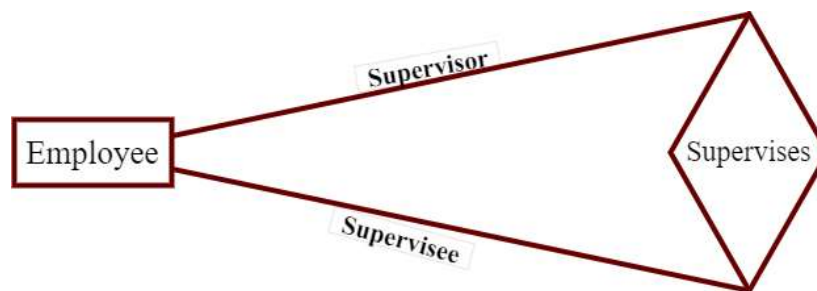


Figure 1.0.13 Employee (Supervisor)-to-Employee (Supervisee)

1.2.5 Order to Order Detail

Some orders are having detailed information about the order.



Figure 1.0.14 Order-to-Order Detail

1.2.6 Product to Category

Each and every products have category within which it classified.



Figure 1.0.15 Product-to-Category

1.2.7 Shipper to Customer

The shipper (Deliverer) will deliver the ordered products to customers who have made orders.

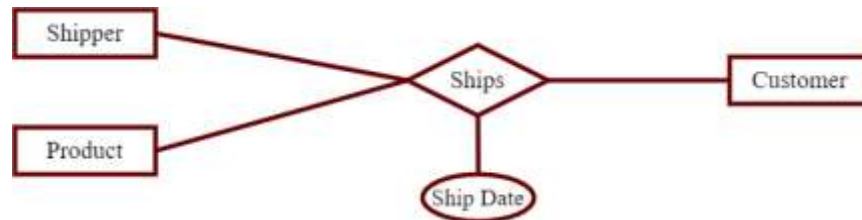


Figure 1.0.16 Shipper-to-Customer

1.2.8 Supplier to Customer

Supplier will process and supply the products to the customers through their employees.



Figure 1.0.17 Supplier-to-Customer

1.2.9 Supplier to Employee

The supplier companies have their own employees to process and deliver the products to the customers.



Figure 1.0.18 Supplier-to-Employee

1.2.10 Supplier to Shipper

Supplier company have the shipper (Deliverer) employees to deliver ordered products to the customers.



Figure 1.0.19 Supplier-to-Shipper

1.3 Initial Entities relationship Diagram (Initial ER Diagram)

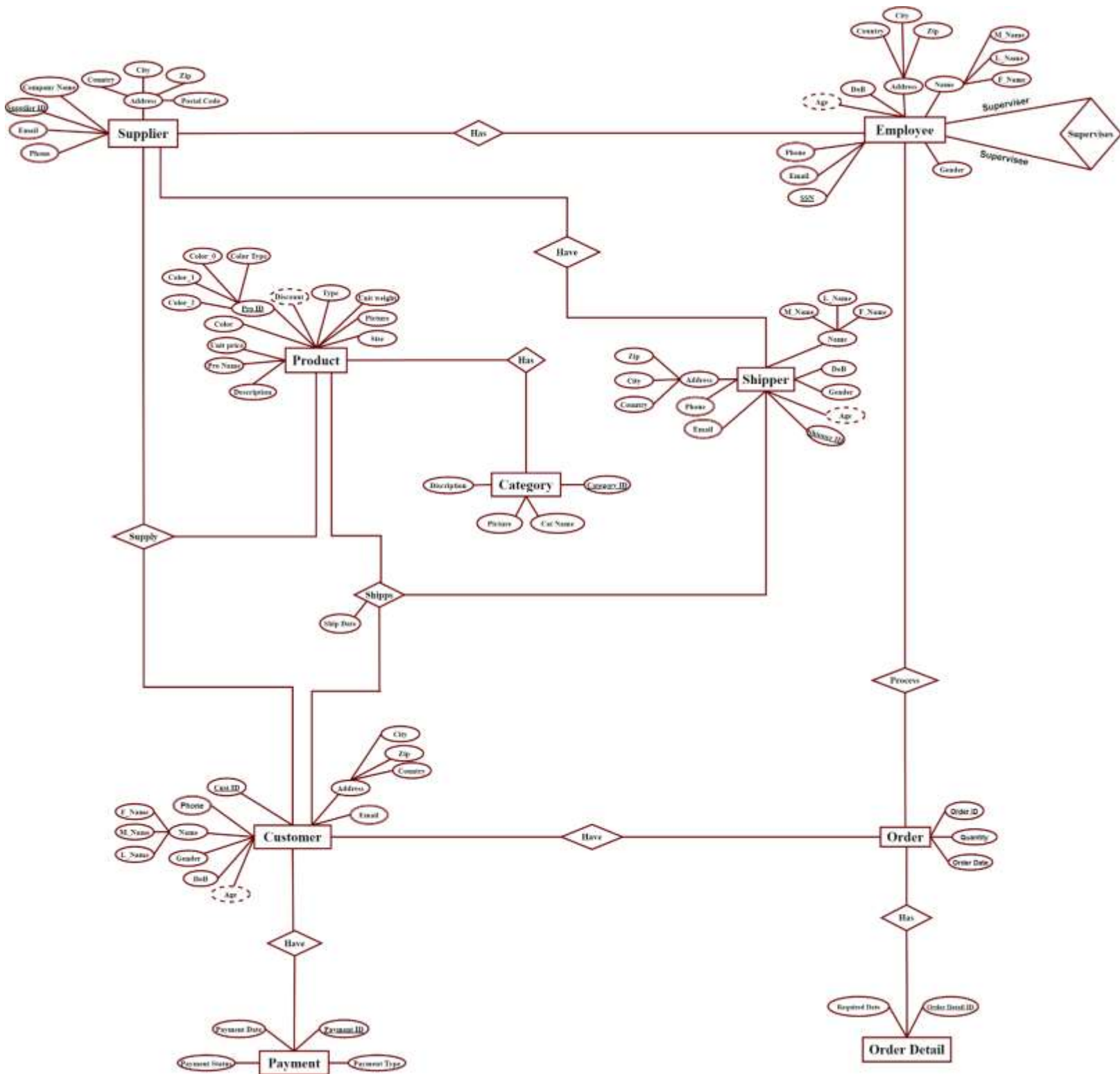


Figure 1.0.20 Initial ER-Diagram

1.4 Relationship Constraints

1.4.1 Cardinality Ratio Constraint

1.4.1.1 Customer to Order

One customer can make more than one orders

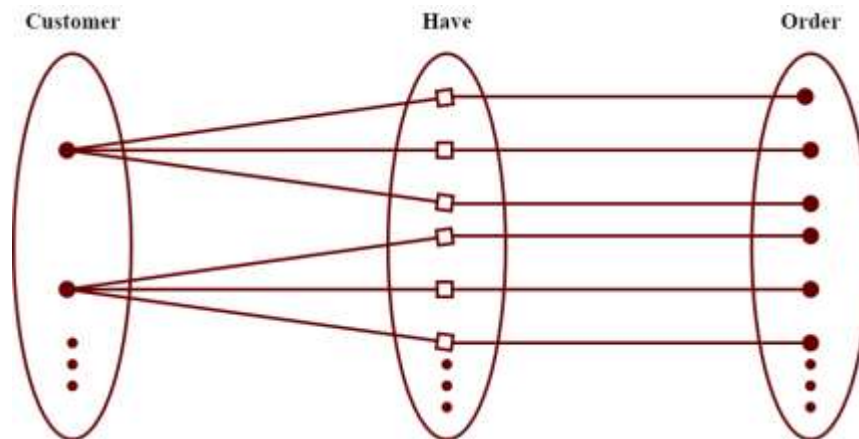


Figure 1.0.21 Customer-to-Order

1.4.1.2 Customer to Payment

One customer can have more than one payment including Medicine payment, Bed room services payment, Diagnosis payment, and the like.

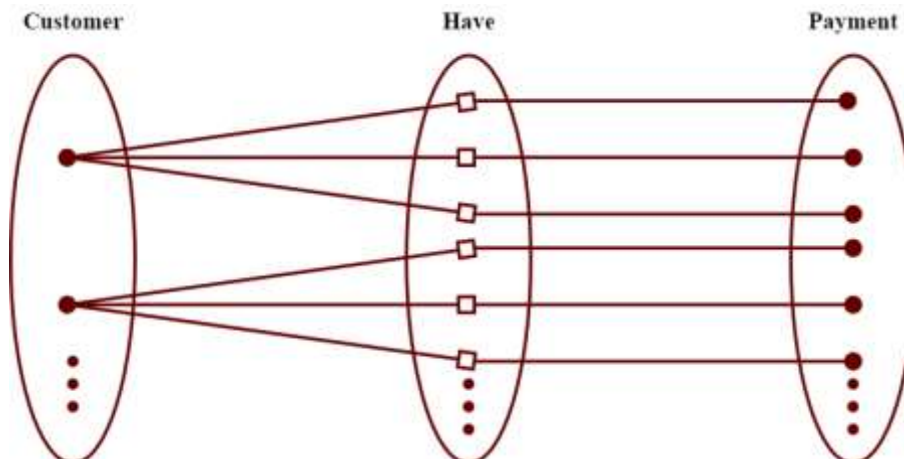


Figure 1.0.22 Customer-to-Payment

1.4.1.3 Employee to Order

One employee can process more than one orders (One-to-Many)

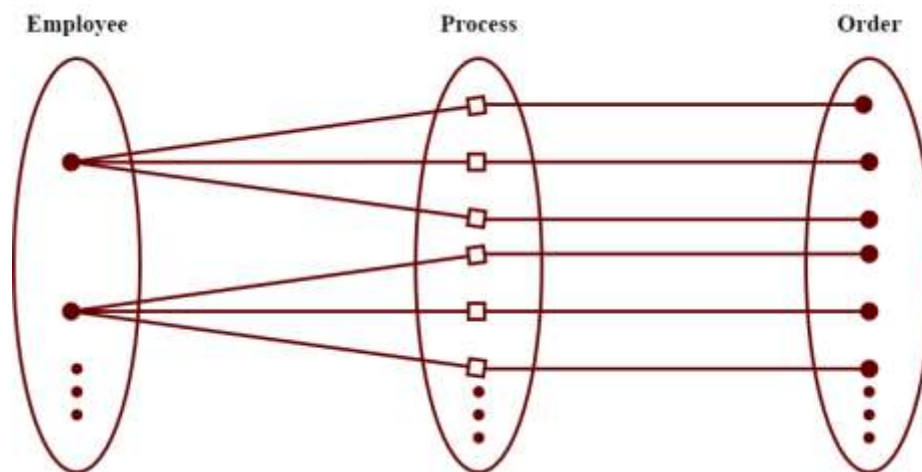


Figure 1.0.23 Employee-to-Order

1.4.1.4 Employee (Supervisor) to Employee (Supervisee)

One supervisor can supervises more than one supervisee (One-to-Many)

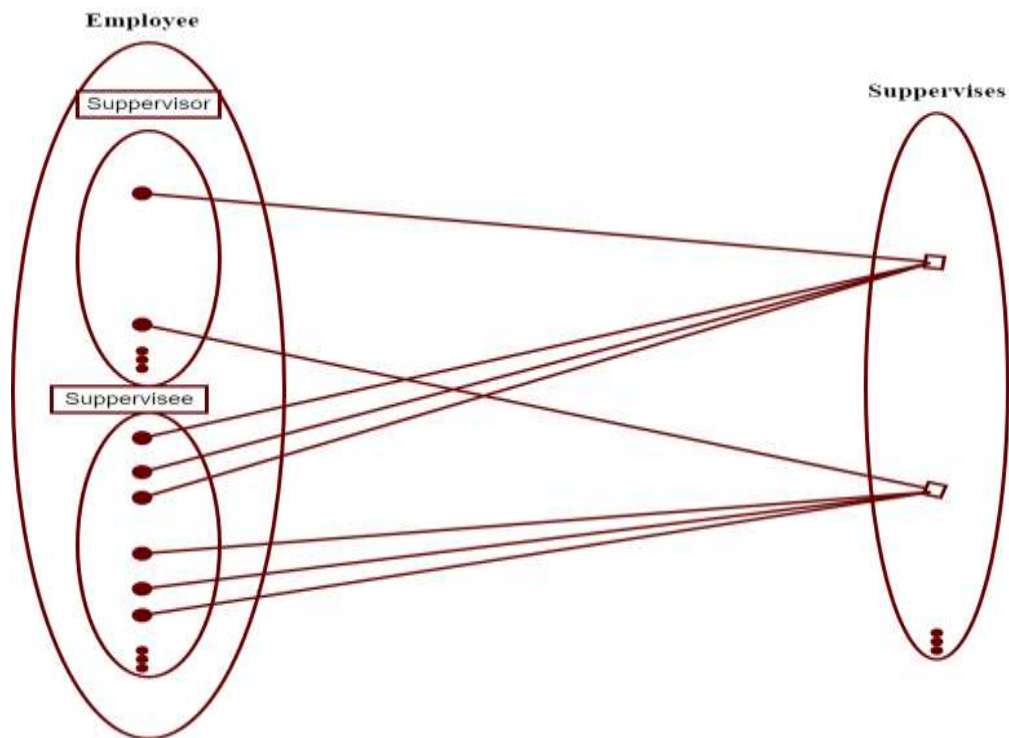


Figure 1.0.24 Supervisor-to-Supervisee

1.4.1.5 Order to Order Detail

One order must have less than or one Order Detail

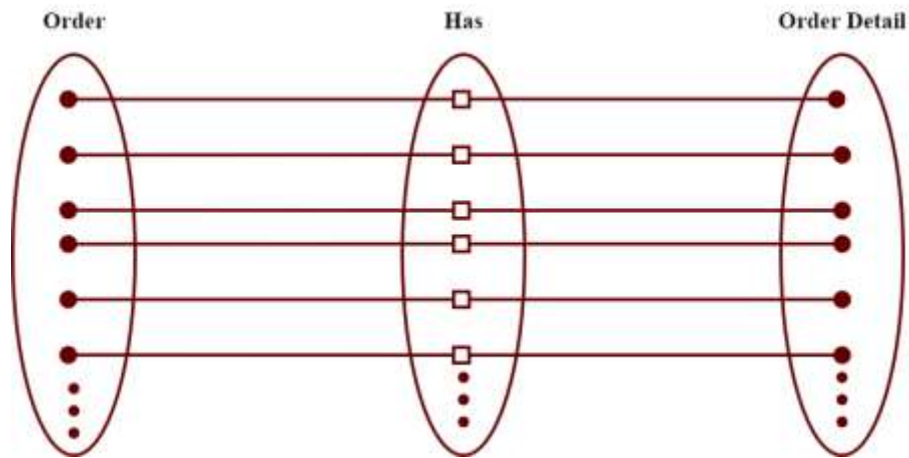


Figure 1.0.25 Order-to-Order Detail

1.4.1.6 Product to Category

Many products are within single category (Many-to-One)

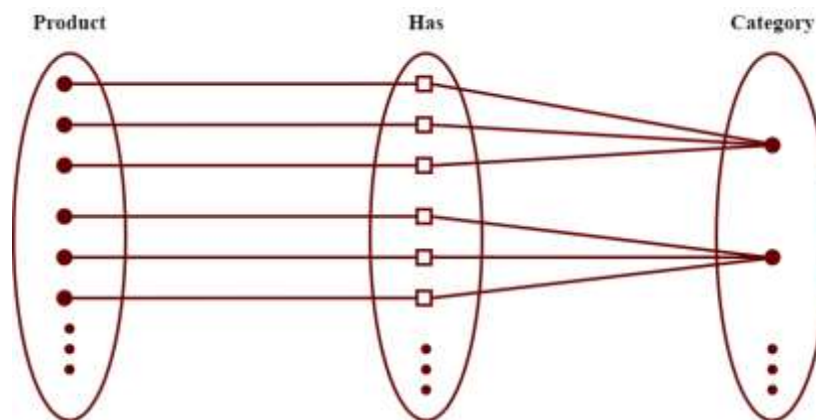


Figure 1.0.26 Product-to-Category

1.4.1.7 Shipper to Customer

One shipper can deliver many products to many customers

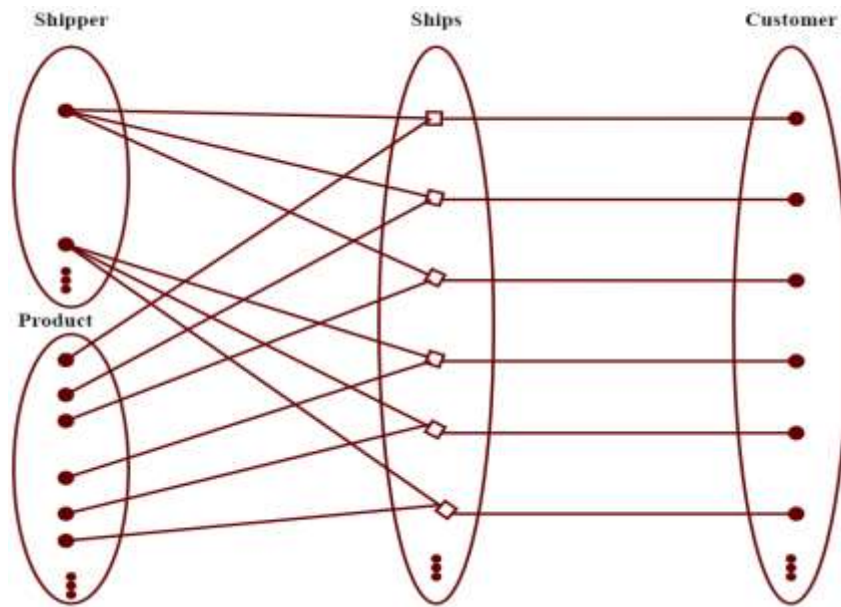


Figure 1.0.27 Shipper-to-Customer

1.4.1.8 Supplier to Customer

One supplier can supply many products to many customers

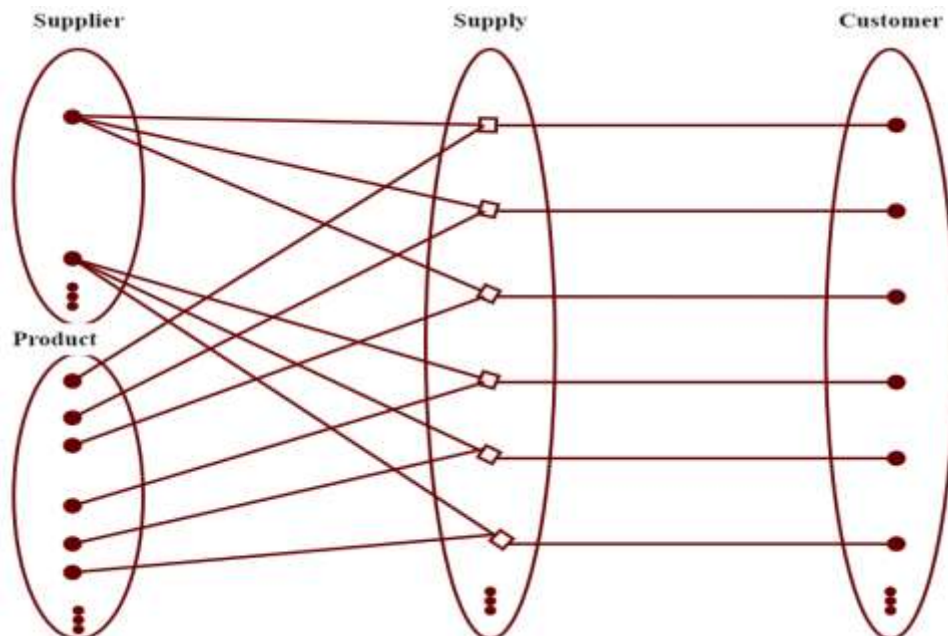


Figure 1.0.28 Supplier-to-Customer

1.4.1.9 Supplier to Employee

One supplier should have many employees

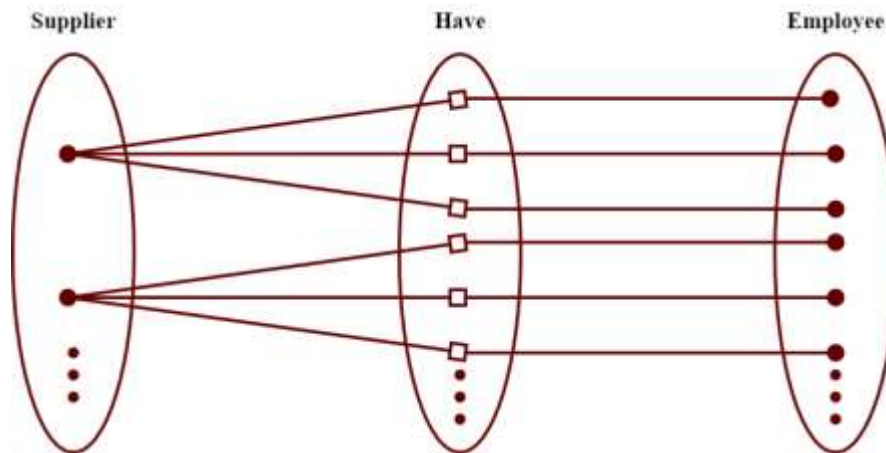


Figure 1.0.29 Supplier-to-Employee

1.4.1.10 Supplier to Shipper

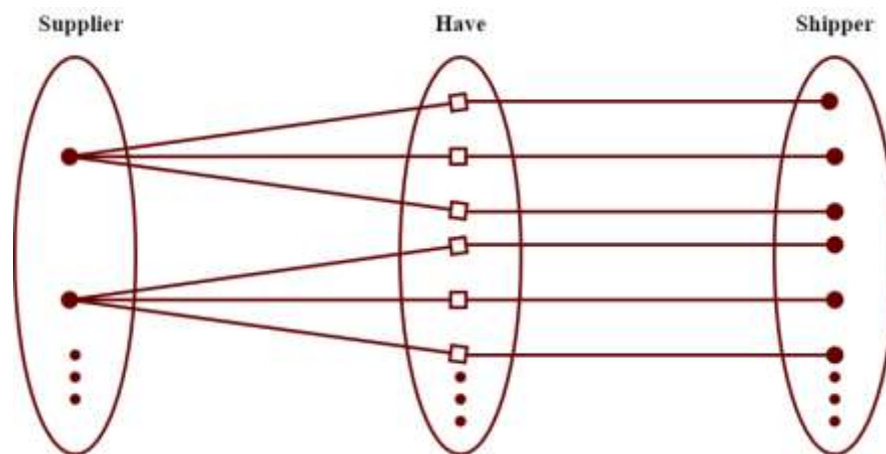


Figure 1.0.30 Supplier-to-Shipper

1.4.2 Participation Constraint

1.4.2.1 Customer to Order



Figure 1.0.31 Customer-to-Order

1.4.2.2 Customer to Payment



Figure 1.0.32 Customer-to-Payment

1.4.2.3 Employee to Order



Figure 1.0.33 Employee-to-Order

1.4.2.4 Employee (Supervisor) to Employee (Supervisee)

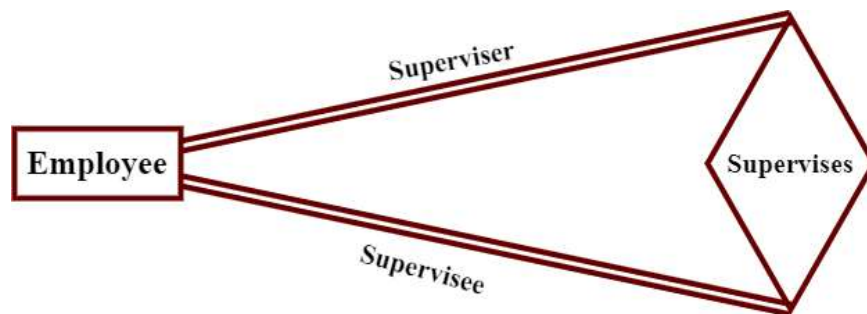


Figure 1.0.34 Supervisor-to-Supervisee

1.4.2.5 Order to Order Detail



Figure 1.0.35 Order-to-Order Detail

1.4.2.6 Product to Category



Figure 1.0.36 Product-to-Category

1.4.2.7 Shipper to Customer

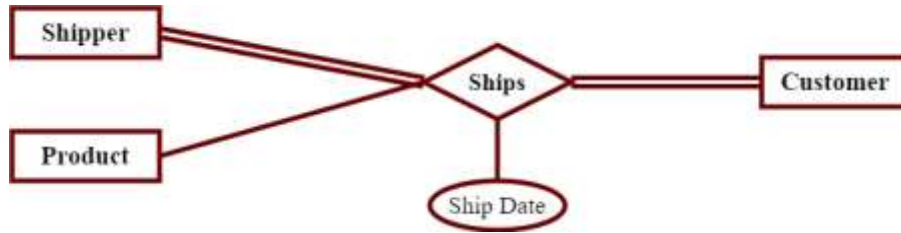


Figure 1.0.37 Shipper-to-Customer

1.4.2.8 Supplier to Customer

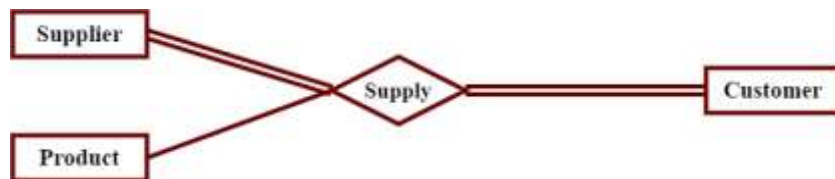


Figure 1.0.38 Supplier-to-Customer

1.4.2.9 Supplier to Employee



Figure 1.0.39 Supplier-to-Employee

1.4.2.10 Supplier to Shipper



Figure 1.0.40 Supplier-to-Shipper

1.5 Refined Entities Relationship (ER) Diagram

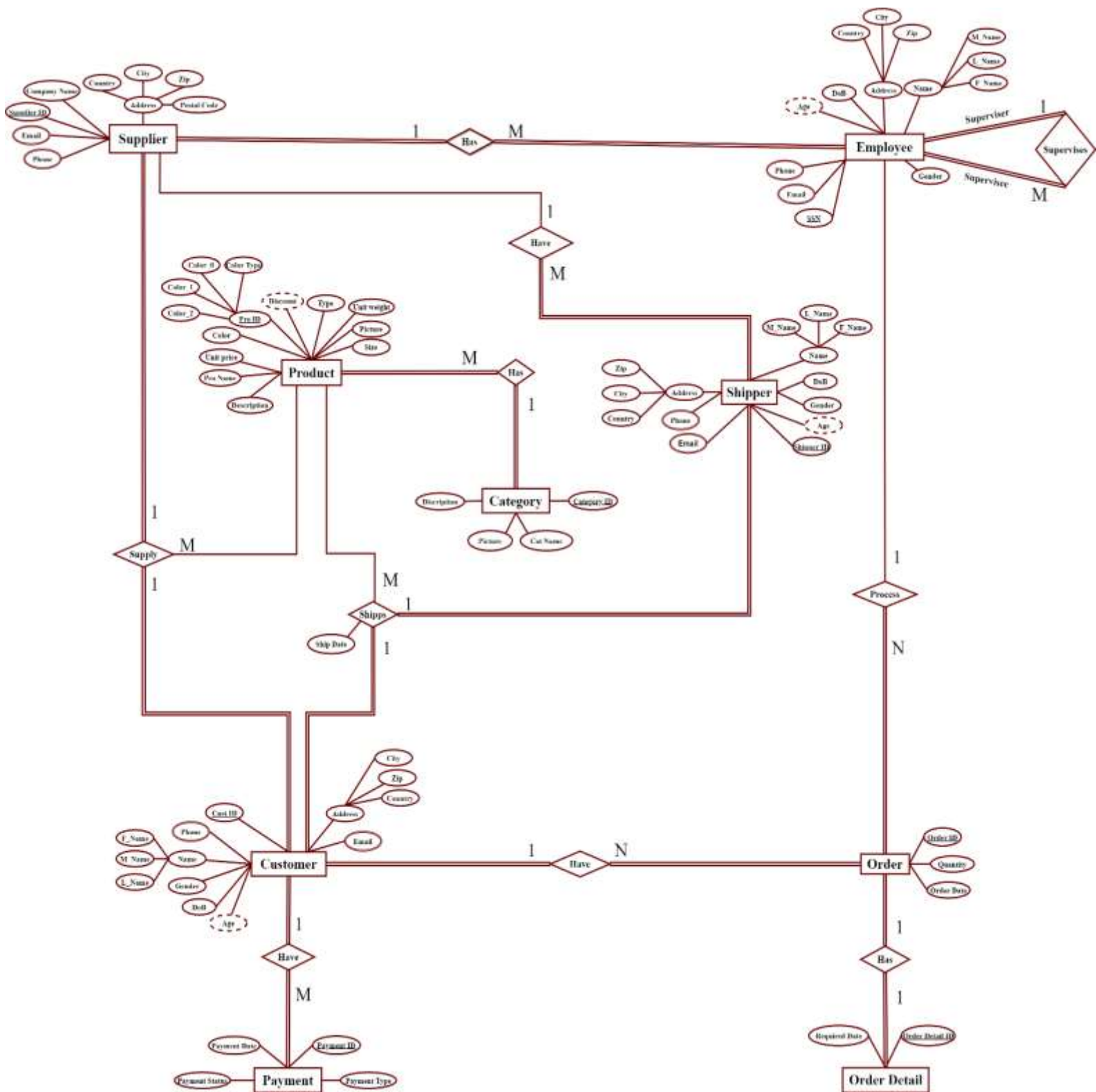


Figure 1.41 Refined ER-Diagram

CHAPTER TWO

LOGICAL DATABASE DESIGN

2.1 ER to Relational Mapping

2.1.1 Strong Entities

2.1.1.1 Product

Table 2 Product

<u>Pro ID</u>	Pro Name	Size	Type	Picture	Unit Price	Unit Weight	Discount	Color Type	Color_0	Color_1	Color_2	Description
---------------	----------	------	------	---------	------------	-------------	----------	------------	---------	---------	---------	-------------

2.1.1.2 Customer

Table 3 Customer

<u>Cust ID</u>	F_Name	M_Name	L_Name	DoB	Age	Gender	Country	City	ZIP
----------------	--------	--------	--------	-----	-----	--------	---------	------	-----

2.1.1.3 Employee

Table 4 Employee

<u>SSN</u>	F_Name	M_Name	L_Name	DoB	Age	Gender	Salary	Country	City	ZIP
------------	--------	--------	--------	-----	-----	--------	--------	---------	------	-----

2.1.1.4 Supplier

Table 5 Supplier

<u>Supplier ID</u>	Company Name	Country	City	Postal Code
--------------------	--------------	---------	------	-------------

2.1.1.5 Shipper

Table 6 Shipper

<u>Shipper ID</u>	F_Name	M_Name	L_Name	DoB	Age	Gender	Country	City	ZIP
-------------------	--------	--------	--------	-----	-----	--------	---------	------	-----

2.1.1.6 Order

Table 7 Order

<u>Order ID</u>	Order Date	Quantity
-----------------	------------	----------

2.1.1.7 Order Detail

Table 8 Order Detail

<u>Order Detail ID</u>	Required Date
------------------------	---------------

2.1.1.8 Payment

Table 9 Payment

<u>Payment ID</u>	Pay Type	Pay Date	Pay Status
-------------------	----------	----------	------------

2.1.1.9 Category

Table 10 Category

<u>Cat ID</u>	Cat Name	Picture	Description
---------------	----------	---------	-------------

2.1.2 Weak Entities

2.1.3 Binary 1:1 Relationship

Table 11 Order-to-Order Detail



2.1.4 Binary 1:N Relationship

Table 12 Customer-to-Order

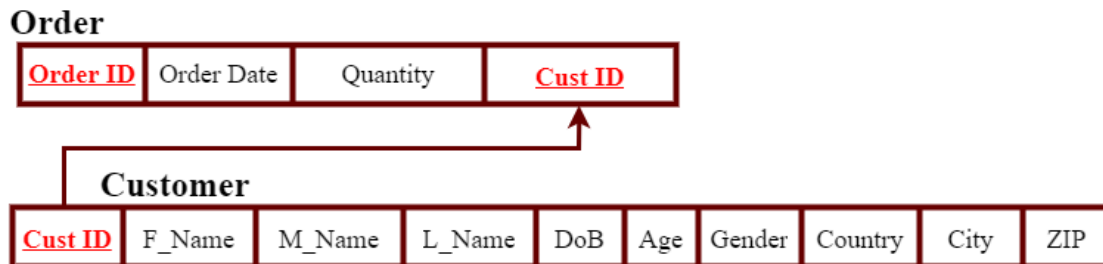


Table 13 Customer-to-Payment

Payment

<u>Payment ID</u>	Pay Type	Pay Date	Pay Status	<u>Cust ID</u>
-------------------	----------	----------	------------	----------------

Customer									
<u>Cust ID</u>	F_Name	M_Name	L_Name	DoB	Age	Gender	Country	City	ZIP

Table 14 Employment-to-Order

Order

<u>Order ID</u>	Order Date	Quantity	<u>EmpSSN</u>
-----------------	------------	----------	---------------

Employee										
<u>SSN</u>	F_Name	M_Name	L_Name	DoB	Age	Gender	Salary	Country	City	ZIP

Table 15 Supervisor-to-Supervisee

Supervision

Employee											
<u>SSN</u>	F_Name	M_Name	L_Name	DoB	Age	Gender	Salary	Country	City	ZIP	<u>SuperSSN</u>

Table 16 Product-to-Category

Product

<u>Pro ID</u>	Pro Name	Size	Type	Picture	Unit Price	Unit Weight	Discount	Color Type	Color_0	Color_1	Color_2	Description	<u>Cat ID</u>
---------------	----------	------	------	---------	------------	-------------	----------	------------	---------	---------	---------	-------------	---------------

Category			
<u>Cat ID</u>	Cat Name	Picture	Description

Table 17 Shipper-to-Employee

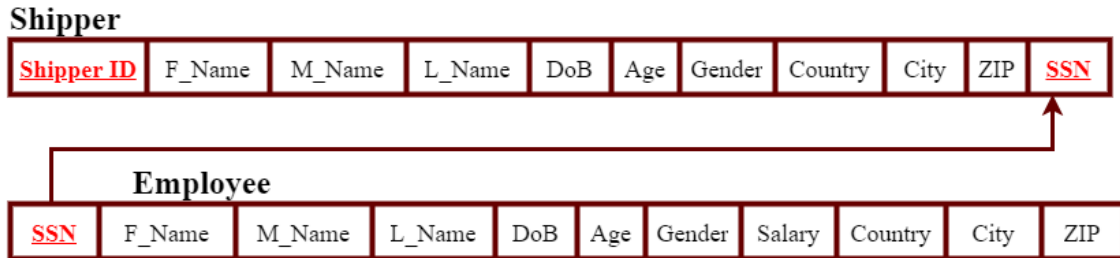
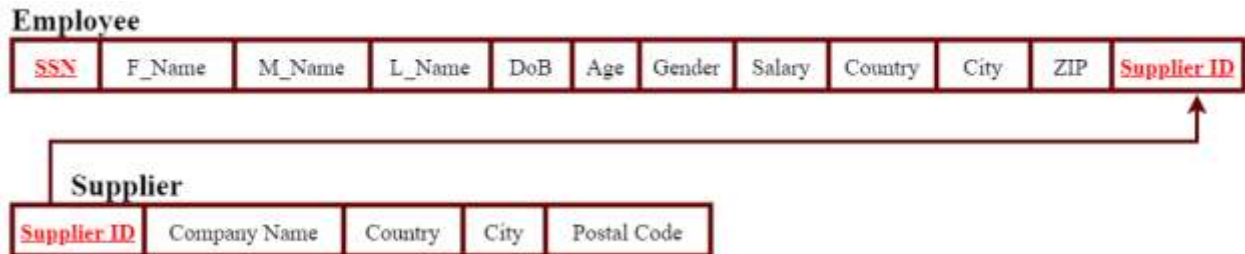


Table 18 Supplier-to-Employee



2.1.5 Binary N:M Relationship

2.1.6 N-ary Relationship

Table 19 Shipper-to-Customer



Table 20 Supplier-to-Customer



2.1.7 Multivalued Attributes

Table 21 Contact_Customer



Table 22 Contact_Employee

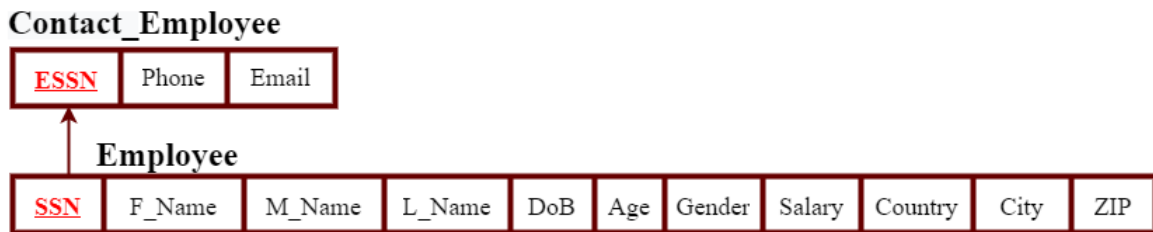


Table 23 Contact_shipper

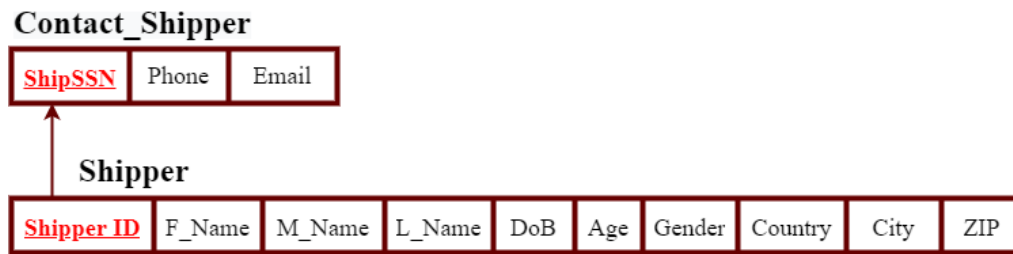
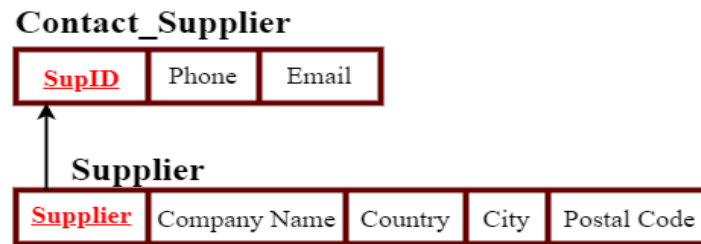


Table 24 Contact_Supplier



2.2 Relational Diagram

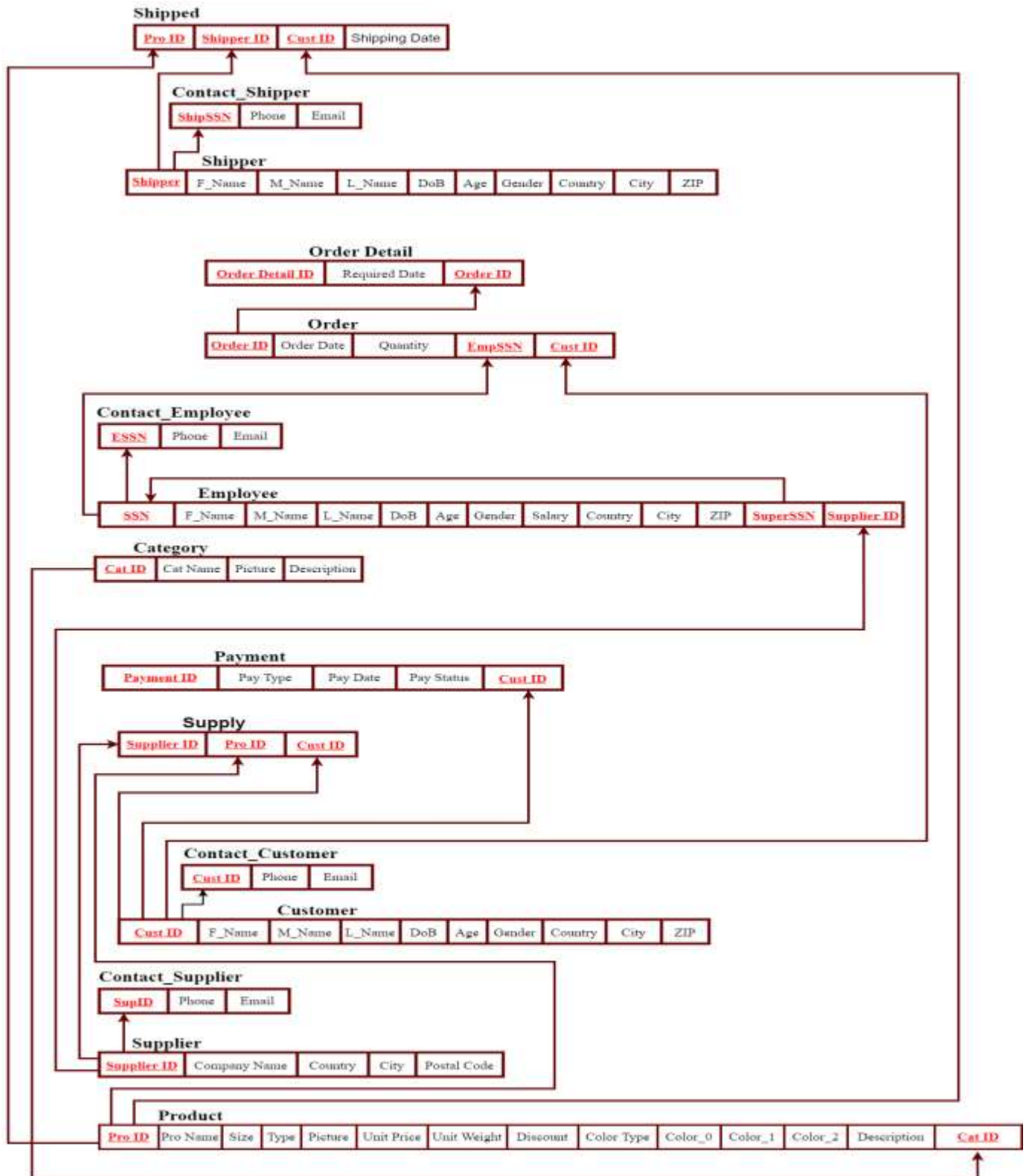


Figure 2.0 1

2.3 Normalization

2.3.1 Unnormalized Relations

2.3.1.1 Employee

Table 25 Employee

SSN	F_Name	M_Name	L_Name	DoB	Age	Gender	Salary	Country	City	ZIP	Supplier ID
E000001	Frezer	Kefyalew	Kebede	1990/01/23	32	M	35000	Ethiopia	Wolaita Sodo	1000	SD000001
E000002	Geremew	Asmare	Bateayehu	1982/08/11	40	M	37000	Ethiopia	Wolaita Sodo	1000	SD000002
SE000003	Abebe	Getachew	Balcha	1971/02/21	51	M	50000	Ethiopia	Wolaita Sodo	1000	SD000003
SE000004	Kebede	Kefyalew	Kabede	1968/05/22	56	M	60000	Ethiopia	Wolaita Sodo	1000	SD000004
E000005	Sosina	Alemayehu	Andualem	1983/01/13	39	F	35000	Ethiopia	Wolaita Sodo	1000	SD000005

2.3.1.2 Contact_Employee

Table 26 Contact_Employee

ESSN	Phone	Email
E000001	+251911903232	frezer@gmail.com
E000001	+251911903230	frezer@yahoo.com
E000002	+251911903220	geremew@gmail.com
E000002	+251911903221	geremew@yahoo.com
SE000003	+251911903210	abebe@gmail.com
SE000003	+251911903211	abebe@yahoo.com
SE000004	+251911903200	kebede@gmail.com
SE000004	+251911903201	kebede@yahoo.com
E000005	+251911903280	sosina@gmail.com
E000005	+251911903281	sosina@yahoo.com

2.3.1.3 Supplier

Table 27 Supplier

Supplier ID	Company Name	Country	City	Postal Code
SD000001	Dicha	Ethiopia	Wolaita Sodo	1000
SD000002	Yacob Hotel	Ethiopia	Wolaita Sodo	1000
SD000003	Abebe Zeleke Hotel	Ethiopia	Wolaita Sodo	1000
SD000004	Dahilak	Ethiopia	Wolaita Sodo	1000
SD000005	Abrham Hotel	Ethiopia	Wolaita Sodo	1000

2.3.1.4 Contact_Supplier

Table 28 Contact_Supplier

SupSSN	Phone	Email
SD000001	+2510465519191	dicha@gmail.com
SD000001	+2510465519192	dicha@yahoo.com
SD000002	+2510465518181	Yacob_hotel@gmail.com
SD000002	+2510465518182	Yacob_hotel@yahoo.com
SD000003	+2510465517171	abebe_zeleke_hotel@gmail.com
SD000003	+2510465517172	abebe_zeleke_hotel@yahoo.com
SD000004	+2510465516161	dahilak@gmail.com
SD000004	+2510465516162	dahilak@yahoo.com
SD000005	+2510465515151	abrham_hotel@gmail.com
SD000005	+2510465515152	abrham_hotel@yahoo.com

2.3.1.5 Shipper

Table 29 Shipper

Shipper ID	F_Name	M_Name	L_Name	DoB	Age	Gender	Salary	Country	City	ZIP
Shp000001	Abrham	Kefyalew	Kebede	1990/01/23	32	M	35000	Ethiopia	Wolaita Sodo	1000
Shp000002	Teketel	Asmare	Bateayehu	1982/08/11	40	M	37000	Ethiopia	Wolaita Sodo	1000
Shp000003	Eyob	Getachew	Balcha	1971/02/21	51	M	50000	Ethiopia	Wolaita Sodo	1000
Shp000004	Markos	Kefyalew	Kabede	1968/05/22	56	M	60000	Ethiopia	Wolaita Sodo	1000
Sh000005	Feven	Alemayehu	Andualem	1983/01/13	39	F	35000	Ethiopia	Wolaita Sodo	1000

2.3.1.6 Contact_Shipper

Table 30 Contact_Shipper

SupSSN	Phone	Email
SD000001	+2510465519191	dicha@gmail.com
SD000001	+2510465519192	dicha@yahoo.com
SD000002	+2510465518181	Yacob_hotel@gmail.com
SD000002	+2510465518182	Yacob_hotel@yahoo.com
SD000003	+2510465517171	abebe_zeleke_hotel@gmail.com
SD000003	+2510465517172	abebe_zeleke_hotel@yahoo.com
SD000004	+2510465516161	dahilak@gmail.com
SD000004	+2510465516162	dahilak@yahoo.com
SD000005	+2510465515151	abrham_hotel@gmail.com
SD000005	+2510465515152	abrham_hotel@yahoo.com

2.3.1.7 Customer

Table 31 Customer

Cust ID	F_Name	M_Name	L_Name	DoB	Age	Gender	Country	City	ZIP
Ct000001	Sisay	Kefyalew	Kebede	1990/01/23	32	M	Ethiopia	Wolaita Sodo	1000
Ct000002	Teklewoyn	Asmare	Bateayehu	1982/08/11	40	M	Ethiopia	Wolaita Sodo	1000
Ct000003	Dirshaye	Getachew	Balcha	1971/02/21	51	M	Ethiopia	Wolaita Sodo	1000
Ct000004	Masresha	Kefyalew	Kabede	1968/05/22	56	M	Ethiopia	Wolaita Sodo	1000
Ct000005	Solanj	Degu	Daniel	1983/01/13	39	F	Ethiopia	Wolaita Sodo	1000

2.3.1.8 Contact_Customer

Table 32 Contact_Customer

Cust ID	Phone	Email
Ct000001	+251993903232	sisay@gmail.com
Ct000001	+251993903230	sisay@yahoo.com
Ct000002	+251993903220	teklewoyn@gmail.com
Ct000002	+251993903221	teklewoyn@yahoo.com
Ct000003	+251993903210	dirshaye@gmail.com
Ct000003	+251993903211	dirshaye@yahoo.com
Ct000004	+251993903200	masresha@gmail.com
Ct000004	+251993903201	masresha@yahoo.com
Ct000005	+251993903280	solanj@gmail.com
Ct000005	+251993903281	solanj@yahoo.com

2.3.1.9 Product

Table 33 Product

Pro ID	Pro Name	Size	Type	Picture	Unit Price	Unit Weight	Discount	Color Type	Color_0	Color_1	Color_2	Description	Cat ID
Pr000001	Onion	Undefined	Food	Onion.png	120 ETB	10Kg	10%	Mixed	Red	White	Yellow	No Description	Cat0001
Pr000002	Pineapple	Undefined	Food	Pineapple.jpg	110 ETB	1Kg	10%	Mixed	Red	Blue	Pink	No Description	Cat0001
Pr000003	Banana	Undefined	Food	Banana.jpg	50 ETB	1Kg	10%	Solid	Yellow	Yellow	Yellow	No Description	Cat0001
Pr000004	Misir	Undefined	Food	Misir.png	320 ETB	10Kg	10%	Solid	Red	Red	Red	No Description	Cat0001
Pr000005	Sugar	Undefined	Food	Sugar.jpg	150 ETB	1Kg	10%	Solid	White	White	White	No Description	Cat0001

2.3.1.10 Order

Table 34 Order

<u>Order ID</u>	Order Date	Quantity	<u>EmpSSN</u>	<u>Cust ID</u>
Or000001	06/05/2022	1	E000001	Ct000001
Or000002	06/05/2022	5	E000001	Ct000001
Or000003	06/05/2022	7	E000001	Ct000001
Or000004	04/04/2022	3	E000002	Ct000002
Or000005	04/04/2022	6	E000002	Ct000002
Or000006	04/04/2022	2	E000002	Ct000002
Or000007	07/05/2022	9	SE000003	Ct000003
Or000008	07/05/2022	1	SE000003	Ct000003
Or000009	08/04/2022	5	SE000004	Ct000004
Or000010	09/03/2022	2	E000005	Ct000005

2.3.1.11 Category

Table 35 Category

<u>Cat ID</u>	Cat Name	Picture	Description
Cat0001	Food	Food.png	No Description
Cat0002	Cosmotics	Cosmotics.png	No Description
Cat0003	Bivrege	Bivrege.png	No Description
Cat0004	Soft_Drink	Soft_Drink.png	No Description

2.3.1.12 Order Detail

Table 36 Order Detail

<u>Order Detail ID</u>	<u>Required Date</u>	<u>Order ID</u>
OrD00001	07/05/2022	Or000001
OrD00002	07/05/2022	Or000002
OrD00003	07/05/2022	Or000003
OrD00004	05/04/2022	Or000004
OrD00005	05/04/2022	Or000005
OrD00006	05/04/2022	Or000006
OrD00007	08/05/2022	Or000007
OrD00008	08/05/2022	Or000008
OrD00009	09/04/2022	Or000009
OrD00010	10/03/2022	Or000010

2.3.1.13 Payment

Table 37 Payment

<u>Payment ID</u>	<u>Pay Type</u>	<u>Pay Date</u>	<u>Pay Status</u>	<u>Cust ID</u>
PI000001	Cash	06/05/2022	Paid	Ct000001
PI000002	Cash	04/04/2022	Paid	Ct000002
PI000003	Cash	07/05/2022	Pending	Ct000003
PI000004	Cash	08/04/2022	Paid	Ct000004
PI000005	Cash	09/03/2022	Pending	Ct000005

2.3.1.14 Supply

Table 38 Supply

<u>Supplier ID</u>	<u>Pro ID</u>	<u>Cust ID</u>
SD000004	Pr000001	Ct000001
SD000004	Pr000002	Ct000002
SD000004	Pr000003	Ct000003
SD000004	Pr000004	Ct000004
SD000004	Pr000005	Ct000005

2.3.1.15 Shipped_Product

Table 39 Shipped_Products

Pro ID	Shipper ID	Cust ID	Shipped Date
Pr000001	Shp000001	Ct000001	07/05/2022
Pr000002	Shp000001	Ct000002	05/04/2022
Pr000003	Shp000001	Ct000003	08/05/2022
Pr000004	Shp000002	Ct000004	09/04/2022
Pr000005	Shp000002	Ct000005	10/03/2022

2.3.2 First Normal Form (1NF)

2.3.2.1 Employee

Table 40 Employee

SSN	F_Name	M_Name	L_Name	DoB	Age	Gender	Salary	Country	City	ZIP	Supplier ID
E000001	Frezer	Kefyalew	Kebede	1990/01/23	32	M	35000	Ethiopia	Wolaita Sodo	1000	SD000001
E000002	Geremew	Asmare	Bateayehu	1982/08/11	40	M	37000	Ethiopia	Wolaita Sodo	1000	SD000002
SE000003	Abebe	Getachew	Balcha	1971/02/21	51	M	50000	Ethiopia	Wolaita Sodo	1000	SD000003
SE000004	Kebede	Kefyalew	Kabede	1968/05/22	56	M	60000	Ethiopia	Wolaita Sodo	1000	SD000004
E000005	Sosina	Alemayehu	Andualem	1983/01/13	39	F	35000	Ethiopia	Wolaita Sodo	1000	SD000005

2.3.2.2 Contact_Employee

Table 41 Contact_Employee

ESSN	Phone	Email
E000001	+251911903232	frezer@gmail.com
E000001	+251911903230	frezer@yahoo.com
E000002	+251911903220	geremew@gmail.com
E000002	+251911903221	geremew@yahoo.com
SE000003	+251911903210	abebe@gmail.com
SE000003	+251911903211	abebe@yahoo.com
SE000004	+251911903200	kebede@gmail.com
SE000004	+251911903201	kebede@yahoo.com
E000005	+251911903280	sosina@gmail.com
E000005	+251911903281	sosina@yahoo.com

2.3.2.3 Supplier

Table 42 Supplier

<u>Supplier ID</u>	Company Name	Country	City	Postal Code
SD000001	Dicha	Ethiopia	Wolaita Sodo	1000
SD000002	Yacob Hotel	Ethiopia	Wolaita Sodo	1000
SD000003	Abebe Zeleke Hotel	Ethiopia	Wolaita Sodo	1000
SD000004	Dahilak	Ethiopia	Wolaita Sodo	1000
SD000005	Abraham Hotel	Ethiopia	Wolaita Sodo	1000

2.3.2.4 Contact_Supplier

Table 43 Contact_Supplier

<u>SupSSN</u>	Phone	Email
SD000001	+2510465519191	dicha@gmail.com
SD000001	+2510465519192	dicha@yahoo.com
SD000002	+2510465518181	Yacob_hotel@gmail.com
SD000002	+2510465518182	Yacob_hotel@yahoo.com
SD000003	+2510465517171	abebe_zeleke_hotel@gmail.com
SD000003	+2510465517172	abebe_zeleke_hotel@yahoo.com
SD000004	+2510465516161	dahilak@gmail.com
SD000004	+2510465516162	dahilak@yahoo.com
SD000005	+2510465515151	abrham_hotel@gmail.com
SD000005	+2510465515152	abrham_hotel@yahoo.com

2.3.2.5 Shipper

Table 44 Shipper

<u>Shipper ID</u>	F_Name	M_Name	L_Name	DoB	Age	Gender	Salary	Country	City	ZIP
Shp000001	Abrham	Kefyalew	Kebede	1990/01/23	32	M	35000	Ethiopia	Wolaita Sodo	1000
Shp000002	Teketel	Asmare	Bateayehu	1982/08/11	40	M	37000	Ethiopia	Wolaita Sodo	1000
Shp000003	Eyob	Getachew	Balcha	1971/02/21	51	M	50000	Ethiopia	Wolaita Sodo	1000
Shp000004	Markos	Kefyalew	Kabede	1968/05/22	56	M	60000	Ethiopia	Wolaita Sodo	1000
Sh000005	Feven	Alemayehu	Andualem	1983/01/13	39	F	35000	Ethiopia	Wolaita Sodo	1000

2.3.2.6 Contact_Shipper

Table 45 Contact_Shipper

<u>SupSSN</u>	Phone	Email
SD000001	+2510465519191	dicha@gmail.com
SD000001	+2510465519192	dicha@yahoo.com
SD000002	+2510465518181	Yacob_hotel@gmail.com
SD000002	+2510465518182	Yacob_hotel@yahoo.com
SD000003	+2510465517171	abebe_zeleke_hotel@gmail.com
SD000003	+2510465517172	abebe_zeleke_hotel@yahoo.com
SD000004	+2510465516161	dahilak@gmail.com
SD000004	+2510465516162	dahilak@yahoo.com
SD000005	+2510465515151	abrham_hotel@gmail.com
SD000005	+2510465515152	abrham_hotel@yahoo.com

2.3.2.7 Customer

Table 46 Customer

<u>Cust ID</u>	F_Name	M_Name	L_Name	DoB	Age	Gender	Country	City	ZIP
Ct000001	Sisay	Kefyalew	Kebede	1990/01/23	32	M	Ethiopia	Wolaita Sodo	1000
Ct000002	Teklewoyn	Asmare	Bateayehu	1982/08/11	40	M	Ethiopia	Wolaita Sodo	1000
Ct000003	Dirshaye	Getachew	Balcha	1971/02/21	51	M	Ethiopia	Wolaita Sodo	1000
Ct000004	Masresha	Kefyalew	Kabede	1968/05/22	56	M	Ethiopia	Wolaita Sodo	1000
Ct000005	Solanj	Degu	Daniel	1983/01/13	39	F	Ethiopia	Wolaita Sodo	1000

2.3.2.8 Contact_Customer

Table 47 Contact_Customer

Cust ID	Phone	Email
Ct000001	+251993903232	sisay@gmail.com
Ct000001	+251993903230	sisay@yahoo.com
Ct000002	+251993903220	teklewoyn@gmail.com
Ct000002	+251993903221	teklewoyn@yahoo.com
Ct000003	+251993903210	dirshaye@gmail.com
Ct000003	+251993903211	dirshaye@yahoo.com
Ct000004	+251993903200	masresha@gmail.com
Ct000004	+251993903201	masresha@yahoo.com
Ct000005	+251993903280	solanj@gmail.com
Ct000005	+251993903281	solanj@yahoo.com

2.3.2.9 Product

Table 48 Product

Pro ID	Pro Name	Size	Type	Picture	Unit Price	Unit Weight	Discount	Color Type	Color_0	Color_1	Color_2	Description	Cat ID
Pr000001	Onion	Undefined	Food	Onion.png	120 ETB	10Kg	10%	Mixed	Red	White	Yellow	No Description	Cat0001
Pr000002	Pineapple	Undefined	Food	Pineapple.jpg	110 ETB	1Kg	10%	Mixed	Red	Blue	Pink	No Description	Cat0001
Pr000003	Banana	Undefined	Food	Banana.jpg	50 ETB	1Kg	10%	Solid	Yellow	Yellow	Yellow	No Description	Cat0001
Pr000004	Misir	Undefined	Food	Misir.png	320 ETB	10Kg	10%	Solid	Red	Red	Red	No Description	Cat0001
Pr000005	Sugar	Undefined	Food	Sugar.jpg	150 ETB	1Kg	10%	Solid	White	White	White	No Description	Cat0001

2.3.2.10 Order

Table 49 Order

<u>Order ID</u>	Order Date	Quantity	<u>EmpSSN</u>	<u>Cust ID</u>
Or000001	06/05/2022	1	E000001	Ct000001
Or000002	06/05/2022	5	E000001	Ct000001
Or000003	06/05/2022	7	E000001	Ct000001
Or000004	04/04/2022	3	E000002	Ct000002
Or000005	04/04/2022	6	E000002	Ct000002
Or000006	04/04/2022	2	E000002	Ct000002
Or000007	07/05/2022	9	SE000003	Ct000003
Or000008	07/05/2022	1	SE000003	Ct000003
Or000009	08/04/2022	5	SE000004	Ct000004
Or000010	09/03/2022	2	E000005	Ct000005

2.3.2.11 Category

Table 50 Category

<u>Cat ID</u>	Cat Name	Picture	Description
Cat0001	Food	Food.png	No Description
Cat0002	Cosmotics	Cosmotics.png	No Description
Cat0003	Bivrege	Bivrege.png	No Description
Cat0004	Soft_Drink	Soft_Drink.png	No Description

2.3.2.12 Order Detail

Table 51 Order Detail

<u>Order Detail ID</u>	<u>Required Date</u>	<u>Order ID</u>
OrD00001	07/05/2022	Or000001
OrD00002	07/05/2022	Or000002
OrD00003	07/05/2022	Or000003
OrD00004	05/04/2022	Or000004
OrD00005	05/04/2022	Or000005
OrD00006	05/04/2022	Or000006
OrD00007	08/05/2022	Or000007
OrD00008	08/05/2022	Or000008
OrD00009	09/04/2022	Or000009
OrD00010	10/03/2022	Or000010

2.3.2.13 Payment

Table 52 Payment

<u>Payment ID</u>	<u>Pay Type</u>	<u>Pay Date</u>	<u>Pay Status</u>	<u>Cust ID</u>
PI000001	Cash	06/05/2022	Paid	Ct000001
PI000002	Cash	04/04/2022	Paid	Ct000002
PI000003	Cash	07/05/2022	Pending	Ct000003
PI000004	Cash	08/04/2022	Paid	Ct000004
PI000005	Cash	09/03/2022	Pending	Ct000005

2.3.2.14 Supply

Table 53 Supply

<u>Supplier ID</u>	<u>Pro ID</u>	<u>Cust ID</u>
SD000004	Pr000001	Ct000001
SD000004	Pr000002	Ct000002
SD000004	Pr000003	Ct000003
SD000004	Pr000004	Ct000004
SD000004	Pr000005	Ct000005

2.3.2.15 Shipped_Product

Table 54 Shipped_Products

<u>Pro ID</u>	<u>Shipper ID</u>	<u>Cust ID</u>	Shipped Date
Pr000001	Shp000001	Ct000001	07/05/2022
Pr000002	Shp000001	Ct000002	05/04/2022
Pr000003	Shp000001	Ct000003	08/05/2022
Pr000004	Shp000002	Ct000004	09/04/2022
Pr000005	Shp000002	Ct000005	10/03/2022

2.3.3 Second Normal Form (2NF)

2.3.3.1 Order

Table 55 Order

<u>Order ID</u>	Order Date	Quantity	<u>EmpSSN</u>	<u>Cust ID</u>
Or000001	06/05/2022	1	E000001	Ct000001
Or000002	06/05/2022	5	E000001	Ct000001
Or000003	06/05/2022	7	E000001	Ct000001
Or000004	04/04/2022	3	E000002	Ct000002
Or000005	04/04/2022	6	E000002	Ct000002
Or000006	04/04/2022	2	E000002	Ct000002
Or000007	07/05/2022	9	SE000003	Ct000003
Or000008	07/05/2022	1	SE000003	Ct000003
Or000009	08/04/2022	5	SE000004	Ct000004
Or000010	09/03/2022	2	E000005	Ct000005

2.3.3.2 Category

Table 56 Category

<u>Cat ID</u>	Cat Name	Picture	Description
Cat0001	Food	Food.png	No Description
Cat0002	Cosmotics	Cosmotics.png	No Description
Cat0003	Bivrege	Bivrege.png	No Description
Cat0004	Soft_Drink	Soft_Drink.png	No Description

2.3.3.3 Order Detail

Table 57 Order Detail

<u>Order Detail ID</u>	<u>Required Date</u>	<u>Order ID</u>
OrD00001	07/05/2022	Or000001
OrD00002	07/05/2022	Or000002
OrD00003	07/05/2022	Or000003
OrD00004	05/04/2022	Or000004
OrD00005	05/04/2022	Or000005
OrD00006	05/04/2022	Or000006
OrD00007	08/05/2022	Or000007
OrD00008	08/05/2022	Or000008
OrD00009	09/04/2022	Or000009
OrD00010	10/03/2022	Or000010

2.3.3.4 Payment

Table 58 Payment

<u>Payment ID</u>	<u>Pay Type</u>	<u>Pay Date</u>	<u>Pay Status</u>	<u>Cust ID</u>
PI000001	Cash	06/05/2022	Paid	Ct000001
PI000002	Cash	04/04/2022	Paid	Ct000002
PI000003	Cash	07/05/2022	Pending	Ct000003
PI000004	Cash	08/04/2022	Paid	Ct000004
PI000005	Cash	09/03/2022	Pending	Ct000005

2.3.3.5 Supply

Table 59 Supply

<u>Supplier ID</u>	<u>Pro ID</u>	<u>Cust ID</u>
SD000004	Pr000001	Ct000001
SD000004	Pr000002	Ct000002
SD000004	Pr000003	Ct000003
SD000004	Pr000004	Ct000004
SD000004	Pr000005	Ct000005

2.3.3.6 Shipped_Product

Table 60 Shipped_Products

<u>Pro ID</u>	<u>Shipper ID</u>	<u>Cust ID</u>	Shipped Date
Pr000001	Shp000001	Ct000001	07/05/2022
Pr000002	Shp000001	Ct000002	05/04/2022
Pr000003	Shp000001	Ct000003	08/05/2022
Pr000004	Shp000002	Ct000004	09/04/2022
Pr000005	Shp000002	Ct000005	10/03/2022

2.3.4 Third Normal Form (3NF)

2.3.4.1 Order

Table 61 Order

<u>Order ID</u>	Order Date	Quantity	<u>EmpSSN</u>	<u>Cust ID</u>
Or000001	06/05/2022	1	E000001	Ct000001
Or000002	06/05/2022	5	E000001	Ct000001
Or000003	06/05/2022	7	E000001	Ct000001
Or000004	04/04/2022	3	E000002	Ct000002
Or000005	04/04/2022	6	E000002	Ct000002
Or000006	04/04/2022	2	E000002	Ct000002
Or000007	07/05/2022	9	SE000003	Ct000003
Or000008	07/05/2022	1	SE000003	Ct000003
Or000009	08/04/2022	5	SE000004	Ct000004
Or000010	09/03/2022	2	E000005	Ct000005

2.3.4.2 Category

Table 62 Category

<u>Cat ID</u>	Cat Name	Picture	Description
Cat0001	Food	Food.png	No Description
Cat0002	Cosmotics	Cosmotics.png	No Description
Cat0003	Bivrege	Bivrege.png	No Description
Cat0004	Soft_Drink	Soft_Drink.png	No Description

2.3.4.3 Order Detail

Table 63 Order Detail

<u>Order Detail ID</u>	Required Date	<u>Order ID</u>
OrD00001	07/05/2022	Or000001
OrD00002	07/05/2022	Or000002
OrD00003	07/05/2022	Or000003
OrD00004	05/04/2022	Or000004
OrD00005	05/04/2022	Or000005
OrD00006	05/04/2022	Or000006
OrD00007	08/05/2022	Or000007
OrD00008	08/05/2022	Or000008
OrD00009	09/04/2022	Or000009
OrD00010	10/03/2022	Or000010

2.3.4.4 Payment

Table 64 Payment

<u>Payment ID</u>	Pay Type	Pay Date	Pay Status	<u>Cust ID</u>
PI000001	Cash	06/05/2022	Paid	Ct000001
PI000002	Cash	04/04/2022	Paid	Ct000002
PI000003	Cash	07/05/2022	Pending	Ct000003
PI000004	Cash	08/04/2022	Paid	Ct000004
PI000005	Cash	09/03/2022	Pending	Ct000005

2.3.4.5 Supply

Table 65 Supply

<u>Supplier ID</u>	<u>Pro ID</u>	<u>Cust ID</u>
SD000004	Pr000001	Ct000001
SD000004	Pr000002	Ct000002
SD000004	Pr000003	Ct000003
SD000004	Pr000004	Ct000004
SD000004	Pr000005	Ct000005

2.3.4.6 Shipped_Product

Table 66 Shipped_Products

<u>Pro ID</u>	<u>Shipper ID</u>	<u>Cust ID</u>	<u>Shipped Date</u>
Pr000001	Shp000001	Ct000001	07/05/2022
Pr000002	Shp000001	Ct000002	05/04/2022
Pr000003	Shp000001	Ct000003	08/05/2022
Pr000004	Shp000002	Ct000004	09/04/2022
Pr000005	Shp000002	Ct000005	10/03/2022

CHAPTER THREE

PYSHICAL DATABASE DESIGN

3.1 Tables attributes, data type, and descriptions

3.1.1 Category

Table 67 Category

Field Name	Data Type	Description
<u>Cat ID</u>	varchar(30)	Category Identification Number
Cat Name	varchar(50)	Name of Category
Picture	varchar(30)	Picture of Category
Description	varchar(300)	Description of Category

3.1.2 Contact_Customer

Table 68 Contact_Customer

Field Name	Data Type	Description
<u>Cust ID</u>	varchar(30)	Customer Identification Number
Phone	Sined Int	Phone number of Customer
Email	varchar(30)	Email of Customer

3.1.3 Contact_Employee

Table 69 Contact_Employee

Field Name	Data Type	Description
<u>ESSN</u>	varchar(30)	Social Security Number of Employee
Phone	Sined Int	Phone number of Employee
Email	varchar(30)	Email of Employee

3.1.4 Contact_Shipper

Table 70 Contact_Shipper

Field Name	Data Type	Description
<u>ShipSSN</u>	varchar(30)	Social Security Number of Shipper
Phone	Sined Int	Phone number of Shipper
Email	varchar(30)	Email of Shipper

3.1.5 Contact_Supplier

Table 71 Contact_Supplier

Field Name	Data Type	Description
<u>Supplier ID</u>	varchar(30)	Unique number of company
Phone	Sined Int	Phone number of Company
Email	varchar(30)	Email of Company

3.1.6 Customer

Table 72 Customer

Field Name	Data Type	Description
<u>Cust ID</u>	VarChar(30)	Customer Identification Number
F_Name	VarChar(150)	First Name of Customer
M_Name	VarChar(150)	Middle Name of Customer
L_Name	VarChar(150)	Last Name of Customer
DoB	Date	Date of Birth of Customer
Age	Int	Age of Customer
Gender	VarChar(5)	Gender of Customer
Country	VarChar(50)	Country of Customer
City	VarChar(50)	City of Customer
ZIP	Int	ZIP code of Customer

3.1.7 Employee

Table 73 Employee

Field Name	Data Type	Description
<u>SSN</u>	VarChar(30)	Social Security Number of Employee
F_Name	VarChar(150)	First Name of Employee
M_Name	VarChar(150)	Middle Name of Employee
L_Name	VarChar(150)	Last Name of Employee
DoB	Date	Date of Birth of Employee
Age	Int	Age of Employee
Gender	VarChar(5)	Gender of Employee
Salary	Float	Monthly Salary of Employee
Country	VarChar(50)	Country of Employee
City	VarChar(50)	City of Employee
ZIP	Int	ZIP code of Employee
<u>Supplier ID</u>	VarChar(30)	Supplier ID of Employee

3.1.8 Order_Order_Detail

Table 74 Order_Order_Detail

Field Name	Data Type	Description
<u>Order Detail ID</u>	varchar(30)	Order Detail Identification Number
Required Date	Date	Date of the Order Required
<u>Order ID</u>	varchar(30)	Order Identification Number

3.1.9 Order

Table 75 Order

Field Name	Data Type	Description
<u>Order ID</u>	varchar(30)	Order Identification Number
Order Date	Date	Date of the Order
Quantity	Int	Quantity of the Order
<u>ESSN</u>	varchar(30)	Social Security Number of Employee
<u>Cust ID</u>	varchar(30)	Customer Identification Number

3.1.10 Payment

Table 76 Payment

Field Name	Data Type	Description
<u>Payment ID</u>	varchar(30)	Payment Identification Number
Pay Type	varchar(30)	Type of Payment
Pay Date	Date	Date of Payment
Pay Status	varchar(30)	Status of Payment
<u>Cust ID</u>	varchar(30)	Customer Identification Number

3.1.11 Product

Table 77 Product

Field Name	Data Type	Description
<u>Pro ID</u>	varchar(30)	Product Identification Number
Pro Name	varchar(150)	Name of the Product
Size	Int	Size of the Product
Type	varchar(30)	Type of the Product
Picture	varchar(30)	Picture of the Product
Unit Price	Float	Unit Price of the Product
Unit Weight	Float	Unit Weight of the Product
Discount	Float	Discount of the Product
Color Type	varchar(30)	Color type of the Product
Color_0	varchar(30)	Color of the product
Color_1	varchar(30)	Color of the product
Color_2	varchar(30)	Color of the product
Description	varchar(300)	Description of the product
<u>Cat ID</u>	varchar(30)	Identification Number of Category

3.1.12 Shipped_Products

Table 78 Shipped_Products

Field Name	Data Type	Description
<u>Pro ID</u>	varchar(30)	Product Identification Number
<u>ShipSSN</u>	varchar(30)	Social Security Number of Shipper
<u>Cust ID</u>	varchar(30)	Customer Identification Number
Shipped Date	Date	Date of shipment

3.1.13 Shipper

Table 79 Shipper

Field Name	Data Type	Description
<u>ShipSSN</u>	VarChar(30)	Social Security Number of Shipper
F_Name	VarChar(150)	First Name of Shipper
M_Name	VarChar(150)	Middle Name of Shipper
L_Name	VarChar(150)	Last Name of Shipper
DoB	Date	Date of Birth of Shipper
Age	Int	Age of Shipper
Gender	VarChar(5)	Gender of Shipper
Salary	Float	Monthly Salary of Shipper
Country	VarChar(50)	Country of Shipper
City	VarChar(50)	City of Shipper
ZIP	Int	ZIP code of Shipper

3.1.14 Supplier

Table 80 Supplier

Field Name	Data Type	Description
<u>Supplier ID</u>	VarChar(30)	Unique number of company
Company Name	VarChar(50)	Company Name of Supplier
Country	VarChar(50)	Reciding Country of Company
City	VarChar(50)	Reciding City of Company
Postal Code	Int	Postal code of Company

3.1.15 Supply

Table 81 Supply

Field Name	Data Type	Description
<u>Supplier ID</u>	varchar(30)	Unique number of company
<u>Pro ID</u>	varchar(30)	Product Identification Number
<u>Cust ID</u>	varchar(30)	Customer Identification Number

3.2 Physical database design

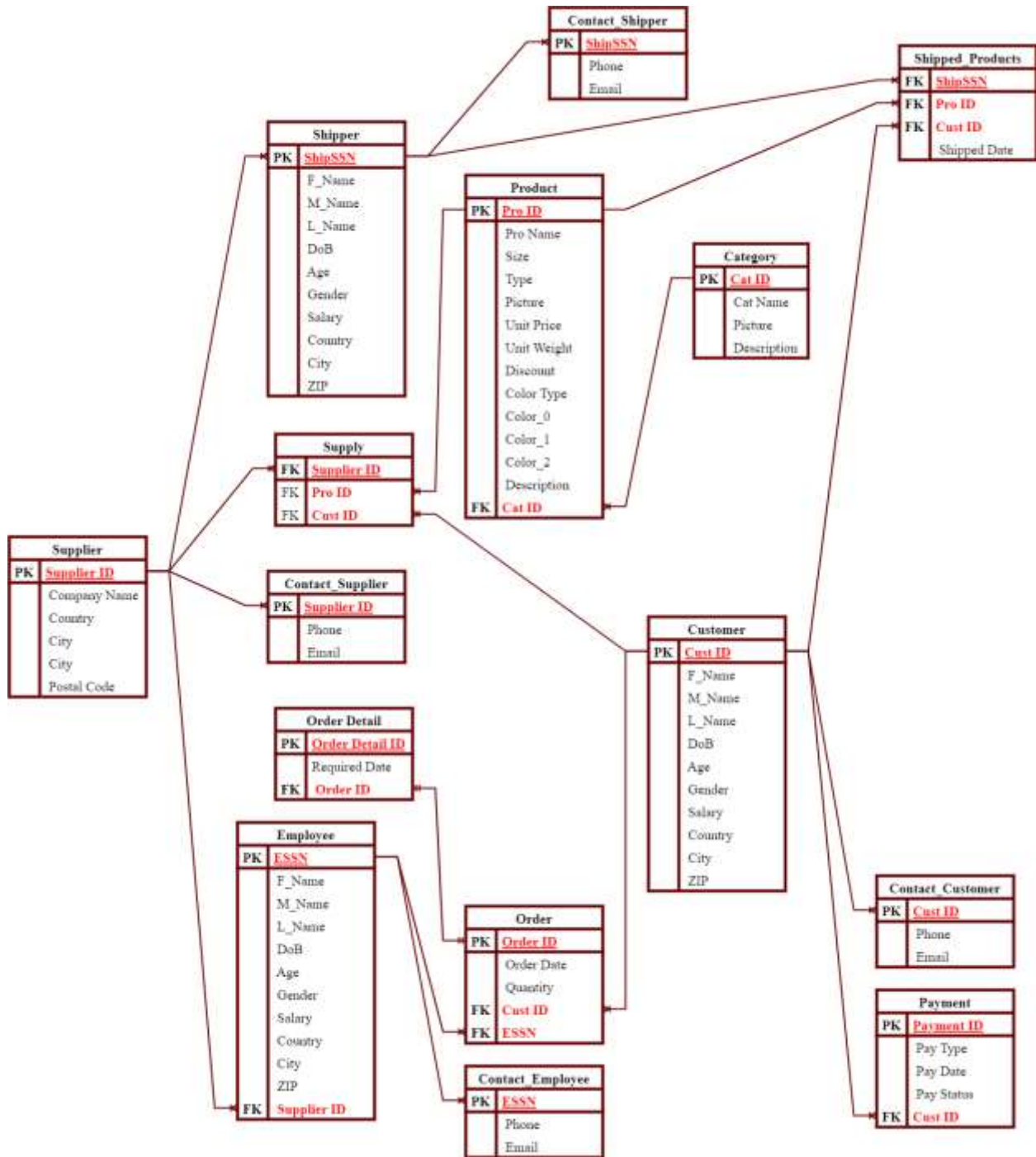


Figure 3.1 0.1