Online Retail Store Database

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Project Description

The online retail market space is crowded with new entrants arriving every day seeking to offer the best possible way to purchase products. A new entrant needs to stand out, to offer a powerful and flexible sales platform that enables sellers to connect easily with customers, that enables customers to find the products they're looking for and enables sellers to most attractively market their goods. We seek to offer an online retail store database that will enable developers to create that platform. Online Retail Store Database will be a product that makes it possible to sell everything from clothes to shoes to jewelry to art to electronics, and not just that, but allow a client to sell shoes AND jewelry AND art AND electronics, or host multiple sellers selling any of the above.

Power and flexibility are the two watchwords of this project, starting with our main metaphor for offering products: Stores. Rather than just one storefront, our product allows privileged users to create any number of stores in which to sell their products. Stores have categories and subcategories which are user defined which can be used to sort products within a store or across stores, allowing sites to create a centralized storefront and have individual homepages for each store.

Our commitment to power and flexibility continues with our next big feature – specifications. Our engine allows store owners to specify any number of specifications for products and options for those specifications, a system that allows store owners to describe their products in as much detail as they need. Not only that, specifications and options can be copied across products and used to filter products within a category, a powerful feature that would improve our competition's sites.

We have surveyed the market and found companies whose existing services would be improved by our design, including redbubble.com and etsy.com, two user-driven retail stores that offer a range of products from a range of sellers, but don't allow the feature of sorting by specifications.

We are very excited to bring our product to market and we hope that you'll agree.

Functional Requirements

1. User
    1.1. A user shall create only one account.
    1.2. A user with an account is a registered user.
    1.3. A user with access to the database is an admin.
    1.4. A user shall be able to browse one store at a time.
    1.5. A user shall be able to browse many products from one store at a time.
    1.6. A user shall be able to browse many products from many categories from many stores at a time.
    1.7. A user shall be able to browse many products from many subcategories from many categories from many stores at a time.
    1.8. A user shall be able to view one product at a time.
    1.9. A user shall be able to view many specifications for a product.
    1.10. A user shall be able to select many specification options for a specification with specification options.
2. Registered User
    2.1. A registered user shall have only one cart.
    2.2. A registered user shall be able to add many products to his cart.
    2.3. A registered user shall be able to put only one product into his cart at a time.
    2.4. A registered user shall be able to purchase the products in his cart.
    2.5. A registered user shall be able to make many purchases.
    2.6. A registered user shall be able to add many addresses.
    2.7. A registered user shall be able to add many credit cards.
    2.8. A registered user who can create stores is a store owner.
3. Store owners
    3.1. A store owner shall be able to create many stores.
    3.2. A store owner shall be able to add many products to his stores.
    3.3. A store owner shall be able to create many specifications.
    3.4. A store owner shall be able to create many options.
    3.5. A store owner shall be able to set many product specifications for his products.
    3.6. A store owner shall be able to set many options for his product specifications.
    3.7. A store owner shall be able to create many categories.
    3.8. A store owner shall be able to create many subcategories.
    3.9. A store owner shall be able to assign many products to many categories.
    3.10. A store owner shall be able to assign many products to many subcategories.
4. Account
    4.1. An account shall be created by only one user.
    4.2. An account shall have only one cart.
    4.3. An account shall have at least one address.
    4.4. An account shall have at least one credit card.
5. Cart

5.1. A cart shall belong to one account
5.2. A cart shall have many products
5.3. A product in a cart is a cart product

6. Cart Product
   6.1. A cart product shall belong to one cart
   6.2. A cart product shall have many specification-option pairs
7. Store
   7.1. A store shall have one store owner.
   7.2. A store shall contain at least one product.
8. Product
   8.1. A product shall belong to one store.
   8.2. A product shall be able to belong to many categories.
   8.3. A product shall be able to belong to many subcategories.
   8.4. A product shall have many specifications.
9. Category
   9.1. A category shall contain many products.
   9.2. A category shall have many subcategories.
   9.3. A category shall be able to be assigned by many store owners.
10. Subcategory
    10.1. A subcategory shall contain many products.
    10.2. A subcategory shall belong to one category.
    10.3. A subcategory shall be able to be assigned by many store owners.
11. Specification
    11.1. A specification shall be able to belong to one or many products.
    11.2. A specification shall be able to have many options.
    11.3. A specification paired to a product is a product specification.
12. Option
    12.1. An option shall belong to one specification.
    12.2. An option shall belong to many product specifications.
13. Product specification.
    13.1. A product specification shall belong to one product.
    13.2. A product specification shall have many options.
14. Credit Card
    14.1. A credit card shall belong to one account.
    14.2. A credit card shall be used to pay for many purchases.
15. Address
    15.1. An address shall belong to one account.
    15.2. An address shall be used to ship many purchases.
16. Purchase
    16.1. A purchase shall belong to one account.
    16.2. A purchase shall have at least one product.
    16.3. A purchase shall have one credit card.
    16.4. A purchase shall have one address.
    16.5. A product which belongs to a purchase is a purchased product.

17. Purchased product
    17.1. A purchased product shall belong to one purchase.
    17.2. A specification and a specification option for a purchased product is a purchased product specification option.
    17.3. A purchased product shall be able to have many purchased product specification options.
18. Purchased product specification option
    18.1. A purchased product specification option shall belong to one purchased product.
19. Admin
    19.1. The admin shall set registered users as store owners when approved.
    19.2. The admin shall approve new stores.

Non-functional Database Requirements

1. Performance
    1.1. The system shall respond to user requests within 2 seconds.
    1.2. Database queries shall be optimized such that 95% of queries shall execute in less than 100 milliseconds.
    1.3. The system shall be able to handle a minimum of 50 concurrent users without experiencing performance degradation.
    1.4. A cache of frequently accessed information shall be used to improve performance with a cache hit ratio of at least 80%.
    1.5. Regular load testing shall be conducted to ensure the database can handle loads during peak events.
2. Security
    2.1. All passwords shall be stored encrypted.
    2.2. All passwords shall be transmitted encrypted.
    2.3. All credit card numbers shall be transmitted encrypted.
    2.4. Steps shall be taken to protect queries against injection attacks.
    2.5. Regular security audits shall be performed to assess and mitigate vulnerabilities.
3. Scalability
    3.1. The database shall run on one server and shall not be scalable to run on multiple servers.
    3.2. The server shall allocate resources to the database on a fixed basis and shall be restarted if those resources need to be changed.
    3.3. Caching shall be limited to the sole server and shall not be distributed.
    3.4. Connection pooling shall not be used and all connections shall be handled as new.
    3.5. The database shall run as a single unsharded instance.
4. Capability
    4.1. The database shall be compatible with many frontends.
    4.2. The database shall have a user-friendly interface.
    4.3. The system shall provide simple reports of basic database information.
    4.4. The database shall support integration with other systems such as email.
    4.5. The database shall support basic data analysis such as querying and filtering data.
5. Environmental
    5.1. Software and hardware configurations shall be optimized to minimize energy usage.
    5.2. Paperless operations shall be encouraged by having all documentation be electronic.
    5.3. Obsolete hardware shall be disposed of responsibly via recycling.
    5.4. Virtualization shall be used where possible to minimize resource consumption.
    5.5. Remote access shall be enabled so that administrators do not need to travel to the database, minimizing carbon footprint.
6. Coding Standards

6.1. Consistent naming conventions for database entities including tables, columns, and indexes shall be enforced.
6.2. Code shall be documented including documentation of queries, schemas, and stored procedures to facilitate teamwork and future development.
6.3. Robust error handling with meaningful error messages shall be implemented.
6.4. Code shall not be optimized but shall be provided in working order.
6.5. Best security practices including input validation and parameterized queries shall be followed.

7. Media Storage and Privacy
   7.1. Privacy shall be maintained by not tracking IP addresses.
   7.2. There shall be a privacy policy that details how data is stored and used.
   7.3. Media shall not be stored in the database.
   7.4. Links to media may be stored in the database.
   7.5. Each table shall be allocated at least 10Mb of disk space.