

# Wholesale Management System Database

Eddie Fu

Student ID: 922393716

Milestone/Version	Date
M2V1	11/03/2022
M1V2	11/03/2022

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## Section I: Project Description

For most businesses to be profitable, business owners must buy in bulk from original retailers to turn a profit. In order for merchandises to reach the consumer, they must first go through a middleman that purchases stocks in bulk. These stores such as Costco, Target, Walmart, and many grocery stores then stores the merchandises in bulk which is then easily accessible to consumers. To make these transactions quick and efficient, it is important to label each stock being transacted to maximize time and costs. Some problems that these stores may run into is that there may be products with the same name but due to their modes of production such as some products being organic or made with different materials, their costs could end up being vastly different. By labeling each distinct product uniquely, we can combat the issue of mistaking items with one another. Both factory and producers want to increase is productivity, accessibility, speed, and efficiency while limiting costs and security breaches.

## Section II: Use Cases

**Use Case:** Factory wants to increase profit

**Actor:** Factory Owner (Robert), merchandise

**Description:** Robert is the owner of a factory that produces all sports-equipment.

His factory makes sports equipment that ranges from baseball bats and gloves, basketballs, tennis balls, and ping pong balls. The factory then sells the sport equipments to brick and mortar stores such as Big 5, Target and Walmart. Robert wants to focus his attention on selling products that perform well to maximize profit. By focusing his production on his products that perform well, he is able to focus his attention on what is making his company money.

The Wholesale Management Database System is able to help Robert with his goal of maximizing profit by tracking how well each individual product does. If a specific type of basketball that is priced at a specific price point and it sells out everytime, he has the option to mass produce the same basketball at that price point. By focusing on the winning products which is tracked by the database, he is able to allow his company to flourish.

**Use Case:** Store wants to cut shelf space

**Actor:** Store (Steve), merchandise, Manufacturer

**Description:** Steve is the manager of a small grocery store in San Francisco. Since there is only a limited amount of shelf space in this small grocery store, Steve needs to figure out how to maximize profit without sacrificing the quality of the product he sells at his store. Due to every produce having an expiration date, he will need to find the best and worst performers of the merchandises that comes to his store. Steve will have to do this by examining how much product is being thrown away on a monthly scale. Steve can also look at how much net-profit each product is bringing him in.

The Wholesale Management Database System is able to help Steve decide which product should stay or which one should go. He can keep track of the quantity of product moved and how much profit the store is netting at the end of each month. Since the emphasis for most business is to make profit, it would make more fiscal sense to keep a product that does not move a lot of units but brings in more profit.

**Use Case:** Labeling Quality of Product

**Actor:** Store (Chris), merchandise, Factory

**Description:** Chris is the manager of a local liquor store. Chris gets many different brands of vodka, whiskey, and tequila from different distilleries. Sometimes the shipments from different distilleries happen on the same day. In order to differentiate an expensive whiskey from a cheap whiskey, Chris will need to diligently label each whiskey with a unique barcode. By correctly labeling the quality of whiskey from the factory, it will prevent the mistake of overcharging or undercharging customers.

The Wholesale Management Database System is able to help Chris succeed in his liquor store business. With the correct labeling at the distilleries that produces the liquor, it will help the liquor store by selling the correct item to the customers. It can also accurately predict future revenue and losses of the items.

**Use Case:** Inventory and Profit Tracking

**Actor:** Store (Roxy), Manufacturer, merchandise

**Description:** Roxy is a store manager at a local Wholesale store in San Francisco.

Due to the large area space of the store, she has trouble keeping track of all the items that come in and out on a daily basis. With how competitive shelf space is in San Francisco, Roxy also has to decide which items stay on or stay off on a daily basis based on an algorithm she develops (Greedy/DP). However, the database does not take into account momentum of sales and the duration of time an item has been in store. She can then decide to give it a trial period of the new items introduced and try to pick up on the different momentum of sales of the items.

The Wholesale Management Database System is able to track down each item and quantity of the items based on their unique barcode. However, it is not able to dive deeper into the deeper non-obvious ways of figuring out whether an item is profitable or not.

**Use Case:** Promoting Self-Brand

**Actors:** Store manager(Lucas), Manufacturer (Brand), merchandise

**Description:** Brand is the owner a large multi-national store brand. Brand wants to start producing his own brand of lime soda to undercut larger corporations in hopes of gaining a piece of the marketshare. Brand instructs Lucas and all the other store managers in his district to start putting his brand of lime soda on the shelf at a reduced price. Brand instructs Lucas to do a competitive analysis of how his off brand soda performs versus notable name brands.

The Wholesale Management Database Systems will be helpful in determining if the self produced lime soda is selling or if they should venture into something else. By keeping track of the net revenue of their own product versus the notable brands, Brand is able undercut prices of their lime soda since they are directly manufacturing to the brick and mortar stores.



## Section III: Database Requirements

### 1. Factory

1.1 A factory can distribute merchandise to many to one stores.

1.2 A factory can produce many to one merchandises.

1.3 A factory is a manufacturer.

1.4 A factory can have many to many workers.

### 2. Stores

2.1 A store sells merchandises to many to many customers.

2.2 A store can sell many to one products.

2.3 A store may obtain inventory from one to many factories.

2.4 A store can have many to one location.

2.5 A store is a part of a company.

### 3. Company Employee

3.1 A company employee is able to work one to many jobs titles within the company.

3.2 A company employee has many to one job title.

3.3 A store manager is a company employee.

3.4 A CEO is a company employee.

3.5 A farmer is a company employee.

3.6 A factory worker is a company employee.

#### 4. Company

4.1 A company owns many to one stores.

4.2 A company owns many to one factories.

4.3 A company has one and only one CEO.

4.5 A company owns many to many manufacturers..

#### 5. Customers

5.1 A customer has many to one variety of options to buy a certain merchandise at a store.

5.2 Customers are able to shop at many to many stores.

5.3 Customers are able to purchase many to one product at the store.

5.4 A Customer is someone that purchases something at a store.

#### 6. Grocery Stores

6.1 A grocery store sells many to one merchandises.

6.2 A grocery store is a store.

6.3 A grocery store has many to one employees.

6.4 A grocery store is a part of a company.

6.5 A farm is a supplier for a grocery store.

6.6 A factory is a supplier for a grocery store.

6.7 A grocery store has one and only one store manager.

## 7. Merchandise

7.1 A merchandise is sold to zero to many customers.

7.2 A merchandise is a food.

7.3 A merchandise is a product.

7.3 A merchandise has one and only one barcode

## 8. Liquor Stores

8.1 A liquor store sells many to one kinds liquor.

8.2 A liquor store is a store.

8.3 A liquor store must check if customer is an adult through means of ID.

8.4 A liquor store has many to one employees.

8.5 A liquor store is a part of the company.

8.6 A factory is a supplier for a liquor store.

8.7 A farm is a supplier for a liquor store.

8.8 A liquor store has one and only one store manager.

## 9. Management

9.1 A CEO is a company employee in management.

9.2 A store manager is a company employee in management.

9.3 A district manager is a company employee in management.

9.4 A store manager is managed by the district manager.

9.5 A district manager is managed by the CEO.

9.6 There is one and only one district manager per district.

9.7 There is one and only one CEO per company.

9.8 There is one and only one store manager per store.

## 10. Sports Equipment Stores

10.1 There exists many to many merchandises in the store.

10.2 A sports equipment store is a store.

10.3 Sports equipment stores has many to many employees.

10.4 A factory is a supplier for a Sports Equipment store.

10.5 A farm is a supplier for a Sports Equipment store.

10.6 A Sports Equipment store has one and only one store manager.

## 11. Big Box Department Stores

11.1 A big box department store is a store.

11.2 A big box department store sells many to many merchandises.

11.3 A big box department store has many to many employees.

11.4 A factory is a supplier for a Big Box department store.

11.5 A farm is a supplier for a Big Box department store.

11.6 A Big Box Department store has one and only one store manager.

## 12. Farm

12.1 A farm distributes many to one stores.

12.2 A farm is a manufacturer.

12.3 A farm has one to many employees.

## 13. Manufacturer

13.1 A manufacturer produces many to one merchandises.

13.2 A manufacturer has many to many factories or farms.

13.3 A manufacturer is overseen by many to one workers in upper management.

## 14. Clothing Stores

14.1 A clothing store is a store.

14.2 A clothing store sells many to many types of clothes.

14.3 A clothing store has many to many employees.

14.4 A clothing store has one and only one store manager.

14.5 A factory is a supplier to a clothing store.

15.5 A farm is a supplier to a clothing store.

## 15. Convenience Stores

15.1 A convenience store is a store.

15.2 A convenience store sells many to many types of merchandise.

15.3 A convenience store has many to one employee.

15.4 A convenience store has one and only one store manager.

15.5 A factory is a supplier to the convenience store.

15.6 A farm is a supplier to the convenience store.

## 16. Book Store

16.1 A book store is a store.

16.2 A book store sells many to one genres of books.

16.3 A book store has many to one employees.

16.4 A book store has one and only one store manager.

16.5 A factory is a supplier to the book store.

## 17. Restaurants

17.1 A restaurant is a store.

17.2 A restaurant shall get food from many to one farms.

17.3 A restaurant shall get merchandise from many to one factories.

17.4 A restaurant has many to many employees.

17.5 A restaurant has one and only one store manager.

17.6 A farm is a supplier to a restaurant.

17.7 A factory is a supplier to a restaurant.

## Section IV: Detailed List of Main Entities, Attributes and Keys

### 1. Factory (Strong)

\*FA\_ID: key, numeric

\*FA\_LOC: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*Production\_type: alphanumeric, multi-value

\*E\_ID: key, numeric

\*M\_ID: key, numeric

### 2. Stores (weak)

\*Store\_ID: key, numeric

\*Store\_LOC: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*Store\_type: alphanumeric, multi-value

### 3. Employee (Strong)

\*E\_ID: key, numeric

\*full\_name: alphanumeric, composite

- First Name
- Middle Name
- Last Name

\*dob: date, multi-value, timestamp

- Year
- Month
- Day

\*age: numeric, derived

\*job\_title: alphanumeric, multi-value

\*hourly\_wage: numeric, multi-value

### 4. Company (Strong)

\*company\_name: key, alphanumeric

\*company\_loc: alphanumeric, multi-value, composite

- Street
- Zipcode
- State



- Country

## 5. Customers (Strong)

\*C\_ID: key, numeric

\*fullname: alphanumeric, composite

- First Name
- Middle Name
- Last Name

\*dob: date, multi-value, timestamp

- Year
- Month
- day

\*age: numeric, derived

## 6. Grocery Store (Strong)

\*GS\_ID: key, numeric

\*GS\_loc: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*Store\_type: alphanumeric, multi-value

\*GS\_Phone: numeric, multi-value, composite

- Country\_code
- Area\_code
- Phone\_number

\*E\_ID: key, numeric

## 7. Merchandise (Strong)

\*M\_ID: key, numeric

\*M\_type: alphanumeric, multi-value

\*barcode: numeric, multi-value

## 8. Liquor Store (Strong)

\*LS\_ID: key, numeric

\*M\_type: alphanumeric, multi-value

\*LS\_loc: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*LS\_Phone: numeric, multi-value, composite

- Country\_code
- Area\_code
- Phone\_number

\*E\_ID: key, numeric

## 9. Management (Strong)

\*E\_ID: key, numeric

\*fullname: alphanumeric, composite

- First Name
- Middle Name
- Last Name

\*dob: date, multi-value, timestamp

- Year
- Month
- Day

\*age: numeric, derived

\*job\_title: alphanumeric, multi-value

\*salary: numeric, derived

## 10. Sport Equipment Stores (Strong)

\*SE\_ID: key, numeric

\*SE\_Loc: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*Store\_type: alphanumeric, multi-value

\*SE\_Phone: numeric, multi-value, composite

- Country\_code
- Area\_code
- Phone\_number

\*E\_ID: key, numeric

## 11. Big Box Department Stores (Strong)

\*BB\_ID: key, numeric

\*BB\_Loc: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*Store\_type: alphanumeric, multi-value

\*BB\_Phone: numeric, multi-value, composite

- Country\_code
- Area\_code
- Phone\_number

\*E\_ID: key, numeric

## 12. Farm (Strong)

\*F\_ID: key, numeric

\*F\_LOC: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*Production\_type: alphanumeric, multi-value

\*E\_ID: key, numeric

\*Store\_type: alphanumeric, multi-value

## 13. Manufacturer (Strong)

\*MF\_ID: key, numeric

\*MF\_LOC: alphanumeric, multi-value, composite

- Street

- Zipcode

- State

- Country

\*Production\_type: alphanumeric, multi-value

\*E\_ID: key, numeric

\*MF\_Phone: numeric, multi-value, composite

#### 14. Clothing Store (Strong)

\*CS\_ID: key, numeric

\*CS\_LOC: alphanumeric, multi-value, composite

- Street

- Zipcode

- State

- Country

\*Store\_type: alphanumeric, multi-value

\*CS\_Phone: numeric, multi-value, composite

- Country\_code

- Area\_code

- Phone\_number

\*E\_ID: key, numeric

## 15. Convenience Stores (Strong)

\*Con\_ID: key, numeric

\*Con\_LOC: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*Store\_type: alphanumeric, multi-value

\*Con\_Phone: numeric, multi-value, composite

- Country\_code
- Area\_code
- Phone\_number

\*E\_ID: key, numeric

## 16. Book Stores (Strong)

\*BK\_ID: key, numeric

\*BK\_LOC: alphanumeric, multi-value, composite

- Street
- Zipcode
- State

- Country

\*Store\_type: alphanumeric, multi-value

\*BK\_Phone: numeric, multi-value, composite

- Country\_code
- Area\_code
- Phone\_number

\*E\_ID: key, numeric

## 17. Restaurants (Strong)

\*RS\_ID: key, numeric

\*RS\_LOC: alphanumeric, multi-value, composite

- Street
- Zipcode
- State
- Country

\*Store\_type: alphanumeric, multi-value

\*RS\_Phone: numeric, multi-value, composite

- Country\_code
- Area\_code
- Phone\_number



\*RS\_type: alphanumeric, multi-value

\*E\_ID: key, numeric

## 18. Orders (Weak)

\*O\_ID: key, numeric

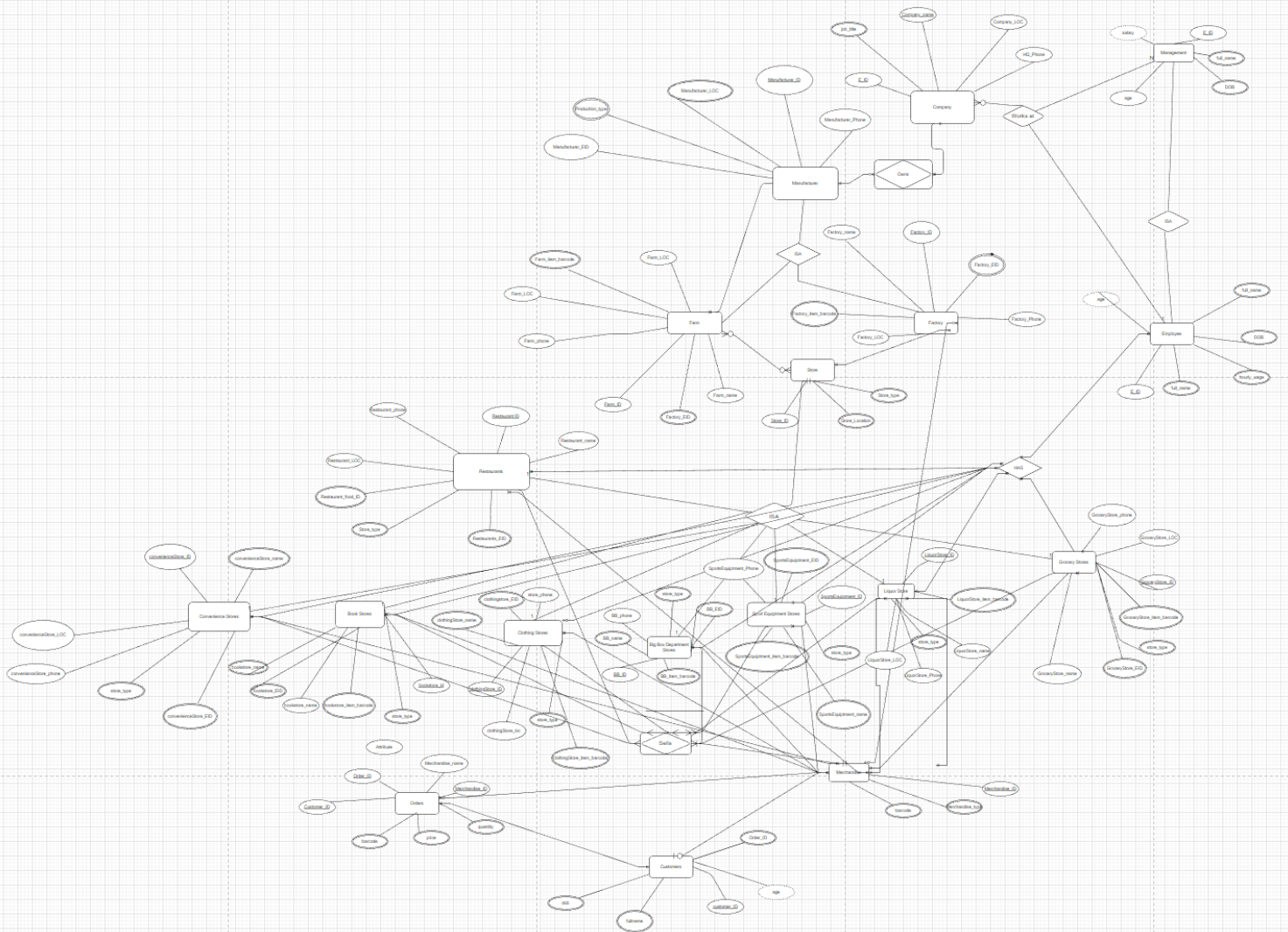
\*C\_ID: key, numeric

\*M\_ID: key, numeric

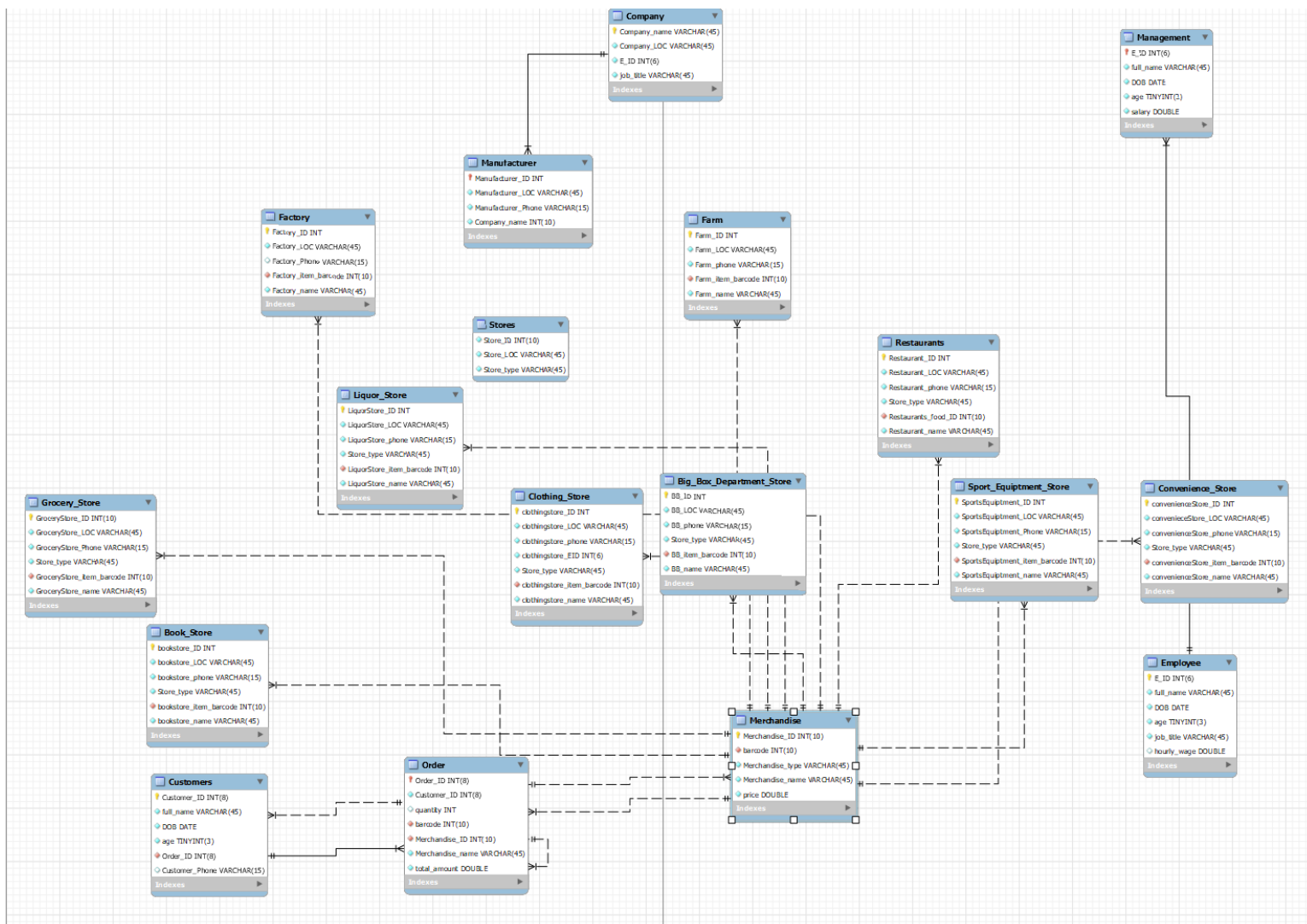
\*M\_type: alphanumeric, multi-value

\*quantity: numeric, multi-value

## Section V: Entity Relationship Diagram (ERD)



## Section VI: Database Model/EER



## Description for ON DELETE And ON UPDATE

Table	FK	ON UPDATE	ON DELETE	Comments
Big Box Department Store	BB_EID	RESTRICT	CASCADE	Restrict ON UPDATE because employee ID should not be changed. Cascade ON DELETE because if the employee is terminated, the employee ID should be terminated from the system.
Big Box Department Store	BB_item_barcode	CASCADE	CASCADE	If the barcode of an item gets updated, so will the barcode of the child class. If the barcode of an item gets deleted from the parent class, so will the child class. Hence, both cascade.

Table	FK	ON UPDATE	ON DELETE	Comments
Book Store	bookstore_EID	RESTRICT	CASCADE	Same reasoning as above.
Book Store	bookstore_item_barcode	CASCADE	CASCADE	Same reasoning as above.
Clothing Store	clothingstore_EID	CASCADE	CASCADE	Same reasoning as above.
Clothing Store	clothingstore_item_barcode	RESTRICT	CASCADE	Same reasoning as above.
Convenience Store	conveniencestore_EID	RESTRICT	CASCADE	Same reasoning as above.
Convenience Store	convenienceStore_barcode	CASCADE	CASCADE	Same reasoning as above.
Customer	Order_ID	RESTRICT	CASCADE	I set this one because order ID cannot be changed since it is a unique set of numbers that identify with the orders that was set at that

Table	FK	ON UPDATE	ON DELETE	Comments
				particular time. Now if an order is deleted, that order ID is gone forever, hence, why I chose cascade for when it is ON DELETE.
Factory	Factory_EID	RESTRICT	CASCADE	Same reasoning as above.
Factory	Factory_item_barcode	CASCADE	CASCADE	Same reasoning as above.
Farm	Farm_EID	RESTRICT	CASCADE	Same reasoning as above.
Farm	Farm_item_barcode	CASCADE	CASCADE	Same reasoning as above.
Grocery Store	GroceryStore_EID	RESTRICT	CASCADE	Same

Table	FK	ON UPDATE	ON DELETE	Comments
				reasoning as above.
Grocery Store	Customer_ID	RESTRICT	CASCADE	Same reasoning as above.
Grocery Store	GroceryStore_items_barcode	CASCADE	CASCADE	Same reasoning as above.
Liquor Store	LiquorStore_EID	RESTRICT	CASCADE	Same reasoning as above.
Liquor Store	LiquorStore_item_barcode	CASCADE	CASCADE	Same reasoning as above.

Table	FK	ON UPDATE	ON DELETE	Comments
Management	E_ID	RESTRICT	CASCADE	The employee ID for management will not change as they progress through the corporate ladder. Therefore we RESTRICT the ON UPDATE and if they get terminated so will their EID.
Manufacturer	Manufactrer_EID	RESTRICT	CASCADE	Same reasoning as above.



Table	FK	ON UPDATE	ON DELETE	Comments
Manufacturer	Company_name	CASCADE	CASCADE	For a manufacturer, we would pick CASCADE for ON UPDATE AND ON DELETE. If a company goes out of business the manufacturer that produces that item would most likely go out of business as well.
Merchandise	barcode	RESTRICT	CASCADE	Every merchandise has a specific barcode, therefore, we restrict the barcode to be updated. If we were to delete the item, so would the barcode.
Order	Customer_ID	RESTRICT	CASCADE	When a

Table	FK	ON UPDATE	ON DELETE	Comments
				customer places an order, the customer ID cannot be updated. Since the customer ID always stays the same. When we choose to delete the order, we should also delete the customer ID along with it.
Order	Merchandise_ID	RESTRICT	CASCADE	When a specific merchandise is removed from the order, the child will also be deleted.
Order	barcode	RESTRICT	CASCADE	Same reasoning as why we

Table	FK	ON UPDATE	ON DELETE	Comments
				cannot change the barcode. We would restrict the parent from changing the barcode. When it is deleted, we would also have to delete it.
Restaurants	RESTAURANT_EID	RESTRICT	CASCADE	Same reasoning as above.
Restaurants	Restaurant_food_ID	RESTRICT	CASCADE	Same reasoning as above.
Sports Equipment Store	SportsEquipment__EID	RESTRICT	CASCADE	Same reasoning as above.
Sports Equipment Store	SportsEquipment_item_barcode	RESTRICT	CASCADE	Same reasoning as above.