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JUDUL **BUS MANAGEMENT SYSTEM**

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BUS MANAGEMENT SYSTEM

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A report submitted in partial fulfilment
of the requirements for the award
of the degree of
Bachelor of Computer Technology (Software Engineering)

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MARCH 2005

DECLARATION

I declare that this thesis entitled "BUS MANAGEMENT SYSTEM "is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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DEDICATION

To my beloved father, mother, all my family who always give me support and encouragement and to all my friends,

Thank you

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ABSTRACT

Bus Management System is a system that developed to make the management of bus driver and bus trip at Transnasional Express Sdn Bhd Kuantan Branch become easier. At this time, this company only has online ticketing system and still do not has computerized management system for their company operation. Therefore, all the data and information that related with driver and bus trip is documented and kept in file base system. Manual system in record keeping make an important data or information has a potential to lost or damage. Besides, driver scheduling is assigned by operation officer manually and the operation officer must prepare the schedule everyday before the driver start their trip. Therefore, computerized driver scheduling is suggested to make the management of driver schedule become easier. RAD model is used as a process model and Microsoft Visual Basic 6.0 and Microsoft Access is used as a tool for Bus Management System development. Besides, the prototype for bus management system successfully developed to make the management work become more effective.

ABSTRAK

Sistem Pengurusan Bas adalah sebuah sistem yang dibangunkan untuk memudahkan pengurusan perjalanan bas dan pengurusan pemandu bagi Syarikat Transnasionl Express Sdn Bhd cawangan Kuantan. Pada masa kini, syarikat ini hanya mempunyai sistem pembelian ticket secara langsung menerusi internet dan masih belum mempunyai sistem pengurusan operasi berkomputer. Oleh itu, segala data-data dan maklumat berkenaan dengan pemandu dan perjalanan bas adalah disimpan secara dokumen dan difailkan. Keadaan ini boleh mengundang risiko kehilangan dan kosakan data atau maklumat penting. Penjadualan pemandu ditetapkan oleh pegawai operasi dan pegawai operasi juga perlu menyediakan jadual perjalanan untuk pemandu setiap hari sebelum pemandu memulakan perjalanan mereka. Microsoft Visual Basic 6.0 dan Microsoft Access 2003 digunakan sebagai perisian untuk membangunkan Sistem Pengurusan Bas ini dan Model 'RAD'digunakan sebagai model proses perisian dalam pembangunan sistem. Oleh itu, sistem penyusunan jadual perjalanan pemandu berkomputer disarankan untuk memudahkan penjadualan pemandu di syarikat tersebut. Selain itu, prototaip bagi sistem pengurusan bas dapat dibangunkan supaya kerja-kerja pengurusan lebih efektif.

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LIST OF ABBREVIATIONS

Bhd	-	Berhad
BMS	-	Bus Management System
Gb	-	Giga byte
ID	-	Identity
IRD	-	International Road Dynamic
KL	-	Kuala Lumpur
KTN	-	Kuantan
Mb		Megabyte
MS-Windows	-	Microsoft Windows
PC	-	Personal Computer
RAD	-	Rapid Application Development
RAM	-	Random Access Memory
RM	-	Ringgit Malaysia
S.ALAM	-	Shah Alam
Sdn	-	Sendirian
TIMS	-	Transport Integrated Management System
VIN	-	Vehicle Identification Number

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Transportation industry in Malaysia is one of the important industries that contribute income for country development. Express bus is one of the transports that normally used for travel around the Peninsular Malaysia. Besides, internal travel is relatively easy, comfortable and cheap. Therefore, most of the people in Malaysia are prefer to use public transportation as their transport to reach their destination, especially in Peninsular Malaysia.

In order to get good support from customer, bus company need to perform good services and facilities. Therefore, to generate the best customer services, the company management should be more effective and efficient. By computerizing the manual system and bus operation, the management of the transport company can become more effective and a good performance of services might be increased.

Bus Management System is a stand alone system. This computerized management system is for company to manage their driver and bus operation. There are two part of management consist in the system such as driver management and bus management. Driver management consists of driver profile, leave, salaries and licenses record while bus management consists of bus profile, maintenance schedule, road tax and insurance, route and bus trip.

In order to get the requirement of Bus Management System, the Transnasional Express Sdn Bhd in Kuantan is choose as the case study. This company was selected because the company is one of the bus companies that involve in transportation industry in Peninsular Malaysia. Besides, the Operation Officer of this company is in pleasure to give cooperation for interview session and information sharing about the driver and bus management in their company.

1.2 Problem Statement

Transnasional express only have online ticketing system currently for the branch in Kuantan. Base on the interview and analysis that has been discuss in Chapter 3, there is no computerized system for operation management yet. All records are documented and kept in file base system.

The trip schedule for driver is done manually and depends on operation officer to arrange the driver duty. The schedule is not fixed and the driver leave can be changed every time. The operation officer must prepare the schedule everyday and the drivers need to know their next trip before starting the trip.

Driver salary and allowance are calculated by operation officer using manual way which is using calculator and this technique takes time and can cause careless mistakes. Daily allowance is recorded in a list and using hand writing. This type of record may effectuate people making careless mistakes. Besides, the drivers need to know their own license expiration date and they have to renew the license themselves.

Therefore, computerized system has a potential to be a medium that can minimize user memory load and avoid data from lost or damage. It also can make the company operation runs smooth and easy.

1.3 Objective

(i) To calculate driver's allowance.

(ii) To develop a prototype Bus Management System.

(iii) To generate schedule trip for the driver.

1.4 Scope

This prototype system is base on requirement of Transnasional Express Sdn Bhd, Kuantan. The Bus Management System allow administrator or operation officer add and delete driver profile in the database. Administrator also can edit and update the information if any changes required. Driver leave that has been approved and driver salaries are also recorded in this system by administrator.

The monthly allowance for driver is calculated once a month. The payment of salary and allowance is separate. The allowance is paid to the driver on 15^{th} every month, while the salary is paid on 27^{th} every month. This prototype system shows the salary for one driver at one time. Bus Management System also only focuses on allowance calculation for duty code KTN-KL and KTN-S.ALAM.

The trip schedule is capable only for one week. Therefore, the operation officer needs to generate another trip schedule for the following week. The schedule just shows the name of the leader for each trip. The trip is limited for the Kuantan to Kuala Lumpur trip. The schedule is generated for 10 drivers.

Bus Management System is only developed for Windows platform. Microsoft Visual Basic 6.0 is an Integrated Development Environment that can be used for Bus Management System development. This software is used as a code generator and creating an interface. Bus Management System require small database for keeping data. Therefore, Microsoft Office Access 2003 is used as the database for Bus Management System.

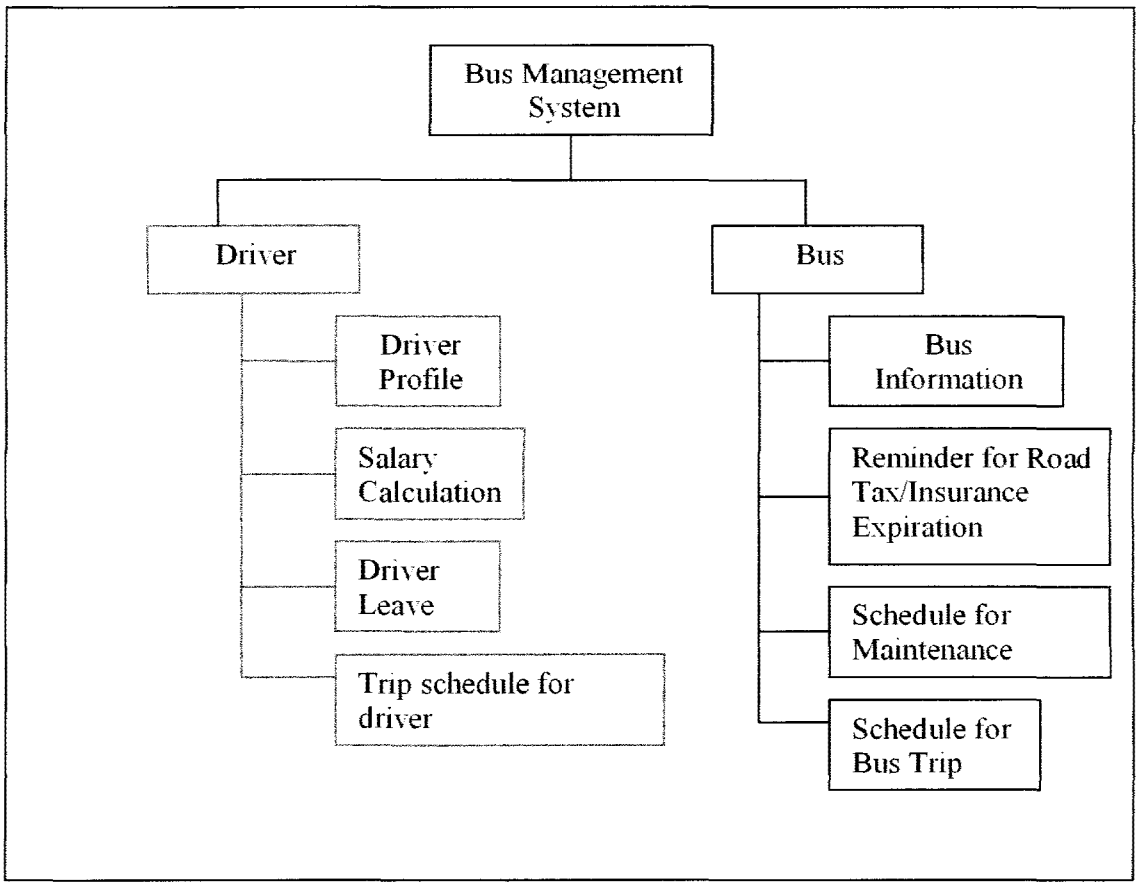

Figure1.1 Overview of Bus Management System

The figure 1.1 above shows the overview of bus management system. There are two (2) parts of management in this system; the first part is driver management which is shown in the left side of the figure. Driver management part is discussed more as the focus of Bus Management System. The second part is bus management. The driver management system consists of Driver Profile module, Salary Calculation, Driver Leave and Trip schedule driver. The second part consists of Bus Information, Reminder road tax expiration, schedule for maintenance and schedule for bus trip. The second part of the system is not discussed because this part is not in the scope.

CHAPTER 2

LITERATURE REVIEW

The Bus Management System is a management system for express bus company, where the bus is referring to a transport or a vehicle that used by public passenger. Bus Management System is applied at express bus company such as Transnasional Express Sdn Bhd.

2.1 Overview of Current System

The largest operator of public bus transportation in Malaysia is the transportation group of companies. 'Transnasional' has the most extensive coverage throughout Peninsular Malaysia with the stage bus operations and inter-city express services. Every year, Transnasional has fifty five (55) million passengers where the number one thousand and two hundred (1,200) busses that give services over two hundred and thirty four (234) routes and over five thousand and two hundred (5,200) trips is generated daily through the nationwide network. Transnasional is operated by nine (9) subsidiaries, to provide comfortable, reliable and safe transportation to all passengers.

Transnasional is the largest leading transportation operator in Malaysia. Transnasional Express Sdn Bhd is operating under NADICORP Holdings Sdn Bhd that established in 1998, and has more than 30 years of experience in servicing millions passengers all over the nation [1].

According to Mr Muhammad Rushadi Omar, Pegawai Kerja Operasi , Transnasioanal Express Sdn Bhd Kuantan, 'Transnasional Express for Kuantan branch still not has any computerized management system'. All of the operation is done manually and kept in written document. The operation is base on decision that make by operation officer.

There are fifty eight (58) drivers and twenty two (22) buses. Forty six (46) drivers have their own bus and every bus has two (2) permanent drivers. Working day for the driver is six (6) days a week. Usually, every driver has three (3) to four (4) trips per day. They are also having overtime or extra trip. Extra trip is depending on the number of passenger and the bus availability. The company also hire commando driver where the commando driver is responsible to take over the permanent driver's duty if the permanent driver is not available.

In addition, driver license expiration is recorded in the driver profile. There are no systems that can alert the operation officer about the driver's license expiration date. The license renewing is depending on the drivers themselves. While the bus road tax and insurance is under the company responsible. It also does not have a system that can alert the operation officer about the expiration date.

2.2 Studies on Business Information System

The explanations for every type of business information system are shown in the table below [2].

Table 2.1: The types of Business Information System

Type	Explanation	Example
Enterprise Computing System	(i) This information system support company-wide data management requirement. (ii) This type of system also can improve data security and reliability by imposing a company-wide framework for data access and storage.	(i) Airline reservation (ii) Credit Card Billing System
Transaction Processing System	(i) This system also called operational system because the data are generated day to day business operation. (ii) This system will capture necessary data and triggers a set of updates when a specific transaction occurs.	(i) Customer billing (ii) Accounts receivable (iii) Warranty claim processing
Business Support System	(i) This system provides job-related information support to users at all levels in the company. (ii) To manage and control business processes, this	(i) Truck fleet dispatcher (ii) Payroll processing (iii) Inventory

		system will analyze transactional data and generate information needed.		control
	(iii)	This system also provides information that leads to better decision making.		
	(iv)	The important features in this system is decision support capability to conduct what –if analysis.		
Knowledge Management System	(i)	Sometimes called expert system because it simulates human reasoning by combining knowledge base and inference rules. Inference rules determine how the knowledge is applied.	(i)	Novell's knowledge management system
	(ii)	In this system, inference rules will identify data pattern and relationship and this shows that this system do not make decision base on common sense or intuition		

User Productivity System	(i)	Provide employees at all organizational levels with a wide array of tools that can improve quality and job performance.	(i)	Local and wide area networking, e-mail, automated calendar, database management, company intranets and internet access throughout the company.
	(ii)	The user at all level can share corporate data to perform their jobs by using this system because users are alike network.		

Bus Management System is base on Business Support System category. This is because through the Bus Management System, the transactional data can be analyzed and information needs can be generated for managing and controlling business processes. This system also provides information that leads to better decision making.

2.3 Studies in Existing System

Nowadays, there are many management systems that developed for management purposes including bus management system. The features in the system are different between one and others. For example EZ maintenance CMMS systems that developed by Link It Software Corporation. This system is very useful for equipment maintenance and vehicle service. Another transport management system is Transport Integrated Management Systems (TIMS) software that developed by Bacchus Management Systems company. This system is a powerful tool for

management of bus operations. Besides, IRD Driver Management System is developed by International Road Dynamic Inc. IRD Management System give managers a powerful set of tools which is to ensure a safe environment for children and minimizing the cost of their school bus fleet.

2.3.1 EZ maintenance CMMS maintenance software

EZ maintenance CMMS maintenance software is complete software for tracking, scheduling, and control maintenance for all equipments and all vehicles. There are two parts of this system which are equipment maintenance and vehicle services. The features that included in equipment part are maintenance scheduling, equipment tracking, maintenance work orders, parts and materials, maintenance calendars, bar coding, supervisory control and complete reports. While the features of vehicle services are vehicle maintenance scheduling, vehicle tracking, vehicle maintenance work orders, parts and materials, vehicle maintenance calendars, tire tracking control, supervisory control and complete reports [3].

The interfaces for this system are shown in the appendix (Refer Appendix A). The features and benefits of EZ maintenance CMMS maintenance software that can be applied in Bus Management System are shown in the table below.

Table 2.2: Features and benefits of EZ maintenance CMMS maintenance software

Features	Benefits
Vehicle Maintenance Scheduling	(i) This system can schedule routine and non-routine vehicle service (ii) The schedule also can be generated based on odometer reading (iii) Weekend days and holidays can be included or

	skip in the schedule (iv) The system can reschedule the subsequent service automatically
Vehicle Tracking	(i) Track the vehicle by VIN(Vehicle Identification Number) number (ii) Reports on vehicle service history
Vehicle Maintenance Work Orders	(i) Produce work order for each individual vehicle service to be completed (ii) Produce printed work orders
Vehicle Maintenance Calendars	(i) Produce print outs of all vehicle service schedules for all or any individual vehicle (ii) Produce actual monthly calendars showing all scheduled vehicle service
Driver Information and Incident Tracking	(i) Records all driver information (ii) Allow entry and tracking of all driver incidents reports
Vehicle and Driver's License Tracking	(i) Tracks both vehicle and driver license information and license expiration dates (ii) Produces a report showing all expiring license 30 days in advance of expiration
Complete Reports	(i) Provides numerous reports

2.3.2 Transport Integrated Management System (TIMS) software

Transport Integrated Management Systems (TIMS) software is a powerful tool for the management of bus operations that developed by Bacchus Management Systems. It is designed to treat the business in a holistic manner ensuring that all facets of the Bus Operation are covered. Bacchus is committed to innovative technology and developing the best industry products which address the real-needs of real-businesses. As a part of our on-going commitment to 'best-technology' for the people-transport industry, TIMS can play a vital role in helping companies gain and maintain cost and resource efficient operations [4].

The table below shows the features and benefits of TIMS software that suitable to include as a features of Bus Management System.

Table 2.3: Features and benefits of TIMS software

Features	Benefits
Driver Roster	(i) This module in this system, allow complete user control over defining shifts, shift types, shift templates, employee availability and penalties and can generate timesheets, payroll and reports instantly
Fleet Maintenance	(i) This module provides the tools needed to tracks service history costs related to specific vehicle (ii) The management and control of vehicle costs, service schedules and analysis of operational performance is directly related to the timely gathering of information, (iii) Scheduling can be done for any fleet size for

		limitless number of depots.
The Performance Manager	(i)	This module emulates an electronic diary of events and reports or graphs can be instantly printed

2.3.3 IRD Driver Management System

IRD Driver Management System provides a set of tools for school bus fleet managers to ensure a safe environment for children and maximizing the cost efficiency of their school bus fleets. This system is developed by International Road Dynamics Inc [5].

Table 2.4: The features and benefits of IRD Driver Management System

Features	Benefits
Driver performance and vehicle operation data collection	(i) This features provide concise reports, enabling objective tracking of driver performance
Documented report	(i) Manager can monitor driver performance by the accurate report that document start time, pick-up, time at stop and driver behavior as well as critical functions like amber and red light activation. (ii) Information collected by the system is used to maintain regular maintenance schedules

2.3.3 Overview of Bus Management System

The idea to develop Bus Management System is come from EZ maintenance CMMS maintenance website. The idea is enlarged by adding other features from other system that relate with Bus Management System. The combination of the features in EZ maintenance CMMS maintenance software, Transport Integrated Management Systems (TIMS) and IRD Driver Management System will produce a useful product for bus management system that consist of driver and vehicle (bus) management system for a management of transportation company like Transnasional.

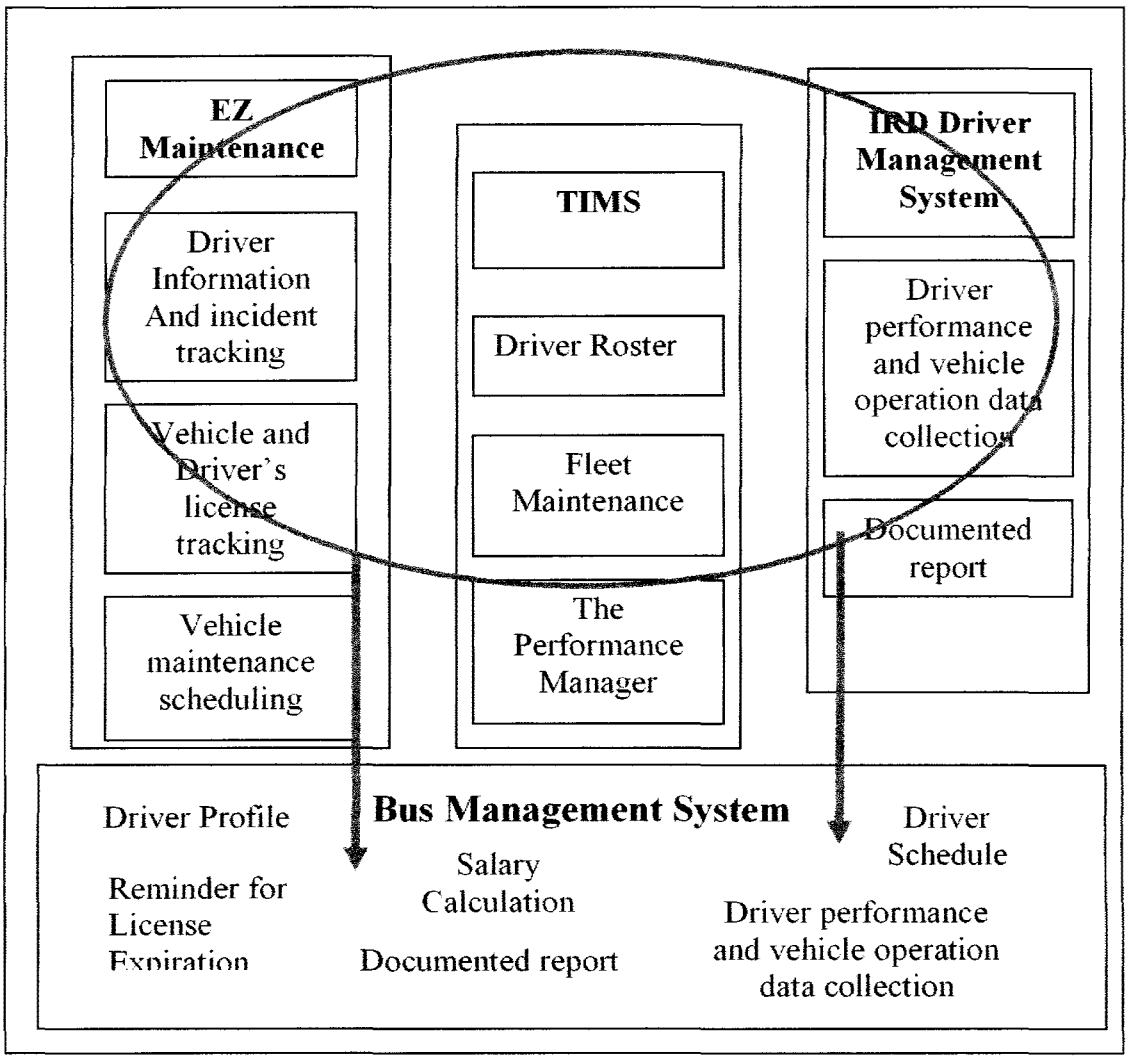

Figure 2.1: The idea for the features of bus management system

Figure 2.1 shows the combination of an idea from EZ maintenance software, Transport Integrated Management System and IRD Driver Management System for the features of Bus Management System. The features of Bus Management System are Driver Profile, Salary Calculation, Driver Schedule, and Reminder for License Expiration, Driver performance and vehicle operation data collection and Documented Report. This is the ideas for the features of Bus Management System, and not all features are developed for this project and this project only focused on Driver Profile, Driver Schedule and Salary Calculation.

The figure 2.1 also shows that not all of the features from EZ maintenance software and Transport Integrated Management System (TIMS) are applied in Bus Management System. The circle on the figure shows the combination of the features from three (3) management system and the product of combination is Bus Management System that showed by both down arrows.

Bus Management System provides a few features that very useful for bus companies. The features are divided into two parts where the first part is for driver management and the second one is for bus management.

Bus Management System can be used only by administrator. There are two parts of management in the system where the administrator may choose by clicking either two buttons that he desire. The buttons are driver management and bus management. In the driver management part, there are four modules that administrator can use to manage his driver. The modules are driver profile, driver salary, driver leave and driver license expiration alert.

Driver profile module has a few functions such as add new driver, view driver profile and edit driver profile. In this module, administrator can add new driver information if new driver is hired. The administrator can update driver profile

if any changes required Driver Salary module has salary calculation function and all information about driver's salaries. Administrator can manage driver salaries and the drivers' trip allowance. While Driver leave module has driver leave application records. All the information about the leave such as duration of leave and reason of leave are recorded in the system.

2.4 Software Process Models

This part had discussed about software process model such as Rapid Application Development model and Waterfall model. The comparison between RAD and Waterfall models had been discussed.

2.4.1 Rapid Application Development

'Rapid Application Development (RAD) is an approach to developing information systems that promises better and cheaper systems and more rapid deployment by having system's developers and end users work together jointly in real-time to develop systems as stressed by Jeffery A Hoffer *et al.*(2002) [6].'

According to Gary B. Shelly, 'RAD process allows user to examine a working model as early as possible, determine if it meets their needs and suggest necessary changes'

RAD is a flexible approach because RAD allow user to request for changes base on their requirement, where RAD have system developers and end users work together. RAD also promises the delivery of products in shorter periods than the 'normal' application of the software engineering methods. The produced systems

correspond to the necessary requirements and are flexible against changes because they can be changed as fast as they build.

RAD models consist of four (4) phases which are requirement planning, user design, construction and cutover. Requirement planning phase requires that high level or knowledgeable end-users determine what the functions of the system should be. It should be a structured discussion of the business problems that need to be solved.

The next phase in RAD models is user design phase. The user design phase requires the users to participate strongly in the non-technical design of the system, under the guidance of Information System professionals. This stage uses workshops to model the system's data and processes and to build a working prototype of critical system components.

In the construction phase, also known as the Development Stage, this stage completes the construction of the physical application system, builds the conversion system, and develops user aids and implementation work plans. At this stage, users continue participate and can still suggest changes or improvements as actual screens or reports are developed.

The last stage in RAD models is cutover phase. This phase consist of data conversion, testing, changeover to the new system and user training task.

2.4.2 The Waterfall model

This model also known as software lifecycle. This model takes the fundamental process activities of specification, development, validation and

evolution. The process activities are represented as separate process phases such as requirements specification, software design, implementation, testing and operation and maintenance.

The phase or stages in waterfall model are overlap and feed information to each other. The following phase should not start if the previous phase is not finished yet. The explanations of the stages in waterfall model are shown in the table below (Ian Sommerville, 2001).

Table 2.5: The principle stages of waterfall model

Stages	Explanation
Requirement analysis and definition	Identify the system's services, constraints and goals by consultation with system users. The requirement are defined in detail and serve as a system specification
System and software design	This stage partitions the requirements to either hardware or software systems. Software design involves identifying and describing fundamental software system abstraction and their relationship
Implementation and unit testing	The software design is realized as a set of programs or program units. In the unit testing phase, the unit is verify either each unit meets its specification
Integration and system testing	In this stage, the individual program units or programs are integrated and tested as a complete system to ensure the software requirement has been met. The software system will delivered to customer after testing
Operation and maintenance	This phase is the longest phase in software life cycle. The system is installed and put into practical use. The maintenance phase is involved correcting errors, improving the implementation of system units and enhancing the system's service as new requirements are discovered.

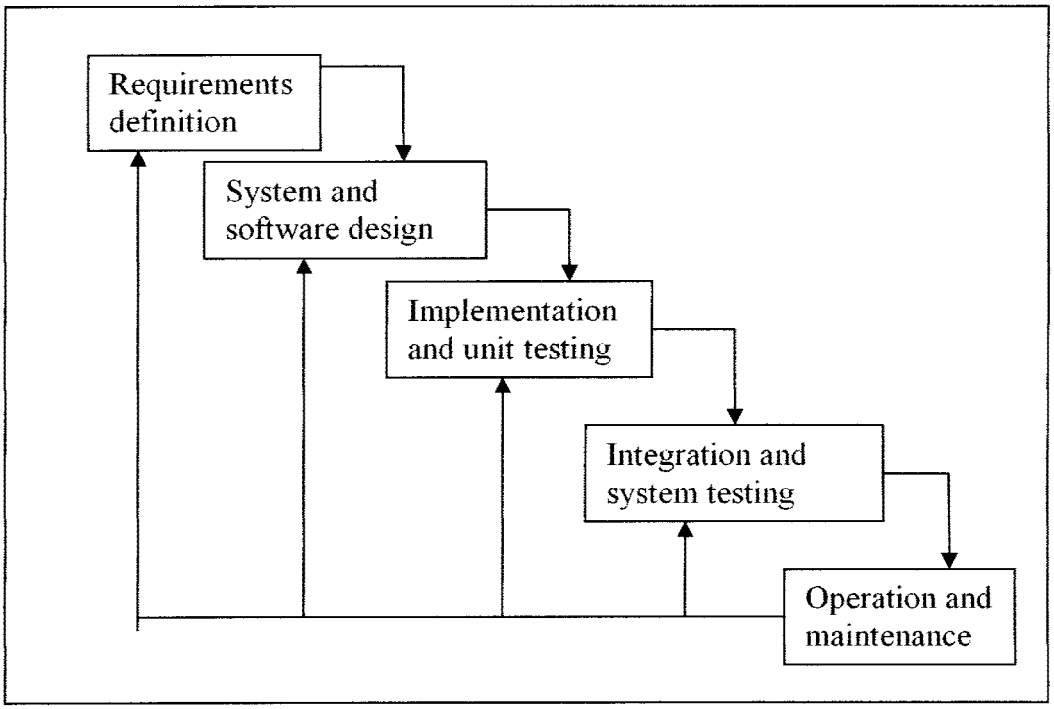

Figure 2.2: The 'waterfall' model
Source: Addison Wesley

Figure 2.2 shows the iteration process that in the waterfall model. The process activities are related with one another. This process is taking a long time to finish, because the principle of this model is, the following task will be start after the previous task is finished.

2.4.3 Comparison between RAD and Waterfall model

The RAD model is use as a methodology for Bus Management System. There are many advantages of RAD model. The RAD approach supports this through its flexibility because it allows a change of requirements during development and ensures in this manner short reaction times to current demands compare with waterfall. The waterfall model need to finished the whole cycle first then the correction will be done because the software process is involves a sequence of iterations of development activities [7].

because the software process is involves a sequence of iterations of development activities [7].

Beside, RAD can save time, money and human effort, while the waterfall is costly. Therefore RAD is suitable for Bus Management System because this system is small and will be developed in a short time period.

2.5 Rule Based System

According to Sutton (2002), Rule Based Systems interpret and act on knowledge expressed as logical 'if ... then' rules [8].

Rule-based systems are really only feasible for problems for which any and all knowledge in the problem area can be written in the form of if-then rules and for which this problem area is not large. If there are too many rules, the system can become difficult to maintain and can suffer a performance hit [9].

To create a rule-based system for a given problem, the following must have:

(i) A set of facts to represent the initial working memory. This should be anything relevant to the beginning state of the system.

(ii) A set of rules. This should encompass any and all actions that should be taken within the scope of a problem, but nothing irrelevant. The number of rules in the system can affect its performance.

(iii) The condition that determines that a solution has been found or that none exists. This is necessary to terminate some rule-based systems that find themselves in infinite loops otherwise.

2.6 Software for System Development

In developing Bus Management System, Microsoft Visual Basic 6.0 edition software is used for the interface and code generator. Microsoft Access is used for Bus Management System database. This software is easy to use and the tools are already provided. The coding for this software is not too complex. Therefore, Visual Basic is suitable for a stand alone system. Both products are more compatible because these products are from the same provider Microsoft. The link with database is simple and not very difficult to set up.

Olaf Merkert(2001), mentioned that Visual Basic 6.0 is a Microsoft product that can be used for rapid prototyping. Obviously MS-Windows- and Basic-based this product lacks of pure object-oriented features that normally make reuse and maintainability easier [10].

In addition, Microsoft Access no needs a large space in hard disk. There is no hardware problem in using Microsoft Access compare to Oracle 9. Using Oracle 9 usually caused PC cannot run smoothly and always hang. There are many protocols in using Oracle. Microsoft is the best choice for this system because it not requires large space, high speed RAM and updated processor. Therefore, this system is suitable to runs in small company that only has one PC for their operation.

CHAPTER 3

METHODOLOGY

3.1 Software Process

A software process is a set of activities and associated results which lead to the production of a software product. Software specification, software design and implementation, software validation and software evolution are the fundamental activities which are common to all software process.

Rapid Application Development (RAD) is a programming system that enable programmer to quickly build working programs. RAD approach is suitable for Bus Management System that need be complete within 3 months. Therefore, Rapid Application Development (RAD) was chosen as a methodology for developing Bus Management System (BMS). The project planning or timeline is shown in Gantt chart (Refer Appendix B).

3.1.1 Requirement Planning

The Requirements Planning and Analysis stage consists of a review of the areas immediately associated with the proposed system. This review produces a broad definition of the system requirements in terms of the functions the system will support. In this stage, user requirement is collected by doing an interview with the Transnational Express Operation Officer. Ask for the related document that required for analysis phase. All the

information and explanation that given by the Operation Officer is written in book to avoid from lost or misplace. The sample of related document that used as reference for analyze the requirement are available in appendices chapter (Refer Appendix C).

Besides, discussion with lecturers and friends is also a part of requirement studies to get a better understanding in analyzing the requirements. On the other hand, the information about existing systems that similar with Bus Management System is searched through the internet to find the beneficial features that can be applied in Bus Management System.

In order to search about the system that related with Bus Management System, the information about scheduling algorithm is also done to find the best technique and simple algorithm for generate a schedule. There are many techniques that can be applied for generate schedule.

3.1.2 User Design

In this system, structured analysis is chosen as a technique for analyze system requirement. Data Flow Diagram is used to create a visual model of the information system. After analyze this system, there are 8 processes that involve in Bus Management System. The processes are filling up form, apply leave, payment calculation, generate schedule, retrieve driver information, retrieve driver schedule, retrieve leave information and generate reminder (Refer Appendix D and E).

The details of the logical model of the system are documented in a data dictionary which is second component of structured analysis. Data dictionary for Bus Management System is a central storehouse of information in Bus Management System's data (Refer Appendix F). After analyzing the requirement, the driver details is needed for driver record, the flow of the manual driver scheduling and formula for calculate salary and allowance.

For the salary calculation module, there are the definitions of the term:

(i) Salary

Salary is a monthly payment that given by company to the bus driver. The salary is including required deduction or additional deduction.

(ii) Basic Salary

Basic Salary is a consistent payment that by the company every month to each driver. The amount of basic salary will increase every year. The basic salary is given to the driver on 27th every month.

(iii) Trip Allowance

Allowance is an extra payment that the company to the driver base on the number of trip and extra work that the driver done. Extra work is an additional work at the workshop that the driver can do in order to get extra money. Allowance is calculated everyday. Every month the daily allowance will be added to get the total of allowance that the drivers get per month. The allowance will be given to the driver on 15th every month.

Trip Allowance = Rate + Extra work + Quality.
Where:
Rate: KTN-KL = RM13.20
KTN-SHAH ALAM = RM14.40
Total Rate for each trip is calculated base on this formula:
Trip 1= Rate
Trip 2= Rate
Trip 3=1.30*Rate
Trip 4=1.90*Rate
Extra Work: Bus Cleaning = RM2
Quality: RM5 is given if there is no accident or damage
Public Holiday: Double payment will be given to the driver if they drive during the public holiday.

Figure 3.1: Allowance trip calculation algorithm

Figure 3.1 at the previous page explained about the formula to calculate daily allowance for driver. The allowance calculation is depend on the rate and the number of trip that achieved by the driver. For example: A driver has a trip from Kuantan to Kuala Lumpur and on that day, he had drive for four (4) trips. The calculation for the allowance that only base on number of trip and destination rate is shown in figure below.

Allowance = (a*13.20) + (b*13.20).
Where:
a= 1.9 +1.3 (*which are the extra amount of trip 3 and trip 4*)
b= 2 * rate (*where the trip 1 and trip 2 has the same amount with rate*)

Figure 3.2: Algorithm for allowance calculation base on trip

The third component of structured analysis is process description. In this phase for Bus Management System, the process tool that used is flowcharts that similar with decision tree. The flowcharts are provided only for payment calculation (Refer Appendix G).

In this phase, the prototype of the system is also developed to present about the system process, outputs and inputs. The requirement of the system might be changed and improved.

3.1.3 Construction

This stage is focus on program and application development task. At this stage, user still can request for changes or improvement. Bus Management System development start with the simple module that consist of simple process and flow such as manage driver information module. In this module only consists of the basic function such as add, edit, delete and view. Then, the development followed by driver leave module which also using quite simple code like manage driver information module.

The development continued by salary calculation module where involving the formula for calculates the daily allowance and monthly allowance.
In this module, rule based system is applied. The rule based is applied for determine the trip allowance that the driver will get based on the number of trip, trip type, duty code, quality and day type.

Below is the code that involves in determining the trip allowance:

```
If (dayType= publicHoliday) Then
        If (tripType=single) Then
                If (quality=yes) Then
                        If (dutyCode=KTN-KL) Then
                                If (number of trip=4) Then
                                paid = 13.2 * 2
                                total = ((3.2 * paid) + (2 * paid) + 5 + bC
                                        + others) * 2
                                Text15.Text = total
                                Else
                                If (d = 3) Then
                                 paid = 13.2 * 2
                                total = ((1.3 * paid) + (2 * paid) + 5 + bC +
                                        others) * 2
                                 Text15.Text = total
                                 Else
                                 If (d = 2) Then
                                 paid = 13.2 * 2
                                 total = ((2 * paid) + 5 + bC + others) * 2
                                 Text15.Text = total
                                 Else
                                 paid = 13.2 * 2
                            total = ((1 * paid) + 5 + bC + others) * 2
                                Text15.Text = total
                                 End If
                            End If
                            End If
                        Else
                        End If
                Else
                End If
        Else
        End If
Else
End If
```

Figure 3.3 Sample coding for determine the trip allowance

The last module is generating trip schedule for driver. This module is developed using rule based system. The "IF...Then..."logical expression is used to determine the availability of the slot. Slot is referring as the space that consists of time, day and destination. The sample of manual schedule is provided (Refer Appendix H)

In order to develop the system, there are four (4) elements that involve in trip schedule generating:

(i) Destination: Kuantan and Kuala Lumpur

(ii) Time: Base on Category

(iii) Day: Monday to Sunday

(iv) Driver

There are four (4) category of trip. The category of trip is based on departure time. The categories are:

(i) Category A: 8.00 am to 12.00 pm

(ii) Category B: 1.00 pm to 5.00 pm

(iii) Category C: 6.00 pm to 10.00 pm

(iv) Category D: 11.00 pm to 12.00 am

The constraints that are needed in order to generate the trip schedule are:

(i) One (1) driver only have one (1) trip for each category

(ii) If the driver is assigned for slot in category A, the particular driver cannot be assigned for slot in category B.

(iii) Every driver only has three (3) to four (4) trip everyday.

(iv) Every driver will be having one (1) day off.

(v) The driver that have trip in category D should start their trip base on category B for the next day.

(vi) For the next day, every driver should start their trip at their last destination.

3.1.4 Cutover

This phase is the last stage in RAD process model. At this stage, not all activities have been done for the prototype of Bus Management System. Only system testing is done in at this stage. The other activities like data conversion, changeover to the new system and user training is not applicable for this prototype. This is because, this prototype system is not going to deploy to any organization.

Bus Management System is tested using three (3) types of testing. Firstly the program is tested individually, where the type of testing is called unit testing. During the unit testing, logic errors and test data that contain both correct data and erroneous data is tested in all possible situations. The second type of testing is integration testing. During this testing, two (2) or more programs that related are tested. The link and data that passed from allowance calculation program to salary module is tested. Lastly, the system testing is done to test the system is running smoothly.

3.2 Software and Hardware Specification

Below are the system requirement requests by client in order to develop this Bus Management System.

Table 3.1: Software and Hardware Specification

Computer	Specification
Operating System	Windows XP Pro
Had Disk	40Gb
RAM	256Mb
Processor	Pentium 4 -2.0
Software	Microsoft Visual Basic 6.0 Professional Edition
Database	Microsoft Access 2003

In order to develop the system, Microsoft Windows ™ Me/NT/2000/XP Professional is used because the operating system is suitable and robust. The recommended processor is (two hundred and fifty six) 256Mb and forty (40)Gb hard disk space is used because the software tools that has been used require large capacity.

CHAPTER 4

RESULT AND DISCUSSION

This chapter is discussing about the result and output from the system testing phase in Bus Management System development. The system is tested after the development of each module.

4.1 Output from Testing Phase

The testing phase is done in cutover stage in RAD process model. The result of the testing phase is discussed.

4.1.1 Driver Profile

Driver profile has four (4) forms that the user to fill in after the driver is hired. The forms are driver details which is contains about driver information, driver license information, the second form is about driver's wife and children's information, the third form is about driver's family information and driver's extra information. In the extra form is consists of driver education background, basic knowledge about computer, course that the driver had attend before and working experience. User can insert data, edit and search driver information by name. (Refer figure 4.1-figure 4.6)

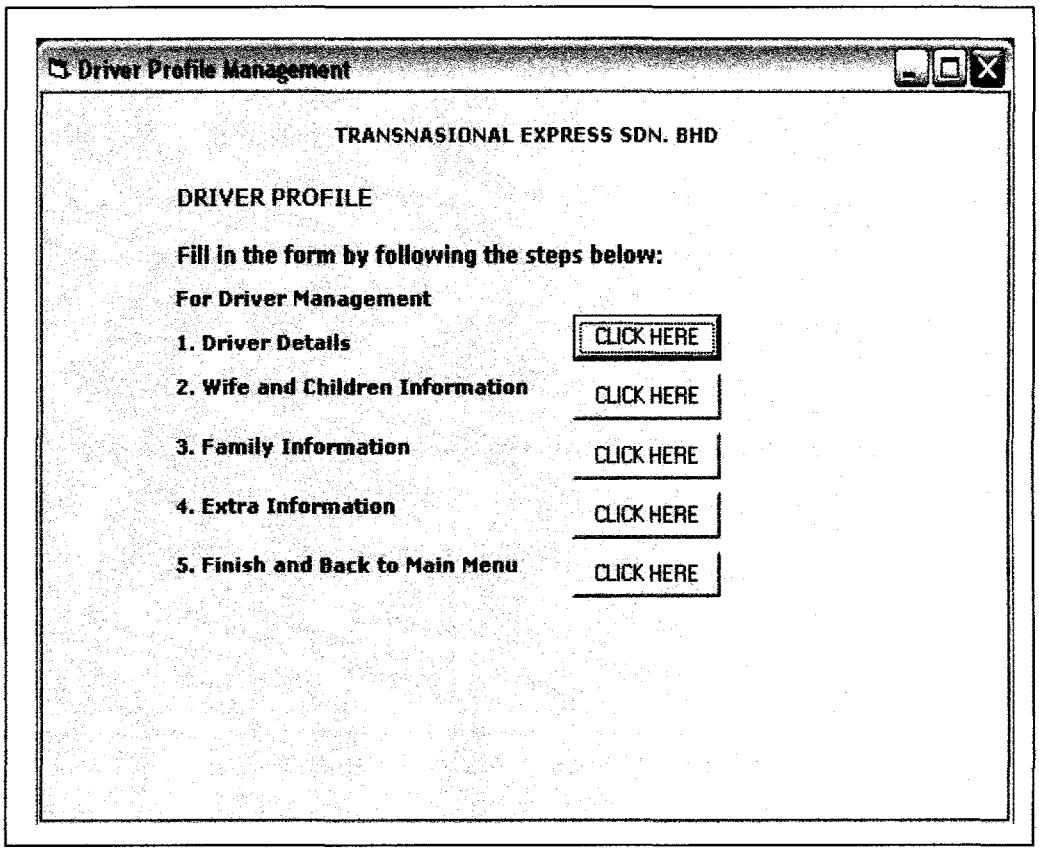

Figure 4.1: The first page for driver profile

Driver profile is tested by clicking 'CLICK HERE' button. The form is displayed base on the menu. A driver detail is showed when the related button is clicked. Figure 4.2 shows the form displayed after the 'CLICK HERE' button is clicked.

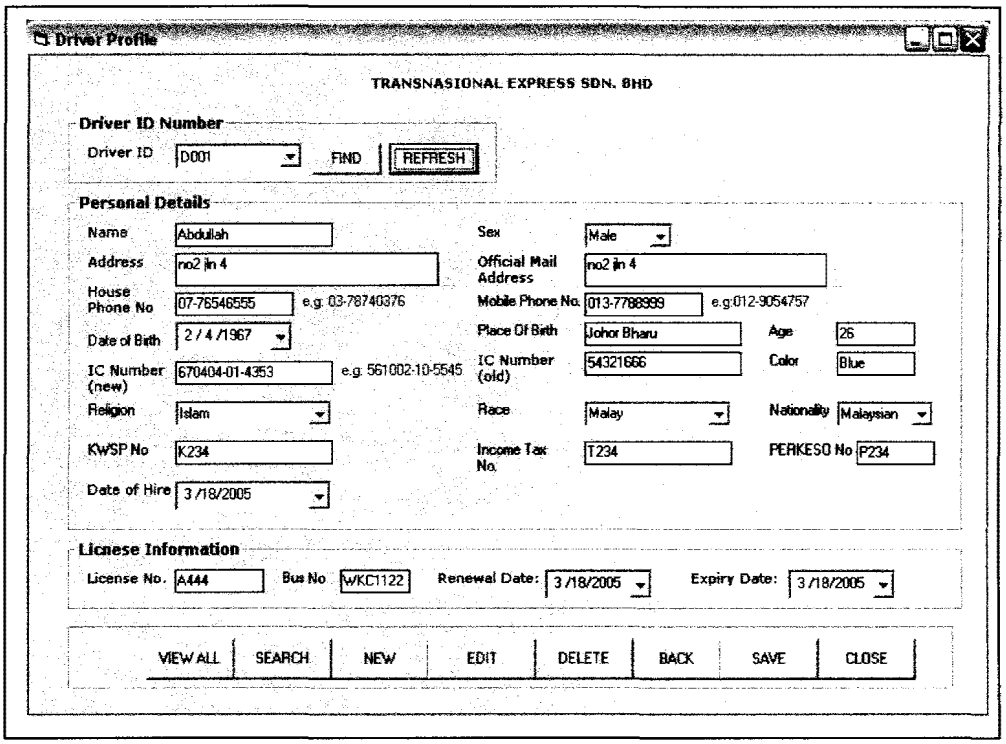

Figure 4.2: View of driver information.

This form show the driver details that recorded in the database. In driver ID number has drop down menu and list of driver ID is displayed. One ID is selected to test the functionality of 'FIND' button and the button is function as expected before.

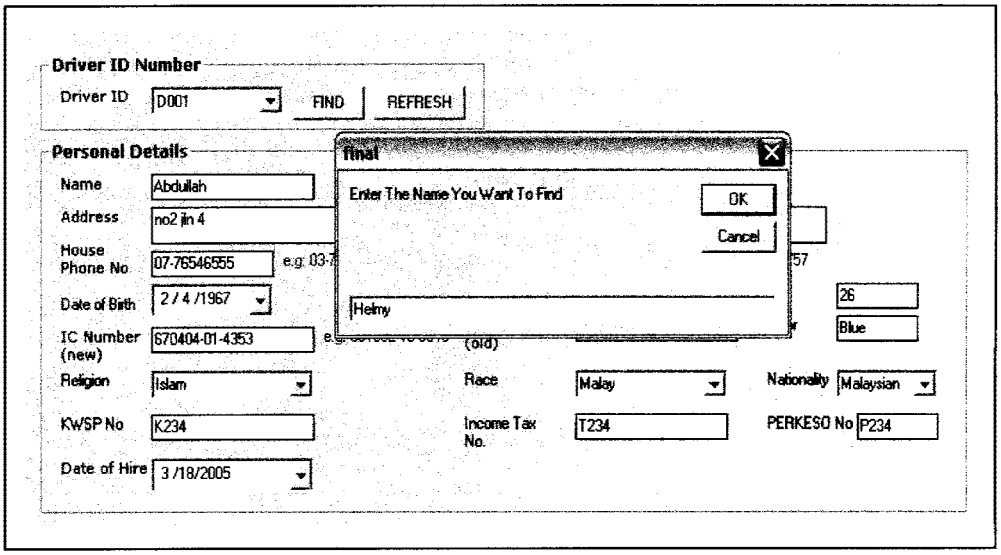

Figure 4.3: The search function

Another alternative to get driver information is using the 'SEARCH' button. The driver information is searched by name. The correct and erroneous data is tested. If the name that entered in the box is in the record, the driver information is displayed (refer figure 4.4).

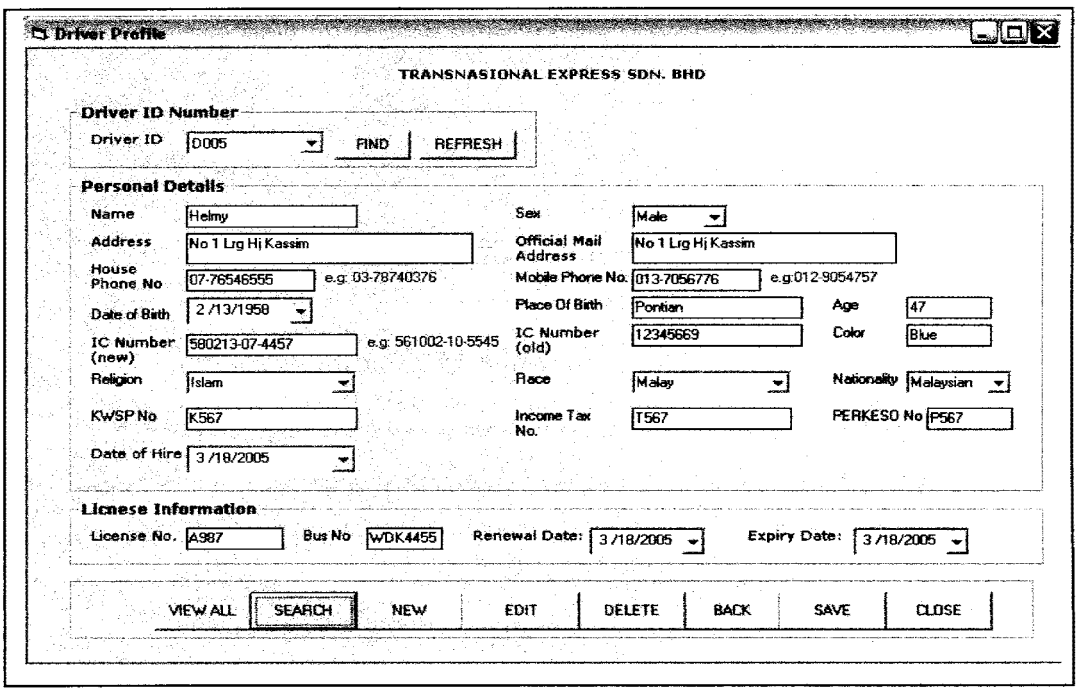

Figure 4.4: Result from the search function

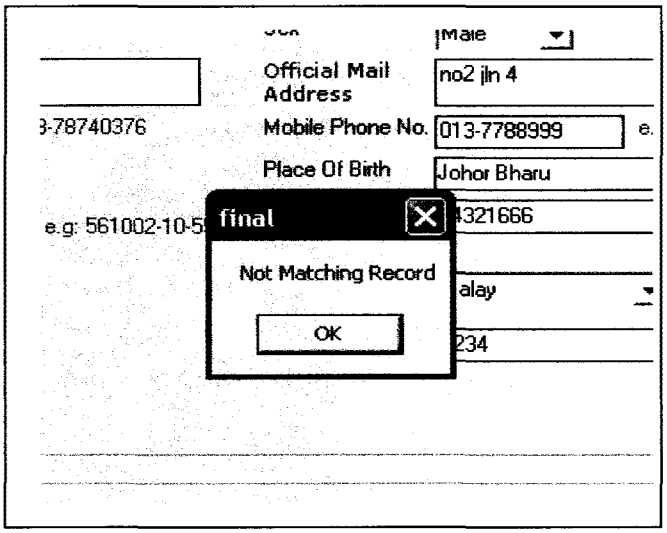

Figure 4.5: Message Box

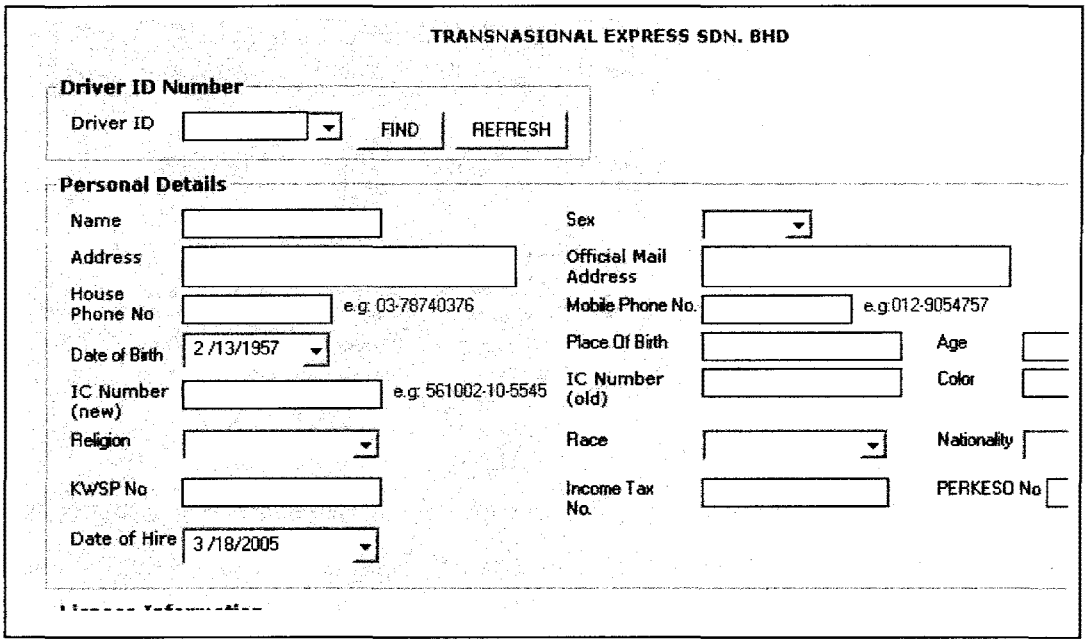

Figure 4.6: New form for add new driver

The form is displayed when the 'New' button is clicked. The new record is has been saved in the database and message box appear to prove that the data successfully saved (refer figure 4.7).

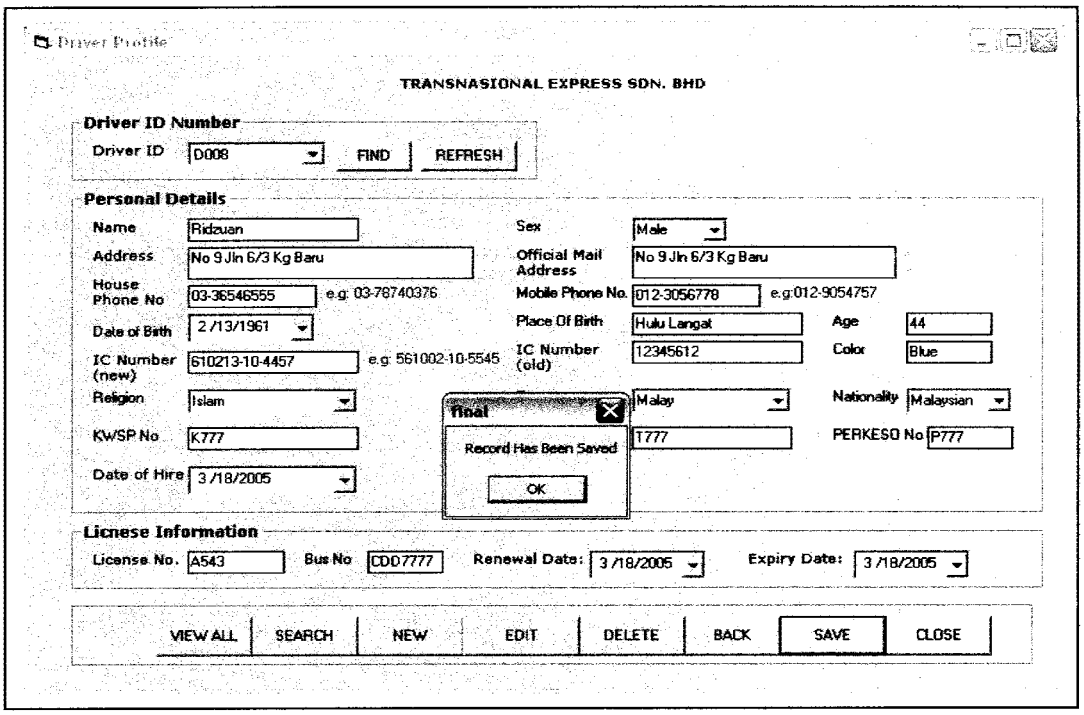

Figure 4.7: Adding new driver and the new record has been saved

4.1.2 Allowance Calculation

All data about the driver is displayed base on Driver ID. To add record about driver allowance is selected and requirements for calculate daily allowance are entered. Total of daily allowance is displayed after calculate button is clicked. All the date entered will be saved into the database. Total of daily allowance is calculated automatically by the system. The total is displayed when the show salary button is clicked. (Refer to figure 4.8-figure 4.9)

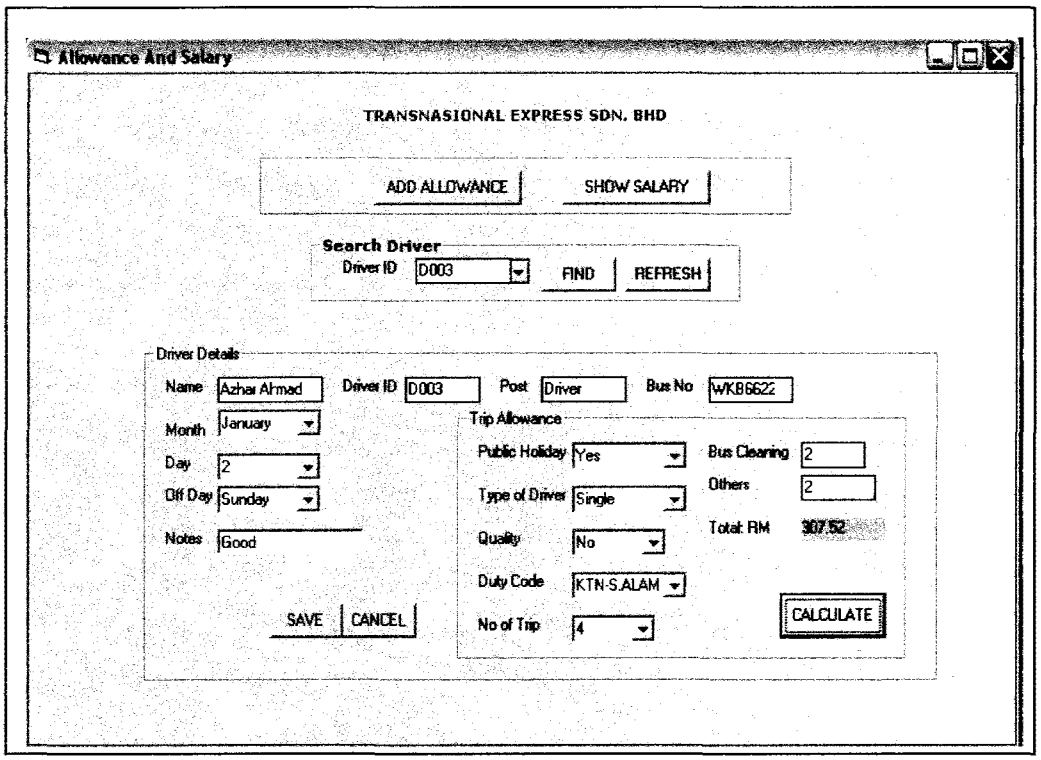

Figure 4.8: Allowance Calculation

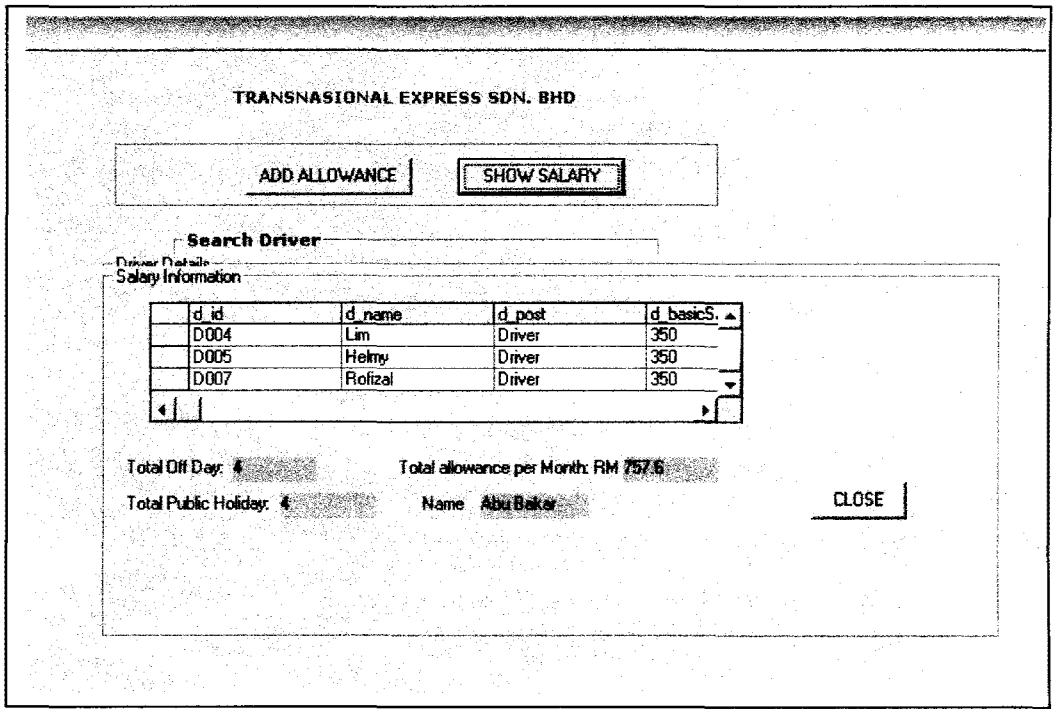

Figure 4.9: The Salary information is displayed

4.1.3 Driver Leave

The result of this module is similar with the manage driver information module. When the user click add new button, the form automatically empty and user can fill in the form. The module run successfully when the data saved into database and displayed on the form. The result for edit function also same with add new function.

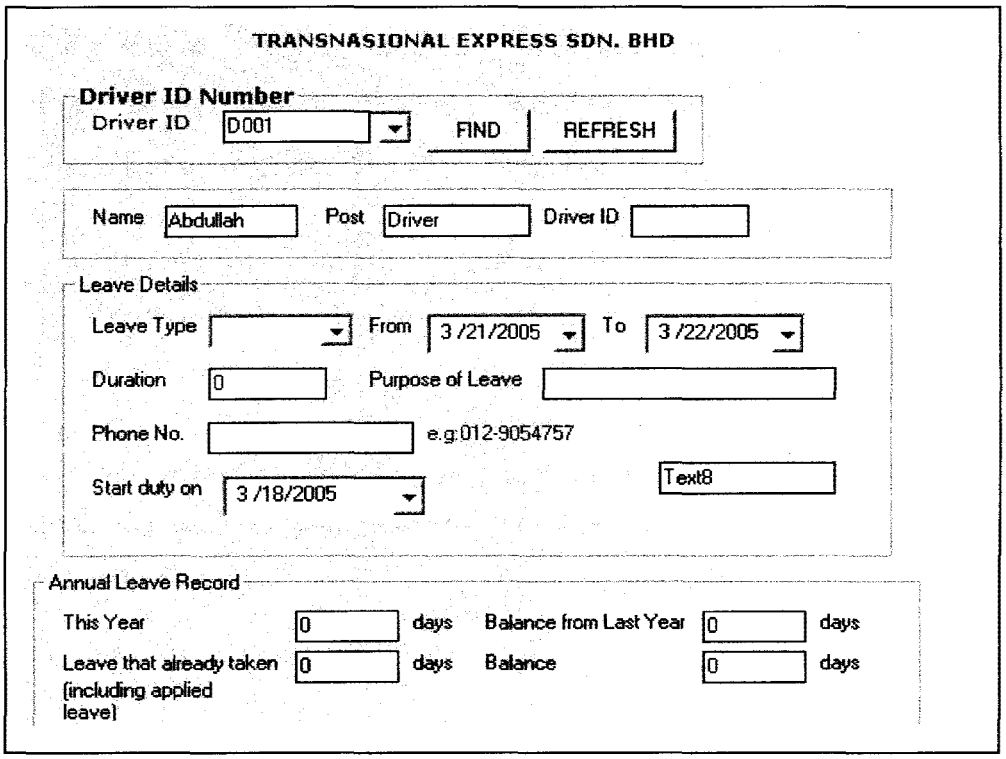

Figure 4.10: The new form for driver leave

4.1.4 Generate Driver Schedule

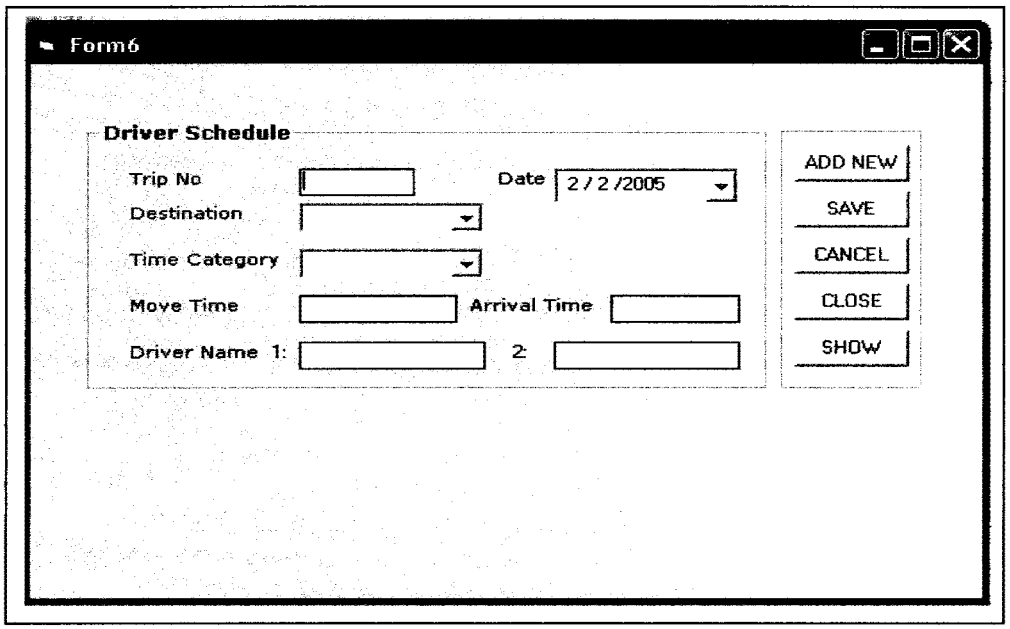

Figure 4.11: Interface for trip schedule

The generate schedule trip function is not running successfully. The schedule is not generated but the system shows the information about the driver trip base on the record in the database

4.2 Discussion

Testing phase against this system has been done. Some of the functions are working and some of them not working properly for this prototype. In addition, incorrectness in keeping data might not happen because the user of this system is allowed to edit the incorrect data. However, sometimes, the system cannot work properly because of technical problems. For instance, the data cannot save in the database when the user click the save button. During fill up data into the system, the valid data must be entered such as number, text and others base on their requirement to avoid the data unable to insert in the database. Despite the system is easy to use and make management more

effective, there are still certain parts of the system that can be improved in order to fulfill the best satisfaction of users.

4.3 Constraint

There are many constraints in developing Bus Management System need to face on. The constraints in system development can be categorized into two (2) parts. The first category is constraint during development and the other one is system constraint.

4.3.1 System constraint

Sometimes, this system cannot run like expected. Debug error will appear and the system stopped from the running process. This error occurs when the value that entered through the interface is not match with the field in the database.

4.3.2 Constraint during development

During Bus Management System development, there is a few constraints that have to faced.

4.3.2.1 Time Constraint

During Bus Management System development, long time period is needed in order to spend the time for doing a research, explore visual basic 6.0 software, develop a system, thinking about the algorithm and finish thesis report. It is very tough job to finish the entire task within 3-4 months. A lot of time is needed to develop a system, thinking about algorithm and exploring visual basic 6.0 environment.

4.3.2.2 Technical Knowledge

Lack of experience in using visual basic 6.0 make the development become difficult. The problem occurs during linking database with the interface. Lack of knowledge in generating code using visual basic and need a long time to explore, study the sample of code and try to apply the code in Bus Management System.

4.3.2.3 Technical Problem

Technical problem is one of the constraints that need to face and feel very patient in developing Bus Management System and doing this thesis. The technical problems that always occur are server down and personal computer not responding. Server down and network connection unavailable can cause difficulties in searching resources through the internet. Personal computer problem can cause all work stuck and hindered.

4.5 Further Research

Bus Management System has potential to expand to develop as web based application system. In this idea, the system can be used by headquarter and all branches over Peninsular Malaysia. The system will consist of driver management, bus management, online ticketing and other operation that involve in Bus Management System.

Further research on Scheduling algorithm is interesting to explore, where the combination of a few techniques can make the scheduling process become faster, accurate and can perform a better performance.

CHAPTER 5

CONCLUSION

As a conclusion, Bus Management System is developed to computerized manual management of Transnasional Express Sdn Bhd, Kuantan. The purpose of this system is to help the organization in operation management. This system also can help company to minimize time and cost management.

Bus Management System that is developed has achieves the objectives of the system. The objectives of the system are developing a prototype Bus Management System where the manual system is converted to computerized system and calculate driver's allowance had been achieved. While generate trip schedule for driver is not fully achieve as targeted earlier. There are many problems that needed to face on during the development of this system. The main problem is lacking of references and expertise in using software tools. Therefore, we must look back at previous development projects to see what we have learned, not assuring the software quality, but also about the effectiveness of our technique and tools.

Even though many problems had occurred during the development, finally this system successfully completed in short time period as planned. In the future, hopefully, this system can help operation officer in managing company operation.

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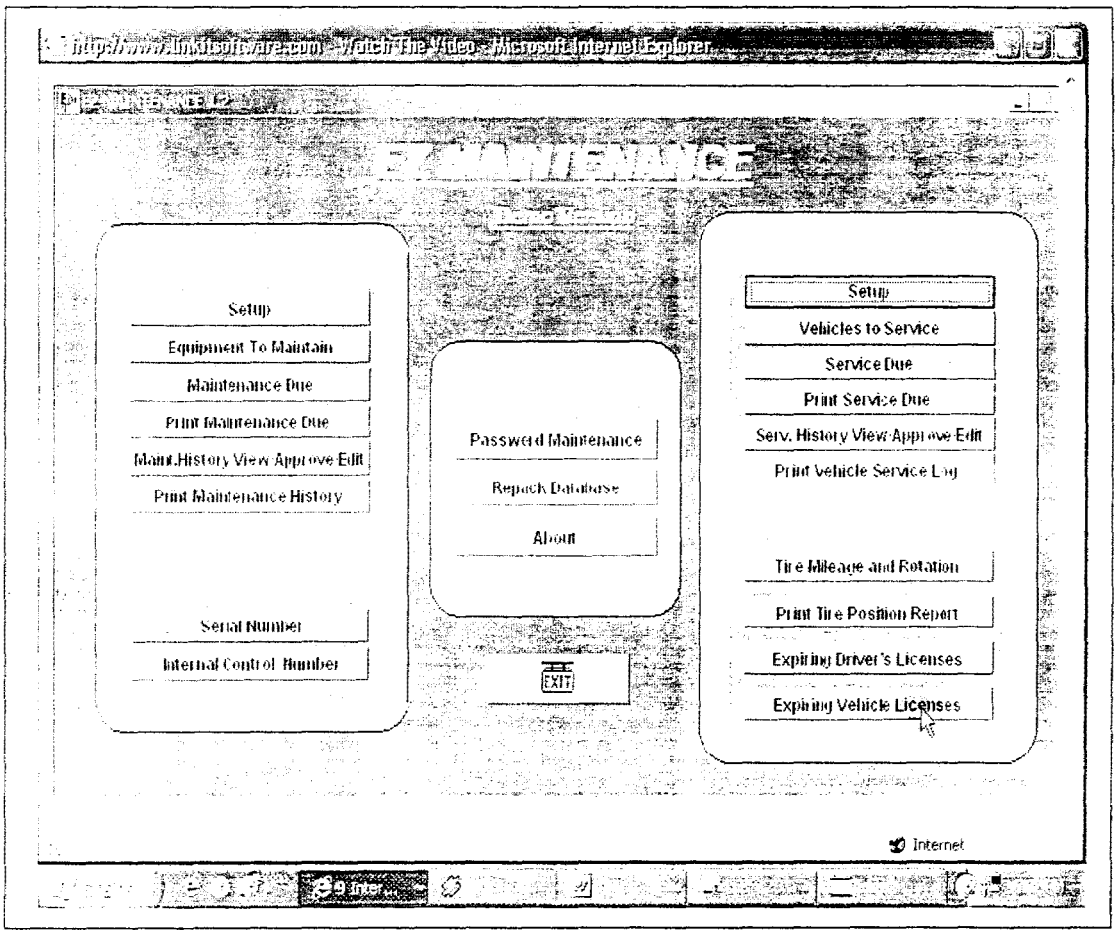
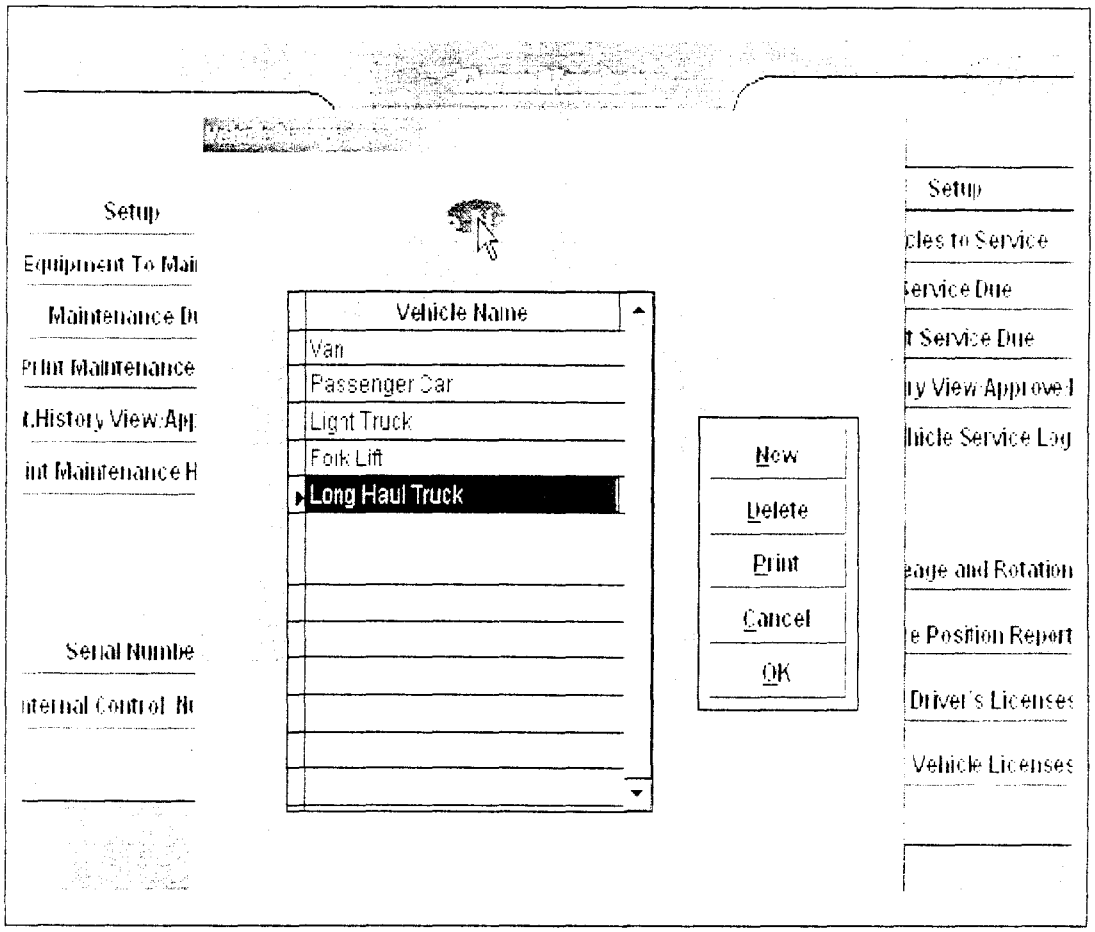
APPENDIX A

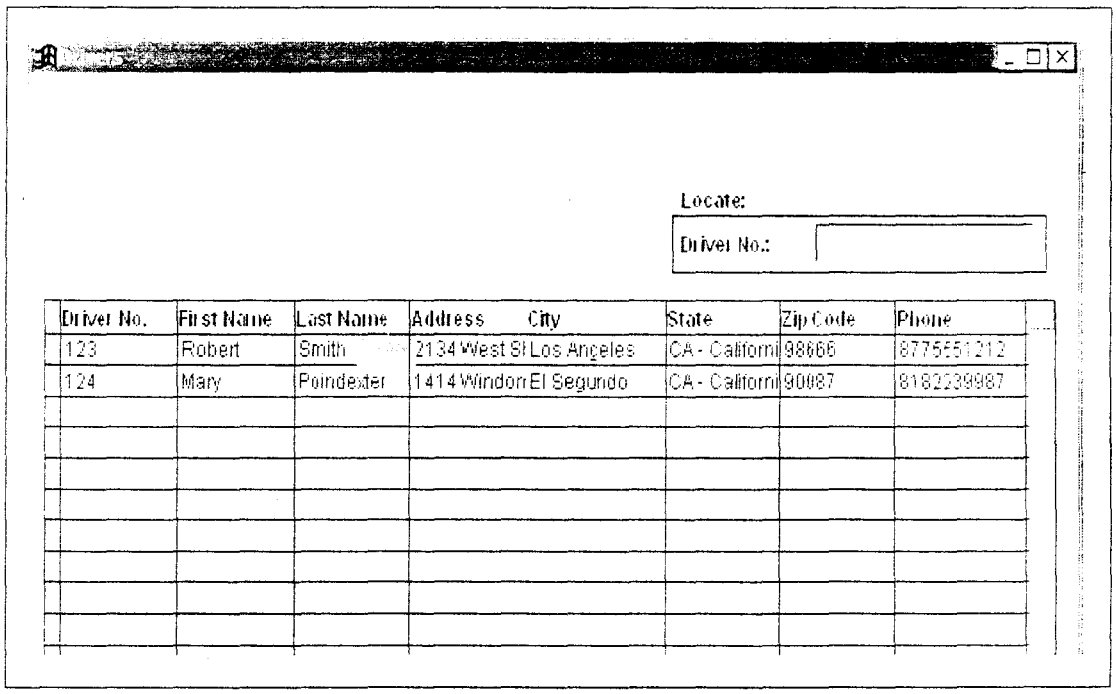
Interface of EZ Maintenance CMMS software



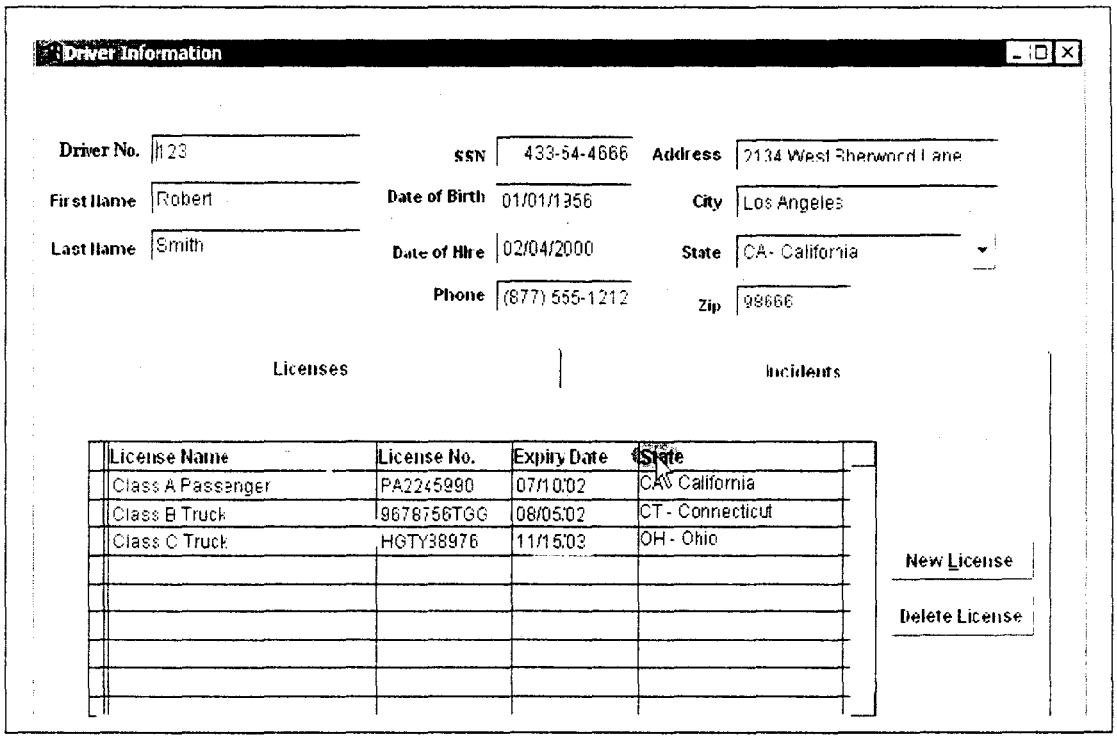
EZ Maintenance CMMS maintenance software main interface



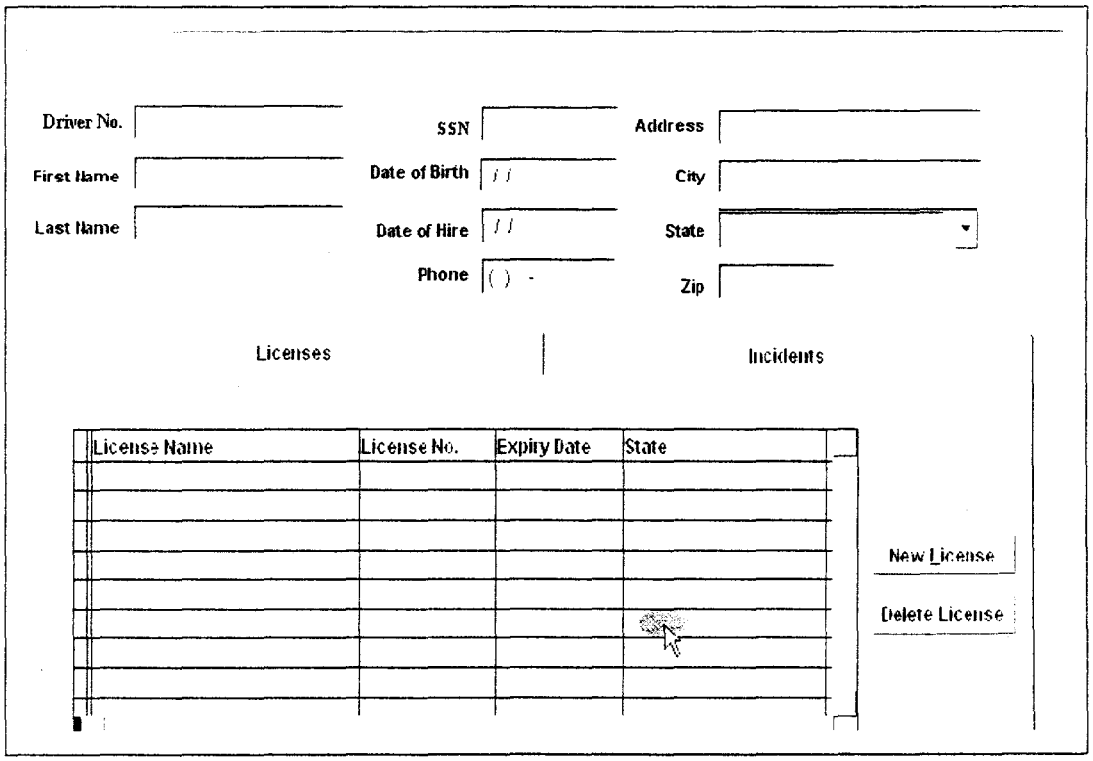
Vehicle Names Interface



List of drivers in drivers interface



License expiration information in Driver Information interface

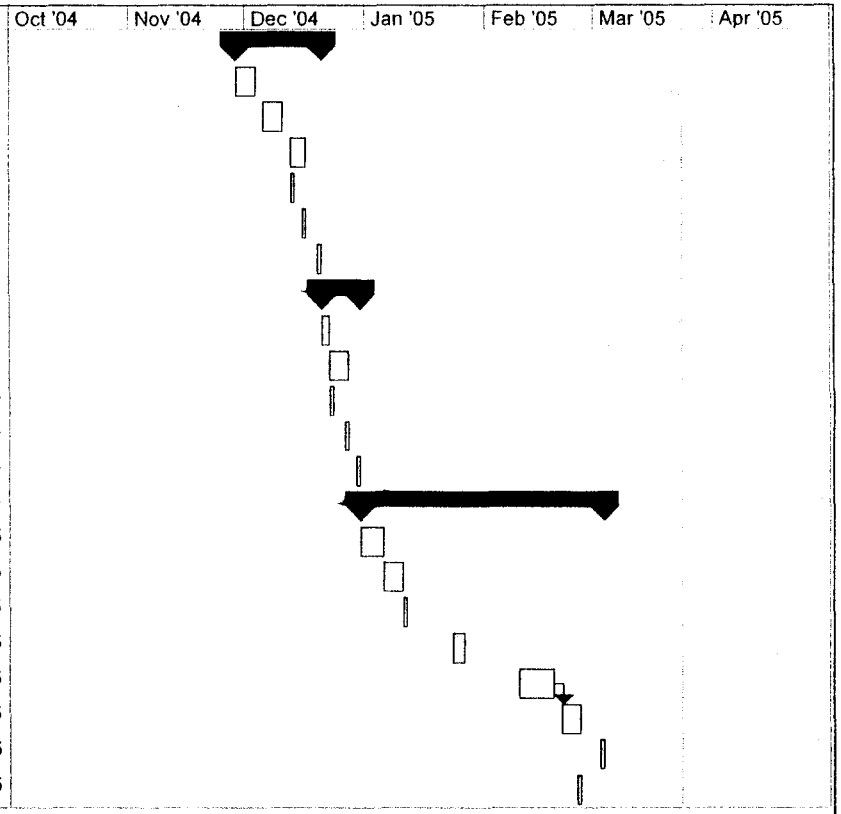


New form for Driver Information

APPENDIX B

Gantt Chart

ID	Task Name	Duration	Start	Finish
1	**Software Planning**	**16 days**	**Mon 11/29/04**	**Mon 12/20/04**
2	Introduction and Project Pr	5 days	Mon 11/29/04	Fri 12/3/04
3	Literature review	5 days	Mon 12/6/04	Fri 12/10/04
4	Find case study	4 days	Mon 12/13/04	Thu 12/16/04
5	Submit chapter1	1 day	Mon 12/13/04	Mon 12/13/04
6	Submit chapter 2	1 day	Thu 12/16/04	Thu 12/16/04
7	Complete chapter 2	1 day	Mon 12/20/04	Mon 12/20/04
8	**Sofware Requirement**	**8 days**	**Tue 12/21/04**	**Thu 12/30/04**
9	Define methodology	2 days	Tue 12/21/04	Wed 12/22/04
10	Analysis requirement	3 days	Thu 12/23/04	Mon 12/27/04
11	Submit chapter 3	1 day	Thu 12/23/04	Thu 12/23/04
12	Submit SRS	1 day	Mon 12/27/04	Mon 12/27/04
13	Complete SRS	1 day	Thu 12/30/04	Thu 12/30/04
14	**Software Design and Develop**	**45 days**	**Fri 12/31/04**	**Thu 3/3/05**
15	Preliminary design	4 days	Fri 12/31/04	Wed 1/5/05
16	Detail design	3 days	Thu 1/6/05	Mon 1/10/05
17	Generate code	1 day	Tue 1/11/05	Tue 1/11/05
18	Pre-presentation	3 days	Mon 1/24/05	Wed 1/26/05
19	Assumtion and further rese	7 days	Thu 2/10/05	Fri 2/18/05
20	Conclusion and appendix	5 days	Mon 2/21/05	Fri 2/25/05
21	Presentation	1 day	Thu 3/3/05	Thu 3/3/05
22	PSM report	1 day	Fri 2/25/05	Fri 2/25/05



Project: Gantt chart
Date: Thu 3/24/05

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Page 1

APPENDIX C.1
Personal Details Form 1

NADICORP HOLDINGS SDN BHD

SULIT

(No. Sykt. 137336-V)

BORANG PERMOHONAN/MAKLUMAT PERIBADI

ISIKAN DENGAN HURUF BESAR

JAWATAN DIPOHON :

JAWATAN SEKARANG :

TARIKH :

GAMBAR

BUTIR-BUTIR PERIBADI

NAMA (DALAM KAD PENGENALAN) :

ALAMAT RUMAH :

ALAMAT SURAT MENYURAT :

NO. TELEFON (RUMAH) :

NO. TELEFON (PEJABAT)

TARIKH LAHIR :

TEMPAT LAHIR :

NO. K/P (LAMA) :

NO. K/P (BARU) :

WARNA :

JANTINA :

UMUR :

KEWARGANEGARAAN :

TARAF PERKAHWINAN :

BANGSA :

AGAMA :

NO. KWSP :

NO. CUKAI PENDAPATAN :

NO. PERKESO :

BUTIR-BUTIR SUAMI/ISTERI

NAMA :

NO. KAD PENGENALAN :

TARIKH LAHIR :

NAMA & ALAMAT MAJIKAN :

JAWATAN :

NO. TELEFON :

NO. CUKAI PENDAPATAN :

APPENDIX C.2
Personal Details Form 2

LATAR BELAKANG BUTIR-BUTIR PENDIDIKAN

BIL	NAMA SEKOLAH/KOLEJ/ UNIVERSITI/INSTITUSI	TARIKH MASUK	TARIKH KELUAR	TEMPOH	KELULUSAN DIPEROLEHI
1.					
2.					
3.					
4					
5.					

PENGGUNAAN KOMPUTER - (Sila Nyatakan)

BIL	PENGETAHUAN KOMPUTER	BIL	PENGETAHUAN KOMPUTER
1.		6	
2.		7	
3.		8	
4		9	
5.		10	

BAHASA PERTUTURAN

BIL	JENIS BAHASA	POTONG MANA YANG TIDAK BERKENAAN PENULISAN	PERTUTURAN
1.	BAHASA MALAYSIA/MELAYU	FASIH / SEDERHANA / LEMAH	FASIH / SEDERHANA / LEMAH
2.	BAHASA INGGERIS	FASIH / SEDERHANA / LEMAH	FASIH / SEDERHANA / LEMAH
3.		FASIH / SEDERHANA / LEMAH	FASIH / SEDERHANA / LEMAH
4.		FASIH / SEDERHANA / LEMAH	FASIH / SEDERHANA / LEMAH

KURSUS/SEMINAR DIHADIRI

BIL	JENIS KURSUS/SEMINAR	TARIKH DIHADIRI	TEMPOH	NAMA PENGANJUR
1.				
2.				
3.				
4.				
5.				
6.				

APPENDIX C.3
Personal Details Form 3

BUTIR-BUTIR ANAK-ANAK

BIL	NAMA ANAK-ANAK	UMUR	JANTINA	TARIKH LAHIR	NO K/P ATAU NO SURAT BERANAK
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

BUTIR-BUTIR KELUARGA

NAMA BAPA/PENJAGA
PEKERJAAN BAPA/PENJAGA
NAMA IBU
PEKERJAAN IBU

BIL	NAMA ADIK-BERADIK	UMUR	JANTINA
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

NAMA BAPA MERTUA :
NAMA IBU MERTUA :

NAMA DATUK

APPENDIX C.4
Personal Details Form 4

PENGALAMAN PEKERJAAN/BUTIR MAJIKAN

BIL	NAMA SYARIKAT/LAIN-LAIN	TEMPOH	GAJI AKHIR	JAWATAN YANG DISANDANG
1.				
2.				
3.				
4.				
5				
6.				
7				

SEBAB-SEBAB BERHENTI DARI MAJIKAN LAMA

TARIKH BOLEH MULA BEKERJA :

GAJI YANG DIMINTA : RM

MAKLUMAT KECEMASAN

NAMA YANG PERLU DIHUBUNGI :

HUBUNGAN :

ALAMAT :

NO. TELEFON :

AKUAN PEMOHON

SAYA MENGAKU BUTIR-BUTIR YANG TERSEBUT DI ATAS ADALAH BENAR DAN BETUL. SAYA JUGA FAHAM JIKA KETERANGAN YANG DIBERIKAN PALSU, PERKHIDMATAN SAYA AKAN DITAMATKAN. SAYA JUGA BERTANGGUNGJAWAB UNTUK MEMBERITAHU KEPADA MAJIKAN SEKIRANYA TERDAPAT APA-APA PERUBAHAN KEPADA BUTIR-BUTIR TERSEBUT DI ATAS. JIKA SAYA GAGAL UNTUK BERBUAT DEMIKIAN, PIHAK MAJIKAN TIDAK AKAN MENANGGUNG APA-APA KERUGIAN ATAU MELAYAN SEBARANG ADUAN.

TANDATANGAN :

TARIKH :

APPENDIX C.5
Driver Duty Form

TRANS/PD/02

TRANSNASIONAL EXPRESS SDN BHD

BORANG DUTI PEMANDU

NAMA: _____ BULAN: _____

NO. PEKERJA: _____ JAWATAN: _____

TARIKH	KOD DUTI	NO. BAS	HARI OFF	CUTI AM	ELAUN TRIP						CATATAN	T. TANGAN PENYELIA
					TRIP BIASA	1.3	1.9	KUALITI	CUCI BAS	S/KHAS		
1												
2												
3												
4												
5												
6												
7												
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27												
28												
29												
30												
31												
		JUMLAH										

JUMLAH BESAR ELAUN TRIP = RM

APPENDIX C

Leave Application Form

TRANSNASIONAL EXPRESS SDN. BHD.
Co. No. 327442-K
BORANG PERMOHONAN CUTI

0046237

Nama .....
Jawatan .....
No. Pekerja .....
Jabatan .....

Jenis Cuti	Dari	Ke	Jumlah Hari
Cuti Tahun			
Cuti Perkahwinan			
Cuti Bersalin			
Cuti Pemeriksaan			
Cuti Ihsan			
Cuti Tanpa Gaji			
Cuti Sakit			

Tujuan Bercuti .....

Alamat Semasa Bercuti .....

No. Telefon Untuk Dihubungi .....
Saya akan mula bertugas pada .....
Pegawai Yang Mengambilalih Tugas .....

Tandatangan Pemohon ..... Tarikh .....

Kegunaan Pejabat Sahaja
Cuti Diluluskan/Tidak Diluluskan Adalah Tertakluk kepada keperluan semasa dan baki cuti

Disokong ☐ Diluluskan ☐

Tidak Disokong ☐ Tidak Diluluskan ☐

....
Tandatangan Tandatangan
Ketua Jabatan Pengurus Besar/Ketua Eksek
Tarikh: Tarikh:

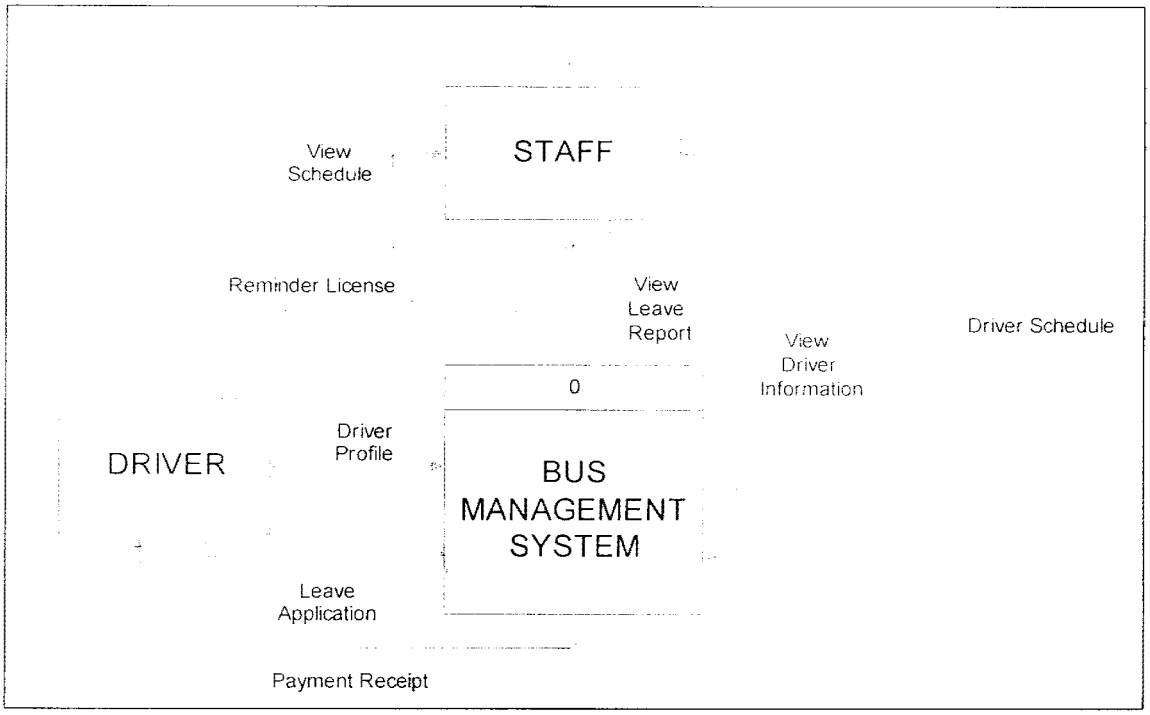
Rekod Cuti Tahun

Tahun Ini .....
Baki Tahun Lepas .....
Telah Diambil .....
(Termasuk Cuti Yang Dipohon)
Baki Cuti .....

Hari
Hari
Hari
Hari

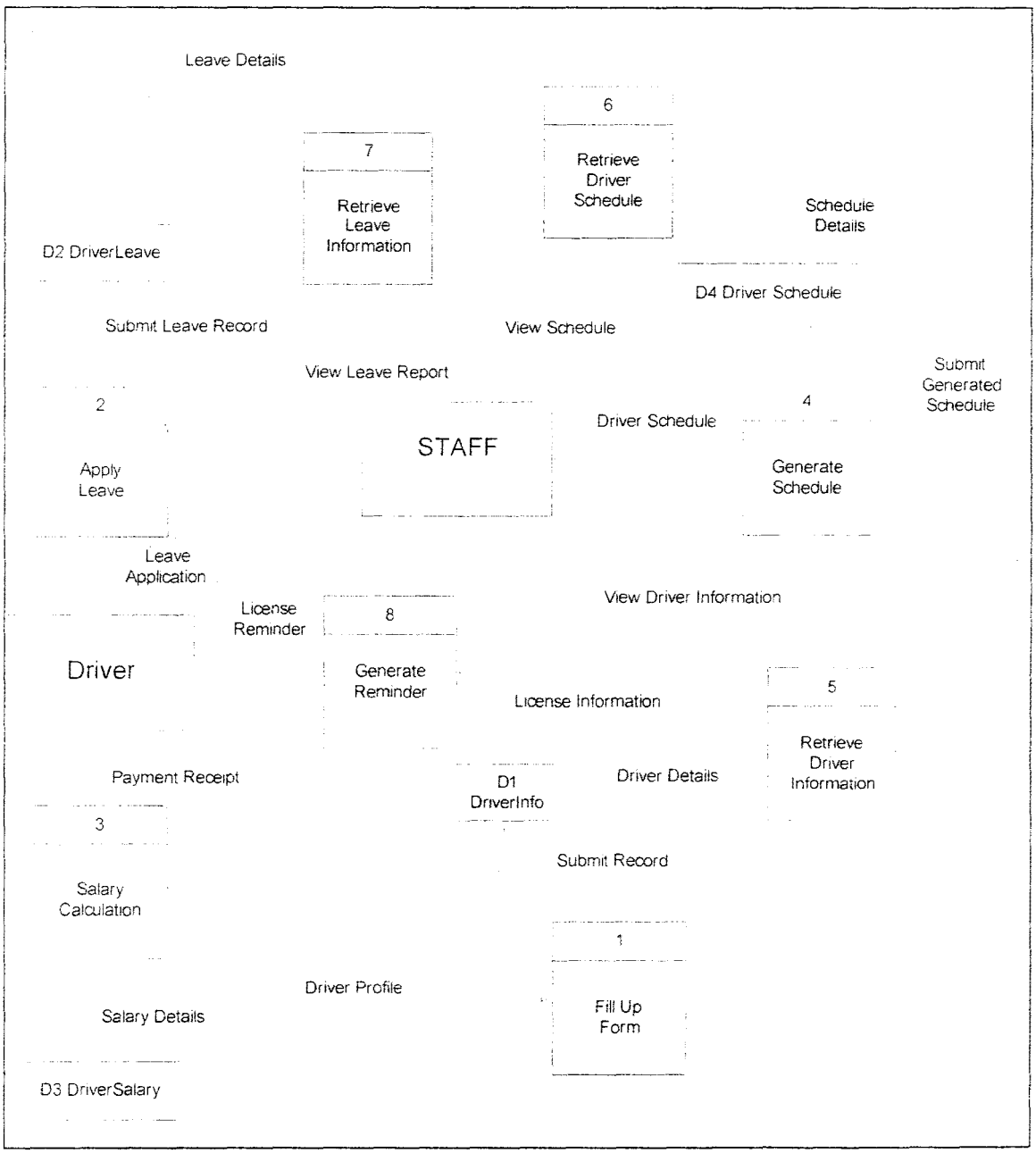
APPENDIX D

Context Diagram



APPENDIX E

Diagram 0



APPENDIX F.1

Data Dictionary for driverInfo Table

No	Field	Type	Length	Description
1.	d_id	Text	4	Driver ID that used as Primary key for driverInfo table.
2.	d_name	Text	30	Driver name
3.	d_ic	Text	12	Driver IC number(new)
4.	d_hireDate	Date	Medium Date	Driver hiring date
5.	d_add	Text	50	Driver address
6.	d_add1	Text	50	Official Address
7.	d_ic1	Text	12	Driver IC number(old)
8.	d_dob	Date	Medium Date	Driver birth date
9.	d_pob	Text	50	Place of birth
10.	d_phone	Text	10	Driver house phone number
11.	d_phone1	Text	10	Driver mobile phone number
12.	d_icColor	Text	10	The color of driver's IC
12.	d_nationality	Text	30	Driver nationality
13.	d_sex	Text	10	Driver Sex
14.	d_ age	Number	Long Integer	Driver Age
15.	d_race	Text	10	Driver Race
16.	d_religion	Text	10	Driver Religion
17.	d_post	Text	10	Position
18.	d_basicSalary	Number	Long Integer	Basic salary
19.	d_kwspNo	Text	5	KWSP Number
20.	d_incomeTaxNo	Text	5	Income Tax Number
21.	d_perkesoNo	Text	5	PERKESO Number
22.	d_busNo	Text	7	Bus number
23.	d_licenseNo	Text	6	Driver's license number
24.	d_licenseExpDate	Date	Medium Date	Driver license expiration date
25.	d_renewalDate	Date	Medium Date	Driver's license renewal date

APPENDIX F.2

Data Dictionary for driverLeave and driverSalary Table

No	Field	Type	Length	Description
1.	l_leaveNo	Text	4	Leave number that used as Primary key for driverSalary table.
2.	l_startDate	Date	Medium Date	Date driver start their leave
3.	l_endDate	Date	Medium Date	Date driver end their leave
4.	l_leaveType	Text	20	Type of leave that driver apply
5.	l_reason	Text	50	Reason for leave application
6.	l_driverID	Text	4	Driver ID that used as foreign key for driverLeave table
7.	l_duration	Number	Long Integer	Duration leave that applied

driverSalary Table

No	Field	Type	Length	Description
1.	s_salaryCode	Text	4	Salary Code that used as Primary key for driverSalary table.
2.	s_month	Text	10	Monthly salary
3.	s_driverID	Text	4	Driver ID that used as foreign key for driverSalary table
4.	s_basicSalary	Currency	Currency	Driver basic salary that paid every month without allowance
5.	s_totalSalary	Currency	Currency	Total salary that paid every month with additional allowance
6.	s_salaryDate	Date	Medium Date	Date that the salary is calculated
7.	s_TAPM	Currency	Currency	Total Allowance per Month
8.	s_TAPD	Currency	Currency	Total Allowance per Day
9.	s_allowanceDate	Date	Medium Date	Allowance date that used as foreign key for driverSalary table

APPENDIX F.3

Data Dictionary for driverAllowance Table

No	Field	Type	Length	Description
1.	AllNo	Auto Number	Long Integer	Primary key for table DriverAllowance
2.	d_id	Text	4	Foreign key for table DriverAllowance
3.	d_name	Text	30	Driver Name
4.	date	Number	Long Integer	Day of the driver trip
5.	month	Number	Long Integer	Month where the allowance is calculated
6.	TotalAll	Number	Long Integer	Total of the allowance
7.	drivertype	Text	10	Type of Driver- Single or Partner
8.	offDay	Text	10	The day when the driver is not work
9.	pubHoliday	Text	10	Status-Yes if that day is Public Holiday and No if the day is not public holiday
10.	trip	Number	Long Integer	Number of trip
11.	quality	Text	10	Status-Yes if there is no accident and No if any accident or damage occur
12.	cleanBus	Number	Long Integer	Bus Cleaning as extra work.
13.	specCase	Number	Long Integer	Additional payment
14.	notes	Text	30	Notes
15.	dutycode	Text	10	Destination code. e.g: KTN-KL

APPENDIX F.4

Data Dictionary for driverChild and driverWife Table

No	Field	Type	Length	Description
1.	d_childID	Auto Number	Long Integer	Primary key for table driverChild
2.	dc_childName	Text	30	Name of driver's children
3.	dc_age	Number	Long Integer	Age of driver's children
4.	dc_sex	Text	10	Sex of driver's children
5.	dc_dob	Date	Medium date	Date of birth
6.	dc_icNo	Text	12	IC number or certificate of birth
7.	d_id	Text	4	Driver ID is foreign key for this table
8.	d_noOfchild	Number	Long Integer	No of children

driverWife Table

No	Field	Type	Length	Description
1.	d_wifeID	Auto Number	Long Integer	Primary key for table driverWife
2.	dw_name	Text	30	Name of Driver's wife
3.	dw_noic	Text	12	IC number
4.	dw_dob	Date	Medium Date	Date of Birth
5.	dw_empoyer	Text	50	Employer name and address
6.	dw_post	Text	10	Position
7.	dw_incometaxNo	Text	5	Income tax number
8.	dw_phone	Text	10	Phone Number
9.	d_id	Text	4	Driver ID is foreign key for this table

APPENDIX F.5

Data Dictionary for driverCourse and driverExperience Table

No	Field	Type	Length	Description
1.	d_courseID	AutoNumber	Long Integer	Primary key for table driverCourse
2.	dco_type	Text	30	Type of Course that the driver attend
3.	dco_attendDate	Date	Medium date	Date of the course that the driver attend
4.	dco_duration	Number	Long Integer	The duration of the course
5.	dco_organizer	Text	30	The name of the course organizer
6.	d_id	Text	4	Foreign key for this table

driverExperience Table

No	Field	Type	Length	Description
1.	d_expeID	AutoNumber	Long Integer	Primary key for table driverExperience
2.	de_compName	Text	30	Name of previous company
3.	de_duration	Number	Long Integer	Duration of working in previous company
4.	de_lastSalary	Number	Double	Salary in previous company
5.	de_position	Text	10	Position in previous company
6.	d_id	Text	4	Foreign key for this table

APPENDIX F.6

Data Dictionary for driverFamily and driverKnowledge Table

No	Field	Type	Length	Description
1.	d_famID	Auto Number	Long Integer	Primary key for table driverExperience
2.	df_fName	Text	30	Father's name
3.	df_fJob	Text	30	Father's job
4.	df_mName	Text	30	Mother's name
5.	df_mJob	Text	30	Mother's job
6.	df_fInlawname	Text	30	Name of Father's in law
7.	df_mInlawname	Text	30	Name of Mother's in law
8.	df_gfname	Text	30	Grandfather's name
9.	df_gfname1	Text	30	Grandfather's name
10.	df_gmname	Text	30	Grandmother's name
11	df_gmname1	Text	30	Grandmother's name
12	d_id	Text	4	Foreign key for this table

driverKnowledge Table

No	Field	Type	Length	Description
1.	d_knowID	Auto Number	Long Integer	Primary key for table driverExperience
2.	d_id	Text	4	Foreign key for this table
3.	dk_compKnow	Text	30	Computer Knowledge
4.	dk_language	Text	15	Language
5.	dk_writelevel	Text	15	Language level in writing
6.	dk_speaklevel	Text	15	Language level in speaking

APPENDIX F.7

Data Dictionary for driverSchool and driverSibling Table

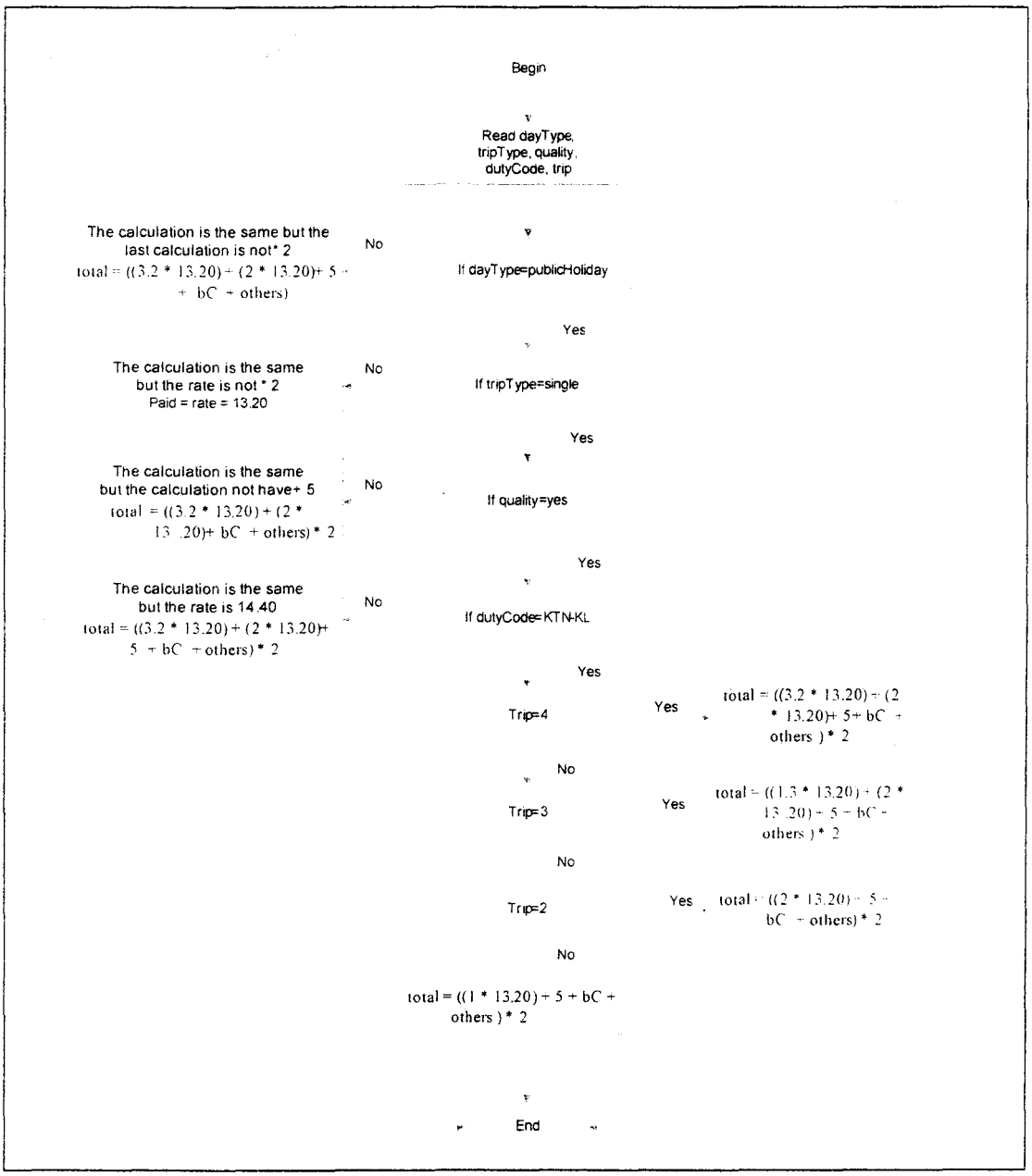
No	Field	Type	Length	Description
1.	d_schoolID	Auto Number	Long Integer	Primary key for table driverSchool
2.	dsh_no	Number	Long Integer	Number of school
3.	dsh_name	Text	30	Name of school
4.	dsh_startdate	Date	Medium date	Start Study
5.	dsh_stopdate	Date	Medium date	End Study
6.	dsh_duration	Number	Long Integer	Duration of study
7.	dsh_qualification	Text	30	Qualification
8.	d_id	Text	4	Foreign key for this table

driveSibling Table

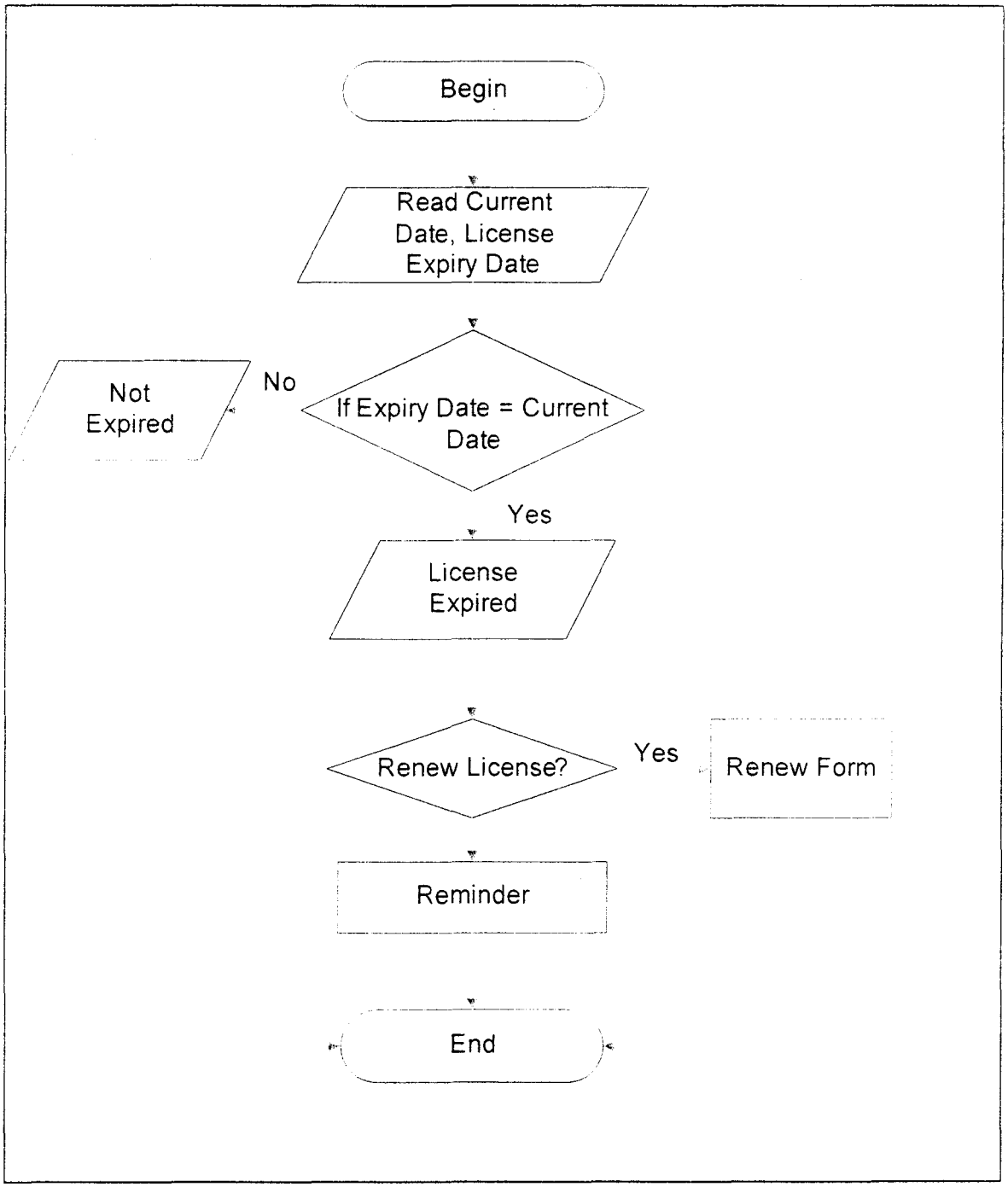
No	Field	Type	Length	Description
1.	df_SibID	Auto Number	Long Integer	Primary key for table driverSibling
2.	ds_no	Number	Long Integer	Number of sibling
3.	ds_name	Tex t	30	Name
4.	ds_age	Number	Long Integer	Age
5.	ds_sex	Text	10	Sex
6.	d_id	Text	4	Foreign key for this table

APPENDIX G

Flow chart for calculate the allowance



Flow chart for reminder process



APPENDIX H

Sample of Manual Schedule

	KTN		KL		KL		KTN
Hari	Ms Btolak	Pemandu	Ms Tiba	Hari	Ms Btolak	Pemandu	Ms Tiba
7/2/2005	8:00	AB	12.00PM	7/2/2005	8:00	YZ	12.00PM
ISNIN	9:00	CD	1:00 PM	ISNIN	9:00	WX	1:00 PM
	10:00	EF	2:00 PM		10:00	UV	2:00 PM
	11:00	GH	3:00 PM		11:00	ST	3:00 PM
	12:00	IJ	4:00 PM		12:00	QR	4:00 PM
	1:00PM	YZ	5:00 PM		1:00PM	AB	5:00 PM
	2:00PM	WX	6:00 PM		2:00PM	CD	6:00 PM
	3:00PM	UV	7:00 PM		3:00PM	EF	7:00 PM
	4:00PM	ST	8:00 PM		4:00PM	GH	8:00 PM
	5:00PM	QR	9:00 PM		5:00PM	IJ	9:00 PM
	6:00PM	AB	10:00PM		6:00PM	YZ	10:00PM
	7:00PM	CD	11:00PM		7:00PM	WX	11:00PM
	8:00PM	EF	12:00AM		8:00PM	UV	12:00AM
	9:00PM	GH	1.00 AM		9:00PM	ST	1.00 AM
	10:00PM	IJ	2.00 AM		10:00PM	QR	2.00 AM
	11:00PM	YZ	3.00 AM		11:00PM	AB	3.00 AM
	12:00AM	WX	4.00 AM		12:00AM	CD	4.00 AM

	KTN		KL		KL		KTN
Hari	Ms Btolak	Pemandu	Ms Tiba	Hari	Ms Btolak	Pemandu	Ms Tiba
8/2/2005	8:00	UV	12.00PM	8/2/2005	8:00	EF	12.00PM
SELASA	9:00	ST	1:00 PM	SELASA	9:00	GH	1:00 PM
	10:00	QR	2:00 PM		10:00	IJ	2:00 PM
	11:00	YZ	3:00 PM		11:00	AB	3:00 PM
	12:00	WX	4:00 PM		12:00	CD	4:00 PM
	1:00 PM	EF	5:00 PM		1:00 PM	UV	5:00 PM
	2:00 PM	GH	6:00 PM		2:00 PM	ST	6:00 PM
	3:00 PM	IJ	7:00 PM		3:00 PM	QR	7:00 PM
	4:00 PM	AB	8:00 PM		4:00 PM	YZ	8:00 PM
	5:00 PM	CD	9:00 PM		5:00 PM	WX	9:00 PM
	6:00 PM	UV	10:00PM		6:00 PM	EF	10:00PM
	7:00 PM	ST	11:00PM		7:00 PM	GH	11:00PM
	8:00 PM	QR	12:00AM		8:00 PM	IJ	12:00AM
	9:00 PM	YZ	1.00 AM		9:00 PM	AB	1.00 AM
	10:00PM	WX	2.00 AM		10:00PM	CD	2.00 AM
	11:00PM	EF	3.00 AM		11:00PM	UV	3.00 AM
	12:00AM	GH	4.00 AM		12:00AM	ST	4.00 AM

	KTN		KL		KL		KTN
Hari	Ms Btolak	Pemandu	Ms Tiba	Hari	Ms Btolak	Pemandu	Ms Tiba
9/2/2005	8:00	IJ	12.00PM	9/2/2005	8:00	QR	12.00PM
RABU	9:00	AB	1:00 PM	RABU	9:00	YZ	1:00 PM
	10:00	CD	2:00 PM		10:00	WX	2:00 PM
	11:00	EF	3:00 PM		11:00	UV	3:00 PM
	12:00	GH	4:00 PM		12:00	ST	4:00 PM
	1:00PM	QR	5:00 PM		1:00PM	IJ	5:00 PM
	2:00PM	YZ	6:00 PM		2:00PM	AB	6:00 PM
	3:00PM	WX	7:00 PM		3:00PM	CD	7:00 PM
	4:00PM	UV	8:00 PM		4:00PM	EF	8:00 PM
	5:00PM	ST	9:00 PM		5:00PM	GH	9:00 PM
	6:00PM	IJ	10:00PM		6:00PM	QR	10:00PM
	7:00PM	AB	11:00PM		7:00PM	YZ	11:00PM
	8:00PM	CD	12:00AM		8:00PM	WX	12:00AM
	9:00PM	EF	1.00 AM		9:00PM	UV	1.00 AM
	10:00PM	GH	2.00 AM		10:00PM	ST	2.00 AM
	11:00PM	IJ	3.00 AM		11:00PM	QR	3.00 AM
	12:00AM	AB	4.00 AM		12:00AM	YZ	4.00 AM

	KTN		KL		KL		KTN
Hari	Ms Btolak	Pemandu	Ms Tiba	Hari	Ms Btolak	Pemandu	Ms Tiba
10/2/2005	8:00	WX	12.00PM	10/2/2005	8:00	CD	12.00PM
KHAMIS	9:00	UV	1:00 PM	KHAMIS	9:00	EF	1:00 PM
	10:00	ST	2:00 PM		10:00	GH	2:00 PM
	11:00	QR	3:00 PM		11:00	IJ	3:00 PM
	12:00	YZ	4:00 PM		12:00	AB	4:00 PM
	1:00PM	CD	5:00 PM		1:00PM	WX	5:00 PM
	2:00PM	EF	6:00 PM		2:00PM	UV	6:00 PM
	3:00PM	GH	7:00 PM		3:00PM	ST	7:00 PM
	4:00PM	IJ	8:00 PM		4:00PM	QR	8:00 PM
	5:00PM	AB	9:00 PM		5:00PM	YZ	9:00 PM
	6:00PM	WX	10:00PM		6:00PM	CD	10:00PM
	7:00PM	UV	11:00PM		7:00PM	EF	11:00PM
	8:00PM	ST	12:00AM		8:00PM	GH	12:00AM
	9:00PM	QR	1.00 AM		9:00PM	IJ	1.00 AM
	10:00PM	YZ	2.00 AM		10:00PM	AB	2.00 AM
	11:00PM	CD	3.00 AM		11:00PM	WX	3.00 AM
	12:00AM	EF	4.00 AM		12:00AM	UV	4.00 AM

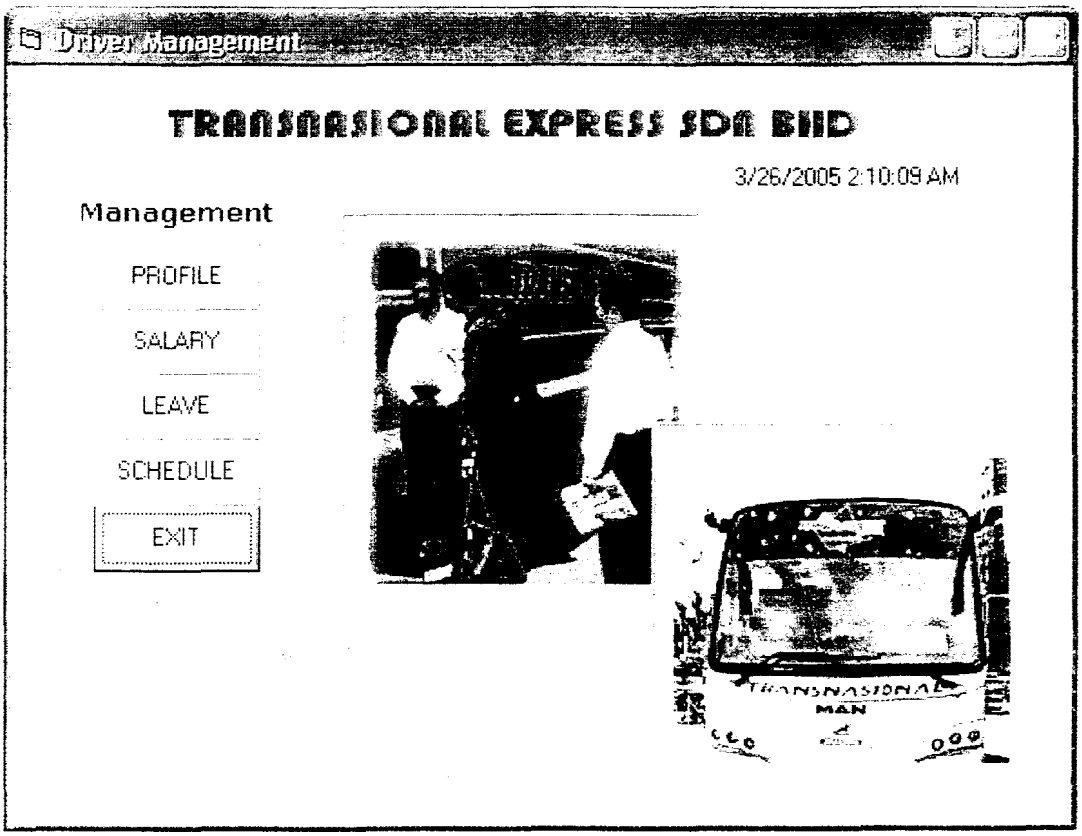
	KTN		KL		KL		KTN
Hari	Ms Btolak	Pemandu	Ms Tiba	Hari	Ms Btolak	Pemandu	Ms Tiba
11/2/2005	8:00	ST	12.00PM	11/2/2005	8:00	GH	12.00PM
JUMAAT	9:00	QR	1:00 PM	JUMAAT	9:00	IJ	1:00 PM
	10:00	YZ	2:00 PM		10:00	AB	2:00 PM
	11:00	WX	3:00 PM		11:00	CD	3:00 PM
	12:00	UV	4:00 PM		12:00	EF	4:00 PM
	1:00 PM	GH	5:00 PM		1:00 PM	ST	5:00 PM
	2:00 PM	IJ	6:00 PM		2:00 PM	QR	6:00 PM
	3:00 PM	AB	7:00 PM		3:00 PM	YZ	7:00 PM
	4:00 PM	CD	8:00 PM		4:00 PM	WX	8:00 PM
	5:00 PM	EF	9:00 PM		5:00 PM	UV	9:00 PM
	6:00 PM	ST	10:00PM		6:00 PM	GH	10:00PM
	7:00 PM	QR	11:00PM		7:00 PM	IJ	11:00PM
	8:00 PM	YZ	12:00AM		8:00 PM	AB	12:00AM
	9:00 PM	WX	1.00 AM		9:00 PM	CD	1.00 AM
	10:00PM	UV	2.00 AM		10:00PM	EF	2.00 AM
	11:00PM	GH	3.00 AM		11:00PM	ST	3.00 AM
	12:00AM	IJ	4.00 AM		12:00AM	QR	4.00 AM

	KTN		KL		KL		KTN
Hari	Ms Btolak	Pemandu	Ms Tiba	Hari	Ms Btolak	Pemandu	Ms Tiba
12/2/2005	8:00	AB	12.00PM	12/2/2005	8:00	YZ	12.00PM
SABTU	9:00	CD	1:00 PM	SABTU	9:00	WX	1:00 PM
	10:00	EF	2:00 PM		10:00	UV	2:00 PM
	11:00	GH	3:00 PM		11:00	ST	3:00 PM
	12:00	IJ	4:00 PM		12:00	QR	4:00 PM
	1:00 PM	YZ	5:00 PM		1:00 PM	AB	5:00 PM
	2:00 PM	WX	6:00 PM		2:00 PM	CD	6:00 PM
	3:00 PM	UV	7:00 PM		3:00 PM	EF	7:00 PM
	4:00 PM	ST	8:00 PM		4:00 PM	GH	8:00 PM
	5:00 PM	QR	9:00 PM		5:00 PM	IJ	9:00 PM
	6:00 PM	AB	10:00PM		6:00 PM	YZ	10:00PM
	7:00 PM	CD	11:00PM		7:00 PM	WX	11:00PM
	8:00 PM	EF	12:00AM		8:00 PM	UV	12:00AM
	9:00 PM	GH	1.00 AM		9:00 PM	ST	1.00 AM
	10:00PM	IJ	2.00 AM		10:00PM	QR	2.00 AM
	11:00PM	YZ	3.00 AM		11:00PM	AB	3.00 AM
	12:00AM	WX	4.00 AM		12:00AM	CD	4.00 AM

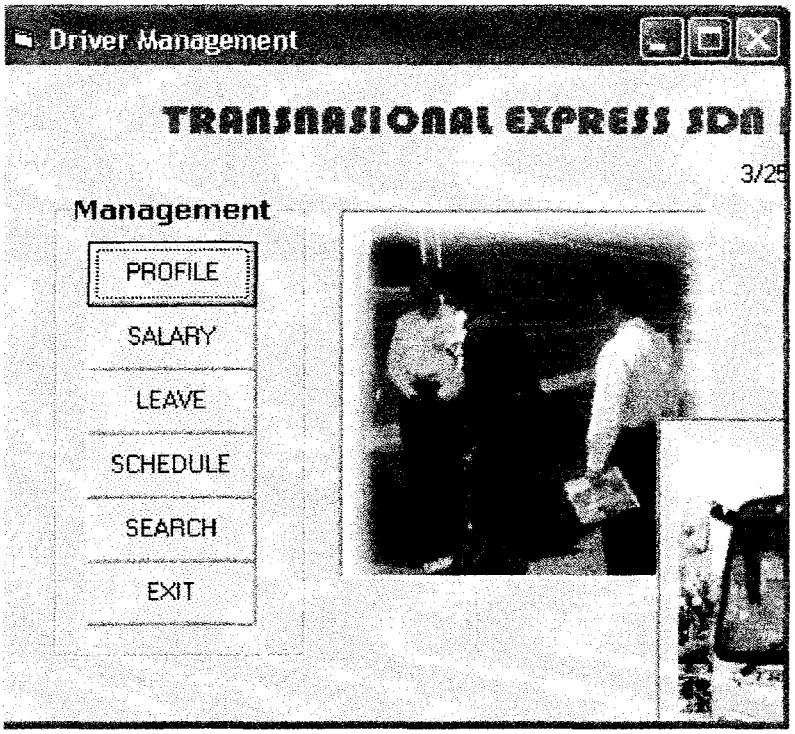
	KTN		KL		KL		KTN
Hari	Ms Btolak	Pemandu	Ms Tiba	Hari	Ms Btolak	Pemandu	Ms Tiba
13/2/2005	8:00	UV	12.00PM	13/2/2005	8:00	EF	12.00PM
AHAD	9:00	ST	1:00 PM	AHAD	9:00	GH	1:00 PM
	10:00	QR	2:00 PM		10:00	IJ	2:00 PM
	11:00	YZ	3:00 PM		11:00	AB	3:00 PM
	12:00	WX	4:00 PM		12:00	CD	4:00 PM
	1:00 PM	EF	5:00 PM		1:00 PM	UV	5:00 PM
	2:00 PM	GH	6:00 PM		2:00 PM	ST	6:00 PM
	3:00 PM	IJ	7:00 PM		3:00 PM	QR	7:00 PM
	4:00 PM	AB	8:00 PM		4:00 PM	YZ	8:00 PM
	5:00 PM	CD	9:00 PM		5:00 PM	WX	9:00 PM
	6:00 PM	UV	10:00PM		6:00 PM	EF	10:00PM
	7:00 PM	ST	11:00PM		7:00 PM	GH	11:00PM
	8:00 PM	QR	12:00AM		8:00 PM	IJ	12:00AM
	9:00 PM	YZ	1.00 AM		9:00 PM	AB	1.00 AM
	10:00 PM	WX	2.00 AM		10:00PM	CD	2.00 AM
	11:00 PM	EF	3.00 AM		11:00PM	UV	3.00 AM
	12:00 AM	GH	4.00 AM		12:00AM	ST	4.00 AM

APPENDIX I

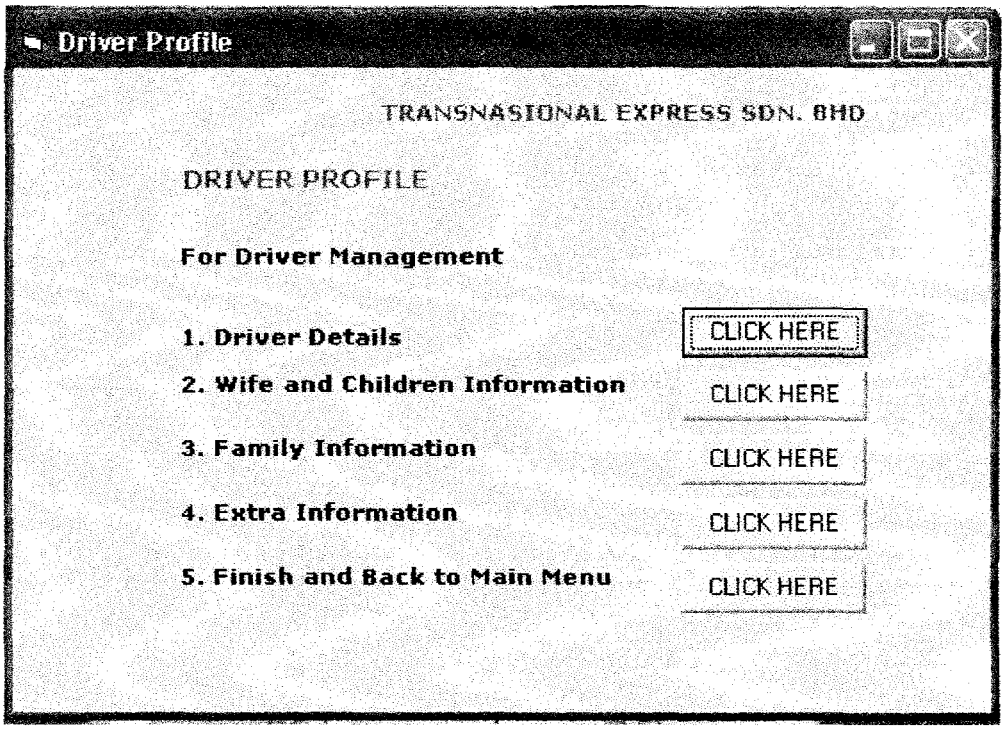
USER MANUAL



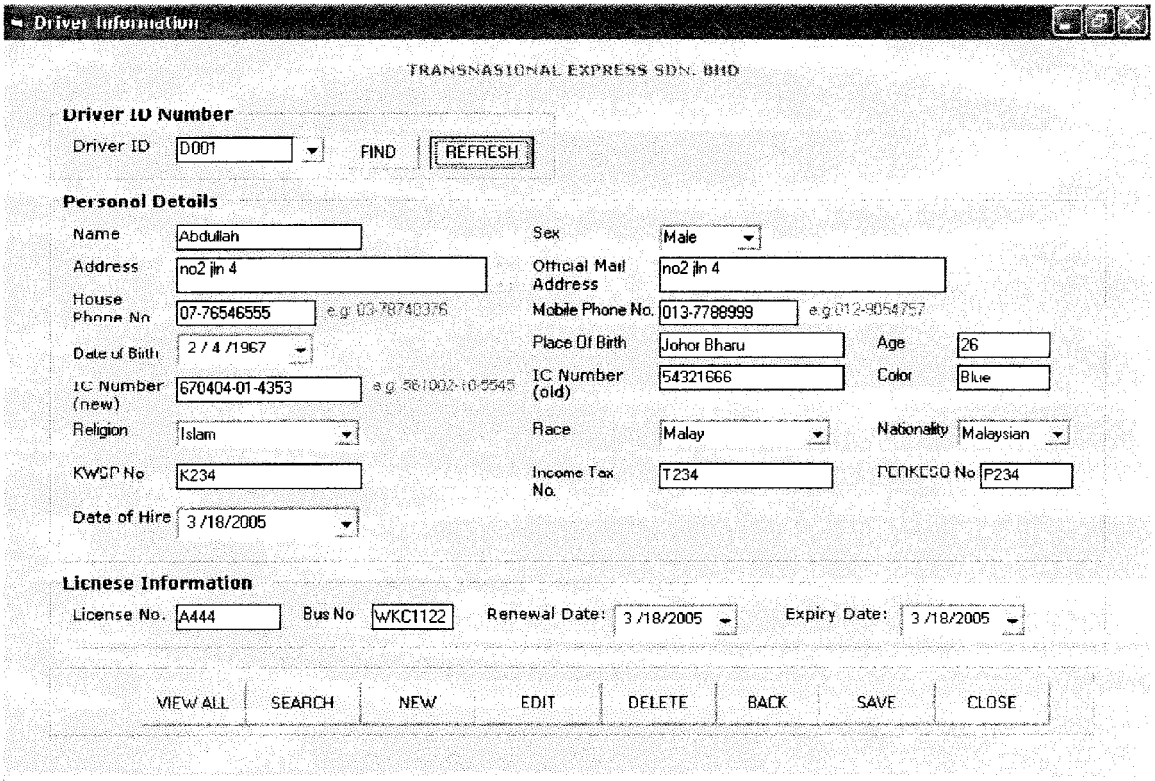
Main Page for Bus Management System



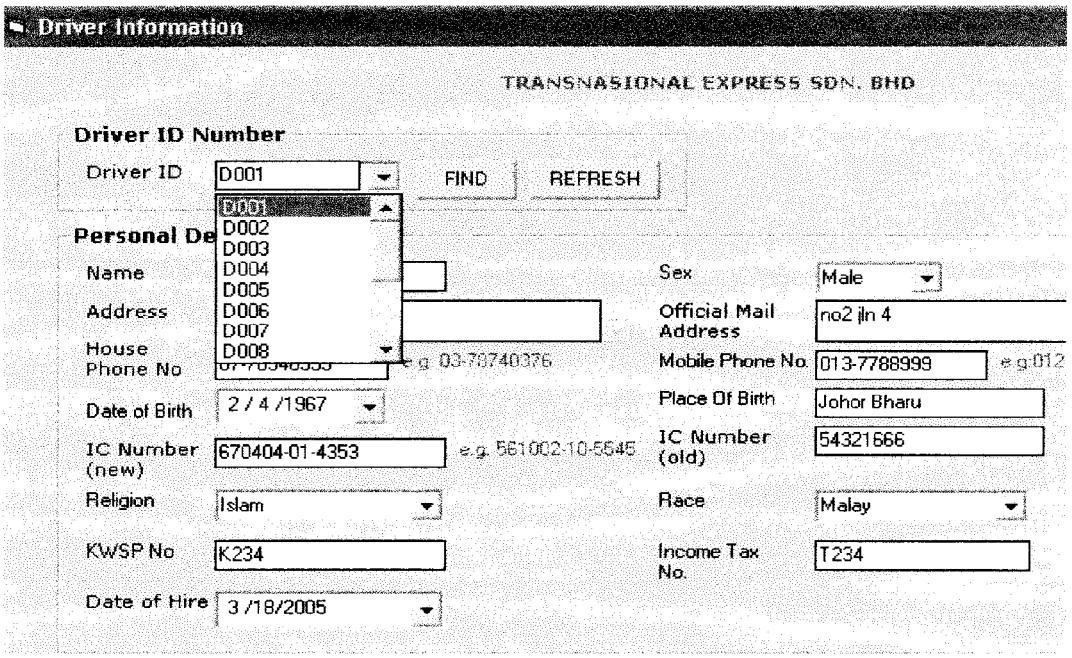
Click 'PROFILE' button



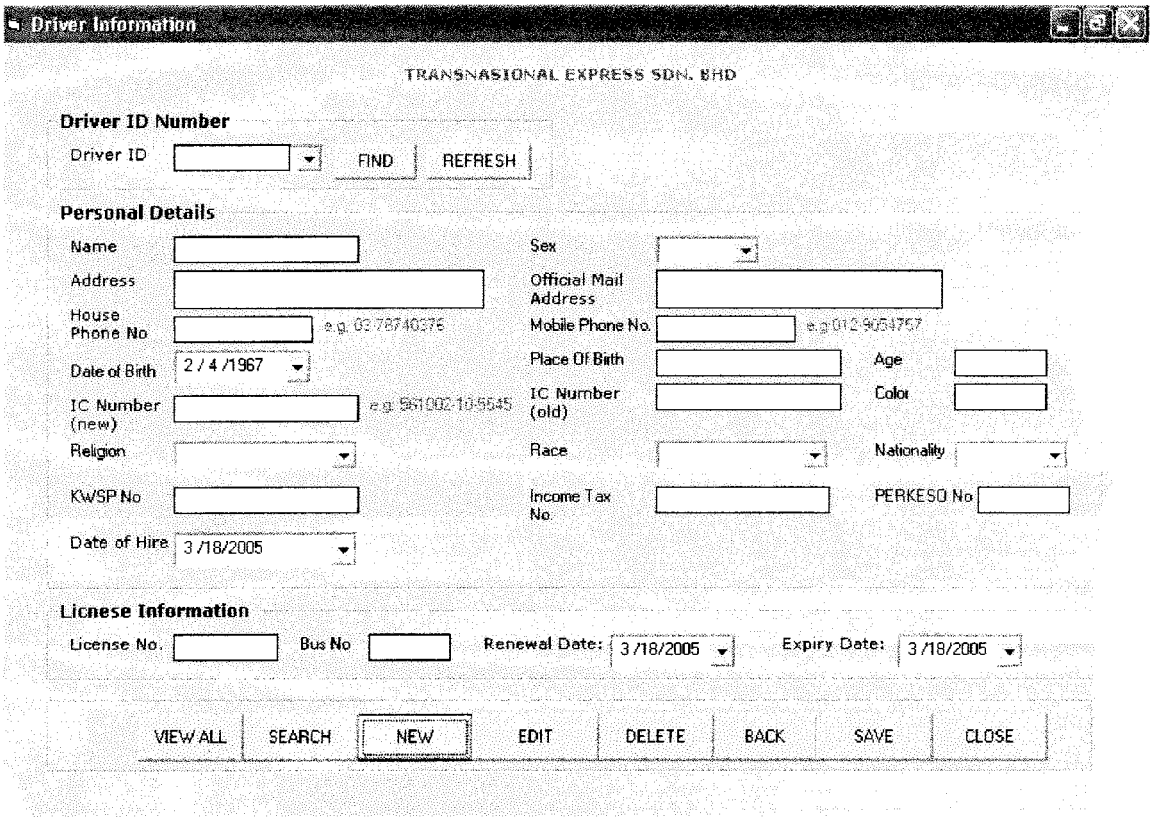
CLICK HERE at Driver Details to view driver information



Driver information is displayed



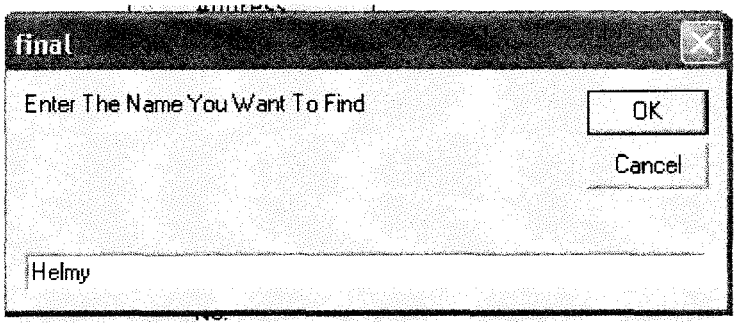
Choose driver ID then click 'FIND' to search the details of particular driver.



1. Click 'New' to insert new driver information. Fill up the form and click 'SAVE' button. Confirmation that the data has been save is displayed in message box.

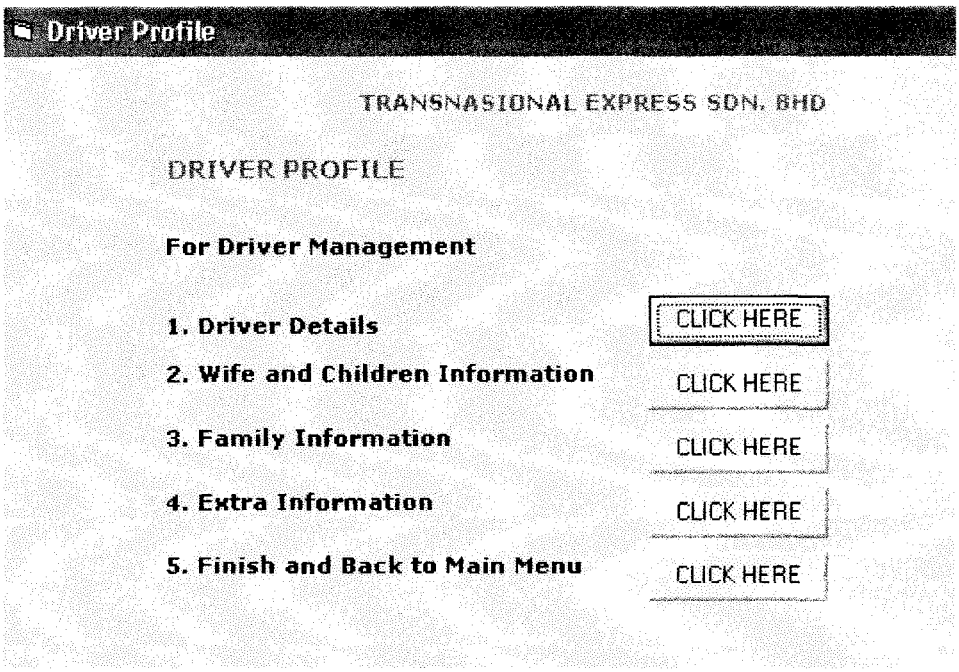
2. Click 'EDIT' button to edit the driver information, then choose driver ID that want to edit. Click 'SAVE' button to save the data in the database.

3. Click 'SEARCH' button to search driver information. Enter the name of driver that wants to search, and then click OK. All the information about the driver will be displayed.



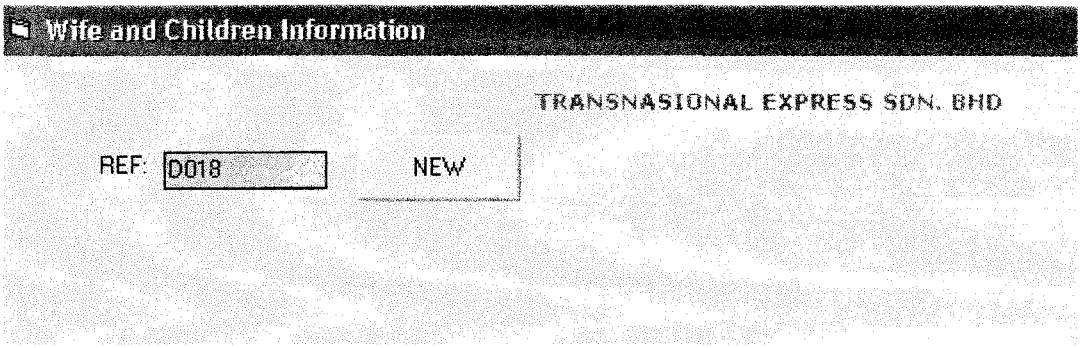
4. Click 'DELETE' button to delete the record of the driver, if required.

5. Click 'BACK' button to go to the previous page

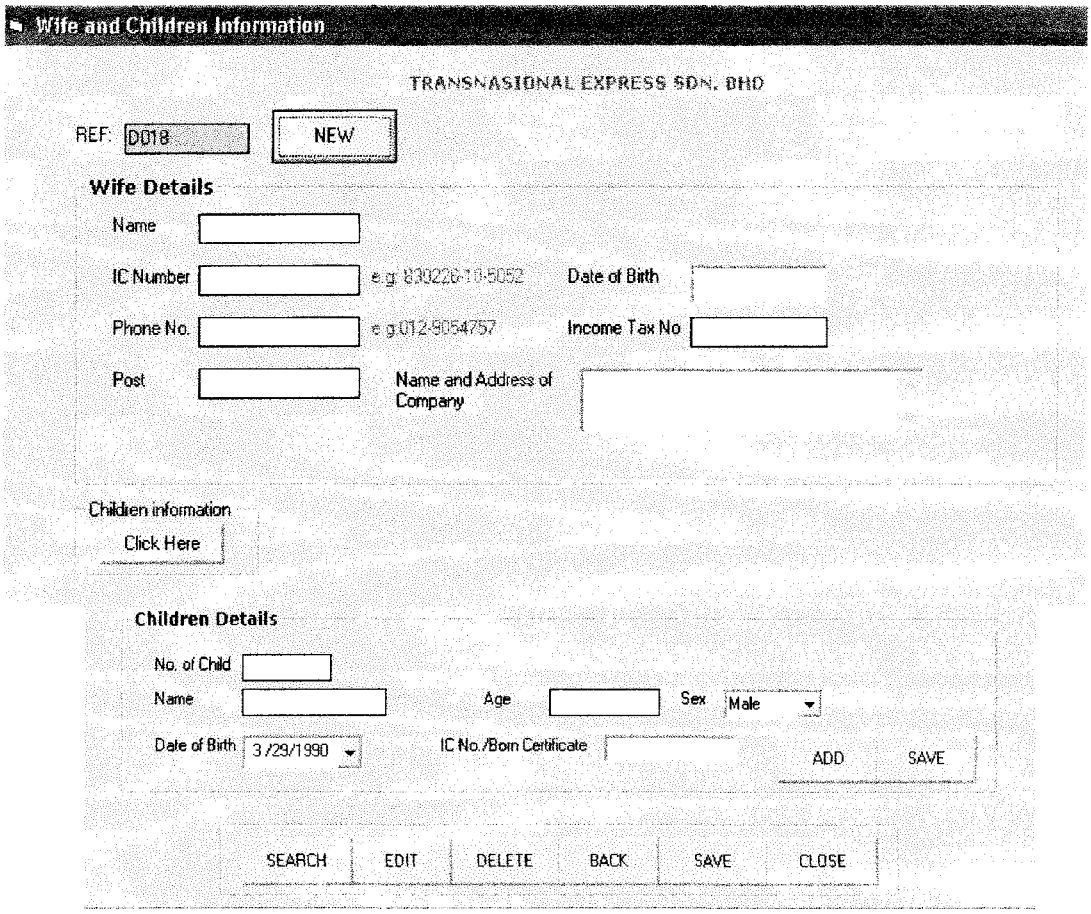


6. Click the button to enter the wife and children information page. The function that included in this page is same with driver profile

7. When new driver is added, the driver ID is bringing forward to the next page as REF number.

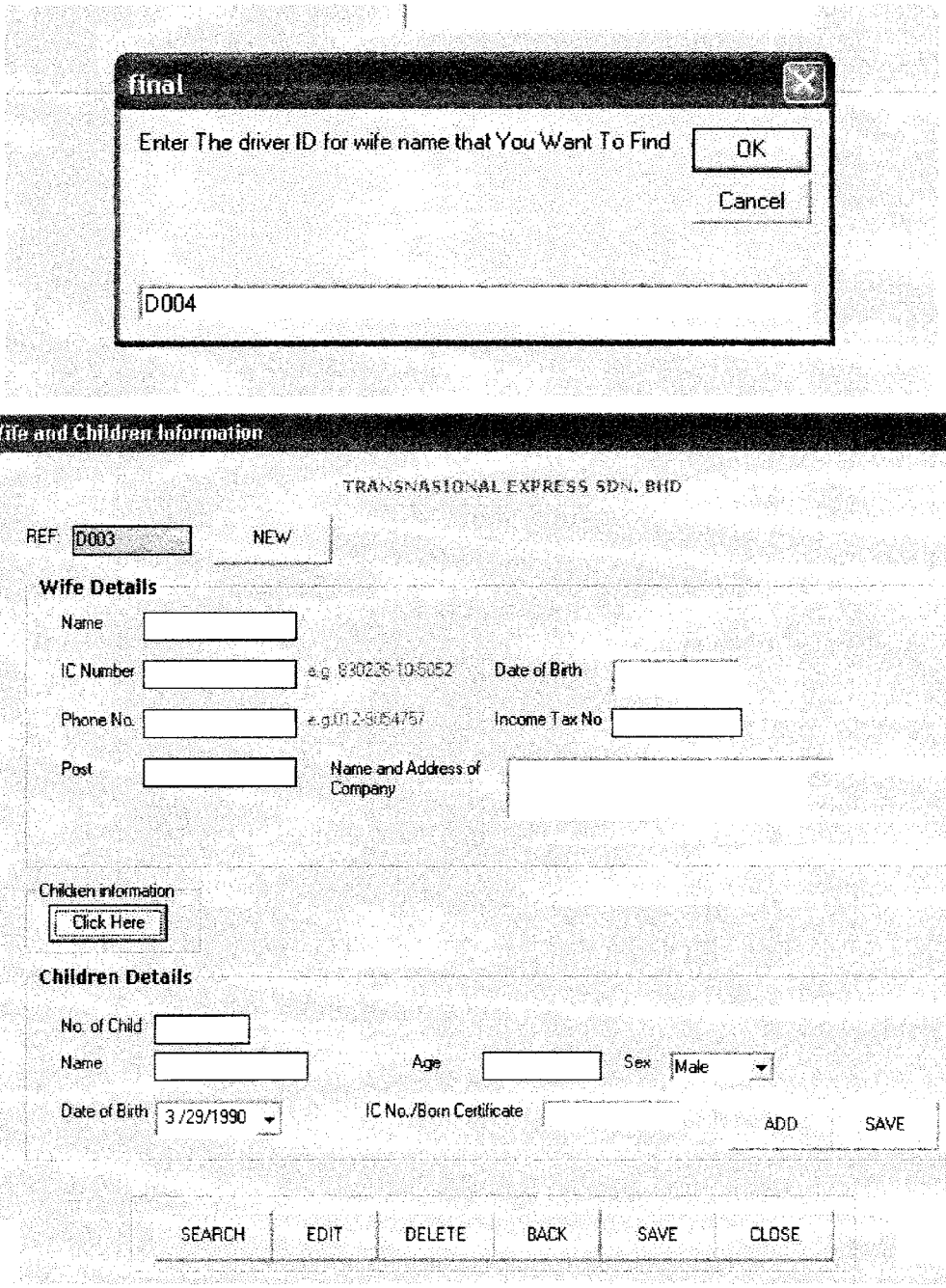


8. New form is displayed when the 'NEW' button is clicked. Fill in the form then 'Click Here' to enter children information

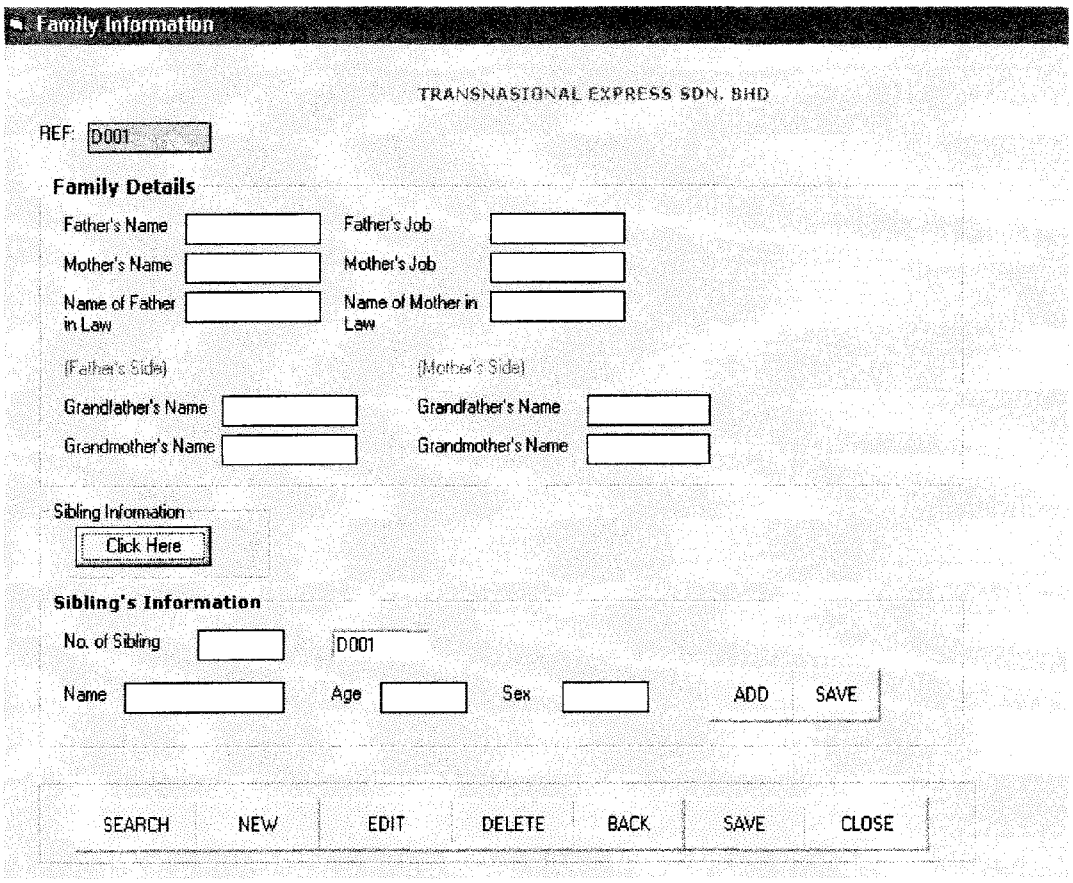


9. After fill in the children information, click 'ADD' button then click 'SAVE' button.
10. Click 'SAVE' button below to save driver's wife information.

11. To edit wife information, click 'SEARCH' button then click 'EDIT' button. Then the information about the driver's wife is displayed.

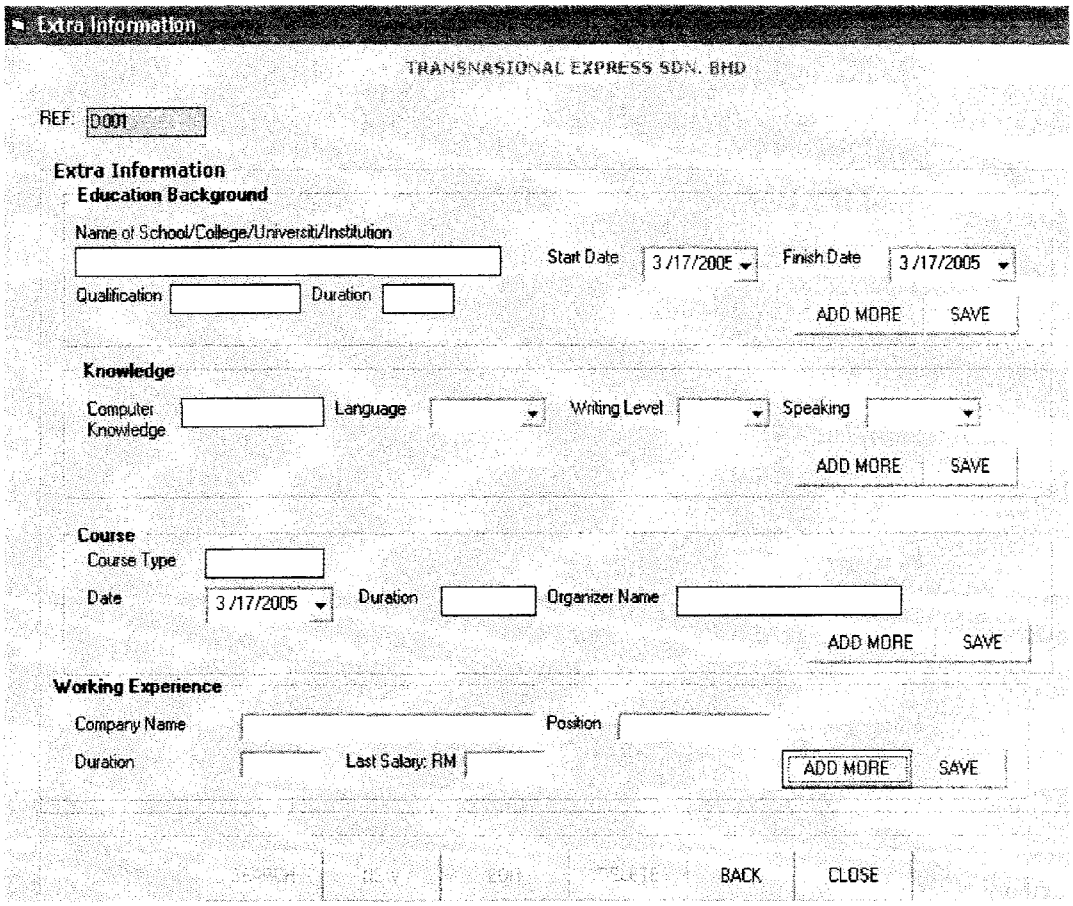


12. When click 'NEW' button, New form will displayed and when click here button, new blank form for children information is displayed. To add another children, click button 'ADD' then click 'SAVE'



13. When click here at the family details in the previous page, this page will be displayed. Fill in the form and to make the sibling's information appear, 'Click Here'. Then add button for add new data and click save button to save the data in database.

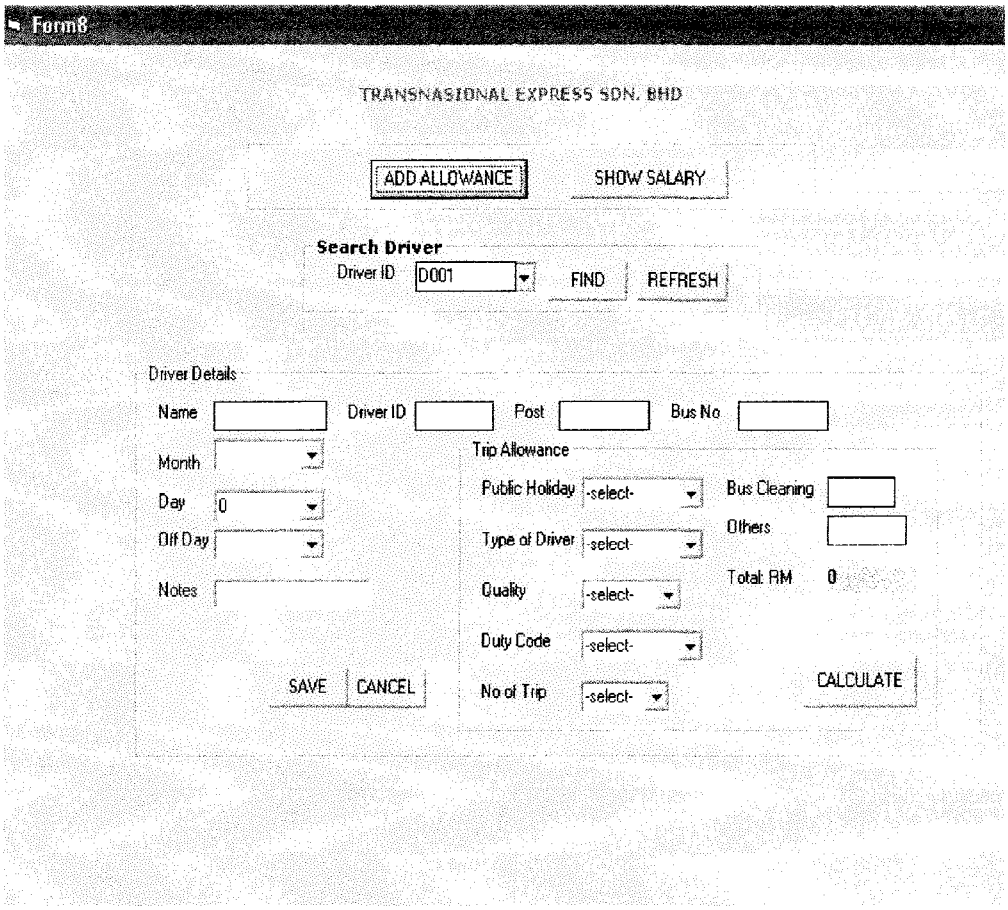
14. The same steps need to follow for the next page.



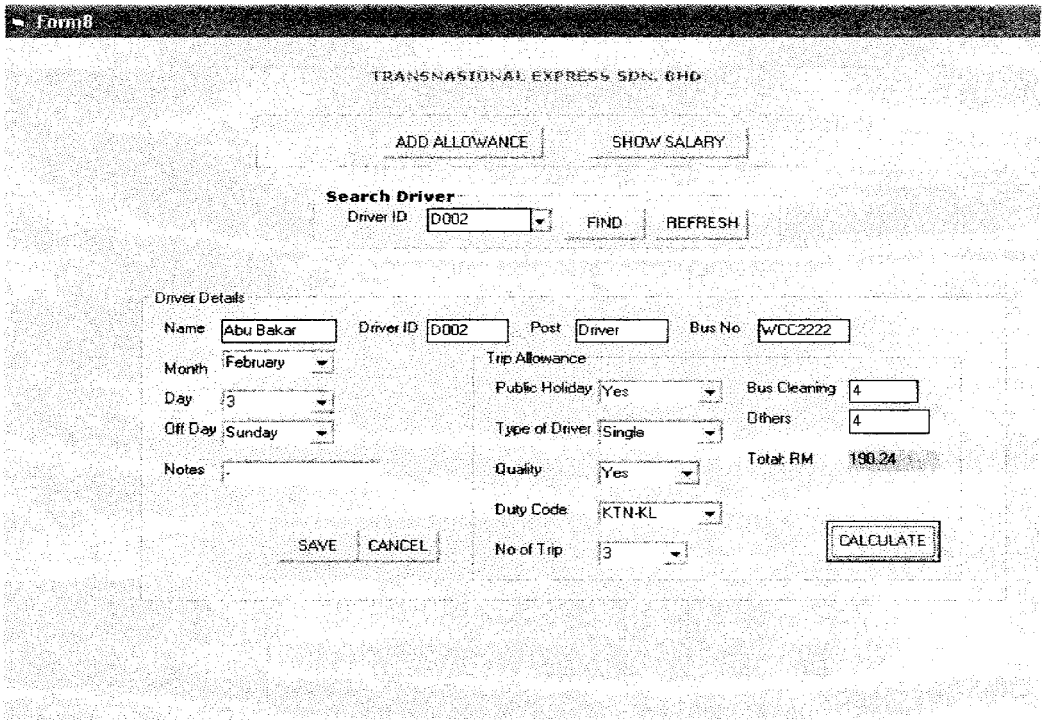
15. Click 'ADD MORE' to add more data in every part.

16. Click Salary button at the main menu. The form will displayed

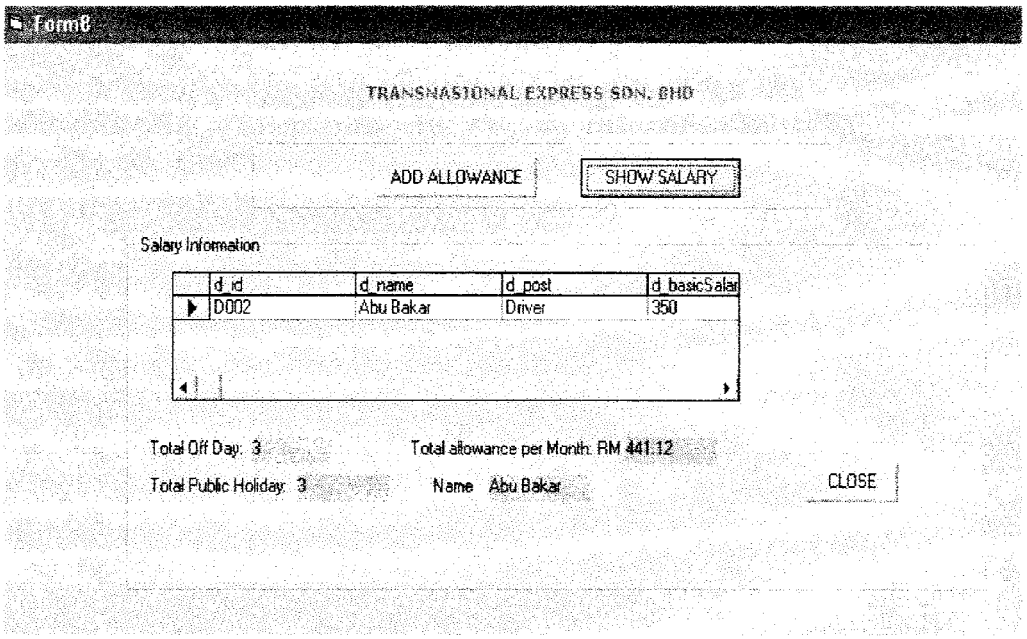
17. Click 'ADD ALLOWANCE' button to add daily allowance for driver



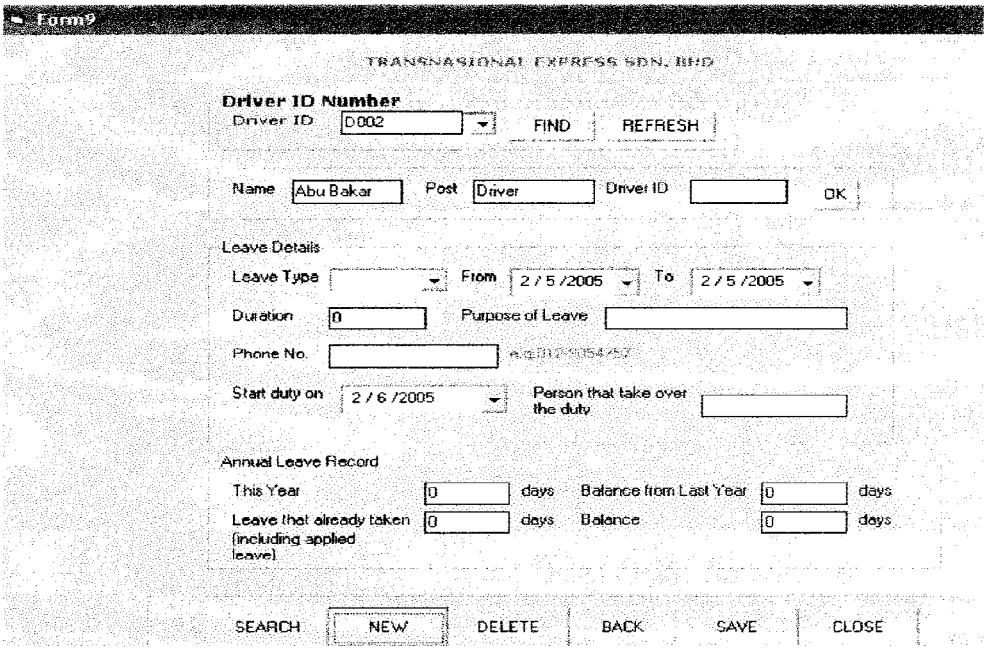
18. Select driver ID and click button FIND, the basic information about driver will be displayed. Fill in the form then select the required information to calculate the daily allowance. Click CALCULATE button, then the system will calculate the allowance base on the selection.



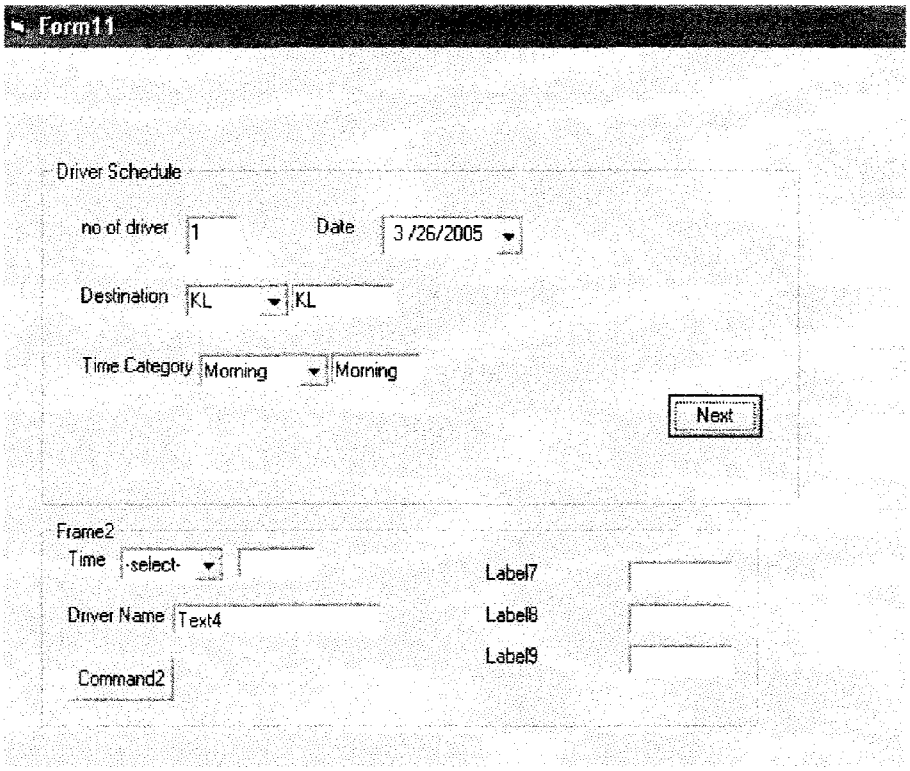
19. Click Show Salary to view the total allowance for the particular driver and list of the driver with their basic salary.



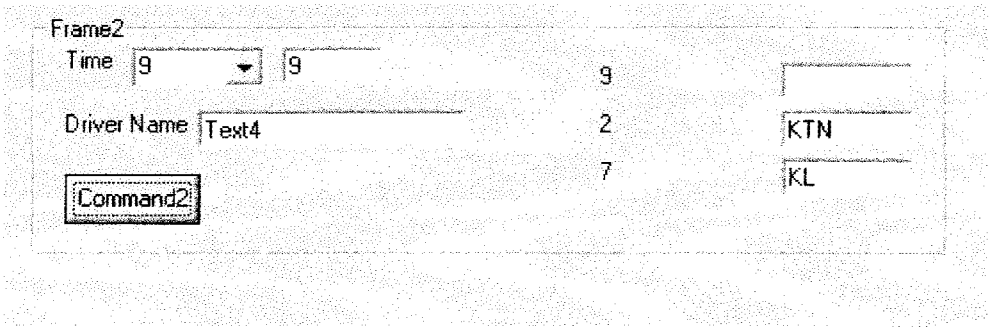
20. Click Leave button then this page will be displayed. Then, to add new driver leave information, select driver id and click 'FIND' button. The name of the driver will displayed and click 'NEW' button to add new leave information for selected driver. Fill in the form and click 'SAVE' button. The other button has the same function with the previous button in the previous page.



21. Click 'SCHEDULE' button then this page will be displayed. Click Next, then the part for enter time will be displayed.



22. When the time is selected, the next destination and it's time is displayed.



23 .Click Exit button at the main menu to exit the system.