ONLINE AUCTION SYSTEM FOR ASTU

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Table of Contents

Tables

Table of figures

Acronyms

ASTU	Adama science and technology university
MS word	Microsoft word
HTML	Hypertext Markup Language
CSS	Cascading Style Sheets
IT	Information technology
SQL	Structured Query Language
Vs code	Visual studio code

Chapter 1

1.Introduction

Bidding is a way of buying and selling goods or services through a tender or auction. The bid is awarded to the bidder when purchasing with a minimal price based on the provided quality. Moreover, Auction is a sales event where in potential buyers place competitive bids on assets or services in an open or closed format. Auctions are the way buyers and sellers believe they will get a good deal buying or selling assets.

Every country has rules, regulations and establishing procedures, in ASTU there is FEDERAL GOVERNMENT MANUAL FOR PURCHESING IMPLEMENTATION. This manual governs the organization and details in bid are organized according to this Manual. However, the process undertaken by the organization accomplishes manually from the starting of the bidding and purchasing action to final part of the process, here is the concern that arises many issues. The different Equipment and supplies, which are in or out from the university are all managed based on the manual work.

The online auction system refers to the bidding process means the digitalization and automation of the bidding process from the low level of paper work to the final level of contract closure in a very efficient and effective way of implementations.

How Auctions Work

There are two formats of bidding which are an open format and closed format in an open format all bidders are aware of the bids submitted. In a closed format, bidders are not aware of other bids. Auctions can be live or they can be conducted on an online platform. The asset or service in question is sold to the party that places the highest bid in an open auction and usually to the highest bidder in a closed auction.

1.2. Background of the organization

Adama Science and Technology University (ASTU) was first established in 1993 as Nazrete Technical Collage, offering degree and diploma level education in technology fields. Later the institution was renamed as Nazrete college of Technical Teachers Education then changed to Adama University. After chosen by the ministry of Education in 2008 it was opened with various program in applied science and engineering fields also, the organization changes its name to Adama Science and Technology University.

ASTUs Purchasing and property administration Directorate was established in 1993 with establishment of ASTU to satisfy the various needs of the university by purchasing different types of tools, items and other services by classifying itself into main department of Bidding and Purchasing.

1.2.1 Mission of the organization

The mission of the organization (ASTU) is to provide ethical and competent graduates applied science and technology through quality education, demand driven research and community service. ASTU also provides innovative knowledge to support the socio-economic development of the nation.

1.2.2 Vision of the Organization

Adama Science and Technology University aspires to be the first choice in Ethiopia and the premier center of excellence in applied science and technology in Africa by 2030.

1.3Background of the project

The main concern of this project is to study the current bidding system and develop a system that operates digitally which is online, the system of purchasing and bidding which is widely used in current times are operated manually. Most organizations conduct bidding without any type of IT supported bidding system. The problem with the current bidding system is bidders must attend specific place otherwise, they cannot participate on the bidding process. And online Auction system avoid problems that both bidders and organizations might face due to the types of problems mentioned above and we believe this system (Online auction system) will make the bidding process easier, efficient, time saving and reliable for both buyers and sellers.

1.4 Statement of the problem

Lack of digitalization systems lead to unnecessary time wastage, Data redundancy, limitations of availability and a major reason for the wastage of external cost on the process of implementations.

The existing Auction system in Adama Science and Technology University follow a traditional way of mechanism for the process of bidding and purchasing. The process undertaken by the organization accomplishes manually from the starting of the bidding action to final part of the process, here is the concern that arises many issues:

- ✓ Time management problem
- ✓ Wastage of materials (resources)
- ✓ leading to external cost for the purpose of promotion(advertisement)
- ✓ Data redundancy due to manual process
- ✓ Limitations of participants
- ✓ leading the bidder for external cost
- ✓ Transparency issues

Therefore, This Online Auction system would be able to overcome the above problems by making the traditional process into digital and automated from the low level of paper work to the final level of contract closure in a very efficient and effective way of implementations.

1.5 Purpose of the project

The purpose of this project is to overcome the problems of the existing purchasing and bidding system by changing the complete current system of ASTU purchase and property administer directorate manual works into computerized or online system without affecting the structure of the existing system.

From the university perspective:

- ✓ The system brings out a mechanism of digitalized and automated implementation of processes that makes the purchasing and auction system more transparent and organized.
- ✓ It would be a good way to obtain a best financial return for ASTU.

From the bidder perspective:

- ✓ It brings free and fair competitions between bidders.

1.6 Objective of the project

1.6.1 General objective

The general objective of this project is to design and develop an Auction System for ASTU purchase and property administer directorate, which is an interactive web based platform that automates the current manual purchase and bidding system.

1.6.2 Specific objective

In order to achieve the general objective, we have to surpass the following:

- ✓ Study the given problem from different perspectives. (how ASTU purchase and property administer directorate work)
- ✓ Gather any data and information that would be an input to the project as if how supplies and equipment requests made and how purchasing occur as well as bidding perform.
- ✓ Decide on a general direction and principle to follow throughout the analysis, design and development phase.
- ✓ Implement the system based on the proposed design and architecture.
- ✓ Implementation through designing independent modules for:-
    - Advertisement
    - Communication
    - Registration and subscription
    - Purchase and bid management
- ✓ Develop prototypes as early as possible
- ✓ Test prototype of the new system rigorously and arrive at a stable working software version.

1.7 Scope and limitation

1.7.1 Scope of the study

- ✓ Support different request for supplies and equipment from major division of service seekers like departments, ASTU directorates.
- ✓ Support pro-forma based purchasing (the purchasing mechanism which not include bidding and advertisement)
- ✓ Support national wide auction on the required criteria of ASTU purchase and property administer directorate for different approved requests.
- ✓ Advertisement for the bid.

1.7.2 Limitation of the project

- ✓ The system may not totally fulfill the gap (Not work reliably as the manual and still not completely resolve all manual works)
- ✓ Online payment. (We are not working on online payment the admin or somebody must check the receipt)
- ✓ Quality inspection. (Quality inspection of proposed products for the purpose of evaluation of bidders will be perform manually)
- ✓ Time constraint (limitation of time for the project)

1.8 Feasibility study

Feasibility study is a crucial thing to evaluate the cost and benefit of the new system whether the system is do-able and profitable. Because of the feasibility study, decision will take whether a specific action makes sense from an economic and operational standpoint.

1.8.1 Technical feasibility

The team members expect the system to be technically feasible. The system will be develop using different open source, easily available software. The team members try to understand what the project need and through refereeing different online courses and available documentations, they would try to design and develop the system. To bring out the technical feasibility of the project as well as to utilize any open source development methods team members use laptop, lab computers, and open source software like slack, Git-hub, Telegram, MS word, Enterprise Architecture, Phpstorm, Vs-code, Browsers, PHP MyAdmin, CSS, Native PHP, Node-JS and Data-bases (relational data base SQL).

1.8.2 Operational feasibility

Once the system is deployed and available for any potential customer and it starts to give its service, it would be very helpful for solving any of the major concerns. However, the service is beyond that because it addresses the major issues of transparency between both sides of Auction participants. As a system, it requires a regular monitor and control to make sure that any of the available data are performed and to monitor any of the service requests.

1.8.3 Economic feasibility

The system as a product would be beneficial in many ways. One of the major cost benefits is good financial return for ASTU also, it reduces the unnecessary cost, which will spent for the promotion and advertising of the bidding, paper work and employers salary. With some kind of agreement with the ASTU, the system could be developing as a main online Auction and purchasing system to replace the traditional work so it would result an economic income to the developers.

1.9 Significance of the project

Significance of the project-

- ✓ Effective management of request and approval for a bid
- ✓ Simplicity for the bidders to supply the requested document and to be active participant of bidding process.
- ✓ Effective and accountable way of bidding
- ✓ Protection over the documents
- ✓ Better and fast process scheduling
- ✓ Reducing errors
- ✓ Reduction of cost
- ✓ Improved efficiency of employees
- ✓ Better and faster decision making

1.10 Beneficiaries of the project

- ✓ The first beneficiary of this project is ASTU Purchase and property administer directorate and the others are Adama Science and Technology University (ASTU) and different bidders all over the country.

1.11 Methodology

Data collection methodology:

- ✓ **Document Analysis:**

We have analyzed a document that placed in ASTU Purchase and property administers Directorate by comparing each business rule and process. We used information from the document.

- ✓ **Observation:**

We visited ASTU Purchase and property administer Directorate Office and observe how the bidding under taken.

- ✓ **Interview:**

At the time we visit, ASTU Purchase and property administer Directorate office to understand how there system work. Then we interview two employees of the office and the Director

Mr. Kuma Waqtolla

MR Kuma Waqtolla is the Directorate Director of ASTU Purchase and property administers Directorate office. He gives us basic information about the system and gives us permission to find out all information from his subordinate.

Mrs. Aberash

Mrs. Aberash is the head of the central procurement office of ASTU Purchase, property administers Directorate, and she told us how they purchase items and the whole system about purchasing.

Mr. Yoseph

MR Yoseph is the Head of bidding management office. He told us all information about bidding process.

System development methodology

We planned to use agile because the collaboration is highly important for the success of the project.

- ✓ Agile focuses on active software rather than documentation.
- ✓ It offers direct communication that helps in maintaining transparency.
- ✓ It also helps us to deliver working software with a preference to the shorter timescale.
- ✓ Also promotes the teams to meet several days in a week to discuss progress, identify problems and plan the day's activities with the goal being able to produce working software as quickly as possible.

1.12 Development tools

Hardware tools:

- ✓ Computer
- ✓ Storage (hard-disk /flash)

Software tools:

Table 1 Development tools

Tools or Programs	Used for
Slack, Git-hub, Telegram	Group working platform
MS Word	For preparing and compiling the document
Enterprise Architect	As a Designing tool for different UML diagrams.
Phpstorm, Visual studio code	Used as editor for the code

Browser	To open the system and display web application
SQL	A database that we use to manage and Store our Data.
CSS, Node-JS	A language used to develop front-end
Native PHP	Language used to develop back-end of the system

1.13 Required resources with cost

Table 2 Required resources with cost

Material name	No. material	Price in ETB	Total price in ETB
Lap top 1	1	25000	25000
Flash 8GB	1	250	250
Paper	100	0.50	50
Pen	5	10	50
Binding	2	10	20
Print	110	1	110
Miscellaneous cost	-	300	300
Total cost of material			25,780

1.14 Task and Schedule

Table 3 Task and schedule

Phases	Time frame					
	March 01,2021	March 15,2021	April 25,2021	May 5,2021	July 1,2021	Aug 13,2021
Project start	✓					
Requirement gathering and Analysis	✓	✓				
Documentation		✓	✓	✓		
Design the Prototype			✓	✓		
Implementation			✓	✓	✓	✓
Testing phase					✓	✓
Finalizing project						✓

1.15. Team Composition

Table 4 Team Composition

Title	**Online Auction System for ASTU**		
	Name	Email	Roll
	Edomias Tesfaye	edomwt@gmail.com	Front-end development and Documentation
	Besufekad Sentayehu	Besufekadsintayehu42@gmail.com	Requirement analysis, Back - end development , Documentation

Team Composition	Ekram Kumdin	bintkumdin@gmail .com	Front-end Development and Documentation
	Adnan Mohamed	adunimh@gmail.com	Ui/Ux design , Requirement analysis and Documentation
	Mikiyas Leul	mikiyasleul@gmail.com	Coordinator , Back-end development and Documentation

Chapter 2

2. Description of Existing system

Large organizations, especially governmental institutions and agencies, have a particular process when procuring and purchasing different supplies and equipment. Likewise, Adama Science and Technology University (ASTU), in certain, has a purchasing and bidding system in order to procure the required items and services. All those works are under the responsibility of ASTU Purchase and property administer Directorate in related to others. Under these directorates, there are subdivisions like central procurement, bid committee, quality checkers...etc.

The existing system has two main parts:

1. The first one is open bidding process.

This purchasing mechanism has 22 steps and it classifies into two. The first one is a bidding process that requires a quality assessment and the second one that does not require a quality assessment.

- ✓ Open bidding process which requires quality assessment

The purchasing of any materials under this category requires quality assessment. The bidding computation will depend on the value of the quality grading and the price bidder submit for the specific product. Therefore, by considering both the value of quality and the proposed prices the winners are select and furthers steps will go on.

- ✓ Open bidding process which does not require quality assessment

This open bidding process does not require quality assessment but the biding computation made only using comparing the price bidders proposed.

Steps for open bidding process:

1. Bid documents will be prepared.

2. The Procurement Approval Committee shall review and approve the bid document.

3. Bid announcement will be prepared.

4. Request for payment of bid service forwarded to the Finance and Budget Directorate.

5. Purchaser Pay for Ethiopian Press Agency by check.

6. The Ethiopian Purchasing Agency will publish the advertisement in the Addis Zemen newspaper or Herald newspaper.

7. Bid documents will be sold to the bidders within 15 days.

8. Bids will be opened on the 16th day.

   Bid documents will be opened on the 21st day.

   Bid document will be opened on the 4th day (International Bid)

9. The bid opening ceremony will be signed.

10. Bidding documents shall be submitted to the University Procurement Development Committee with a technical evaluation result.

11. Financial evaluation or technical evaluation results will be send to the University Procurement Approval Committee.

12. The Procurement Advocacy Committee shall evaluate and approve the decision and submit its decision to the Procurement and Property Administer Directorate.

13. The Procurement and Property Administer Directorate informs (announce) the bidders of the financial evaluation.

14. The financial bid winners will sign the contact by providing the required document within seven working days.

15. Submission to the University Property Administer Directorate shall be made within the given days after signing the contract.

16. After technical evaluation the bid document will be opened after seven (7) working days.

17. The bid opening ceremony will be signed (central procurement)

18. A review of the financial bid document shall be submitted to the Procurement Approval Committee.

19. Procurement Approval Committee shall review and approve the document.

20. Notify the approved documents the Procurement and Property Administer Directorate.

21. Purchase and Property Administer Directorate shall inform the bidders of its financial results.

22. Then the provisions of verses 14 and 15 shall apply.

2. The second one is pro-forma invoice purchasing

This purchasing mechanism has 24 steps to make it fully implemented.

Steps for pro-forma invoice purchasing process:

1. The secretary of the purchasing department directorate will accept purchase requests sent from different directorates, after signing.

2. The secretary will deliver the letter of purchase request to the director.

3. The director will direct the letter of request to the central purchasing team.

4. The central purchasing team will accept the letter after the secretary of the director write down the date and the number of the request letter, this letter of request will be delivered to the head of the central purchasing team.

5. The head of the central purchasing team will pass a directive to prepare pro-forma invoice format to the central purchase secretary.

6. The team of the central purchase will prepare the format per requested and deliver to the head to have it signed.

7. The signed letter will be passed to the purchasing team. /purchasing department

8. The purchasing department will put in a request to the department of transportation /Logistic/ to be supplied with transportation vehicles in order to gather pro-forma invoice.

9. After the request of transportation has been issued, the team will travel to Addis Ababa or within Adama to gather the invoice and deliver to the purchasing department Directorate director.

10. The director will authorize the sealed envelopes and send in to the central purchasing team via a secretary.

11. The central purchase team will gather purchase experts and open the sealed envelope after signing the envelope.

12. The pro-forma invoice will be passed to the passed to the purchase evaluation team.

13. The evaluation team will review the legal documents and rank the contenders in a table and choosing the one with lowest price as a winner. Prepare a minute with the team that opened the pro-forma and sign the paper. After that, it will be delivered to the director.

14. After the director reviews the legitimacy of the evaluation and checking the signature, the request will be issued and approved to make a purchase.

15. The secretary of the director will titter each signature and deliver to the registry.

16. After the registry revise the number of copies needed and other requirements, the letter will be given registration number and issued date. This will be delivered to the finance and budget directorate to be authorized.

17. The finance and budget directorate will pass directives to the finance officers to prepare payment, after revising the documents.

18. The finance officers will review the balance, and prepare check and deliver to the finance and budget directorate.

19. The responsible directorates will sign the check and pass it to the purchaser.

20. The purchaser will cash out the check in the nearby bank and buy the requested item.

21. The requested item will be delivered to the storage facility.

22. The department that requested the purchase would inspect and sign the inspection form, the purchaser will receive the model 19.

23. The department that requested the purchase will be able to use the purchased item.

24. The purchaser will make model 19 and other related documents. These documents will be delivered to the finance and budget directorate to balance per request and purchase /financial statement.

Advertisement:

The directorate make an advertisement for the bid, through printed media and online medium. ASTU uses Negairit Magazine and its own two official websites. The directorate make announcement for the bid and any purchasing related advert using those public mediums.

The directorate make all those works like request acceptance, advertisement, bid computation, quality assessment, contract closure, financing by following the existing manuals which rely on the FEDERAL GOVERNMENT MANUAL FOR PURCHESING IMPLEMENTATION

2.1 Major Function of Existing system

As there is manual based working existing system to the ASTU purchase and property administer directorate, the major functions are:

- ✓ Request management
- ✓ Pro-forma based purchasing
- ✓ Open bid process (for national and international bidders)
- ✓ Big computation (The bid computation is depend on the type of bid and the price and quality of products proposed by the bidders are the core values used for evaluation of bidders.)
- ✓ Resource management (different supplies and equipment)
- ✓ Advertisement (Through Negairit magazine and using ASTU official websites)

2.2 Users of current system

The actors involved in current system are -

1. ASTU purchase and property administer directorate
    - ✓ The main directorate responsible of the whole process.
2. Service seeker:
    - ✓ The different directorates (34 directorates) which are available in ASTU.
3. Casher
    - ✓ Accept the payment of bidder and purchasers.
4. Bidder
    - ✓ They are major participants of bidding process.

5. Advertiser

   - ✓ The one, which is responsible for the advertisement of bid and different purchasing advert.

6. Bid committee

   - ✓ The central office that are responsible for controlling the whole process of auctions.

2.3 Drawback of the current system

The current system have the following drawbacks:

- ✓ The process is time and resource consuming

The manual way of doing the work makes the procurement and purchasing of the process to be time and resource consuming. The entire request, which comes from 34 different directorates to the ASTU purchase and property administer directorate passes through different stages of permission and validation through manual work.

- ✓ Manual file arranging system

On different stage of the work the request, permission, validation, bidders comparison table (based on the price they submit for a specific product), financial statement, quality assessment and lots of papers work attached together for one purchased material makes the file management work to be bulky and huge. In addition, they used traditional ways of file storage and management.

- ✓ The bidders go through a lot to get what they want

Bidders' personal connection and the time, which needs by ASTU purchase and property administer directorates for checking the different files, for validation, financial work, the price and quality assessment, comparing different valid candidates based on the preform they submit makes bidders to go through a lot to get what they want.

- ✓ Safety and security issues

Most manual based works have safety and security problems like paper lose, unexpected file damage, stealing, loss of confidential information.

Loss of confidential information are one of the major concerns in securing the process of purchasing and auctions. So on the current system there are still issues and complains related to security issues and the confidentiality of the system is still not solved.

- ✓ Most users make complains in improper ways. It makes workers on this department dis-comfortable

ASTU have a directorate on different hierarchies to accept complains from students, different division workers, outside persons that has direct and indirect contact with the organization. Likewise all users should use this protocol if they have any complains related to the service what they get form ASTU purchase and property administer directorates. Nevertheless, most the time

customers makes their complain and aggressiveness in an improper ways. This makes workers on this division to be dis-comfortable.

2.4. Business rules

The following are business rules of system.

1. The Bid committee is the only team allowed to manage any activity related to the Bid submission and revealing winner.
2. The Bidder must be authenticated by a means of payment to access the system.
3. Bidder must be registered before any operations related with bids are performed.
4. The bid is generated if and only if a specific bid request and bid verification are already satisfied.
5. If the service seeker wants to request a service, he/she should send a request to the Bid committee.
6. Bid committee view and manages all things about Bid.
7. Only Bid Committee can manage and modify the time adjustment.
8. Bidder has a privilege of viewing advertisement.
9. The Bid committee orders advertisement on service and product that are approved, issued by service seekers.
10. Bid committee must verify any service and product that are issued by service seekers.
11. The system should compare and reveal the bid winner.

Chapter 3

3. Proposed System

3.1 Overview

The proposed system aims to develop a web-based platform that will provide computerized and digitalized ways of doing the current manual works of ASTU purchase and property administer directorate. The system will perform major functions of the existing manual works, but it will not include some of the manual tasks, which needs human interventions for quality checking and validation of proper document. Our system includes request forms, advertisement of different bidding and pro-forma purchase, ranking of bidders based on price and quality grade, subscriptions of bidders using legal documents, announcement and report generations, bid computation, and storing confidential and proper documents.

The proposed system will be advantageous in terms of time saving, security and good financial returns for the organization also it will solve the reliability problems of the existing manual works.

This chapter portrays the projects from aspects of Requirement Engineering, Architecture of solution including general architecture, requirement elicitation and specification, components diagram, class diagram, data model and functionality of requirements.

3.2 Functional requirement

- ✓ Requisition platform
- ✓ Request approval and disproval
- ✓ Advertisement platform (for any open bid and other required purchasing issues)
- ✓ Subscription module (for validation of legal bidders)
- ✓ Catalog (bid form) generation
- ✓ Solicitation or response for catalog.
- ✓ Crud operation (Add, Update and Delete forms)
- ✓ Compute the Bid.
- ✓ The system has to announce the winner.
- ✓ File management. (All required and confidential data for a specific purchase compiled and stored together)

3.3 Non-functional requirement

Users interface

- ✓ User interface should support optional ways to complete a task.
- ✓ The interface should be attractive and user friendly.
- ✓ Minimum response time for displayed required interface.
- ✓ having graphical ways of error message displaying
- ✓ The system will have clear content presentation.
- ✓ Implementing easy navigation method.
- ✓ Strategical use of color and texture throughout the entire system.

- ✓ Providing help information and user centric approach.

Authentication

- ✓ Depending on types of the user, the system will give different accessing.
- ✓ The system support admin user-name and password to have full access of the system.
- ✓ Giving different privilege to protect intruding.

Usability

- ✓ Through provides easy access, with easy user interface.
- ✓ The system shall be easy to understand and easy to implement.
- ✓ The system will insure increased performance of users completing their task thorough evaluating the easiness of the system.
- ✓ The information and tools within the system are made to be easily accessible and easily understandable.
- ✓ Implements safe environment for the things that can be undone.

Reliability:

Our system should be reliable through:

- ✓ Appropriate error messages will be provide to users whenever incorrect information is insert.
- ✓ Setup error handling methods in place where in case of exception
- ✓ The platform works with slow network connections.

Compatibility

- ✓ The system will be compatible with existing operating systems and different browsers.

Security

- ✓ The system should not display or give access on confidential data that are not meant to be displayed before the predefined date and time.
- ✓ The back end of the system should be secure from unauthorized persons.

3.4 System model

3.4.1 Scenario

1. Scenario Name: Browse Website

Actors: All user

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.

Flow of events:

- ✓ Users opens a web browser application on the computer.
- ✓ Types in the address of the website and searches it on the web.
- ✓ Once, the website loads successfully he/she browses the site for what they are looking for.

2. Scenario name: purchase request

Actor: Requisitioner

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.
- ✓ The user has a valid user name and password which recognized by the system.

Flow of event:

- ✓ The system displays homepage.
- ✓ User chooses request form tab.
- ✓ Requisitioner fills request form.
- ✓ Submits its request.
- ✓ The system display Successful message.

Alternate condition:

- ✓ If the user fills the form incorrectly, the system will generate an error message.

3. Scenario name: Approve/Dis-approve

Actor: Procurement and property administration directorate

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.

- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.
- ✓ The user has a valid user name and password which recognized by the system.
- ✓ A submitted request by Requisitioner.

Flow of event:

- ✓ The system displays homepage.
- ✓ The director chooses the requested services tab.
- ✓ The director either approves or disapproves the requested service.

4. Scenario name: Advertisement

Actor: Advertiser

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.
- ✓ The user has a valid user name and password which recognized by the system.

Flow of event:

- ✓ The system displays homepage.
- ✓ The advertiser view already approved advert requests.
- ✓ The advertiser chooses the make advert tab.
- ✓ Fill the advertisement form
- ✓ The advertiser posts the advertisements.

Alternate condition:

- ✓ If the user fills the form incorrectly, the system will generate an error message.

5. Scenario name: Subscription

Actor: Bidder, purchaser

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.
- ✓ The user has a valid user name and password which recognized by the system.

Flow of event:

- ✓ The system displays homepage.
- ✓ The purchaser enters new subscription registration tab.
- ✓ Purchaser checks the eligibility of the documents and register the subscribers by uploading the documents.
- ✓ The purchaser gives identification number for the new subscriber.

Alternate condition:

- ✓ If the user fills the form incorrectly, the system will generate an error message.

6. Scenario name: Document generation

Actor: Central procurement group

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.
- ✓ The user has a valid user name and password which recognized by the system.
- ✓ Approved bid.

Flow of event:

- ✓ The system displays homepage.
- ✓ The central procurement group chooses the type of form needed for the approved bid by the director.
- ✓ Users choses bid document tab
- ✓ The user prepares bid document.
- ✓ User submit the bid document.
- ✓ User chose bid form tab
- ✓ The central procurement group submits the chosen type of form.

7. Scenario name: Payment announcement

Actor: Bidder

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.

Flow of event:

- ✓ The system displays homepage.
- ✓ The bidder choose payment information submission tab.
- ✓ The bidder submits subscription identification number and payment information for the specific bid he/she wanted to be engaged.

8. Scenario name: Grant bid access

Actor: Purchaser

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.
- ✓ The user has a valid user name and password which recognized by the system.

Flow of event:

- ✓ User choses the submitted payment tab.
- ✓ User checks subscription identification number and the payment information eligibility.
- ✓ User sends user and password information to bidders who submitted eligible payment information.

9. Scenario name: Fill bid form and Submission

Actor: Bidder

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.

- ✓ The user has a valid user name and password which recognized by the system.

Flow of event:

- ✓ User refer the bid document
- ✓ User choose bid form tab.
- ✓ User fill the bid form.
- ✓ User submit the bid form.
- ✓ The system displays successful message.
- ✓ The system validates form details.

Alternate condition:

- ✓ If the user fills the form incorrectly, the system will generate an error message.

10. Scenario name: Bid computation

Actor: System

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ Submitted bid.
- ✓ The predefined date and time should be similar to the current time and date.

Flow of event:

- ✓ The System computes the submitted bid.
- ✓ The system reveal bid winners.
- ✓ The system announces bid winner.

11. Scenario name: Quality inspection

Actor: Quality inspector

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ They have to navigate to the website.
- ✓ The user has a valid user name and password which recognized by the system.
- ✓ Submitted bid document.

Flow of event:

- ✓ The system displays a document that has technical feature of the bid form.
- ✓ User gives valuation to the inspection.
- ✓ User submit the rank.

12. Scenario name: Recording data

Actor: System

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ Submitted documents.

Flow of event:

- ✓ The system stores the documentation of the whole bid process into the database for future use.

13. Scenario name: Crude operation

Actor: Advertiser, Bidder, Central procurement group, Requisitioner, purchaser

Entry Condition:

- ✓ Power supply has to be available to power on the laptop.
- ✓ Internet connection has to be available.
- ✓ Any forms and advertisements should submit

Flow of event:

- ✓ User enters homepage.
- ✓ User choses to create, read, update, delete and edit operation.
- ✓ The user performs chosen operation.

3.4.2 Use case model

I. Actor identification

1. Requisitioner

- ✓ Login
- ✓ Make purchase request
- ✓ View approval status
- ✓ View advertisement

2. Bidder

- ✓ Login
- ✓ Subscription
- ✓ Payment announcement
- ✓ View advertisement
- ✓ Make bid

3. Advertiser

- ✓ Login
- ✓ View approved advert-request
- ✓ Make advertisement
- ✓ View advertisement

4. Procurement and property administer directorate

- ✓ Login
- ✓ View purchase request
- ✓ Approve and dis-approve purchase request
- ✓ View advertisement
- ✓ View bid announcement report

5. Central procurement

- ✓ Login
- ✓ View approved purchase request
- ✓ Prepare bid document
- ✓ post bid document
- ✓ View bid announcement report
- ✓ View advertisement

6. Purchaser

- ✓ Login
- ✓ Registrations
- ✓ Subscription

- ✓ Grant bid access
- ✓ View advertisement

7. Quality inspector

- ✓ Login
- ✓ Give quality valuation
- ✓ View advertisement

8. Admin

- ✓ Login
- ✓ Registration
- ✓ Manage users

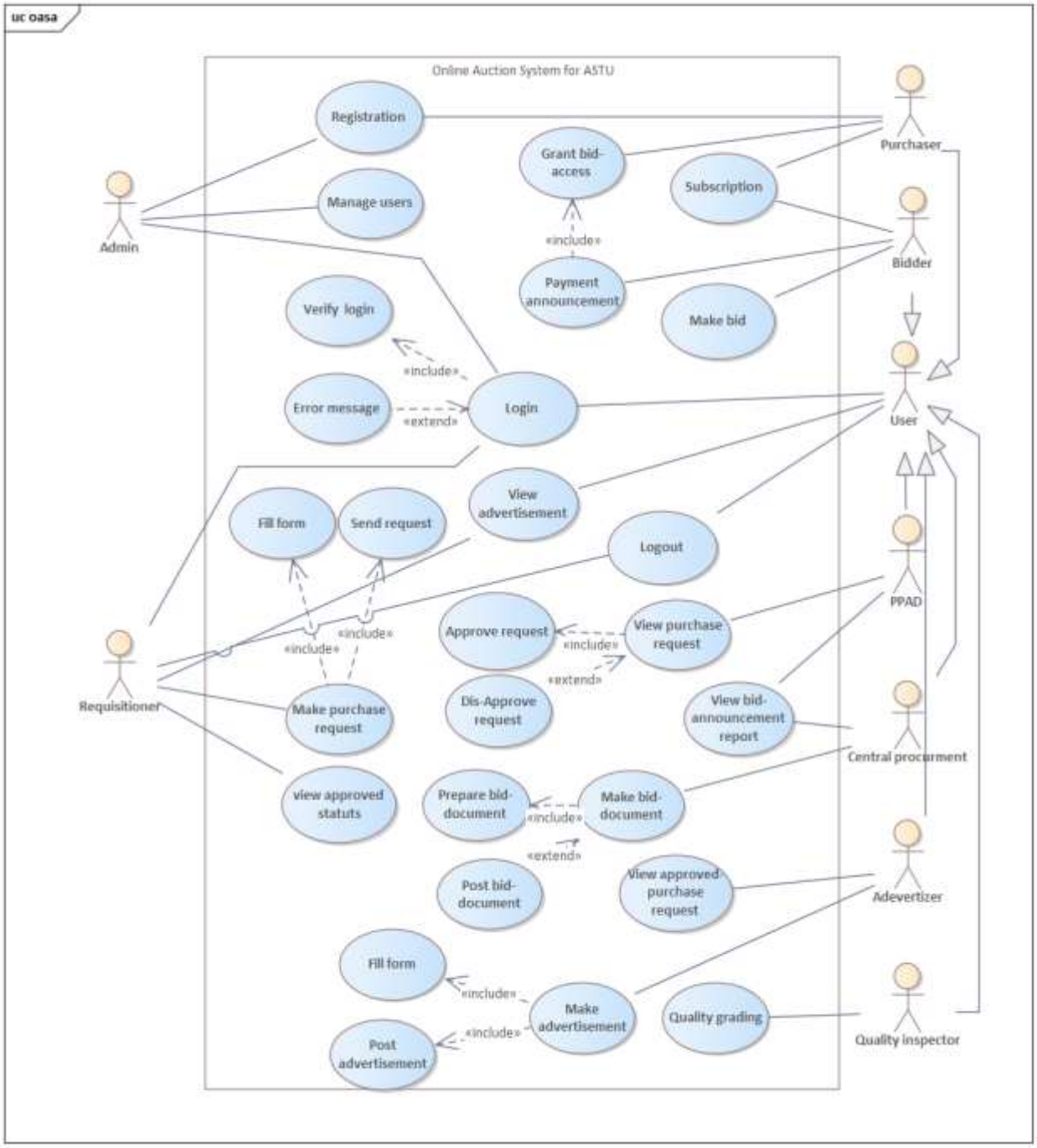
II. Use case identification

Our system includes the following use cases:

- ✓ Login
- ✓ Register
- ✓ Manage users
- ✓ Grant bid access
- ✓ Make purchase request
- ✓ View approval status
- ✓ Subscription
- ✓ Payment announcement
- ✓ Make bid
- ✓ View advertisement
- ✓ View purchase request
- ✓ View Bid announcement
- ✓ Make bid document
- ✓ Make advertisement
- ✓ Quality grading
- ✓ Make crud operation
- ✓ logout

III. Use case diagram

*Figure 1**Use case diagram***



Iv. Use case description

Table 5 Use case description for login

Use case name	Login
Use case ID	01
Use case description	Whenever the user tries to access his/her personal page like advertising, posting etc. he/she is required to provide his/her username and password and the user will login.
Actor	All user
Pre-condition	The user must have valid username and password
Post-condition	Leaving from login page and will join home page
Main flow	✓ The user opens the system. ✓ The user fills the login form by writing his/her username and password ✓ The login information is sent to the server for authentication by clicking the login button ✓ The system display home page.
Exceptional flow	✓ If he/she enters wrong data the system display a message to enter correct data
Include	Create account
Business rule	Valid username and password should be acquired
Frequency of use	Once in every single use

Table 6 Use case description for Purchase Request

Use case name	Purchase Request
Use case ID	02
Use case description	Provide service seeker(Requisitioner) to ask or send a purchase request to bid committee
Actor	Requisitioner
Pre-condition	✓ They have to navigate to the website. ✓ The user has a valid user name and password which recognized by the system.
Post-condition	Request reaches to bid committee
Main flow	✓ The system displays homepage. ✓ User chooses request form tab. ✓ Requisitioner fills request form. ✓ Submits its request form for approval. ✓ The system display Successful message.

Exceptional flow	✓ If the user fills the form incorrectly, the system will generate an error message.
Include	-
Business rule	A valid department or sector should have a valid user and request should be submitted by that user
Frequency of use	Every time when service is requested

Table 7 Use case description for Register

Use case name	Register
Use case ID	03
Use case description	The bidder must register into the system in order to participate in the bidding process
Actor	Admin, Purchaser
Pre-condition	He/she user must have valid email address.
Post-condition	Having valid username and password
Main flow	The user fills the information that is required in the registration form, information like : ✓ First name ✓ Last name ✓ Gender ✓ Name of firm/company ✓ Email ✓ Telephone number ✓ Access level ✓ Users type Click Submit
Exceptional flow	✓ If the bidder does not enter correct information in to the form, the system notifies to enter the correct data
Include	-
Business rule	Those information above should be submitted
Frequency of use	Ones to register

Table 8 *Use case description for Approve purchase request*

Use case name	Approve purchase request
Use case ID	04
Use case description	PPAD observes those service/item list that have been requested and approves by choosing.
Actor	PPAD
Pre-condition	Service requests should be send
Post-condition	Approve/Dis-approve for advertisement
Main flow	✓ The system displays homepage. ✓ View purchase request ✓ The director chooses the requested services tab. ✓ The director approves the requested service.
Exceptional flow	-
Include	-
Business rule	Service seekers first should make a request
Frequency of use	Once

Table 9 *Use case description for Dis-approve purchase request*

Use case name	Dis-approve purchase request
Use case ID	05
Use case description	PPAD observes those service/item list that have been requested and approves by choosing.
Actor	PPAD
Pre-condition	Service requests should be send
Post-condition	Approve/Dis-approve for advertisement
Main flow	✓ The system displays homepage. ✓ View purchase request ✓ The director chooses the requested services tab. ✓ The director disapproves the requested service.
Exceptional flow	-
Include	-
Business rule	Service seekers first should make a request
Frequency of use	Once

Table 10 Use case description for Subscription

Use case name	Subscription
Use case ID	06
Use case description	The bidders should have to subscribe in order to get access for making a bid for already available bid announcements.
Actor	Bidder, Purchaser
Pre-condition	✓ They have to navigate to the website. ✓ The user has a valid user name and password which recognized by the system.
Post-condition	Bidders get access to participate in any biding.
Main flow	✓ The system displays homepage. ✓ The purchaser click new subscriber registration tab. ✓ Purchaser checks the eligibility of the documents and register the subscribers by uploading the documents. ✓ The purchaser gives identification number for the new subscriber.
Exceptional flow	✓ If the user fills the form incorrectly, the system will generate an error message.
Include	Refresh, the file permanently saved to database
Business rule	Bidders should submit all valid documents for the bid.
Frequency of use	Once in valid time

Table 11 Use case description for Quality grading

Use case name	Quality grading
Use case ID	07
Use case description	Quality inspector should check the products which are proposed by the bidders , after that he/she gives ranking for the specific products which helps for automatic bid computation
Actor	Quality inspector
Pre-condition	✓ They have to navigate to the website. ✓ The user has a valid user name and password which recognized by the system. ✓ Submitted bid document.
Post-condition	Bidders get their rank based on their quality
Main flow	✓ The system displays a document that has technical feature of the bid form. ✓ User gives valuation to the inspection.

	✓ User submit the rank.
Exceptional flow	None
Include	Refresh, the file permanently saved to database
Business rule	Central procurement should give permission to make the quality assessment
Frequency of use	Once in valid time

Table 12 Use case description for Make crud operation

Use case name	Make crud operation
Use case ID	08
Use case description	If any redo operations necessary for already submitted forms and advertisements any users can uses this crud operations to make the redo.
Actor	Advertiser, Bidder, Central procurement, Requisitioner, purchaser, PPAD
Pre-condition	The forms will update
Post-condition	The content of the form will be update
Main flow	✓ The system displays homepage. ✓ The bidder choose already prepared forms ✓ Make any crud operation ✓ The bidder submits.
Exceptional flow	None
Include	Refresh, the file permanently saved to database
Business rule	
Frequency of use	Every time before the posting the document

Table 13 Use case description for Payment announcement

Use case name	Payment announcement
Use case ID	09
Use case description	Bidders after paying the initial payment for the bid they make an announcement for the purchaser to get identification number form him/her for
Actor	Bidder
Pre-condition	✓ They have to navigate to the website.
Post-condition	Bidders get identification number which helps for making a bid
Main flow	✓ The system displays homepage.

	✓ The bidder choose payment announcement submission tab. ✓ The bidder submits subscription identification number and payment information for the specific bid he/she wanted to be engaged.
Exceptional flow	None
Include	Refresh, the file permanently saved to database
Business rule	Bidders should submit all valid documents for the bid and they should have a subscription.
Frequency of use	Once in valid time

Table 14 Use case description for Grant bid access

Use case name	Grant bid access
Use case ID	10
Use case description	The purchaser after checking the payment announcement he/she will give grant or privileges for bidders
Actor	Purchaser
Pre-condition	✓ The user has a valid user name and password which recognized by the system. ✓ Payment announcement should perfume
Post-condition	Bidders get one-time access key for a specific bid
Main flow	✓ User choses the submitted payment tab. ✓ User checks subscription identification number and the payment information eligibility. ✓ User sends user and password information to bidders who submitted eligible payment information.
Exceptional flow	None
Include	Refresh, the file permanently saved to database
Business rule	Payment should submit
Frequency of use	Once in a year for each bidders

Table 15 Use case description for logout

Use case name	Logout
Use case ID	11
Use case description	The user will logout of the system when he/she finish.
Actor	All user
Pre-condition	The user must login
Post-condition	Back to login page/homepage

Main flow	✓ The user clicks on the logout button ✓ His/her information removed on the local storage. ✓ The system leads there page to their home page
Exceptional flow	
Include	Refresh, the file permanently saved to database
Business rule	-
Frequency of use	Once

Table 16 Use case description for Prepare bid document

Use case name	Prepare bid document
Use case ID	12
Use case description	The central procurement first should prepare the bid document based on the approved request to make the purchasing and auction process start
Actor	Central procurement
Pre-condition	Requisitioner request should approved by PPAD
Post-condition	Post document
Main flow	✓ The system displays homepage. ✓ The central procurement group chooses the type of form needed for the approved bid by the director. ✓ Users choses bid document tab ✓ The user prepares bid document.
Exceptional flow	✓ If the user fills the form incorrectly, the system will generate an error message.
Include	Refresh, the file permanently saved to database
Business rule	Request should approve.
Frequency of use	Every time for any document preparation

Table 17 Use case description for post bid document

Use case name	Post bid document
Use case ID	13
Use case description	The central procurement after preparing their bid documents they will post it to be available for any bidders
Actor	Central procurement
Pre-condition	Bid document preparation should complete
Post-condition	Available for users
Main flow	✓ User submit the bid document. ✓ User chose bid form tab ✓ The central procurement group submits the chosen type of form.

Exceptional flow	✓ If the bid document should not fill or prepare in the right manner
Include	Refresh, the file permanently saved to database
Business rule	-
Frequency of use	Once for any prepared document

Table 18 Use case description for fill form in make advertisement

Use case name	Form fill
Use case ID	14
Use case description	Advertiser prepares the advertisement forms by filling all the necessary information.
Actor	Advertiser
Pre-condition	All purchased request should get permission for advertisement
Post-condition	Post advertisement
Main flow	✓ The system displays homepage. ✓ The advertiser view already approved advert requests. ✓ The advertiser chooses the make advert tab. ✓ Fil the advertisement form
Exceptional flow	✓ If the advertisement form should not fill or prepare in the right manner
Include	Refresh, the file permanently saved to database
Business rule	-
Frequency of use	Once for any prepared bid documents

Table 19 Use case description for Post advertisement in make advertisement

Use case name	Post advertisement
Use case ID	15
Use case description	After preparing the advertisement for any approved purchases, which need to be post on the system to make it available for any users of the system.
Actor	Advertiser
Pre-condition	Advertisement form should fill
Post-condition	Available for users
Main flow	✓ The advertiser posts the advertisements.
Exceptional flow	✓ If the advertisement form should not fill or prepare in the right manner
Include	Refresh, the file permanently saved to database
Business rule	-
Frequency of use	Once for any prepared advertisement forms

Table 20 Use case description for view advertisement

Use case name	view advertisement
Use case ID	16
Use case description	Any users of the system can see an advertisement.
Actor	All users
Pre-condition	Posting the advertisement should complete
Post-condition	Available for users
Main flow	✓ Open the websites ✓ Enter username and password ✓ systems inter to the home page ✓ Chose view advertisement tab
Exceptional flow	✓ If the advertisement form should not fill or prepare in the right manner
Include	Refresh, the file permanently saved to database
Business rule	The advertisement should available
Frequency of use	Once for any prepared advertisement forms

Table 21 Use case description for View bid announcement

Use case name	View bid announcement
Use case ID	17
Use case description	Once the system perform the bid computation and the predefined data and time meet the bid result should be accessible for central procurement and PPAD
Actor	Central procurement, PPAD
Pre-condition	Bid computation should perform
Post-condition	Result report generate
Main flow	✓ Open the websites ✓ Enter username and password ✓ Enter in to the home page ✓ Chose view bid result tab
Exceptional flow	-
Include	Refresh, the file permanently saved to database
Business rule	Based on price and quality assessment bid computation should first perform by the system.
Frequency of use	Every time when needed

Table 22 Use case description for Make bid

Use case name	Make bid
Use case ID	18
Use case description	If users see the advertisement for the bid, if they have already a subscription, and if they make a payment announcement they can directly participate in a bid.
Actor	Bidders
Pre-condition	Bidders should have subscription and payment announcement should be complete
Post-condition	Successful message will display and they can view a bid, which they participate already.
Main flow	✓ Open the websites ✓ Enter username and password ✓ Enter in to the home page ✓ Chose make bid ✓ Fill the form ✓ Submit the form
Exceptional flow	✓ If the bidder does not enter correct information in to the form, the system notifies to enter the correct data
Include	Refresh, the file permanently saved to database
Business rule	Users should have subscription to be participant
Frequency of use	Once for a specific bid.

3.5 Object Model

3.5.1 Data Dictionary

The data dictionary is used to define each class in the system and the member of class like attribute, operation and description about the class.

Table 23 Data Dictionary

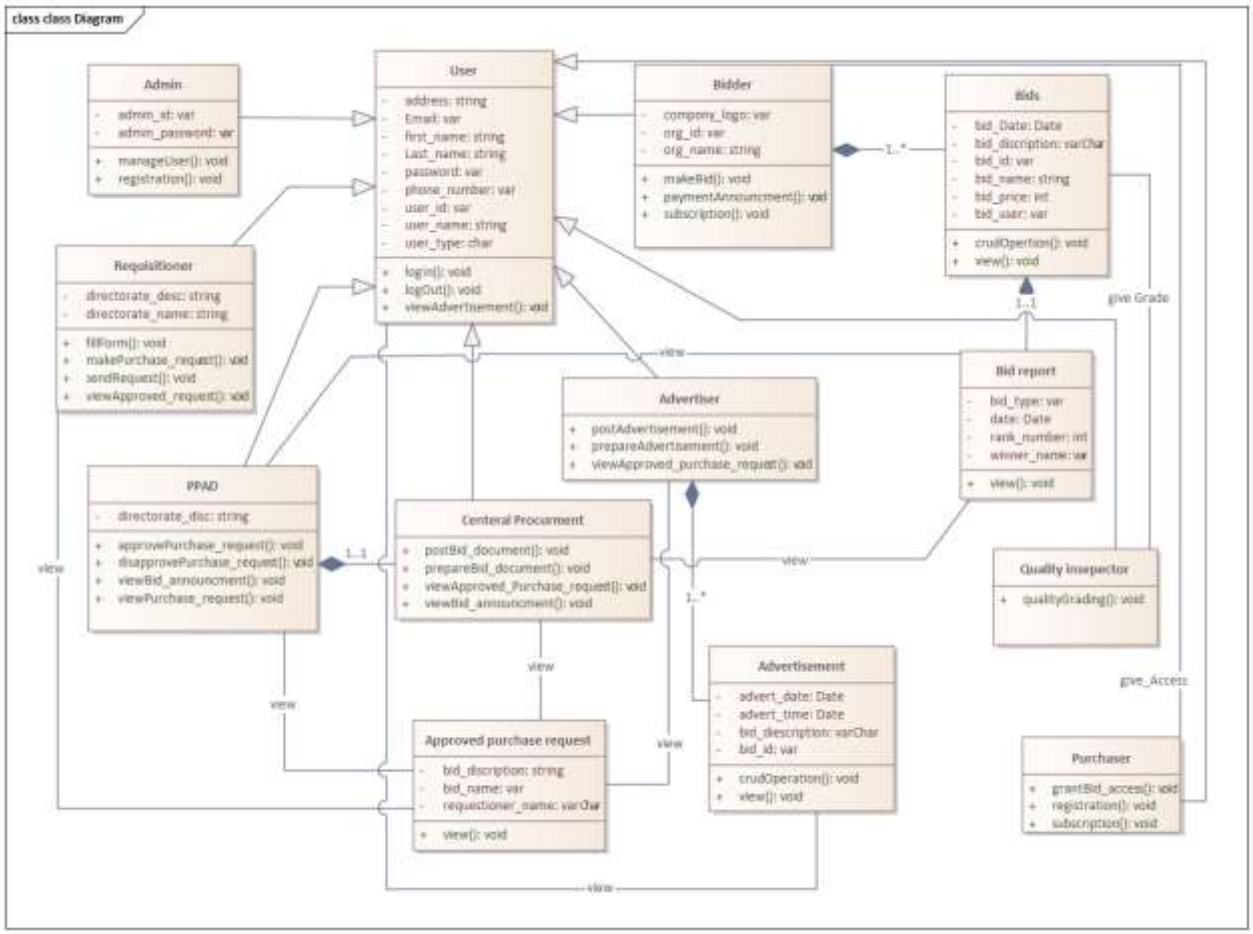
Class	Attribute	Operation	Description
User	First_name Last_name Password Phone_number User_name User_type Email Address User_id	Login () Change password () Logout () View advertisement()	A user is an actor which represents all users of the system and it is the parent class for all other class
Central procurement		View bid- report() Prepare bid-document() Post bid-document() ViewApproved_purchase_request()	A central procurement is a group that is responsible to prepare any bid document and make a bid.
Bidder	Company_logo Org_id Org_name	Subscription() Make bid() PaymentAnnouncement()	Any legal organization that can participate on the bid process
Purchaser		Registration() Subscription() GrantBid-access()	A persona that checks the legitimacy of all legal documents of bidders and subscribe them to the system, give an

			access for the bidders.
Requisitioner	Directorate_disc Directorate_name	fillForm() makePurchase_request() sendRequest() viewApproved_request()	Any directorates of ASTU.
Advertiser		ViewApproved_purchase_request() PrepareAdvertisement() PostAdvertisement()	A person responsible for preparing an advertisement for already approved bid document and post the advertisement on the advertisement page.
Admin	Admin_id Admin_password	Manage user() Registration()	System controller and manage all users.
PPAD	Directorate_disc	ViewPurchase_request() ApprovePurchase_request() DisapprovePurchase_request() ViewBid_announcement ()	Directorate, which is responsible for all purchase and bid process.
Quality inspector		QualityGrading()	A group which checks the quality of the proposed product by the bidders and give a quality valuation to the specific product
Advertisement	Advert_date() Advert_time() Bid_diescription() Bid_id()	View() CrudOperation()	A class that holds any of already approved advert
Bid report	Bid_type Date Rank_number Winner_name	View()	After bid computation, the system displays a

			bid report. Therefore, the bid repost contains and displays already computed bid values.
Bids	Bid_date Bid_name Bid_id Bid_discription Bid_price Bid_user	CrudOperation() View()	A class that holds any of already submitted bids
Approved purchase_request	Bid_discription Bid_name Requestioner_name	View()	A class that holds any of already approved purchase request

3.5.2 Class Diagram

Figure 2 ***Class diagram***



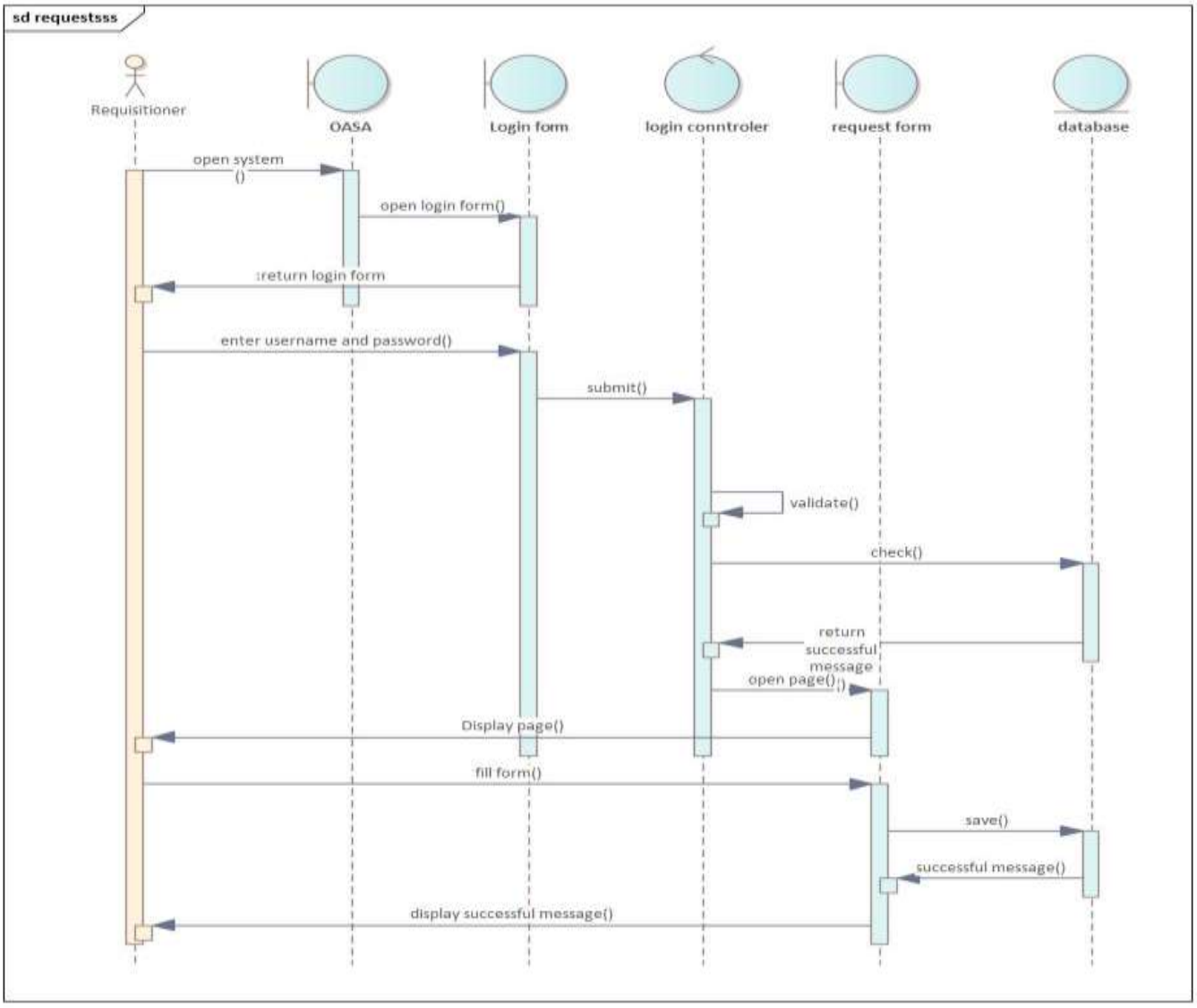
3.6 Dynamic Model

3.6.1 Sequence Diagram

A. Requisition

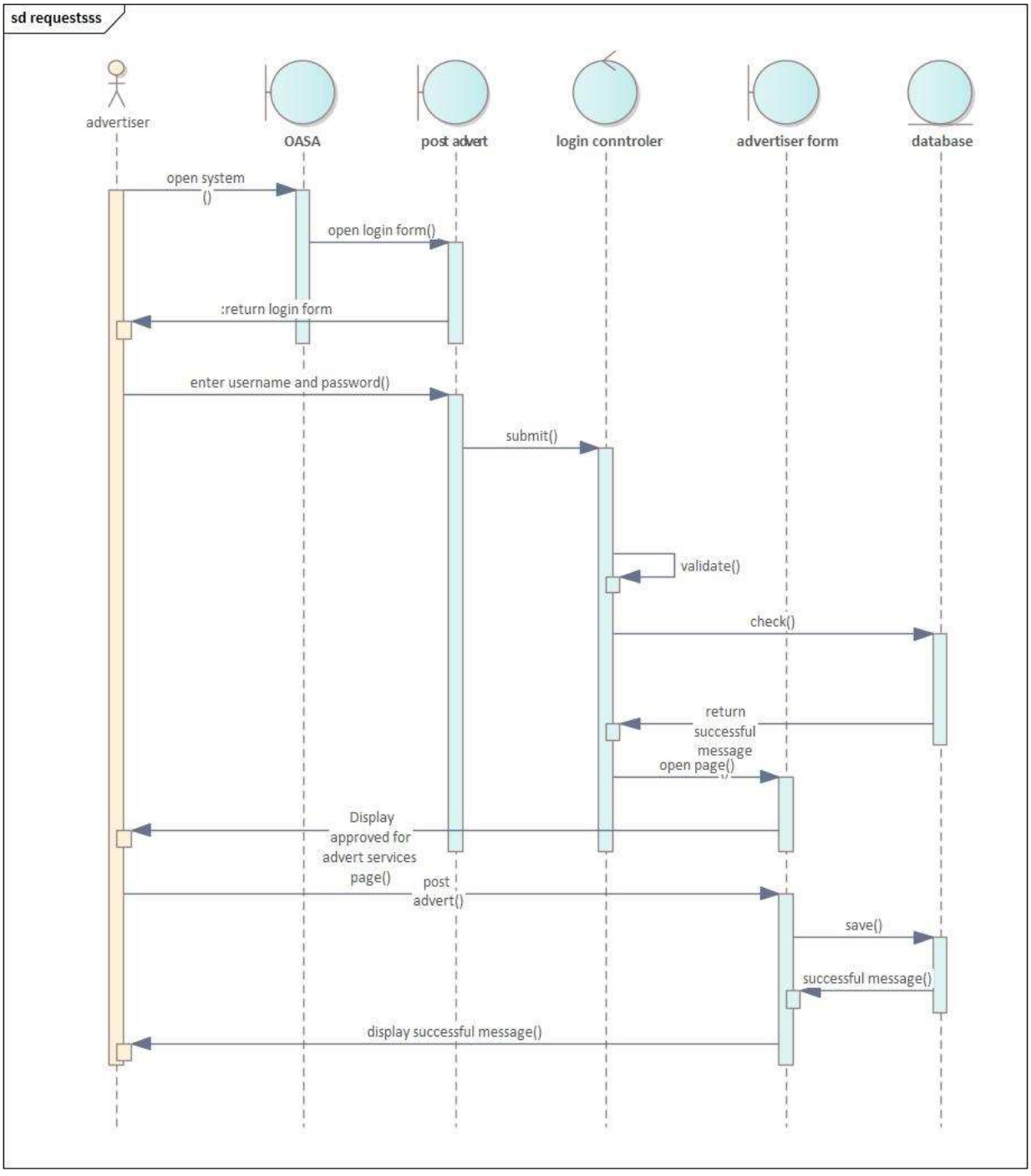
Is the process in which Requisitioner passes its request to the responsible division to gain permission and collect its good or service.in this request response process the Requisitioner passes through a sequence of processes, this processes are illustrated in a diagram below.

Figure 3 ***Requisition sequence diagram***



B. Advertisement The advertisement processes takes place by the advertiser and those requests will go through a series of operation and gets to advertiser. This is where the advertiser logs into its side of the system and publish it goes through the following activity.

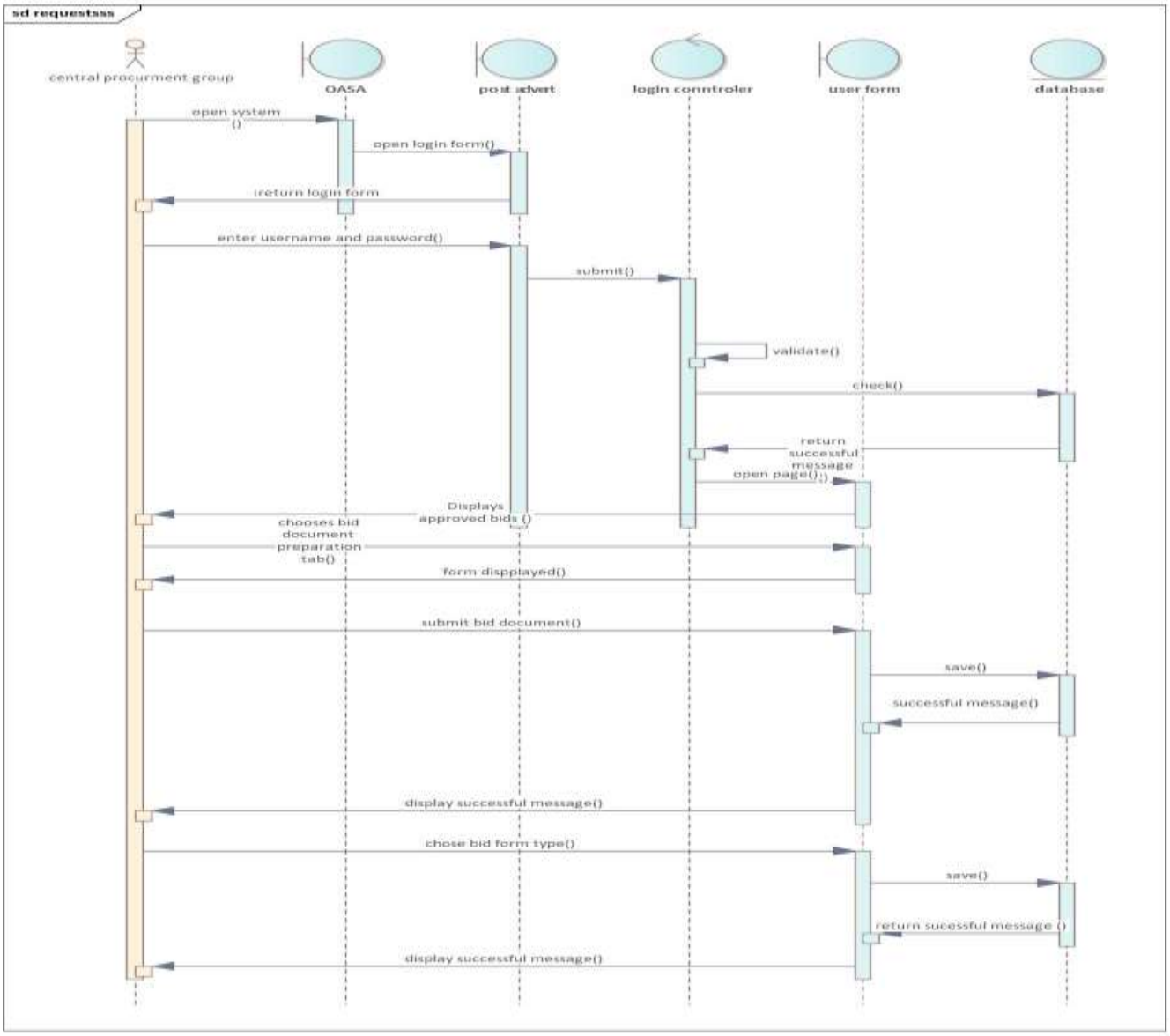
Figure 4 ***Advertisement sequence diagram***



C. Make bid document

The bid document preparation includes choosing types of bid form and publication of this type and full submission of the document to the next part of the system process. The sequesnce takes place in the following manner.

Figure 5 ***Make bid document sequence diagram***

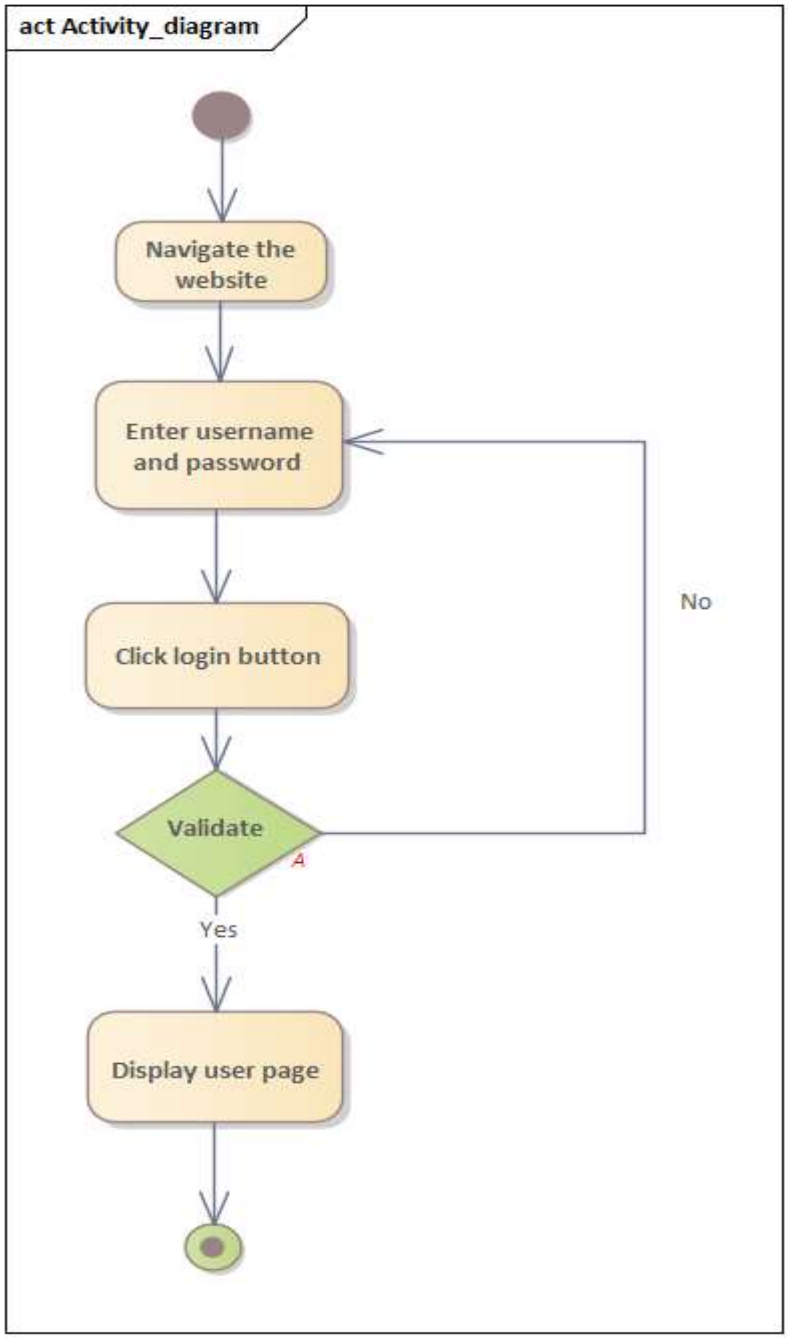


3.6.2 Activity Diagram

1. login

Login activity taks place for all authorized users in order to enter their side of the system. The acitivity to logo into the system takes place as below.

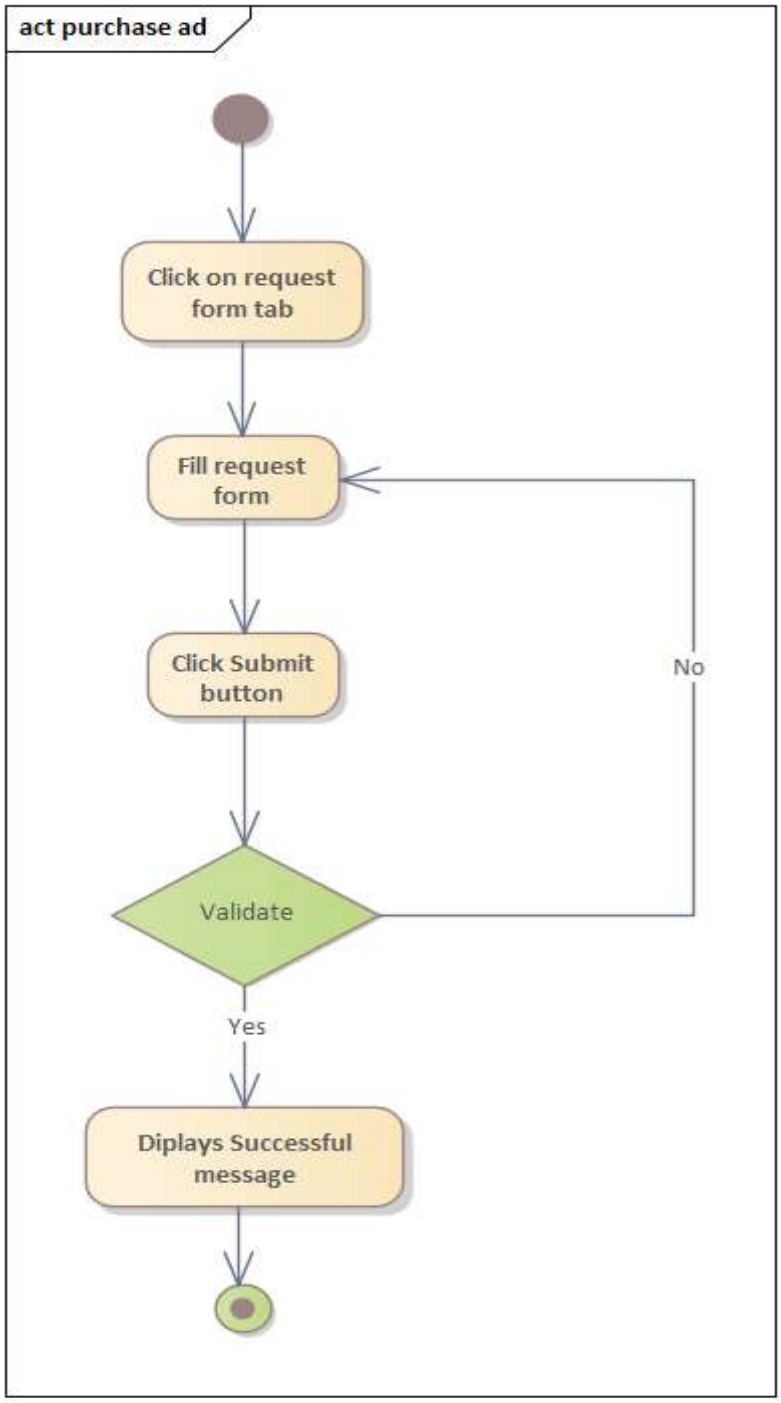
Figure 6 ***Login activity diagram***



2.Purchase request

The activity to make purchase request by requestioner is illusterated in the below diagram.

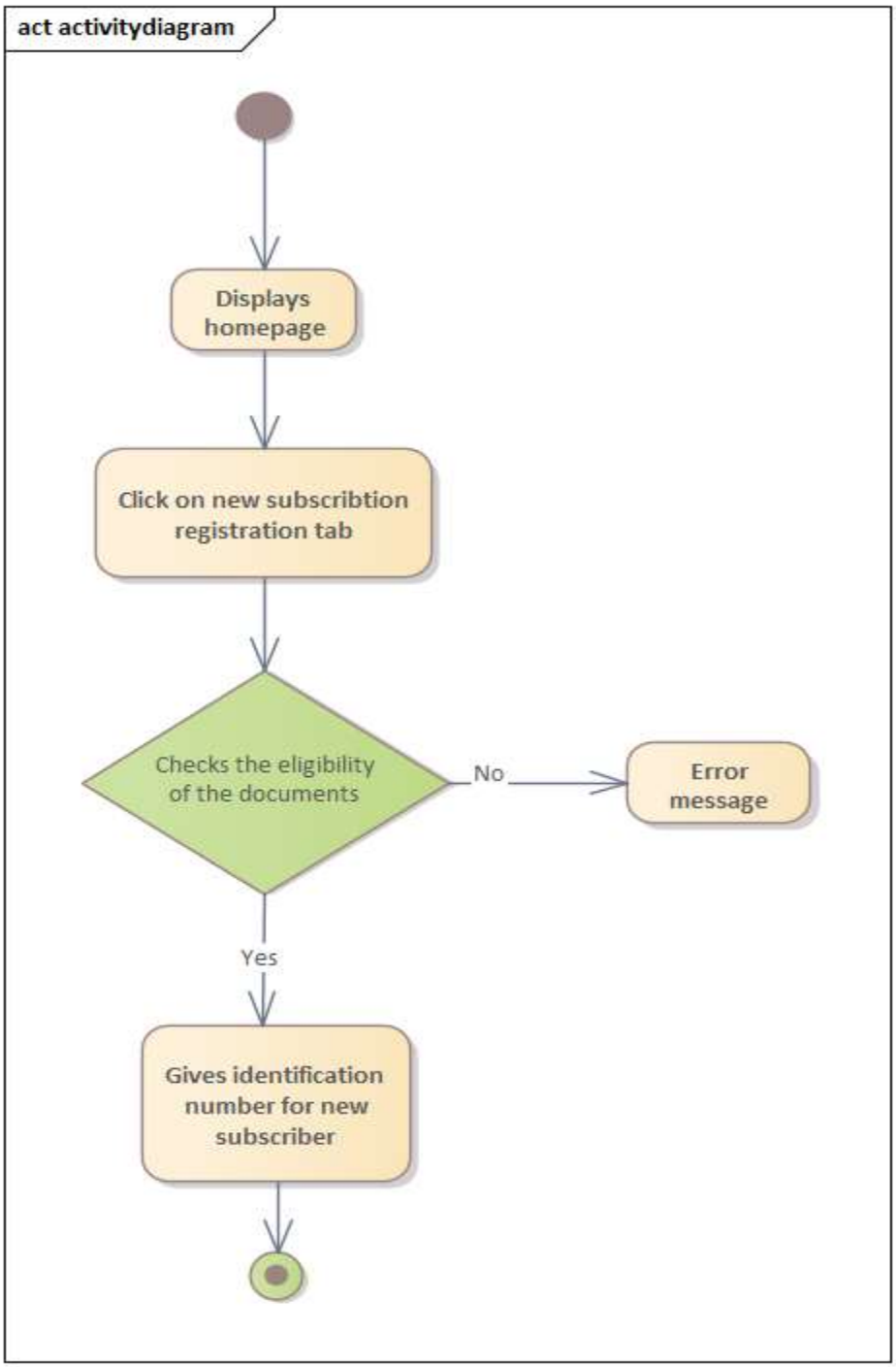
Figure 7 ***Purchase request activity diagram***



3.Registration (To register bidderes in our system)

In order to register bidder in our system the bidders wlligablity is validated and only if they are elligliable new seubscription takes place and activity are as showm below.

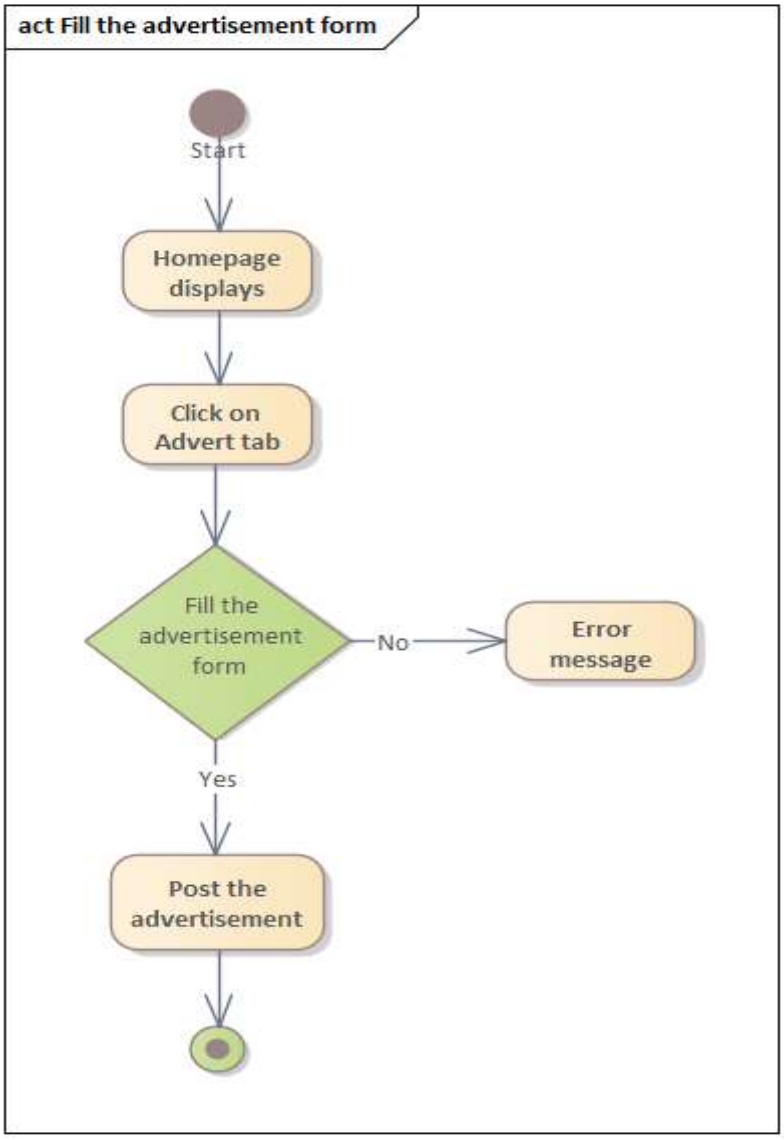
Figure 8 ***Registration activity diagram***



4.Make advertisement (fill advertisement form and post it)

The advertisement process takes place by the advertisers and those requests will go through a series of operation and gets to advertiser. This is where the advertisement logs into its side of the system and publish the advertisement, the advertisement to publish its advertisement it goes the following activities.

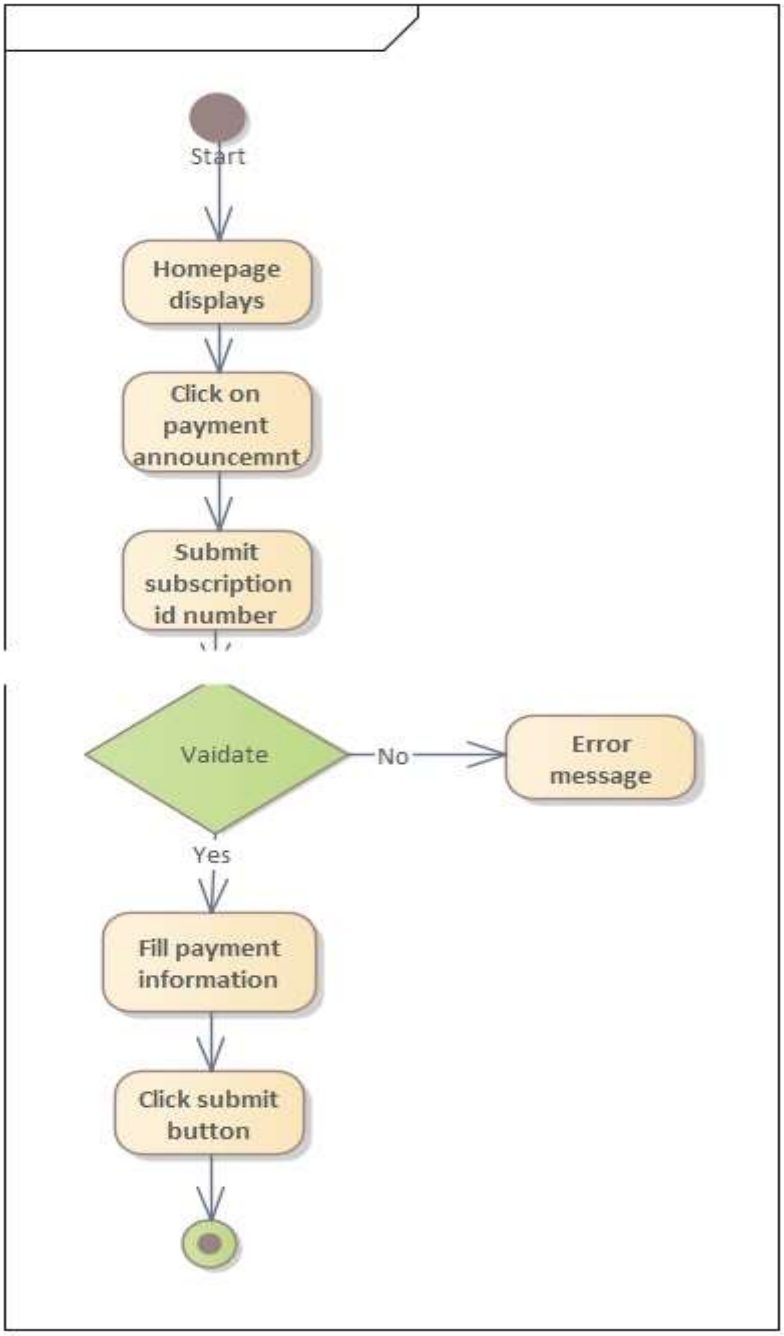
Figure 9 ***Make advertisement activity diagram***



5. Payment announcement

Is the process of eligible bidder notifies the purchaser to be granted and access for a bid and this is done by sending information about payment made and specific eligibility id. The activity involved are summarize in the diagram below.

Figure 10 ***Payment announcement activity diagram***

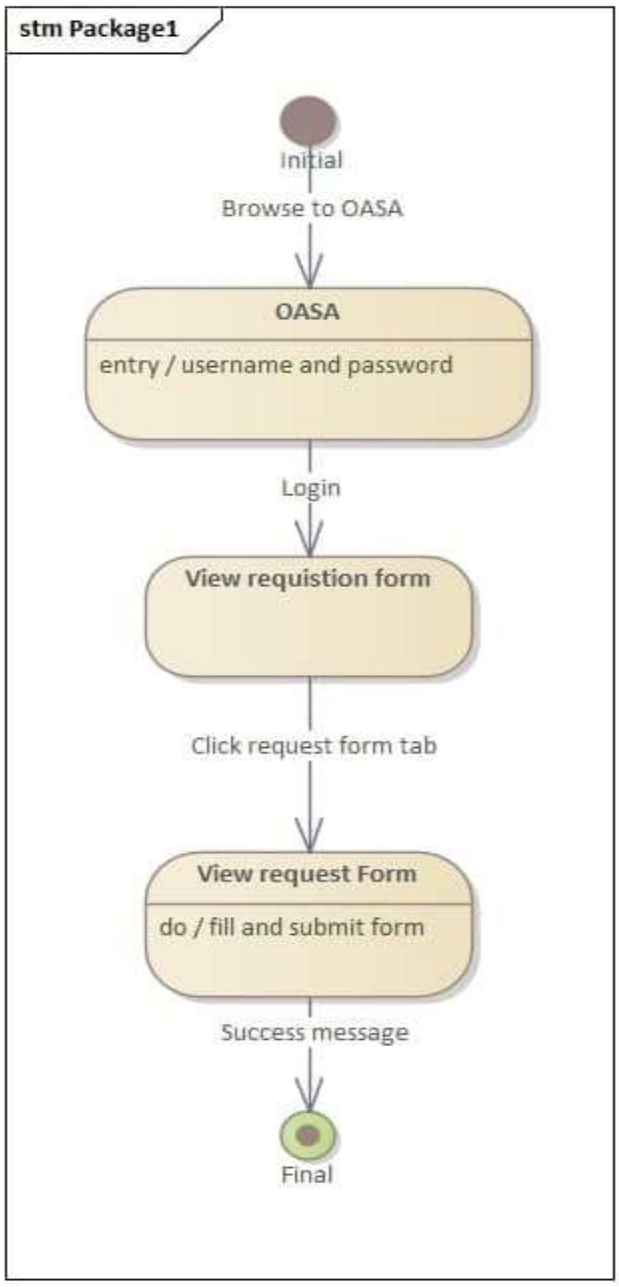


3.6.3 State Chart Diagram

1. Requisition

The flow for Requisitioner requests for purchase is as follows.

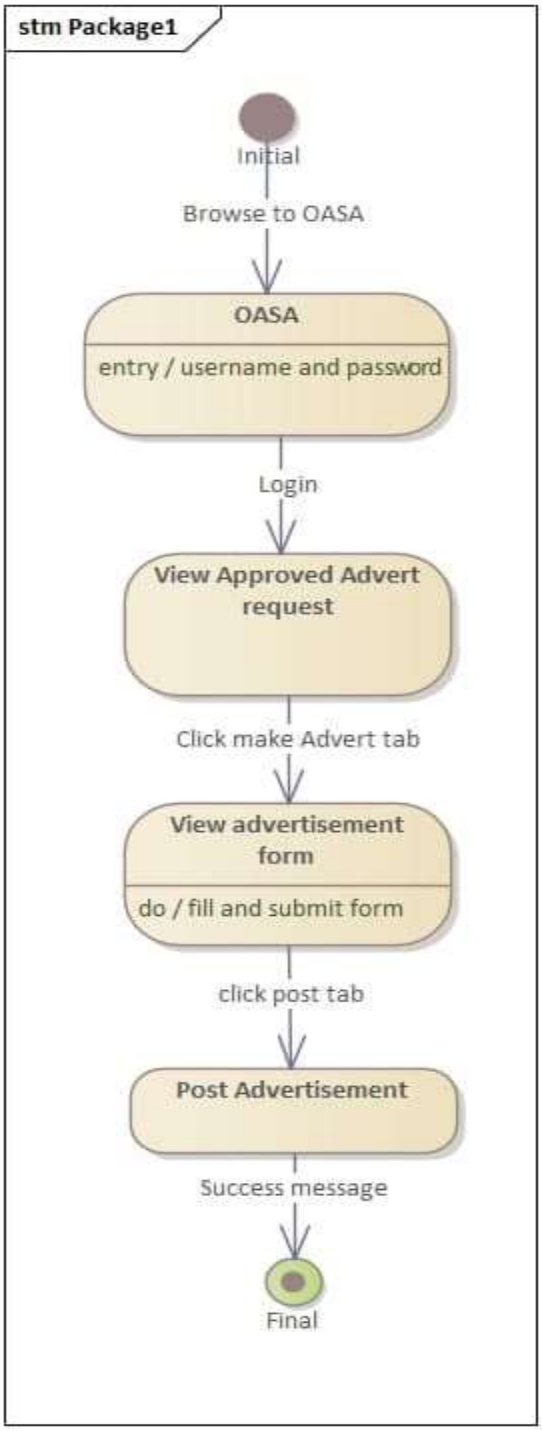
Figure 11 ***Requisition state chart diagram***



2. Advertisement

The flow of event carries out in advertisement starting from browsing the system to posting or publishing the advert is putt in this diagram.

Figure 12 ***Advertisement state chart diagram***



3. Subscription

Is made to validate eligibility of new incoming bidders for a bid and given the special eligibility identifier for the bidder. The following diagram illustrates the flow of this subscription process.

Figure 13 ***Subscription state chart diagram***