E-Vendors

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS TESIS

JUDUL: E-Vendors

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DECLARATION

I hereby declare that this project report entitled

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STUDENT : _____ Date : 25/8/2016

(CHONG KIT SHING)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of Computer Science (Software Development) With Honours.

SUPERVISOR : _____ Date : 25/8/16

(DATIN NURAZLINA BINTI MOHD SANUSI)

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ABSTRACT

This project involves the existing procedures that store and manage information of the company which has business deal with UTeM. This proposed system is to be named as E-Vendor that allows company to register an account to this system. This system will be used to gather the companies' information and the information will be validated by the bursars. Once the bursars from Bursary Office UTeM validate and approve the documents presented by company, the company can start dealing business with UTeM. The main objective of this project is to establish a web-based vendor information system. This project will use qualitative research approach. Interview is being used as technique to collect data from users. This project is expect to be used by company that wants to do business deal with UTeM to register their company via this system before starting to make business transaction with UTeM. The procedures to register the company itself and update its information using this system can be fast and efficient. The manual information update and document validation works can be eliminated and replaced by this proposed system which helps to improve the existing system.

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CHAPTER I

INTRODUCTION

1.1. Project Background

Universiti Teknikal Malaysia Melaka (UTeM) has a few online applications mainly for management usage. One of the online applications is E-Vendors. This existing E-Vendors is a part from Sistem Maklumat Kewangan Bersepadu or Integrated Financial Information System. This existing system is mainly use to record the information provided by company or supplier who has business deal with UTeM.

The existing E-Vendors is separated into two parts that the first part is using by company and the second part is using by staff from Bursary Office of UTeM. The first part of the existing E-Vendors is developed as a server side application where user can access this part of system via portal UTeM. It includes functions such as add new company information, view company information, print the validation form of registration of suppliers, display supplier payment status and record information about Goods and Services Tax (GST) number registration that provided by company.

The second part of the existing E-Vendors is developed as part of a client side application that combines with other subsystems. It can only be accessed via the client's computer. It has functions such as view and approves company information and generates report related to company information. In this case, UTeM prefers some of the client side applications evolve into web based system. This is because web- based system has advantages such as accessible everywhere and anytime and no installation of system is required.

Therefore, under the cooperation between Pusat Perkhidmatan Pengetahuan Dan Komunikasi (PPPK) and Fakulti Teknologi Maklumat dan Komunikasi (FTMK), the existing E-Vendors is requested by PPPK to be improvised into a fully web based system. PPPK hopes that the proposed system is easy to learn and use by the users after the improvisation. The proposed system is still named as E-Vendors.

The proposed E-Vendors is a web-based computerized system that gathers necessary data related to the company which has business deal with Universiti Teknikal Malaysia Melaka (UTeM). It combines the two parts of the existing E-Vendors into a web based system. This system will be developed using ASP.NET as markup language, VB.NET as programming language and MS SQL Server 2012 as backend to store information.The target users will be company or supplier and staff from Bursary Office of UTeM. This system will use systematic process and procedure to manage all information of the companies.

This proposed E-Vendors has enhancements and changes to make it different from the existing system. For instance, the new E-Vendors is using newer markup language which is Active Server Pages (ASP).NET for system development instead of using classic ASP which is a traditional markup language. Using newer markup

language makes the system always up-to-date and allows more of the usage of new features during system development.

The proposed E-Vendors allows company to register an account before accessing to this system. After company registered, the company is allowed to enter company's details into and the information will be validated by the bursars. Once the staffs from Bursary Office of UTeM validate and approve the documents presented by company, the company can start dealing business with UTeM.

The proposed E-Vendors has 5 main modules which are company registration, login, company information, approval and report. Company registration module allows company to register an account with Suruhanjaya Syarikat Malaysia or Companies Commission of Malaysia (SSM) ID. Login module is used to control different users' access to company information and prevent access from unauthorized users. Company information module is used to store company's details such as company name, registration number, email, address and others. Approval module allows bursar to approve company information and bursar has the right to view company information. For report module, it allows bursar to generate report related to specific company.

1.2. Problem Statements

In order to improvise an existing system, problems occurred when using the existing system must be state accurately. Solutions or further analysis can be made only if problems are found. There are some problems that occurred before using the proposed E-Vendors. These problems are derived from explanation by staffs from PPPK and Bursary Office of UTeM.

Firstly, this problem is occurred in the first separation part of the existing E-Vendors as mentioned earlier in introduction. This part of system is used for collecting

company information. Even though this part is developed as server side application, some company information such as commemorative certificate from SSM is collected manually.

In this condition, the staffs from Bursary Office of UTeM feel it is very time consuming to gather certain information from distant company. Manual method such as courier service or sending personally is still used to send company information to Bursary Office of UTeM. This inefficient way of collecting information is not only wasting the company's time but also delay the time for documents' approval by the staffs.

Secondly, it becomes a problem when update information is not available in the existing system. Sometimes the company makes mistake when adding new information into system. However, they are not able to update their information in the system because lacking of update function in the existing system. This condition may affect the business process in Bursary Office of UTeM.

Lastly, the second part of the existing system which is developed as part of a client side application is not accessible via Internet. This is one of the disadvantages of client side application which the operations only take place on the client's computer. The staffs from Bursary Office of UTeM are not able to access the data from remote places such as staff's home. This will be a problem when a user wants to retrieve information from distant places under an urgent condition.

1.3. Objectives

This project embarks on the following objectives:

1. To change the existing vendor information system from platform based to web based.
2. To allow user to update require info onto web based system.
3. To allow user to upload certificates onto web based system.
4. To send out notification email to users.

1.4. Scope

The target users for this project are staffs from Bursary Office UTeM and licensed company which the company must have incorporate number assigned by SSM. The licensed company is allowed to enter their company's details into the system and wait for approval by Bursary Office's staff in order to start their business deal with UTeM. This system is developed using Windows platform. This system will be developed using ASP.NET programming language and Microsoft SQL Server 2012 as backend to store information. The proposed system will cover the following modules.

1) Company Registration Module

This module is created to register new company. The function of this module is to allow company to register an account for login purpose.

2) Login Module

This module is created to control users' access by assigning different access rights to different types of users. The function of this module is to avoid unauthorized person to use the system. The registered company can login using their SSM Id and the bursar can login using their portal Id.

3) Company Information Module

The enhancement of this module is to record all necessary details provided by the company. The functions included are adding new company information, update, view and print company information. The company can upload their documents and submit all information for approval. An email will be sent to the bursar as notification for documents approval after the company submits the information. This module is mainly used by the registered company.

4) Approval Module

The enhancement of this module is to approve company's information and generate a new user id for the approved company. The functions of this module are sending new user id to approved company, view company information and update company information. This module is only used by bursars.

1.5. Project Significance

This system will ease the company by allowing them to upload important documents to system without the need to sending documents to Bursary Office of UTeM using courier service. The bursars can check and approve company information on website at anytime and anywhere.

1.6. Expected Output

This project is expect to be used by company that wants to do business deal with UTeM to register their company via this system before starting to make business transaction with UTeM. The procedures to register the company itself and update its information using this system can be fast and efficient. The manual information update and document validation works can be eliminated and replaced by this proposed system which helps to improve the existing system.

1.7. Conclusion of Chapter 1

This chapter contains the introduction for proposed E-Vendor system that gathers necessary data related to the company which has business deal with UTeM. The main objective of this project is to eliminate manual working procedures happened between the company and the Bursary Office UTeM. The background of the project will be discussed in next chapter which is Chapter 2 Literature Review and Project Methodology.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1. Introduction

This chapter discussed the facts and finding about the comparison of a few existing systems. The technique used to gather user requirements is also explained in this chapter. Project methodology selected to conduct this project and the project requirements that include software and hardware requirements will be discussed. Project schedule and milestones will be prepared to show the activities to be executed in each stage.

2.2. Facts and Findings

The general knowledge about the project domain will be explained. The approaches, hardware and software used in past research will be identified.

2.2.1. Domain

The Internet, Intranets, Extranets, and the World Wide Web grow rapidly and impact significantly on many fields such as business, industry, banking and finance, commerce, education, government and entertainment sectors, and personal and working

life. The Internet and Web become platforms where many legacy information and database systems are being migrated to.

The domain of this project is web-based information system which uses Internet web technologies to deliver information or service to users or other information systems/applications. This system contains information technologies such as servers, web-server software (Active Server Pages) and code-written that used for the web-server. The web-based information can be received and read without location and time constraints. This system helps the bursars to manage company information and let them to have access to company information whenever and wherever they need.

Besides the advantage that a web-based system allows easy access to information, it is important to take attention to usability of a Web system design. User-friendly Web-based systems usually need to provide easy navigation, automated web control, attractive design and useful function to users.

The proposed system is designed to be easily access at everywhere and user-friendly to the users of the system.

2.2.2. Existing System

This project proposed a web-based information system which improved the existing system, E-Vendors. The existing system is mainly use to record the information provided by company or supplier who has business deal with UTeM.

Basically, the existing E-Vendors is separated into two parts that the first part is using by company and the second part is using by staff from Bursary Office of UTeM.

The first part of the existing E-Vendors is developed as a server side application where user can access this part of system via portal UTeM. It includes functions such as add new company information, view company information, print the validation form of registration of suppliers, display supplier payment status and record information about Goods and Services Tax (GST) number registration that provided by company.

The *second* part of the existing E-Vendors is developed as part of a client side application that combines with other subsystems which are not related to E-Vendors system. It can only be accessed via the client's computer. It has functions such as view and approves company information and generates report related to company information. In this case, UTeM prefers some of the client side applications evolve into web based system. This is because web-based system has advantages such as accessible everywhere and anytime and no installation of system is required.

The existing E-Vendors is developed using classic ASP, a markup language and VBScript, a scripting language. MS SQL Server is used as backend to store server side information collected using existing E-Vendors. A web server located in UTeM is used to store information collected from the client side application as mentioned above.

The existing E-Vendors has been used for years. Some parts of system need to be changed and enhanced as Web technology grows rapidly. The part of E-Vendors developed on client side need to migrate to Web environment for better access. Programming language that classic ASP used is VBScript. This VBScript is a scripting language used to develop the existing E-Vendors and it is considered obsolete.

In this case, using an old scripting language, VBScript and deprecated markup language, classic ASP in development is risky. This is because there may be no more

platforms to run program developed using traditional programming language or no platform that support outdated web features. Poor user interface design of existing E-Vendors system led to complains from users. The existing E-Vendors has not achieve the usability because of user control is design badly. The design of web user interface control for web-based system should be concerned.

2.2.3. Technique

The technique used for data collection in this project is unstructured interviews. The unstructured interviews are qualitative research method. Unstructured interviews are interview that the interviewer wants to discover about a particular topic without thinking interview structure or expect how the interview will proceed.

The unstructured interview is useful when asking the interviewee about user experience. It helps in discovering extra important information that seems irrelevant before the interview. It also allows the interviewer to ask questions from the perspective of interviewees. The interview makes interviewees feel comfortable under informal environment and it is more like everyday conversation without tension.

There are two interviewees participated in this project. The interview takes place at meeting room in PPPK and Bursary Office of UTeM. The interviewees are being interviewed in a few weeks after this project has started. The researcher started the discussion with one or two questions and design continuous questions according to interviewees' previous reactions. Question such as "What is the business processes involved in this project?" is asked to interviewees in order to understand the flow of business. Useful data are collected during interview sessions throughout this project.

2.3. Project Methodology

This project implements Rapid application development (RAD) methodology. As the project progresses, RAD approaches emphasize the necessity of adjusting requirements in reaction to knowledge gained. This causes RAD to use prototypes that act like a desired product or system. RAD approaches allow flexible process to adapt as the project evolves or requirement changes instead of defining specifications rigorously and plans correctly from the start.

In this project, the system is believed to be developed in higher quality through re-use of software components and design and gather requirements using interview with less formality communication. RAD usually includes object-oriented programming (OOP) methodology. Visual Basic(VB).NET used for this project development is one of the object-oriented programming languages which offered in visual programming packages that provide rapid application development.

Using prototype in development has several advantages compare to traditional specifications. The advantages include risk reduction, quick feedback regarding requirements from users and increase reusability of software components. A prototype could find possible most difficult parts to develop early in the life cycle. This helps to reduce time for system implementation when system design is feasible. Users' involvement during analysis, design and development stages helps in providing faster feedback on what they require the system to do and able to know how the users react to the working prototype.

There are four phases in RAD methodology which are requirements planning phase, user design phase, construction phase and cutover phase. This approach relies heavily on user involvement and prototyping. Hence, the iterative process is happened

continuously until the system development is complete and the users are satisfied. Figure 1 shows four phases in RAD methodology.

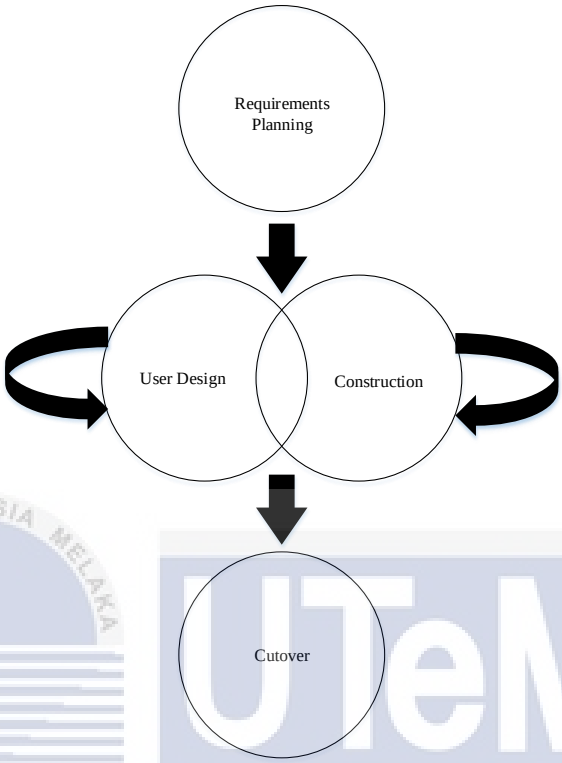

Figure 1: Four phases in RAD methodology

During requirements planning phase, approval to start creating prototype is needed after the users and the developer achieve consensus on project scope and system requirements. In user design phase, the developer needs to interact with users to build a prototype. Feedbacks are given when the users react to the working prototype. The developer adapts the changes on requirements and makes corrections on prototype.

At the same time, as user design phase is going on, the construction phase is proceeding as well with system development. Unit, integration and system testing are performed as the development is carry on. Lastly in cutover phase, the developer performed data conversion, full scale testing on system and provide user training to system users.

2.4. Project Requirements

For the project implementation, there are certain software and hardware requirements that have been identified to assist efficiently in project development.

2.4.1. Software Requirement

Software that is being used during the development stage is as shown in *Table 1*.

No.	Software
1.	Windows 8 Operating System
2.	Microsoft Visual Studio Ultimate 2012
3.	Microsoft SQL Server 2012 (MSSQL Server 2012)
4.	Microsoft Visio 2013
5.	Microsoft Word (for documentation)

Table 1: Software Requirement

2.4.2. Hardware Requirement

Hardware that is being used during the development stage is as shown in *Table 2*.

No.	Hardware	Description
1.	Laptop	Unit used during the development stage that will run the software listed.

Table 2: Hardware Requirement

2.4.3. Other Requirements

- A discussion room (for discussion with system user)

2.5. Project Schedule and Milestones

The flowchart below shows the flow of activities from planning to implementation stage throughout the system development. The schedule shows total time requires to complete this project is in 14 weeks.

No	Activity	Week														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Proposal PSM : Submission & Presentation															
	Proposal assessment and verification															
2	Proposal Correction/Improvement Chapter 1															
	List of supervisor/title															
3	Chapter 1(System Development Begins)															
4	Chapter 1 & Chapter 2															
5	Chapter 2															
6	Chapter 2 Chapter 3															
	Student Status															
7	Project Demo & Chapter 3 Chapter 4															
8	Mid Semester Break															
9	Project Demo & Chapter 4															
10	Project Demo & Chapter 4															
	Student Status															
11	Project Demo															
	Determination of student status(Continue/Withdraw)															
12	Project Demo & PSM Report															
13	Project Demo & PSM Report															
	Presentation Schedule															
14	Project Demo & PSM Report															
15	Final Presentation															

16	REVISION WEEK Correction draft report based on supervisor's and evaluator's comments during the final presentation session. Submission overall marks to PSM/PD committee.															

Table 3: Project Schedule

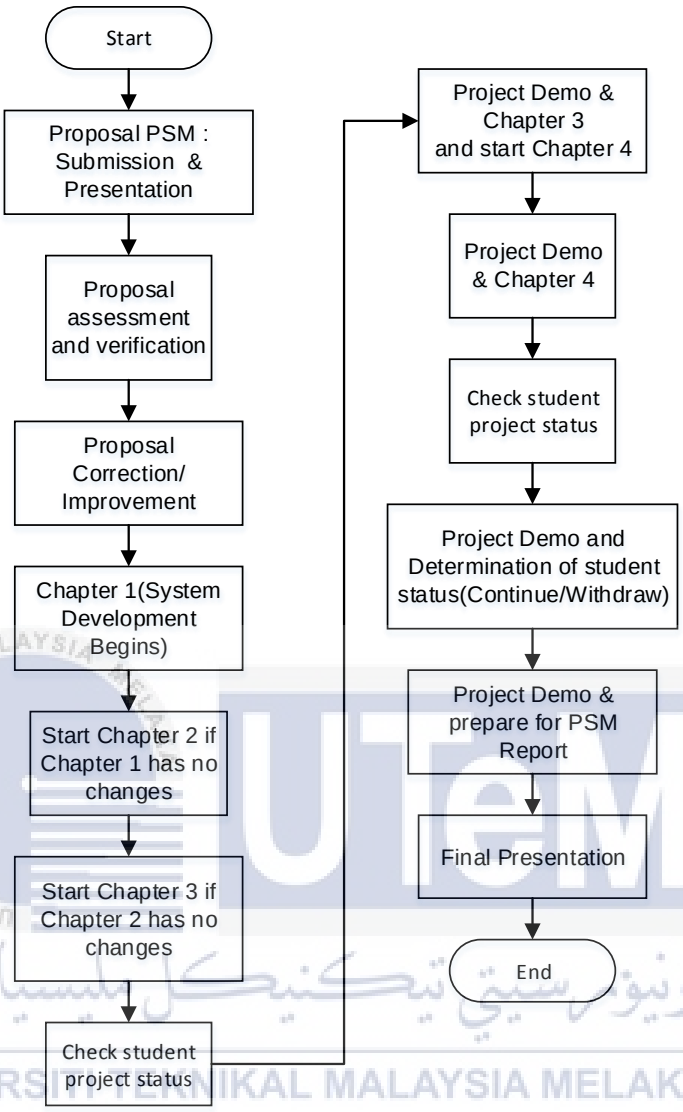

Figure 2: Project Milestone

2.6. Conclusion of Chapter 2

This chapter explains the background for existing E-Vendor system. The domain of this project is discussed. The methodology used in this project is RAD which relies more on prototyping and users involvement. Project requirements include software, hardware and other requirements are listed. The analysis for both existing and proposed system will be discussed in next chapter which is Chapter 3 Analysis.

CHAPTER III

ANALYSIS

3.1. Introduction

This chapter will analyze the current system and the proposed system. Problem of the current system is analyzed and the flow of system is described using diagrams. The requirement analysis includes data requirement, functional requirement, non-functional requirement and other requirements such as software and hardware requirements.

3.2. Problem Analysis

The existing system, E-Vendor is web based information system that collects and stores licensed company information for UTeM Bursary Office's approval before the company starts business deal with UTeM. The existing system has the basic function included registration, login, add company information and view company information.

Table 4 shows comparison between existing E-Vendors and proposed E-Vendors systems based on the system functionalities. There are ten functionalities including register function, login function, add new company information function, upload files

function, update company information function, view company information function, print company information function, approve company information function and generate PDF file function.

Systems / Functionalities	Existing system (E-Vendors)	Proposed system (new E-Vendors)
Register	✓	✓
Login	✓	✓
Add new company information	✓	✓
Upload files		✓
Update company information		✓
View company information	✓	✓
Print company information	✓	✓
Approve company information	✓	✓
Generate PDF file		✓

Table 4: Comparison between existing E-Vendors and proposed E-Vendors systems

In order to improvise an existing system, problems needs to be identified and analysed to come up with best solution. There are some problems that occurred when using the existing E-Vendors. These problems are derived from explanation by staffs from PPPK and Bursary Office of UTeM.

Firstly, this problem is occurred within the initial separation part of the existing E-Vendors as mentioned earlier in introduction. This part of system is used for grouping company data. Despite the fact that this half is developed as server side application, some company data like ceremony certificate from SSM is collected manually.

This makes the staffs from Bursary Office of UTeM feel very time consuming to gather certain information from distant company. Manual method such as courier service or sending personally is still used to send company information to Bursary Office of UTeM. This inefficient way of collecting information is not only wasting the company's time but also delay the time for documents' approval by the staffs.

Secondly, update information function is not available in the existing system. Sometimes the company makes mistake when adding new information into system. However, they are not able to update their information in the system because lacking of update function in the existing system. This condition may affect the business process in Bursary Office of UTeM.

Lastly, the client side application of the existing E-Vendors is not accessible via Internet. This is one of the disadvantages of client side application which the operations only take place on the client's computer. This limits the staffs of Bursary Office of UTeM from accessing the data at anytime and anywhere. Hence, this becomes a problem when a user wants to retrieve information from distant places under an urgent condition.

3.3. Requirement analysis

The purpose of doing requirements analysis for this project is to determine user expectations or gather the software requirements from users for proposed system. These requirements collected must be relevant and detailed. Such requirements are often called functional specifications in software engineering. At this stage, there are only 3 out of total 4 modules will be discussed. This is because the requirements are not fully obtained from system user.

At second stage of project development, all modules are completed after fully obtained requirements from system user.

3.3.1. Data Requirement

Inputs:

1- Company information (defined by company)

Type of Information	**Reference to Database Entity**
Login information	login entity
Suruhanjaya Syarikat Malaysia (SSM) information	syarikat_maklumat entity
Goods and Services Tax (GST) information	syarikat_maklumat entity
Kementarian Kewangan Malaysia (KKM) information	maklumat_kkm entity
Pusat Khidmat Kontraktor (PKK) information	maklumat_pkk entity
Lembaga Pembangunan Industri Pembinaan Awam (CIDB) information	maklumat_cidb entity
Business sector information	bidang_perniagaan entity
Business branch information	maklumat_cawangan entity
Grade of CIDB information	gred_CIDB entity
Declaration of information	maklumat_akuan entity

Table 5: Input: Company information

2- Approval information (defined by bursar)

Type of Information	**Reference to Database Entity**
Login information	bendahari_login entity
Status information	maklumat_akuan entity

Table 6: Input: Approval information

3- Database information (defined by developer)

Type of Information	Reference to Database Entity
State information	negeri entity
Country information	negara entity
Bank information	bank entity
Sector information	bidang entity
Grade information	gred entity
Category information	kategori entity
Sub Category information	subkategori entity
Bumiputera information	bumiputera entity

Table 7: Input: Database information

Outputs:

1- Screen outputs

Approximately, the system has 10 screen outputs. For example, login or company information.

2- PDF files

Company can download PDF files that consist of company information as a proof of submission.

3.3.2. Functional Requirement

The system provides different functionalities depend on user categories. At this stage, the functional requirements are described according to only one user group as shown below.

User group: Company

The rights assigned to company are explained in descriptions.

Requirement ID	Functional Requirement	Descriptions
FRC001	User registration	The system shall require company to register to the system. There is a condition where the company must be a licensed company that has registered to SSM and obtained an incorporate number (SSM Id) assigned by SSM.
FRC002	Login and logout	After registration succeeds, the system shall allow the company to login to the system using SSM Id.
FRC003		The system shall verify the valid user ID and password for company and bursar.
FRC004	Add company information	The system shall allow company to add new company information into the system.
FRC005		The system shall allow company to upload documents such as Perakuan Pembekal Pendaftaran Syarikat and Sijil Suruhanjaya Syarikat Malaysia (SSM) for approval.
FRC006		The system shall allow company to save new company information into the system.
FRC007	Send notification email and update company status	The system shall allow company to send notification email to Bursary Office of UTeM via system during information submission.
FRC008		The system shall update company status after information submission.
FRC009	Update company	The system shall allow company to update

	information	company information and send notification email to Bursary Office of UTeM to approve the updated information.
FRC0010	View company information	The system shall allow company to view company.
FRC0011	Print company information	The system shall allow company to print the company information.

Table 8: Functional requirements for company

User group: Bursar

The rights assigned to bursar are explained in descriptions.

Requirement ID	**Functional Requirement**	**Descriptions**
FRB001	Login and logout	The system shall require bursar to login to the system. All bursars use their staff id as user id and have their own password to access the system.
FRB002	View company information	The system shall allow bursar to view all companies' information.
FRB003	Update company information	The system shall allow bursar to update any of the company information.
FRB004	Approve and disapprove company information	The system shall allow bursar to approve or disapprove company information.
FRB005	Send notification email and update company status	The system shall allow bursar send notification email to company via system when approval or disapproval of company information is made.
FRB006		The system shall update company status after approval or disapproval of company

		information is made.

Table 9: Functional requirements for bursar

3.3.2.1 Use Case Diagram

A use case diagram as shown in figure represents the users' interaction with the system. There are two actors which are company and bursar that interact to ten use cases.

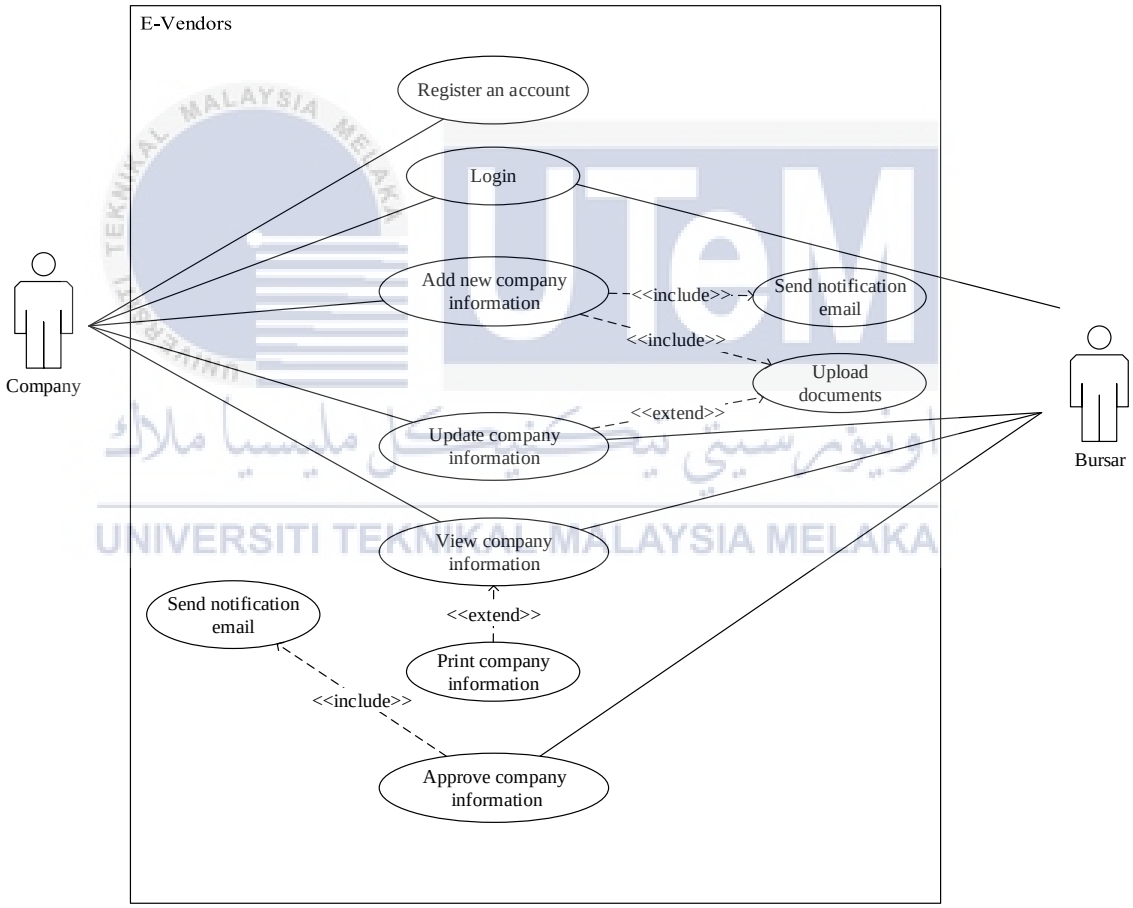

Figure 3: Use case diagram

3.3.2.2 Activity Diagram

1) Registration Module : Registration Activity for Company

The following figure 4 shows an activity diagram of registration module for company:

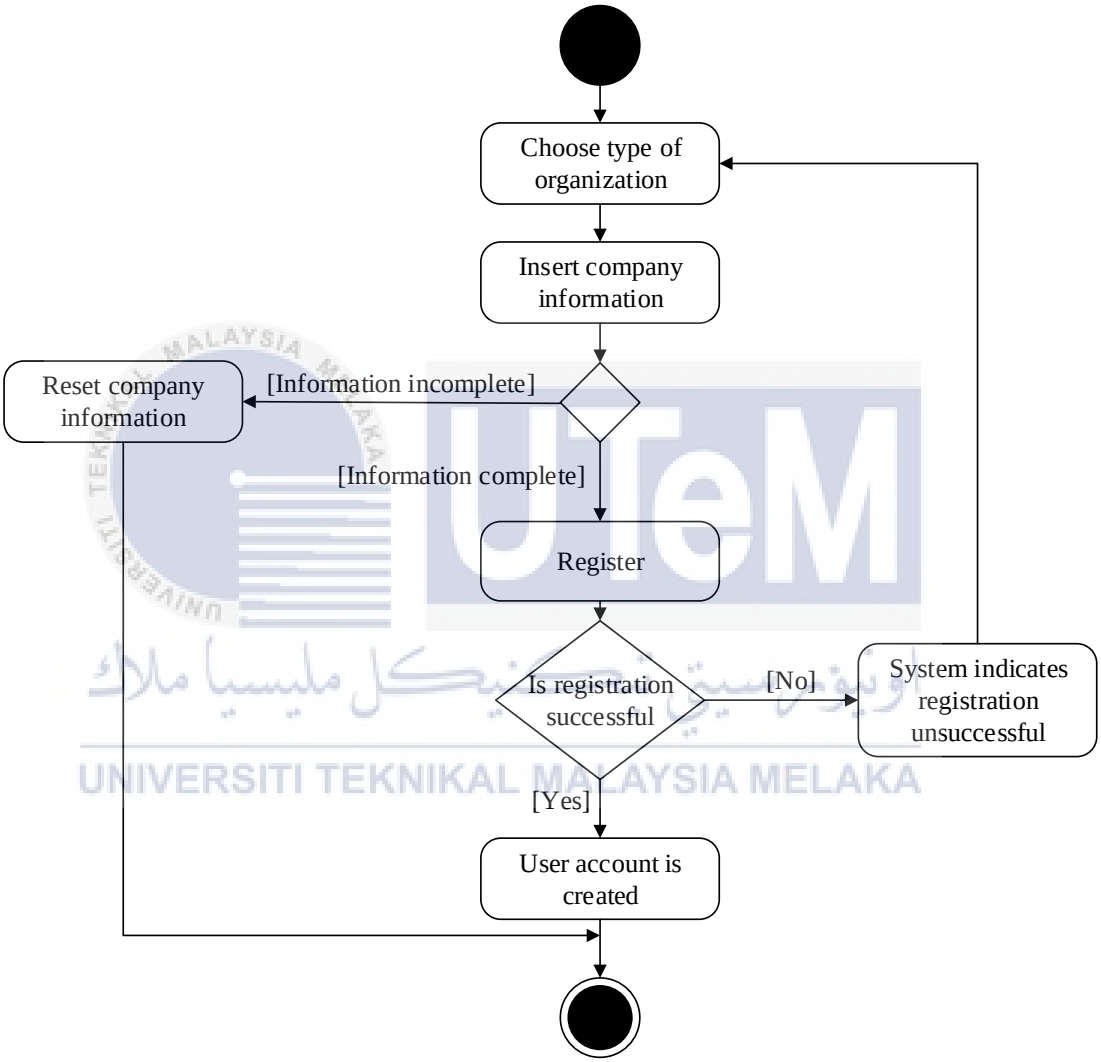

Figure 4: Activity diagram of registration module for company

2) Login Module : Login Activity for Company

The following figure shows an activity diagram of login module for company:

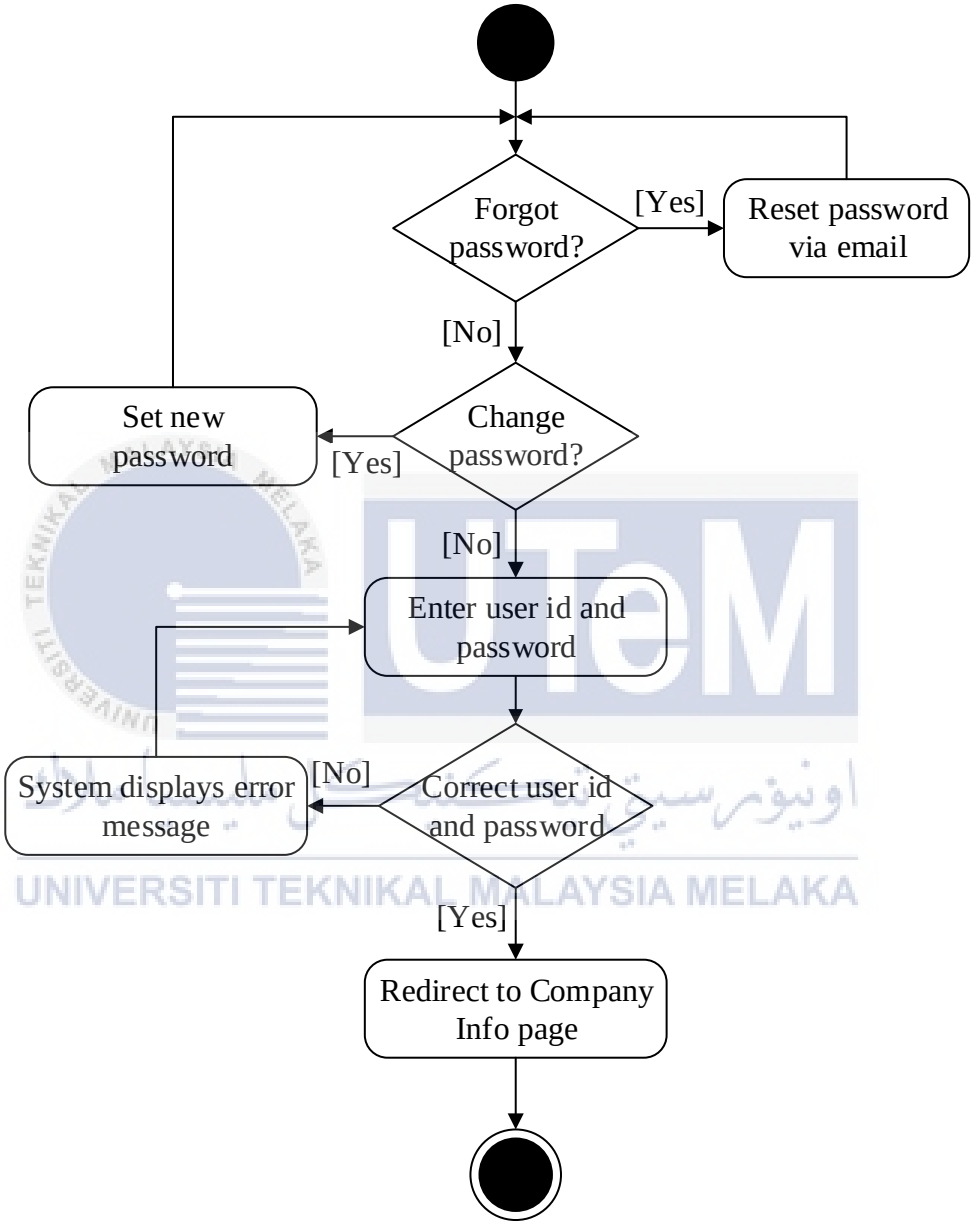

Figure 5: Activity diagram of login module for company

Login Module : Login Activity for Bursar

The following figure shows an activity diagram of login module for bursar:

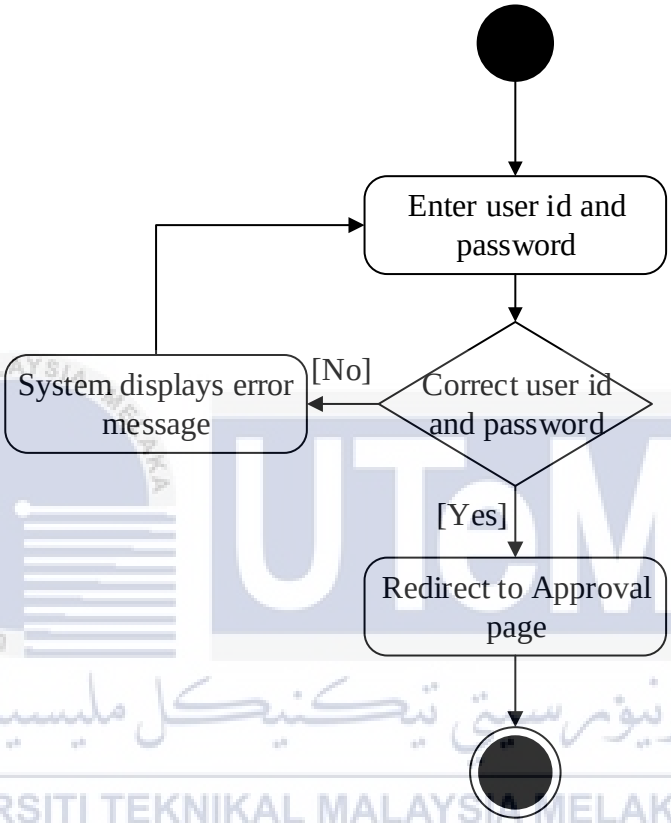

Figure 6: Activity diagram of login module for bursar

3) Company Information Module : Add New Company Information Activity for Company

The following figure shows an activity diagram of company information module for company:

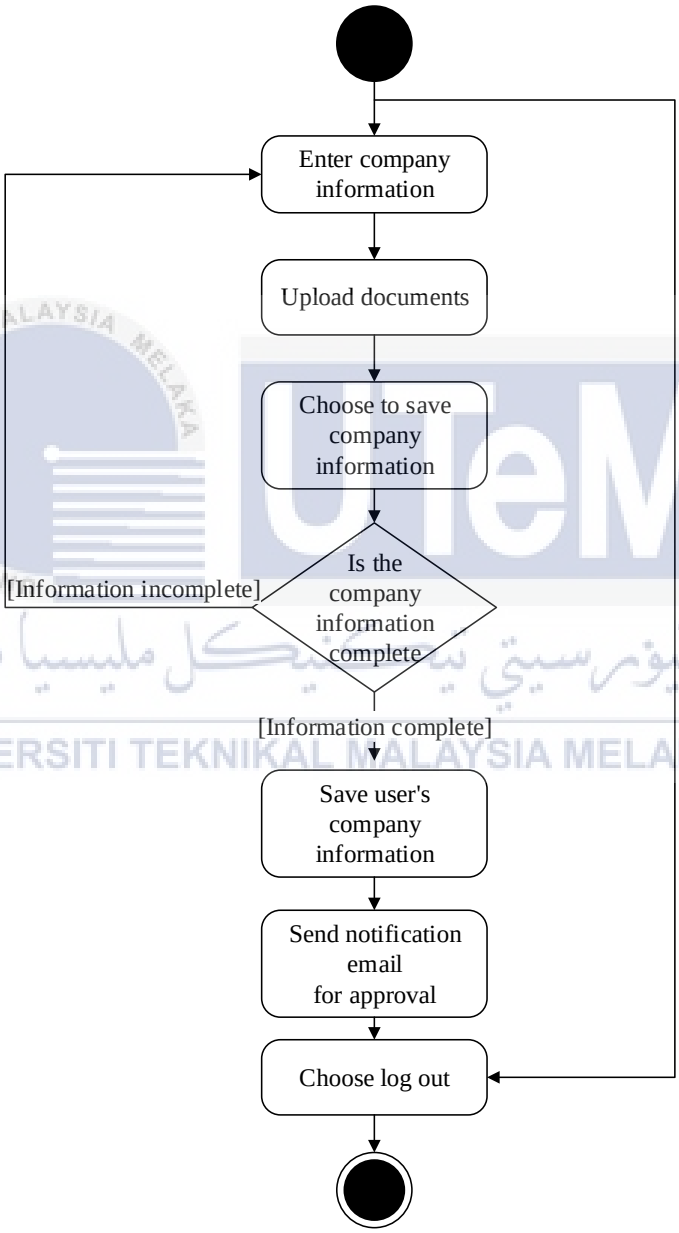

Figure 7: Activity diagram of company information module for company

Company Information Module : View Company Information Activity for Company

The following figure shows an activity diagram of company information module for company:

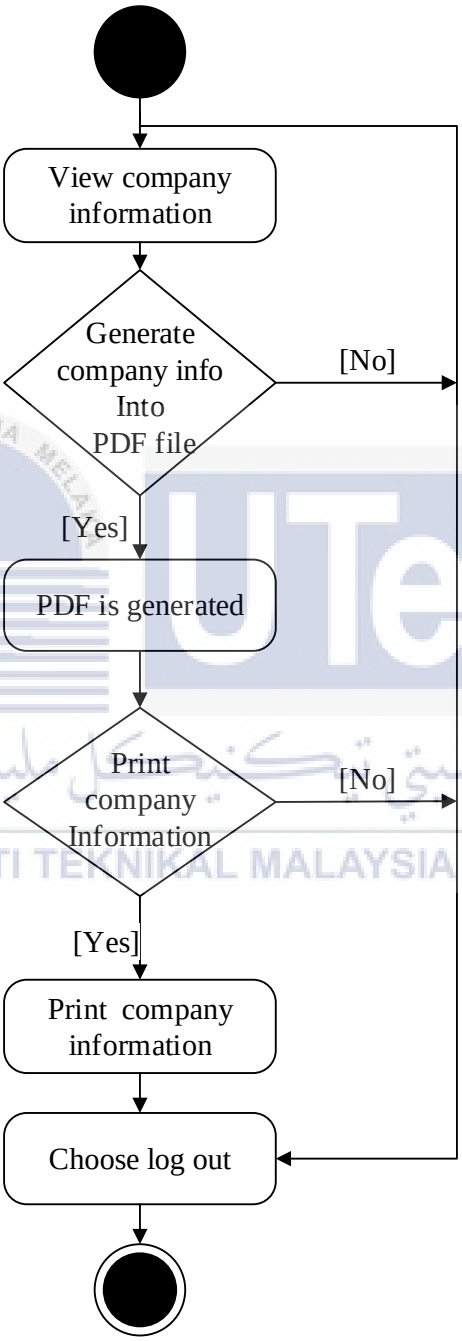

Figure 8: Activity diagram of company information module for company

4) Approval Module : Approve Company Information Activity for Bursar

The following figure shows an activity diagram of approval module for bursar:

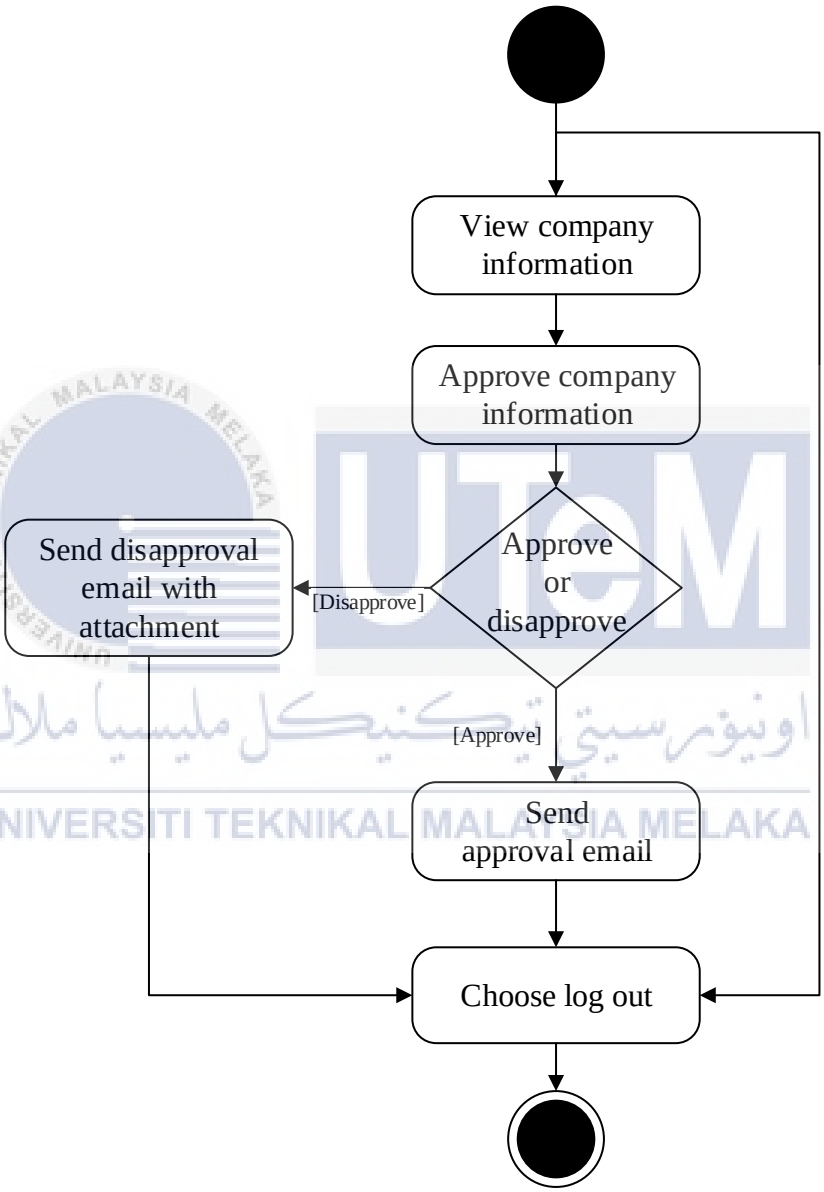

Figure 9: Activity diagram of approval module for bursar

Approval Module : View and Update Company Information Activity for Bursar

The following figure shows an activity diagram of approval module for bursar:

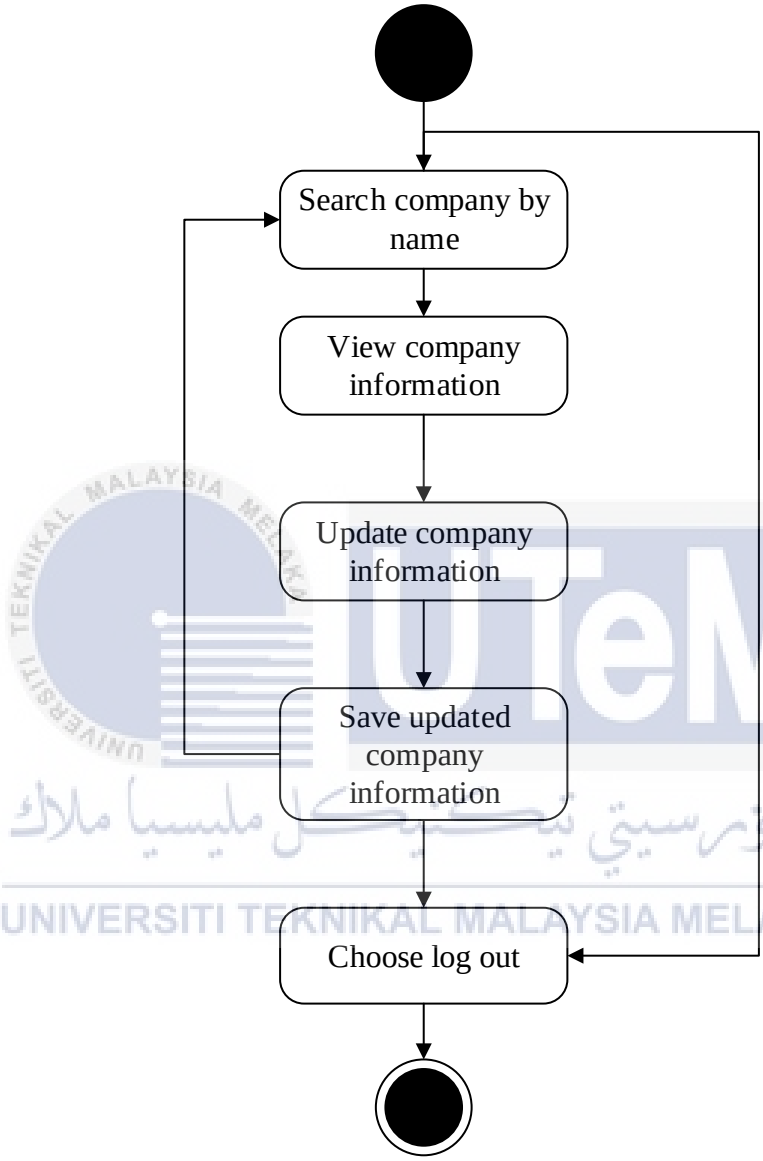

Figure 10: Activity diagram of approval module for bursar

3.3.3. Non-functional Requirement

Non-functional requirements are attributes used to judge the operation of a system, instead of system functionalities. Such requirements are usually not point out by stakeholders and need to be draw out by the developer. Non-functional requirements that applied in this project are shown in Table 10 below.

Requirement ID	Non-Functional Requirement Category	Descriptions
NFRB001	Usability	The system shall allow novice users to operate it with little or no training.
NFRB002	Security	Only authorized users shall be permitted to access company information.
NFRB003	Portability	This system shall allow users to access it from various web browsers.

Table 10: Non-Functional Requirements

3.3.4. Others Requirement

Please refer **section 2.4.1** for software requirements, **section 2.4.2** for hardware requirements and **section 2.4.3** for other requirements applied in this project.

3.4. Conclusion

This chapter discussed the problem found while using the existing E-Vendor system. Analyzed are made to come up a solution and enhance the existing E-Vendors. Functional requirements are defined for two user groups based on four out of total five modules. This is because the requirements are not fully obtained from system users. These requirements are visualized using use case and activity diagram. Non-functional requirements in this project are also described. The architecture design of proposed system will be discussed in next chapter which is Chapter 4 Design.

CHAPTER IV

DESIGN

4.1. Introduction

This chapter will give an overview of the proposed E-Vendors. High level design of the proposed system is visualized through modeling tool. Design of user interface of proposed system is refined and database design is shown in following section.

4.2. High-Level Design

This section explains the architecture used for developing the proposed system. The architecture diagram provides an overview of an entire system, main components that would be developed for proposed system and its interfaces are identified.

The Figure 11 shows a simplified class diagram which has a controller (E-Vendors System), four boundaries (Home.aspx, Login.aspx, Company_Info.aspx, Approval.aspx) and ten entities (login, bendahari_login, syarikat_maklumat, maklumat_kkm, maklumat_pkk, maklumat_cidb, bidang_perniagaan, gred_CIDB, maklumat_cawangan, maklumat_akuan).

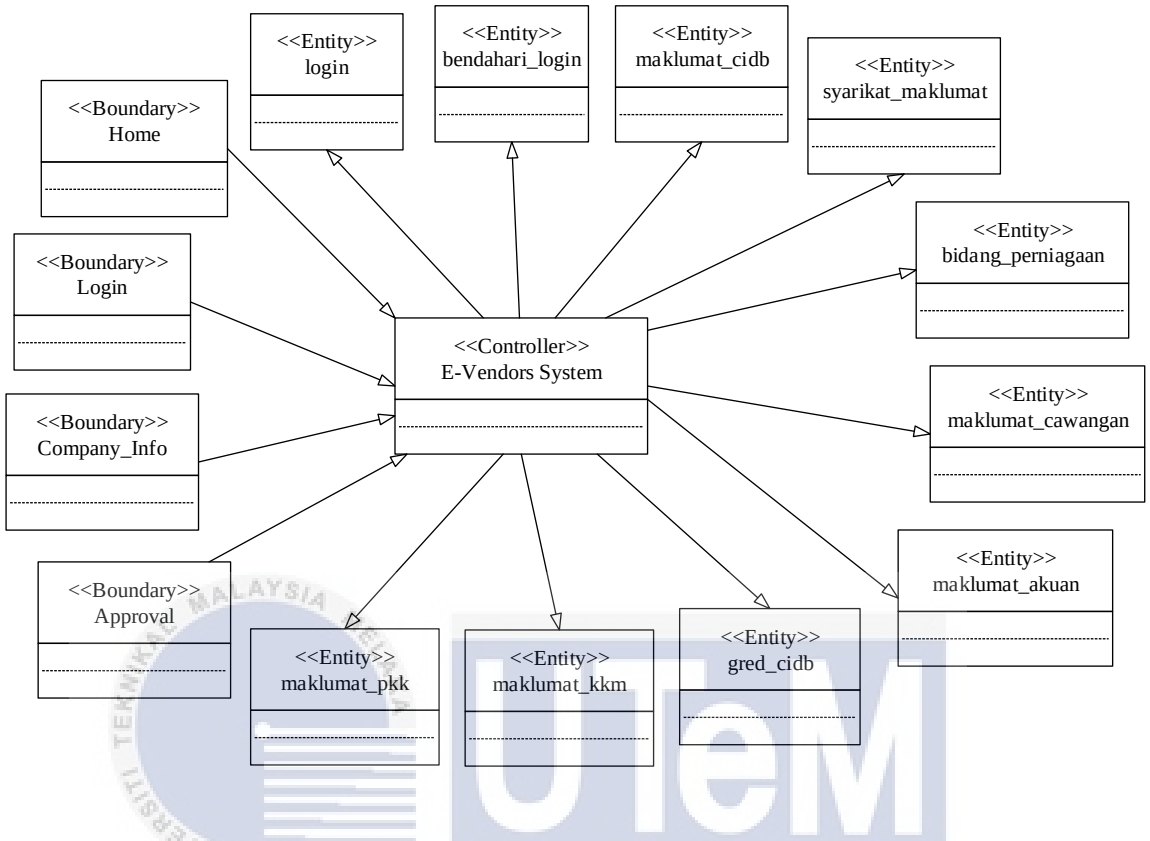

Figure 11: Simplified class diagram

4.2.1. System Architecture

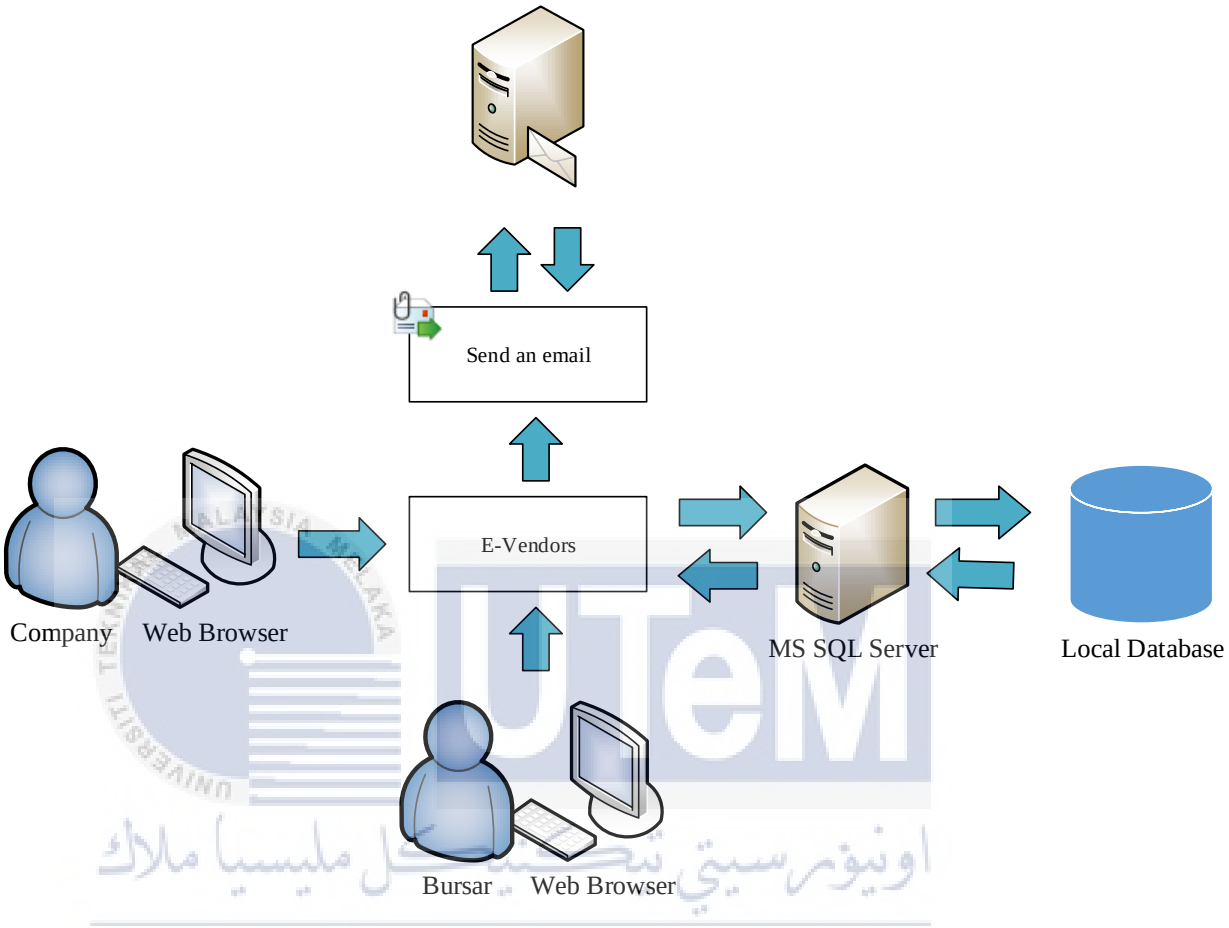

Figure 12: System architecture of E-Vendors

The Figure 12 above shows the E-Vendors system architecture and the work flows of system.

4.2.2. User Interface Design

(i) Navigation Design

Not applicable.

(ii) Input Design

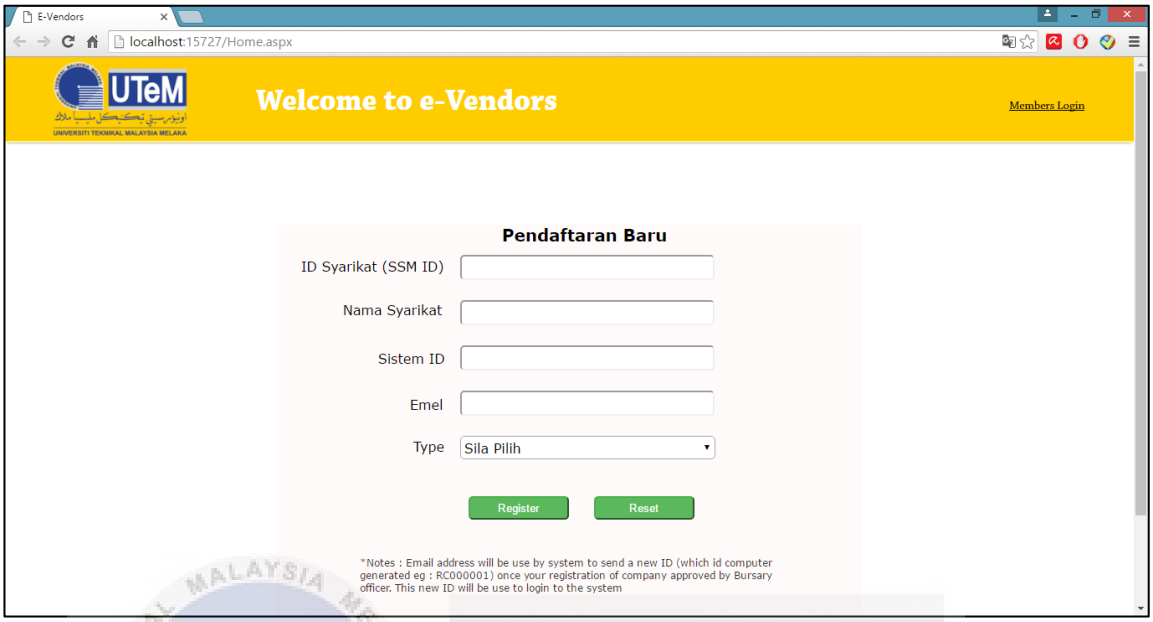

Figure 13: Registration screen

Figure 13 shows the Registration Screen (Home page of E-Vendors) in Registration module.

Figure 14: Login screen

Figure 14 shows the Login Screen in Login module.

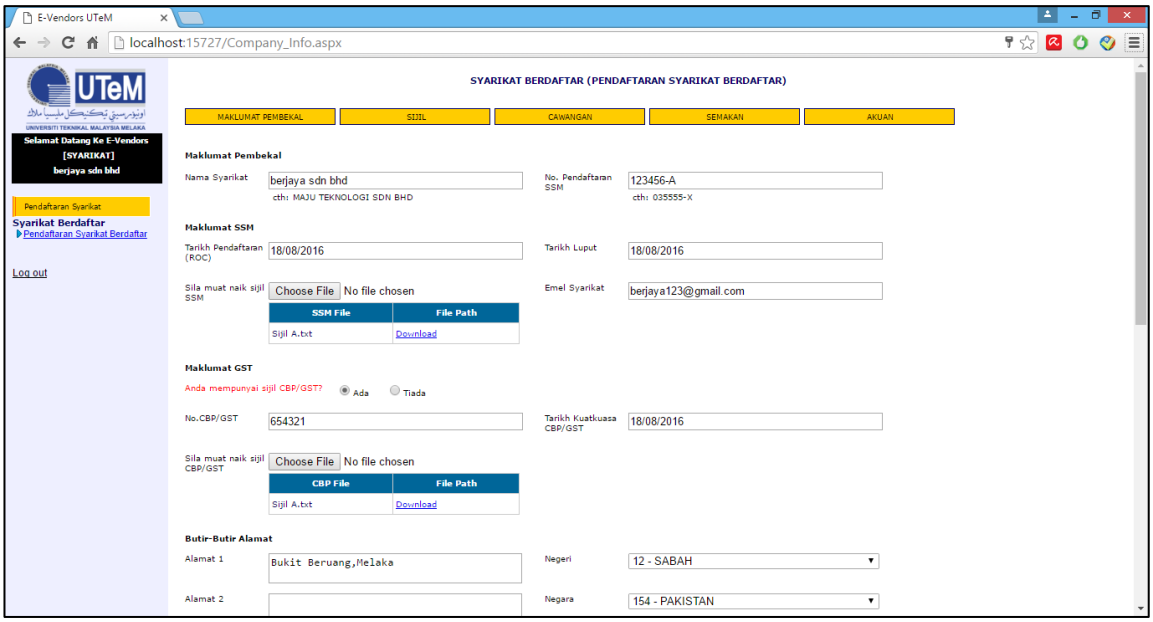

Figure 15: 'Maklumat Pembekal' screen (upper part)

Figure 15 shows the 'Maklumat Pembekal' screen (upper part) in Company Information module.

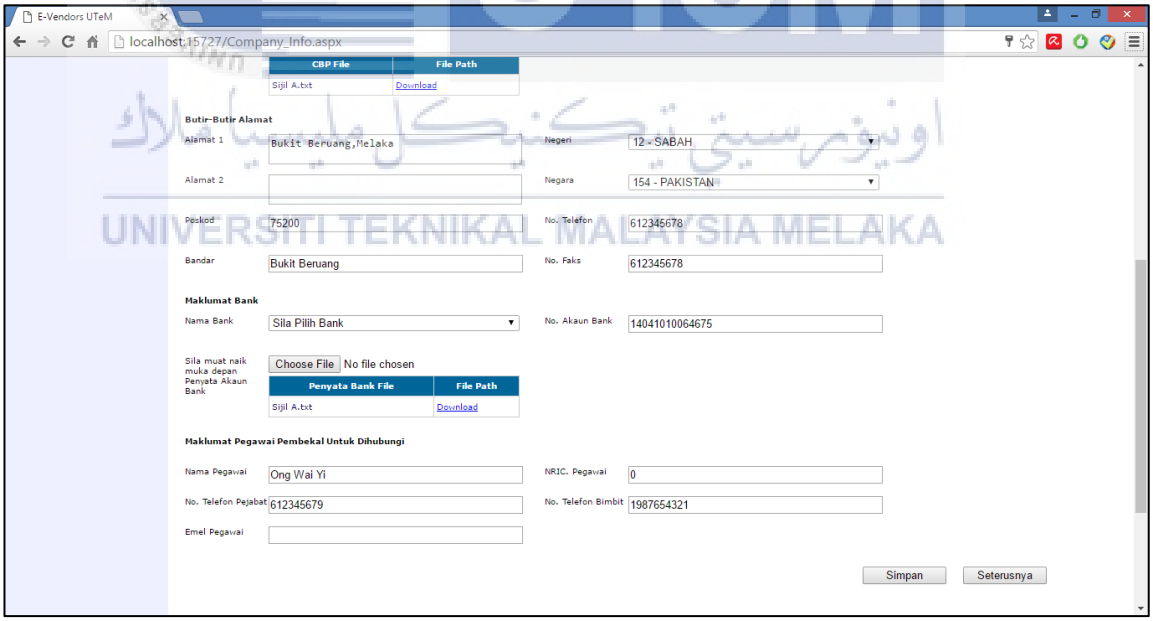

Figure 16: 'Maklumat Pembekal' screen (lower part)

Figure 16 shows the 'Maklumat Pembekal' screen (lower part) in Company Information module.

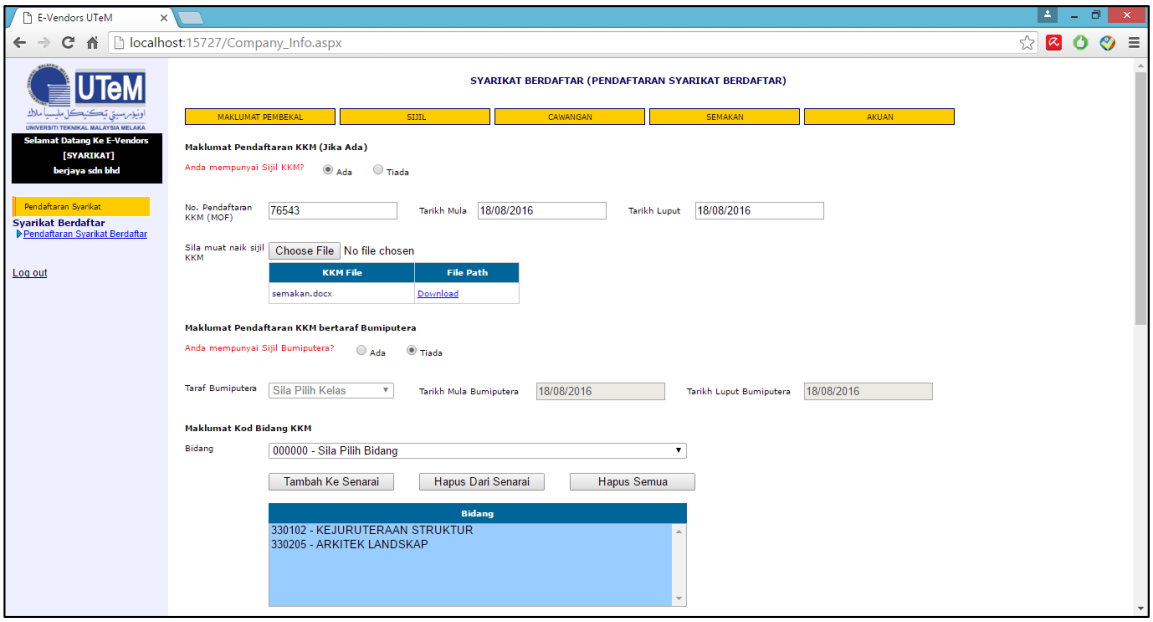

Figure 17: 'Sijil' screen (upper part)

Figure 17 shows the 'Sijil' Screen (Upper part) in Company Information module.

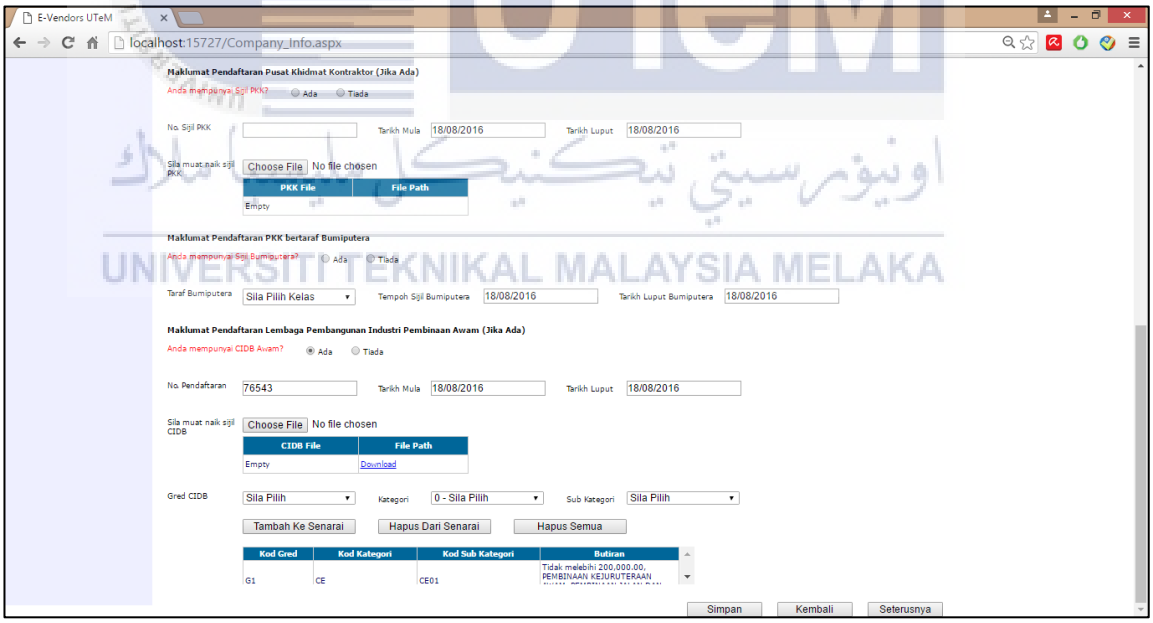

Figure 18: 'Sijil' screen (lower part)

Figure 18 shows the 'Sijil' screen (lower part) in Company Information module.

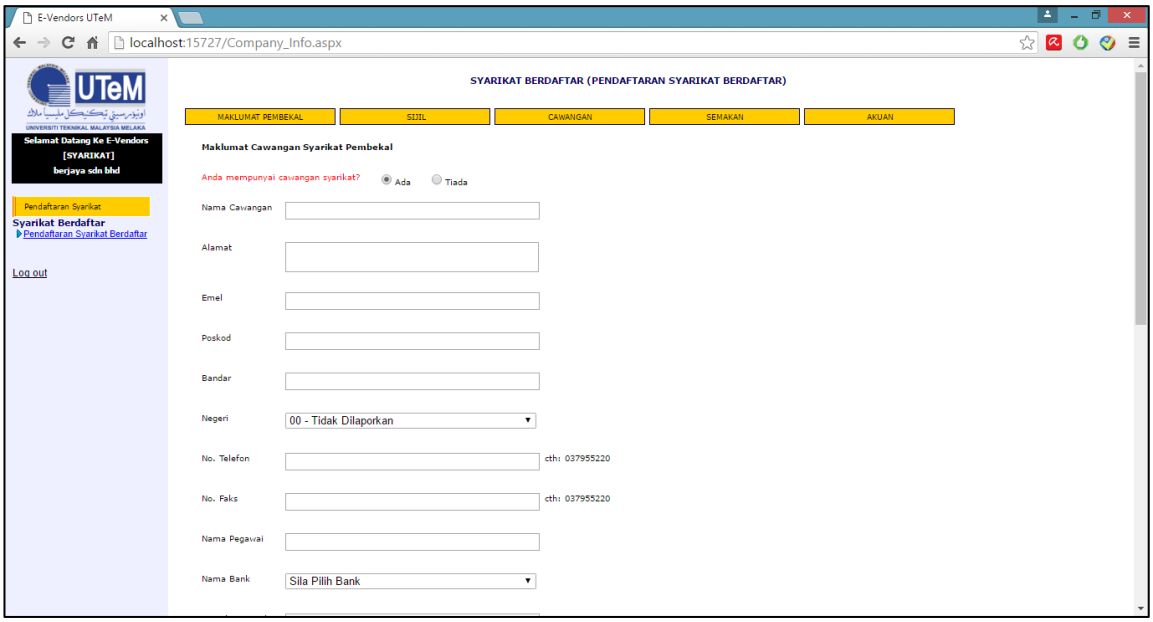

Figure 19: 'Cawangan' screen (upper part)

Figure 19 shows the 'Cawangan' screen (upper part) in Company Information module.

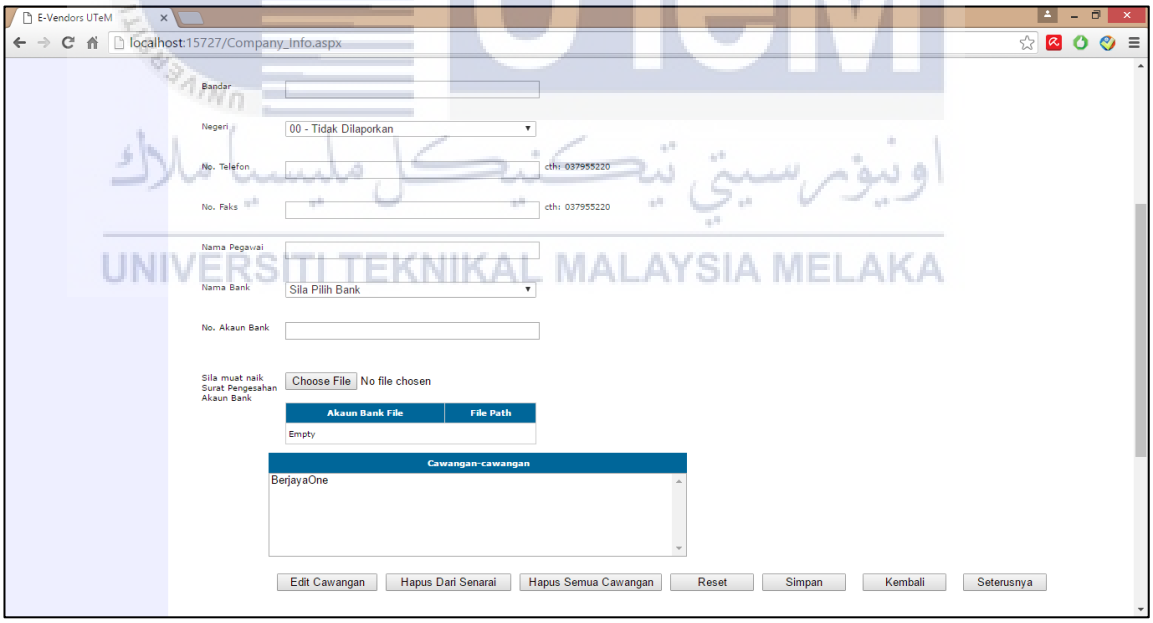

Figure 20: Cawangan' screen (lower part)

Figure 20 shows the 'Cawangan' screen (lower part) in Company Information module.

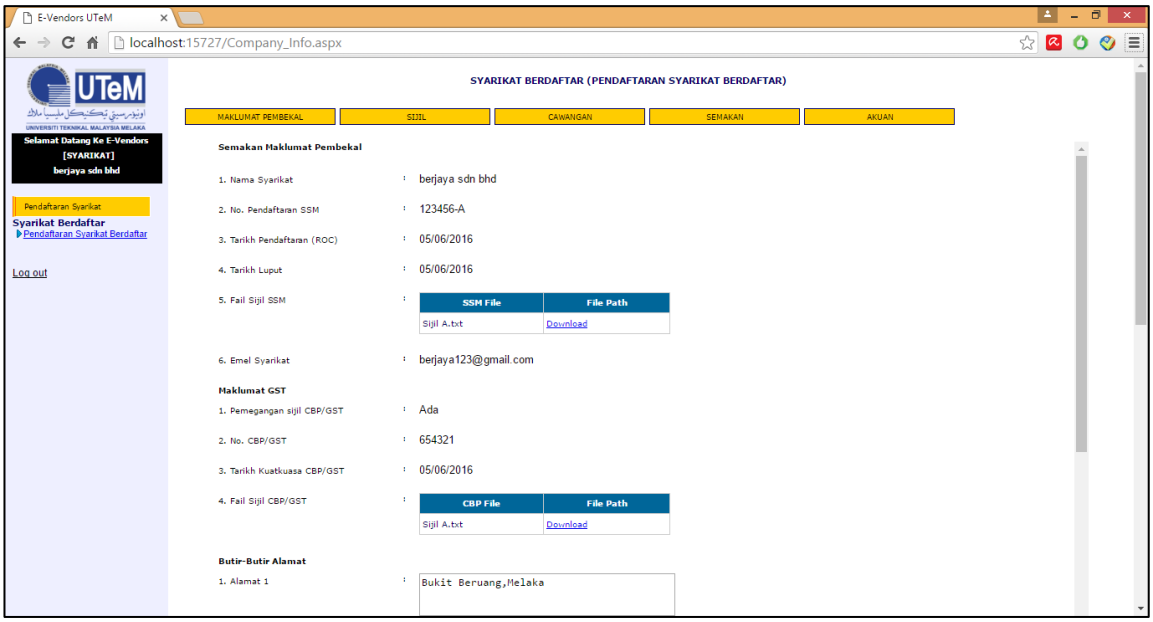

Figure 21: 'Semakan' screen (upper part)

Figure 21 shows the 'Semakan' screen (upper part) in Company Information module.

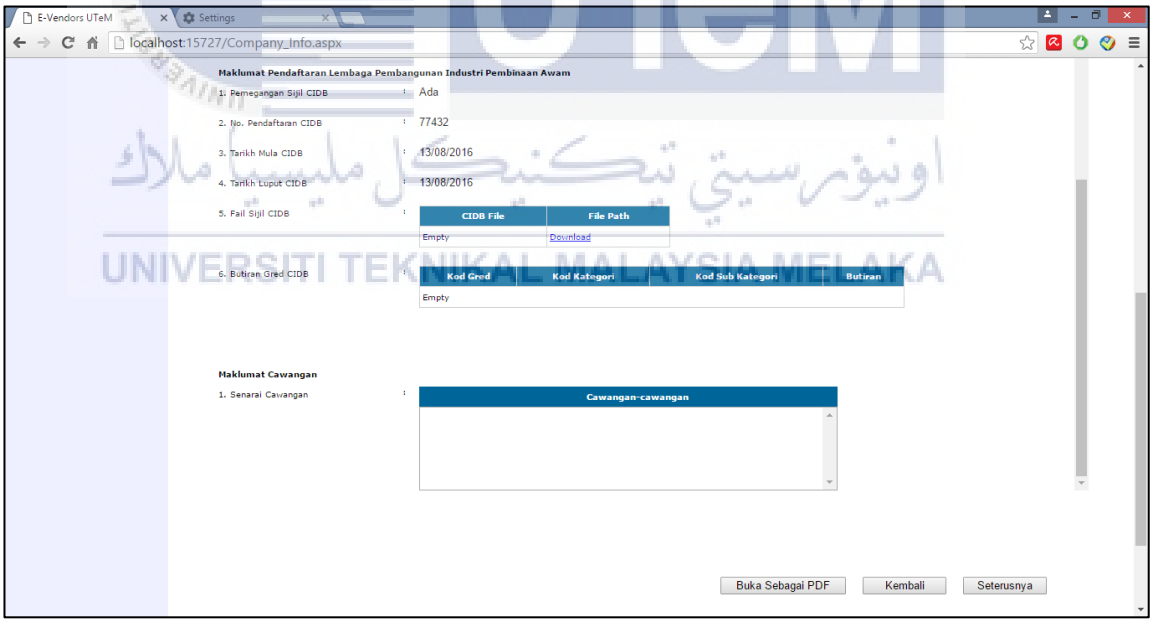

Figure 22: 'Semakan' screen (lower part)

Figure 22 shows the 'Semakan' screen (lower part) in Company Information module.

Figure 23: 'Semakan PDF' screen (generate PDF part)

Figure 23 shows the 'Semakan PDF' screen (generate PDF part) in Company Information module.

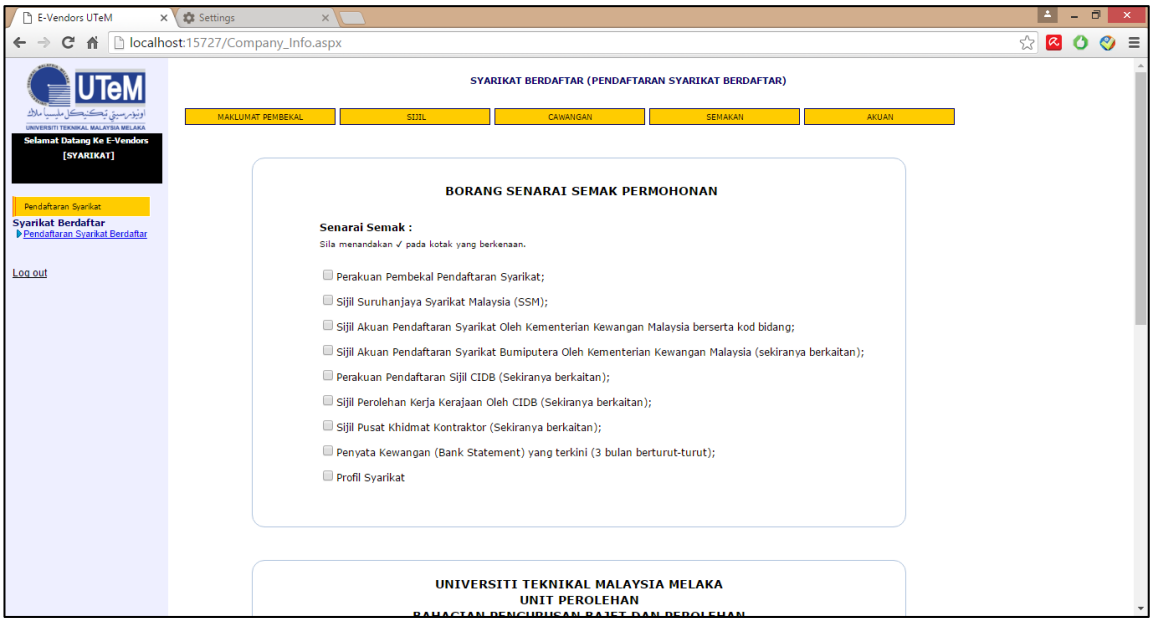

Figure 24: 'Akuan' screen (upper part)

Figure 24 shows the 'Akuan' screen (upper part) in Company Information module.

Figure 25: 'Akuan' screen (lower part)

Figure 25 shows the 'Akuan' screen (lower part) in Company Information module.

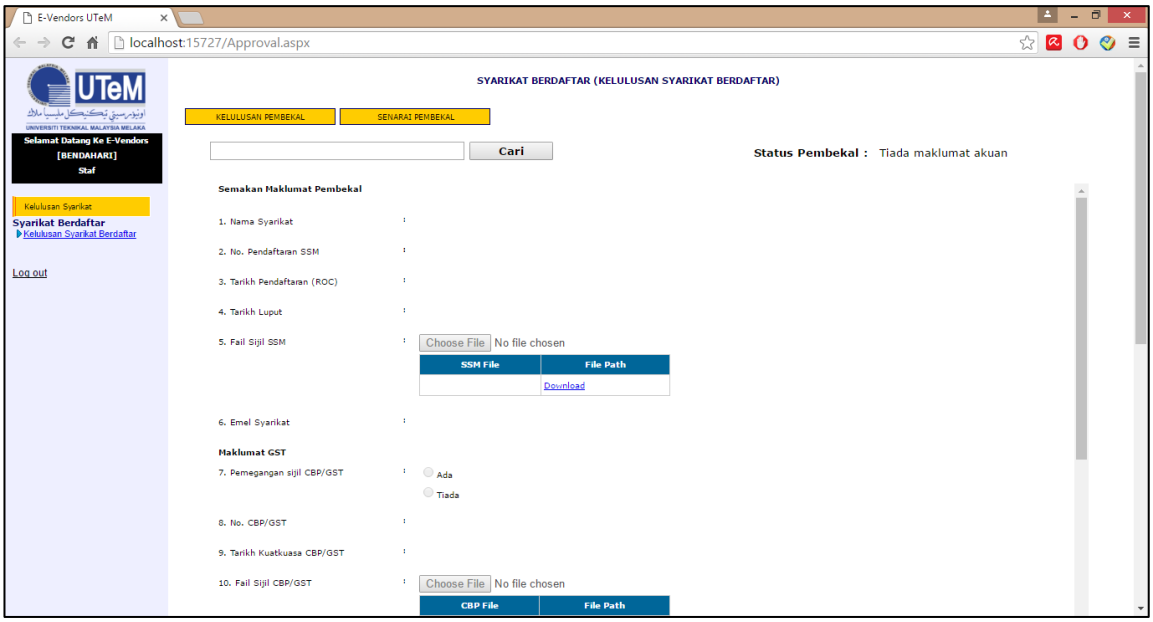

Figure 26: 'Kelulusan Pembekal' screen (upper part)

Figure 26 shows the 'Kelulusan Pembekal' screen (upper part) in Approval module.

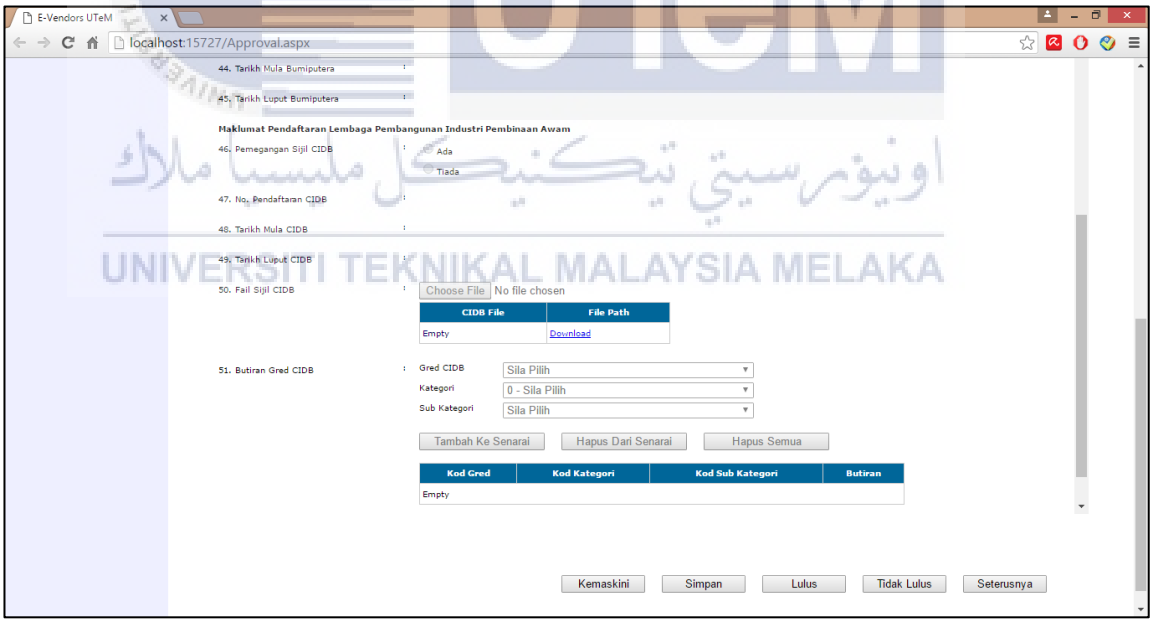

Figure 27: 'Kelulusan Pembekal' screen (lower part)

Figure 27 shows the 'Kelulusan Pembekal' screen (lower part) in Approval module.

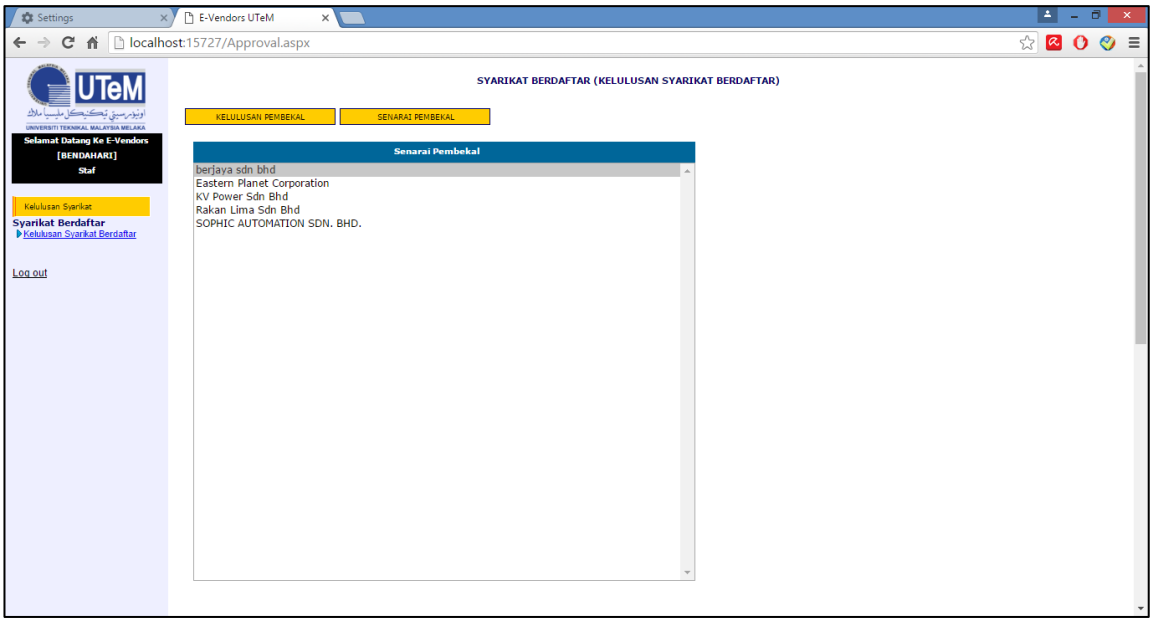

Figure 28: 'Senarai Pembekal' screen

Figure 28 shows the 'Senarai Pembekal' screen if 'Senarai Pembekal' button is pressed in Approval module.

(iii) Output Design

Figure 29: Error messages

Figure 29 shows error messages displayed on 'Registration Screen'.

4.2.3. Database Design

4.2.3.1. Conceptual and Logical Database Design

Entity Relationship Diagram (ERD)

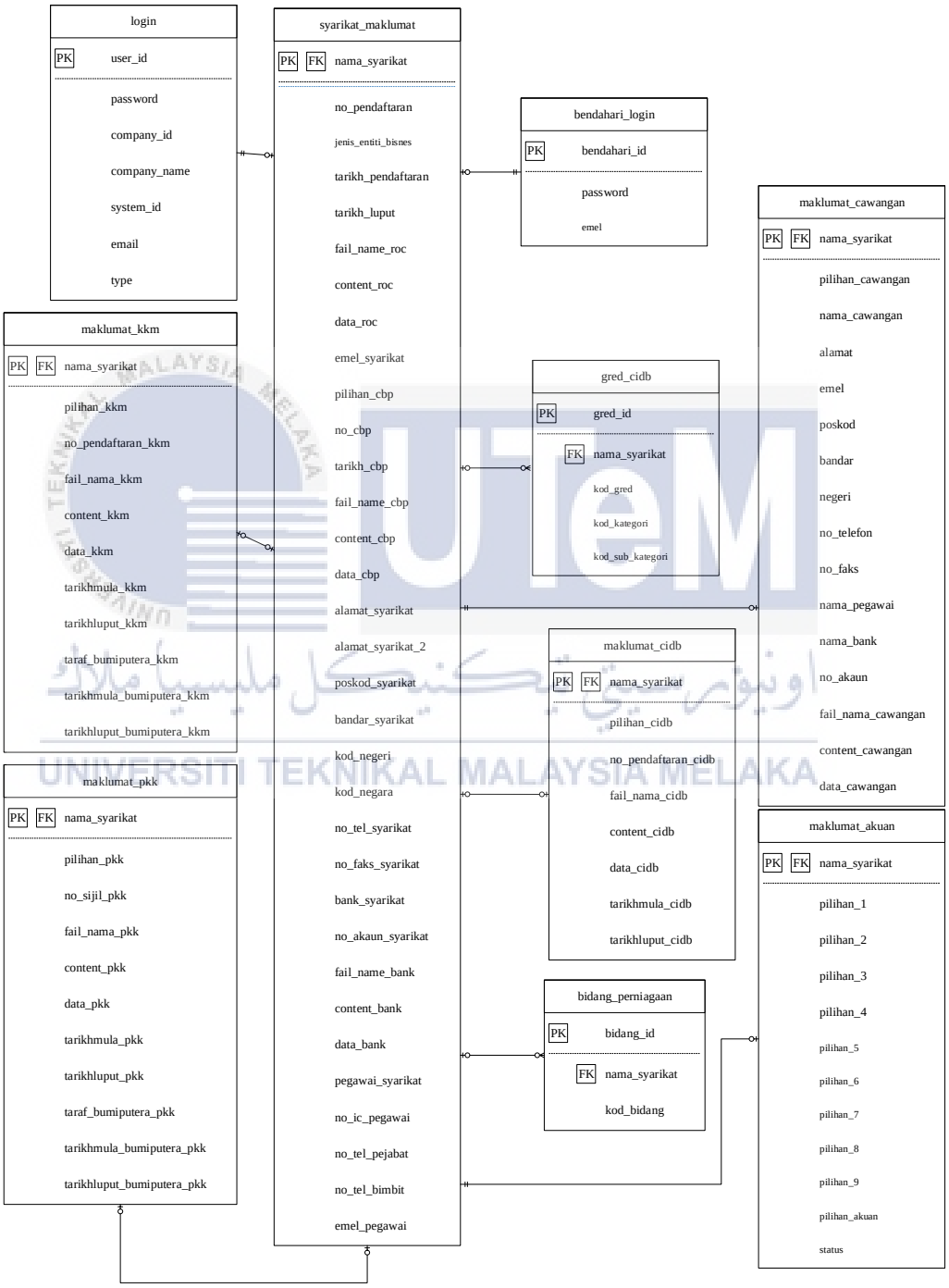

Figure 30: Entity Relationship Diagram (ERD)

Data Dictionary

1) login Entity

Column Name	Data Type	Constraint Type	Is Nullable
user_id	varchar(50)	PRIMARY KEY	NO
password	varchar(50)	NULL	NO
company_id	varchar(50)	NULL	NO
company_name	varchar(150)	NULL	NO
system_id	varchar(50)	NULL	NO
email	varchar(50)	NULL	NO
type	varchar(20)	NULL	NO

Table 11: login entity

2) bendahari_login Entity

Column Name	Data Type	Constraint Type	Is Nullable
bendahari_id	varchar(15)	PRIMARY KEY	NO
password	varchar(30)	NULL	NO
emel	varchar(30)	NULL	NO

Table 12: bendahari_login entity

3) syarikat_maklumat Entity

Column Name	Data Type	Constraint Type	Is Nullable
nama_syarikat	varchar(150)	PRIMARY KEY	NO
jenis_entiti_bisnes	varchar(8)	NULL	NO
no_pendaftaran	varchar(20)	NULL	NO
tarikh_pendaftaran	date	NULL	NO
tarikh_luput	date	NULL	NO
fail_name_roc	varchar(50)	NULL	NO
content_roc	nvarchar(200)	NULL	NO
data_roc	varbinary(max)	NULL	NO
emel_syarikat	varchar(50)	NULL	NO

pilihan_cbp	varchar(10)	NULL	NO
no_cbp	varchar(10)	NULL	NO
tarikh_cbp	date	NULL	NO
fail_name_cbp	varchar(50)	NULL	NO
content_cbp	nvarchar(200)	NULL	NO
data_cbp	varbinary(max)	NULL	NO
alamat_syarikat	varchar(200)	NULL	NO
alamat_syarikat_2	varchar(200)	NULL	NO
poskod_syarikat	int	NULL	NO
bandar_syarikat	varchar(50)	NULL	NO
kod_negeri	varchar(5)	NULL	NO
kod_negara	varchar(5)	NULL	NO
no_tel_syarikat	int	NULL	NO
no_faks_syarikat	int	NULL	NO
bank_syarikat	varchar(80)	NULL	NO
no_akaun_syarikat	bigint	NULL	NO
fail_name_bank	varchar(50)	NULL	NO
content_bank	nvarchar(200)	NULL	NO
data_bank	varbinary(max)	NULL	NO
pegawai_syarikat	varchar(100)	NULL	NO
no_ic_pegawai	int	NULL	NO
no_tel_pejabat	int	NULL	NO
no_tel_bimbit	int	NULL	NO
emel_pegawai	varchar(50)	NULL	NO

Table 13: syarikat_maklumat Entity

4) maklumat_kkm Entity

Column Name	Data Type	Constraint Type	Is Nullable
nama_syarikat	varchar(150)	PRIMARY KEY	NO
pilihan_kkm	varchar(10)	NULL	NO

no_pendaftaran_kkm	varchar(20)	NULL	NO
fail_nama_kkm	varchar(50)	NULL	NO
content_kkm	nvarchar(200)	NULL	NO
data_kkm	varbinary(max)	NULL	NO
tarikhmula_kkm	date	NULL	NO
tarikhluput_kkm	date	NULL	NO
taraf_bumiputera_kkm	varchar(20)	NULL	NO
tarikhmula_bumiputera_kkm	date	NULL	NO
tarikhluput_bumiputera_kkm	date	NULL	NO

Table 14: maklumat_kkm Entity

5) bidang_perniagaan Entity

Column Name	Data Type	Constraint Type	Is Nullable
bidang_id	int	PRIMARY KEY	NO
nama_syarikat	varchar(150)	NULL	NO
kod_bidang	varchar(100)	NULL	NO

Table 15: bidang_perniagaan Entity

6) maklumat_pkk Entity

Column Name	Data Type	Constraint Type	Is Nullable
nama_syarikat	varchar(150)	PRIMARY KEY	NO
pilihan_pkk	varchar(10)	NULL	NO
no_sijil_pkk	varchar(20)	NULL	NO
fail_nama_pkk	varchar(50)	NULL	NO
content_pkk	nvarchar(200)	NULL	NO
data_pkk	varbinary(max)	NULL	NO
tarikhmula_pkk	date	NULL	NO
tarikhluput_pkk	date	NULL	NO
taraf_bumiputera_pkk	varchar(20)	NULL	NO
tarikhmula_bumiputera_pkk	date	NULL	NO
tarikhluput_bumiputera_pkk	date	NULL	NO

Table 16: maklumat_pkk Entity

7) maklumat_cidb Entity

Column Name	Data Type	Constraint Type	Is Nullable
nama_syarikat	varchar(150)	PRIMARY KEY	NO
pilihan_cidb	varchar(10)	NULL	NO
no_pendaftaran_cidb	varchar(20)	NULL	NO
fail_nama_cidb	varchar(50)	NULL	NO
content_cidb	nvarchar(200)	NULL	NO
data_cidb	varbinary(max)	NULL	NO
tarikhmula_cidb	date	NULL	NO
tarikhluput_cidb	date	NULL	NO

Table 17: maklumat_cidb Entity

8) gred_cidb Entity

Column Name	Data Type	Constraint Type	Is Nullable
gred_id	int	PRIMARY KEY	NO
nama_syarikat	varchar(150)	NULL	NO
kod_gred	varchar(2)	NULL	NO
kod_kategori	varchar(2)	NULL	NO
kod_sub_kategori	varchar(5)	NULL	NO

Table 18: gred_cidb Entity

9) maklumat_cawangan Entity

Column Name	Data Type	Constraint Type	Is Nullable
nama_syarikat	varchar(150)	PRIMARY KEY	NO
pilihan_cawangan	varchar(10)	NULL	NO
nama_cawangan	varchar(150)	NULL	NO
alamat	varchar(200)	NULL	NO
emel	varchar(50)	NULL	NO
poskod	int	NULL	NO
bandar	varchar(50)	NULL	NO

negeri	varchar(20)	NULL	NO
no_telefon	int	NULL	NO
no_faks	int	NULL	NO
nama_pegawai	varchar(100)	NULL	NO
nama_bank	varchar(80)	NULL	NO
no_akaun	bigint	NULL	NO
fail_nama_cawangan	varchar(50)	NULL	NO
content_cawangan	nvarchar(200)	NULL	NO
data_cawangan	varbinary(max)	NULL	NO

Table 19: maklumat_cawangan Entity

10) maklumat_akuan Entity

Column Name	Data Type	Constraint Type	Is Nullable
nama_syarikat	varchar(150)	PRIMARY KEY	NO
pilihan_1	int	NULL	NO
pilihan_2	int	NULL	NO
pilihan_3	int	NULL	NO
pilihan_4	int	NULL	NO
pilihan_5	int	NULL	NO
pilihan_6	int	NULL	NO
pilihan_7	int	NULL	NO
pilihan_8	int	NULL	NO
pilihan_9	int	NULL	NO
pilihan_akuan	varchar(12)	NULL	NO
status	varchar(30)	NULL	NO

Table 20: maklumat_akuan Entity

4.3. Detailed Design

4.3.1. Physical Database Design

During physical database design, tables and columns are created according to entities and attributes that were defined during logical database design. Constraints such as primary keys, foreign keys, and check constraints are also defined. Views can be created to summarize data or to provide the user with another point of view of specific data. Logical database design is transform to physical database design using data definition language (DDL).

1) DDL for **login Entity**

```
CREATE TABLE [dbo].[login](
        [user_id] [varchar](50) NOT NULL,
        [password] [varchar](50) NOT NULL,
        [company_id] [varchar](50) NOT NULL,
        [company_name] [varchar](50) NOT NULL,
        [system_id] [varchar](50) NOT NULL,
        [email] [varchar](50) NOT NULL,
        [type] [varchar](20) NOT NULL,
 CONSTRAINT [PK_login] PRIMARY KEY CLUSTERED
(
        [user_id] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
```

2) DDL for **bendahari_login Entity**

```
CREATE TABLE [dbo].[bendahari_login](
        [bendahari_id] [varchar](15) NOT NULL,
        [password] [varchar](30) NOT NULL,
        [emel] [varchar](30) NOT NULL,
 CONSTRAINT [PK_bendahari_login] PRIMARY KEY CLUSTERED
(
        [bendahari_id] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
```

3) DDL for **syarikat_maklumat Entity**

```
CREATE TABLE [dbo].[syarikat_maklumat](
        [nama_syarikat] [varchar](150) NOT NULL,
        [jenis_entiti_bisnes] [varchar](8) NOT NULL,
        [no_pendaftaran] [varchar](20) NOT NULL,
        [tarikh_pendaftaran] [date] NOT NULL,
        [tarikh_luput] [date] NOT NULL,
        [fail_name_roc] [varchar](50) NOT NULL,
        [content_roc] [nvarchar](200) NOT NULL,
        [data_roc] [varbinary](max) NOT NULL,
        [emel_syarikat] [varchar](50) NOT NULL,
        [pilihan_cbp] [varchar](10) NOT NULL,
        [no_cbp] [varchar](20) NOT NULL,
        [tarikh_cbp] [date] NOT NULL,
        [fail_name_cbp] [varchar](50) NOT NULL,
        [content_cbp] [nvarchar](200) NOT NULL,
        [data_cbp] [varbinary](max) NOT NULL,
```

```
	[alamat_syarikat] [varchar](200) NOT NULL,
	[alamat_syarikat_2] [varchar](200) NOT NULL,
	[poskod_syarikat] [int] NOT NULL,
	[bandar_syarikat] [varchar](50) NOT NULL,
	[kod_negeri] [varchar](5) NOT NULL,
	[kod_negara] [varchar](5) NOT NULL,
	[no_tel_syarikat] [int] NOT NULL,
	[no_faks_syarikat] [int] NOT NULL,
	[bank_syarikat] [varchar](80) NOT NULL,
	[no_akaun_syarikat] [bigint] NOT NULL,
	[fail_name_bank] [varchar](50) NOT NULL,
	[content_bank] [nvarchar](200) NOT NULL,
	[data_bank] [varbinary](max) NOT NULL,
	[pegawai_syarikat] [varchar](100) NOT NULL,
	[no_ic_pegawai] [int] NOT NULL,
	[no_tel_pejabat] [int] NOT NULL,
	[no_tel_bimbit] [int] NOT NULL,
	[emel_pegawai] [varchar](50) NOT NULL,
 CONSTRAINT [PK_syarikat_maklumat] PRIMARY KEY CLUSTERED
(
	[nama_syarikat] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
```


4) DDL for **maklumat_kkm Entity**

```
CREATE TABLE [dbo].[maklumat_kkm](
	[nama_syarikat] [varchar](150) NOT NULL,
```

```
	[pilihan_kkm] [varchar](10) NOT NULL,
	[no_pendaftaran_kkm] [varchar](20) NOT NULL,
	[fail_nama_kkm] [varchar](50) NOT NULL,
	[content_kkm] [nvarchar](200) NOT NULL,
	[data_kkm] [varbinary](max) NOT NULL,
	[tarikhmula_kkm] [date] NOT NULL,
	[tarikhluput_kkm] [date] NOT NULL,
	[taraf_bumiputera_kkm] [varchar](20) NOT NULL,
	[tarikhmula_bumiputera_kkm] [date] NOT NULL,
	[tarikhluput_bumiputera_kkm] [date] NOT NULL,
 CONSTRAINT [PK_maklumat_kkm] PRIMARY KEY CLUSTERED
(
	[nama_syarikat] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
```


5) DDL for **bidang_perniagaan Entity**

```
CREATE TABLE [dbo].[bidang_perniagaan](
	[bidang_id] [int] IDENTITY(1,1) NOT NULL,
	[nama_syarikat] [varchar](150) NOT NULL,
	[kod_bidang] [varchar](100) NOT NULL,
 CONSTRAINT [PK_bidang_perniagaan_1] PRIMARY KEY CLUSTERED
(
	[bidang_id] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
```

) ON [PRIMARY]

6) DDL for **maklumat_pkk Entity**

```
CREATE TABLE [dbo].[maklumat_pkk](
        [nama_syarikat] [varchar](150) NOT NULL,
        [pilihan_pkk] [varchar](10) NOT NULL,
        [no_sijil_pkk] [varchar](20) NOT NULL,
        [fail_nama_pkk] [varchar](50) NOT NULL,
        [content_pkk] [nvarchar](200) NOT NULL,
        [data_pkk] [varbinary](max) NOT NULL,
        [tarikhmula_pkk] [date] NOT NULL,
        [tarikhluput_pkk] [date] NOT NULL,
        [taraf_bumiputera_pkk] [varchar](20) NOT NULL,
        [tarikhmula_bumiputera_pkk] [date] NOT NULL,
        [tarikhluput_bumiputera_pkk] [date] NOT NULL,
 CONSTRAINT [PK_maklumat_pkk] PRIMARY KEY CLUSTERED
(
        [nama_syarikat] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
```


7) DDL for **maklumat_cidb Entity**

```
CREATE TABLE [dbo].[maklumat_cidb](
        [nama_syarikat] [varchar](150) NOT NULL,
        [pilihan_cidb] [varchar](10) NOT NULL,
        [no_pendaftaran_cidb] [varchar](20) NOT NULL,
        [fail_nama_cidb] [varchar](50) NOT NULL,
```

```
	[content_cidb] [nvarchar](200) NOT NULL,
	[data_cidb] [varbinary](max) NOT NULL,
	[tarikhmula_cidb] [date] NOT NULL,
	[tarikhluput_cidb] [date] NOT NULL,
 CONSTRAINT [PK_maklumat_cidb] PRIMARY KEY CLUSTERED
(
	[nama_syarikat] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
```

8) DDL for **gred_CIDB Entity**

```
CREATE TABLE [dbo].[gred_CIDB](
	[gred_id] [int] IDENTITY(1,1) NOT NULL,
	[nama_syarikat] [varchar](150) NOT NULL,
	[kod_gred] [varchar](2) NOT NULL,
	[kod_kategori] [varchar](2) NOT NULL,
	[kod_sub_kategori] [varchar](5) NOT NULL,
 CONSTRAINT [PK_gred_CIDB] PRIMARY KEY CLUSTERED
(
	[gred_id] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
```

9) DDL for **maklumat_cawangan Entity**

```
CREATE TABLE [dbo].[maklumat_cawangan](
	[nama_syarikat] [varchar](150) NOT NULL,
```

```
    [pilihan_cawangan] [varchar](10) NOT NULL,
    [nama_cawangan] [varchar](150) NOT NULL,
    [alamat] [varchar](200) NOT NULL,
    [emel] [varchar](50) NOT NULL,
    [poskod] [int] NOT NULL,
    [bandar] [varchar](50) NOT NULL,
    [negeri] [varchar](20) NOT NULL,
    [no_telefon] [int] NOT NULL,
    [no_faks] [int] NOT NULL,
    [nama_pegawai] [varchar](100) NOT NULL,
    [nama_bank] [varchar](80) NOT NULL,
    [no_akaun] [bigint] NOT NULL,
    [fail_nama_cawangan] [varchar](50) NOT NULL,
    [content_cawangan] [nvarchar](200) NOT NULL,
    [data_cawangan] [varbinary](max) NOT NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
```

10) DDL for **maklumat_akuan Entity**

```
CREATE TABLE [dbo].[maklumat_akuan](
    [nama_syarikat] [nchar](150) NOT NULL,
    [pilihan_1] [int] NOT NULL,
    [pilihan_2] [int] NOT NULL,
    [pilihan_3] [int] NOT NULL,
    [pilihan_4] [int] NOT NULL,
    [pilihan_5] [int] NOT NULL,
    [pilihan_6] [int] NOT NULL,
    [pilihan_7] [int] NOT NULL,
    [pilihan_8] [int] NOT NULL,
    [pilihan_9] [int] NOT NULL,
    [pilihan_akuan] [varchar](12) NOT NULL,
    [status] [varchar](30) NOT NULL,
```

```
 CONSTRAINT [PK_Table_1] PRIMARY KEY CLUSTERED
(
        [nama_syarikat] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY]
```

4.4. Conclusion

This chapter discussed overview of proposed E-Vendors through high level design, system architecture, user interface design and detailed design. The project setup environment, configuration management and implementation status of proposed system will be discussed in next chapter which is Chapter 5 Implementation.

CHAPTER V

IMPLEMENTATION

5.1. Introduction

This chapter is about the implementation of the system. The purpose of this phase is to make the system available for a prepared set of users (the deployment), and positioning on-going support and maintenance of the system within the organization. In this phase, the developer should carry out execution or practice of plan, method and design for the system that is built. The execution includes the installation, configuration, running, testing, and making necessary changes of the system.

Proposed E-Vendors has a total of 5 modules. However until this stage, only 3 out of 5 modules are being developed. The completed modules are registration, login and company information. Each of these modules has its own function and they are implemented in term of logical design to physical software and hardware.

5.2. Software Development Environment setup

There is only one integrated development environment (IDE) used to write the system which is Microsoft Visual Studio Ultimate 2012.

5.2.1 Microsoft Windows

This project used operating system Windows 8 (64bit) Single Language to deploy the project and install the Microsoft Visual Studio Ultimate 2012 and Microsoft SQL Server 2012.

5.2.2 Microsoft Visual Studio Ultimate 2012

This IDE is used to develop computer programs or applications for Microsoft Windows or develop web applications, web sites and web services. Visual Studio uses Microsoft software development platforms such as Windows API and Windows Forms. It provides built-in tools such as a forms designer for building GUI applications, web designer and database schema designer. It supports different programming languages and allows the code editor and debugger to support nearly any programming language. Built-in languages available in this IDE include C, C++/CLI, VB.NET, C#, and F. It is suitable for this project development because it supports other languages as well such as HTML, CSS and JavaScript which can be used to develop web components.

5.2.3 Microsoft SQL Server 2012

This software is a relational database management system developed by Microsoft. It is a database server with the primary function of storing and retrieving data when other software programs or applications that may run on the same computer or run on other computer across a network make request to it. For this project, it is used to store and retrieve company information and approval information provided by system users. The web system of this project is running on browser through localhost server instead of real server.

5.3. Software Configuration Management

Software configuration management is the process of identifying and defining the software configuration items in a system, controlling the release and change of these items throughout the system lifecycle, recording and reporting the status of configuration items and change requests, and verifying the completeness and correctness of configuration items.

The system configuration needs to be managed well. This step is also to define the error of misconfiguration, error occurred for both software and hardware. Configuration management makes sure the changes of based on requirements have been identified and made throughout the system lifecycle.

5.3.1. Configuration environment setup

In order to connect to database server for data storage and retrieval purpose, server software must be installed in computer. By using Microsoft Visual Studio, connection between the IDE and database server can be established. The database server used in this project is Microsoft SQL Server 2012.

In this project, it needs to select its server type, server name and ways of authentication that may need to provide username and password. The proposed E-Vendors is running using localhost server. This makes the connection setting for authentication is set to Windows Authentication. Entities of database scheme can only be added Login. The proposed E-Vendors system must ensure connection to database server is established and connect successfully to server before execute any sql statements through Visual Studio.

5.3.2. Version Control Procedure

When major changes made to source code or source file of the proposed system during implementation, the developer will make a backup of entire file includes all source file, xml file and others. Every backup file has its version number to track changes made during development. The version control procedure is done without any assist from version control system or tools.

5.4. Implementation Status

At this stage, login, registration and company information are almost completed. This system is a prototype. However, the user requirements need to be revised with system users. Therefore, these completed modules may have changes in future. The approval module and report module are not started to implement. This is because the user requirements are not fully obtained from system users.

Implementation status of user interface design for company user, it takes 2 to 3 weeks to collect requirements from users and approve by users before starting implementation. User interface design for bursar user is not discussed at this stage. Login and registration modules are developed within one week. Despite this, it is not fully developed due to changes of user requirements.

Implementation status for company info module took a long time to implement. It is the largest module in this project. It covers almost 7 to 8 weeks to develop. It is not fully developed due to changes of user requirements.

5.5. Conclusion

This chapter discussed how the proposed is implemented. The software or IDE used to develop or write the proposed system is defined. The configuration management for database server is explained. Implementation status based on modules or project

activities are stated. The system testing details for proposed system will be discussed in next chapter which is Chapter 6 Testing.

CHAPTER VI

TESTING

6.1 Introduction

Software testing is a technique by using a program or application to find software bugs of a software product. It is the process to validate and verify software item to detect the difference between existing and required conditions and to make sure a software product always meets business and system requirements.

This section will explain the details of system testing which include test plan, test strategy, test design, test result and analysis. Unit testing, system testing, integration testing and acceptance testing are the four main stages of testing that need to be executed before the system can be cleared for use. The main activity in testing phase is involving the targeted user to be the tester for this system to test the related parts of system. Functional testing and regression testing are also executed in this project. The strategy that will adopt for testing is white-box and black-box testing and top-down testing. *(Please refer section 6.3 for the definition of testing strategy and the information of test requirements.)*

6.2 Test Plan

6.2.1 Test Organization

Test organization is a team who is involve in activity in the testing phase. Test functions, test activities and test facilities are defined by the organization. There are three personnel involve in testing part, who are suitable to be the testers for this system, the software developer (Chong Kit Shing) and the existing system users (Encik Hadzri and Encik Anwar). Encik Hadzri from PPPK is involved in the user acceptance testing (UAT).

The selected users have the responsible to test each function of the module they involve. For company, the modules involved are the registration and login, add company information (upload documents), view company information, print company information and submit company information via system (send notification email).

For bursar, the modules involved are management of company information (update), view company information (search), print company information, approve or disapprove company information after received notification email and send notification email to approved or disapproved company via system.

The software developer and the existing system user need to check and test the entire system. The software developer is responsible for recording test error and test results when the existing system user found the error, bugs or the system failure on certain function in the specific modules. The project's supervisor has the responsible to suggest the correction on some modules.

6.2.2 Test Environment

A web-based system requires the testing activity to be carried out in a place that surrounded by network (local internet / Wi-Fi / mobile data) as the system needs to connect with internet to access the online database. The location can be anywhere that suitable and comfortable for the tester and software developer to test the software product. At the early stage of this project, it is tested using localhost server which does not require internet connection. There are parts such as sending email requires internet connection. After the system is completed, it is tested using real server at PPPK.

The hardware involved is a laptop installed with Microsoft Visual Studio 2012 and MS SQL Server 2012. Initially, this project is still a prototype which has not yet been deployed with a real server. At the last stage of this project, user acceptance testing is carried out after the system is successfully deployed with a real server. The UAT form is obtained from PPPK (please refer to appendices for UAT form).

This system can be accessed at https://qa.utem.edu.my/PSM/Home.aspx. However, the system can only be accessed in the range of UTeM.

6.2.3 Test Schedule

There are six tasks to be completed in testing phase. The following table describes each task and the duration to complete the task.

Testing Task	Descriptions	Duration (days)	Start Date	End Date
Unit Testing	Testing on smallest testable parts of this system.	12	11/07/2016	22/07/2016
Integration Testing	Testing on several modules immediately.	9	23/07/2016	31/07/2016
Functional Testing	This testing is based on the test cases that describe in	18	1/08/2016	18/08/2016

	section 6.4.			
System Testing	Testing on the complete integrated system.	8	12/08/2016	19/08/2016
User Acceptance Testing (UAT)	Testing based on the specification requirements that agreed in the analysis phase.	4	23/08/2016	26/08/2016
Regression Testing	Testing on the modules that has been updated or changed to ensure that the system is still performing correctly.	15	12/08/2016	26/08/2016

Table 21: Test schedule

6.3 Test Strategy

Based on the test schedule in section 6.2, this system will undergo six types of testing. Test strategy describes the testing approach of the development cycle and to inform stakeholders of the key issues of testing process. Each testing level has it testing strategy, whether it is suitable for using white-box or black box testing.

White-box testing is a testing technique that takes the program structure or component into account and examines the program structure to derive test data. It has other names such as structural testing, open box testing, path driven testing and glass-box testing. Software developer who is a person with programming knowledge is recommended to be involved in this testing. Unit testing, integration testing and regression testing will use this strategy to test the system.

Black-box testing is a testing that ignores the internal structures of a system or component and focuses solely on the functionalities of a program. It is also called functional testing or specifications based testing. This testing can be applied to every level of testing includes unit testing and acceptance testing. This testing does not require a tester or user with programming knowledge. The tester or user need to input the

appropriate and correct data to this system and examine the output response from the system. They have to make sure the result is what they requested.

6.3.1 Classes of tests

There are two classes of tests which are used in this project as mentioned in section 6.3, which are Black-box testing and White-box testing. Both testing description is listed in the table below.

White-box Testing Class

White-box Testing (Non-Functional)	Descriptions
Usability	The system shall allow novice users to operate it with little or no training.
Security	Only authorized users shall be permitted to access company information.
Portability	This system shall allow users to access it from various web browsers.

Table 22: Classes of test (White-box)

Black-box Testing Class

Black-box Testing (Functional)	Descriptions
Interface	The interface of E-Vendors website is responsive to all the browser such as Internet Explorer (IE) 9 and above, latest Google Chrome version and the latest Mozilla Firefox version.
Regression	Regression testing is the most important part in testing. All the related function should be tested after the internal

	mechanism has been changed to ensure that there is no running error and not affected the system modules.
Output of correctness	The input test data is required to receive the output data. The output test data is correct and accurate with what is expected, such as the input data of company name is output with the specific company's information.

Table 23: Classes of test (black-box)

6.4 Test Design

6.4.1 Test Description

This section will describe the test case identification, test cases and the expected result. The test case is based on each functional requirement from the all modules in this system.

Test Cases for Company

Module	Test Case ID	Description	Expected result
Registration	CTC_1.1	To validate that the user can register using valid email address.	The error message 'Alamat emel tidak sah' is not displayed.
	CTC_1.2	To validate that the user register with empty field(s).	The error message for related field is displayed.
	CTC_1.3	To validate that the user does not registered to system before.	The user registration is successful.
Login	CTC_2.1	To validate that the user login with correct	The company information view is displayed after

		username and password.	login.
	CTC_2.2	To validate that the user login with empty field of username or password or both.	The error message for related field is displayed.
	CTC_2.3	To validate that the user login with incorrect username or password or both.	The error message '* ID pengguna atau kata laluan anda tidak sah' is displayed.
Company Information	CTC_3.1	To validate that the user can add/save company information.	The company information is stored into database.
	CTC_3.2	To validate that the user can view company information.	The company information is successfully retrieved from database and the information is bound on every related field.
	CTC_3.3	To validate that the user can generate PDF file for company information.	The company information is opened and displayed as PDF file.
	CTC_3.4	To validate that the user can print company information.	The printing function is available from PDF file and company information can be printed.
	CTC_3.5	To validate that the user can send notification email via system.	A message 'Notification sent' is shown to indicate an email has been successfully sent to the bursar.
Logout	CTC_4.1	To validate that the user can logout.	The user is logout successfully.

Table 24: Test Cases for Company

Test Cases for Bursar

Module	Test Case ID	Description	Expected result
Login	BTC_1.1	To validate that the user login with correct username and password.	The approval view is displayed after login.
	BTC_1.2	To validate that the user login with empty field of username or password or both.	The error message for related field is displayed.
	BTC_1.3	To validate that the user login with incorrect username or password or both.	The error message '* ID pengguna atau kata laluan anda tidak sah' is displayed.
Approval	BTC_2.1	To validate that the user can search a company information by entering company name.	The correct company information is displayed on screen.
	BTC_2.2	To validate that the user can view company information.	The company information is successfully retrieved from database and the information is bound on every related field.
	BTC_2.3	To validate that the user can update company	The company information can be

		information.	edited and saved to database.
	BTC_2.4	To validate that the user can approve or disapprove company information.	Approved: Status of company is updated and notification email is sent. Disapproved: Status of company is updated and 'Tidak Lulus' screen is displayed.
	BTC_2.5	To validate that the user can send notification email via system.	A message 'Notification sent' is shown to indicate an email has been successfully sent to the company.
Logout	BTC_3.1	To validate that the user can logout.	The user is logout successfully.

Table 25: Test Cases for Bursar

6.4.2 Test Data

The test data is a set of realistic data used in system test to produce expected result. This section identified how the system behaves or responses when given empty input, valid or invalid input as test data. The test data used in this project is shown below for each test case:

Test Data for Company Test Cases

Test Case ID	Pre-condition	Test Data	Step/Flow

CTC_1.1	Open E-Vendors Website	Emel: abc	1. Enter the given emel on 'Emel' field.
CTC_1.2		No input for every field on registration page. ID Syarikat (SSM ID): Nama Syarikat: Sistem ID: Emel: Jenis:	1. Click 'Register' button.
CTC_1.3		ID Syarikat: Setia Perkakasan Sdn Bhd	1. Enter a new ID Syarikat. 2. Fill in other fields. 3. Click 'Register' button.
CTC_2.1	Open E-Vendors Website	ID Pengguna: 794994-D Kata Laluan: 123456	1. Click 'Member login' link button. 2. Enter the given ID Pengguna and Kata Laluan. 3. Click 'Login' button.
CTC_2.2		No input for username field and password field.	
CTC_2.3		ID Pengguna: 123456 Kata Laluan: 654321	
CTC_3.1	User logged in to the system.	Input all related fields on 'Maklumat Pembekal' screen,'Sijil' screen and 'Cawangan screen.	1. Enter all fields required on 'Maklumat Pembekal' screen. 2. Click 'Simpan button 'Maklumat Pembekal' screen. 3. Enter all fields related on 'Sijil' screen.

			4. Click ‘Simpan’ button on ’Sijil’ screen. 5. Enter all fields related on ‘Cawangan’ screen. 6. Click ‘Simpan’ button on ‘Cawangan’ screen
CTC_3.2	User logged in to the system. The user has added company information.	No input.	1. Click ‘Semakan’ button to ‘Semakan’ screen.
CTC_3.3	User logged in to the system. The user has added company information.	No input.	1. Click ‘Semakan’ button to ‘Semakan’ screen. 2. Click ‘Buka Sebagai PDF’ button.
CTC_3.4	User logged in to the system. The user has added company information.	No input.	1. Click ‘Semakan’ button to ‘Semakan’ screen to print company information. 2. Click ‘Buka Sebagai PDF’ button and choose ‘Print’ button on PDF file. 3. Click ‘Akuan’ button to ‘Akuan’ screen to print ‘borang semakan’ and ‘surat akuan’. 4. Click ‘Buka Sebagai PDF’ button and choose ‘Print’ button on PDF file.
CTC_3.5	User logged in to	Tick on ‘Saya	1. Click ‘Akuan’ button to

	the system. The user has added company information.	setuju' or 'Saya tidak setuju' checkbox.	'Akuan' screen. 2. Click 'Hantar' button to send notification email.
CTC_4.1	User logged in to the system.	No input.	1. Click 'Log out' link button.

Table 26: Test Data for Company Test Cases

Test Data for Bursar Test Cases

Test Case ID	Pre-condition	Test Data	Step/Flow
BTC_1.1	Open E-Vendors Website.	ID Pengguna: 794994-D Kata Laluan: 123456	1. Click 'Member login' link button. 2. Enter the given ID Pengguna and Kata Laluan. 3. Click 'Login' button.
BTC_1.2		No input for username field and password field.	
BTC_1.3		ID Pengguna: b0123 Kata Laluan: 0123	
BTC_2.1	User logged in to the system.	SOPHIC AUTOMATION SDN. BHD.	1. Enter the given test data into search field on 'Kelulusan Pembekal' screen. 2. Click 'Cari' to search for the company.
BTC_2.2			
BTC_2.3	User logged in to the system. The user searched for company information and the information is	No. Pendaftaran SSM: 123456-A	1. Click 'Kemaskini' button' after company information is displayed. 2. Enter the given test data to 'No. Pendaftaran SSM' field.

	displayed.		3. Click ‘Simpan’ button.
BTC_2.4	User logged in to the system. The user searched for company information and the information is displayed.	berjaya sdn bhd	To approve: 1. Click ‘Lulus’ button. To disapprove: 1. Click ‘Tidak Lulus’ button.
BTC_2.5			
BTC_3.1	User logged in to the system.	No input.	1. Click ‘Log out’ link button.

Table 27: Test Data for Bursar Test Cases

Test Result for Company Test Cases

Test Case ID	Actual Result	Success (S) / Fail (F)
CTC_1.1	The error message ‘Alamat emel tidak sah’ is not displayed.	S
CTC_1.2	The error message for related field is displayed.	S
CTC_1.3	The message is shown to indicate the user registration is successful.	S
CTC_2.1	The company information view is displayed after login.	S
CTC_2.2	The error message for related field is displayed.	S
CTC_2.3	The error message ‘* ID pengguna atau kata laluan anda tidak sah’ is	S

	displayed.	
CTC_3.1	The company information is stored into database.	S
CTC_3.2	The company information is successfully retrieved from database and the information is bound on every related field.	S
CTC_3.3	The company information is opened and displayed as PDF file.	S
CTC_3.4	The printing function is available on PDF file and company information can be printed.	S
CTC_3.5	A message 'Notification sent' is shown to indicate an email has been successfully sent to the bursar.	S
CTC_4.1	The user is logout successfully.	S

Table 28: Test Result for Company Test Cases

Test Result for Bursar Test Cases

Test Case ID	Actual Result	Success (S) / Fail (F)
BTC_2.1	The correct company information is displayed on screen.	S
BTC_2.2	The company information is successfully retrieved	S

	from database and the information is bound on every related field.	
BTC_2.3	The company information can be edited and saved to database.	S
BTC_2.4	Approved: Status of company is updated and notification email is sent. Disapproved: Status of company is updated and 'Tidak Lulus' screen is displayed.	S
BTC_2.5	A message 'Notification sent' is shown to indicate an email has been successfully sent to the company.	S
BTC_3.1	The user is logout successfully.	S

Table 29: Test Result for Bursar Test Cases

6.5 Conclusion of Chapter VI

This chapter discussed how system testing is implemented. Testing is the most important stage before a system is deploy to the real user/stakeholder. The test cases and the test result will be used as references in the future for maintenance and enhancement purposes. The weakness and the strength of proposed E-Vendors system will be discussed in next chapter which is Chapter 7 Conclusion.

CHAPTER VII

CONCLUSION

7.1 Introduction

This chapter will explain the future enhancement for this system. The weakness and strength of this completed system is determined. A conclusion of the result that whether the system meets the objectives that stated earlier in Chapter I. The contribution of this project to the targeted user is discussed in this chapter.

7.2 Observation on Weakness and Strengths

There is no software can be perfect and works without bugs. Software always has its limitations because no software can perfectly address every customer's needs. As for this proposed system, there are weaknesses on system function. This system is not able to generate report for bursar which is quite an important function for user to do data analysis on company information.

This proposed system has its strength compare to existing system. This system allows users to upload documents. There is no more delivery of documents from place to place using courier service. It is time-saving and more efficient in doing approval work. The company can also update their company information after their information is approved by bursar. The company can send notification email to bursar during submission of company information. By this way, the bursar is easily notified by email that new company information is submitted for approval.

7.3 Propositions for Improvement

There are many improvement can be made on this system. One of the improvements needed is the function to generate report. This is an essential function for an information system that store and manage information. Search functionality can be added to filter data in report module. Graphs or bar charts can be used to illustrate the number of companies registered to this system.

The graphical user interface of this system can be redesigned by changing the existing system controls to a more user friendly system controls. This can ensure the system controls on the screen maintains at same position on different browser such as Google Chrome and Internet Explorer.

7.4 Project Contribution

This project will contribute to company or supplier and staff from Bursary Office of UTeM. The procedures to register the company itself and update its information using this system can be fast and efficient. The manual information update and document validation works can be gradually eliminated and replaced by this proposed system which helps to improve the existing system.

7.5 Conclusion

In conclusion, the project objectives that stated earlier in this document are met. The approval module from the existing vendor information system has been migrated to web based. This system is also successfully allow user to update require info onto web based system. Upload certificates onto web based system and send out notification email to users are objectives that has been achieved. Therefore, this system has met all of the project objectives.

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APPENDICES

Please refer to next page for UAT form.

4.0 PELAKSANAAN PENGUJIAN

Nama	Mohammad Hadzir Ahmad	Tarikh	28/9/16
Jawatan	Pg. Tek. Maklumat.	Tandatangan	

BIL	SUB MODUL	MAKLUM BALAS		
		ADA	TIADA	PINDAAN
1.	Daftar syarikat/koperasi	/		- Kata/ayat perlu di maklumkan dan perlu di ubah.
2.	Log masuk dan log keluar dari sistem sebagai syarikat atau bendahari	/		
3.	Tambah maklumat syarikat baru	/		- Field tarikh pendekkan. - Function cancanyan perlu di tambah baik terutama berkaitan button.
4.	Muat naik fail maklumat	/		
5.	Kemaskini maklumat syarikat sebelum kelulusan	/		
6.	Kemaskini maklumat syarikat selepas kelulusan		/	

7.	Cetak maklumat syarikat (Paparkan maklumat syarikat dalam fail PDF)	/		- Boleh ditambahbaik.
8.	Hantar maklumat syarikat dan emel notifikasi	/		
9.	Semakan maklumat syarikat	/		
10.	Kelulusan maklumat syarikat	/		- list senarai syarikat yg belum diluluskan Perlu papar syarikat yg belum diluluskan sahaja.
11.	Paparan maklumat syarikat		/	

5.0 PENGESAHAN PENERIMAAN PENGGUNA

I. Maklumat Pengguna	Nama	: Mohammad Hadzri Ahmad.
	Jawatan	: Peg. Teknologi Maklumat
	Bahagian/Jabatan	: Pembangunan Sistem
II. Maklumat Sistem	Sistem	: Sistem maklumat kemasyan
	Modul	: Pendaftaran syarikat
	Tarikh ujian	: 26/8/16
	Tarikh pengesahan	: 28/8/16
III. Komen Keseluruhan	- interface boleh ditambahbaik - perlu memperbaik function agar berjalan lancar. - skrin kemaskini syarikat selepas kelulusan dan paparan maklumat syarikat belum siap dibangunkan.	
IV. User Acceptance	☐ Ya, terima dan boleh dilaksanakan. ☒ Terima dengan syarat semua penambahbaikan dilakukan di dalam tempoh masa yang dipersetujui bersama.	
	(MOHAMMAD HADZRI BIN AHMAD Pegawai Teknologi Maklumat Pusat Komputer Universiti Teknikal Malaysia Melaka Nama Jawatan Tarikh 28/8/16.	