Project Title: Inventory Control Management Database

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Section I: Project Description

Tracking goods going in and out of warehouses, being delivered to customers, or being shipped to you is a hassle. Not knowing whether you have enough of an item in stock to make it through a quarter or when your shipments are being delivered. There are many problems in knowing where your products are at any given moment. It costs time and money when one location, whether that be a store or warehouse, is running low on inventory but the excel spread sheet says you have thousands of units oh hand. A modern solution is needed to remedy these problems. One that takes all the data needed and puts it in one system.

This is where EZI comes in to fix all these problems. A backend inventory control management system for your operation that will track your products coming in and out of your locations. Need to look at all the incoming shipments? No problem. Each shipment is labeled with a location, whether that's one of your stores or a warehouse, the product along with how much of it you purchased, the Supplier from whom you bought it from, and the date it was shipped. If you need to look at outgoing orders to customers, the orders will have a list of products that were purchased, the location they are being delivered, and a total amount.

To keep track of inventory that is moving between locations, there is the ability to see all requests made by stores. These requests allow you to see which employee is asking for more product. The ability to see inventory extends further as you will be able to monitor which employees are working on purchases from customers. They will be creating requests for product in the warehouse to be delivered to their stations and it is possible to look at the products being shipped out to the customers as well.

Section II: Use Cases

1. David is a supermarket manager that wants to restock food for the store. He goes to the computer in his office which is already on the supermarket chain's network. He needs to log into his Manager EZI account with his Employee ID number and password before being able to access any of the system. Then, he creates a request for the food he needs at the store along with a desired amount. After he submits the request, he wants to change the amount of items and submits a request change that modifies the original request.

2. Victor is an employee at a warehouse for a big box chain and is tasked with processing requests from the stores. He logs into his Sender EZI account from his work station to see the requests he is assigned. He then gathers the product to send to the store and creates a conformation request for the initial request, indicating it has been fulfilled. Victor knows that not everything in the store request was available at his warehouse and knows that another warehouse will submit their own confirmation request when they send product to the store.

3. Mia is an employee working at a big box store and is working on the online fulfillment purchases. She logs into her Sender EZI account and sees a customer has ordered some products and they will be picked up at the store. She collects the items for the purchase and notices that is has been updated for delivery. Mia places the contents in a shipping box and creates a confirmation update for the order, indicating that the purchase has been packed and is in the process of being delivered.

4. Mel works in a warehouse and today has been assigned online orders for shipping. They log into their Sender EZI account and see that there is a purchase for some products. Mel gathers the product, puts it in a shipping box and creates a confirmation update for the purchase, letting the customer know that their item has started the transit process.

5. Patty is the manager at a warehouse and notices some product is getting low. She logs into her Manager EZI account and creates an order that will be fulfilled by a Supplier and shipped to her warehouse. The stock shipped by the Supplier can contain a variety of different products in one shipment.

6. It is Chris's first day on the job at a store. Before he can get to work, the manager of the store has to login to their Manager EZI account and create a Sender account using Chris's Employee ID. The first time that Chris tries to log into his account, he will have to create a password so that he will be able to access it each time he comes to work.

7. Mary is one of the only employees that showed up to work today. She has to do more tasks than usual today, so she logs into her Manager EZI account and starts fulfilling orders that are meant for store pickup and delivery by creating confirmation updates for Customer purchases.

Section III: Database Requirement

1. Location
    i. A location shall be a store or a warehouse
    ii. A location shall contain products
    iii. A location shall receive stock

2. EZI Account
    i. An EZI account shall only be used by Employees
    ii. An EZI account shall only be used by one Employee
    iii. An EZI account shall only be used on company machines
    iv. There are only three different EZI account types
    v. Manager EZI accounts shall do everything a Sender account shall do
    vi. Manager EZI accounts shall make requests to restoke their store
    vii. Manager EZI accounts shall submit request changes to change previous requests
    viii. EZI accounts shall view requests made by Manager accounts
    ix. EZI accounts shall create confirmation requests indicating that items in a request are being shipped to the store that requested them
    x. Multiple EZI accounts shall contribute to one request and send multiple confirmation requests
    xi. EZI accounts shall create confirmation updates for Customer purchases either for shipping or store pickup
    xii. Manager EZI accounts shall order more Stock from Suppliers
    xiii. Manager EZI accounts shall create Sender EZI accounts
    xiv. Manager EZI accounts shall create Driver EZI accounts
    xv. Manager EZI accounts shall create Security EZI accounts

3. Employee
    i. An Employee shall only have one EZI account

4. Customer
    i. A Customer shall only be able to determine if their purchase is pick up or delivered

5. Suppliers
    i. Suppliers will ship stock to warehouses

ii. Supplies will receive orders from EZI Managers
iii. Suppliers can ship stock that has multiple different products

6. Devices
    i. Devices shall only be used by Employees
    ii. Employees use to login to EZI account

7. Packages
    i. Packages shall contain different Product
    ii. Packages shall be delivered to Customers
    iii. Packages shall be delivered by Drivers or Delivery Partners
    iv. Packages shall be shipped from locations

8. Delivery Partners
    i. Delivery Partners shall deliver packages to customers

9. Vehicles
    i. Vehicles shall be used by Drivers

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

1. Employee (Strong)
    - employee_id: key, numeric
    - name: composite
        - first_name: alphanumeric
        - last_name: alphanumeric
    - dob: composite, numeric
        - year: numeric
        - month: numeric
        - day: numeric
    - age: derived, numeric
    - email: alphanumeric

2. EZI Account (Weak)
    - easy_id: key, numeric
    - employee: weak key, numeric
    - password: alphanumeric

3. Manager EZI Account (Weak)
    - ManagerEZI_id: key, numeric

4. Sender EZI Account (Weak)
    - SenderEZI_id: key, numeric

5. Product (Strong)
    - product_id: key, numeric
    - product_name: alphanumeric
    - product_descrip: alphanumeric

6. Location (Strong)

- location_number: key, numeric
- address: composite, alphanumeric
    - street: alphanumeric
    - zipcode: numeric
    - city: alphanumeric
    - state: alphanumeric

7. Supplier (Strong)
    - supplier_id: key, numeric
    - supplier_name: alphanumeric
    - address: composite, alphanumeric
        - street: alphanumeric
        - city: alphanumeric
        - country: alphanumeric

8. Shipment (Weak)
    - shipment_id: key, numeric
    - location: weak key, numeric
    - supplier: weak key, numeric
    - arrival: composite, numeric
        - year: numeric
        - month: numeric
        - day: numeric

9. Shipping Content (Weak)
    - shipment: weak key, numeric
    - stock: weak key, numeric
    - quantity: derived, numeric

10. Customer (Strong)
    - customer_id: key, numeric

- customer_name: composite
    - customer_first: alphanumeric
    - customer_last: alphanumeric

11. Customer Purchase (Weak)
- purchase_id: key, numeric
- customer_id: weak key, numeric
- destination: composite, alphanumeric
    - street: alphanumeric
    - zipcode: numeric
    - city: alphanumeric
    - state: alphanumeric
- total: numeric

12. Confirm Purchase (Weak)
- purchase_id: weak key, numeric
- deliver_date: composite, numeric
    - year: numeric
    - month: numeric
    - day: numeric
- store_ready: boolean

13. Purchase Content (Weak)
- order_id: weak key, numeric
- product_id: weak key, numeric
- quantity: numeric

14. Inventory (Weak)
- location: weak key, numeric
- product_id: weak key, numeric
- quantity: numeric

15. Review (Weak)
- order_id: weak key, numeric
- easy_id: weak key, numeric
- status: bool

16. Device (Strong)
- device_id: key, numeric
- type: alphanumeric

17. Stock (Strong)
- stock_id: key, numeric
- product_id: weak key, numeric
- supplier: weak key, numeric

18. Order (Weak)
- order_id: key, numeric
- location: weak key, numeric
- stock_id: weak key, numeric

19. Request (Weak)
- request_id: key, numeric
- stock_id: weak key, numeric

20. Confirm Request (Weak)
- confirm_id: key, numeric
- arrival: composite, numeric
    - year: numeric

    - month: numeric
    - day: numeric

21. Package(Strong)
- tracking_number: key, numeric
- weight: numeric
- deliver_date: composite, numeric
    - year: numeric
    - month: numeric
    - day: numeric

22. Delivery Partner (Strong)
- partner_id: key, numeric
- partner_name: alphanumeric
- country: alphanumeric

23. Driver (Weak)
- driver_id: key, numeric
- license_number: numeric
- working: Boolean

24. Vehicle (Strong)
- vehicle_number: key, numeric
- license_plate: alphanumeric
- current_location: composite, alphanumeric
    - street: alphanumeric
    - city: alphanumeric
    - state: alphanumeric

25. Record (Strong)

- trip_id: key, numeric

- distance: numeric
- package_count: numeric

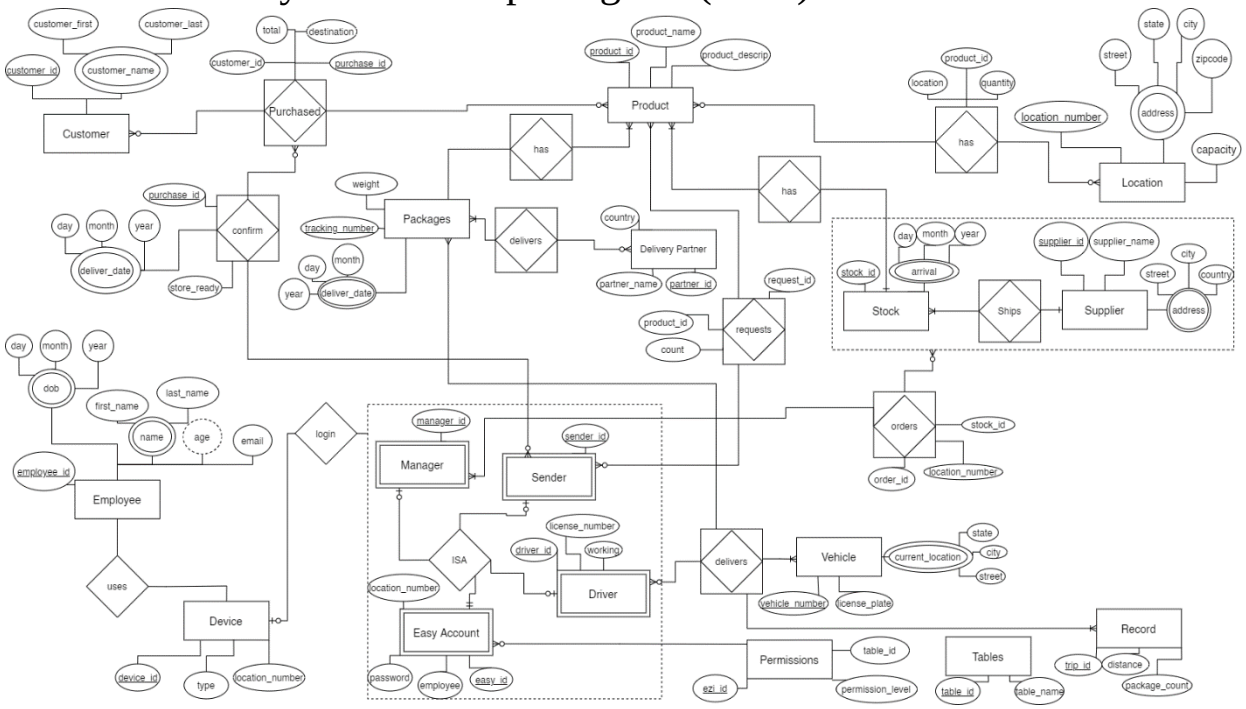
26. Permission (Strong)

- ezi_id: key, numeric
- permission_level: numeric
- update_level: numeric

27. Tables (Strong)

- table_id: key, numeric
- table_name: alphanumeric

Section V: Entity Relationship Diagram (ERD)



Section VI: Testing Table

Rule	Entity A	Relation	Entity B	Cardinality	Pass/Fail	Description
1	Location	Has	products	Many to Many	Pass	None
3	Employee	Uses	EZI acct	One and Only one	Fail	No relation on line
5	Device	login	EZI acct	Many to one	Fail	No relation on line
6	EZI acct	ISA	Manager EZI acct, Sender EZI acct	ISA	Pass	None
7	Manager EZI	Request	product	0 or many to 1 or many	Pass	None
8	Manager EZI	Request Change	Request	One to one	Fail	No relation on line
9	EZI account	create	Confirmation request	One to one	Fail	Can confirm a 0
11	EZI account	confirm	purchase	0 or 1 to 0 or many	fail	Only 1 account can confirm
14	Manager EZI	order	stock	Many to 0 or many	pass	none
15	Manager EZI	Create	Sender EZI	One to one	Fail	No where on erd diagram

Section VII: Database Model/EER

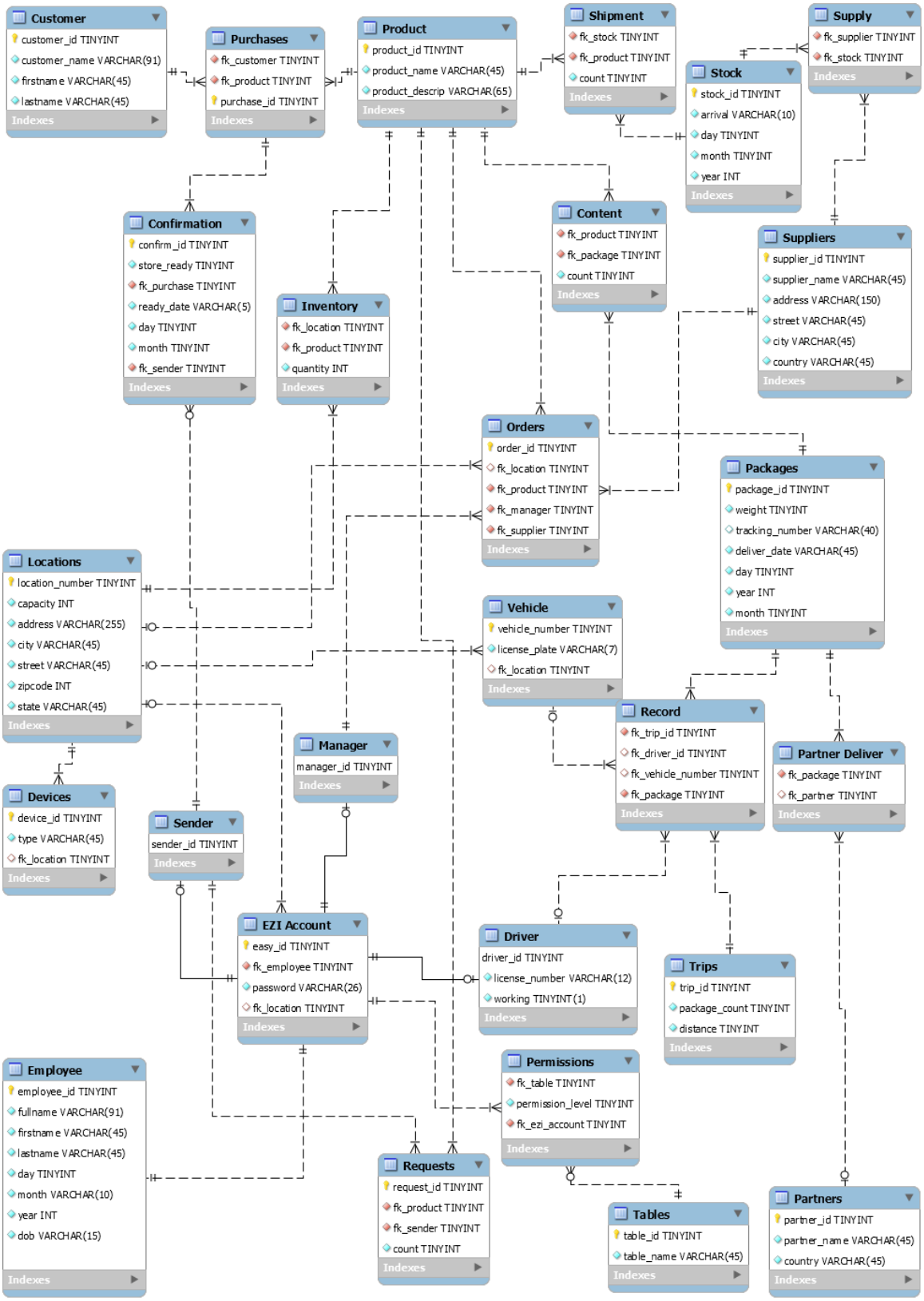


Table	FK	ON DELETE	ON UPDATE	Comment
Purchases	Customer	NO ACTION	CASCADE	If the customer is deleted, their purchases can still be useful to study the data of customers purchasing from the company
Purchases	product	NO ACTION	CASCADE	If the product is deleted, there should still be a record of what items are being sold
Shipment	stock	CASCADE	CASCADE	If a stock is deleted, then there should be no reason to keep the items in the shipment from that stock
Shipment	product	NO ACTION	CASCADE	If product is deleted, that doesn't delete the product in transit
Supply	supplier	NO ACTION	CASCADE	If a supplier is deleted, the stock in transit will still arrive
Supply	stock	CASCADE	CASCADE	If a stock is deleted, then a location might need to reorder from the same supplier
Content	product	NO ACTION	CASCADE	If product is delete, that doesn't mean the product currently in transit will stop existing
Content	package	CASCADE	CASCADE	If a package is deleted, then items that are not going to be shipped should not be saved
Inventory	location	CASCADE	CASCADE	If a location is deleted, then there is no need to assume anything is accessible at that location
Inventory	product	NO ACTION	CASCADE	If product is deleted, there could still be some at locations
Confirmation	purchase	CASCADE	CASCADE	If the purchase is deleted, the customer cancelled their purchase so they should not receive products
Confirmation	sender	NO ACTION	CASCADE	If sender is deleted, that doesn't mean the confirmation of customer purchase is deleted
Orders	location	SET NULL	CASCADE	If a location is deleted, then it will be set to null so a delivery can go to a different location
Orders	stock	CASCADE	CASCADE	If the stock is deleted, then the order was cancelled and doesn't need to be kept
Orders	manager	NO ACTION	CASCADE	If a manager is deleted, that should not change the request for more product

Orders	supplier	CASCADE	CASCADE	If a supplier was deleted, then that means they wont be sending the stock
Vehicle	location	SET NULL	CASCADE	If a location is deleted, then the vehicle can be moved to a different location
Record	trip	CASCADE	CASCADE	If a trip was deleted, then the is no reason for a driver to deliver
Record	driver	SET NULL	CASCADE	If a driver is deleted, then it is set to null so a different driver can be assigned to the trip
Record	vehicle	SET NULL	CASCADE	If a vehicle is deleted, then it is set null so a different vehicle can be assigned to the trip
Record	package	CASCADE	CASCADE	If a package is deleted, then only that package is removed from the trip and that is fine
Partner Deliver	package	CASCADE	CASCADE	If a package is deleted, then there is no more reason for it to be delivered
Partner Deliver	partner	SET NULL	CASCADE	If a partner is deleted, then it will be set Null so another partner can finish the delivery
Devices	location	SET NULL	CASCADE	If a location is deleted, then it will be set null so the devices can be moved to a different location
EZI Account	employee	NO ACTION	CASCADE	If an employee is deleted, then there should be no action since they may have other processes in process
Requests	product	CASCADE	CASCADE	If the product is deleted, then it can’t be delivered to the customer
Requests	sender	SET NULL	CASCADE	If a sender is deleted, then it will be set null so another worker can finish the job
Permission	Ezi account	CASCADE	CASCADE	If a ezi account is deleted, then their permissions will also be deleted
Permission	Tables	CASCADE	CASCADE	If a table is deleted, then accounts should not be able to access them

Section IX: Inserting Data

Entity	SQLQuery	Pass/Fail	Error Description	Possible Solution
Employee	Update	Pass	None	
Employee	Delete	Fail	foreign key constraint fails	Create another table to hold deleted employees or
Partners	Update	Pass	None	None
Partners	Delete	Pass	None	None
Tables	Update	Pass	None	None
Tables	Delete	Pass	None	None
Requests	Update	Pass	None	None
Requests	Delete	Pass	None	None
Permissions	Update	Pass	None	None
Permissions	Delete	Pass	None	None
Trips	Update	Pass	None	None
Trips	Delete	Pass	None	None
Driver	Update	Pass	None	None
Driver	Delete	Pass	None	None
Ezi Account	Update	Fail	foreign key constraint fails	Make sure the other tables have foreign key on cascade
Ezi Account	Delete	Fail	foreign key constraint fails	Add a table for deleted accounts
Devices	Update	Pass	None	None
Devices	Delete	Pass	None	None
Sender	Update	Fail	Constraint on sender table	Make sure the other tables have foreign key on cascade
Sender	Delete	Fail	foreign key constraint failed	Allow id to be severed from the employee after employee deletion
Manager	Update	Pass	None	None
Manager	Delete	Fail	foreign key constraint failed	Allow id to stay in tables for the record and make account inactive
Record	Update	Pass	None	None
Record	Delete	Pass	None	None

Packages	Update	Pass	None	None
Packages	Delete	Pass	None	None
Partner Delivery	Update	Pass	None	None
Partner Delivery	Delete	Pass	None	None
Vehicle	Update	Pass	None	None
Vehicle	Delete	Pass	None	None
Locations	Update	Pass	None	None
Locations	Delete	Pass	None	None
Orders	Update	Fail	Constraint on orders table	Set the key on orders table to cascade
Orders	Delete	Pass	None	None
Suppliers	Update	Pass	None	None
Suppliers	Delete	Fail	Key constraint failed on orders	This should have been set to null, so check the key action on delete
Content	Update	Pass	None	None
Content	Delete	Pass	None	None
Inventory	Update	Pass	None	None
Inventory	Delete	Pass	None	None
Confirmation	Update	Fail	Constraint on purchase	make the action for key in purchase table cascade
Confirmation	Delete	Pass	None	None
Supply	Update	Fail	Constraint to stock	Check the action for key on stock table
Supply	Delete	Pass	None	None
Stock	Update	Pass	None	None
Stock	Delete	Fail	Constraint to stock	Check the table binding stock and supply together
Shipment	Update	Pass	None	None
Shipment	Delete	Pass	None	None
Product	Update	Pass	None	None
Product	Delete	Fail	foreign key constraint failed	Need to add a table for deleted products until all are deleted from other tables

Purchase	Update	Fail	Constrained to confirmation	Check the action for confirmation table to update
Purchase	Delete	Fail	foreign key constraint failed	Need to delete the confirmation if deleted
Customer	Update	Pass	None	None
Customer	Delete	Fail	Cannot delete parent row	Need to keep customer in separate table so their purchase is still valid