Secured Online UTP Industrial Training System

By

Normalayati Abdul Aziz

A Final Report submitted in partial fulfillment of
the requirement for the
Bachelor of Technology (Hons)
(Information Communication and Technology)

November 2006

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CERTIFICATION OF APPROVAL

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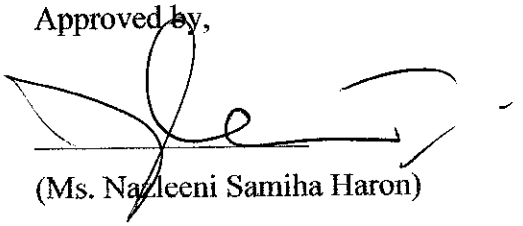
Approved by,



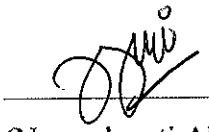
(Ms. Nazleeni Samiha Haron)

Universiti Teknologi Petronas
Tronoh, Perak.

November 2006

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 acknowledgement, and that the original work contained here in have not been undertaken or done by the unspecified sources or persons.



(Normalayati Abdul Aziz)

Date: 7/11/06

ABSTRACT

Nowadays, online system is considered as a need in working world. The rapid growth in Information Technologies triggers the usage of Internet to ensure the effectiveness in delivering tasks. In online system, there are factors that need to be considered such time taken to run the system, the quality of the system and understandability and reliability of system.

As my Final Year Project, I have chosen the Secured Online UTP Industrial Training System. My project will be focus on UTP needs of an automation system. However, I most concerned and precisely explained about the Web Services and Web Security as main scope in this project. Secured Online UTP Industrial Training System is one of the systems that will useful for students while undergone their industrial training. Therefore, it can be concluded that it will help in UTP to the community and management.

ACKNOWLEDGEMENT

First of all, I would like to express a lot of thank to Allah S.W.T to make a success and achieve to this interim stage. A token of appreciations also goes to my University Technology Petronas supervisors, Ms. Nazleeni Samiha Haron and Mr. Anang Hudaya Muhammad Amin for his hardship, guidance, valuable knowledge and understanding.

Special thanks to the entire course mates of the Information Communication Technology and not to forget all my close friends that have assisted and be my backbone while completing the report.

A token of appreciation, thank you to all IT/IS lecturers and staffs for giving directly or indirectly helps in providing the precious information and experience about the final year project. I really appreciate your cooperation in every activity we had together and for the willingness to share the knowledge with me.

Not to be forgotten, thanks to my families for the full support and giving the good advices while I'm in stressed situation.

ABBREVIATION AND NOMENCLATURES

UTP	Universiti Teknologi PETRONAS
SV	Supervisor
SIIU	Student Industrial Internship Unit
ICT	Information Communication Technology
BIS	Business Information System
SSL	Secure Socket Layer
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol over SSL
PDA	Personal Digital Assistance
CA	Certificate Authority
DFD	Data Flow Diagram

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CHAPTER 1
INTRODUCTION

1. BACKGROUND OF STUDY

University Technology Petronas (UTP) is becoming world-class university in education and facilities. It also offers a wide range of engineering and technology programmes at undergraduate and postgraduate levels. University Technology Petronas is promoting the university by sending the students to undergone internship program into various companies in Malaysia as well as international companies. Industrial training is an important course that requires fulfilling for students in order to graduate. The students need to undergone 32 weeks of internship. Currently, University Technology Petronas is using manual system that created few problems to the students and Student Industrial Internship Unit (SIIU) as administrator. One of the problems is to report the logbook and update the latest progress. These 32 weekly reports of every student need to be processed and submitted manually to the SIIU. All process of submitting the documents will cause time consuming, tedious and ineffective to the students. Consequently, I have suggested an online system to be implemented to change from the current manual system into online system as to solve the problems.

Considering nowadays rapid technology, online system becomes a necessity to any companies and institutions. It is necessity to manage content management system and update information on the dynamics of management. By having online reporting system, we will be able to gather information through a simple interface to the database operation as well as reduce the time consuming while using manual system. It is also greatly reduced the workload and simplify maintenance process.

To ensure the security of the system, I have decided to implement the Secure Socket Layer (SSL). Basically, SSL provides secure communication between client (users) and server. Nowadays, every user of a public network sends various types of data from email to credit card details daily. For Secured Online UTP Industrial Training System, I have decided to protect the data transmission in the login page. This is because the main security issue with HTTP is the fact that all the traffic between the client and the server is done as clear text (plaintext). By implementing the SSL, the data will be more secure when in transit over a public network because the data will be encrypted.

1.1 Problem Statement

Previously, there are many problems occurred with the manual system that has been used before. From my research, I have found that the main problem is to organize the documents required by the SIIU. Collecting the weekly reports and final report are timing consuming. As we already known, with the traditional of manual system, there are a lot of trouble occurred in any system itself. I have highlighted two important problems which are current manual system and Web Security. With the current manual system the process is not efficient because it drives to the time consuming and paper redundancy. For example, the students need to go to the SIIU to submit the logbook and final report at the end of the internship and it will cause time consuming as all the students need to queue and wait for the confirmation from the SIIU. However, by having online system, it will be more convenience because the students can directly submit the final report and logbook to the SIIU.

1.1.1 Secured Online UTP Industrial Training System

i. No direct medium for communication

There is no medium for student to have direct communication with SIIU and UTP supervisor. There is no medium for student to channel all their problems and suggestions. There is also a flaw of manual system when few students are unlisted and did not inform any updating information by the SIIU. Sometimes, miscommunication also occurred between the UTP supervisor and SIIU.

There is miscommunication problem occurred by using the manual system. The student will not be directly informed by UTP lecturers. So, this problem will lead to the miscommunication between the student and UTP supervisor. For example, there is a case where a student has missed out his presentation because of the miscommunication between the lecturers and SIIU. SIIU has delivered the wrong information about the date of final presentation.

ii. Paper Redundancy

The redundancy of papers of weekly report also creates a problem for SIIU as the administrator. They have to spend much time in arranging and managing the papers of weekly report. There are numerous of number of students undergone the internship every year. As a result, there will be a load of papers in SIIU. However, by having Secured Online UTP Industrial Training System, it will minimize the usage of papers. It is because all the reports are submitted using this online system.

iii. Time Consuming

While using the manual system, it is time consuming for the UTP supervisor and host plant supervisor to check all the 32 weekly reports. Both of supervisors need to check one by one of each student because the reports will be submitted end of training period.

1.1.2 Web Security

i. Confidential Of Data Transmission

The users and administrator (SIIU) need to worry about the confidentiality of the data transmitted across the Web. The TCP/IP protocol was not designed with security in mind. So, it is in danger to network eavesdropping. The focus of security is in the Login page. Information of username and password need to be kept secret from the intruders. If the intruders or hackers able to get the password and username, they will be able to access the system. They will able to do the adjustment of data inside the Secured Online UTP Industrial Training System. For example, the unauthorized user will be able to change the marking grade for the students. It will eliminate the data integrity in this system.

ii. Token Threats

I'm using the HTTP in this system. As we know, HTTP is a connectionless protocol and Web page requires multiple server requests and responses to complete the page. I choose the method used by the Web server (IIS) to issue a token to the client (user) browser making the request. After the Communicator Web Access server successfully authenticates an internal or external user, it issues a token into a session cookie, which is returned to the client. This cookie is used for access to the server for a single session. Therefore, clients must accept cookies from the Communicator Web Access server to function correctly. An attacker could possibly steal and reuse this token. Communicator Web Access mitigates the token threat by issuing only a session cookie, using SSL (when enabled) to transport the token, clearing the token when the session ends, and causing the token to expire after a period of client inactivity.

iii. Malicious Administrator

The SIIU acts as administrator has rights on a Communicator Web Access server that has been configured for forms authentication. So, the user can view the credentials for any user who logs on to the server. Even though the credentials are encrypted in transit between the authenticating user's computer and the server, the credentials are in plain text when they arrive at the server. The malicious user may then be able to use those credentials to log on and escalate privileges on the network.

1.2 Objectives

The objectives that are to be achieved by the end of this project:

- To build a Secured Online UTP Industrial Training System
- To implement the Secure Socket Layer in Secured Online UTP Industrial Training System

By having this system, it can create the significant cost; resources saving for students thus diminish time consuming for the administrator as well as reducing the paper redundancy. It also allows direct communication among the SIIU, students, UTP Supervisor and host plant Supervisor.

1.3 Scope of study

Basically, my scope of study covers the elements that will be implemented in the system. It is also to achieve all the three main objectives for Secured Online UTP Industrial Training System. This system is focusing on Secure Socket Layer. I will explain in details on how to implement the Secure Socket Layer, Secured Online UTP Industrial Training System development and Data Access Control for SQL Server. Reporting Automated System is a system that will be used to store all the important data for the administrator and to show the security features that will be executed.

1.3.1 University Technology Petronas

University Technology PETRONAS (UTP) was established on January 10, 1997 when PETRONAS was invited by the Malaysian government to set up a university. The campus is built on a 400 hectare (1,000 acre) site strategically located at Bandar Seri Iskandar, Perak Darul Ridzuan, Malaysia.University Technology Petronas (UTP) was established with the objective of producing well-rounded graduates who possess technical competence, lifetime learning capacity, critical thinking, communication and behavioral skills, business acumen, practical aptitude and solution synthesis ability. Currently, UTP offers six major programmes, namely, Chemical Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Civil Engineering, Information and Communication Technology and Business Information System.

1.3.2 Industrial Training in University Technology Petronas

UTP is aware that its undergraduate students must not only learn the theoretical knowledge from class but must also undergo practical work in terms of industrial internship prior to the completion of their studies at UTP. The industrial internship carries sixteen credit hours and lasts for thirty-two weeks. The Industrial Internship Programme is coordinated by the Students Industrial Internship Unit (SIIU). The SIIU responsibility is to ensure the success of the Industrial Internship Programme and to enhance the relationship between UTP and the industry as well as government sectors.

The purpose of industrial internship is to expose UTP students to the world of work so that they can relate theoretical knowledge with application in industry. From the Industrial Internship programme, the students will also develop skills in work ethics, communication, and management. Furthermore, this Industrial Internship Programme will establish close relationship between the industry and UTP.

1.3.3 Secured Online UTP Industrial Training System

The system is used for SIIU to administer all the tasks in the process of Industrial Training process in UTP. With the current manual system, there are many problems have risen. There is no direct communication with the manual system. The students are having difficulties in communicating with their supervisor. The paper load also created immense problem to the UTP. The SIIU needs to handle all the documents manually as it drives to the time consuming in processing the assessments. However, with the Secured Online UTP Industrial Training System will help the all the four main users, namely students, UTP supervisor, host plant supervisor and SIIU to reduce all the difficulties involved in the industrial training process. All the users are able to access to the system but with different level of admission. Basically, the four users are able to view, update, delete and add new data in the Secured Online UTP Industrial Training System.

1.3.3 Implementation Secure Socket Layer

Secure Sockets Layer (SSL) is a security standard designed to provide secure connections on the Internet.).The SSL is a good security protocol because it prevents the system from the eavesdropping, tampering and message forgery. SSL also can ensure the confidentiality and the integrity of data stored. For Secured Online UTP Industrial Training System, I have focused on how to set up a SSL and certificate. In order to successfully use SSL, I choose to obtain a Server Certificate. However, I only focus on obtaining a certificate from a local CA.

CHAPTER 2
LITERATURE REVIEW AND THEORY

2. OVERVIEW ON SECURE SOCKET LAYER

Related to the matters above, I have focused on the Secure Socket Layer (SSL) as it provides data encryption, server authentication and message integrity. It allows web browsers and web servers to communicate over a secure connection. In the secure connection, the data that is being sent is encrypted before being sent. Then, it will be decrypted upon the receipt before processing. Both the browser and the server encrypt all traffic before sending any data. The SSL is designed to make used of TCP in order to provide reliable secure services. There are two important SSL concepts:

- **SSL Connection:** Connection is transport layer that provides suitable services. For example, connection on peer to peer relationship.
- **SSL Session:** SSL session is an association between client and server. It is created by Handshake Protocol. Session is a set of cryptography security parameters, which shares among multiple connections

[Refer articles of Secure Socket Layer from http://www.windowsecurity.com[4]]

2.1 Objectives of Secure Socket Layer

The main objectives for Secure Socket Layer are:

- **Authenticating the client and server to each other**: the SSL protocol supports the use of standard key cryptographic techniques (public key encryption) to authenticate the communicating parties to each other. Though the most frequent application consists in authenticating the service client on the basis of a certificate, SSL may also use the same methods to authenticate the client.

- **Ensuring data integrity:** during a session, data cannot be either intentionally or unintentionally tampered with.
- **Securing data privacy:** data in transport between the client and the server must be protected from interception and be readable only by the intended recipient. This prerequisite is necessary for both the data associated with the protocol itself (securing traffic during negotiations) and the application data that is sent during the session itself. SSL is in fact not a single protocol but rather a set of protocols that can additionally be further divided in two layers:

[Refer articles of Secure Socket Layer from http://www.windowsecurity.com[4]]

The SSL covers all the authentication, data integrity and data privacy which is needed in to ensure the security of Reporting Automated System.

2.2 Method in Secure Socket Layer (SSL)

"SSL addresses the following important security elements:

- **Authentication:** During your initial attempt to communicate with a web server over a secure connection, that server will present your web browser with a set of credentials in the form of a server certificate. The purpose of the certificate is to verify that the site is who and what it claims to be. In some cases, the server may request a certificate that the client is who and what it claims to be (which is known as client authentication).
- **Confidentiality:** When data is being passed between the client and the server on a network, third parties can view and intercept this data. SSL responses are encrypted so that the data cannot be deciphered by the third party and the data remains confidential.
- **Integrity:** When data is being passed between the client and the server on a network, third parties can view and intercept this data. SSL helps guarantee that the data will not be modified in transit by that third party."

In *Figure 1*, it shows how the Secure Socket Layer (SSL) works:

i. A client (user) asks for a connection to the server (local host).

ii. The server listens to the client request.

iii. The server sends its digital certificate to the client to authenticate it self along with its public key.

iv. The client verifies the server's authentication.

v. If authenticated it creates a random session key and encrypts it with the server's public key.

vi. Server decrypts session key using its private key and establishes a secure session.

vii. Optionally authenticate the client to the server.

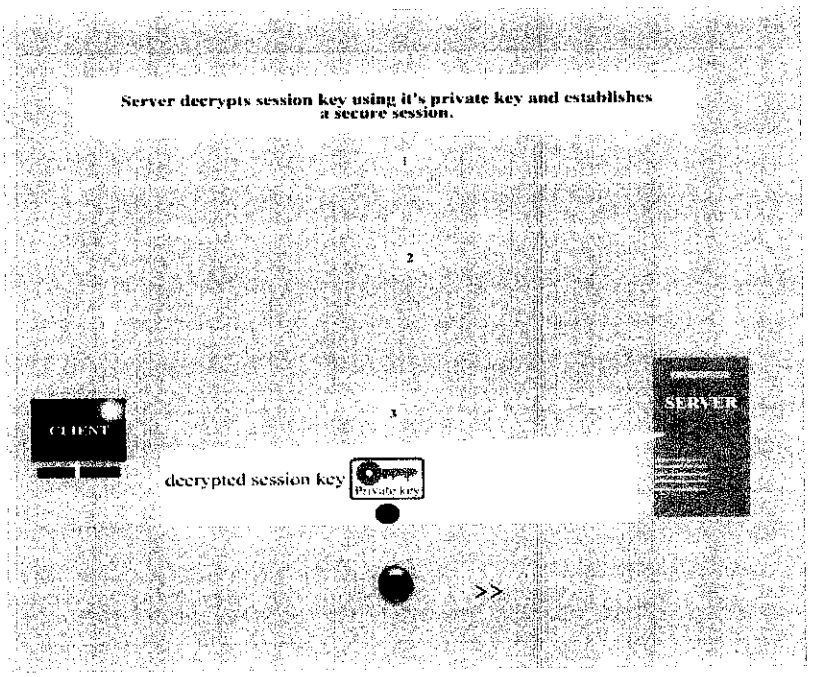


Figure 1

[Refer to online tutorial of http://www.kentlaw.edu/ [1]]

2.3 Different types of SSL

Secure Sockets Layer (SSL) is a security standard designed to provide secure connections on the Internet. Using an SSL solution, we can encrypt confidential data and exchange it over the Internet between Web servers and clients. The minimum components of an SSL solution are an SSL-equipped server, an SSL-equipped client,

and a public-key certificate installed on either the server (typical) or the clients (the exception), or both.

To ensure the security in the connection, the data that is being sent is encrypted before being sent and then is decrypted upon receipt and before processing. Both the browser and the server encrypt all traffic before sending any data. SSL addresses the following important security considerations.

SSL comes in two strengths:

- **40-bit** : Most browsers support 40-bit SSL sessions
- **128-bit** : Netscape Communicator 4.0 enables users to encrypt transactions in 128-bit sessions

The bits are referring to the length of the "session key" generated by every encrypted transaction. The longer the key, the more difficult it is to break the encryption code. For Secured Online UTP Industrial Training System, I have set the login page to the "require secure channel SSL for 128-bit encryption" inside the directory security in Internet Information Services.

[Refer articles of Secure Socket Layer from http://www.windowsecurity.com[4]]

2.4 Implementation Encryption in Secure Socket Layer

2.4.1 Cryptography

"SSL protects confidential information through the use of cryptography. Sensitive data is encrypted across public networks to achieve a level of confidentiality. There are two types of data encryption: symmetric cryptography and asymmetric cryptography (refer to Table 1).Symmetric cryptography uses the same key for encryption and decryption. An example of symmetric cryptography is a decoder ring. Alice has a ring and Bob has the same ring. Alice can encode messages to Bob using her ring as the cipher. Bob can then decode the sent message using his ring. In cryptography, the "decoder ring" is considered a pre shared key.

The key is agreed upon by both sides and can remain static. Both sides must know each other already and have agreed upon what key to use for the encryption and decryption of messages. Remember that the same key is used for encoding as well as decoding messages—thus the term symmetric cryptography.

Asymmetric algorithms use one key for encryption of data, and then a separate key for decryption. Asymmetric algorithms are more favorable than symmetric algorithms because even if the encryption key is learned in one direction, the third party still needs to know the other key in order to decrypt the message in the other direction."
[William Stallings,"Network Security Essentials, Applications and Standard" . Prentice Hall]

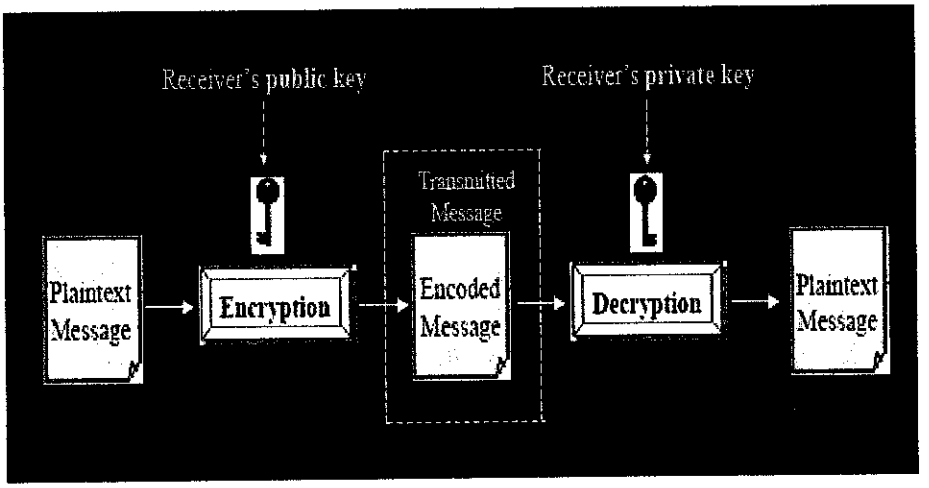


Figure 2: Public key decryption and encryption

2.4.2 Digital certificate

It is a digital code that can be attached to an electronically transmitted message that uniquely identifies the sender. The purpose of a digital signature is to guarantee that the individual sending the message really is who he claims to be. Digital signatures are important for e-commerce and are a key component of most authentication schemes. Digital Certificates facilitate the public key exchange that is required to enable an SSL connection. Digital certificate can be issued by any Certificate Authority; most web browsers contain a list of trusted CAs, such as VeriSign or Thawte. Both the client and server get their digital certificates to authenticate them self.

2.4.3 Digital Signatures

To ensure message integrity, each message exchanged in SSL has a digital signature attached to it. A digital signature is a hashed message digest with public key information. The message digest is based on the checksum of the message. The message digest is difficult to reverse. Both parties compute the message digest separately and compare the hashed results. Matching results means that the checksum was unaltered during transit, minimizing the chance of a compromised message

[William Stallings, "Network Security Essentials, Applications and Standard" . Prentice Hall]

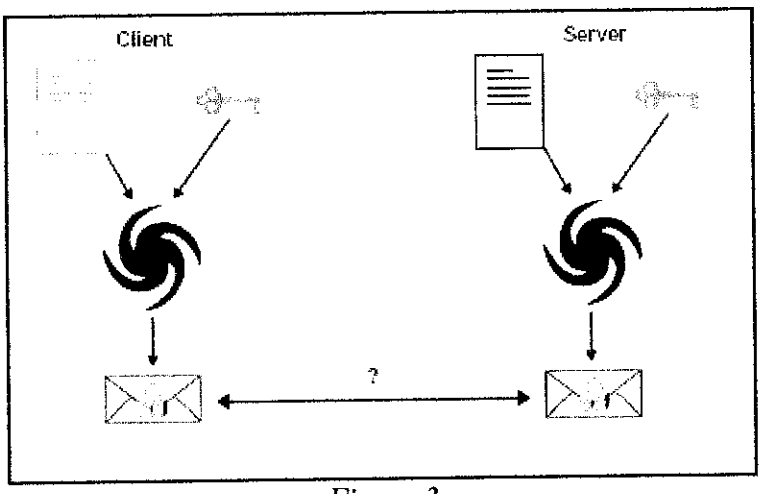


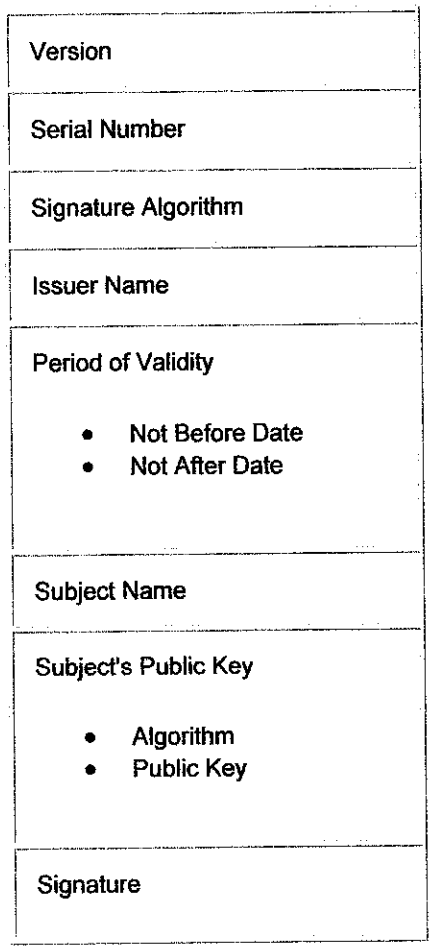
Figure 3

1. Client sends a message
2. Client has message and a public key
3. Client hashes message with public key
4. Server takes random message and knows public key
5. Server hashes message with public key
6. Server sends hashed message
7. Client compares its own hashed message to server's message
8. If the two match, then the message has not been tampered

2.4.4 Certificates

SSL uses digital certificates to authenticate servers .SSL also includes an optional authentication for clients. Certificates are digital documents that will attest to the binding of a public key to an individual or other entity. They allow verification of the claim that a specific public key does, in fact, belong to the specified entity. Certificates help prevent someone from impersonating the server with a false key.

X.509 certificates for testing purposes only. It creates a public and private key pair for digital signatures and stores it in a certificate file. This tool also associates the key pair with a specified publisher's name and creates an X.509 certificate that binds a user-specified name to the public part of the key pair. These certificates contain information about the entity, including public key and name. A certificate authority then validates this certificate (refer to *Figure 4*)



CHAPTER 3
METHODOLOGY

3. METHODOLOGY

The methodology that I have used is Throw Away Prototyping. Basically, this method included the development of prototypes and done at different point in System Development Life Cycle (SDLC). There are five stages in throw-away prototyping, namely planning, analysis, design and prototyping, implementation and system *(refer to Figure 3.0)*. It has relatively thorough analysis phase that used to gather information and to develop ideas for the system concepts. It is a product that represents the system that needs additional refinements and enables users to understand the problems occurred under the development process.

The objective of throw-away prototyping is to validate or derive the system requirements. A system that is developed probably relies on the several design prototypes during the analysis and design phase. By using this method, the risk can be minimized by confirming the issues before the real system is built. This methodology a balance in benefits of through out analysis and usually produces more stable and reliable system. I also can ensure the working system is available early in the process. When we start the prototyping process early, it will reduce the requirements risk

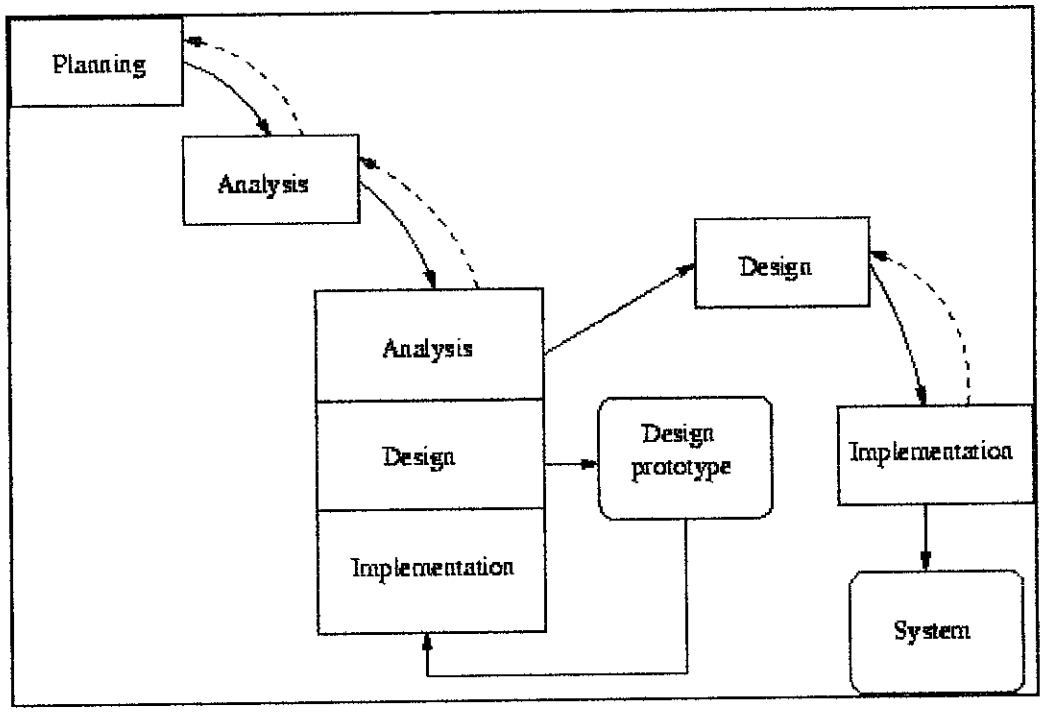


Figure 5

3.1 Data Analysis

I have done the research on the system and the security part. For the system, I have do some research on the documentation matters and problems that occurs in previous manual system. In the security, I have focused on Secure Socket Layer (SSL) in Web Services, additionally the data access control in SQL Server. Theoretically, the rationale of doing research is to define all the elements that will be put in this system. Doing study on the SSL is to make things clear on how to implement the SSL in this system.

For the programming part, I have done on the tutorial part of ASP.NET and SQL programming. By doing research, it helps me a lot especially in handling the error while doing the programming

3.1.1 Tools

These are the tools required to develop the Reporting Automated System:

3.1.1.1 The development platform:

- Dreamweaver MX 2004

3.1.1.2 Language:

- Active Server Page

  ASP arrives complete with authentication providers that provide interfaces to other levels of security existing within or external to the web server computer system. Web configure is utilized to define security settings such as; the authentication method to use, the users who are permitted to use the application and how sensitive data should be encrypted

3.1.1.3 Database server:

- Microsoft SQL Server

  For the authentication, we can choose whether using the Window Authentication or SQL standard login. SQL Server supports two authentication modes; Windows Authentication Mode and Mixed Mode

3.1.1.4 Design tool:

- Fireworks and Photoshop are used to do the design for the interface.

3.1.1.5 Web server:

- Microsoft Internet Information Services (IIS) 5.0

  To integrate Windows authentication that used in ASP.Net the application needs to be properly configured to do so via IIS. It also used to configure the directory where the protected resource is located.

3.2 Data Gathering

The method that I have chosen to gather all the data is by distributing the questionnaires. It is because as a mechanism for obtaining information and opinion about the current manual system for industrial training in UTP and new suggestion to improve the current system. In general, questionnaires are effective mechanisms for efficient collection of certain kinds of information in a big group. The questionnaires are also easy to analyze and familiar to most people. So, UTP student will not feel apprehensive while completing the questionnaires. It is relatively quick to collect information using questionnaire especially in a university.

3.3 Design and Prototyping

For the second phase, I have designed the Graphical User Interface (GUI) for the system itself. I have used the Visual Studio 2005 for this automation system. The design is started with the storyboard. All the navigational functions are being tested to meet the requirement of Human Computer Interaction (HCI). I have designed the prototyping for the different users (SIIU, students, UTP Supervisor and Host plant Supervisor).

Generally, the main features in this system are Login Page, View Page, Add Page, Edit Page and Delete Page. All these pages are implemented in each user's page. All the system data will be stored in the FYP Database (refer to Appendix: Figure 5). Below is the Data Dictionary for this table:

Table Name	**Description**
TBL_STUDENT	Use to store the information about the students. For example, student name, ID number and programme.
TBL_LECTURER	Use to store the information related to the UTP lecturers that have been assigned to be a supervisor. For example, lecturer name, address, email and telephone number
TBL_SUPERVISOR	Use to store the information of host plant supervisor. For example, the name, address, position and company name
TBL_ADMIN	Use to store the information of administrator (SIIU). For example, name, level of admission , status , messages received and total marks

TBL_FACULTY	Use to store the information related to the faculty. For example, the faculty name, address, telephone number and fax number
TBL_PROGRAMME	Use to store the information of programme in University Technology Petronas such programme name.
TBL_COMPANY	Use to store the data about the company of host plant supervisor. For example, the company's name, address, telephone number, fax number and company profile.
TBL_WEEK	Use to store the data about weekly report such weekly brief
TBL_YEAR	Use to store the data about the year. For example, year of undergoing the internship
TBL_LOGIN	Use to store the data for login page such username and password
TBL_DOCUMENT	Use to store the data of documents required by SIIU

3.4 System Testing for SSL

3.4.1 White Box Testing

- Testing that is underlying implementation of the source code without regard to the external description for this system

- White box testing strategy deals with the internal logic and structure of the code. The tests written based on the white box testing strategy incorporate coverage of the code written, branches, paths, statements and internal logic of the code etc.

- In order to implement white box testing, I have to deal with the code and hence needed to possess knowledge of coding and logic i.e. internal working of the code. By using the white box test, also I need to look into the code and find out which unit/statement/chunk of the code is malfunctioning. I have tested only on view page of each user's page.

- **Unit Testing**

  I have chosen the unit testing. This is the simplest method in white box testing. I have carried out unit testing in order to check if the particular module or unit of code is working fine. The Unit Testing comes at the very basic level as it is carried out as and when the unit of the code is developed or a particular functionality is built.

3.4.2 Black Box Testing

- In black box testing, I have tested without the knowledge of internal workings of the item being tested. Meaning, it is applied to the tester that would only know the "legal input" and the expected output. But, it is not how the program actually gets arrived at those "expected output".

Simply saying, it is testing that occurs from the viewpoint of an end user. Black box tests find bugs such as incorrect functions, interface problems, and database errors. I have assigned few of my friends to test the functionality of this system. They are given specific time to use it. Therefore, black box testing is absolutely mandatory for acceptance testing. They must able to understand all the features to ensure that I have achieved the expected level.

3.5 Deliverable of system

This is the final stages after completing the design phase, construction phase and testing phase. The system will be delivered to the end user after completed all the phases by meeting all the requirements needed.

CHAPTER 4

RESULT AND DISCUSSION

4. SECURED ONLINE UTP INDUSTRIAL TRAINING SYSTEM

4.1 User Requirements

Right now, the current system of industrial training consists of paper applications. By having Secured Online UTP Industrial Training System, it allows the SIIU to concentrate on updating the system rather than handling the manual bureaucratic procedures. The user requirements will describe the basic features that implemented in this system. To build a reliable system, we need to define precisely the user needs. Mainly, there are 4 users that involved in this system. After doing the research, these are the requirement based on the 4 types of user; SIUU, student, Supervisor UTP, Supervisor Host Plant. All the users are having different requirements.

User Requirements	
1. Students Industrial Internship Unit	▪ View the new ▪ Approve the student's account ▪ View all the 3 users (student, SV UTP, SV Host Plant) ▪ Have functions like view, create, edit, and delete all the users account. ▪ Check all the documents submitted by students and both supervisors ▪ Search user by based on user ID ▪ Give full report of grade obtain by the students

2. Student Module	▪ Register for internship by filling up the registration form ▪ This form is based on the student's course and batch. It is to avoid the overlapping among the students going for internship. ▪ Register the confirmation of Host Company ▪ Filling up the training schedule for 32 weeks ▪ Submit the weekly report based on weekly task at the Host Company ▪ Submit the final report at the end of industrial internship ▪ Send messages to administrator (SIIU) ▪ All the documents submit by student will be timestamp. ▪ View the grade getting for internship ▪ View all the updated messages provided by the SIIU to get students aware of new information

3. Supervisor UTP Module	▪ View all the students under supervision ▪ Enable to view student's document such weekly report, final report and training schedule ▪ Search student based on student id and course ▪ View updated messages from the SIIU ▪ Have access to contact the Supervisor host plant, students, and SIIU ▪ View the marks of weekly report ▪ View the assessment of student's performance ▪ Fill in the oral presentation score sheet based on student presentation and student's score form
4. Supervisor Host Plant Module	▪ Register by filling up the form registration ▪ Fill in the student information under supervision ▪ Able to view and give marks for students log book ▪ Filling up the form for assessment of student's performance during industrial internship ▪ View messages from the SIIU ▪ Send comments to the UTP Supervisor and SIIU regarding the students performance ▪ Have access to contact information of students, UTP Supervisor and SIIU

Currently, University Technology Petronas is using the manual system for Industrial Internship. One of the problems mentioned is to arrange all the forms that manually processed by staffs in the SIIU. As administrator facing few problems with the current system, I have come out with the idea of Secured Online UTP Industrial Training System. The main significances of this project are:

- System should allow students and companies to register online.
- New automated system should match with administrator's requirement
- System should able to provide the web based application to submit all the required documents through online system.

The students require going through all the phases in *Figure 4.1* for them to complete the industrial internship. Assessment is the most important element in Reporting Automation System. Generally, the students performances are based on submission of document such weekly report and final report as well as the assessment marks given by host plant supervisor. The marks and grade will be given based on the assessment from both supervisors. There are four important documents required by the SIIU:

- Confirmation of registration (student)
- Training Schedule (student)
- Weekly Report / Log book (student)
- Final Report(student)
- Assessment during internship (plant supervisor)
- Oral presentation Score Sheet (UTP and plant supervisor)

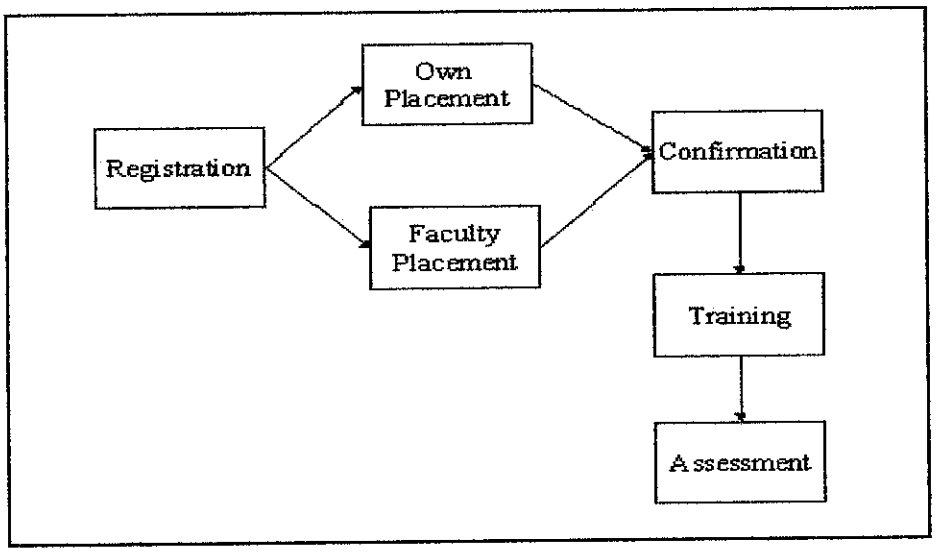


Figure 6: Flow of Industrial Training

There are four users in Secured Online UTP Industrial Training System; SIIU (Administrator), students, UTP supervisor and host plant supervisor. All the users have different level. These tables describe the basic features that will be implemented in this system.

I. SIIU (Administrator)

Available Features	Description
Login	A security measurement in which Administrator must provide a correct username and password in order to access the administrator features.
View	Allow administrator to view all information, feedback, as well as registered user under the system.
Sort	Allow administrator to sort the users
Logout	Ending all session and exiting the system.

II. End-user (Student, Lecturer and SV Host Plant)

Available Features	Description
Login	A security measurement in which user must provide a correct username and password in order to access the user's features.
Add	Allow user to weekly report and final report as required.
Edit	Allow user to change any record regarding the information
Delete	Allow user to delete any record that they have entered into the database.
Save	Allow user to save all the information into the database.
Submit	Allow user to submit the entire particular that they have inserted in order to see their overall score.
View	Allow user to view the information that have been saved into the database, so that they can do any amendment before submitting i
Logout	Ending all session and exiting the system.
Feedback	Allow user to give any feedback regarding the system.

4.2 Questionnaires Analysis

There are 6 questions stated in this survey form. I have distributed this form to 50 students in UTP. The purpose of having this survey is to have student's opinion about converting manual industrial training system into an automation system. Nowadays, almost 80% process of learning and information administration have been done automated. By upgrading from manual into automation system, optimistically it will be more useful and practical system to be used.

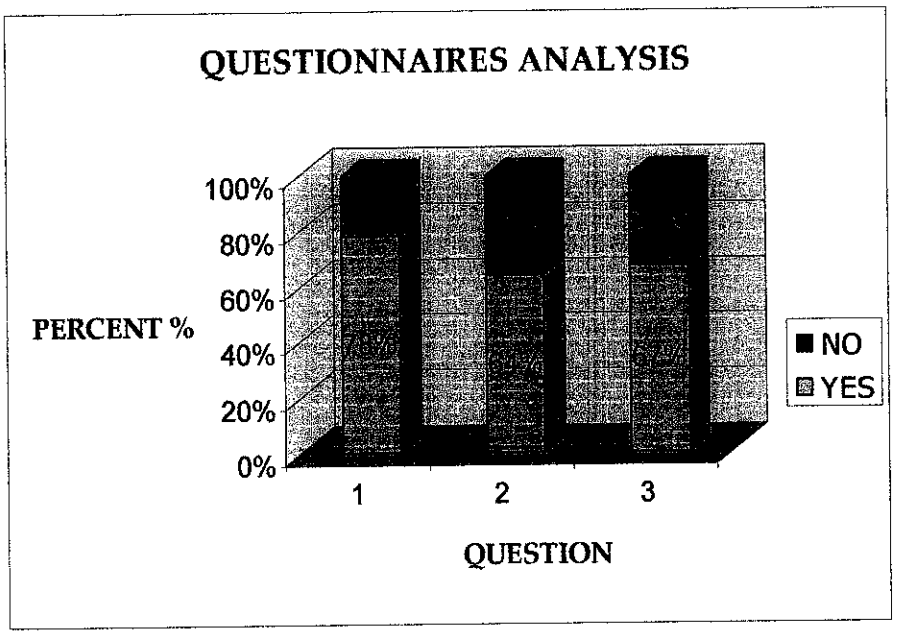


Figure 7

For the Question 1 till Question 3, the bar graph in the *Figure 7 has* illustrated the result For Question 1, there are 78% students in UTP have realized the importance of online system nowadays. However, there are 22% students who do not aware of it. In Question 2, there are 64% students are having problems with the current manual Industrial Training compared to the 36% that do not have any problem at all. For question 3, 67% students have a thought that having the online system will ease the task of submitting weekly report. Otherwise, 33% students do not agree with it. From the analysis above, it shows that UTP students are really need the online system. Furthermore, online system is becoming much more prominent in our daily life.

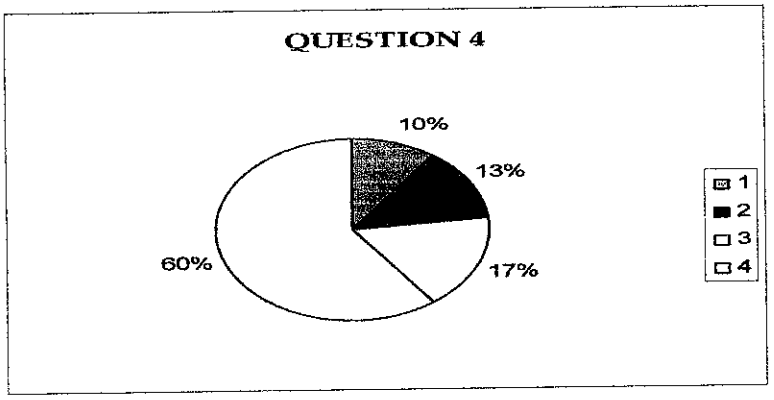


Figure 8

For Question 4, the rate of 4 gets the highest percentage, 60%. It follows by rate 3, 17%, rate 2 gets 13 % and rate 4, 10%. They have rated their needs on online system for Industrial Training while undergoing the internship. From the result, it shows that the students have voted to have an automated while they undergoing internship. This system acts as medium for communication among the students, lecturers (SV UTP) and SIIU. It also used to channel their needs and share the problems faced.

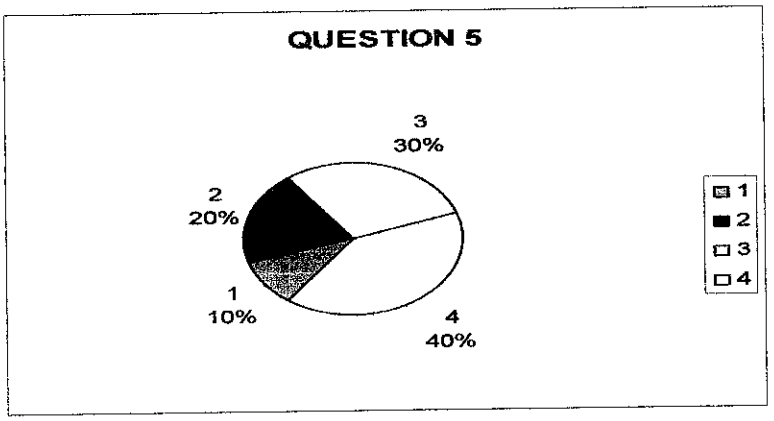


Figure 9

For *Figure 9,* it shows the rate of efficiency level in manual system that has been implemented (recent manual system) voted by students. The highest rate is 40%, rate 4. The rate 3 gets 30%, rate 2 is 20% and 10% for rate 1. From the result, we can conclude that there is problem in the current system. That's the reason why I have come out with this automated online reporting for industrial training.

4.3 Flow Chart

This flow chart is only show the process of submitting the weekly report as required. The students can upload the weekly report at anytime they want. This shows the efficiency of online system.

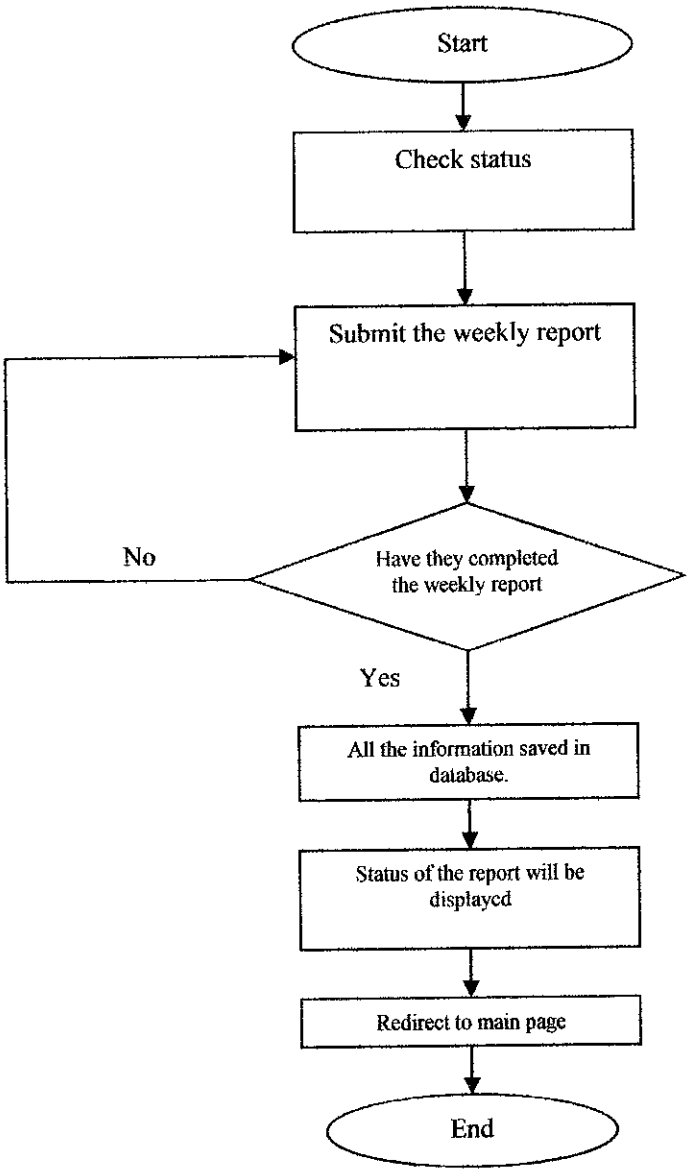


Figure 10

4.4 System Functionality

It defines only the basic functions inside the Secured Online UTP Industrial Training System.

Login Page

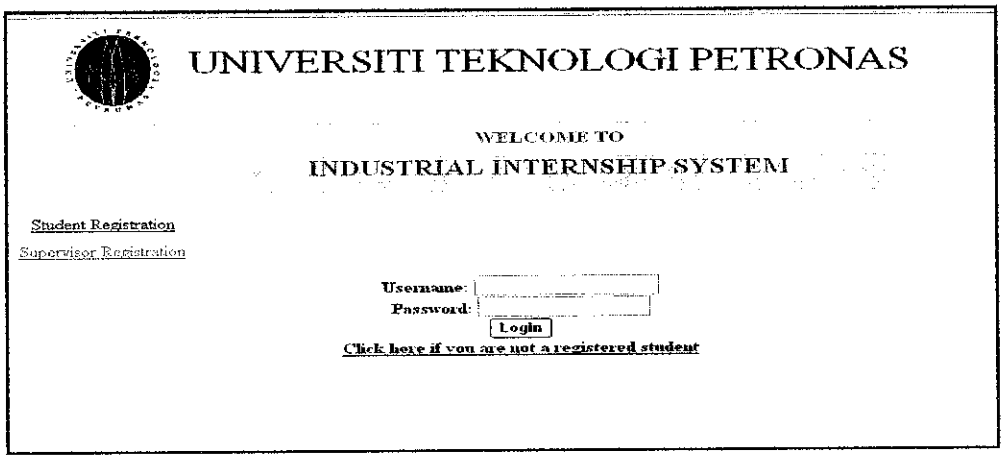


Figure 11

In this login page, the users need to fill in the username and password to authenticate the users. Only the valid user can access this system. I also have implemented the Secure Socket Layer (SSL) to ensure the system security. So, the login page will be https (https://localhost/SSL_login/Login.aspx) instead of http. If the user is not a registered user, they have to fill up the registration form to access it. Different users have different level of accessing this system. The system will redirect to the main page according to the level of admission.

View Page

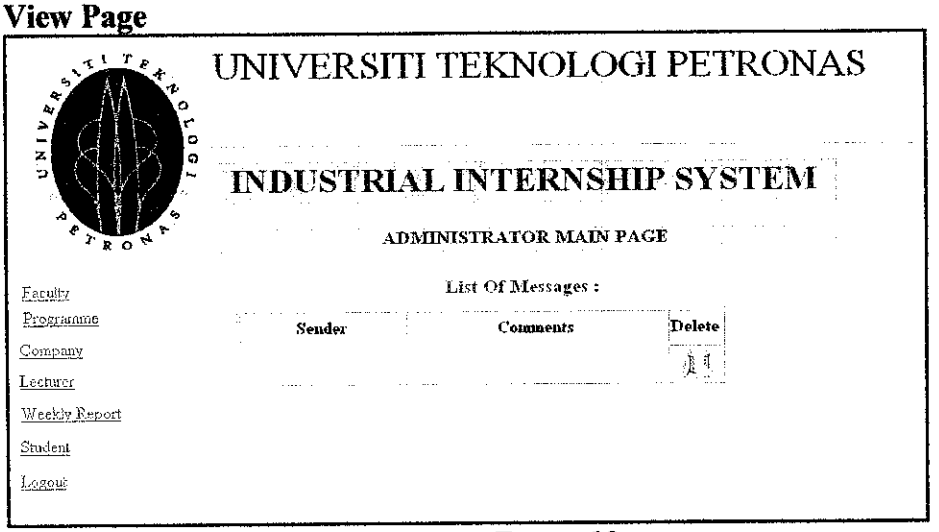


Figure 12

The main task of administrator is to maintain and administer all the users. The SIIU is able to view and access the information from 3 users (students, UTP Supervisor, Host plant Supervisor).The *Figure 12* shows the function to view the messages that have been sending by users. The administrator is able to view the messages and delete the unnecessary message.

Insertion Page

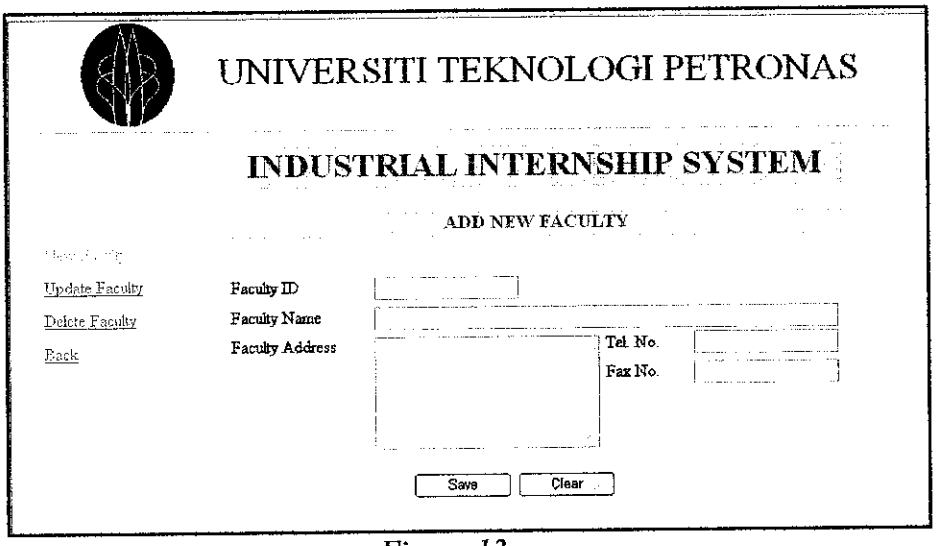


Figure 13

This is the form used by SIIU to add the new UTP Supervisor from different faculty. There are four faculties in University Technology Petronas ; ICT & BIS Department, Mechanical Engineering Department, Chemical Engineering Department, Electronic & Electrical Engineering Department and Civil Engineering Department

Update Page

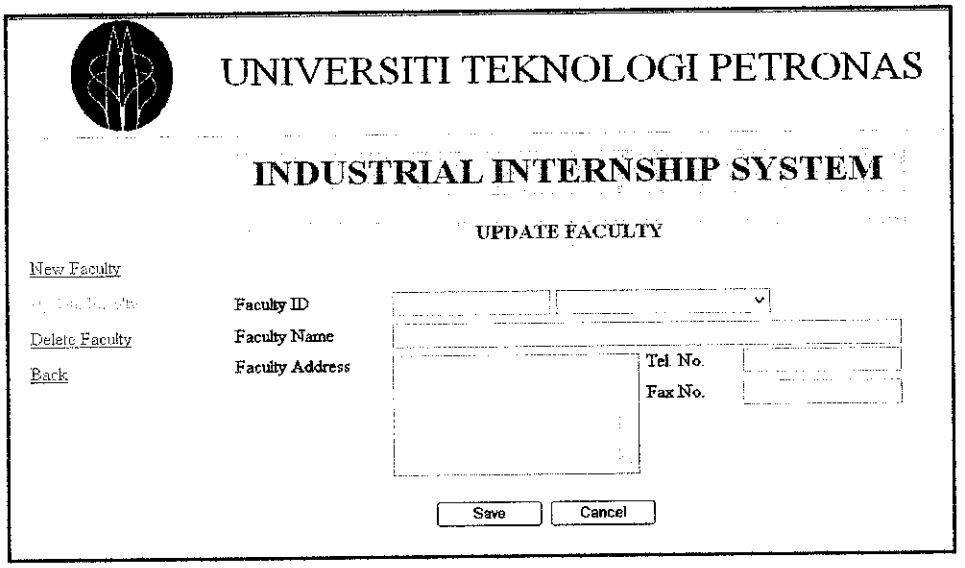


Figure 14

This page is used to update the faculty by adding new information of the new faculty in University Technology Petronas. For example, the changes on the telephone number and the fax number. It will be helpful to the SIIU if keep on updating the information

Delete Page

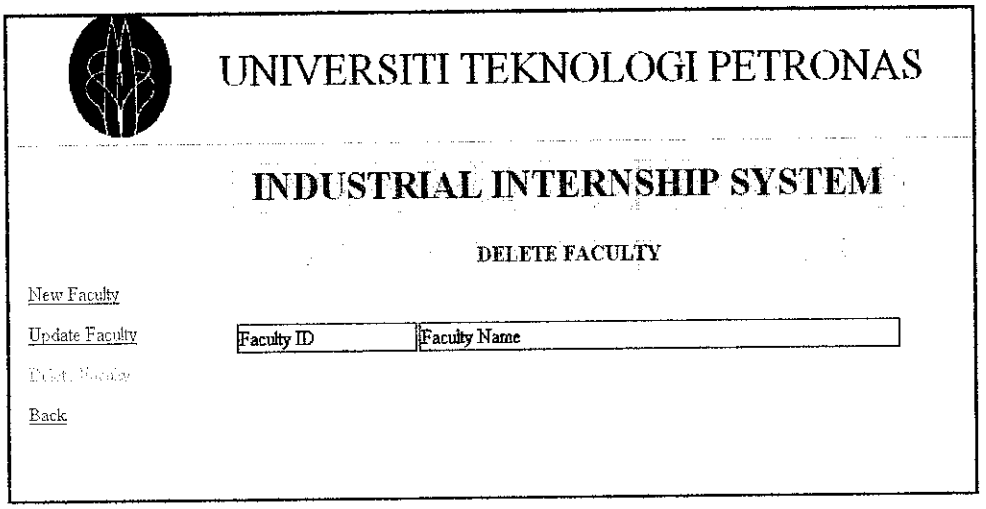


Figure 15

The users are allowed to delete the faculty based on their ID and name of UTP Supervisor. For example, if the lecturer is no more working in UTP, so we can remove all the related information. So, it will reduce the spaces uses in database system and avoid the redundancy.

4.5 Implementation of Secure Socket Layer

For security purpose, I have decided to implement the Secure Socket Layer in Secured Online UTP Industrial Training System inside the login page. It is because Secure Socket Layer is critical for protecting private information like username and password. SSL is a protocol for securing client-server communications and includes mechanisms for authentication, encryption and decryption.

It has two important functions; authentication of the server and client at the beginning of the session, and encryption/decryption of data exchanged between the two parties during the session.

These are the security features that have been implemented in Reporting Automated System:

- **Login Page:** This is a page that I have focused on SSL. The username and password is required to access this system. By using SSL, I can ensure the confidential user information and a secure connection between a client and a server, over which any amount of data can be sent securely. By executing the SSL, the URL of login page will use the HTTPS technology instead of HTTP. It shows that login page has been secured by SSL.
- **Password Display:** The password will only appear the dotted line. So, we do not expose the password from other users and can avoid from being seen.
- **Message Password:** After logging in the system, the sender inside the machine will send the user id based on their privileges. Different user has different level of access. If the user has key in the wrong input for password and username, the system will pop up a message of error and redirect to the login page.
- **Page Time Out:** I have set the time expired for every session in 10 minutes. If the user just left the system without using it, the session will be end. Therefore, the user needs to re-login. I also have disabled the usage button next to the login page after the session end.

- **Session Id:** I'm using the session password to avoid unauthorized user from accessing the system. If it is expired, then it will redirect to the login page.

The main security issue with HTTP is the fact that all the traffic between the client and the server is done as clear text, meaning that anyone could potentially "listen" to talk and grab frames and valuable information from the net. To secure the transmission of information between web servers running IIS 5.0 on, I have encrypted the information being transmitted by using SSL (Secure Sockets Layer).

For this automation system, I have implemented the Secure Socket Layer (SSL) in order to secure the submission data in the login page (https://localhost/SSL_Login/Login.aspx). I have focused on how to set up a SSL and certificate. In order to successfully use SSL, I choose to obtain a Server Certificate. I only focus on obtaining a certificate from a local CA. However, it is possible that we acquire the Server Certificate from a trusted 3rd party CA such as Verisign or Thawte. The figure shows the security architectures that involved the IIS, ASP.NET and SQL Server.

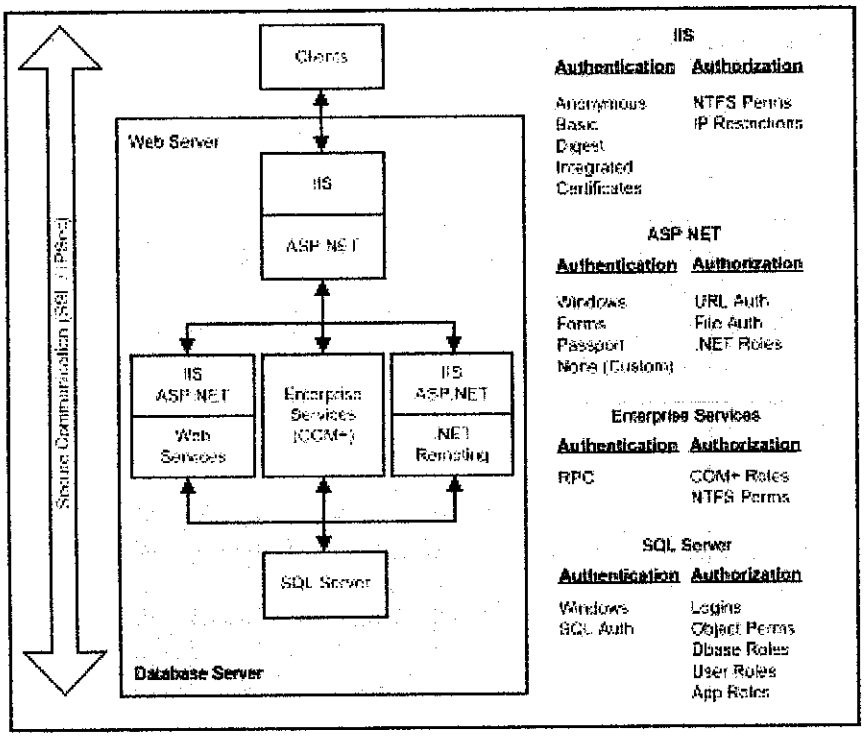


Figure 16

4.5.1 Steps to Verify That SSL is working

To test the new settings connect, open a web browser and type in the address bar (https://localhost/SSL_login/Login.aspx). However, if we are using the HTTP (plain text http, using TCP port 80) we will get the following error message (*Figure 14*):

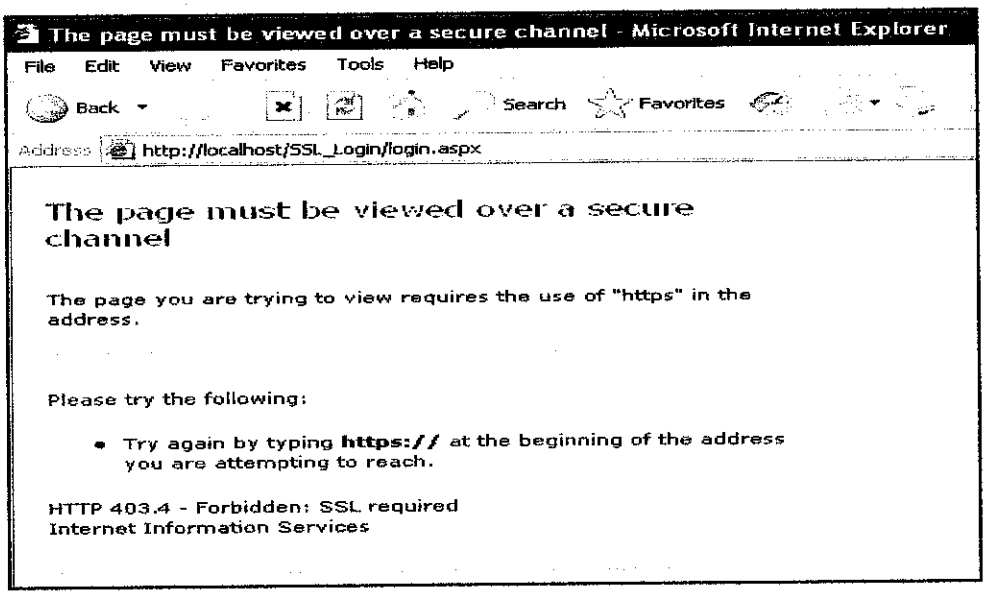


Figure 17

Now re-type the URL by using HTTPS instead of HTTP. Then, we should be able to view the web page of login and receive a Security Alert window *(Figure 18)*.

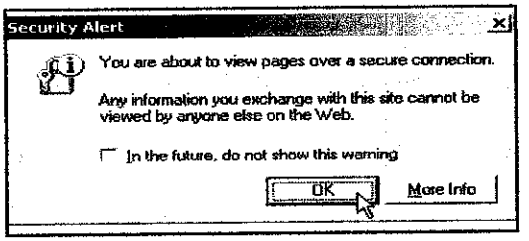


Figure 18

If configured correctly, I have able to connect to SSL-protected website (https://localhost/SSL_Login/Login.aspx).

To verify that we're using SSL, we will find a small yellow lock icon on the browser lower right corner. Double click the lock icon. A Certificate window will open and review the information that is entered into the certificate. For Reporting Automation System, the certificate is issued to the IP address of local host (164.0.5.142)

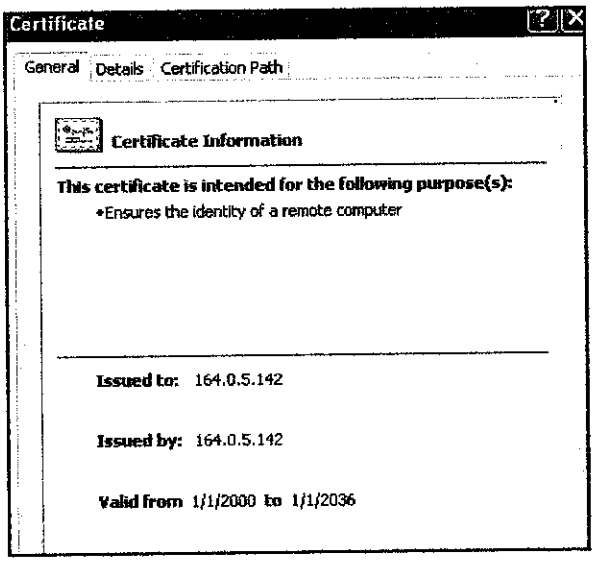


Figure 19

4.5.2 Setting the Secure Socket Layer

This table shows the steps on how to set up the Secure Socket Layer in Secured Online UTP Industrial Training System and how to create the certificate. These are the procedures:

- Locate makecert in C:\Program Files\ Microsoft Visual Studio 8\SDK\v2.0\Bin
- Use command prompt and type in

```
makecert -r -pe –n
"CN=164.0.5.142; O=University Technology Petronas;
OU=SIIU; C=Malaysia; ST=Perak; L=Tronoh "
-b 01/01/2000 -e 01/01/2036 -eku 1.3.6.1.5.5.7.3.1 -ss
my -sr localMachine -sky exchange –sp "Microsoft RSA
SChannel Cryptographic Provider" -sy 12
```

- To add the certificate, open mmc.exe. Then open the console, select Add/Remove
  Snap-in. Add the certificate to the local computer.
- Open the Console Root -> Certificates(local host) -> Personal->Certificates

Output

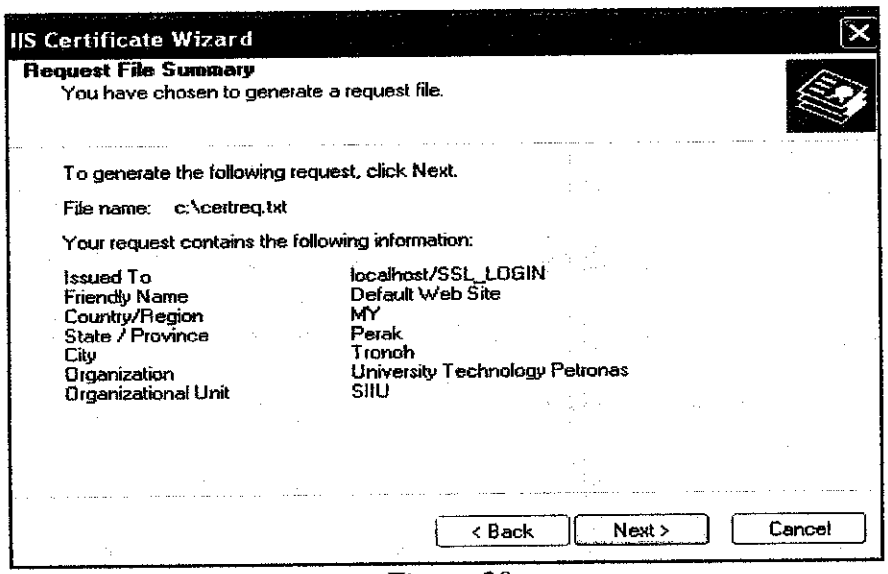


Figure 20

Communications section click "Edit". Then, check "Require secure channel (SSL) and "Require 128-nit encryption".So, now the page Login.aspx should only use SSL (https://localhost/SSL_Login/Login.aspx)

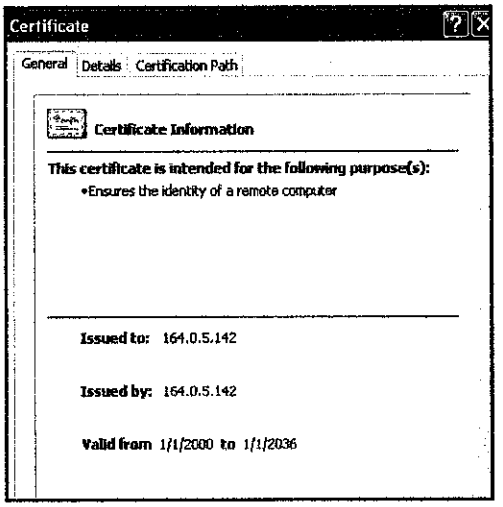


Figure 22

- To make the certificate "trusted", copy the certificate to the following destination Console Root -> Certificates (Local Computer) -> Trusted Root Certification Authorities -> Certificates.
- To prevent the browser from popping up the warning certificate, choose the certificate in Console Root -> Certificates (Local Computer) ->Personal -> Certificates-> Export

Output

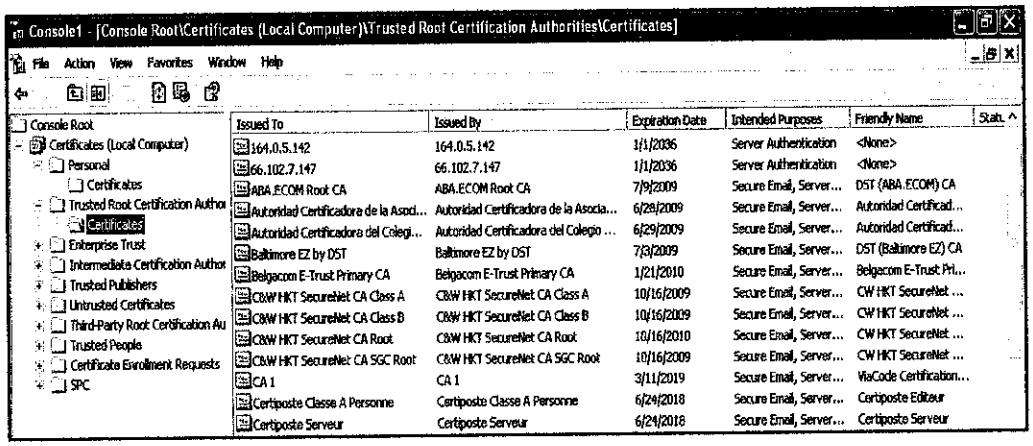


Figure 21

- To install the certificate, open up Internet Service Manager by Settings -> Control Panel - >Administrative Tool -> Internet Service Manager. Right click on the item of Default Web Site -> properties. Then select Directory Security" and click "Server certificate". Then, choose the Certificate () that was created before.

- To force any aspx page to use SSL, choose Login.aspx file in Internet Service Manager, choose File Security tab and under Secure

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5. 1 Recommendation

For future enhancement, there are few additional that need to be added to ensure the full usage of automated system. These are the features that I have recommended for future enhancement:

- **Forum/ Chat Room** : to give any constructive comments or recommendation about the company(host plant) and SIIU management while undergone the internship
- **Email notification**: It will propagate notification if the student has submitted the required documents to the SIUU and lecturer. They will be notified.
- **SMS notification** : Instead of propagating using email, this system also capable to notify the users by using SMS notification if there is any important message such meeting, updating news or document submission.
- **Mobile Reporting Automation System:** By using the mobile technology, the users able to view all the information using PDA. It will enhance the efficiency in this system.
- Printed document by using **Crystal Report** as document purposes for SIUU.

5.2 Conclusion

This project contributes a simple and secured online system to the UTP students and SIIU. It helps the students to register and submit all the documentations required by SIIU using the Secured Online UTP Industrial Training.

From the research and development done for Secured Online UTP Industrial Training, I can honestly claimed that I have reached the objectives by developing simple online system and implementation of Secure Socket Layer.

As a conclusion, this project is focused on current industrial training manual system, online system and the Secure Socket. In developing an advanced system, there are basically few things that need to be considering such web security, web services and secured network. It must be able to handle and process the documentation in electronic form. It is also can create significant cost, time and resources savings for the students, staff and community. Overall, Secured Online UTP Industrial Training System is intended to assist the UTP students while undergoing 8 months of industrial training.

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Institute of Computer Science, Foundation for Research and Technology

APPENDICES

Questionnaire: Reporting Automation for Industrial Training
Brief Explanation
Automation Industrial Training is one of the systems that will useful for students while undergone their industrial training. Therefore, it can be concluded that it will help in UTP to the community and management

Please tick all your answer in the given boxes.

1. Are you aware of the importance of online system?

   ☐ Yes ☐ No

2. Do you have any problems with the manual system of Industrial Training?
   ☐ Yes ☐ No

3. Does it easier when students are able to submit the weekly report using online system?
   ☐ Yes ☐ No

4. Please rate the needs of online system for Industrial Training for you while undergoing the internship?
   ☐ 1 (Least)
   ☐ 2
   ☐ 3
   ☐ 4 (Most)

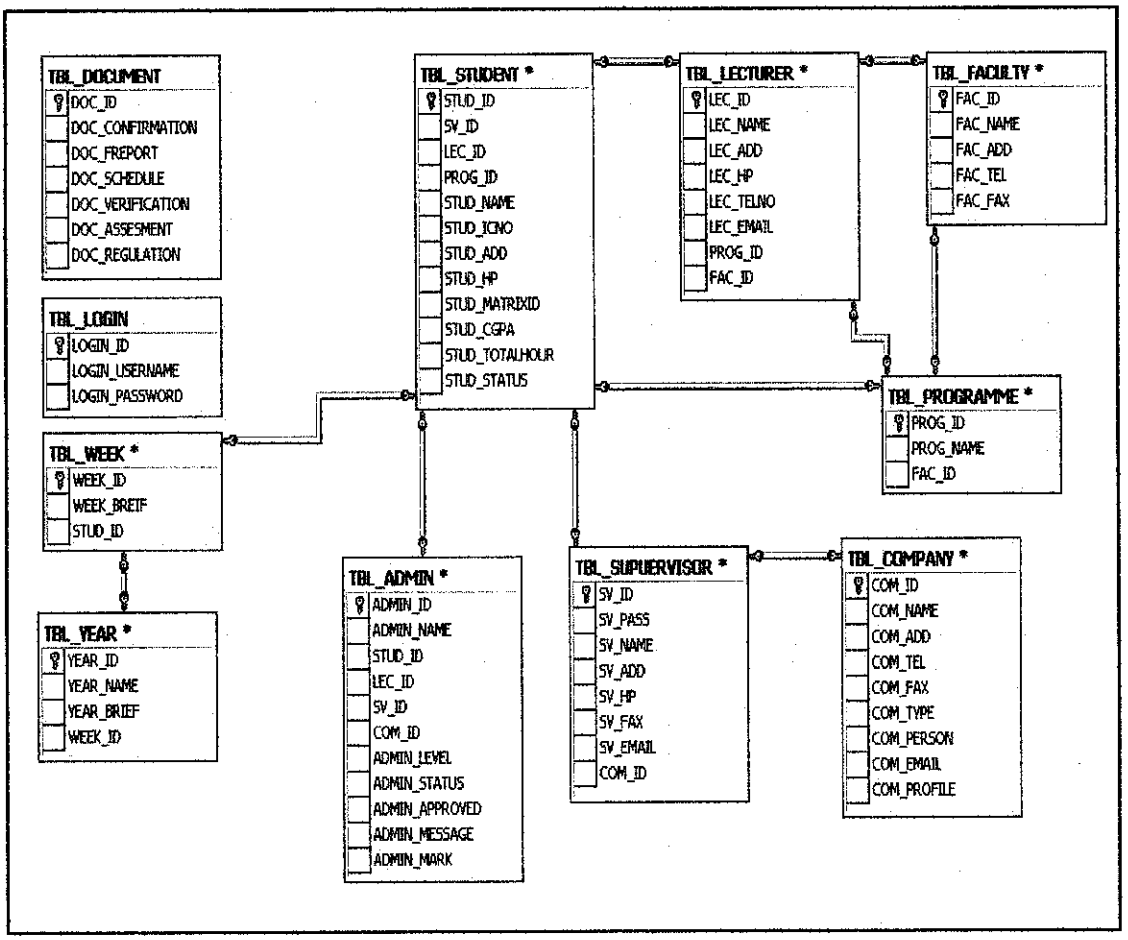
5. Please rate the efficiency level of manual system that has been implemented (recent manual system)
   ☐ 1 (Least)
   ☐ 2
   ☐ 3
   ☐ 4 (Most)

6. Suggestion to the new online system (requirements)

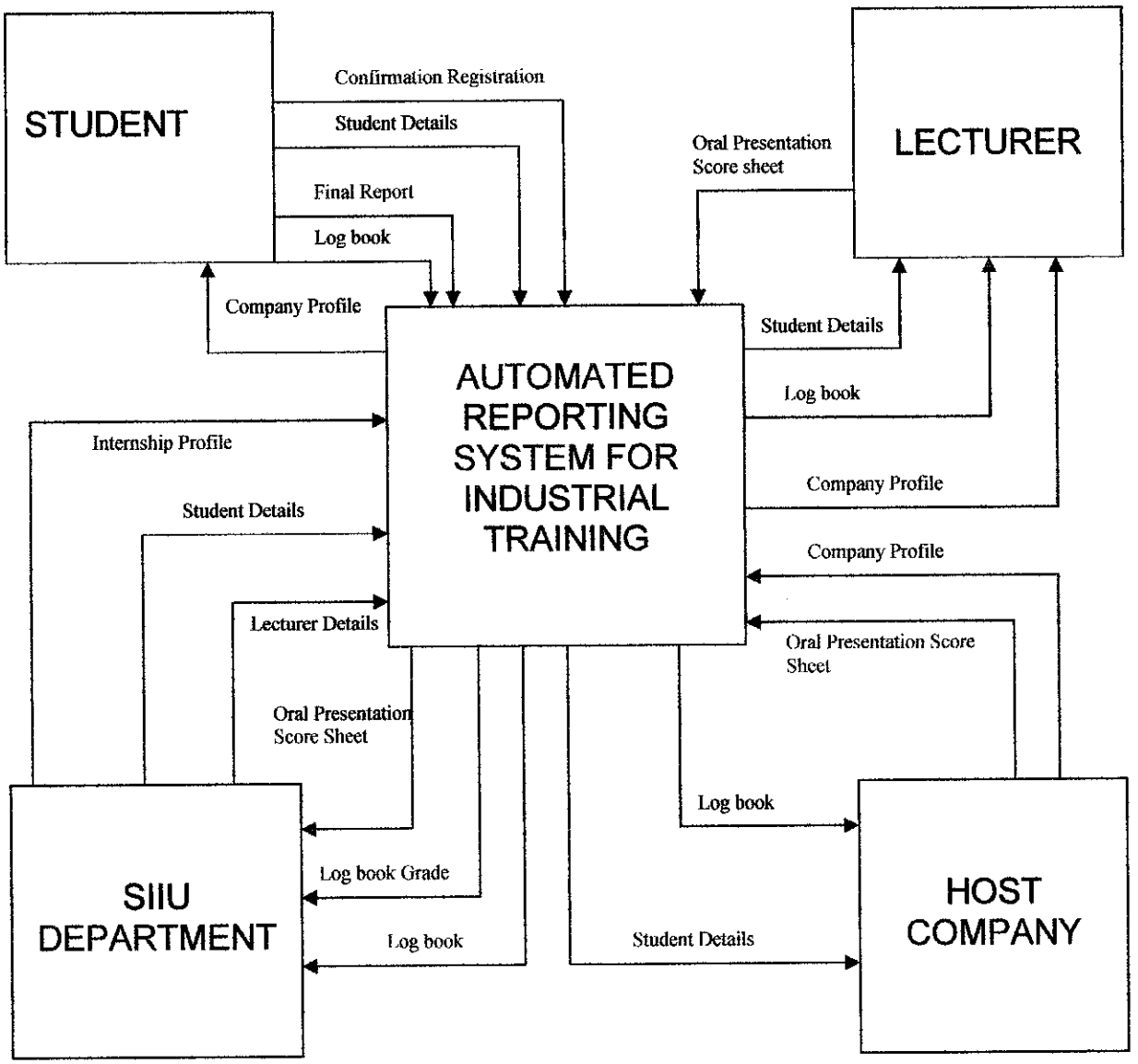
   _____

   _____

Database Diagram



0-Level System DFD



Use Case of Secured Online UTP Industrial Training System