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The TranSys: Information System for Small and Medium Scaled Transportation Companies

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Disclaimer

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Abstract

Logistics affect almost every sphere of human activities. One major component of logistics process is the movement of goods from point-to-point to point-of-consumption, and perhaps their return as well. Transportation is often the single largest cost in the logistics process. Therefore, it is important component that must be managed effectively.

The TranSys, a transportation system is basically a application which targets logistics practitioner especially those who provide trucking service to automate and structure the delivery process to help ensure that products and services meet or exceed customer's exact requirements. The convenience of the TranSys is to bring automation in scheduling trucks and drivers to delivery items to destination. Embedded in this system was cost analysis, a powerful yet versatile module which help management to keep in touch with the most expensive cost component in logistics. The intelligence of the system will be placed on the server where all calculations and business rules are applies.

The TranSys is planning to be developed by using Microsoft Visual Basic 6.0 and Crystal Report 8.5 technologies on the Window 2000 Server platform with Microsoft SQL Server 2000 as its back-ends.

With the latest and powerful ActiveX Data Objects 2.6 technology, the system is not only expected to be workable, but also highly efficient in terms of execution speed and response time. The system design is dynamic and supporting concurrent users to interact with the system over the 2-tier traditional client-server architecture.

Acknowledgement

The author would like to take this opportunity to acknowledge those who have gave the author inspiration, hope and support throughout the project development.

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Thirdly, the author wishes to thank his beloved family especially his elder brother, late Paul Chung Chee Soong who dismissed on 25 January 2003. His unfaltering support throughout the duration of the project development will always be remembered forever and I miss his so much.

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1.1 Logistics Definition

A first step in gaining an understanding of logistics process is to have a clear understanding of what logistics management means. Logistics management has many names, including:

- Business logistics

- Channel management

- Physical distribution

- Materials management

- Supply chain management

The most commonly accepted term among practicing logisticians is logistics management. The Council of Logistics Management (CLM), a leading organization for logistics professionals with a current membership of over 18,000, define the term as follows:

- Logistics management is that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point-of-origin to the point-of-consumption in order to meet customers requirements. (Stock & Lambert, 2001)

The objective of logistics is to arrange delivery of finished inventory, work in process inventory, and material assortments, when required, in usable condition, to

the location where needed, and at the lowest total cost. (Bloomberg D. J. et al., 2001)

1.2   Logistics Transportation System

One major component of logistics process is the movement or flow of goods from point-of-origin to point-of-consumption, and perhaps their return as well. (Stock & Lambert, 2001). The traffic and transportation activity involves managing the movement of products and includes selecting the method of shipment (air, rail, water, pipeline, truck, intermodal); choosing the specific path (routing); complying with various local, state, and federal transportation regulations; and being aware of both domestic and international shipping requirements.

Transportation is often the single largest cost in the logistics process. Therefore, it is important component that must be managed effectively.

1.2.1 Mode of transport

In addition to classifying transportation alternatives on the basis of mode, another method of grouping is base on carrier category. The four traditional types of carrier are:

- Common Carrier
- Contract Carrier
- Exempt Carrier
- Private Carrier
- Independent Carrier

1.3   Project Definition

The current project will develop a Traffic and Transportation System known as TranSys that will exploit the distribution system as the core information system for logistics practitioner that provide trucking services. Historically, procurement in transportation management has been a large and complex; especially in international logistics management. Management is quiet concerned with the value added by logistics, because improvements in place and time utility are ultimately reflected in the firm's profits. Both cost savings in logistics and a stronger marketing position due to an improved logistics system can cause improved bottom-line performance. In addition to that, this project will be improving the largest cost component in logistics, transportation.

The TranSys will target all logistics practitioner from small to medium scale firm that provide trucking services. These include the staff from management, clerk, secretaries, and drivers to benefit the usage of information technologies via electronic exchange that provide fast and accuracy information amongst them.

Just because the TranSys will implement for small to medium scale companies, so this system will be running in traditional 2-tier client-server architecture rather than client-web server architecture.

The TranSys allows management to schedule carrier such as truck and lorry to optimize the usage of its. The schedule also involves driver who will be on shift with automated scheduler. Thus, there will be a systematic duty roaster who carry out task on shift added a value to improve logistics system.

This system also allows management to aware of transportation cost involves in a journey by estimating the cost of fuel and labor wages. By this, management cans promptly pricing charges on customer, which are profitable and scalable. This will lead to increase company's revenue by providing strategic profit model and pricing method.

Besides that, customer satisfaction, of which customer service is an integral part, occurs if the company or organization's overall marketing efforts are successful. The Traffic and Transportation System will affect a customer to receive the right product, at the right time. Thus the system will integrate logistics management concept in order to provide the necessary level of customer satisfaction at the lowest possible total cost.

The development of the TranSys is decomposed into five major modules, which are;

1. Carriers and drivers scheduling system

2. Transportation cost estimation system

3. Payroll system (driver)

4. Warehousing

5. Accounting (account payable and account receivable)

1.4   Project Motivation

1.Reduced transportation cost

Operating of any logistics company will be streamlined and take advantages of shared technologies infrastructure to cut transportation costs. Automation of manual process and information flows saves labor, paper, fax and phone service costs.

2.Allows efficient movement to the customer

As E. Grosvenor Plowman said that the "five rights" of logistics system are supplying the right product at the right place at the right time in the right condition for the right cost to those customers consuming the product. (Parker D.D., 1962)

3.Effective communication

Communication is a vital link between the entire logistics process and the firm's customers. Accurate and timely communication is the cornerstone of successful logistics management.

4.Improve information management

Management reporting has been a constant frustrating weakness for most manual system. The transportation system provide accurate information that help management staff to better handle and manage the transportation system. Such information can be logged and analyzed. Following this, predictive and proactive management strategies can be put into play.

1.5   Project Objective

The objectives of developing the Logistics Transportation System, TranSys are:

1. To enable management to automate scheduling the carrier.

2. To enable management to automate scheduling the drivers.

3. To ensure that the delivery meet or exceed the customer exact requirement.

4. To keep close to the cost managing.

5. To reduce error in delivery and speed up the process.

The target users for the TranSys are those who are in all level of logistics management that include the management staff, secretaries, clerks and drivers.

1.6   Project Scope

The current project emphasis on developed a procurement system as the basic

development of the Logistics System. The overall system structure can be described

as the following diagram.
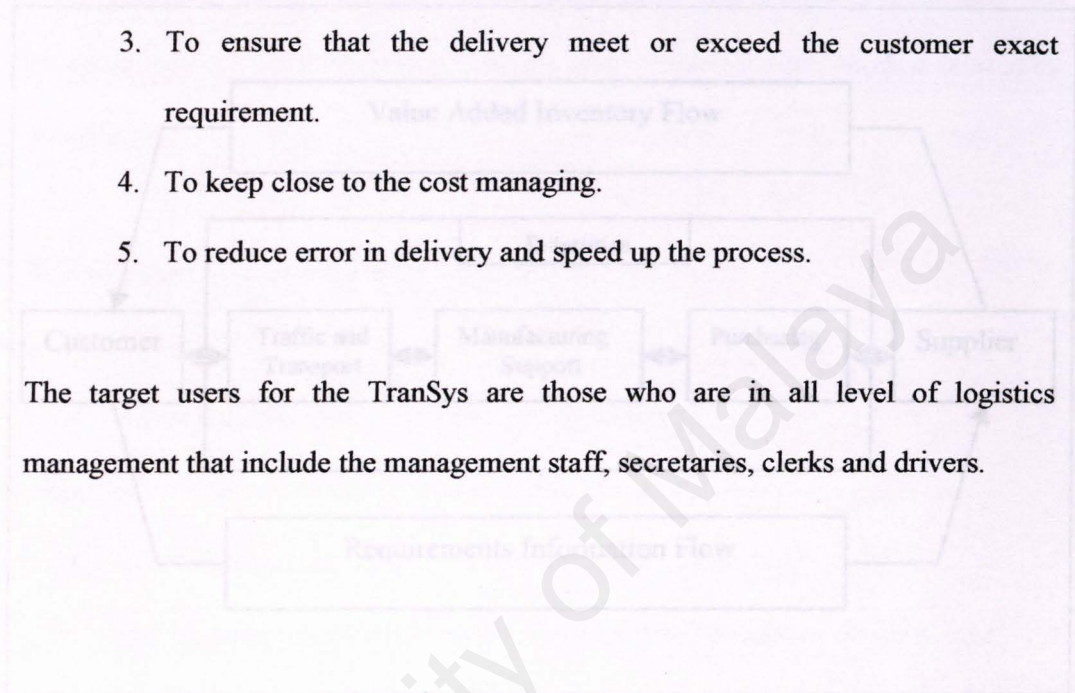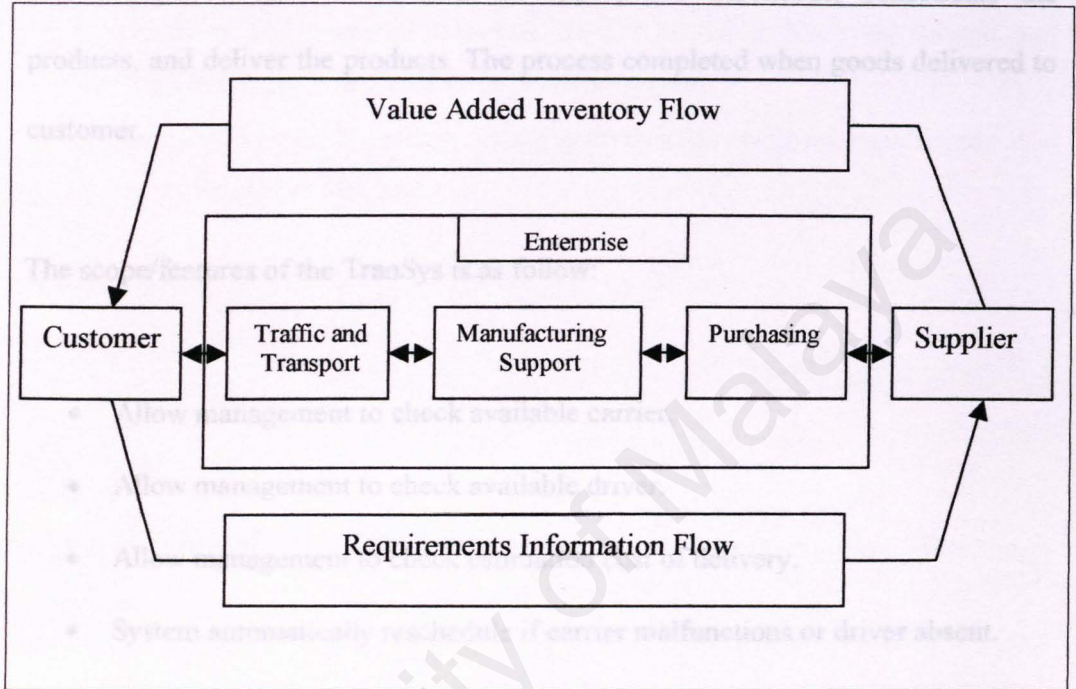
Figure 1.1 A general Logistics System structure

As the Logistics System is large and complicated, this project is narrowed down

and focuses primarily on:

1.   Traffic and Transportation System

As mentioned earlier, this project is primarily focused on the Traffic and

Transportation System. The Traffic and Transportation System is basically a

automated scheduling and systematic delivery of goods to customer in order to meet

or exceed customers exact requirement including quantity, quality, specifications,

time of delivery and other terms and conditions. The intelligence of the system will be placed on the server where all calculations and business rules are applies.

The delivery process begins when a goods is routed to the manufacturing support. The enterprise begins to allocate an appropriate warehouse, consolidate the products, and deliver the products. The process completed when goods delivered to customer.

The scope/features of the TranSys is as follow:

- Allow management to check available carrier.

- Allow management to check available driver.

- Allow management to check estimation cost of delivery.

- System automatically reschedule if carrier malfunctions or driver absent.

- Enable the management to consolidate products that can be found in several warehouses.

- There is a delivery breakdown; the management should able to provide second carrier or driver.

- Allow clerks to do accounting basic

- Allow clerks and management to check items in warehouse to be deliver

- Display all the delivery orders.

- Documents print out, like invoice and items check list

The limitations of the TranSys are:

- It does not incorporate any online payment system as the system is configured to use delivery order and invoice as an alternative.
- It cannot trace a single vehicle by real time, as most customers would like to know when the delivery items would arrive.
- Currency and language selection are not available. Malaysia Ringgit and English language are used as the system default.
- No guided route to delivery items to destination was implemented and it is up to drivers' experience.

1.7   Project Schedule

In view of developing the project, a project schedule is planned as a guideline to manage the time and tasks that need to be accomplished. A project development schedule is highly needed to ensure that effort is distributed within the prescribed time to make the best use of resources. The TranSys development is divided into six phases, which are research, system analysis, system design, system implementation, system testing and documentation.

The schedule of the project is as shown in the Gantt chart below.
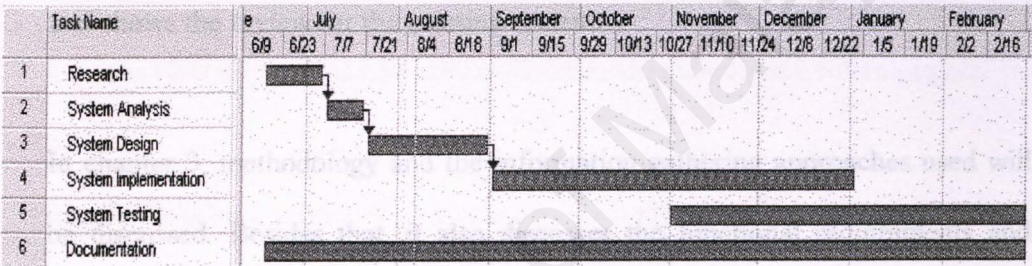
Figure 1.2   Gantt chart for Project Schedule

1.8 Overview of Dissertation

The first chapter gives an overview of the definition of the TranSys. It also gives an idea of the motivation and objective of this dissertation. Finally, it shows the scope and schedule for the project.

The next chapter, which is chapter 2, is represents the literature review. This chapter discusses about the terms, concepts and technologies used in this dissertation. Furthermore, it also discusses the literatures for this dissertation and shows the review for the existing system.

In chapter 3, methodology and the information gathering approaches used will be discussed. Besides that, it also discusses the functional requirements and non-functional requirements that need to consider during the whole project. Finally, it discusses about the system development tools that used.

Chapter 4 will be focusing on the discussions about the system analysis. It discusses the functional requirement and non-functional requirement of the system along with development tools that will be use.

Chapter 5 will be focusing on the discussions about the system design. It discusses the system architecture, program design, database design as well as the interface design for the whole system.

Chapters 6 will describes the processes and technique of transfers the system design into workable modules and programming codes, setting up the system in the same environment where it will be used.

In Chapter 7, it will discuss various testing techniques that are carried out throughout the development process in order to develop a precise and accurate system.

Chapter 8, which is the System evaluation, focuses on the post-implementation review to determine strengths and limitations/constraints of the system. The appraisal will also provide feasible information to enhance the future project.

The final chapter, chapter 9, is a summary to the whole dissertation and this will conclude everything that has been reviewed in all previous chapters.

Chapter 2 Literature Review

Review of literature is a background study about the knowledge and the information gained to develop this project. The purpose of this review of literature is to get a better understanding on the development tools that can be used to develop a project and also to get a better knowledge on the development methodologies used while developing a project.

Apart from that, the review of literature also enables the developer to do comparison on the past-developed projects and study the strength and weakness of it. This will help the author to develop a suitable and powerful system. With sufficient knowledge of strengths and limitation of several development tools may help the developer to choose the right tool to develop the system It will also give an overview of how to improve the weakness and fulfill the requirements needed.

2.1   Logistics

2.1.1 Overview

The logistics process affects almost every sphere of human activity, directly or indirectly. Few area of business has significant an impact on a society's standard of living as logistics. As customer, we tend to notice logistics only when there is a problem:

- A consumer uses the Internet to purchase a birthday gift for a family member and the item arrives too late, even though timely delivery was promised.

- A product advertised in a weekend newspaper insert is not available when a customer attempts to purchase it at a local retail store.

- An order is delivered to the wrong customer, and it takes several days for the mistake to be corrected; in the meantime, a substitute shipment must be sent by air express, resulting in additional costs to the seller.
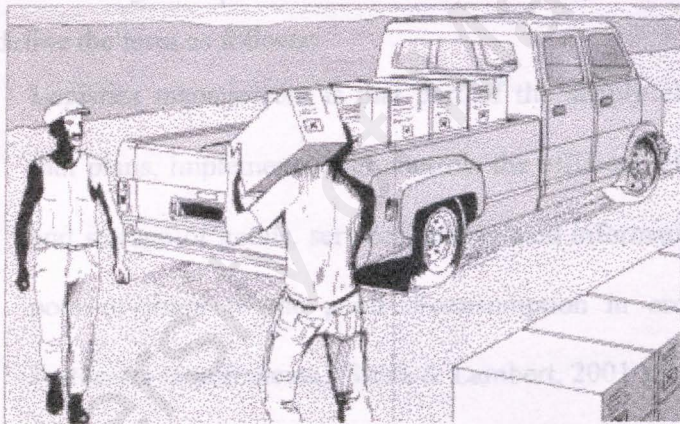
Figure 2.1 Logistics practitioner.

We often don't think of the role that logistics has in our lives until something goes wrong. Fortunately, such occurrences are the exception rather than the rule.

2.1.2 Logistics Definition

A first step in gaining an understanding of logistics process is to have a clear understanding of what logistics management means. Logistics management has many names, including:

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- Supply chain management

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The objective of logistics is to arrange delivery of finished inventory, work in process inventory, and material assortments, when required, in usable condition, to the location where needed, and at the lowest total cost. (Bloomberg D. J. et al., 2001)

2.1.3 Transportation

One major component of logistics process is the movement or flow of goods from point-of-origin to point-of-consumption, and perhaps their return as

well. (Stock & Lambert, 2001). The traffic and transportation activity involves managing the movement of products and includes selecting the method of shipment (air, rail, water, pipeline, truck, intermodal); choosing the specific path (routing); complying with various local, state, and federal transportation regulations; and being aware of both domestic and international shipping requirements.

Transportation is often the single largest cost in the logistics process. Therefore, it is important component that must be managed effectively.

2.1.4 System Approach/Integration

The system approach is a critical concept in logistics. Logistics is, in itself, a system; it is a network of related activities with a purpose of managing the orderly flow of material and personnel within the logistics channel.

The system approach is a simplistic yet powerful paradigm for understanding interrelationships. The system approach simply states that all functions of activities need to be understood in terms of how they affect, and are affected by, other elements and activities with which they interact. The idea is that if one looks at actions in isolation, he or she will not understand the big picture or how such actions affect, or are affected by, others activities. In essence, the sum, or outcome of a series of activities, is greater than its individual part.

In addition to that, it is likely not desirable to build a sub-system. The implementations of a individual system, which suppose interact with others activities would just slowly down the whole process of delivery. (Stock & Lambert, 2001)

2.1.5 Cost Component in Logistics

The rising affluence of consumers has led to increasing national and international markets for goods and services. The distribution of products from point-to-origin to point-of-consumption has become an enormously important component of the gross domestic product (GDP) of industrialize nations.

Table 2.1 Components of 1999 Logistics Cost (Delaney R. V. & Wilson R., 2000)

Component	$ Billions
Inventory carrying costs(All business inventory: $1.376trillion)	
Interest	70
Taxes, obsolescence, depreciation, insurance	187
Warehousing	75
Subtotal	332
Transportation costs	
Motor carriers:	
Truck-intercity	300
Truck-local	150
Subtotal	450
Other carriers:	
Railroads	35
Water	22
Oil pipelines	9
Forwarders	6
Air	26
Subtotal	98
Shipper-related costs	5
Logistics administration	35
Total logistics costs	**920**

2.2 Existing System Review

This section discusses the existing transportation system in the market. Previous related thesis is not discussed, as there is no thesis related to logistics transportation system is found.

2.2.1 Transportation System in the market – Seagull Logistics Transportation System

This section reviews the transportation system that developed for Seagull Logistics Sdn. Bhd. The system is provided to all kind of users that are involved in the logistics.

Basically, this transportation system has covered all the basic function that need for delivery process. Besides that, the interface design of the system is also very ease-to-use to its users. This transportation system also included inventory management system to keep track the stocks in the warehouse.

The advantage of the transportation system was the use of Global Positioning System (GPS), which allow the firm to keep track for each truck on delivery. This real time base system also provides more accurate information to customer about the arrival of the goods.

However, there are some weaknesses in this system. Firstly there is no automating scheduling for drivers as each driver is assign to a particular

truck. Secondly, there is no cost estimation for each journey. This will surely reduce the firm competitive in making scalable and profitable price

2.2.2 Transportation System in the market – Atwin Transportation System

This section reviews the transportation system that developed for Atwin Sdn. Bhd. This system is use by all staff in Atwin firm.

Averagely, this transportation system has all the basic function that need for transportation process embedded within. The interface design of the system is not so easy to use. This transportation system also included inventory management system like Seagull transportation system to keep track the stocks in the warehouse.

There is several dissatisfaction in this system. Firstly, the delivery agents are unable to keep track the stocks outside of the warehouse, as the system is not web-enabled. This brings a lot of inconveniences to them. Besides that, the system is fully based on the paper-based transaction. The administrators need to print out all the report or summary in order to keep track their stocks. It is relatively slow, prone to error and difficult to update.

In conclusion, Atwin transportation system provides sufficient and quality services to the users.

2.2.3 Transportation System in the market – Skyway Express Transportation System

This was small-scaled transportation company that hasn't much exploiting the benefit of the information technologies. The firm has only a small system to carry out task for accounting.

Most of the process delivery is manually done.

2.3   Client-Server Computing

This section discusses the features of client server computing and different types of client/server architecture.

Client server programming is one of the most dominant programs of information technology and has developed as the computer industry moved from a centralized chare logic-based system to a network of workstations and servers. It involves providing an application architecture that enables a computerized process to be broken up into two or more less complex tasks with a commercial mechanism for these sub-processes to co-operate.

The client/server model is an approach to software in which one application (the client) asks for and receives services from another application (the server). Another definition for client/server is " a software partitioning paradigm in which a distributed system is split between one or more server tasks which accept requests, according to some protocol, from (distributed) client tasks, asking for information or action" (Petroutsos E., 2000). This model allows clients and servers to be placed independently on nodes in a network.

One of the prime benefits of a client/server system is the lower cost. Another is increased productivity from the individual to the corporation that results from better access to information and the distribution of resources through the corporation (Petroutsos E., 2000).

Though client/server architecture can be very complex, there are generally three kinds of client/server infrastructures to choose from, which are two-tier, three-tier, multi-tier architectures.

2.3.1 Two-tier architecture

The two-tier architecture contains two computers: a client, and a server, with areas of logic combined on the client. The three components of an application- presentation, processing, and data, are divided among two software, entities or tiers: client application cods and database server. A robust client application development language and a versatile mechanism for transmitting direct requests to the server essential for a two-tier implementation. (Petroutsos E., 2000).

Presentation is handled exclusively by the client, processing is split between client and server, and data is stored on and accessed through the server. The client assumes the bulk of responsibility for application (functionality) logic with respect to the processing component, while the database engine, with its attendant integrity checks, query capabilities, and central repository functions, handles data intensive tasks.

2.3.2 Three-tier architecture

The components of three-tier architecture are divided into three layers: a presentation layer, a functionality layer, and the data layer. Each of these

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layers must be logically separated. The attempt to overcome some of the limitations of the two-tier scheme by separating presentation, processing and data into separate destruct entities.
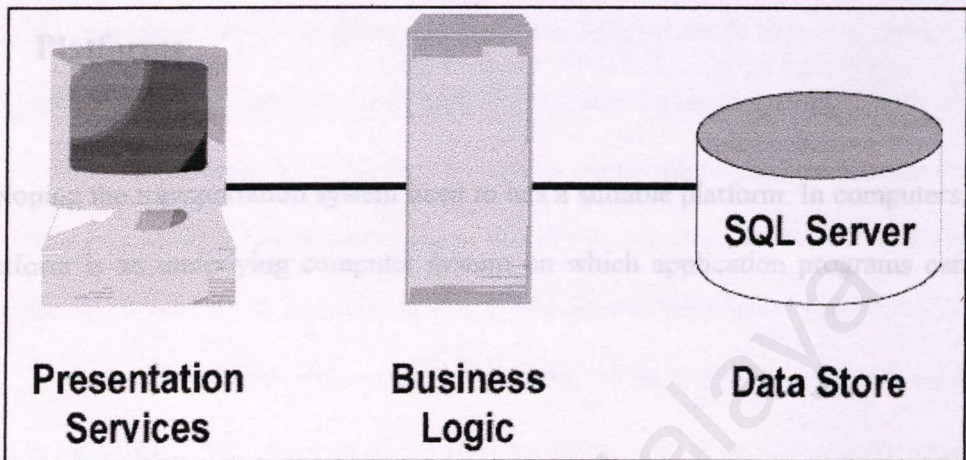
Figure 2.2 Three-tier architecture

The same type of tools can be used for presentation as were used in a two-tier environment. However the tools are now dedicated to handling just the presentation. When calculations or data accesses are required by the presentation client, a call is made to a middle tier functionality server. (Petroutsos E., 2000).

2.3.3 Multi-tier architecture

In a multi-tier architecture, the business logic is partitioned and distributed over several machines. As requirements change during a systems lifetime, this partitioning and deployment can be reviewed and emended with minimal impact. Furthermore, additional tiers architecture included to

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support multiple databases and other services such as message switches, legacy system, data warehouses, communication channels and so on.

2.4 Platforms

Developing the transportation system need to has a suitable platform. In computers, a platform is an underlying computer system on which application programs can run.

A platform consists of an operating system, the computer system's coordinating program, which in turn is built on the instruction set for a processor or microprocessor, the hardware that performs logic operations and manages data movement in the computer. The operating system must be designed to work with the particular processor's set of instructions. There are usually other implied parts in any computer platform such as a motherboard and a data bus, but these parts have increasingly become modularized and standardized.

Historically, most application programs have had to be written to run on a particular platform. Each platform provided a different application program interface for different system services. Although these platform differences continue to exist and there will probably always be proprietary differences between them, new open or standards-conforming interfaces now allow many programs to run on different platforms or to interoperate with different platforms through mediating or "broker" programs.

2.4.1 Windows 2000 Server

Windows 2000 Server is a product of Microsoft Corporation. It is a multipurpose operating system for business of all sizes. It provides services that enable the user to build and deploy servers more quickly. With its feature 'Configure Your Server' wizard, it significantly reduces the time it takes to build a server and reduces the likelihood of error. Windows 2000 Server allows easier network configuration with its support on plug and play network adapters. Furthermore, it provides services that manage the trust relationships between domains in organization, and it provides automated replication and local caching of DNS and DHCP information so that the network is robust and responsive.

Windows 2000 Server provides powerful management services through infrastructure enhancements such as the Active Directory service, as well as tools built on the infrastructure, such as IntelliMirror management technologies. Windows 2000 Server delivers powerful, comprehensive management services to better manage servers, networks and Windows-based desktops, including Group Policy, Windows Management Instrumentation (WMI), Windows Script Host (WSH) and Microsoft Management Console (MMC). But still stability of the operating is still a main concern. Users still faces "blue screen of death" showing the system hangs. (Minasi M. et al., 2001)

2.4.2 Sun Solaris 8 Operating Environment

Solaris 8 is the latest in a long line of top-notch and high-performance Unix operating environments from Sun. It is designed for multiprocessing and 64-bit computing. By minimizing planned and unplanned downtime, reducing administration errors, and simplifying troubleshooting, it keeps mission-critical applications available, and ensures high-speed, reliable access to your data. Based on a smaller, more stable kernel, the Solaris platform delivers industry-leading load balancing across multiple processors. To maximize uptime, Solaris software provides built-in features such as live upgrade, automatic dynamic reconfiguration, hot relief, hot diagnostics, dynamic system domains, IP network fail over and balancing, UNIX file system logging, and remote console. With these features it enables user to maximize uptime and increase availability to services.

As with previous versions, the modular construction of the Solaris 8 platform allows installation of new feature updates as they become available while users' applications continue to run. The Sun Solaris 8 is easy to scale and manage as it supports the latest networking protocols and adheres to major industry standards and inclusion of comprehensive system management tools. With Solaris 8 software, security is easy to deploy and manage as many frameworks and products are either incorporated or available via free download. These include Kerberos, IPSec, Smart card authentication, role-based access control for distributing super user authorizations and auditing features. Moreover, Solaris 8 Supports the latest

networking protocols and adheres to major industry standards. (Veeraraghavan S. & Watters P. A. 2000).

However, Solaris 8 operating system does not support the primary protocols used for providing Web-based applications. Using the base Solaris 8 operating environment it is therefore difficult to provide a coherent Internet solution across the different services that would normally make up your Internet service. For example, using the built-in e-mail services and a third

party Web server solution requires two different authentication systems.

Although this requirement is not an issue for public Web services such as e-commerce, it is a significant omission for Intranet and Extranet applications. Besides that, the base Solaris 8 package does not come with a unified

interface for managing different aspects of the operating system. Instead,

most systems management tasks are handled by manually modifying the various text files controlling different elements, using a text editor such as *vi* or EMACS. There is an administration tool supported by the X Windows GUI that allows for easier modification of certain databases, but it is limited

to modifying the user, group, host, and printer configuration. (Veeraraghavan S. & Watters P. A. 2000).

2.4.3 UNIX

UNIX is a multi-tasking multi-user operating system. It developed at AT&T Bell Laboratories. It is a powerful and mature operating system and network-based platform. Besides, UNIX is an ideal platform for running mail servers, networked file systems and so on. UNIX users normally share

processing time on a central computer, or cluster of computers. (Peek J.D. et al, 2001).

UNIX, like other operating systems, is a layer between the hardware and the applications that run on the computer. It has functions that manage the hardware and functions that manage the executives of applications. (Peek J.D. et al, 2001).

UNIX includes the traditional operating system. In addition, a standard UNIX system includes a set of libraries and a set of applications. It includes the file system and process control and a set of libraries.

One of the greatest strength of UNIX is the consistent way in which it treats files. It is very easy for the users to work with files because users don't need to learn special commands for every new task. (Peek J.D. et al, 2001).

Basically, UNIX is used for several main purposes, which are:

- ➢ Sending and receiving email, forwarding mail, redirecting and mapping a particular mail group to a list of specific users.

- ➢ Managing centralized databases, serving information to users remotely. For instance, Ingress, Oracle, etc.

- ➢ Storing files, including users personal files as well as publicly accessible software archives.

> Running a web server, storing web pages.

> Remotely services – computers running UNIX normally support certain remote services, allowing users to request information from the computer without actually log in.

UNIX is not known only for its longevity and versatility as an operating system, but also for the variety and number of utility programs that called tool. The problem with UNIX is that it is too expensive to use. It need very powerful workstations and therefore not cost effective.

2.5   Web Servers

A Web server is a program that, using the client/server model and the World Wide Web's Hypertext Transfer Protocol (Hypertext Transfer Protocol), serves the files that form Web pages to Web users (whose computers contain HTTP clients that forward their requests). Every computer on the Internet that contains a Web site must have a Web server program. (Spainhour S. et al.,1999)

2.5.1   Apache Web Server

Apache server is a powerful yet flexible web server. It is compliant with HTTP/1.1 and implements the latest protocols, including HTTP/1.1 (RFC2616). Apache web server is highly configurable as it is in open source code and extensible with third-party modules, and can be customized by writing 'modules' using the Apache module API. Moreover, it provides full source code and comes with an unrestrictive license. (Coar, K. A. et al, 1998).

Apache web server runs on Windows NT/9x, Netware 5.x, OS/2, and most versions of Unix, as well as several other operating systems. The web server is actively being developed and encourages user feedback through new ideas, bug reports and patches. The features of Apache web server includes DBM databases for authentication, customizable responses to errors and problems, multiple DirectoryIndex directives and unlimited flexible URL rewriting and aliasing. It is compatibles with Windows 2000, NT, Linux, NewWare 5.0 (with Service Pack 5), 5.1 (with Service Pack 1), UNIX, BSD, HP MPE/iX 6.0 or higher and TPF version 4.1 PUT09.

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However, there are limitations in Apache Web Server. To corporate Web server customers, the fact that Apache is free can be a drawback, signifying a lack of the explicit or implied accountability they get with vendor products. Its flexibility also can be a double-edged sword. Apache is easy to set up, but those who try to extend it had better know what they are doing. Where there is not a lot of expertise available, customers may also prefer to see features that come together and have been tested together rather than search them out from multiple sources on the Internet. The lack of software support for Apache that has been a stumbling block to its adoption by business users also is beginning to be remedied. Traditionally, Apache support has been confined to online resources. (Coar, K. A. et al, 1998)

2.5.2 Microsoft Internet Information Server (V.5.0)

Internet Information Services 5.0 (IIS) is the Windows 2000 Web service that makes it easy to publish information on the intranet for the Internet. It is completely integrated with Windows NT Directory Services and includes Crystal Reports, a visual reporting tool. Internet Information Server 5.0 has many new features to enables user to create a scalable and flexible web applications. It allows administrators to configure servers, sites, virtual directories, subdirectories and files individually. It also includes crash protection that allows users to run multiple applications reliably. Moreover IIS includes tools to analyze and manage web server content and supports multiple web sited on one IP address. (Microsoft , 2000)

2.5.3   Netscape Enterprise Server

The Enterprise Server is a high performance, enterprise-strength web server. It provides supports HTTP 1.1 protocol, a built-in search engine with documents attributes and custom views, advanced content publishing and management for end users through an approach called "Netshare", server clustering and administrative rights delegation and Java integration with support for JavaBeans, JDBC and Servlets. It can support a variety of platforms such as Windows NT, Unix, IRIX, AIX, HPUX and others. (McFarlane N. et al., 1999).

Netscape Enterprise Server provides end-users the ability to manage their own content. "Netshare" a built-in tool facilitates group collaboration as multiple users may publish pages to a server, edit, share, collaborate on creating a document and control access to their documents without needing a system administrator to intervene. With its centralized server management capability, it enables large organizations to manage its large number of users more effectively.

However, Netscape Enterprise has several drawbacks. Due to its insufficient GUI-based interface, it is difficult to configure. Users are facing difficulty in getting support as the only way to get technical support is through mailing lists.

2.6   Browsers

2.6.1   Netscape Navigator 6

Netscape Navigator comes in a package with Netscape 6 and built on the innovative Netscape Gecko browser engine and sporting a new look, Navigator is now smaller, faster and fully standards compliant. The interface of Navigator is pared down to the make the most important tasks easy to find, while at the same time freeing up more space, allowing user to see more of what's on the page.

Navigator is based on the innovative Netscape Gecko, its new, fully standards compliant layout engine. It also provides powerful new search that are fast and convenient. With a feature called 'My Sidebar' keeps user connected to important information. Lastly, it can translate web pages in a single click to user's native language with the AutoTranslate feature in Navigator, based on Alis Technologies, Inc.'s Gist-In-Time service for the Internet. (Fulton J. & Gertler N., 1996)

2.6.2   Internet Explorer 6.0

Internet Explorer is a product from Microsoft Corporation. It provides capability for print preview enabling user to see how web pages will look like on paper. Besides that, this version of Internet Explorer can be easily installed on computer. Internet Explorer 6.0 includes an amazing assortment

of new DHTML capabilities. For example, it's now possible to make frames transparent so that whatever is in the page behind it shows through - great for creating things such as watermarks. For instance, put a large corporate logo on the background page, and it appears as a watermark on all the pages within that site. (Lowe D., 2001)

New frames support is possible because Internet Explorer has changed the way it renders frames its own DHTML support. Consequently, it provides faster performance and improved stability. Moreover, the browser contains a ton of features that help developers write Web pages that look good and function well in Internet Explorer. Now, developers would be able to create colored scroll bars, HTML pop-ups, and other user interface widgets.

2.7   Web Application Programming Language

2.7.1   Active Server Pages

An Active Server Page (ASP) is an HTML page that includes one or more script (small-embedded programs) that is processed on a Microsoft Web server before the page is sent to the user. An ASP is somewhat similar to a Server-side include or a common gateway interface (CGI) application in that all involve programs that run on the server, usually tailoring a page for the user. Typically, the script in the Web page at the server uses input received as the result of the user's request for the page to access data from a database and then builds or customizes the page on the fly before sending it to the requestor.

ASP is a feature of the Microsoft Internet Information Server (IIS), but, since the server-side script is just building a regular HTML page, it can be delivered to almost any browser. You can create an ASP file by including a script written in VBScript or JScript in an HTML file or by using ActiveX Data Objects (ADOs) program statements in the HTML file. You name the HTML file with the ".asp" file suffix. Microsoft recommends the use of the server-side ASP rather than a client-side script, where there is actually a choice, because the server-side script will result in an easily displayable HTML page. Client-side scripts (for example, with JavaScript) may not work as intended on older browsers. (Buser D. et al., 1999).

2.7.2 Java Server Page

Java Server Pages allows web developers and designers to rapidly develop and easily maintain, information-rich, dynamic web pages that leverage existing business systems. As part of the Java family, Java Server Pages enables rapid development of web-based applications that are platform independent. Java Server Pages technology separates the user interface from content generation enabling designers to change the overall page layout without altering the underlying dynamic content.

Java Server Pages technology uses XML-like tags and scriptlets written in the Java programming language to encapsulate the logic that generates the content for the page. Additionally, the application logic can reside in server-based resources that the page accesses with these tags and scriptlets. Any and all formatting (HTML or XML) tags are passed directly back to the response page. This makes Java Server Pages technology makes it faster and easier than ever to build web-based applications. Together, JSP technology and servlets provide an attractive alternative to other types of dynamic web scripting/programming that offers platform independence, enhanced performance, separation of logic from display, ease of administration, extensibility into the enterprise and most importantly, ease of use. (Hanna P. , 2001).

2.7.3 VBScript

VBScript is a member of Microsoft's Visual Basic family of development products. It is a scripting language for HTML pages on the World Wide

Web and corporate Intranets. VBScript is fast, portable, lightweight interpreter for use in Web browsers and other applications that use Microsoft ActiveX Controls, Automation severs, and Java Applets. VBScript can be embedded in the HTML pages to build the Web applications. (Lomax P., 2000)

VBScript is designed for use with Microsoft's Internet Explorer browsers together with other programming that can be run at the client's side, including ActiveX controls, Automation Servers and Java Applets. The VBScript code is interpreted and compiled while the browser is downloading it from a Web server. (Lomax P., 2000)

2.7.4 JavaScript

JavaScript is a programming language that allows scripting of events, objects and actions to create Internet applications. It is developed by Netscape and it is the first Web scripting. It is syntactically identical to Java, which is based on C++, but it's an interpreted language as compare to Java, which is a compiled language.(McFarlane N. et al., 1999)

With JavaScript, new dynamic elements let developers go beyond the simple click and wait. Users will not just read the pages but also interact with them. Users can get quick responses the interaction does not need to involve the server but can take place in their browser.

2.7.5 PERL (V5)

Perl is a high-level programming language and derived from the C programming language Perl's process, file, and text manipulation facilities make it particularly well-suited for tasks involving quick prototyping, system utilities, software tools, system management tasks, database access, graphical programming, networking, and world wide web programming. Perl is flexible and extensible to use on virtually any task, from one-line file-processing tasks to large, elaborate systems. For many people, Perl serves as a great replacement for shell scripting. For others, it serves as a convenient, high-level replacement for most of what they'd program in low-level languages like C or C++.   But Perl has some drawbacks. Firstly, it has somewhat of a reputation for being unreadable and this can leads to difficulties in maintaining the problem. Secondly, as Perl does has any formal support, it sometimes difficult to get any support when needed. Lastly, there would be a penalty in the execution time of Perl Language as it is a interpreted language.(Gundavaram S.& Briznieks G., 2000)

2.8   Electronic Commerce Portal Development Tools

2.8.1   IBM WebSphere Commerce Suite, Pro Edition

The IBM WebSphere Commerce Suite is IBM's solution for e-business. The IBM WebSphere Commerce Suite provides the framework and solutions for catalog and storefront creation to merchandising, relationship marketing and payment processing in a secure, scalable environment. With its advanced search function, it enables quick access to products, items, and components. Moreover, with the combination of knowledge engineering and parametric search provides search and buying assistance for all types of customer and needs. Parametric search can be customized at every, or any category or subcategory level. Sales assistance is based on the expertise of a company's sales and marketing expertise. Questions and answer selection determines the next question until product determination is reached.(Ibm[A];Ibm[B], 15/08/2002).

The IBM WebSphere Commerce Suit enables customers to switch easily switch from sales assistance to a parametric search. It also very flexible and customizable to shopping/buyer groups, to industry, segment, or customer needs. Built with IBM's unique technology, it allows for the design of additional search, sales advice, and product guidance methods. The IBM WebSphere Commerce Suit is compatibles with Windows NT, IBM AIX and Sun Solaris platform. But, because of its overall complicated design, it requires to a lot of customization. (Ibm[A];Ibm[B], 15/08/2002).

2.8.2 InterWorld Commerce Exchange V3.1

InterWorld Commerce Exchange is a procuct by InterWorld Corporation. It is a family of software products designed to enable manufacturers, distributors, and retailers to compete in the digital economy. The products are grouped into tools for business management and development, applications based on best practices, and adapters for integrating Commerce Exchange with legacy and enterprise business systems. The Process Application Server is the engine that drives the software, while Web Broker handles traffic volume. The three major applications driven by the Process Application Server are Product Merchandising, Order Management, and Account Management. Each application provides a set of best practices from which customers can choose to personalize their version of Commerce Exchange. It can be used with Informix, Microsoft SQL, Oracle, Sybase database.

The strengths of the Interworld Commerce Exchange are its Role-Based Station Tools and allow implementation without customized programming. Role-Based Station Tools allow managers to control their portion of the enterprise online infrastructure without reliance on program code. Business Station, Dev Station, Control Station, and Design Station allow individuals across an organization to collaborate in the development and management of their online business. The latter, customers of Commerce Exchange can launch e-commerce sites without adding any custom programming to the underlying InterWorld technology. This decreases the time it takes to get to

market with a Web channel. The InterWorld Commerce Exchange is compatibles with Digital UNIX, Sun Solaris, and Microsoft Windows NT platform.

2.8.3 Microsoft Commerce Server 2000

As its name implied, Commerce Server 2000 is a scalable e-commerce platform that provides ready-to-use features for developing, deploying, and upgrading effective e-commerce applications for the Web developed by Microsoft Corporation. This extensible platform enables customers, Independent Software Vendors (ISVs), and Internet Service Providers (ISPs) to build solutions that scale with business needs and integrate with existing systems and data. The strengths of Commerce Server is its highly scalable user information management that supports millions of users. Users can be grouped into specific groupings so that administrator could effectively target groups of customers. It also has a sophisticated and extensible content scoring framework for managing complex content selection decisions. (One, 15/08/2002)

Commerce Server 2000 provides flexible campaign management, fully-integrated with the Targeting, Data Mining and Analytics Systems, enables business managers to create, analyze and manage personalized and targeted discounts, direct marketing, and advertising campaigns. It is built-in fast and scalable service to enable personalized, targeted direct marketing, tracking and reporting The Expression Builder empowers business managers to

easily create explicit business rules to target content (ads, information, discounts, direct mail) to specific users Integrated and powerful search capabilities make product information easy to find, enhancing user experience Business Desk provides managers with remote access to their business at any time and from any location securely via the Web. In short with its built-in capabilities, the developers could easily build an e-commerce site a short time and less error prone.(One, 15/08/2002).

2.8.4   Microsoft Visual Interdev 6

Microsoft Visual InterDev, formerly Microsoft's Internet Studio product, is the company's Web application development product for building data-driven, Internet-based business applications. The latest version, 6.0, is offered as a standalone product and as part of the Visual Studio suite. Visual Interdev is based on a distributed architecture and, thus, typical Visual Interdev projects reside on Web servers while the actual development takes place on a developer's workstation or PC.

The strengths of Visual Interdev is the Enhanced Integrated Development Environment (IDE) for rapid Application Development (RAD) Development . The enhanced IDE gives users a high level of control over the development interface. The WYSIWYG Page Editing feature allows users to design/edit a Web application using WYSIWYG views and to see displays of the formatting and content of the HTML source code.(Amundsen M.& Crouch R. L., 1999)

IntelliSense script writing tools analyze both client- and server-side objects and can help developers become familiar with ASP, DHTML, and Internet Explorer 4.0 object models. Syntax Tips offers coding suggestions for Visual Basic, Scripting Edition, and JScript users. Debugging facilities now include a toolbar to start/continue/stop execution, set breakpoints, and attach to remote server processes. Breakpoints can be set for both client- and server-side script.

The interface also provides a view of all documents on the browser and server; Watch, Local, and Auto windows for inspecting and manipulating variables; an Immediate window for typing in Visual Basic or JScript expressions; and a display of the running threads and Call Stack.

Microsoft's Universal Data Access initiatives are prevalent in Visua Interdev 6.0. Support for three core technologies--OLE DB, ODBC, and ADO-- provide developers a means of accessing disparate database systems for use in the development of dynamic Web applications. It also supports Team-Oriented and Enterprise-Level Application Development.(Amundsen M.& Crouch R. L., 1999). With the addition of a Local Working Mode allows individual developers working on a development team to isolate themselves and some of their work from the project without losing the ability to build, test, and debug via VI's features and functions.

2.8.5   Microsoft FrontPage 2000

Microsoft FrontPage 2000 is designed to be an all-purpose web site authoring package. It provides a variety of features and is geared for beginning to intermediate users. FrontPage provides several interesting features. The Themes (which have been increased to 67) are an especially helpful feature, allowing novices and nondesigners to focus on content rather than on design, and simplifying the process of creating sites with a consistent appearance. FrontPage also includes strong site management features, including the capability to visualize a Web site through multiple views and edit the site via drag and drop.

FrontPage provides strong site management features that are also easy to use, especially since FrontPage Editor and FrontPage Explorer, formerly separate modules, are now integrated. FrontPage can automatically verify, edit, or repair hyperlinks, and broken links can be easily discerned. The product automatically renames pages and reconstructs applicable links when pages are rearranged; users need only drag and drop page icons between folders or tree branches to relocate site content.(Randall N.& Jones D. , 1999)

Site publishing is also easy and allows developers to upload anything from an entire site to one or more individual pages. There are also features for managing sites in a team development environment. Furthermore, the

program now includes 13 new management reports that quickly summarize a site's status.

The main disadvantage is an obvious reliance on Microsoft technology. Features such as DHTML, Visual Basic Scripts, ActiveX Controls, and Channel Definition Format work only with Microsoft products. But in light of America Online's purchase of Netscape and the alliance with Sun Microsystems, this issue may decrease in importance.

2.9   Database

A database is a collection of data that is organized so that its contents can easily be accessed, managed, and updated. All data and information about TranSys such as delivery orders detail needed to be store. Hence a database will be necessary to keep all information. This section will discuss the different types of database and its important.

2.9.1   Oracle 9i Database

Oracle 9i Database is the latest database product from Oracle Corporation. It provides transparent application scalability by sharing cluster-wide caches for coordinated data access. It also includes business intelligence capabilities. With is open framework, programmatic access, centralized management, and multi-channel delivery of Internet services can be provided to users. A key feature of the database is the facility to recover from disaster situations.(Greenwald R. et al., 2001)

Besides that, Oracle 9i database is designed with integrated manageability that creates a complete business view of all components powering e-business processing. As any other database software in the market, Oracle 9i provides multiple layers of security to prevent any unauthorized access to the database. Oracle 9i is compatible with UNIX and Windows NT. But, the cost of the Oracle software is more expensive compared to other database software.

2.9.2   Microsoft SQL Server 2000

Microsoft SQL Server 2000 is an enterprise-level database and is the latest version of Microsoft SQL 7. It is enhanced with Extensible Markup Language (XML) support that enables data return in XML and also enables XML be used to insert, update, and delete values in the database. SQL Server 2000 supports enhancements to distributed partitioned views that allow users to partition tables horizontally across multiple servers.(Vieira R., 2000). Its full-text search includes change tracking and image filtering.

In the security point of view, SQL Server 2000 uses Kerberos to support mutual authentication between the client and the server, as well as the ability to pass the security credentials of a client between computers, so that work on a remote server can proceed using the credentials of the impersonated client.(Vieira R., 2000).

Moreover, SQL Server 2000 introduces a new, more easily understood model for specifying backup and restores options. In term of scalability, it Scales up to 32 CPUs and 64 GB RAM.

2.9.3   Microsoft Access 2000

Microsoft Access 2000 is a relational database application that allows desktop users to create and manipulate megabytes of data, with 50MB being

the average size database. Multi-user access to the same database is accomplished via file-server architecture, rather than a client/server architecture.

Microsoft Access 2000 provides organizations with the tools for finding and managing data by focusing on three key areas. First, Access 2000 simplifies the skill set needed to create simple, useful databases for desktop users. Second, Access 2000 adds Data Access Pages, which are HTML pages that let users interact with data over the Web from any location and maintain live links to a database. Finally, Access 2000, through its support of OLE DB, can act as a front end to high-end database engines such as Microsoft SQL Server, making Access 2000 databases more scalable as business needs grow. But Both the Jet and Microsoft Database Engines available with Access 2000 support only 2GB per database, which means it only supports only individual, workgroup or small company.(Jennings R., 1999).

2.10 Summary

This chapter discussed the study about the areas that need to be covered in order to develop the system. These areas included logistics management and transportation. This ensures that the readers have better understanding about the basic concept. Besides that, this chapter also reviewed on the related existing system. The author studied the strength and weakness of the system in order to develop a powerful and suitable system after discovered some of the constraints and limitations of the existing system. Finally, this chapter also discussed the development tools that needed to develop the system. Each development tool is compared among several different kinds of tools that have similar characteristics to help the author choose the right tool to develop the system.

Chapter 3   Methodology

3.1 Methodology

In order to develop the TranSys on time and within effort, an effective development method has to be chosen. Methodology is a classically thought of as the set of activities that analysts, designers and users carry out to develop and implement a system. A suitable methodology helps the author to develop the system on time and increases the quality or usefulness of the system .(Pfleeger, S. L., 2000; Sommerville I., 2001).   The Waterfall Model with prototyping is chosen as the development methodology for the TranSys.

3.1.1 Waterfall Model With Prototyping

The Waterfall Model with prototyping consists of eight major stages. These stages overlap and feed information into each other. The model is not a simple linear model but involves a sequence iteration of the development activities. Design prototyping helps developers assess alternative design strategies and decide which is best for a particular system.

Reason of choosing Waterfall Model with Prototyping:

  ➢ It is widely used, easily understood and implemented in a system development process.

  ➢ It supports good process visibility as each activity produces some kind of deliverable. These deliverables may prove to be useful when the system evolves in the future.

➤ It enforces disciplined approach to develop a system as documents prepared after each stage will have to be checked and approved.

There are nine stages of Waterfall Model with prototyping. The nine stages are:

➤ Requirement

➤ System

➤ Program

➤ Coding

➤ Unit

➤ System

➤ Acceptance Testing

➤ Operation and Maintenance

➤ Prototyping

➤ It enables maintenance to be carried out at each stage due to its interactive nature. Changes can be done during any of the stages by returning to the previous stages. The iteration process may be carried out as many times as needed and this produces a fine system of high quality that meets user's requirements.

Figure 3.1   Waterfall Model With Prototyping

3.1.2   Stages of Waterfall Model With Prototyping

There are nine stages of waterfall model with prototyping. The nine stages are:

- ➤ Requirements Analysis
- ➤ System Design
- ➤ Program Design
- ➤ Coding
- ➤ Unit and Integration Testing
- ➤ System Testing
- ➤ Acceptance Testing
- ➤ Operation and Maintenance
- ➤ Prototyping
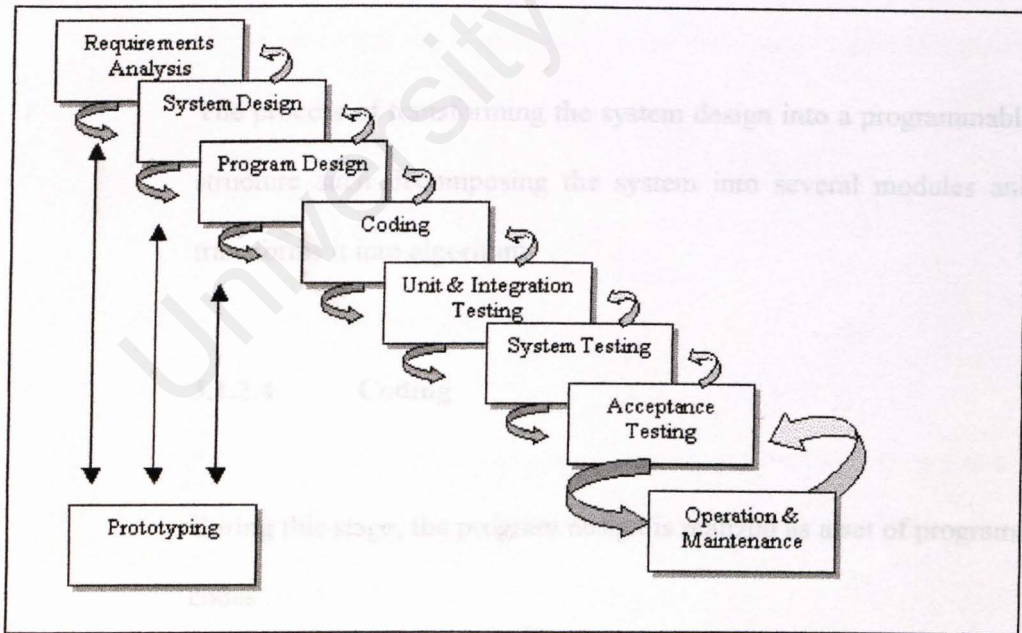
Figure 3.1   Waterfall Model With Prototyping

3.1.2.1 Requirements Analysis

In this stage, study and research of the TranSys have to be carried out to understand the issues concerning the system and the nature of the system. The main objective of this stage is to establish the system's services, constraints and goals. In this stage project requirement, needs, and constraints have to be identified.

3.1.2.2 System Design

The process of transforming the problem into a solution which then incorporated into the system.

3.1.2.3 Program Design

The process of transforming the system design into a programmable structure such decomposing the system into several modules and transforms it into algorithm.

3.1.2.4 Coding

During this stage, the program design is realized as a set of programs codes.

3.1.2.5 Prototyping

The process of continuous developing a quick and rough version of a desired or parts of that system. This stage is important in order to develop a suitable user interface that meets the user requirements especially for the catalogs part.

3.1.2.6 Unit and Integration Testing

During this stage, each program unit or modules are tested independently. Then several modules are combined and tested to ensure integration compatibility.

3.1.2.7 System Testing and Integration

All the modules are combined to form the whole system and then it is tested in its actual or similar environment when the system is implemented.

3.1.2.8 Acceptance Testing

During this stage, the actual user is given the opportunity to use the system. The purpose is to enable the users to determine if the system really meets their needs and expectations.

3.1.2.9 Operation and Maintenance

The system is ready to be implemented. This includes training of users to use the system, system maintenance and enhancement to meet new requirements. Maintenance on the system includes fixing bugs that are discovered. Maintenance is crucial to ensure that the system remains useful.

3.2 Summary

This chapter discussed the methodology used to develop the TranSys, which is the waterfall model with prototyping. It is very important in having the right methodological approach, as it will affect whether the aims and objectives could be achieved successfully.

Chapter 4   System Analysis

4.1 System Analysis

System analysis is the process of gathering and interpreting facts, diagnosing

problems and using the information to recommend improvement of the system. In

order to get an overview of the system requirement, an extensive analysis is needed.

The purposes of system analysis are to ascertain the functional and non-functional

requirement of the TranSys. It also helps to determine the programming language,

databases and hardware needs for this TranSys.

4.1.1 Information Gathering Approach

The information gathering is one of the phases of the system analysis. It was

carried out in order to gather relevant information to determine the

requirement of the system. Following is the approach used to define the

system requirements of the TranSys:

4.1.1.1   Reading Printed Material

The author gathers relevant information about the TranSys by

reading books, journal, thesis and magazines. The author gathered

the information about the similar existing system, method of

developing the system, programming language and web application

technology through reading. Book of reference will be list in

reference.

4.1.1.2   Observation

The author has an additional perspective about the TranSys through the observation of the real environment of existing system. In additional, the author understands the user's need by observed the user response.

4.1.1.3   Surfing Internet

Internet surfing is an efficient way of gathered the updated and useful information. A lot of website that provides useful and expertise which needed in the system. Websites that are visited are listed in reference.

4.1.1.4   Informal Interview

Informal interview with similar existing system users and developer have been carried out to know the system requirement. This will help to understand the need of the existing system from user view. Besides, informal interview with developer of the similar existing system help the author to choose suitable and effective tool for developing the TranSys.

4.2 Requirements Analysis And Specifications

Requirement can be defined as a condition or capability needed by a user to solve a problem or achieve an objective; a condition or a capability that must be met or processed by a system…to satisfy a contract, standard, specification or formally imposed document. Requirements analysis is a set of techniques to identify or extract system problems and solution requirements from the user community.

There are two ways to describe the requirements, which are functional requirement and non-functional requirement. The next section describes the functional requirements and non-functional requirements for the proposed system.

4.2.1 Functional Requirement

Functional requirement describes an interaction between the system and its environment. Furthermore, functional requirement described how the system should behave. Functional requirement are system expected by the user . The functional requirements for the TranSys are shown as below.

4.2.1.1 TranSys

4.2.1.1.1   Login Module

System will allow the authorized administrator to login to the system. User verification will be based on user identification and password.

4.2.1.1.2   Scheduling

System will allow computerize in scheduling drivers to transfer items to destination.

4.2.1.1.3   Cost Analysis

This module allow management to keep acknowledge with costs involved in the journey. This include in calculating the fuel consumption for each.

4.2.1.1.4   Delivery

Goods that are ready to be delivered will be computerizing documented with delivery order and invoice. Before this drivers need to approve for each delivery from office staff.

4.2.1.1.5   Warehousing

This module shows updating goods in warehouse and keep track for the outgoing and incoming items. This module are handle by office workers.

4.2.1.1.6   Pay Role

The system allows automating calculation of wages pay for drivers due to their workdays.

4.2.1.1.8   Exit and reenter

This module will ensure that the administrator or users that had exit cannot access the system already unless they login again.

4.2.2 Non-Functional Requirement

Non-functional requirements are the constraints under which a system must operate and the standards which must be met by the developed system (Pfleeger, S. L, 2000)

Following is the non-functional requirement of the TranSys:

4.2.2.1   Ease-to-use

Ease-to-use is important especially for new users because it will help them to use the function provided easily. The system has to be developed with the following features in order to be user-friendliness. The features are:

➢ Attractive, simple and ease-used interface design.

➢ Systematic standard Window Graphical User Interface (GUI).

➢ Field description for every window component.

➢ Module browser to allow users to shift among the system modules.

4.2.2.2   Reliability and Accuracy

The system is required to be reliable, as to produce results and information, which is required precision and accuracy by the user. This feature is important for this TranSys in order to ensure that the delivery process meet the exact requirements of the customers.

4.2.2.3   Availability

The system should be developed in a way that it is available to be accessed at anytime and anywhere. This feature is important for online system because the purpose of the TranSys is to provide convenient way for the administrators.

4.2.2.4 Efficiency

It is one of the important of the system, where it should provide a good response time for user request. The TranSys will provide real-time communication. Hence the system should not delay any user request.

4.2.2.5   Expandability

The system is needs to be developed in a way that capable to expand its module and functionality in the coming future.

4.3 Consideration on System Development Tools

A review on several selected system development tools have been carried out in previous chapter, Chapter 2, to discover and study the offered features and capabilities. After the considerations have been carried, the most suitable with the high capabilities tools are chosen in order to develop an efficient system. This section will discuss the features of the tools that had chosen.

4.3.1   Platform

Window 2000 Server was chosen as the platform due to several advantages that are distinct when compared to other operating systems. Below are the reasons why it has been chosen over the other operating system.

➢ Dominant Position

Windows currently enjoys a dominant position as the preferred network operating system by most corporations. In the consumer market, Microsoft's Windows enjoys a penetration rate of almost 90% of the overall market.

➢ User Friendly Environment

Windows 2000 Server support multitasking and it is also extremely user-friendly. Furthermore, the user interface of Windows 2000 Server is

very similar to Windows 95 or Windows 98. Therefore, users have no

difficulty in adapting to Windows 2000 Server.

➢ Developments Tools

Various development tools have been created for Windows users. Some

of these have helped to speed up the software development process.

➢ Skilled Professional

Microsoft boasts of extensive resources of skilled professional as its

produce are widely used. However, UNIX does not have as many skilled

development and support professionals. This will inherently increase the

cost of developing and maintaining the system as the shortage of

professional leads to competition.

Windows 2000 Server also supports for innovative web publishing features,

customize tools and new wizard technologies makes it the best platform

available to publish information over the Internet especially in this proposed

system.

4.3.2 Programming Language

The considerations in choosing a programming language, Microsoft Visual

Basic 6.0 will be appropriate because this system was intend to develop in a

rapid pace.

4.3.3 Data Access Technology

Data Access method use for the development of the TranSys will be ActiveX Data Objects. Since it is scoring almost as Universal Data Access, it provides more efficiency and stability for each transaction in the TranSys.

4.3.4   Report Generator

After taken into consideration, the TranSys will use Visual Basic Data Report as its report generator. The reason to choose this are :

- Provide more controls to the report design
- Suitable to use with Microsoft Visual Basic 6.0

4.3.5   Database Server

Microsoft Access 2000 had been chosen as the database server that used to develop the back-ends of the TranSys. This database ship with Microsoft Office 2000 and provide cheaper licensing compare to Microsoft SQL Server 2000.

4.4   System Requirement

4.4.1   Development Requirement

4.4.1.1 Hardware Requirement

The specifications of the hardware that use to develop the

TranSys are listed at Table 4.1.

Table 4.1   Hardware specifications for the development requirement

Minimum Requirements	
Computer/Processor	Pentium II 166 MHz or higher Pentium-compatible CPU
Memory	128 megabytes (MB) of RAM recommended minimum
Hard Disk	2 GB hard disk with a minimum of 1.0 GB free space. (Additional free hard disk space is required if you are installing over a network.)
CPU Support	Windows 2000 Server supports up to four CPUs on one machine
Input Devices	Mouse, keyboard, scanner
Output Devices	Printer
Video Monitor	EGA, VGA or compatible display

4.4.2 Runtime Requirement

4.4.2.1 Server Hardware Requirement

The recommended hardware requirements for the server are listed at Table 4.2.

Table 4.2 Hardware specifications for the server hardware requirement

Minimum Requirements	
Computer/Processor	Pentium II 266 MHz or higher Pentium-compatible CPU
Memory	128 megabytes (MB) of RAM recommended
Hard Disk	2 GB hard disk with a minimum of 1.0 GB free space. (Additional free hard disk space is required if you are installing over a network.)
CPU Support	Windows 2000 Server supports up to four CPUs on one machine
Input Devices	Mouse, keyboard
Output Devices	Printer
Video Monitor	EGA, VGA or compatible display
Internet Connection	At least ISDN line

4.4.2.2 Server Software Requirement

The recommended software requirements for server are listed at Table 4.3.

Table 4.3 Software specifications for the server software requirement

Platform	Microsoft 2000 Server
Web Server	Microsoft Internet Information Server 5.0
Report Generator	Visual Basic Data Report
Database Server	Access 2000

4.4.2.3 Client Hardware Requirement

The recommended hardware requirements for the client are listed at Table 4.4.

Table 4.4 Hardware specifications for the client hardware requirements

Minimum Requirements	
Computer/Processor	Intel Pentium 100 MHZ or greater and other compatible X86 processors like AMD
Memory	128 megabytes (MB) of RAM recommended minimum [64 MB minimum supported; 4 gigabytes (GB) maximum]

Hard Disk	2 GB hard disk with a minimum of 1.0 GB free space. (Additional free hard disk space is required if you are installing over a network.)
CPU Support	Windows 2000 Server supports up to four CPUs on one machine
Input Devices	Mouse, keyboard
Video Monitor	EGA, VGA or compatible display
Modem/Internet Connection	A minimum 28.8kbps modem is required

4.4.2.4 Client Software Requirement

The recommended software requirements for client are listed at Table 4.5.

Table 4.5   Software specifications for the client software requirement

Platform	Microsoft 2000 Professional

4.5 Summary

This chapter discussed the functional requirements and non-functional requirements in the Requirements Analysis and Specifications section. The author needs to study all these requirements and translate it into system characteristics during the system design in order to meet the exact requirements of the users. System development tools that had chosen also discussed in this chapter. These tools are discussed based on their suitability to develop the system.

Finally, the last section in this chapter discussed about the development and runtime requirements for the TranSys.

Chapter 5   System Design

Design phase is the stage of system development where the requirements for the system are translated into the system characteristics to meet the user requirement and satisfaction.

5.1   System Architecture

The TranSys is designed to leverages the traditional client / server architecture. It is using the 2-tier client / server systems where the first tier is the client and the second tier is the database server.

For the client side, client is equipped with designed application to view the information displayed on the screen, receive data or information from the server. The application logic is buried within the database on the server. Users are running the GUI on the client. It sends file system calls or SQL commands over a network to the server. The server processes the request and returns the results. Figure 5.1 shows the architecture of the 2-tier client / server application.

Figure 5.1   A 2-tier Client/Server Application Architecture

5.2   Program Design

Author has imposed program design as a process to transfer the system requirements to system functions. The TranSys is designed based on the Unified Modeling Language (the UML), which provide a high level view for ease to understand the system.

The TranSys can be further defined into several sub modules, which are:

> Login

> Scheduling

> Cost Anaysis

> Delivery

> Warehousing

➤ Pay Role

5.2.1   The UML

The UML is a general-purpose visual modeling language that is used to specify, visualize, construct and document the artifacts of a software system. The UML includes semantic concepts, notation and guidelines. It has static, dynamic, environmental and organizational parts. It is intended to be supported by interactive specification does not define a standard process but is intended to be useful with an iterative development process.

The UML captures information about the static structure and dynamic behavior of a system. A system is modeled as a collection of discrete objects that interact to perform work that ultimately benefits an outside user. The static structure defines the kinds of objects important to a system and to its implementation, as well as the relationships among the objects. The dynamic behavior defines the history of objects over time and the communications among objects to accomplish goals. Modeling a system from several separate but related viewpoint permits it to be understood for different purposes (Rumbaugh J. et al., 1999).

Representation	Symbol
Actor	�-symbol
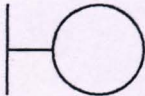
User Interface Icon	
Controller Icon	
Entity Icon	

Figure 5.2   Components of the UML

This section shows all the UML state diagram and dynamic diagram for the modules in the TranSys.

5.2.1.1 The TranSys Use Case Diagram
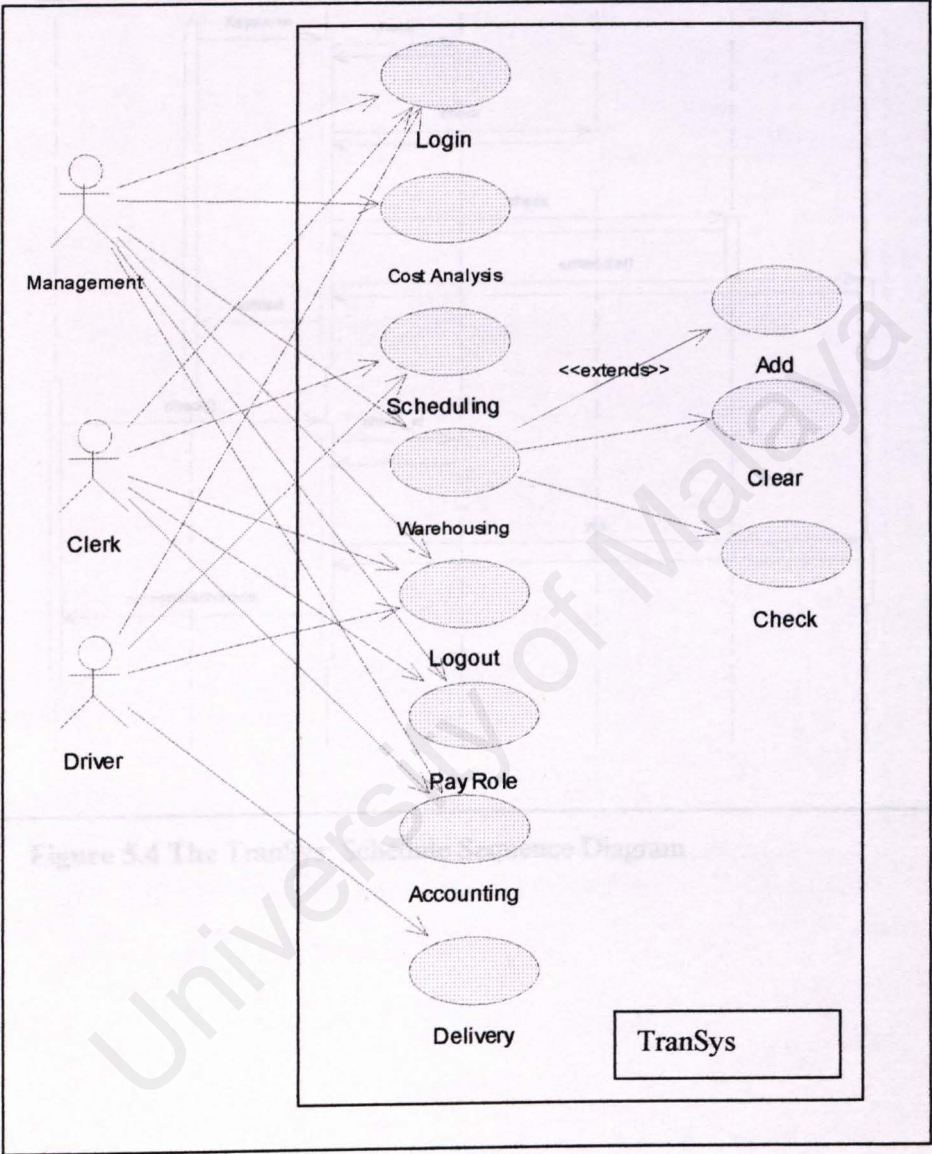
Figure 5.3 The TranSys Use Case Diagram

5.2.1.2 The TranSys: Schedule Sequence Diagram
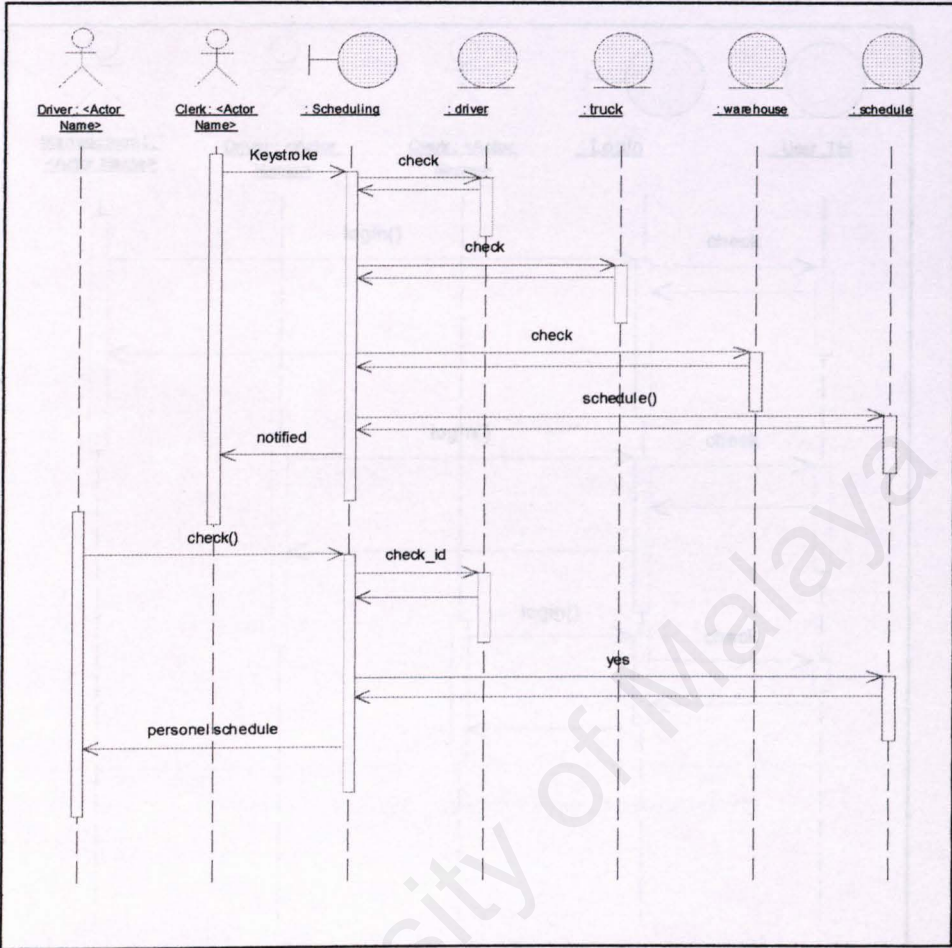
Figure 5.4 The TranSys: Schedule Sequence Diagram

5.2.1.3 The TranSys: Login Sequence Diagram
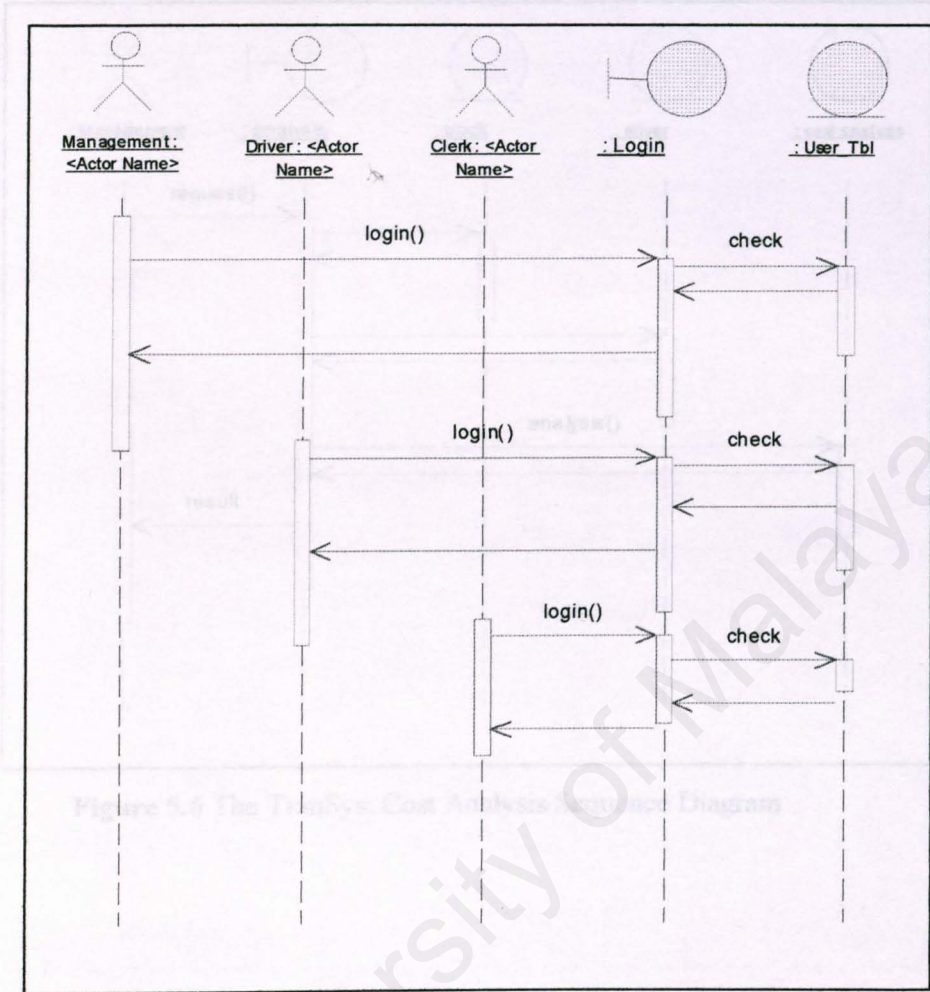
Figure 5.5 The TranSys: Login Sequence Diagram

5.2.1.4 The TranSys: Cost Analysis Sequence Diagram
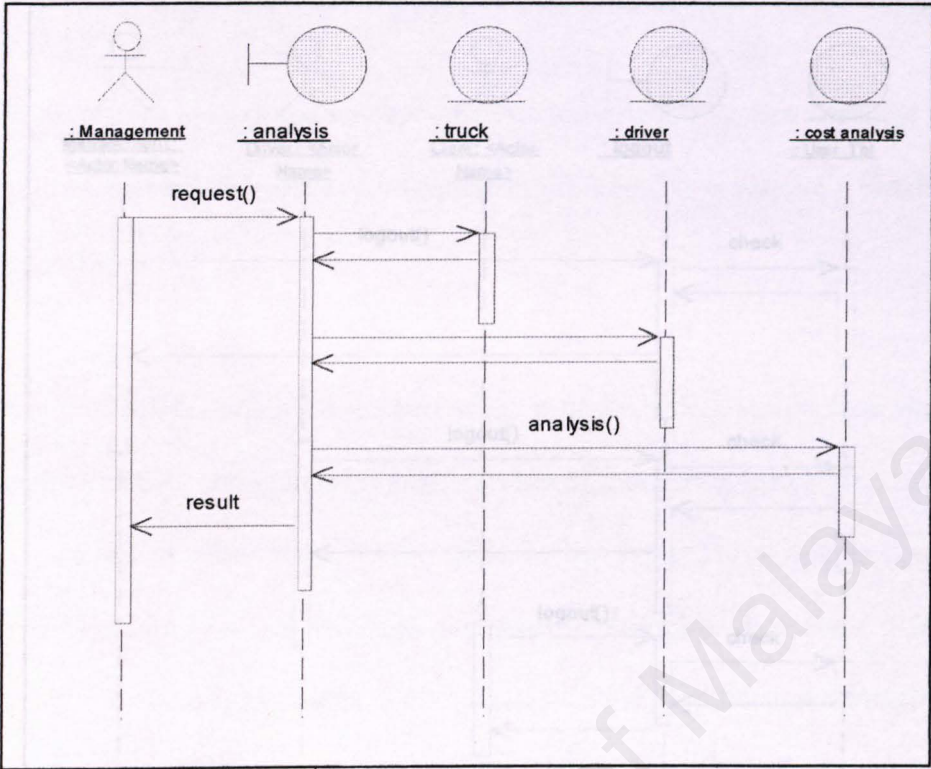
Figure 5.6 The TranSys: Cost Analysis Sequence Diagram

5.2.1.5 The TranSys: Logout Sequence Diagram
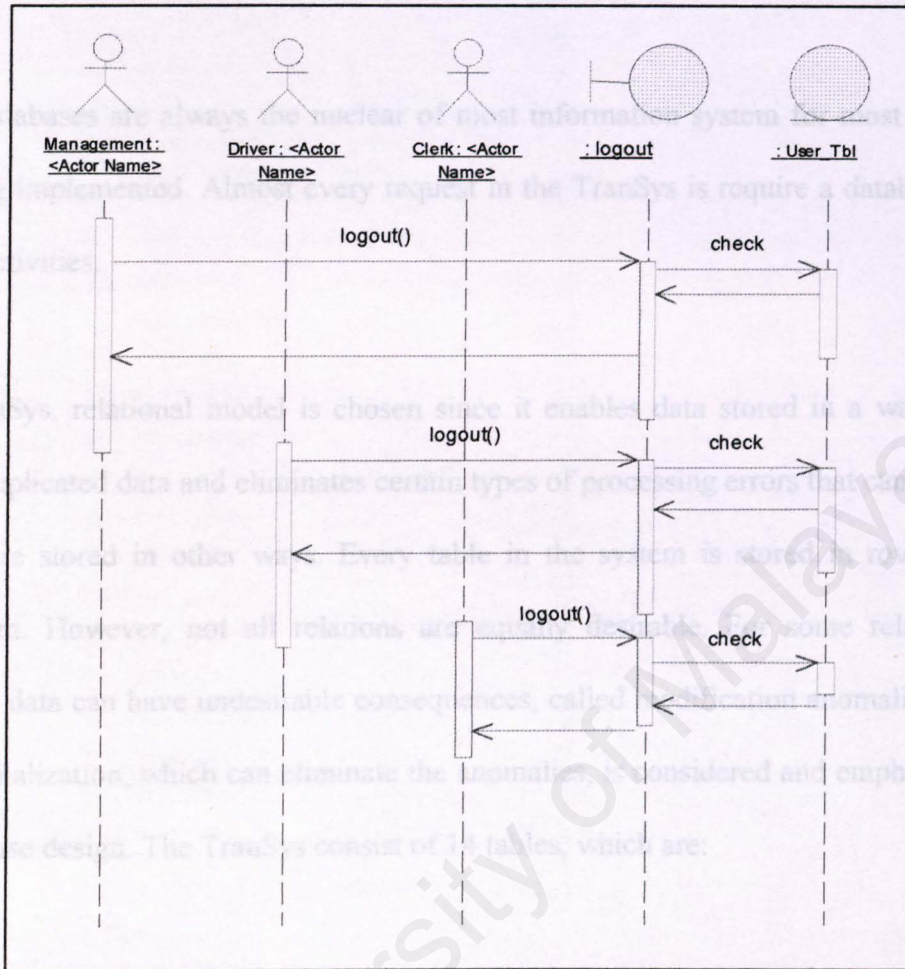
Figure 5.7 The TranSys: Logout Sequence Diagram

5.3   Database Design

Basically, databases are always the nuclear of most information system for most of the system being implemented. Almost every request in the TranSys is require a database to support its activities.

For the TranSys, relational model is chosen since it enables data stored in a way that minimizes duplicated data and eliminates certain types of processing errors that can occur when data are stored in other ways. Every table in the system is stored in rows and columns form. However, not all relations are equally desirable. For some relations, changing the data can have undesirable consequences, called modification anomalies. As a result, normalization, which can eliminate the anomalies, is considered and emphasized during database design. The TranSys consist of 14 tables, which are:
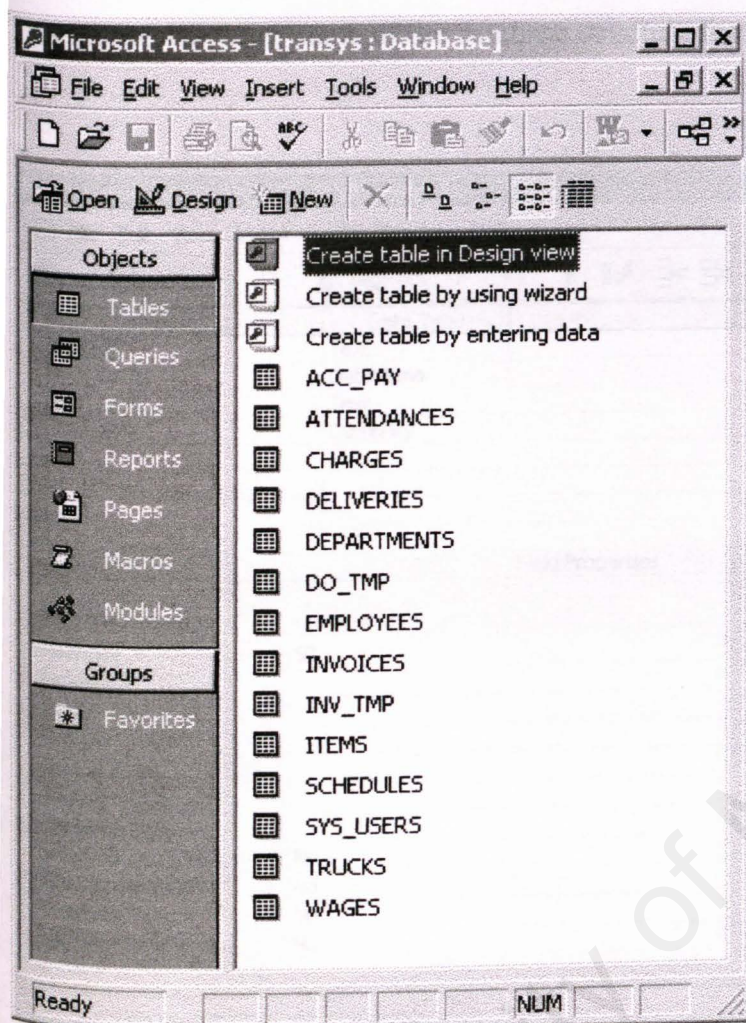
Figure 5.8 List of database tables

This section list down some of the database structure for the TranSys.

Figure 5.9 Acc_Pay Table

Figure 5.10 Attendances Table

Microsoft Access - [CHARGES : Table]

File Edit View Insert Tools Window Help

Field Name	Data Type	Description
CHG_ID	Text	
CHG_CAT	Number	1-10kg below 2-20kg below 3-40kg below 4-100kg below 5-above
CHG_DESC	Text	
CHG_AMT	Currency	

Field Properties

General | Lookup

Field Size	50
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	No
Indexed	No
Unicode Compression	No

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

NUM

Figure 5.11 Charges Table
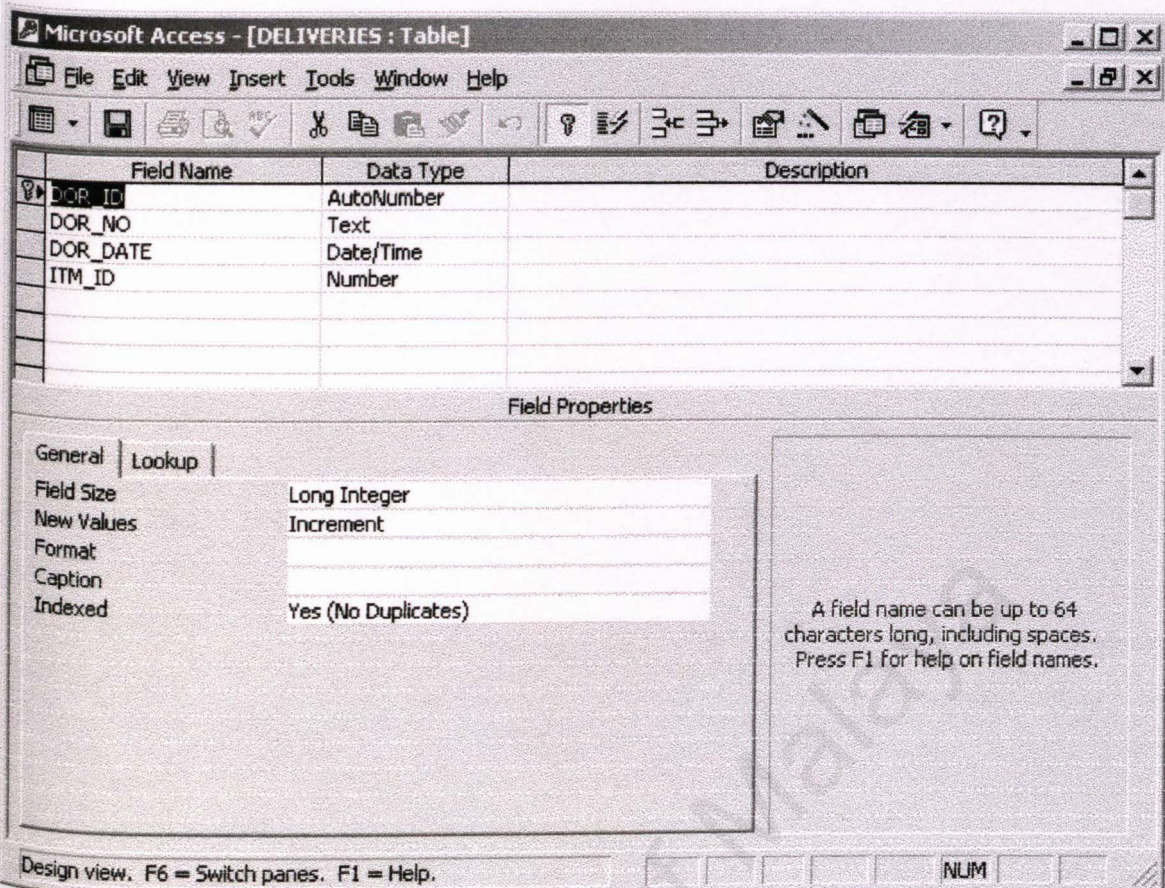
Figure 5.12 Deliveries Table
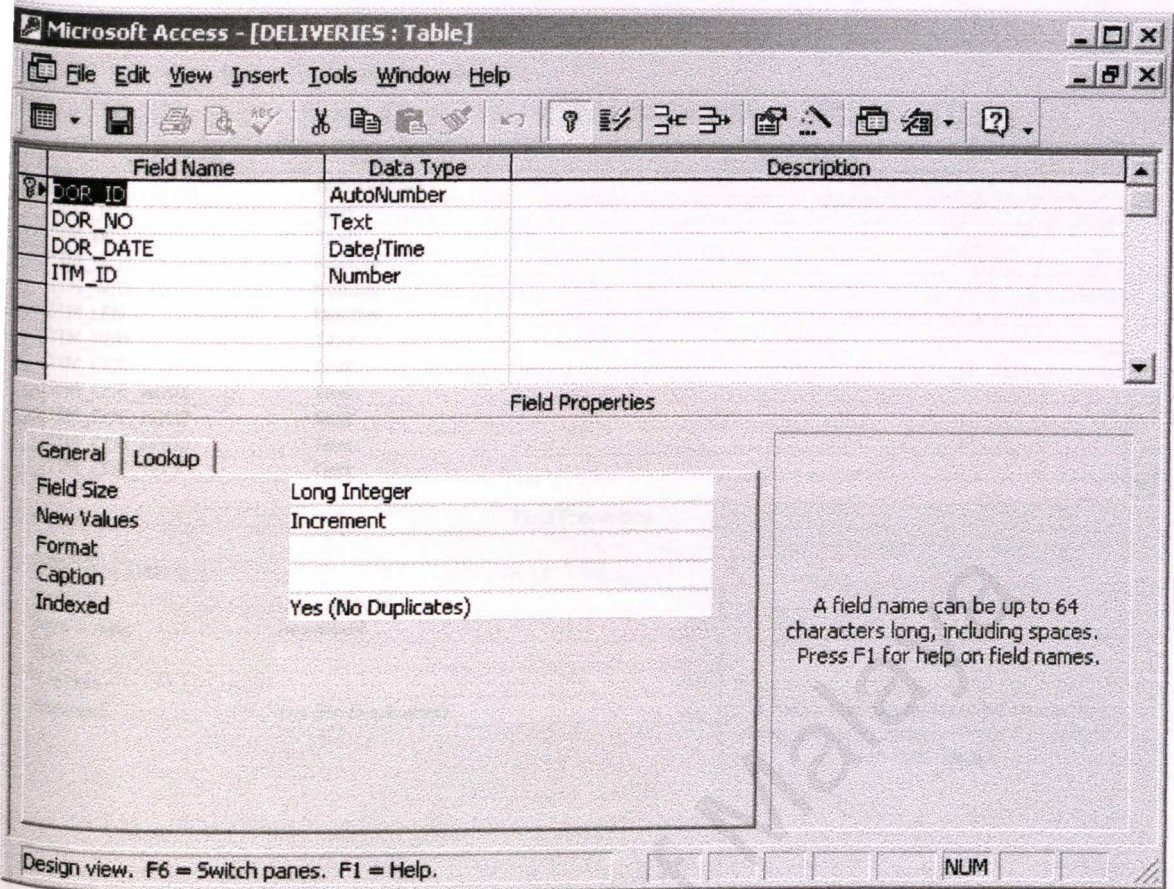
Figure 5.13 Department table

Figure 5.14 DO_tmp table

Figure 5.15 Employees Table

Figure 5.16 Invoices Table

Figure 5.17 INV_TMP Table

Microsoft Access - [ITEMS : Table]

File Edit View Insert Tools Window Help

Field Name	Data Type	:rip
ITM_ID	AutoNumber	
ITM_DES	Text	
ITM_WGT	Number	
ITM_WID	Number	
ITM_LEN	Number	
ITM_CHKIN	Yes/No	
ITM_CHKOUT	Yes/No	
ITM_INDATE	Date/Time	
ITM_OUTDATE	Date/Time	
ITM_REM	Text	
ITM_COE	Text	
ITM_COE_ADD1	Text	
ITM_COE_ADD2	Text	
ITM_COE_ADD3	Text	
ITM_COE_TEL1	Text	
ITM_HAWB	Text	
ITM_MAWB	Text	
ITM_FLINO	Text	

Field Properties

General | Lookup

Field Size	Long Integer
New Values	Increment
Format	
Caption	
Indexed	No

NUM

Figure 5.18 Items Table
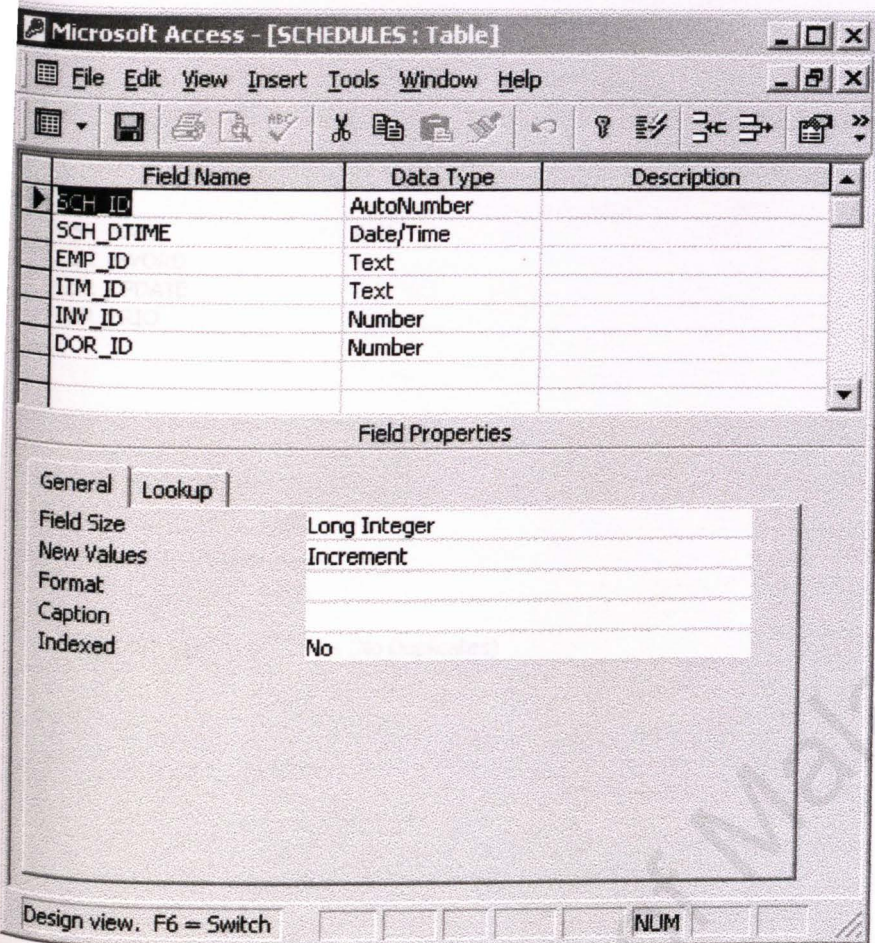
Figure 5.19 Schedules Table
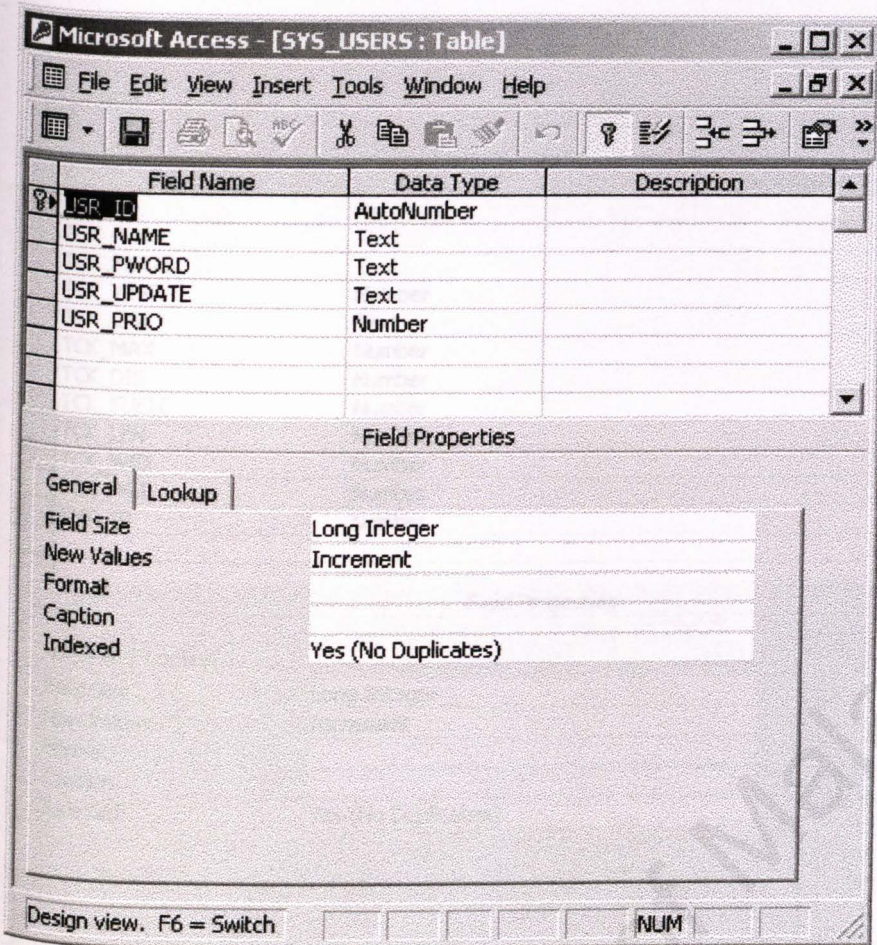
Figure 5.20 SYS_Users Table

Figure 5.21 Trucks Table

Figure 5.22 Wages Table

5.4 Interface Design

System Interface design plays an important role in system development. Interactive and easy to use interfaces enable users to interact with component more efficiently. These simple and yet easy-to-navigate interfaces help users to solve their problems when they browse through the system.

Basically, the interfaces for the TranSys are presented in the form of application interface. Screen designs are performed in a standard layout to generate a better and ease-to-use interface.

The following are some of the preliminary interface design for the TranSys.

Figure 5.23   The TranSys – Main Menu
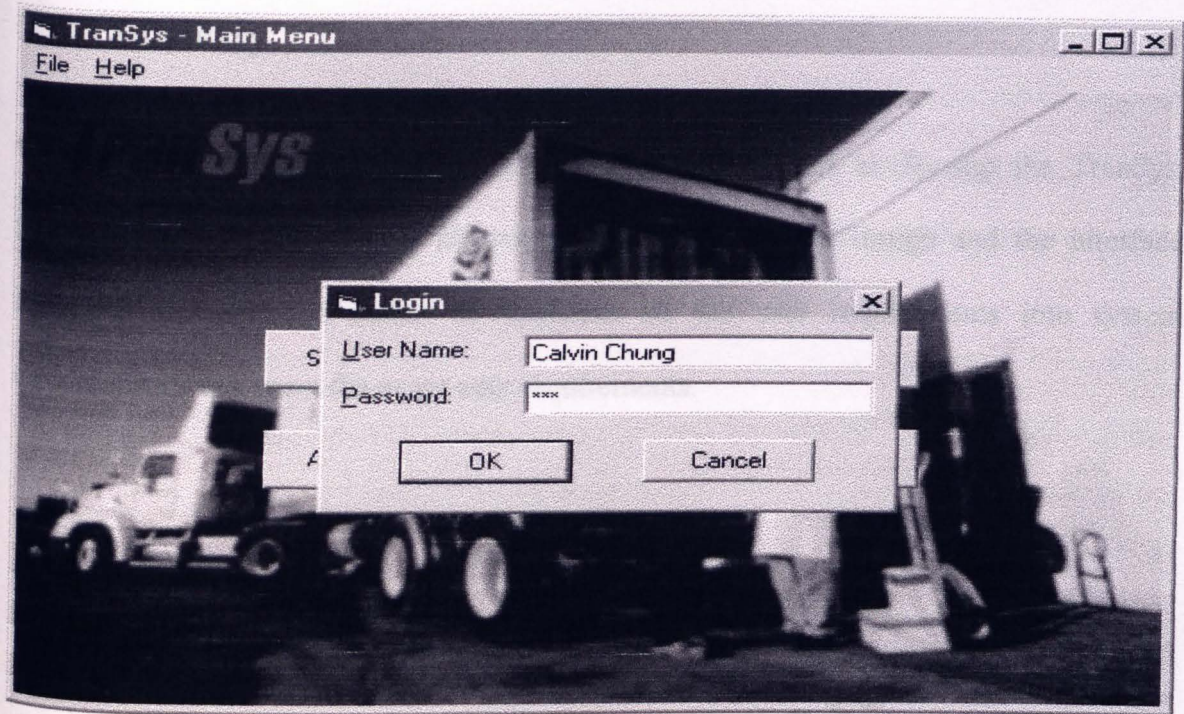
Figure 5.24 Login Module

5.5   Summary

This chapter discussed the system architecture that needed to develop the TranSys. Furthermore, it also discussed the program design, database design and the interface design. This helps the author to translate all the user requirements into system characteristics that meet the exact user requirements.

6   System Implementation

6.1 Introduction

System implementation is the process of setting up the system in the actual environment to provide actual service. The strategy used to implement the system is a straightforward deployment.

6.2 Deployment

The deployment of this Transys System is ease and simply. Search to the folder containing setup.exe file. Double click the file and follow the instruction. If nothing goes wrong, a successful message will prompt. Then all you need to do is to map your database. If your database is on the network, then search to the folder on the network and the right click it. A pop up menu will show. Select mapping and pick L: drive. Make sure that the folder on the network was shared earlier. If the database on local machine, then type the following to run it in command.

Subst l: <location or path of the folder consist the database>

6.3 Training

For each new system, training must be carrying out in order to explain to and train the user about the functions provided by the system and the correct way

to use it. As the potential user of this system are not IT-savvy (staff of a non IT company), user training must be done properly to ensure that the user understand how to handler and use this system. Therefore, a comprehensive user manual that contains guidance and instruction to the system will be prepared for this purpose in the end of this dissertation.

6.4 Summary

This chapter describes the processes and techniques of transfers the system design into workable modules and programming codes, setting up the system in the same environment where it will be used.

Development strategy, development platform configuration and development techniques are the three most important aspects in the system development phase.

This chapter also discusses the system implementation to set up the system in the actual environment to provide actual service. The strategy used to implement the system is a straightforward deployment.

Chapter 7 System Testing

7.1 Introduction

Testing is a process that tests the half or full-developed system to make sure it can fulfill the objective requirement. Since Transys System is developed using Model Waterfall with Prototyping, so testing is carries out along the development process.

The main objectives of the testing process are stated as bellow:

- ➢ To reveal different types of error with a minimum amount of time and efforts.

- ➢ To checks that the system performs its functions as specified in the requirement.

- ➢ To assure the customers that the system they requested is the system that was built for them.

- ➢ To allow users to exercise system functions and document additional problems that result from being at the actual site.

The testing process of the Transys System includes testing the interfaces between subsystems, the correctness of the output, and the usefulness and understandability of system documentation and output.

The system has undergone 4 stages of testing which are:

1. Unit Testing

2. Integration Testing

3. System Testing

4. User Testing

7.2 Unit Testing

In unit testing, the most basic units of the system – the individual modules are tested. A module is tested independent of other modules. The main objective of unit testing is to ensure program accuracy, data integrity, usability and efficiency at the module level.

The steps involved in unit testing of this Transys System are listed as bellow:

1. First, examine the program coding by reading through it, trying to spot algorithm, data and syntax faults.

2. Then, compare the code with the specifications and design to make sure that all relevant cases had been considered.

3. After finished the coding of that module, view the web page through the browser and eliminate remaining syntax faults or errors if exist.

4. Finally, develop the test cases to show that the input is properly converted to the desired output.

The test cases, which will be built, are used to test some important aspects of the system such as the interface, local data structure, output of the program, boundary conditions and also the error handling paths.

Conclusion of Unit Testing

Unit testing has been done during the coding and development phase. It is a continuous process, which must be carried along this phase to ensure that the output and the logic and process flow of that unit or module can satisfy the user requirement.

After carried out the unit testing, a lot of logic errors, data structure faults, input validation and unexpected output have been found. These errors and faults need to be solve before proceed to the integration testing process.

As the conclusion, some modification has been carried out in order to fix these errors and upgrade the functionality of this system. Therefore, a lot of new control functions had been inserted into the program in order to control the input and output value of the program, for example the display function that will prompt a message to inform user that no information is found.

7.3   Integration Testing

The integration testing process will be carried out after the unit testing process has been done. When the individual modules are working correctly and meet the system objective during the unit testing, these modules then combined into a working system. While several independent modules combined into a single system, it will cause some unpredicted and unexpected errors that related to the integration of these modules. So, integration testing is a systematic approach for constructing the application while conducting tests to uncover errors associated with interfacing of different components or modules.

The development of the Transys System is divided into modules and then all the modules are integrated as one main system. Therefore the bottom up approach is the most suitable integration testing method. Each component or module at the lowest level of the system hierarchy is tested individual first. Then, the next components to be tested are those that call the previously tested ones. This approach is followed repeatedly until all components or modules are included in the testing.

After finished the integration test, those errors and faults discovered should be corrected as soon as possible in development in order to proceed to the system-testing phase.

7.4   System Testing

After all the modules are completed, the entire system must now be validated. This validation is done by carry out the system testing process. Testing the whole system is very different from unit and integration testing. When doing the system testing process, the major different compare to unit and integration testing is that we need to work with the entire environment of the system such as the hardware, software, databases and computer systems.

There are several types of system testing that can be used to test a software system. But only two types of system testing are used for this system:

7.4.1   Function testing
Function testing focus on the functionality of the system that based on the system functional requirements. It checks whether the system provides the necessary function to do a particular task, which it supposes to do.

7.4.2   Performance testing
This testing is carrying out after the function testing process. When the system performs the function required by the requirements, the testing process then turn to test the way in which those functions are performed. Thus, the performance testing addresses the non-functional requirements. The purpose of this testing is to test the run time performance of this software within the context of an integrated system. It involves both hardware and software instruments.

7.5   User Testing

Although all testing discussed earlier have been performed, another important testing will be user testing. End user will be the user that will be using our system. So, user testing is important to get a view of our system and any comment from them is useful to enhance our system based on their requirement.

For this project, the author has invited several users to perform the user testing. The users are one of the programmers that involved in the development of warehousing system and a few non-IT savvy users.

After perform this user testing, a lot of useful information has been gained. This information is very useful and helpful when performing the system upgrade process and bugs checking process. Bellow is a summary of some comments given by the user during the user testing.

➢ The interface design is not enough attractive, it will cause the user feel bored when using the system. Some colorful but formal picture and icon can be inserted into the system to make the interface look more nicely.

➢ The reporting module only provides some common reports, more details report about warehouse system is not provided.

➢ The system must have a help file, which can guide the user when using this system. So, it can reduce the mistake or error cause by unskillful user.

➢ All the necessary tasks and functions that need to be done during the fulfill orders process are included.

➢ The system is easy to use and understand.

After study these comments by those users, some comments have been considered during the upgrade process and modification has been performed to eliminate or reduce those weaknesses.

7.6 Summary

Testing is a very important process that can ensure the accuracy and precise of the developed system. Errors that are discovered during the testing can be eliminated before distribute it to the users.

This chapter discusses the four types of testing techniques that the author used for the testing process which are unit testing, integration testing, system testing and user testing.

8.0   SYSTEM EVALUATION

8.1   SYSTEM EVALUATION

8.1.1 Obstacle Faced

As usual, problems always occur during system development and it has been no exception in this project. Throughout this project, many problems have kept unfolding one after another as development work progressed due to many reasons.

1.   During Analysis Phase

Determining Scope of the system

Since there was no prior experience in developing a system, it was hard to determine to which extent to define the scope of the system so that it can be completed within the given time frame. However, this was overcame by analyzing and studying all of the capabilities that Visual Basic and ADO technology can do before determining the scope of the system.

2.   During Design Phase

Time Constraint

During the design phase, there was not enough time to study and produce the best solution of design in first semester. This was due to inexperience and insufficient knowledge of designing a system. The best way to learn is to read as many approaches used in previous year students' thesis documentation.

3.   During Implementation Phase

Problems on Installation

There were a lot of problems on installing and configuring Windows 2000, Access 2000, Development Tools and other tools before starting coding. The needed software and tools were successfully installed only after a few times of reinstallation. From the experience, it is essential to know the sequence of product installations. This is to ensure smooth execution without system errors. This vital information about installation sequence is not provided in a user-friendly way to guide user.

4. During Testing Phases
Unanticipated appearance of result in different workstation

The appearance of different on workstation during the testing phase, such as Win9x, Win2000 and WinXp. The main cause of these problems was the ADO version refers by the Transys System was 2.6 that release after Win2000. So in order to run on Win9x workstation, DCOM98 was require. Win2000 will require update of MDAC (Microsoft Data Access Component), which can be downloading from Microsoft web page for free.

8.1.2 System Strength

Although this system does not have powerful features to some extent, but it still has some strength of its own when compared to some existing system.

- **Database maintenance and utilities.**

Users are able to do housekeeping for database maintenance. They can create, add, update and delete the association information. Besides that, they can also keep track on the records and view the reports. Further more, the user can backup and restore the database.

- **User interface**.

This system is featured with an attractive and easy to use graphical interface. Most of the operation can be done by click and point operations. There are only a few input actions required during the user's interaction. Thus, users will spend most of their time using the system without much input effort.

- **Transparent**.

System is transparent, as users do not need to know where the database resides, how the system is structured, etc. For example, users do not need to know how to retrieve from and insert records in to the database.

- **Relatively fast response in document retrieval from server**.

Each web page is designed to be lightweight. These pages loaded in a reasonable amount of time to ensure users need not wait too long to view the pages. Heavy graphics is avoided.

- **Error messaging.**

This is a reliable system as it caters for almost any possible errors encountered. System will generate appropriate feedback to user when an error occurs. For example, a password validation failure or user login ID failure is handle by the system and a user-friendly message will then be generate to inform the user that he or she input the wrong password or user login ID.

8.1.3 System Limitations

Despite some of the system strengths mentioned previously, there are limitations, which cannot be researched and developed due to time constraint and the lack of resource.

Those limitations are:

- Password is not encrypted and this result in high vulnerability of password.

- Due to the private and confidential issue, the format of the medical records cannot be confirmed. Thus, the medical records are present in table form format.

8.1.4 Future Enhancement

This system provides you with a functional framework from which to evolve. Here are some future enhancement's suggestions.

- Encryption and decryption of password. Password should be encrypted before store in database and decrypted during password retrieval process.

- Error log report format. System should be able to generate standard delivery and invoice report for user.

8.2   Summary

This chapter highlights some of the problems faced throughout the project and also the solutions that have been taken to solve it. Besides that, this chapter also includes the evaluation of the system to identify its strengths and limitations. As suggestion to further improvement of this system, the possibility to enhance the system is also explored.

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APPENDIX – USER MANUAL

Hardware Requirements

The recommended hardware configuration requirement for accessing Transys System are as:

a. Pentium II 233 MHz and above or AMD K6-2300 MHz (3D now) and above.

b. 64 RAM (Random Access Memory) and above.

c. 15 inch Color SVGA (Super Video Graphics Array) Monitor (with resolution set to 800X600).

d. Standard Keyboard and Mouse.

e. A 14.4 KBPS (Kilo Bits Per Second) modem or Internet connection.

f. 100 MB Free Hard disk space and above.

Software Requirement

Transys requires the following software as its running platforms:
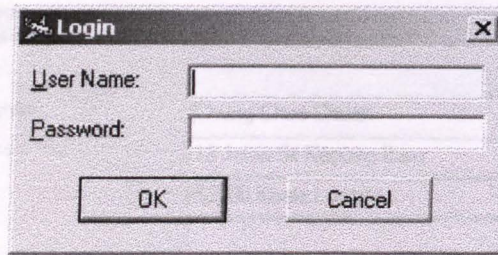
a. Microsoft Windows 98 or Window 2000

b. Microsoft Access 2000

Installation

Search for a setup.exe file and double click it. Follow the instruction. Make sure that if your system is using Windows 98 platform, you need to install DCOM98, else if Windows 2000, you need to get mdac2.6 and above from Microsoft.com. The next steps is to map your database to L: drive.

Beginning

From the start up menu, you should able to find Transys program. Click it and a login window will appear.

Type in the user name and password to gain access to the system. If you forget your password or haven't have one, find your system administrator. If you provide a valid user name and password you will enter to the main menu.
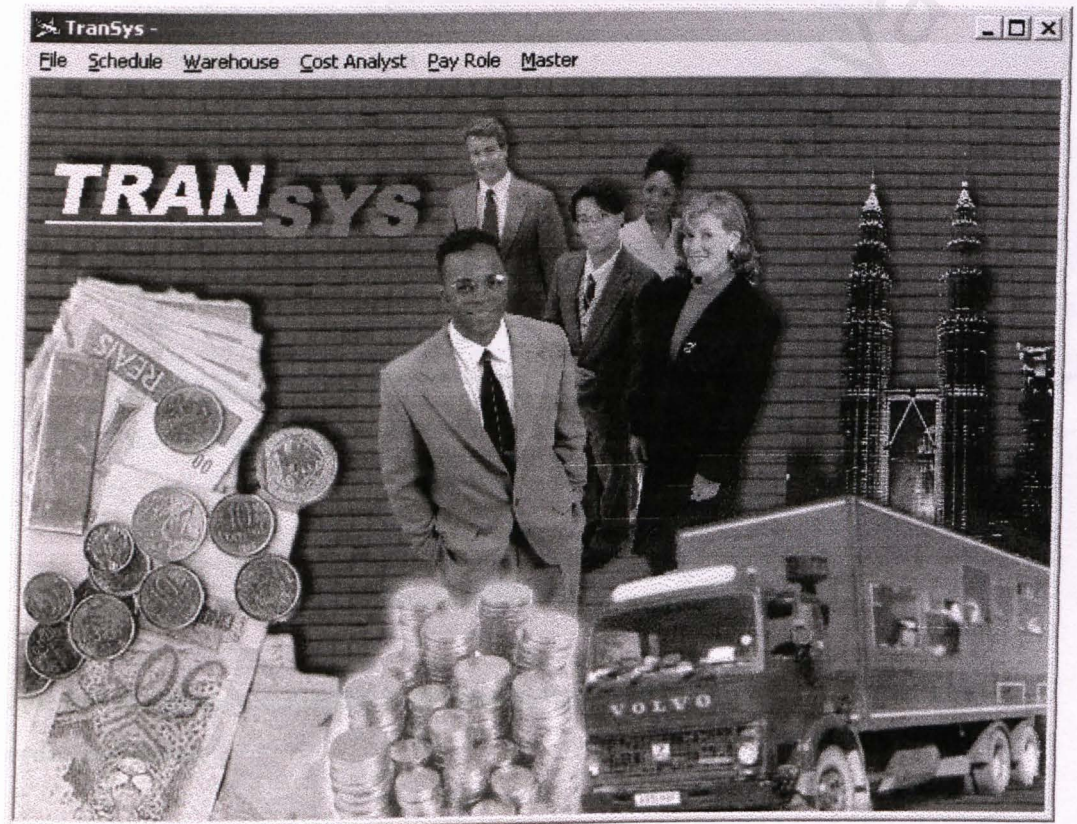
From here, you may add items arrived via Warehouse menu and deliver it later using Schedule menu.

ITEMS

Consignee	Chung Chee Chuan
Address	13 Jalan 54 Kepong Baru
	52100 Kuala Lumpur
Telephone	603-26914306
Check In	☑
Date	9/2/2003
Check Out	☑
Date	2/9/2003
Description	Baggage
Lenght(cm)	40
Remark	Fragile
Weight(kg)	40
Width (cm)	40

Add | Update | Delete | Refresh

Record: 14

DELIVERIES

Item Selection

Delivery Order Number

Update

Just follow the easy steps and if successful you be able to preview your delivery order or invoice.

DELIVERY ORDER PREVIEW

Zoom 100%

TRANSYS TRANSPORTATION INFORMATION SYSTEM

No. 47 Jalan PJS 11/9, Bandar Sunway,

46150 Petaling Jaya, Selangor.

Tel: 03-7344293   Fax: 03-7341178

Consignee Name:	Chung Chee Chuan	DO No.	DOR123
Address:	3 Jalan 54	Date:	2/10/2003
	Kepong Baru		
	52100 Kuala Lumpur		
Telephone:	012-62744997		

<u>Delivery Items Detail</u>

Description:	Baggage		
Lenght (cm)	40	Weight (kg)	3
Width (cm)	40		
Remark:	Testing remark		

Pages: 1

The Cost Analyst and Pay Role menu are only available for users with priority of 2 or lower. While the Master menu is only for administrator privilege or priority 1

Skyway Express (M) Sdn. Bhd.

(Co. No.:118038-K)
No. 47, Jalan PJS 11/9, Bandar Sunway,
46150 Petaling Jaya, Selangor.
Tel:03-7344293   Fax:03-7341178

INVOICE 0207/102	
Job No:	I23078
Date:	24/07/2002
D/O:	I23078

MS. CHUNG LAI KHENG/MR. THOMAS
13, JALAN BUNGUR, KEPONG BAHRU
52100 KUALA LUMPUR
TEL: 012-6991023

232-7115 7973   HAWB No. :   B111076   FLIGHT No.:   MH 0007/22
1 CTN   WT.   22.0KGS   TO/FROM :   UK   MANIFEST No.:   -

OR/CONSIGNEE: EXCESS BAGGAGE
S: PERSONAL EFFECTS (MS. CHUNG LAI KHENG)
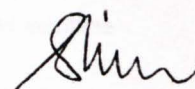
DETAILS OF CHARGES	AMOUNT
Break Bulk Charges	50.00
Terminal Charges	20.00
Airport Transfer Fees	50.00
E.D.I. K4 Charges	32.50
CUSTOMS DOCUMENTATION	20.00
CUSTOM FORMALITIES & EXAMINATION	30.00
HANDLING CHARGES	50.00
Add: 5% Service Tax	5.00
E.D.I. K1 Charges	32.50

RGT : TWO HUNDRED NINETY ONLY.

E. & O. E.   TOTAL   290.00

For Skyway Express (M) Sdn. Bhd.

AWB
AWB
USTOM FORMS

Authorised Signature

LL BE CHARGED ON OVERDUE ACCOUNT AT 1½% PER MONTH
TION CHEQUES SHOULD INCLUDE BANK COMMISSION.

EXCESS BAGGAGE COMPANY

EXCESS INTERNATIONAL MOVERS

SECURITY DECLARATION BY SENDER OF UNACCOMPANIED BAGGAGE

White copy — Agent
Blue copy — Customer
Pink copy — File
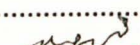
GNEE NAME : LAI KHENG CHUNG	REF NO : B111076
NATION ADDRESS	DESTINATION : KUALA LUMPUR INT'L AIRPORT, SEPANG, MALAYS
LUMPUR INTERNATIONAL AIRPORT (KLIA)	DOOR TO AIRPORT (✓) DOOR TO DOOR ( )
1 481A	CONTACT ADDRESS (If different) 13 JALAN BUNGUR KEPONG BAHRU
OF YOUR ARRIVAL AT DEST: / /	52100 KUALA LUMPUR
O: HOME	MALAYSIA
WORK	TEL. NO: HOME 00603-62744997 / 00603 563246361
FAX	WORK 00602-6791023
EMAIL	EMAIL

PACKING LIST

Item		Item		
	Clothes	11		
	Toiletries	12		
	Books / Files	13		
	A Trainer	14		
	Pillow cases	15		
		16		
		17		
		18		
		19		
		20		

TANT : Please read carefully

ess undertaken subject to Standard Conditions of Excess Baggage Plc, Please see reverse.
require clearance before goods can be forwarded.
es to arrival destination Port or Airport only will EXCLUDE Duty, Customs Clearance, Airline Fees, Local Delivery and
e charges. All South Africa prices EXCLUDE Ad Valorum Whafage. All Australian and New Zealand prices exclude
ne and Agricultural fees.
e has been offered to me and It has been my decision to accept or decline.
ds uninsured are carried at the OWNERS RISK and all unpaid invoices will incur premium storage charges.
ve the right to dispose of goods if storage or invoice charges have not been settled within 3 months.
irm that we have read and understood the following conditions with regards to the shipment of my/our effects.

re : _____   Date : 17/7/02

ANT : Please read carefully   * Delete where appropriate

oods were personally packed by me and have been in my constant possession since packing.
oods have been added to the consignment by any other person, nor are any goods being carried on behalf of
other person.
e declared all ELECTRICAL ITEMS on the packing list.
nsignment contains personal effects only and NO goods of hazardous nature, nor any explosive, corrosive, or
ms of any description.
e read and understood the Conditions of Carriage and the list of a hazardous goods displayed on the premises
ve / have not witnessed the security screening and sealing of my baggage.
aware that any false statement may render me liable to prosecution under the terms of the Aviation and maritime
rity Act 1990.
eby declare that the above information is true and correct.

RT NO. : A9329966	TODAY'S DATE 17/7/02
DATE OF ISSUE : KUALA LUMPUR,	
LITY : MALAYSIA	SIGNATURE :

Goods are carried subject to the Company's Terms and Conditions available on request

R AWB No.		CRN No.	HAWB No.
7115 7973) MHCUO7/22 JUL		Non Stat	B111076

nc. Shipper (Name, Address, A/C No.)

XCESS BAGGAGE PLC
HANNAH CLOSE
embley, NW10 0UX
AX: +44 (0)20 8324 2094
T: Ms Lai Kheng Chung

EXCESS BAGGAGE PLC
4 HANNAH CLOSE
Wembley, NW10 0UX

FAX: +44 (0)20 8324 2094

Tel: +44 (0)20 8324 2000

ee (Name, Address, A/C No.)

s Lai Kheng Chung
Jalan Bungur
pong Bahru 52100 Kuala Lumpur
alaysia
L: +603 6274 4997 +603 5632 46861

Copies 1 2 and 3 of this Air Waybill are originals and have the same validity

Name and City

Accounting Information

EXCESS BAGGAGE PLC
4 Hannah Close, Wembley, NW10 0UX
TEL: +44 (0)20 8324 2000
CASS Code 99-9 1414/000 1

Security Declaration/Packing
list attached to Airway bill

SHIPMENT X-RAYED
Agents Ref: 517572
Booking Ref: P3306030

Departure and requested Routing
LONDON

By first Carrier	Routing and Destination	KUL	MH	o	cv	GBP	PP	COLL	PP	COLL	Other			NCV

ala Lumpur	MH003/21		Amount of Insurance N/R	INSURANCE - If Shipper requests insurance in accordance with issuers conditions indicate amount to be insured in figures in box marked Amount of insurance.

ts held for 24 hrs prior to shipment s.t.c No restricted or dangerous items
IMPORTANT PLEASE INFORM CONSIGNEE IMMEDIATELY OF ARRIVAL

Gross Weight	kg lb	Rate Class / Commodity Item No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (incl. Dimensions or Volume)
22 K			22 Kg	3.44	75.75	PERSONAL EFFECTS (Not Restricted) Dimensions cms: 58 x 39 x 40 4113 cc/Kg

Prepaid	Weight Charge	Collect	Other Charges	

C.P Penolong Pengaran Kastam
P. Pengurusan Zon Perdagangan Bebas
KLIA Sepang

It is agreed that the goods herein are accepted subject to issuer's conditions of contract. If the carriage involves an ultimate destination or stop in a country other than the country of departure, the Warsaw Convention may be applicable and Convention governs and in most cases limits the liability of carriers in respect of loss of, damage or delay to cargo. Agreed stopping places (other than the place of departure or destination) detailed under "Routing" herein and/or those places shown in the timetables of any carriers performing carriage hereunder as scheduled stopping places for the route.

Shipper certifies that the particulars on the face hereof are correct
Signature of Shipper or his Agent   **EXCESS BAGGAGE PLC**

Total prepaid	Total collect
75.75	

ncy Conversion Rates | cc charges in Dest. Currency

19-Jul-02   London/XS   Shaheeda Dossa
Executed on   (Date)   at   (Place)   Signature

JABATAN KASTAM DAN EKSAIS DIRAJA MALAYSIA / ROYAL MALAYSIAN CUSTOMS AND EX...
PENGAKUAN BARANG-BARANG YANG DIIMPORT/DECLARATION OF GOODS IMPORTED

Kastam No. 1 Pin. 8/...
Customs No. 1 Rev. 8...

Consignor / Pengeksport (Nama dan Alamat) Consignor / Exporter (Name and Address)	UNTUK KEGUNAAN RASMI / FOR OFFICIAL USE

MS.CHUNG LAI KHENG
C/O EXCESS BAGGAGE PLC
4 HANNAH CLOSE WEMBLEY
NW10 OUX U.K

Consignee / Pengimport (Nama dan Alamat)
Consignee / Importer (Name and Address)

MS.CHUNG LAI KHENG
13,JALAN BUNGUR
KEPONG BAHRU
52100 KUALA LUMPUR

Nama dan Alamat Ejen Yang Diberikuasa
Name and Address of Authorised Agent

SKYWAY EXPRESS (M) SDN BHD
47 JLN PJS 11/9
BANDAR SUNWAY
46150 PETALING JAYA

Kod Pengimport / Importer Code

10. Tarikh dan Waktu Terima
Date and Time of Receipt

RECEIVED 24 JUL 2002

11. Nombor Pendaftaran / Registration Number
W20107042839

12. Stesen / Station — Kod / Code

13. No. Pendaftaran Manifes / Manifest Registration No.

14. Penerimaan Duti/Cukai seperti yang dilevi dibenarkan oleh / Receipt of Duty/Tax as levied authorised by:
B.P PENOLONG PENGARAH KANAN KASTAM
P.PENGURUSAN ZON PERDAGANGAN BEBAS

Tarikh / Date

Pegawai Kastam Yang Hak / Proper Officer of Customs

15. No. Permit Import / Import Permit No.

16. Tarikh Luput / Expiry Date

Kod Ejen / Agent Code

17. Bayaran bagi barang akan dibuat kepada: (Negeri) Payment for goods to be made to: (Country)
UNITED KINGDOM — Kod / Code GB

18. No. Muka Surat Manifes Manifest Page No.

19. No. Rujukan C.J.5/C.J.5 Reference No.

20. Bil Muatan atau No. Nota Konsainan Bil of Lading or Consignment Note No.

Cara Pengangkutan/Mode of Transport 1. Laut/Sea 2. Keretapi/Rail 3. Jalan Raya/Road 4. Udara/Air 10. Lain-lain (Nyatakan)/Others (Specify)	5. Tarikh Import/Date of Import 22/07/2002	21. Layanan Khas / Special Treatment	22. Penaikan Agensi Agency Uplift	23. Insurans / Insurance MYR 2.00

No./Nama Kapal/Penerbangan/Kenderaan No./Name of Vessel/Flight/Conveyance 007 /	7. Pelabuhan/Tempat Import Port/Place of Import KUALA LUMPUR Kod/Code MYKUL	24. Caj-caj Lain Other Charges MYR 0.00	25. Nilai CIF/CIF Value MYR 350.07	26. Tambang / Freight MYR 148.07

Pelabuhan/Tempat Dimuatkan Port/Place of Loading LONDON	Kod/Code GBLON	9. Melalui (kargo dipindah kapal) Via (transhipment cargo only)	Kod/Code	27. Berat Kasar/Gross Wt.(Kg.) 22.000 KGM	28. Ukuran/Measurement (m³) 0.132 MTQ	29. Nilai FOB/FOB Value MYR 200.00

Tanda dan No. / No. Kontena Marks and Nos. / Container Nos.	31. Bil. No.	32. No. dan Jenis Bungkusan No. and Type of Packages	33. Keterangan Barang (Dokumen berkenaan hendaklah dikemukakan) Description of Goods (Relevant documents must be submitted)	Tarif Kastam Malaysia / Malaysian Customs Tariff	
				34. No. Kod / Code No.	35. Unit / Unit
		1 CARTON	(USED PERSONAL EFFECTS)		
	1)		USED PERSONAL EFFECTS	9800.00 400	KGM

200.00
0.00
148.07
350.07

350.07

Ex. Rate :
GBP: 5.9329

Bil. No.	36. Kod Negeri Asal Country of Origin Code	37. Kuantiti mengikut Unit Tarif Kastam / Qty. based on Customs Tariff Unit	Nilai / Value MYR		Duti Import / Import Duty			Cukai-cukai Lain Kena Dibayar Other Taxes Payable		
			38. Satu Unit Per Unit	39. Jumlah / Total	40. Kadar / Rate	41. Amaun/Amount MYR	42. Jenis Type	43. Kadar Rate	44. Amaun/Amount MYR
	GB	22.0000 KGM	15.91229	350.0725	N/D			NIL	
		22.0000		350.0725					

	JUMLAH/TOTAL 45	350.07	46	0.00	47		0.00

Nama / Name
SUBRAMANIAM A/L RAJOO

No. Kad Pengenalan / Pasport / I.C. / Passport No.
640806065521

Taraf / Status
OPS.SUPERVISOR

Saya mengesahkan ikrar ini benar dan lengkap
I hereby certify that this declaration is true and complete

22/07/2002

UNTUK KEGUNAAN RASMI / FOR OFFICIAL USE	
52. Pengeluaran daripada Kawalan Kastam dibenarkan oleh / Removal from Customs Control authorised by:	

53. Jumlah Duti / Cukai Kena Dibayar Total Duty / Tax Payable	MYR	
54. Bayaran-bayaran Lain Other Charges	MYR	
55. Jumlah Amaun Kena Dibayar Total Amount Payable	MYR	0.00
56. No. Resit Manuskrip (jika berkenaan) Manuscript Receipt No. (if applicable)		Tarikh / Date

B.P PENOLONG PENGARAH KANAN KASTAM
P.PENGURUSAN ZON PERDAGANGAN BEBAS
KLIA SEPANG
Pegawai Kastam Yang Hak
Proper Officer of Customs

Skyway Express (M) Sdn. Bhd.

Head Office : No. 47, Jalan PJS 11/9, Bandar Sunway, 46150 Petaling Jaya.
Tel: 56344293 (4 lines)   Fax: 603-56341178   Email: skyex@tm.net.my
(KLIA) F1-16, Klas Forwarders Building, Kuala Lumpur International Airport
Airport Office : Souther Support Zone, 64000 KLIA, Sepang, Selangor, Malaysia.
Tel: 03-87788378   Fax: 03-87788384

DELIVERY ORDER

S CHUNG LAI KEENG / MR THOMAS

3, JLN BUNGUR, KEPONG BAHRU

2100 KUALA LUMPUR.

EL: 012-6991023

EXCESS BAGGAGE (UK)

L No.: MH0007/22

D/O: N° 23078

Date: 24.7.2002

AWB/B.L. No.:	QTY	WT	DESCRIPTION OF GOODS
-71157973			
11076)	1 CTN	22.0KG	PERSONAL EFFECTS.

elivered by :

NAME : JK CHONG .

O :

: 25/7/2002

Goods Received by :

Received in good order & condition
(Chop & Sign)
NAME : TAN WAY ENG
I/C NO : 79834
TIME & DATE : 25/07/02