COMP-421 Database Systems, Winter 2019

Project 1: Database Design and Data Modelling

SAAS Shoe Store Database

Group 37

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Requirement Analysis

Introduction

Purpose:
This application will store information and requirements necessary to reflect the operations of an online shoe store. Our database design effectively represents the transactional process of storing inventory, displaying our product (shoes), and selling to customers. In the creation of our database model below, we hoped to design a system that both accurately shows the mechanics behind the purchase of a shoe on our online shoe store and helps drive insights into growing our business.

Overview:
For our online shoe store, online guests can browse through our available shoe stock, discovering a variety of footwear they can purchase. We offer an assortment of different shoes - from everyday athletic and casual shoes to high-end dress shoes. Each shoe model can come with different sizes and colors, and we offer options for both men and women. When filtering through particular shoes, our guests can read other customers' ratings and reviews of the shoe, and determine whether to make a purchase. If the guest is interested, they can create an account - which will ask for their name, email address, address, and other details - and they can add the shoe and the quantity of which to buy to a list of items, which constitutes a shopping cart, and can continue shopping until satisfied. When satisfied with the items, the customer is then sent to an interface to purchase their items, where they can now select a delivery type (expedited shipping, regular shipping, etc.), and receive a total cost for that purchase - this constitutes an invoice. With their required method of payment, a payment is made and the shipment is sent, and the user can track its arrival time until they finally receive their product.

Inspiration:
Our project idea was inspired from various online shoe companies such as Allbirds, which is a newer footwear company priding itself upon using sustainable materials. Inspiration for the database design and sets/relationships was derived from sites like Footlocker.

Database Description

Entities and their Attributes

Customers: A customer is someone that has created a profile with our platform and has a username, password, gender, birthday, address and email address as attributes. A customer is uniquely identified with the email address.

Credit Cards: A credit card is uniquely identified with the customer, and is the payment method used by the customer to make the purchase. Its attributes are the card number, the card type, name on the card, address, CVV2 and the postal code. A card is partially identified with the card number, and fully identified with the customer.

Items: Items is a weak entity set that lists items with which the user has interacted. The set of items (which can be thought to constitute a shopping cart), is identifiable by a customer and products they've bought or are interested in from the Shoe entity set. An item also has a status ('bought' or 'interested'), and the quantity of each shoe.

Invoices: The invoices represent the purchases made by the customer. An invoices' attributes are the total amount paid, the date and time of the purchase, shipment type and the invoice_id which is used to identify the invoice uniquely.

Shipment: Shipment represents the details of the delivery. It's attributes include departure time and date, arrival time and date, status and shipment_id. It is uniquely identified with the shipment_id.

Shoes: Shoes are the items in the store that have the attribute of size, product_id and status. Shoes are available in different models. The shoes are uniquely identified with the product_id.

Models: The model of a shoe represents a category of shoe that can have multiple colors. For example, the Air Force 1 shoe model is available in black, white, blue, etc. A model's attributes include its name, description, the model_id, and the price. A model is uniquely identified with the model_id and gender.

Colors: Colors is a weak entity set that relies on the model to identify which colors are available for that model.

Casual Shoes: It is a type of shoe and it inherits the primary key combination from the Shoe entity set.

Sport Shoes: It is a type of shoe and it inherits the primary key combination from the Shoe entity set.

Dress Shoes: It is a type of shoe and it inherits the primary key combination from the Shoe entity set.

Relationships

For: In the Items entity set, each listed shoe in this set is 'for' that customer.

InteractedWith: If the user interacted with a shoe, the item is placed within the Items entity set. A unique shoe can be in at most one user's Items list, and all items in the Items set must map to at most one unique product in Shoes.

PaysWith: The Customer pays for their purchase with a credit card. There is a key and participation constraint on Credit Card, which indicates that all stored cards must be associated with a customer and can be identified by the user.

Purchase: The purchase relationship relates the items bought from a customer with an invoice. There is a key constraint from Items to Invoices, as each unique item (signified by unique pid) can have at most one invoice (only sold once). A participation constraint exists between Invoices and Items, as an invoice must contain an item.

PaidWith: An invoice relies on the existence of a credit card, which pays for the user's items. This relationship has a key and participation constraint from Invoices to Credit Cards, as we allow items to be bought by at most one credit card (no partial payments on multiple cards).

Review: This is a many-to-one relationship between a customer and a model of shoe. A review has a comment and rating as its attributes.

ShoesOf: This is a many-to-one relationship between customers and models, where a customer can review a shoe model only once, while a shoe model can have reviews from many customers.

OfColor: This is a relationship between models and colors that uniquely identifies a model's available colors, with 3 media with which to display the shoe.

RelatedTo: This relationship is between Invoices and Shipments, and represents the shipment associated with an invoice. An invoice ships in one shipment, and each shipment has an invoice.

Functional Requirements

UpdateCart(shoe): The customer adds or removes the shoes that they wants to the Items which is the shopping cart for each customer.

PurchaseShoes(items): The customer purchases the items in the shopping cart that is paid for by the credit card.

UpdateReview(comment, rating): The customer can add or update a review to a particular model by commenting on it and rating the model of the shoe.

CreateAccount(email, username, password, gender, birthdate, address): Guests need to create an account before they make a purchase.

CancelOrder(invoice_id): The customers have the option to cancel an order after they have purchased it

AddCreditCard(card_number, type, name, address, CVV2, postal_code): The customer can add credit card to their account

TrackShipment(shipment_id): The customers can track their shipment info for the their invoices

Relational Model

- Shoes(product_id, model_id, gender, status, size)
- Models(model_id, gender, name, description, price)
- Colors(color_id, model_id, gender, media1, media2, media3)
    - model_id, gender ref Models
- Casual_Shoes(model_id, gender)
    - model_id, gender ref Models
- Sport_Shoes(model_id, gender)
    - model_id, gender ref Models
- Dress_Shoes(model_id, gender)
    - model_id, gender ref Models
- Customers(email, username, password, gender, birthdate, address)
- Items(item_id, email, status, quantity, product_id)
    - email ref Customers
    - product_id ref Shoes
- Purchase(item_id, email, invoice_id)
    - item_id and email ef Items
    - invoice_id ref Invoices
- Credit_Cards(card_number, email, type, name, address, address, CVV2, postal_code)
    - email ref Customer
- Review(email, model_id, comment, rating, model_id)

    - email ref Customers
    - model_id ref Models
- Shipments(shipment_id, departure, arrival, status)
- Invoices(invoice_id, total, date_time, shipment_type, card_number, email, shipment_id)
    - card_number and email ref Credit_Cards
    - shipment_id ref Shipments

Group 37

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email
username
password
gender
birthdate
address
Customers
PaysWith
card number
type
name
address
CVV2
postal code
Credit Cards
For
PaidWith
History of items bought - status
is 'bought' if purchased, else 'in cart'

If quantity 0, it's removed (operation)
Is a shopping cart, listing items.
status
item_id
Items
Purchase
Invoices
RelatedTo
Shipments
shipment id
departure
arrival
status
Don't have to buy everything in
shopping cart, so no participation
constraint here.
total
invoice_id
time/date
shipment type
There has been some interaction between
the customer and the item.
InteractedWith
model_id
gender
name
description
price
product_id
status
size
Shoes
ShoesOf
Model exists without shoe designed in it.
Models
OfColor
Colors
color_id
media1
media2
media3
Review
comment
rating
ISA
Casual Shoes
Sport Shoes
Dress Shoes