CS157A project proposal
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Goals and Description of the Application

Goals:

The primary goal of the Auction and Marketplace System is to provide a platform for users to buy, sell, or auction products. The system will cater to both sellers and buyers by facilitating the listing of items, bidding on auctions, and direct purchasing of products. Additionally, the system will include essential features such as user account management, payment processing, and notifications for transactions.

The system aims to:

1. Enable sellers to list products for sale or auction, manage their listings, and track bids.
2. Allow buyers to browse products, participate in auctions, or directly purchase items.
3. Provide a user-friendly platform that supports product reviews, category management, shipping logistics, and notifications for transactions and updates.
4. Ensure data consistency, secure transactions, and a scalable architecture for future growth.

Description of the application:

The proposed application will function as an online marketplace where users can either list items for sale or participate in auctions. Sellers can create detailed product listings, including images and descriptions, while buyers can browse items, bid on auctions, or make direct purchases. The system will also provide various features to support payments, shipping, and notifications. The application will manage different types of products across multiple categories and will allow users to write reviews and provide feedback on their purchased products.

Key functionalities include:

- **User management**: Secure user registration, login, and profile management.
- **Product management**: Sellers can list products for sale or auction, edit listings, and track bids.
- **Bidding system**: Buyers can bid on auctioned items and view bidding history.
- **Order and payment management**: Buyers can place orders, input payment information, and view order details.
- **Shipping logistics**: The system will manage shipping information and delivery status for each order.

- **Notification system**: Users will receive notifications regarding transactions, bids, and shipping updates.

Application/ Functional requirements

Functional Requirements:

User management:

Register and authenticate users login

Update user information/profile after user login

Change user password

Product sell or auction management:

Seller can list products in different category for sell or auction

Seller can set and edit products name, description, price/starting price, quantity, and listing duration

Seller can view bids on auction product, and also top bid price and bid history

Bidding system:

Buyers can browse products in different categories and bid on products.

Buyers can check for products listing duration and bid history.

Place order and payment system:

Buyers can place order for products

Buyers can manage order details (order date, product name, quantity, individual price, and total price)

Buyers can input different payment methods(visa or others)

Product review system:

Buyers can write reviews and give ratings to purchased products

Buyers can only write reviews to each purchased products once per order

Reviews and ratings will display on product pages

Category management:

Define and manage categories for products

Products associated with different categories

Shipping logistic management:

Create shipping information for orders

Update shipping status and estimate delivery date/time

Notification management:

System sent notification to users about bids, sales, and shipping information

User can view and manage their notification preferences

Nonfunctional Requirements:

Performance

The system must return search results and product listings within 2 seconds under normal load conditions.

Auction bidding updates should be displayed to users within 1 second of a new bid being placed to ensure real-time accuracy during live auctions.

Maintainability

The system should be built using modular components, allowing for easy updates or bug fixes. The average time to resolve issues should not exceed 24 hours.
Developers should be able to add new features or modify existing ones without significant rewrites, supported by comprehensive documentation.

Availability

The system should be available 24/7, with scheduled maintenance taking place during non-peak hours and notifications sent to users 48 hours in advance.

Security

Regular security audits must be conducted, and any discovered vulnerabilities should be addressed within 48 hours.

Usability

The user interface should be intuitive, allowing users to easily navigate between product listings, auction bidding, and account management.
Feedback for user actions (e.g., confirmation of placed bids or successful purchases) must be displayed clearly within 1 second.

Architecture

We developed a web-based Auction and Marketplace System using a client-server model connected to a MySQL database, applying the skills and technologies learned in our Database Management Systems course. Below, I'll describe the tools and technologies used for development in more detail:

Frontend: HTML, CSS, and JavaScript

The user interface is built with HTML, CSS, and JavaScript to ensure a smooth and interactive user experience. When users visit the platform, the frontend sends requests to the backend to fetch initial product or auction data, which is then dynamically displayed using JavaScript. The front end features a search bar and filter options, allowing users to refine their search for products or auction items. As users interact with these features, the front end captures their inputs and communicates with the backend to retrieve and display filtered or search results in real-time, offering a seamless and intuitive browsing experience.

Backend: Node.js and Express Framework

The backend is implemented using Node.js and the Express framework, creating a powerful and flexible server-side environment. The server handles all HTTP requests from the frontend, such as retrieving products, managing auctions, or processing transactions. When a request is received, the backend interacts with the MySQL database, executing SQL queries to fetch the required data, whether it's for listing products, tracking bids, or managing user accounts. The backend then formats this data and sends it to the frontend as a JSON response, ensuring fast and efficient data handling.

Database: MySQL

The MySQL database stores all product and auction data, structured with tables that include attributes like ProductID, SellerID, BidAmount, and more. Each time a user searches for products, applies filters or participates in auctions, the backend constructs SQL queries to match the specified criteria. The database efficiently executes these queries, returning the relevant data to the backend, which processes and formats it for display on the front end. This setup ensures that product listings, auction updates, and user information are always accurate and up to date.

Development Resources

- **Product Images**: Over 200 product images are used to visually enhance the user experience.
- **CSV Files**: Product and auction data are initially imported via CSV files to populate the database.