SUDAN UNIVERSITY OF SCIENCE & TECHNOLOGY
COLLEGE OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY
SOFTWARE ENGINEERING DEPARTMENT

E-TENDERING SYSTEM

THIS THESIS IS SUBMITTED IN PARTIAL FULFILLMENT OF THE ACADEMIC REQUIREMENTS FOR THE DEGREE OF B.SC. (HONOR) DEGREE IN SOFTWARE ENGINEERING

PREPARED BY:

AHMED MOHAMMED OSMAN

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AHMED GSEMALSEED AHMED

SUPERVISOR:

MOHAMMED AHMED MAHMOUD

October 2015

بسم الله الرحمن الرحيم

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SIGNED: ….....

DATE: 15/10/2015

الآيـــة

قال تعالى:

بسم الله الرحمن الرحيم

﴿ اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ *
خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ *
اقْرَأْ وَرَبُّكَ الْأَكْرَمُ *
الَّذِي عَلَّمَ بِالْقَلَمِ *
عَلَّمَ الْإِنْسَانَ مَا
لَمْ يَعْلَمْ ﴾

صدق الله العظيم

سورة العلق الآية ﴿1-5 ﴾

الحمـد لله

اللَّـــهُمَّ لك الحَمـــــــــدُ كُلُّهُ،

وإلَيْك يَرْجِعُ الأمْرُ كُلُّهُ،

عَلانِيَتُهُ وسِرُّهُ.

فَحَقٌّ أنْتَ أنْ تُعْبَد،

وحَقٌّ أنْتَ أنْ تُحْمَد،

وأنْتَ على كُلِّ شَيْءٍ قَديْر

اللَّهُمَّ لك الحَمْدُ كالَّذِي تَقُولُ،

وخَيـــــرًا مِـــــمَّا نَقـــــــــــُولُ

..اللَّـــــهُمَّ لك الحَمْدُ بِجَمِيْعِ المَحَامِد كُـلِّها

DEDICATION

To all the people who stayed around us...

By their Presence… or even with their hopes

By their helping… or even their thoughts

By their communicating… and their supporting

Our mothers…

Awatif Faroug

Nawal Youssef

Enaam Tyfour

Our fathers…

Mohammed Osman

Gasmalseed Ahmed

Gasmalseed Alfadel

Our brothers and sisters…

Our families…

Our friends…

To our Colleagues that we suffered with them the trouble the seeking knowledge day after day and for everyone who stay with us step after step

We dedicate this research, and we hope you like it and asking ALLAH to guided us to serve this country

ACKNOWLEDGEMENT

All praise to ALLAH, for guiding us to complete this research…

To our supervisor teacher Mohammed Ahmed Mohammed and co-supervisor teacher Obay Gsmalseed for their help, supporting and for encouraging us to keep working.

To all people who help to complete this project successfully.

ABSTRACT

The tenders are the first way for government entities to obtain services and products, and the tender in manual way is consuming effort, time and money, also some buyers can bias to some supplier over the others.

As well as known the Sudanese government is going into automate its service (e-Government). This project is aimed to automate the tender process through automate the process of creating, advertising, submitting and selecting the best offer.

The system had been divided into 3 parts depending on user type, first type for buyers, they could be able to create new tenders, qualify companies, answer and provide clarification for supplier's questions, select the winner in tender and advertise the result. The second type for suppliers, they could be able to participate in tenders and ask the buyer about any ambiguous Requirements. The third type for admins, they could be able to manage all tenders in system by accept the new created tenders and accept the registration of new buyers.

The system was web based application to provide accessibility and availability to wide range of people in domain to access the website and take the advantage of the system.

The system helped and facilitated the tender creation, advertisement, submission, collecting the offers and selection the best offers to save time, efforts and cost.

The E-Tender system had been developed to supports the e-Government, increasing the connection and cooperation between government entities and facilitate the government purchase, by saving some effort, time and money and provide some fairness between the suppliers.

We recommend to aware the people and units in the domain of the importance of this system.

المستخلص

ان العطاءات هي الطريقة الاولى للوحدات الحكومية للحصول على السلع والخدمات وان العطاءات بالطريقة الحالية تستهلك جهد ووقت وتكلفة بالاضافة الى ان بعض المشترين يمكن ان يتحيزون لبعض البائعين دون الاخرين.

كما هو معلوم ان الحكومة السودانية اتجهت مؤخرا نحو اتمتة خدماتها. فهذا المشروع يهدف الى اتمتة العطاءات عن طريق اتمتة عمليات الانشاء والاعلان والتقديم واختيار افضل العروض.

تم تقسيم النظام الى ثلاثة اجزاء اعتمادا على مستخدمي النظام , اولا المشترين حيث مكنهم النظام من انشاء عطاءات جديدة , تأهيل الشركات , تقديم توضيح الاجابة عن استفسارات و اسئلة الموردين , اختيار افضل عرض من العروض المقدمة , اعلان النتيجة . ثانيا الموردين حيث مكنهم النظام من المشاركة في العطاءات و تقديم استفسار عن اي متطلبات غير واضحة . ثالثا مدراء النظام حيث مكنهم النظام من ادارة العطاءات في النظام عن طريق الموافقة على العطاءات الجديدة و الموافقة على انضمام مشترين جدد.

النظام ساعد وسهل عملية انشاء العطاءات , الاعلان عنها , التقديم فيها , تجميع العروض , واختيار افضل العروض لتوفير الوقت والجهد والتكلفة المصروفة

تم تطوير نظام العطاءات الالكترونية لمساعدة وتسهيل عمليات الشراء الحكومي , عن طريق تقليل الجهد و الوقت والتكلفة وتوفير قليل من العدل بين البائعين.

هذا المشروع يستخدم اليه (الخادم - العميل) لتوفير امكانية الوصول والاتاحية لاكبر عدد من الافراد في هذا المجال للاستفادة من الخدمات المقدمة في النظام.

هذا المشروع يدعم الحكومة الالكترونية ويقوم بزيادة الاتصال والتعاون بين الوحدات الحكومية.

نوصي بتوعية العاملين في هذا المجال بأهمية نظام العطاءات الالكترونية.

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GLOSSARY

PreQTender	Prequalification tender
HTML	Hyper Text Markup Language
XHTML	Extensible Hyper Text Markup Language
CSS	Cascading Style Sheets
JSON	JavaScript Object Notation
XML	Extensible Markup Language
AJAX	Asynchronous JavaScript And XML
DOM	Document Object Model
XSLT	Extensible Style sheet Language Transformations
HTTP	Hypertext Transfer Protocol
ASP	Active Server Pages
MVC	Model-View-Controller
LINQ	Language-Integrated Query
SQL	Structured Query Language
RDMS	relational database management system
IDE	integrated development environment
Windows CE	Windows Compact Edition
UML	Unified Modeling Language

Chapter 1

Introduction

This chapter introduces the current research with a background of the problem, describes the current system, explains the problem statement, and gives description of the proposed system. Moreover the objectives of the study, the scope and the structure will be described.

1.1 BACKGROUND:-

Tender is an invitation to interested supplier (bidder) to make an offer to the buyer (principal) who is capable to accept and select the best offer. (Mohamad Noor & Mohemad, 2008). It's divided into two types according to the way of invitation to participate in the tender: the first type is known as the open Tender also called Generic Tender, in this type bidders are invited in a public advertisement. The second type is the Selective Tender also called limited Tender, in which the invitations are sent to specific companies which are capable to deliver the required services. Tenders can also be divided according to the nature of the tender into tenders of goods, services, works fulfillment, selection of consultants and qualify companies to participate in future tenders of the qualifying company.

Government Procurement is a way to obtain services and goods by companies. Tender is the best and fairest mean to obtain such procurement, because it provides competition between the companies and this will provide more offers to government entities to choose the best offer among them targeting the best quality.

In Sudan, Tenders represents the first rule to fulfill government procurement, the government, in order to provide services and duties like education, health, defense and etc., it depends on buying huge amount of services and goods which represent 70% of the state budget. (Ahmed, 2015)

In Sudan tenders are done manually, which leads to the loss of the objectives of tenders. To prevent this we need to automate the tender by making the process of obtaining, submitting and opening tenders done via Internet (e-tender).

E-tender is divided into two types. The first type: is the semi-dynamic, in which the system delivers the list of the best tenders to the principal, so he can chose the winner. The second type: is the full dynamic, in which the system selects the winning tender automatically according to specific criteria that selected by principal. (Fong & Yan, 2009)

1.2 THE CURRENT SYSTEM:-

Any department needs a service, prepares a request to the ministry (buyer) to which they belong, to make a tender.

Then the person in charge at the ministry level usually refers the request to the procurement section. The procurement section and that particular department prepare the tender requirements (general and technical) then prepare the form (tender sheet) which is used at the submission phase and finally they advertise the tender in newspapers (at least 2 widespread newspapers).

The suppliers who want to make offer for the tender, come to procurement section and request to buy the tender sheet.

After given the permission, they pay at the accounts section. After payment they are given the supplier sheet from the procurement section after the delivery of financial receipt. Then the suppliers fill the tender sheet, and submit the tender sheet to procurement section after being covered properly and sealed with red wax, where it's put it in closed box (tender box).

Tender box must be closed and protected in a secure way and must have a label which contains information about the tender (tender NO, tender name). The tender box mustn't be opened until the end of submission date.

Following the submission date, all supplier representatives attend a meeting with the selection committee to attend the primary selection to make sure that selection process is done in a fair way.

In this meeting (primary selection) , the committee opens the tender box and gets tender sheets and ensures that every supplier satisfies the general requirements of the tender and display the cost of each submission. This process provides a list of suppliers who satisfies the general requirements of the tender.

After the representatives leave the meeting, committee continues their work to choose the best offer from the filtered list according to the technical requirements.

After the committee chooses the best offer they advertise the winner and communicate with him to make a contract.

1.3 PROBLEM STATEMENT:-

1. Advertisement for manual tenders in newspapers or other media is expensive. (High cost).
2. The process of getting and submitting tender document is not available all the time for the manual tenders.
3. in manual tender the bidder usually needs long time, high effort and cost to reach the location of the procurement section to submit (participate) in tender , (e.g.: if the bidder in Portsudan and the tender location in Khartoum , it takes 8-9 hours of travel, in addition to the traveling cost).
4. The process of collecting tender documents requires a long time, high effort, and cost.
5. The tender box needs to be secure, and sometimes the guard who is in charge of securing the tender box may be bribed.
6. The process of selecting the winner may be non-transparent in manual system, and selection committee may be biased to a bidder and ignores fairness.

1.4 PROPOSED SYSTEM:-

Design e-tender system to automate the manual tender using internet, to solve the problem facing the manual process.

The buyer interested to get a service, will prepare a tender requirements (general and technical) then waits for administrator approval.

The administrator gets notification of the new tender to conform it or not. If the administrator conform the system advertises the tender and be available for submission to authorized users.

If the tender type is selective then the system will advertise it by sending emails to qualified participants. Otherwise, the system will advertise it at the website.

The supplier who interested to participate must pay to be authorized to reach the web page. After that the supplier will fill the tender sheet and either save it or submit it. If the supplier saves the tender sheet, he will be able to modify it later. If he submits the tender, he won't be able to modify it later. The process of selection the best tender is done from the submitted tenders only.

No one can see the submitted tender sheets until the end of submission date to ensure fairness.

At the end of submission date the system will prepare a primary selection result about the general requirements and submission costs and send the results to the supplier's accounts.

Then the system will select the best offer according to the specific criteria, and display all suppliers' offers including the winning offer chosen by system to the buyer to accept the winning offer or select another offer and show his reasons for selecting this offer. Then the system declares the winner on the website.

1.5 THE RESEARCH OBJECTIVES:-

The aim of this research is to design a system that automates the manual processes. The objectives are mentioned based on the problem statement as the following:

1. To develop an e-tender system which will be available all the time
2. To enable the suppliers to bid for a tender with an easy process which leads to decrease cost and time.
3. To design a free website for tenders' advertisements.
4. To develop a fair and a transparent system that selects the best offer, and ensures impartiality between suppliers.

1.6 THE RESEARCH IMPORTANCE:-

1. Automate system and reduce paperwork.

2. Maximizing economic.

3. Facilitate revision process.

4. Centralization tenders.

5. Promote fairness and transparency.

6. E-government reinforcement.

1.7 SCOPE OF THE STUDY:-

E-tender system is a large system that can be divided into four parts. The first part is the tender system itself which contains many phases: tender creation, advertisement, submission, and selection. The second part is payment system which makes supplier authorized to compete in tender. The third part is securing the system to ensure fair competition between suppliers. The fourth part that the system needs to communicate with other systems to work successfully (e.g.: commercial registrar, taxes system, zakat system).

This research focuses on tender system part and covers the communication part as assumption.

1.8 SEARCH STRUCTURE:

The research is divided into six chapters, which will be discussed. Literature review will be discussed in chapter two, containing tender background, papers in the domain, and finally case studies of websites which they are similar to research.

Chapter three discusses the tools and technique that used to implement the system.

Chapter four discusses the system analysis and design.

Chapter five discusses the implementation of the system.

And finally chapter six provides the result and recommendation to improve system in future.

Chapter 2

Literature review

This chapter is divided into three sections, the first section provides overview of the tender and some laws related to it. The second section provides overview of the related studies and applications in the same domain.

2.1 THE TENDER:

In order to the government to provide services like education, health, etc., it depends on the purchase of a set of goods and services, which represents about 70% of the country's budget. The procurement processes are done according to the law of Procurement and contracting and disposal of the surplus for the year 2010, this law applies to all purchases of all government's entities with various levels of governance.

According to this law, there is a general administration in the Ministry of Finance and National Economy responsible for controlling the procurement process known as The General Administration of purchasing and contracting and disposal of the surplus.

2.1.1 SOME TASKS OF THE GENERAL ADMINISTRATION OF PURCHASING AND CONTRACTING:

- Monitoring the Procurement activities in the Republic of Sudan and advise with any modifications required.
- Perform periodic reviews to the records and the procedures of purchasing entities, in order to assure enforcing the law correctly.
- Collecting information about suppliers, contractors and prices and distributing it to all entities.
- Issuing the necessary guidance to implement the procurement processes.
- Prepare an annual report about the execution of the procurement system and the general purchasing activity, and submit it to the specialized authority in the Ministry of Finance.

2.1.2 SOME TASKS OF THE PUBLIC ADMINISTRATION AUTHORITIES:

- Access to all books, records, documents, or any other assets belonging to any procurement entities, contractor, supplier, or consultant.yy
- Request any information related to awarding a tender or any general contract or any other necessary information.

2.1.3 UNITS OF PROCUREMENT IN THE GOVERNMENT'S ENTITIES:

Under this law there must be an establishment of units for the government purchase and contracting in the government entities which their nature of work requires creation of unit for purchasing and contracting, which they work according to the recommendations of the General Administration of purchasing and contracting.

2.1.4 TASKS AND TERMS OF REFERENCE OF THE PROCUREMENT UNITS IN THE GOVERNMENT ENTITIES:

- Study procurement plans, and disposal of assets in the government entities that follow it, and provide proposals and recommendations about that.
- Coordinating with the procurement Committee and the General Administration of government in purchasing and contracting, and the drafting of the announcement of tender and its documents. Also prepare of all documents related to the tender.
- Doing the secretarial work of the Procurement Committee.
- Keeping all documents related to the procurement process, and submitting periodic reports to the General Administration of purchasing and government contracting when so required.

2.1.5 PROCUREMENT AND CONTRACTING RULES:

The government's entities must follow any of the following ways in purchasing and contracting:

1. The Public Tender
2. The Limited Tender
3. The Direct purchase
4. The Direct work

THE PUBLIC TENDER:

For all the government entities they must follow the public tender system to get goods, services or to implement their work.

THE LIMITED TENDER:

The government entities can follow the limited tender system in the following cases:

- If the goods and services or intellectual property rights intended to be contracted are confined to technical or financial reason to known sources or agencies, So that the public tender system does not lead to increase the competition.
- Emergency situations such as disasters.

for any unit wants to follow the limited competition system, it must prepare a list renewed annually about names of qualified companies according to its financial capabilities, technical competencies, and the work accomplished by them, and send a copy of that record to the General Administration for approval.

THE DIRECT PURCHASE

The government entities can follow The Direct Procurement system in special cases.

Any unit must do the following when applying the direct procurement system:

- Qualifying suppliers or specifying a list of specialists renewed annually.
- Invite seven suppliers at least to submit their offers.
- Obtaining the approval of the General Administration about the list of suppliers and the tender documents.
- Granting the supplier a period not less than thirty days at a minimum to prepare offers and submit them.

PUBLIC TENDER PROCEDURES

Units must follow the following procedures when applying the public tender system:

1. Preparing the tender sheet according to the form prepared by the General Administration of purchasing and contracting and disposal of the surplus.
2. Advertise about goods, services or works on the available media, and the advertisement must include :
    - A brief description of the goods, services, or works.
    - The necessity to lock bid envelopes with red wax.
    - The necessity to pay 2% of the value of the tender as initial insurance presents by imminent (cheque), or A valid letter of bank guarantee

throughout the period of bid validity, or cash paid to the accounts section.

- The necessity to complete the initial insurance to 10% for supplier who wins the tender by a Certified Bank cheque or A valid letter of bank guarantee throughout the implementation period on behalf of the Buyer Name.
- Define the last date for submission of tender.
- The way and place for goods delivery.
- Any other conditions determined by the buyer.

3. The period of tender announcement should not be less than 15 days.
4. The necessity to prepare a tender box tightly locked and placed in a visible and accessible place.
5. Identifying the address of the unit and the person who responds to the questions.
6. The head of the unit specify a committee to open the tenders and study them technically, financially, and legally, and submit its recommendations to him.
7. Choosing the least expensive tender among the offers which they approved technically and financially.
8. The Technical Committee studies and recommends about offers.

2.2 RELATED STUDIES:

2.2.1 DESIGN OF A WEB-BASED TENDERING SYSTEM FOR E-GOVERNMENT PROCUREMENT

In the past digitized the process in frontend (suppliers) side and the other part (selecting winner) is manually, in this paper they are digitizing both frontend and backend. They present new design of a Web-based Tendering System which aims at improving the efficiency as well as transparency, as well as operating costs could be lowered in the new model. They divide system into modules as:

- Tenderee module : its function is selecting contract or tender creating
- Tenderer module : its function is making an offer to tenders or registering goods
- general module : its function is viewing tenders or searching for specific one
- evaluator module : its function is auto evaluating or manual evaluating
- committee module : its function is publishing score or managing tender
- web services module
- Database module

2.2.2 DECISION SUPPORT FOR WEB-BASED PREQUALIFICATION TENDER MANAGEMENT SYSTEM IN CONSTRUCTION PROJECTS

In this paper they design model which offer security to tender documents, reducing tender administration by reducing workload and paperwork. Prequalification is an initial phase in tendering processes, it can lower the risk in projects, the supplier (bidder) has to fulfill all document required by buyer. Their problem is that the selection is done manually and it takes long time. Their research framework is:

- **workflow**
  Begin by client displaying the tender then the contractor view tender and fill tender document if he have interest then if he didn't have modification then accepting the tender then check the prequalification if he meet the compliant then added and evaluate
- **framework**
  Framework of PreQTender it consists of five main modules:
  1- The modules are preparation of tender documents
  2- Obtaining of tender documents
  3- Submission of tender documents
  4- Opening tender documents
  5- Prequalification tendering analysis
- **Software architecture**
  Web-based DSS support three quarter architecture which a Web browser sends HTML request using the (HTTP) to a Web server (PreQTender). The Web server processes these requests using a common Gateway Interface Script (CGI) script. Application server sends requests to a model Base program or a database server.

2.2.3 A FAIR E-TENDERING PROTOCOL

This paper proposes an e-tendering system that is secure and fair to all participants. They protect information by strong encryption and secure the storage where submission is stored. And the system is fair if and only if

- the principle can't obtain information about submitted tender before submission time is done
- it's impossible for illegal participant to submit tender

The result is that they provide fair e-tendering system that meets all the security requirement of the traditional tendering system and offers new services such as anonymity and, tendering hiding and binding.

2.2.4 KERBEROS BASED ELECTRONIC TENDER SYSTEM

This paper proposed to enable users to participate in tender nevertheless of the geographic locations and without worrying about security. This paper is based on KBETS model which basic purpose of this model is to increase security and quality of an e-tender system.

An E-tender system called KBETS is proposed, this system covers three stages:

- Pre-registration stage: In this stage the system insure that the user is the individual which he claims to be by sending multiple messages to SIM card issuing company, VID card issuing Authority and Credit card issuing authority.
- Post-registration stage: In this stage the user can use the application program in secure manner after login.
- Retrieving e-Tender services stage. This study enhances the level of security during an e-tender system process so users can trust the system and easily use it without any hesitation.

2.2.5 Sudabids

This site provides advertisements for tender only for members in the site, and visitors can not register in the site automatically.

Figure 2.2.5 Illustrate the Sudabids website

2.2.6 The Saudi Electronic Procurements portal

The website project aims to standardization of tender process and make them easy in all government sectors, and also to support the transparency between all suppliers.

Any supplier can register in the site automatically, then he needs to activate the account manually.

When supplier needs to participate in tender competition he needs to search for competitions which he interested with and choses one of them, after that he pays the tender sheet price using "SDAD" service, after that he can download tender sheet and attachments (if found), after that he must fill the tender sheet and deliver his bid manually to the buyer (government entity).

When the competition supervisor wants to open the bidding envelopes all participant suppliers be notified with the result of this process.

When the completion supervisor prepares the technical evaluation of the offers also all participant suppliers be notified by (identical of non-identical) according to their bid.

When awarding the completion for one supplier (full award) or for several suppliers (partial award), then supplier (or suppliers) be notified with that.

Figure 2.2.6 Illustrate the Saudi Electronic Procurements portal (Monafsat)

2.2.7 The Egyptian Electronic Procurements portal

This site aims to provide smart and hi-tech solution for Government tenders/auctions and purchasing, which assures the transparency and easiness.

The site provides many services which are implemented especially to the suppliers and the purchasing officials in different organizations (ministries, government's entities), who are responsible of creating, publishing tenders/auctions, and evaluating suppliers' offers.

This site developed to enable the Government to publish its tenders/auctions on the internet in any field, and to enable the suppliers to submit their bids electronically to be evaluated by government’s officials which increases the transparency, eliminate the corruption, and facilitate the work done.

Any supplier can easily gain access to the site through registration, thus he will be able to join opened tenders/auctions and securely bid for any of them. The suppliers' registration is one of the main features, after the supplier is registered he will be able to deal with all government entities utilizing the site. As for buyer users, they will be able to publish, evaluate, and award tenders/auctions. The registration process is not fully automated.

Figure 2.2.7 Illustrate the Egyptian Electronic Procurements portal

2.2.8 The Australian Government Tender System

This site is the Australian Government procurement information system. It provides a central web-based facility for: Publishing of all publicly available Government tenders and contracts awarded, Electronic distribution of tenders documentation and addenda, and secure lodgment of tender responses.

Any Supplier can register in the site automatically, then he can utilizing the site.

The site allows suppliers to search and browse publicly tenders and contracts awarded for participating Australian Government agencies. Suppliers may download tender documentation and upload their responses to a secure facility.

Suppliers can lodge their responses into a secure electronic tender box, which is administered in the same way as a traditional tender box or in the traditional tender box. This depends on the instructions provided in the tender documentation by the procuring agency.

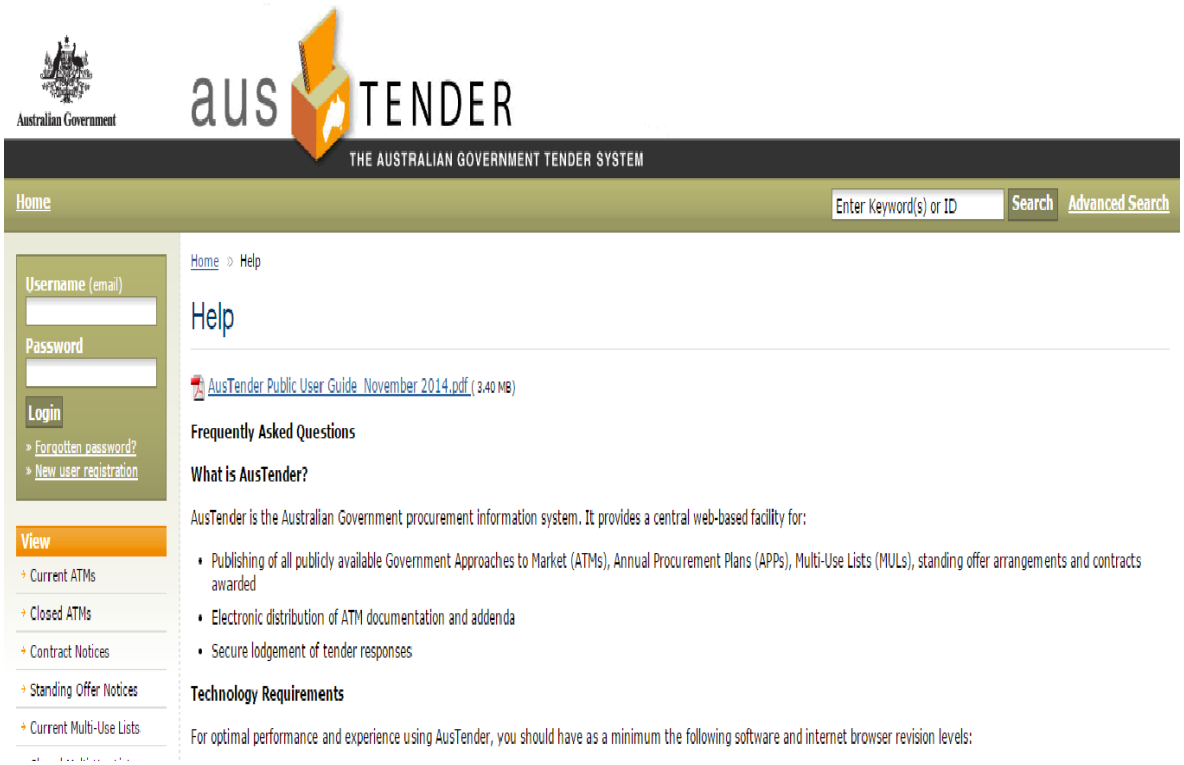

Figure 2.2.8 Illustrate the Australian Government Tender System

Chapter 3

Tools and Technique

This chapter is divided into four sections, the first section describes the tools and technique used in developing the client side application, the second section describes the tools and techniques used in developing the server side application, the third section is describing the visual studio which is used in developing both client and server side, the forth section describes the UML which is used in system analysis.

3.1 CLIENT SIDE:

3.1.1 HTML:

HTML stands for Hyper Text Markup Language, it's a format that tells a computer how to interpret and display a web page using special "tags" that are written as plain text on documents files.

HTML file must have .htm or .html file extension, the htm extension comes from the past when only three letter extensions were allowed (austin community college)

3.1.1.1 HTML TAGS:

HTML uses tags to control the look and feel of your web page. Tags are enclosed in < > characters called angle brackets.

HTML tags normally come in pairs like and , the first tag in a pair is the start tag, the second tag is the end tag and the text between the start and end tags is the element content. Each one tells the browser a piece of information about how it should display the text between the tags (information technology services)

3.1.1.2 TAG ATTRIBUTES:

Tag attributes provides additional information about the HTML elements that tell the browser how to implement the tag. (austin community college)

3.1.1.3 Html 5:

It's backwards compatible, it contains all the features from the previous version with a few changes and improvements. But also introduces some new feature, such as:

- New semantic elements rather than using lots of classes and IDs.
- Rich application type content such as new APIs for adding video, audio and scriptable graphics.
- **Browser support:** all major browsers (Safari, Chrome, Firefox, Opera, and Internet Explorer) support most of its features.
- New form **control attributes such as** number, date, time, etc.

(Clark, Studholme, Murphy, & Manian, 2012)

3.1.2 CSS:

Stands for Cascading Style Sheets is a styling language, it's used for describing the appearance of web documents. It was proposed in 1994 by Håkon Wium Lie

ADVANTAGES OF USING CSS

1. Separate document structure from its presentation
2. Contents could be optimized for multiple types of devices
3. Lightning-fast performance: browsers use a feature called **caching**, a process by which your browser will download CSS files or other web documents only once, and will not request that file from the web server again unless it has been updated

(Pouncey & york, 2011)

3.1.3 JAVASCRIPT:

JavaScript is lightweight, object-oriented scripting language, it's downloaded from the web server then executed inside the client's PC.

JavaScript allow the web developers to perform many tasks such as:

- Read and write documents.
- Manipulate or move data.
- Perform mathematical operations.
- Interact with user events, such as a user clicking a button.
- Detecting the user's browser, OS, screen size, etc.
- Perform different actions based on different conditions.

(Duckett, 2010)

3.1.4 BOOTSTRAP:

It's a front-end framework that is used for web development to make development fast and easy. It uses HTML, CSS and JavaScript.

BOOTSTRAP BENEFITS:

- Mobile first approach
- Open source
- Responsive design
- Supported by all popular browsers.
- Has good documentation and it's easy to begin
- Provide customizability for web based systems

(tutorialsPoint bootstrap)

3.1.5 JSON:

JSON stands for JavaScript Object Notation. It's a data interchange format, it's easy for humans to read and write, it's derived from JavaScript, and it used to exchange data between different systems.

- JSON is language independent
- JSON represents data in a way that is friendly to universal programming concepts

(Bassett, 2015)

WHY JSON?

- In JSON the data stored in arrays and records and in XML the data stored in trees. That makes JSON the best tool for sharing data.
- JSON support only traditional data format on the other hand in XML can attach all format, this make it possible to attach executable files which may expose system and Security breach

(MIKOLUK, 2013)

3.1.6 AJAX

AJAX stands for Asynchronous JavaScript and XML. It's a technique for creating interactive and responsive web pages by handling things at the client side whenever possible. The pages make HTTP requests in the background without reloading an entire page allowing the user to keep working instead of waiting for a response. (Riordan, 2008)

3.1.6.1 AJAX PRINCIPLES:

1. Ajax can minimize the amount of traffic between the client and the server.
2. Avoid unnecessary and distracting page elements such as looping animations and blinking page sections.
3. Avoid entire page downloads by updating parts of webpage without reloading the entire page.

(Zakas, McPeak, & Fawcett, 2007)

3.1.6.2 AJAX TECHNOLOGIES:

1. HTML/XHTML: data representation languages
2. CSS: formatting HTML pages
3. DOM: Dynamic updating of a loaded page
4. XML: Data exchange format
5. XSLT: Transforms XML into XHTML (styled by CSS)
6. XMLHttp: Primary communication broker
7. JavaScript: Scripting language used to program an Ajax engine

(Zakas, McPeak, & Fawcett, 2007)

3.1.7 JQUERY:

"JQuery is a fast, small, and feature-rich JavaScript library. It makes things like HTML document traversal and manipulation, event handling, animation, and Ajax much simpler with an easy-to-use API that works across a multitude of browsers. With a combination of versatility and extensibility, JQuery has changed the way that millions of people write JavaScript." (JQuery Official Home Page)

Anything that can be accomplished using JQuery can also be accomplished using plain JavaScript, except that JQuery is easy to use and it uses fewer lines of code (Joshi, 2013)

JQUERY FEATURE:

- Selecting HTML DOM Elements.
- Handling Events.
- Adding Stylish Effects and Animations to Web Pages.
- Provides rich and flexible ways to make Ajax calls to the server.

(Joshi, 2013)

3.1.8 ARTISTEER:

ARTISTEER is web design automation software that enables the developer to easily design websites and Blog templates

ARTISTEER 4.0 FEATURES:

- HTML5 and CSS3 Support
- Footer Layout and Editing
- New Styling Options like (Shadow Effect for Text, Color options).

  Content Editing for All Templates

(artisteer)

3.2 SERVER SIDE:

3.2.1 ASP .NET:

ASP .NET stands for Active Server Pages, is web application framework from Microsoft to build dynamic website.

ASP .NET BENEFITS:

- Reduce the amount of code required to develop functions.
- Use built-in Windows authentication and per-application configuration to secure application.
- Use early binding, just-in-time compilation and native optimization to enhance performance.
- Language independent (can use C#, Visual Basic, J#)

(Kozyk, 2013)

3.2.2 MVC:

The Model-View-Controller pattern is an architectural pattern that encourages isolation between the parts of an application, it's also known as, "loose coupling", which provide it with benefits:

1. Components do not directly depend on other components, which mean that they can be more easily developed in isolation. Components can also be readily replaced or substituted.
2. Loose coupling of components allows test implementation of production component in isolate, e.g. avoid making calls to a database, by replacing the component that makes database calls with one that simply returns static data.
3. The change is typically isolated into small number of component (often just one)

(Chadwick, Snyder, & Panda, 2012)

The MVC separates the user interface (UI) of an application into three main aspects:

The MODEL: It's most likely a Data Access Layer, it's often encapsulating data stored in a database as well as code that manipulates the data and enforces domain-specific business logic

The VIEW: Defines how the application's UI will be displayed

The CONTROLLER: This is a special class that manages the relationship between the View and the Model. It responds to user input, talks to the Model, and decides which view to render this class is conventionally denoted by the suffix Controller

(Galloway, Wilson, Allen, & Matson, 2014)

3.2.2.1 MVC 5:

MVC 5 was released along with Visual Studio 2013 in October 2013. The main focus of this release was:

- In previous versions of MVC, programmers faced a choice every time they created a project. They had to choose between an MVC application, Web Forms application, or some other project type, but in MVC 5, just one ASP.NET project type exists they can add MVC to any ASP.NET application using ASP.NET Scaffolding (which is code generation for ASP.NET Web application add scaffolding to the project when there need to quickly add code that interacts with data models. Using scaffolding can reduce the amount of time to develop standard data operations in your project).
- The default template of MVC 5 moved to run on the popular bootstrap framework.
- ASP.NET scaffolding is the process of generating code based on your model classes MVC has had scaffolding since version 1, but it was limited to MVC projects. The new ASP.NET scaffolding system works in any

ASP.NET application. Additionally, it includes support for building powerful custom scaffolds

- MVC has long supported a feature called authorization filters, which allow you to restrict access to a controller or action based on role membership

(Galloway, Wilson, Allen, & Matson, 2014)

3.2.3 C#

C# is object-oriented programming language developed by Microsoft as part of .NET framework.

C# FEATURES:

- Automatic Garbage Collection.
- Standard Library.
- Assembly Versioning.
- Properties and Events.
- Indexers.
- Integration with Windows.
- LINQ and Lambda Expressions.

(tutorialsPoint Csharp)

3.2.4 SQL SERVER:

SQL itself stands for Structured Query Language. This is the language used to manage the database server.

SQL Server is a relational database management system (RDMS). It's developed by Microsoft used for storing and managing data. The data stored inside SQL Server will be saved in a relational database. (Schlichting, 2008)

3.2.4.1 MANAGEMENT SYSTEM:

Management System means that SQL Server includes the tools needed to structure, manipulate, and manage that data. "And when installing SQL Server, there are options for including Report Writing tools, Data Import Export applications, Analysis tools, and Management Interfaces". (Schlichting, 2008)

3.2.4.2 STORE PROCEDURE:

A stored procedure is an already written SQL statement that is saved in the database, after that programmer can run the stored procedure from the database's command environment (ONEILL, 2003)

Stored Procedures Uses:

1. encapsulate queries and execute them from anywhere on the network
2. stored procedures accepted one or more parameters and returned a subset of the information in the tables in which the user was interested (Parameterized Queries)
3. guarantee that all access to your database will be standardized and ensure there are known action will be done in each table

4. When mistake happen there is only one place to look to find the problems and when the problem is fixed, one place to roll the changes to.
5. Create a stored procedure that accesses a table, and revoke access to that table; the only way your users can access that table is through the stored procedure you've created. It's powerful method for locking down the server and keeping users from accessing information they aren't supposed to.

(Shepker, 2000)

3.3 Visual studio:

"Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It can be used to develop console and graphical user interface applications along with Windows Forms applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Phone, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight.

The Visual Studio product family shares a single integrated development environment (IDE) that is composed of several elements: the Menu bar, Standard toolbar, various tool windows docked or auto-hidden on the left, bottom, and right sides, as well as the editor space. The tool windows, menus, and toolbars available depend on the type of project or file you are working in.

There exist different versions of Visual Studio, such as Visual Studio Express (free), Visual Studio Professional, Visual Studio Premium and Visual Studio Ultimate."(HALVORSEN, 2014)

3.4 UML

Stands for unified modeling language, is a language used for describing and modeling software and systems development.

A model is an abstract of real thing. In software it's simplification of real system.

3.4.1 UML ADVANTAGES:

- Formal language and any element have special meaning.
- Made up of simple and straightforward notation.
- Describe all important aspect of system.
- Control by an open standard group so it's standard.

(tutorialsPoint UML Tutorial)

3.4.2UML DIAGRAMS:

Divided into two categories:

- Structural diagrams:
    - Class diagram.

      Describing the different type of object in the system and relation among them

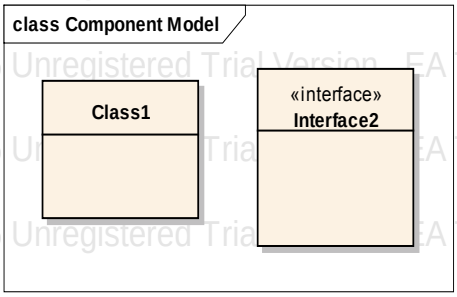

Figure 3.4.2-1 Illustrate the class components

    - Package diagram.

      Used to group classes together and view dependencies between packages

- Component diagram

  Describing how the system parts are organized into modules and component

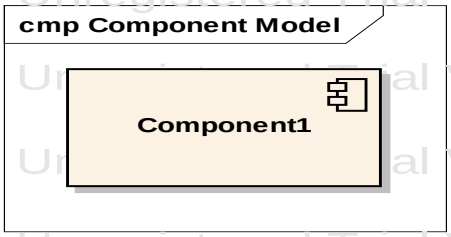

Figure 3.4.2-2 Illustrate the component model

- Deployment diagram.

  Describing the physical components of a system where the software components are deployed

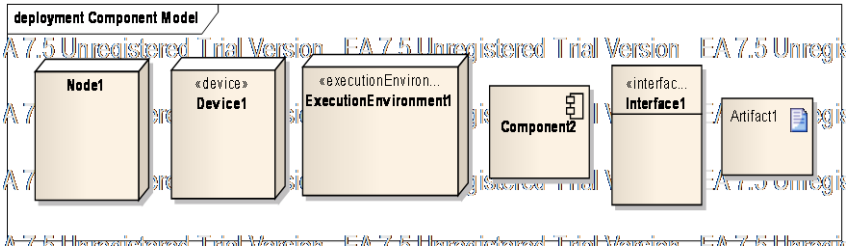

Figure 3.4.2-3 Illustrate the deployment components

- Behavioral diagrams:
  - Use case diagram

    Describing and capture the system functionality

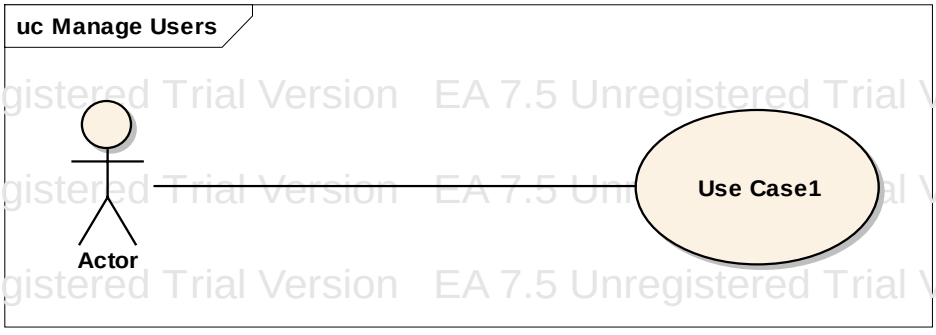

Figure 3.4.2-4 Illustrate the use case diagram

  - Activity diagram.

    Describing the set of task needed to achieve goal

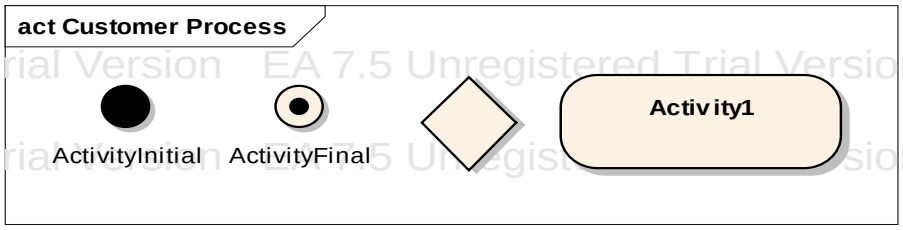

Figure 3.4.2-5 Illustrate the Activity components

- Sequence diagram.

  Showing the sequence of occurrence of a particular process and display the messages that are transmitted between objects.

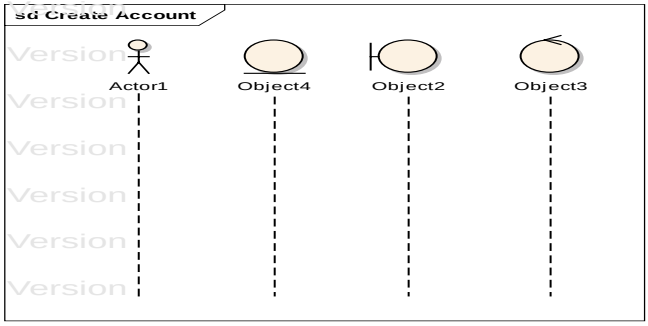

Figure 3.4.2-6 Illustrate the sequence model

- State machine diagram

  Describing system states that object need to come through them during its life cycle and condition to actions that force object to change its condition.

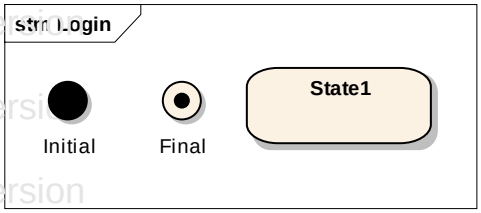

Figure 3.4.2-7 Illustrate the state machine components

Chapter 4

Analysis and design

This chapter describes the system analysis using unified modeling language (UML), using use case diagram to describe system functionality, activity to describe the process for completing a task and it's divided into three sections depending on user type and his related to system, sequence diagram to describe the timing and sequencing of process and message passing through system, and finally class diagram to describe the system objects and their relations.

4.1 SYSTEM ANALYSIS:

The system is divided into three components depending on the users type, the first component is the buyers, whom the system will allow to create new tenders, qualify companies, answering and provide clarification for supplier's questions, select the winning tender and advertise the result. The second component is the suppliers, whom the system will allow to participate in tenders after analyzing the tender requirements and asking the buyer about any ambiguous Requirements. The third component is the admins, whom the system will allow to manage all tenders in system to accept or reject the new created tenders, reviewing tenders after closure and accepting the registration of new buyers.

Each of the three components will have functions like registration, staff management, editing accounts, and reviewing reports as shown in Figure 4.1-1.

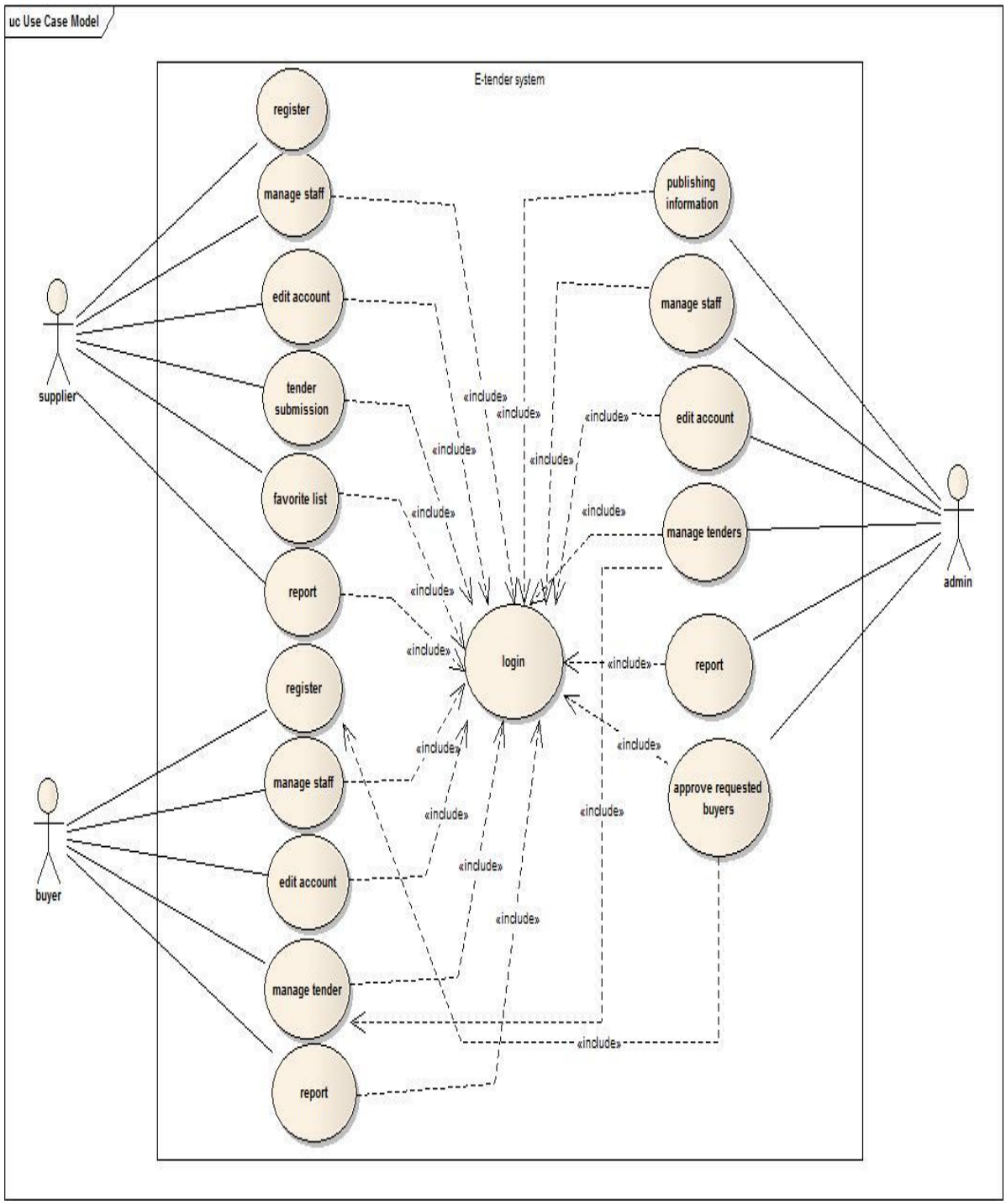

Figure 4.1 Illustrate use case diagram of the system

4.2 SYSTEM DESIGN: the system described using sequence diagram and activity diagram

4.2.1 SYSTEM ACTIVITY:

The system activity is divided into three parts depend on users types and how they related to the system

- First showing buyer user activities and their relation to system and admin as shown in Figure 4.2.1-1

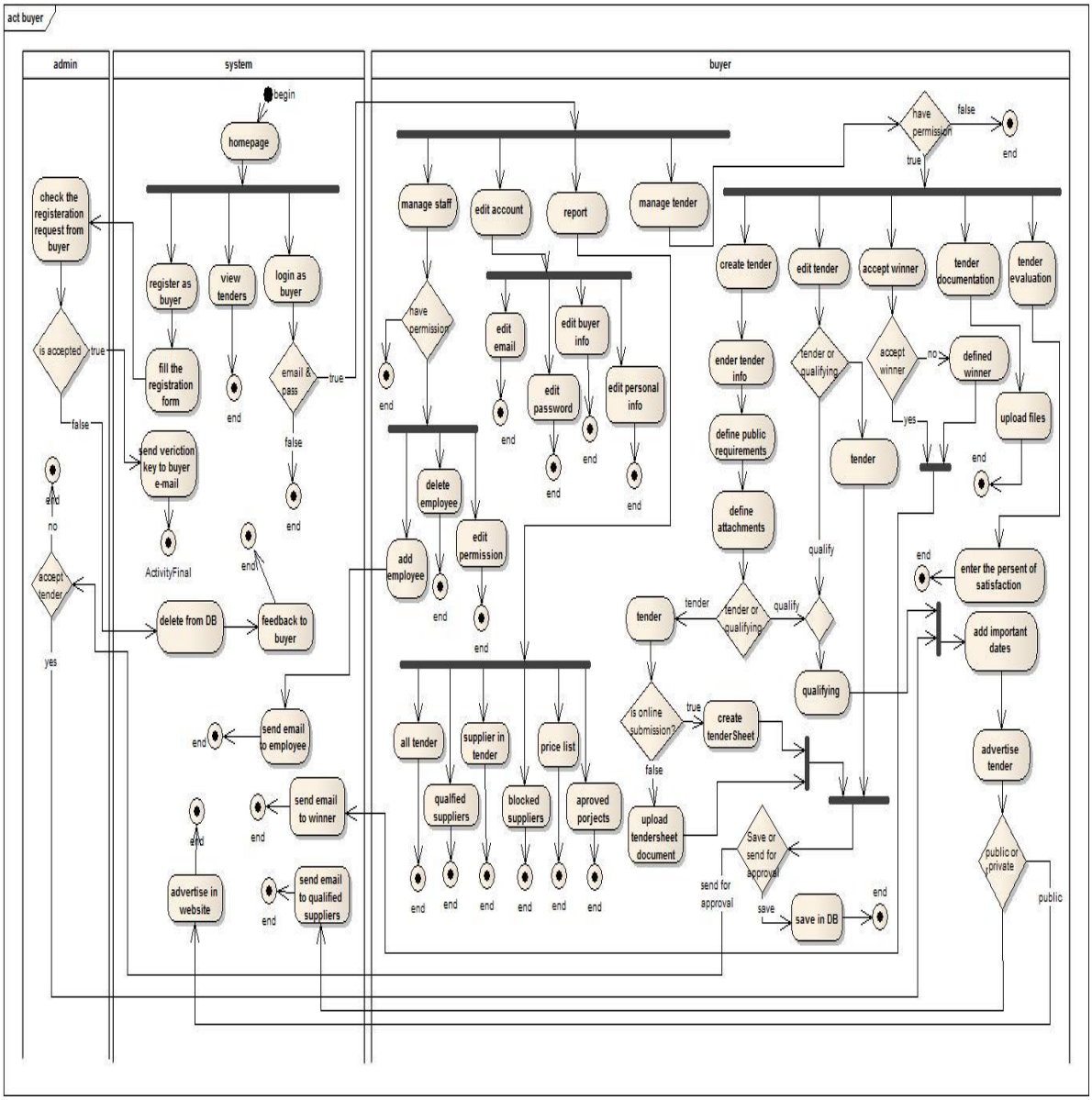

Figure 4.2.1-1 Illustrate activity diagram – buyer activities

❖ Second, admin activities and relation with system as shown in Figure 4.2.1-2

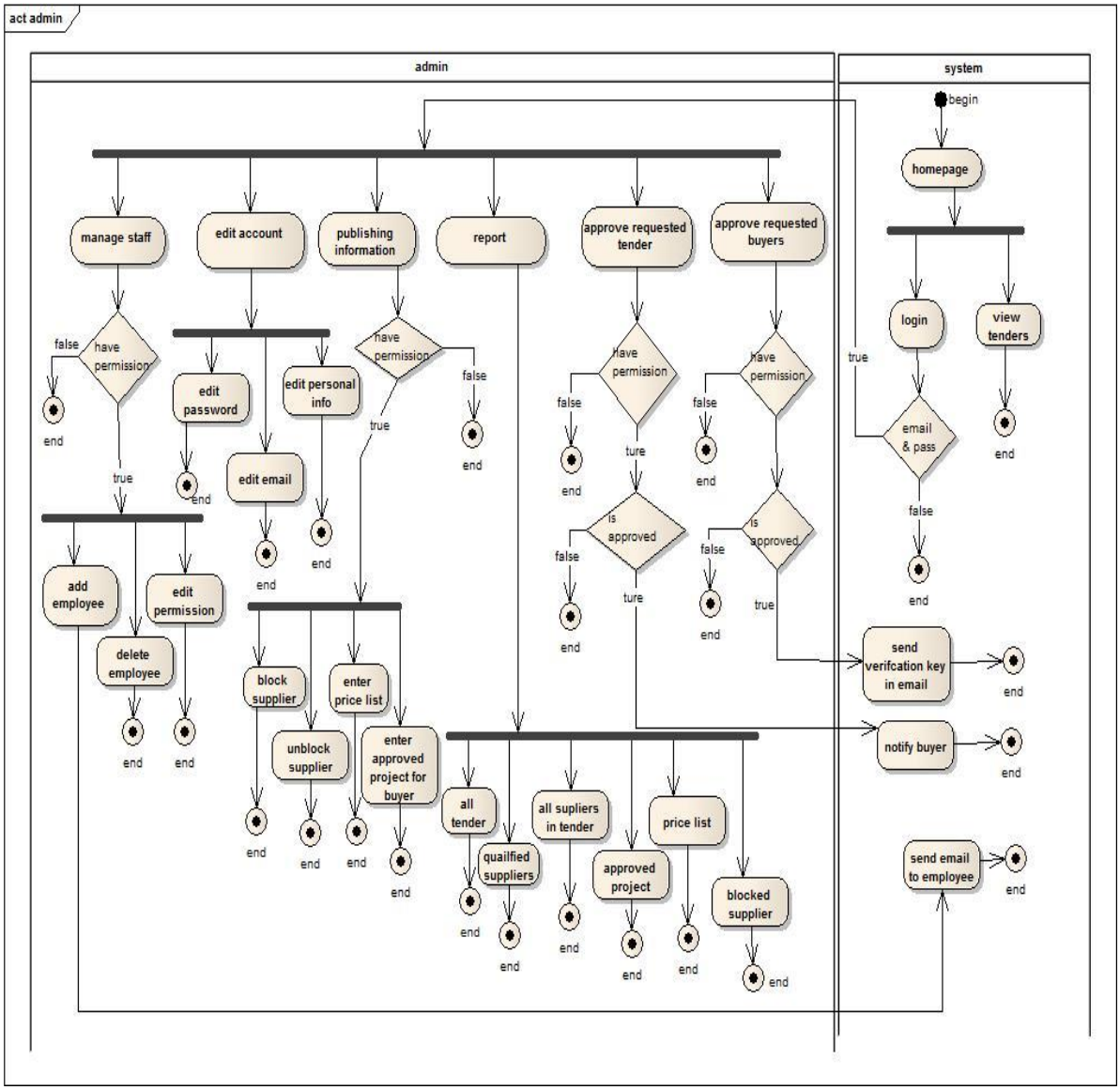

Figure 4.2.1-2 Illustrate activity diagram – admin activities

❖ And finally supplier activities and relation with system as shown in Figure 4.2.1-3.

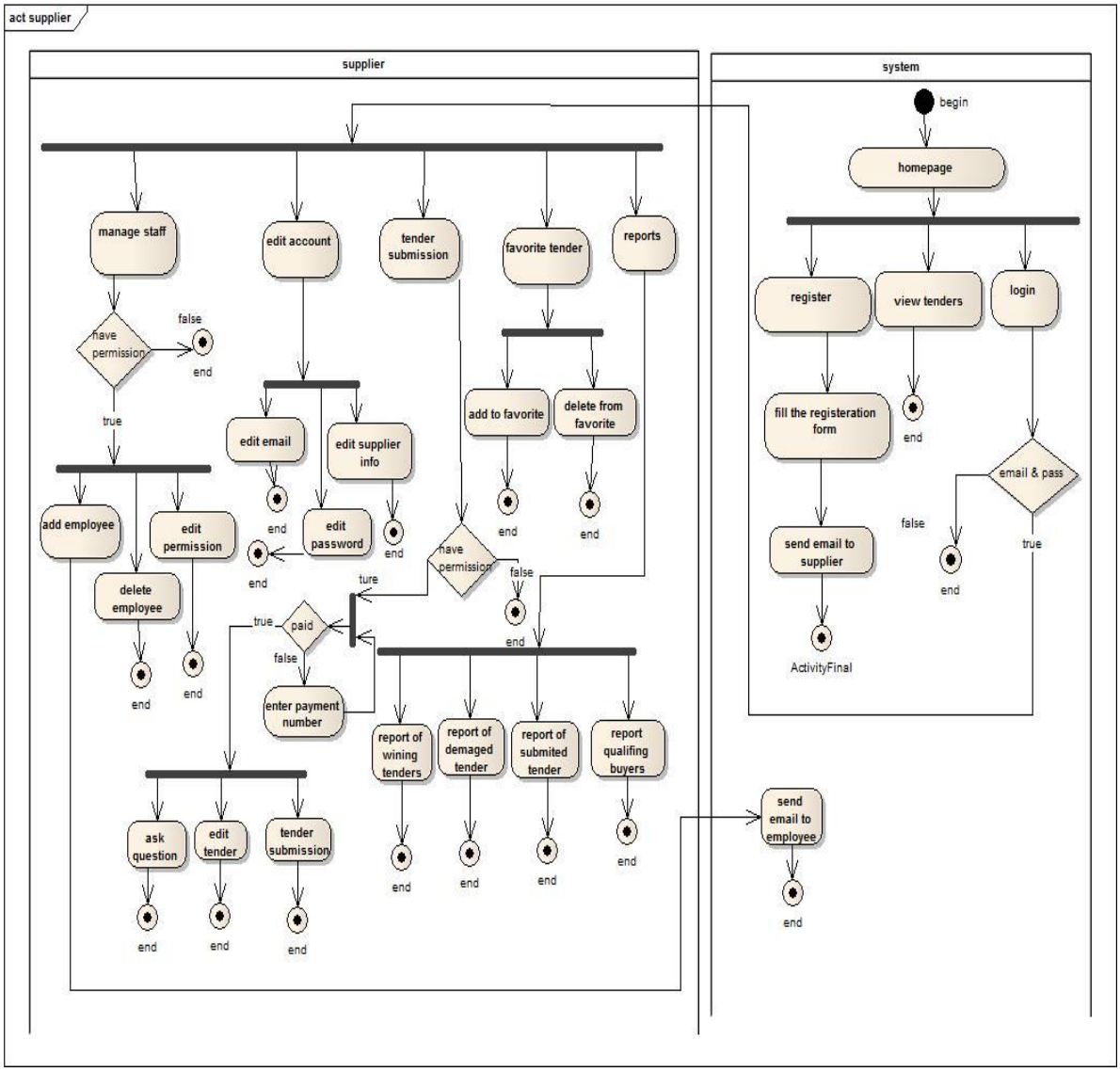

Figure 4.2.1-3 Illustrate activity diagram – supplier activities

4.2.2 SYSTEM SEQUENCE:

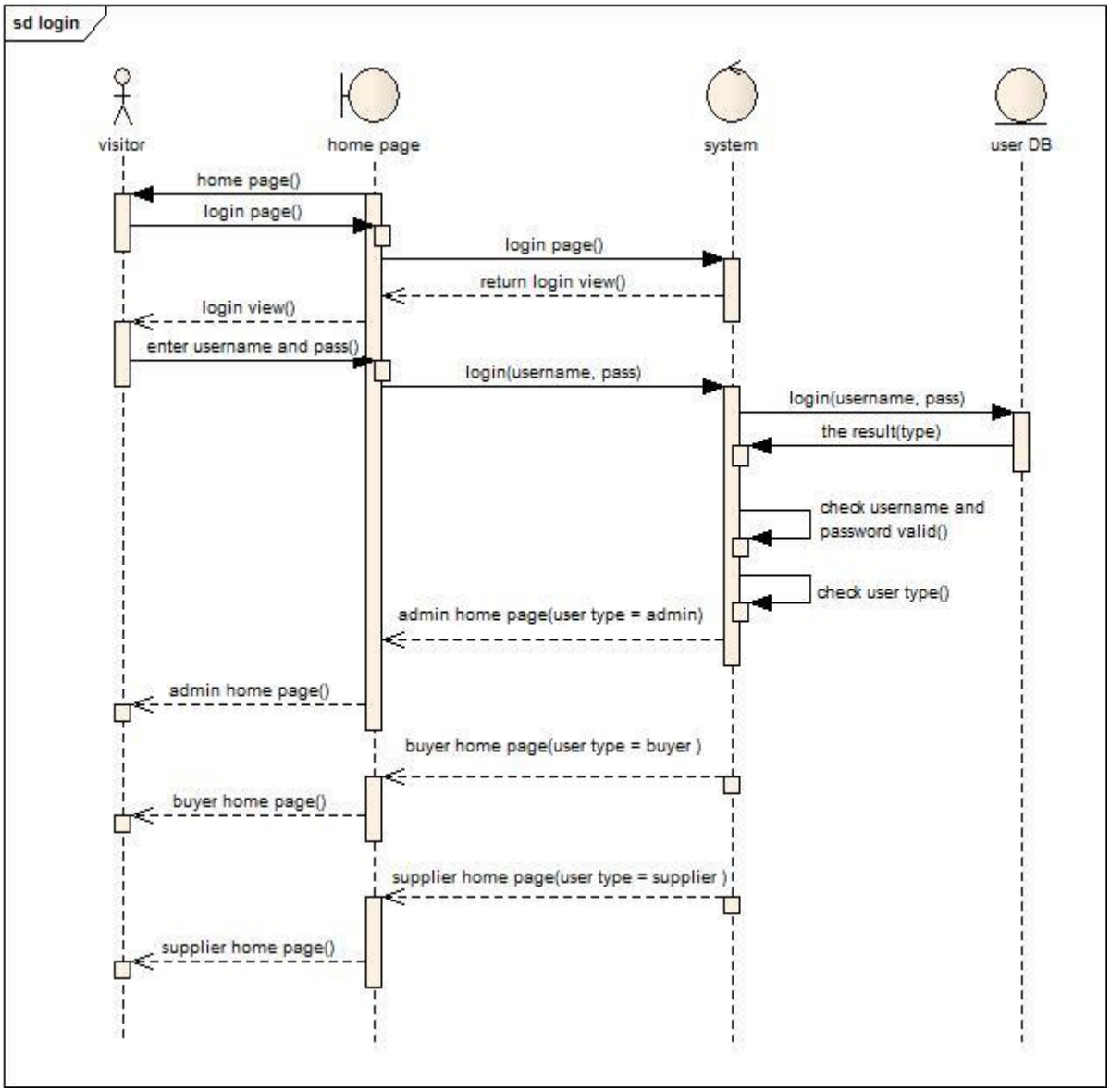

Figure 4.2.2-1 Illustrate sequence of login process of different type of user

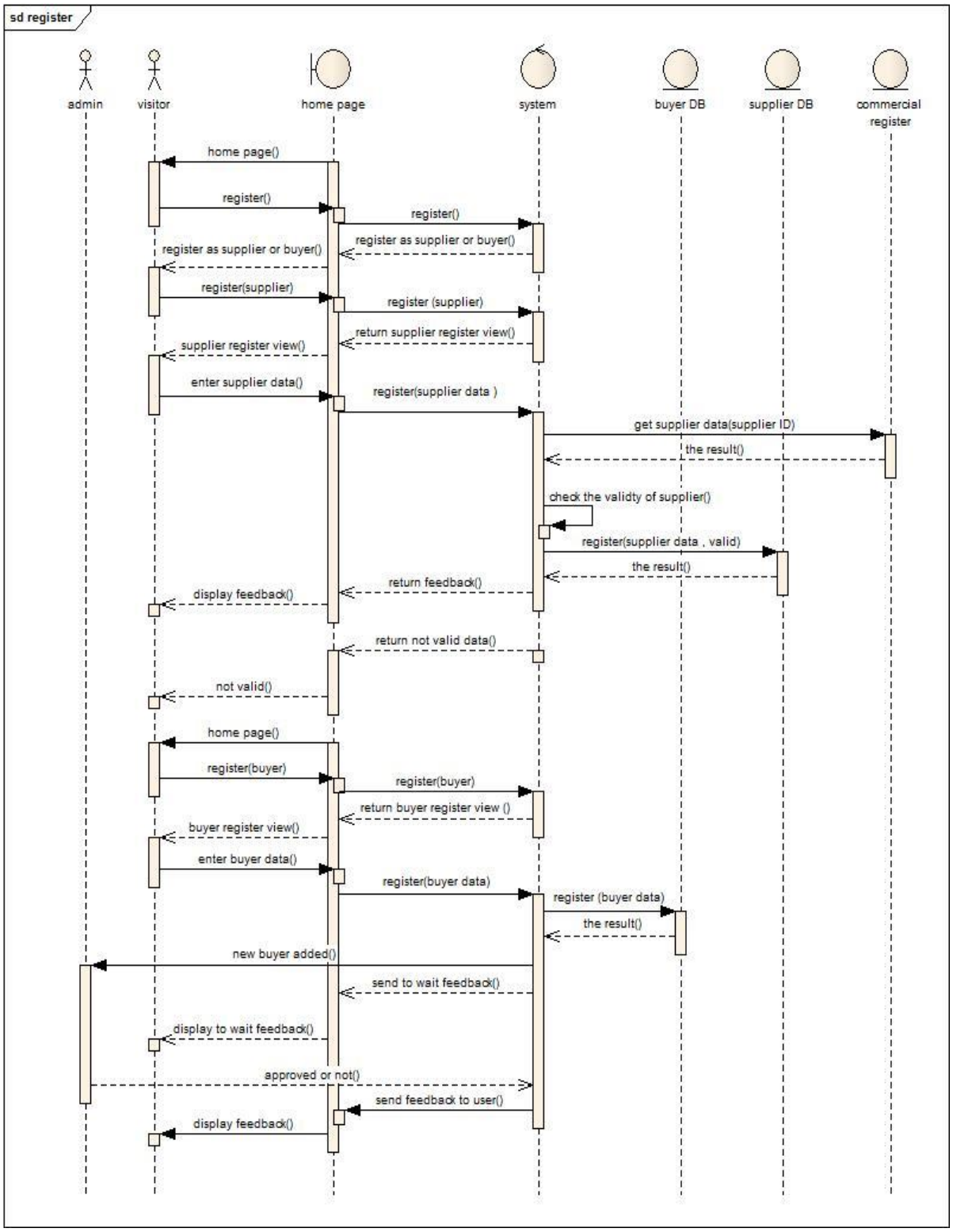

Figure 4.2.2-2 Illustrate sequence of registration process for all types of users

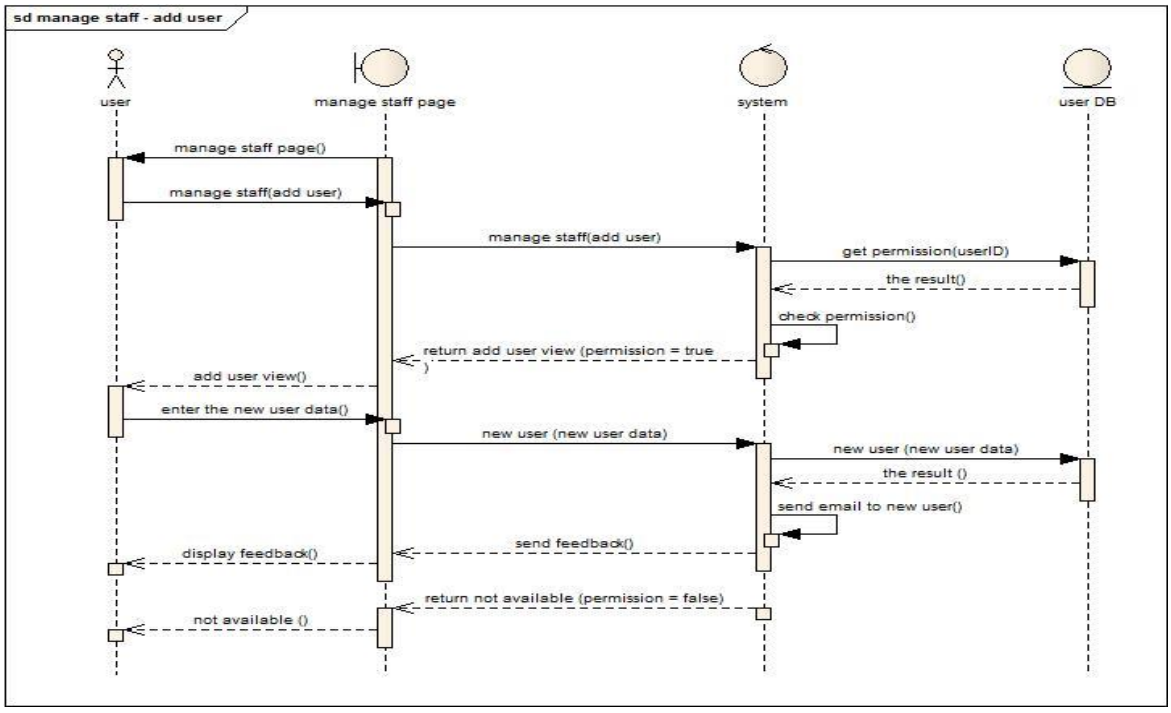

Figure 4.2.2-3 Illustrate sequence of managing staff – adding user process

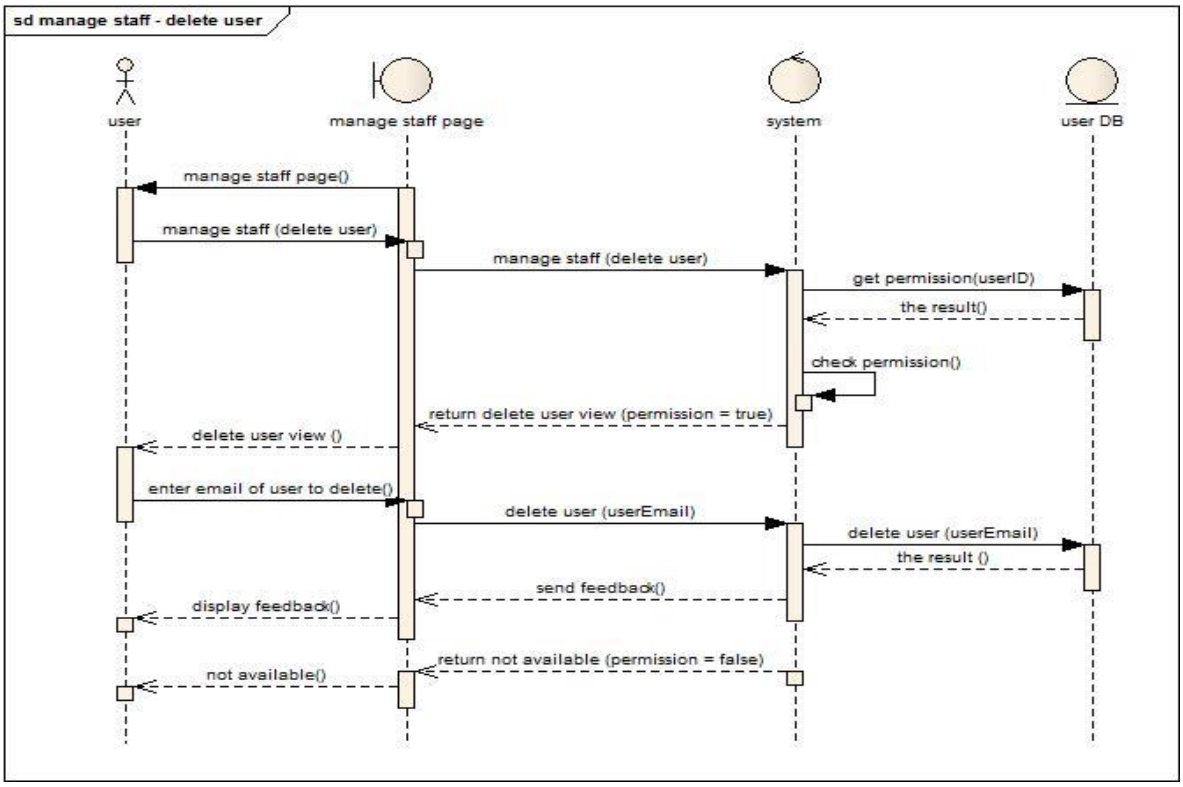

Figure 4.2.2-4 Illustrate sequence of managing staff – delete user process

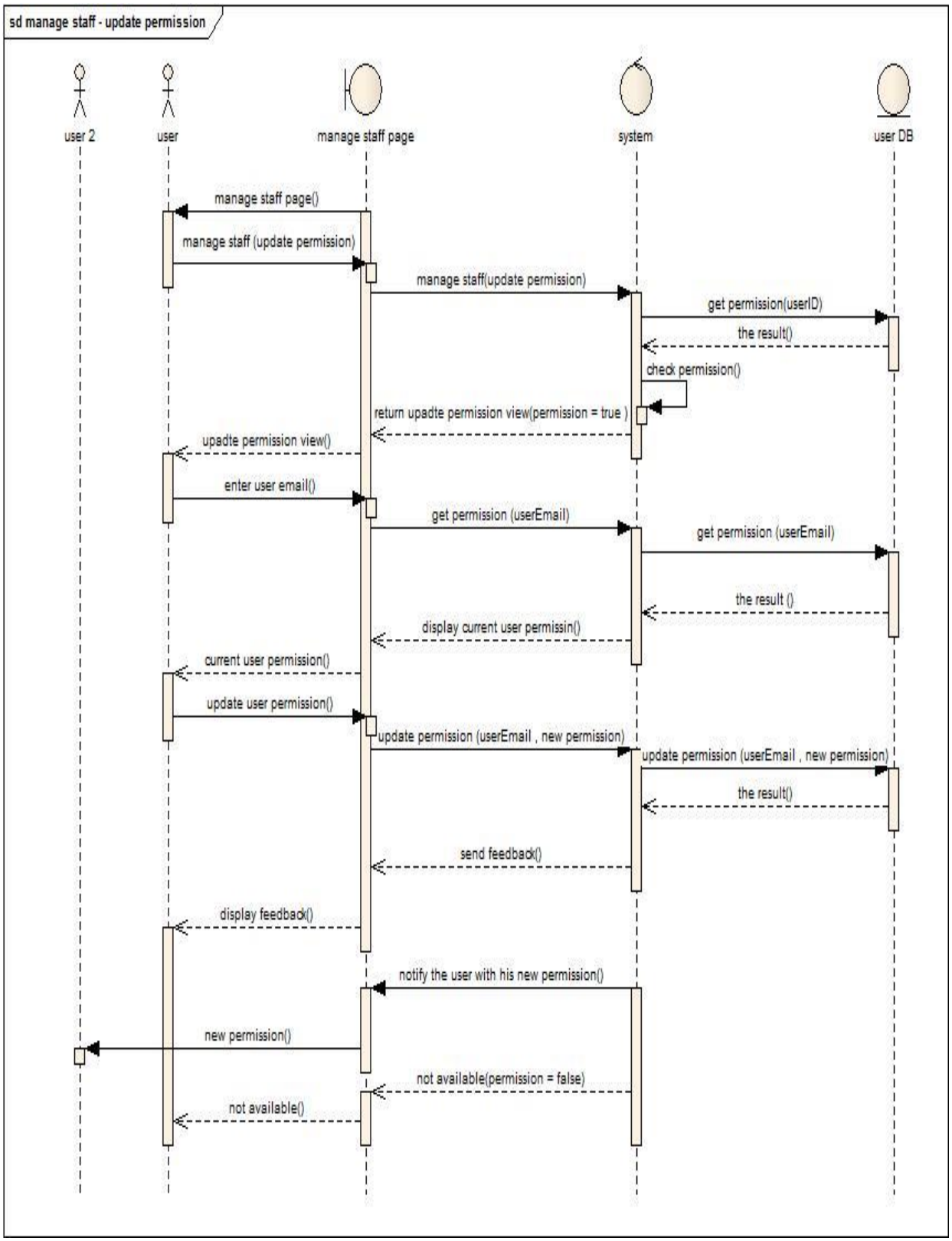

Figure 4.2.2-5 Illustrate sequence of managing staff – update permission process

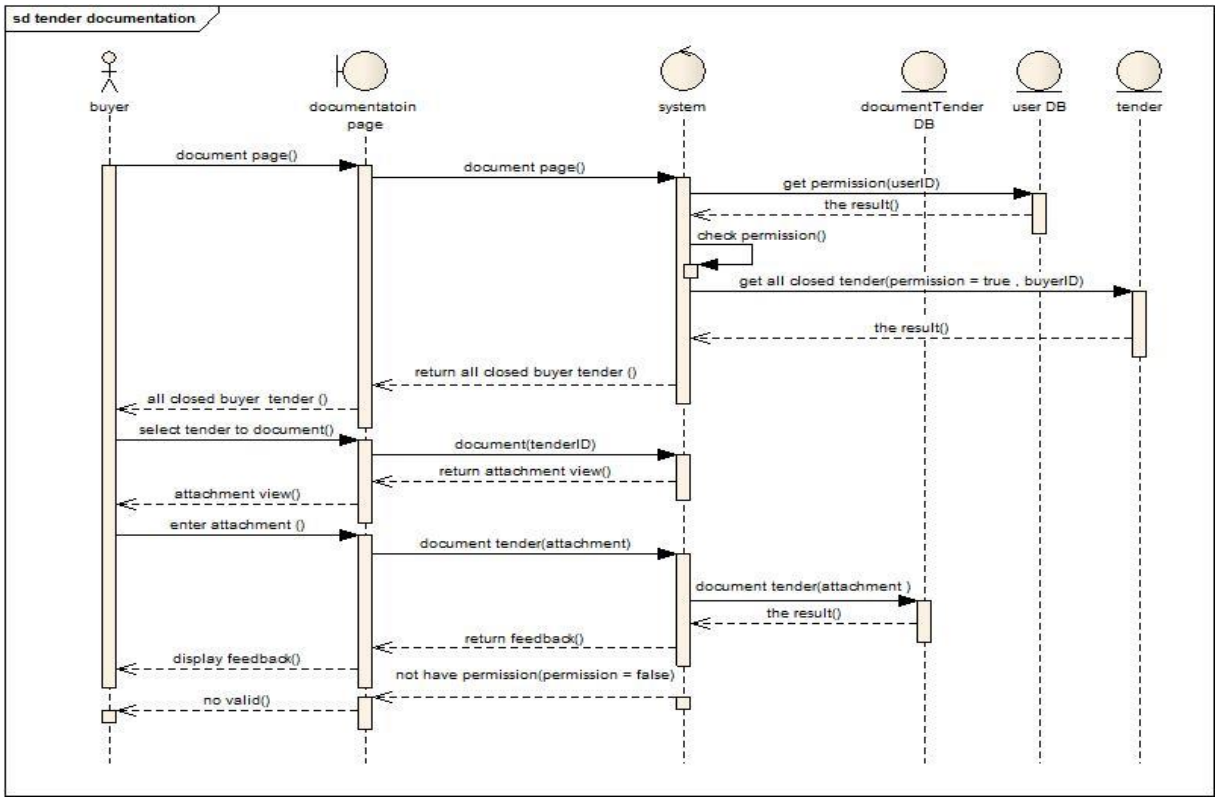

Figure 4.2.2-6 Illustrate sequence of tender documentation

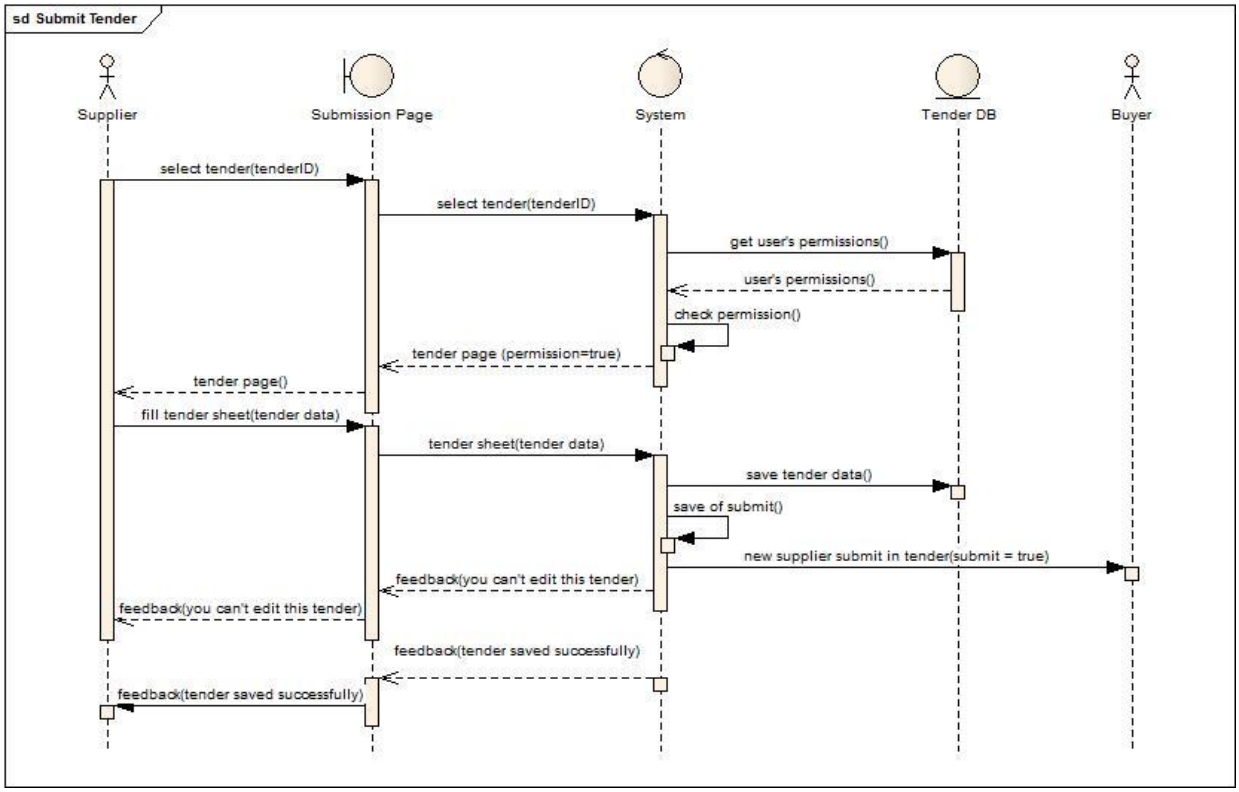

Figure 4.2.2-7 Illustrate sequence of submitting tender process

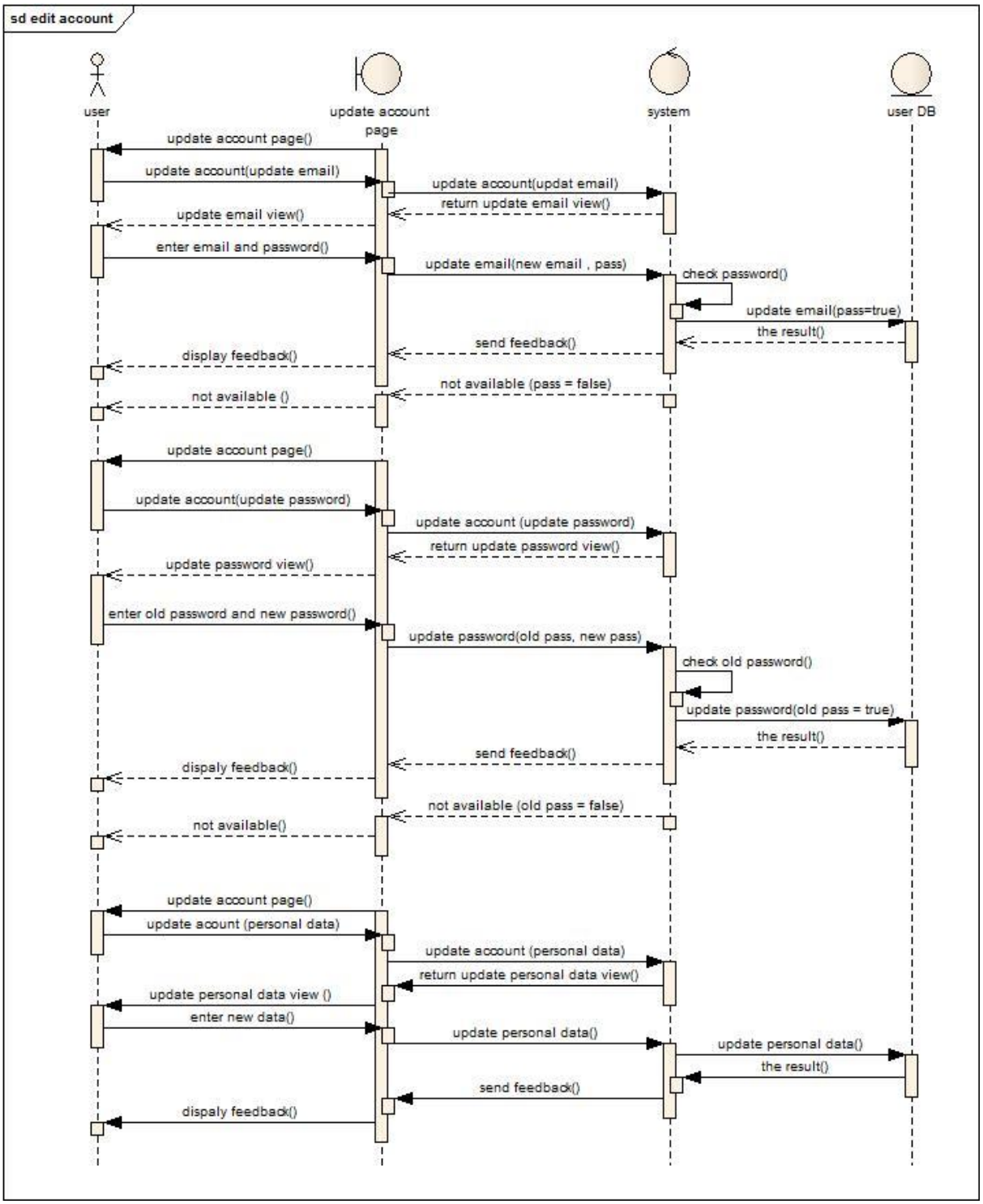

Figure 4.2.2-8 illustrate sequence of update account (email, password, or personal data)

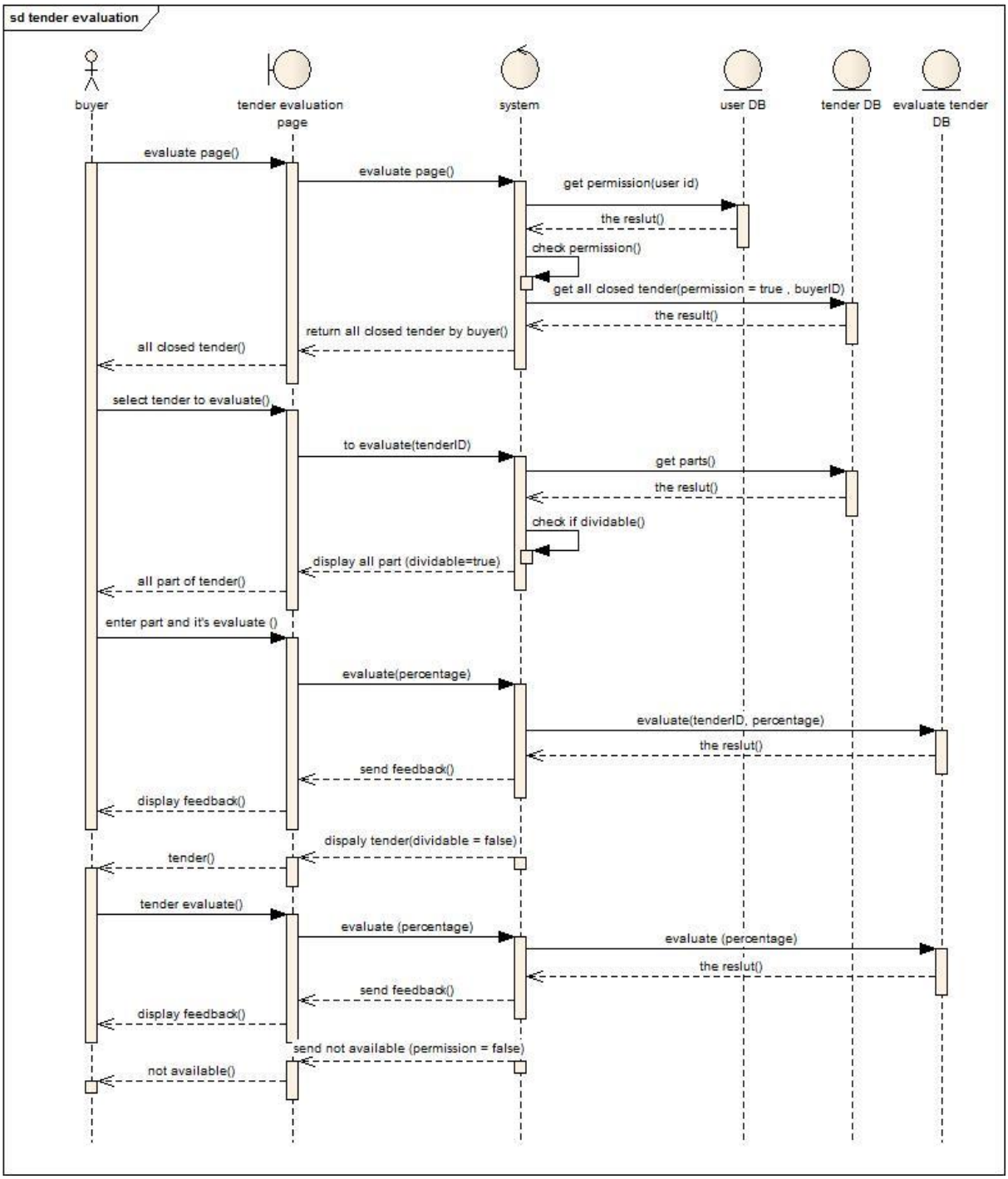

Figure 4.2.2-9 illustrate sequence of evaluating tender

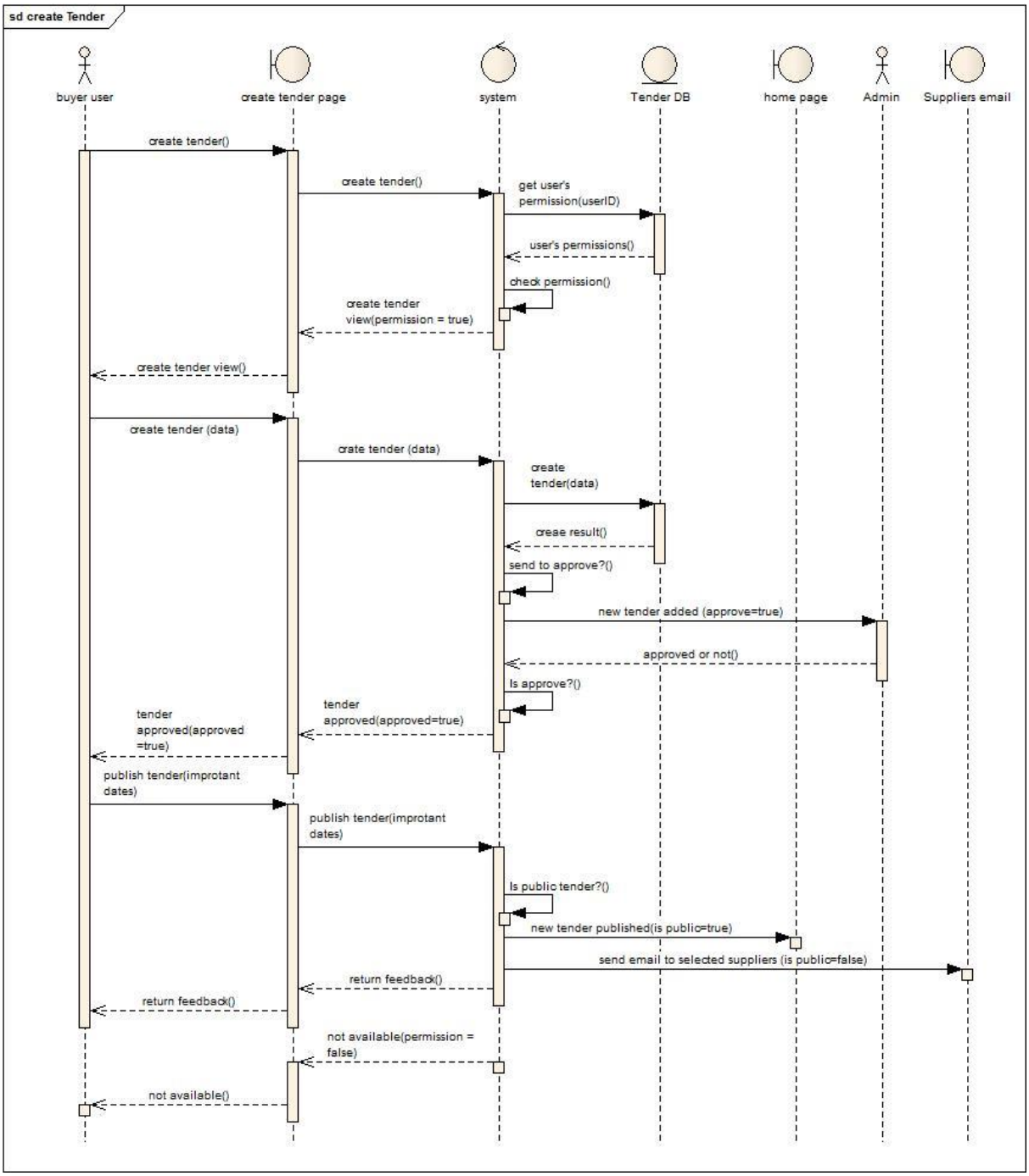

Figure 4.2.2-10 illustrate sequence of creating tender

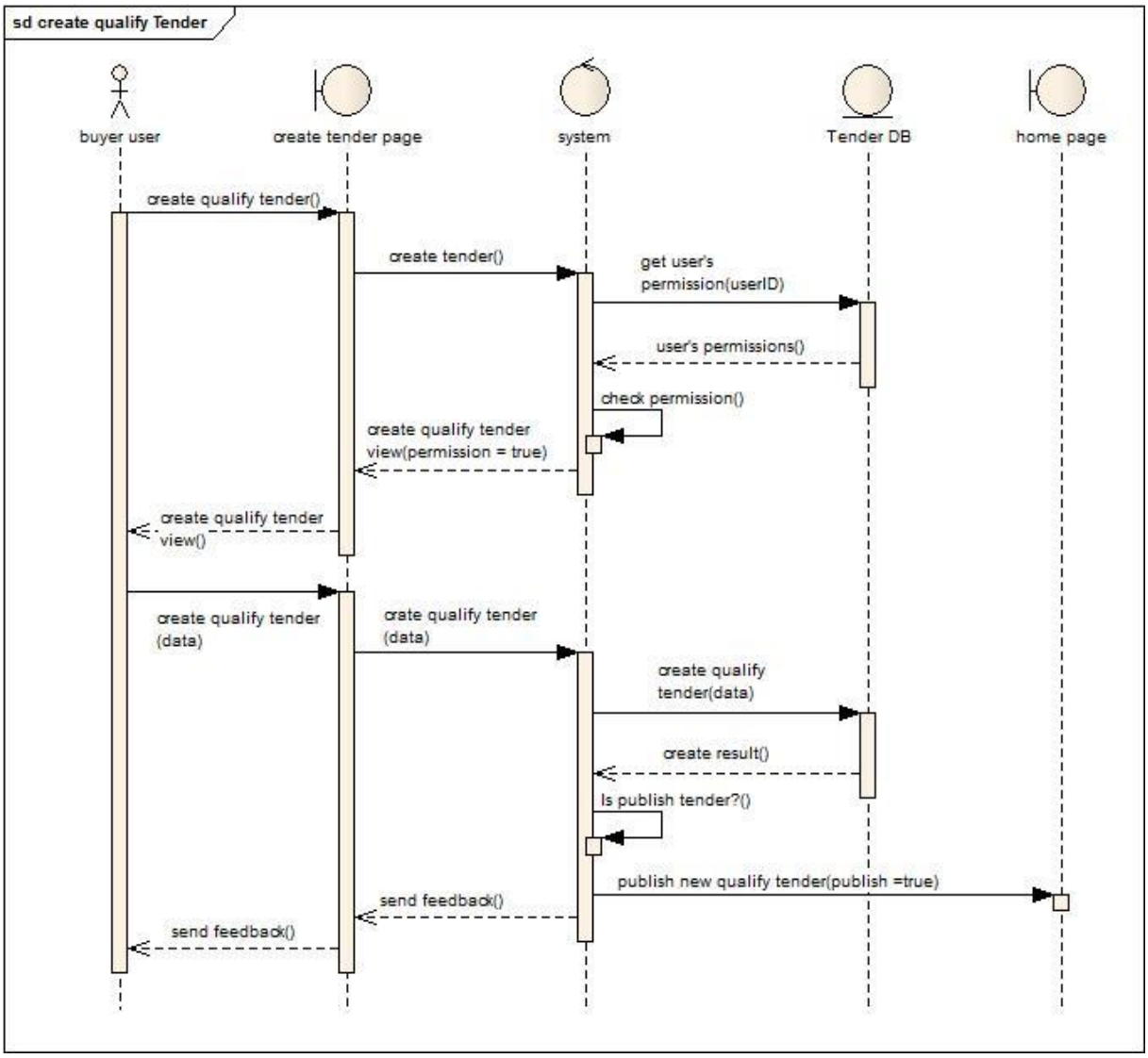

Figure 4.2.2-11 illustrate sequence of creating qualify tender

Chapter 5

Implementation

This chapter is divided into four sections depending on system components, the first section will introduce the Implementation of system homepage, second section will introduce the implementation of the important functions in buyer component, the third section will introduce the implementation of the important functions in supplier component, the fourth section will introduce the implementation of the important functions in admin component.

5.1 HOME PAGE IMPLEMENTATION:

Introduce system home page, system login and system registration.

5.1.1 HOME PAGE: contains the active tenders, closed tenders, login, registration, FAQ, about us and contact us.

Figure 5.1.1 Illustrate the system Home Page

5.1.2 SYSTEM LOGIN: the user enters email and password then the system validates the data and defines user type.

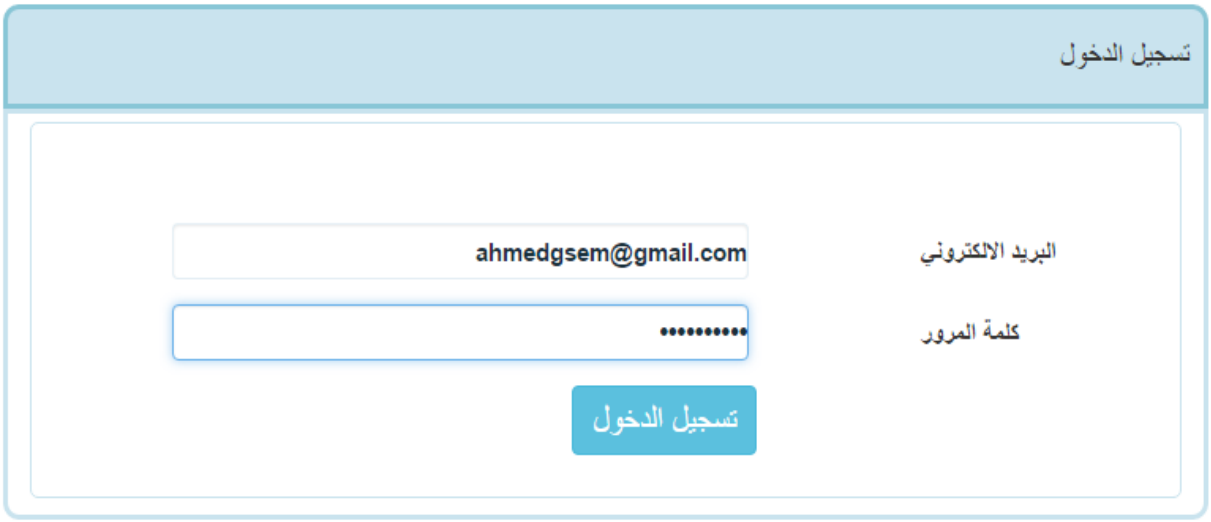

Figure 5.1.2 Illustrate the system login

5.1.3 USER REGISTRATION: user can register as buyer or supplier, first if the user registers as buyer then the user will wait until he is approved by the system admin, second if the user registers as a supplier then the data will be validated through system by checking company data in commercial registrar.

- **The supplier** enters information about entity and information about user.

Figure 5.1.3-1-1 Illustrate the supplier registration- the first part supplier information

Figure 5.1.3-1-2 Illustrate the supplier registration- the second part supplier information

❖ SUPPLIER PERSONAL INFORMATION

Figure 5.1.3-2 Illustrate the supplier registration- supplier personal information

❖ **The buyer** enters information about entity and information about user.

Figure 5.1.3-3 Illustrate the buyer registration- buyer information

❖ BUYER PERSONAL INFORMATION

Figure 5.1.3-4 Illustrate the buyer registration- buyer personal information

❖ After completion of the registration process, the system sends an email to the supplier's email to verify the supplier.

Figure 5.1.3-5 Illustrate the supplier registration confirmation

5.2 BUYER IMPLEMENTATION:

The buyer is the user with specific needs and he is using tenders to get offers to fulfill this specific needs.

5.2.1 HOME PAGE:

The header contains all user functions in Drop-down list, also the footer contains system functions to provide learnability and usability.

Figure 5.2.1 Illustrate the buyer home page

5.2.2 CREATE TENDER:

- Enter tender basic information (tender name, tender domain, tender type, tender expected price, tender sheet price, is the tender can be divided to more than one winner? is the alternative offers is accepted? is the tender sheet prepared manually or through system?)
- There are two cases for tender sheet, first if the tender sheet is prepared manually then the processes will continue as shown in Figure 5.2.2-5, second if tender sheet is done through system then the processes will continue as shown in Figure 5.2.2-6

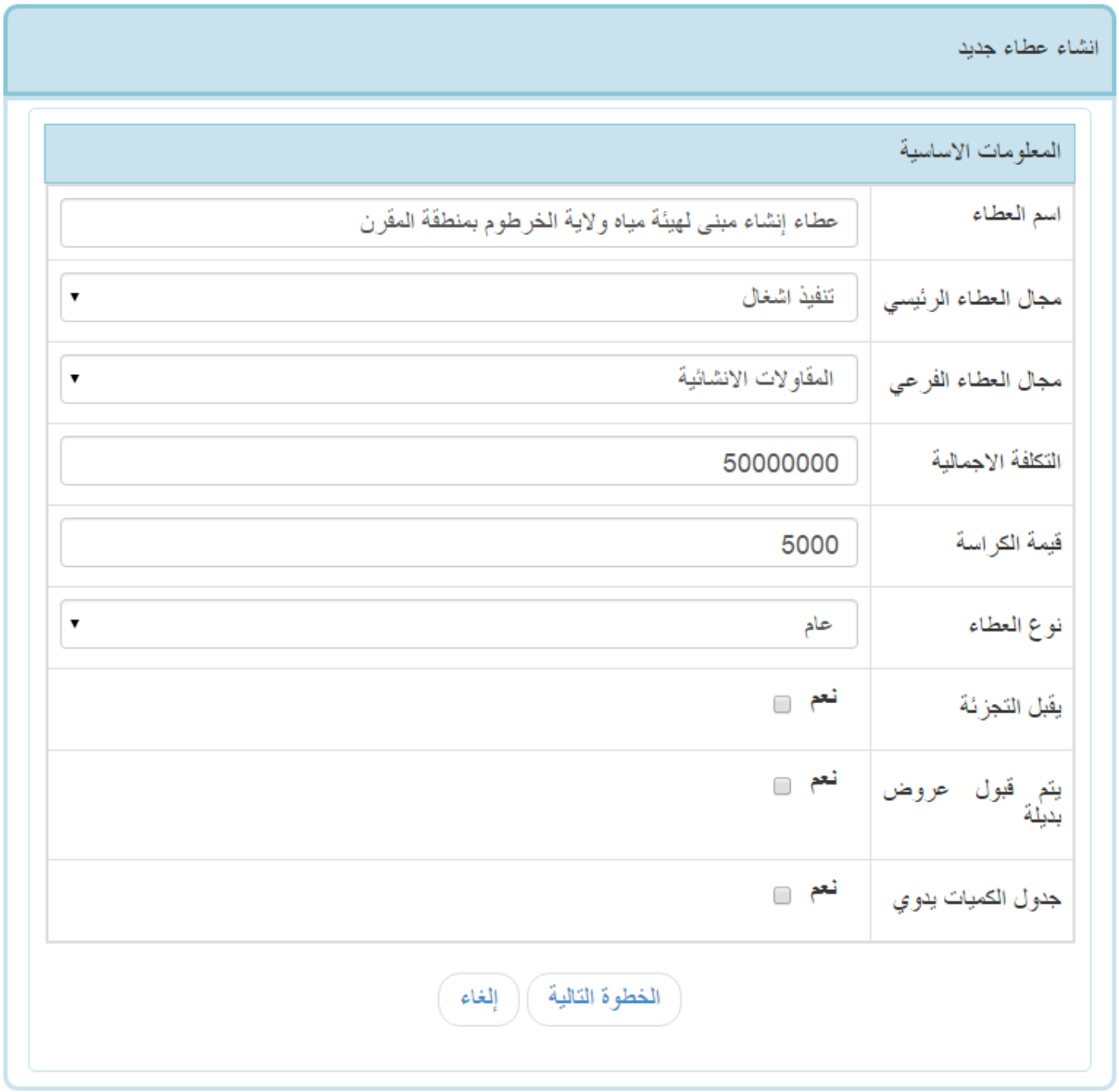

Figure 5.2.2-1 Illustrate tender creation – basic info

❖ Enter the tender requirement like (taxes, zakat, Commercial registrar) and can add all necessary requirement by clicking in the (+) button.

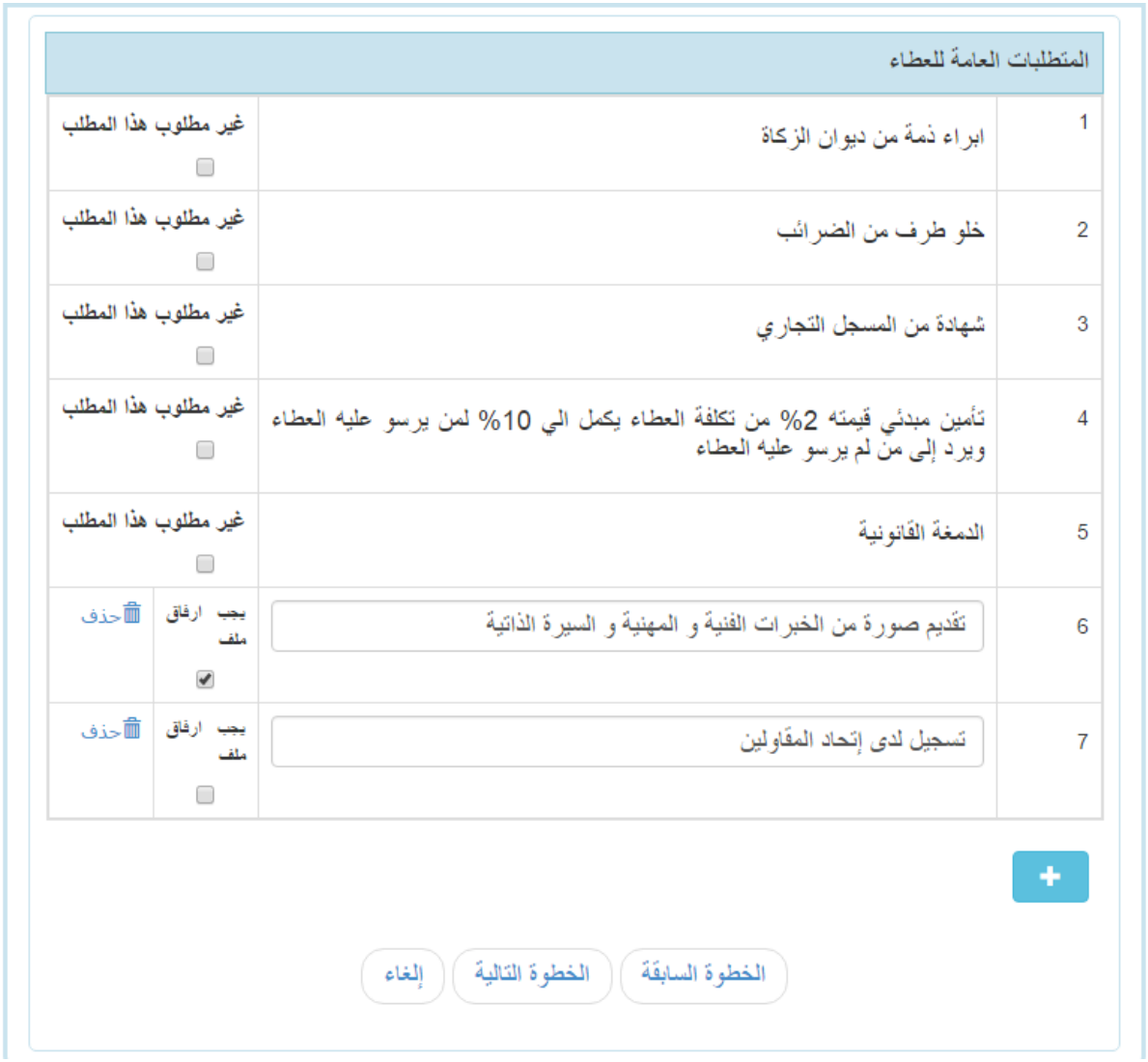

Figure 5.2.2-2 Illustrate tender creation – tender general requirement

❖ Adding extra documents.

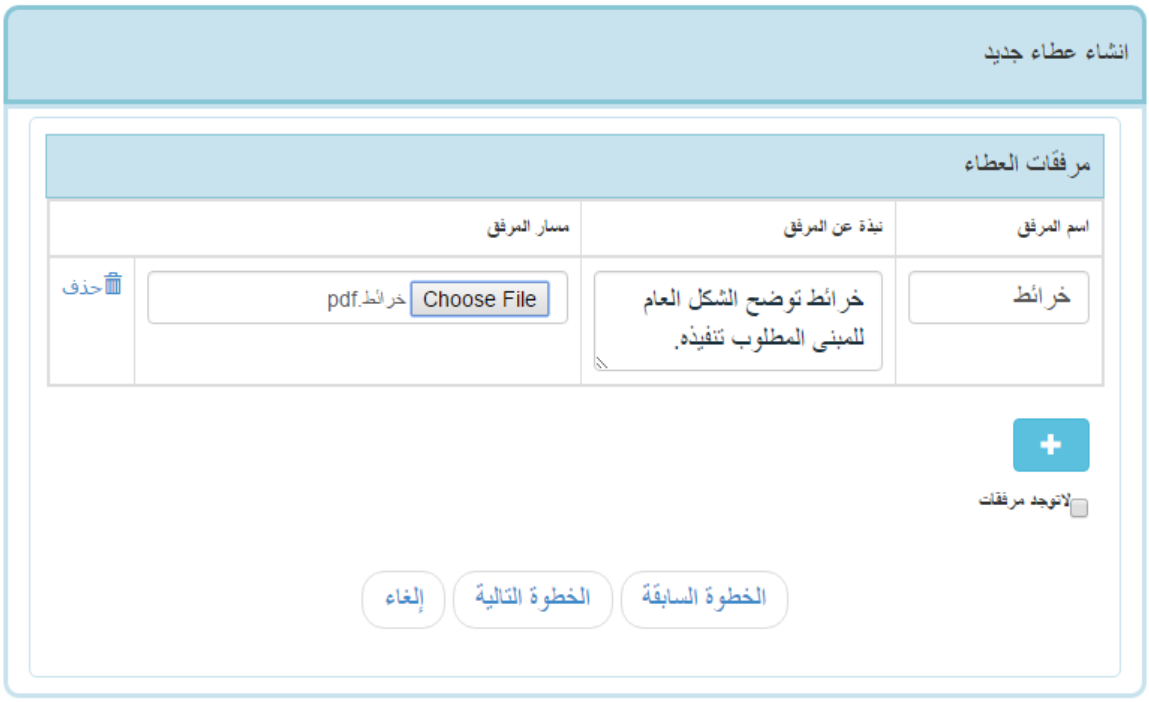

Figure 5.2.2-3 Illustrate tender creation – tender attachment

❖ Buyer can save the information or move to add tender sheet.

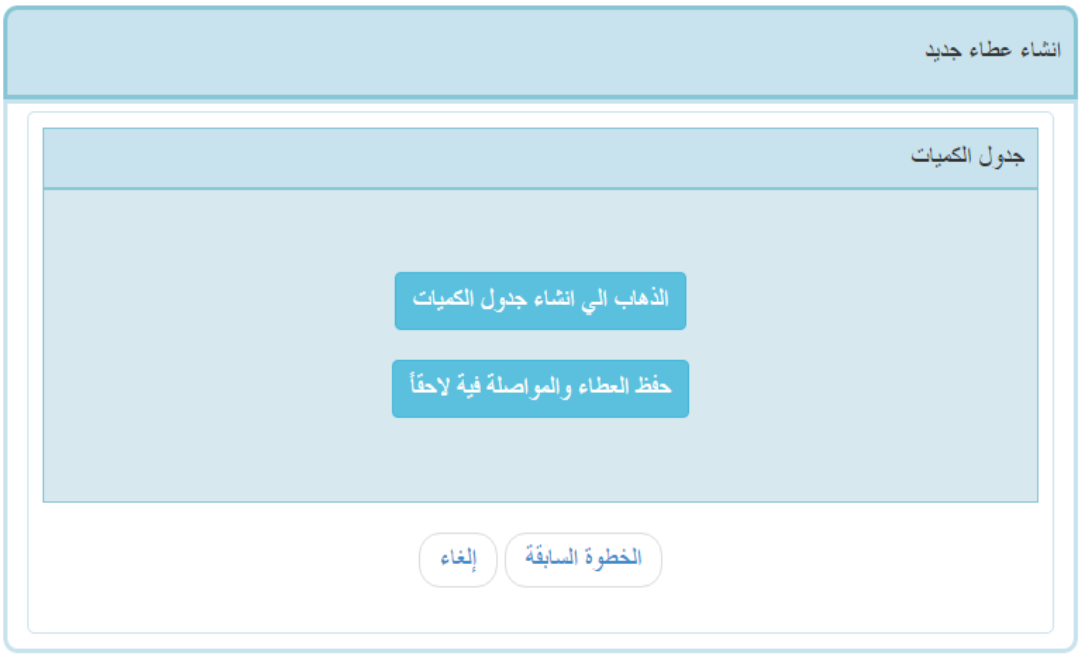

Figure 5.2.2-4 Illustrate tender creation – save or forward to tender sheet

- If the tender sheet is prepared manually then the system will allow buyer to add the prepared document as pdf file into system to provide availability of the document in the website all the time for suppliers to download and to facilitate the submission process for suppliers.

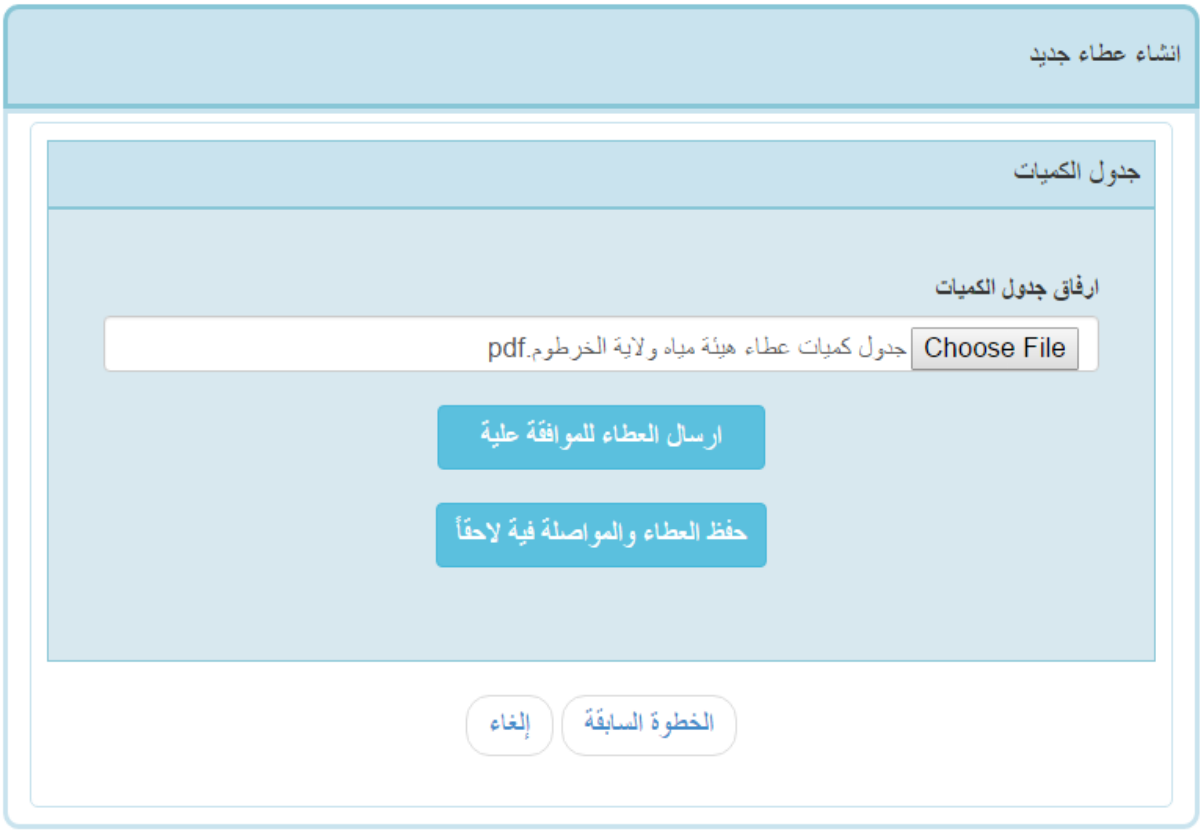

Figure 5.2.2-5 Illustrate tender creation – manual tender sheet attachment

- If the tender sheet is prepared through system then the buyer will enter the required specification and unit and quantity of the required units.

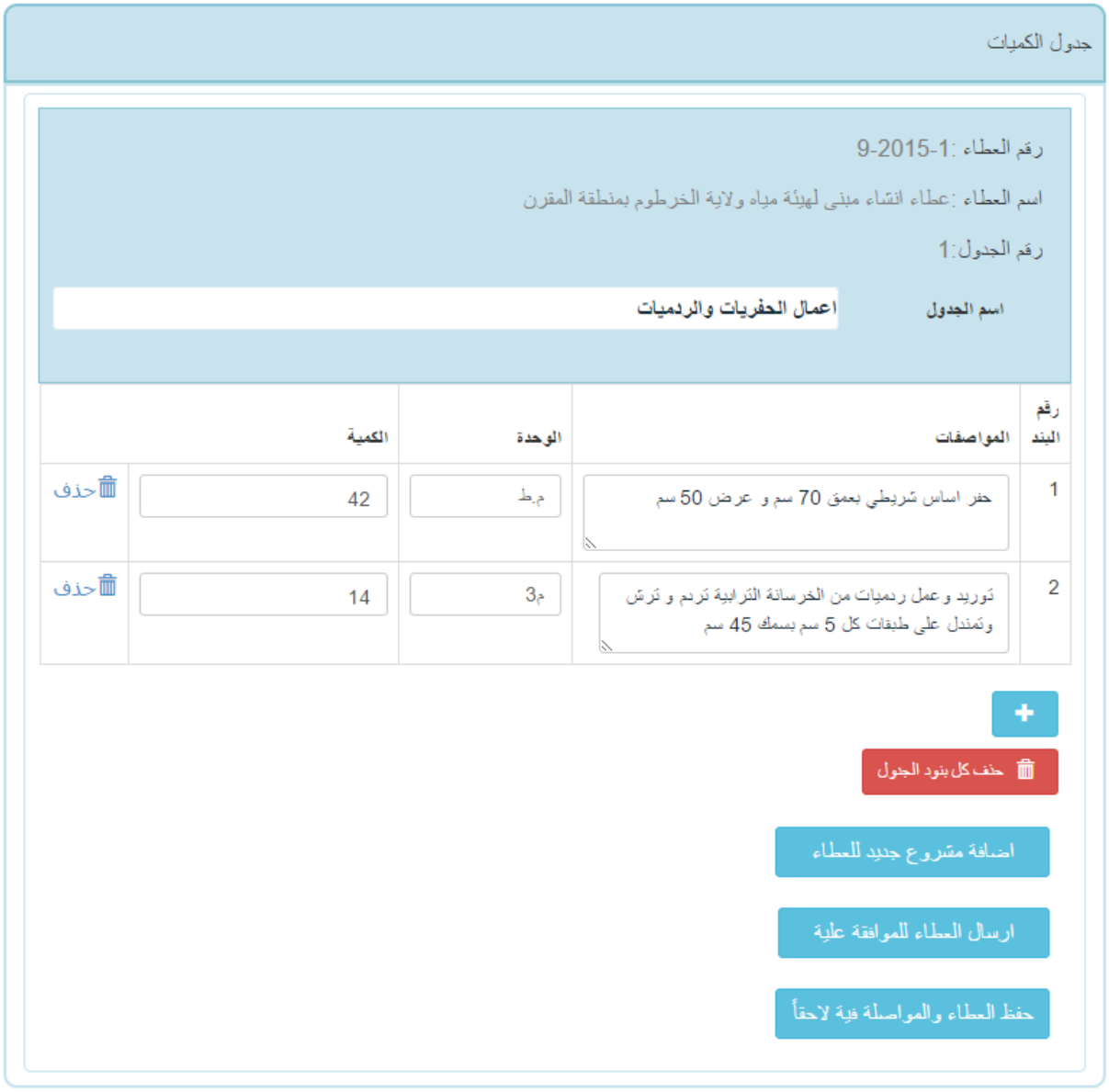

Figure 5.2.2-6 Illustrate tender creation – tender sheet preparation

- After the approval of the tender by system admin the buyer will enter the tender's important dates and publish the tender after reviewing the tender information.

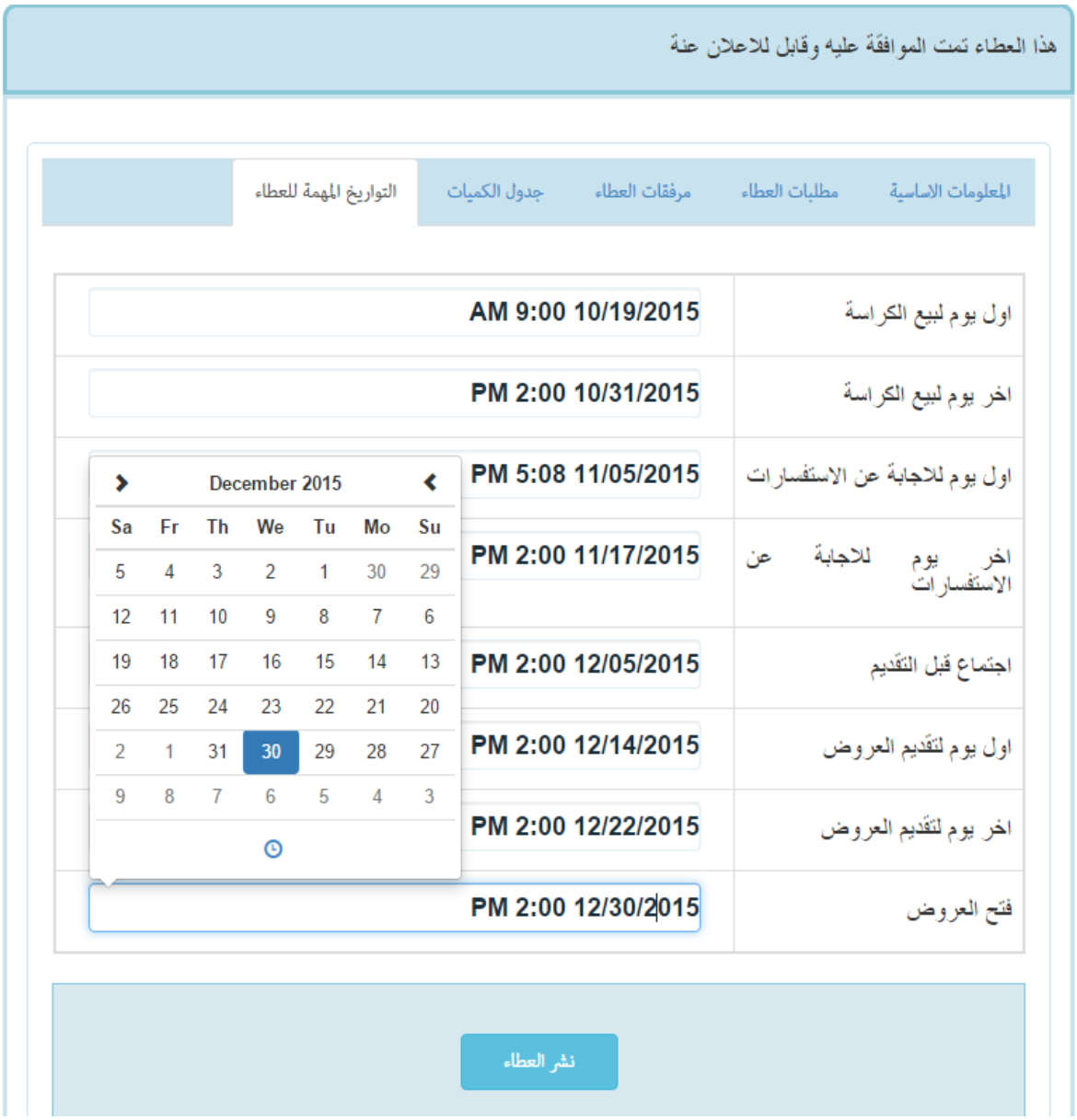

Figure 5.2.2-7 Illustrate tender creation – publish tender

5.2.3 REPORTS

This section will discuss the most important reports for buyers which are (reviewing all tender, qualified suppliers, authorized projects)

- Showing all tenders and also allowing the buyer to search according to specific search criteria like (tender domain, tender type, tender status, and tender year).

#	رقم العطاء	اسم العطاء	نوع العطاء	حالة العطاء	المجال الرئيسي	المجال الفرعي	سنة العطاء
1	1-2015-1	توريد اثاث	عام	لم تتم الموافقة عليه	سلع	اثاث وتجهيزات سكنية	2015
2	1-2015-15	توريد أجهزة حواسيب	عام	محفوظ فقط	سلع	أجهزة إلكترونية	2015
3	1-2015-16	توريد طابعات	عام	محفوظ فقط	سلع	أجهزة إلكترونية	2015
4	1-2015-17	تأهيل مستشفى الخرطوم التعليمي	عام	محفوظ فقط	تنفيذ اشغال	المقاولات الانشائية	2015
5	1-2015-18	عطاء صيانة مسجد الخرطوم الكبير	عام	تمت الموافقة عليه	تنفيذ اشغال	المقاولات الانشائية	2015

Figure 5.2.3-1 Illustrate buyer report - all tenders

❖ Showing all qualified companies and also allowing the buyer to search according to specific search criteria like (tender domain, tender sub-domain, and qualification year).

#	اسم المورد	مجال التأهيل	مجال التأهيل الفرعي	سنة التأهيل
1	الشركة العربية	سلع	أجهزة إلكترونية	2015
2	شركة ماكروميديا	تنفيذ اشغال	الاعمال الكهروميكانيكية	2013
3	شركة الهدف	الخدمات	خدمات القطاعات الأمنية والعسكرية	2015
4	شركة وادي الجندي	تنفيذ اشغال	الاعمال الكهروميكانيكية	2013
5	شركة المهاجر	الخدمات	الخدمات الزراعية	2013
6	شركة أبو الفاضل	سلع	اثاث وتجهيزات سكنية	2015

Figure 5.2.3-2 Illustrate buyer report – qualified suppliers

❖ Showing all authorized projects for buyer and also allowing buyer to search according to the project year criteria.

#	اسم المشروع	تكلفة المشروع	سنة المشروع
1	إنشاء مبنى لهيئة مياه ولاية الخرطوم	50000000.0000جنيه	2015
2	مشروع إعادة تأهيل مستشفى الخرطوم	40000000.0000جنيه	2015
3	توريد أجهزة حواسيب	100000.0000جنيه	2015
4	مشروع تأهيل مدرسة الشهيد الطاهر	100000.0000جنيه	2014

Figure 5.2.3-3 Illustrate buyer report – authorized projects

5 Showing the all items' price menu and also allowing the buyer to use specified search using item domain to help the buyers to prepare the tender sheet.

#	اسم السلعة	سعر السلعة	وحدة قياس السلعة	مجال السلعة	تاريخ آخر تعديل
1	إسمنت	12000.0000	طن	المقاولات و الإنشاءات	10-15-2015
2	خرسانة	1300.0000	قالب	المقاولات و الإنشاءات	10-14-2015
3	رملة كنجر	700.0000	قالب	المقاولات و الإنشاءات	02-02-2015
4	سيخ 4 لنية	6000.0000	طن	المقاولات و الإنشاءات	10-14-2015
5	طوب	450.0000	1000 طوبة	المقاولات و الإنشاءات	01-10-2015

Figure 5.2.3-4 Illustrate buyer report – price menus

5.3 SUPPLIER IMPLEMENTATION:

The supplier is the user who interests to make an offer to the buyer user to fulfill buyer's needs.

5.3.1 HOME PAGE:

The header contains all user functions in Drop-down list; also the footer contains the same functions to provide learnability and usability

Figure 5.3.1 Illustrate the supplier home page

5.3.2 SUBMIT IN TENDER

- First the supplier selects the tender and reviews its information then decides whether to buy the tender or to add it to his favorite list.

Figure 5.3.2-1 Illustrate tender submission – select tender

❖ If the supplier chooses to buy the tender he must pay in the bank and then enter the code in the system to get the permission to submit in the tender.

Figure 5.3.2-2 Illustrate tender submission – buy tender

❖ The supplier downloads attached files if any file uploaded by buyer

Figure 5.3.2-3 Illustrate tender submission – download attachment

❖ If the tender is prepared manually in the creation process then the supplier must download the document, fill it and finally upload it to the website.

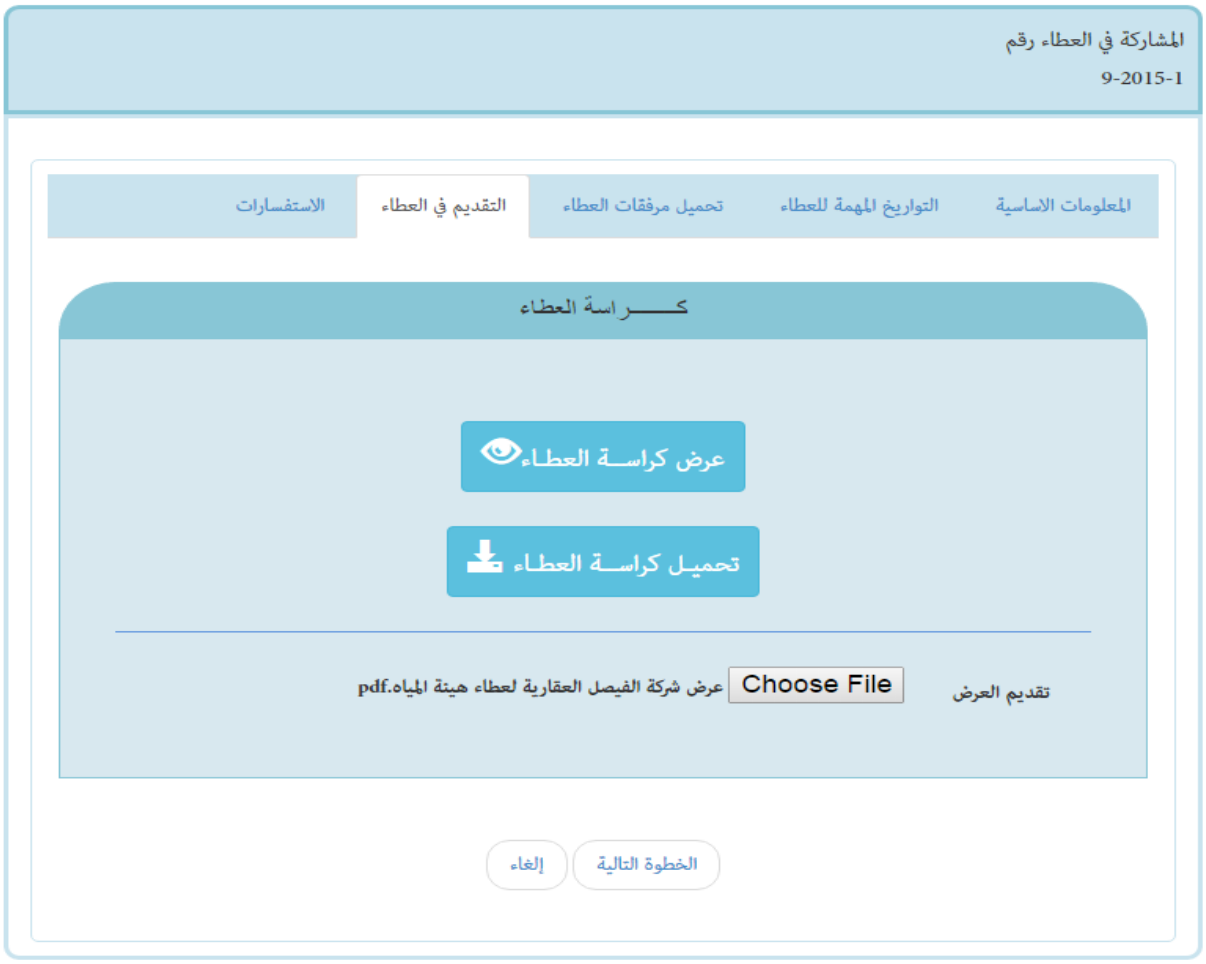

Figure 5.3.2-4 Illustrate tender submission – manual submission

❖ If the tender is prepared through the system then the supplier must fill the form.

Figure 5.3.2-5 Illustrate tender submission – submission through system

❖ Then the supplier submits necessary requirements.

Figure 5.3.2-6 Illustrate tender submission – submit requirement

- If the supplier has a question then he can ask the buyer in private, if the buyer finds the question may help the other suppliers, then he can publish the question for other suppliers.

Figure 5.3.2-7 Illustrate tender submission – questions

- After the supplier enters the submission data or uploads the tender sheet document then he can submit the tender or saves it for future modification.

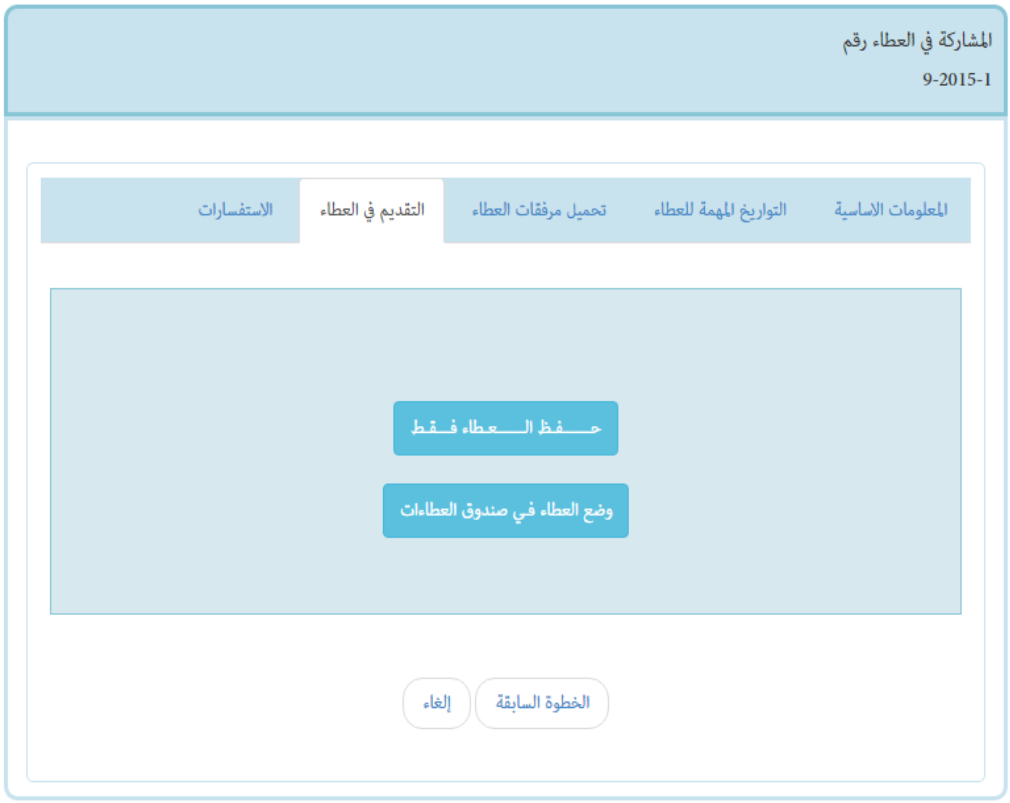

Figure 5.3.2-8 Illustrate tender submission – submit or save tender

5.3.3 REPORTS

The section will discuss the most important report for supplier

- Showing all submitted tenders for supplier.

Figure 5.3.3 Illustrate tender report – all submitted tender

5.4 ADMIN IMPLEMENTATION:

The admin is the user who manages and monitors the tender processes in the system.

5.4.1 HOME PAGE:

The header contains all user functions in Drop-down list; also the footer contains the same functions to provide learnability and usability.

Figure 5.4.1 Illustrate the admin home page

5.4.2 TENDER CONFIRMATION

The buyer after creation of the tender needs for the admin approval, the admin can review tender details and after that decides whether to accept or reject the tender.

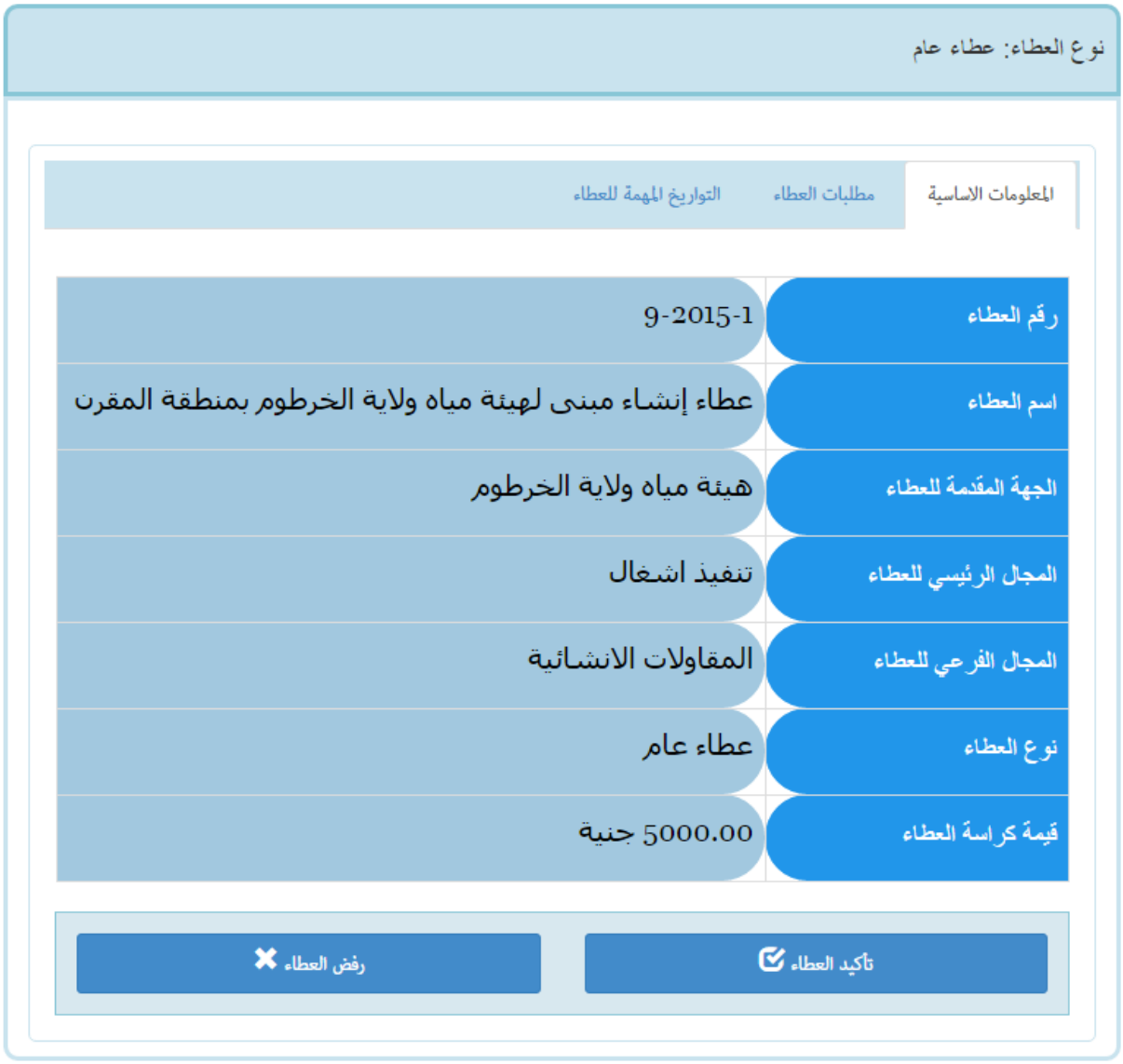

Figure 5.4.2 Illustrate the tender confirmation

5.4.3 QULAIFYING COMPANIES CONFIRMATION

Figure 5.4.3 Illustrate the qualifying companies confirmation

5.4.4 REPORTS

The section will discuss the most important reports for admins which is (tender info, items price list)

- review specific tender after closure with all tender details (tender basic info, important dates, requirements, attachments, participated companies, primary selection result, and final selection result)

Figure 5.4.4-1 Illustrate the admin report – tender review

❖ Showing the register items price and admin can modify the price, add new item or delete the item.

Figure 5.4.4-2 Illustrate the admin report – items price list

Chapter 6

Result and Recommendation

This chapter describes the important results of the system and the recommendations for future improvement.

6.1 THE RESULTS:

The system had been developed to automate the tender process in Sudan, its developed according to the law of buying and contracting of Sudanese government for year 2010.

The main idea of the research is automating and facilitating the processes of creating, advertising and submitting tenders and finally selecting best offer.

- Any buyer or supplier has system account.
- Any buyer or supplier can add new users with different permission or he can delete them.
- The buyer user can create a tender, and the creation of the tender process is divided into two ways, it can be prepared manually and then added to system so supplier can download them, or it can be prepared using system forms in the same way of manual tenders template.
- The buyer can edit the tender depending on tender status.
- The advertising will be in website in addition to tenders' reports.
- The supplier can submit in tender after paying the tender, the submitting has two ways according to creation way, if the creating of tender is done manually then the submitting process will be done by downloading the attached documents and fill them and upload them again to send them to buyer, else if the created tender is done through the system then the submitting form will be generated by system and suppliers can fill data into them.
- The suppliers can seek clarification on tender, and then the buyer can answer them. If the buyer finds the clarification can help other suppliers, the buyer can make it appears to them.
- The selecting process will be done with buyer team's help, they enter the technical evaluation about suppliers offers, and the system calculates the financial evaluation and finds the best offer, then the buyer have to accept the offer or choose another offer with explanation help in review process by admin.
- The System has an admin and he can add another admins with different permission or delete them.

- The tender must be accepted by the admin before it has been advertised.
- The admin can block supplier from participating in a specific tender.

6.2 THE RECOMMENDATIONS:

Firstly we recommend to aware the people and units in this domain of the importance of this system.

Secondly, we recommend the searcher in this domain to try to add these features in the system to reach to perfection and completion of the system

- Implement high level security like encrypting all passing messages and implementing Kerberos protocol to provide authentication.
- Integrate the system with other government systems like taxes, Zakat, commercial registrar systems which related to tender process.
- Integrate system with a payment system.
- Adding notification service to the system such as the notification of new tenders with SMS or WHATSAPP.
- Categorizing the products and defining an interesting list for suppliers to notify them with new tenders in the category through email and other notifying services.

6.3 THE CONCLUSION

In this research the system was developed to automate the manual tender processes to provide usability of tender submission and creation and make the service available all the time.

At the end of the research found a number of results, the system has ease the tender submission and creation process, according to the results of the testing of 5 persons as suppliers, they had been asked to participate in a pre-specified tender, they take an average of 17 minutes. While this process takes an average of 4 hours to buy and fill the tender sheet.

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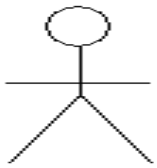
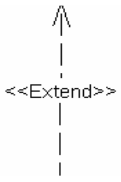
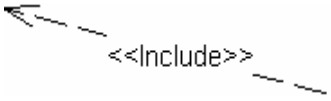
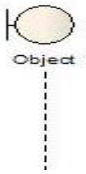
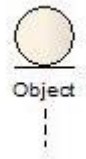
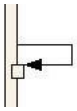
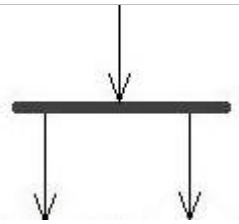
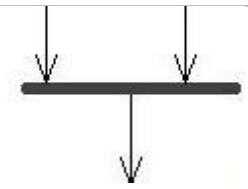
APPENDIX

APPENDIX A:

	Actor	An Actor models a type of role played by an entity that interacts with the subject
	Use Case	A use case is the specification of a set of actions performed by a system, which produces an observable result that is, typically, of value for one or more actors or other stakeholders of the system.
	Extend Relationship	This relationship specifies that the behavior of a use case may be extended by the behavior of another (usually supplementary) use case
	Include Relationship	Include is a Directed Relationship between two use cases, implying that the behavior of the included use case is inserted into the behavior of the including use case.

	Association Relationship	An association specifies a semantic relationship that can occur between typed instances.
	Actor	An Actor models a type of role played by an entity that interacts with the subject.
	Boundary	A lifeline represents an individual participant in the Interaction.
	Entity	A lifeline represents an individual participant in the Interaction.
	Control	A lifeline represents an individual participant in the Interaction.
	Message	A message defines a particular communication between Lifelines of an Interaction.
	Return Message	A message defines a particular communication between Lifelines of an Interaction.

	Recursive Message	A message defines a particular communication between Lifelines of an Interaction.
	Initial Node	An initial node is a control node at which flow starts when the activity is invoked. An activity may have more than one initial node.
	Activity	An activity specifies the coordination of executions of subordinate behaviors, using a control and data flow mode.
	Decision	A decision node accepts tokens on an incoming edge and presents them to multiple outgoing edges.
	Fork Node	A fork node is a control node that splits a flow into multiple concurrent flows. A fork node has one incoming edge and multiple outgoing edges.
	Join Node	A join node is a control node that synchronizes multiple flows. A join node has multiple incoming edges and one outgoing edge.

	Final Node	An activity may have more than one activity final node. The first one reached stops all flows in the activity.