



Intranet-based Timesheet Information System

by

Mr. Pollarit Petchvorakul

A Final Report of the Six-Credit Course
IC 6998 E-Commerce Practicum

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Internet and E-Commerce Technology
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Name Mr. Pollarit Petchvorakul

Project Advisor Rear Admiral Prasart Sribhadung


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Approval Committee:


(Rear Admiral Prasart Sribhadung)
Dean and Advisor


(Prof. Dr. Srisakdi Charmonman)
Chairman


(Dr. Ketchayong Skowratananont)
Member


(Assoc. Prof. Somchai Thayarnyong)
MUA Representative

July 2003

ABSTRACT

This report was written to study about the problems found in the company which provides an hourly service to customer and how to implement a web based application to solve the problem. The report focuses on the problem found in the law firms whose lawyers need to spend time every day to record working hours or coordinate with the accounting department for issuing an invoice or report.

The solution for this problem is to develop an application that would shorten the time of each lawyer to record their working hours. Moreover the application should help the accounting department to spend less time to check the data and issue an invoice to the client. The application on this report is developed using Microsoft .NET Framework technology which is the common used the business.

This report includes the estimation of cost and benefits from implementing the system. The financial analysis compares many factors between costing from developing the application and benefits from using the application.

ACKNOWLEDGEMENTS

Working on this report has taken a lot of effort. At the start I have only the knowledge of how to write the software. But after only a few weeks of starting the report, I have experienced a lot of problems from analysis of cost and benefits from develop the software. Even though this is involved in every real world software development it was the first time for me to be part of this state.

After several rounds of facing and solving the problems, I completed this report with the valuable suggestions from two of my co-project advisors, Rear Admiral Prasart Sribhadung and Dr. Saranpong Pramsane.

Moreover this report could never have been started without a big push from my family which hoped me to graduate after finishing this 6 credits class. I would like to give special thanks to them for a lot of care and patience during the study and preparing for this report.

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I. INTRODUCTION

1.1 Background of the Project

For the company, which provides a consultancy or outsourcing service such as law consultancy or IT related service, it is important that they keep track of man-hours they spend on each client company. Because their income depends on the amount of time they provide to the client. Moreover there is other information that the company needs to record such as cost for traveling, billing period, currency and so on. For the accounting department it is important that they provided accurate information and send an invoice to the client.

In history without support from computer system, those consulting companies have to record all information manually, which consumes a large amount of time. As the 'time' is all the source of income for the company, reduce any unnecessary task each from staff means more income & profit to the company.

The example of the procedure that each staff needs to do everyday is followed these steps: record the time they spend for all clients they are working for, record any additional service charge such as traveling, extra expense during work, etc. For the accounting department, there are more complex tasks to perform. They have to issue invoice to every client that meets the billing cycle. They also need to check the accuracy with the staff about the service hours. As each client has different billing cycle, different service rate, different currency, etc. This could be a time consuming for the company, as they have to perform these tasks to each client they have. Moreover a mistake could happen, if they do it without using computer system.

Thus most of the consultancy company nowadays is using a computer system to help them shorten time & reduce error. Some company use computer intensively while

the others are not. The company that intensively uses computer system has the application that was built specifically for this purpose. This application is usually called a Time Sheet System. The application has screen for user (lawyer, IT people, accounting department) to manage their task such as enter man-hour, issue invoice and generate report. On the other hand, the other group of company that doesn't use time sheet system may use a generic purpose application to support their work. The sample of this application is Microsoft Office. The company uses Microsoft Excel or Microsoft Access to store data, then use Microsoft Word to issue invoice or print the report.

To choose one of these 2 methodologies depends on many factors. A small company that has a staff or less than 10 may choose Microsoft Office to handle their job. While a company that has 100 staff may choose to develop a specific application (Time Sheet System) to handle their work.

1.2 The Objectives of the Project

This project is targeted on developing a Web base Time Sheet System that provides a necessary functionality to serve a Law company.

1.3 Scope of the Project

This project focuses on the implementation of Web base Time Sheet System on the company Intranet. The application provides the services to staff in the company.

The project includes:

- (1) Study, analysis and prepare the specification of the Web base Time Sheet
- (2) Select the most suitable methodology to develop the web application
- (3) Design the layout (HTML & graphic) for user interface
- (4) Develop the prototype of the system
- (5) Financial analysis on how this system reduces cost in an organization

1.4 Deliverables

- (1) A final report detail covering the scope mentioned earlier
- (2) A Demonstration of Web base Time Sheet System



II. LITERATURE REVIEW

2.1 Definition of Time Sheet System

Time Sheet System is the application that is used to record all expense a consultant uses to provide service to the client.

2.2 Definition of Intranet

The Intranet is a dedicated Internet to a company whose access is protected by a server called a firewall.

2.3 Benefit of Using Time Sheet on the Company Intranet

Easy to Use

An Intranet application is the as same as an Internet web page. Most of the user use Internet & Browser everyday i.e. checking e-mail, sending e-card. Thus it will take less time to understand and using Intranet application. This will help the organization reduce cost for training staff.

Shorten the Workflow

Using Time Sheet can shorten the workflow and increase the efficiency in the work process. For example:

The lawyer enters the expense to the system. The accountant receives the information immediately. Thus they can operate their task faster.

The supervisor can check the progress for the work by access the system

Protected Information

Only an authorized person can access the information on the system. For example: only staff that works for the client can access the information about that client.

Increase Efficiency

Time Sheet system can increase work efficiency in the organization. As everything is computerized. The staff doesn't need to manually enter all data by themselves. For example: to issue the report of man-hour for the specific client, accounting department only provide the client reference and the reporting period then the system will generate the report for them. Compared with the case that the company doesn't have any support from the time sheet application, accounting department may need to list all data that lawyer fill in the paper, filter only the client & period they want then calculate the service cost to produce the report. Manually generating the report is not only time consuming but also increases the possibility to produce errors in the report.

Thus time sheet system can increase efficiency in the organization. Lawyers can concentrate with their work. They don't have to spend too much time with recording time or communicating with the accounting department. The accounting department doesn't take time to issue invoices and produce reports.

2.4 Web Base Time Sheet Development

To obtain a Timesheet system for the company, the developer can come from the information technology department in the company or use the out sourcing IT service or use both developers in the organization and outside the organization.

There are advantages and disadvantages in these two methodologies:

Table 2.1. Advantage and Disadvantage of Using Developer in and Outside the Organization.

Topic	Developer	IT Outsource Service
Time used in development	Developer takes long time to develop the system because building Intranet may not be their profession.	Developer takes shorter time because they have knowledge about Intranet development.
System requirement and Specification	Developer understands the business rule. They can implement better software that extremely supports the company core business.	Developer takes time to understand the business rule. The system need time to modify to support the business.
Cost of development	Hire a full time employer for develop the system is expensive.	Hire IT service only the period of development is cost saving.
Upgrading the system	When the system needs to modify to support the new business rule, the developer takes less time to modify because they are the team who developed the system.	Organization has to contact the IT company that builds the system. Then make a new contact for modification. This can be very expensive.
Maintenance	Cost for maintenance is low because the person who maintains the system is an employee of the organization.	Cost for maintenance is high because organization has to hire someone outside the company.

III. TECHNOLOGY OVERVIEW

3.1 Overview

Web Application can be constructed with many technologies. Most of them are based on the same architect but have a different implementation. To choose what methodology is the most suitable for developing is depended on many factors. First, we have to examine all the possibility method and technology. Then select the methodology that is the best suit to company environment.

3.2 Technology Used in Develop Web Application

This section reviews the current technology that is involved in developing and running the web application. It can be categorized into three main groups, which are Operating system, Database management and Programming language.

Operating System

Operating systems can be grouped according to functionality: operating systems for supercomputing, render farms, mainframes, servers, workstations, desktops, handheld devices, real time systems, or embedded systems.

Supercomputing is primarily scientific computing, usually modeling real systems in nature. Render farms are collections of computers that work together to render animations and special effects. Work that previously required supercomputers can be done with the equivalent of a render farm.

Mainframes used to be the primary form of computer. Mainframes are large centralized computers. At one time they provided the bulk of business computing through time sharing. Mainframes and mainframe replacements (powerful computers or clusters of computers) are still useful for some large scale tasks, such as centralized billing systems, inventory systems, database operations, etc. When mainframes were in widespread use, there was also a class of computers known as minicomputers which

were smaller, less expensive versions of mainframes for businesses that couldn't afford true mainframes.

Servers are computers or groups of computers used for internet serving, intranet serving, print serving, file serving, and/or application serving. Servers are also sometimes used as mainframe replacements.

Desktop operating systems are used for personal computers.

Workstations are more powerful versions of personal computers. Often only one person uses a particular workstation (like desktops) and workstations often run a more powerful version of a desktop operating system, but workstations run on more powerful hardware and often have software associated with larger computer systems.

Handheld operating systems are much smaller and less capable than desktop operating systems, so that they can fit into the limited memory of handheld devices.

Real time operating systems (RTOS) are specifically designed to respond to events that happen in real time. This can include computer systems that run factory floors, computer systems for emergency room or intensive care unit equipment (or even the entire ICU), computer systems for air traffic control, or embedded systems. RTOSs are grouped according to the response time that is acceptable (seconds, milliseconds, microseconds) and according to whether or not they involve systems where failure can result in loss of life.

Embedded systems are combinations of processors and special software that are inside of another device, such as the electronic ignition system on cars.

The operating systems that are involved in the Intranet system usually are Server and Works Station. The following list is the operating system that is used in today business.

Table 3.1. Operating System Used in Today Business.

Family	Operating System
Windows	Windows XP is a server, workstation, and desktop operating systems made by Microsoft that run on the Intel/Cyrix/AMD Pentium.
	Windows 2000 Professional, Windows 2000 Server, and Windows 2000 Advanced Server are server and workstation operating systems made by Microsoft that run on the Intel/Cyrix/AMD Pentium.
	Windows NT, Windows NT Server, and Windows NT Server Enterprise Edition are server and workstation operating systems made by Microsoft that run on Intel/Cyrix/AMD Pentium, Intel 80x86, and DEC Alpha.
	Windows ME (Millennium Edition) is a low quality desktop operating system made by Microsoft that runs on Intel/Cyrix/AMD Pentium.
	Windows 98 is a low quality desktop operating system made by Microsoft that runs on Intel/Cyrix/AMD Pentium and Intel 486DX.

Table 3.1. Operating System Used in Today Business (Continued).

Family	Operating System
Macintosh OS	Macintosh OS X Server (MXS) is a server operating system based on Rhapsody. MXS is made by Apple Computers and runs on Motorola/IBM PowerPC.
	Macintosh OS X (ten) is a desktop operating system based on Rhapsody. Macintosh OS X is made by Apple Computers and will run on Motorola/IBM PowerPC.
	Macintosh OS 9, OS 8, OS 7, and OS 6 are desktop operating systems made by Apple Computers that run on Motorola/IBM PowerPC and Motorola 680x0.
OS/2	OS/2 is a high performance desktop and high end operating system made by IBM that runs on Intel/Cyrix/AMD Pentium and Intel 80x86.
UNIX	LINUX is a free version of UNIX that runs on Intel/Cyrix/AMD Pentium, Intel 80x86, Motorola/IBM PowerPC, Motorola 680x0, Sun SPARC, SGI MIPS, DEC Alpha, HP PA-RISC, DEC VAX, ARM, API 1000+, and CL-PS7110.
	FreeBSD is a free version of UNIX that runs on Intel/Cyrix/AMD Pentium and Intel 80486.

Table 3.1. Operating System Used in Today Business (Continued).

Family	Operating System
UNIX	NetBSD is a free version of UNIX that runs on Intel/Cyrix/AMD Pentium, Intel 80486, Intel 80386, Motorola/IBM PowerPC, Motorola 680x0, Sun SPARC, HP PA-RISC, DEC VAX, and ARM.
	OpenBSD is a free version of UNIX that runs on Intel/Cyrix/AMD Pentium, Intel 80486, Intel 80386, Motorola/IBM PowerPC, Motorola 680x0, Sun SPARC, HP PA-RISC, DEC VAX, and ARM.
	GNU Hurd is a free open source operating system.
	Solaris is a UNIX-based operating system made by Sun Computers that runs on Sun SPARC and Intel/Cyrix/AMD Pentium.
	SunOS is an older text-based UNIX that runs on Sun SPARC.
	Solaris is an enhancement of SunOS that includes a graphic user interface.
	HP-UX is a UNIX-based operating system made by Hewlett-Packard that runs on HP PA RISC.
	VMS is a high performance operating system made by Compaq/DEC that runs on DEC VAX. OpenVMS is an updated version of VMS.
	Tru64 Unix (formerly Digital UNIX) is a UNIX-based operating system made by Compaq/DEC for the DEC Alpha.

Table 3.1. Operating System Used in Today Business (Continued).

Family	Operating System
UNIX	ULTRIX is a UNIX-based operating system made by Compaq/DEC. ULTRIX has been replaced by Digital UNIX.
	IRIX is a UNIX-based operating system made by SGI that runs on SGI MIPS.
	NeXT is a UNIX-based operating system made by NeXT that runs on Intel/Cyrix/AMD Pentium, Intel 80486, and Motorola 68040. OpenSTEP runs on Intel/Cyrix/AMD Pentium, Intel 80486, Motorola 68040, Sun SPARC, and HP PA RISC.
	Rhapsody is a UNIX-based operating system that includes capabilities from the NeXT and Macintosh operating systems. Rhapsody is made by Apple Computers and will run on Intel/Cyrix/AMD Pentium and Motorola/IBM PowerPC and will have a Run Time Library for Windows.
	AIX is IBM's version of UNIX.
	NetWare "is a dedicated network operating system" that runs on Intel/Cyrix/AMD Pentium, Intel 80486, and Intel 80386.e16
	BeOS is a high performance desktop operating system made by Be that runs on Motorola/IBM PowerPC and Intel/Cyrix/AMD Pentium.

Table 3.1. Operating System Used in Today Business (Continued).

Family	Operating System
UNIX	AmigaOS is an old but popular operating system that is being resurrected. Only low end servers can run on this operating system.
	SCO UnixWare is a UNIX-based operating system that runs on Intel/Cyrix/AMD Pentium.
	Pyramid uses the MIPS chipset, and did the reference port of SysVr4 to those chips under contract to Unix System Laboratories (USL). Pyramid runs Sys V, release 4.2 (with their own enhancements).
	BSDi Internet Super Server (also known as BSD/OS) is a commercial BSD UNIX for Pentiums and other processors.

Database Management System (DBMS)

DBMS can be categorized into the following group:

Hierarchical

Now obsolete, a hierarchical DBMS assumed hierarchical relationships between data i.e. parent - child. Data structures were often forced to conform to the hierarchical model in order to take advantage of the management and programming aspects of the products.

Network

Network DBMS allowed complex data structures to be built but were inflexible and required careful design. Very efficient in storage and fast however - best examples are airline booking systems. Generally conform to the CODASYL standards. Example: IDMS from Cullinet. Note: Network DBMS describes the connections between data elements - not the ability to operate over a network. A pre-cursor to and largely superseded by:

- (a) Relational DBMS
- (b) Advantages
- (c) Fast
- (d) Efficient
- (e) Disadvantages
- (f) Inflexible
- (g) Technically obsolete (although many in commercial use).

Relational

Arose from theoretical considerations of data structures in IBM by Dr Codd. True Relational DBMS use the Structured Query Language (SQL) to extract and update data and conform as closely as possible to the theoretical relational rules of normalization.

Oracle, Sybase, Informix etc are examples. Work best when the data structures have been "normalized" to eliminate data and field duplication. Data is organized within "Tables" (files) and relationships expressed between tables and data elements. Note that just because a system uses a Relational DBMS, it does not mean that the data structures have been properly defined in the first place. You can build rotten data structures with a good tool. See Data Structures. SQL is now the industry standard for data querying and updating of databases. Relational DBMS lend themselves very well to the library concepts of authority files.

Advantages

- (a) Overwhelmingly, the most popular type of DBMS in use and as a result technical development effort ensures that advances e.g. object orientation, web serving etc appear quickly and reliably.
- (b) There are many third party tools such as report writers that are tuned to work with the popular Relational DBMS via standards such as Open Database Connectivity (ODBC).
- (c) Offer distributed database and distributed processing options which might be advantageous for some large consortium libraries.
- (d) Extremely well developed management tools and security with automatic data logging and recovery.
- (e) Have Referential integrity controls ensure data consistency.
- (f) Have Transactional integrity features to ensure that incomplete transactions do not occur.

Disadvantages

- (a) Relational DBMS have to employ many tables to conform absolutely to the various normalization rules. This can make them slow and consume a lot of

resource compared to more flexible systems. Most Relational DBMS do not now have performance problems.

- (b) Some restrictions in field lengths. Field lengths are usually defined with a maximum. This can lead to occasional practical problems.
- (c) SQL does not provide an efficient way to browse alphabetically through an index. Thus some systems cannot provide a simple title A-Z browse.

Nested

These systems are derived from the innovative PICK system developed by Dick Pick and IBM in the late 60s/early 70s. The original PICK system was designed as a database cum operating system with the tools for data retrieval built in - the same concept as with a modern relational DBMS like Oracle. The main differences between a Relational DBMS and the PICK-like "nested" or "post relational" systems are:

They allow related multiple values and sub values within a field - groups of related data. For example multiple authors, series, publishers for a work can be easily handled.

They easily support variable length, non-limited fields. Early versions of relational DBMS had maximum field lengths of about 255 characters. Library data requires several fields that might contain very long fields.

Note that the Oracle8 now allows multiple values - so PICK was about 30 years ahead of Oracle in this area!

Advantages

- (a) Fast and flexible development - no problems handling complex text oriented data structures as found in library data.
- (b) Low administrative costs - they are simpler to administer than a Relational DBMS.

- (c) More efficient - more users on less power and memory.

Disadvantages

- (a) A minor market segment when compared to the likes of Oracle and Sybase - can be thought non-standard by some corporate IT departments - virtually unknown in some industries.
- (b) In the early days, PICK was prone to data corruption. Reliability now as good as Relational DBMS with transaction logging and similar features built in.
- (c) The data query language although easier to use than SQL was "not SQL" and associated tools for data querying could not be used against a Nested DBMS. Now both main Nested Relational DBMS suppliers can be queried using SQL

Proprietary

Some library system suppliers are continuing to maintain and develop their own DBMS. This may seem anachronistic but there are some advantages amongst the obvious dangers of support should the company fail. However, if the company should fail, then knowledge of the DBMS is less critical in support terms than the application knowledge - i.e. whichever DBMS a company is using, if they fail commercially then there will be more problems with supporting the application than the DBMS. Of course a proprietary DBMS may well be Relational, Network or Hierarchical. If it uses SQL then it usually conforms to the relational model.

Advantages

- (a) The DBMS can be totally designed around the problems and idiosyncrasies of the library application. Inverted indexes can be built in (most relational DBMS have no support for inverted indexes - so library system developers

using them have to build these components themselves). A good example of this is the Adlib system that is currently being enhanced with native (built-in) Z39.50 support.

- (b) Speed of response to problems - should a problem arise with a proprietary database, then the company can usually fix it more quickly than bigger company where a small "libraries only" problem may not get priority.

Disadvantages

- (a) A small company maintaining its own database is probably not a big risk at the basic technical level provided it can demonstrate the capabilities for creating the right data structures reliably and flexibly. The main disadvantage is probably in the area of keeping up with new developments like web serving extensions and object storage. Lack of compliance with standards (e.g. ODBC SQL) may mean that standard tools like MS Access and Excel for reporting and analysis may not be available.
- (b) System migration - hardware options may be limited.

Text Retrieval Systems or "Free Form" Databases.

Text retrieval is one of the weasel words in the library automation industry. It describes a process in terms of what it retrieves but it tends to be used to define the data structures, what is indexed and the tools available to retrieve the text. In some ways they are at the opposite end of the spectrum to a relational database. A "Free Form" database is the better term since there is little structure imposed on the designer of these systems. A library using a system such as BRS Search or Status can define their own record structures. The search "engine" then indexes every field in an inverted index structure so that any string of data may be used to retrieve a record. The search sophistication possible with such indexes is enormous - Boolean combinations between terms both

within and across fields are simply done and the typical text retrieval functions of adjacency, truncation, set manipulation etc are all built in.

Disadvantages

- (a) Free Form databases have no structure and thus the advantages of a relational structure to create authority files where data is kept just once and concepts such as global edit and heading merge are not easy to achieve.
- (b) Functions other than retrieving records from the information file e.g. circulation, acquisitions are difficult to achieve without database structures.

Advantages

- (a) The main advantage is the power of search and retrieve functions. Where there are large numbers of technical reports to be searched for information in an unpredictable way then a text retrieval engine is required since its efficiency and flexibility of indexing mean that you can index the "full text" of the report. A text retrieval engine verges on textual analysis.
- (b) A text retrieval engine can be combined with a structured DBMS to produce the best of both worlds. Such "hybrid systems" such as Unicorn from Sirsi are beginning to impact on the academic as well as the special library market since disc space is no longer a system limitation.

Object Oriented DBMS (OODBMS)

Object orientation for a database means the capability of storing and retrieving objects in addition to mere data. As their name suggests - Database Management Systems were designed to look after data - numbers, words etc. Objects are complex and not well handled by standard Relational DBMS. Object Oriented DBMS have been emerging over the last few years and established products like Oracle with their Oracle8 have announced object capability. The implications for library systems are unclear.

Most systems can handle images, video and other objects but do so in a non-standard way in many cases. The first system to announce the use of an Object Oriented DBMS is Taos from Data Research Associates.

Hybrids

There are hybrid systems and hybrid databases. Basically, a hybrid system is one that uses two DBMS for handling the complex requirements of a library system - complex searching where a free form DBMS excels and a relational DBMS for structured data transaction processing.

A hybrid database combines the features of two of the main types. The current debate (mid 1997) is whether the hybrid Object-relational DBMS like Oracle8 or Informix/Illustra will prove more effective at handling future requirements than a "pure" OODBMS like ObjectStore.

Programming Language

Programming for web application can be categorized into 2 groups.

Client-Side Programming

Each of these technologies relies on a module (or plug-in) built into the browser to process the instruction. The client-side technologies are a mishmash of scripting languages, controls, and fully fledged programming language.

(a) JavaScript

JavaScript is the original browser scripting language. Netscape had Originally developed a scripting language, known as LiveScript, to add Interactivity to their web server and browser range. It was introduced in the release of the Netscape 2 browser, when Netscape joined forces with Sun and in the process, they changed its name to JavaScript. JavaScript borrows some of its syntax and basic structures from Java, but has a different

purpose – and evolved from different origin.

For example, while JavaScript can control browser behavior and content, it isn't capable of controlling features such as file handling. Meanwhile, Java can't control the browser as a whole, but it can do graphics and perform network and threading functions.

Microsoft introduced their own version of JavaScript, known as Jscript, in Internet Explorer 3.0 and have supported it ever since right up to, and including IE6. It has only minor differences from the Netscape version of the language, although in older versions of both browser, the differences were originally quite a lot wider.

(b) VBScript

In Internet Explorer 3.0, Microsoft also introduced their own scripting language, VBScript, which was based on their Visual Basic programming language. VBScript was intended to be a direct competitor to JavaScript. In terms of functionality, there isn't much difference between the two; it's more a matter of personal preference – VBScript has a similarly reduced functionality. Visual Basic developers sometime prefer VBScript because VBScript is, for the most part, a subset of Microsoft's Visual Basic language. However, it enjoys one advantage that makes it more attractive to novice programmers, in that, unlike JavaScript, it isn't vase-sensitive and is therefore less fussy about the particulars of the code. Although this “advantage”, make it a lot slower and less efficient.

The biggest drawback is that there isn't a single non-Microsoft Browser that supports VBScript for client-side scripting. For a short while there were some proprietary plug-ins for Netscape that provided VBScript

support, but these never took off. JavaScript is much more widely used and supported. Indeed Microsoft themselves have replaced VBScript in their .NET Framework, with VB.NET. VBScript should be considered when working on Intranet pages where it is known that all clients are Internet Explorer on Windows

With both JavaScript and VBScript there is a module, known as script engine, built into the browser that dynamically processes the instructions, or script.

(c) ActiveX Controls

An ActiveX control is a self-contained program (or component), written in a language such as C++ or Visual Basic. When added to a web page, it provides a specific piece of client-side functionality, such as a bar chart, timer, client authentication, or database access. ActiveX controls are added to HTML pages via the <object> tag, which is now part of HTML standard. ActiveX controls can be executed by the browser when they are embedded in a web page.

There is a catch. ActiveX controls were developed by Microsoft, and despite being compatible with the HTML standard, they are not supported on any Netscape browser prior to version 6 without an ActiveX plug-in. Without this, they will only function on the Internet Explorer. Also, unlike VBScript, ActiveX is able to manipulate items on the user's machine such as the files or Windows registry. For this reason it is very often considered a security risk and is not even allowed through firewalls. Consequently, ActiveX controls still can't really be considered either a common or a cross-platform way of making page dynamic and are falling out of use.

(d) Java applets

Java is a cross-platform language for developing applications. When Java first hit the web, it created a tremendous stir. The idea is to use Java code in the platform of applets, which are essentially Java components that can be easily inserts into two pages with the aid of the <applet> tag.

Java enjoys better functionality than scripting language, offering better capabilities in areas such as graphic functions and file handling. Java is able to provide these powerful features without compromising security because the applets run in what is known as a sandbox – which prevents a malicious program download from the web from doing damage to the system. Java also boasts strong database support through JDBC.

Microsoft and Netscape browsers both have built-in Java support via something known as the Java Virtual Machine (JVM), and there are several standard <object> and non-standard <applet> tags that are use to add java applets to a web page. These tags tell the browser to download a Java file from a server and execute it with the Java Virtual Machine built into the browser.

(e) Curl

A very recent innovation comes from a company partly set up by Tim Berbers-Lee (the innovator behind the web and the HTML language). Curl is another programming language like Java, but unlike Java, where a second file (or more) has to be downloaded with the HTML file, it completely replaces the HTML source and the Java files. IT relies on a Curl plug-in having been installed on the browser first, and current works on very recent browsers. The advantage is that the download time is faster than Java,

and also capable of providing the same features as both Java and JavaScript.

Server-Side Programming

(a) CGI

The Common Gateway Interface (CGI) is a mechanism for creating scripts on the server, which can then be used to create dynamic web applications. CGI is a module that is added to the web server. CGI allows the user to invoke another program (such as Perl Script) on the web server to create the dynamic web page, and the role of CGI is to pass the user supplied data to this program for processing.

(b) ASP

Active Server Pages (ASP) is now dubbed “Classic ASP”. ASP commonly relied on either of the JavaScript or VBScript scripting languages to create dynamic web pages. ASP is a module (the asp.dll file) that attach to web server, and it then processes the JavaScript/VBScript on the web server, and turns it into HTML, before sending it into the server, rather than doing it on the browser.

ASP lets us use practically any of the functionality provided by Windows, such as database access, e-mailing, graphics, networking, and system functions, and all from within a typical ASP page. However, ASP's shortcomings are that it is very, very slow performance wise. It is also restricted to using only scripting languages. It can't do all the things that a fully - fledged programming language can. Secondly, the scripting languages, being like “junior” versions of full programming languages, took a lot of shortcuts to make the language smaller. Some of these shortcuts make their programs longer and more complicated than is otherwise

necessary.

(c) JSP

JavaServer Pages (JSP) is a technology that combines markup (HTML or XML) with Java code to dynamically generate web pages. The JSP specification is implemented by several web servers, as opposed to ASP which is only supported under IIS, and plug-ins are available that allow JSP to run with IIS 4.5/5.x. One of the main advantages of JSP is the portability of code between different servers. JSP is also very powerful, faster than ASP, and instantly familiar to Java programmers. It allows the Java program to leverage the aspects of the Java2 platform such as JavaBeans and the Java2 libraries. JavaServer Pages isn't directly related ASP, but it does boast the ability to embed Java code into the web pages using server-side tags.

(d) ColdFusion

ColdFusion enables servers to access data as the server builds an HTML page. Coldfusion is a module installed onto the web server. Like ASP, ColdFusion pages are readable by any browser. ColdFusion also utilizes a proprietary set of tags, which are processed by the ColdFusion Server software. This server software can run on multiple platforms, including IIS, Netscape Enterprise Server and Unix/Apache.

(e) PHP

PHP (originally Personal Home Pages, but more recently PHP HyperText Preprocessor) is another scripting language for creating dynamic web pages. When a visitor opens the page, the server processes the PHP commands and then sends the results to the visitors' browser, just as with ASP.NET or ColdFusion. Unlike ASP.NET or ColdFusion, however, PHP is open-source and cross-platform. PHP runs on Windows NT and many Unix versions, and it can be built as an Apache module and as a binary that can run as a CGI. When built as an Apache module, PHP is especially speedy. A downside is that you have to download PHP separately and go through a series of quite complex steps to install it and get it working on your machine. Also PHP's session management was non-existent until PHP 4, and still is even now, inferior to ASP's even now.

PHP has some rudimentary object-oriented features, providing a helpful way to organize and encapsulate source code.

(f) ASP.NET*

ASP.NET relies on a module attached to the web server. However, the ASP.NET module (which is a physical file called aspnet_isapi.dll) doesn't do all of the work itself; it passes some on to the .NET Framework to do the processing for it.

IV. SYSTEM SPECIFICATION

4.1 Assumption and System Requirement

Assumption

- (1) Time Sheet application in this study is implemented on Microsoft platform.
The application requires the following software install on the server.
- (2) In development of the system, the company hires the system analysis and programmer instead of using the out sourcing service.
- (3) The company has an active staff of about 200.

System Requirement

Windows 2000 Server

- (1) Operating system on the server is Microsoft Windows 2000 server.
- (2) Microsoft Internet Information Service (IIS) 5
- (3) Windows uses IIS as its primary Web server software. Thus the server machine must install this software.

Microsoft .NET Framework 1.0

The application is developed using ASP.NET. The server requires .NET Framework installed in order to run the application.

Microsoft Data Access Component 2.7 (MDAC)

To work with database management system such as SQL Server, ASP.NET application requires that the server must install MDAC 2.7 or higher version. This is also a requirement when installing .NET Framework.

Microsoft SQL Server 2000

The backend database for this application is SQL Server 2000.

4.2 Specification

The application provides the following function:

Manage Staff Profile

The application provides the functionality to insert, update and delete staff record in the database.

Manage Client Profile

The application provides the functionality to insert, update and delete client record in the database.

Manage Client's Project

Each client may repeatedly hire the company to work on several projects (also called "Matter"). The application must provide the functionality to insert, update and delete client project information in the database.

Manage Staff's Task & Man-Hour

Staff has to enter detail of work and man-hour to the database. This information is called "Task". Each task dedicated to only one client's project. Each task is marked with "Task Code" which describes the detail of task. The application provides the functionality to insert, update and delete task record in the database.

Manage Task Code

Task code is a code that represents specific work. For example, Task code "cv5" represents "Preparing minutes of Board's meeting for bank account closing". The application provides the functionality to insert, update and delete task code record in the database.

Manage Expense

During work on the client project (or matter), There may be some extra charge to the client. For example staff spent Baht 200 for traveling from office to law court. The

application must provide the functionality to insert, update and delete expense record in the database.

Manage Service Rate

The company may charge the different service rate to different client. For example Client A has service rate at Baht 1,200 per hour while Client B has service rate at Baht 1,500 per hour. Thus the application must provide the functionality to insert, update and delete service rate information in the database.

Manage Currency

The company may calculate the payment term in several currencies. For example the payment for an American client is calculated in US Dollar while a Japanese Client uses YEN. Thus the application must provide the functionality to insert, update and delete currency information in the database.

Manage Payment term and Billing Format

The application provides the functionality to insert, update and delete information about payment term and billing format from the database.

Manage Company's Department and Position

The application provides the functionality to insert, update and delete information about department and job position in the database.

Manage User Group and Permission

Each user is granted for different set of screen in the application. For example, Lawyer can access to the screen that allows they enter task and expense. Accountant can access the Billing format or currency screen. Administration can access to screen that used for creating user and setting permission to staff. Thus the application should provide the functionality to insert, update and delete user & its role from the database.

4.3 System Overview

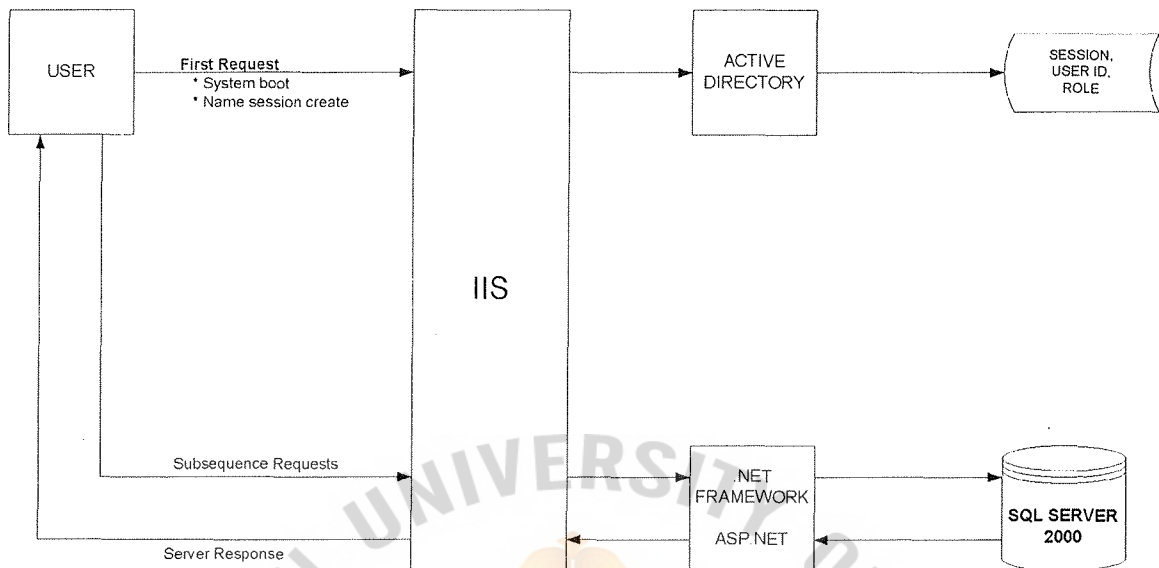


Figure 4.1. System Overview.

The application starts when the user (web browser) makes the first request to the web server (IIS). New session is created on the server. The application reads user name and domain from HTTP header then compare with data in Active directory. The subsequent request is based on the user name and role retrieved from Active directory.

The request from user is handled by IIS and .NET Frameworks (ASP.NET). The data such as Hour used, invoice and client are stored in SQL Server, which is connected from ASP.NET page.

4.4 System Work Flow

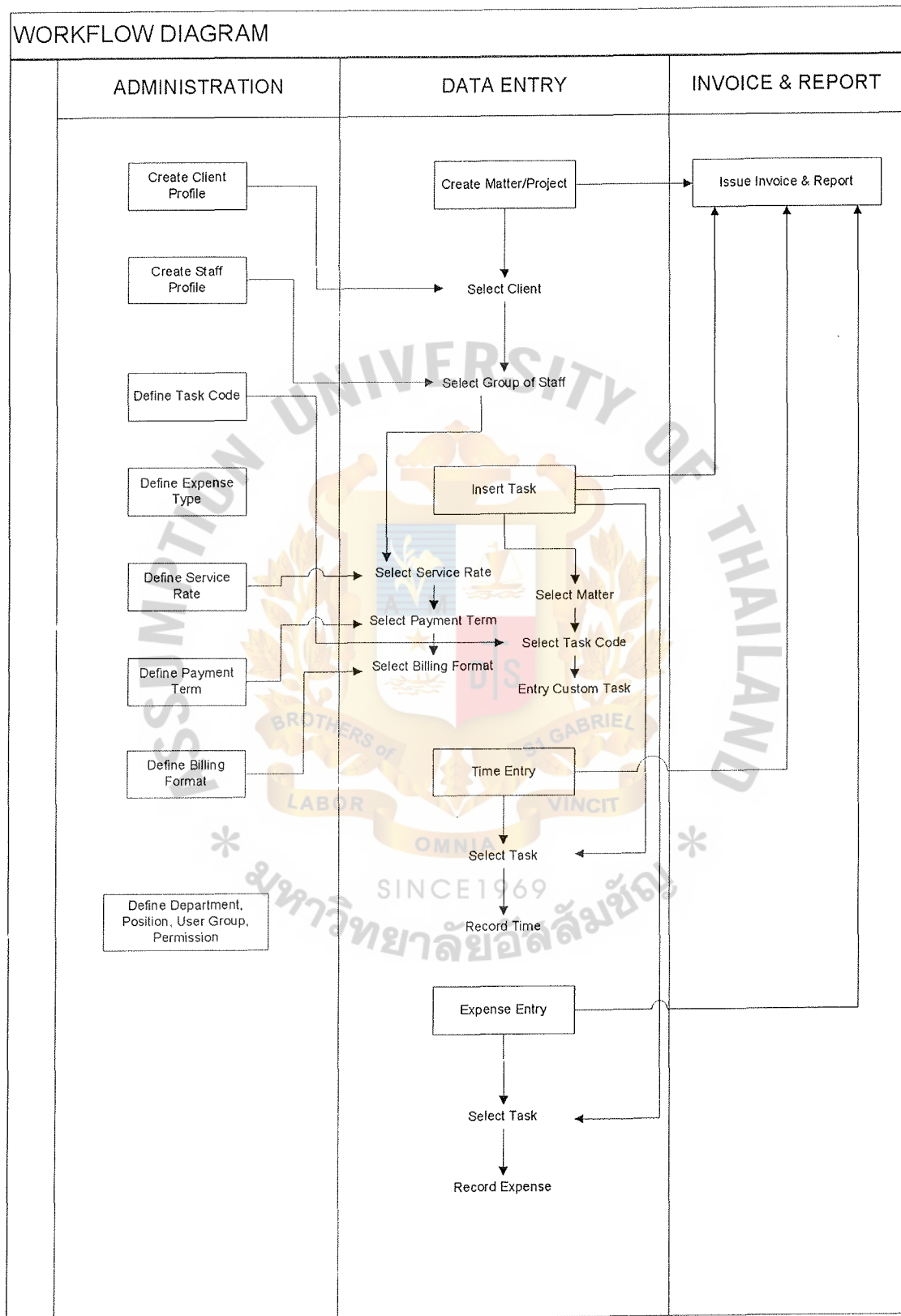


Figure 4.2. System Work Flow.

Administration Section

This role is responsible for creating necessary information for user:

- (1) Client Profile
- (2) Staff Profile
- (3) Task Code
- (4) Expense Type
- (5) Service Rate
- (6) Payment Term
- (7) Billing Format
- (8) Department, Job Position, User, User Group

Data Entry

This role is the entry point of the data. For instance, the lawyer hour used is in the state.

Invoice & Report

Accounting Department controls this job. This role handles all kind of reports and invoices. The data come from Data Entry state.

4.4 Database Dictionary

The following diagram shows the main tables used in the application.

Table: ts_Matter

Column Name	Condensed Type
MatterID	int
ParentMatterID	int
MatterPath	ntext
ClientID	int
Title	nvarchar(500)
Description	ntext
OpenDate	datetime
CloseDate	datetime
BillingEmail	nvarchar(255)
BillingAddress	nvarchar(4000)
BillingZipCode	nvarchar(5)
BillingInstruction	nvarchar(4000)
BillingFormatID	int
BillingCurrencyID	int
TaxID	nvarchar(50)
PaymentTermID	int
ContactPerson	nvarchar(50)
ContactTel	nvarchar(50)
ContactEmail	nvarchar(255)
ContactAddress	nvarchar(4000)
ContactZipCode	nvarchar(5)

Table: ts_Task

Column Name	Condensed Type
TaskID	int
TaskCodeID	int
MatterID	int
StaffID	int
ServiceRateID	int
Title	nvarchar(4000)
Detail	ntext
Billable	int

Table: ts_TaskCode

Column Name	Condensed Type
TaskCodeID	int
TaskCode	nvarchar(50)
Description	nvarchar(4000)

Table: ts_TaskTimeEntry

Column Name	Condensed Type
TaskTimeEntryID	int
TaskID	int
EntryDate	datetime
HourUse	int

Table: ts_ExpenseType

Column Name	Condensed Type
ExpenseTypeID	int
Code	nvarchar(50)
Title	nvarchar(500)
Description	nvarchar(4000)

Figure 4.3. Database Dictionary.

Table: Client

	Column Name	Condensed Type
?	ClientID	int
	BusinessTypeID	int
	TitleName	varchar(50)
	FirstName_en	varchar(50)
	LastName_en	varchar(50)
	MiddleInitial_en	varchar(50)
	FirstName_th	varchar(50)
	LastName_th	varchar(50)
	isCompany	int
	CompanyName_en	varchar(100)
	CompanyName_th	varchar(100)
	Businessphone	varchar(50)
	Extension	varchar(50)
	BusinessFax	varchar(50)
	Cellphone	varchar(50)
	Homephone	varchar(50)
	Address	varchar(1024)
	City	varchar(50)
	Postcode	varchar(50)
	Country	varchar(50)
	bAddress	varchar(1024)
	bCity	varchar(50)
	bPostcode	varchar(50)
	bCountry	varchar(50)
	Email	varchar(100)
	ClientCode	varchar(50)
	CreateDateTime	datetime
	IntroducedBy	varchar(100)
	FeeArrangement	varchar(50)
	Remark	varchar(1024)
	ApprovedByStaffID	int
	RelatedClientID	int
	OpposingClientID	int
	Approved	int
	RelatedClient_Etc	varchar(256)
	OpposingClient_Etc	varchar(256)
	ContactType	varchar(256)
	ApprovedforIP	int
	RelatedforIP	int
	OpposingforIP	int
	RelatedforIP_Etc	varchar(256)
	OpposingforIP_Etc	varchar(256)
	OriginatingforIP	int

Table: ts_ExpenseValue

	Column Name	Condensed Type
?	ExpenseValueID	int
	ExpenseTypeID	int
	TaskID	int
	DescriptionOnBill	nvarchar(4000)
	DescriptionPurpose	nvarchar(4000)
	ExpenseValue	money
	CurrencyID	int
	Billable	int
	ShowOnBill	int
	Reimbursable	int

Table: ts_Currency

	Column Name	Condensed Type
?	CurrencyID	int
	CurrencyName	nvarchar(100)
	CurrencyCode	nvarchar(3)
	ValueInTHB	money

Table: ts_ServiceRate

	Column Name	Condensed Type
?	ServiceRateID	int
	Code	nvarchar(50)
	Title	nvarchar(500)
	Description	nvarchar(4000)
	RatePerHour	money
	CurrencyID	int

Table: ts_BillingFormat

	Column Name	Condensed Type
?	BillingFormatID	int
	Title	nvarchar(500)

Table: ts_PaymentTerm

	Column Name	Condensed Type
?	PaymentTermID	int
	Title	nvarchar(500)

Table: BusinessType

	Column Name	Condensed Type
?	BusinessTypeID	int
	Description	varchar(100)

Figure 4.3. Database Dictionary (Continued).

Table: Staff

	Column Name	Condensed Type
🔑	StaffID	int
	UserStatusID	int
	UserGroupID	int
	PositionID	int
	DepartmentID	int
	OfficeID	int
	SecretaryID	int
	Username	varchar(50)
	Password	varchar(50)
	Login	varchar(50)
	Admin	bit
	FirstName_en	varchar(50)
	LastName_en	varchar(50)
	FirstName_th	varchar(50)
	LastName_th	varchar(50)
	NickName	varchar(50)
	BirthDate	datetime
	Sex	varchar(50)
	Homephone	varchar(50)
	Cellphone	varchar(50)
	Businessphone	varchar(50)
	Extension	varchar(50)
	Email	varchar(100)
	Address	varchar(1024)
	City	varchar(50)
	Postcode	varchar(50)
	StaffCode	varchar(50)
	Description	text
	isIP	int

Table: Country

	Column Name	Condensed Type
🔑	CountryCode	char(3)
	Description	char(48)

Table: Department

	Column Name	Condensed Type
🔑	DepartmentID	int
	Description	varchar(100)

Table: AccessPoint

	Column Name	Condensed Type
🔑	AccessPointID	int
	Description	varchar(100)
	Code	varchar(50)

Figure 4.3. Database Dictionary (Continued).

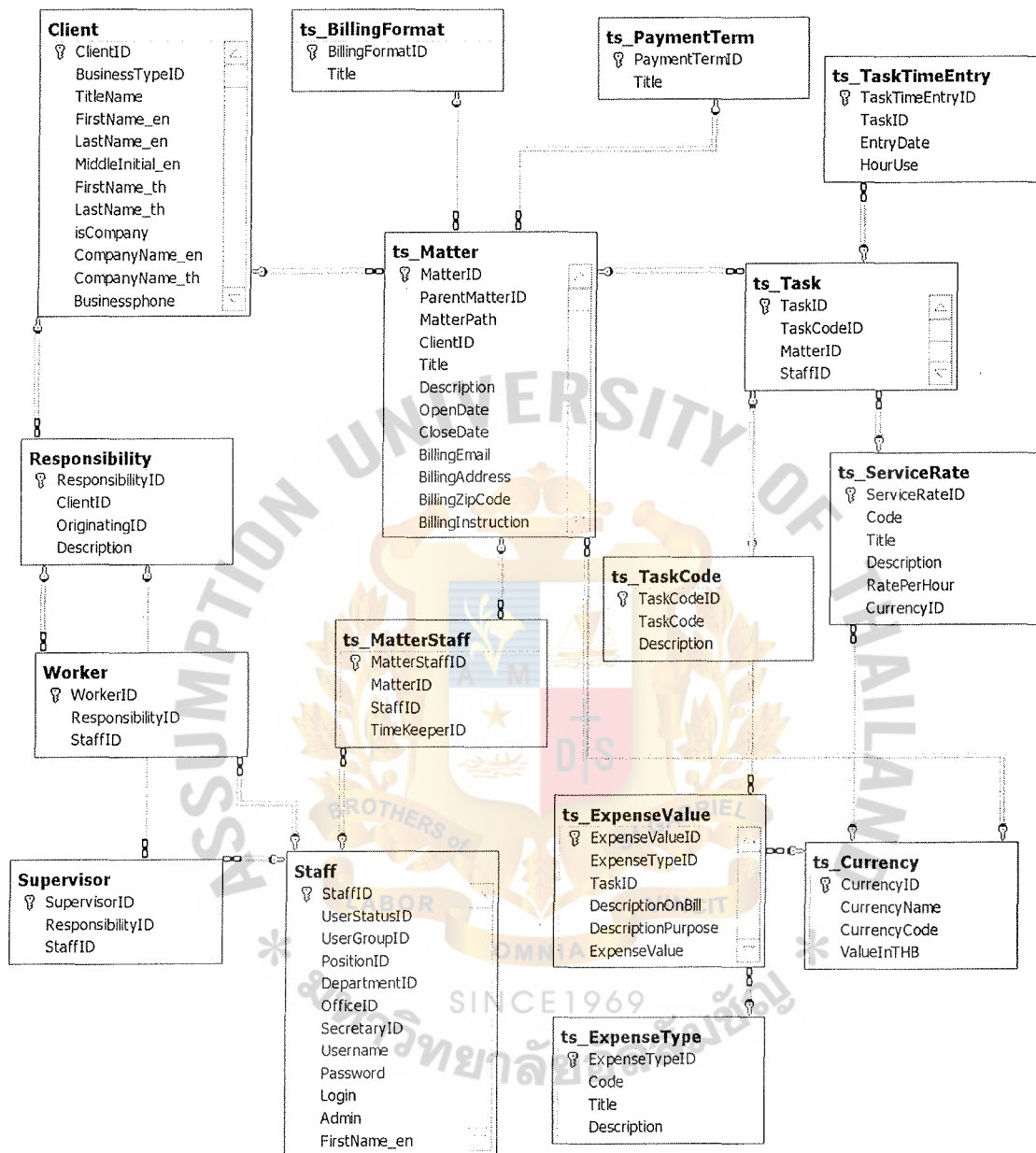


Figure 4.4. ER Diagram.

4.5 User Interface

This section shows the sample of user interface. For the complete user interface see the Appendix A.

The screenshot displays a web-based 'TIME SHEET' application. At the top, the title 'TIME SHEET' is prominent. Below it, the user is identified as 'User : Pollarit P.U'. A 'Main Menu' sidebar on the left lists various navigation options: Home, Staff Directory, Clients Directory, Time Entry (highlighted), Expense Entry, Matter/Project, Report, Task Code, Service Rate, Expense Type, Currency, Payment Term, Billing Format, Department, Position, User Group, Office Location, and Set Permission. The main content area is titled 'Time Entry' and features a calendar for April 2003. The calendar shows the following dates: Sun 30, Mon 31, Tue 1, Wed 2, Thu 3, Fri 4, Sat 5, Sun 6, Mon 7, Tue 8, Wed 9, Thu 10, Fri 11, Sat 12, Sun 13, Mon 14, Tue 15, Wed 16, Thu 17, Fri 18, Sat 19, Sun 20, Mon 21, Tue 22, Wed 23, Thu 24, Fri 25, Sat 26, Sun 27, Mon 28, Tue 29, Wed 30, Thu 1, Fri 2, Sat 3, Sun 4, Mon 5, Tue 6, Wed 7, Thu 8, Fri 9, Sat 10. Below the calendar is a table with columns: No., Name, Matter, Task, and Hour. The table contains five rows of tasks, each with a time entry field (a small box with a down arrow). The tasks are: 1. Panasonic Matter 04 Task 06 (0 hours), 2. siam design e-business web site Preparing minutes of Board's meeting for bank account closing (0 hours), 3. siam design e-business web site Preparing minutes of Board's meeting for changing of bank account signing authority (0 hours), 4. siam design e-business web site this is manual keyin task (0 hours), 5. siam design e-business web site use manual key (0 hours). A 'Total' row shows 0 hours. At the bottom of the table, there are two buttons: 'Save' and 'Cancel'. A large watermark for 'ASSUMPTION UNIVERSITY THAILAND' is overlaid on the image.

No.	Name	Matter	Task	Hour
1	Panasonic	Matter 04	Task 06	0
2	siam design	e-business web site	Preparing minutes of Board's meeting for bank account closing	0
3	siam design	e-business web site	Preparing minutes of Board's meeting for changing of bank account signing authority	0
4	siam design	e-business web site	this is manual keyin task	0
5	siam design	e-business web site	use manual key	0
Total				0

Figure 4.5. Sample of User Interface (Time Entry).

- (1) Select date in the calendar the
- (2) Tasks on the selected date are display
- (3) Enter hour used on each task
- (4) Click save

TIME SHEET

User : Pollant P.O

Main Menu

- Home
- Staff Directory
- Clients Directory
- Time Entry
- Expense Entry
- Matter/Project
- Report
- Task Code
- Service Rate
- Expense Type
- Currency
- Payment Term
- Billing Format
- Department
- Position
- User Group
- Office Location
- Set Permission

Time Entry

April 2003							
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
[w]	30	31	1	2	3	4	5
[w]	6	7	8	9	10	11	12
[w]	13	14	15	16	17	18	19
[w]							
[w]	27	28	29	30	1	2	3
[w]	4	5	6	7	8	9	10

No	Task	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
1	Panasonic Matter 04 / Task 06 siam design	0	0	0	0	0	0	0	
2	e-business web site / Preparing minutes of Board's meeting for bank account-closing siam design	0	0	0	0	0	0	0	
3	e-business web site / Preparing minutes of Board's meeting for changing of bank account signing authority siam design	0	0	0	0	0	0	0	
4	e-business web site / this is manual keyin task siam design	0	0	0	0	0	0	0	
5	e-business web site / use manual key siam design	0	0	0	0	0	0	0	
Total									

Figure 4.6. Sample of User Interface (Time Entry in Weekly View).

- (1) Select week by click at [w] hyperlink
- (2) Tasks on specific week are display
- (3) Enter hour used on each task and day
- (4) Click save

V. FINANCIAL ANALYSIS

5.1 Investment Cost

Investment cost for this system consists of 3 parts.

Cost of Hardware

Hardware required for the system consists of 2 parts:

- (1) Server
- (2) Client Computer (Workstation)

Server machine is a host for the application, database and web server. The general specification & price to obtain server is described below.

Table 5.1. Hardware specification of the Server.

Part	Detail
Main System	PowerRACK P3I-1120/OEM
Primary Processor	Intel Pentium III 1.26GHz, 512K
Memory	KINGSTON KVR133X64C3/512
Storage	SEAGATE IDE, 7200, 60GB
CDROM	Asustek OEM CD-S520, 52X, IDE
Integrated Display	Integrated Intel 815 DVM System Utilized memory frame buffer
Integrated NIC1	Integrated Intel 82559 LAN Controller
Integrated NIC2	Integrated ICH2 LAN Controller
Power Supply	Full EMACs 250W For 1U Rackmount
Keyboard	SHU PS/2 107key
Estimated Cost	Baht 36,850.00

Cost of Software

The system runs entirely on Microsoft platform. Thus all software required for the system is shown on the following table.

Table 5.2. Estimation of Software License on the Server and Client Workstation.

Software	Estimated Price
Microsoft Windows 2000 Server	Baht 50,000
Microsoft SQL server 2000	Baht 100,000
Microsoft Windows XP Professional (For Client machine)	Baht 50,000
Estimated Cost	Baht 200,000.00

Cost of Application Development

The cost of development has 2 factors, Cost of software required in development and Cost of hiring system analysis and programmer to develop the system.

(1) Software used in development.

The example of the software is Visual Studio .NET. Software on this part is not required in production environment. However it helps in development of the system.

Microsoft offers a special arrangement for company who use their product for development and testing. The solution they offer is called "Microsoft Subscription". This solution consists of 5 levels.

(a) **MSDN Universal.**

Delivers the most comprehensive set of Microsoft software (including **Visual Studio .NET Enterprise Architect**) necessary to build and fully test XML Web services and applications.

(b) **MSDN Enterprise.**

Delivers the development tools (including **Visual Studio .NET Enterprise Developer**), five - core .NET Enterprise Servers and platform technologies, and technical resources needed to build and test XML Web services and applications.

(c) **MSDN Professional.**

Delivers the development tools (including **Visual Studio .NET Professional**) and platform technologies needed to build and test XML Web services and applications.

(d) **MSDN Operating Systems.**

Delivers the Microsoft operating systems and technical resources you need to test your XML Web services and applications.

(e) **MSDN Library.**

Delivers the latest technical content from Microsoft including over 1.8 GB of code samples, product documentation, and programming information.

Each level contains different set of Microsoft product and price. The following table compares the differences among these levels.

Table 5.3. Comparison among Different Package of Microsoft Subscription.

Microsoft Development Tools					
	Universal	Enterprise	Professional	Operating Systems	Library
Visual Studio .NET Professional 2003			✓		
Visual Studio .NET Enterprise 2003		✓			



Table 5.3. Comparison among Different Package of Microsoft Subscription
(Continued).

Microsoft Development Tools					
	Universal	Enterprise	Professional	Operating Systems	Library
Visual Studio .NET Enterprise Architect 2003	✓				
Visual Studio 6.0 Professional			✓		
Visual Studio 6.0 Enterprise	✓	✓			
Visual FoxPro 8.0	✓	✓	✓		
Continuously Updated Resources					
Online Access to the Latest Resources	✓	✓	✓	✓	✓
Regular Updates on CD or DVD	✓	✓	✓	✓	✓
Technical Resources					
New Releases, Updates, and Service Packs	✓	✓	✓	✓	✓
MSDN Library	✓	✓	✓	✓	✓
Technical Support Incidents1	✓	✓	✓	✓	

Table 5.3. Comparison among different package of Microsoft subscription
(Continued).

	Universal	Enterprise	Professional	Operating Systems	Library
Managed Newsgroup	✓	✓	✓	✓	
Support1					
Software	✓	✓	✓	✓	
Development Kits					
Driver Development	✓	✓	✓	✓	
Kits					
Software Betas	✓	✓	✓	✓	
Microsoft Operating Systems2					
Windows 2000	✓	✓	✓	✓	
Professional					
Windows 2000	✓	✓	✓	✓	
Server					
Windows 2000	✓	✓	✓	✓	
Advanced Server					
Windows XP Home	✓	✓	✓	✓	
Edition					
Windows XP	✓	✓	✓	✓	
Professional					
Windows Server	✓	✓	✓	✓	
2003					

Table 5.3. Comparison among different package of Microsoft subscription
(Continued).

Microsoft Server Test Platforms2					
	Universal	Enterprise	Professional	Operating Systems	Library
SQL Server 2000	✓	✓			
Exchange 2000 Server	✓	✓			
Commerce Server 2002, Developer Edition	✓	✓			
Host Integration Server 2000	✓	✓			
BizTalk Server 2002	✓				
Application Center 2000	✓				
ISA Server 2000	✓				
SharePoint Portal Server 2001	✓				
Mobile Information 2001 Server	✓				
Content Management Server 2001	✓				

Table 5.3. Comparison among different package of Microsoft subscription
(Continued).

Microsoft Productivity Applications					
	Universal	Enterprise	Professional	Operating Systems	Library
Visio Professional 2002	✓				
Office XP Developer Edition	✓				
Project 2002	✓				
MapPoint 2002	✓				

Price for Universal

Table 5.4. Price for Microsoft Universal Subscription.

Type	Estimated Price	Upgrade Information	Rebate Information - North America only
Full Packaged Product	Baht 120,000	N/A	Baht 13,000 rebate for customers that choose DVD media option
Renewal/Upgrade	Baht 99,000	<p>Customers who qualify for the renewal/upgrade price include:</p> <p>Existing MSDN Universal, Enterprise, Professional, and Operating Systems subscribers</p> <p>Microsoft Visual tool users, version 5.0 or later</p> <p>Microsoft Certified Partners & Certified Trainers</p>	Baht 13,000 rebate for customers that choose DVD media option

Price for Enterprise

Table 5.5. Price for Microsoft Enterprise Subscription.

Type	Estimated Price	Upgrade Information	Rebate Information - North America only
Full Packaged Product	Baht 95,000	N/A	Baht 8,600 rebate for customers that choose DVD media option
Renewal/Upgrade	Baht 69,000	<p>Customers who qualify for the renewal/upgrade price include:</p> <p>Existing MSDN Enterprise, Professional, and Operating Systems subscribers</p> <p>Microsoft Visual tool users, version 5.0 or later</p> <p>Microsoft Certified Partners & Certified Trainers</p>	Baht 8,600 rebate for customers that choose DVD media option

Price for Professional

Table 5.6. Price for Microsoft Professional Subscription.

Type	Estimated Price	Upgrade Information	Rebate Information - North America only
Full Packaged Product	Baht 52,000	N/A	Baht 4,700 rebate for customers that choose DVD media option
Renewal/Upgrade	Baht 39,000	<p>Customers who qualify for the renewal/upgrade price include:</p> <p>Existing MSDN Professional and Operating Systems subscribers</p> <p>Microsoft Visual tool users, version 5.0 or later</p> <p>Microsoft Certified Partners & Certified Trainers</p>	Baht 4,700 rebate for customers that choose DVD media option

Price for Operating Systems

Table 5.7. Price for Microsoft Operating Subscription.

Type	Estimated Price	Upgrade Information	Rebate Information - North America only
Full Packaged Product	Baht 30,000	Customers who qualify for the renewal/upgrade price include:	Baht 8,600 in-box rebate for:
Renewal/Upgrade	Baht 21,500	Existing MSDN Operating Systems subscribers	Existing MSDN Operating Systems subscribers (renewal)
		Microsoft Visual tool users, version 5.0 or later	Microsoft Visual tool users, version 5.0 or later
		Microsoft Certified Partners & Certified Trainers	Microsoft Certified Partners & Certified Trainers
		For North America, see in-box rebates for renewing customers	Baht 3,500 rebate for customers that choose DVD media option

Price for Library

Table 5.8. Price for Microsoft Library Subscription.

Type	Estimated Price	Upgrade Information	Rebate Information - North America only
Full Packaged Product	Baht 8,600	Customers who qualify for the renewal/upgrade price include:	Baht 4,300 in-box rebate for:
Renewal/Upgrade	Baht 4,300	Existing MSDN Library subscribers	Existing MSDN Library subscribers (renewal)
		Microsoft Visual tool users, version 5.0 or later	Microsoft Visual tool users, version 5.0 or later
		Microsoft Certified Partners & Certified Trainers	Microsoft Certified Partners & Certified Trainers
		For North America, see in-box rebates for renewing customers	

(2) Hiring system analysis and programmer.

The example of the software is Visual Studio .NET. Software on this part is not required in production environment. However it helps in development of the system. The system is planned to develop within 4 months. The company hires 1 system analyst and 2 Programmers.

Table 5.9. Summary Development Cost for Timesheet Application.

Item	Cost
MSDN Subscription (Universal)	Baht 120,000 / Year
System Analysis	Baht 40,000 / Month / Person
Subtotal	Baht 160,000
Programmer	Baht 20,000 / Month / Person
Subtotal	Baht 160,000
Estimated cost in total	Baht 440,000

Total cost of 3 parts is summary in the following tables:

Table 5.10. Summary of All Cost in Develop Timesheet Application.

Item	Cost
Hardware	Baht 36,850
Software	Baht 200,000
Development	Baht 440,000
Total	Baht 676,850

5.2 Operation Cost

The cost for operation has 2 parts.

Software upgraded

The cost comes from the release of new version either operation system or SQL Server.

Staff who maintain the system

The staff is required to maintain the system. Thus the cost of this part is the salary of hiring employees.

5.3 Benefit of using the system

This system is developed to support staff in the organization. The organization will have the benefit from this system in term of increasing of employee's work efficiency. Table below display the comparison between record time manually and using the system.

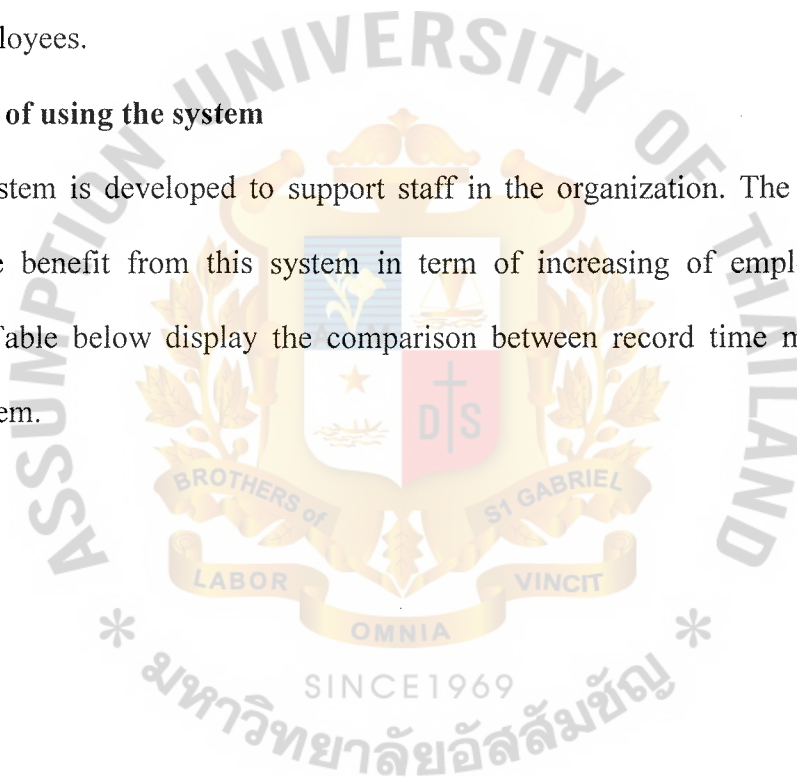
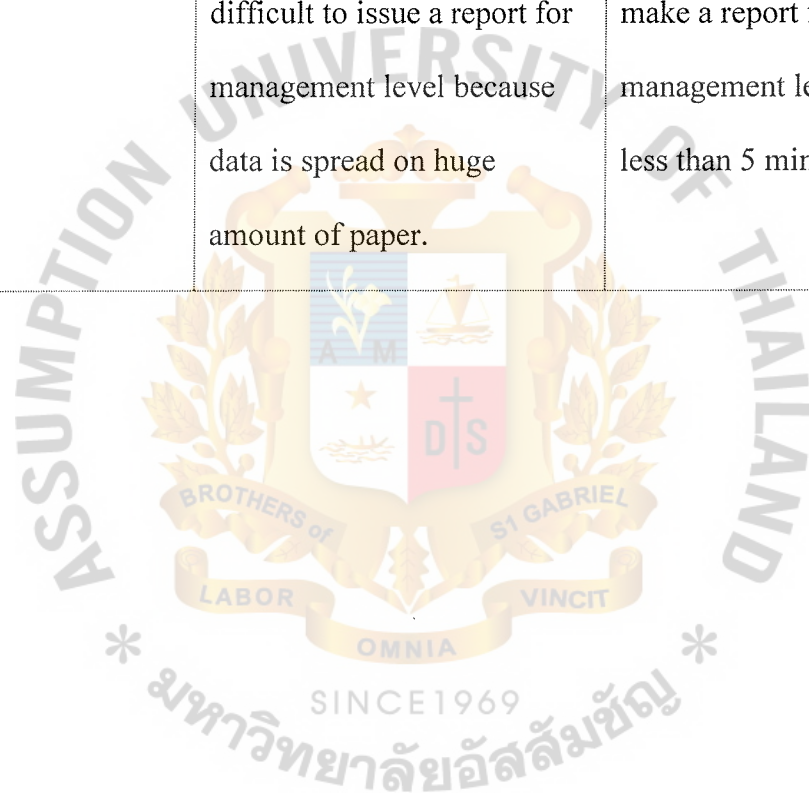


Table 5.11. Advantage of Migrate from Manually Recording and Using Timesheet.

	Manually Record	Using Timesheet System
Paper and Paperless	Use paper to keep record of hour used. The cost of using paper is involved 1) hiring more staff to control about purchasing paper and necessary equipment. 2) Cost of paper	Every data is recorded directly to the system.
Staff efficient	1) Lawyer need to spend time on recording and summarize all record on every billing cycle 2) Accounting department has to spend time in checking and accurately of invoice	1) Lawyer spends less time in recording time because the system validates input data. Thus Lawyer does not need to check and make a report on every billing cycle. 2) Accounting can process the data from the system with less time.

Table 5.11. Advantage of Migrate from Manually Recording and Using Timesheet (Continued).

	Manually Record	Using Timesheet System
Accurate data and Report	Data is stored in paper. Thus there is a possibility for a mistake when issue invoice or report. Moreover it is difficult to issue a report for management level because data is spread on huge amount of paper.	Data is kept in the database. Thus data appeared in report or invoice is accurate. Also make a report for management level is taken less than 5 minutes.



Estimation of Saved Cost from Using Timesheet System

Table 5.12. Estimation of Benefit from Using Timesheet.

	Baht / month
Paper and Equipment	
Paper cost	500
Printing cost	2,000
Staff	
Administrator (1 staff)	12,000
Lawyer	$=(15 \text{ min} \times 150 \text{ lawyer}) \times (1,500 / 60)$
- Organization has 150 lawyer	$= 56,250$
- Each lawyer save 10 minutes of each billing cycle	
- Hourly rate is Baht 1,500	
Accountant (1 Person)	25,000
Total	95,750

5.4 Break Even

Table 5.13. Estimation of Break Even.

	Costing		Benefit	Costing (Accum.)	Benefit (Accum.)
	Fixed	Variable			
Jan	236,850	90,000	-	326,850	-
Feb		90,000	-	416,850	-
Mar		90,000	-	506,850	-
Apr		90,000	-	596,850	-
May		10,000	95,750	606,850	95,750
Jun		10,000	95,750	616,850	191,500
Jul		10,000	95,750	626,850	287,250
Aug		10,000	95,750	636,850	383,000
Sep		10,000	95,750	646,850	478,750
Oct		10,000	95,750	656,850	574,500
Nov		10,000	95,750	666,850	670,250
Dec		10,000	95,750	676,850	766,000

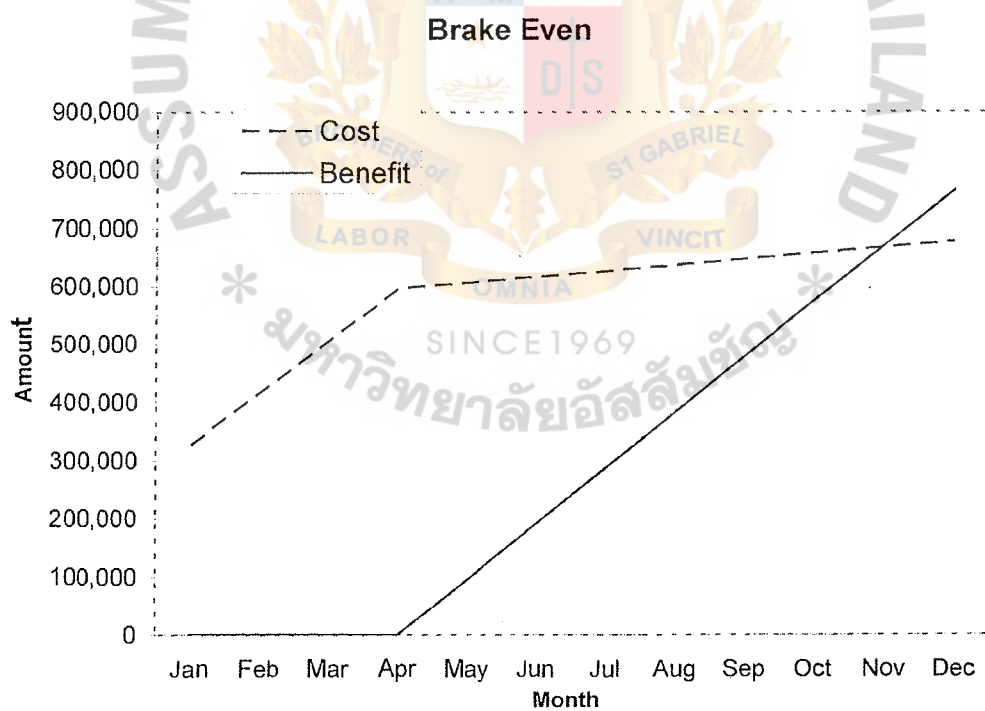


Figure 5.1. Break Even.

VI. CONCLUSIONS AND RECOMMENDATIONS

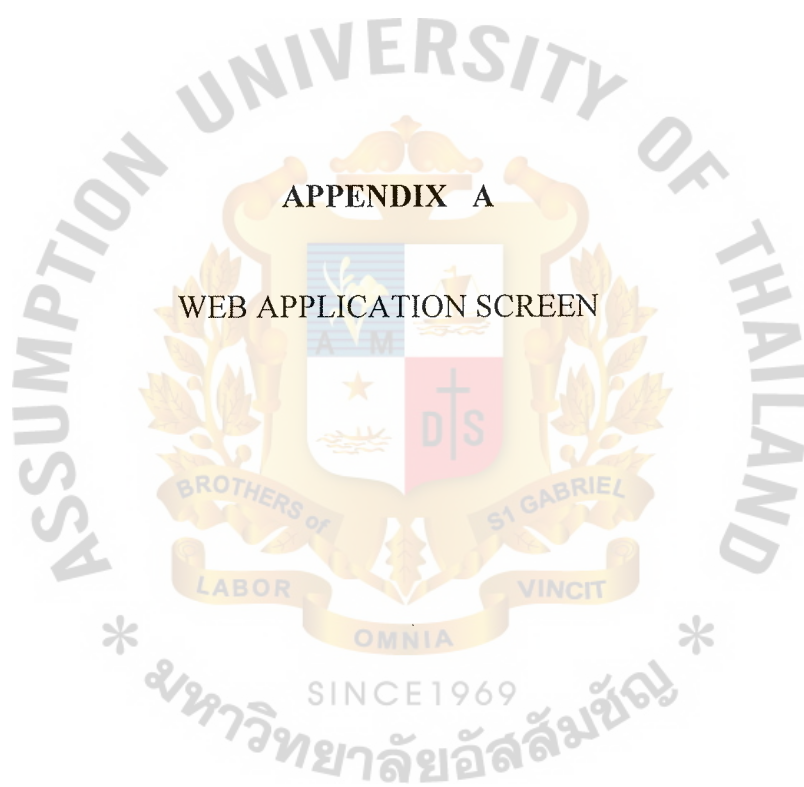
The development of Timesheet system will help the organization in many ways. The benefit from the system depends on the size of the organization. A large size organization tends to gain more benefits from the system. Also the biggest benefit from obtaining the system is increasing of staff efficiency. The lawyer does not have to spend much time in keeping records. This helps them to concentrate on their major work, which is income to the company. Accountant takes less time to obtain data from all lawyers in the organization, reduce paper work and data more accurately. Accounting department can take advantage of the system such as issue invoice automatically or issue summary reports in the criteria they want. Without timesheet system, these tasks can take a day or a week to finish. But timesheet system can generate these documents in only a minute. For the management level or marketing department, timesheet system can help them in decision-making or marketing planning. As timesheet can issue many form of reports such as summary of hour used on each project, service charge per client per month. The evaluation of staff efficiency is easier because the system shows statistic of staff working history. The system produces a summary of the amount an individual staff brings to the company.

From the investment part, the timesheet system involves 3 main factors (1) software license for operation system and database management, (2) hardware for building a server machine and network infrastructure and (3) cost of software development. The development takes 4 months to complete and the break-even take 1 year. This figure assumes that there is no hardware and software that is already invested in the organization for other purposes. If the organization has invested in some of the

system requirement (such as operating system or server machine), the investing cost and break-even is reduced.

According to the current specification, Timesheet system is still lack of some important functionality. The current system aims to support lawyer, accountant and administrator. It's not designed to support the management level. Although, some functionality may be apply to this issue but the application still lack of rich module to support decision making. Thus, for further development, the application should be extended the reporting module. The application should be able to generate several views of report that support the management level.





Purpose: Enter hour used on the specific date

TIME SHEET

User : Pollart P.[]

Main Menu

- Home
- Staff Directory
- Clients Directory
- Time Entry
- Expense Entry
- Matter/Project
- Report
- Task Code
- Service Rate
- Expense Type
- Currency
- Payment Term
- Billing Format
- Department
- Position
- User Group
- Office Location
- Set Permission

Time Entry

April 2003

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
[w]	30	31	1	2	3	4	5
[w]	6	7	8	9	10	11	12
[w]	13	14	15	16	17	18	19
[w]	20	21	22	23	24	25	26
[w]	27	28	29	30	1	2	3
[w]	4	5	6	7	8	9	10

No	Client	Matter	Task	Hour
1	Panasonic	Matter 04	Task 06	0
2	siam design	e-business web site	Preparing minutes of Board's meeting for bank account closing	0
3	siam design	e-business web site	Preparing minutes of Board's meeting for changing of bank account signing authority	0
4	siam design	e-business web site	this is manual keyin task	0
5	siam design	e-business web site	use manual key	0
Total				0

Save Cancel

Figure A.1. Time Entry (Day View).

- (1) Select date in the calendar the
- (2) Tasks on the selected date are display
- (3) Enter hour used on each task
- (4) Click Save

Purpose: Enter hour used on the specific week

TIME SHEET

User : Pollarit P.O

Main Menu

- Home
- Staff Directory
- Clients Directory
- Time Entry
- Expense Entry
- Matter/Project
- Report
- Task Code
- Service Rate
- Expense Type
- Currency
- Payment Term
- Billing Format
- Department
- Position
- User Group
- Office Location
- Set Permission

Time Entry

April 2003

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
[w]	30	31	1	2	3	4	5
[w]	6	7	8	9	10	11	12
[w]	13	14	15	16	17	18	19
[w]	27	28	29	30	1	2	3
[w]	4	5	6	7	8	9	10

Task	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
1 Panasonic Matter 04 / Task 06	0	0	0	0	0	0	0	0
siam design	0	0	0	0	0	0	0	0
2 e-business web site / Preparing minutes of Board's meeting for barank account closing	0	0	0	0	0	0	0	0
siam design	0	0	0	0	0	0	0	0
3 e-business web site / Preparing minutes of Board's meeting for changing of bank account signing authority	0	0	0	0	0	0	0	0
siam design	0	0	0	0	0	0	0	0
4 e-business web site / This is manual keyin task	0	0	0	0	0	0	0	0
siam design	0	0	0	0	0	0	0	0
5 e-business web site / use manual key	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0

Save Cancel

Figure A.2. Time Entry (Week View).

- (1) Select week by click at [w] hyperlink
- (2) Tasks on specific week are display
- (3) Enter hour used on each task and day
- (4) Click Save

Purpose: Display list of Staff

TIME SHEET

User : Pollant P.IJ Search

Main Menu

- Home
- Staff Directory
- Clients Directory
- Time Entry
- Expense Entry
- Matter/Protect
- Report
- Task Code
- Service Rate
- Expense Type
- Currency
- Payment Term
- Billing Format
- Department
- Position
- User Group
- Office Location
- Set Permission

Staff Directory

To view the list of staff, please input staff name into the box and/or choose User Group, User Status, Position and Department then click GO.

Name / NickName / Initial Name :

User Group :

User Status :

Position :

Department :

NO	Name	Group	Position	Department	Status	Act	Delete	Detail
1	Anthony Mcdonal (Ann)	Partner	Admin Staff	Information Technology	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
2	Chatchai	System Admin	Admin Staff	Information Technology	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
3	David Derkin	System Admin	Admin Staff	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
4	Jutaporn Charin (CHAI)	System Admin	Admin Staff	Information Technology	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
5	Ple Ple	System Admin	Admin Staff	Information Technology	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
6	Pollarit Petchvorakul (ป๋อ)	System Admin	Partner	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
7	Pollarit Petchvorakul	Partner	Partner	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
8	Pornthep Thamtheerasan	Associate Lawyer	Associate Lawyer	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
9	Prayoon Dangsoonthornchai	System Admin	IT Staff	Information Technology	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
10	Ranat Sianworakul	System Admin	Partner	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
11	Sean Davidson	Partner	IT Staff	Information Technology	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
12	Siriporn Satittaweechai (น)	Secretary	Secretary	Human Resource and Administration	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
13	Somchai Rakdee (Chai)	System Admin	IT Staff	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
14	Supawanee Konjing (น)	System Admin	Admin Staff	Information Technology	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
15	Suwanna Mongkolvanichaya (น)	System Admin	Associate Lawyer	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
16	sysadmin sysadmin (admin)	System Admin	Partner	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
17	Thippaphan Bhurikitti	System Admin	IT Staff	Information Technology	Active	<input type="checkbox"/>	<input type="checkbox"/>	More
18	Thongchai Rangseewijitprapha (Zin)	System Admin	Admin Staff	Consultant	Active	<input type="checkbox"/>	<input type="checkbox"/>	More

Total : 18 items
page : 1 | 1 |

Figure A.3. Staff List.

- (1) Click "Staff Directory" on the left menu
- (2) Enter criteria
- (3) Click Go
- (4) The list of Staff is display

Purpose: Modify Staff record

TIME SHEET

User: Pollant P.(I) Search

Main Menu

- Home
- **Staff Directory**
- Clients Directory
- Time Entry
- Expense Entry
- Matter/Project
- Report
- Task Code
- Service Rate
- Expense Type
- Currency
- Payment Term
- Billing Format
- Department
- Position
- User Group
- Office Location
- Set Permission

Staff Directory

Please complete the details below then press 'Save' button to save them into database or press 'Cancel' button to ignore them.

Staff ID: 3

Login name: Zeddy

Staff Code:

Can Use IP Projects: ☒ Yes ☐ No

User Status:

User Group:

Position: Secretary:

Department:

Office Location:

Firstname (Eng): Pollant Lastname (Eng): Petchvorakul

Firstname (Th): Lastname (Th):

NickName / Initial Name: Sex: ☒ Male ☐ Female

Birth Date: 1 January 1900

Office Telephone: Ext:

Home Phone:

Mobile:

Address:

City: Postcode:

Email: nani.k@cybernetworksconsulting.com

Description:

Education

From (year)	To (year)	Name of Institute	Faculty	Degree

มหาวิทยาลัยอัสสัมชัญ

SINCE 1969

Figure A.4. Staff Update.

- (1) From Staff list screen, click icon from edit column
- (2) Staff information is display
- (3) Make necessary change
- (4) Click Save to return to Staff List page

Purpose: Display list of client

TIME SHEET

User : Pollant P.URecentSearch

Main Menu

- Home
- Staff Directory
- Clients Directory
- Time Entry
- Expense Entry
- Matter/Project
- Report
- Task Code
- Service Rate
- Expense Type
- Currency
- Payment Term
- Billing Format
- Department
- Position
- User Group
- Office Location
- Set Permission

List Clients

To view the list of Clients, please input client name into the box and/or choose Business Type then click GO.

Name :

Business Type :

GO

No	Company	Business Type	Date / Time	Approved	Edit	Delete	More
1	Siamdesign Contact Person:	Agriculture	October 22, 2002	No	<input type="checkbox"/>	<input type="checkbox"/>	More
2	Panasonic Contact Person:	Banking, Securities and Finance	October 07, 2002	No	<input type="checkbox"/>	<input type="checkbox"/>	More
3	test ddd Contact Person:	Banking, Securities and Finance	January 09, 2002	No	<input type="checkbox"/>	<input type="checkbox"/>	More
4	dfds Contact Person:	Communications / Entertainment	December 22, 2001	No	<input type="checkbox"/>	<input type="checkbox"/>	More
5	siam design Contact Person:	Hotel / Resort / Tourism	November 22, 2001	Yes	<input type="checkbox"/>	<input type="checkbox"/>	More
6	cds Contact Person: ss ss	Agriculture	October 24, 2001	Yes	<input type="checkbox"/>	<input type="checkbox"/>	More
7	Client Test 3 Contact Person:	Communications / Entertainment	October 19, 2001	No	<input type="checkbox"/>	<input type="checkbox"/>	More
8	Client Test1 Contact Person:	Communications / Entertainment	October 19, 2001	No	<input type="checkbox"/>	<input type="checkbox"/>	More
9	Client Test2 Contact Person:	Communications / Entertainment	October 19, 2001	No	<input type="checkbox"/>	<input type="checkbox"/>	More
10	Client Test4 Contact Person:	Communications / Entertainment	October 19, 2001	No	<input type="checkbox"/>	<input type="checkbox"/>	More
11	DTAC Contact Person: ss ss	Banking, Securities and Finance	October 19, 2001	No	<input type="checkbox"/>	<input type="checkbox"/>	More

Figure A.5. Client List.

- (1) Click “Client Directory” hyperlink on the left menu
- (2) Provide specific criteria
- (3) Click Go

Purpose: Display list of matter/project

TIME SHEET

User: Pollark P.()

Main Menu

- Home
- Staff Directory
- Clients Directory
- Time Entry
- Expense Entry
- Matter/Project
- Report
- Task Code
- Service Rate
- Expense Type
- Currency
- Payment Term
- Billing Format
- Department
- Position
- User Group
- Office Location
- Set Permission

Project

Client: [All Clients] ▼

Open Date: 7 ▼ August ▼ 2002 ▼

Close Date: 5 ▼ November ▼ 2003 ▼

No	Matter	Status	Staff	Task	Est	Delete
1	Matter 01	Close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Matter 02	Close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Matter 03	Close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Matter 04	In Progress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	e-business web site	In Progress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	New billing system	Close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	e-business web site	Close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Add Item

Figure A.6. Matter List.

- (1) Click “Matter/Project” hyperlink from the left menu
- (2) Provide specific criteria
- (3) Click Go

Purpose: Assign staff on each matter/project

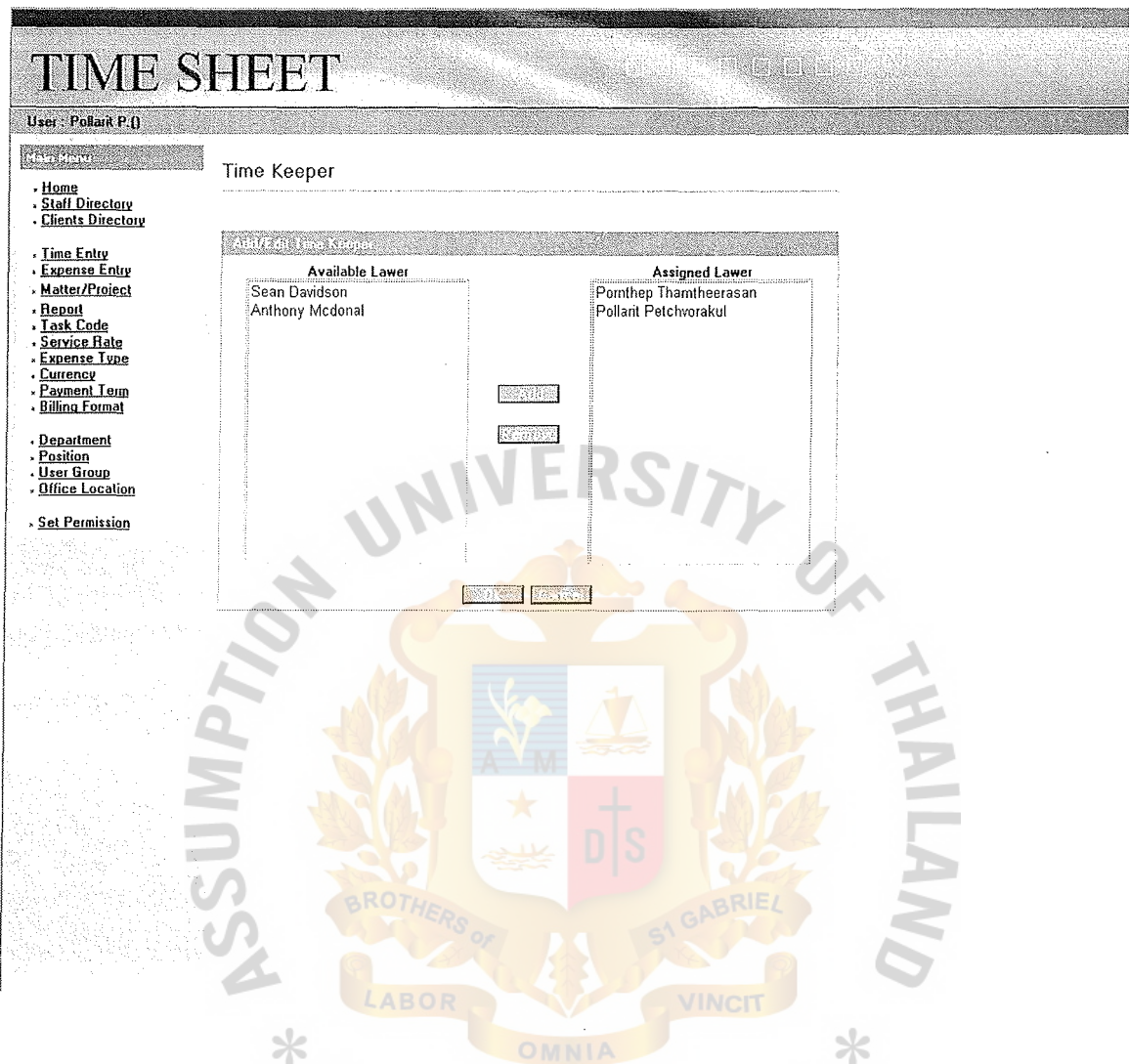


Figure A.75 Assign staff to Matter.

- (1) From Matter/Project list screen, click icon from staff column
- (2) Select staff from the right list
- (3) Click add button (between right and left list)
- (4) Left list display select staff
- (5) Staff on the left list is responsible for that matter/project
- (6) Click OK

Purpose: List task from specific matter/project

TIME SHEET

User: PoBant P.U.

Main Menu

- Home
- Staff Directory
- Clients Directory
- Time Entry
- Expense Entry
- Matter/Project
- Report
- Task Code
- Service Rate
- Expense Type
- Currency
- Payment Term
- Billing Format
- Department
- Position
- User Group
- Office Location
- Set Permission

Task

Staff: [All Staff]

Task Code: [All Tasks]

Back

ID	Code	Task	Ed	Del
1	cw	Task 01	<input type="checkbox"/>	<input type="checkbox"/>
2	cv5	Task 02	<input type="checkbox"/>	<input type="checkbox"/>

☐ [Add Item](#)

Figure A.8. Task List.

- (1) From matter/project list screen, click icon from the task column
- (2) Enter criteria
- (3) Enter Go

Purpose: Update task information

TIME SHEET

User : Pollarit P.()

Main Menu

Home

Staff Directory

Clients Directory

Time Entry

Expense Entry

Matter/Project

Report

Task Code

Service Rate

Expense Type

Currency

Payment Term

Billing Format

Department

Position

User Group

Office Location

Set Permission

Task

Add/Edit Task

Matter

Matter 01

Staff

Pollarit Petchvorakul

Task

CW

☐ Other task

Service Rate

SR01

Billable

☒

Full Description

narin 22222 narin 22222 narin

22222 narin 22222 narin 22222

narin 22222 narin 22222 narin

22222 narin 22222 narin 22222

narin 22222 narin 22222 narin

Save

Cancel

Figure A.9. Task Edit.

- (1) From task list screen, click edit icon form the edit column
- (2) Make necessary change
- (3) Click Save

Purpose: List report from specific criteria

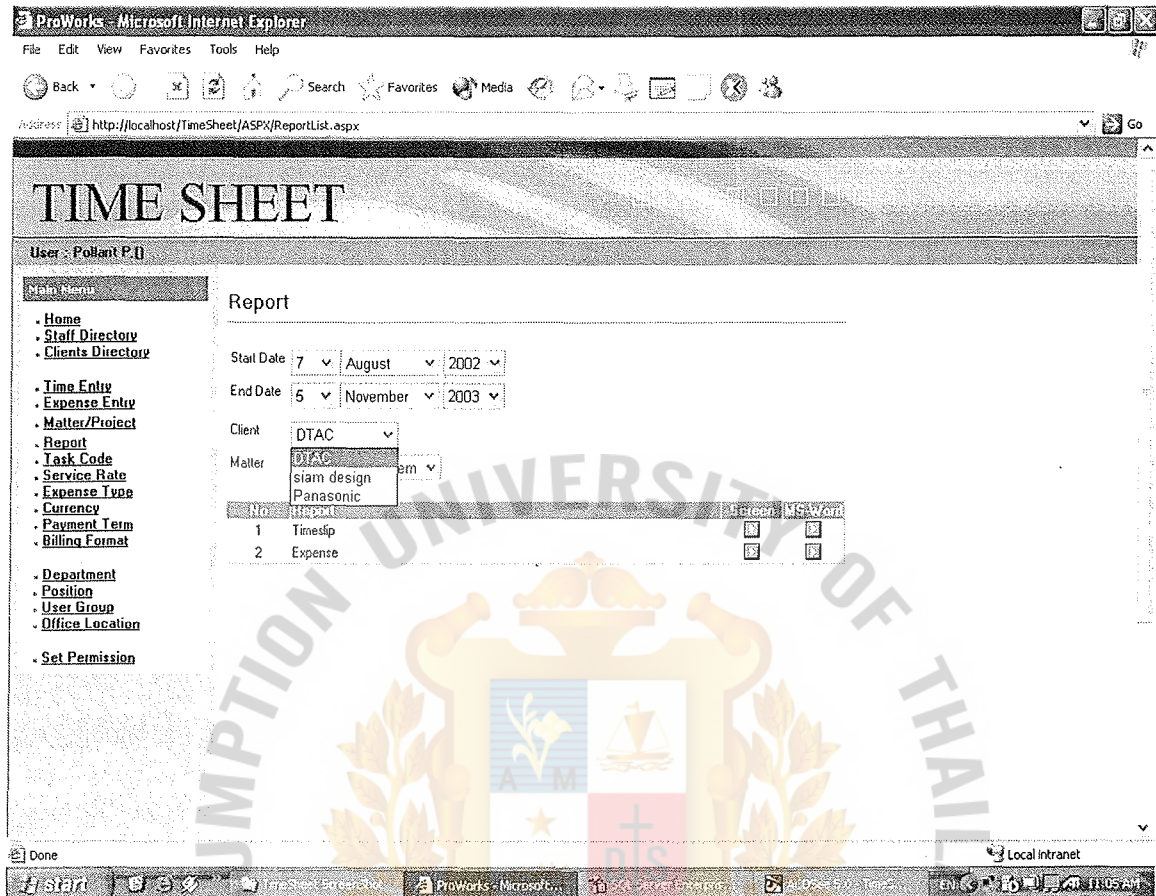


Figure A.10. Report List.

- (1) Click "Report" hyperlink form the left menu
- (2) Provide criteria from dropdown list
- (3) Click Go

Purpose: Display report for each client

ReportTimeSlip - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://localhost/TimeSheet/ASPX/ReportTimeSlip.aspx?StartDate=7-Aug-2002&EndDate=5-Nov-2003&ClientID=43&MatterID=5

Client : siam design CYBERWORKS CONSULTING Print on : 4/22/2003 11:06:07 AM

Date : 8/7/2002-11/5/2003

FULL TIMESLIP LISTING REPORT

Matter	Task	Time Keeper	Date	Work Hour	Service Rate	Bill Amount
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	16 October 2002	3	4,000.00	12,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	21 October 2002	3	4,000.00	12,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	22 October 2002	5	4,000.00	20,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	23 October 2002	4	4,000.00	16,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	24 October 2002	7	4,000.00	28,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	25 October 2002	8	4,000.00	32,000.00
e-business web site	this is manual keyin task	Pollarit	21 October 2002	1	4,000.00	4,000.00
e-business web site	this is manual keyin task	Pollarit	22 October 2002	1	4,000.00	4,000.00
e-business web site	this is manual keyin task	Pollarit	23 October 2002	2	4,000.00	8,000.00
e-business web site	this is manual keyin task	Pollarit	24 October 2002	1	4,000.00	4,000.00
e-business web site	this is manual keyin task	Pollarit	25 October 2002	2	4,000.00	8,000.00
e-business web site	use manual key	Pollarit	21 October 2002	4	4,000.00	16,000.00
e-business web site	use manual key	Pollarit	22 October 2002	1	4,000.00	4,000.00

Done Local intranet

http://localhost/TimeSheet/ASPX/ReportTimeSlip.aspx?StartDate=7-Aug-2002&EndDate=5-Nov-2003&ClientID=43&MatterID=5

start TimeSheet ASPX ReportTimeSlip ASPX Data Server Error ASPX Data Server Error ReportTimeSlip

Figure A.11. Report (Web page View).

- (1) From report list screen, click Web page icon from the web page column
- (2) Report is generated and display on the new instance of web browser

Purpose: Display report for each client

ReportTimeSlip - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://localhost/TimeSheet/ASPX/ReportTimeSlip.aspx?StartDate=7-Aug-2002&EndDate=5-Nov-2003&ClientID=43&MatterID=5

Client : siam design CYBERWORKS CONSULTING Print on : 4/22/2003 11:06:07 AM

Date : 8/7/2002-11/5/2003

FULL TIMESLIP LISTING REPORT

Matter	Task	Time Keeper	Date	Work Hour	Service Rate	Bill Amount
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	16 October 2002	3	4,000.00	12,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Petchvorakul	21 October 2002	3	4,000.00	12,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	22 October 2002	5	4,000.00	20,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	23 October 2002	4	4,000.00	16,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	24 October 2002	7	4,000.00	28,000.00
e-business web site	Preparing minutes of Borad's meeting for changing of bank account signing authority	Pollarit	25 October 2002	8	4,000.00	32,000.00
e-business web site	this is manual keyin task	Pollarit	21 October 2002	1	4,000.00	4,000.00
e-business web site	this is manual keyin task	Pollarit	22 October 2002	1	4,000.00	4,000.00
e-business web site	this is manual keyin task	Pollarit	23 October 2002	2	4,000.00	8,000.00
e-business web site	this is manual keyin task	Pollarit	24 October 2002	1	4,000.00	4,000.00
e-business web site	this is manual keyin task	Pollarit	25 October 2002	2	4,000.00	8,000.00
e-business web site	use manual key	Pollarit	21 October 2002	4	4,000.00	16,000.00
e-business web site	use manual key	Pollarit	22 October 2002	1	4,000.00	4,000.00

Done

http://localhost/TimeSheet/ASPX/ReportTimeSlip.aspx?StartDate=7-Aug-2002&EndDate=5-Nov-2003&ClientID=43&MatterID=5

Start TimeSheet 3 Projects 19 SQL Server 50 D Des 5.0 ReportTimeSlip... Local intranet 11:06 AM

Figure A.12. Report (Microsoft Word View).

- (1) From report list screen, click MS-Word icon from the MS-Word column
- (2) Report is generated and display on the new instance of web browser with Microsoft Word embedded

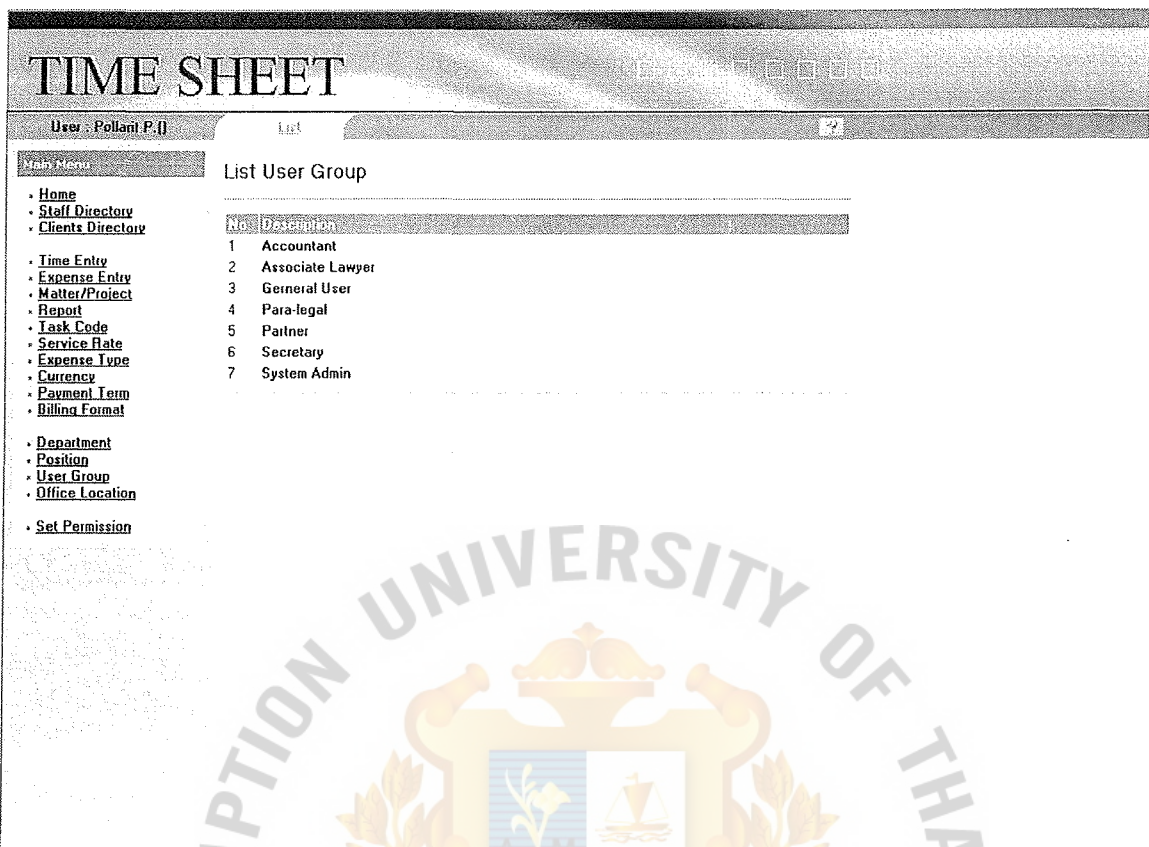


Figure A.13. User Group.



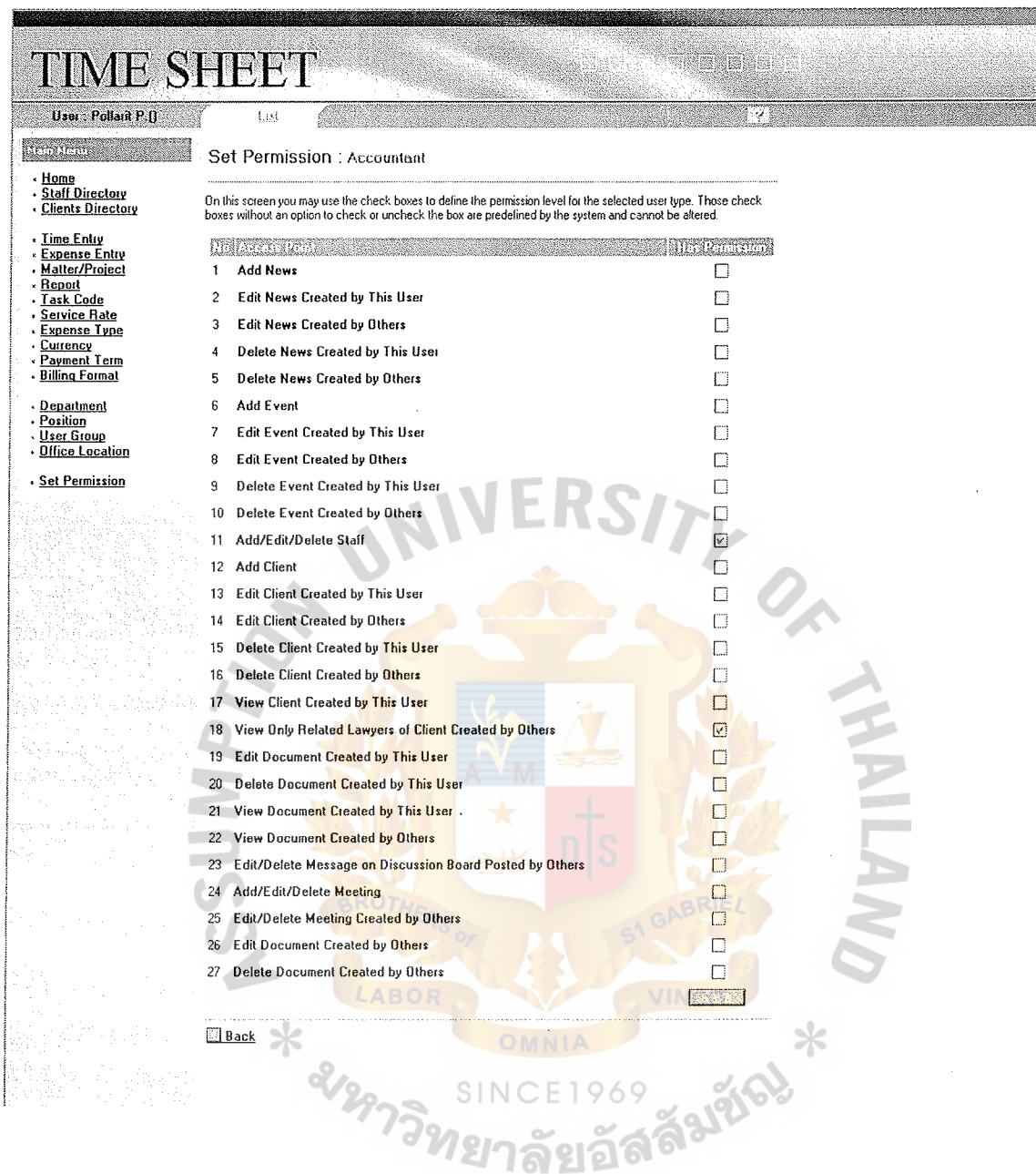


Figure A.14. Setting Permissions on each User Group.

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