Online Retail Database

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Project Description

When running an online retail service, there is a huge amount of details that needs to be kept track of to ensure both user satisfaction and company profits. When these details are recorded incorrectly, items could be sent to the wrong locations, transactions could be processed at the wrong prices, and users could accidentally purchase items that are out of stock. All of these scenarios will result in a loss of time and money for both the user and the company.

This is where the online retail database comes in. With this database, companies will be able to keep track of their products, users, and orders with much greater efficiency and accuracy than before. This database will automatically update the quantity of items when an order is made, as well as store important user information to determine where the order should be sent and how the payment will be made. This database will also store user reviews of the products being sold, giving greater insight to companies on why certain products are not selling as well as others. With a collection of user orders and reviews, companies will be able to better recommend products to their customers and be able to adjust their lineup of items to accommodate customer needs. In addition to this, the database will help to provide quality assurance by tracking the journey of each package from the supplier who creates it all the way to the courier service that makes the final delivery. Employees that are necessary to keep this online retail store running will also be included in the database, making it easier to distribute tasks and adding more accountability on each employee.

The advantage of using this database over others is that it has a strong focus on quality assurance, allowing the company to find any areas that may result in them sending a product in less-than-satisfactory condition and remedy them quickly.

Use Cases

Use Case: Purchasing an item

Actors: John - Customer, Retail Company

Description: John is a customer who frequently buys products from this retailer. Since he is busy and cannot make it to the physical store, he often finds himself purchasing from their website. However, he is frustrated because there are several problems that occur during the buying process, ranging from minor inconveniences to serious issues. For one, the website prompts him every time he uses the website to provide his payment information and address, and he finds it tedious to have to continually input this information. Another issue he experiences is that sometimes he will purchase an item, and he will later receive an email telling him that the item is out of stock, and that he can either wait longer than promised for his order or apply for a refund.

The online retail database will allow companies to better serve customers like John. Using the database, customer information such as their payment information and address will be stored, making the purchasing process much quicker. In addition, the online retail database will automatically decrement the stock of a product after it is purchased, making it easier to know if a product is out of stock, thereby allowing the website to temporarily prevent a customer from buying this product. When a customer enters a site, a shopping session is automatically created, and the customer can add products to their carts during this time. If a product is out of stock, it won't be added to the cart. Another benefit is that upon selecting a delivery option, the cost of delivery will automatically be added to the order. The database will also store pictures of each item, allowing the customer to see them and make a more informed purchase.

Use Case: Vendors Selling Products

Actors: Shoplist - Retail Company, Vendors

Description: Shoplist is an online retail store that has been doing well for some time, and has managed to attract some third-party vendors. However, the executives at Shoplist have been finding it difficult to keep track of all the vendors they work with, and how much money each one is owed. It takes a significant amount of time to go through the orders and divide up the amount owed per vendor, time that could be better spent on more forward-thinking initiatives.

With the online retail database, this issue will be no more. Shoplist will be able to put all their third-party vendors into the database. In addition, when a purchase of a product from one of these vendors is made, the database will automatically update the amount owed to this vendor, and will also link the order details to the vendor in case this amount needs to be verified.

Use Case: Quality Control

Actors: Ariana - Quality Control Representative, Distribution Worker, Distribution Center, Courier Service

Description: Ariana is in charge of quality control at the online retail company she works for. A problem she often runs into is having trouble tracking down what caused an order to be completed in an unsatisfactory way. The first problem with this is that it's difficult to figure out which worker handled the package, or what packaging or courier service was used to deliver it. Even if this is found out, when customers return their items, there are varying levels of feedback

on what the issue with the product is, meaning that it's hard to discern whether the problem occurred during delivery or was an issue with the vendor.

This situation can be avoided using the online retail database. With the database, whenever an order is carried out, the ID of the worker who handled the package at the distribution center will be inputted, as well as the packaging and courier services used to package and deliver the order. In addition, returns will be divided into different categories based on the reason for return, such as packaging damaged but item undamaged, packaging undamaged but item damaged, or packaging damaged and item damaged. This will remove much of the guesswork in trying to figure out where things went wrong in the process of completing the order. If the problem was a result of vendor or supplier issues, Ariana can check when their contracts expire and consider moving forward with a different option.

Use Case: Categorizing Products

Actors: Allan - Customer, Online Retail Company

Description: Allan is a frequent customer of this particular online retail store. He likes their selection of products, but often finds it difficult to navigate through them. They aren't organized in an intuitive way, and when he tries to search up products, it doesn't do a very good job of recommending similar ones that he might enjoy more. This lack of organization is a problem for the company too, because they have a hard time figuring out what type of items sell the best.

With the online retail database, this problem will be solved by having specific categories for items. When the online retail company first lists a product for sale, they will have to input the

category and subcategory this item belongs to. Using this, the company will be able to sort by category to see which products bring in the most profits, as well as display the products in a way that is easy to navigate for the customer.

Use Case: Product Reviews

Actors: Vivienne - Customer, Arlene - Customer Service Representative

Description: Vivienne is a frequent shopper at an online retail store. She likes most of the products they have on sale, but occasionally she is dissatisfied with something she receives. She finds it somewhat difficult to find what products would be good or bad because there aren't many reviews on the site. This is because the company has an outdated system of having customers email in any complaints or general feedback they have on the products they receive. This makes it difficult and time-consuming for Arlene, the customer service representative, to sort through all of them and figure out which reviews correspond to which product. Because of how slow this process is, there is often a long time period between when the first negative reviews of a product are made and any action is taken.

This can be solved by the online retail database. When customers leave reviews, they will immediately be stored in the database and linked to the products they are referencing. This way, the reviews can be seen quickly and sorted based on the rating given, allowing the company to act more swiftly to remedy any issues with their products and ensuring that customers can be confident with their purchases. A certain proportion of negative reviews will flag an item for review by a customer service representative.

Use Case: Sending Alerts

Actors: Customer, Charlene - Online Retail Company CEO

Description: Charlene is the CEO of an online retail company that has recently been gaining traction. Now that she has something of a dedicated user base, she feels as though there must be some way to incentivize users to purchase more products that they may be interested in. As of now, she must find the email addresses of all customers and send them any deals that are currently occurring. She believes there must be a simpler and more efficient way to do this.

With the online retail database, Charlene can send alerts to a large number of customers on the site very quickly. This way, customers will see any deals they might be interested in when they sign into their accounts.

Use Case: Advertising

Actors: CEO - Jack, Online Retail Company, Brand Partners, PPC (pay-per-click) Managers, Marketing Specialists

Description: Jack is the CEO of an online retail company that has recently gained some traction. He attributes this increase in customers to the money he's invested in marketing. However, he's not sure what parts of his marketing campaign are actually bringing him the most success. He feels that if he knew what channels performed worse in terms of attracting new clients, he would be able to redirect the money that would have gone there to something more beneficial.

The online retail database provides the perfect solution for this problem. Using the database, Jack can input any brand partners and advertising channels that he's utilizing. He will be able to

assign specialized workers to monitor these two things, and analyze what parts of them are bringing in the most money. In particular, by having the advertising channels in the database, he can quickly and easily find out which advertising channel produces the best click rate based on cost.

Use Case: Distribution of Work

Actors: Olga - CEO, Office Workers

Description: Olga is the CEO of a moderately successful online retail store. She believes that business is fine as it is, but could be doing much better. To her, the biggest problem she encounters is a lack of awareness of what tasks each worker is assigned to. It's common for some to be in charge of too many products, while others have little to do. In addition, when mistakes happen amongst the employees, it's difficult to pinpoint who was responsible.

The online retail database will solve this problem by including specific attributes for each employee. These attributes will immediately allow Olga to find out how many tasks each worker has assigned to them, and in this way she and other employees will be more easily able to divide up the work. Another feature is that employee errors will be logged in, and she can see if any employees have a higher-than-average error rate, and be able to talk to them to see if there's anything she can do to remedy the situation. The database will also allow for office workers to be set as supervisors for other office workers, making the task of training a new hire a clearer responsibility.

Use Case: Tracking Expenses

Actors: Jason - CEO

Description: Jason is the CEO of an online retail business that has recently been making a large amount of sales. This would be exciting news, but the only problem is, Jason has a hard time keeping track of all the expenses incurred along the way, and therefore doesn't actually know if he's making a profit. He would like a simple way to be able to track the gains and losses made by his company.

The online retail database will solve this problem by having each expense saved in its database after being manually inputted. With this information, the database can add up all the costs incurred, as well as the all the money made from the orders, and return the difference to show how much money was made. This database will have the dates when these expenses and orders were made, so it will be able to show data over certain time periods, so Jason can figure out if he's trending upward or downward, and how to proceed based on this information. In addition, expenses will be tracked based on what category they are from. For example, Jason could choose to look at only courier costs to get a greater understanding of where company money is going.

Database Requirements

1. Users
    1.1. A user shall have many order details
    1.2. A user shall make many reviews
    1.3. A user shall have many payment methods
    1.4. A user shall have many returns
    1.5. A user shall have many gift cards
    1.6. A user shall have many addresses
    1.7. A user shall receive many alerts
    1.8. A user shall have many cart items
    1.9. A user shall have at most one membership
2. Products
    2.1. A product shall have at most one third-party vendor
    2.2. A product shall have its material provided by at most one supplier
    2.3. A product shall be referenced by many order items.
    2.4. A product shall have many reviews
    2.5. A product shall be overseen by at most one quality assurance representative
    2.6. A product shall be referenced by many cart items
3. Vendors
    3.1. A vendor shall have many products
    3.2. A vendor shall incur many vendor expenses
4. Vendor expense

4.1. A vendor expense shall be incurred by only one vendor

5. Supplier

5.1. A supplier shall provide materials for many products

5.2. A supplier shall incur many supplier expenses

6. Supplier expense

6.1. A supplier shall be incurred by only one supplier

7. Shopping session

7.1. A shopping session shall belong to only one user

7.2. A shopping session shall be referenced by many cart items

8. Cart Item

8.1. A cart item shall reference only one product

8.2. A cart item shall belong to only one session

9. Reviews

9.1. A review shall belong to only one user

9.2. A review shall belong to only one product

10. Order Details

10.1. An order detail shall belong to one user

10.2. An order detail shall be paid by only one payment information

10.3. An order detail shall use only one delivery option

10.4. An order detail shall be processed by at most one distribution center

10.5. An order detail shall be processed by many distribution center workers

10.6. An order detail shall be packaged by at most one packaging service

10.7. An order detail shall be delivered by at most one courier service

11. Order Items

    11.1. An order item shall belong to only one order detail

    11.2. An order item shall include only one product

12. Product categories

    12.1. A product category shall be assigned to many products

13. Payment Information

    13.1. A payment information shall belong to at least one user

    13.2. A payment information shall belong to many order details

14. Delivery Option

    14.1. A delivery option shall be used in many orders

15. Returns

    15.1. A return shall be made by only one user

    15.2. A return shall reference only one order

    15.3. A return shall be made with one or many products

16. Return Reasons

    16.1. A return reason shall be used in many returns

17. Distribution Centers

    17.1. A distribution center shall be used to distribute many orders

18. Distribution Center Worker

    18.1. A distribution center worker shall process many orders

    18.2. A distribution center worker shall work at at most one distribution center

19. Courier Services

    19.1. A courier service shall deliver many orders

19.2. A courier shall incur many courier expenses

20. Courier expense

20.1. A courier expense shall be incurred by only one courier

21. Packaging Services

21.1. A packaging service shall package many orders

21.2. A packaging service shall incur many packaging expenses

22. Packaging expense

22.1. A packaging service shall be incurred by only one packaging service

23. Office Worker

23.1. An office worker is a quality assurance representative, a customer service representative, a PPC manager, or a marketing specialist

23.2. An office worker can supervise another office worker

24. Quality Assurance Representative

24.1. A QA representative shall oversee many products

25. Customer Service Representatives

25.1. A customer service representative shall process many refunds

26. Addresses

26.1. An address shall belong to at least one user

27. Alerts

27.1. An alert shall be sent to many users

28. Membership

28.1. A membership shall belong to one user

29. Advertising Channels

29.1. An advertisement channel will be overseen by many PPC managers.

30. Brand Partnerships

30.1. A brand partnership will be overseen by many marketing specialists.

31. PPC (Pay-per-click) Manager

31.1. A PPC manager shall oversee at least one advertising channel

32. Marketing Specialist

32.1. A marketing specialist shall oversee at least one brand partnership

33. Expenses

33.1. An expense shall be incurred by at most one of the following expenses: vendor expense, supplier expense, packaging expense, or courier expense

Entities List

1. Users (Strong)
    a. user_id: key, numeric
    b. name: composite, alphanumeric
        i. first
        ii. last
    c. dob: date, composite
        i. year
        ii. month
        iii. day
    d. registration_date: date, composite
        i. year
        ii. month
        iii. day
    e. email: alphanumeric
    f. password: alphanumeric
2. Products (Strong)
    a. product_id: key, numeric
    b. name: alphanumeric
    c. description: alphanumeric
    d. stock: numeric
3. Vendors (Strong)

    a. vendor_id: key, numeric
    b. name: alphanumeric
    c. contract_start: date, composite
    d. contract_end: date, composite

4. Vendor Expense (Weak)
    a. vexpense_id: key, numeric
    b. amount: numeric
    c. description: alphanumeric
    d. paid_on: date, composite
5. Supplier (Strong)
    a. supplier_id: key, numeric
    b. name: alphanumeric
    c. contract_start: date, composite
    d. contract_end: date, composite
6. Supplier Expense (Weak)
    a. sexpense_id: key, numeric
    b. amount: numeric
    c. description: alphanumeric
    d. paid_on: date, composite
7. Shopping Session (Weak)
    a. session_id: key, numeric
    b. total: numeric
    c. created_at: date, composite

    d. modified_at: date, composite

8. Cart Item (Weak)
    a. item_id: key, numeric
    b. quantity: numeric
    c. added_at: date, composite
9. Reviews (Weak)
    a. review_id: key, numeric
    b. description: alphanumeric
    c. created_at: date, composite
10. Order details (Weak)
    a. order_id: key, numeric
    b. total: numeric
    c. created_at: date, composite
11. Order items (Weak)
    a. item_order_id: key, numeric
    b. quantity: numeric
    c. created_at: date, composite
12. Product categories (Strong)
    a. category_id: key, numeric
    b. category name: alphanumeric
    c. subcategory name: alphanumeric
13. Payment Information (Weak)
    a. payment_id: key, numeric

    b. card_number: numeric
    c. cvv: numeric
    d. expiration: date, composite
        i. year
        ii. month

14. Delivery Option (Strong)
    a. option_id: key, numeric
    b. description: alphanumeric
    c. nonmember_price: numeric
    d. member_price: numeric

15. Returns (Weak)
    a. return_id: key, numeric
    b. description: alphanumeric
    c. created_at: date, composite

16. Return Reasons (Strong)
    a. reason_id: key, numeric
    b. categories: alphanumeric
    c. subcategories: alphanumeric

17. Distribution Center (Strong)
    a. center_id: key, numeric
    b. total_packages_processed: numeric
    c. address: alphanumeric, multi-value, composite
        i. street

ii. zipcode

iii. state

18. Distribution Center Worker (Strong)
    a. worker_id: key, numeric
    b. packages_processed: numeric
    c. errors: numeric
    d. salary: numeric
19. Courier Service (Strong)
    a. courier_id: key, numeric
    b. company_name: alphanumeric
    c. contract_start: date, composite
    d. contract, end: date, composite
20. Courier Expense (Weak)
    a. cexpense_id: key, numeric
    b. amount: numeric
    c. description: alphanumeric
    d. paid_on: date, composite
21. Packaging Service (Strong)
    a. packaging_id: key, numeric
    b. company_name: alphanumeric
    c. contract_start: date, composite
    d. contract, end: date, composite
22. Packaging Expense (Weak)

a. pexpense_id: key, numeric
b. amount: numeric
c. description: alphanumeric
d. paid_on: date, composite

23. Office Worker (Strong)
    a. worker_id: key, numeric
    b. salary: numeric
    c. date_hired: date, composite
24. Quality Assurance Representative (Weak)
    a. qa_rep_id: key, numeric
    b. products_managed: numeric
    c. errors: numeric
25. Customer Service Representatives (Weak)
    a. service_rep_id: key, numeric
    b. returns_handled: numeric
    c. errors: numeric
26. Addresses (Weak)
    a. address_id: key, numeric
    b. street: alphanumeric
    c. zipcode: numeric
    d. state: alphanumeric
27. Alerts (Strong)
    a. alert_id: key, numeric

b. subject: alphanumeric
c. description: alphanumeric
d. created_at: date, composite
e. expires_at: date, composite

28. Memberships (Weak)
    a. membership_id: key, numeric
    b. start_date: date, composite
    c. expiry_date: date, composite

29. Advertising Channels (Strong)
    a. channel_id: key, numeric
    b. channel_name: alphanumeric
    c. cost: numeric
    d. clicks: numeric
    e. contract_start: date, composite
    f. contract_end: date, composite

30. Brand Partnerships (Strong)
    a. partnership_id: key, numeric
    b. company_name: alphanumeric
    c. contract_start: date, composite
    d. contract_end: date, composite

31. PPC Manager (Weak)
    a. manager_id: key, numeric
    b. channels_handled: numeric

    c. total_clicks: numeric

32. Marketing Specialist (Weak)

    a. specialist_id: key, numeric

    b. partnerships_handled: numeric

    c. total_cost: numeric

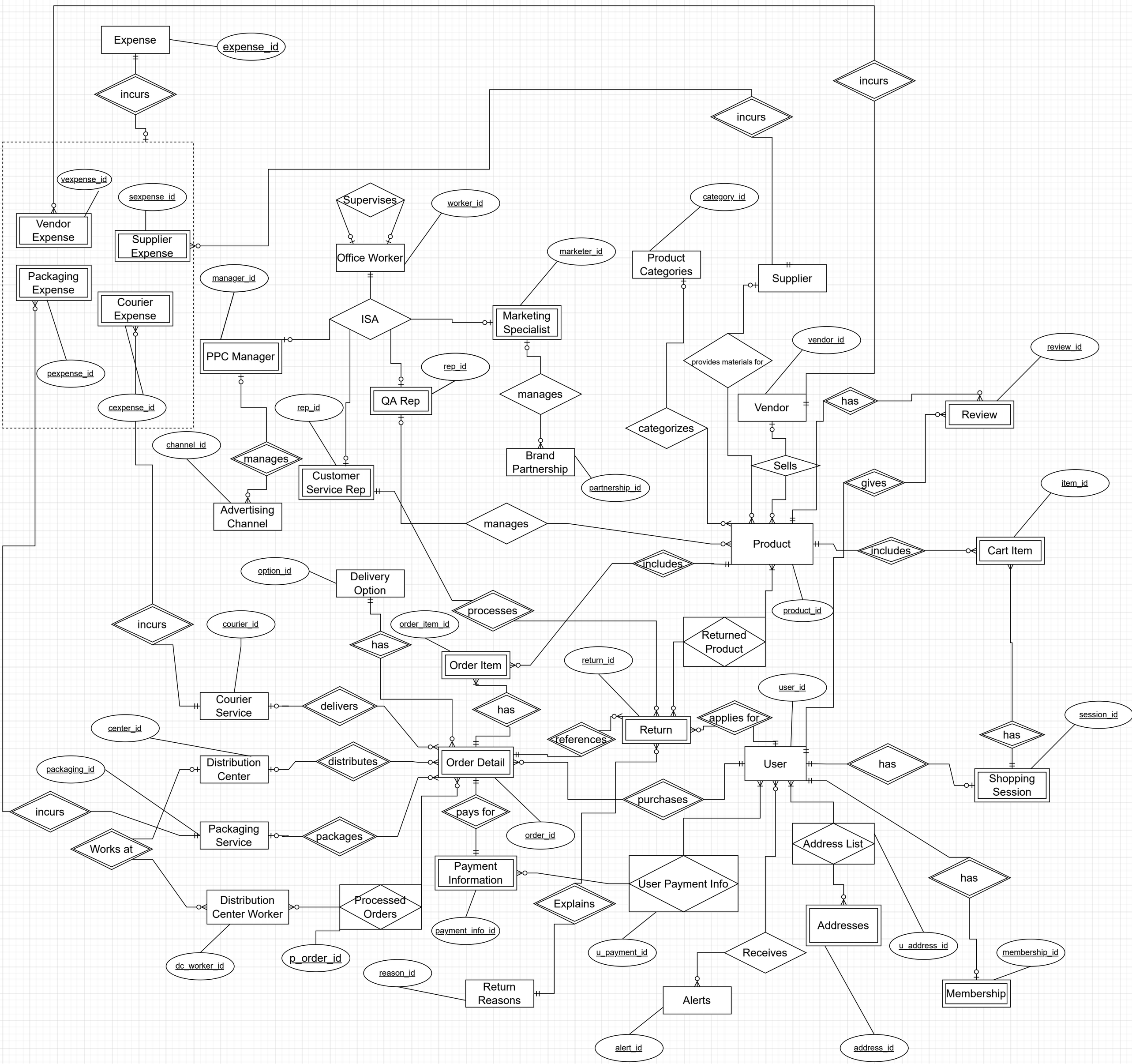
33. Expense (Strong)

    a. expense_id: key, numeric

    b. category: alphanumeric

    c. amount: numeric

Entity Relationship Diagram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incurs
incurs
incurs
vexpense_id
sexpense_id
Vendor Expense
Supplier Expense
Supervises
worker_id
Office Worker
category_id
Product Categories
Supplier
marketer_id
Packaging Expense
Courier Expense
manager_id
ISA
Marketing Specialist
PPC Manager
pexpense_id
cexpense_id
rep_id
QA Rep
rep_id
manages
provides materials for
vendor_id
review_id
Vendor
has
Review
channel_id
manages
Customer Service Rep
Brand Partnership
partnership_id
categorizes
Sells
gives
item_id
Advertising Channel
manages
Product
includes
Cart Item
option_id
Delivery Option
includes
processes
product_id
incurs
courier_id
order_item_id
has
Returned Product
Order Item
return_id
Courier Service
delivers
has
user_id
center_id
applies for
session_id
has
references
Return
Distribution Center
distributes
Order Detail
User
has
Shopping Session
packaging_id
purchases
incurs
pays for
Packaging Service
packages
order_id
Address List
Works at
has
Payment Information
User Payment Info
Distribution Center Worker
Processed Orders
Explains
Addresses
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dc_worker_id
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u_payment_id
Receives
membership_id
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Return Reasons
Alerts
Membership
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