

COMPUTER SCIENCE DEPARTMENT

ONLINE AUCTION SYSTEM

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### Introduction

The online auction system is a web application where all products are displayed in different categories and a customer can bid to the selected category wised product without facing any problem. The online auction system deals between sellers and bidders. It provides the users for sign up to this application and search for products, manages their accounts. Each customer will have their own account showing their username they have logged in. On the other hand users can also see all product pages without having an access with their account. Signed up users will have to log in first then they can upload products on the site from their account and also can bid for other products which are not owned by them. Users can edit their profile and see their uploaded products and bided products.

Administration panel can approve products, update products, delete products, delete user, update and delete all ongoing bids and can also see all the products, categories, users and bids. All particular bids have limited time to finish. After finishing the bids admin can notify the sellers and also the bidders. This is a well secured system and can be easily operated.

This is fully dynamic. There is nothing static here. The main aim of this web application is to make a good online system that provides a great alternative of bidding policy for general people that saves both time and money.

**1.1 Background of Organization**

For our project we consider the online auction system as our target. In our country there is not much of auction site. So this is a modified and improved idea for ethiopia. This web based application helps users to choose their desire products and upload products on the site. Users can also easily bid on particular products. This provides a great alternative of auction system for general people.

Electronic commerce, also known as e-commerce, has developed rapidly in recent years. More and more and more consumers prefer to shop online for convenience and other benefits. E-commerce and auctions are also attracting attention. Many internet companies like eBay and Yahoo have launched their own auction platforms. Consumer to consumer (C2C) is a business model whereby customers can trade with each other. The consumer to consumer auction is usually an online environment where one customer purchases good from another customer using a third-party platform to facilitate the auction process. The global reach of online auction market allows for the buyers and sellers to overcome geographical constraints and purchase products anytime from anywhere over the internet. Online auction systems provide a more convenient platform for purchasing products than a traditional market. It provides the consumers with great advantages of low prices, greater product selection and greater efficiency compared to the usual traditional offline markets. The reputation of online auctions may be attributed to the simplicity in price negotiations - certainly considered the most frustrating part of the interaction between buyers and sellers. It provides a flexible price point for products unlike the traditional online stores or physical stores. The functional and operational characteristics of the online auctions are different from those of other e-commerce companies.

**1.2 Statement of Problem**

The problem which usually arises in the traditional method of auctioning is that the participants would have to leave their various homes to auctions, this cannot be easy at times and also there are risks involves, for example, a participant may be a victim of a targeted armed robbery attack after bidding . Another issue is the amount of preparation needed before each auction, combined with the high cost of setting up the auction, which made the traditional method efficient for only for the auction of expensive items. With internet, most of these issues have been resolved but there are still a few issues with the existing online auction systems. The major problem with online auctions is inability of buyers to properly and physically evaluate the product quality as the whole process happens over the internet this greatly affects a buyer’s choice when it comes to partaking in online auctions. These problems discourages users from participating in online auctions and hurts the online auction industry.

**1.3 Objectives of the project**

### 1.1.1. General Objectives

### The main objective of this project is to provide a platform for individuals and businesses to buy and sell goods and services through an online bidding process that is scalable, robust and secure.

### Specific Objectives

* To enable customers to see all the products without any authentication.
* To enable the customers to have a visual confirmation that the bid was placed correctly.
* To enable the customers to know product details before bid.
* To ensure correct bid placement through visual interface.

**1.4 METHODOLOGY**

**A. Requirements Gathering:**

The project begins with a thorough requirements gathering phase, involving stakeholder consultations, market research, and analysis of user needs. This phase aims to define the scope of the project, identify key functionalities, and establish performance criteria.

**B. System Design**: Once requirements are gathered, the project moves into the system design phase. Here, the architecture of the online auction system is conceptualized, including database design, user interface design, backend logic, and integration with external services such as payment gateways.

**C. Development and Implementation**: The development phase involves coding the system based on the design specifications. Agile development methodologies are often employed to ensure flexibility, responsiveness to change, and incremental progress. Developers work collaboratively to build and test various components of the system.

**D. Testing and Quality Assurance**: A rigorous testing and quality assurance process is integral to the project flow. This phase involves unit testing, integration testing, system testing, and user acceptance testing to ensure that the online auction system meets functional and performance requirements, is free of bugs, and provides a seamless user experience.

**E. Deployment and Launch**: Once testing is complete and the system is deemed ready for deployment, it is prepared for launch. Deployment involves setting up servers, configuring the environment, migrating data, and conducting final checks to ensure everything is functioning as expected.

**F. Post-Launch Monitoring and Maintenance**: After the system is launched, ongoing monitoring and maintenance are crucial to its success. This includes monitoring system performance, addressing any issues or bugs that arise, implementing updates and enhancements based on user feedback, and ensuring data security and integrity.

**H. Methodology**: The project follows a structured methodology that combines elements of agile and iterative development to ensure efficiency, flexibility, and continuous improvement. Key aspects of the methodology include:

* **Iterative Development**: The project is divided into iterative cycles, with each cycle focusing on specific features or modules. This allows for incremental progress, regular feedback from stakeholders, and flexibility to adapt to changing requirements.
* **Collaborative Approach**: Collaboration between developers, designers, stakeholders, and end-users is encouraged throughout the project. Regular meetings, feedback sessions, and demonstrations help ensure alignment with user expectations and project goals
* **Continuous Testing**: Testing is integrated into every stage of development, from unit testing during coding to comprehensive system testing before deployment. This ensures early detection and resolution of issues, reducing the risk of defects in the final product. Scalability and Extensibility: The system is designed with scalability and extensibility in mind, allowing for future enhancements, integration of new features, and adaptation to evolving business needs and technological advancements.

**1.5 Tools**

**Software tools:**

* To build up this website we have used the main language of programming PHP. For database system, we have used MYSQL. For designing the view in both front-end and back-end, we have used :
* Programming languages: PHP (python(library flask),JavaScript)
* Database system: MYSQL (Postgres)
* Markup languages: HTML, CSS

# 1.6 Scope and Limitation of The Project

# 1.6.1. Scope of the Project

Online Auction System- Bid On will be a web based application which main language of programming will be PHP. Its main aim is to simplify and improve the efficiency of the bidding process for users, minimize data entry and ensure data accuracy and security bid placement process. Users will also be able to view all product menus in categorized way with their full details. Users will also be able to have a visual confirmation that the order was place correctly.

# 1.6.2. Limitations of the project

* Requires internet connection and the person must be computer literate.
* It may not show the complete details of user after getting an item. Sometimes the system falls because of the power outage, internet connection failures both from server and client side.

**1.7 Significance of Study**

There are online auction systems in which the full product description are not available to buyers and this increases the product and seller uncertainty. This new system is trying to improve the buyer’s certainty on the product and the seller they choose to bid on, with the aid of the four important product information signals (text, visual, necessary certifications, book value and usage). The successful implementation of this project results in an auction site which allows for far more effective product evaluations that are comparable to or equal to physical product evaluations

**1.8 Feasibility Study**

**1. Executive Summary**

This feasibility study assesses the viability of developing an online auction platform for companies located in Ethiopia to sell and buy products and also to provide services to the companies. The target audience includes big companies, service providers for the companies, and casual participants seeking affordable equipment.

**2. Market Feasibility**

* **Demand**: There's a growing demand for B2B online auction platforms, particularly for:
  + Surplus inventory: Companies can offload excess stock or discontinued products.
  + Raw materials: Businesses can source materials at competitive prices.
  + Returns and liquidation: Businesses can recoup value from returned or obsolete goods.
* **Competition**: Existing platforms like Alibaba and Global Sources cater to B2B transactions, but some lack a dedicated auction format.
* **Competitive Advantage:**The platform can focus on specific industries or product categories, offering features like:
  + Secure bidding processes tailored to B2B transactions.
  + Verification systems to ensure buyer and seller legitimacy.
  + Bulk lot auctions for efficient offloading of large quantities.

**3. Technical Feasibility**

* **Technology Stack**: The platform will require a robust e-commerce framework with features like secure bidding, user authentication with multi-factor verification for businesses, and bulk upload capabilities. Integration with business accounting systems might be considered for seamless invoicing and payment processing.
* **Technical Expertise:**The development team should have experience with enterprise-level e-commerce platforms, secure data handling practices, and potentially integrations with existing business software.

**4. Financial Feasibility**

* **Costs:** Development costs will be higher compared to a consumer-focused platform due to the complexity of features and security requirements. Marketing will target specific industries through trade publications and online B2B marketplaces, development costs will include initial platform setup, integration with e-commerce and payment processing systems, and ongoing maintenance. Marketing will focus on social media advertising.
* **Revenue:** The platform will generate income through commission fees on completed sales. A premium seller membership option can be explored for features like highlighted listings or bulk upload capabilities.

**5. Other Considerations**

* **Security:** Robust security measures will be implemented to protect user data, financial information, sensitive business data, intellectual property, during auctions, and ensure the integrity of the auction process.
* **Scalability:** **Scalability:** The system should be able to handle large numbers of concurrent auctions, high-value transactions, and a potentially global user base.
* **Legal Compliance:** The platform will adhere to all relevant regulations concerning online auctions, consumer protection, and data privacy.
* **Regulations:** The platform needs to comply with B2B trade regulations, data privacy laws, and industry-specific compliance requirements depending on the products being auctioned

**6. Conclusion**

The development of a B2B online auction system holds promise. There's a clear market demand, and a platform with targeted features can carve a niche in the B2B online marketplace. However, the technical complexity and security requirements necessitate a strong development team and potentially higher initial investment costs.

**1.9 Risk Assumption**

**1.9.1 Risks:**

* **Fraudulent Activity:** B2B transactions can involve large sums of money. An online system introduces vulnerabilities to fake bidders, shill bidding (driving up prices), or even stolen goods.
* **Non-Payment:** Unlike established business relationships, online auctions introduce the risk of buyers winning bids but not following through with payment.
* **Product Misrepresentation:** Sellers may misrepresent the condition or quality of products, leading to disputes and dissatisfied buyers.
* **Security Concerns:** Sensitive business information or financial data could be compromised if the online auction platform has security weaknesses.

**1.9.2 Assumptions:**

* **Technology Adoption:** It assumes businesses are comfortable using online auction technology and have the necessary infrastructure.
* **Competition:** The system relies on enough buyers and sellers to create a competitive and efficient marketplace.
* **Standardized Products:** The system works best for products with clear specifications and easy online evaluation,
  1. **Work Plans**
* Register: user need to sign up first to add or bid a product into the site
* All product: user can see all product pages
* Product details: user can see the product details
* All category: user can see all the categorized product
* Total items: user can see their total uploaded and bided items on the page
* Edit Profile: User Can Edit their profiles

2.Requirement Analysis and Specification

**2.1 Current system**

The current online auction system operates through a combination of web technologies and software functionalities to facilitate transactions between buyers and sellers.

**Front-End (User Interface):**

* This is what users interact with directly, typically a website or mobile app.
* Common features include:
  + Browsing auctions by category or search.
  + Viewing detailed information about auction items (pictures, descriptions, pricing).
  + Placing bids and managing bids.
  + Creating and managing user accounts.
  + Secure login and communication systems.

**Back-End (Server-Side):**

* This handles the core logic and data processing behind the scenes.
* Key functionalities include:
  + Managing user accounts and profiles.
  + Storing and processing auction listings.
  + Facilitating the bidding process (tracking bids, notifying users).
  + Secure payment processing systems (may integrate with third-party services).
  + Auction timers and management.
  + Communication tools (messaging between buyers and sellers).
  + Database management for storing auction data, user information, and transaction history.

**Additional Features:**

* Many platforms offer advanced features to enhance the user experience:
  + **Watch lists:** Allow users to track specific auctions and receive notifications.
  + **Seller verification and reputation systems:** Build buyer trust in the sellers.
  + **Shipping and fulfillment integrations:** Streamline product delivery.
  + **Search filtering and sorting:** Refine search results based on specific criteria.
  + **Analytics and reporting tools:** Provide insights into auction performance and user behavior.

**Underlying Technologies:**

* Programming languages like Java, Python, or PHP are commonly used for back-end development.
* Web frameworks like spring or Django can expedite development.
* Database management systems (e.g., MySQL, PostgreSQL) store auction data and user information.
* Secure communication protocols like HTTPS ensure safe data transmission.

**Business Models:**

* Online auction platforms typically generate revenue through:
  + **Listing fees:** Sellers pay a fee to list items for auction.
  + **Transaction fees:** A commission is charged on the final sale price.
  + **Subscription fees (optional):** Some platforms offer premium memberships with additional features.

**2.2 Business area analysis**

**2.2.1 Detailed analysis**

An online auction system for B2B transactions offers a unique approach to procurement and surplus inventory management. Let's analyze its potential impact on various business areas:

**Benefits:**

* **Increased Efficiency:** Auctions can streamline procurement by fostering competition and potentially driving down acquisition costs. Buyers can quickly compare offers from multiple sellers, while sellers have a wider audience to reach.
* **Inventory Management:** Businesses can offload excess inventory efficiently through auctions, freeing up storage space and generating revenue from idle assets.
* **Price Discovery:** Auctions facilitate price discovery in a dynamic marketplace, ensuring buyers pay fair market value and sellers receive competitive prices for their goods.
* **New Supplier Acquisition:** B2B auctions can introduce buyers to new suppliers they might not have considered before, expanding sourcing options.
* **Reduced Transaction Costs:** Online auctions can potentially reduce administrative costs associated with traditional procurement methods like RFPs (Request for Proposals).

**Challenges:**

* **Product Suitability:** Not all B2B products are well-suited for auctions. Complex items requiring technical specifications or warranties may be better suited for traditional negotiation processes.
* **Buyer Trust:** Building trust in the quality and reliability of products sold through auctions is crucial. Implementing seller verification and reputation scoring systems can help.
* **Logistics & Payment:** Clearly defined logistics and payment terms upfront are essential to avoid post-auction disputes. Secure online payment processing is necessary.
* **Price Volatility:** Auctions can lead to price fluctuations, which may not be desirable for all B2B transactions, especially for stable, ongoing procurement needs.
* **Regulation & Compliance:** Specific industries may have regulations regarding procurement practices. Ensure the auction platform complies with relevant B2B transaction laws.

**Business Areas Impacted:**

* **Procurement:** Auctions can significantly impact procurement by offering a faster and potentially more cost-effective way to source goods and services.
* **Inventory Management:** Efficiently managing excess inventory through auctions frees up capital and storage space.
* **Sales & Marketing:** B2B auctions offer an alternative sales channel for businesses to reach a wider audience and sell surplus or slow-moving inventory.
* **Finance:** Streamlined procurement processes can lead to improved cash flow management, while selling excess inventory through auctions can generate additional revenue.
* **Customer Relationship Management (CRM):** Integrating the auction platform with CRM systems can improve communication and build stronger relationships with suppliers.

Overall, online auction systems for B2B offer a valuable tool for streamlining procurement, managing inventory, and potentially reducing costs. However, careful consideration of product suitability, buyer trust, and regulatory compliance is essential for successful implementation**.**

* 1. **Proposed system**

**2.3.1 overview**

The proposed system is creating online auction system for Ethiopia that allows everyone using it. No matter where they are or when they use it. From now on, there is no need to go anywhere to participate in auction process. Alternatively, they can stay at home and join it. At any time, they wish to participate in it. The only thing that users have to do is to take part in bidding process is registering and confirming their emails. The email verification will be done through a confirmation link that they will receive in their email inbox after registration. Without this verification the users cannot access to the website.

The problem that ordinarily occurs in the online auction systems is the user's unreliability towards each other and uncertainty to the seller’s item, because the buyer is unable to see the item physically. The users must verify their identities to reduce the fraud make by users and producing higher level of confidently. Thus a person is known who she/he is. By this way the users can trust each other, and providing confidence and willingness to deal with each other. The verification of user’s identities is done by asking user to upload his/her national card at registration time. It is used for identifying each person’s personal information. On that way, the user cannot do with fraud. In proposed system the users require to provide detail descriptions of items which they upload them for auctioning. Giving detail information about items leads to increase the sureness of bidders to seller’s item.

What the proposed system is trying to achieve is to produce a higher level of confidence among users, the type of sellers, and items that they choose for bidding. By making the seller give the efficient information like visible and textual description of items. The outcome of implementing this system successfully will be an online auction system. It provides the evaluation of the item that is far much effective and that come close or equal to the physical evaluation of the item.

**2.3.2. Functional requirement**

Functional requirements define the specific actions and functionalities the system must perform. They detail what the system should do from the user's perspective. These are the functionalities we will have:

**User Management:** The ability for buyers and sellers to register, login, and manage their profiles.

**Item Listing:** Sellers can list items with descriptions, photos, starting bids, and durations. Buyers can search and browse through listings.

**Bidding Process:** Buyers can place bids, track current bids and time remaining, and potentially utilise features like automatic bidding.

**Auction Management:** The system automatically closes auctions when time expires, determines winners, and facilitates communication between buyers and sellers.

**Payment Processing:** Secure integration with a payment gateway to allow secure transactions for both buyers and sellers.

**Admin Panel:** An interface for administrators to manage users, auctions, and the overall system, including generating reports and analysing data.

**2.3.3. Nonfunctional Requirements**

Non-functional requirements for a system are specifications that describe **how well** the system operates rather than what specific features it has. They are often contrasted with functional requirements, which define the actions and functionalities of the system.

Here are the Non-functional requirements:

**Security:**

* **User Authentication and Authorization:** The system shall require strong user authentication mechanisms (e.g., complex passwords, two-factor authentication) to prevent unauthorized access. It should also enforce authorization rules to restrict user actions based on their roles (buyer, seller, admin).
* **Data Encryption:** The system shall encrypt sensitive data (e.g., financial information, bids) at rest and in transit to protect it from unauthorized access.
* **Audit Logging:** All user actions and system events should be logged for audit purposes to ensure traceability and accountability.

**Performance:**

* **Scalability:** The system should be able to handle a high volume of users and concurrent auctions without experiencing significant performance degradation.
* **Availability:** The system should be highly available with minimal downtime to ensure business continuity. This may involve implementing redundancy measures for critical components.
* **Response Time:** The system should respond to user actions and queries promptly (e.g., page load times, bid placement) to maintain a smooth user experience.

**Usability:**

* **Intuitive Interface:** The system interface should be user-friendly and intuitive for buyers and sellers with varying levels of technical expertise.
* **Accessibility:** The system should be accessible to users with disabilities, following accessibility guidelines (e.g., WCAG).
* **Localization:** The system should ideally be able to support multiple languages to cater to a global B2B audience.

**Reliability:**

* The system should be highly available with minimal downtime.
* Data backup and disaster recovery procedures.

**2.3.4 System Model**

The UML has been developed to offer a standardized notation to define Object Oriented Models. However, to effectively apply the UML notation, it must be employed with an Object-Oriented Analysis and Design method. Object-Oriented analysis and design (OOAD) refers to a group of methodologies to produce business component based software. The methodology summaries the life cycle of system development identifying the deliverables and tasks in an object-oriented project. Using a combination of UML notation and process, the life cycle of system development can be reduced, the system can be easily maintained, and the modules reusability can be improved. Conventionally, requirements analysis comprised of finding functions and relevant data that will be supported by the software system. The entity-relationship diagrams will describe the data that the system will handle, while data flows will describe the functions. Object-oriented software development uses new methods of design, which are supported by computer-aided software engineering. The UML is a language used to specify, visually model, and document the artifacts of an Object-Oriented system under development. It denotes a number of ideas unification from various methods. UML is used in the system design to improve its reusability and maintainability. Object-oriented analysis methods offer class, use case, activity , state chart, sequence and other diagrammatic notations for modeling. UML has been employed effectively in many projects for modeling different requirements and architectures. Use case diagram, class diagram and sequence diagram were selected for the user’s requirements analysis; Class Diagrams were selected to represent the classes’ static structure. Therefore, this work designs and implements the online web-based auction system (OAS) using UML. Where in the proposed OAS, the UML offering several diagrams to enable the new functions to be updated and added easily such as: use case, sequence, class diagrams, and user interfaces. The proposed OAS will help the bidders to bid in fast and increase their chances to make a successful bid by suggesting a bid price, and help the seller to achieve maximum profit.

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**Actor description**

**Companies**: the one who lists items for auction on the platform. They can set the starting price, duration of the auction, and any other relevant details about the item. They can also track bids and communicate with potential buyers.

**Buyers**: the one who browses the auction listings and places bids on items they are interested in. They can monitor auctions, adjust their bids, and track their success in winning items.

**Administrator:** The administrator is responsible for the overall management of the auction platform. They may handle tasks such as setting up the system, managing user accounts, ensuring fair play, and resolving disputes. They may also generate reports and analyze data to improve the platform.

**2.3.4.1 Essential Use Case Description**

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## **Use Case: Placing a Bid on an Auction Item**

This use case describes the scenario where a bidder finds an item they are interested in on the online auction platform and submits a bid.

**Actors:**

* Bidder: The user who wants to purchase an item through the auction.

**Preconditions:**

* The bidder has a registered account on the platform.
* The bidder is logged in to their account.
* An auction for the desired item is ongoing and accepting bids.

**Basic Flow:**

1. The bidder browses the available auctions through categories or search functionalities.
2. The bidder finds an item of interest and clicks on the auction listing to view details.
3. The auction details page displays information like item description, photos, current highest bid, reserve price (if any), and time remaining in the auction.
4. The bidder decides to place a bid. They enter a bid amount in the designated field.
5. The system validates the bid amount. It checks if the bid is higher than the current highest bid and meets the minimum bid increment (if applicable).
6. If the bid is valid, the system confirms the bid. The bidder receives a message indicating their bid has been placed successfully and they are now the highest bidder (if applicable).
7. The auction details page updates to reflect the new highest bid and the bidder's username (unless anonymous bidding is allowed).
8. The system may notify the previous highest bidder (if any) that they have been outbid.

**Alternative Flows:**

* **Invalid Bid:** If the bidder enters an invalid amount (e.g., lower than the current highest bid or minimum increment), the system displays an error message explaining the issue and prompts the bidder to enter a valid amount.
* **Reserve Not Met:** If the auction has a reserve price and the bidder's maximum bid is not high enough, the system may inform the bidder that the reserve has not been met without revealing the actual reserve price.
* **Outbid:** The bidder places a bid, but another bidder submits a higher bid before the auction closes. The system notifies the first bidder that they have been outbid.

**Post conditions:**

* The bidder has successfully placed a bid on the chosen item, and they become the highest bidder if their bid is the current highest.
* The auction details page reflects the updated bid information.
* Depending on the scenario, other users involved (previous highest bidder, seller) may receive notifications.

**Use Case Diagram for Administrative panel**

Use case diagram for administration panel is given in the following figure 2.2

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Functionalities provided:

* Check Product: Admin can check products
* Approve Product: Admin can approve products
* Update product: Admin can update products
* Update Bid: Admin can update bid status
* Notify: Admin can notify bidders and sellers
* Delete user: Admin can delete user

**2.3.4.2 Sequence Diagram**

A sequence diagram is one of the UML dynamic models, and it defines the interaction scene between the objects in time when the use case was executed and highlights the information sending time priority among objects. Usually, the sequence diagram illustrates the single use-case behavior.



* + - 1. **Activity diagram**

**Activity Diagram for User panel**

Activity diagram for user panel is given in the following figure 2.3

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**Activity Diagram for Admin panel**

Activity diagram for admin panel is given in the following figure 2.4

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* + - 1. **Class diagram**

In Object-Oriented analysis and design, the class diagram is the most essential entity. It defines the kinds of objects that are present in the system and describes the static relationships between the system internal classes. The operations and attributes of a class and the constraints that apply to the objects connection can be shown by the class diagram.

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