Chapter 4

4. System design

4.1 Overview of system design

The basic of the system design is to plan a solution for the problem. This phase is composed of several systems. This phase focuses on the detailed implementation of the feasible system. Its emphasis on translating design specifications to performance specifications. System design has two phases of development logical and physical design.

During the logical design phase developers describes inputs (sources), outputs (destinations), databases (data stores), and procedures (data flows) all in a format that meets the user requirements. The developers also specify the user needs and at a level, that virtually determines the information flow in and out of the system and the data resources. Here the logical design is done through data flow diagrams and database design.

The logical design is followed by physical design or coding. The physical design produces the working system by defining the design specifications, which tell the programmers exactly what the candidate system must do. The programmers write the necessary programs that accept input from the user, perform necessary processing on accepted data through call and produce the required report on a hard copy or display it on the screen.

4.1.1 Purpose of the system design

The software design section describes the architecture and model of the system with high quality by providing value-added services to the bidder and ASTU purchasing and property directorate. Implementing a high-quality system depend on the nature of the design created by the designer. It provides a complete architectural overview of the proposed system. It is intended to express the significant architectural decisions that have been made on the system. The system should be equipped with some sort of structure and organization throughout the system. Such that the CRUD rules, as well as MVC (Model View Controller) layout, should be maintained. The basic goal of system design is to plan a solution for the problem.

4.1.2 Design goal

The Design Goals specify the qualities of the system that should be achieved and address during the design of the system. Therefore, there is a lot of design goal to be achieved, yet the following are some of the design goals that are attempted to be maintained for this particular system; namely Online auction system for ASTU.

Performance:

- ✓ **Response time**: The amount of time it takes from an initial user request to receipt of a response. Should be fast given today's user demand.

- ✓ **Storage**: To work efficiently the processor has to be more than 2GB RAM and HD (hard disk) storage to be more than 100MB

Dependability:

- ✓ **Robustness**: The multi-platform environment of the web places extraordinary demands on the program because the program must execute reliably in a variety of systems. The ability to create a robust program was given high priority in the design of PHP. It checks your code at a compiled time and runs time.

- ✓ **Scalability**: More bidders online stand for the increased number of users all making requests. The application must be scalable, that is it has to be able to process those increasing numbers of requests just as rapidly as before. This means proactively adding more hardware so that correct scaling and architecture are in place and ready to handle the increasing load.

- ✓ **Security**: ASTU online bidding system should be secured, i.e., by updating system as and for, by using digital signature, encrypted security system and by not allowing other users or unauthorized users to access data that has no the right to access it.

- ✓ **Reliability**: the information provided by the system is as reliable as it is present on the web page interface, and this is maintained by the persistent database.

Maintenance: Focused on upgrading an application to ensure it remains productive and cost-effective.

- ✓ **Availability**: The ability for the application to be usable by its intended users during advertised hours. Any faller that affects a critical component severely enough by decreasing the number of a single point of failure in an environment as long as there is an internet connection and system failure of the system can disrupt availability.

- ✓ **Recoverability**: the ability to recover an application environment in the event of system failure or data loss. If a critical component fails and is not recoverable, availability will become non-existent improving maintainability. A related concept reduces the event of failure and therefore can improve availability in the event of failure.

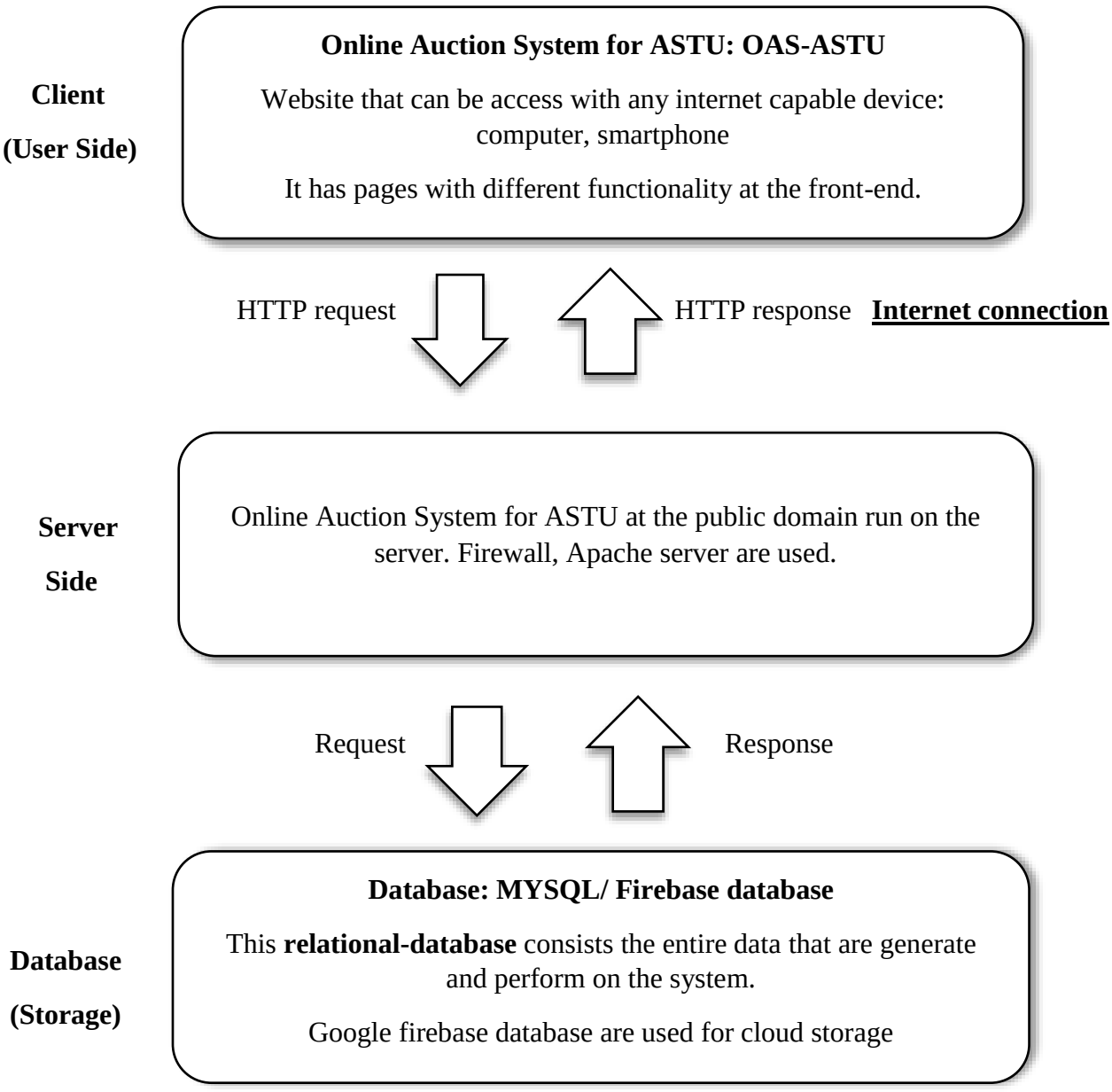
End-User Criteria: The system should have a simple and understandable graphical user interface such as forms and buttons, which have descriptive names. It should give a reliable response for each user comment. All the interfaces, forms, and buttons are written or designed in a simple language or common language so that the user can access it without any difficulty. Moreover, has to be interactive, user friendly.

4.2 Proposed system architecture

The following diagrams can furthermore represent the system architecture. It shows the entire interaction among the users (Bidder, Central-Procurement, Purchaser, Advertiser, Quality-Inspector, PPAD, and Administrators) and the web system between the storage and databases.

Client to server communication

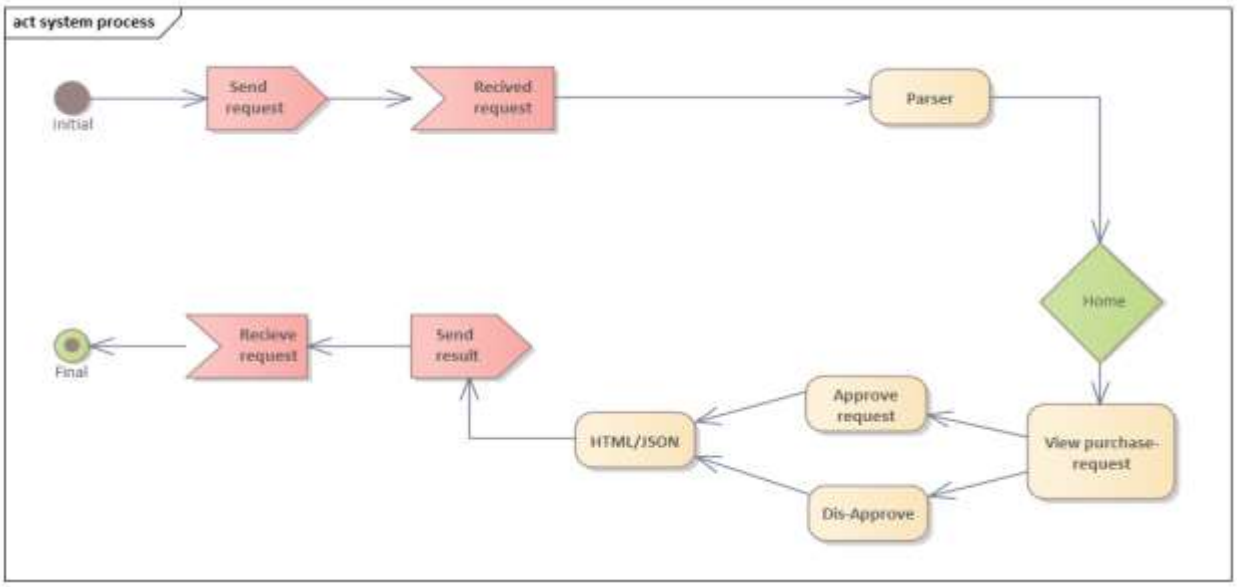
The client uses the OAS-ASTU websites to get services from the system. The system user-side is designed using an interactive interface and java-script frameworks and bootstrap are used to design it. The back-end of the system is designed using a relational database MYSQL and real-time database that is a Google firebase base database. Native-PHP is used for connectivity of the user-side of the system to the back-end. Furthermore, firewall, Apache server are used on the server.



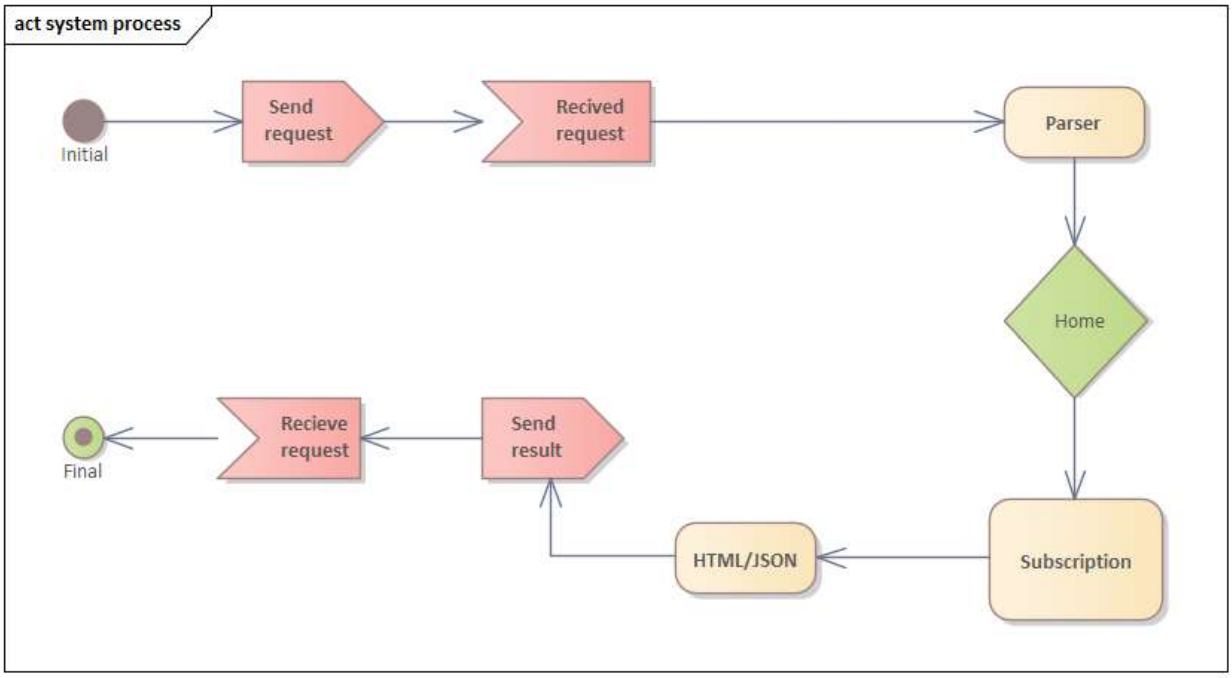
4.2.1 System process

The following diagrams shows the relationship of components.

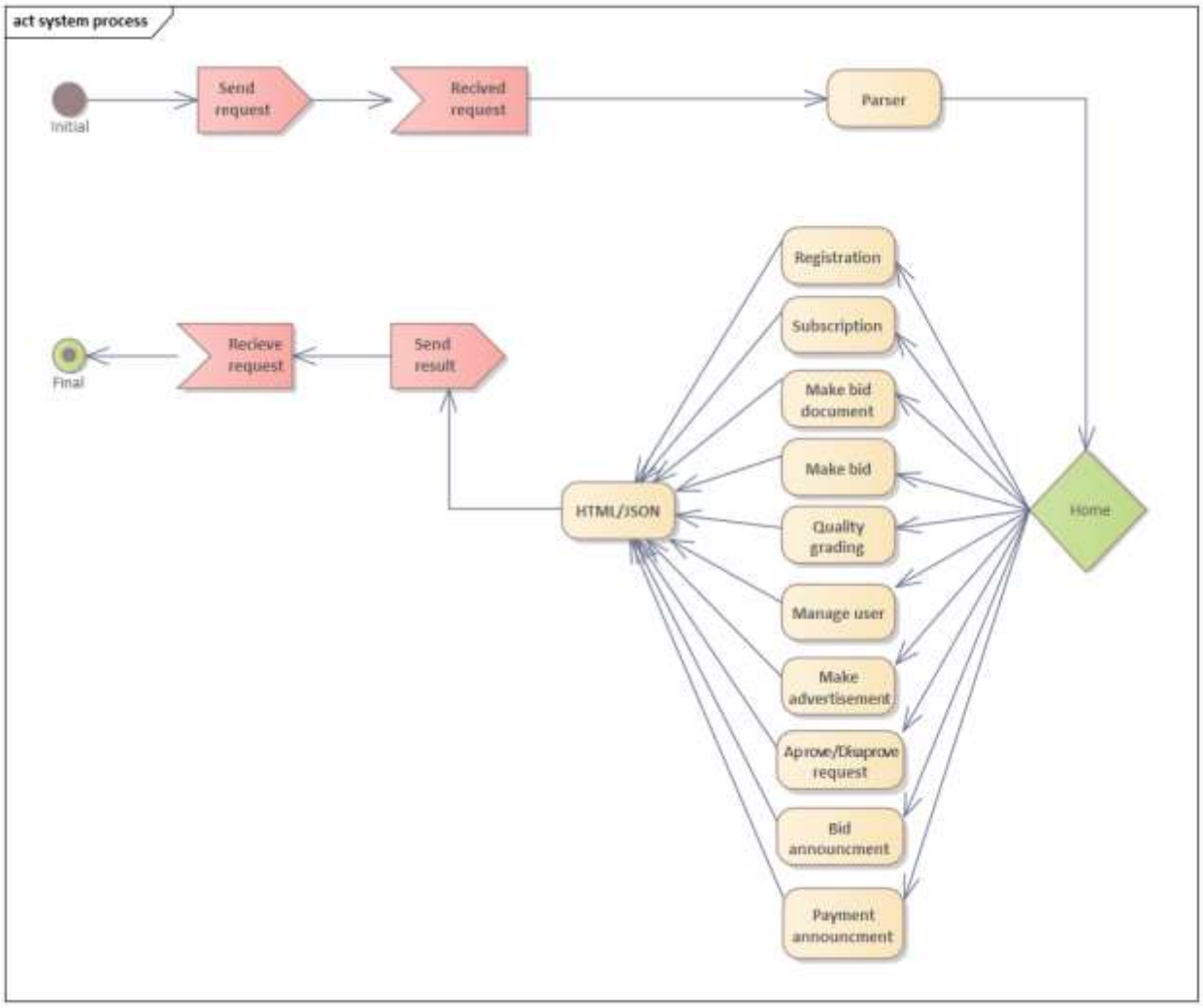
- ✓ The following diagram represents of a system process of how a front-end user Property and purchase administer directorate can access the system and get services.



- ✓ The following diagram represents of a system process of how a front-end user Bidders can subscribe into the system and get services.

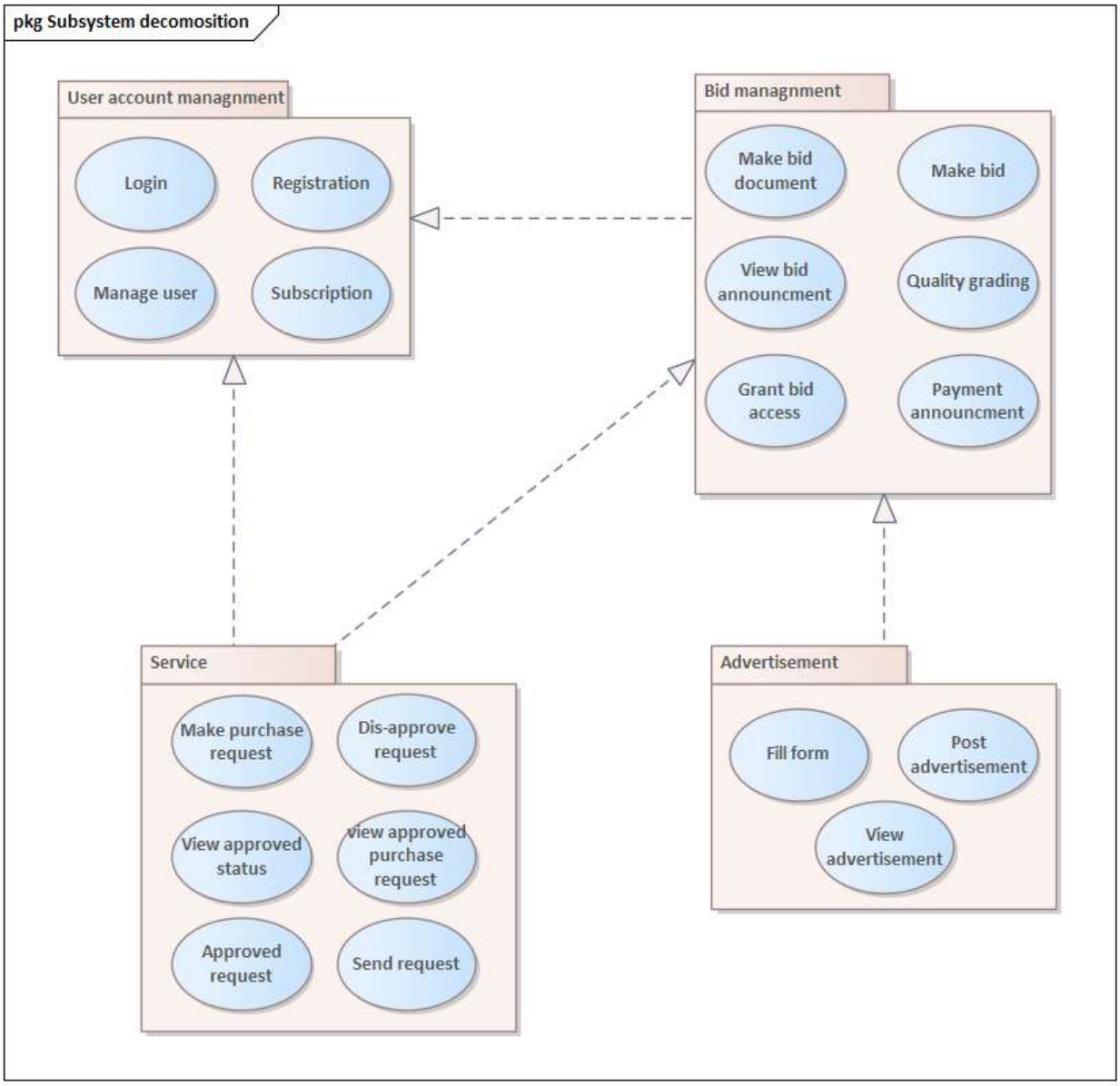


- ✓ Overall system process of the system.



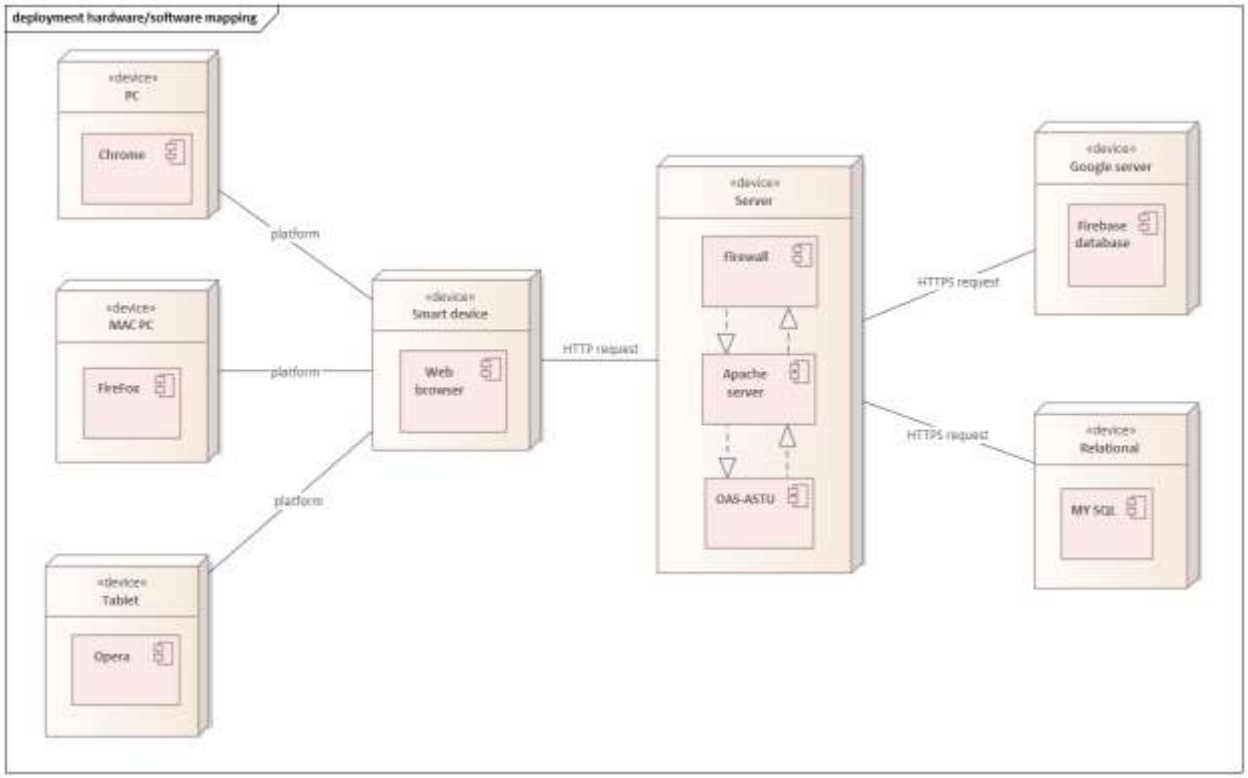
4.2.2 Subsystem decomposition

Subsystems are collection of classes, associations, operations, events and constraints that are closely interrelated with each other. The objects and classes from the object model are the “seeds” for the subsystems. In UML, subsystems are modeled as packages.



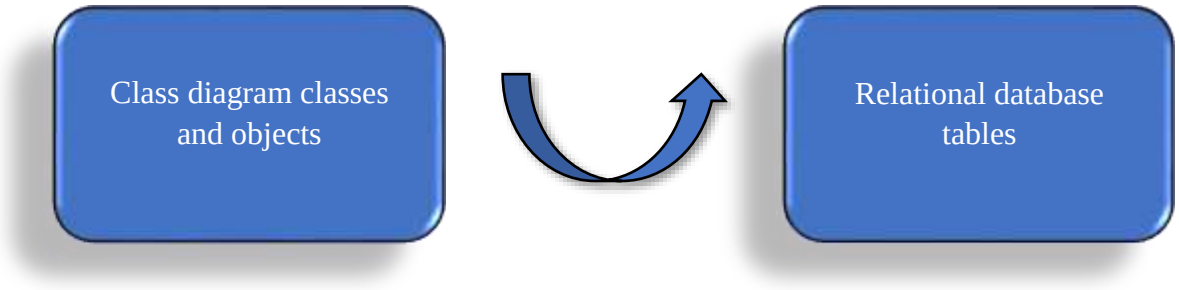
4.2.3 Hardware/ software mapping

In this system design, mainly three hardware components are there the client-side, server-side, and database side. When implementing the system, necessary software is loaded to each side, hardware components and network should be installed between each side. Then each sub-system software will be assigned and configured to the mapped hardware. After that, the local area network will be connected to the internet and the system become functional.

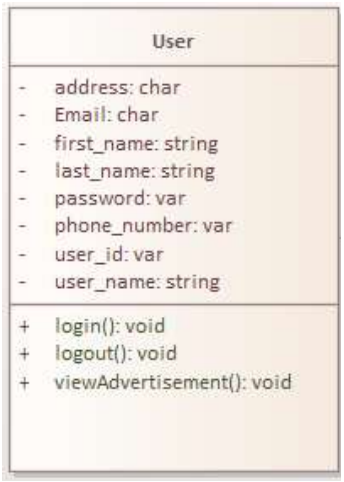


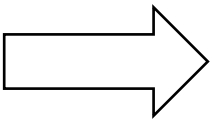
4.2.4 Persistent data management

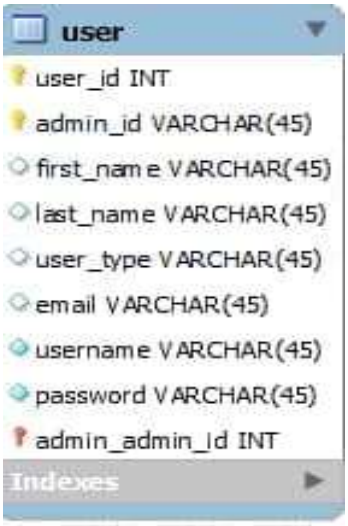
This section provides a mapping of the class diagram's classes and objects that were identified in the requirement analysis phase into a relational database format.



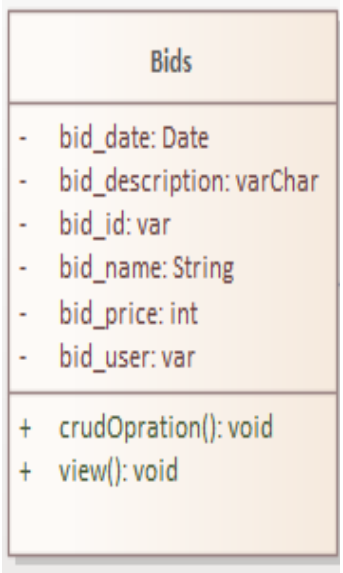
User mapping

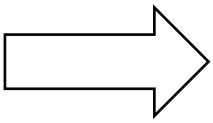


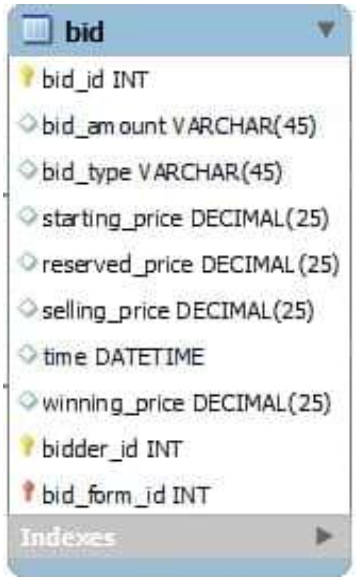




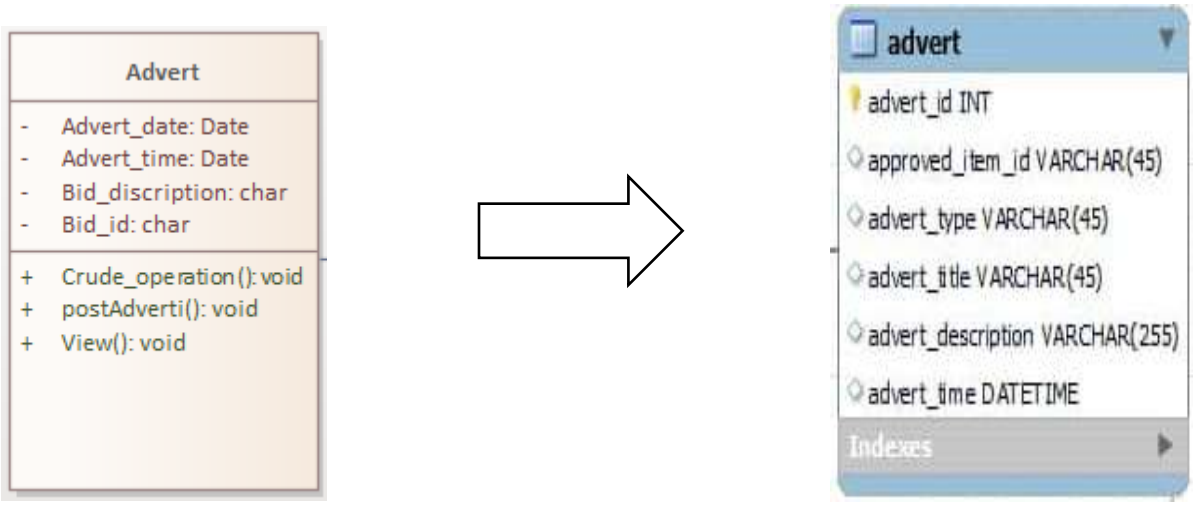
Bid mapping



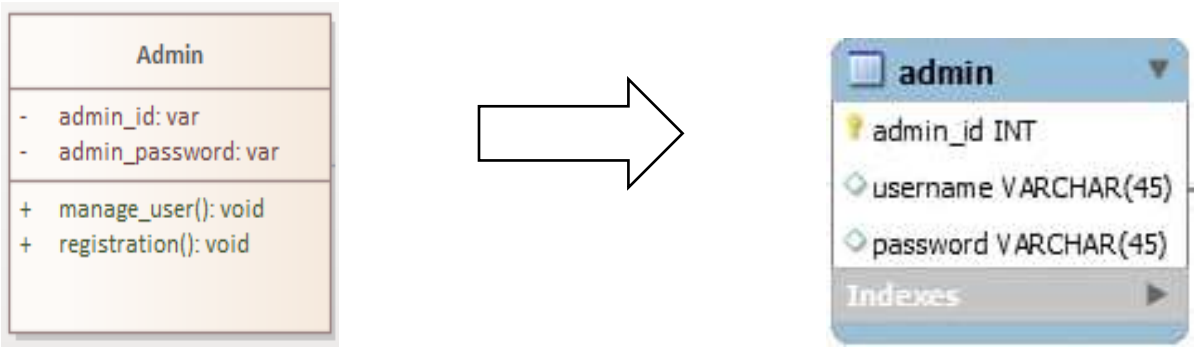




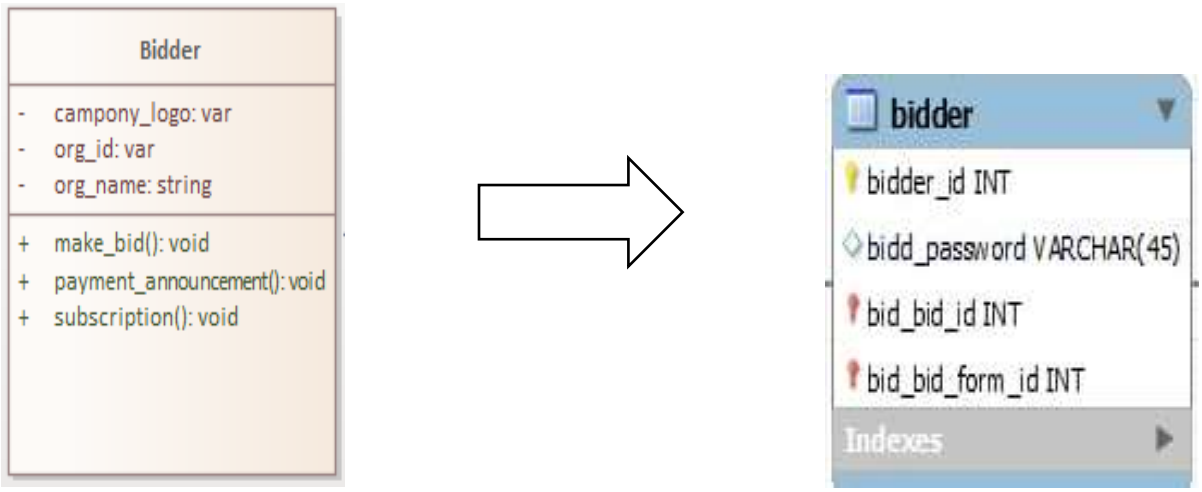
Advertisement mapping



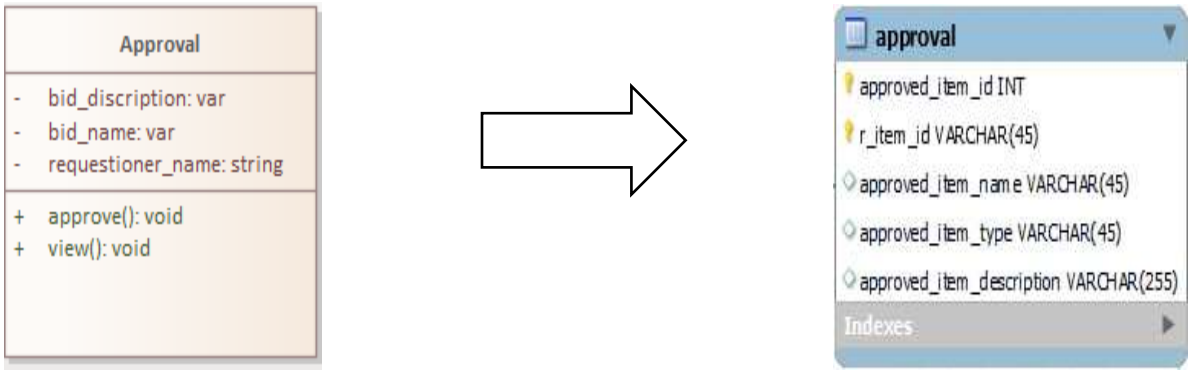
Admin mapping



Bidders mapping

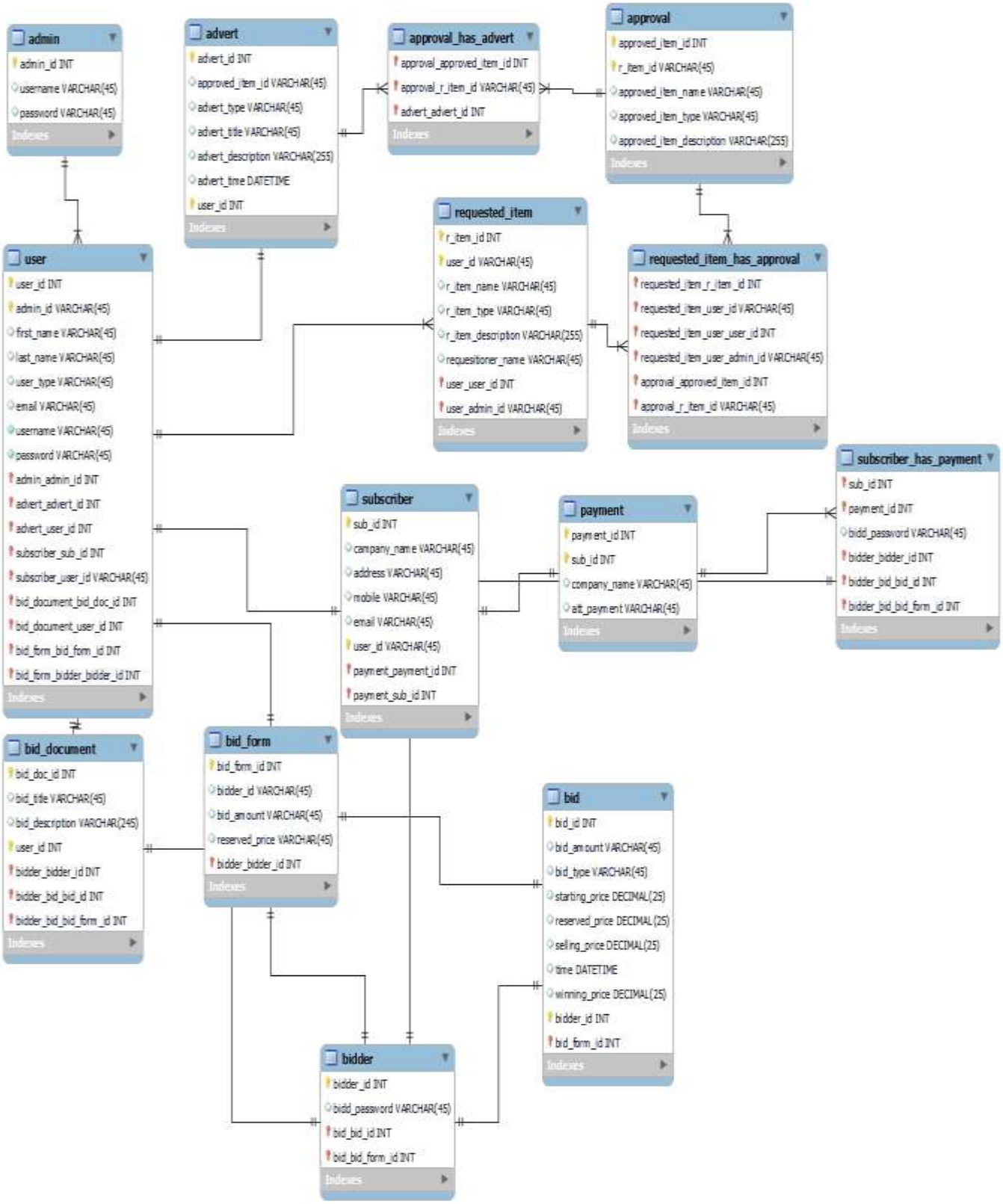


Approval mapping



4.2.5 Component diagram

4.2.6 Database design



4.2.7 Access control

Due to the prototype demonstration nature of the Online Auction System for ASTU project, the access control issue will address through designing the project based on the available requirement. The different users of the proposed system have different access and privileges to get service from the system.

Admin: - list of access and privileges that the admin have

- ✓ Registration
- ✓ Manage user
- ✓ View advertisement
- ✓ Login
- ✓ Logout
- ✓ Perform crude operation

Requisitioner: - The Requisitioner have the privilege to

- ✓ make purchase request
- ✓ perform crude operation
- ✓ login
- ✓ logout
- ✓ view advertisement
- ✓ view approved status

Purchaser: - list of access and privileges that the purchaser have

- ✓ login
- ✓ logout
- ✓ Registration
- ✓ view advertisement
- ✓ Grant bid access
- ✓ Subscription approval
- ✓ perform crude operation

Bidder: - The bidder have privilege for

- ✓ View advertisement
- ✓ Login
- ✓ Logout
- ✓ Perform crude operation
- ✓ Subscription
- ✓ Payment announcement
- ✓ Fill form
- ✓ Make bid

Advertiser: - have the access for the following operations

- ✓ View advertisement
- ✓ Login
- ✓ Logout
- ✓ Perform crude operation
- ✓ Make and Post advertisement
- ✓ Fill form
- ✓ View approved purchase request

Quality inspector: - The following operation are given access to quality inspector

- ✓ View advertisement
- ✓ Login
- ✓ Logout
- ✓ Perform crude operation
- ✓ Quality grading

Central procurement: - have the following privileges

- ✓ View advertisement
- ✓ Login
- ✓ Logout
- ✓ Perform crude operation
- ✓ Post bid document
- ✓ Make bid document
- ✓ View bid announcement report

Purchase and property administrator directorate (PPAD): - The following are access for the operations given to the PPAD

- ✓ View advertisement
- ✓ Login
- ✓ Logout
- ✓ Perform crude operation
- ✓ View purchase request
- ✓ View bid announcement report
- ✓ Approve purchase request
- ✓ Dis-approve purchase request

4.2.8 User interface design

The following interfaces are list to show some of the interface that are going to be implement in the proposed system.

1. **Login interface**

When user like bidder, purchaser, advertiser and central procurement needs to login into the system the use the interface below.

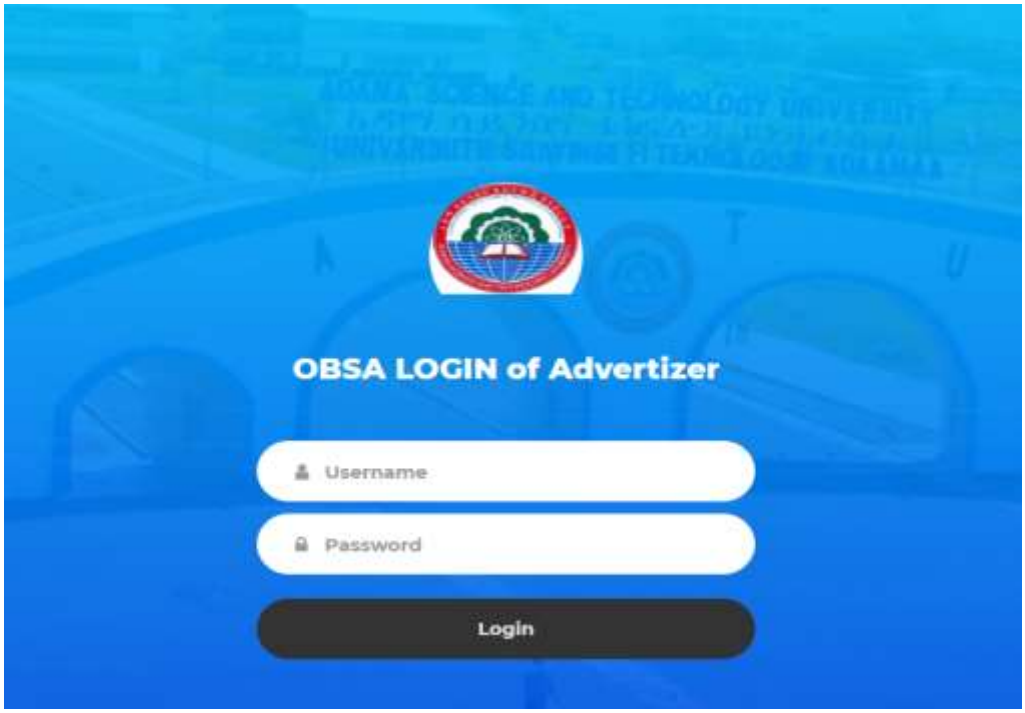


Figure 1 User interface Login

2. **Advertisement interface**

This interface is used to advertise the bids that are requested by service seekers (Requisitioner). In addition, approved by central procurement verifiers in order to get illegible bidders.

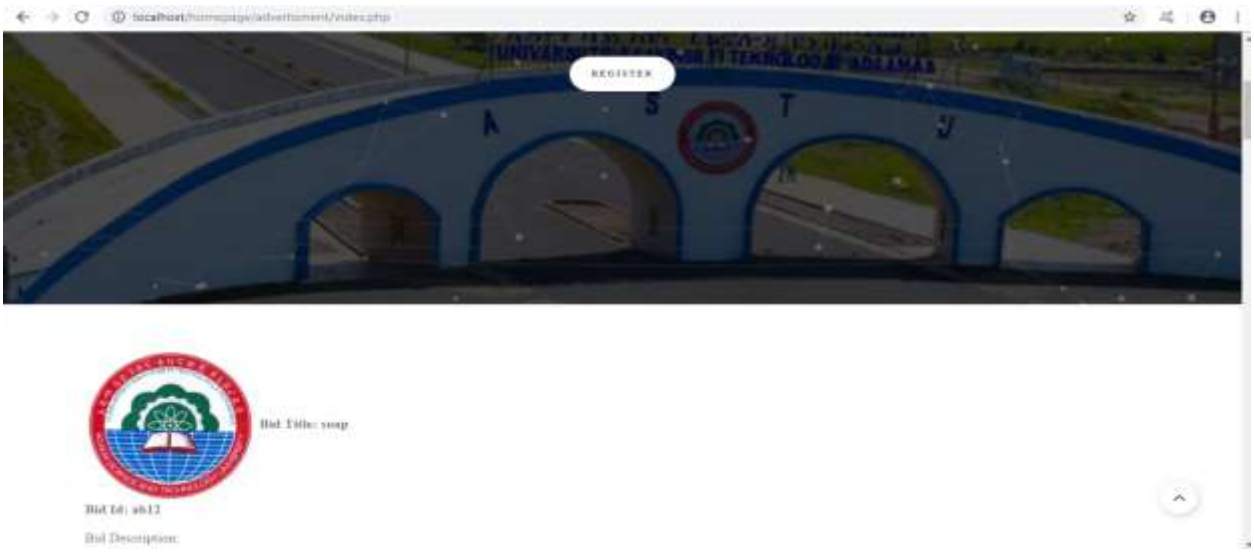


Figure 2 User Interface Advertisement

1. **Bidders interface**

The bidders to submit their legal documents and to be part of the bid they use this interface, the document submitted by this interface will be approve after receiving the expected payment from the bidder.

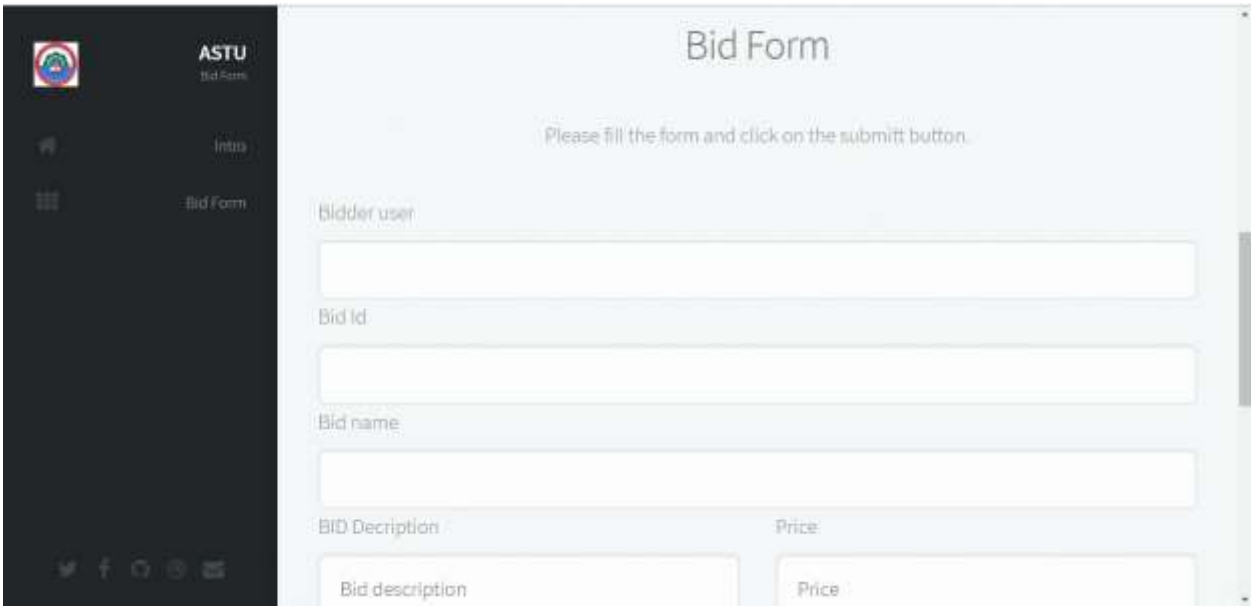


Figure 3 User interface Bidders