

E-Tendering System
APEX Communications Sdn. Bhd.

IT Division

by

Noor Firdaus Abu Mansor

**Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Information System)**

DECEMBER 2005

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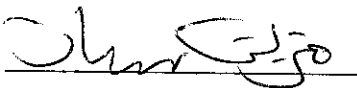
CERTIFICATION OF APPROVAL

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IT Division

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A Project dissertation submitted to the
Information System Programme
Universiti Teknologi PETRONAS
In partial fulfillment of the requirements for the
BACHELOR OF TECHNOLOGY (Hons)
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Approved by,

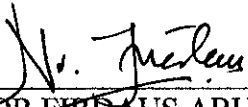


(Ms. Mazlina bt. Mehat)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
December 2005

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



NOOR FIRDAUS ABU MANSOR

ABSTRACT

The commercial exploitation of the Web is in its infancy. However, a growing number of organizations are beginning to analyze ways of doing business over the Web. Intranets can be used for a range of purposes. One of the main uses is as document management system for the organization.

The APEX Communications IT Division e-Tendering System represents the uses of an intranet as stated above. The objective of the e-Tendering System is mainly to change the process of preparing tender documents manually (paper-based) into an automated process (online).

It has been identified that the conventional process of preparing tender documents has resulted in the occurrence of some problems such as the tender preparation process becomes very tedious, the usage of too much paper and files, the use of many employees for a particular tender preparation and also it takes up too much time to finish preparing the tender documents.

As a result of the development of this project, the E-Tendering System has been successfully produced with all the functions working properly, thus enabling users to automate their conventional way of preparing tender documents. System users are now able to upload and download tender documents, making the process of tender preparation faster and more organized.

With the development of the e-Tendering System using a Spiral Design methodology, all the problems identified will be diminished in the most efficient and effective manner.

ACKNOWLEDGMENT

First and foremost, praise be upon to Allah s.w.t for his mercy given me the strength to complete this project within time given.

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TABLE OF CONTENTS

CERTIFICATION OF APPROVAL	i
CERTIFICATION OF ORIGINALITY	ii
ABSTRACT	.	.	.	.	.	.	.	.	iii
ACKNOWLEDGEMENT	.	.	.	.	.	.	.	.	iv
LIST OF FIGURES	.	.	.	.	.	.	.	.	v
CHAPTER 1:	INTRODUCTION								
	1.1	Introduction	.	.	.	.	.	.	3
	1.2	Problem Statement	.	.	.	.	.	.	4
	1.3	Objective	.	.	.	.	.	.	5
	1.4	Scope of Study.	.	.	.	.	.	.	6
CHAPTER 2:	LITERATURE REVIEW AND THEORY								
	2.1	E-Commerce	.	.	.	.	.	.	7
	2.2	E-Procurement	.	.	.	.	.	.	7
	2.3	Intranet	.	.	.	.	.	.	8
	2.4	E-tendering	.	.	.	.	.	.	8
	2.5	E-Perolehan	.	.	.	.	.	.	9
	2.6	Large Business System Project	.	.	.	.	.	.	9
CHAPTER 3:	METHODOLOGY								
	3.1	Procedure Identification	.	.	.	.	.	.	11
		3.1.1 System Analysis	.	.	.	.	.	.	12
		3.1.2 System Design	.	.	.	.	.	.	13
		3.1.3 Application Prototyping	.	.	.	.	.	.	14
		3.1.4 System Construction	.	.	.	.	.	.	15
		3.1.5 System Testing	.	.	.	.	.	.	16
	3.2	Tools Required	.	.	.	.	.	.	17
		3.2.1 Software	.	.	.	.	.	.	17

3.2.1	Software	.	.	.	.	17
3.2.2	Hardware	.	.	.	.	17
CHAPTER 4:	RESULT AND DISCUSSION					
4.1	Result	.	.	.	.	18
4.1.1	Start Page	.	.	.	.	18
4.1.2	Login Page	.	.	.	.	18
4.1.3	Home Page	.	.	.	.	19
4.1.4	Bulletin Board.	.	.	.	.	19
4.1.5	Upload Tender File Page	.	.	.	.	20
4.1.6	Administrator Main Page	.	.	.	.	20
4.1.7	Upload New Tender Page	.	.	.	.	20
4.1.8	Administrator Bulletin Board.	.	.	.	.	21
4.1.9	Create Tender Details Page	.	.	.	.	21
4.2	Discussion	.	.	.	.	22
CHAPTER 5:	CONCLUSION AND RECOMMENDATION	.	.	.	.	24
REFERENCES	.	.	.	.	.	26
APPENDICES	.	.	.	.	.	27

LIST OF FIGURES

Figure 1	Spiral Design Model
Figure 2	Start Page
Figure 3	Login Page
Figure 4	Home Page
Figure 5	Bulletin Board Page
Figure 6	Upload Tender File Page
Figure 7	Administrator Main Page
Figure 8	Upload New Tender Page
Figure 9	Administrator Bulletin Board
Figure 10	Create Tender Details Page

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The APEX Communications Group is a stable of manufacturing and service companies dedicated to the growth and development of the communications industry. In keeping abreast of technological advancement, its requirements and opportunities, APEX Communications Sdn. Bhd. has expanded to pursue endeavors in the information technology and multimedia sector. With close collaboration with leading global IT vendors, the organization strives to serve the country better by providing complete end-to-end systems, maximizing local participation backed by the principal expertise.

Through the student's observation, it has been identified that APEX Communications Sdn. Bhd. IT Division is currently using the conventional paper-based method of tender preparation. Tender documents will be divided into two parts which are the Technical files and the Commercial files. After all the tender files have been prepared and packed, they will be sent manually to the buyer.

In the aim of improving the company's efficiency and productivity in tender preparation, the student is proposing to develop an e-Tendering System which can be used by the company's employees. The system would be an ideal solution or alternative that can overcome some of the occurring problems which will be discussed in the problem statement.

1.2 PROBLEM STATEMENT

Through various observations conducted and experience gained in tender preparation process during the Industrial Internship Program, the student has identified few occurring problems:

1) Manual tender preparation process is very tedious.

Team leader will normally make copies of the tenders' technical specifications and will distribute it among other team members. Some of the specifications given by the buyer are of the same equipments or products. Dividing the technical specifications in paper form will result in confusion among team members on who should search and prepare the brochures for the given specifications. Some of the brochures were even printed multiple times and this is wasting the company's stationery.

2) Excessive usage of papers and files

The bigger the project the company is bidding, the bigger amount of tender files will be submitted. Some tender requires the bidder to submit more than 50 sets of technical and commercial files. With this number, the company must increase cost on stationery especially on printing papers and ring files.

3) Too many employees for one tender

Conventional tender preparation will normally be done by 2 teams. One is for the Technical files and another for the Commercial files. This usually needs around 7 to 8 employees' participation. The bigger the tender, the more employees needed.

4) *Lack of mobility, time constraint*

With the amount of tender documents pertaining to the technical specifications and equipment and product pricing, it is hard for employees to prepare it outside of the office. This will take up a longer time for a certain tender to finish its preparation. Normally, the participating employees need to do overtime and even overnight at the office to finish the tender preparation in order to comply with the deadline.

1.3 OBJECTIVE

After comprehensive understanding of the problem statement, the student has come up with several objectives in developing the e-Tendering System for APEX Communications Sdn. Bhd. The objectives are as stated below:

- 1) To implement an automated tender preparation process in exchange to the conventional, paper-base process.
- 2) To enable employees to participate efficiently in multiple tender preparations in a given time period, hence increasing organization's productivity.
- 3) To allow mobility in the tender preparation process to cut short the preparation time.

The student has selected this project as his scope of study due to the experience gained in involving with tender preparation process during the Industrial Internship Program.

1.4 SCOPE OF STUDY

Being familiar with the tendering preparation through direct involvement, the student is confident that relevance of this project will suit ideally with the scope of study.

The project of developing the E-Tendering System for APEX Communications Sdn. Bhd. IT Division took the student 14 weeks to finalize. Preliminary research was done during the semester break.

The scope of the project is entirely the employees of APEX Communications Sdn. Bhd. IT Division, who will be the initial system users. The system users are comprised of two categories; the administrator and the normal system users. Both categories of system users have different set of privileges and functions they can perform.

The E-Tendering System has three important functions; upload, download and update tender documents. The system administrator has the privilege to upload new tender documents into the system's database. The administrator also can insert details regarding the tenders that have been uploaded for the viewing of normal system users.

For the normal system users, they can view the details for each uploaded tender. They can also download the tender documents, which comprise of commercial and technical documents, for editing. After editing and preparing the tender documents, the system users can upload the latest version of update into the database to be viewed by other users.

CHAPTER 2

LITERATURE REVIEW AND THEORY

2.1 E-COMMERCE

Electronic commerce can be defined loosely as ‘doing business electronically’. Electronic commerce, or better electronic business, includes electronic trading of physical goods of intangibles such as information (Timmers, 2000, p.xiii). It consists primarily of the distributing, buying, selling, marketing, and servicing of products or services over electronic systems such as computer networks. The information technology industry might see it as an electronic business application aimed at commercial transactions. It can involve electronic funds transfer, supply chain management, e-marketing, online marketing, online transaction processing, electronic data interchange, automated inventory management systems, and automated data-collection systems. It typically uses electronic communications technology such as the Internet, extranets, e-mail, Ebooks, databases, and mobile phones.

2.2 E-PROCUREMENT

According to Timmers (2000)

E-procurement is electronic tendering and procurement of goods and services. Large companies or public authorities may implement some form of e-procurement on the Web. An example is Japan Airlines (<http://www.jal.com>). Benefits sought include having a wider choice of suppliers, which is expected to lead to lower cost, better quality, improved delivery, reduced cost of procurement (e.g. tendering specifications downloaded by suppliers rather than mailed by post). Electronic negotiations and

contracting and possibly collaborative work in specification can further enhance time and cost savings and convenience. For suppliers, the benefits are in more tendering opportunities, possibly on a global scale, lower cost of submitting a tender and possibly tendering in parts that may be better suited for smaller enterprises, or collaborative tendering (if the e-procurement site supports forms of collaboration). The main source of income is reduction of cost (of tender processing and getting more cost-effective offers).

2.3 INTRANET

According to Standing (2000)

Many intranet and Internet systems started off as document publishing systems. Intranets typically contain information on company policies and procedures, minutes of meetings, company and departmental strategy, and promotion application details. In fact, intranets have been used to present information that was once produced on paper and circulated around the organization. (p.99)

2.4 E-TENDERING

CIPFA Commissioned Report (2002) says that E-tendering systems provide for the enabling of tendering, where many stages of the manual process are replaced by electronic facilities. Tender documentation is sent to potential suppliers in electronic form, which can subsequently send completed tenders via secure electronic means.

Electronic processes can be much more efficient than manual systems, bringing down transaction costs and freeing staff from routine administration to concentrate on higher added-value activities

2.5 E-PEROLEHAN

The electronic procurement system, better known as E-Perolehan, streamlines government procurement activities and improves the quality of service it provides. E-Perolehan converts traditional manual procurement processes in the Government machinery to electronic procurement on the Internet.

E-Perolehan allows suppliers to present their products on the World Wide Web, receive, manage and process purchase orders and receive payment from government agencies via the Internet. The supplier's product catalogue is converted into the form of an electronic catalogue or E-Catalogue, which can be viewed from any desktop with a web browser.

The supplier is able to submit quotations, obtain tender document and submit tender bid through E-Perolehan. E-Perolehan allows suppliers to register or renew their registration with the Ministry of Finance through the Internet. Suppliers are able to submit application, check application status and pay registration fees through E-Perolehan.

2.6 LARGE BUSINESS SYSTEMS PROJECT

According to Weaver (2004)

Projects for large organizations will invariably require significant time and resources to be spent in addressing organizational and change management concerns. This means that even if system requirements appear to be relatively straight-forward (which would be unusual for a large and complex organization), a student project will rarely be able to cover the entire life cycle of the project. Likewise, if the organization is relatively small but the functional scope is very wide, and then the amount of effort

needed to complete all of the necessary development activity will be beyond the limited resources of the student's project. To overcome the problems of scale in a large business system project, the student will need to identify one or more self-contained pieces of the overall project that together will constitute a meaningful, complete and individual project. A more successful approach can be to take on a complete phase of the project. This will usually be an early phase, such as a strategy study, feasibility study or requirements analysis, as the resources required will be less than of the later phase of a large project.

CHAPTER 3

METHODOLOGY

3.1 PROCEDURE IDENTIFICATION

In developing the e-Tendering System for APEX Communications Sdn. Bhd. IT Division, the student adopted the Spiral design model as the project development methodology. In the spiral design model, a waterfall structure is adopted for the early stages of the project culminating in a detailed requirements specification. The spiral model is then applied to the physical design and construction stages (Please refer to Figure 1). In a project where the requirements are reasonably well understood and/or complex, or where an existing system is being replaced without significant functional change, and where the system will be largely GUI-based the spiral design model may be appropriate.

The spiral design model can also be useful in a wide range of student projects, where the business problem is frequently too large for a complete solution to be delivered in time, but where the implementation of at least an initial prototype is essential to meet the requirements of the university. Using the spiral design model, the student is able to develop and demonstrate a deeper understanding of formal system development techniques, most notably in the modeling of the requirements. At the same time, the student is able to demonstrate his ability to deliver a working piece of system that meets those requirements.

3.1.1 System analysis

Investigation and information sources

The student started embarking in the project by doing first and foremost the preliminary investigation. The student identified the underlying problems the current system is facing. With the current manual tendering preparation process, excessive usage of stationeries and tedious documents preparations became the main problems. The student also did investigation on the proposed system's objectives and requirements to make sure what the proposed system is required and expected to do. Since the student is proposing to implement an online tendering system, investigation on the existing system and its infrastructure were also done to make sure the proper infrastructure is available for system implementation.

Information search is very crucial in order to understand the overall process of developing the e-tendering system. Information searched must be relevant to the scope and background of study. The student gained all the necessary information from sources that includes:

- **Literature search.** Journal articles, books, company profile and case studies.
- **Company representatives.** Interviews and discussions with APEX Communications Sdn. Bhd. IT Division executives regarding the tendering preparation process.
- **Company documents.** APEX Communications Sdn. Bhd. company profile, tender documents and CDs.

- **Fellow students and personal contacts.** Discussions to establish requirements of system and development stage with colleagues and industry practitioners.

3.1.2 System design

The system design phase is concerned with technology-based views of the system's data, process and interface. In this phase, the student has identified the system's function definitions. The functions definitions include the definition of each button in the user interface and what it means and represents to the system, for example, the "Login" button represents the login action that the system will perform to access the E-Tendering System. Some other function definitions include the upload and download tender documents and view the tender documents. Each function represents a meaningful and complete unit of work, carried out in response to the system event. The complete set of functions, when taken together, will represent all of the processing that the system needs to carry out, whether user or system initiated. It is essential for the student to create a complete set of function definitions using textual description to make the purpose and logic of the function clear.

The student also has designed the user interface for the system. Before actually designing the user interface, the student had firstly established the user interface standards for implementing common features and functions across all user interfaces. The standard covers cosmetic issues such as the use of color, logos, text styles and icons, as well as the navigation schemes. The student has opted to use Macromedia Dreamweaver MX and PHP to develop the user interface for the system, which will be correlated with MySQL database.

3.1.3 Application prototyping

In the phase of developing the E-Tendering System, the student has implemented the application prototyping method. Prototypes are pre-production versions of part or all the system, and may vary in sophistication from paper sketches to near complete system. Since the student's project is adopting an RAD development approach (spiral design life cycle), the early prototype will be steadily evolved into the final system by refining and adding to it in the light of user feedback and testing, and by building operational-level capacity and resilience into the final version. The student's project aims to deliver a prototype application, which consists either of a subset of the full system that is close to production, or an earlier but still working prototype of the full system. The features that can be expected in the student's E-tendering system project consist of:

- **User interfaces.** The E-Tendering System contains a functional user interface for navigation purposes.
- **Database integration.** The system is integrated with databases to store data on system users and tender documents.
- **Tested functionality.** The E-Tendering System is included with authentication validation. This is to make sure that only the authorized user can get access to the system.

3.1.3 System construction

The first stage done by the student in developing the system was creating individual pages for the user interface. Some of the elements which were included in the pages were command buttons, labels, text boxes, text area and picture boxes. The linking between the pages was done after successive pages have been developed. This is to make sure that correct pages were linked together and to enable early detection if there is any error in the linkage. If the student did the linking after all the pages had been developed, there might be a possibility of linking the wrong pages together and this will disrupt the whole functionality of the system. The cosmetics aspect of the user interface was done at the final stage of the user interface. This concerns the use of colours for the pages, the logos and also the pictures.

The student also built the databases which were later linked with the user interface. The databases were built to store data regarding the system users, such as the users' e-mail and also login password. A database storing data of the tenders was also built. The database consists of tables and fields storing the tenders' numbers, date the tender was published and action performed for each tender advertised in the bulletin board of the system. The databases were developed using MySQL database which can be perfectly integrated with the user interface developed using Macromedia Dreamweaver MX and PHP.

3.1.5 System testing

Testing is critically important to the success of the student's project that aims to deliver a working application. To make sure that the finished product functions perfectly and meets every objective defined, the student had initiated several testing procedures:

- **Unit testing.** To test that the systems' components integrate with each other, and that data and control flow correctly between them.
- **System testing.** To test that the system as a whole meets its requirements and conceptual design.
- **User acceptance testing.** To test the acceptability of the system with the users.

The student has selected a group of users from APEX Communications Sdn. Bhd. IT Division to participate in all the testing processes. Remarks and recommendations given by the group were taken into consideration by the student in order to improve the E-Tendering System.

3.2 TOOLS REQUIRED

3.2.1 Software

Programming and coding

- Macromedia Dreamweaver MX
- PHP

Database management

- MySQL

3.2.2 Hardware

- Operating System : Microsoft Windows XP Professional Edition Pack 2 Version 2002
- Processor : Intel Pentium 4, 2.00 GHz
- Memory : 512 MB of RAM
- Display : NVIDIA GeForce 4 MX 420
- Display Mode : 1024 x 768
- Input : Mouse and Keyboard
- Hard Disk requirement :50 MB

CHAPTER 4

RESULT AND DISCUSSION

4.1 RESULT

The result of this project is the E-Tendering System which functions perfectly according to the requirements and meets the objectives that have been identified.

4.1.1 Start Page

Every time users want to access the E-Tendering System, they will come to this page first (Please refer to Figure 2). The Start Page contains a brief explanation about the APEX Communications Group, stating the mission and vision of the group of companies. To go to the login page, users need to click at the Login button, and users will be directly linked to the specified page.

4.1.2 Login Page

In the Login Page (Please refer to Figure 3), users need to insert their company e-mail and password in order to login to the E-Tendering System. The usage of the company e-mail rather than a username is an authentication validation method used by the student in order to restrict access to the E-Tendering System only for employees of APEX Communications Sdn. Bhd. If the user entered the wrong e-mail or password, the login would not be successful and users need to re-enter the correct e-mail or password. To login to the system, users must click the Login button. If users click the Reset button, the system will clear both of the text boxes.

4.1.3 Home Page

Normal users who login to the E-Tendering System will be directed to the system's Home Page (Please refer to Figure 4). There is only one link available at this page, which is the link to the Bulletin Board, which shows all the tender documents that had been uploaded by the administrator, plus the edited tender documents which were uploaded by other users.

4.1.4 Bulletin Board

The Bulletin Board will show the users the entire tender documents that had been uploaded into the system's database (Please refer to Figure 5). All the tenders are categorized by the Date the tender was uploaded, Ministry, the Tender Number, the Tender Title and the Commercial and Technical documents. In this page, users can be able to view the details of each Commercial files of every tender. To view the detail, users need to click the View Details link. The main functions of this E-Tendering System are to enable users to download and upload commercial and technical documents of a particular tender. In order to download the documents which had been uploaded by the administrator, users need to click the Download links at both the Commercial and Technical sections. Users can also upload the tender documents which have been edited. To upload the edited documents, users need to click the Upload link and the system will direct users to the specified page. The Bulletin Board page also will show users all the comments done by previous users who have updated any tender documents earlier.

4.1.5 Upload Tender File Page

Users who have edited the tender documents can upload the documents back into the system. To do so, users need to go to the Upload Tender File page (Please refer to Figure 6). In this page, users will be required to enter the Date and the specified Commercial and Technical files. To select the files, users can click the Browse buttons and search for the files to be uploaded. Users can also add a comment regarding the tender files which are to be uploaded. To upload the files, users can simply click the Upload button. The Reset button will clear all the text boxes.

4.1.6 Administrator Main Page

If the administrator login to the E-Tendering System, the administrator will have an access to the Administrator Main Page (Please refer to Figure 7). In this page, the administrator will be able to upload new tender documents into the system's database. To upload a new tender, the administrator needs to click the Upload New Tender link to go to the specified page. In the Administrator Main Page, there are also links to the E-Tendering System Home Page and the Administrator Bulletin Board, which shows the tender documents that had been uploaded by the administrator.

4.1.7 Upload New Tender Page

The system administrator can upload a new tender into the system's database at the Upload New Tender page (Please refer to Figure 8). In this page, the administrator needs to insert several details pertaining to the tender which will be uploaded. The details are the Date Uploaded, Ministry, Tender Number and Tender Title. The administrator needs to upload both the Commercial and Technical documents. To do so, the administrator can click the Browse buttons to search for folders containing the documents which are to be

uploaded. The administrator can also put in a comment at the specified text box to comment on anything regarding the tender which will be uploaded. After finish entering all the specified details, documents and comment, the administrator need to click the Upload button to upload the new tender. If the administrator clicks the Reset button, the system will clear all the text boxes.

4.1.8 Administrator Bulletin Board

The Administrator Bulletin Board shows all the tenders which were uploaded earlier by the administrator (Please refer to Figure 9). In this page, there is a link to the page for the administrator to create the details of the tender which has been uploaded.

4.1.9 Create Tender Details Page

In the Create Tender Details page, the administrator can insert the details of a particular tender which has been uploaded (Please refer to Figure 10). The administrator needs to insert the information pertaining to the uploaded tender at the specified text boxes. The information required are the Date the tender was published, Ministry, Tender Title, Details of the tender, Field Code, Supplier Status, Closing Date to submit the tender, Closing Time, name of the Contact Person, the Contact Number and also the contact person's E-mail. After inserting all the required information, the administrator needs to click the Save button to save all the information entered. Those information will then be visible to users when they click the View Details link in the Bulletin Board (Please refer to Figure 5).

4.2 DISCUSSION

In this part, the student focuses the discussion to comparing the E-Tendering System which was developed by the student with the E-Perolehan which was developed by Commerce Dot Com Sdn. Bhd., in terms of their scope and functionalities.

From the result above, the main focus of the E-Tendering System is to automate the manual tender preparation process, hence eliminating the problems which had been identified in the problem statement earlier. The E-Tendering System contains some of the elements of the E-Perolehan system since it was developed based on the existing E-Perolehan system architecture. In other words, the E-Tendering System can be seen as a subset system from the E-Perolehan system because it focuses mainly on the preparation of the tender documents and does not include other bigger and more complex processes such as tender bidding and selection processes. By referring to the result above, the main functions of the E-Tendering System are to upload new tenders documents, download the commercial and technical documents, and uploading the documents which have been edited back into the system's database. On the system users' validation, the student has used the authentication validation method, by using the users' company e-mail rather than username to login to the system. This was done by the student to ensure that only the authorized users can be able to access the E-Tendering System.

Compared to the E-Tendering System, the E-Perolehan System has a bigger and wider scope and functionalities. E-Perolehan allows suppliers to present their products on the World Wide Web, receive, manage and process purchase orders and receive payment from government agencies via the Internet. The supplier's product catalogue is converted into the form of an electronic catalogue or E-Catalogue, which can be viewed from any desktop with a web browser.

The suppliers are able to submit quotations, obtain tender document and submit tender bid through E-Perolehan. E-Perolehan also allows suppliers to register or renew their registration with the Ministry of Finance through the Internet. Suppliers are able to submit application, check application status and pay registration fees through E-Perolehan.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 CONCLUSION

Based on the research that has been done by the student regarding the background study and scope of the project, it has been identified that the development of the E-Tendering System is very beneficial and relevant as a measure to counter all the underlying problems that exist in the current conventional tendering process. Adopting elements from the E-Perolehan system architecture which is used by the Malaysian government, the E-Tendering System has successfully meet all the objectives and goals that have been defined earlier, hence providing employees of APEX Communications Sdn. Bhd. IT Division with a revolutionary new alternative in tender preparation process that can increase the efficiency and productivity in tender preparation.

5.1 RECOMMENDATION

There are several recommendation and suggestions that can be done in the future for the system enhancement:

- i. Include an E-catalogue in the E-Tendering System for users to view product catalogue. This function will be very beneficial to the system users because product catalogue is a very important piece of technical document which will be included into the Technical Tender Files and submitted to the buyer. Some of the tenders contain the same product and equipment specifications, so the student

thinks that it would be best to come up with an E-Catalogue to store all the product brochures in a softcopy form for easy reference.

- ii. Include interactive tutorial in the E-tendering system to enable new users to learn how to use the system more effectively. Currently, the E-Tendering System does not have any tutorial or help functions to guide the users on how to use the system. So it is a good recommendation to install the system with an interactive tutorial so that the E-Tendering System will not be misused by the users.

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APPENDICES

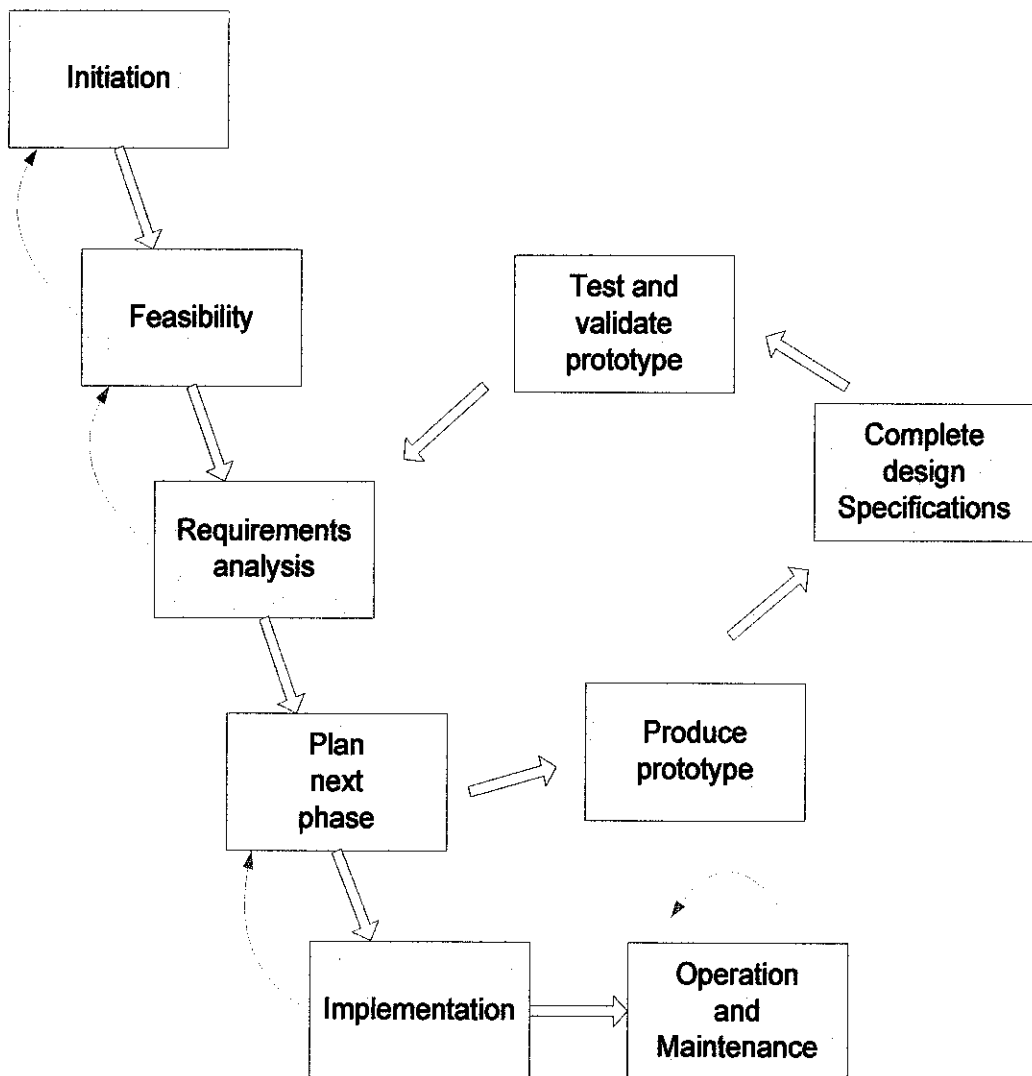


Figure 1: Spiral Design Model

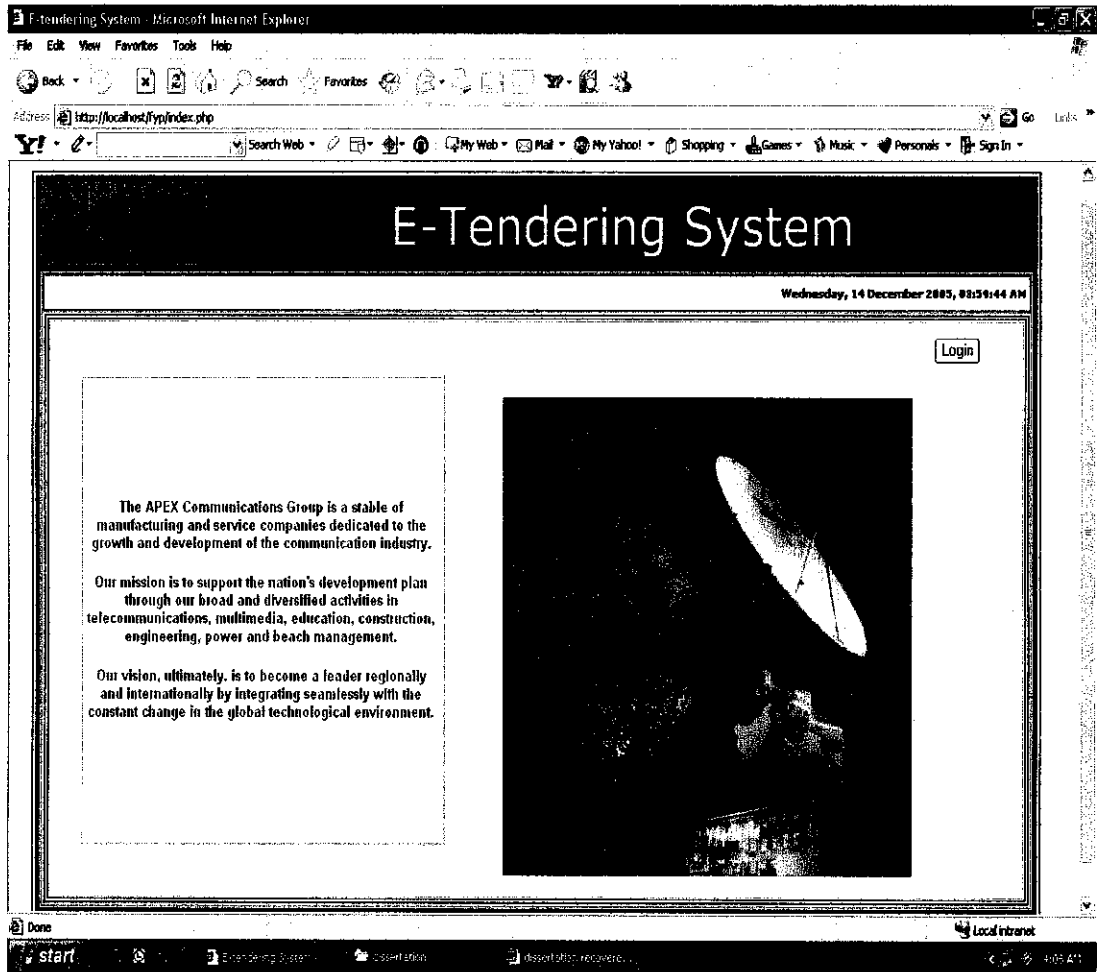


Figure 2: Start Page

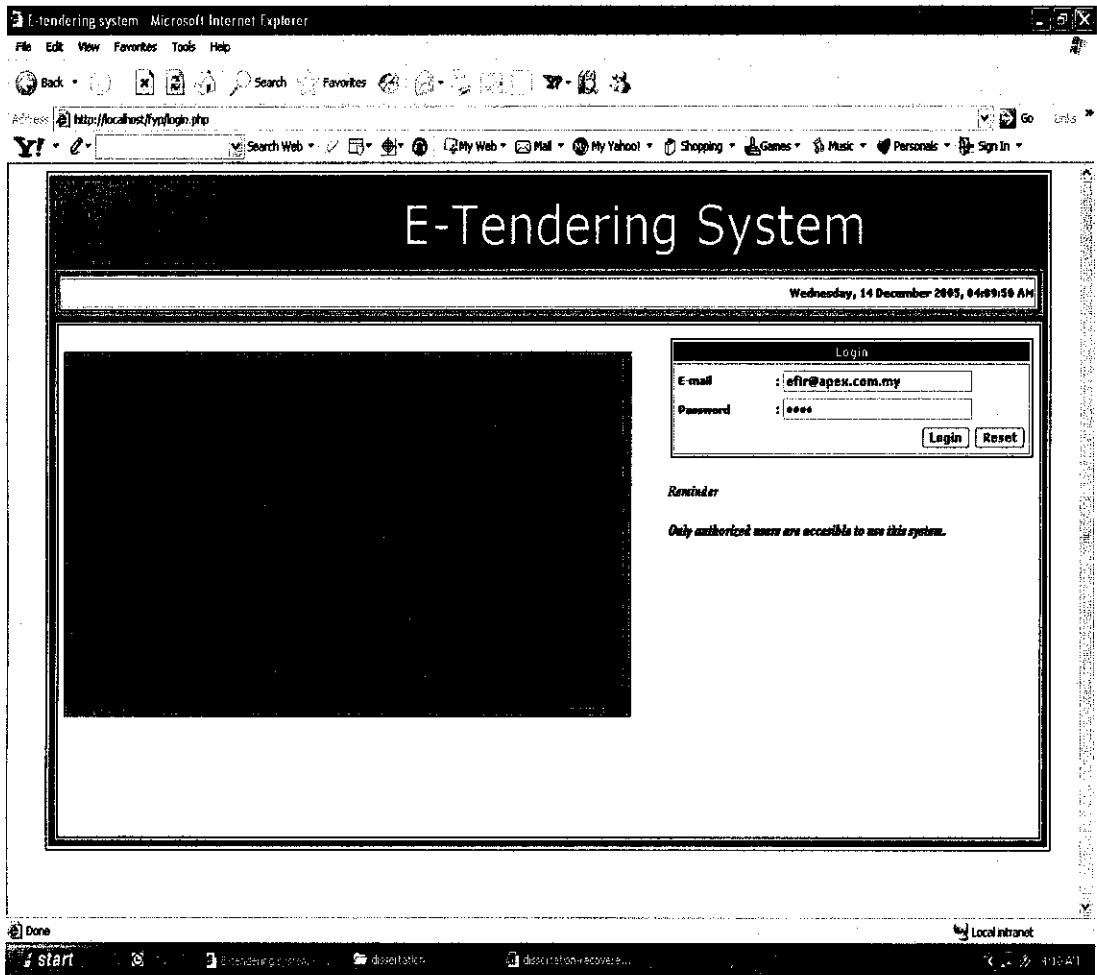


Figure 3: Login Page

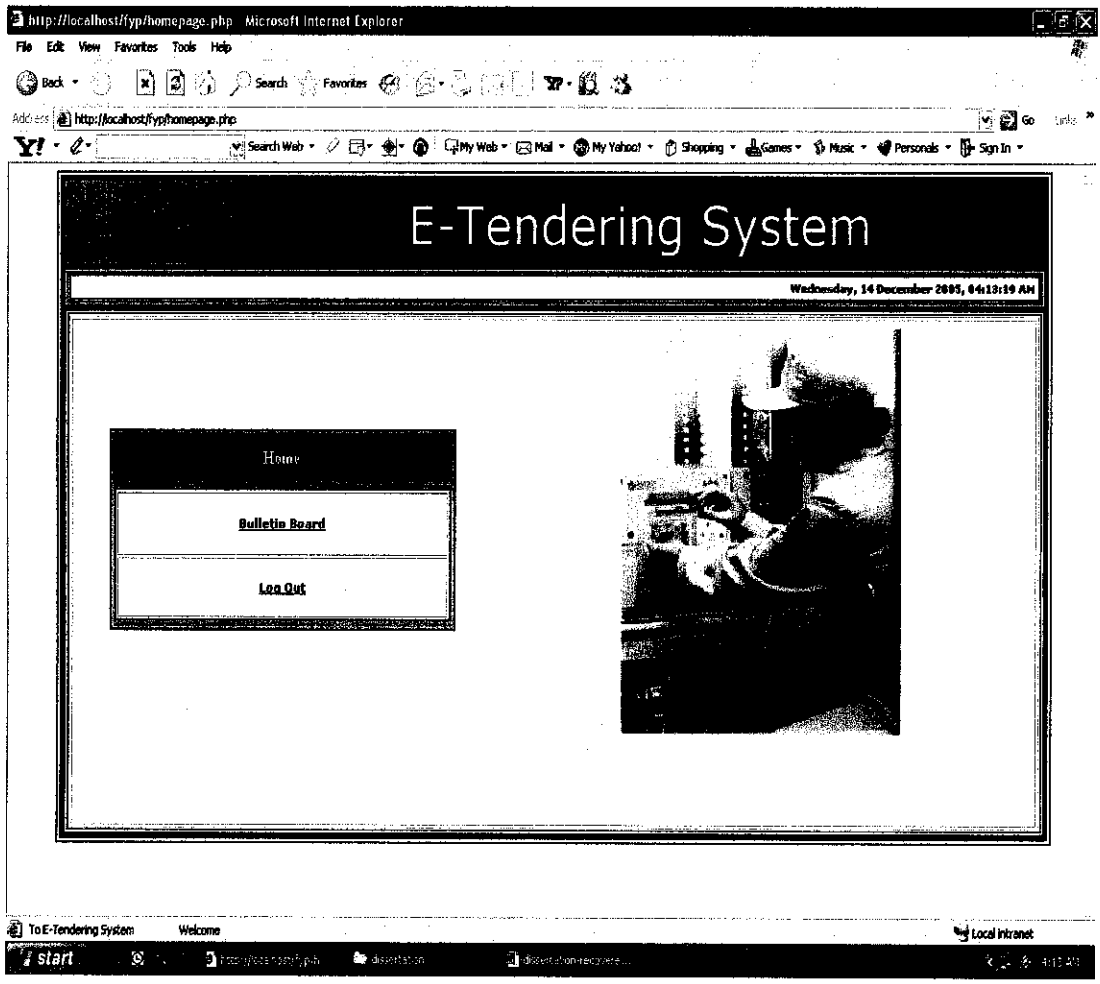


Figure 4: Home Page

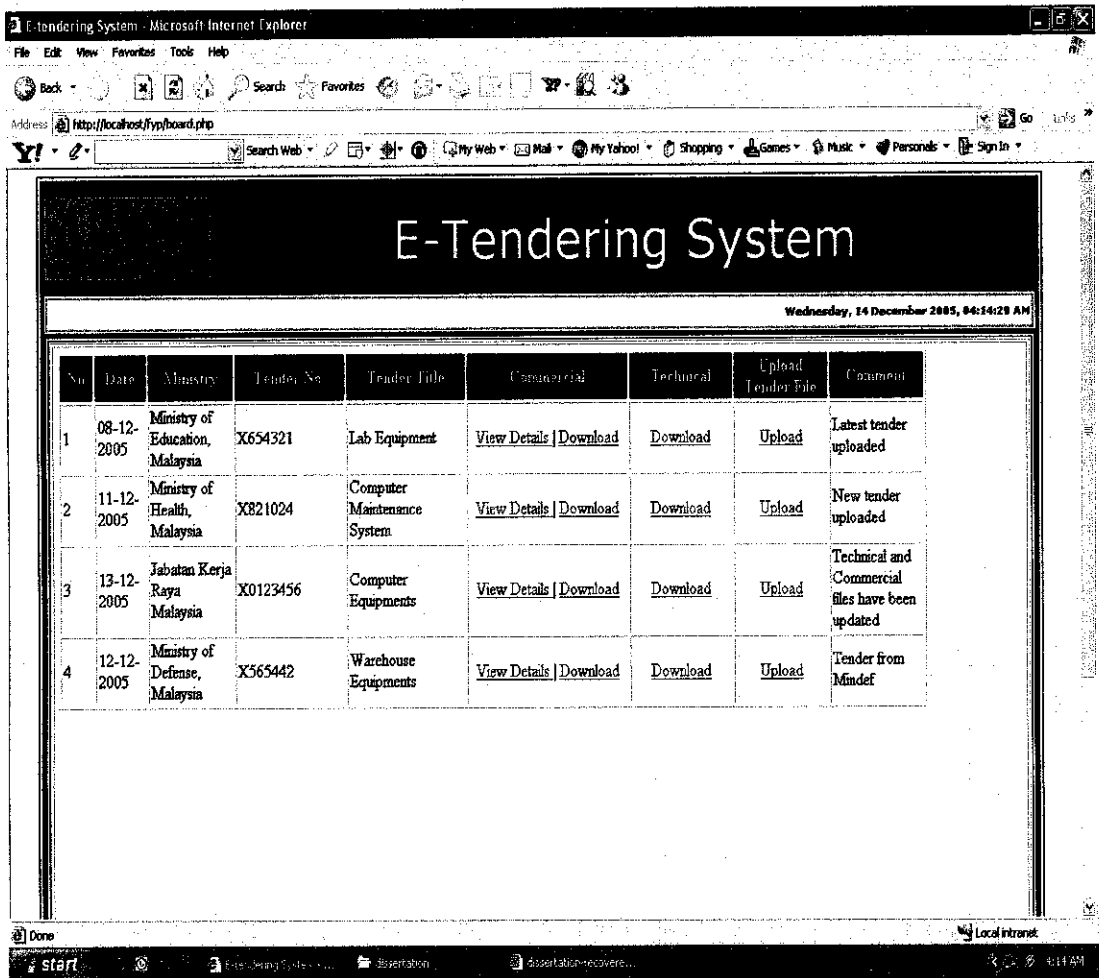


Figure 5: Bulletin Board Page

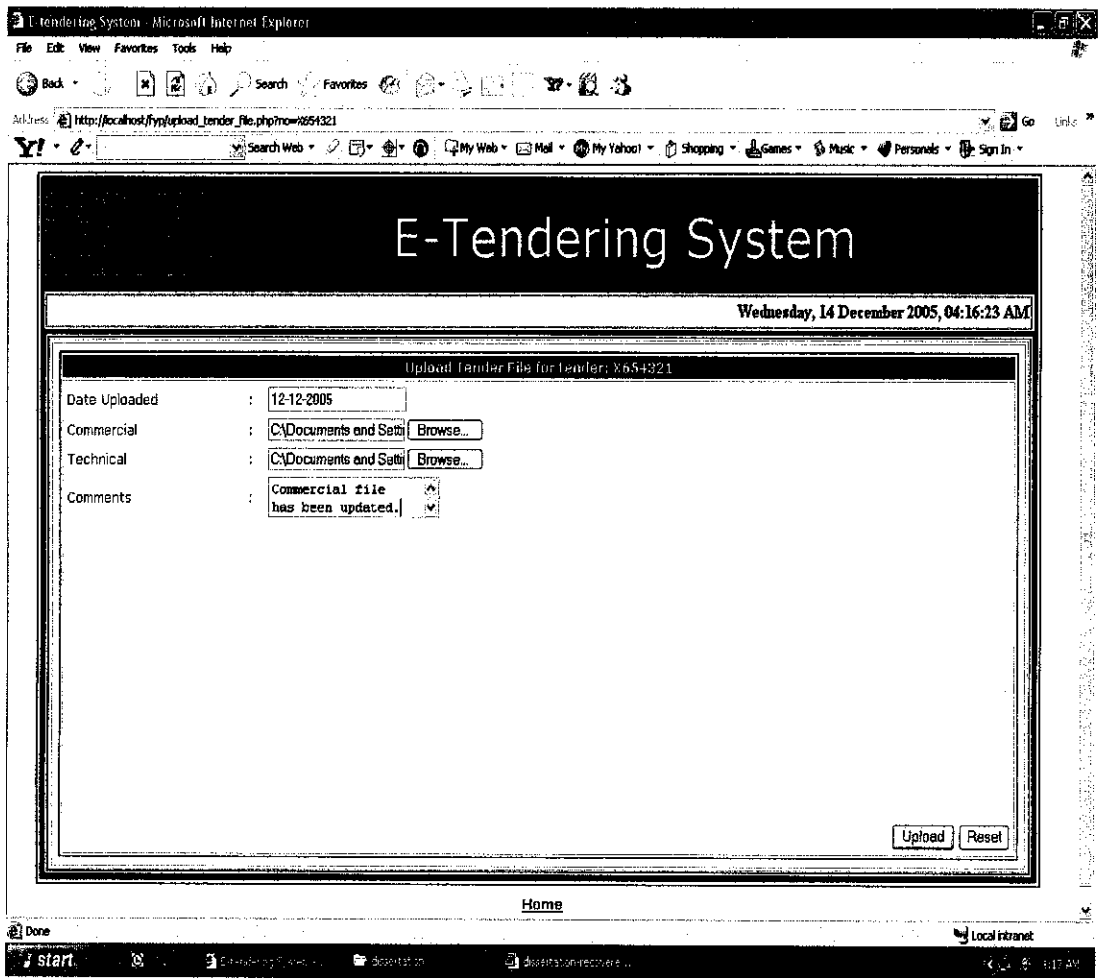


Figure 6: Upload Tender File Page

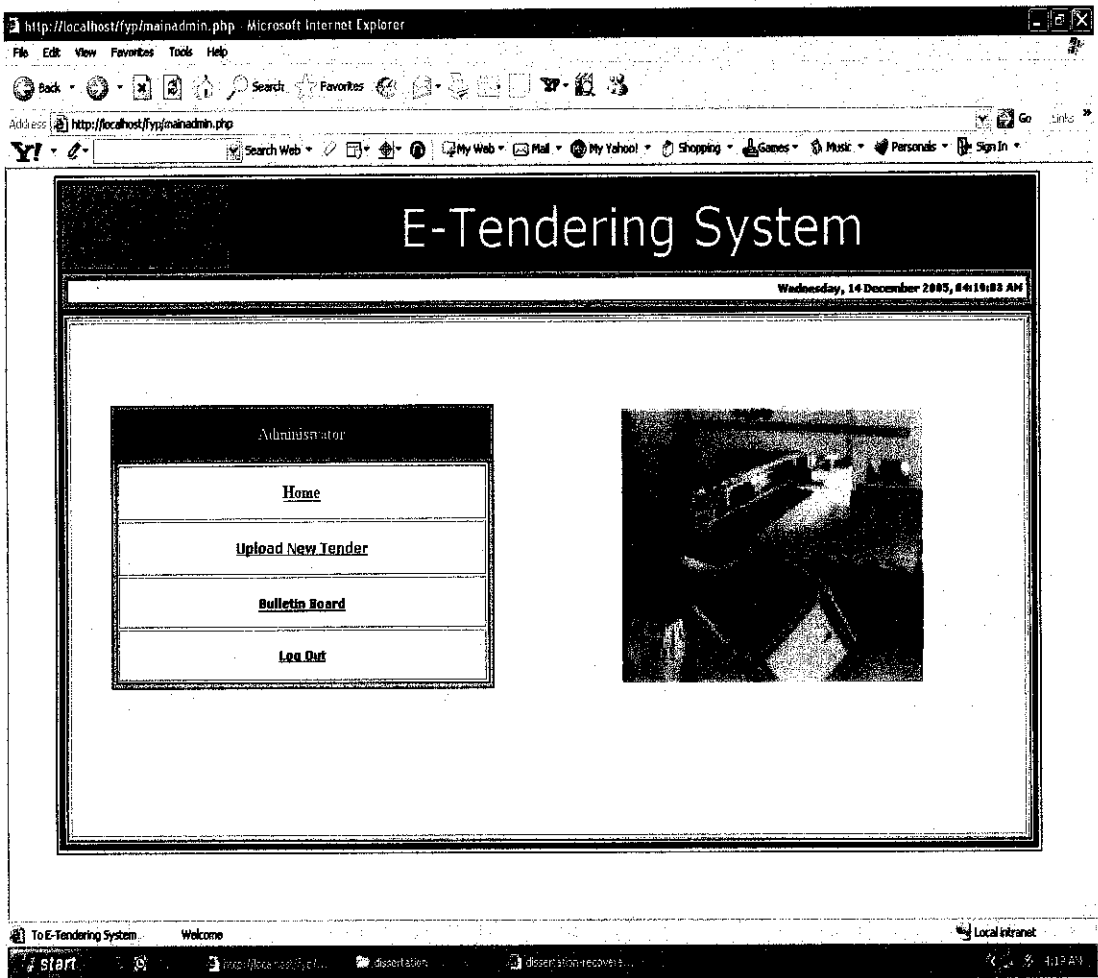


Figure 7: Administrator Main Page

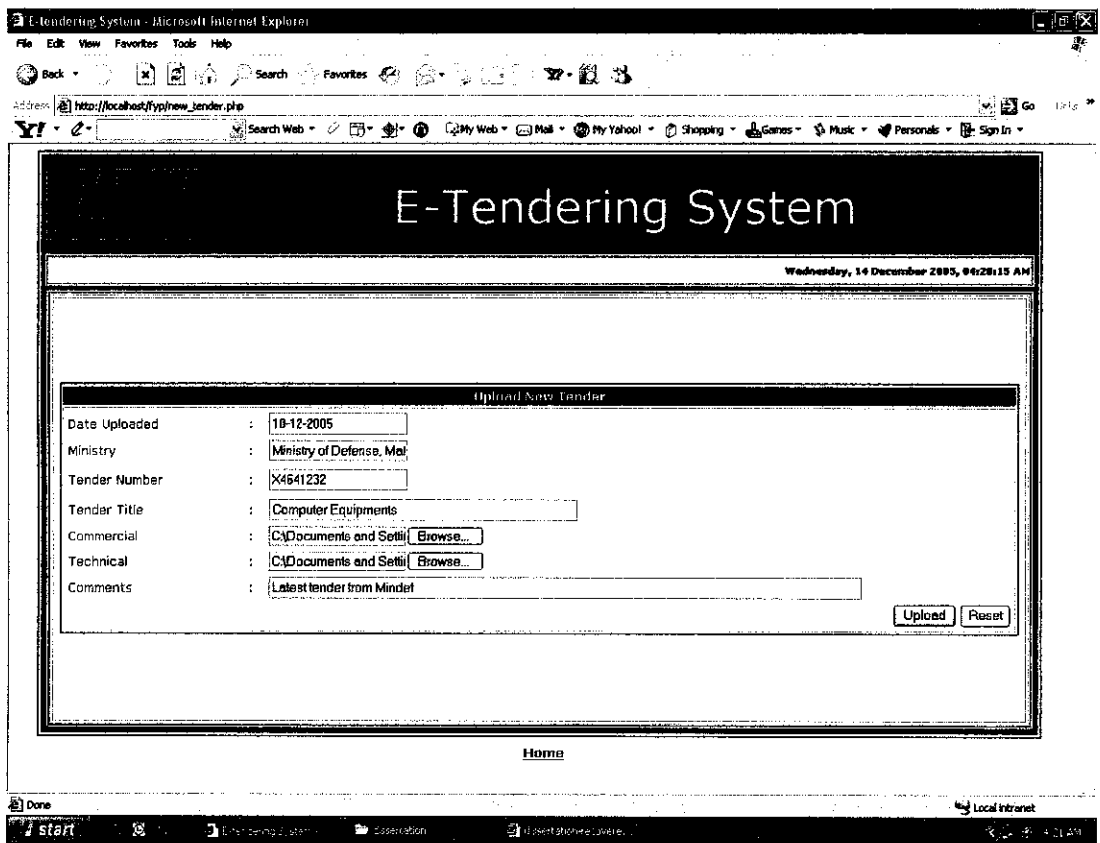


Figure 8: Upload New Tender Page

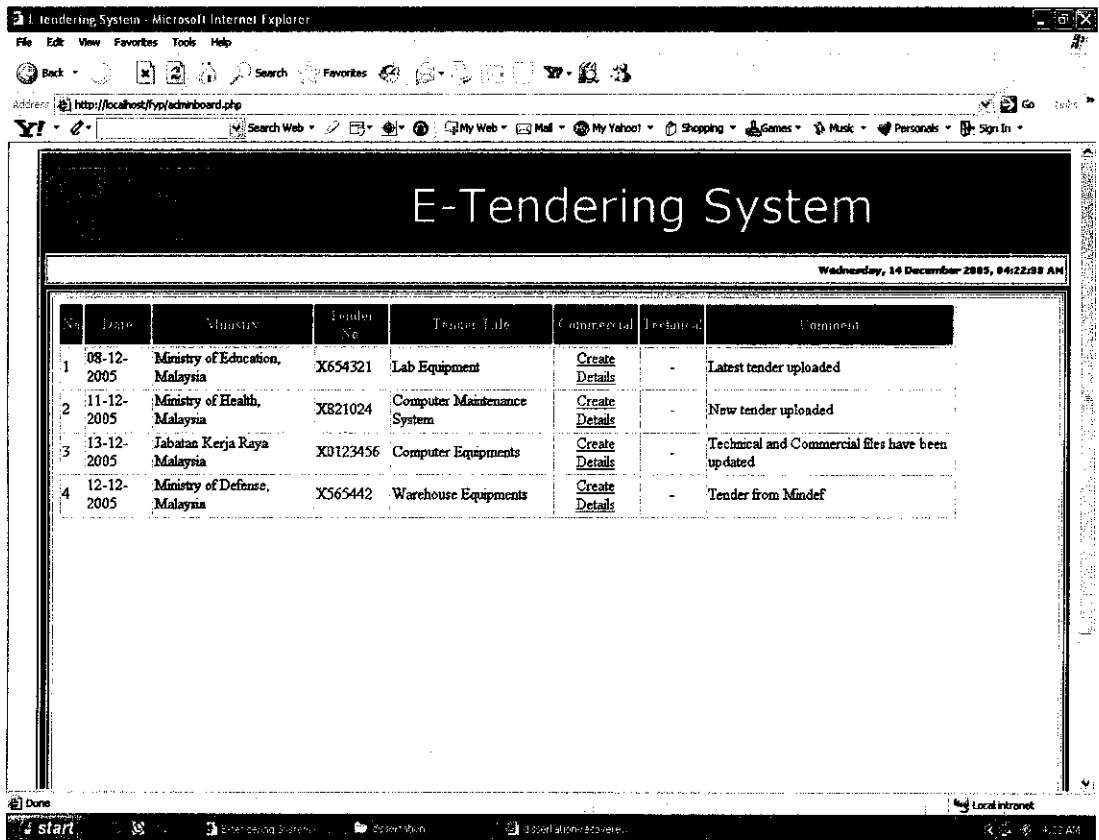


Figure 9: Administrator Bulletin Board

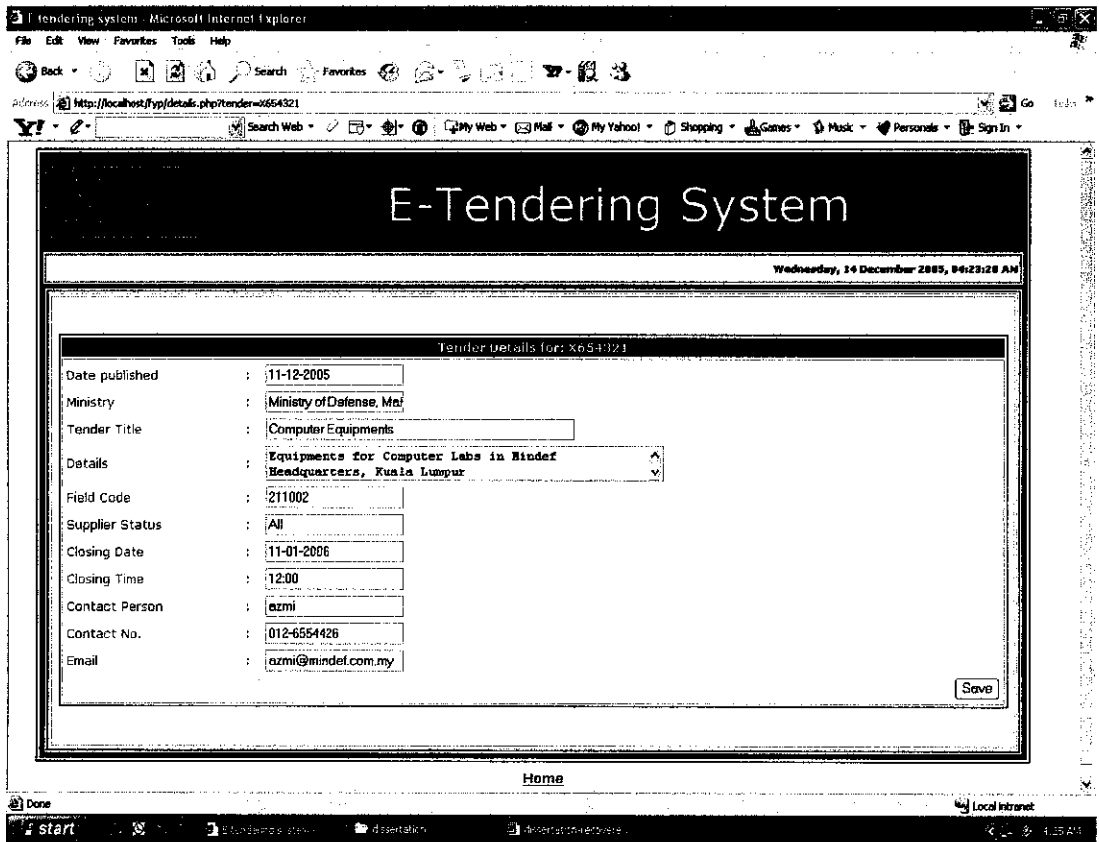


Figure 10: Create Tender Details Page