# A-Level ICT 6 Project

# Contents

# Analysis

## *Situation*

This project is being designed for “Victor’s Garage” which is based in West Norwood, Lambeth. It is run by my uncle Victor who is very hands on with the day to day running of the business, and he has two employees who are his subordinates. Since they are only a few people working in the business, it has remained small for the past two years since it’s been formed. Victor believes that business has been good since they have managed to survive these past two couple of years. The amount of customers can range from 10 cars in 5 days to only 2 cars in a fortnight.

Currently, the system works to record all details of customers who come with their cars; it also records the problems with the cars as well as the employee(s) who worked on it in a record book. All these record books are stored on shelves and some at Victor’s home as archives so that they can be referred to in the future for legal reasons, for conducting reports, etc.

## *Overview of the problem & System limitations*

Victor’s garage deals with an average of 12 cars a week. The employees fill out the details of the customers, their cars, the problem or job with the vehicle, the employee details responsible for making sure the job is done and the amount paid is all recorded manually on a single sheet of paper for each transaction by Victor or by another employee (if permitted). A shortened copied version of this sheet, which includes the name of the employee, the customer details, date and the car repairing details is given to the customer as a receipt. Victor’s garage copy is then kept on file for later reference if needed. However, Victor feels that there are various imperfections which need to be eliminated and improvements that need to be applied:

**1st.** The amount of archives is increasing rapidly as Victor’s garage comes more popular, as a result paper is being misplaced and lost, and they are running out of places to store the paper where they can easily reach it. The employees are becoming so annoyed by this they are more likely to not fill out the information sheet to avoid dealing without the archives. As a result if a customer or legal representative wanted to see a specific transaction, Victor would face a discomfiting situation because they would be unable to do so.

**2nd.** The speed of which data is entered for the current system is discouraging the employees, information is being entered repeatedly and is encouraging mistakes and misrepresentation of data. The information of the transaction has to be recorded every time a customer has been dealt with. This has dispirited the employees so much to the point were they would prefer to do no work so that they don’t get extra paper work.

**3rd.** Finding data has become unnecessarily difficult, the organisation and orderliness of the archives has deteriorated as the quantity amplifies. Employees have to delve through scores of paperwork looking for the right section, which is a task in itself. The whole operation could take a significant amount of time.

I have been in touch with my uncle Victor and his garage for numerous years at first the problems illustrated above was not apparent and therefore not highlighted. However, over the years the problems became more unambiguous to the point where it began to affect the morale and efficiency of the business.

Consequently, I have been assigned to solve these problems by introducing a new computerised system. Moreover, to solve these problems I will create a system which will

provide quick data entry through which employees can use to enter information about the cars, their problems, customer details, etc. The new system will be designed to allow Victor to easily search the database and retrieve information within seconds. For example, if they want to find jobs carried out by a certain employee it will be should be retrieved within a short a amount of time with the entrance of desired filters and a click of a button. Data security will be ensured through the use of this new system. The system will inaccessible to unauthorised users, this will be certified through the insertion of passwords and firewalls. Storage space is a big issue with Victor's garage; this can be easily eliminated, since the system will be stored on the computers hard drive. Furthermore, another copy will be saved on a compact disc and kept on another location, in the event that an unexpected event destroys the primary copy.

## *Interview[1] Key Points*

- The current system is at present consists of manual activities. Information on the customer, the cars problem and how it was solved, the price and the employee taking care of the job is recorded (written down). Information is then stored in the form of reports an archives. Calculations and other processes are made solely by the person inputting the information. The output is the single report sheet.
- Numerous problems occurred with this system, data entry is slow and inefficient, the system is prone to human error and there are no measures in place to minimise, incorrect data is an increasing trouble due to employees making mistakes and data being misinterpreted. The amount of storage space is limited, Victor is running out of places to store the documents due to the increasing quantity, which leads to the next problem, certain archives are becoming harder to find. If there is a situation where Victor needs to find the history of a certain customer, the chances are that the business has misplaced it or even lost it, either way it will take him and his subordinates an unnecessary amount of time to locate it.
- The user requires the new system to be computer based. Therefore, a software program is required, which needs to be designed according to Victor's other requirements: quick and easy data entry, this will involve the elimination of repeating the same data, if the customer information has already been entered then the same information doesn't need to be entered again. Efficient data storage; data will be stored on the computers hard disk which will save a lot of space, more information can be stored in a significantly smaller amount of space. Fast locating of data; with the new system the user must be able to allocate data easily, possibly by having a search bar or being able to ask the database queries.
- On average Victor and his employees have minimal IT literacy skills, as a result the complexity of the database has to be limited, since they are the ones who have to analyse problems and repair faults if the system has troubles.

[1] The interview on which these points are based on can be viewed on page 103

## *A detailed description of the current system*

This is a typical scenario which involves the current system:

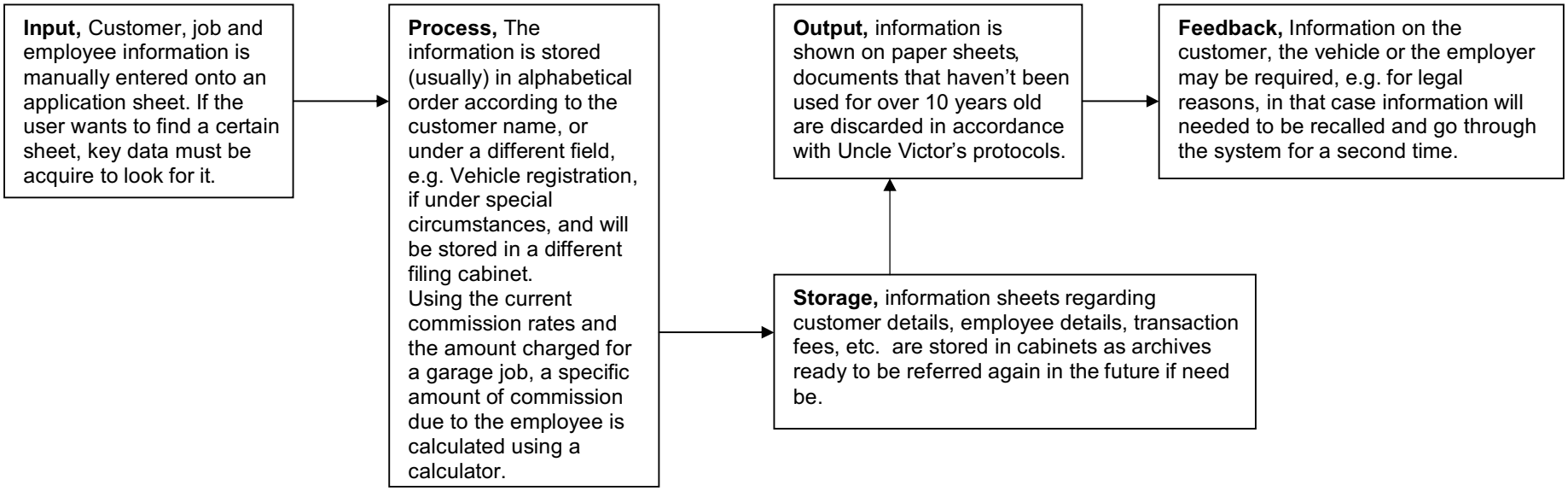
1. *A customer enters the premises in their vehicle; one or the other employee attends to the customer and asks him/her "how can he be of service". Employees are always on hand to attend to new customers in accordance with the manager's strict emphasis on customer service.*
2. *The customer states the problem and the employee inspects it. Inspection may involve lifting the bonnet and using visual observation to diagnose the problem or equipment can be used to test specific parts of the vehicle. Alternatively the employee could drive the car (with the owner's consent) to experience the problem for themselves.*
3. *Afterwards the employee will give the customer an overview of the problem (if the customer doesn't exactly know what it is or if they were incorrect). Assuming the customer isn't familiar with garage car jargon, a brief summary using low key terms is most appropriate.*
4. *Subsequently a predicted price is given. All the prices of the different jobs have already been pre recorded and are altered annually in correspondence with inflation. Once the work that needs to be done to the vehicle has been identified the related price is presented to the customer, which needs to be accepted to carry on to the next step, or declined, in which case there is no further action.*
5. *The vehicle is then left in the hands of the garage, which is when the garage employee (who is dealing with the job) begins filling out the details on the sheet. At this point in the transaction, the employee will record; the customer name, customer address, customer telephone number and email (optional), and other contact details.*
6. *During/after the paper work, the appropriate work is done on the car. The employees use their technical expertise to provide a solution to the car and meet the requirements of the customer.*
7. *Once the job has been completed the rest of the recording will take place, i.e. the price charged, parts of the care serviced or replaced. Once the remaining data has been input the record is now complete and can be used for alternative reasons.*
8. *Subsequently, the customer's and vehicle's information is stored in folders and cabinets, ready to be summoned for other purposes such as proof of transaction, primary/secondary market research, etc.*

The interview[1] with the end user suggested that at the moment, Victor has a low level IT knowledge, he recognises the functions of Microsoft Word, Excel, however, he is yet to gain effective know how of software applications, e.g. Microsoft Access. Although, he has already identified this setback and has planned to take a short course on generic software applications and do some background research, (books), to expand his familiarity. As for his employees, they have next to no computer literacy, which is one of the reasons why they are doing manual, blue collar work in oppose to working with arguably more mind provocative work, e.g. office desk job. This entails a very straightforward simplified interface, for the workers to easily input and extract information.

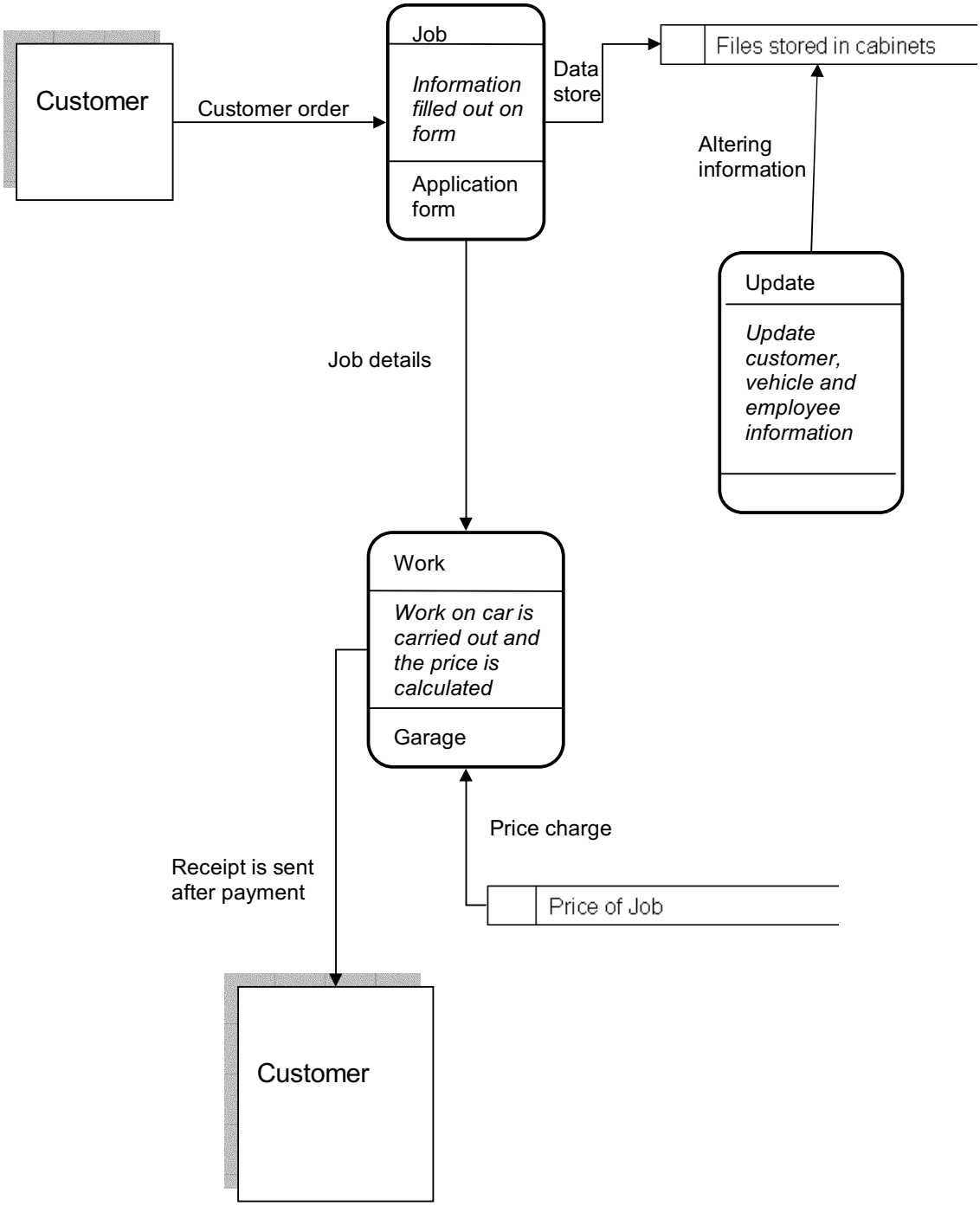
Presently, there are no hardware or software essentials available on site; Victor intends to set a budget for the introduction of a new system at a later date. At this early stage of the feasibility I can't give an accurate description of all the hardware and software systems.

[1] This interview can be viewed on page 103

## *Input-Process-Output of the Current System*



## *Data Flow Diagram of current system*



## *ICT Requirements of the new system*

Through interviewing Victor and assessing the key points of the meeting, I am able to accumulate and outline the general, specific and quantitative requirements of the new system. Validation and Verification techniques are important to any important system, especially one which handles and records the allocation of important assets of the customers as well as businesses. Due to Victor's limited knowledge on computing functions, it wasn't until I introduced and explained the concept and advantages of Validation and Verification that Victor decided that this was a primary requirement. Mistakes by careless human error were common in the previous manual system, Validation and Verification will prevent these providing effective measures are positioned. For example, presence checks to ensure any missing data alerts the user, this is a validation check. As for verification the user could be prompted to enter data twice to highlight mistakes, which could be used when entering passwords to access the system.

Victor emphasised the importance of an effective and straightforward data entry process, which involves entering all the information regarding the customer details, car specifications, etc. This requirement is linked to the amount of training the employees needed, (which needs to be minimal). The data entry methods need to be short in order to minimise the chances of it being entered incorrectly. To achieve this, a consistent layout and closed questions will be put into affect, which refers to all sub programs of the same group will all have similar appearance, and any questions asked will not give immeasurable open answers Nonetheless this shouldn't influence the amount of data that is implemented, corners will not be cut to provide convenience, all essential data must be incorporated, however, additional may be entered depending the specific case or on Victor's authority.

The user interface involves the way the receiver identifies the information conveyed to them. A consistent layout will allow comfortable usage for employees when using the system, which can be realised by implementing a consistent layout and a secure colour scheme and screen layout so it's easy on the eye. This will make the employees ill-eagerness to avoid using the system decline or even vanish. A successfully easy to view user interface (which will include a consistent layout) will link in with the previous objective of easy simplified data entry. A constant layout allows the user to recognise the positions of interest during input. A Graphical User Interface (GUI) would be most preferable; windows will contain information relevant to one particular task, enabling the user to multi task with numerous different windows simultaneously. Icons (pictures) will symbolise commands, for example, clicking on one may bring up a customer data entry form. Menus can provide the employees with a selection of choices and they can respond accordingly depending on the desired task.

It is probable that the information inputted and processed will need to be viewed in different forms of output, primarily through the visual display unit (the monitor). The system must allow for various forms of output, including hardcopy paper. The VDU (visual display unit) will help to display temporary information that the user searches for or enters in the system. Other required output devices include printers, which will be needed to print hard copies for review by other parties, or for developing reports regarding a certain job transaction or customer.

Navigation of the system is preferred to be as uncomplicated as possible, due to the limited computer literacy available, the ability to move around the system successfully must be able to be easily acquired. In order to meet this objective the functions must be clearly defined, for example, if the user wants to view all customers, the button must be clearly visible and comprehensible. This allows even the most primitive computer users to perform tasks successfully. Moreover, consistency must be in place to allow users to remember the layout more easily, so that the learning curve of the system becomes steeper as the user employs the system more often.

The security of the data is essential, due to the large amount of sensitive data regarding customers and their vehicles. The garage has a duty to keep the data secure and follow the principles of the Data Protection Act. To ensure security prominent actions are required. A

record of users will be kept, to allow Victor to see who has accessed the system and when, which allow him to discover unauthorised users and employees who have been using the system unduly. To support this all authorised users will be given user names and given permission to create their own passwords to limit the chance of hackers. Moreover, access rights will be put into practice, only senior personnel will have access to the most sensitive information, while the lower staff will be given access applications they need to perform their job.

Furthermore, the business doesn't possess a particularly strong purchasing power, meaning that it doesn't have the financial strength to purchase expensive equipment, hence the small budget that has been presented to me. Consequently, the system is required to be built on a platform that doesn't come with a high cost to acquire and/or maintain. The system should put minimal demands on the systems hardware so that the effects of the depreciation are not significant, thus allowing the system to last longer and reach the objective of being able to remain operation for at least three years without any major problems.

Backup protocols are a necessity in the event that the master copy is lost or destroyed. Backup up will be provided by an external hard drive, and the system will be backed up periodically, i.e. every week, or in special circumstances, for example, there is a significant in take of data into the system. Furthermore, the backup copy will be stored of site, so that if there's a natural disaster affecting the main site, the backup copy will remain. Plus, this method of backup can be described as differential backup, which practices a cumulative backup of changes from the last full backup , allowing a full system restore based upon the last full backup.

Due to the non existent computer skills of the employees, an introduction into the use of computers is necessary. To accompany the basic skills they will acquire, I will need to develop a user manual which will provide detailed instructions in performing various tasks in the system as well as maintaining it, which is vital to its integrity and reliability. However, Victor has advised me to provide a manual of minimal size and contents in order to avoid confusion and enable the employees to read it swiftly, so they can get on with the job as soon as possible.

## *Hardware and software analysis of current system*

Currently the end user has no computer system therefore I am unable to include a brief specification of the hardware nor can I list the relevant software on the system.

The first problem is that the end user possesses no system to put the solution on. Consequently, they are required to go out and purchase one; the user guide placed later in this project explains the minimum and recommended specifications, which the end user can use to justify the purchase of a selected system.

## *Old System vs. New System & Limitations*

The old system incorporates entirely a body of manual processes, which arguably signifies the age and how incapacitated the system has become in light of modern times. All processes, such as formulating the amount of commission an employee is due, from start to finish are done by one or more employees whilst utilising tools such as calculators, pens and paper, before storing information within cabinets on-site.

The proposed system entails the use of more modern equipment such as desktop personal computers and printers. The user is only required to enter initial information referring to data subjects such as customers and vehicles, the remaining tasks such calculating commission is performed automatically by the system. Once the remaining processes in a transaction are complete

The old system heavily relies on the ability as well as their organisation as the amount of paper based information grows over time. The main output of the system is paper based documents once initial use of the file has passed they will be placed in filing cabinets. The garage has been operational for an extended time period; as a result a lot of space has been taken up with filling archives, thus causing a lot of visual pollution as space needs to be prepared constantly to accommodate more files meaning that space that could be used for a more productive purpose is lost.

In addition, the old system does put a strain on the tangible as well intangible resources of the company. To produce the output an increased amount of pen, paper, etc. is necessary for purchase. As a result the cost of production which contributes to the expenses of the business grows in proportion to the growth of sales, thus making it difficult to improve the profit margin.

In addition, to cost it is time consuming because of the slow methods that have to be used. Employees are obliged to spend time doing paperwork, as a result have the opportunity cost of not being able to more productive such as attending to the cars of customers. Moreover, the numerous repetitive manual operations does strain the morale of the employees because performing the same task repeatedly is boring since it carries little variation. As a result workers become demoralised and more prone to making mistakes whilst performing task in garage.

The limitations represented by the proposed system is the ICT skills of the users, how effective the system is depends on how well the user can use the various utilities to maximise output. Previously, as suggested in the interviews the employees have no prior IT training, consequently, it will take a long time before their ability can provide maximum returns by system, plus there will be increased costs of training staff up to this standard.

Moreover, even though a majority of tasks are automated, the system is still susceptible to human errors during the input stage of the system when information is keyed in. Validation and verification doesn't guarantee accuracy, if the wrong information is entered the output will have no integrity, garbage in garbage out.

## *ICT skills of the user(s) & Identified training needs for the user(s)*

The interview[1] with the end user suggested that at the moment, Victor has a low level IT knowledge, he recognises the functions of Microsoft Word, Excel, however, he is yet to gain effective know how of software applications, e.g. Microsoft Access. As for his employees, they have next to no computer literacy, which is one of the reasons why they are doing manual, blue collar work in oppose to working with arguably more mind provocative work, e.g. office desk job. This entails a very straightforward simplified interface, for the workers to easily input and extract information.

Although, he has already identified this setback and has planned to take a short course on generic software applications and do some background research, (books), to expand his familiarity. All user groups need to be trained to use state-of-the-art application suites consisting of programs and many utilities in or to be more a productive user once the new system is put into place. The following points illustrate the essential areas which the end user must be trained to learn:

- **How to correctly access the system**, throughout the day to day use of the system workers will be regularly opening the program to input information on data subjects, security measures are going to be put into place to protect this data. Therefore it is important for workers to know how to use their passwords correctly to enter areas only authorised by the administrator and avoid any unauthorised access and suspicious behaviour.
- **How to use the navigation facilities**-it is probable that the initial system will be relatively complex and over time new areas and functions are likely to come into play. Consequently, the ability to efficiently move around the system is essential to save time and reduce the chance of data being inputted in the wrong place.
- **How to use the various utilities to complete tasks**-how well the users make use of the utilities to fulfil their day to day tasks dictates their productivity. To achieve this, a user guide would be most effective since it will explain all relevant tasks whilst relating them to typical daily activities.
- **How to use all help available**-it is inevitable that the users will run into problems that the worker or the system itself is responsible. In order to respond to problems and find solutions quickly user support needs to be recognised, this can range from the troubleshooting section found at the back of the system to online help that can be accessed on the internet.

[1] Interview can be referred to on page 103

## *Evaluation Objectives of the Project*

### General System Objectives

- The new system must exceed the standards of the current system, while using as much computer technology as possible
- A user interface must be achieved by incorporating a graphical user interface, i.e. windows, icons, menus and pointers
- The majority of manual methods performed in the current system must be converted to automated actions in the new system
- The system must be reliable, since important information will be held on it
- Defence measures must be performed to prevent hackers and other unauthorised personnel from gaining access
- Validation and Verification checks should be performed on the essential data, that if entered correctly could cause significant problems
- The complexity of the database must be kept to a minimum so that only basic computer training is required of the employees
- The system should entail of a quick and easy for data entry
- The final result (output) information should be able to be viewed in various formats, e.g. forms and reports
- Navigation while looking for files should be easy, for example, by entering filter specifications
- The new system should be able to be easily backed up using various storage mediums, e.g. compact disks
- The database should be future proof, meaning that it can be expanded to meet future needs

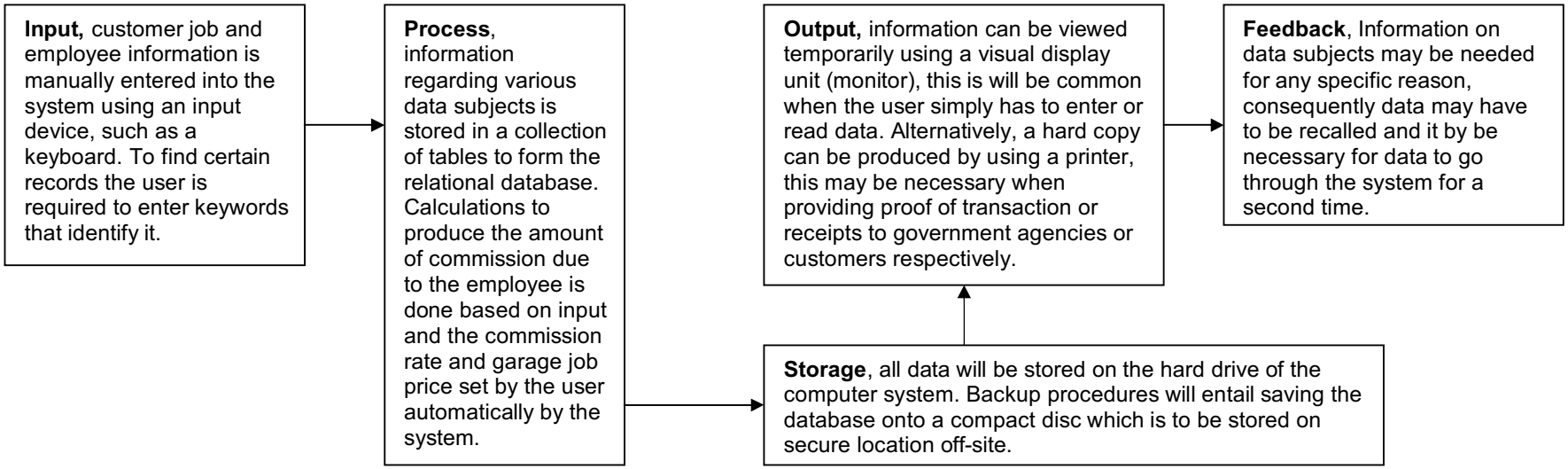
### Qualitative objectives

- The system should have the capacity to store all of the information regarding customers and their vehicles
- Specific records of customers should be able to be located with ease
- Information should not need to be entered twice, if possible it should become automated if it is a routine process
- Price calculations should be done automatically, or specific charges should be apparent as soon as the information is entered, if the prices are pre-recorded
- Filter techniques, i.e. queries should be available for searching the database for records with specific characteristics
- Past data should be as easily accessible as the current data
- Processes are performed quickly easily by the user as well as the computer system
- The information created must be of high quality to maintain the business' integrity
- The database must be easy on the eye, i.e. attractive, to discourage boredom and promote enjoyable use
- Access to system must be obtained with minimum obtrusiveness

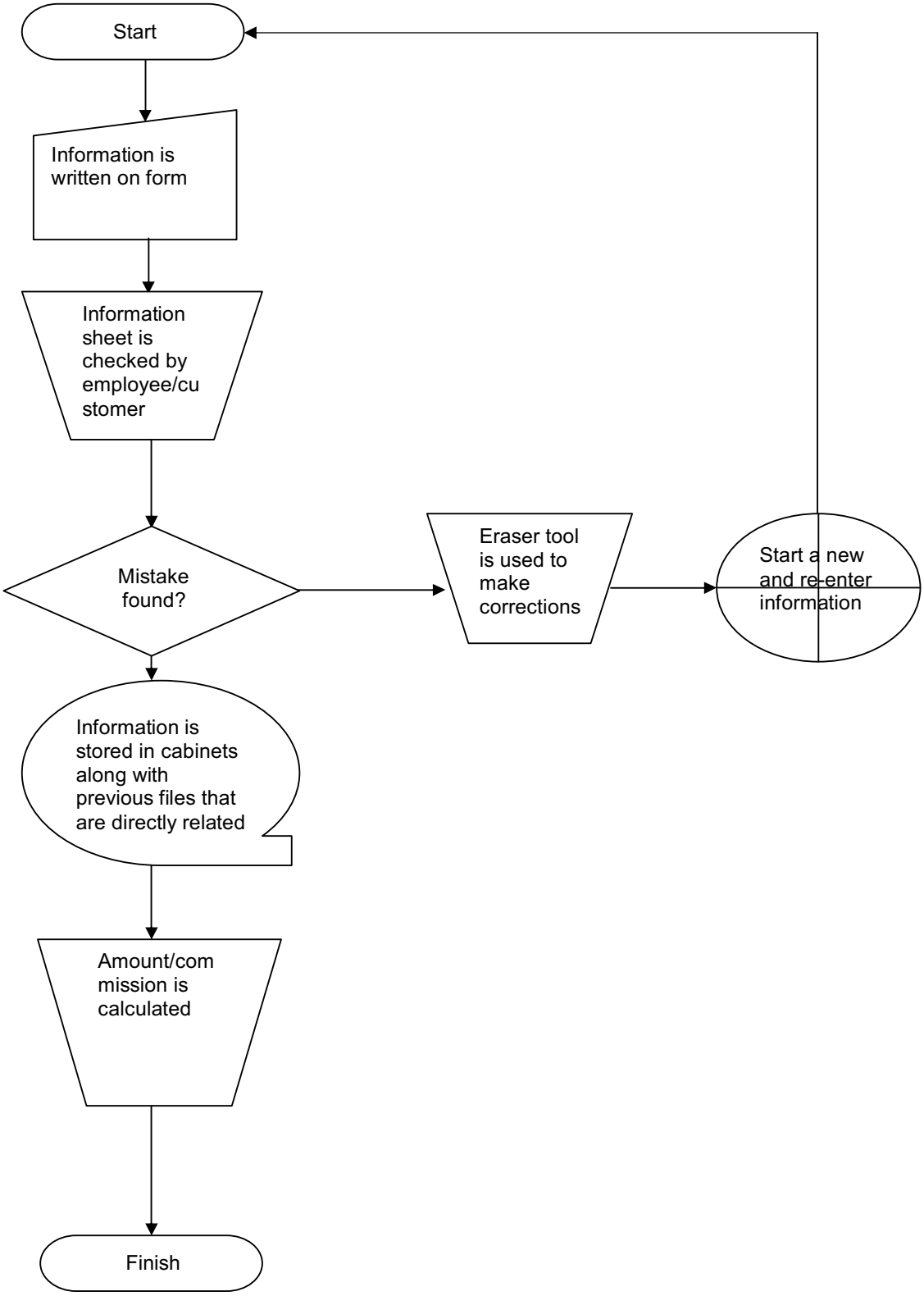
### Quantitative Objectives

- The system should store information regarding over 500+ different customers, 2000+ jobs descriptions and 50 employees
- The system must be able to operate for at least 3 years before having to transfer past data
- The information regarding any data subject must be accessible within 5 mouse clicks
- A maximum of 3 days training must be needed for a user to operate the fundamental features of the database

## *Input – Process – Output of the Proposed System*



## *System flowchart of current system*



# Design

## *Possible solutions for the new system*

A potential solution to the problem presented to Victor, is to develop a strict manual system, consisting of important protocols. He could hire a specialist employee who would enforce these laws and introduce more if required. The specialist employee would draw up a system which would involve strict steps for the garage workers to follow, and could provide incentives such as appraisals or even punishments. Moreover, the specialist would be providing printed templates and forms as a form of data entry. The system will emphasise prominent steps to ensure the success of the system and maintenance of its integrity. This is a satisfactory system mainly because of its cost-effectiveness, namely due to its low cost and ability succeed. Plus, the system doesn't require any special training, since it's similar to the current system already in place; this meets the requirements of easy data entry as well as navigation, allowing the system to produce maximum productivity with virtually immediate affect. However, there're noticeable disadvantages, it doesn't meet Victor's primary objective being computer based, which hinders his plans for advancing with technology through his business, therefore it is still liable to the faults of the current system. In addition, there's no verification or validation, there's no method to ensure data is entered correctly or accurately, as a result errors will be more frequent and miscalculations can be made when charging prices, sending information to customers or providing financial accounts. The solution is also limited to one form of output, written format, results cannot be presented as tables, graphs or diagrams, plus, the data won't be able to be sent as an email, it's limited to post and paper. Navigation would also be ineffective; the employees will still be required to search through large amounts of paper, which is time consuming and stop the user from doing other work. More secure and effective means of security cannot be implemented to insure integrity. This is due to the system's simplicity, the best security is to place the documents under lock and safe, or place security guards, which cost money. Solely tedious forms of backup are available, which includes copying out, or photocopying information. Paperwork time will be doubled by copying it out and increasing amounts of cash will be spent on photocopying.

A further solution is to use generic database software to develop a database containing information containing numerous entities, which will illustrate their characteristics by using selected field names. A successful database will provide an automated data entry system complete with pre recorded field names, which the garage employee can respond to with customer/vehicle/job information. The advantages this system can provide include numerous validation as well as verification functions. Various checks, e.g. presence check, which insures data is entered in a selected cell, can be easily activated to insure all necessary data is inputted. Verification functions provide accuracy by prompting the user to enter information twofold, the second entry is checked with the first entry and differences are made evident. This function will prove imperative when entering important information e.g. bank account details and passwords. Providing the advanced features of the database software is exploited a successful interface can be displayed, activities the system and user need to perform can be done by selecting the appropriate icon. Minimal training is required to maintain and operate the system, since easy to follow wizards are supplied, which provide instructions on how to make tables, field names and their types, etc. Plus, the querying function is an essential tool when searching the database using filters, criteria can be inputted and the database will immediately provide relevant results. There're various formats for the processed information to be view, for example, in form and reports, enabling dynamic and robust viewing for the user. Since the system is computerised backup devices such as external hard disks and compact disks are available for use to provide rapid data transfer. However, there are disadvantages, such as the price of developing such a system with so many advanced features being used, specialist personnel may be required.

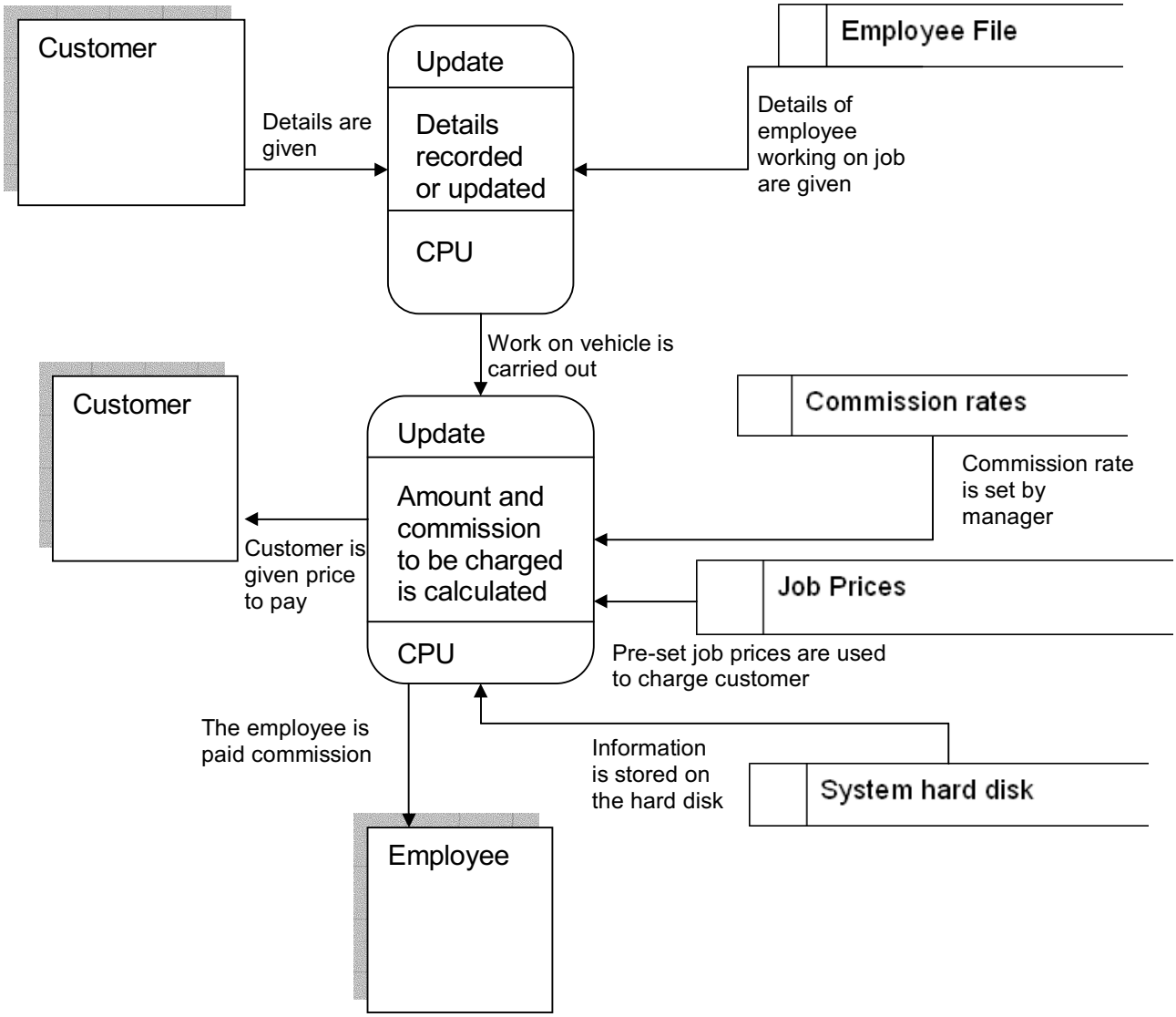
An alternative solution is to use a generic spreadsheet application to input, process and output information. Calculations will be automatically made by the system using the various formulas, which can be inserted. Templates can be created and saved before hand, for

example the questions asked for customers, e.g. name will already be laid out in a spreadsheet. The user will just select the file; fill it out and 'Save As' to keep the template as well as the sheet containing the customer information. This would be a successful system since it aids Victor's ambition for a computerised system. Various validation techniques can be implemented, for example range checks, which prompt the user when data that is extraordinary or significantly low data is realised. This will drastically minimise the amount of errors made human users. Moreover, depending on how the spreadsheet file is developed an accommodating user interface, consisting of macros and hyperlinks can be created to represent a graphical user interface. This will in turn allow users to better understand how to navigate through the system and perform specific operations productively. Using a typical generic spreadsheet software, functions are available to represent the data already in tabular form into numerous other formats, e.g. bubble charts, area charts and pie charts. This will enable data to be viewed in various ways to allow the viewer to reach different conclusions more conveniently.

Since the system is computerised, more secure security measures can be implemented, the file can be made read-only, so that it cannot be edited unless permitted by an administrator. Plus passwords can be put in place to restrict unauthorised access to sensitive areas. The system can be easily backed up using storage devices such as compact disks and flash memory sticks. Both storage mediums provide quick and effectual data transfer. Disadvantages include the large amount of training that is required due to the minimal assistance the software itself provides, there are no wizards available to walk the user through developing a system relevant this scenario. Therefore, training will be a large overhead cost. In addition, inserting new records and entities of customers will prove to a time and storage space operation, partially due to the fact that spreadsheets are not specifically designed for this kind of use, although a successful system can be developed using it, providing the developer possesses the relevant knowledge.

The solution I have chosen to follow is the generic database solution. This choice is justified since database software has been designed specifically for this problem. The solution will minimise the costs spent on training since the basics of the system are explained using wizards. Information can be easily formatted to be viewed in different formats and can be accessed by effortlessly navigating through system following the descriptions given by icons and window names. Moreover, it is the only solution which provides a productive method of system searching, namely the query function. The query function is so easy and effective to use training is not necessary to do it, the help provided in the software package will suffice.

***Data Flow Diagram of proposed solution***



## *Normalisation*

For the database, I have used normalisation to formulate the most effective design possible for a relational database. The initial attributes are as follows: employee name, *employee contact number*, employee work plan, *employee position*, date employed; *job name*, vehicle name, *vehicle registration*, customer name, *customer address*, customer contact number, *employee 1*, employee 2, *garage job description*.

### 1st Normal Form

The two tables represented will be represented in standard notation as:

EMPLOYEE (Employee ID, name, address, contact number, work plan, position, date employed)
GARAGE JOB (Job ID, vehicle ID, vehicle registration, vehicle name, customer name, customer address, contact number, employee 1, employee 2, job description)

These two tables are to be linked together by a common field, which is the employee name or ID. However, it may appear that 1st normal form hasn't been reached because of the repeating employee field, (i.e. employee 1 and employee 2); this isn't true because these two separate fields are required to show the names of the one or more employees who took part on that job. The employee ID and Job ID are primary keys which eliminate redundancies allowing records to be uniquely identified.

### 2nd Normal Form

To get into 2nd normal form I required a 3rd table that links the entities in the employee and garage job tables. The tables represented in standard notation above aren't in 2nd normal form because, for example, employee work plan is not dependant on the employee ID. Therefore I need to introduce a third table that acts as a link; this will be the employee work plan table. The tables will be as follows:

EMPLOYEE (Employee ID, name address, contact number, position, date employed)
EMPLOYEE_WORK_PLAN (Employee work plan ID, employee work plan description, approved by?)
GARAGE_JOB (Job ID, vehicle registration, vehicle name, vehicle manufacturer, customer ID, customer name, customer address, contact number, employee 1, employee 2, job description)

Now the table is in second normal form, as no column that is not part of the primary key is dependant on only part of the primary key.

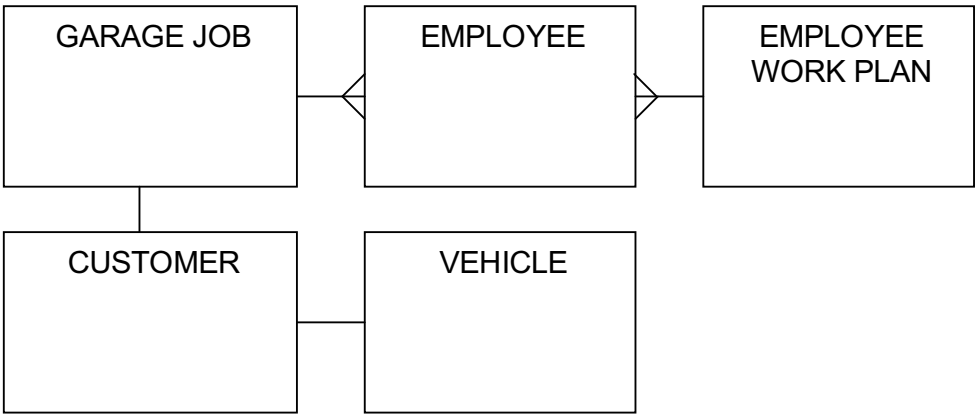
### 3rd Normal Form

After the reviewing the current table the vehicle name and customer name aren't dependant on the Job ID. Therefore they need to be removed to reach third normal form, this has created:

EMPLOYEE (Employee ID, name address, contact number, position, date employed)
EMPLOYEE_WORK_PLAN (Employee work plan ID, employee work plan description, approved by?)
GARAGE_JOB (Job ID, Employee 1 ID, Employee 2 ID, Customer ID, Vehicle ID, Job description)
CUSTOMER (Customer ID, customer name, address, contact number, vehicle ID)
VEHICLE (Vehicle ID, registration number, name, customer ID)

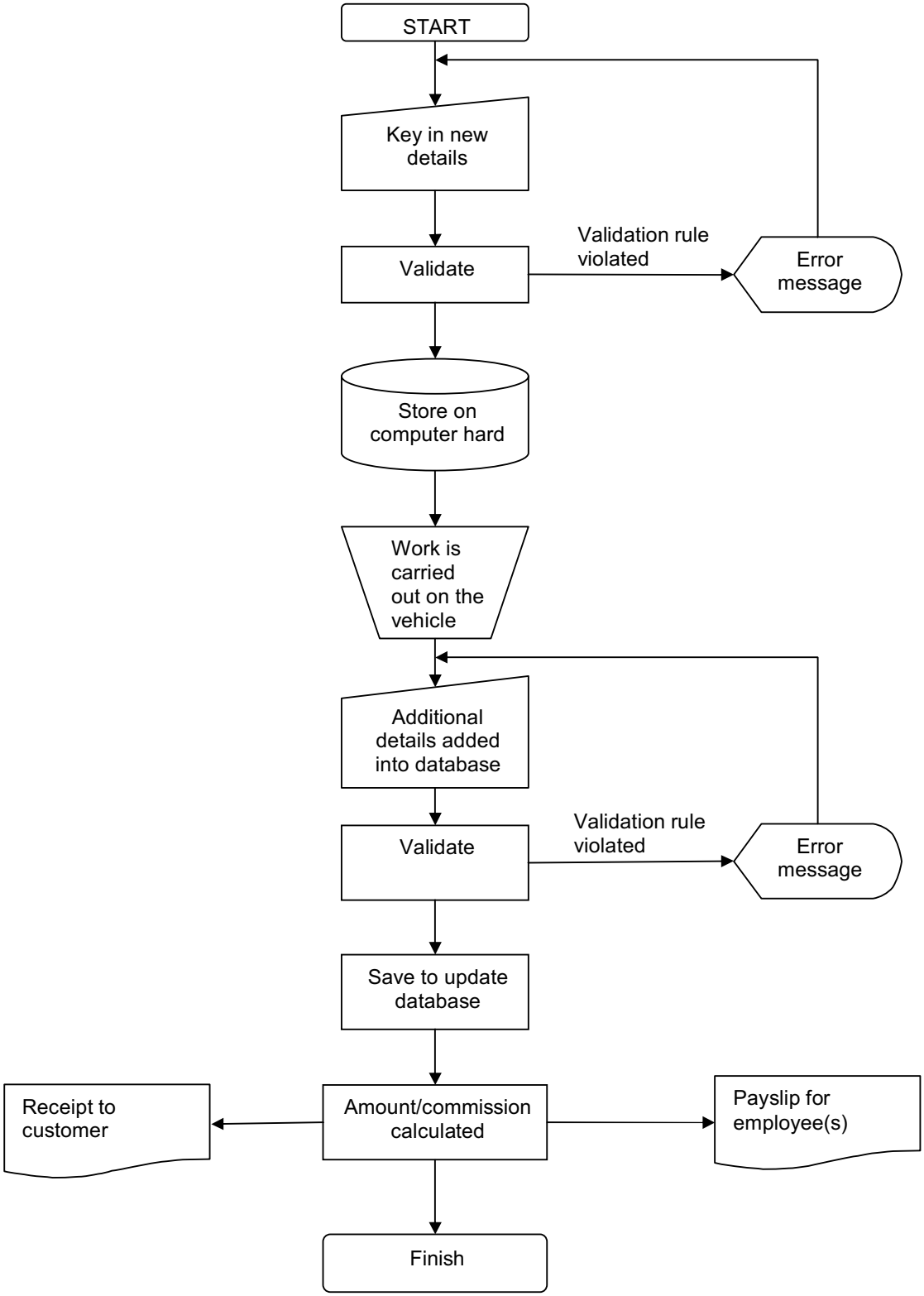
This is now the most effective way of holding the data, as the are no attributes being duplicated, and it contains no ‘non-key dependencies’. This will allow data to be more consistent throughout the database, the structure of the tables are able to be easily manipulated to allow me to enter as many entries as I can. Plus the structure enables complex queries to asked relating to data from various tables.

## Entity – Relationship Diagram




Above is an entity relationship

***System flowchart of proposed system***



## *Macro Design*

Macro design to open the table of customers:

- Macro Action is to be **OpenTable**
- The table name to be selected is **Customer**
- The view should be set as **Datasheet**
- The data mode shall be set as **Edit**

Macro design to open the table of employees:

- Macro Action is to be **OpenTable**
- The table name to be selected is **Employee**
- The view should be set as **Datasheet**
- The data mode shall be set as **Edit**

Macro design to open the table of employee work plans:

- Macro Action is to be **OpenTable**
- The table name to be selected is **Employee Work Plan**
- The view should be set as **Datasheet**
- The data mode shall be set as **Edit**

Macro design to open the table of Garage Job:

- Macro Action is to be **OpenTable**
- The table name to select is **Garage Job**
- The view should be set as **Datasheet**
- The data mode shall be set as **Edit**

Macro design to open the form of Customers:

- Macro Action is to be **OpenForm**
- The form name to select is **Customer**
- The view should be set as **Form**
- The window mode shall be set as **Normal**

Macro design to open the form of Employee Work Plans:

- Macro Action is to be **OpenForm**
- The form name to select is **Employee Work Plan**
- The view should be set as **Form**
- The window mode shall be set as **Normal**

Macro design to open the form of Employees:

- Macro Action is to be **OpenForm**
- The form name to select is **Employees**
- The view should be set as **Form**
- The window mode shall be set as **Normal**

Macro design to open the form of Garage Job:

- Macro Action is to be **OpenForm**
- The form name to select is **Garage Job**
- The view should be set as **Form**
- The window mode shall be set as **Normal**

Macro design to open the form of Vehicle:

- Macro Action is to be **OpenForm**
- The form name to select is **Vehicle**
- The view should be set as **Form**
- The window mode shall be set as **Normal**

Macro design to ask the database to sort customers by their surnames:

- Macro Action is to be **OpenQuery**
- The query name to select is **Customer sort (last name)**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to ask the database to find jobs according to the amount charged to the customer:

- Macro Action is to be **OpenQuery**
- The query name to select is **Amount charged**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to ask the database to calculate the commission amount for each employee:

- Macro Action is to be **OpenQuery**
- The query name to select is **Commission calculator**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to find employees and/or customers by their address:

- Macro Action is to be **OpenQuery**
- The query name to select is **Employee/Customer address search**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to find specific garage jobs:

- Macro Action is to be **OpenQuery**
- The query name to select is **Garage Job**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to find manufacturers of the vehicles registered in the database:

- Macro Action is to be **OpenQuery**
- The query name to select is **Employee/Customer address search**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to find manufacturers of the vehicles registered in the database:

- Macro Action is to be **OpenQuery**
- The query name to select is **Employee/Customer address search**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to find manufacturers of the vehicles registered in the database:

- Macro Action is to be **OpenQuery**
- The query name to select is **Employee/Customer address search**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to find a vehicle by its registration:

- Macro Action is to be **OpenQuery**
- The query name to select is **Vehicle License Plate search**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to find a vehicle by its registration:

- Macro Action is to be **OpenQuery**
- The query name to select is **Vehicle License Plate search**
- The view should be set as **Design**
- The data mode shall be set as **Edit**

Macro design to show the report of all customers:

- Macro Action is to be **OpenReport**
- The report name to select is **Customer**
- The view should be set as **Print**
- The window mode shall be set as **Normal**

Macro design to show the report of all employees:

- Macro Action is to be **OpenReport**
- The report name to select is **employee**
- The view should be set as **Print**
- The window mode shall be set as **Normal**

Macro design to show the report of all the employee work plans:

- Macro Action is to be **OpenReport**
- The report name to select is **employee work plan**
- The view should be set as **Print**
- The window mode shall be set as **Normal**

Macro design to show the report of all garage jobs:

- Macro Action is to be **OpenReport**
- The report name to select is **Garage Job**
- The view should be set as **Print**
- The window mode shall be set as **Normal**

Macro design to show the report of all the vehicles:

- Macro Action is to be **OpenReport**
- The report name to select is **Vehicle**
- The view should be set as **Print**
- The window mode shall be set as **Normal**

## *Data Validation*

| *Field(s)* | *Validation* | *Method* |
|---|---|---|
| Date employed | Must be a date in the year 2003 | Input mask that only allows long dates between 01/01/03 to 01/01/04 |
| House Name | The number must be less than 400 | Validation rule set to permit numbers below 400 |
| Post Code | Should contain maximum 8 characters and must begin with S | Input mask, i.e. Like "S???????" |
| Contact Number | Must contain 11 numbers and begin with 020 | Input mask that allow allows an 11 digit number which starts with 020 |
| Position | Must be either: Mechanic or Boss | A list box that contains a value list, the options being Mechanic and Boss |
| Title | Must be either: Mr, Mrs, Miss or Ms | A list box that contains a value list, the options being Mr, Mrs, Miss and Ms |
| Name | Must be less than 20 characters | Validation rule set to permit text of maximum 20 letters |
| Rate of pay/hour | The maximum an employee can be paid is £10 per hour | Validation rule set to permit a number equal to or less than 10 |
| Customer ID (Vehicle Table) | The numbers should be identical to the ones in the Customer ID field in the Customer Table | A list box designed to contain a value list, the options coming straight from the entries inside the Customer ID field in the Customer Table |
| Job start date; Job finish date | The long dates entered should be in the year 2007 | Input mask that only allows long dates between 01/01/03 to 01/01/04 |
| Amount Charged | The lowest price that can be charged is £19.99 | Validation rule set to permit a number equal to or less than £19.99 |
| Commission | The commission given to each employee will never be zero | Input mask set allow any figure that doesn't equal zero |

## *Data Security and Integrity*

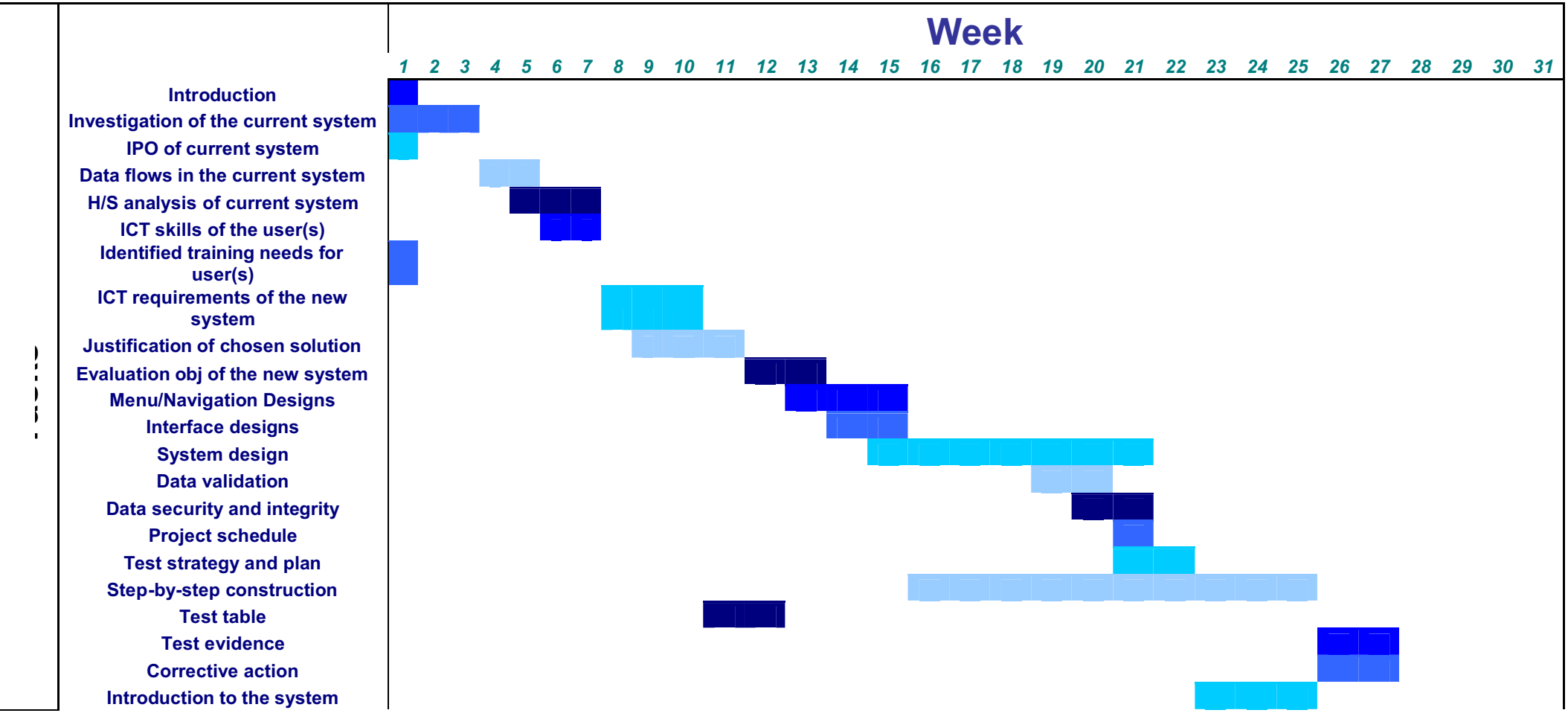
The area which the garage operates in has never experienced any threatening weather conditions, as a result only a small backup plan has been formulated in order to keep peace of mind. A backup will be stored on external hard disks; regular backups will be made of the data in the system. The method that will be employed is the ancestral method. This involves the first saved backup being called the son, which becomes the father when another backup is made called the son, when the third backup is made the earliest backup can be deleted, and the process continues. If the original file is incapacitated there are two more backups.

Data integrity involves the accuracy of the data. To ensure that errors are avoided, data entry will be limited to those authorised to do so, these personnel will be instructed and well trained in the correct methods of inputting data into the system. Plus there are numerous validation rules placed all around the system too ensure input is reasonable and reduce the chance of mistypes or other errors during operating procedures. In addition, once information has been printed out it will be inspected and reviewed for possible errors that may need to be investigated. This will be important when sending out documents contains the audit trails, since unexplained figures can lead to legal punishments.

Furthermore, physical security will be put into place. An alarm system will be put into place to protect unauthorised entry by burglars. The serials numbers of all essential equipment used, for example the central processing unit, will be recorded to make identification easier when police identify stolen property. The location of the computer will be hidden from view so they aren't easily seen from the outside. Moreover, doors shall be looked when the rooms aren't in use and windows should be closed typically by blinds to restrict view into the premises.

The last line of security is the passwords that are set, different passwords have been set for each user, and each user has specific privileges assigned by Victor. Passwords are useful to prevent authorised access, i.e. hackers. The passwords will be at least 12 characters long to make harder to guess. The password will be immediately encrypted by the computer to prevent other onlookers from gaining the knowledge. In addition, passwords should be kept secret and changed regularly, preferably every ninety days

## *Project Schedule*



**Step-by-step user instructions**
**Troubleshooting**
**Evaluation of project objectives**
**Evaluation by real end user**
**Future developments of the solution**

## *Test Plan*

This is the testing section, its purpose is to draw out any apparent failures and discover what parts of the system don't work. Errors can be discovered and corrective action can be carried out remove these errors. In order for the system to be a success it primarily needs to be able to process any inputted data correctly. The test plan table states all parts of the new system that have been specified in the previous sections that need to be checked.

Within this test plan I'm going to test the essential procedures and functions that allow the database to maintain its integrity. The database is designed to begin taking data from the beginning of 2007; therefore previous data won't be entered, this is because entering all the previous data will be a tedious and time consuming process, therefore it's more likely for mistakes to take place. Consequently, the test data will be the same as the previous data but with some changes. To test the system, I will be using a wide variety of data, so that as many errors can be found, so that the end solution is as bug free as possible.

Primary purpose of this test plan is to highlight any apparent errors in the system that requires immediate attention. Plus to ensure e all the different functions of the database are functioning at a satisfactory level so that any (reasonable) data can be accepted, and to test whether the original requirements of the system have been put into practice.

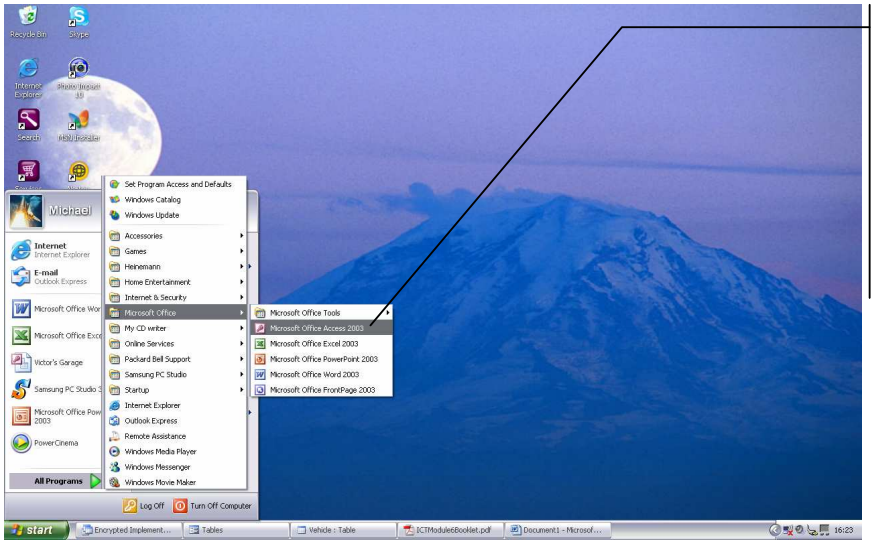
| | **Test Description** | **Test Data** | Expected Outcome |
|---|---|---|---|
| T1 | Make sure the customer table can hold more than 500 records | 500 customer records | **Accepted and save** |
| T2 | Make sure the garage job tables should be able to hold over 2000 records | 2001 garage job records | **Accepted and save** |
| T3 | Make sure at least 50 employees can be put in the employees table | 51 employee records | **Accepted and saved** |
| T4 | To test the name fields only allow text with a maximum of 20 characters | Credible (typical) | **Accepted and saved** |
| T5 | | Delilayabejabablesans (boundary) | **Accepted and saved** |
| T6 | To make sure data subject data can be reached in less than 5 clicks | Use user interface to access information an employee | **Information reached in 3 clicks** |
| T7 | Make sure all date fields allow only long dates | 12 March 2007 (typical) | **Accepted and saved** |
| T8 | | 12/03/07 (erroneous) | **Validation text appears** |
| T9 | Test that all dates are in the year 2007 | 12 May 2007 (typical) | **Accepted and saved** |
| T10 | | 1 January 2007 (extreme) | **Validation box appears to check entry** |
| T11 | | 2 June 2004 (erroneous) | **Validation text appeared** |
| T12 | Make sure the house number field only three of less characters | 252 (typical) | **Accepted and saved** |
| T13 | | 999 (extreme) | **Accepted and saved** |
| T14 | | Three hundred and thirty nine (erroneous) | **Validation text appears** |
| T15 | Make sure all postcodes begin with 'S' and are 8 characters long | SW18 4CH (typical) | **Accepted and saved** |
| T16 | | EW18 4CH (erroneous) | **Validation text appears** |

| | | | |
|---|---|---|---|
| T17 | Test that the database only allows house numbers containing 11 numbers | 02072324545 (typical) | **Accepted and saved** |
| T18 | | 0710723245459 (erroneous) | **Validation text appears** |
| T19 | To test that the maximum amount to be paid per hour is £10 | 7 (typical) | **Accepted and saved** |
| T20 | | 10 (extreme) | **Accepted and saved** |
| T21 | | 50 (erroneous) | **Validation text appears** |
| T22 | Test that the open customer table macro works | Click the macro on the table switchboard | **Customer table opens in table view** |
| T23 | Test that the open employee table macro operates accordingly | | **Employee table opens in table view** |
| T24 | Test that the open employee work plan table macro works | | **Employee work plan table opens in table view** |
| T25 | Test that the open garage job table macro operates accordingly | | **Garage job table opens in table view** |
| T26 | Test that the open vehicle table macro works upon selection | | **Vehicle table opens in table view** |
| T27 | Check the open customer form functions correctly | Click the corresponding link on the form switchboard | **Customer form opens in form view** |
| T28 | Check the open employee work plan form works appropriately | | **Employee work plan form opens in normal form view** |
| T29 | Check the open employee form functions correctly | | **Employee form opens in normal form view** |
| T30 | Check the open garage job form works appropriately | Click the corresponding link on the form switchboard | **Garage job form opens in normal form view** |
| T31 | Check the open vehicle form functions correctly | | **Vehicle from opens in normal form view** |
| T32 | Verify the open customer sort query macro works correctly | Click the Macro on the query switchboard | **Customer sort query opens in design view** |
| T33 | Verify the open amount charged query macro runs appropriately | | **Amount charged query opens in design view** |
| T34 | Verify the open commission calculator query macro works correctly | | **Commission calculator query opens in design view** |
| T35 | Verify the employee/customer address query macro runs appropriately | | **Employee/Customer address search query opens in design view** |

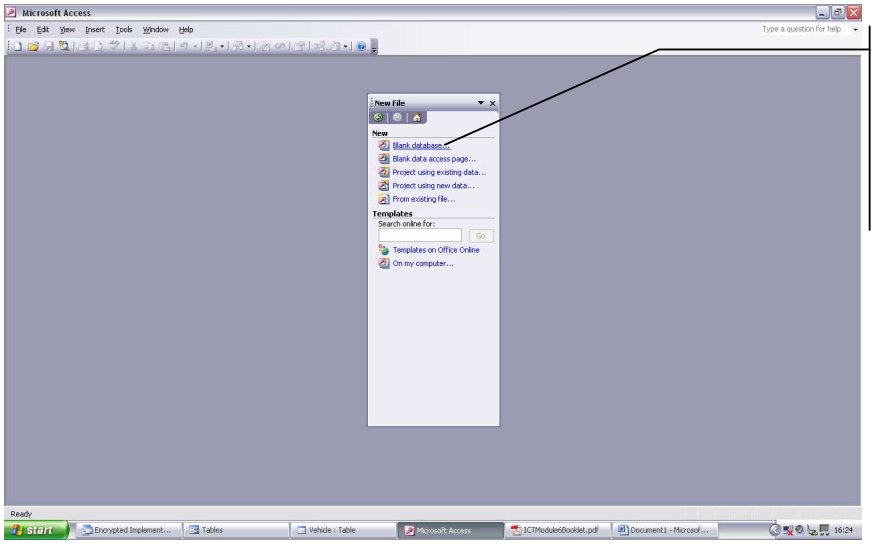
| | | | |
|---|---|---|---|
| T36 | Verify the garage job query macro works correctly | | **Garage job query opens in design view** |
| T37 | Check the view customer report macro works correctly | Click the corresponding link on the report switchboard | **Customer report opens in print preview mode** |
| T38 | Check the view employee report operates correctly | | **Employee report opens in print preview mode** |
| T39 | Check the view employee work plan report macro works correctly | | **Employee work plan report opens in print preview mode** |
| T40 | Check the view garage job report operates correctly | | **Garage job report opens in print preview mode** |
| T41 | Check the view vehicle report macro works correctly | | **Vehicle report opens in print preview mode** |
| T42 | Check the amount charged query operates effectively | Search for jobs charging over £400 | **3 job test data records appear** |
| T43 | Test the commission calculator query | Job charging £100 with a commission rate of 10% | **£10 commission produced** |
| T44 | Test the manufacturer search query works correctly | Search for Peugeot cars on record by just typing: 'Peu*' | **Vehicle manufactured by Peugeot are displayed on screen** |
| **T45** | **Verify the licence plate search query functions appropriately** | **Search for a pre-specified licence plate** | **The corresponding vehicle record is displayed** |

# Implementation

This section of the coursework entails a step-by-step construction of the system using screenshots accompanied by annotations.




The first step (shown above) involves accessing the Microsoft Access application, i.e. Menu/All Programs/ Microsoft Office/ Microsoft Access 2003

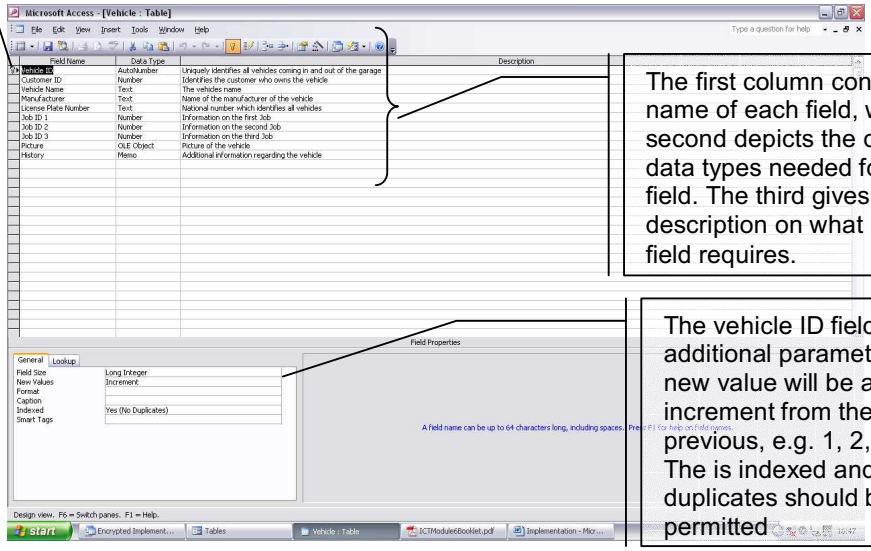



Next, a blank database is opened so that the end solution can begin to be made

## *Tables*

The following is a screenshot of the table design for the Vehicle table.

This symbol identifies the primary key. I needed a primary key to be able to search more easily and utilise an exclusive title to refer to each record. In this table "Vehicle ID" is the primary key as it holds the ability to uniquely identify all the records in this table.




The first column contains the name of each field, whilst the second depicts the different data types needed for each field. The third gives a short description on what input the field requires.

The vehicle ID field requires additional parameters. Each new value will be an increment from the previous, e.g. 1, 2, 3, etc. The is indexed and no duplicates should be permitted

| General | Lookup |
|---|---|
| Field Size | Long Integer |
| Format | |
| Decimal Places | Auto |
| Input Mask | |
| Caption | |
| Default Value | 0 |
| Validation Rule | |
| Validation Text | |
| Required | Yes |
| Indexed | Yes (Duplicates OK) |
| Smart Tags | |

This screenshot illustrates the parameters of the Customer ID and Job ID (1,2 and 3) fields, this part of the record needs to be filled so that the owner of the vehicle can be identified, consequently, Required should read 'Yes'

| General | Lookup |
|---|---|
| Field Size | 30 |
| Format | |
| Input Mask | |
| Caption | |
| Default Value | |
| Validation Rule | |
| Validation Text | Incorrect entry please try again |
| Required | No |
| Allow Zero Length | Yes |
| Indexed | No |
| Unicode Compression | Yes |
| IME Mode | No Control |
| IME Sentence Mode | None |
| Smart Tags | |

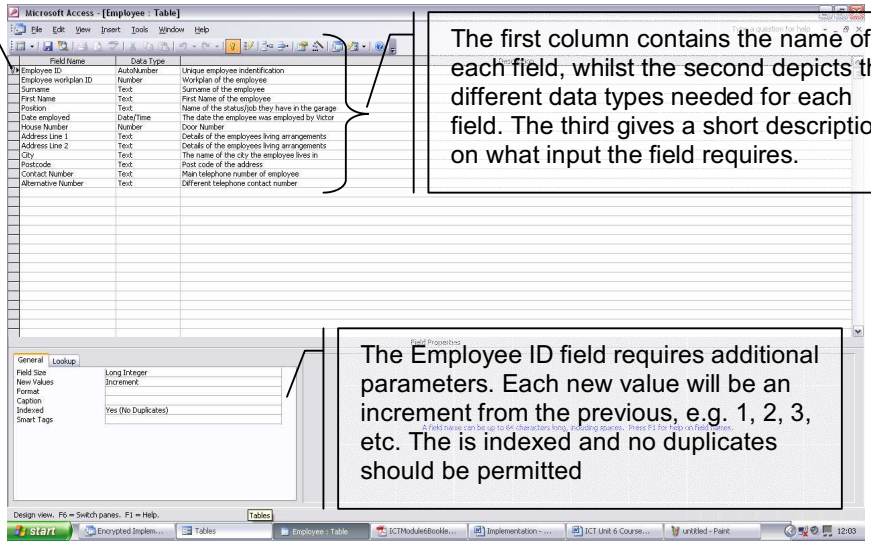
The adjacent screenshot depicts the parameters of the Manufacturer and Vehicle Name; the field size should be set to 30 so that only reasonable data is allowed, if entry is deemed to be incorrect then the validation text: "Incorrect entry please try again should appear", this also meets the validation requirements requested by the end user.

| General | Lookup |
|---|---|
| Field Size | 8 |
| Format | |
| Input Mask | |
| Caption | |
| Default Value | |
| Validation Rule | |
| Validation Text | Incorrect entry please try again |
| Required | Yes |
| Allow Zero Length | Yes |
| Indexed | No |
| Unicode Compression | Yes |
| IME Mode | No Control |
| IME Sentence Mode | None |
| Smart Tags | |

The screenshot on the left shows the parameters of the license plate field, Victor selected this information as an important asset for the system and therefore requested additional constraints on entry, to facilitate, I have set the field size to 8; data relating to this field is a requirement so a new record cannot be saved without a correct license plate number, if entry is incorrect the user will be prompted with the message: "Incorrect entry please try again"

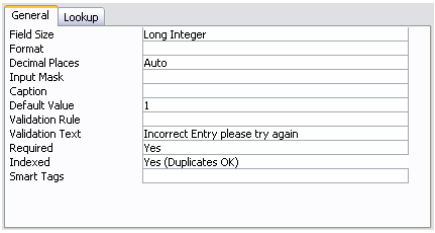
The following screenshots display the design of the employee table.

Within the ICT requirements section, Victor stressed the importance of eliminating duplicated data; he requested a function that could identify different records. Employee ID has been set as the primary key since it can uniquely identify each record

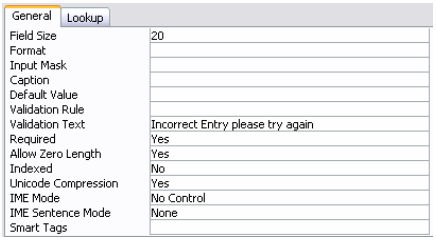



The first column contains the name of each field, whilst the second depicts the different data types needed for each field. The third gives a short description on what input the field requires.

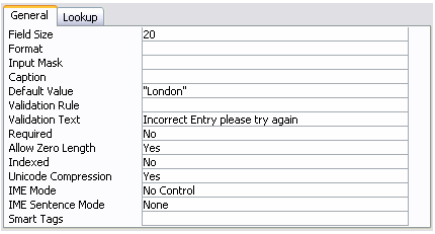
The Employee ID field requires additional parameters. Each new value will be an increment from the previous, e.g. 1, 2, 3, etc. The is indexed and no duplicates should be permitted




The adjacent screenshot shows the parameters of the employee work plan ID field. Victor stated that he may need to cross reference garage job dates with the day an employee worked at the garage, therefore the integrity of this field's data is essential. As a result there will be a message should incorrect data be entered, the default value is set to 1 since that is the plan most employees are on, and this part of the record requires an entry.



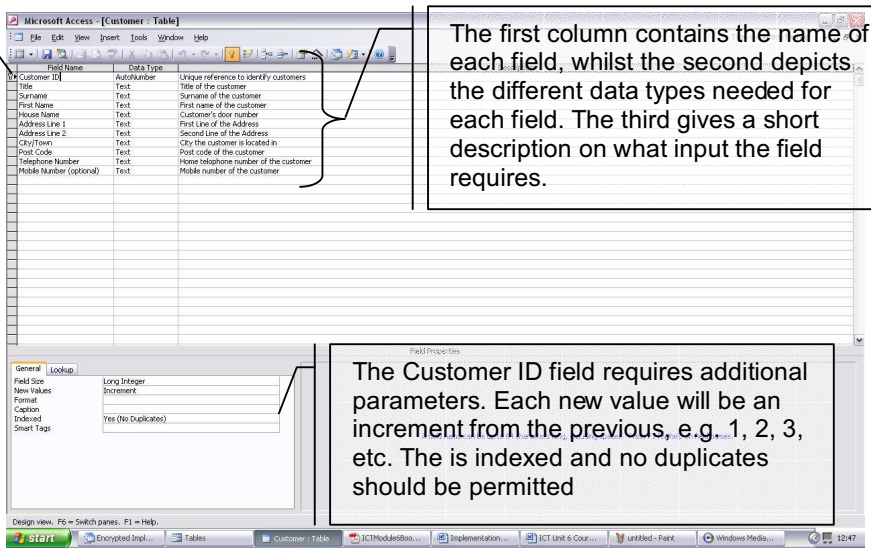

The screenshot on the left shows the parameters of the first name, surname, postcode and position fields. The field size has been set to 20 for validation purposes. If the data entered is wrong the user will be prompted to try again




The adjacent represents the City field; a change has been from the design section. The garage is local so the chances are all customers will be located in London; therefore the default value is now set as London, plus the field is capped to 20 characters to minimise mistakes, if a mistake is made the user is prompted with a message

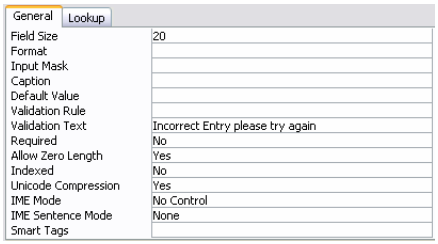
The following screenshots illustrate the design of the customer table.

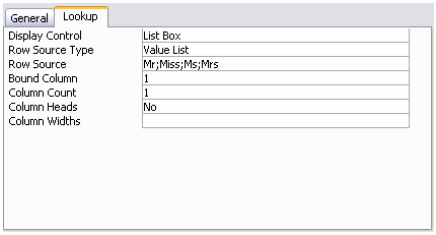
ICT requirements emphasised the need for unique identification, the customer ID field possess the attributes necessary to recognise each record individually




The first column contains the name of each field, whilst the second depicts the different data types needed for each field. The third gives a short description on what input the field requires.

The Customer ID field requires additional parameters. Each new value will be an increment from the previous, e.g. 1, 2, 3, etc. The is indexed and no duplicates should be permitted

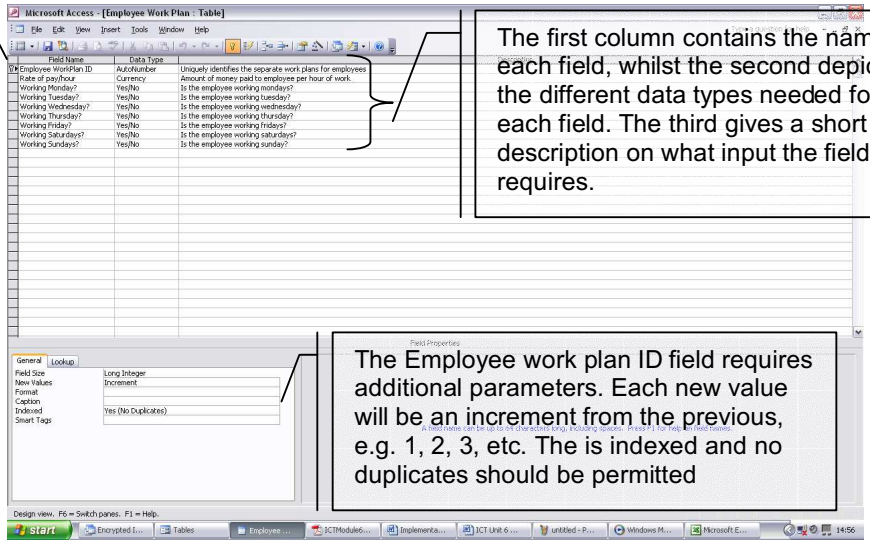



The top screenshot refers to the parameters of the Title field. The maximum characters allowed is 20, when a validation rule is violated the user is prompted. A change has been made from the design section, in oppose to having “Mr” as the default value (which has now been removed) the user can select from a drop down list. This is an answer to Victor’s request for easier input; the possible entries are shown in the bottom screenshot. The use of list box is an advanced feature that I have learned during the course of this project

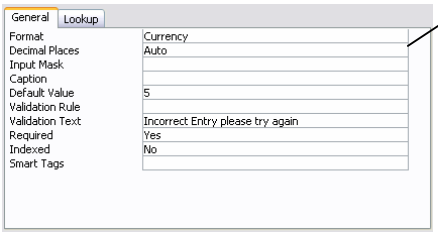
The following screenshots depict the design of the employee work plan table.

Employee work plan ID has been set as the primary key, which can be used as a reference to classify each record




The first column contains the name of each field, whilst the second depicts the different data types needed for each field. The third gives a short description on what input the field requires.

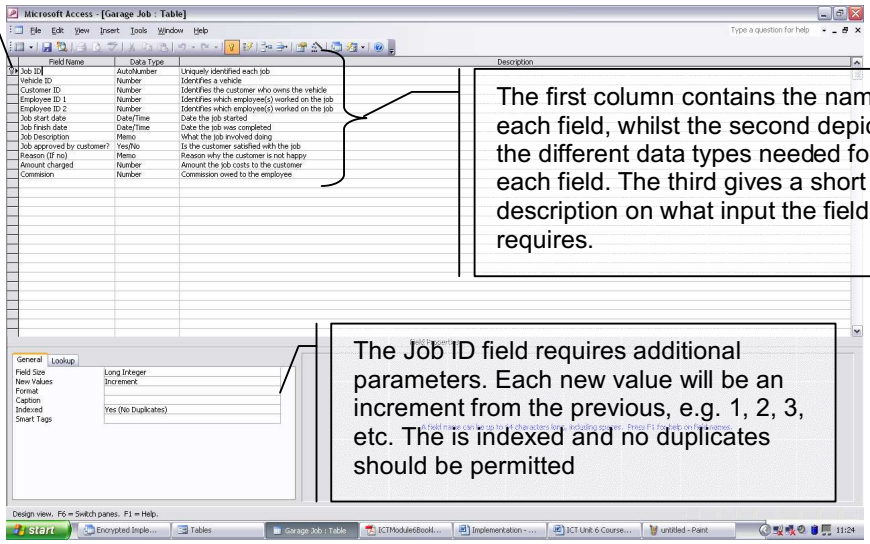
The Employee work plan ID field requires additional parameters. Each new value will be an increment from the previous, e.g. 1, 2, 3, etc. The is indexed and no duplicates should be permitted




The adjacent screenshot refers to the rate of pay/hour field. Victor specified this as an important part of the system since it involves money and how much an employee gets paid. As a result this is part of the record is a requirement. The default value is £5 since that is the minimum wage (at the garage). Validation techniques was one of the requirements, if the validation rule is violated the user is prompted with a message

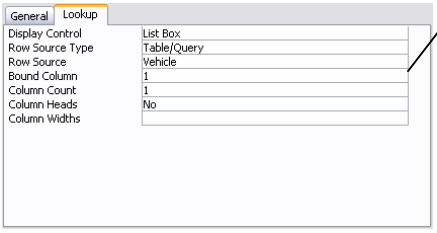
The following screenshots show the design of the garage job table.

Job ID has been set as the primary key, which can be used as a reference to classify each record




The first column contains the name of each field, whilst the second depicts the different data types needed for each field. The third gives a short description on what input the field requires.

The Job ID field requires additional parameters. Each new value will be an increment from the previous, e.g. 1, 2, 3, etc. The is indexed and no duplicates should be permitted

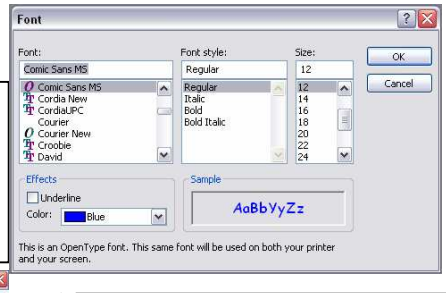


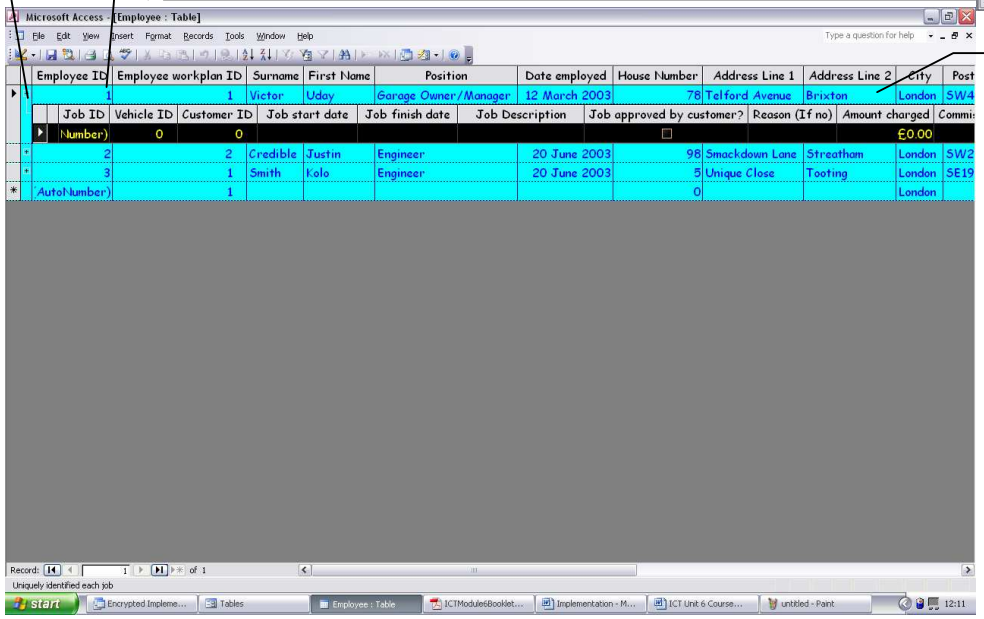

The screenshot on the left refers to the lookup details of the Vehicle ID field. A change has been made from the design section to respond to Victor's request for easier input and less chance of human errors. A list box has been created that is directly linked to the vehicle table, therefore only IDs that are already registered in the vehicle table can be entered in this table, thus minimising chance of error. The same method has been used with the customer ID and Employee (1 and 2) ID. Using relationships to link tables together for use of list boxes is an advanced feature I've learned while doing this project.

The following screenshot is an **example** of a table, and the annotations refer to all tables in the database.

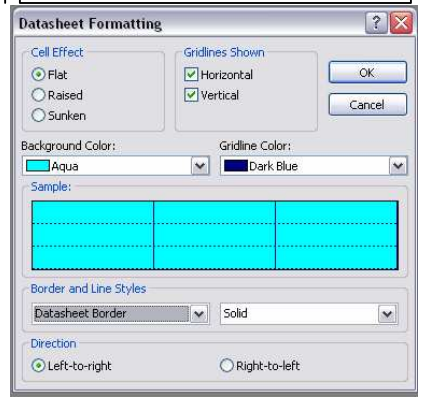
To meet the easy input requirements, relationships have been formed to allow sub-datasheets to be opened, in the example shown the end user can view as well as enter garage job details related to Employee ID 1

Victor specified in the ICT requirements section that the database should also be visually appealing, so I have made a change to from the design section to accommodate for this. As displayed in the screenshot on the right the font is Comic Sans MS, with regular font style, size 12, as well as blue in colour




To add to the visually appealing look, the datasheet has been formatted with an aqua background and dark blue grid lines, these are new formatting techniques I've learned during this project



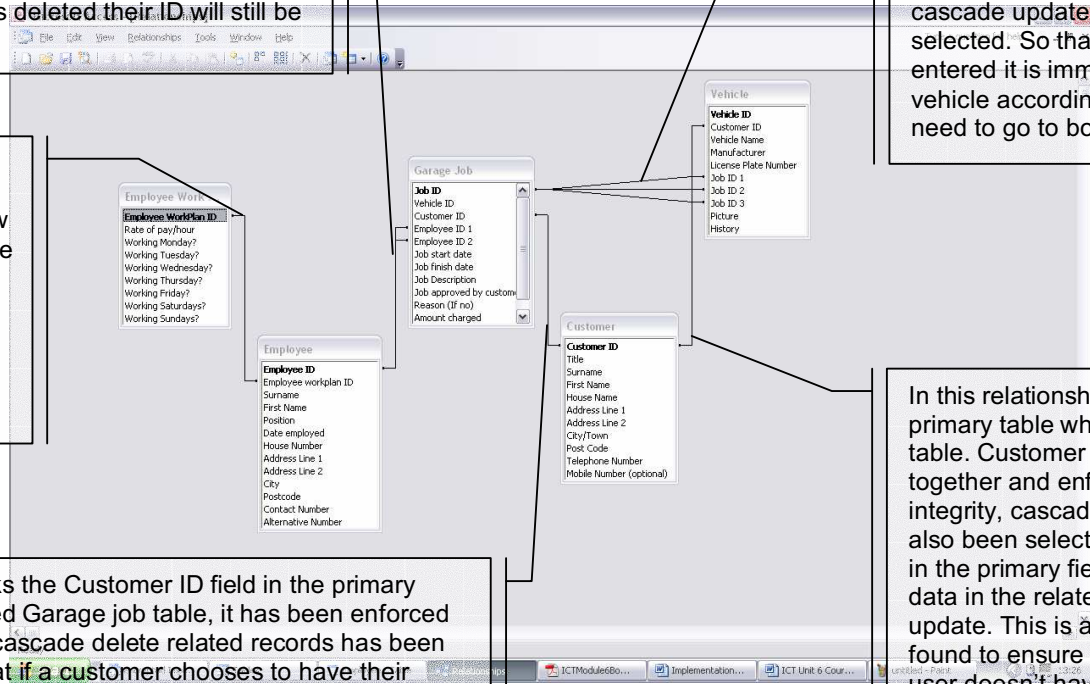
## *Relationships*

The following screenshot shows the relationship between the various tables in the system.

The selected relationship represents the link between the primary employee table with the related garage job table. The relationship has been enforced with referential integrity, and cascade delete related records have been selected. So if an employee leaves and his record is deleted their ID will still be shown on the garage job table.

This relationship entails Garage Job being the primary table and Vehicle the related table. This relationship has also been enforced with referential integrity, and cascade update related field has been selected. So that when a new job has been entered it is immediately linked with a vehicle accordingly, thus eliminating the need to go to both tables.

Here, Employee work plan is the primary table and employee table is the related table. This is to allow use of the list box (in the employee table), employee work plans can be selected with a drop down list, thus limiting human errors and meeting Victor's easy input requirements

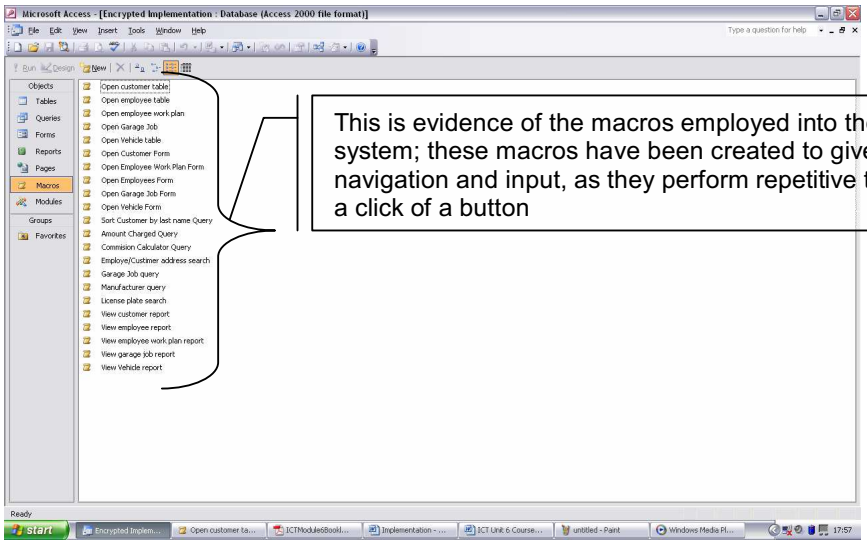



The indicated relationship links the Customer ID field in the primary Customer table and the related Garage job table, it has been enforced with referential integrity, and cascade delete related records has been selected. This is to ensure that if a customer chooses to have their details deleted information regarding the related jobs are not also lost, since they are still needed for commission calculation, invoicing, etc.

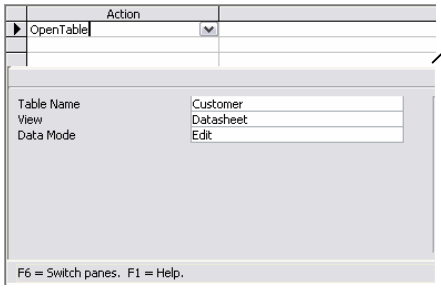
In this relationship the customer table is the primary table while vehicle is the related table. Customer ID has been linked together and enforced with referential integrity, cascade update related fields has also been selected ensure that when data in the primary field has been altered the data in the related table will automatically update. This is a new technique that I have found to ensure easier input, as the end user doesn't have to go to each table while updating

## *Macros*

The following screenshots show the macros included in the system

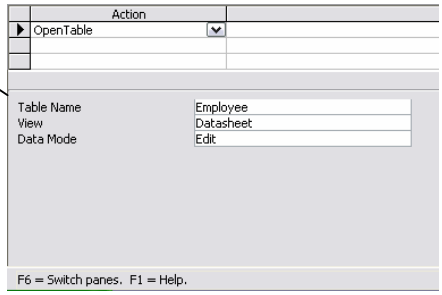


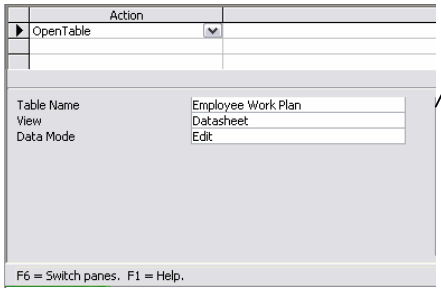

This is evidence of the macros employed into the system; these macros have been created to give easier navigation and input, as they perform repetitive tasks at a click of a button



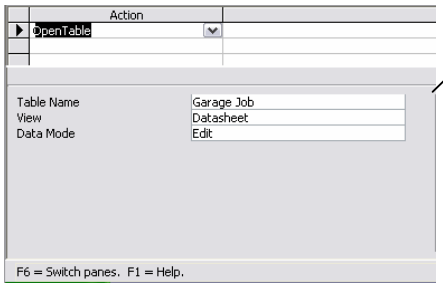

This is the design of the 'open customer table' macro. The actions are simple so that Victor's employees can alter them without difficulty. The data is shown as a datasheet for easy viewing, and is show in edit data mode so that records can be immediately opened and closed. This macro is placed on the table switchboard.

The adjacent screenshot is the design for the 'open employee table' macro. The only action required is 'OpenTable', and has been edited to open the employee table in datasheet and edit mode. This macro is also played on the table switchboard.



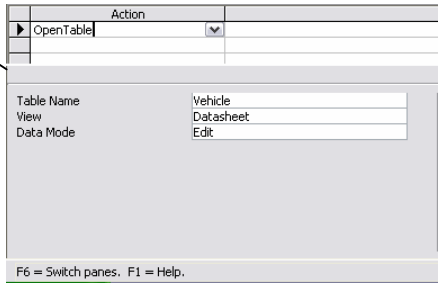



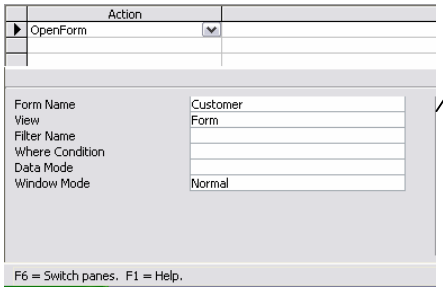

This is the design of the 'employee work plan table' macro. Just like the above macros as little macros as possible is used to reduce complexity, and save storage space. This macro can be accessed from the Table switchboard.




The screenshot on the right displays the 'open Garage Job table' macro design. To answer Victor's calls for easy database maintenance only one action has been created, which performs the simple task of opening the table from the table switchboard.

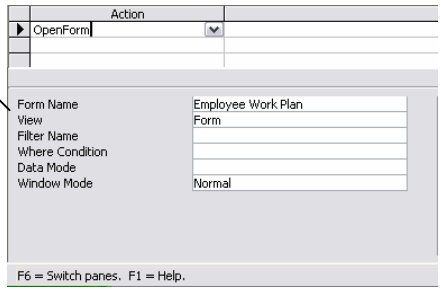
This is the design of the 'open vehicle table' macro. The actions are simple so that Victor's employees can alter them without difficulty. The data is shown as a datasheet for easy viewing, and is show in edit data mode so that records can be immediately opened and closed. This macro is placed on the table switchboard.

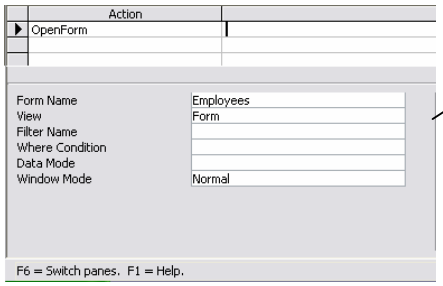


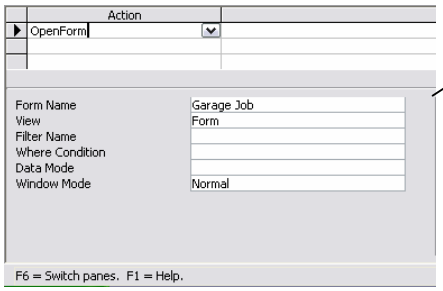

This is the design for the 'open customer form' macro. The simplistic action plan enables the form to be displayed in normal window view, which then allows the user to navigate through customer records as well as add new ones.

The adjacent screenshot is the design for the 'open employee work plan form' macro. The single action plan reduces the amount of storage space used, as well as opens the form, while being activated from the form switchboard.



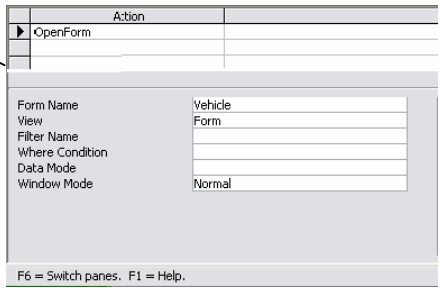



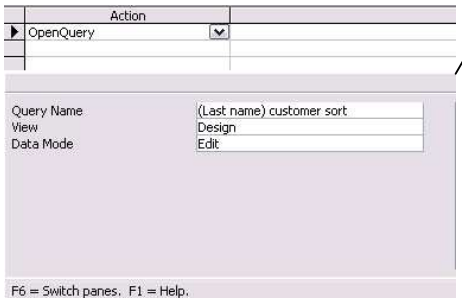

The screenshot on the left is the 'open employee form' macro design. The single action opens the form in form view and in normal window mode




The screenshot on the left shows the macro design for the 'open garage job form'. The single action can be activated from the form switchboard.

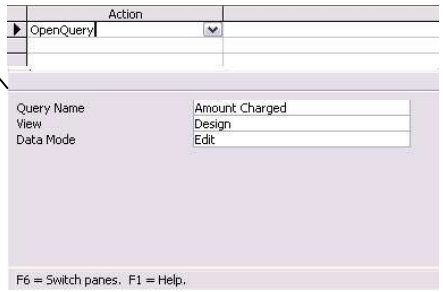
The adjacent screenshot is the design for the 'open vehicle form' macro. The single action plan reduces the amount of storage space used, as well as opens the form, while being activated from the form switchboard.

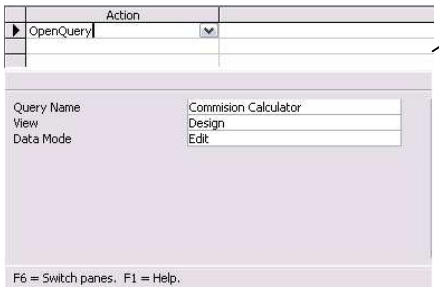


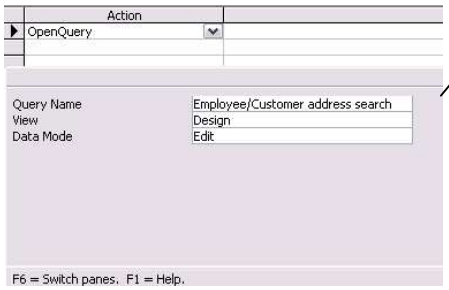

The screenshot on the left is the macro design for the 'Sort customer by last name query'. A descriptive name has been given to provide the user with an indication of what the query does, which can make the database less complex and more user friendly. This macro opens the query in edit mode so that the user can enter any additional parameters before clicking the search button.

The adjacent screen shot depicts the 'amount charged query' macro design. Just like virtually all macros in the database there's only one action to make any alterations to the design of the system an easier task. This function can be accessed from the Queries & Searches switchboard, the query will be shown in edit mode.



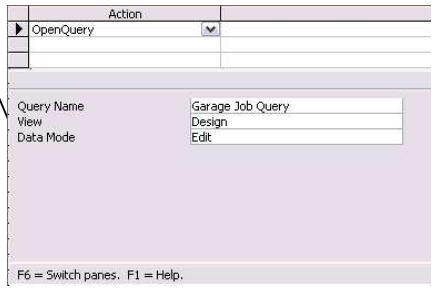



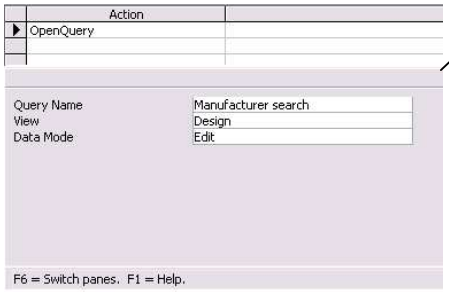

This is the 'Commission Calculator query' macro design, it doesn't specifically calculate the commission, and it activates the query that does that function. Upon activation from the Queries & Searches switchboard, the user will be prompted with the commission rate rather than view the design, since the parameters are fixed and don't require alteration so frequently.




The screenshot on the left is the macro design for activating the employee or customer address search in the design mode, to allow users to insert any extra rules.

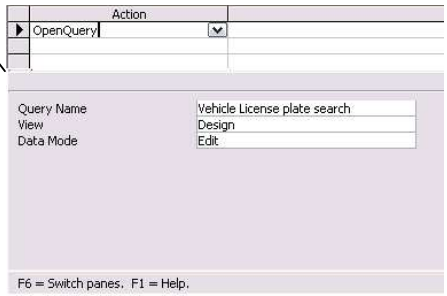
The adjacent screenshot illustrates the macro design for the 'garage job' query. There's only one action in place to reduce storage usage and make it easy for the end user to alter the query. This macro will be opened in the design view so that any extra parameters can be added.

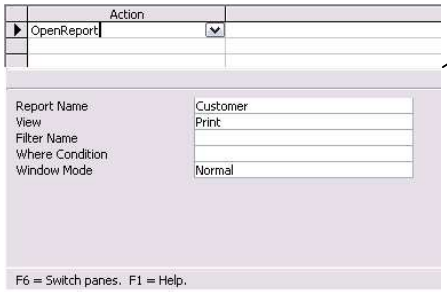


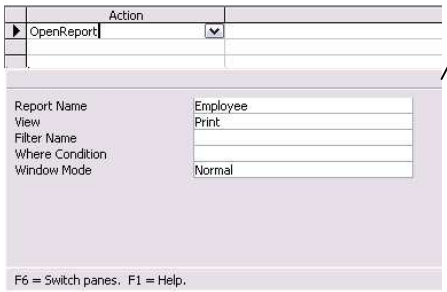

The left screenshot is the 'manufacturer search', which activates the design, which leads the execution of actually performing the query. The macro takes the user to the design stage, after selecting the macro from the searches & queries switchboard.

This is the 'vehicle License plate search' macro design, which takes the user to the design view of the query. Only one action is necessary which is advantageous when keeping storage to a minimum to allow the system to run smoothly. This macro can be activated from the searches & queries switchboard.



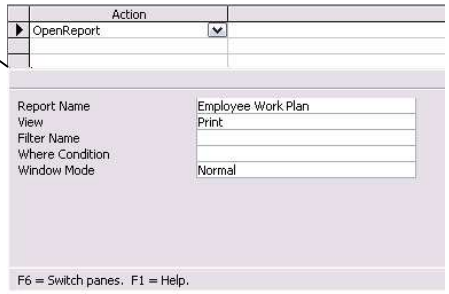



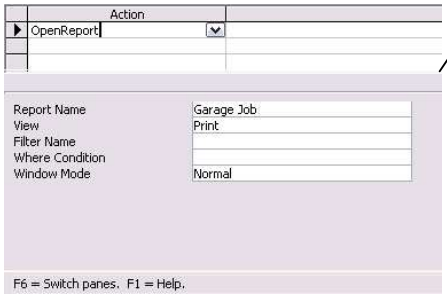

This screenshot shows the design of the 'open customer report' macro, which meets Victors request for easy navigation, since this macro takes the user straight to the customer report in normal view, after clicking the macro from the report switchboard




The adjacent screenshot is the macro design for the 'open employee report' macro. There's only one action, which ensures simplicity, and takes the user straight to the employee report after clicking the link from the report switchboard.

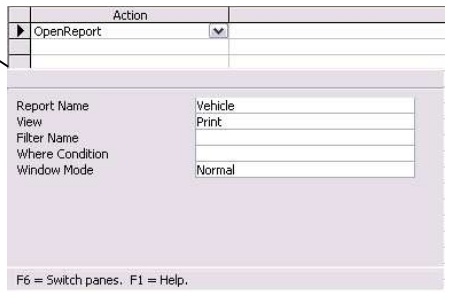
The screenshot on the right shows the macro design to open the employee work plan report. To simplify navigation the report can be accessed straight from the report switchboard in oppose to performing numerous sub-tasks.




This screenshot shows the design of the 'open garage job report' macro, which meets Victors request for easy navigation, since this macro takes the user straight to the garage job report in normal view, after clicking the macro from the report switchboard.

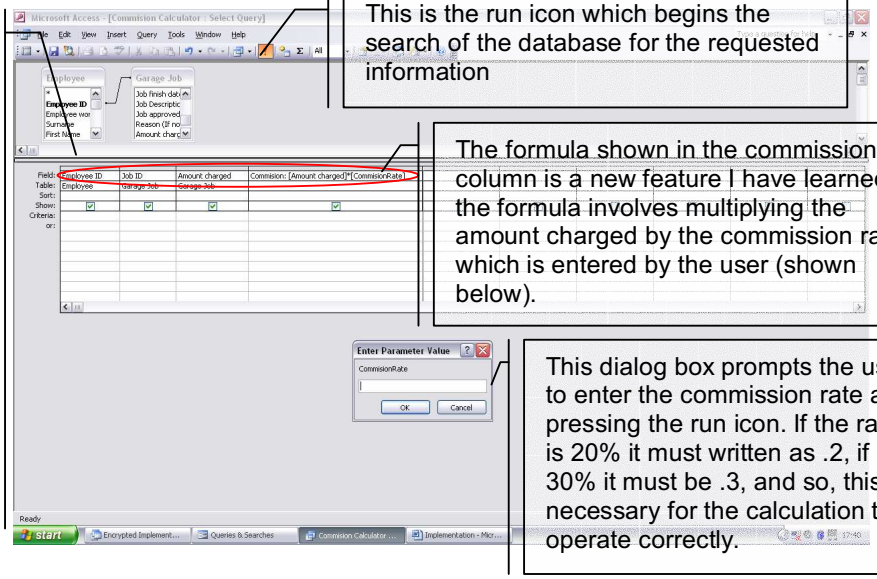
The adjacent screenshot is the macro design for the 'open vehicle report' macro. There's only one action, which ensures simplicity, and takes the user straight to the vehicle report after clicking the link from the report switchboard.



## *Queries*

The following screenshots show the queries contributing to the end solution:

These are the fields that will be shown to show relevant information concerning how much commission an employee is owed. Employee ID is necessary to identify the particular employee; Job ID to know which job the calculation is referring to; Amount charged shows the original price of the job; and Commission being the most important part since it illustrates the actual commission for that job.

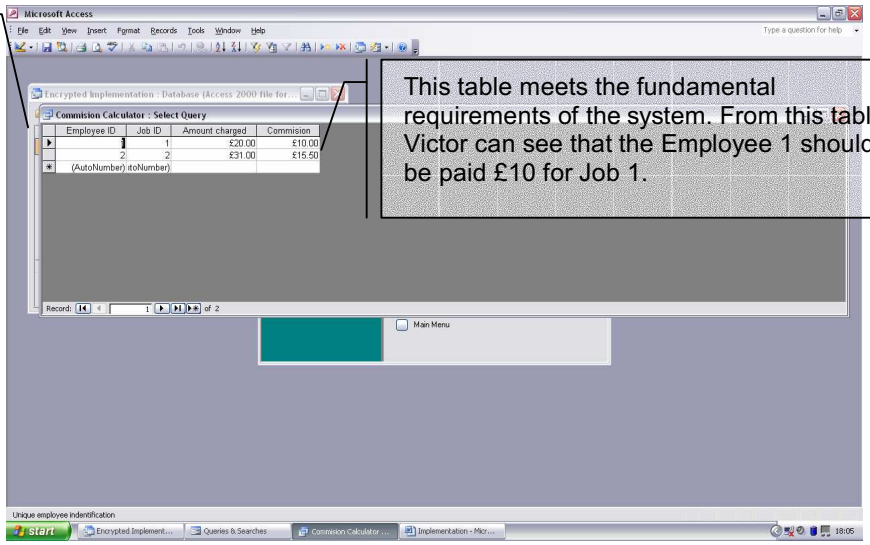



This is the run icon which begins the search of the database for the requested information

The formula shown in the commission column is a new feature I have learned, the formula involves multiplying the amount charged by the commission rate which is entered by the user (shown below).

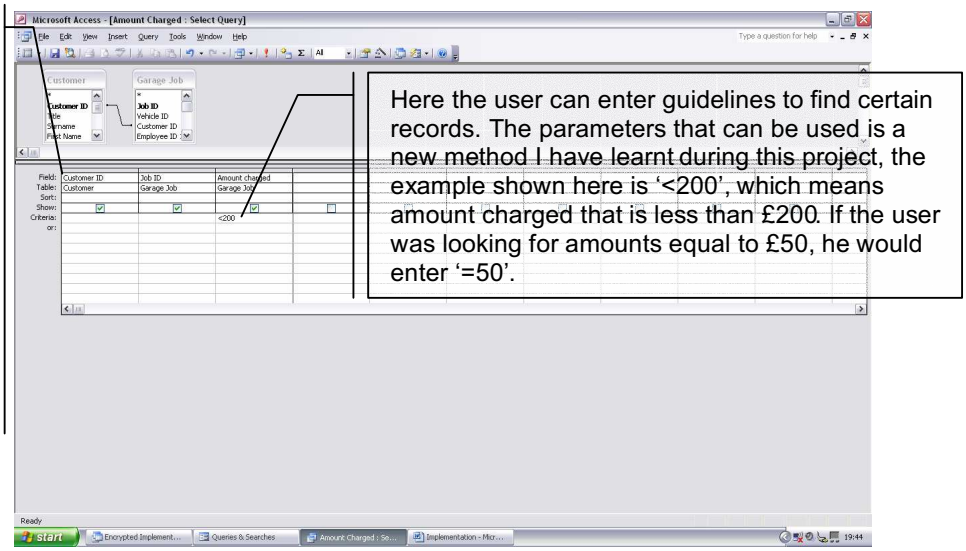
This dialog box prompts the user to enter the commission rate after pressing the run icon. If the rate is 20% it must written as .2, if 30% it must be .3, and so, this is necessary for the calculation to operate correctly.

This is an example of the end result. The commission rate was set to .5 (50%), and consequently the correct commission owed each employee was calculated.

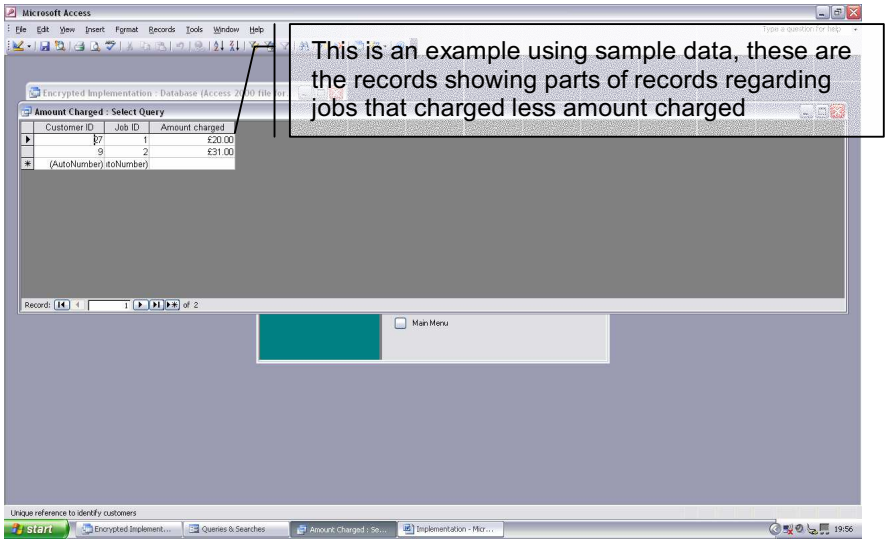



This table meets the fundamental requirements of the system. From this table Victor can see that the Employee 1 should be paid £10 for Job 1.

These are the fields relevant when attempting to find certain jobs within a specified amount charged range. The customer ID field is needed to know who the amount was charged to; Job ID is needed to see what job the amount was charged for; and amount charged is needed to apply the parameters to.

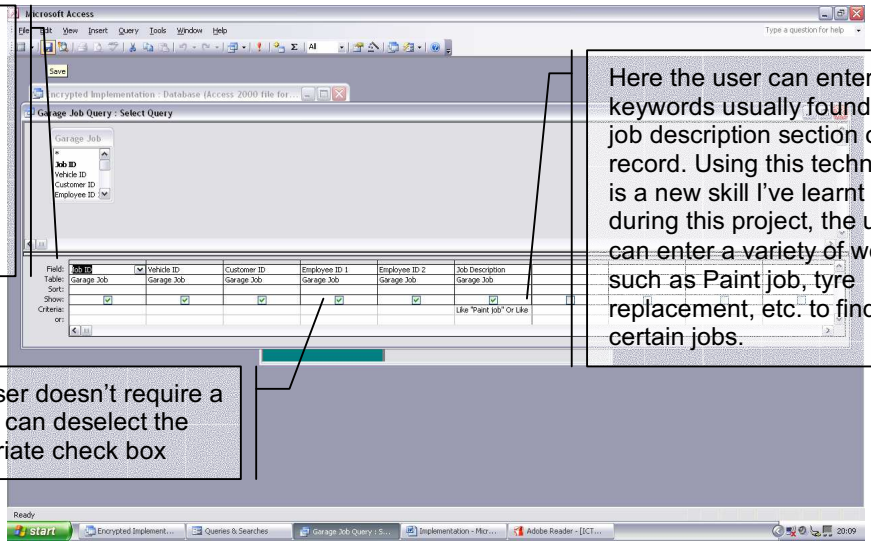



Here the user can enter guidelines to find certain records. The parameters that can be used is a new method I have learnt during this project, the example shown here is '<200', which means amount charged that is less than £200. If the user was looking for amounts equal to £50, he would enter '=50'.



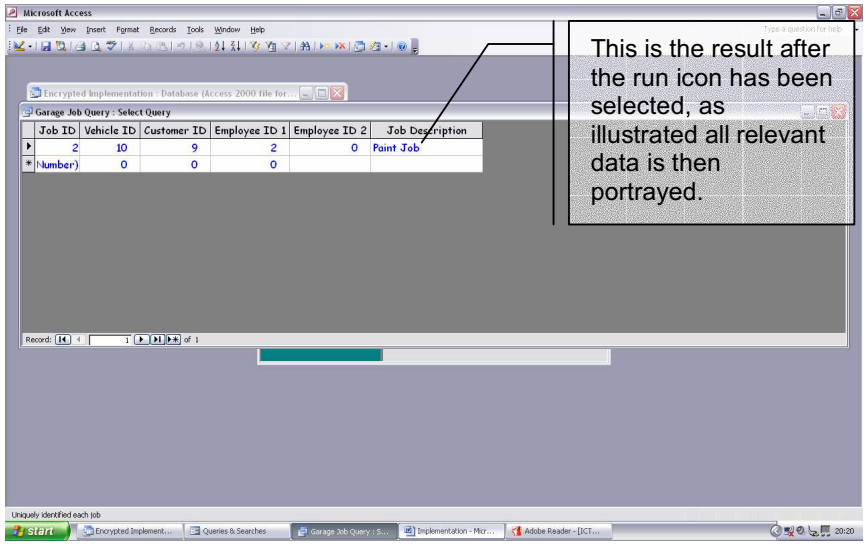

This is an example using sample data, these are the records showing parts of records regarding jobs that charged less amount charged

This is the query design for garage job searching. A garage job record can be found using any of the fields displayed, but the default field being used is job description in case the ID isn't known.



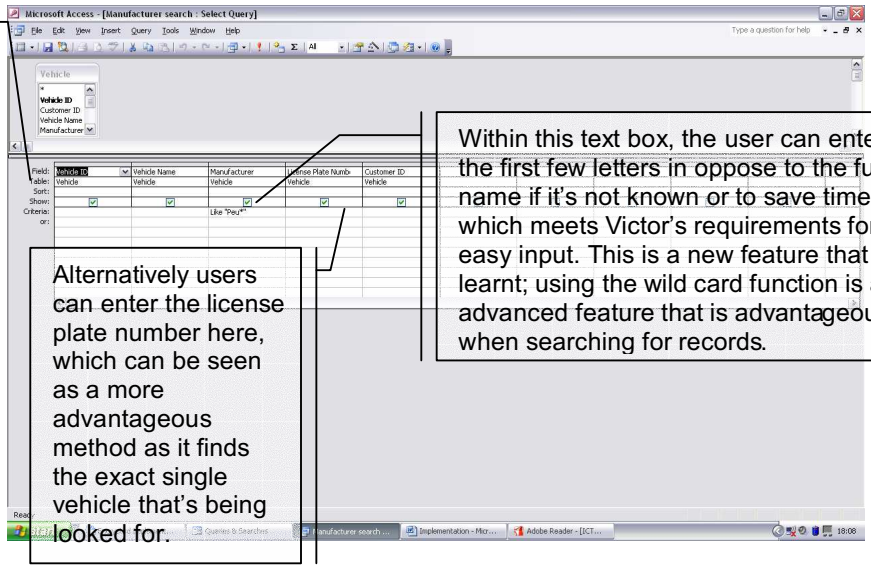

Here the user can enter keywords usually found in the job description section of a record. Using this technique is a new skill I've learnt during this project, the user can enter a variety of words such as Paint job, tyre replacement, etc. to find certain jobs.

If the user doesn't require a field he can deselect the appropriate check box



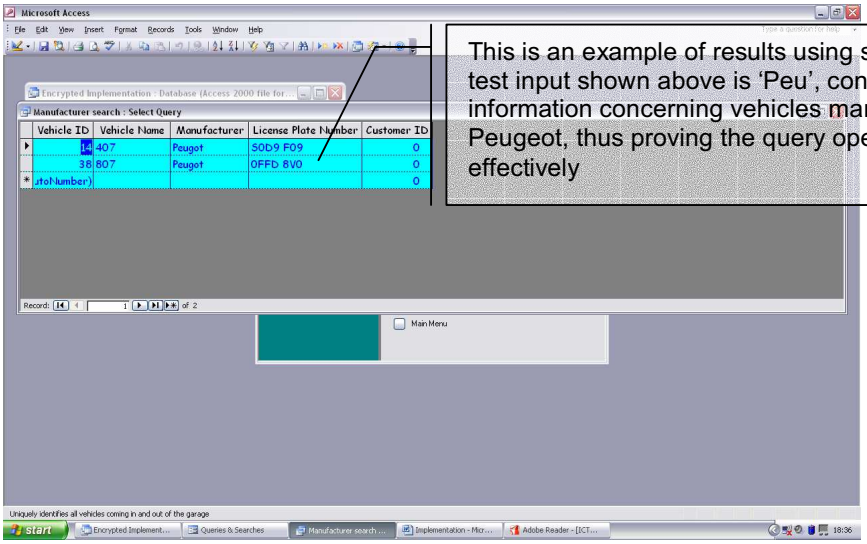

This is the result after the run icon has been selected, as illustrated all relevant data is then portrayed.

These are the necessary fields needed when the user is searching for cars made by specific manufacturers. The vehicle ID and name fields are needed to see what vehicle was made by the manufacturer; the licence plate and customer ID fields are required for identification purposes.



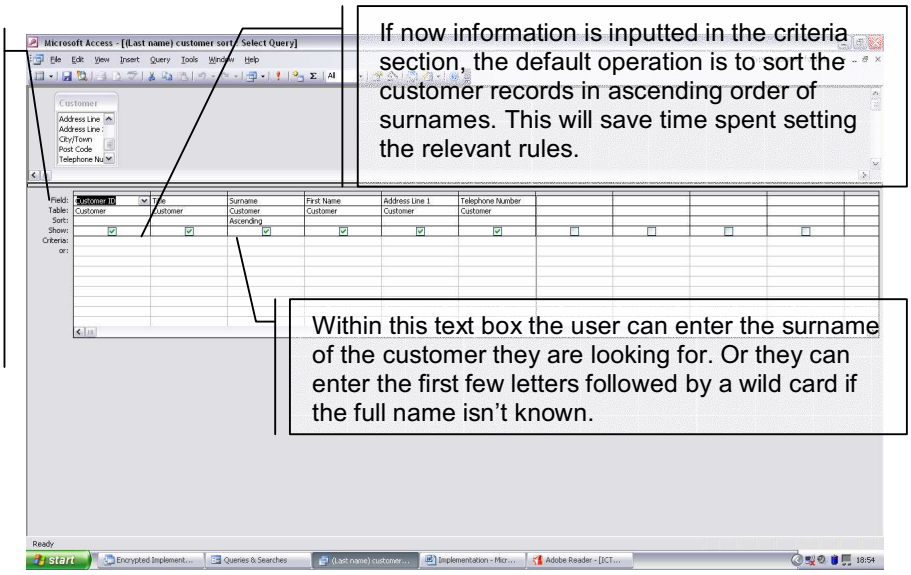

Within this text box, the user can enter the first few letters in oppose to the full name if it's not known or to save time, which meets Victor's requirements for easy input. This is a new feature that I've learnt; using the wild card function is an advanced feature that is advantageous when searching for records.

Alternatively users can enter the license plate number here, which can be seen as a more advantageous method as it finds the exact single vehicle that's being looked for.



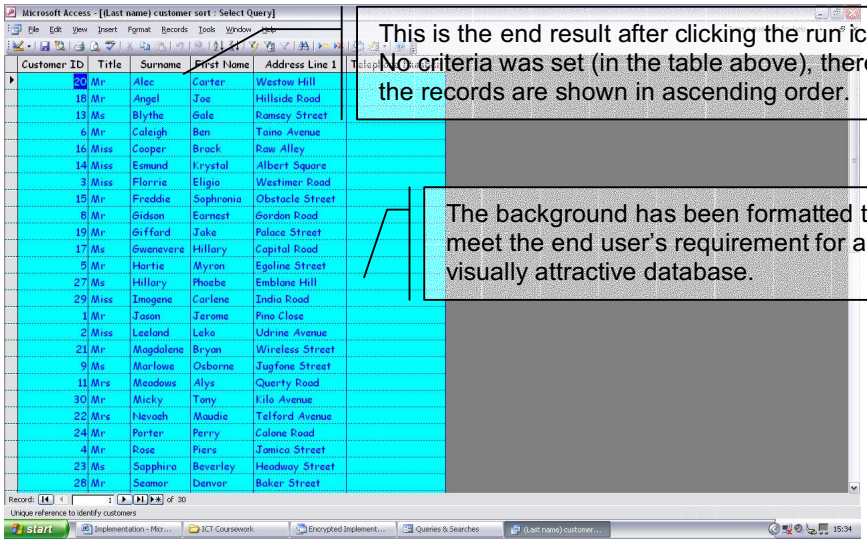

This is an example of results using sample data, the test input shown above is 'Peu', consequently information concerning vehicles manufactured by Peugeot, thus proving the query operates correctly and effectively

These are the necessary fields required when searching for customers by their last name. All the fields are in place to illustrate the methods of contact either by telephone, post or even word of mouth.




If now information is inputted in the criteria section, the default operation is to sort the customer records in ascending order of surnames. This will save time spent setting the relevant rules.

Within this text box the user can enter the surname of the customer they are looking for. Or they can enter the first few letters followed by a wild card if the full name isn't known.




| Customer ID | Title | Surname | First Name | Address Line 1 |
|---|---|---|---|---|
| 20 | Mr | Alec | Carter | Westow Hill |
| 18 | Mr | Angel | Joe | Hillside Road |
| 13 | Ms | Blythe | Gale | Ramsey Street |
| 6 | Mr | Caleigh | Ben | Taino Avenue |
| 16 | Miss | Cooper | Brock | Raw Alley |
| 14 | Miss | Esmund | Krystal | Albert Square |
| 3 | Miss | Florrie | Eligio | Westimer Road |
| 15 | Mr | Freddie | Sophronia | Obstacle Street |
| 8 | Mr | Gidson | Earnest | Gordon Road |
| 19 | Mr | Gifford | Jake | Palace Street |
| 17 | Ms | Gwenevere | Hillary | Capital Road |
| 5 | Mr | Hartie | Myron | Egoline Street |
| 27 | Ms | Hillary | Phoebe | Emblane Hill |
| 29 | Miss | Imogene | Carlene | India Road |
| 1 | Mr | Jason | Jerome | Pino Close |
| 2 | Miss | Leeland | Leko | Udrine Avenue |
| 21 | Mr | Magdalene | Bryan | Wireless Street |
| 9 | Ms | Marlowe | Osborne | Jugfone Street |
| 11 | Mrs | Meadows | Alys | Querty Road |
| 30 | Mr | Micky | Tony | Kilo Avenue |
| 22 | Mrs | Nevaeh | Maudie | Telford Avenue |
| 24 | Mr | Porter | Perry | Calone Road |
| 4 | Mr | Rose | Piers | Jamica Street |
| 23 | Ms | Sapphira | Beverley | Headway Street |
| 28 | Mr | Seamor | Denvor | Baker Street |

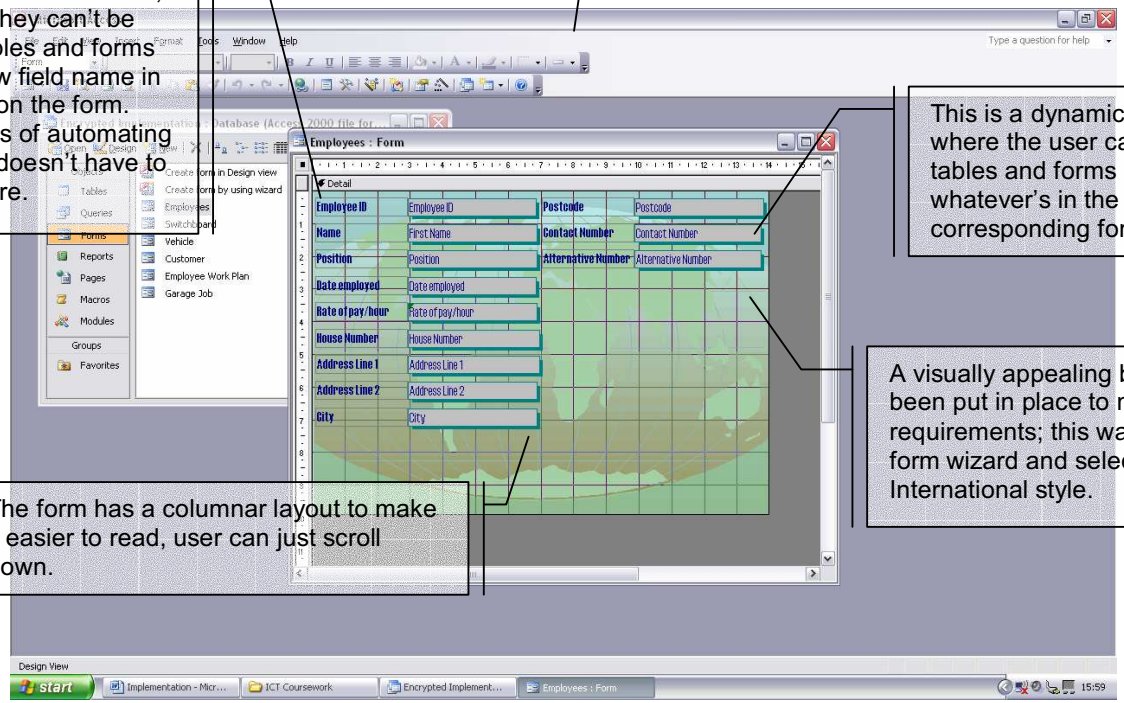
This is the end result after clicking the run icon. No criteria was set (in the table above), therefore the records are shown in ascending order.

The background has been formatted to meet the end user's requirement for a visually attractive database.

## *Forms*

This is a screenshot showing the design of all forms in the database using the design for the employee form as an example.

The text in bold represent the field names, and is static, meaning that they can't be changed or altered. The tables and forms are linked so if there's a new field name in the table it will also appear on the form. This meets the requirements of automating tasks, so that the end user doesn't have to change functions everywhere.

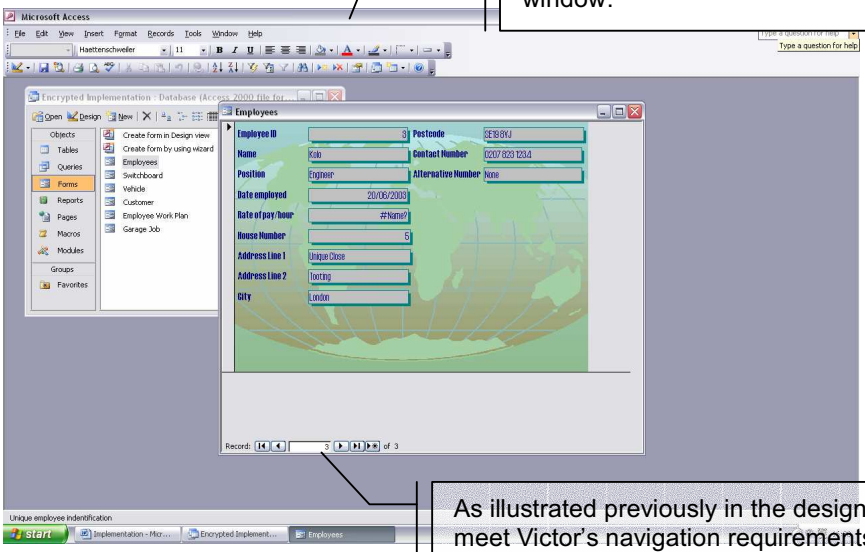



This is a dynamic text box complete with a shadow, where the user can enter relevant information. The tables and forms are associated with each other, so whatever's in the employee table will be in the corresponding form.

A visually appealing background has been put in place to meet the ICT requirements; this was created using the form wizard and selecting the International style.

The form has a columnar layout to make it easier to read, user can just scroll down.

This is the information shown in the previous page in form view. This screenshot represents all the other forms for the customer, vehicle, employee and employee work plan records, which can be seen to the left of the employee form window.



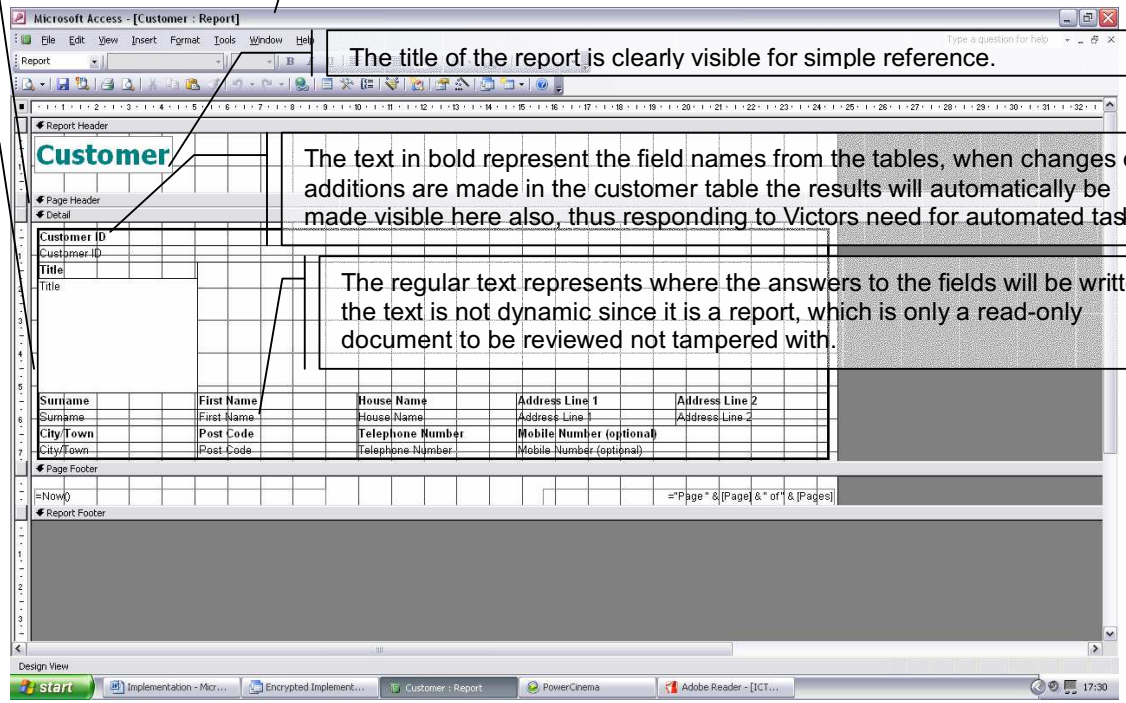

As illustrated previously in the design section, to meet Victor's navigation requirements, there are buttons here that can be used to flick through the records, as well as enter new ones

## *Reports*

This is the design view of the customer report, representing the reports for the employee, employee work plan, garage job and vehicle records, since they all the same.

The layout is justified to allow better viewing and reading.

The background is just plain white so that not much ink is needed when these reports are printed out, thus saving money and responding to Victor calls for a cost effective system.

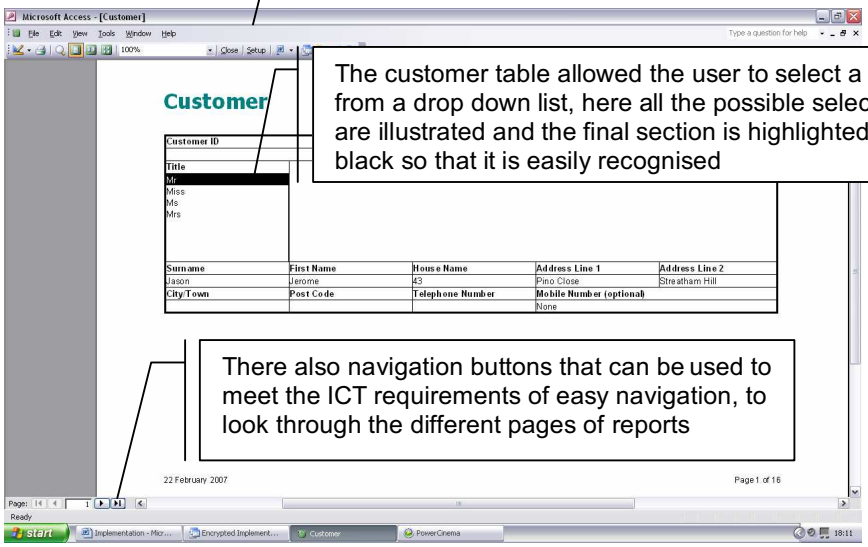



The title of the report is clearly visible for simple reference.

The text in bold represent the field names from the tables, when changes or additions are made in the customer table the results will automatically be made visible here also, thus responding to Victors need for automated tasks.

The regular text represents where the answers to the fields will be written, the text is not dynamic since it is a report, which is only a read-only document to be reviewed not tampered with.

This is the report view of the design shown on the previous page.

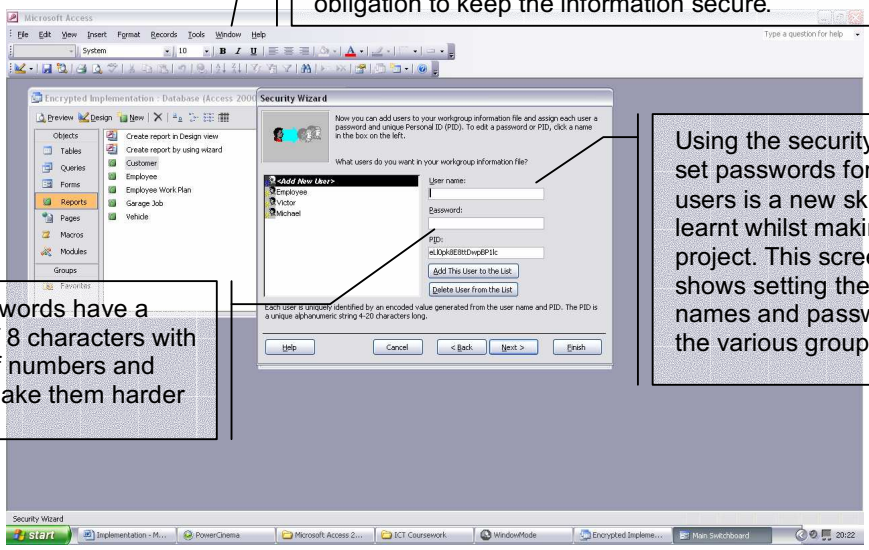



The customer table allowed the user to select a title from a drop down list, here all the possible selections are illustrated and the final section is highlighted in black so that it is easily recognised

There also navigation buttons that can be used to meet the ICT requirements of easy navigation, to look through the different pages of reports

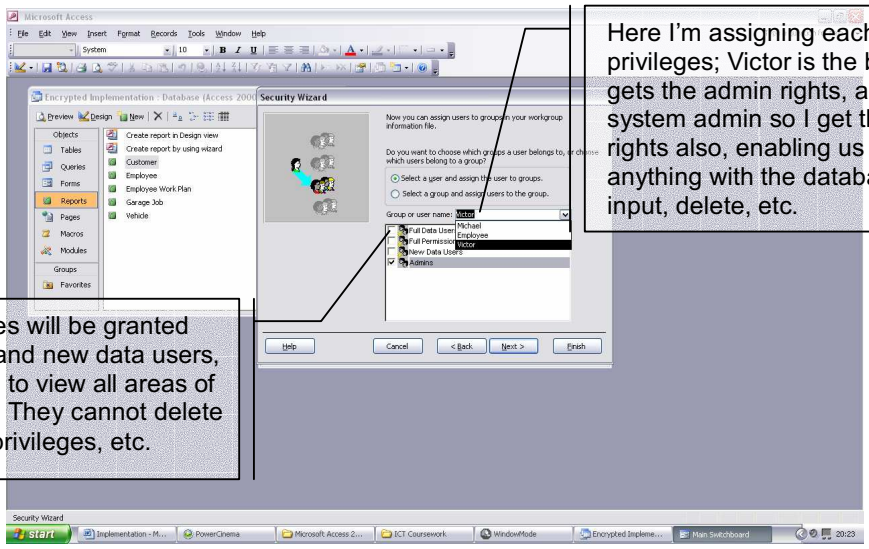
## *Security*

Security is an important issue as illustrated by the ICT requirements, since there's a lot of sensitive information on the database and it is a legal obligation to keep the information secure.



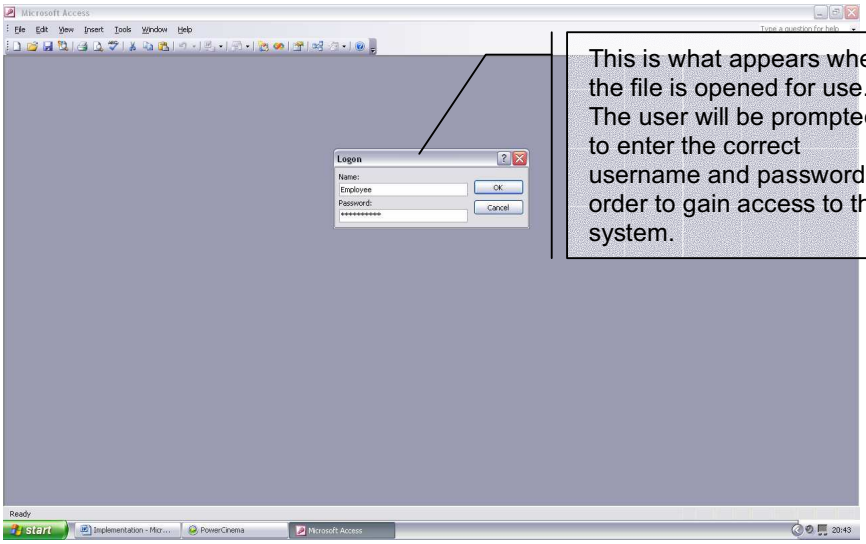

Using the security wizard to set passwords for different users is a new skill I've learnt whilst making this project. This screenshot shows setting these user names and passwords for the various groups

All the passwords have a minimum of 8 characters with a mixture of numbers and letters, to make them harder to crack.



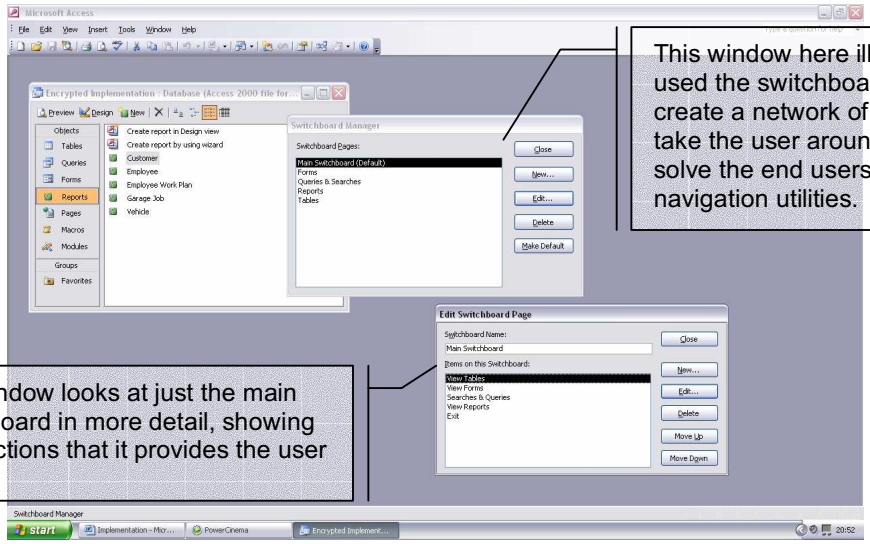

Here I'm assigning each worker their privileges; Victor is the boss so he gets the admin rights, and I am in the system admin so I get the same rights also, enabling us to do anything with the database e.g. read, input, delete, etc.

The employees will be granted with full data and new data users, allowing them to view all areas of the database. They cannot delete data, assign privileges, etc.



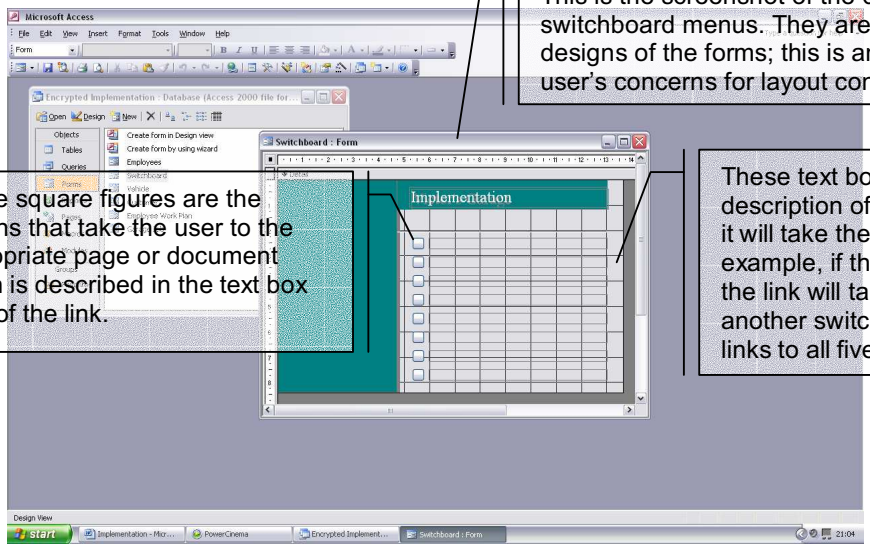

This is what appears when the file is opened for use. The user will be prompted to enter the correct username and password in order to gain access to the system.

## *Switchboards*




This window here illustrates how I have used the switchboard manager to create a network of switchboards that take the user around the system and solve the end users need for sufficient navigation utilities.

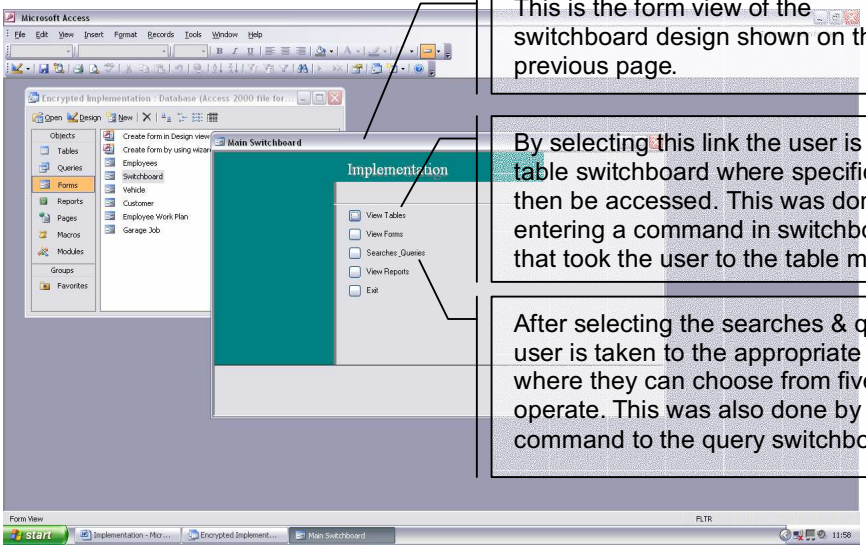
This window looks at just the main switchboard in more detail, showing the functions that it provides the user with.




This is the screenshot of the design of all the switchboard menus. They are very similar to the designs of the forms; this is an answer to the end user's concerns for layout consistency.

These square figures are the buttons that take the user to the appropriate page or document which is described in the text box right of the link.

These text boxes contain the description of where link left of it will take the user. For example, if the text says tables, the link will take the user to another switchboard contain links to all five specific tables.




This is the form view of the switchboard design shown on the previous page.

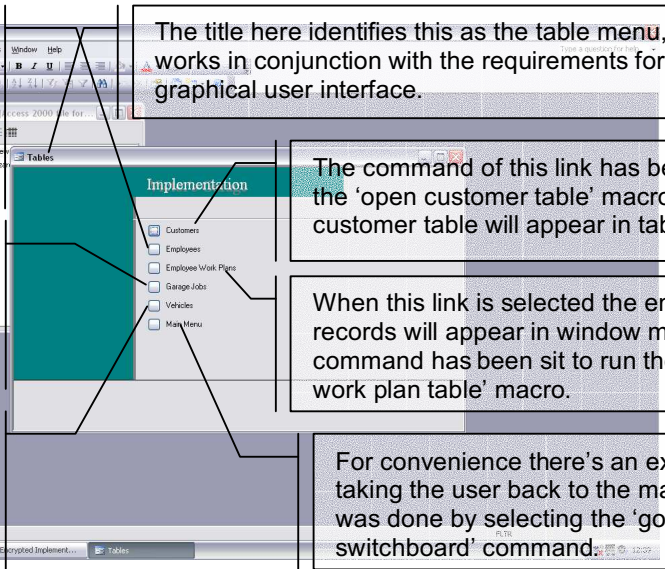
By selecting this link the user is taken to the table switchboard where specific tables can then be accessed. This was done by simply entering a command in switchboard manager that took the user to the table menu

After selecting the searches & queries link, the user is taken to the appropriate switchboard where they can choose from five queries to operate. This was also done by editing the command to the query switchboard.

When this link is selected the records of the employees appear in normal table view, since the command has been edited to run the 'open employee table' macro.

The command of this link involves running the 'open garage job table'; after this link is clicked the garage job table will appear in table view.

When this link is selected the records of the vehicles appear in normal table view, since the command in switchboard manager has been set to run the 'open vehicle table' macro.

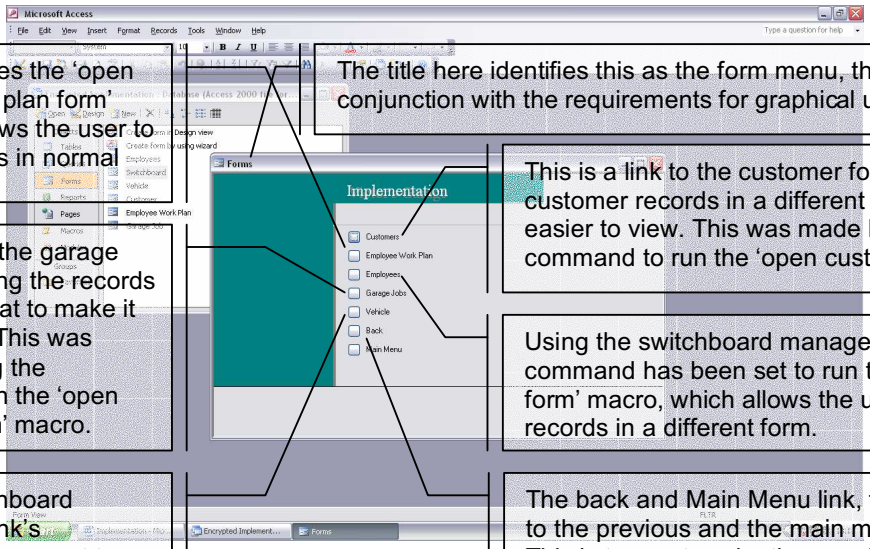



The title here identifies this as the table menu, this works in conjunction with the requirements for graphical user interface.

The command of this link has been edited to run the 'open customer table' macro, when clicked the customer table will appear in table view.

When this link is selected the employee work plan records will appear in window mode, since the command has been sit to run the 'open employee work plan table' macro.

For convenience there's an extra link here taking the user back to the main menu. This was done by selecting the 'go back to the main switchboard' command.




This link activates the 'open employee work plan form' macro, and allows the user to view the records in normal form view.

The title here identifies this as the form menu, this works in conjunction with the requirements for graphical user interface.

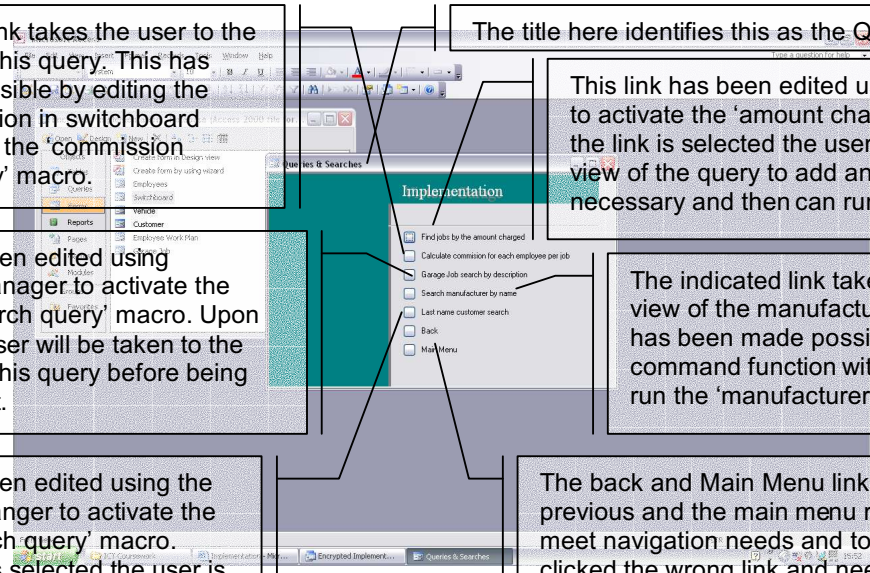
This is a link to the customer form, showing customer records in a different format to make it easier to view. This was made by setting the command to run the 'open customer form' macro.

This is a link to the garage job form, showing the records in a varied format to make it easier to view. This was made by setting the command to run the 'open garage job form' macro.

Using the switchboard manager, this link's command has been set to run the 'open employee form' macro, which allows the user to view the records in a different form.

Using the switchboard manager, this link's command has been set to run the 'open vehicle form' macro, which allows the user to view the records in a different form.

The back and Main Menu link, take the user back to the previous and the main menu respectively. This is to meet navigation needs and to aid the user if he has clicked the wrong link and needs to go back.




The indicated link takes the user to the design view of this query. This has been made possible by editing the command function in switchboard manager to run the 'commission calculator query' macro.

The title here identifies this as the Queries & Searches menu.

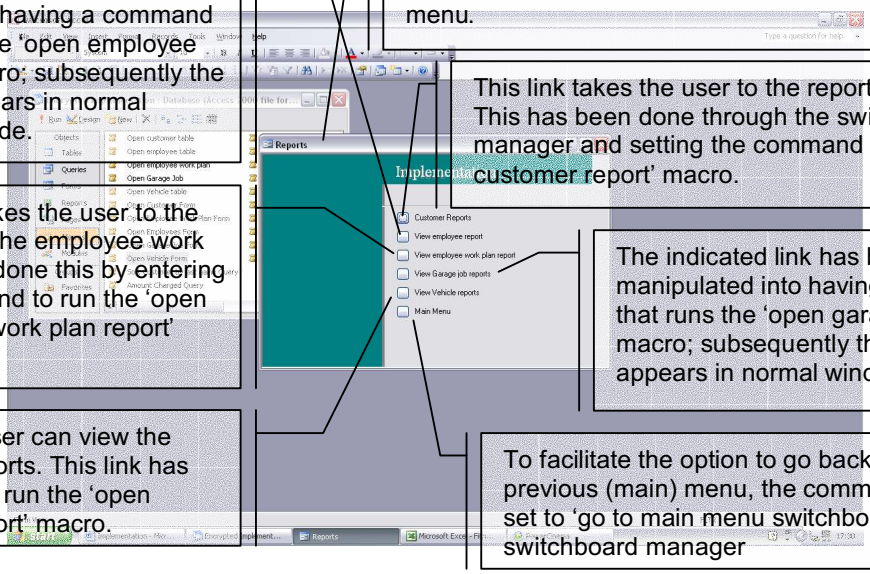
This link has been edited using switchboard manager to activate the 'amount charged query' macro. When the link is selected the user is taken to the design view of the query to add any extra parameters if necessary and then can run it.

This link has been edited using switchboard manager to activate the 'garage job search query' macro. Upon selection, the user will be taken to the design view of this query before being allowed to run it.

The indicated link takes the user to the design view of the manufacturer search query. This has been made possible by editing the command function with switchboard manager to run the 'manufacturer query' macro.

This link has been edited using the switchboard manger to activate the 'customer search query' macro. When the link is selected the user is taken to the design view of the query to add any extra rules if necessary and then they can run it.

The back and Main Menu link, take the user back to the previous and the main menu respectively. This is to meet navigation needs and to aid the user if he has clicked the wrong link and needs to go back.




The indicated link has been devised by having a command that runs the 'open employee report' macro; subsequently the report appears in normal window mode.

The title here identifies this as the Queries & Searches menu.

This link takes the user to the reports on customers. This has been done through the switchboard manager and setting the command to run the 'open customer report' macro.

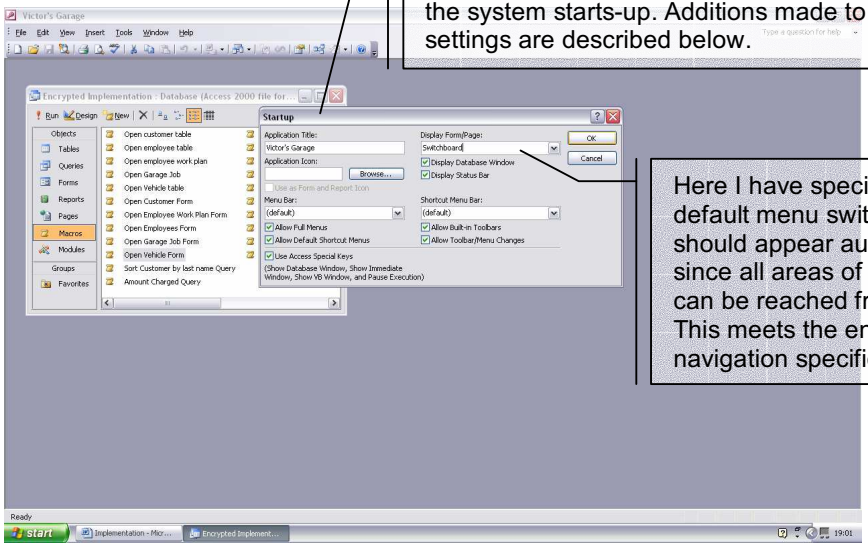
This link takes the user to the reports on the employee work plans. I've done this by entering the command to run the 'open employee work plan report' macro.

The indicated link has been manipulated into having a command that runs the 'open garage job report' macro; subsequently the report appears in normal window mode.

Here the user can view the vehicle reports. This link has been set to run the 'open vehicle report' macro.

To facilitate the option to go back to the previous (main) menu, the command has been set to 'go to main menu switchboard' using the switchboard manager

## *Database Start-up*




This window shows the configurations made for when the system starts-up. Additions made to the default settings are described below.

Here I have specified that the default menu switchboard should appear automatically, since all areas of the system can be reached from this point. This meets the end users navigation specifications.

# Testing

## *Test plan table*

| | Test Description | Test Data | Expected Outcome | Actual Outcome | Corrective Action |
|---|---|---|---|---|---|
| T1 | Make sure the customer table can hold more than 500 records | 500 customer records | Accepted and save | Passed - All records are saved | |
| T2 | Make sure the garage job tables should be able to hold over 2000 records | 2001 garage job records | Accepted and save | Passed - All records are saved | |
| T3 | Make sure at least 50 employees can be put in the employees table | 51 employee records | Accepted and saved | Passed - All records are saved | |
| T4 | To test the name fields only allow text with a maximum of 20 characters | Credible (typical) | Accepted and saved | Passed – Accepted and saved | |
| T5 | | Delilayabejaba blesans (boundary) | Accepted and saved | Passed – system stops any extra characters from being entered | |
| T6 | To make sure data subject data can be reached in less than 5 clicks | Use user interface to access information an employee | Information reached in 3 clicks | Passed – employee data subjects reached in 3 clicks | |
| T7 | Make sure all date fields allow only long dates | 12 March 2007 (typical) | Accepted and saved | Passed – accepted and saved | |
| T8 | | 12/03/07 (erroneous) | Validation text appears | Passed – the user is prompted with a window | |
| T9 | Test that all dates are in the year 2007 | 12 May 2007 (typical) | Accepted and saved | Failed – only 2006 entries accepted | **See corrective action 1** |
| T10 | | 1 January 2007 (extreme) | Validation box appears to check entry | Failed – only 2006 entries accepted | |
| T11 | | 2 June 2004 (erroneous) | Validation text appeared | Passed – input not accepted | |
| T12 | Make sure the house number field only three of less characters | 252 (typical) | Accepted and saved | Passed – changes are accepted | |
| T13 | | 999 (extreme) | Accepted and saved | Passed – accepted and saved | |

| | | | | | |
|---|---|---|---|---|---|
| T14 | | Three hundred and thirty nine (erroneous) | Validation text appears | Passed – user is prevented from saving this entry | |
| T15 | Make sure all postcodes begin with 'S' and are 8 characters long | SW18 4CH (typical) | Accepted and saved | Passed – accepted and saved | |
| T16 | | EW18 4CH (erroneous) | Validation text appears | Passed – user is prompted with text box | |
| T17 | Test that the database only allows house numbers containing 11 numbers | 02072324545 (typical) | Accepted and saved | Passed – entry is accepted | |
| T18 | | 071072324545 9 (erroneous) | Validation text appears | Passed – further entry is prohibited | |
| T19 | To test that the maximum amount to be paid per hour is £10 | 7 (typical) | Accepted and saved | Passed – changes are accepted | |
| T20 | | 10 (extreme) | Accepted and saved | Passed – changes are saved | |
| T21 | | 50 (erroneous) | Validation text appears | Passed – user is prompted to change entry | |
| T22 | Test that the open customer table macro works | Click the macro on the table switchboard | Customer table opens in table view | Customer table appears | |
| T23 | Test that the open employee table macro operates accordingly | | Employee table opens in table view | Employee table appears | |
| T24 | Test that the open employee work plan table macro works | | Employee work plan table opens in table view | Employee work plan table appears | |
| T25 | Test that the open garage job table macro operates accordingly | | Garage job table opens in table view | Garage job table appears | |
| T26 | Test that the open vehicle table macro works upon selection | | Vehicle table opens in table view | Vehicle table appears | |
| T27 | Check the open customer form functions correctly | Click the corresponding link on the form switchboard | Customer form opens in form view | Customer form appears | |
| T28 | Check the open employee work plan form works appropriately | | Employee work plan form opens in normal form view | Employee work plan form appears | |
| T29 | Check the open employee form functions correctly | | Employee form opens in normal form view | Employee form appears | |

| | | | | | |
|---|---|---|---|---|---|
| T30 | Check the open garage job form works appropriately | Click the corresponding link on the form switchboard | Garage job form opens in normal form view | Garage job form appears | |
| T31 | Check the open vehicle form functions correctly | | Vehicle from opens in normal form view | Vehicle form appears | |
| T32 | Verify the open customer sort query macro works correctly | Click the Macro on the query switchboard | Customer sort query opens in design view | Design view of customer query appears | |
| T33 | Verify the open amount charged query macro runs appropriately | | Amount charged query opens in design view | Design view of the query appears | |
| T34 | Verify the open commission calculator query macro works correctly | | Commission calculator query opens in design view | Design view of commission calculator appears | |
| T35 | Verify the employee/customer address query macro runs appropriately | | Employee/Customer address search query opens in design view | Design view of query appears | |
| T36 | Verify the garage job query macro works correctly | | Garage job query opens in design view | Design of garage job query appears | |
| T37 | Check the view customer report macro works correctly | Click the corresponding link on the report switchboard | Customer report opens in print preview mode | Customer report appears | |
| T38 | Check the view employee report operates correctly | | Employee report opens in print preview mode | Employee report appears | |
| T39 | Check the view employee work plan report macro works correctly | | Employee work plan report opens in print preview mode | Employee work plan report appears | |
| T40 | Check the view garage job report operates correctly | | Garage job report opens in print preview mode | Garage job report appears | |
| T41 | Check the view vehicle report macro works correctly | | Vehicle report opens in print preview mode | Vehicle report appears | |
| T42 | Check the amount charged query operates effectively | Search for jobs charging over £400 | 3 job test data records appear | 3 garage job records are illustrated | |

| | | | | | |
|---|---|---|---|---|---|
| T43 | Test the commission calculator query | Job charging £100 with a commission rate of 10% | £10 commission produced | Failed – error message appears under commission field | **See Corrective Action 2** |
| T44 | Test the manufacturer search query works correctly | Search for Peugeot cars on record by just typing: 'Peu*' | Vehicle manufactured by Peugeot are displayed on screen | Passed – all Peugeot cars are shown | |
| **T45** | **Verify the licence plate search query functions appropriately** | **Search for a pre-specified licence plate** | **The corresponding vehicle record is displayed** | **Passed – record of the 406 Renault with the specified licence plate appears** | |

## *Test Evidence*

The following screenshots accompanied by text provides evidence for the tests that are successful. After each type of test the user input has been included in the form of a user comment, at the end of the section a summary is given based on the questionnaire which can be found in the appendix.

**T1**

I didn't have 500 real records available, so I have copied and pasted the original 30 records numerous times until 500 records had been replicated


| Customer ID | Title | Surname | First Name | House Name | Address Line 1 | Address Line 2 | City/Town | Post Code | Telephone Number | Mobile Number (option |
|---|---|---|---|---|---|---|---|---|---|---|
| 476 | Mrs | Nevaeh | Maudie | 56 | Telford Avenue | Bottomfield | | | | None |
| 477 | Ms | Sapphira | Beverley | 64 | Headway Street | Kingston | | | | None |
| 478 | Mr | Porter | Perry | 35A | Calone Road | Chelsea | | | | None |
| 479 | Miss | Van | Bertram | 187 | Speaker Avenue | Islington | | | | None |
| 480 | Ms | Xavier | Lashonda | 56 | Conary Road | Fulham | | | | None |
| 481 | Ms | Hillary | Phoebe | 134 | Emblane Hill | Grimsby | | | | None |
| 482 | Mr | Seamor | Denvor | 109 | Baker Street | Crystal Palace | | | | None |
| 483 | Miss | Imogene | Carlene | 58 | India Road | Brixton | | | | None |
| 484 | Mr | Tyrll | Max | 34 | Gordon Street | South Norwood | | | | None |
| 485 | Ms | Blythe | Gale | 167 | Ramsey Street | Carlisle | | | | None |
| 486 | Miss | Esmund | Krystal | 16A | Albert Square | Kent | | | | None |
| 487 | Mr | Freddie | Sophronia | 34B | Obstacle Street | West Norwood | | | | None |
| 488 | Miss | Cooper | Brack | 126 | Raw Alley | Clapham | | | | None |
| 489 | Ms | Gwenevere | Hillary | 73 | Capital Road | Balham | | | | None |
| 490 | Mr | Angel | Joe | 193 | Hillside Road | Camden | | | | None |
| 491 | Mr | Giffard | Jake | 124 | Palace Street | Penge | | | | None |
| 492 | Mr | Alec | Carter | 132 | Westow Hill | Norbury | | | | None |
| 493 | Mr | Magdalene | Bryan | 12 | Wireless Street | Lympstone | | | | None |
| 494 | Mrs | Nevaeh | Maudie | 56 | Telford Avenue | Bottomfield | | | | None |
| 495 | Ms | Sapphira | Beverley | 64 | Headway Street | Kingston | | | | None |
| 496 | Mr | Porter | Perry | 35A | Calone Road | Chelsea | | | | None |
| 497 | Miss | Van | Bertram | 187 | Speaker Avenue | Islington | | | | None |
| 498 | Ms | Xavier | Lashonda | 56 | Conary Road | Fulham | | | | None |
| 499 | Ms | Hillary | Phoebe | 134 | Emblane Hill | Grimsby | | | | None |
| 500 | Mr | Seamor | Denvor | 109 | Baker Street | Crystal Palace | | | | None |

This is evidence, showing the 500th customer record, the changes were immediately saved without any problems.

**T2**

Victor's Garage - [Garage Job : Table]

| Job ID | Vehicle ID | Customer ID | Employee ID 1 | Employee ID 2 | Job start date | Job finish date | Job Description | Job approved by customer? | Reason (I |
|---|---|---|---|---|---|---|---|---|---|
| 1978 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1979 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1980 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1981 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1982 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1983 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1984 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1985 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1986 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1987 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1988 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1989 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1990 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1991 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1992 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1993 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1994 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1995 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1996 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1997 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 1998 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 1999 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| 2000 | 10 | 9 | 2 | 0 | 04 August 2006 | 05 August 2006 | Paint Job | ☑ | |
| 2001 | 8 | 27 | 1 | 2 | 04 August 2006 | 08 August 2006 | 15" wheel replacement | ☑ | |
| Number) | 0 | 0 | 0 | | | | | ☐ | |

Record: 1959 of 1982

Identifies a vehicle

I didn't have 2001 real records available, so I have copied and pasted the original 3 (test) records numerous times until 2001 records had been replicated

This is evidence, showing the 2001st garage job record, the changes were immediately saved without any problems.

**T3**

Victor's Garage - [Employee : Table]

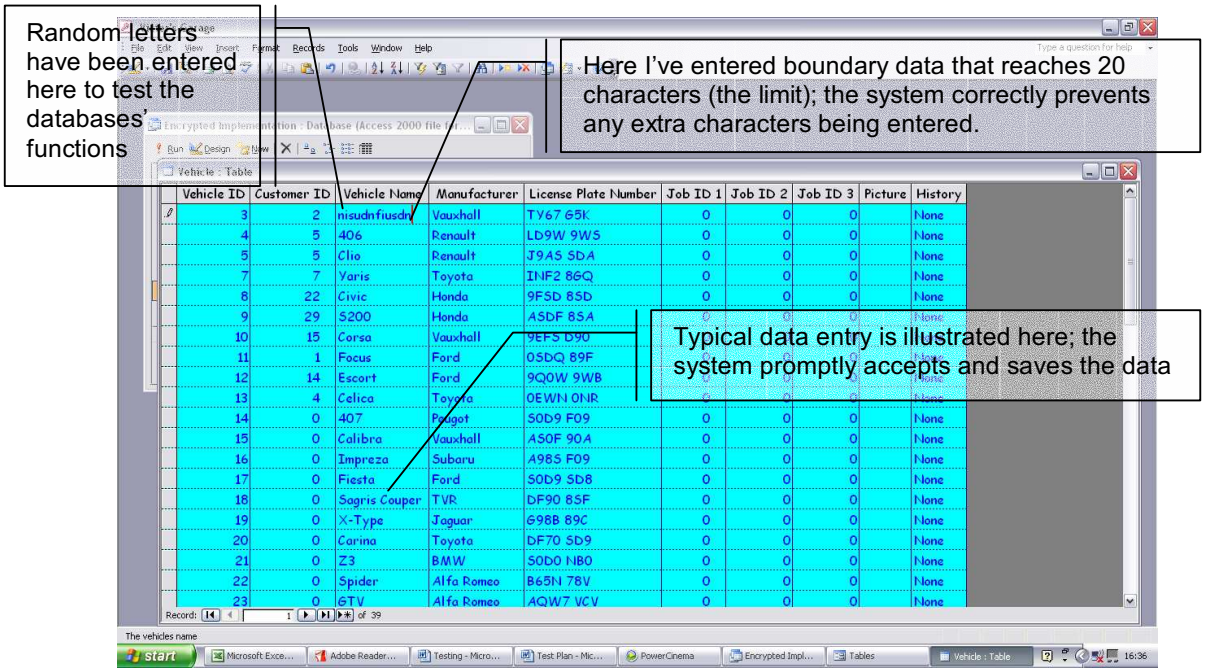
| Employee ID | Employee workplan ID | Surname | First Name | Position | Date employed | House Number | Address Line 1 | Address Line 2 | City | Po |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 7 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |
| 8 | 1 | Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW |
| 9 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 10 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |
| 11 | 1 | Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW |
| 12 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 13 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |
| 14 | 1 | Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW |
| 15 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 16 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |
| 17 | 1 | Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW |
| 18 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 19 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |
| 20 | 1 | Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW |
| 21 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 22 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |
| 23 | 1 | Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW |
| 24 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 25 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |
| 26 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 27 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |
| 28 | 1 | Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW |
| 29 | 2 | Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW |
| 30 | 1 | Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE |

Record: 5 of 29

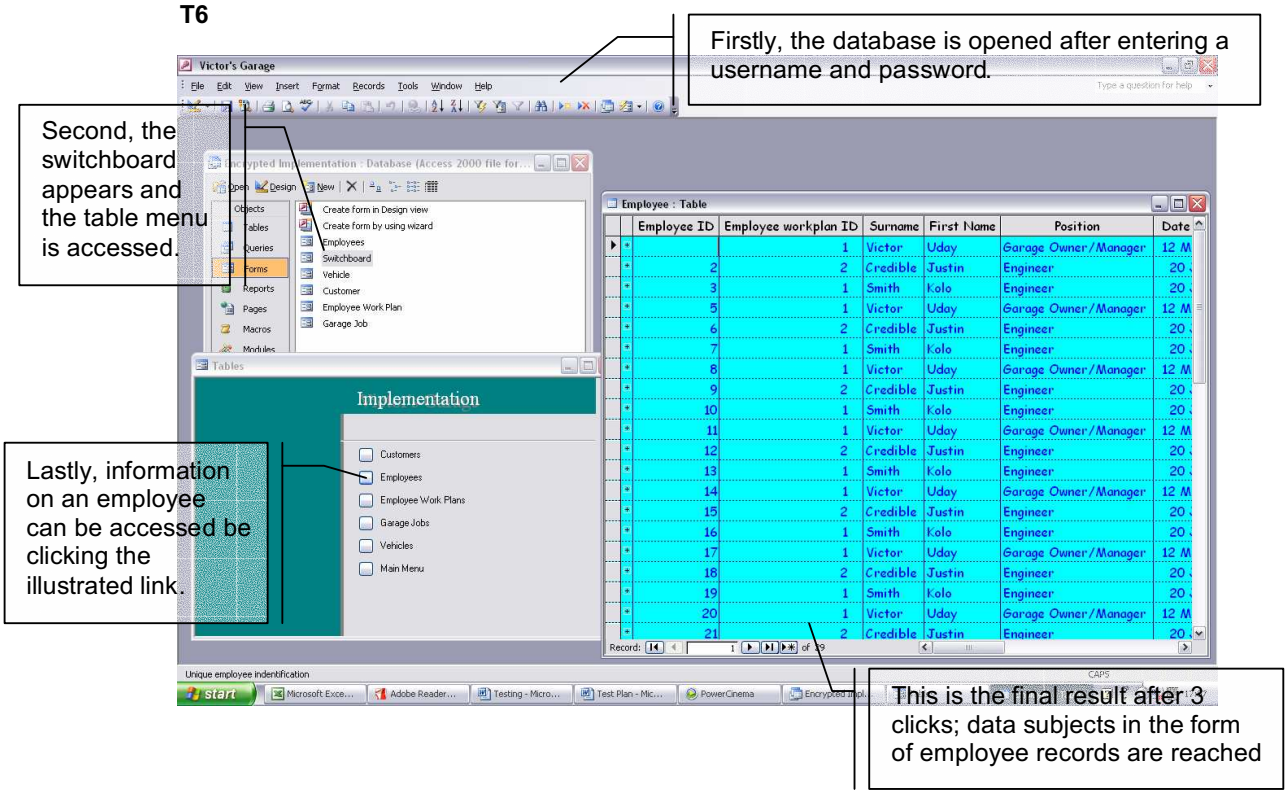
Workplan of the employee

This is evidence, showing the 30th employee record, the changes were immediately saved without any problems.

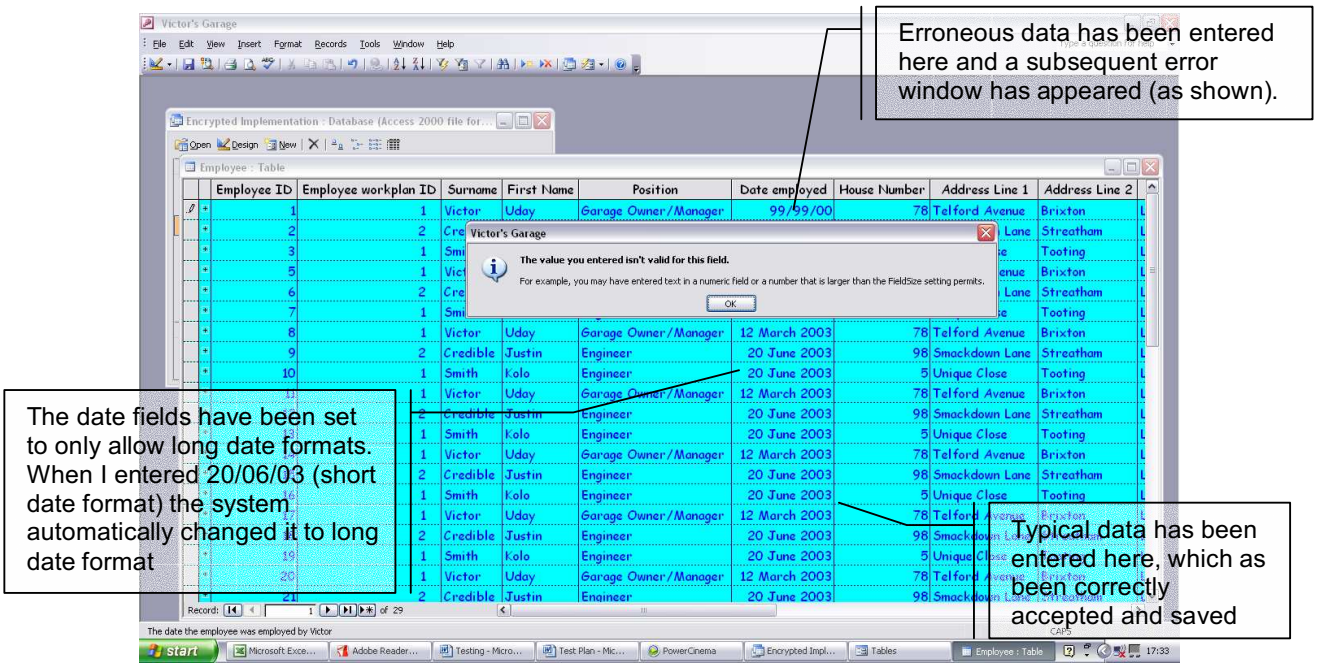
**T4, T5**


Random letters have been entered here to test the databases' functions
Here I've entered boundary data that reaches 20 characters (the limit); the system correctly prevents any extra characters being entered.
Typical data entry is illustrated here; the system promptly accepts and saves the data
Vehicle : Table
Vehicle ID | Customer ID | Vehicle Name | Manufacturer | License Plate Number | Job ID 1 | Job ID 2 | Job ID 3 | Picture | History
3 | 2 | nisudnfiusdn | Vauxhall | TY67 65K | 0 | 0 | 0 | | None
4 | 5 | 406 | Renault | LD9W 9W5 | 0 | 0 | 0 | | None
5 | 5 | Clio | Renault | J9A5 5DA | 0 | 0 | 0 | | None
7 | 7 | Yaris | Toyota | INF2 86Q | 0 | 0 | 0 | | None
8 | 22 | Civic | Honda | 9F5D 85D | 0 | 0 | 0 | | None
9 | 29 | S200 | Honda | A5DF 85A | 0 | 0 | 0 | | None
10 | 15 | Corsa | Vauxhall | 9EF5 D90 | 0 | 0 | 0 | | None
11 | 1 | Focus | Ford | 05DQ 89F | 0 | 0 | 0 | | None
12 | 14 | Escort | Ford | 9Q0W 9WB | 0 | 0 | 0 | | None
13 | 4 | Celica | Toyota | 0EWN 0NR | 0 | 0 | 0 | | None
14 | 0 | 407 | Peugot | S0D9 F09 | 0 | 0 | 0 | | None
15 | 0 | Calibra | Vauxhall | A50F 90A | 0 | 0 | 0 | | None
16 | 0 | Impreza | Subaru | A985 F09 | 0 | 0 | 0 | | None
17 | 0 | Fiesta | Ford | S0D9 5D8 | 0 | 0 | 0 | | None
18 | 0 | Sagris Couper | TVR | DF90 85F | 0 | 0 | 0 | | None
19 | 0 | X-Type | Jaguar | G98B 89C | 0 | 0 | 0 | | None
20 | 0 | Carina | Toyota | DF70 5D9 | 0 | 0 | 0 | | None
21 | 0 | Z3 | BMW | S0D0 NB0 | 0 | 0 | 0 | | None
22 | 0 | Spider | Alfa Romeo | B65N 78V | 0 | 0 | 0 | | None
23 | 0 | GTV | Alfa Romeo | AQW7 VCV | 0 | 0 | 0 | | None

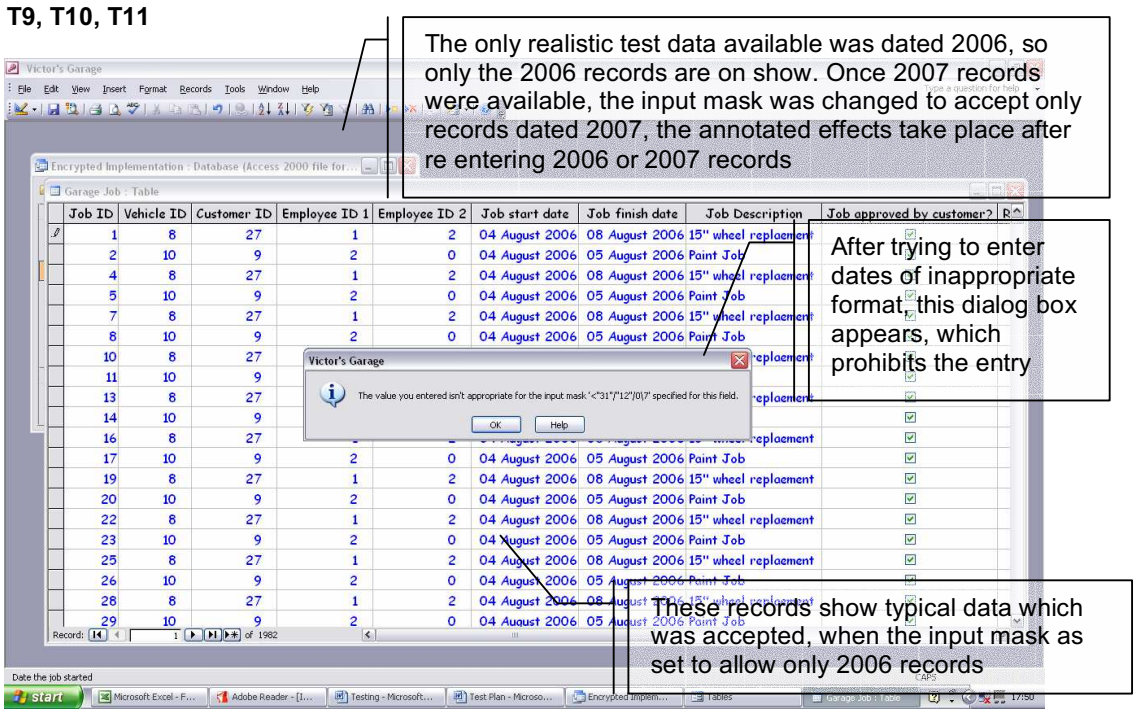
**T6**


Firstly, the database is opened after entering a username and password.
Second, the switchboard appears and the table menu is accessed.
Lastly, information on an employee can be accessed be clicking the illustrated link.
This is the final result after 3 clicks; data subjects in the form of employee records are reached
Victor's Garage
Implementation
Customers
Employees
Employee Work Plans
Garage Jobs
Vehicles
Main Menu
Employee : Table
Employee ID | Employee workplan ID | Surname | First Name | Position | Date

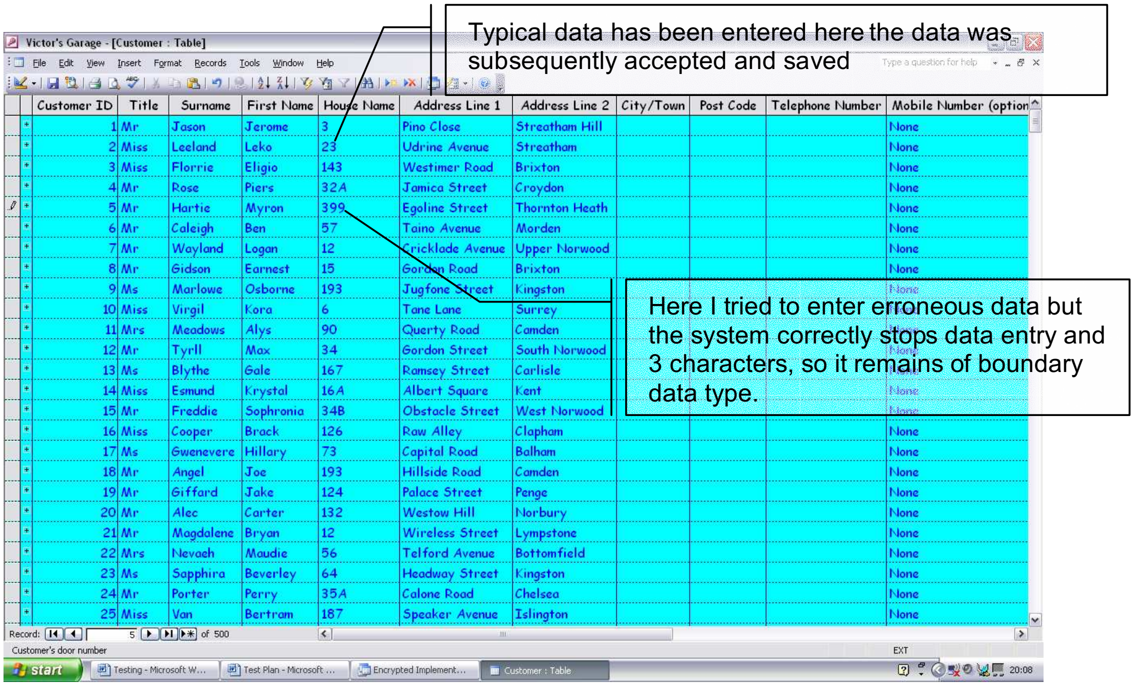
**T7, T8**




**T9, T10, T11**



**T12, T13, T14**



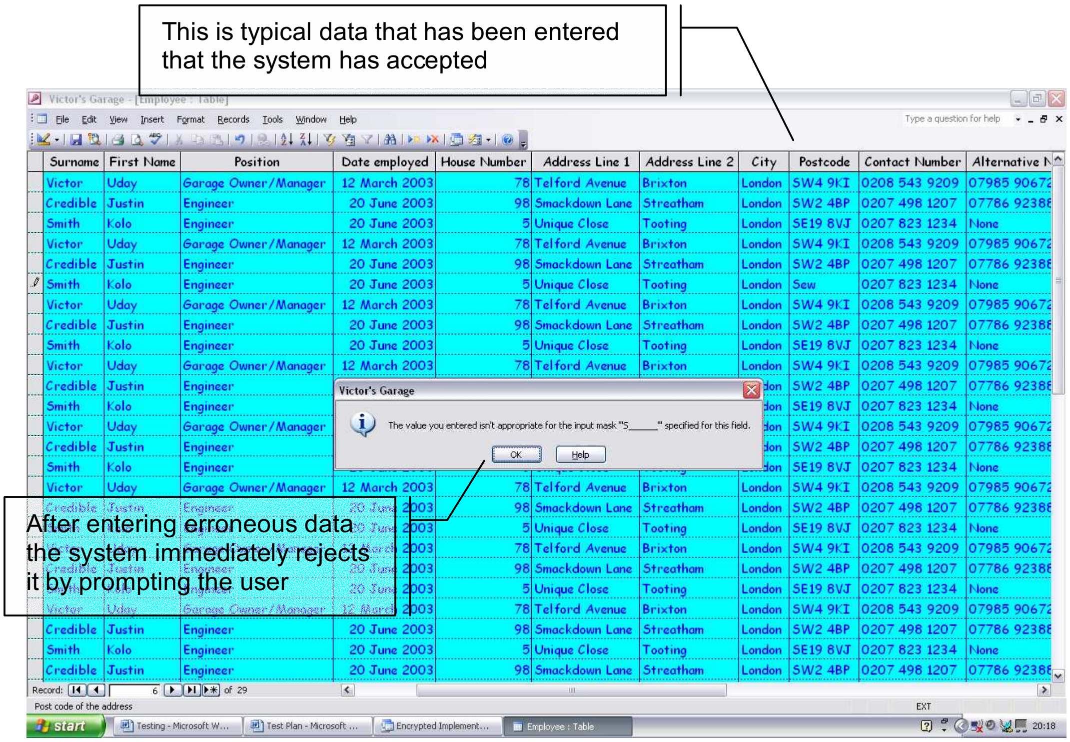
Typical data has been entered here the data was subsequently accepted and saved

Here I tried to enter erroneous data but the system correctly stops data entry and 3 characters, so it remains of boundary data type.

| Customer ID | Title | Surname | First Name | House Name | Address Line 1 | Address Line 2 | City/Town | Post Code | Telephone Number | Mobile Number (option |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mr | Jason | Jerome | 3 | Pino Close | Streatham Hill | | | | None |
| 2 | Miss | Leeland | Leko | 23 | Udrine Avenue | Streatham | | | | None |
| 3 | Miss | Florrie | Eligio | 143 | Westimer Road | Brixton | | | | None |
| 4 | Mr | Rose | Piers | 32A | Jamica Street | Croydon | | | | None |
| 5 | Mr | Hartie | Myron | 399 | Egoline Street | Thornton Heath | | | | None |
| 6 | Mr | Caleigh | Ben | 57 | Taino Avenue | Morden | | | | None |
| 7 | Mr | Wayland | Logan | 12 | Cricklade Avenue | Upper Norwood | | | | None |
| 8 | Mr | Gidson | Earnest | 15 | Gordon Road | Brixton | | | | None |
| 9 | Ms | Marlowe | Osborne | 193 | Jugfone Street | Kingston | | | | None |
| 10 | Miss | Virgil | Kora | 6 | Tane Lane | Surrey | | | | None |
| 11 | Mrs | Meadows | Alys | 90 | Querty Road | Camden | | | | None |
| 12 | Mr | Tyrll | Max | 34 | Gordon Street | South Norwood | | | | None |
| 13 | Ms | Blythe | Gale | 167 | Ramsey Street | Carlisle | | | | None |
| 14 | Miss | Esmund | Krystal | 16A | Albert Square | Kent | | | | None |
| 15 | Mr | Freddie | Sophronia | 34B | Obstacle Street | West Norwood | | | | None |
| 16 | Miss | Cooper | Brack | 126 | Raw Alley | Clapham | | | | None |
| 17 | Ms | Gwenevere | Hillary | 73 | Capital Road | Balham | | | | None |
| 18 | Mr | Angel | Joe | 193 | Hillside Road | Camden | | | | None |
| 19 | Mr | Giffard | Jake | 124 | Palace Street | Penge | | | | None |
| 20 | Mr | Alec | Carter | 132 | Westow Hill | Norbury | | | | None |
| 21 | Mr | Magdalene | Bryan | 12 | Wireless Street | Lympstone | | | | None |
| 22 | Mrs | Nevaeh | Maudie | 56 | Telford Avenue | Bottomfield | | | | None |
| 23 | Ms | Sapphira | Beverley | 64 | Headway Street | Kingston | | | | None |
| 24 | Mr | Porter | Perry | 35A | Calone Road | Chelsea | | | | None |
| 25 | Miss | Van | Bertram | 187 | Speaker Avenue | Islington | | | | None |

Customer's door number

**T15, T16**



This is typical data that has been entered that the system has accepted

After entering erroneous data the system immediately rejects it by prompting the user

The value you entered isn't appropriate for the input mask '"S______"' specified for this field.

| Surname | First Name | Position | Date employed | House Number | Address Line 1 | Address Line 2 | City | Postcode | Contact Number | Alternative N |
|---|---|---|---|---|---|---|---|---|---|---|
| Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW4 9KI | 0208 543 9209 | 07985 90672 |
| Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW2 4BP | 0207 498 1207 | 07786 92388 |
| Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE19 8VJ | 0207 823 1234 | None |
| Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW4 9KI | 0208 543 9209 | 07985 90672 |
| Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW2 4BP | 0207 498 1207 | 07786 92388 |
| Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | Sew | 0207 823 1234 | None |
| Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW4 9KI | 0208 543 9209 | 07985 90672 |
| Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW2 4BP | 0207 498 1207 | 07786 92388 |
| Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE19 8VJ | 0207 823 1234 | None |
| Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW4 9KI | 0208 543 9209 | 07985 90672 |
| Credible | Justin | Engineer | [illegible] | [illegible] | [illegible] | [illegible] | don | SW2 4BP | 0207 498 1207 | 07786 92388 |
| Smith | Kolo | Engineer | [illegible] | [illegible] | [illegible] | [illegible] | don | SE19 8VJ | 0207 823 1234 | None |
| Victor | Uday | Garage Owner/Manager | [illegible] | [illegible] | [illegible] | [illegible] | don | SW4 9KI | 0208 543 9209 | 07985 90672 |
| Credible | Justin | Engineer | [illegible] | [illegible] | [illegible] | [illegible] | don | SW2 4BP | 0207 498 1207 | 07786 92388 |
| Smith | Kolo | Engineer | [illegible] | [illegible] | [illegible] | [illegible] | don | SE19 8VJ | 0207 823 1234 | None |
| Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW4 9KI | 0208 543 9209 | 07985 90672 |
| Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW2 4BP | 0207 498 1207 | 07786 92388 |
| Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE19 8VJ | 0207 823 1234 | None |
| Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW4 9KI | 0208 543 9209 | 07985 90672 |
| Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW2 4BP | 0207 498 1207 | 07786 92388 |
| Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE19 8VJ | 0207 823 1234 | None |
| Victor | Uday | Garage Owner/Manager | 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW4 9KI | 0208 543 9209 | 07985 90672 |
| Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW2 4BP | 0207 498 1207 | 07786 92388 |
| Smith | Kolo | Engineer | 20 June 2003 | 5 | Unique Close | Tooting | London | SE19 8VJ | 0207 823 1234 | None |
| Credible | Justin | Engineer | 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW2 4BP | 0207 498 1207 | 07786 92388 |

Post code of the address

**T17, T18**

Here typical data has been entered, upon attempting to save input it was correctly accepted by the system

Microsoft Access - [Employee : Table]

| Date employed | House Number | Address Line 1 | Address Line 2 | City | Postcode | Contact Number | Alternative Number |
|---|---|---|---|---|---|---|---|
| 12 March 2003 | 78 | Telford Avenue | Brixton | London | SW4 9KI | 02085489287 | 07985 906723 |
| 20 June 2003 | 98 | Smackdown Lane | Streatham | London | SW2 4BP | 02074981269 | 07786 923883 |
| 20 June 2003 | 5 | Unique Close | Tooting | London | SE19 8WJ | 02078231232 | None |
| | 0 | | | London | | | None |

I tried to enter erroneous data within this cell but once the 11 character limit had been fulfilled, the system prevented any subsequent

Record: 3 of 3

Main telephone number of employee

**T19, T20, T21**

Microsoft Access - [Employee Work Plan : Table]

Typical data has been entered here which was subsequently accepted and saved

This cell contains boundary data, the absolute limit that this cell can take, nonethele4ss it was accepted saved

| Employee WorkPlan ID | Rate of pay/hour | Working Monday? | Working Tuesday? | Working Wednesday? | Working Thursday? | Workin |
|---|---|---|---|---|---|---|
| 1 | £7.00 | ☐ | ☑ | ☑ | ☑ | |
| 2 | £1.90 | ☐ | ☐ | ☐ | ☐ | |
| 3 | £10.00 | ☑ | ☑ | ☐ | ☑ | |
| 4 | £12.80 | ☑ | ☑ | ☑ | ☑ | |
| (AutoNumber) | £5.00 | ☐ | ☐ | ☐ | ☐ | |

Within this cell erroneous data was entered, which is obviously violates the validation rule, as a result it isn't accepted and the below message is displayed

Microsoft Office Access

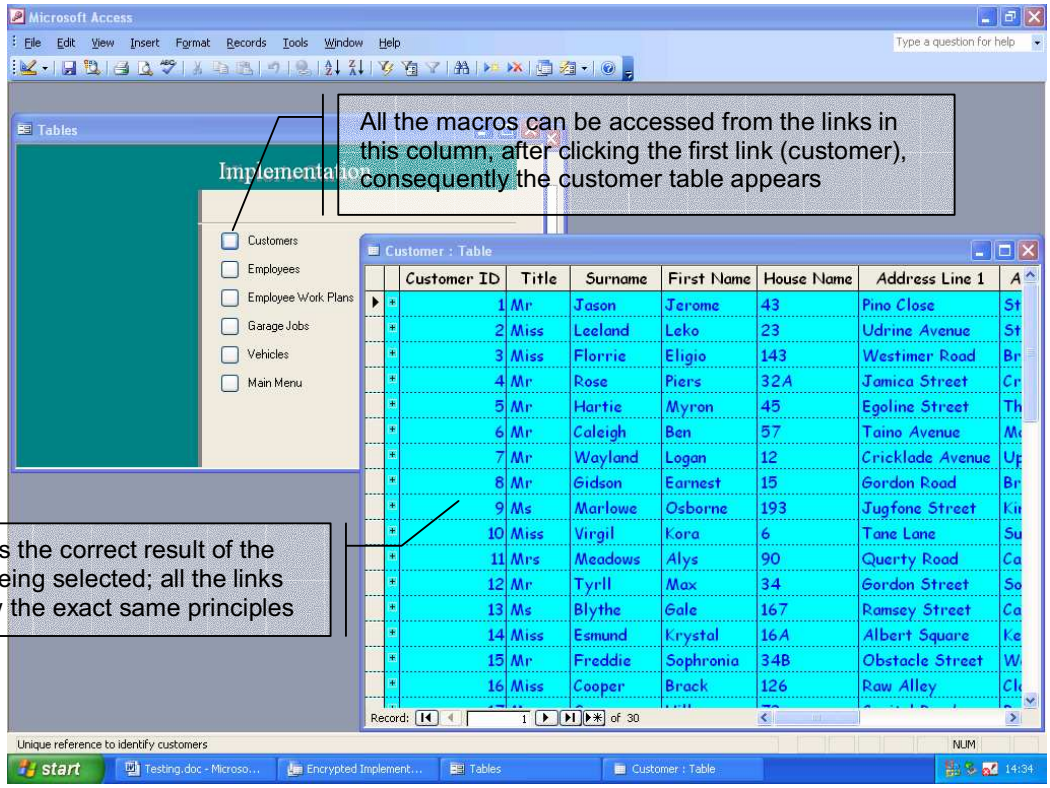
Incorrect Entry, pay exceeds £10, please try again

OK Help

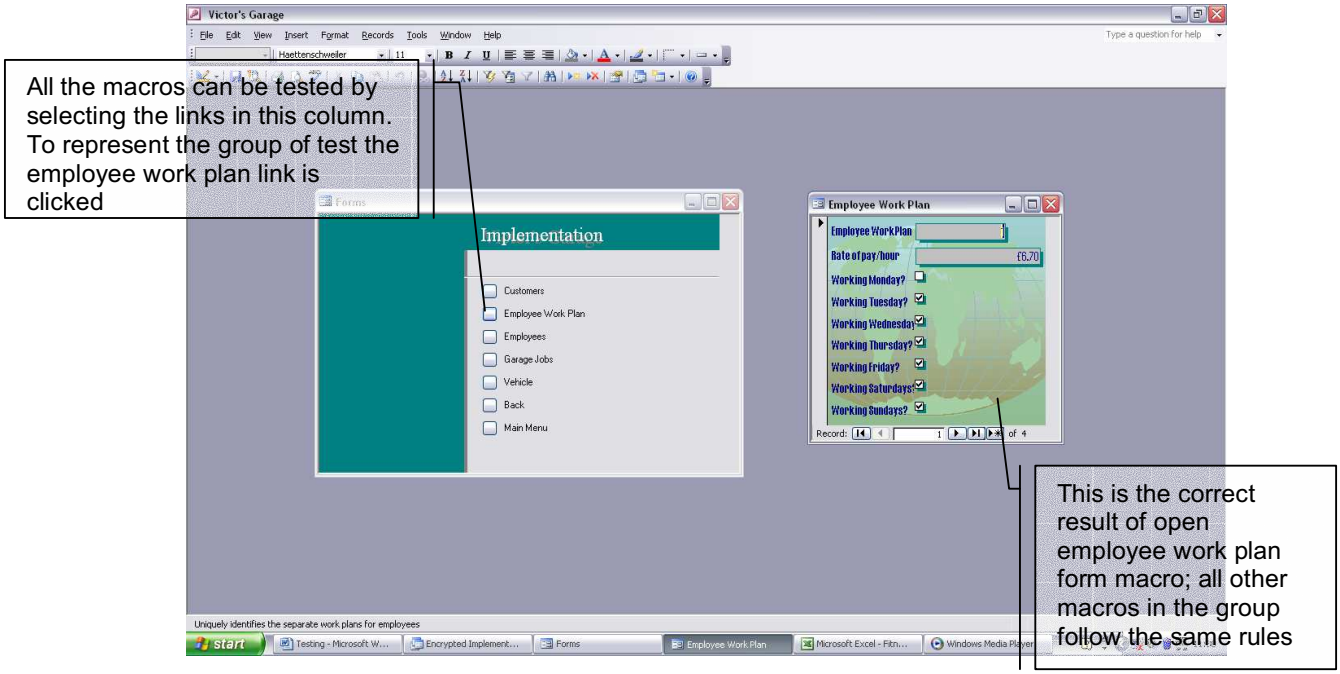
Record: 4 of 4

Amount of money paid to employee per hour of work

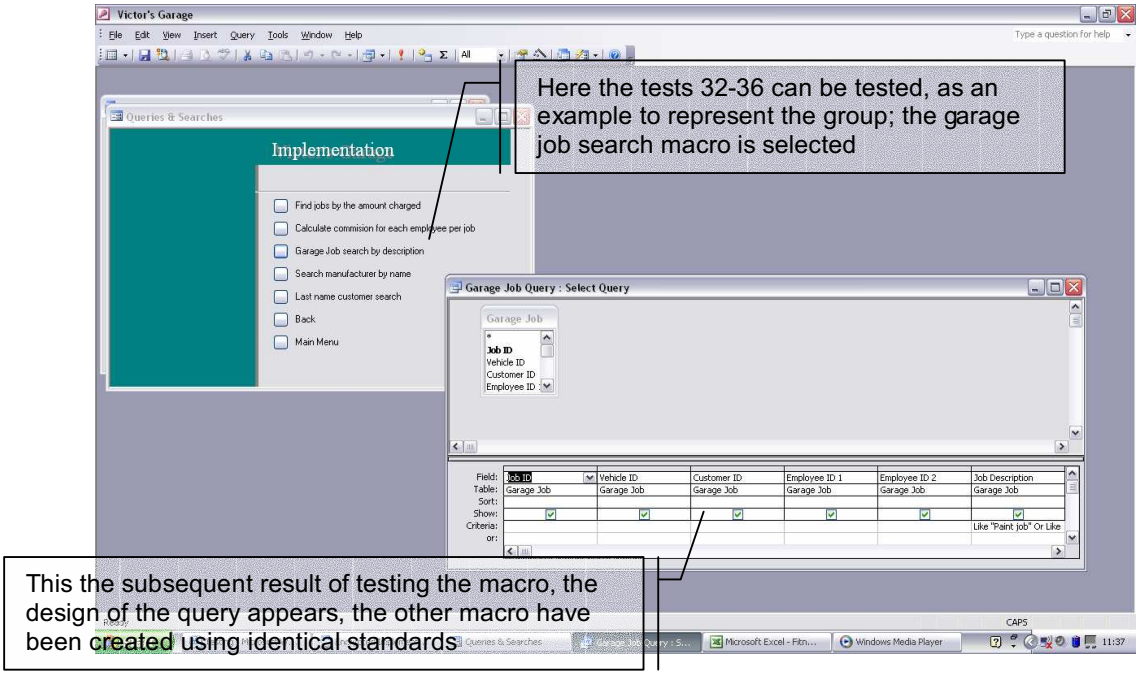
**T22, T23, T24, T25, T26**



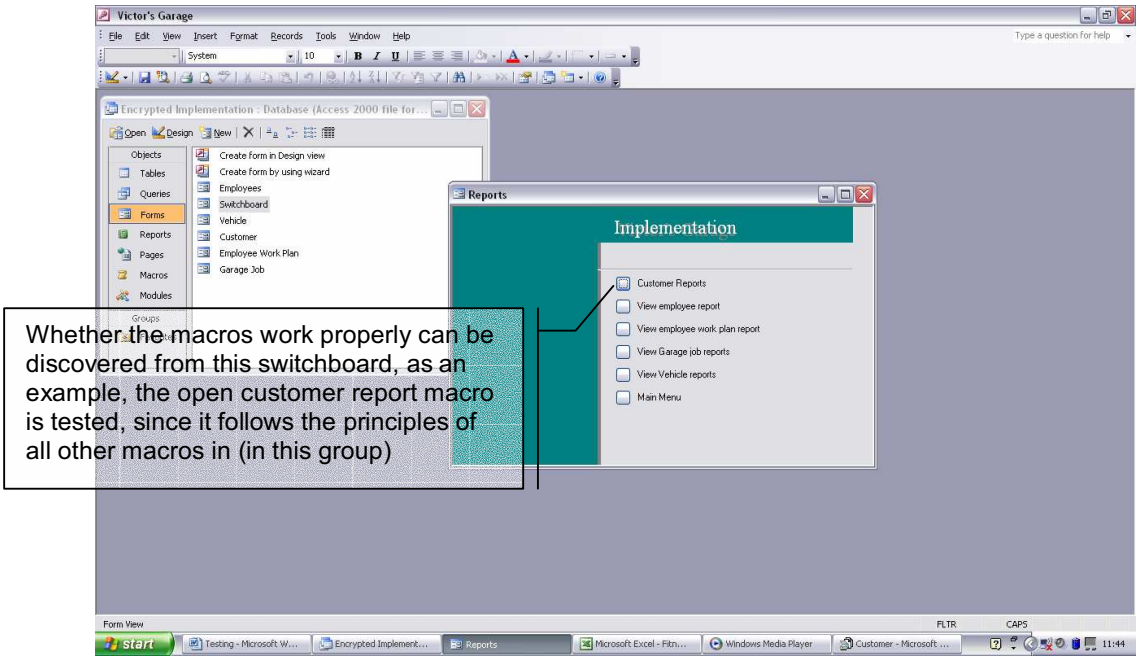

**T27, T28, T29, T30, T31**



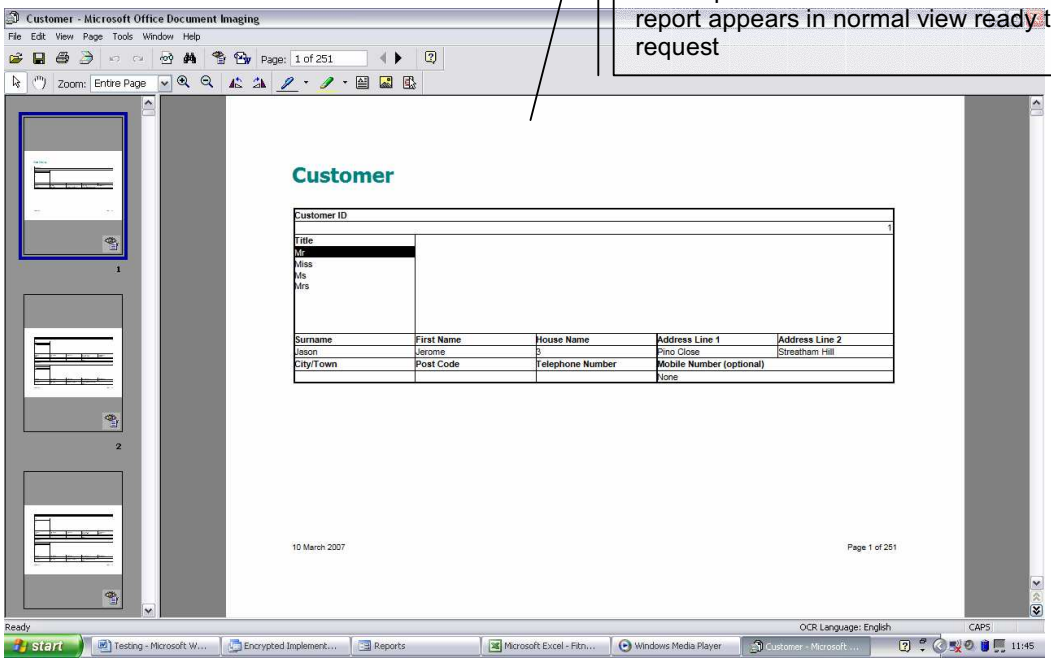
**T32, T33, T34, T35, T36**



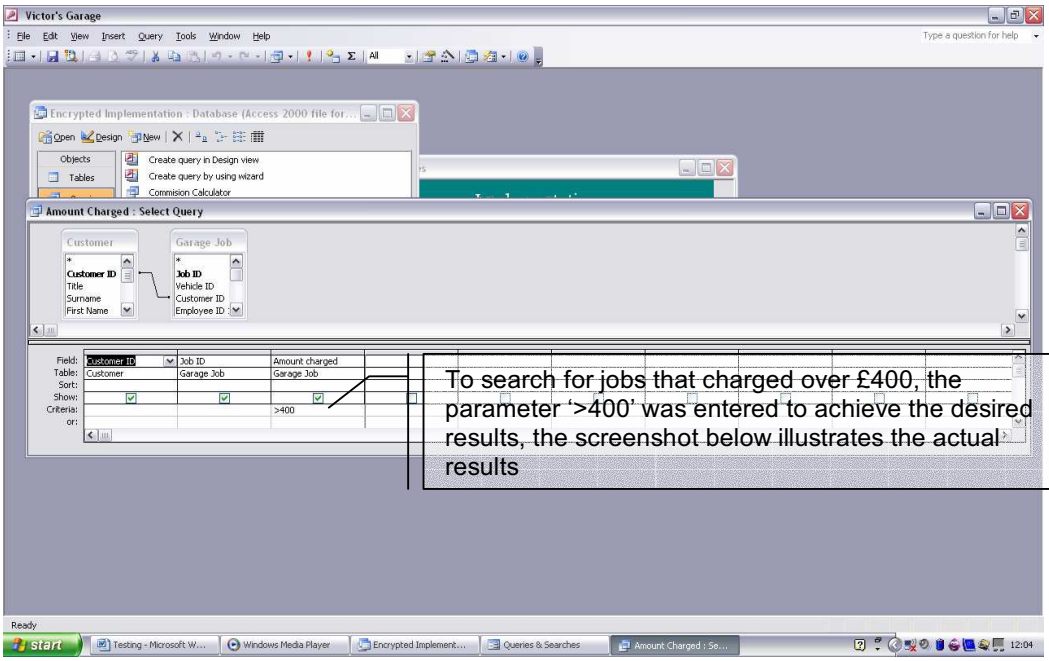

**T37, T38, T39, T40, T41**



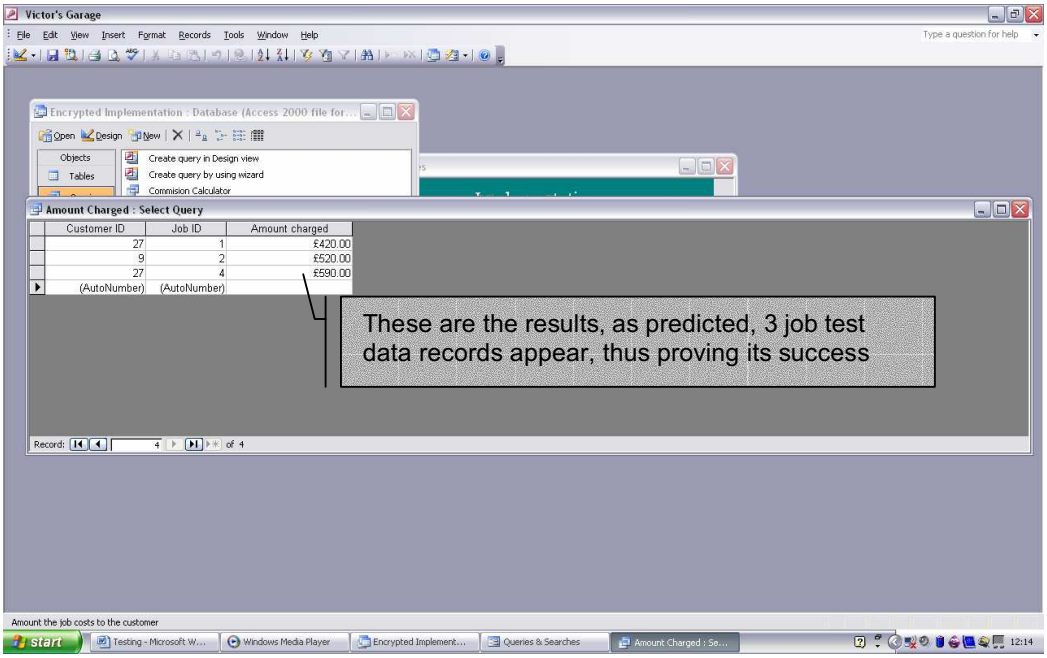
This is proof of the tests success the customer report appears in normal view ready to print upon request



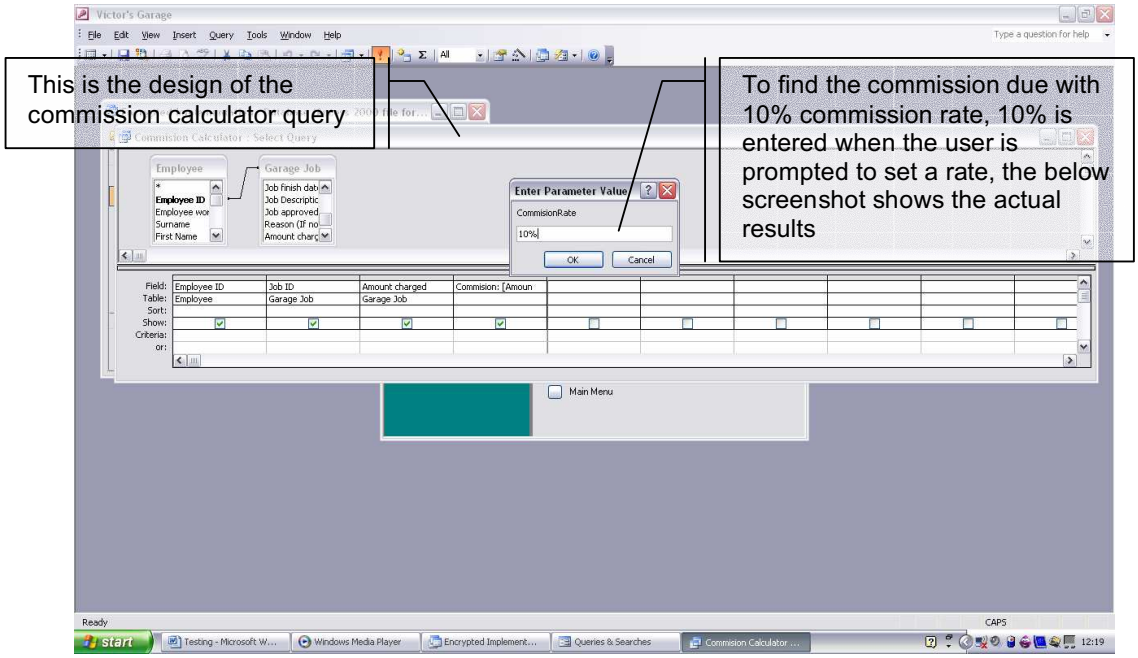

**T42**

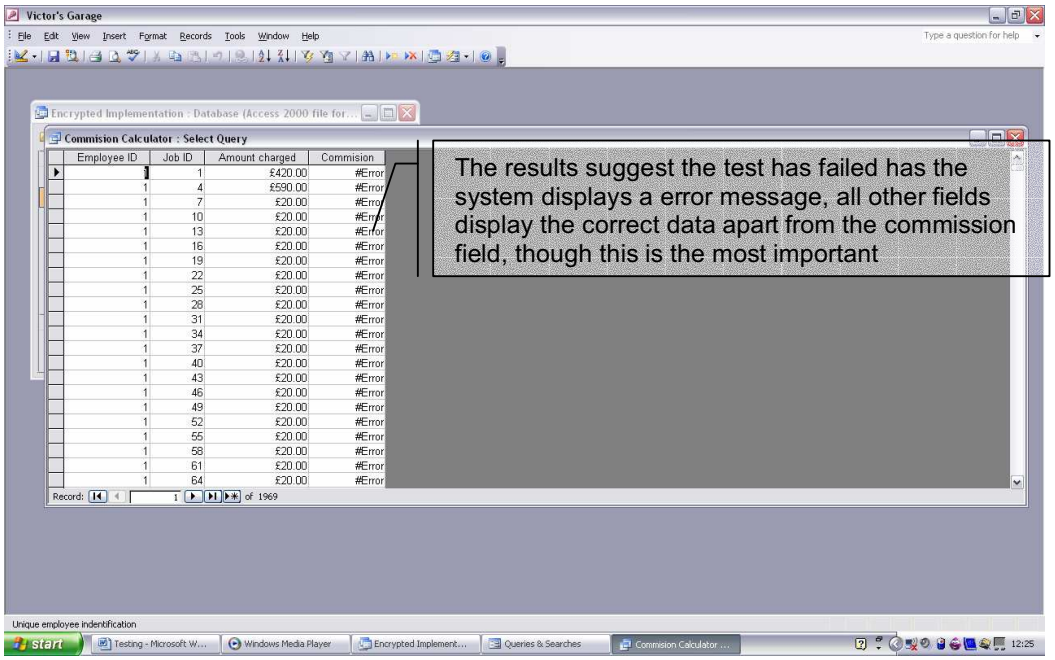



To search for jobs that charged over £400, the parameter '>400' was entered to achieve the desired results, the screenshot below illustrates the actual results

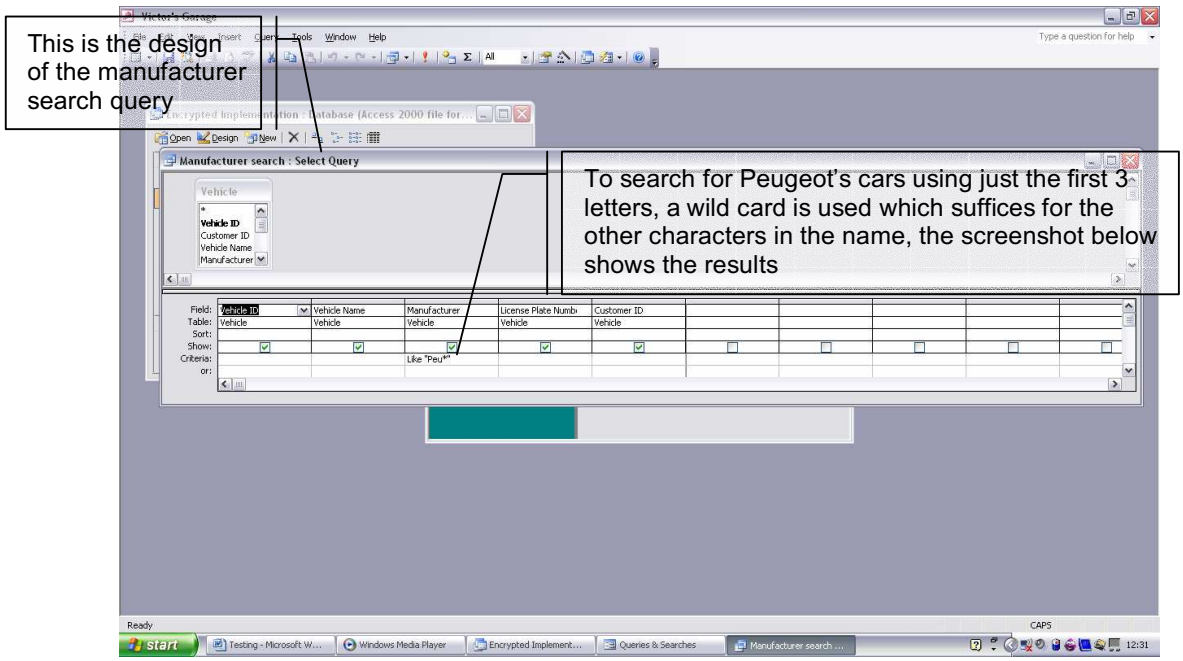

Victor's Garage
Amount Charged : Select Query
Customer ID
Job ID
Amount charged
27 1 £420.00
9 2 £520.00
27 4 £590.00
(AutoNumber) (AutoNumber)
These are the results, as predicted, 3 job test data records appear, thus proving its success

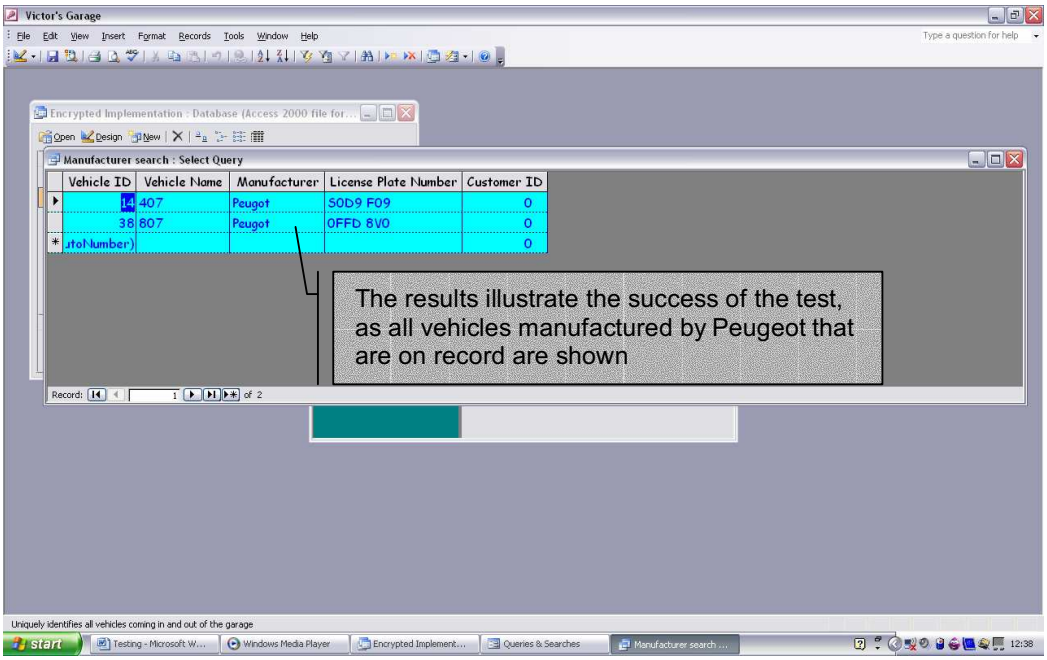
**T43**


This is the design of the commission calculator query
To find the commission due with 10% commission rate, 10% is entered when the user is prompted to set a rate, the below screenshot shows the actual results
Enter Parameter Value
CommisionRate
10%
OK
Cancel

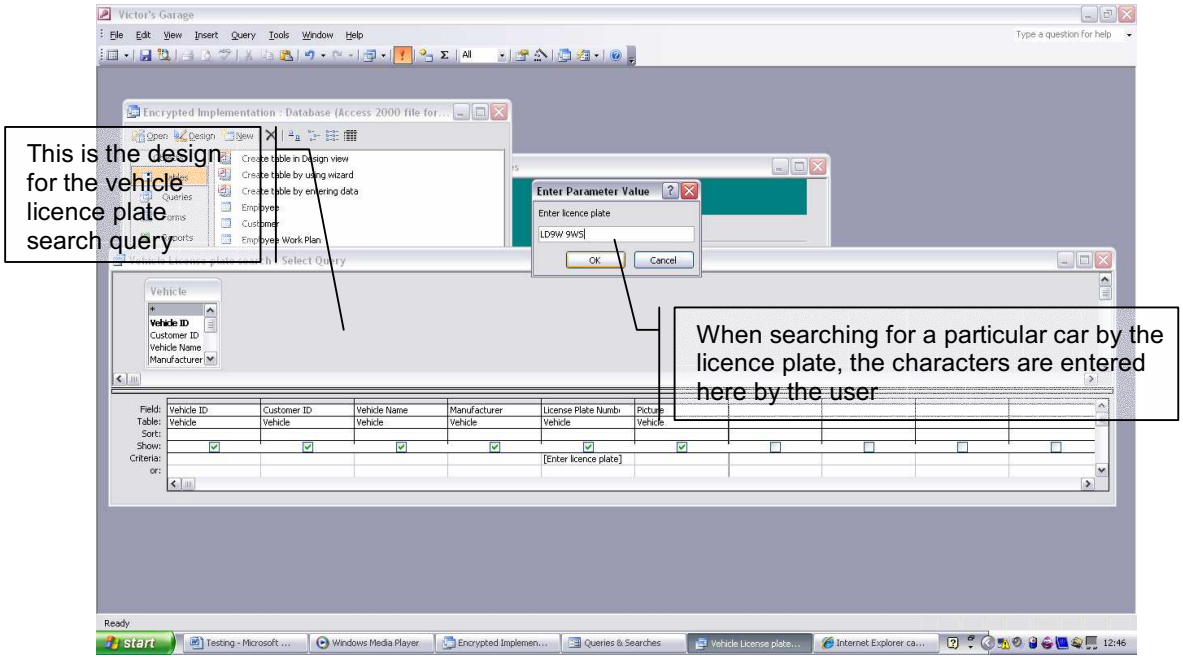

Victor's Garage
Commision Calculator : Select Query
Employee ID | Job ID | Amount charged | Commision
The results suggest the test has failed has the system displays a error message, all other fields display the correct data apart from the commission field, though this is the most important

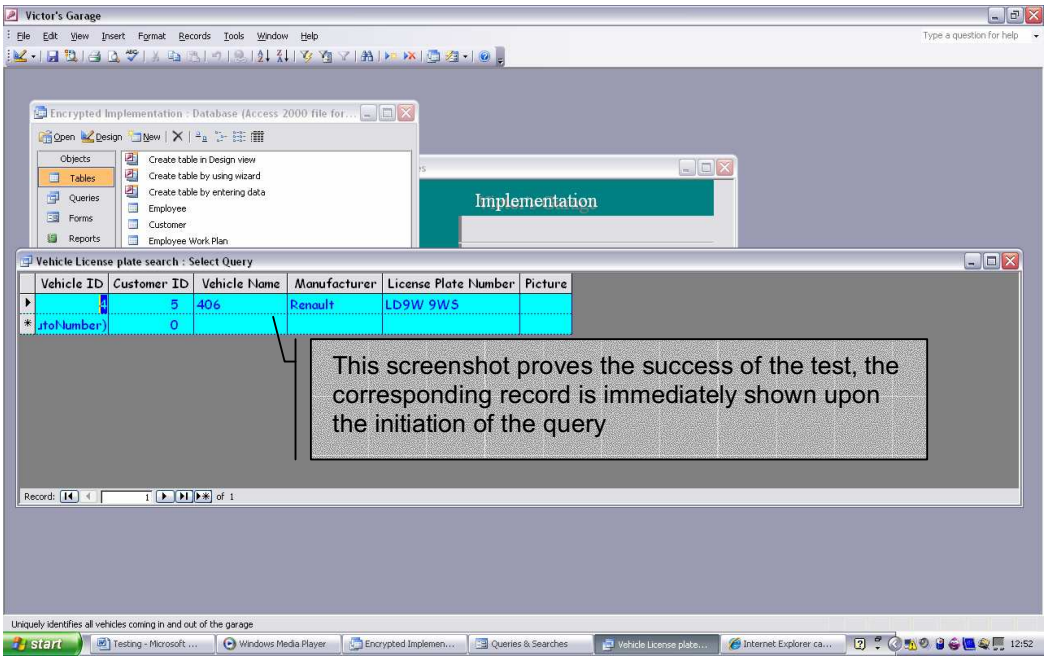
**T44**


This is the design of the manufacturer search query
Manufacturer search : Select Query
To search for Peugeot's cars using just the first 3 letters, a wild card is used which suffices for the other characters in the name, the screenshot below shows the results


Victor's Garage
File Edit View Insert Format Records Tools Window Help
Type a question for help
Encrypted Implementation : Database (Access 2000 file for...
Open Design New
Manufacturer search : Select Query
Vehicle ID | Vehicle Name | Manufacturer | License Plate Number | Customer ID
14 | 407 | Peugot | 50D9 F09 | 0
38 | 807 | Peugot | 0FFD 8V0 | 0
0
The results illustrate the success of the test, as all vehicles manufactured by Peugeot that are on record are shown
Record: 1 of 2
Uniquely identifies all vehicles coming in and out of the garage
start
Testing - Microsoft W...
Windows Media Player
Encrypted Implement...
Queries & Searches
Manufacturer search ...
12:38

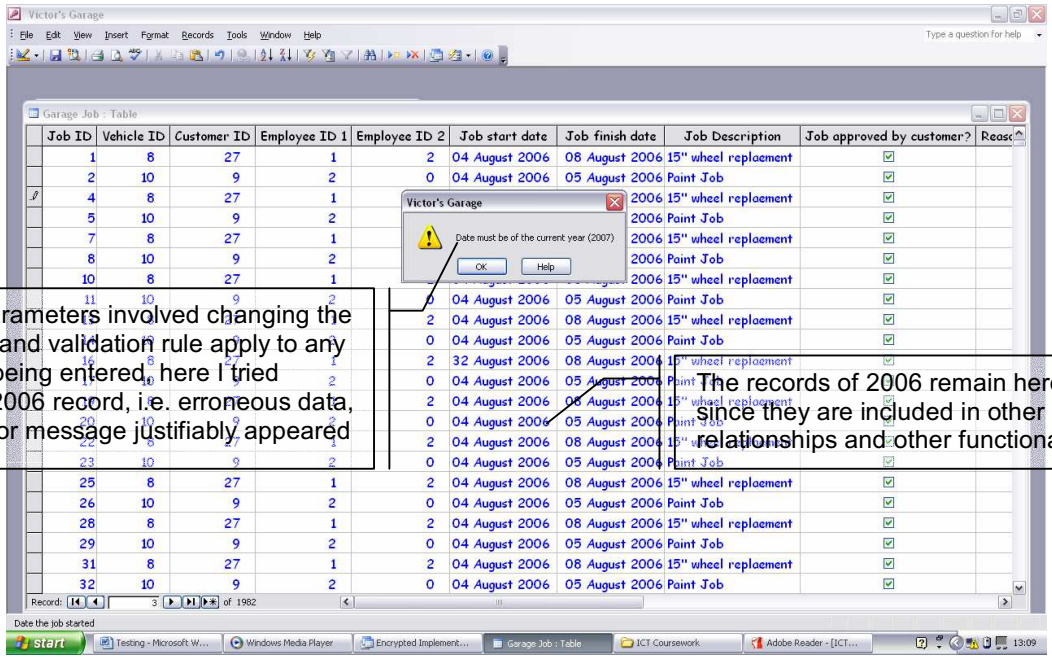
**T45**

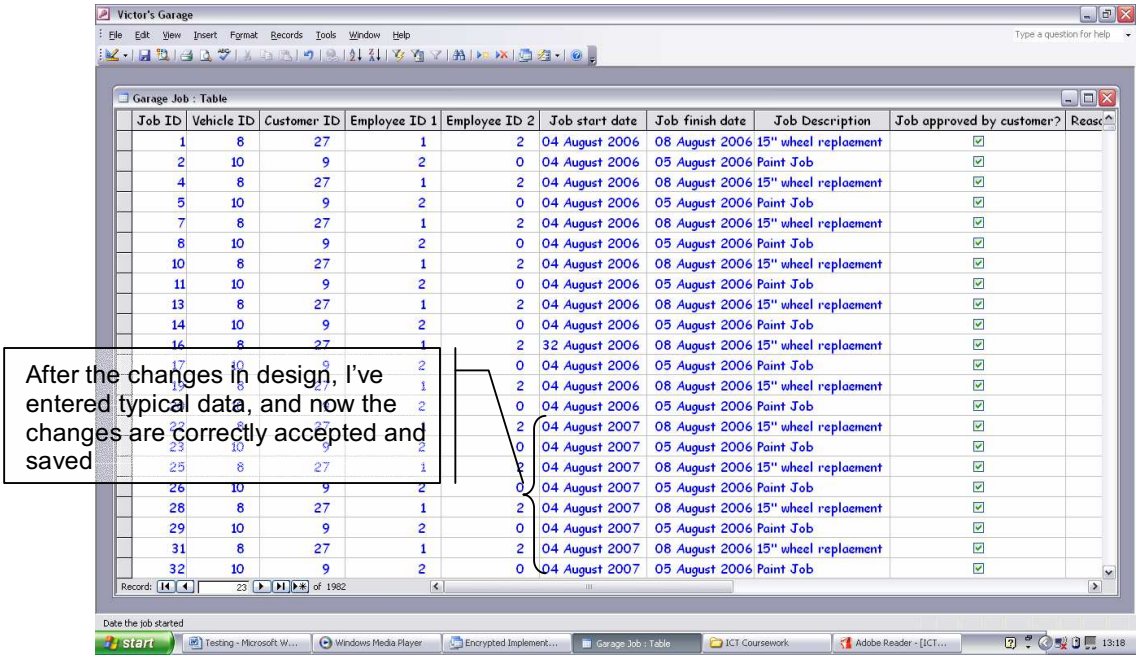

This is the design for the vehicle licence plate search query
When searching for a particular car by the licence plate, the characters are entered here by the user
Enter Parameter Value
Enter licence plate
LD9W 9WS
OK
Cancel
Vehicle
Vehicle ID
Customer ID
Vehicle Name
Manufacturer
Field:
Table:
Sort:
Show:
Criteria:
or:
[Enter licence plate]


Vehicle License plate search : Select Query
Vehicle ID
Customer ID
Vehicle Name
Manufacturer
License Plate Number
Picture
5
406
Renault
LD9W 9WS
0
This screenshot proves the success of the test, the corresponding record is immediately shown upon the initiation of the query

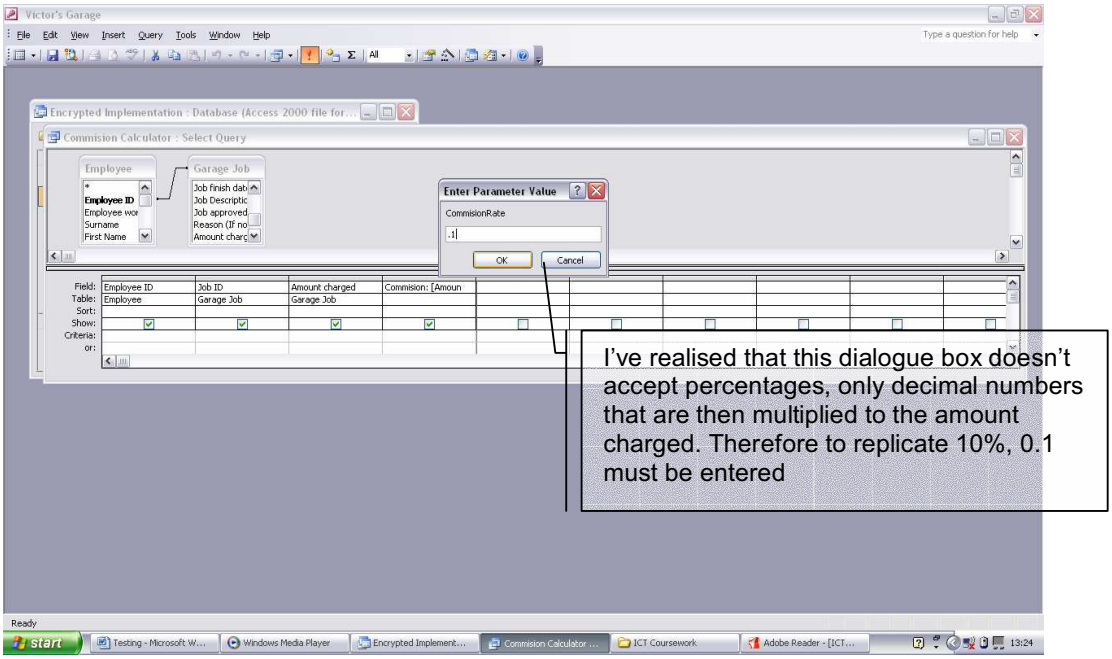
**Corrective Action 1**

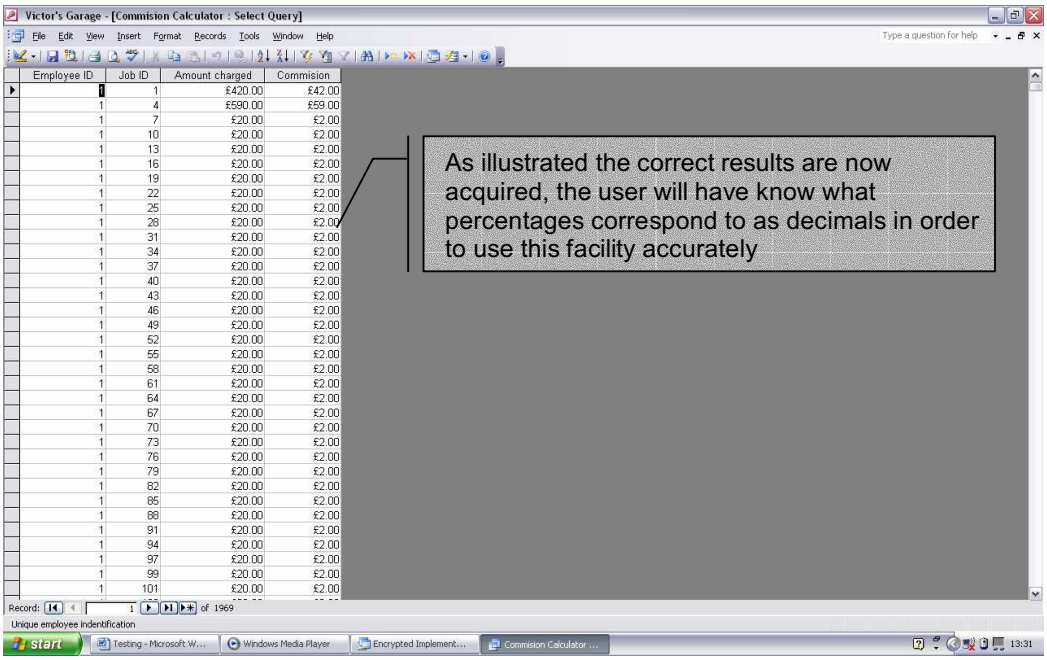
The complications are shown under T9 and T10 on page 8, the system needs to accept 2007 records rather than those of 2006.



**Corrective action 2**



## *End user testing*

When developing any solution for an end user it is essential that they are involved at all stages of development so that all requirements are met and advantageous feedback can be acquired. Worksheet based on the requirements of the system has been devised for the end user, which they are to complete and provide feedback on. The worksheet is kept short and minimal to avoid taking up too much time of the end user.

### Worksheet

*Before attempting to complete these tasks it is necessary for the user guide to be read fully so that the know how to undertake the tasks can be gathered.*

1. Open the customer table in normal datasheet view, and alter the house number of the third record to '999999'.
2. Open the employee work plan form in normal form view, and change the rate of pay for the first record to £10.00.
3. Open the employee work plan form in normal form view, and insert a blank new form sheet. Ensure that it is identified as employee work plan ID 4; specify the rate pay per hour as £6 when working on Monday, Wednesday, Thursday and Saturday.
4. Observe the layout of the menus by looking through and accessing as many switchboards as possible.
5. Open the vehicle report in normal report view, and select the print icon.
6. Close down and Open up the system.
7. Insert a blank CD-RW and backup the database.

*Thank you for taking the time to complete this worksheet, your contribution is highly appreciated.*

## *Results and feedback of the user from the worksheet*

The following regular text represents the opinions of the end user after completing the worksheet shown in the previous page, whilst the *italic text* represents my own analysis and review.

**Question 1-**I managed to reach the customer table with ease, it only took around 2-3 clicks to get there. The third record (the 3rd record down the list) was easy to find, and was easily apprehended before entering data. However, I did realise that if I was required to find the 241st record for example, it may have taken a much longer time to find since I would have to skim down the table for an extended period of time. Upon entering the data I was unable to past the 5th character so the full completion of the task was unfeasible.

*The feedback from the end user suggests that the validation techniques to ensure the reasonable entry of data is apparent in the database, which meets ICT requirements set out in the analysis section of this study. Furthermore, a problem has been identified, as the database grows with more records, individuals records may be hard to find when looking at the table alone. To defeat this problem the user must make use of the customer search query, where an identifying feature can be entered, e.g. customer surname, and the corresponding record will promptly appear.*

**Question 2**-Using the navigation utilities, i.e. the switchboards are obviously going to be an integral factor when using the system for day to day tasks. Once gaining access to the first employee work plan record I was able to change the rate of pay per hour to £10 without any prompting from the system.

*The results of this question signify the failure in one of the ICT requirements. £10 is boundary data so would usually result in the user being asked to enter the data again to verify that the entry was deliberate. This contributes to the limitation of the program and what it is unable to do.*

**Question 3**-By now using the menus was becoming second nature, they are very simple to use and get to grips with. This allowed me to open the employee work plan forms relatively easily, the user guide clearly explained how to create a new form sheet to enter a new record. The remaining aspects of the task were completed without any problems.

*Using this feedback I can conclude to say that the system is user friendly as the end user states that the interface is easy to recognise, consequently they have become proficient in its use, which helps the user to be more productive and get more out of the system. Moreover, the comments suggests the accomplished of the easy input ICT requirement set out by the end user, since they have just demonstrated that they were able to enter raw data without any faults. This is vital when trying to reduce time consumption so that the workers can concentrate on working with the vehicles that with the system.*

**Question 4**-Flicking through the menus (switchboards) I can see that they boast having the same format, regarding the layout and the placements of titles as well as links. In my opinion, the menus are quite boring and plain and lack imaginative flair; it would be prudent to add a background that relates to the business, e.g. pictures of the business site, employee portraits and vehicles.

*The comments suggest that I have succeeded in providing a consistent layout but failed when attempting to produce an attractive database. From reviewing the amount weight that the user put on each one the boring and non-attractive background is an influential factor in the system's success. Therefore effort needs to be made to alter the background using pictures and other graphical images that relate to the business and provide a more vibrant atmosphere. However, the need for a consistent layout must not be forgotten so that one problem isn't dropped for another.*

**Question 5**-I used the switchboards to reach the vehicle reports, they were shown through the visual display unit, using the user guide I figured how to print the select document. Subsequently, numerous sheets containing information regarding each of the vehicles in the database were produced in hard paper format; however, every other sheet was a blank sheet. To solve this problem the troubleshoot section of the user guide was extremely advantageous, and the instructions given eliminated the problem.

*User feedback illustrates continued praise for the navigation utilities. Moreover, it suggests the achievement of the ICT requirements that specifies that data needs to be able to be accessed and viewed in numerous format. The reports were first able to be viewed as temporary information using the visual display unit, and then a permanent copy was supplied by the printouts. This allows the user to utilise as well as view information for multiple purposes, thus increasing the systems functionalities and chances for successful implementation.*

**Question 6**-As specified by the user guide I selected the 'Exit' link shown on the main menu (default switchboard) to close down the system before being prompted to save the changes made. To open the database I simply accessed the file in the 'my documents' folder and gained full access by firstly inserting my username and password.

*The purpose of this question was to establish feedback regarding how easy it is to open and close the system whilst taking into account the security measures. The comments suggest that the database is uncomplicated to close down and the user can benefit from being prompted to save the changes, as the possibility of accidentally losing any important alterations to the database is immediately eliminated. Furthermore, it is evident that the ICT requirement to implement effective security has been realised as the user is prompted to enter their personal username and password, which only allows authorised users and prevents the illegal entry of hackers into the system.*

**Question 7**-To complete the seventh task and backup the database I followed the simple instructions stated in the user guide, which was followed and completed to a 'T'.

*This task was inserted to ensure the accomplishment of the requirement for an effective backup protocol. The end user seems satisfied with the backup protocol in place to act as a contingency plan if the business was to be threatened by external factors that are out of their control.*

# User Guide

# User guide
# for
# Victor's Garage system

# Contents

# Introduction

Victor's garage system has been built upon Microsoft Access 2003, which is a modern application suite providing programs and additional utilities that have been exploited to serve the requirements of the end user. This user guide will give step by step instructions on how to perform the fundamental tasks that can only be related to this system alone. These tasks range from how to start up the application to troubleshooting errors that are most likely to occur, and including numerous other essential tasks that allow efficient as well as effective use of the system.

# Getting Started

This chapter dictates the first steps into using this system, illustrating the working area that will be used in the day to day usage of the program.

## *System requirements*

Minimum requirements:

- Operating system: Windows® 98
- CPU Type and speed: Pentium® II 450 or equivalent
- Hard Drive space: 40MB
- Memory: 16MB
- CD-ROM Speed: 4x or faster
- Audio: Speakers not required
- Printer: Required
- Internet Access: Not required
- Applications: Microsoft Access 2003 is required

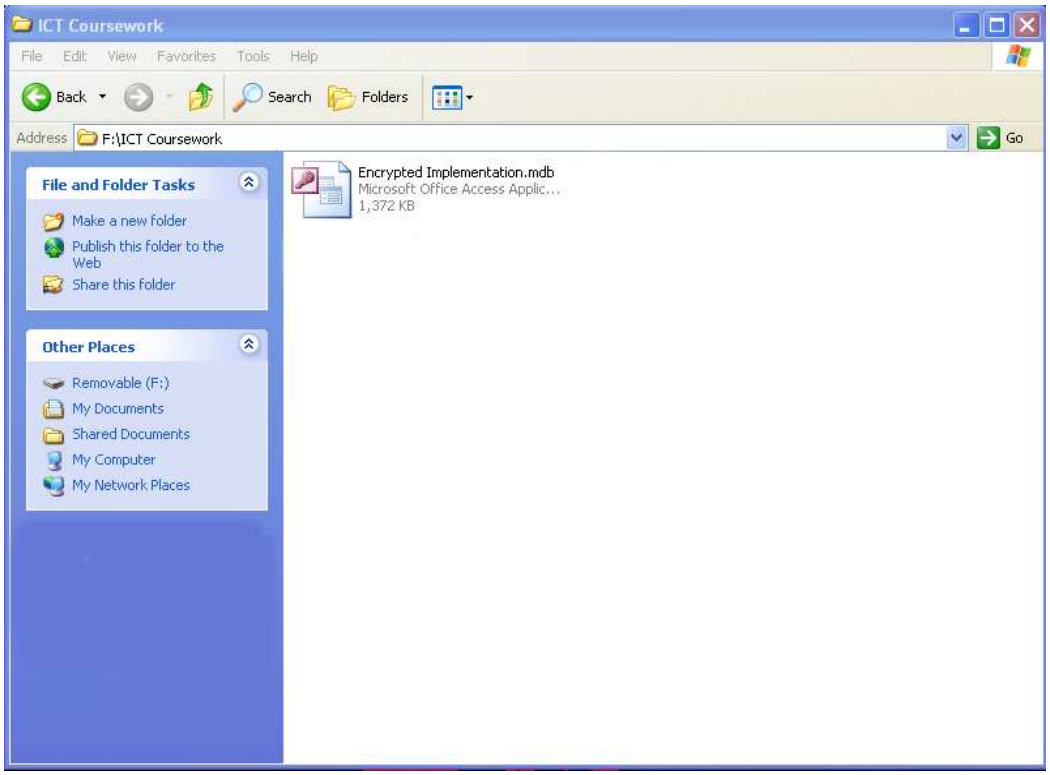
Recommended requirements:

- Operating system: Windows® XP
- CPU Type and speed: Pentium® III 450 or equivalent
- Hard Drive space: 200MB
- Memory: 128MB
- CD-ROM Speed: 4x or faster
- Audio: Speakers not required
- Printer: Required
- Internet Access: Not required
- Applications: Microsoft Access 2003 is required

## *Installation*

The system has been compressed[1] as well as encrypted[2], which has resulted in the size of the file being 1.34MB[3], which is relatively small, this includes the small number of test data that has been used. Victor's Garage system has been stored on a CD-R[4], to begin installation follow these steps:

1. Insert CD-R into compact disc drive located on the processor of your desktop computer
2. Wait a few seconds for auto run to take it course; a window will appear containing the file, as illustrated in the screenshot below.




3. Double click the file (encrypted implementation.mdb), you will then be prompted with a username and password[5], which has been supplied directly to the owner of the garage.
4. Once inside the database, the file can be saved to the computer, by clicking (File), a drop down list appears, click (Save), the file can typically be saved as Victor's Garage system.

The CD can still be used as a fundamental backup medium, in case of a system restore[6] operation, etc. the CD can be kept to start over again or even compare to any future systems that may be developed.

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[1] Definition of 'compressed' is to condense data so that it takes up a reduced amount of storage space
[2] 'Encryption' refers to converting the program into code so that users cannot change the view
[3] 'MB' means megabytes, which is a measure of data size, they range from bytes to tera bytes
[4] 'CD-R' is a compact disc used for read only memory with computer systems
[5] 'Password' is a secret word or phase that ensures admission to the database by proving identity
[6] A 'system restore' changes all aspects of a system to an established point in the past

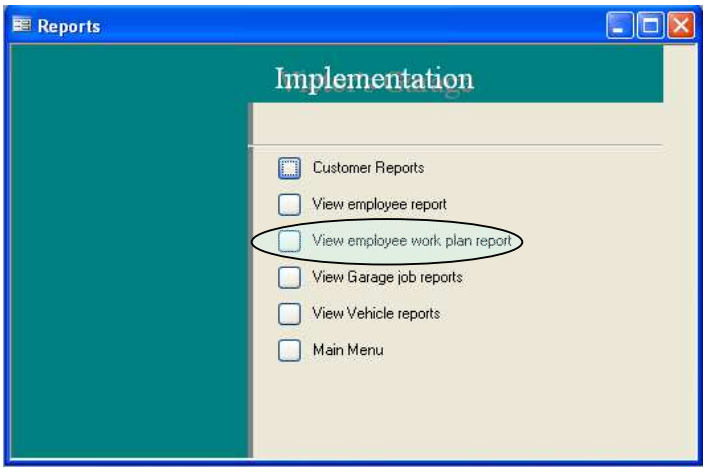
# General use

## *Using the switchboards*

The switchboards[1] have been constructed for navigation purposes, to allow easy access to all areas of the data base. Ways to different sections of the system all follow the same concept, as an example, how to view the employee work plan report using the switchboards will shown below in a few simple steps.

1. After logging on the main switchboard will already be displaying, to reach the employee work plan report click the view reports button, which is emphasised below.


2. You should now be on the report switchboard, to reach our objective the view employee work plan link must be selected, which is shown below.



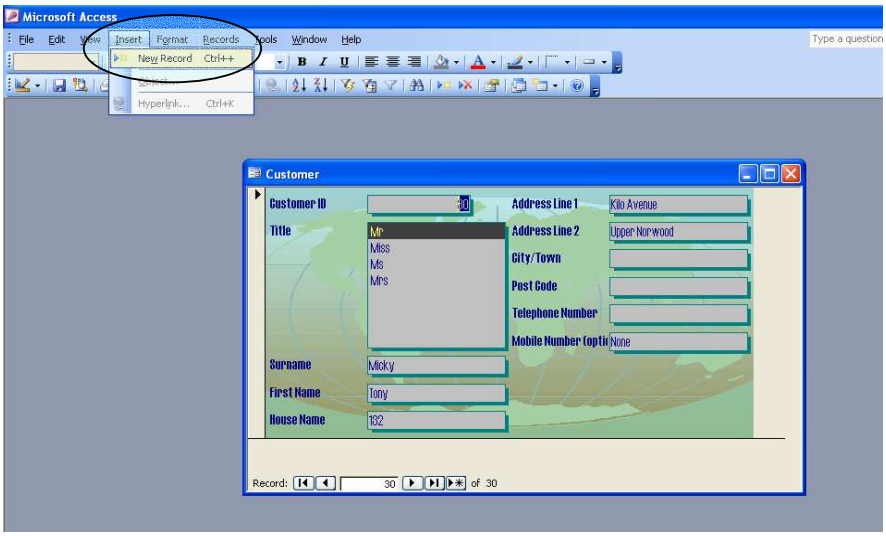

The final result is the employee work plan reports being showed in print preview mode

[1] 'Switchboards' help the user to navigate around the system

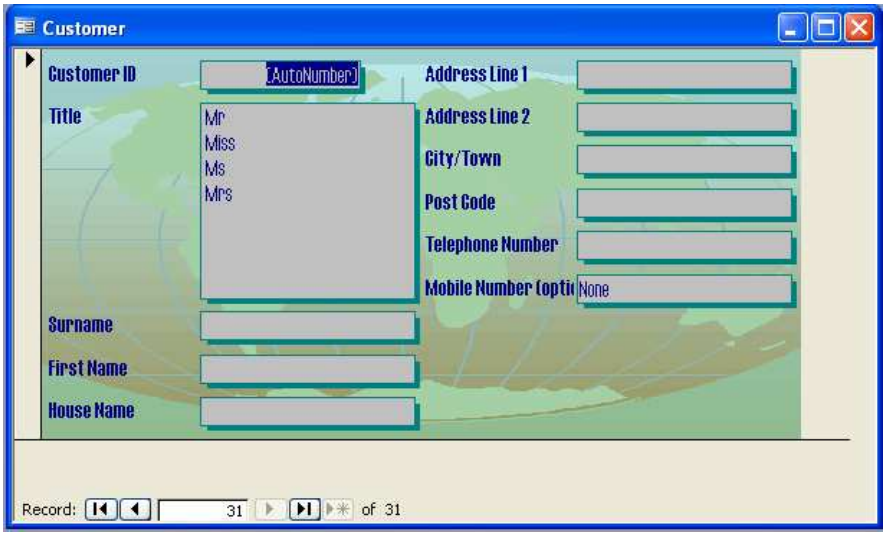
## *Inserting new records*

Inserting new records can be done by entering new data into the tables, however the form method is much easier and user friendly with a more appropriate interface. This section will describe how to enter new records using forms. Since all types of records being inserted follow the same concept, example will be used, which will be how to insert a new customer record.

1. Using the techniques and switchboards shown above, navigate until the customer form is opened
2. Whilst looking at standard toolbar, click the insert button and select the new record function, which is shown below.



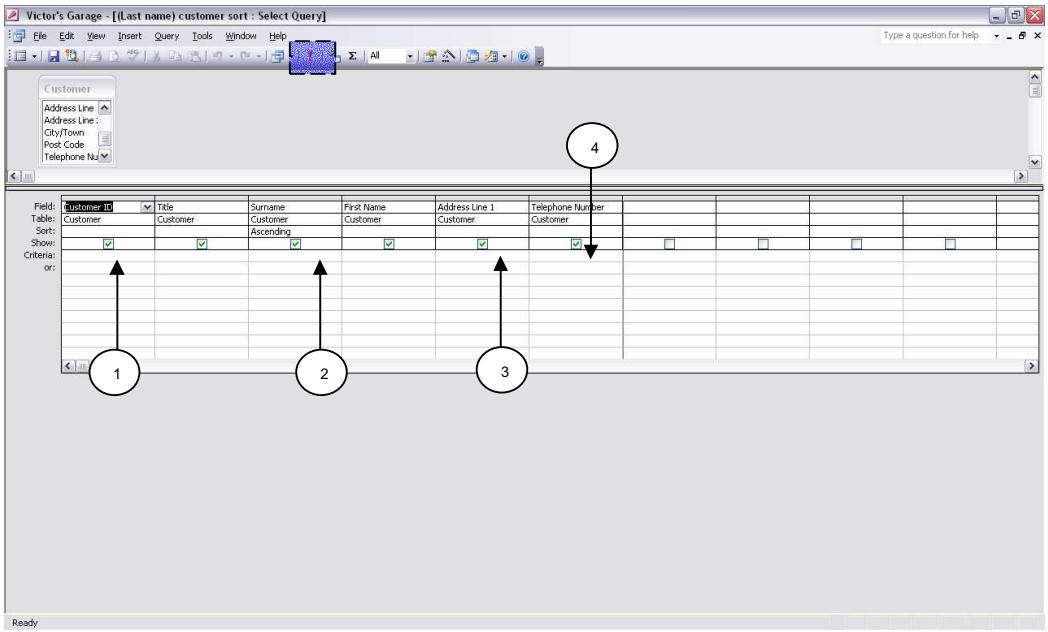

3. Subsequently, a fresh form page will appear which you can now use to enter a new record in, as shown below.



## *How to search for a customer*

When using the system for day to day use, the situation my require you to find a particular record of a customer, for example, to take a survey on the type of customers the garage serves, or the data subject may want their record deleted, which has to be obey chiefly due to the Data Protection Act. This section depicts the various ways to search for individual or groups of customer records. The following steps illustrate this method.

1. Using the switchboards[1], starting from the (main menu) default switchboard, select the following link: ( Searches _Queries )
2. You should now be on the searches and queries[2] switchboard, select the ( Last name customer search ) link, this should take you to the following location:




3. Above shows the customer search query, each criteria box[3] in the row is labelled with a number, each one will be explained and related to how it can be used to search for customer records:
   ①. **Customer ID**, if known you can enter the unique reference number here, which will display a single record, providing it actually exists
   ②. **Customer surname**, enter the surname here and corresponding records will appear, customers may have the same surname so hypothetically there could be more than one record
   ③. **Address Line 1**, to get the full benefits of this function, the exact address must be entered, partial entries won't give the proper information
   ④. **Telephone number**, once again the full 11 digits must be entered correctly, since it is a relatively large entry, errors are more likely

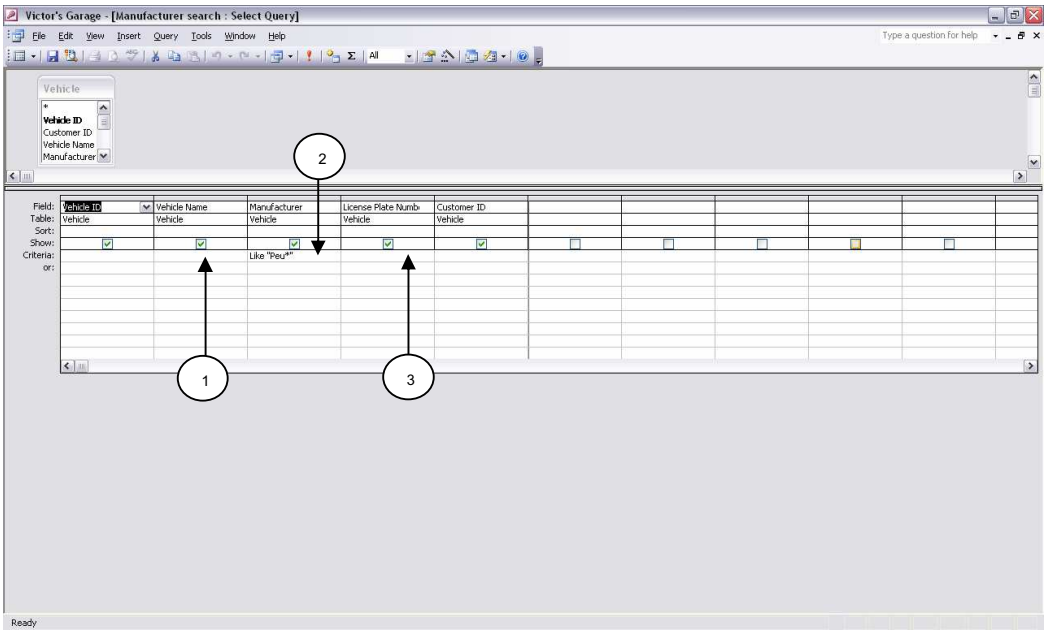
**Note:** upon inputting the data into one of the criteria boxes, click the run button which is shown in the above screenshot behind a translucent blue box.

[1] Refer to page 84 to see how to use switchboards appropriately
[2] A 'query' is a request for information
[3] When searching for customers using one of the six options and the corresponding criteria box, all other criteria boxes must be empty for the function to work appropriately

## *Searching for a vehicle and its driver*

One scenario may be that a car has been found with limited available information; subsequently this information can be inputted into the system to gain the corresponding data[1]. The steps necessary to achieve this are as follows:

1. Using the switchboards[2], starting from the main menu, click (Searches_Queries)
2. Once on the searches and queries switchboard select (Search manufacturer by name), the following window should now be displayed on your screen:




3. Similar to the options shown in the previous page, numerous parameters can be entered in the criteria row, when searching for a vehicle and its customer. The different numbered options shown above are described alone:
   ①. Here the vehicle name can be entered, if the full name isn't known, the first few letters can be entered followed by a wild card, (e.g. As*)
   ②. Alternatively the manufacturer name can be entered, if the full name of the manufacturer isn't available for some particular reason, the first letters of the name can be entered followed by a wild card, which is illustrated in the screenshot
   ③. If the licence plate is the sole piece of data available it can be entered here, there is only one licence plate per car, so the result display only one vehicle record

**Note:** upon inputting the data into one of the criteria boxes, click the run button which is shown in the above screenshot behind a translucent blue box.

[1] 'Data' refers to the details in a record
[2] Information on how to use the switchboards is shown on page 84

## *Adding a new user and modifying a password*

As the business grows and the work load increases, new employees may need to be employed consequently they need to be given appropriate levels of access to the system. The following steps describe how to add a new user and assign/modify passwords.


1. As illustrated on the right click Tools on the toolbar
2. Select the security button
3. Finally click user and group accounts, you should now be in the location shown in the below screenshot


4. Insert the name of the user new user into the name bar
5. Suggest what group they are put in by adding or removing groups from the available group to the 'member of'

To change the password of this new user they must be logged on the person changing it must have the correct privileges[1].


6. Click the change logon password bar which is shown near the top of the window
7. As shown below enter the specific password into the corresponding bars

[1] 'Privileges' refers to the amount of freedom a user has around the database

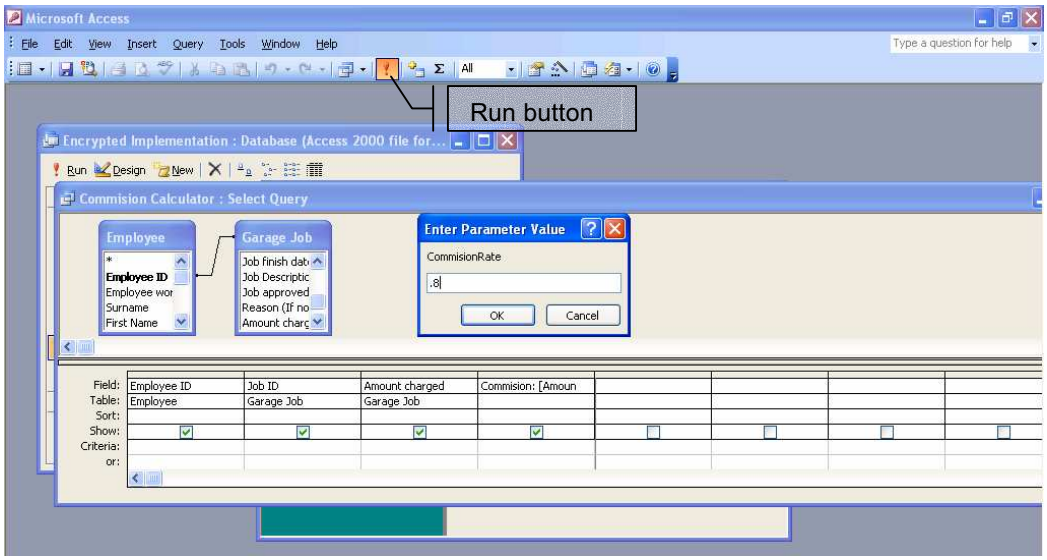
## *Calculating commission*

Commission is the fee or payment made to a worker for the services to a body. The subsequent steps state how to calculate the commission for each garage job.

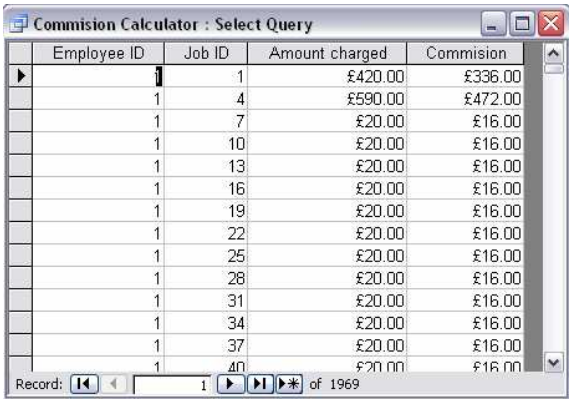
1. Access the searches and queries switchboard by selecting ( Searches _Queries ) on the main menu
2. Select the ( Calculate commision for each employee per job ) link located near the top of the searches and queries menu

You should now be viewing the design view of the commission calculator query, shown in the screen shot below. Depending on how many garage jobs you want the commission query to calculate different parameters are required. The following steps process all garage jobs.

3. As illustrated in the below screenshot, leave the criteria row blank and immediately press the run button




4. As shown above the ‘enter parameter value’ will appear and you will prompted to enter the commission rate, this function doesn’t understand percentages, so decimals must be used to represent them. 10%=0.1, 25%=0.25, 78%=0.78, 100%=1, in the above screenshot 80% is represented as ‘.8’
5. Once the commission rate (decimal) has been entered click the OK button, and the results shall be shown in table view, as sampled below



Commision Calculator : Select Query

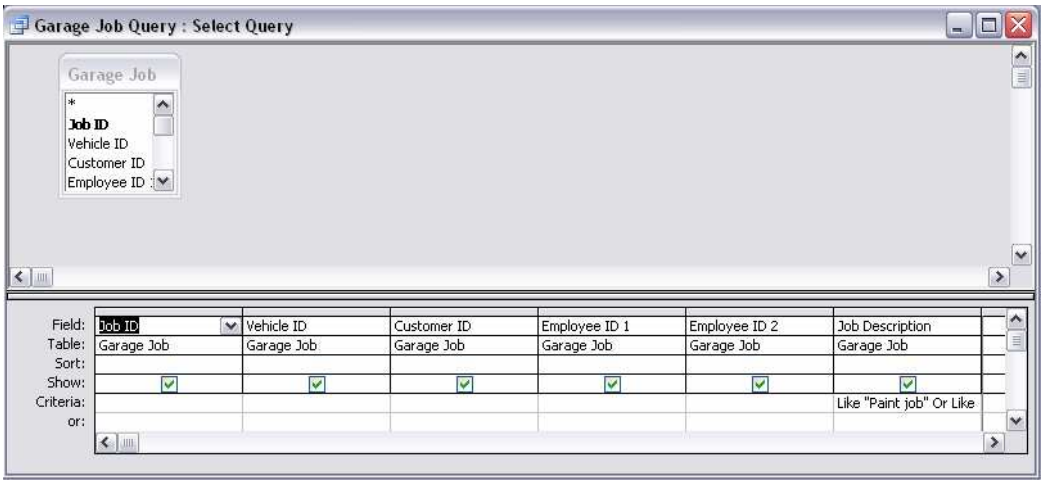
| Employee ID | Job ID | Amount charged | Commision |
|---|---|---|---|
| 1 | 1 | £420.00 | £336.00 |
| 1 | 4 | £590.00 | £472.00 |
| 1 | 7 | £20.00 | £16.00 |
| 1 | 10 | £20.00 | £16.00 |
| 1 | 13 | £20.00 | £16.00 |
| 1 | 16 | £20.00 | £16.00 |
| 1 | 19 | £20.00 | £16.00 |
| 1 | 22 | £20.00 | £16.00 |
| 1 | 25 | £20.00 | £16.00 |
| 1 | 28 | £20.00 | £16.00 |
| 1 | 31 | £20.00 | £16.00 |
| 1 | 34 | £20.00 | £16.00 |
| 1 | 37 | £20.00 | £16.00 |
| 1 | 40 | £20.00 | £16.00 |

Record: 1 of 1969

## *Searching for garage jobs*

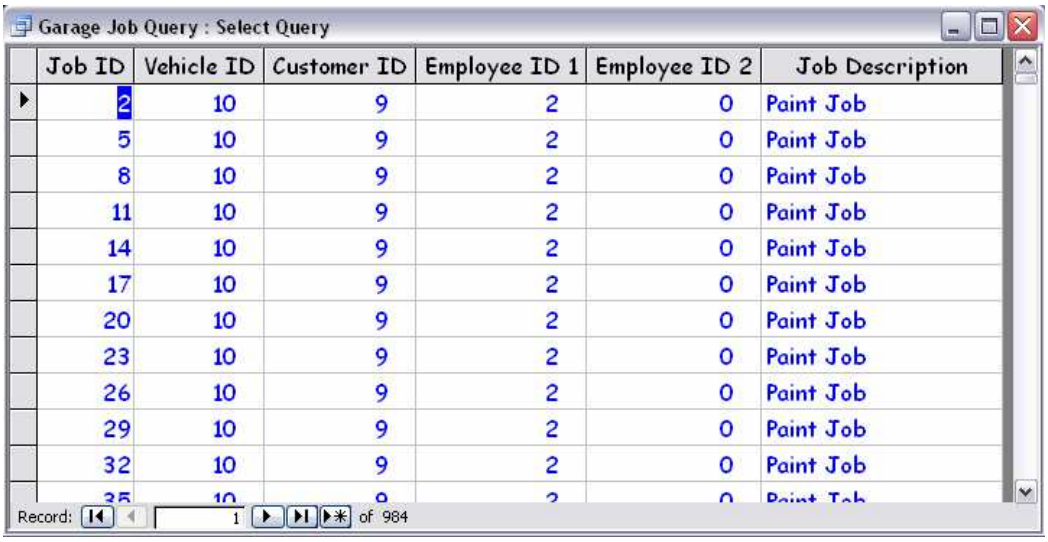
Whilst completing the details of a garage job, particularly the description field, the first one or possibly words must be default entries depending on the job. For example, if the job is to with the tyres, all other jobs of this kind must begin with tyre job, this necessary for easy garage job searches. The following steps state how to effectively search for jobs.

1. Using the switchboards access the searches and queries menu
2. select the ( Garage Job search by description ) link to reach the query in design view as shown below




3. Enter in the criteria box in the job description, the job you are looking for, for example if you are looking for paint jobs enter: Like “Paint job”, if you are looking for more than one job enter: Like “Paint job” Or Like “Tyre job”
4. Finally select the run ( ) button

The results are shown in normal table view, as illustrated below

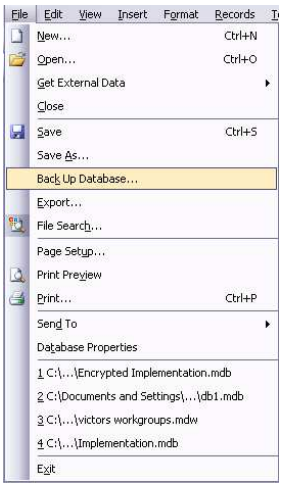



| Job ID | Vehicle ID | Customer ID | Employee ID 1 | Employee ID 2 | Job Description |
|---|---|---|---|---|---|
| 2 | 10 | 9 | 2 | 0 | Paint Job |
| 5 | 10 | 9 | 2 | 0 | Paint Job |
| 8 | 10 | 9 | 2 | 0 | Paint Job |
| 11 | 10 | 9 | 2 | 0 | Paint Job |
| 14 | 10 | 9 | 2 | 0 | Paint Job |
| 17 | 10 | 9 | 2 | 0 | Paint Job |
| 20 | 10 | 9 | 2 | 0 | Paint Job |
| 23 | 10 | 9 | 2 | 0 | Paint Job |
| 26 | 10 | 9 | 2 | 0 | Paint Job |
| 29 | 10 | 9 | 2 | 0 | Paint Job |
| 32 | 10 | 9 | 2 | 0 | Paint Job |
| 35 | 10 | 9 | 2 | 0 | Paint Job |

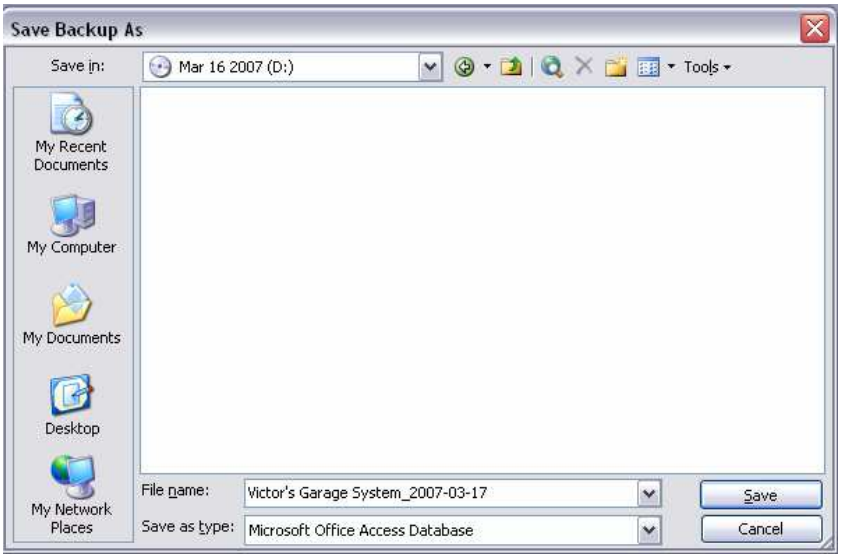
# Backup procedures

Periodic backup is needed, which involves regularly copying files and keeping them away from the original in a safe place. The following steps illustrate how to backup the system onto a system.

1. Insert a CD-RW/CD-R into the CD-ROM drive
2. Open Victor's Garage system
3. Save and backup the system on the CD by selecting the Back Up Database... option in the File menu, which is illustrated below




4. Use the default name given and click save, to successfully backup the database, which is depicted below as a screenshot



# Trouble shooting

## I installed and saved the system but certain aspects are not shown/I can't find the program

The most likely reason for this is that the program hasn't been installed properly or certain files have been deleted or gone missing. To solve this problem follow the subsequent steps.

1. Quit all running programs
2. After clicking the 

button open the 

3. Find the file and delete it
4. Access the original or most recent backup CD and insert it into the CD-ROM drive
5. Proceed to follow the steps of installation[1]

## I can't open the password protected file

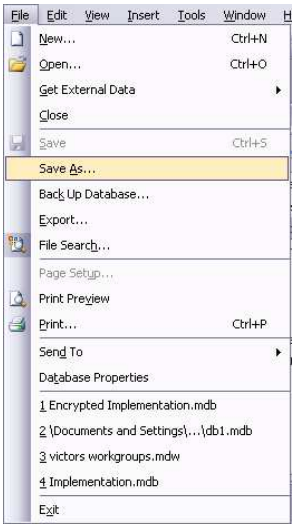
All passwords as well as user names are case sensitive; therefore it matters whether the caps lock in on or off. When entering the username and password check to see whether the caps lock is on or off, retype the password to make sure it wasn't mistyped.

## I am unable to save changes to the system

When accessing the system straight from a CD-ROM it is opened as a read-only file, as a result changes cannot be made. To save changes it needs to be saved under a different name to the original by using the 

button on the 

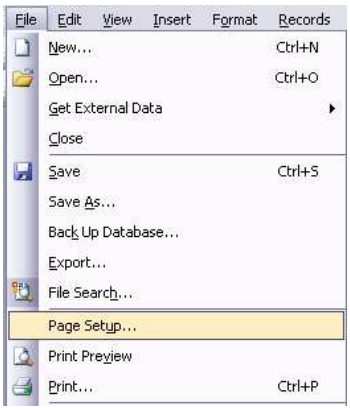
menu, as shown below.



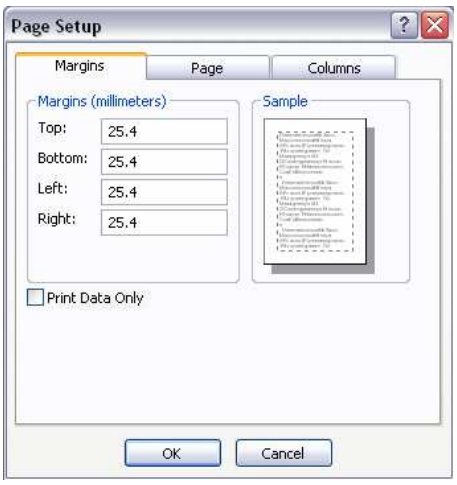

[1] Refer to page 5 to find details of how to install the system

## When printing or previewing the reports, there's a blank page each one

To solve this ensure that the width of the report as well as the margins (left and right) don't go over the paper size dictated in the page setup in the file menu, which can be accessed as illustrated below.




The size of the report can be adjusted by width or by the margin, as shown in the subsequent screenshot.



## When searching for queries I am not getting the records I want

If you find yourself in this situation check the data you are looking for, if it contains unusual characters, the criteria inputted must account for it. Alternatively a wildcard can be used to suffice for characters you are unsure of; if a wildcard is already being used make sure it is used for the correct type of data.

Furthermore, check that the criteria entered is correct, looking for any spelling errors including extra spaces or characters.

## I have set up a relationship but I don't see a sub datasheet

This scenario has occurred because the value of the sub datasheet name property has been set to none, which results in no sub data sheet being created. To create a datasheet the value of the sub datasheet name property to auto.

## I am having difficulty creating/modifying a primary key for my table

Try setting the primary key whilst taking into account:

- All columns part of a table's primary key must have unique values
- The primary key must have at least one column and unique data value
- A primary key cannot created using a text, image, or bit data type

# Evaluation

This section of the project will involve evaluating the system based on the qualitative and quantitative criteria as well as the requirements of the end user stated in the specification (analysis) section.

**"Validation and Verification techniques are important to any important system, especially one which handles and records the allocation of important assets of the customers as well as businesses"**
Validation and Verification techniques were a requirement directly specified by the end user. To meet this requirement numerous validation rules have been put on field data entry that limits input to reasonable data only. For example, the rate of pay per hour only allows £10 and below, this is because no worker gets paid more than £10 per hour at the garage. Similar rules are in place all around the database, which displays a message highlighting the unreasonable data input if the validation rule is violated. However, verification techniques were not incorporated to a satisfactory degree. The only verification apparent in the database is when a password is being set of changed, where the user is prompted to enter the password in twice to prevent mistypes by checking the second entry against the original entry. However, in other places where verification would've been advantageous it hasn't been used, this is due to the limitations of the software application being used.

**"Victor emphasised the importance of an effective and straightforward data entry process, which involves entering all the information regarding the customer details, car specifications, etc"**
Easy input was an additional requirement of the end user. To meet this objective various methods have been utilised to make entering information easy and problem-free as possible. When working with queries the user guide clearly illustrates how to use them, only a few letters are necessary plus a wild card. This makes data entry easy as well as quick, which gives the end user the opportunity to do other tasks. Plus, the areas where user input is required can be easily identified to the viewer, this is done by clear field names and guidelines, or dialogue boxes that prompt the user directly, for example, the commission calculator prompts the user with a commission rate directly.

**"The user interface involves the way the receiver identifies the information conveyed to them. A consistent layout will allow comfortable usage for employees when using the system"**
A graphical user interface has been implemented to meet the requirement for an attractive user interface. The database follows a green colour scheme and the tables enjoy a blue colour scheme, with an Arial font style. These changes make the system more eye catching and less boring, since the user will have to working with the system on a daily basis, the system would benefit from being 'fun' to use to avoid workers being bored and more prone to make errors. Moreover, workers have the option to place pictures of cars that they are working on, which can be viewed on the forms as well as the reports. This can act as a visual aid and provide more variety and enlivenment when looking through records.

**It is probable that the information inputted and processed will need to be viewed in different forms of output, primarily through the visual display unit (the monitor).**
Victor requested that the information could be viewed in different formats. The system allows data to be viewed as output from a visual display unit or a hardcopy from a printer. The reports have been purposely modified and created to allow for simple print previewing and act as a hardcopy when appropriate. This will be beneficial when requiring a permanent piece of information to send or just show to a government agency of proof as transaction or for a customer who wishes to have the documents related to them. Tables and forms allow easy viewing on a visual display unit (monitor), which is ideal when information is only needed temporarily.

**Navigation of the system is preferred to be as uncomplicated as possible, due to the limited computer literacy available**
The primary response to easy navigation is the switchboards. Only a small network with a minimal amount of links and menus has been made to make moving through them as uncomplicated as possible considering the available computer literacy. All links are marked with clear and concise descriptions so there is no confusion when choosing a button and links are easily comprehended. The switchboards also have a consistent layout to avoid confusion and make it easier for the user to recognise the menu and know what action to take, this will allow a steeper learning curve and the user becomes more effective in the systems use.

**"The security of the data is essential, due to the large amount of sensitive data regarding customers and their vehicles"**
The user requirements also emphasised the existence of a competent security system due to the quantity of sensitive information regarding data subjects and their vehicles. To act towards this the database is equipped with passwords for separate work groups, which gives users their own username, password and set of privileges. Workers at the bottom of the hierarchy are given limited access since they are novices, so they are prevented from accidentally deleting software or wrongly manipulating records. Whereas experienced workers and the Admin have full access since they are proven to be competent in use of the system. Furthermore, the database has been encrypted, which makes it more difficult for unauthorised users to read the database and the file cannot be read without the decrypting key. This reduces the risk from hackers and other authorised hackers whilst providing reliability as well as integrity.

**"Backup protocols are a necessity in the event that the master copy is lost or destroyed"**
The user guide supplied in this project outlines the backup protocols necessary in case of an event that destroys the master copy and provides a written teaching on how to use the database. The backup strategy involves saving the data regularly on to a compact disk and storing it in a safe location away from the original, so information isn't lost and production can continue with minimal disruption to the business. The user guide uses simple language to allow the users with little computer literacy to comprehend how to perform day to day tasks using the system.

- **The new system must exceed the standards of the current system, while using as much computer technology as possible**

General system objectives stated that the new system must exceed the standards of the current system, while using as much technology as possible. Evidently, this objective has been accomplished in numerous respects. The new system uses advanced computer hardware whilst utilising the most current Microsoft office software, i.e. Microsoft Access 2003. The previous system took up an excessive amount of physical space when storing paper-based records and files, the new system eliminates this problem, all the data is saved on a comparatively small space (i.e. the hard drive or a compact disk), and allows Victor to use the space for other equipment from cars to assorted car parts. Furthermore, efficiency has been greatly improved, previously certain records were hard to find and files could be easily lost or misplaced. The new system provides functions to remove these worries, searches and queries can be made by entering minimal input which can locate specific data within seconds. This greatly saves time and can allow employees to concentrate on other business functions such as fixing cars. Furthermore, data cannot be lost unless the user purposely deletes the record, in which case the end user is aware of any data being lost and can act more precisely and appropriately.

- **A user interface must be achieved by incorporating a graphical user interface, i.e. windows, icons, menus and pointers**

General system objectives also specified that there must be a user interface that incorporates a graphical user interface, i.e. windows, icons, menus and pointers. This objective has been achieved fully; operating system that is being used, i.e. Windows XP, by default uses a pointer as part of its graphical user interface. All aspects of the database, namely the tables,

forms, reports are viewed in windows to make them easy to view and differentiate from each other. Switchboards represent the menus, a network of menus has been made to allow navigation, and icons represent the links to different parts of the database. Therefore the system is an effective solution in meeting this requirement.

- **The majority of manual methods performed in the current system must be converted to automated actions in the new system**

Another of the general system objectives was to automate as many previous manual methods as possible. This objective has evidently being completed with all manual process being eliminated. For example, calculating the commission no longer requires intermediate maths skills and a calculator, the user can simply enter the commission rate (and specify the garage job ID where appropriate) and the system quickly gives the correct result with 100% accuracy. Furthermore, the previous system involved searching through loads of files and records in order to locate information regarding a data subject. Now the user can simply enter a minimal amount of data, for example, an ID number or a surname, and the corresponding data is revealed within a second. The database doesn't make mistakes and always produces the correct information providing the correct data is inputted (GIGO [garbage in, garbage out]).

- **The complexity of the database must be kept to a minimum so that only basic computer training is required of the employees**

The end users have little computer literacy so reduced database complexity is a general system objective, so that only basic computer training is required. To make the database easy to user a graphical user interface has been incorporated so the user can easily get to grips with system and can identify functions using the window names, icons, descriptions, etc. Although advanced features have been used, even beginners can put them into use. For example, the queries use various calculations but only simple input is required by the user.

- **The system should have the capacity to store all of the information regarding customers and their vehicles**

Qualitative objectives required the database to have the capacity to store all of the information regarding customers and their vehicles. The testing section provides proof of this objective being accomplished; the amount of records allowed to be saved is only restricted by the amount of space on the hard drive which is several dozen gigabytes.

- **Specific records of customers should be able to be located with ease**

Several queries meet the objective of specific records of customers being able to be located with ease. The user can simply enter the ID number and the system can accurately locate the record immediately. Even if the full details are not available, the wild card function can act to remove this problem and still produce the same results with accuracy as well as reduce input time.

- **Information should not need to be entered twice, if possible it should become automated if it is a routine process**

Qualitative objectives also stated that information should not need to be entered twice; if possible it should become automated. This objective has not been completed; if a new vehicle record is being created that has the same customer/employee details as another record the same details will have to be entered again. The only solution I could think of was to make macros that automatically entered previous information, but considering the amount of details regarding employees and customers, an exceeding amount of macros would have to made, and new ones would have to be made as the database grows. Not only would this take up an increasingly amount of storage space between it would unnecessarily increase the end user's work load.

- **Filter techniques, i.e. queries should be available for searching the database for records with specific characteristics**

Numerous queries have been made using filter methods that allow searching for records in the database with unique references. The queries include ones that allow the user to find garage jobs according their price, for example, jobs that charged below, equal or above £29.99 can be found. Garage jobs can also be located according to their description, all descriptions start with the same couple of words, e.g. repainting a car or giving another coat of paint would first be described as a 'paint job', so that is all that needs to entered and subsequently all related records show up. Other queries include searching for customers and vehicles by their surnames and manufacturers respectively, which both use the same concept.

- **Access to system must be obtained with minimum obtrusiveness**

Qualitative objectives specified that the system should be accessed with minimum obtrusiveness. When meeting this objective I had to consider security since making it too easy to access could make the system vulnerable to outside 'attack'. Therefore I decided to place just password protection before gaining access, this requires quick entry by the user each time the program is opened and only takes a few seconds to carry out.

- **The system should store information regarding over 500+ different customers, 2000+ jobs descriptions and 50 employees**

The system has performed successfully when evaluated against quantitative objectives, which is shown in the testing section. The objectives include being able to hold over 500 customer records, 2000 job records and 50 employee records. Test data was entered and copied and pasted to replicate large numbers, and the changes were accepted and saved without any interruptions or complications.

- **The information regarding any data subject must be accessible within 5 mouse clicks**

Quantitative objectives also specified that information regarding any data subjects must be accessible within 5 clicks. The testing section should that information can be reached within 3 clicks, this is due to the easy to use switchboards that avoid complexity and provide speedy access to different areas of the system. Even as the database grows, minimal manipulations to the switchboards are required.

Additional quantitative objectives included being able to view information in a secondary format within 10 seconds of viewing it in its original format. Once a report has been opened it already view in print preview mode, all the user has to do is click the print button located on the toolbars above and put the printer on, and the documents will be produced in physical paper back within a few days.

## *System limitations*

Limitations are apparent in particular aspects of the database; one of the requirements was to provide easy input. However, this isn't achieved when the commission rate is being entered. The problem involves the user being unable to enter percentages, only decimals are accepted. This requires the user to have extended numerical skills which may require further training. Plus it takes more effort to convert the percentage to a decimal so mistakes will be more frequent. I do not know how to configure the application to accept percentages or the application itself is incapable of doing so.

Additional, limitations include the results of queries. At the moment only minimal small amounts of information are shown once a query is run. So information that a user may be

looking for may not be shown, which may result in the user having to quit the query and access another table or form causing excessive time consumption. The cause of this limitations mainly lies with me, since I had the means and the know how to prevent this from occurring, hence the fact that a solution would be easy to develop for future enhanced versions of the system.

Further limitations include the absence of any reasonable amount of verification techniques in the database to check accuracy of inputted data against the original; this prevented me from achieving certain tests in the task plan[1]. The main reason is that the possibility of using verification methods is not enabled with Microsoft Access 2003. If this is the case future models may have to be created using alternative software so that all the ICT requirements can be met to produce a more optimal solution. Alternatively, I may not possess the expertise to deploy verification facilities; therefore I would need to gain access to all user documentation and online user support to discover how to eliminate the restriction on how I can meet the requirements.

## *End user evaluation*

To discover the remaining limitations of the system and what modifications could made for future models I have interviewed the end user to provide some suggestions, the interview can be found in the appendix, whilst the analysis of the main points have been stated below.

The interview signifies that the end user is content with the system as the vast majority of objectives have been fulfilled, which have been fully explained in the previous three pages. The system has been weighed against the requirements and has been successful. On the other hand, there're some limitations and suggestions that the end user has made concerning the final system.

The lack of verification has been highlighted as an issue boundary data that has been entered that may possibly be incorrect go unchecked as a result, so the system is more prone to errors. Microsoft Access doesn't provide any functions to respond this problem as a result it cannot be solved, the user has to be relied upon to not make mistakes. Alternatively, the new version of Microsoft Access, i.e. Microsoft Access 2007, which is released later this use could be used to solve this issue.

Additional limitations include the lack of information shown after running the queries. At the moment queries only produce limited information for example, just the Customer ID, surname, first line of address and telephone number are shown from running the customer search query. As result if the user wanted to see what vehicle they owned, they would have to quit the query and find the customer's record in the long list in the customer table.

The end user gave a couple of suggestions to consider for any future models. The system should be more visually appealing, a simple colour scheme and pictures of cars are not enough, if any part of the system should in depth it should be the visual aids. At the moment it is colourful but it will be boring within a short space of time. Inspiring backgrounds that encourage workers to work harder would be a worthwhile image that should be used.

Moreover, the end user suggested that more information should result from queries. When searching for customers by their last name, their entire record should appear. This can be easily completed by adding more field values whilst in the design view of the query. By doing this the end user doesn't have to record the customer details and go looking for the rest of the customer's information in the large list in the customer tables.

[1] The task plan can viewed on page 57

# Appendix

## *Interview with End User*

*ME*
*UNCLE VICTOR*

*What service (or product) does your business provide to the public?*
*My business is a garage which repairs and checks damaged and older vehicles.*

*What is your current system designed to do within your business?*
*The system in place at the moment is designed to record customer information, the job information as well as who carried out the job.*

*What are the general procedures for this system?*
*Before the job has been completed an employee records the customer information and what is wrong with the vehicle. Once the job is complete, the price charged and how the problem was rectified is recorded.*

*How often do you and your employees perform the tasks within the current system?*
*The frequency ranges, depending on the amount of cars we have coming in. It can range to twice a week to 4 times a day.*

*Apart from you and your employees is there anyone else involve in this system?*
*No.*

*What data is captured and then entered into the scheme?*
*Customer details, the vehicles problem and how it was sold, the employee's information and the price charged is gathered and entered in the system.*

*After the procedure have been carried out what is the end result?*
*A sheet of paper (or report) containing the information.*

*Is there any processing involved in the system?*
*Apart from the calculation of the price, no.*

*What is the level of security for the system?*
*Security is minimal; most of the documents are stored on site (at the garage), which is locked when vacant as is my house where the older archives are stored.*

*How and where are the archives stored?*
*They are stored at the garage and at my house.*

*Is the system backed up in anyway?*
*No, no copies are made.*

*Have there been any problems with this system?*
*Yes, data is becoming unreliable, difficult to enter and very slow*

*For the new system are you planning to purchase new hardware or software or do you already have what you require?*
*Apart from the data needed to enter we don't have any necessary equipment, such as personal computers and printers.*

*How good are yours and your employee's computer literacy?*
*I have substantial computer experience, but the employees have next to none.*

*What is it you are looking for in the new system?*
*Speed, reliability, accuracy and easy to use.*

## *Evaluating the system with the end user (interview)*

ME
END USER

Did you find accessing the system easy enough?
Yes, it didn't take me long to access the system

Do you prefer the new system to the old one?
The new system is definitely more preferable, mainly because tasks can be done much more quickly and effectively with minimum effort

Have you discovered that there's less manual and tedious work involved?
I am pleased that I no longer have to rack my brain to work out calculations, or spending ages looking for files on the shelves

Did you find entering data into the system a challenging task?
I found that it took some time to comfortably enter information; I had to refer to the user guide a few times before I was able to do it on my own

Were you satisfied with the amount of security measures in place?
I feel that the encryption and passwords are more than enough to ensure security since I haven't had any problems with the previous system's security which had next to no security compared with the new system

Do you feel the database has been constructed with too much complexity?
Once I first opened the system it was slightly intimidating with my little computer knowledge, although the user guide was a big help when problems arose. During day to day use I got the impression that complexity was not going to be a problem

Does the capacity of the database suit the amount of data being saved?
Yes

Did you find the user interface appealing?
I found the interface to be pretty boring; there are no features that I felt impressed with regarding the colour scheme, backgrounds and pictures

Were the navigation utilities, i.e. the switchboards easy to use for day to day use?
The switchboards are the easiest and enjoyable to use

Are there any remaining limitations that came to your attention?
I noticed the lack of verification taking place went inputting data, plus the results of queries should reveal more information.

Are there any suggestions you can provide for future model enhancements?
The user interface should look more visual appealing, with more pictures and logos. The results of queries shouldn't be just limited to a data subjects ID, it should also include all other information about them.