Available online at http://www.advancedscientificjournal.com
http://www.krishmapublication.com
IJMASRI, Vol. 2, issue 12, pp. 730-741, Dec. -2022
https://doi.org/10.53633/ijmasri

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY ADVANCED SCIENTIFIC RESEARCH AND INNOVATION (IJMASRI)

ISSN: 2582-9130 **IBI IMPACT FACTOR 1.5** **DOI: 10.53633/IJMASRI**

RESEARCH ARTICLE

DESIGN AND IMPLEMENTATION OF AN ONLINE AUCTION SYSTEM

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Abstract

Online web auction systems nowadays have become an important component of the electronic marketplace**.** In this thesis, a practical case study will be presented to highlight best practices for the analysis and design of an Internet-based online auction system. The proposed Online Auction System was designed and implemented using includes Node.js, React.js, Mongo DB, JavaScript and Amazon S3 for images as a proposed programming language and various UML (Unified Modelling Language) to make several diagrams which contribute in design of the Online Auction System. The proposed Online Auction System will help bidders to get the best product possible and the seller to get maximum profit for the product. The proposed Online Auction System together with the tools which have been used based on the analysis and implementation environment, offers excellent advantages to support system development.

Keywords*:* Auction System and Unified Modelling Language, electronic marketplace, OAS

Introduction

Searching for items has always been a daunting activity for most people in the country and around the world. People are always on their way to reputable product suppliers, nearby market canters, or sometimes local street vendors to transfer items. Yes, and if the buyer can't get the item they want, they mostly shake hands to get the item and sometimes get confused. This is because an unqualified person offers to deliver the goods to the customer.

Due to buyer inequality, Korn men have always taken advantage of offering delivery of items to their customers, as many counterfeit goods end up in people's hands or they do not receive the proper goods from sellers. , the buyer remains the same shortage. Buyers may struggle to find the right product and try to return home. On the other hand, there are suppliers and traders who are qualified to deliver and sell, but very few people come to them, and it is the same place.

Through this online auction management system, auctioneers will be able to connect with specific sellers who will provide them with the necessary information and/or help them sell their

items. This will save time and deliver quality products to contractors through responsive and attentive services. This system will replace the manual way to search for items in the market and go a long way to get an item, but still have items available in the immediate vicinity.

The author here created an online auction system which is secure helps to reduce the fraudulent activities done. To check the fraudulent activities and tackle them the test are run in a controlled environment. The designed and implemented online auction system is named as FairBid. Author here also uses Unified Modelling Language (UML) in order to design the Fair Bid with a proper structure and also to show the architectural model, subsystems, activity workflows, use cases, class diagram, system sequence diagrams and user interfaces.

System Analysis

To design the UML diagrams for the online auction system we must use Object-Oriented analysis and design (OOAD) which refers to a set of rules which helps to design a business component based software. A methodology outlines the system development lifecycle by defining deliverables and tasks in an object-oriented project. You can use a combination of notation and UML processes to shorten the system development lifecycle, simplify system maintenance, and increase module reusability.

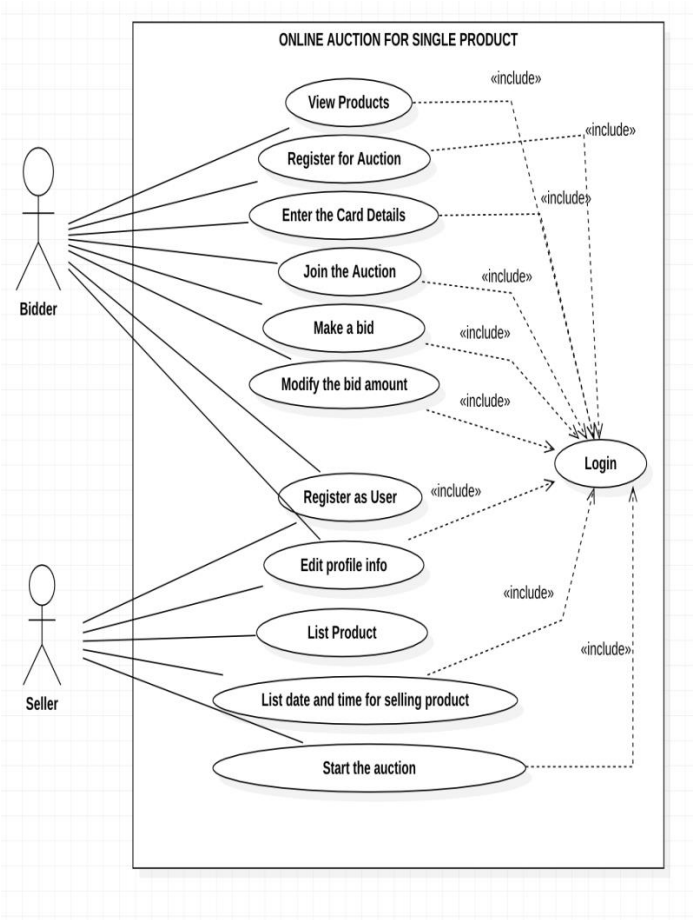
To find functions and relevant data we prepare requirement analysis. The data handled by the system and the flow of it is described by the entity-relationship diagrams.

Object-oriented software development comes with a systematic way of tackling a problem and uses new methods of design, which are assisted by computer-aided software engineering tools.

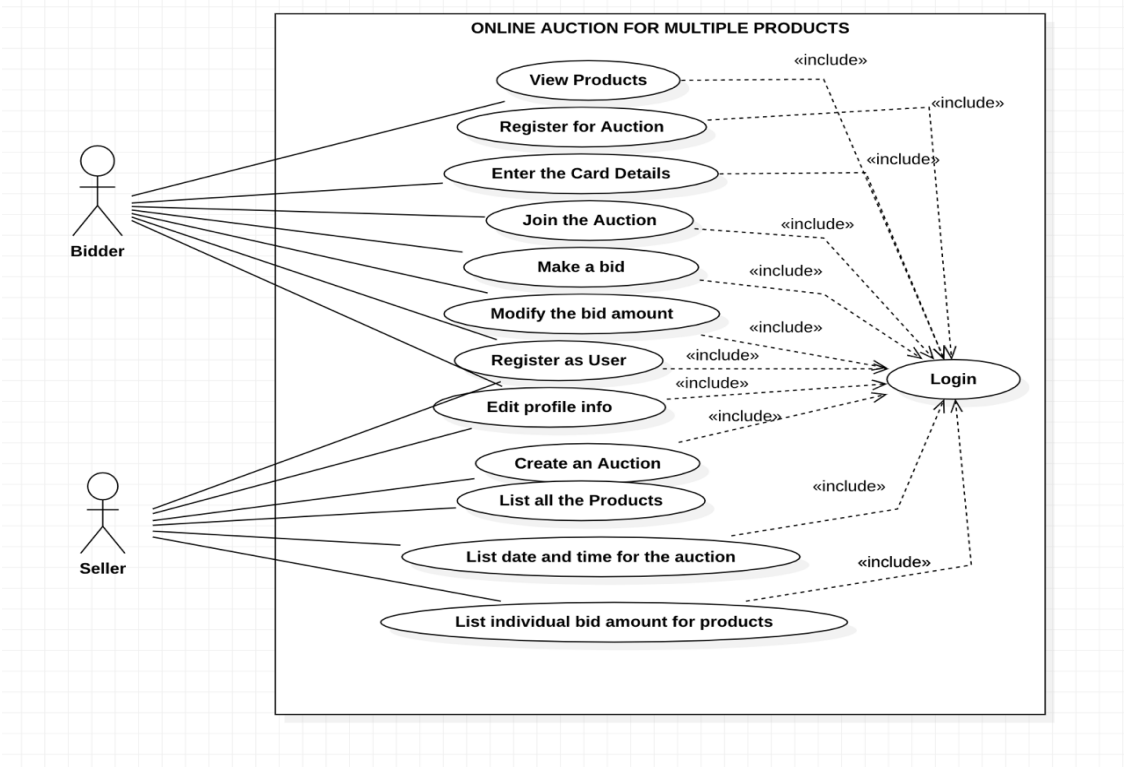
UML is a language used to specify, visually model, and document the artefacts of an object-oriented system under development. Represents a set of ideas unified from different ways. UML is used in system design to improve reusability and maintainability. Object-oriented analysis methods provide classes, use cases, state diagrams, sequences, and other graphical notation for modelling. UML has been successfully used in many projects to model 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.

The work designs and implementation of the online web-based auction system (OAS) would be using UML. Where in the proposed OAS, we would be using many popular diagrams such as use case, sequence, class diagrams, and user interfaces which are offered by UML to enable the new functions to be updated and added easily. The proposed OAS will help both the seller and bidder to get the best bids that they want to achieve.

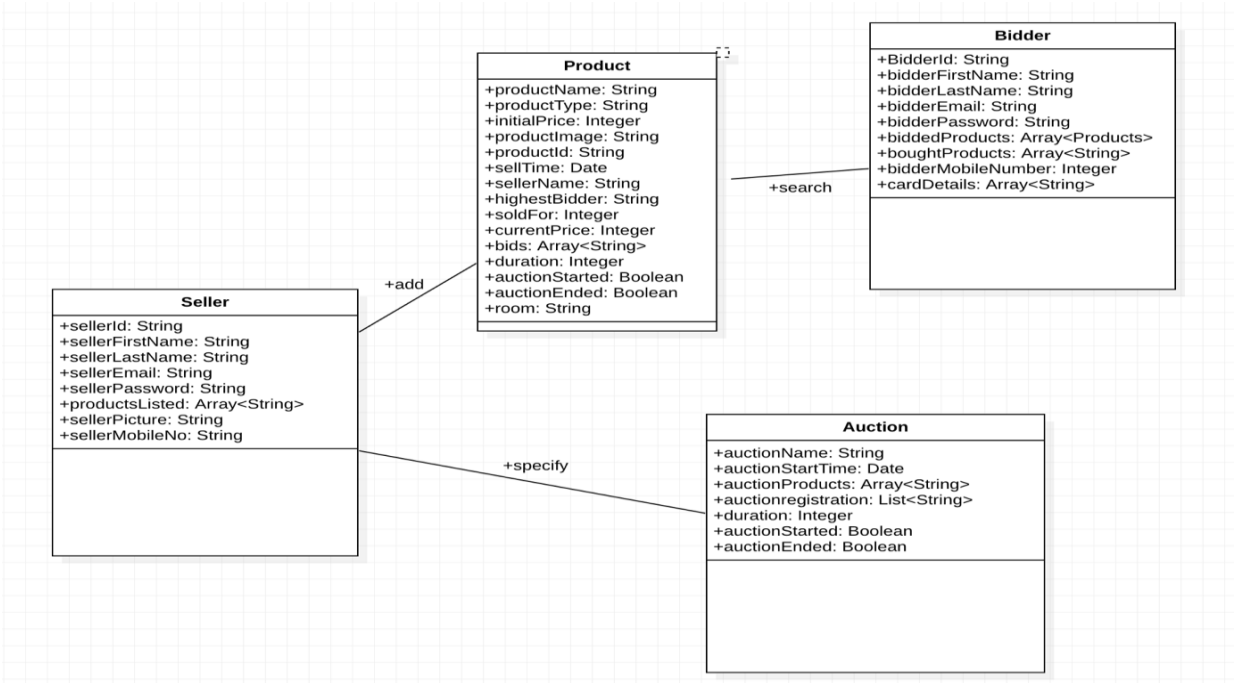
Use Case Diagrams



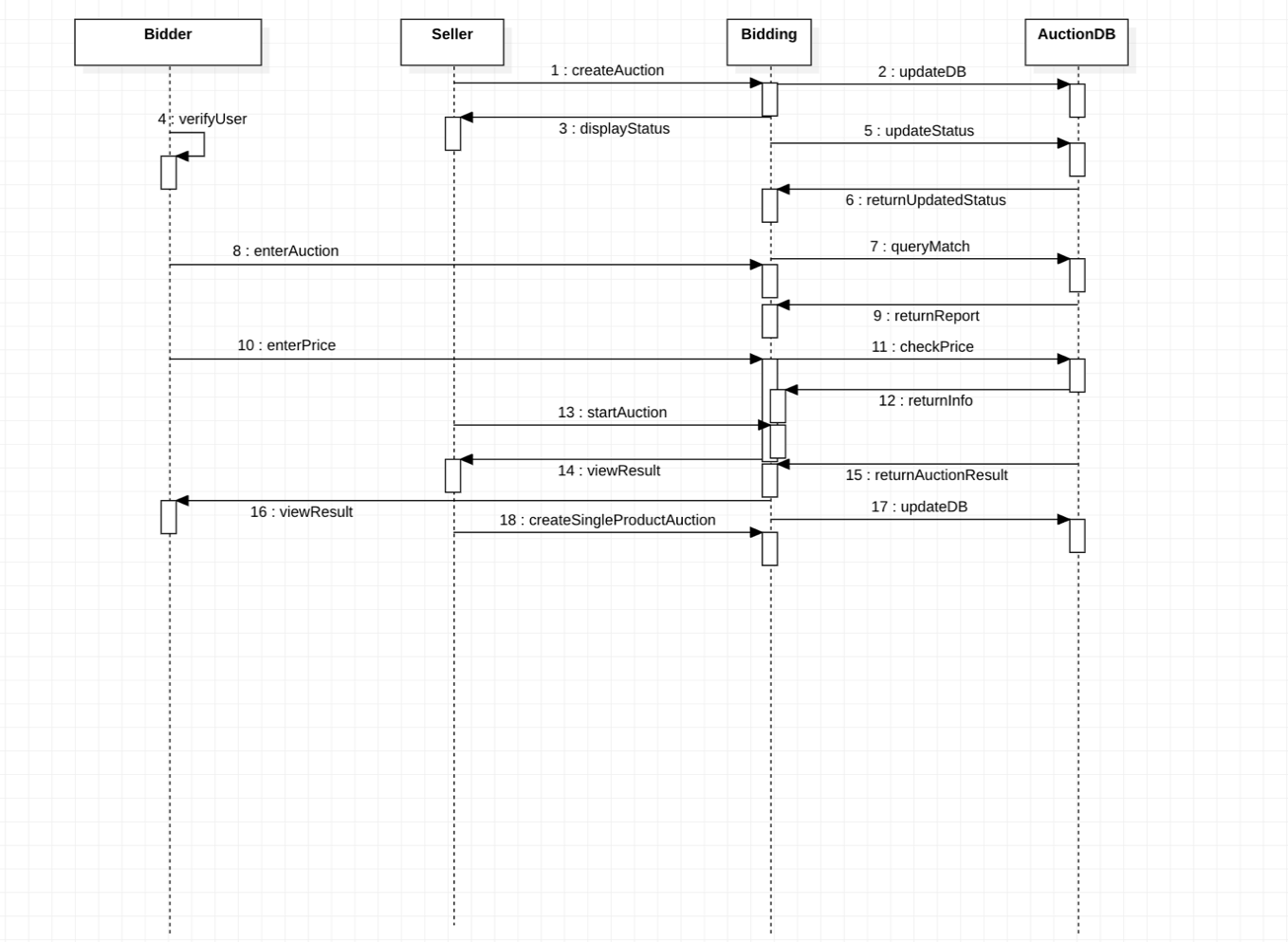
Use Case Diagram for OAS of Single Product



Use Case Diagram for OAS of Multi Product



Class Diagram for OAS



Sequence Diagram for OAS

Sequence Diagrams

UML Sequence Diagrams are interaction diagrams that represent how the operations are being carried out. They capture the interaction between objects in the context of collaboration. Sequence Diagrams are time focus and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when.

Sequence Diagrams captures:

- the interaction that takes place in a collaboration that either realizes a use case or an operation (instance diagrams or generic diagrams)
- high-level interactions between user of the system and the system, between the system and other systems, or between subsystems (sometimes known as system sequence diagrams).

Database testing and construction

- Database testing is fundamentally used to find bugs that can affect the security, consistency, reliability, and performance of the system and is important for validating the system against user-set requirements.

MongoDB was used for database implementation. The snippet of the JSON object represents the data storage inside the database.

```
    {
"_id" : ObjectId("6367daa9edc0cd809f302d37"),
"sellerFirstName" : "ritesh",
"sellerLastName" : "ar",
"sellerEmail" : "ritesh@gmail.com",
"sellerPassword" : NumberDecimal("1"),
"productsListed" : [],
"sellerPicture" : "",
"sellerMobileNo" : "+919999999999",
"createdAt" : ISODate("2022-11-06T16:02:49.616Z"),
"updatedAt" : ISODate("2022-11-06T16:02:49.616Z"),
"__v" : 0
    }
```


Seller Schema


```
{
    "_id" : ObjectId("6367daa9edc0cd809f302d37"),
    "productName" : "Running Shoes",
    "description" : "Shoe",
    "basePrice" : NumberDecimal("1"),
    "currentPrice" : NumberDecimal("1"),
    "duration" : 1,
    "timer" : 1,
    "image" : "https://pranjulbucket.s3.ap-south-1.amazonaws.com/499f684a4c95fbee48c4366ac567062a",
    "auctionStarted" : false,
    "auctionEnded" : false,
    "sold" : false,
    "owner" : ObjectId("636354d1c564ab7cf2613d66"),
    "bids" : [ ],
    "room" : ObjectId("6367daa9edc0cd809f302d38"),
    "createdAt" : ISODate("2022-11-06T16:02:49.616Z"),
    "updatedAt" : ISODate("2022-11-06T16:02:49.616Z"),
    "__v" : 0
    },
```


Product Schema

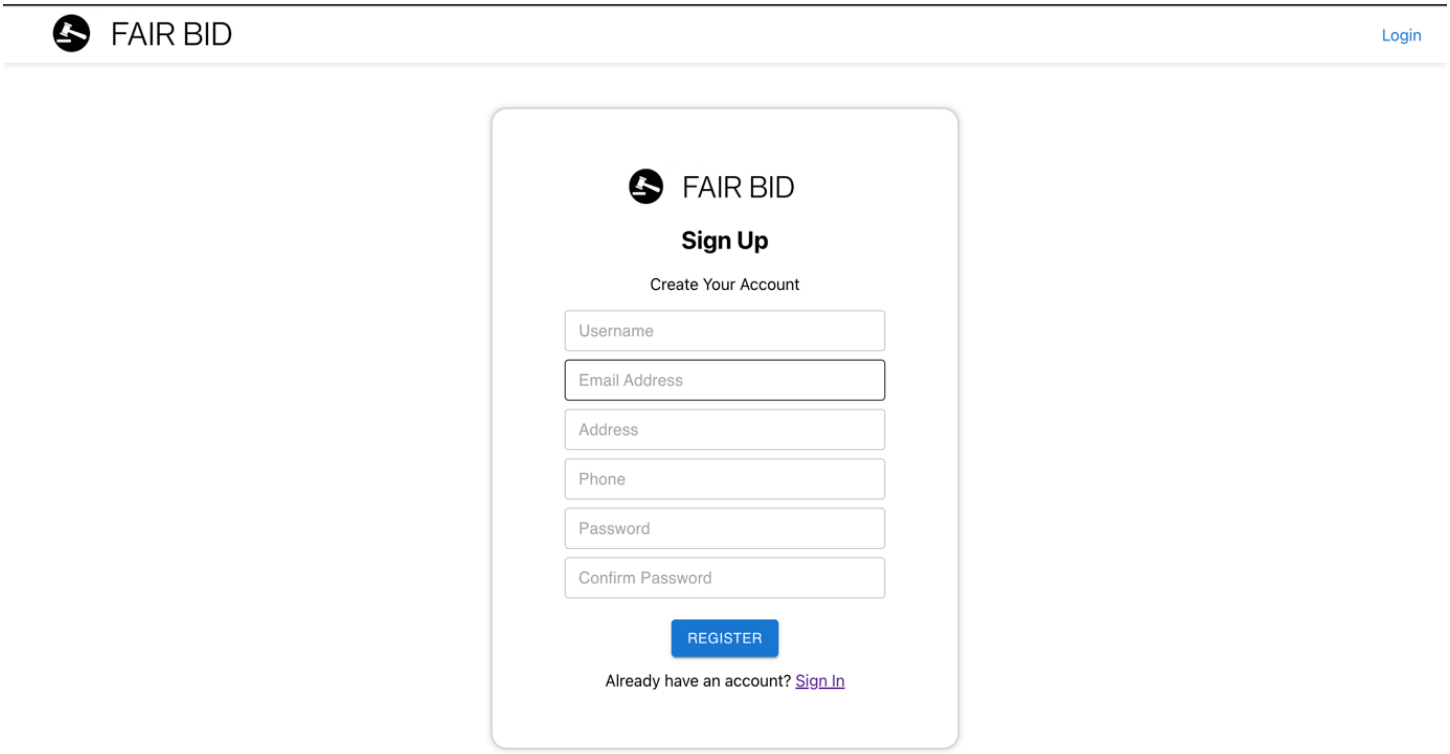
```
    {
"_id" : ObjectId("6367daa9edc0cd809f302d37"),
"bidderFirstName" : "pranjul",
"bidderLastName" : "dw",
"bidderEmail" : "pranjul@gmail.com",
"bidderPassword" : NumberDecimal("1"),
"boughtProducts" : [],
"bidderPicture" : "",
"bidderMobileNo" : "+910000000000",
"bidderCardDetails":["","",""]
"createdAt" : ISODate("2022-11-06T16:02:49.616Z"),
"updatedAt" : ISODate("2022-11-06T16:02:49.616Z"),
"__v" : 0
    }
```


Bidder Schema

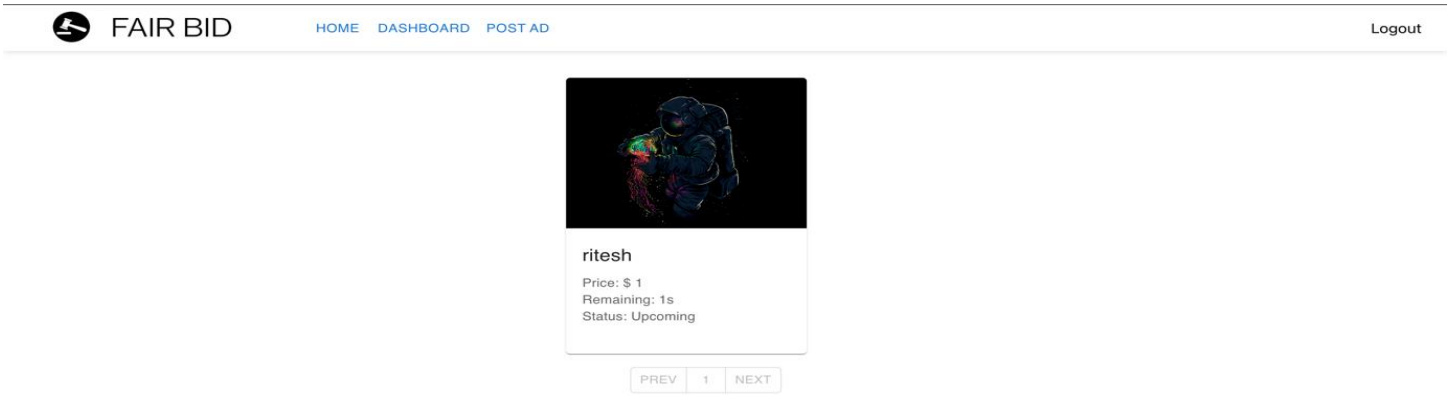

```
    {
"_id" : ObjectId("6367daa9edc0cd809f302d37"),
"auctionName" : "ritesh",
"auctionProducts" : [],
"auctionRegistered" : ["",""],
"currentPrice" : NumberDecimal("1"),
"duration" : 1,
"auctionStartTime" : ISODate("2022-11-06T16:02:49.616Z"),
"auctionStarted" : false,
"auctionEnded" : false,
"room" : ObjectId("6367daa9edc0cd809f302d38"),
"createdAt" : ISODate("2022-11-06T16:02:49.616Z"),
"updatedAt" : ISODate("2022-11-06T16:02:49.616Z"),
"__v" : 0
    }
```


Auction Schema

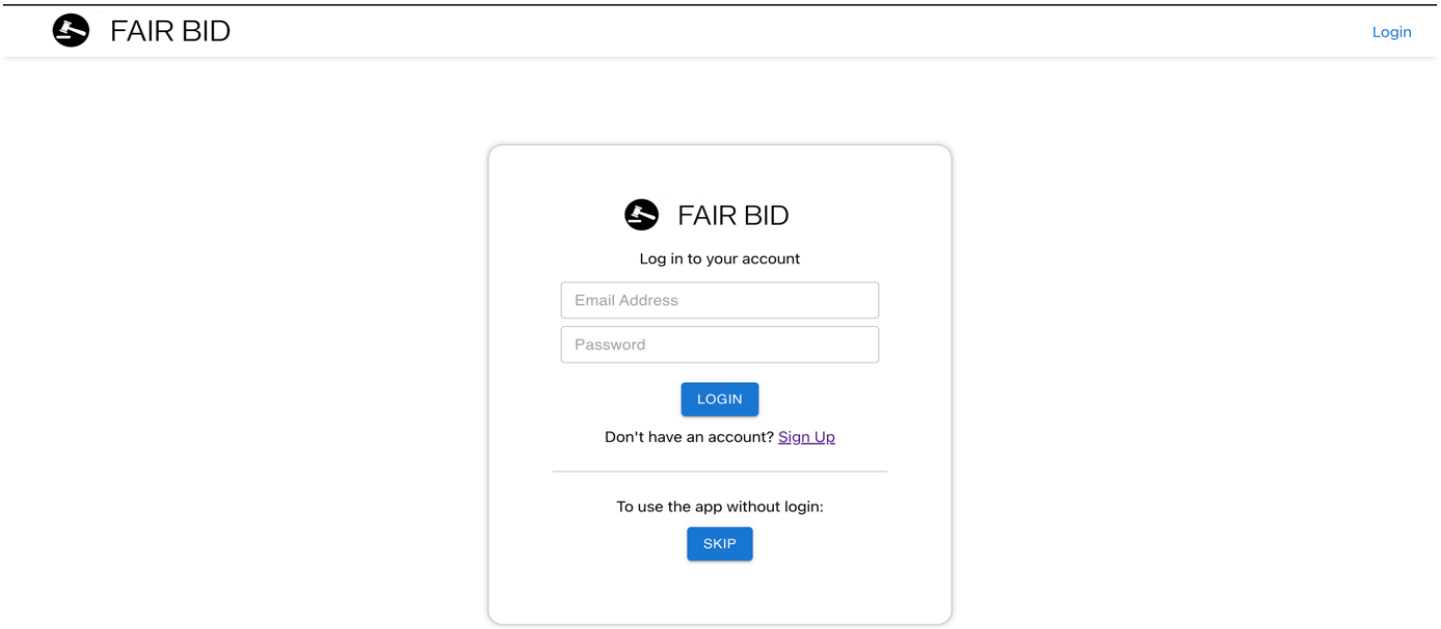
System implementation



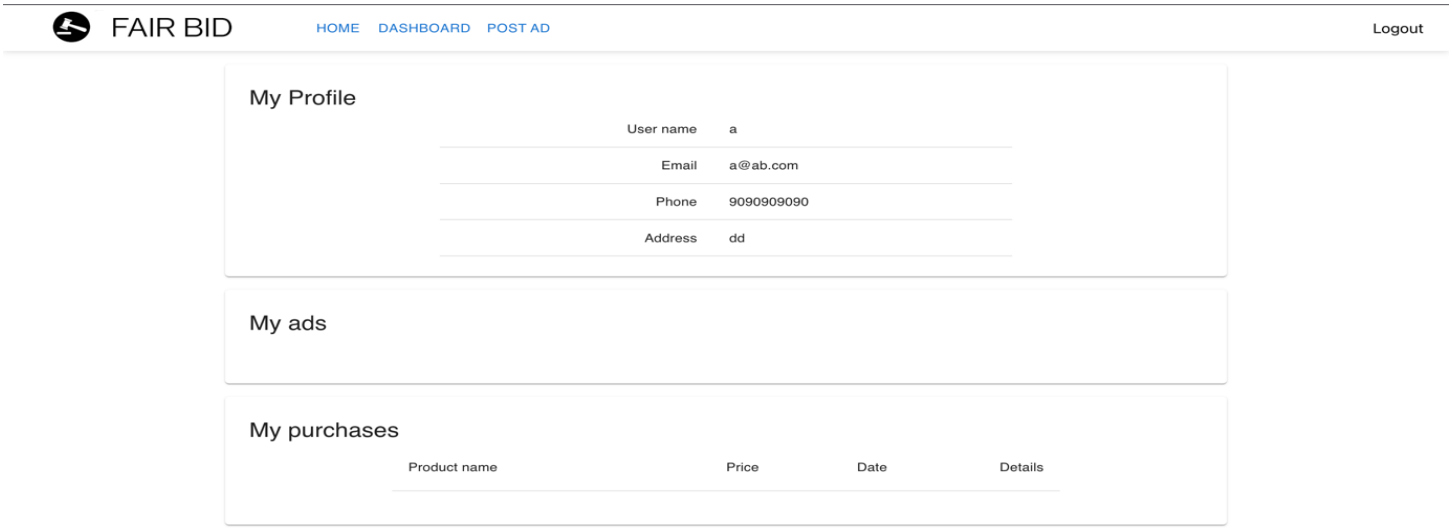
Sign Up Page



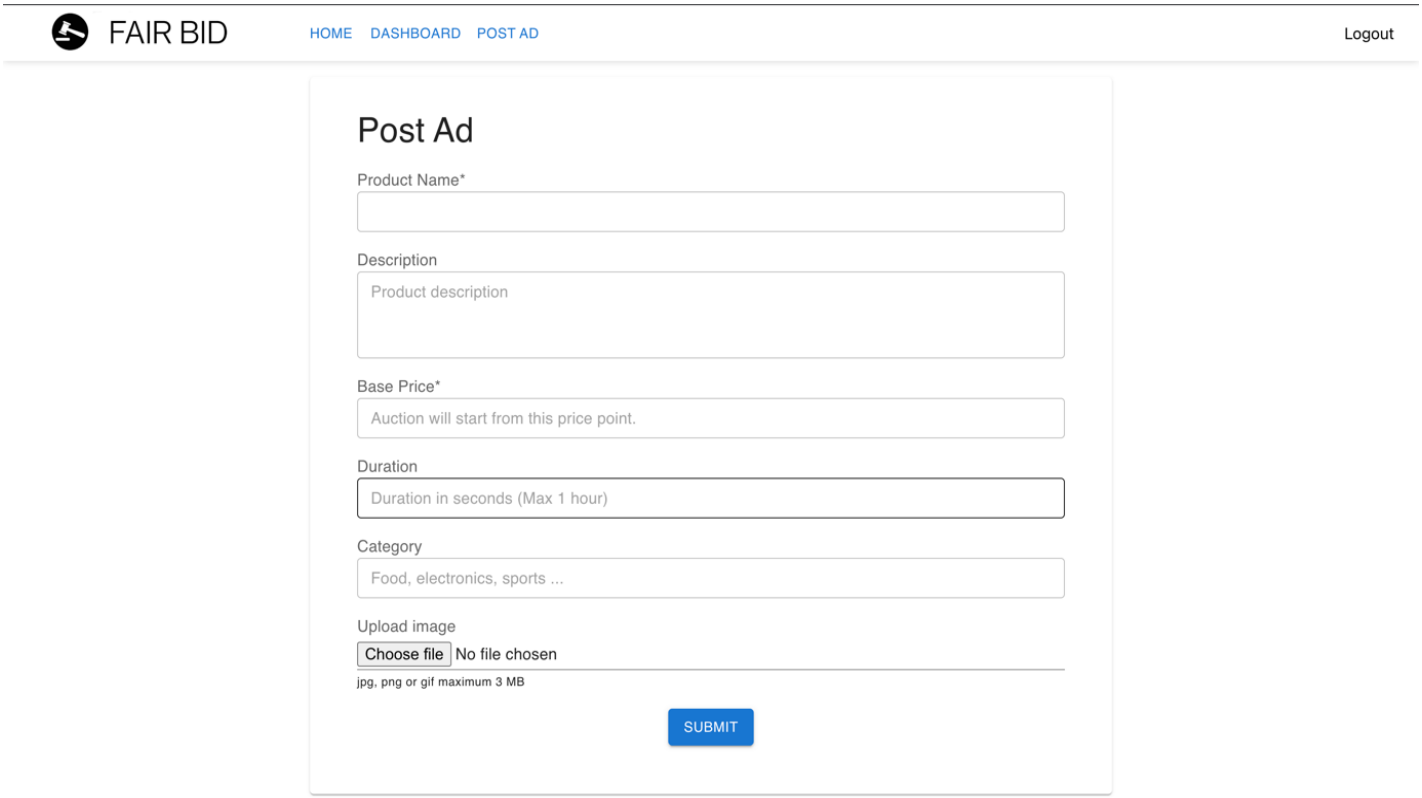
Dashboard



Login



User Page



Post Ad

This section presents the proposed work deliverables along with the implementation that followed the analysis and design of the system. The results of system analysis and configuration of the proposed system are presented. It uses the JavaScript, HTML, MongoDB, Node.Js, and React.Js programming languages and relies on properties suitable for this task. To start using the proposed system, users must register as bidders or sellers. The proposed system OAS directs the user (bidder or seller) to a welcome web page. Merchant) can check from the proposed system page and initiate a secured session (login) as indicated. Unregistered users must complete a registration form to use the system. A bidding interface will appear.

Result and Discussion

The system of Online Bidding website FairBid has been tested in order to measure its usability, the online Bidding website FairBid was tested by operating on Microsoft Edge, Google Chrome with the local host server. Many students evaluated the system prototype from Maharaja Agrasen Institute of Technology (MAIT). After given a description about how to use the system, the students have been tested the Online Bidding website Fair Bid and asked to fill out review. The main aim of the survey is to measure the usability of OAS and the user satisfaction about the OAS. The results obtained shows a high percentage of the students agree with the usability of the OAS and the study achieves the main project target.

Conclusion

This research paper describes best practices for building and designing web-based auction systems. In this paper, I designed and implemented a web-based online auction system (OAS) using UML,

the programming language JavaScript, and the frameworks React.JS and Node.JS. In the proposed OAS, UML provided several diagrams and made it easy to update and add new features such as use case diagrams, sequence diagrams, class diagrams, user interface, etc. Proposed OAS helps bidders to bid faster, improve their odds of winning by suggesting bid prices, and help sellers maximize their profits. The proposed OAS, together with the tools used based on the analysis and implementation environment, provided great advantages in assisting system development.

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