

1. Description of the Problem

Background of the System

Doric Engineering Pvt. Ltd is a well renowned private company. It is situated in the 91/B, Elephant Road Boro Moghbazar, Dhaka-1217. It sells a profitable number of generators per week. It started as a small private company three years ago. But due to their supply of better quality generators, their number of customers gradually increased.

Currently the company is using a **manual record keeping system** along with two managers, three cashiers and six salesmen only in the sales department. The customer comes to the company's office and talks with one of the salesmen. The salesman then chooses a set of **generators**, according to the customer's requirements, and provides them, with full details, to the customer. Then according to the customer's choice, a generator is chosen and thus, purchased.

The company stays open between Sunday to Thursday from 8 A.M. to 6 P.M. and on Saturday 9 A.M. to 5 P.M. It remains closed on Fridays.

But as the number of customers rapidly increased over the years, I began to suspect a problem that Doric Engineering might start to face- the **drawbacks of the manual record keeping system**.

My Involvement with the Problem

My father is the Chairman of the Doric Engineering Pvt. Ltd. When I visited his office, I was expecting to observe how their recent transactions were taking place and what I saw was something that might be harmful for the company's growth. The ratio of the number of customer to the number of salesman was 5 to 1. The salesman delayed to give proper attention to each customer. Plus, for each customer he had to personally check the **stock register** of the system over and over, as it was a manual record keeping. The customer had to wait to make the transactions and when they reached the cashiers, the drawbacks of the manual system started to show again as the bill was made manually, thus slowly. To top it off, the managers were too busy editing the **stock register**. The number of customer was overwhelming and their face expressions gave a feedback of the **manual record keeping system** being less than satisfactory.

When I inquired about these problems to my father, he seemed to be agreeing with me of searching for a proper solution. I took my chance and asked if I could solve their problem by introducing a computerized database system. Fortunately the Managing Director was present and the decision was made of introducing the computerized database system.

Fact Finding: Method 1 - Interview (Fig: 1.01)

I decided to host an interview with the two managers of the sales department to have a further grasp of the problem being faced and the reasons behind them.

Interview with the two managers

1. THE METHOD OF TRANSACTION BEING USED RIGHT NOW, WERE YOU AWARE OF ITS DRAWBACKS?

Ans: Yes, unfortunately we were fully aware of its drawbacks.

2. HAVE YOU TRIED TO INTRODUCE ANY SORT OF ALTERNATIVE METHOD TO THE TRANSACTION SYSTEM?

Ans: Yes, we have already tried to change some aspects of the method of transaction but it did not seem to help solve the main problems.

3. THE OWNERS OF THE COMPANY HAVE DECIDED TO SOLVE THE CURRENT PROBLEMS BY USING A COMPUTERIZED DATABASE, ARE YOU HAPPY ABOUT THEIR DECISION?

Ans: Yes, of course. I am completely agreeing on their decision of using a computerized database system as it may be one of the only efficient solutions to our problems.

4. ARE THE STAFF TRAINED ENOUGH TO HANDLE A COMPUTERIZED DATABASE SYSTEM?

Ans: No, eighty percent of the sales department staff is not trained to use a computerized database system.

5. DO YOU THINK A SECURITY SYSTEM IS REQUIRED FOR THE NEW SOFTWARE THAT IS ABOUT TO BE USED IN THE COMPANY?

Ans: Yes, I absolutely think a security system is required to access the database so that data integrity is maintained.

6. DO YOU HAVE ANY SUGGESTIONS OR PERSONAL CHOICES IN THE MATTER OF THE DESIGN OF THE NEW SOFTWARE?

Ans: No, I do not have any specific suggestions in the matter of the design of the software, but I only want the software to be user friendly.

My opinion after the interview: The transaction, stock and searching system requires an implementation of a computerized database that would allow easier data manipulation, storage and searching within a short time.

Fact Finding: Method 2 – Observation of the Existing Solution

I observed how the transaction is managed by the staff. And also how the stock and customer registers are managed. And also studied how the invoices and reports are prepared. According to my observation the staffs were facing various obstacles in managing the stock registers as well as the transactions. The manual system seems to have hindered the work efficiency of the company staff. Thus, a new solution was required.

Problem Identification

Later on, some specific customers and staff member, present at that time, were chosen for a short interview and just as predicted the main drawbacks of the manual database system came to light.

- **Maintaining the data keeping is very problematic**

As the system is manual, records are kept in the register by writing which can become lengthy and time consuming. If photocopies are kept every day, for each transaction, then a good amount of cost would be required.

- **Data Integrity is not ensured**

As the database is manual, anyone can get access to them as thus data integrity is lost.

- **Frequent update problem**

The records need to be updated frequently for every purchase of generators. It becomes a very hard task for the staffs to update the records so frequently.

- **Unclear handwriting**

The handwriting of the staff can sometimes be unclear which can lead to dangerous misunderstandings.

- **Transposition and transcription error**

These are errors that are likely to occur while creating or copying records. For instance, someone can read 96 as 69 and accidentally write this number instead.

- **Errors while calculating**

In rush hours calculation mistake may occur as it is done manually using calculators. The cashier can accidentally type 6 as 5 or may be * as +.

- **Finding records**

If the record of a specific product is required, then it becomes extremely difficult to find that record in the database.

- **Field Omission**

The staff can accidentally skip one or more than one of the fields unintentionally.

All of these problems will be solved in the introduction of the new system due to the use of validation and verification. It will be computerized thus handwriting problems, calculation problems, field omission problems and transposition and transcription errors, etc. can be avoided. Finding records will become easier. The database will become easy to update and data integrity will be maintained.

2. Objectives

Computerized Objectives

- Co.1 **User interface:** The interface of the computerized system should be user friendly so that it is easier to use, by using navigation tools, drop-down lists, etc.
- Co.2 **Data storage:** Huge Data should be stored in an orderly manner in separate tables for transaction, customer, etc.
- Co.3 **Avoid data duplication and redundancy:** Data will not be duplicated and data redundancy must be avoided by the use of product key, relationship between primary key & foreign key, as a result consistency of data will be increased, like Customer ID used in Transaction table.
- Co.4 **Auto ID Generation:** To make the records in the table unique, like Transaction ID, Customer ID.
- Co.5 **Validation:** There should be validation and verification checks to reduce the errors in data.
- Co.6 **Search & Reports:** The new system should provide faster data searching and faster data reports with much less human intervention.
- Co.7 **Security:** There should be a security system to prevent unauthorized people from viewing confidential data.

Business Objectives

- Bo.1 **Reduces paper cost:** The new system should reduce the extreme paper cost to a minimum.
- Bo.2 **Reduces number of employees:** The number of employees required for this system is less.
- Bo.3 **Calculations:** The calculations should be more accurate to prevent the miscalculation of money.

Bo.4 **Implementation:** The implementation should be chosen very carefully because if it hampers the transactions then the business can face problems.

Bo.5 **Maintenance:** Maintenance should be less time consuming and it should not hamper the process for transactions.

Bo.6 **Increase efficiency of staff:** Staff should be able to operate efficiently while in sync with the computerized system.

Bo.7 **Increase goodwill:** Customer satisfaction increase is also necessary.

3. Description of existing solution

Full description of the current system

Doric Engineering Pvt. Ltd is currently using a manual database system. There are two managers, three cashiers and six salesmen only in the sales department. The customer comes to the company's office and talks with one of the salesmen. The salesman then chooses a set of generators, according to the customer's requirements and provides them, with full details, to the customer. Then according to the customer's choice, a generator is chosen and thus, purchased and **provide customer form (Fig: 1.02)**

This is the outside view and it seems pretty easy for the staff. But inside, the company is falling into a jeopardizing situation. The records of transactions, customers and generators are all hand written and stored in manual **registers**. Editing any errors or adding any extra information becomes very difficult. The staff also does jobs of record maintenance, updating, sorting, deleting, making calculations, etc. But there is also the job of searching which is the most fearful one. Because, searching and finding data during transaction, in a company such as this, becomes next to impossible when the data registers are not completely updated or wrongly updated due to human errors. And while editing, all the previous information including the new information is added again to a new page which also consumes a lot of time.

At the end of each day one manager checks the amount of transaction, the number of targets met, etc. And the other manager checks the stock of generators to see if stock re-order is needed. Before leaving, the two managers conduct a meeting with the owner about the transactions, stock, new products, etc.

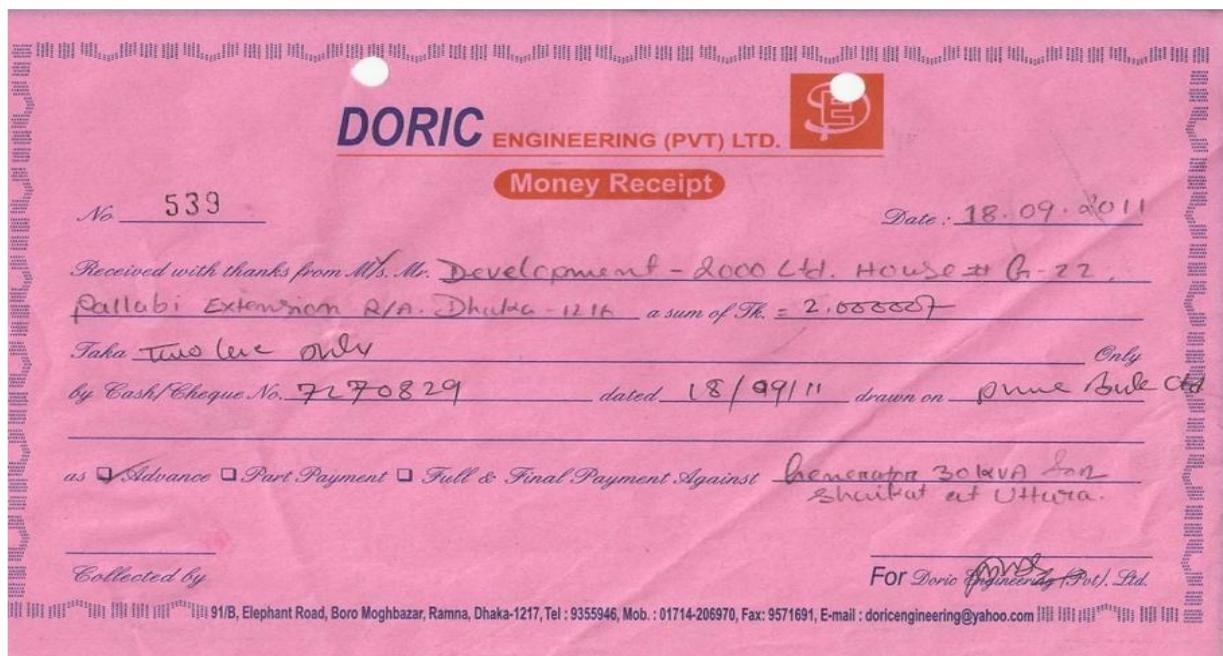
Process of data input of the Transaction Register (Fig: 1.01)

Sales No.	Date	Generator No.	Name	Address
539	18/09/2011	103	Development-2000 Ltd.	Pallabi Extension Dhaka 1216
540	18/09/2011	115	City Lifts Pvt. Limited	Fakirapul, Dhaka
541	19/09/2011	129	Square Hospital	Dhanmondi-27, Dhaka

Process of data input of the Customer Register (Fig: 1.03)

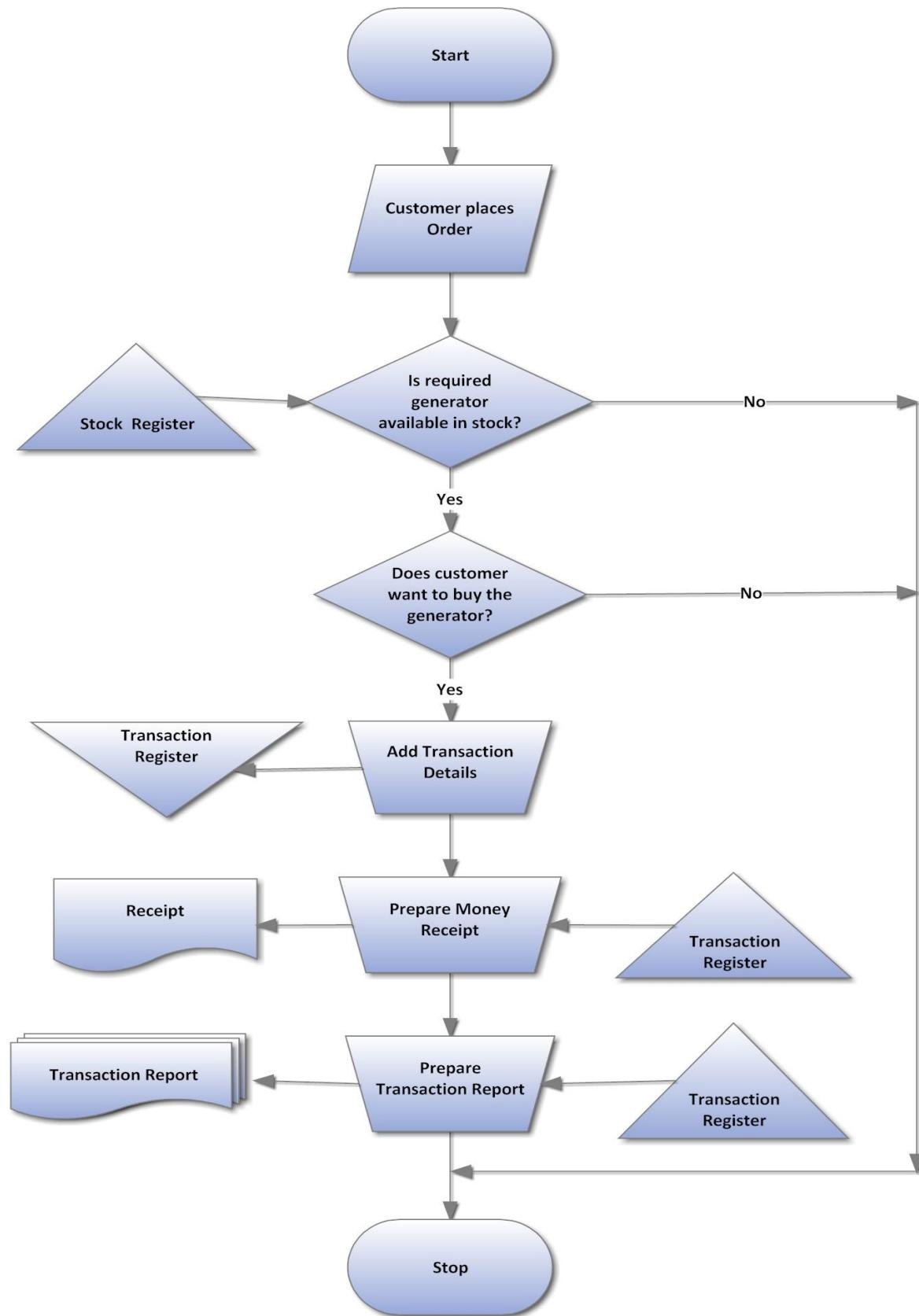
Name	Address	Contact Number	Bank Name
Development-2000 Ltd.	Pallabi Extension Dhaka 1216	01813351868	EXIM
City Lifts Pvt. Limited	Fakirapul, Dhaka	01714489677	BRAC
Square Hospital	Dhanmondi-27, Dhaka	01846686135	SOUTH EAST

Process of bill invoice (Fig: 1.04)



System flowchart of existing system (Fig: 1.05)

A system flowchart of the existing manual record keeping system:



4. Evaluation of Existing System

The advantages of the existing system are the following:

- Special training is not required for the staff.
- It is quite efficient when the customer demand is less.
- The structure of the system can be changed very easily.

The disadvantages of the existing system are the following:

- The running and staff cost is very high.
- The speed of customer service reduces along with the increase in the number of customers.
- Data security is almost negligible.
- The data may contain errors as there is no validation system.
- Keeping back up is more costly as it means doubling the amount of materials used for storing data.

Suggested Improvements:

The existing system can be only improved in small-scale because the size of the business does not allow it to increase the fixed factors. The only way to increase possible efficiency is by increasing the variable factors because fixed factors are not variable in short run. The business may decrease the registers and reduce data input requirements, which however may lead to data inadequacy. Data input process can be done by creating a Customer information form, where the customer him/herself fills the data. This may save time of asking questions by the staff to the customer but at the same time, the staff has to input the acquired data into the register. Still this may create a change of data validation as the staff can now make corrections.

These possible improvements may slightly change the efficiency in the short run but in the long run permanent solutions are needed. The cost for system operation and running may increase or decrease if improvements are made. Plus, there is no guarantee that the system will become more efficient.

5. Description of other possible Solutions

The following are the description of the other possible solutions:

- Increasing the number of staff members: Increasing more staff might be less time consuming and it may solve the problem of delayed service and update but it increases the cost spent on the staff.
- Enlarging the size of the business: Enlarging the size of the business is very much time consuming and it depends on the how well the business is proceeding. Thus, it is not a reliable solution to the problem.
- Data collection using the customer, staff and a computerized system: This method of implementation is the most costly and most time consuming as new forms are needed to be introduced and the customer has to fill up a form as well which is time consuming.
- A completely computerized transaction, customer and stock recording system: Although it takes more time and is a bit more costly, it allows the data to become flawless through validation. It reduces the number of staff needed and updating it is much faster.

Justification of the choice of the proposed system

The existing system can be improved in many ways but, for the betterment of the business the computerized system, though has some starting costs, is able to fulfill the objectives that a company requires in its long run. As it will use electronic databases to store data, the data will be more validated. Data search and report will become easier. The other proposed solutions may improve the system in the short run but will not be able to improve for a run in the long terms. They will cost more and at the end of the day, will be less efficient than the computerized system. The other proposed systems, but the computerized one, will face problems in storing and manipulating and above all searching for data. So, the computerized system is decided to be the solution for the company's database system.

6. Action plan

Detailed Description of Action Plan

I will create an Action Plan for the implementation of my generator management system which includes the following:

- Creating Time Line with Starting and Finishing Date
- Creating a Gantt Chart with all the activities
- Designing a Structured Diagram to show the tasks

I will create the system flowcharts for

- Overall System
- Adding a record
- Deleting a record
- Saving a record
- Editing a record
- Searching a record (Co.5)

I will design the following Input and Output layout for my System (Co.1)

- Security (Login Form) (Co.6)
- Main Form
- Transaction Form
- Customer Form
- Generator Form
- Search & Report Form (Co.5)

I will design Navigation for

- Forms
- Records

I will design a File Suture for Smooth Handling of Data.

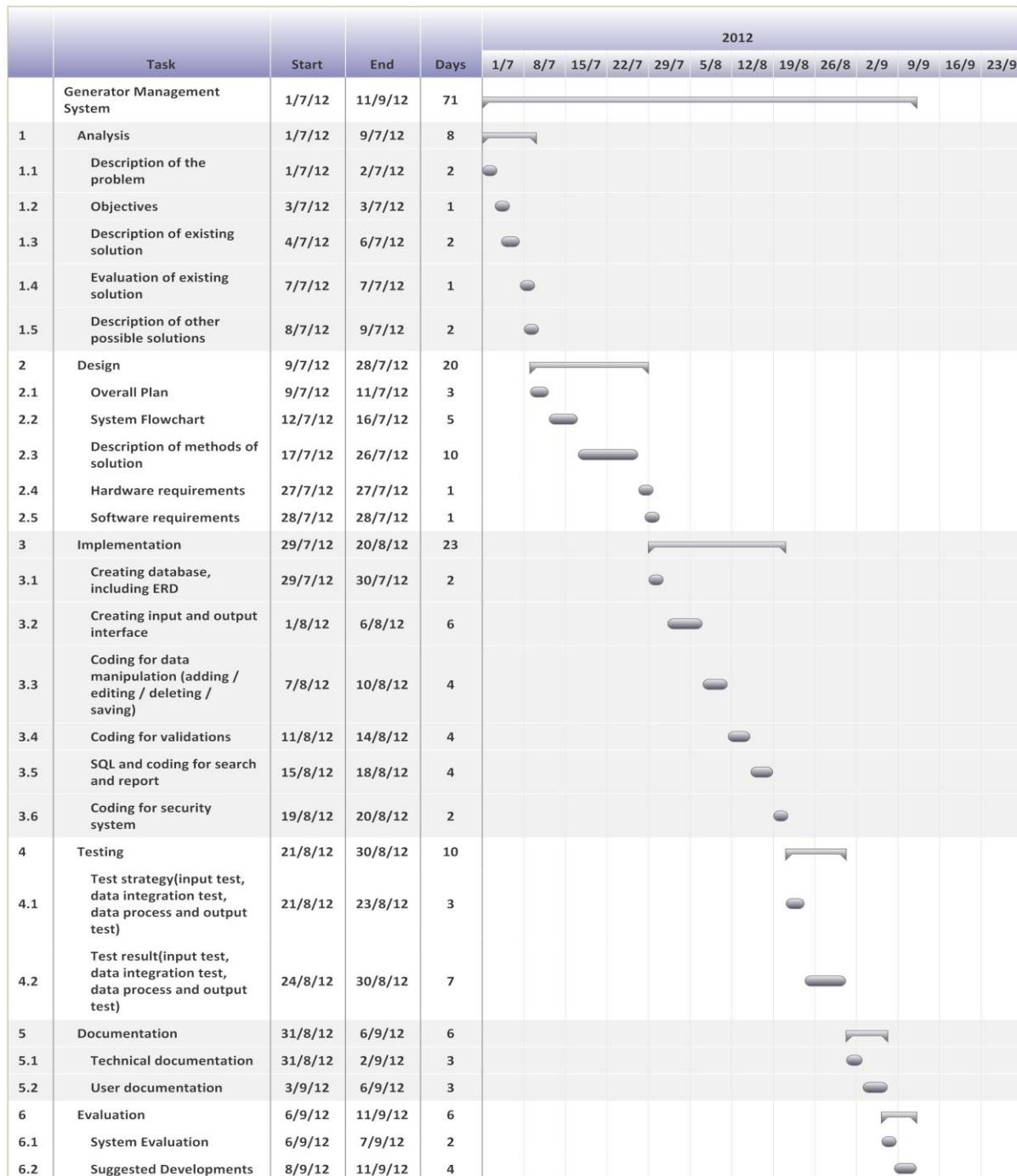
I will create a Test Strategy for Testing the System. (Co.4)

I will store the data in a Computerized Database. (Co.2)

I will create an ERD for making relationship between the Data Tables. (Co.3)

I used the following formulas for automatic calculations

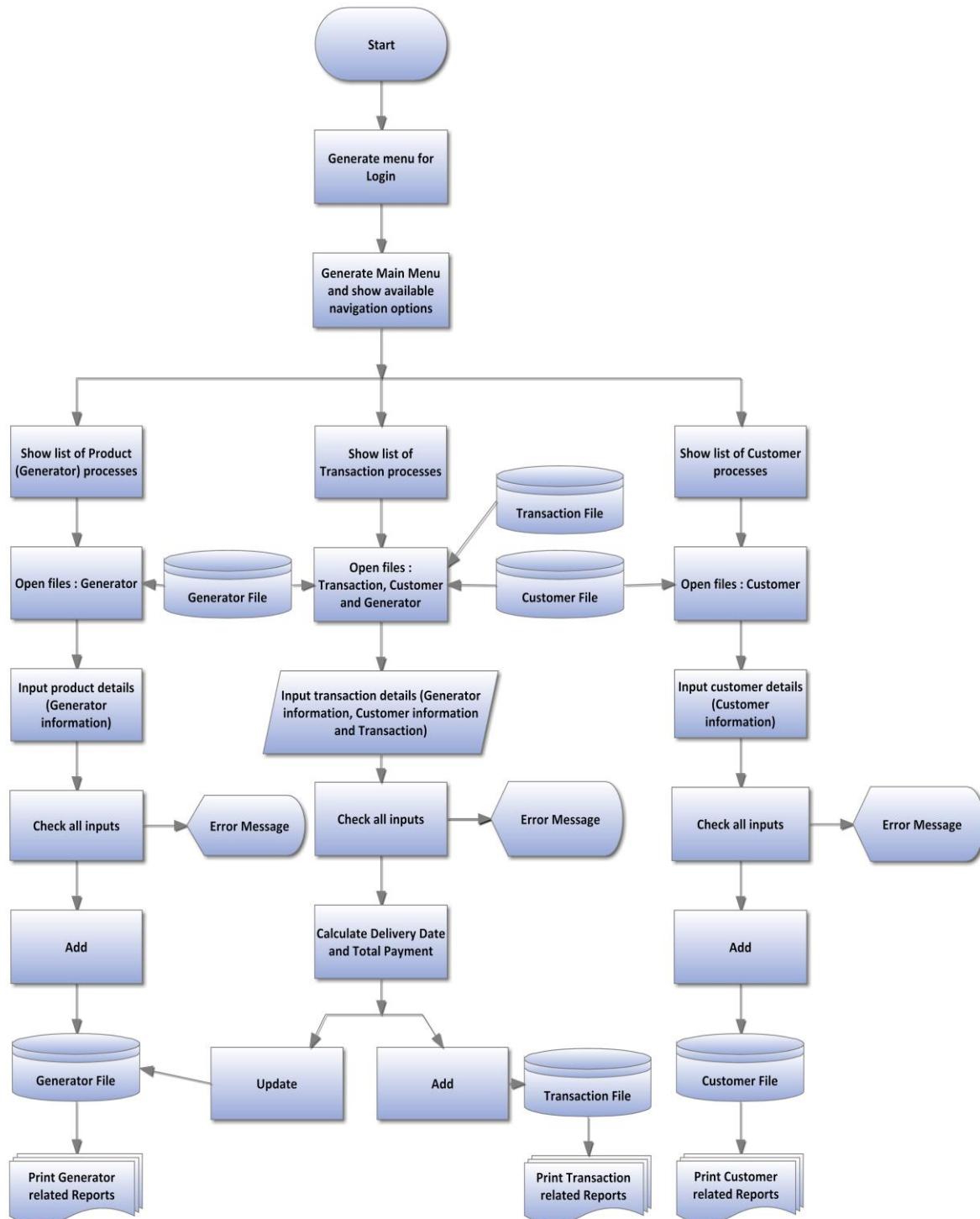
Gantt Chart + Time Schedule (Fig 2.01)



7. System Flowchart

System flowchart (Fig 2.02) is used to illustrate how the processes are inter-linked to the data storage. It is used to show the logical designs of an entire system. It shows how data input, process and output is given.

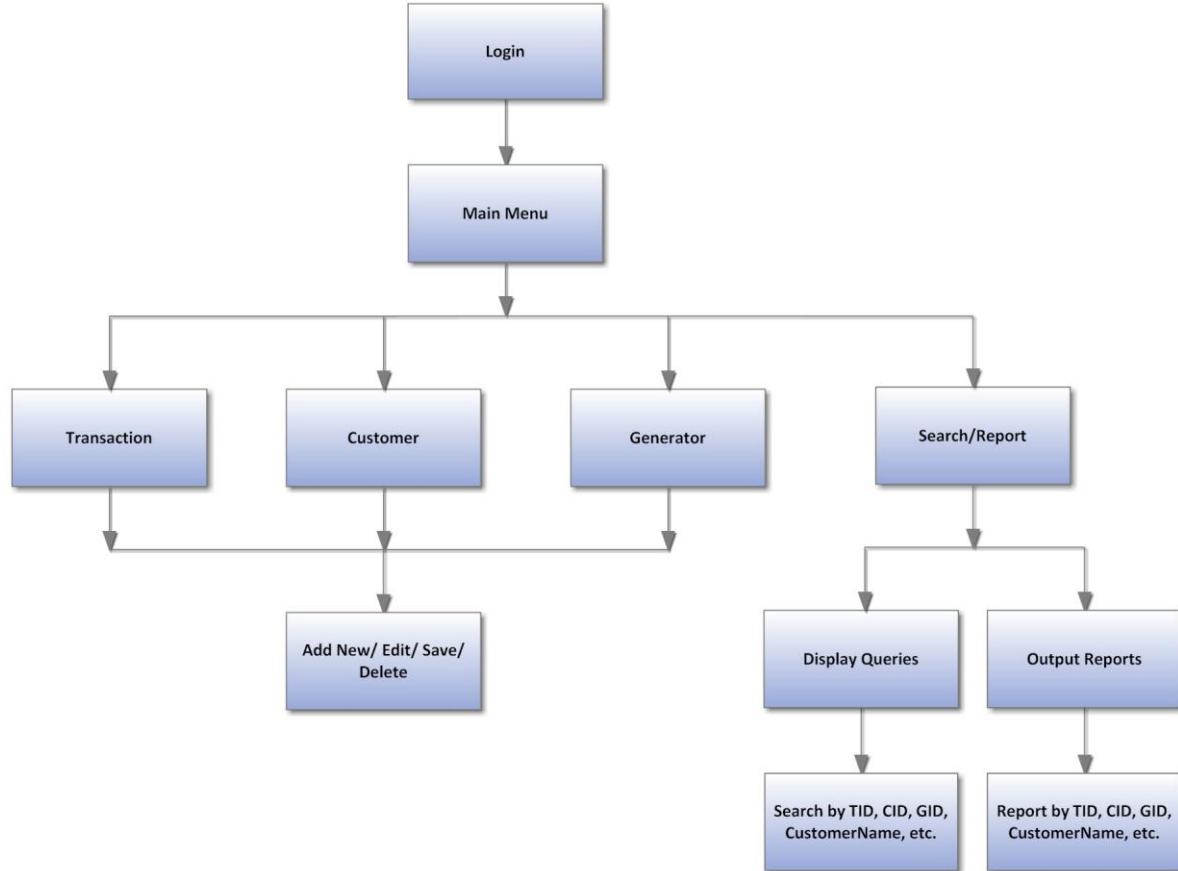
Overall System Flowchart (Fig 2.02)



8. Description of the method of solution

Top-down design of the new system (Fig 2.03):

To show a helicopter view of the new system and its processes



Other flowcharts for different processes:

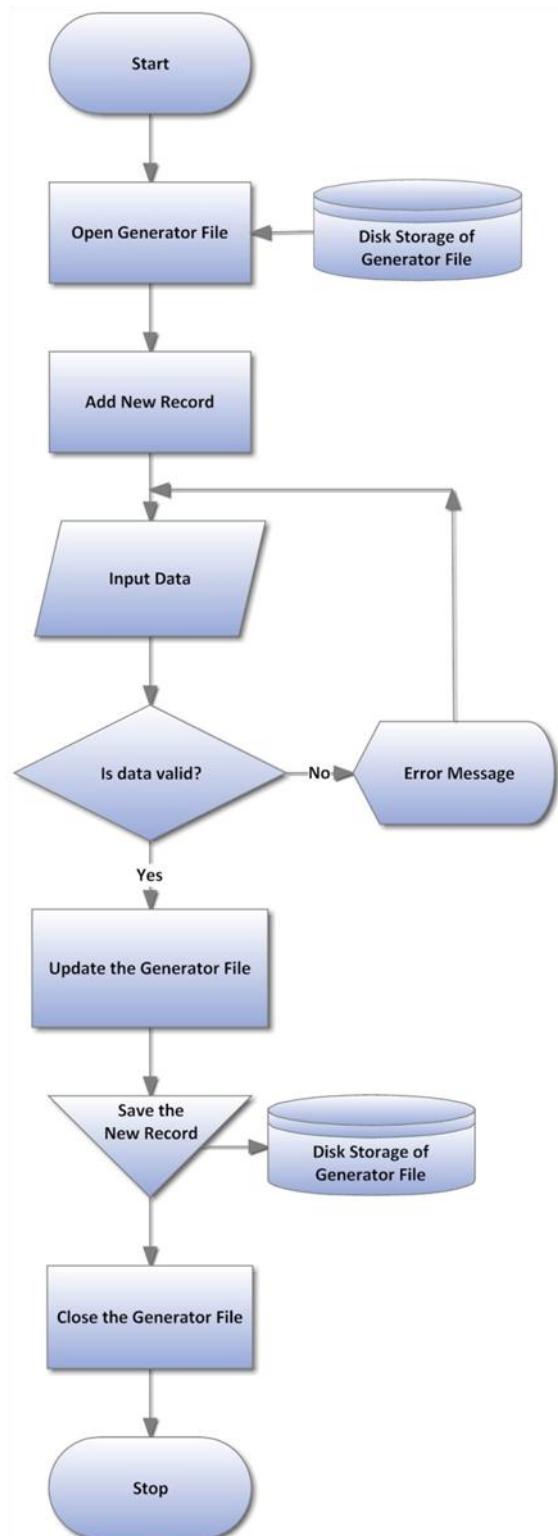


Fig 2.04: Adding a New Record in Generator Table

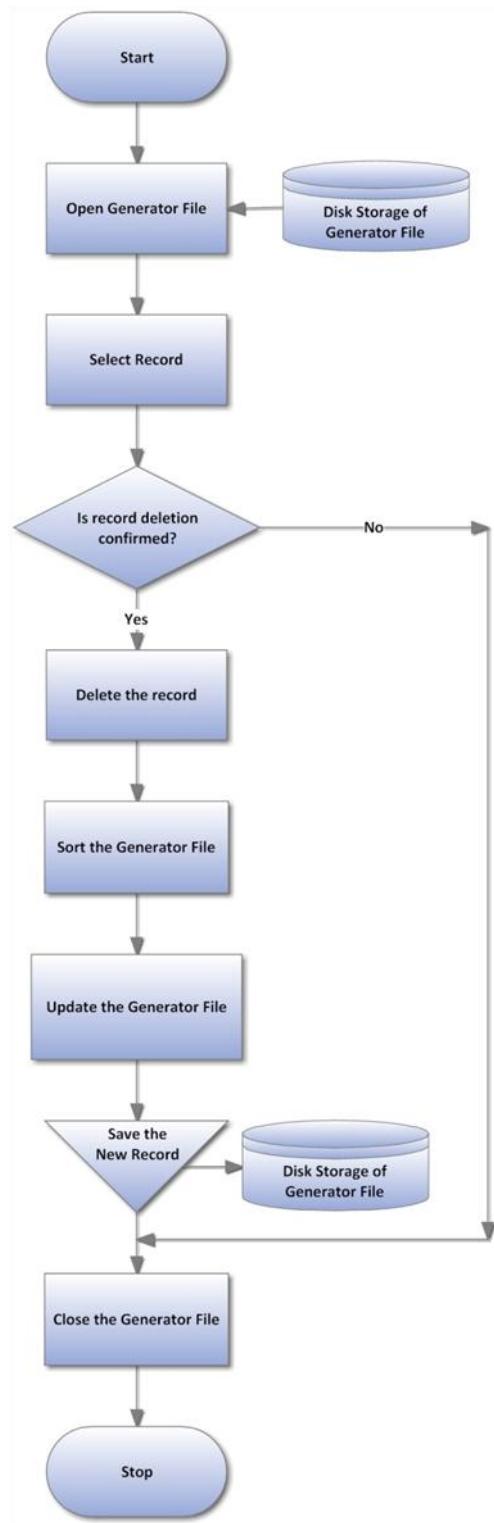


Fig 2.05: Deleting a Record in Generator Table

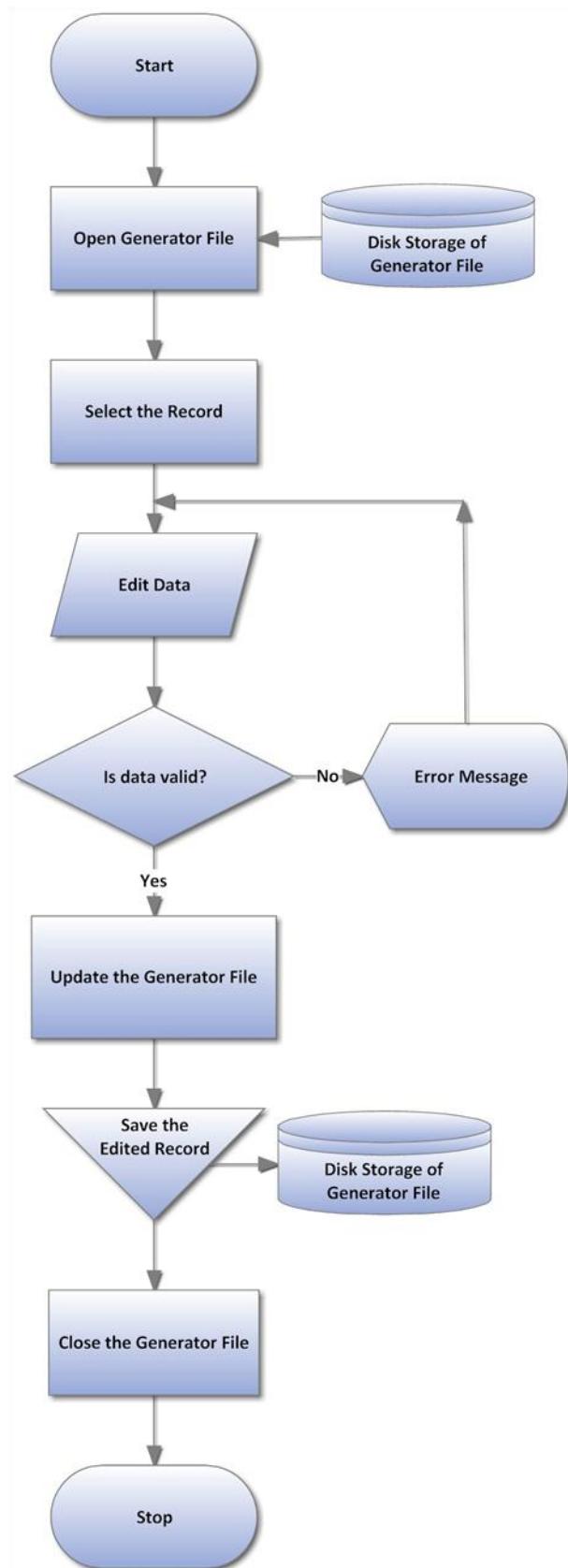


Fig 2.06: Editing a Record in Generator Table

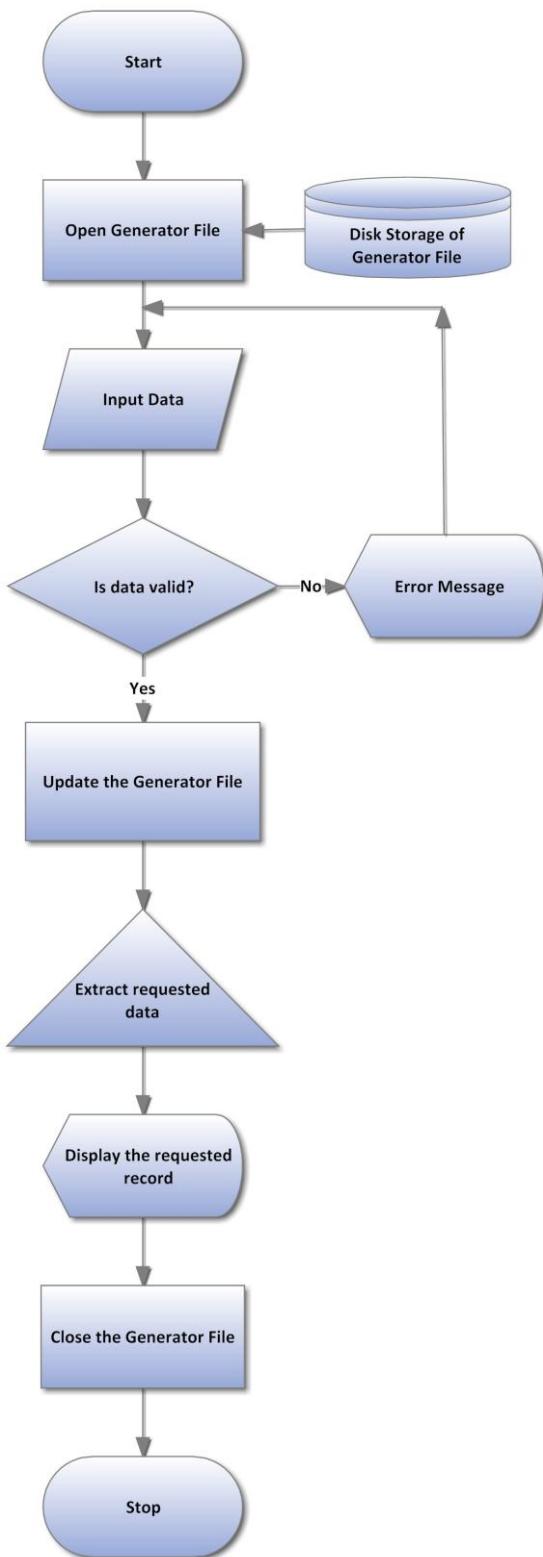


Fig 2.07: Searching a Record in Generator Table

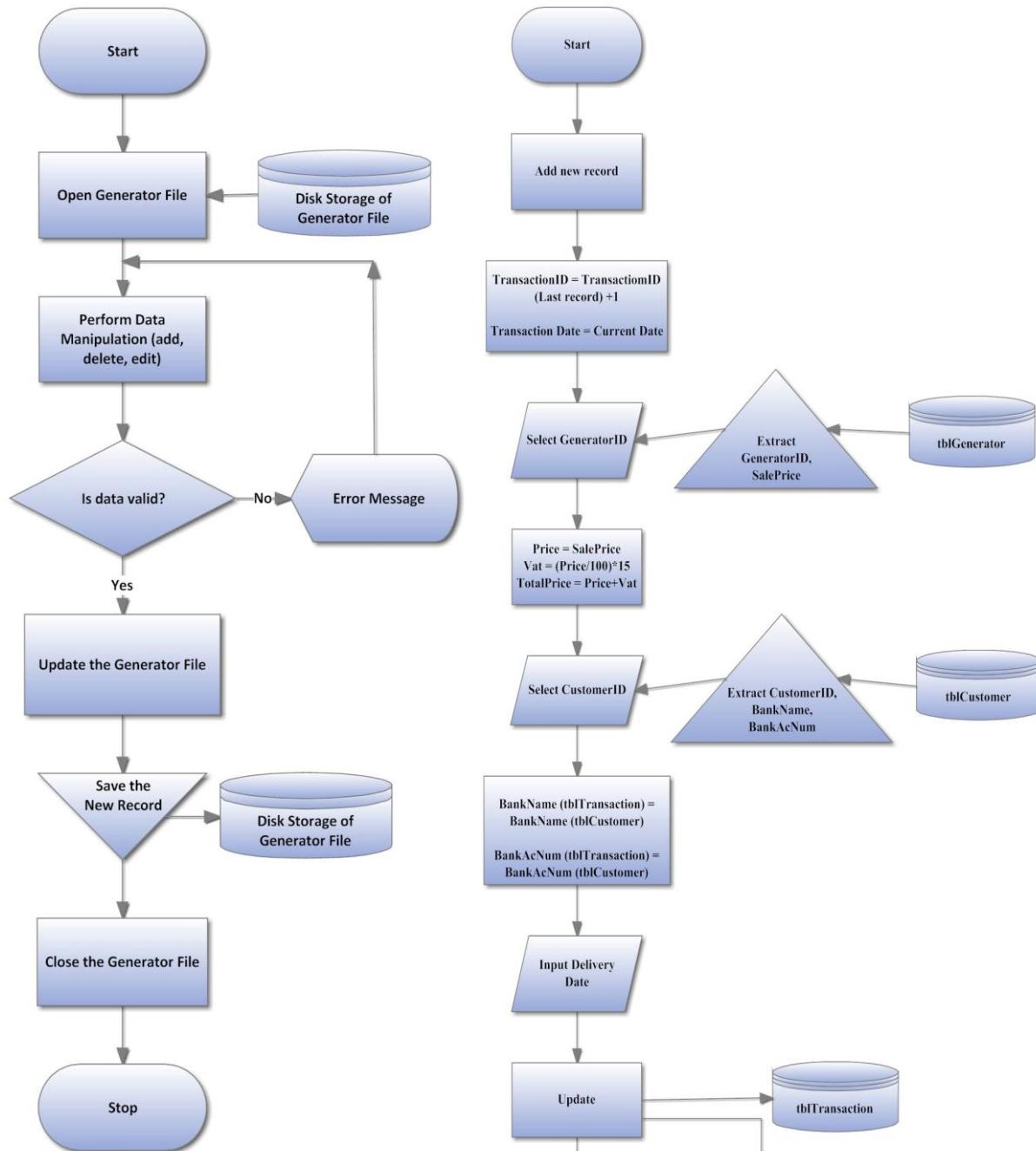
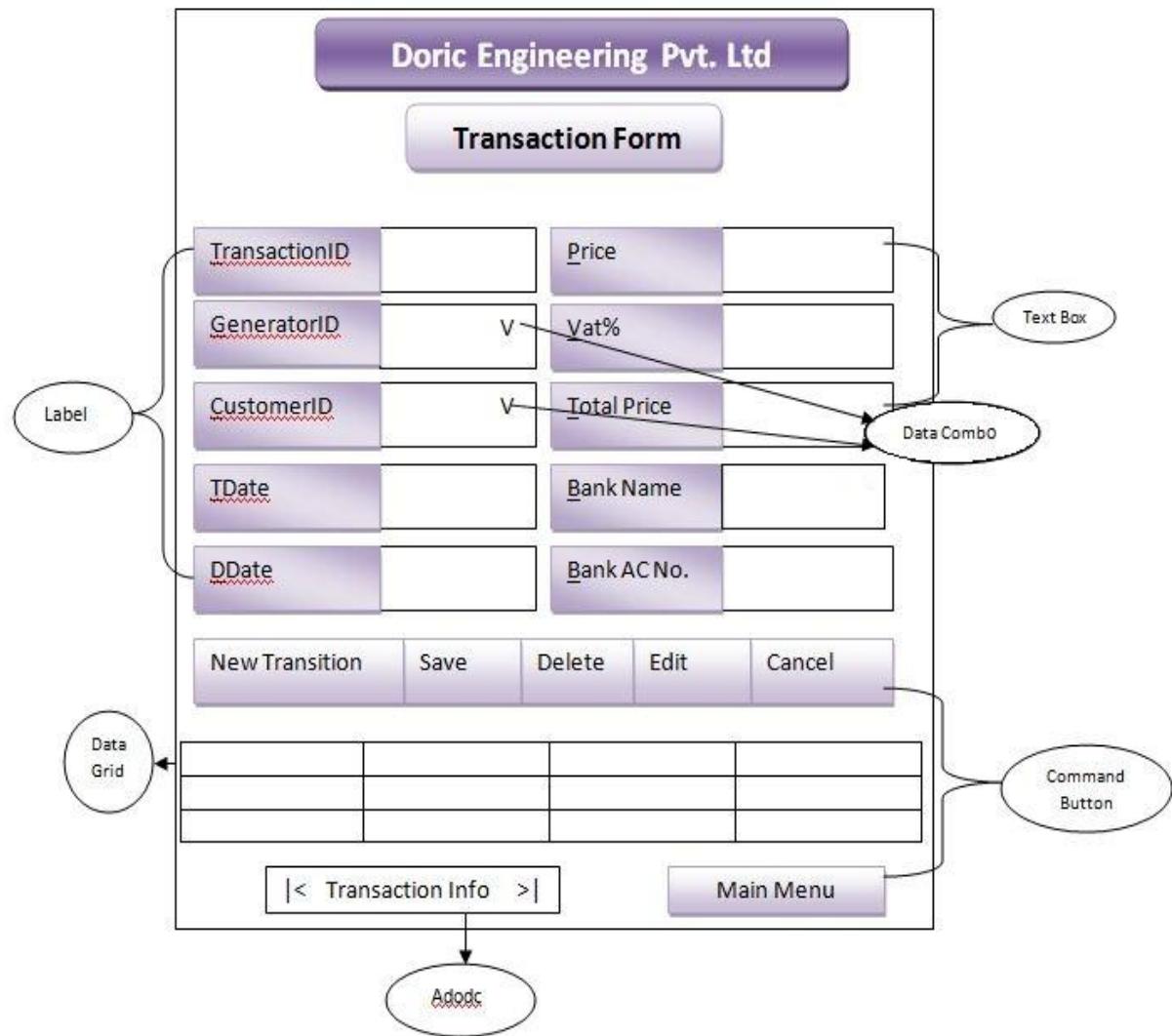


Fig 2.08: Saving a Record in the Generator Table

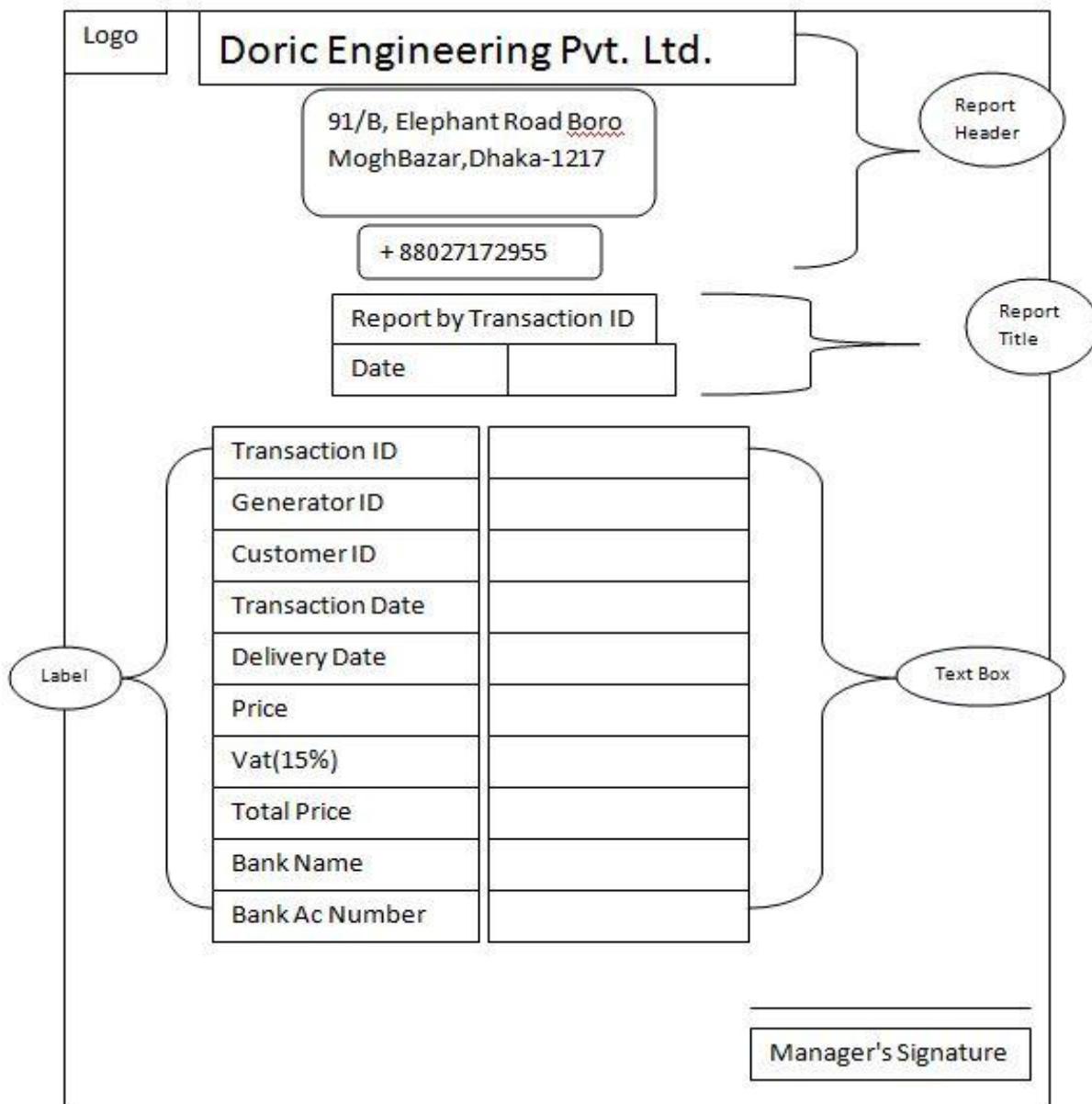
Fig 2.09: Transaction Processing

Input Layout of the Transaction Form (Fig 2.10)



The input layout of the Customer Form and the Generator Form are similar to the input layout of the Transaction Form (Fig 2.10).

Output Layout of the Transaction Report (Fig 2.11)



The design output layout of the Customer Report, Generator Report, etc is similar to that of the Transaction Report (Fig 2.11)

Database Design:

To illustrate the database of the new system, showing tables and how data is stored with data type, field size and data format with examples. It also shows the relationship among the tables.

The designed tables are in the following page.

Transaction Table

Field Name	Data Type	Field Size	Format	Example
TID (Primary Key)	Text	6	T#####	T10001
GID	Text	4	G###	G101
CID	Text	5	C#####	C1001
TDate	Date	10	DD/MM/YYYY	17/03/2007
DDate	Date	10	DD/MM/YYYY	17/04/2007
Price	Currency	Long Integer	£.....	£50,000.00
Vat	Currency	Long Integer	£.....	£7,500.00
TotalPrice	Currency	Long Integer	£.....	£57,500.00
BankName	Text	15	N/A	EXIM
BankAcNumber	Number	Long Integer	N/A	115877674

Customer Table

Field Name	Data Type	Field Size	Format	Example
CID (Primary Key)	Text	5	C#####	C1001
CustomerName	Text	25	N/A	Afroz Al Mamun
Gender	Text	6	Male/Female	Male
PhoneNumber	Text	11	N/A	01823357448
EmailID	Text	30@.....	afroz_27@gmail.com
Designation	Text	15	N/A	Director
AssetName	Text	20	N/A	Icon College
PropertyType	Text	10	N/A	Company
Address	Text	40	N/A	D-Block Lalmatia, Dhaka
BankName	Text	15	N/A	EXIM
BankAcNum	Number	Long Integer	N/A	115877674

Generator Table

Field Name	Data Type	Field Size	Format	Example
GID (Primary Key)	Text	4	G###	G101
GType	Text	10	N/A	24GFS
Model	Text	10	N/A	K4100D1
ManufacturerCo	Text	15	N/A	Mindong
ManufacturingCountry	Text	15	N/A	Japan
Power_kW	Number	Long Integer	N/A	24
Voltage_V	Number	Long Integer	N/A	230
Current_A	Number	Long Integer	N/A	1500
VoltageModulationRate	Text	10	N/A	Exceed 95
PotetionClass	Text	10	N/A	IP22
Stock	Number	Long Integer	N/A	15
Price	Currency	Long Integer	£.....	£45,000.00
SalePrice	Currency	Long Integer	£.....	£55,000.00

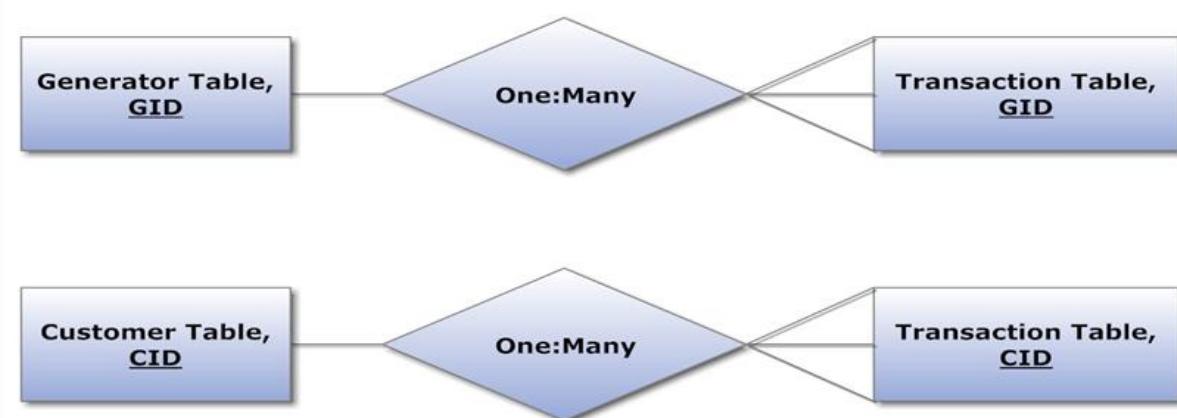
List of Variables

Variable	Purpose/Position
xTID	Transaction Form, used in auto ID generation for the Transaction ID
xCID	Customer Form, used in auto ID generation for the Customer ID
xGID	Generator Form, used in auto ID generation for the Generator ID
d	Used to hold the string command for the delete function, in Transaction Form, Customer Form and Generator Form.
s	Used, in the Transaction Form, to hold the Numeric data of the "Stock" field in the Generator Table, subtract "1" from the stock and to update the "Stock" field.
g	Used to hold the string command for the Generator Type function, in Generator Form.
stockconf	Contains Boolean data, Used in Transaction Form for stock update.

List of Formulas

Field	Formula
Vat	<code>txtVat = (Val(txtPrice) / 100) * 15</code>
Total Price	<code>txtTPrice = Val(txtPrice) + Val(txtVat)</code>
Delivery Date	<code>txtDDate.Text = DateAdd("d", 15, txtTDate)</code>

The entity relationships in between the tables are as follows (Fig 2.12):



9. Hardware requirement

DEVICE	CONFIGURATION	Justification
Processor	Intel Core i3 (2.3 GHz)	For faster data processing
RAM	2 GB	For storing more online application data temporarily
Hard disk	500 GB	For storing more data on the database
DVD-ROM Drive	ASUS 52-X	For inputting data from optical disks
Input devices	Keyboard and Mouse	For manipulating/inputting transaction, customer, etc. details onto the database
Printer	Canon ip2772 inkjet	For printing transacting, generator, etc. reports
Monitor	17" colour monitor	For viewing the running system

10. Software requirements

There are many commercial software packages available to solve the drawbacks of the store. For example database software can be used to keep all the records of the store that will perform as the back-end and will also be used to store data. The front-end will be an interface created using a programming language. Both the database and the programming language will be used to establish the system, since they cannot be used alone and would easily carry out all the tasks required.

The options for the database software are:

- Microsoft Access
- Microsoft Excel
- Oracle

The options for the programming languages are:

- Visual Basic
- Quick Basic

Database Software:

Software	Advantages	Disadvantages
MS Access	<ul style="list-style-type: none"> 1. Easy to create a database. 2. Tables, forms, queries and report generating are easier by using wizard or design mode. 3. Easy to establish relationship between tables in a database. 	<ul style="list-style-type: none"> 1. Can't handle huge amount of data. 2. When access database file is used, it increases unnecessary size. 3. To solve a specific task, it needs Visual Basic programming editor or script.
MS Excel	<ul style="list-style-type: none"> 1. Excellent program to create spreadsheet for various modelling and simulation. 2. It has numerous built in functions to solve the mathematical and logical problems. 3. It has different types of charts and graphs. 	<ul style="list-style-type: none"> 1. User defined functions can't be solved since all the functions are unalterable. 2. Does not support DBMS. 3. Does not create the attractive and user friendly interfaces to run the developed application program.
Oracle	<ul style="list-style-type: none"> 1. It handles huge amount of data. 2. Complex search and report generating can be done easily. 3. It has a strong and maximum data security facility to protect the data. 	<ul style="list-style-type: none"> 1. It requires high skilled programming knowledge to develop the program. 2. It is expensive to afford. 3. It is difficult to program

Software	Advantages	Disadvantages
Visual Basic	<ul style="list-style-type: none"> 1. It is very good application developer that comes with good number of useful tools and components. 2. It is easy and convenient to write program and debug, with it is instructions that is closer to English. 3. It has an attractive and a graphical user interface. 	<ul style="list-style-type: none"> 1. Multiple projects cannot be opened or run in the same window. 2. The developer should have clear programming knowledge. 3. It needs high requirements as MS windows.
Quick Basic	<ul style="list-style-type: none"> 1. User defined functions can be solved. 2. Its syntax (instructions) is close to English statement, so it is easy to understand. 3. It includes interpreter that converts a written program into a compiled self 	<ul style="list-style-type: none"> 1. It does not have the good and attractive interfaces. 2. Too many codes (instructions) have to be written to solve the problem.

Ideal software that can be used

ORACLE 8i with Developer 2000 is very powerful to handle large amount of data which is very expedient. But it requires very high skilled and skilled programmer and also it is very expensive. Therefore I have chosen Microsoft Excel and Access.

Best software to be used to solve the problem

The database software that will be used would be Microsoft Access 2000 or higher. This will be used as data holder and the programming language would be Microsoft Visual Basic 6.0 (VB98) that will perform as the manipulator of data. It is wise to use both of these; since Access supports all the modules and Structured Query Language (SQL) required for developing the system and also it is less costly. Visual Basic will be used to create the interfaces, since it supports SQL for input and output of data to and from the database, as it will be connected to the database via Microsoft Jet Engine 4.0 using ActiveX Data Object (ADO) control.

Justifications for writing a problem

The tasks like validation checking, searching records and report generating would become handy only by a written program though programming language is a bit difficult to learn and utilize. So I used Visual Basic which is comparatively easier to write the program which has facilities that I would need to produce the software, as follows:

1. Its Graphical User Interface has a professional look but yet it is user-friendly
2. When the user writes an object's name while programming, the programming editor provides the properties and methods automatically
3. Writing the program is done conveniently as the required tools and components are provided.
4. Visual Basic programming language allows modular programming, which increases the usability of programs as a common function.
5. Different types of colour codes are used to show the different modes of the program, that helps the programmer to know whether he is going in right way or not.

Moreover, any kind of calculation and checking can be performed. Additionally, the program would give proper security to the records by the use of passwords.

11. Method of solution

I used Microsoft Office Access 2007 to create the database which contained the transaction table, customer table, product table, etc.

- Click on Start. Open All Programs. Click on Microsoft Office Access2007. Create blank table.

I used Microsoft Visual basic 6.0 to create the data manipulation interface.

- Click on Start. Open All Programs. Open on Microsoft Visual Basic 6.0. Click on Microsoft Visual Basic 6.0. Open **Standard EXE**.

Generator Table Design View (Fig 3.1)

The screenshot shows the Microsoft Access 2007 'Design' tab selected. In the main area, a table named 'tblGenerator' is displayed with columns: GID, GType, Model, ManufacturerCo, ManufacturingCountry, Power_KW, Voltage_V, Current_A, VoltageModulationRate, PotectionClass, and Stock. The 'GID' column is highlighted with a yellow circle. In the 'Field Properties' pane, the 'Required' property is set to 'Yes (No Duplication)', also highlighted with a yellow circle. A callout box labeled 'Primary Key (No Duplication)' points to this setting. Another callout box labeled 'Data Type' points to the 'Data Type' column in the main table view, which is also circled.

Generator Table Datasheet view (Fig 3.02)

The screenshot shows the Microsoft Access 2007 'Datasheet' tab selected. The 'tblGenerator' table is displayed in a grid format. The first three rows (GID 101, 102, 103) are highlighted with a large oval. The columns shown include GID, GType, Model, ManufacturerCo, Power_KW, Voltage_V, Current_A, VoltageModulationRate, PotectionClass, Stock, Price, and SalePrice.

Transaction Table Design View (Fig 3.3)

The screenshot shows the Microsoft Access Table Tools Design View for the tbITransaction table. The table structure is as follows:

Field Name	Data Type	Description
TID	Text	
GID	Text	
CID	Text	
TDate	Date/Time	
DDate	Date/Time	
Price	Currency	
Vat	Currency	
TotalPrice	Currency	
BankName	Text	
BankAcNumber	Number	

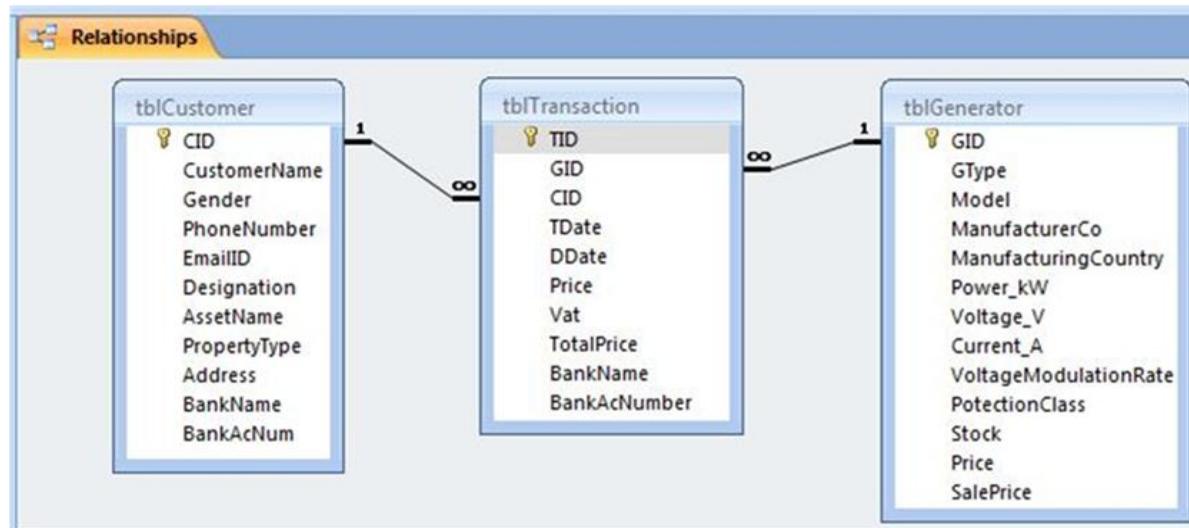
A callout box labeled "Primary Key (No Duplication)" points to the Primary Key icon in the toolbar. Another callout box labeled "Data Type" points to the "Data Type" column in the table structure.

Transaction Table Datasheet View (Fig 3.4)

The screenshot shows the Microsoft Access Table Tools Datasheet View for the tbITransaction table. The data is as follows:

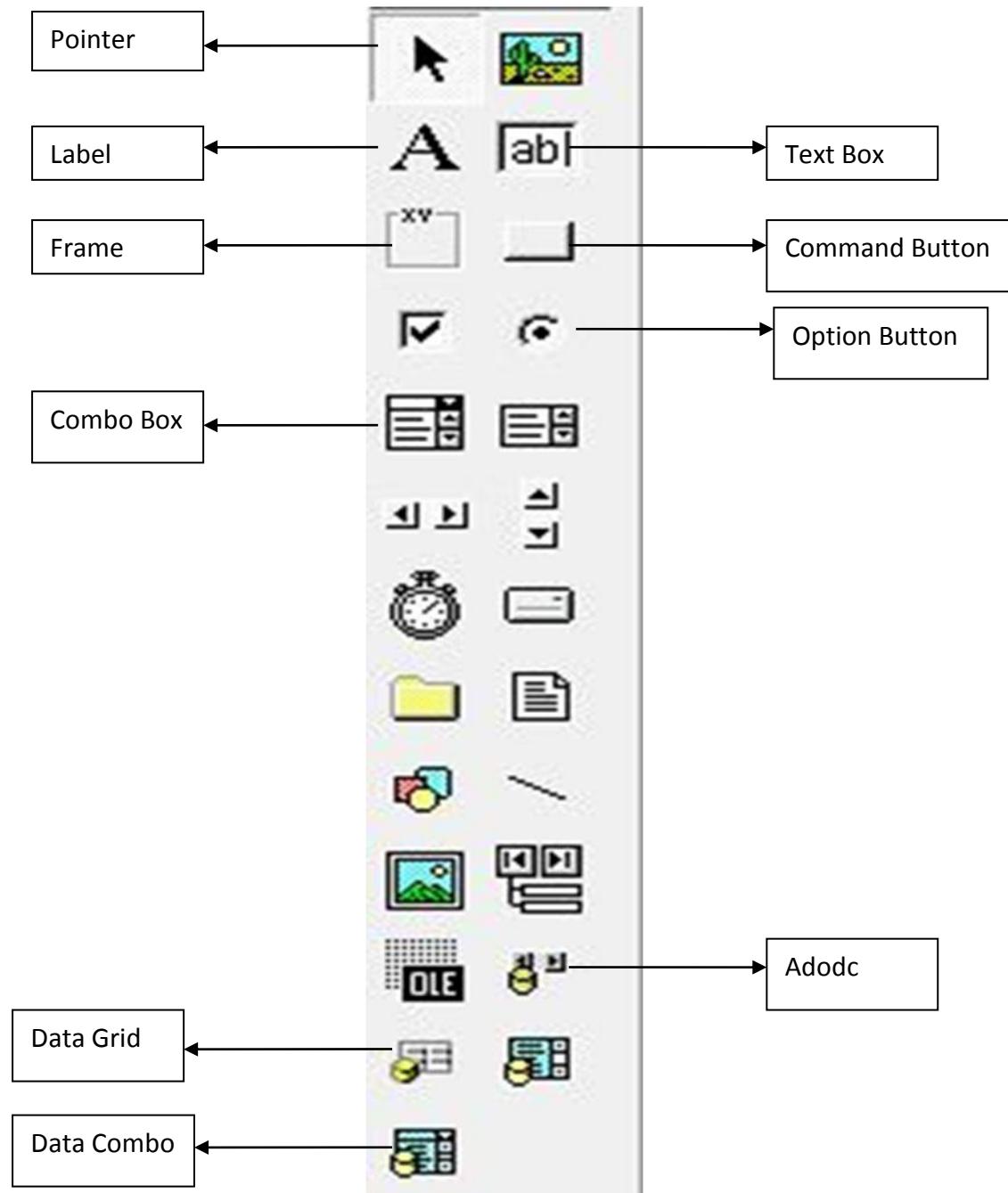
TID	GID	CID	TDate	DDate	Price	Vat	TotalPrice	BankName	BankAcNumber
T10001	G101	C1001	17/03/2007	17/04/2007	£55,000.00	£8,250.00	£63,250.00	EXIM	115877674
T10002	G102	C1002	27/05/2005	12/06/2005	£105,000.00	£15,750.00	£120,750.00	BRAC	11358965
T10003	G101	C1003	24/11/2011	30/11/2011	£55,000.00	£8,250.00	£63,250.00	South East	115584644
T10004	G103	C1004	15/02/2012	18/02/2012	£125,000.00	£18,750.00	£143,750.00	BRAC	115642998
T10005	G102	C1005	25/02/2012	15/03/2012	£105,000.00	£15,750.00	£120,750.00	EXIM	118799983

Relationship Diagram (Fig 3.05)

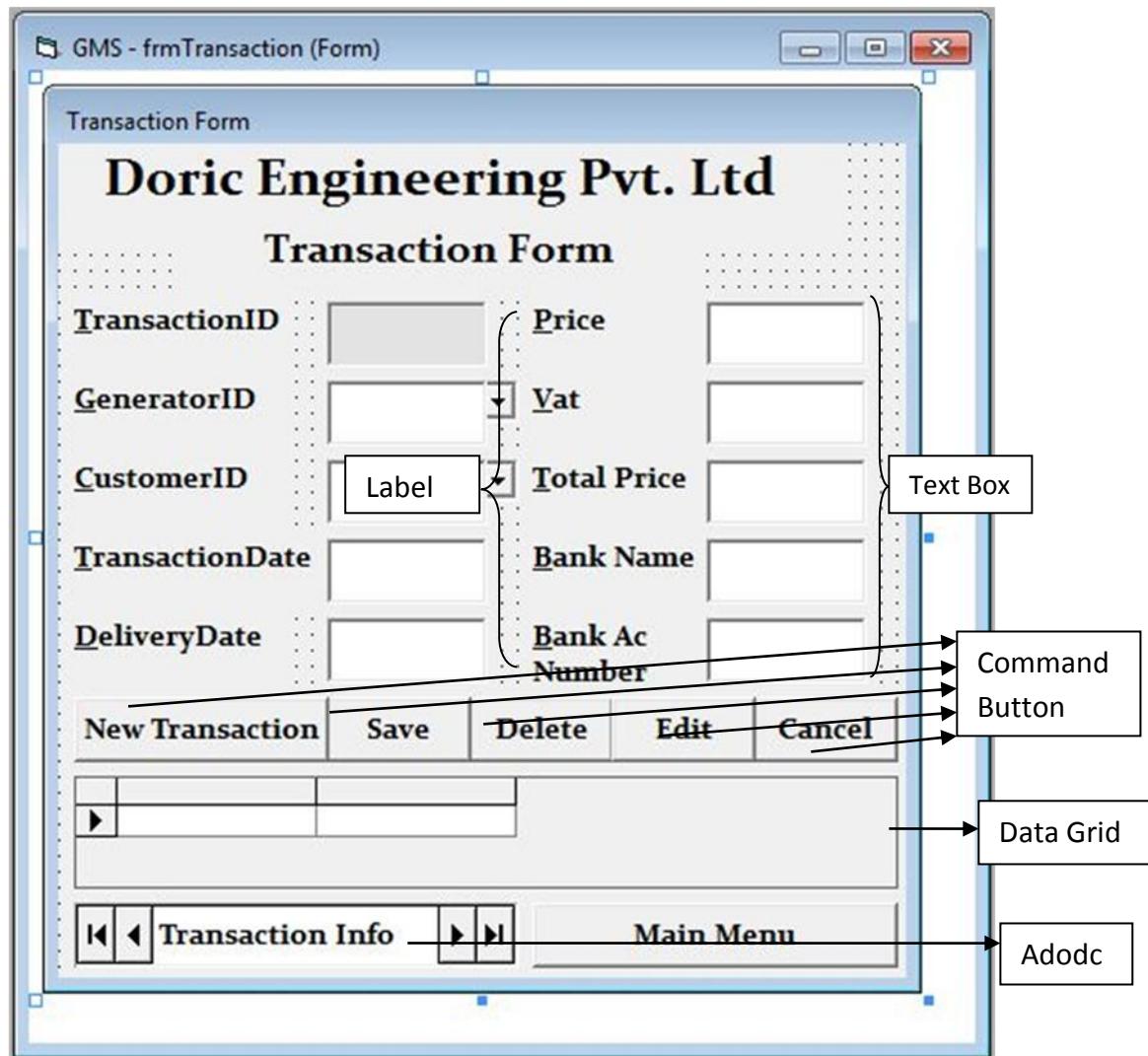


The relationship diagram (Fig 3.05) shows how the **primary keys** of the transaction table is related to the **foreign keys** of the generator table and customer table with **one is to many** relationships.

Tool Box (Fig 3.06)

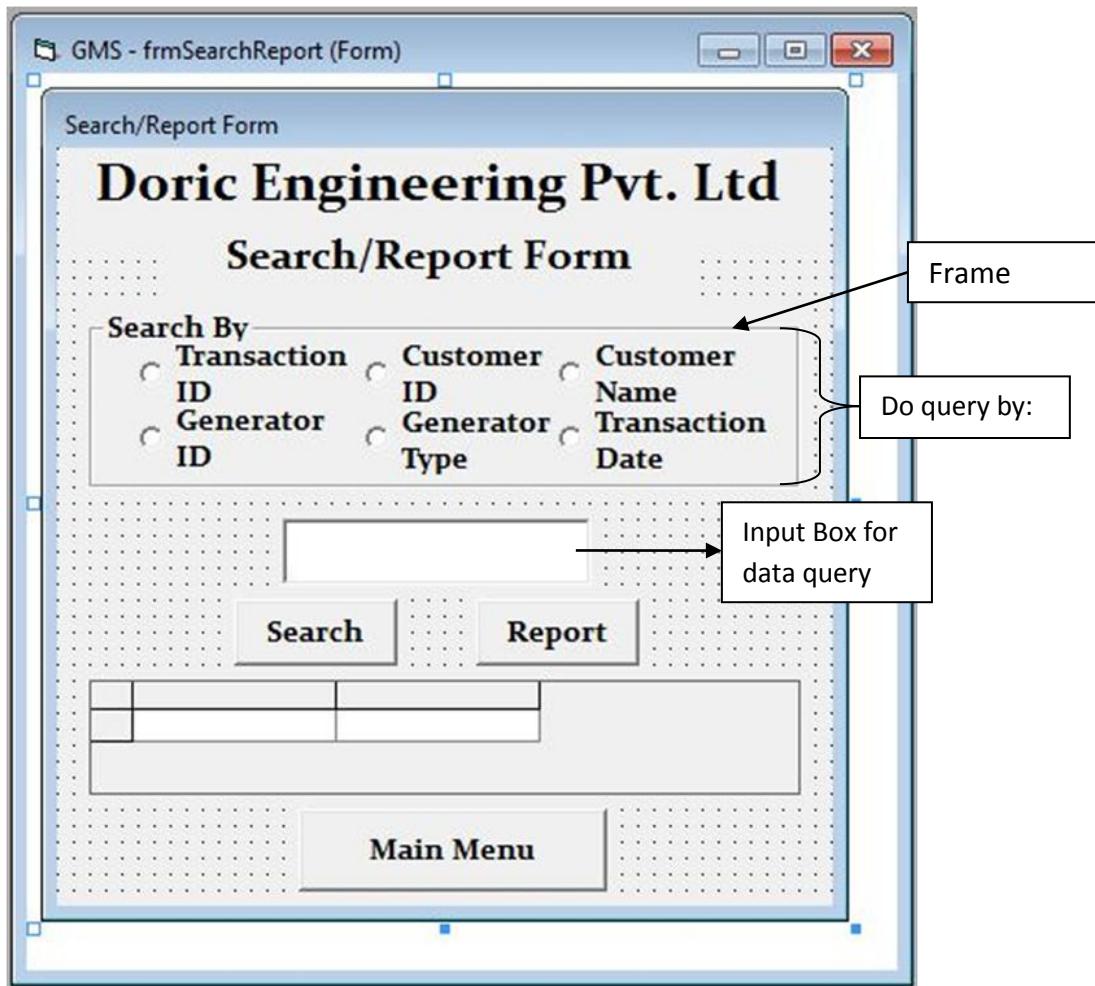


Input layout of Transaction Form (Fig 3.07)



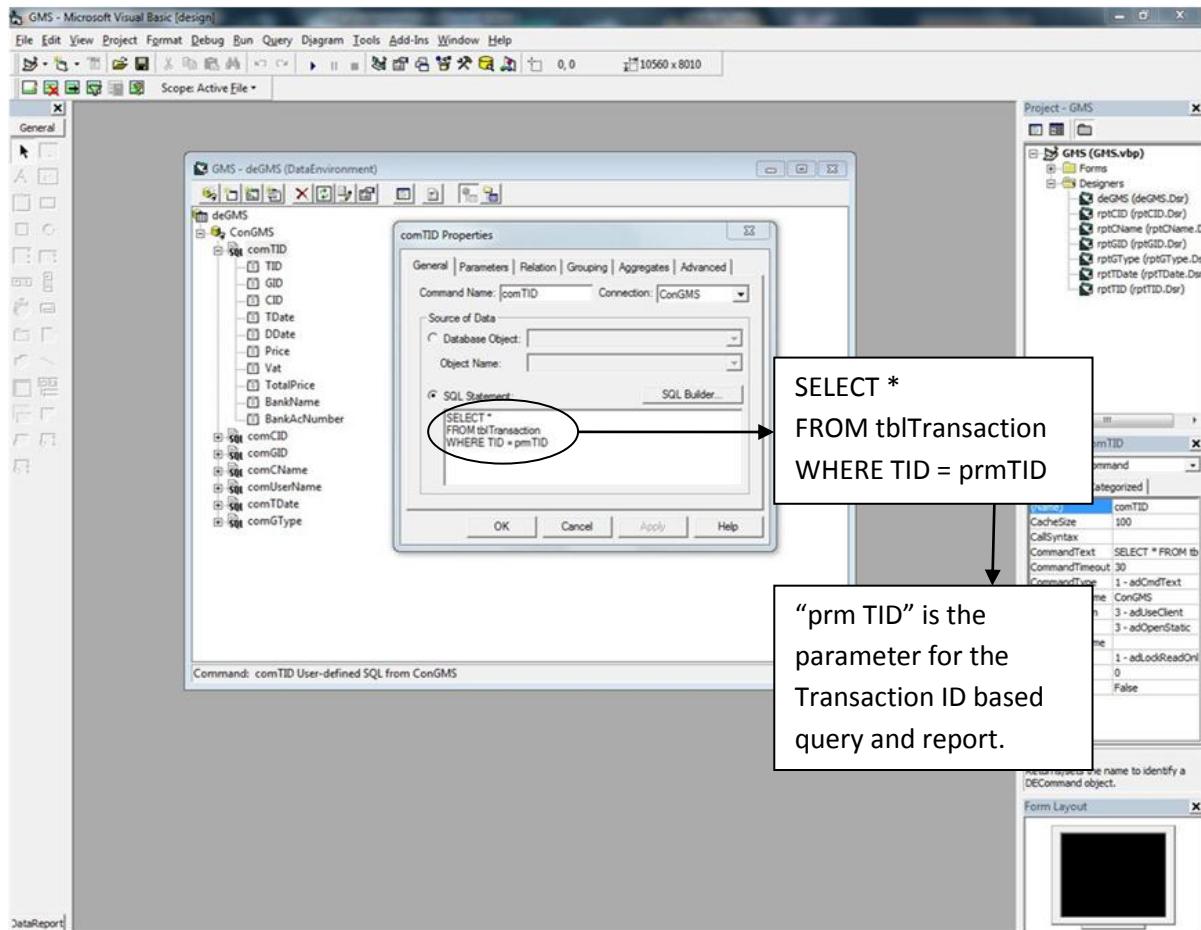
The Input layout of the **Customer Form** and the **Generator Form** is similar to the input layout of the **Transaction Form** (Fig 3.7). The **Login Form** and the **Main Form** use similar tools as the transaction from.

Search and Report Form (Fig 3.08)



I used the **Search and Report Form (Fig 3.8)** to input data to refer to for searching and report. I used **Data Environment (Fig 3.9)** and the **SQL Statement (Fig 3.10)** according to the query requirement to connect to the table in the database to enable query for data. And also, the report option is available to display the query as a **report (Fig 3.11)**.

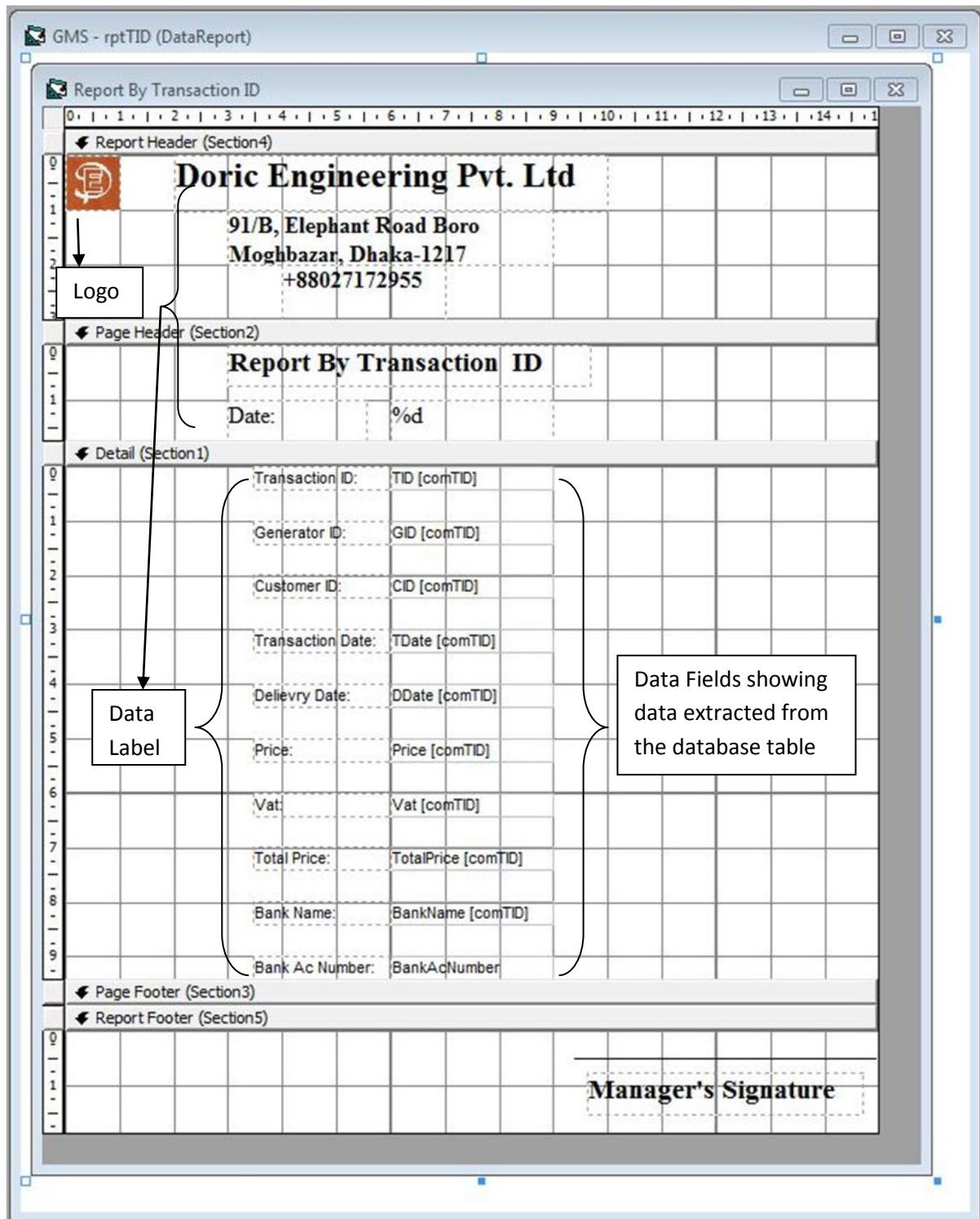
Data Environment (Fig 3.09)



SQL Statement Table (Fig 3.10)

Command Name	SQL Statement
comTID	SELECT * FROM tblTransaction WHERE TID = prmTID
comCID	Select * From tblCustomer WHERE CID=prmCID
comGID	SELECT * FROM tblGenerator WHERE GID=prmGID
comCName	SELECT * FROM tblCustomer WHERE CustomerName=prmCustomerName
comUserName	SELECT * FROM tblLogin WHERE UserName=prmUserName
comTDate	SELECT * FROM tblTransaction Where TDate=prmTDate
comGType	SELECT * FROM tblGenerator WHERE GType=prmGType

Report by Transaction ID (Fig 3.11)



The Report by **Customer ID**, **Generator ID**, etc are similar to that of the **Transaction ID** (Fig 3.11).

12. Accurate method of solution

According to the computer related objectives mentioned in the analysis phase and the action plan in the design phase whether those are achieved.

Co.1 User interface: The interface of the computerized system should be user friendly so that it is easier to use, by using navigation tools, drop-down lists, etc.

- Has been successfully achieved by creating forms and using the tools available in the software Visual Basic 6.0. (Pg 64 - 65; Fig 4.36-4.38)

Co.2 Data storage: Huge Data should be stored in an orderly manner in separate tables for transaction, customer, etc.

- Has been successfully achieved by creating tables in a database and storing data in them accordingly. (Pg 24 - 25; Fig 3.02, 3.04)

Co.3 Avoid data duplication and redundancy: Data will not be duplicated and data redundancy must be avoided by the use of product key, relationship between primary key & foreign key, as a result consistency of data will be increased, like Customer ID used in Transaction table.

- Has been successfully achieved by creating relationships between tables using primary keys. (Pg 24 - 25, 26; Fig 3.01, 3.03, 3.05)

Co.4 Auto ID Generation: To make the records in the table unique, like Transaction ID, Customer ID.

- Has been successfully achieved by using the auto ID generating codes. (60 - 61; Fig 4.38 - 4.40)

Co.5 Validation: There should be validation and verification checks to reduce the errors in data.

- Has been successfully achieved by doing validation checks (Pg 39 - 42, 51-54; Fig 3.18 - 3.21, 4.01 - 4.22) by the validation codes in the coding page (Pg 39 - 42, 44 - 46).

Co.6 Search & Reports: The new system should provide faster data searching and faster data reports with much less human intervention.

- Has been successfully achieved by creating a **Search and Report Form** (Pg 29; Fig 3.8), **Data Environment** (Pg 30; Fig 3.09) and the **SQL Statements** (Pg 30; Fig 3.10) using Visual Basic 6.0.

Co.7 Security: There should be a security system to prevent unauthorized people from viewing confidential data.

- Has been successfully achieved by using the **Login Form** (Pg 66 - 67; Fig 4.41 - 4.46) security codes in coding page.

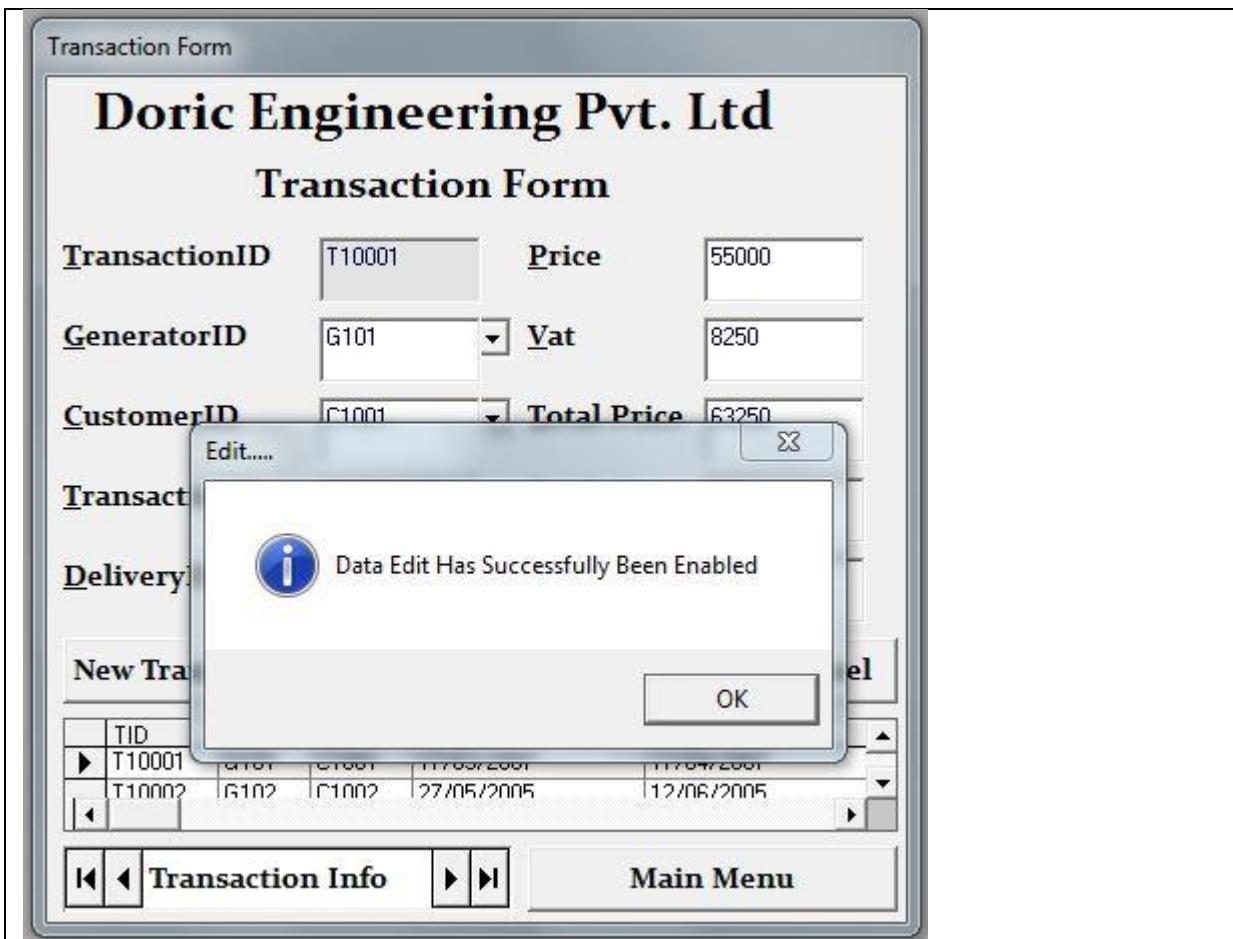
13. Programming Code

Data Manipulation

Adding a new record (Fig 3.12)

Code	Purpose
<pre>adcTransaction.Recordset.MoveLast xTID = Right(txtTID, 5) adcTransaction.Recordset.AddNew txtTID = "T" + CStr(xTID + 1)</pre>	For adding a new record. Then performing auto ID generation - first by taking the last records numeric code as "xTID" and then adding "1" to it and then adding it as a text next to "T".
txtTDate.Text = Date	To set the current date as the "Transaction Date".
txtDDate.Text = DateAdd("d", 15, Date)	To add 15 days to the Transaction Date, which will be the Delivery Date of the product.
MsgBox "Record Added Successfully", vbInformation, "New Transaction"	To give a message to the user that the record was added without any problems or errors.

Editing a record (Fig 3.13)



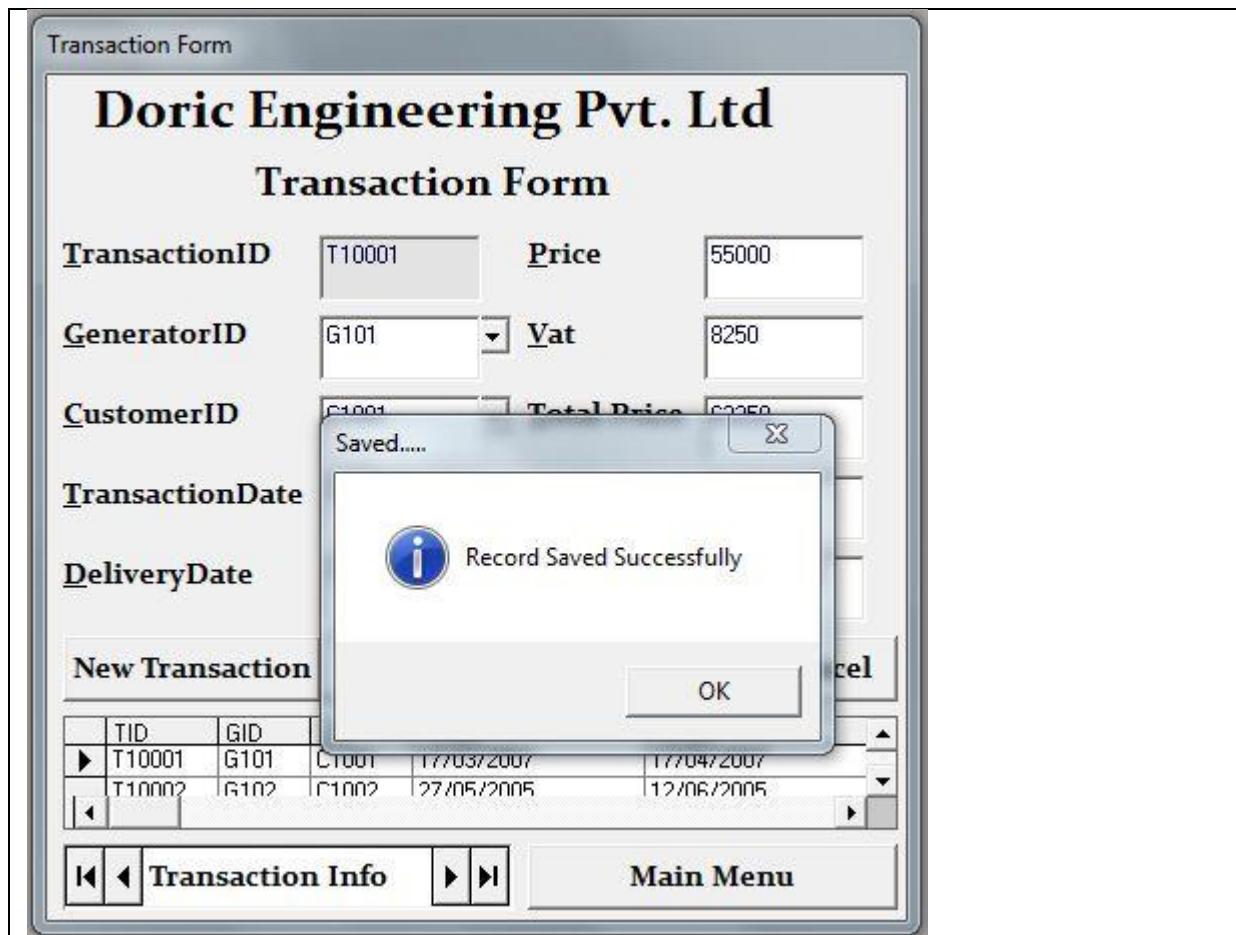
Code	Purpose
<pre>txtTID.Locked = False txtGID.Locked = False dcmbGID.Locked = False txtCID.Locked = False dcmbCID.Locked = False txtTDate.Locked = False txtDDate.Locked = False txtPrice.Locked = False txtVat.Locked = False txtTPrice.Locked = False txtBName.Locked = False txtBAcNum.Locked = False</pre>	To allow all the fields to be edited, by unlocking them the field lock.
<pre>MsgBox "Data Edit Has Successfully Been Enabled", vbInformation, "Edit...."</pre>	To give a message to the user that the record can now be edited.

Deleting a record (Fig 3.14)

Transaction Form																
Doric Engineering Pvt. Ltd	Transaction Form															
TransactionID <input type="text" value="T10005"/>	Price <input type="text" value="105000"/>															
GeneratorID <input type="text" value="G101"/>	Vat <input type="text" value="8250"/>															
CustomerID <input type="text" value="C1005"/>	TransactionDate <input type="text" value="25/02/2012"/>															
DeliveryDate <input type="text" value="15/03/2012"/>	New Transaction Save Delete Edit Cancel															
<table border="1"> <thead> <tr> <th>TID</th> <th>GID</th> <th>CID</th> <th>TDate</th> <th>DDate</th> </tr> </thead> <tbody> <tr> <td>T10005</td> <td>G102</td> <td>C1005</td> <td>25/02/2012</td> <td>15/03/2012</td> </tr> <tr> <td colspan="5"> <input type="button" value=" <"/> <input type="button" value=" >"/> Transaction Info <input type="button" value=" < >"/> <input type="button" value="Main Menu"/> </td> </tr> </tbody> </table>		TID	GID	CID	TDate	DDate	T10005	G102	C1005	25/02/2012	15/03/2012	<input type="button" value=" <"/> <input type="button" value=" >"/> Transaction Info <input type="button" value=" < >"/> <input type="button" value="Main Menu"/>				
TID	GID	CID	TDate	DDate												
T10005	G102	C1005	25/02/2012	15/03/2012												
<input type="button" value=" <"/> <input type="button" value=" >"/> Transaction Info <input type="button" value=" < >"/> <input type="button" value="Main Menu"/>																
<input type="button" value="Delete....."/> Are you sure that you want to delete? <input type="button" value="Yes"/> <input type="button" value="No"/>																
<input type="button" value="Deleted....."/> Record Deleted Successfully <input type="button" value="OK"/>																

Code	Purpose
<pre>d = MsgBox("Are you sure that you want to delete?", vbYesNo, "Delete.....")</pre>	"d" is used as a variable to store the decision taken when the delete query was made. A decision box is shown to ask the user to confirm his "delete action".
<pre>If d = vbYes Then adcTransaction.Recordset.Delete adcTransaction.Refresh Else: Exit Sub End If</pre>	To delete the selected record if the decision was "Yes", else exit from the running function.
<pre>MsgBox "Record Deleted Successfully", vbInformation, "Deleted....."</pre>	To give a message to the user that the record has been deleted.

Saving a record (Fig 3.15)



Code	Purpose
adcTransaction.Recordset.Update	To update all the fields/ amended fields in the Transaction Table.
s=adcGenerator.Recordset.Fields("Stock").Value s = s - 1 With adcGenerator.Recordset .Fields("Stock") = s .Update End With	To subtract "1" from the stock of the selected generator. To update the "Stock" field in the Generator Table.
MsgBox "Record Saved Successfully", vbInformation, "Saved...."	To give a message to the user that the record has been saved.

Data Searching and Report

Searching for a record (Fig 3.16)

Search/Report Form

Doric Enterprise

Search

Search By Transaction ID

Search Result Shown

OK

T10001

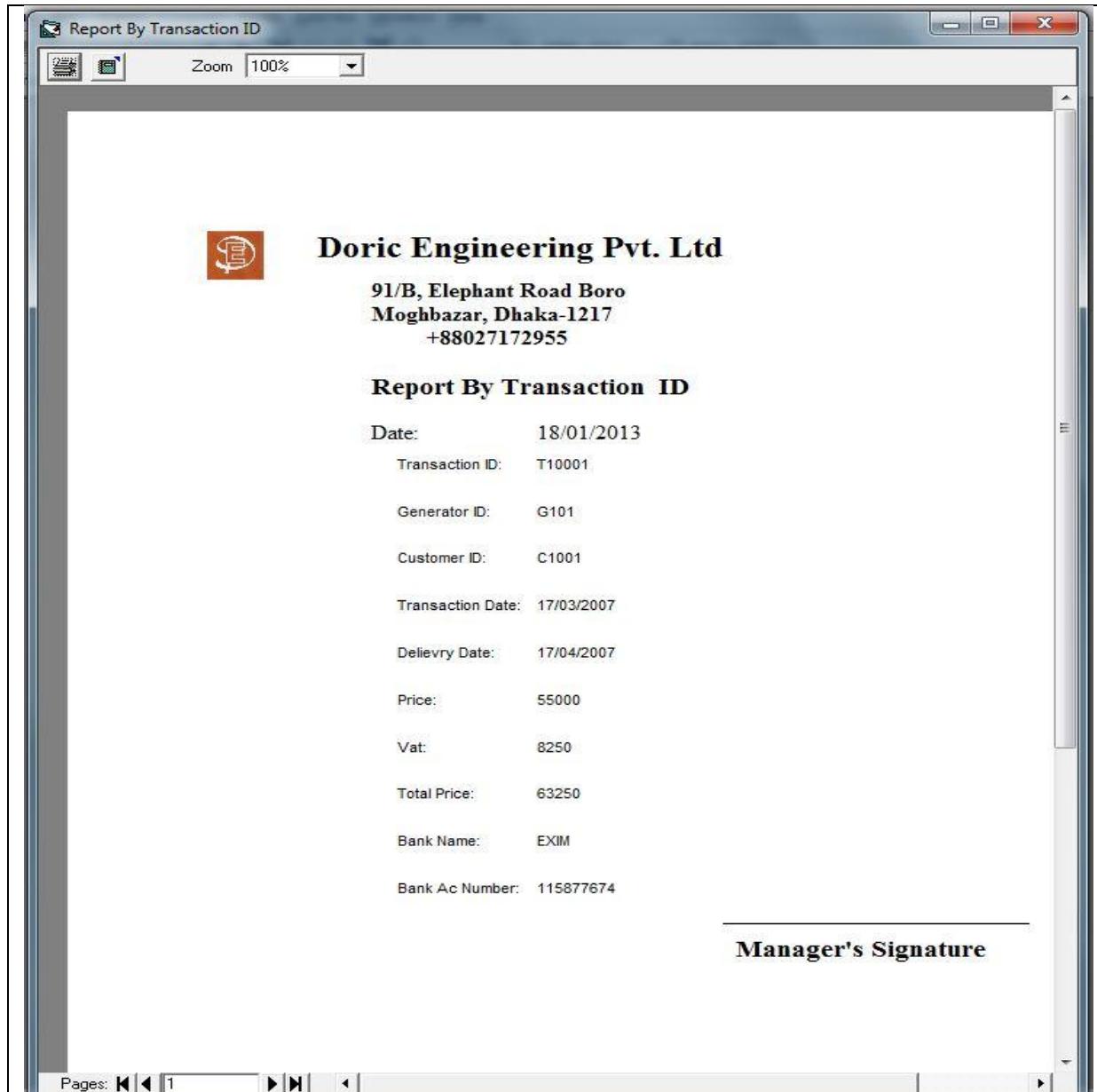
Search Report

	TID	GID	CID	TDate	DDate
▶	T10001	G101	C1001	17/03/2012	01/04/2012
◀					▶

Main Menu

Code	Purpose
If optTID.Value = True Then txtSearchReport.SetFocus	To do the following query functions if it is selected and focus the cursor in the SearchReport text box.
If deGMS.rscomTID.State = adStateOpen Then deGMS.rscomTID.Close End If	To close the data environment (deGMS) object if it is open, to avoid unexpected errors.
deGMS.comTID Trim(txtSearchReport.Text)	To search using the SQL code in the selected command in the data environment (deGMS) using the query request in the SearchReport text box.
grdSearchDataMember = "comTID"	To display the search result in the Search Grid (grdSearch).
MsgBox "Search Result Shown", vbInformation, "Search"	To give a message to the user that the query for the record has been successful.

Data Report (Fig 3.17)



Code	Purpose
If optTID.Value = True Then txtSearchReport.SetFocus	To do the following report function and focus the cursor in the SearchReport text box.
If deGMS.rscomTID.State = adStateOpen Then deGMS.rscomTID.Close End If	To close the data environment object if it is open, to avoid unexpected errors.
deGMS.comTID Trim(txtSearchReport.Text)	To make a report using the SQL code in the selected command in the data environment (deGMS) using the query request in the SearchReport text box.
rptTID.Show	Show the Transaction Report, such as the above.

Validation

Length Check (Fig 3.18)

CID	CustomerName	Gender	PhoneNumber
C1006			
C1001	Afroz Al Mamun	Male	01823357441

Code

```
If Len(txtCName.Text) > 25 Then
    MsgBox "Customer Name cannot be more than 25 characters", vbCritical, "Error"
End If
```

Purpose

Used in the Customer Name field in the Transaction Form to check the name input if the length is more than 25 characters and shows error message in case the data is more than 25 characters.

Format Check (Fig 3.19)

The screenshot shows a Windows application window titled "Transaction Form". Inside, there's a title "Doric Engineering Pvt. Ltd" and "Transaction Form". The form contains several input fields: "TransactionID" (T1005), "Price" (empty), "GeneratorID" (dropdown menu), "Vat" (0), "CustomerID" (dropdown menu), "Total Price" (0), "TransactionDate" (01/03/2013), "Bank Name" (empty), and "Delivery Date" (dropdown menu showing 7/04/2007). A modal dialog box titled "Error Input" is displayed, containing a red "X" icon and the message "Wrong Format T#####". It has "Edit" and "Cancel" buttons at the top right and an "OK" button at the bottom right. In the background, there's a "Main Menu" button.

Code	Purpose
<pre>If KeyAscii = 13 Then If txtTID Like "T#####" Then Else MsgBox "Wrong Format T#####", vbCritical, "Error Input" End If End If</pre>	Used to check if the Transaction ID is in the correct format or not and shows error message in case the data is in the wrong format.

Type Check (Fig 3.20)

Code	Purpose
<pre>If IsNumeric(txtPhNum.Text) = True Then Else: MsgBox "Phone Number can be numeric only", vbCritical, "Error" txtPhNum.Text = "" txtPhNum.SetFocus End If</pre>	Used in Phone Number text box in the Customer Form to check if data is only numeric and shows error message if data of any other type is present.

Presence Check (Fig 3.21)

<p>Code</p> <pre>If KeyAscii = 13 And txtGID = "" Then MsgBox "Empty Field", vbCritical txtGID.SetFocus ElseIf KeyAscii = 13 Then txtCID.SetFocus End If</pre>	<p>Purpose</p> <p>Used to check the field "Generator ID" in the Transaction Table to find if the field contains null value and prevents from moving the cursor to the Customer ID field if data is not present and also shows error message in case the data is not present.</p>

To see other workings of Data Manipulation, Search and Report, Validation, Security including other Forms see Testing Phase (Page 49-65).

Other Codes

Data manipulation

Customer Form

Code for adding a new record

```
adcCustomer.Recordset.MoveLast  
xCID = Right(txtCID, 4)  
adcCustomer.Recordset.AddNew  
txtCID = "C" + CStr(xCID + 1)
```

Code for editing a record

```
txtCName.Locked = False  
txtGender.Locked = False  
cmbGender.Locked = False  
txtPhNum.Locked = False  
txtPType.Locked = False  
txtAName.Locked = False  
txtAddress.Locked = False  
txtDesignation.Locked = False  
txtBName.Locked = False  
txtBAcNum.Locked = False
```

Code for deleting a record

```
d = MsgBox("Are you sure that you want to delete?", vbYesNo, "Delete.....")  
If d = vbYes Then  
    adcCustomer.Recordset.Delete  
    MsgBox "Record Deleted Successfully", vbInformation, "Deleted....."  
    adcCustomer.Refresh  
    adcCustomer.Recordset.Sort = "CID"  
Else:  
    Exit Sub  
End If
```

Code for saving a record

```
adcCustomer.Recordset.Update
```

Generator Form

Code for adding a new record

```
adcGenerator.Recordset.MoveLast  
xGID = Right(txtGID, 3)  
adcGenerator.Recordset.AddNew  
txtGID = "G" + CStr(xGID + 1)
```

Code for editing a record

```
txtGID.Locked = False  
txtGType.Locked = False  
txtModel.Locked = False  
txtMan.Locked = False  
txtManCountry.Locked = False  
txtPower.Locked = False  
txtVoltage.Locked = False  
txtCurrent.Locked = False  
txtVMR.Locked = False  
txtPCase.Locked = False  
txtStock.Locked = False  
txtPrice.Locked = False  
txtSPrice.Locked = False
```

Code for deleting a record

```
d = MsgBox("Are you sure that you want to delete?", vbYesNo, "Delete.....")  
If d = vbYes Then  
    adcGenerator.Recordset.Delete  
    MsgBox "Record Deleted Successfully", vbInformation, "Deleted....."  
    adcGenerator.Refresh  
Else: Exit Sub  
End If
```

Code for saving a record

```
adcGenerator.Recordset.Update
```

Validation

Transaction Form

Format check for Transaction Date

```
Private Sub txtTDate_KeyPress(KeyAscii As Integer)  
If KeyAscii = 13 Then  
    If txtTID Like "DD/MM/YYYY" Then  
        txtGID.SetFocus  
    Else  
        MsgBox "Correct Format: DD/MM/YYYY", vbCritical, "Error Input"  
    End If  
End If  
End Sub
```

Customer Form

Format check for Customer ID

```
Private Sub txtCID_KeyPress(KeyAscii As Integer)
If KeyAscii = 13 Then
    If txtCID Like "C#####" Then
        txtCName.SetFocus
    Else
        MsgBox "Correct Format: C#####", vbCritical, "Error Input"
    End If
End If
End Sub
```

Length check for Customer Name

```
Private Sub txtCName_Change()
If Len(txtCName.Text) > 25 Then
    MsgBox "Customer Name cannot be more than 25 characters", vbCritical, "Error"
End If
End Sub
```

Format check for Email

```
Private Sub txtEmail_Validate(Cancel As Boolean)
If InStr(1, txtEmail, "@") = 0 Then
    MsgBox "Email Address Not Valid", vbCritical, "Error Input"
    txtEmail.SetFocus
    Exit Sub
End If
End Sub
```

Presence check for Bank Name

```
Private Sub txtBName_KeyPress(KeyAscii As Integer)
If KeyAscii = 13 And txtBName = "" Then
    MsgBox "Empty Field", vbCritical
    txtBName.SetFocus
ElseIf KeyAscii = 13 Then
    txtBAcNum.SetFocus
End If
End Sub
```

Type check for Bank Account Number

```
Private Sub txtBAcNum_KeyPress(KeyAscii As Integer)
If IsNumeric(txtBAcNum.Text) = True Then
Else: MsgBox "Bank Account Number can be numeric only", vbCritical, "Error"
    txtBAcNum.Text = ""
    txtBAcNum.SetFocus
End If
End Sub
```

Generator Form

Format check for Generator ID

```
Private Sub txtGID_KeyPress(KeyAscii As Integer)
If KeyAscii = 13 Then
    If txtGID Like "G###" Then
        Else
            MsgBox "Correct Format: G###", vbCritical, "Error Input"
    End If
End If
End Sub
```

Presence check for Model

```
Private Sub txtModel_KeyPress(KeyAscii As Integer)
If KeyAscii = 13 And txtModel = "" Then
    MsgBox "Empty Field", vbCritical
    txtModel.SetFocus
ElseIf KeyAscii = 13 Then
    txtMan.SetFocus
End If
End Sub
```

Range check for Stock

```
Private Sub txtStock_KeyPress(KeyAscii As Integer)
If KeyAscii = 13 Then
    If Val(txtStock.Text) > 0 And Val(txtStock.Text) <= 50 Then
        Else: MsgBox "Stock is out of range", vbCritical, "Error"
        txtStock.Text = ""
        txtStock.SetFocus
    Exit Sub
End If
If KeyAscii = 13 Then
    txtPrice.SetFocus
End If
End If
End Sub
```

Formula

Transaction Form

Code for calculating Vat

```
Private Sub txtPrice_Change()
txtVat = (Val(txtPrice) / 100) * 15
End Sub
```

Code for calculating Total Price

```
Private Sub txtPrice_Change()
txtTPrice = Val(txtPrice) + Val(txtVat)
End Sub
```

Login Form Codes

Code to check for correct User Name and Password

```
Private Sub cmdLogin_Click()
If deGMS.rscomUserName.State = adStateOpen Then
    deGMS.rscomUserName.Close
End If
deGMS.comUserName Trim(txtUserName.Text)
If deGMS.rscomUserName.RecordCount = 0 Then
    MsgBox "Invalid User Name", vbCritical
    Exit Sub
End If
If txtPassword.Text = deGMS.rscomUserName.Fields("Password").Value Then
    MsgBox "Welcome", vbInformation
    Unload Me
    frmMain.Show
Else: MsgBox "Invalid Password", vbCritical
    txtPassword.SetFocus
End If
End Sub
Code for Closing the software
```

Private Sub cmdClose_Click()

```
End
End Sub
```

Main Form Codes

Code for Closing the software

```
Private Sub cmdClose_Click()
End
End Sub
```

Code for opening Customer Form

```
Private Sub cmdfrmCustomer_Click()
Unload Me
frmCustomer.Show
End Sub
```

Code for opening Generator Form

```
Private Sub cmdfrmGenerator_Click()
Unload Me
frmGenerator.Show
End Sub
```

Code for Logging Out

```
Private Sub cmdfrmLogin_Click()
Unload Me
frmLogin.Show
End Sub
```

Code for opening Search/Report From

```
Private Sub cmdfrmSearchReport_Click()
Unload Me
frmSearchReport.Show
End Sub
```

Code for opening Transaction From

```
Private Sub cmdfrmTransaction_Click()
Unload Me
frmTransaction.Show
End Sub
```

Search/Report Form

Code for searching data

```
Private Sub cmdSearch_Click()

If optTID.Value = True Then
txtSearchReport.SetFocus
If deGMS.rscomTID.State = adStateOpen Then
    deGMS.rscomTID.Close
End If
deGMS.comTID Trim(txtSearchReport.Text)
grdSearch.DataMember = "comTID"
MsgBox "Search Result Shown", vbInformation, "Search"

ElseIf optGID.Value = True Then
If deGMS.rscomGID.State = adStateOpen Then
    deGMS.rscomGID.Close
End If
deGMS.comGID Trim(txtSearchReport.Text)
grdSearch.DataMember = "comGID"
MsgBox "Search Result Shown", vbInformation, "Search"

ElseIf optGType.Value = True Then
If deGMS.rscomGType.State = adStateOpen Then
    deGMS.rscomGType.Close
End If
deGMS.comGType Trim(txtSearchReport.Text)
grdSearch.DataMember = "comGType"
```

```
MsgBox "Search Result Shown", vbInformation, "Search"
ElseIf optCID.Value = True Then
If deGMS.rscomCID.State = adStateOpen Then
    deGMS.rscomCID.Close
End If
deGMS.comCID Trim(txtSearchReport.Text)
grdSearch.DataMember = "comCID"
MsgBox "Search Result Shown", vbInformation, "Search"

ElseIf optCName.Value = True Then
If deGMS.rscomCName.State = adStateOpen Then
    deGMS.rscomCName.Close
End If
deGMS.comCName Trim(txtSearchReport.Text)
grdSearch.DataMember = "comCName"
MsgBox "Search Result Shown", vbInformation, "Search"

ElseIf optTDate.Value = True Then
txtSearchReport.SetFocus
If deGMS.rscomTDate.State = adStateOpen Then
    deGMS.rscomTDate.Close
End If
deGMS.comTDate Trim(txtSearchReport.Text)
grdSearch.DataMember = "comTDate"
MsgBox "Search Result Shown", vbInformation, "Search"

End If
End Sub
```

Code for generating report

```
Private Sub cmdReport_Click()
If optTID.Value = True Then
txtSearchReport.SetFocus
If deGMS.rscomTID.State = adStateOpen Then
    deGMS.rscomTID.Close
End If
deGMS.comTID Trim(txtSearchReport.Text)
rptTID.Show

ElseIf optGID.Value = True Then
txtSearchReport.SetFocus
If deGMS.rscomGID.State = adStateOpen Then
    deGMS.rscomGID.Close
End If
deGMS.comGID Trim(txtSearchReport.Text)
rptGID.Show
```

```
ElseIf optCID.Value = True Then
    txtSearchReport.SetFocus
    If deGMS.rscomCID.State = adStateOpen Then
        deGMS.rscomCID.Close
    End If
    deGMS.comCID Trim(txtSearchReport.Text)
    rptCID.Show

ElseIf optCName.Value = True Then
    txtSearchReport.SetFocus
    If deGMS.rscomCName.State = adStateOpen Then
        deGMS.rscomCName.Close
    End If
    deGMS.comCName Trim(txtSearchReport.Text)
    rptCName.Show

ElseIf optGType.Value = True Then
    txtSearchReport.SetFocus
    If deGMS.rscomGType.State = adStateOpen Then
        deGMS.rscomGType.Close
    End If
    deGMS.comGType Trim(txtSearchReport.Text)
    rptGType.Show

ElseIf optTDate.Value = True Then
    txtSearchReport.SetFocus
    If deGMS.rscomTDate.State = adStateOpen Then
        deGMS.rscomTDate.Close
    End If
    deGMS.comTDate Trim(txtSearchReport.Text)
    rptTDate.Show

End If
End Sub
```

14. Test strategy

To fulfil my objective of the software to run smoothly, I used different validation techniques to test for three types of test data (Normal, Abnormal and Extreme). The following are the testing that I formed upon several fields:

- **Length Check** - This checks if the length of the data entered is within the limit.
- **Format Check** - This checks if the data entered is in the correct format.
- **Type Check** - This check if the data entered is the correct data type.
- **Presence Check** - This checks if the data is present in the text box.
- **Range Check** - This checks if the value of the data is within a certain range.

I planned a validation test strategy for some of my fields for checking for different data sets.

Then I showed the workings of different forms for data manipulation and search. I also included the security system and showed how it works.

Validation Test planning (Co.5)

Transaction Form

Field Name	Test Data	Data Type	Validation	Expectation
TID	T10005	Normal	Format Check	Accepted
	T100057	Abnormal		Error Message
Transaction Date	23/03/2013	Normal	Format Check	Accepted
	23/03/13	Abnormal		Error Message

Customer Form

Field Name	Test Data	Data Type	Validation	Expectation
CID	C1006	Normal	Format Check	Accepted
	C10068	Abnormal		Error Message
CustomerName	Zeba Farzana	Normal	Length Check	Accepted
	Fayez Ahmed Jahangir Masud	Abnormal		Error Message
EmailID	akbar.ovi@yahoo.com	Normal	Format Check	Accepted
	akbarovi71	Abnormal		Error Message
BankName	Exim	Normal	Presence Check	Accepted
	" "	Abnormal		Error Message
BankAcNum	118799983	Normal	Type Check	Accepted
	11879a	Abnormal		Error Message

Generator Form

Field Name	Test Data	Data Type	Validation	Expectation
GID	G104	Normal	Format Check	Accepted
	G1045	Abnormal		Error Message
Model	K5100ZA	Normal	Presence Check	Accepted
	" "	Abnormal		Error Message
Stock	17	Normal	Range Check	Accepted
	-1	Abnormal		Error Message
	1, 50	Extreme		Accepted

Validation Test screenshots

Doric Engineering Pvt. Ltd
Transaction Form

<u>TransactionID</u>	T10005	<u>Price</u>	
<u>GeneratorID</u>		<u>Vat</u>	
<u>CustomerID</u>		<u>Total</u>	
<u>TransactionDate</u>	23/03/2013	<u>Bank</u>	
<u>DeliveryDate</u>	07/04/2013	<u>Bank Numt</u>	
New Transaction		Save	Delete

The TransactionID field contains 'T10005' and is highlighted with a red oval. The GeneratorID, CustomerID, and DeliveryDate fields are also highlighted with red ovals.

Fig 4.01

Doric Engineering Pvt. Ltd
Transaction Form

<u>TransactionID</u>	T100056	<u>Price</u>	
<u>GeneratorID</u>		<u>Vat</u>	0
<u>CustomerID</u>		<u>Total</u>	
<u>TransactionDate</u>		<u>Bank</u>	
<u>DeliveryDate</u>		<u>Bank Numt</u>	
New Transaction		Save	Delete

An error dialog box titled 'Error Input' is displayed, showing a red 'X' icon and the message 'Correct Format: T#####'. The TransactionID field contains 'T100056'.

Fig 4.02

Doric Engineering Pvt. Ltd
Transaction Form

<u>TransactionID</u>	T10005	<u>Price</u>	
<u>GeneratorID</u>	G103	<u>Vat</u>	
<u>CustomerID</u>	C1004	<u>Total</u>	
<u>TransactionDate</u>	23/03/2013	<u>Bank</u>	
New Transaction		Save	Delete

The TransactionDate field contains '23/03/2013' and is highlighted with a red oval.

Fig 4.03

Doric Engineering Pvt. Ltd
Transaction Form

<u>CustomerID</u>	C1001	<u>Total Price</u>	
<u>TransactionDate</u>	17/03/13	<u>Bank Name</u>	
New Transaction		Save	Delete

An error dialog box titled 'Error Input' is displayed, showing a red 'X' icon and the message 'Correct Format: DD/MM/YYYY'. The TransactionDate field contains '17/03/13'.

Fig 4.04

Doric Engineering Pvt. Ltd
Customer Form

<u>CustomerID</u>	C1006	<u>Asset Name</u>	
<u>Customer Name</u>		<u>Property Type</u>	
<u>Gender</u>		<u>Address</u>	
<u>Phone Number</u>		<u>Bank Name</u>	
<u>Email ID</u>		<u>Bank Account Number</u>	
<u>Designation</u>		<u>Bank Account Number</u>	

The CustomerID field contains 'C1006' and is highlighted with a red oval. The Customer Name, Gender, Phone Number, Email ID, and Designation fields are also highlighted with red ovals.

Fig 4.05

Doric Engineering Pvt. Ltd
Customer Form

<u>CustomerID</u>	C10068	<u>Asset Name</u>	
<u>Customer Name</u>		<u>Property Type</u>	
<u>Gender</u>		<u>Address</u>	
<u>Phone Number</u>		<u>Bank Name</u>	
<u>Email ID</u>		<u>Bank Account Number</u>	
<u>Designation</u>		<u>Bank Account Number</u>	

An error dialog box titled 'Error Input' is displayed, showing a red 'X' icon and the message 'Correct Format: C####'. The CustomerID field contains 'C10068'.

Fig 4.06

Doric Engineering Pvt. Ltd

Customer Form

<u>CustomerID</u>	C1006	<u>Asset Name</u>	
<u>Customer Name</u>	Zeba Farzana	<u>Property Type</u>	
<u>Gender</u>		<u>Address</u>	
<u>Phone Number</u>		<u>Bank</u>	

Fig 4.07

Doric Engineering Pvt. Ltd

Customer Form

<u>CustomerID</u>	C1006	<u>Asset Name</u>	
<u>Customer Name</u>	Jahangir Masud	<u>Property Type</u>	
<u>Gender</u>	Male	<u>Address</u>	

Error

X Customer Name cannot be more than 25 characters

OK

Fig 4.08

Engineering Pvt. Ltd

Customer Form

<u>Email ID</u>	akbar.ov@yah	<u>Bank Name</u>	
<u>Designation</u>	Owner	<u>Bank Ac Number</u>	
New Customer	Save	Delete	Edit
CID	CustomerName	Gender	
C1005	Akbar Ovi	Male	

Fig 4.09

Engineering Pvt. Ltd

Customer Form

<u>Email ID</u>	akbarovi71	<u>Bank Name</u>	
<u>Designation</u>		<u>Bank Ac Number</u>	
New Customer	Save	Delete	Edit
CID	CustomerName	Gender	
C1005	Akbar Ovi	Male	

Error Input

X Email Address Not Valid

OK

Fig 4.10

Engineering Pvt. Ltd

Customer Form

1001	<u>Asset Name</u>	Icon College
Roz Al Mamun	<u>Property Type</u>	Company
ale	<u>Address</u>	D-Block Lalmatia, Dhaka
1823357448	<u>Bank Name</u>	EXIM
roz_27@gmail.c	<u>Bank Ac Number</u>	
rector		

Fig 4.11

Engineering Pvt. Ltd

Customer Form

1002	<u>Asset Name</u>	F.Tower
Maria Faruk	<u>Property Type</u>	Domestic
GMS	<u>Address</u>	91/B, Elephant Road, Dhaka-1217
	<u>Bank Name</u>	
	<u>Bank Ac Number</u>	

X Empty Field

OK

Fig 4.12

<u>Address</u>	H-131, Old Dhaka	
<u>Bank Name</u>	HSBC	
<u>Bank Ac Number</u>	118799983	
Delete	Edit	Cancel

Fig 4.13

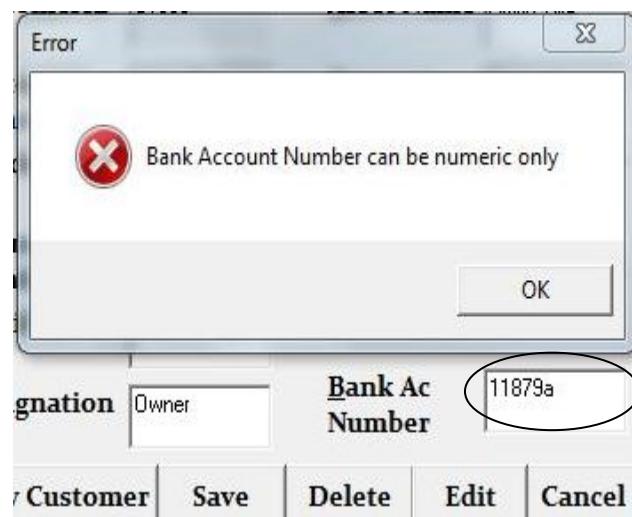


Fig 4.14

Generator Form

Doric Engineering Generator

<u>GeneratorID</u>	G104
<u>GType</u>	
<u>Model</u>	

Fig 4.15

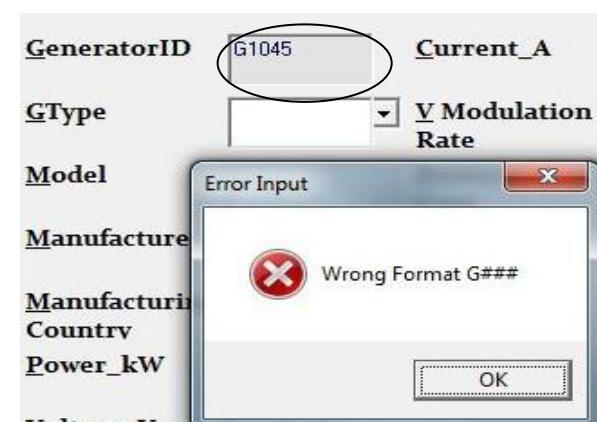


Fig 4.16

Generator Form

Doric Engineering Generator

<u>GeneratorID</u>	G104
<u>GType</u>	30GFS
<u>Model</u>	K5100ZA
<u>Manufacturer</u>	

Fig 4.17

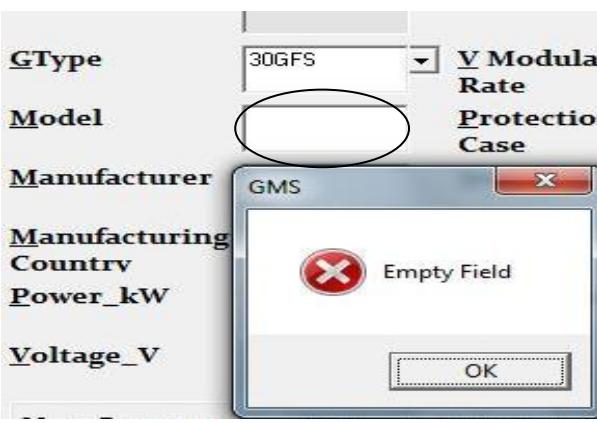


Fig 4.18

Protection Case	IP22
Stock	17
Price	
Sale Price	

Fig 4.19

Protection Case	IP22
Stock	50
Price	
Sale Price	

Fig 4.21



Fig 4.20

Protection Case	IP32
Stock	1
Price	
Sale Price	

Fig 4.22

Data Manipulation Screenshots (Customer Form & Generator Form)

The screenshot shows the 'Customer Form' window for 'Doric Engineering Pvt. Ltd'. A message box in the center says 'Record Added Successfully'. An arrow points from the 'CustomerID' field (containing 'C1006') to a box labeled 'Auto generated ID'. Another arrow points from the bottom-most row of the grid (containing 'C1007', 'Laila Faruk', 'Female', '01813359789') to a box labeled 'New blank record added'.

Customer Form
Doric Engineering Pvt. Ltd
Customer Form

New Customer

Record Added Successfully

OK

CustomerID C1006 **Asset Name**

Customer Name **Property**

Gender

Phone Number

Email ID

Designat

New Customer Save Delete Edit Cancel

CID CustomerName Gender PhoneNumbe
C1001 Afroz Al Mamun Male 01823357441
C1002 Laila Faruk Female 01813359789

Customer Info Main Menu

Fig 4.23

The screenshot shows the 'Customer Form' window. A message box says 'Data Edit Has Successfully Been Enabled'. An arrow points from the 'Asset Name' field (containing 'Matrix') to a box labeled 'Edited Field'. To the right, another 'Customer Form' window shows a comparison of two records. The first record has 'Asset Name' as 'Icon College'. The second record has 'Asset Name' as 'Kader And Brothers'. An arrow points from the 'Icon College' entry to a box labeled 'Field Edited in Database'.

Customer Form
Doric Engineering Pvt. Ltd
Customer Form

New Customer Save Delete Edit Cancel

CID CustomerName Gender PhoneNumbe
C1001 Afroz Al Mamun Male 01823357441
C1002 Laila Faruk Female 01813359789

Customer Info Main Menu

Customer Form
Doric Engineering Pvt. Ltd
Customer Form

New Customer Save Delete Edit Cancel

CID CustomerName Gender PhoneNumbe
C1001 Afroz Al Mamun Male 01823357441
C1002 Laila Faruk Female 01813359789

Customer Info Main Menu

The screenshot shows the 'tblGenerator' and 'tblCustomer' tabs. A message box says 'Field Edited in Database'. An arrow points from the 'Asset Name' field (containing 'Icon College') in the second record to a box labeled 'Field Edited in Database'.

CID	CustomerName	Gender	PhoneNumber	EmailID	Designation	AssetName
C1001	Afroz Al Mamun	Male	01823357448	afroz_27@gmail.com	Director	Icon College
C1002	Laila Faruk	Female	01813359788	faruk_laila@yahoo.com	Manager	F.Tower
C1003	Saikat Ali	Male	01741335577	ali_36@yahoo.com	Manager	Kader And Brothers
C1004	Borhan Uddin	Male	01746686197	buddin.486@hot	Manager	Bura House

tblGenerator tblCustomer

Field Edited in Database

Fig 4.24

The screenshot shows the 'Customer Form' application window for 'Doric Engineering Pvt. Ltd'. The main form has fields for CustomerID (C1005), Asset Name (Amrin Villa), Customer Name (Akbar Ovi), and Property (Domestic). A message box titled 'Saved.....' displays 'Record Saved Successfully'. Below the form is a table with columns CID, CustomerName, Gender, and PhoneNumber. A row for C1005 (Akbar Ovi, Male, 0167471192) is selected. A database table 'tblCustomer' is shown below, containing records for multiple customers. A callout box points to the message box with the text 'Record Saved into Database'.

CID	CustomerName	Gender	PhoneNumber
C1005	Akbar Ovi	Male	0167471192

tblCustomer

CID	CustomerName	Gender	PhoneNumber	EmailID	Designation	AssetName
C1001	Afroz Al Mamun	Male	01823357448	afroz_27@gmail.com	Director	Icon College
C1002	Laila Faruk	Female	01813359788	faruk_laila@yahoo.com	Proprietor	F.Tower
C1003	Saikat Ali	Male	01741335577	ali_36@yahoo.com	Managing Director	Kader And Brothers
C1004	Borhan Uddin	Male	01746686197	buddin.486@hotmail.com	Proprietor	Buira House
C1005	Akbar Ovi	Male	01674711928	akbar.ovvi@yahoo.com	Owner	Amrin Villa

Fig 4.25

The screenshot shows the 'Customer Form' application window for 'Doric Engineering Pvt. Ltd'. The main form has fields for CustomerID (C1005), Asset Name (Amrin Villa), Customer Name (Akbar Ovi), and Property (Domestic). A message box titled 'Delete.....' asks 'Are you sure that you want to delete?'. Below the form is a table with columns CID, CustomerName, Gender, and PhoneNumber. A row for C1005 (Akbar Ovi, Male, 0167471192) is selected. A database table 'tblCustomer' is shown below, containing records for multiple customers. A callout box points to the message box with the text 'Record Deleted from Database'.

CID	CustomerName	Gender	PhoneNumber
C1005	Akbar Ovi	Male	0167471192

tblCustomer

CID	CustomerName	Gender	PhoneNumber	EmailID	Designation	AssetName	PropertyType
C1001	Afroz Al Mamun	Male	01823357448	afroz_27@gmail.com	Director	Icon College	Company
C1002	Laila Faruk	Female	01813359788	faruk_laila@yahoo.com	Proprietor	F.Tower	Domestic
C1003	Saikat Ali	Male	01741335577	ali_36@yahoo.com	Managing Director	Kader And Brothers	Company
C1004	Borhan Uddin	Male	01746686197	buddin.486@hotmail.com	Proprietor	Buira House	Domestic

Fig 4.26

The screenshot shows the 'Generator Form' window for 'Doric Engineering Pvt. Ltd'. A message box displays 'Record Added Successfully'. Annotations indicate 'Auto generated ID' pointing to the 'GeneratorID' field (G104) and 'New blank record added' pointing to the bottom of the grid.

GID	GType	Model	ManufacturerCo	Manufact

Fig 4.27

The screenshot shows two instances of the 'Generator Form' window. The left instance has an 'Edit...' dialog box open with the message 'Data Edit Has Successfully Been Enabled'. The right instance shows the edited data. Annotations point to the edited 'Current_A' value (1600) in both the form and the database grid.

GID	GType	Model	ManufacturerCo	Manufact
G101	24GFS	K4100D1	Mindong	Japan
G102	30GFS	K4100ZD	Mindong	Japan
G103	40GFS	R4110D40	Otis	Koren

The screenshot shows the 'tblGenerator' table with three rows. An annotation points to the 'Current_A' value (1600) in the third row, which is highlighted. A callout box says 'Field Edited in Database'.

GID	GType	Model	ManufacturerCo	Manufact
G101	24GFS	K4100D1	Mindong	Japan
G102	30GFS	K4100ZD	Mindong	Japan
G103	40GFS	R4110D40	Otis	Koren

Fig 4.28

Generator Form

Doric Engineering Pvt. Ltd

Generator Form

<u>GeneratorID</u>	G104	<u>Current_A</u>	1500
<u>GType</u>	30GFS	<u>V Modulation Rate</u>	Exceed 100
<u>Model</u>	Saved.....		
<u>Manufacture Country</u>	Record Saved Successfully		
<u>Power_kW</u>	000		
<u>Voltage_V</u>	2000		

New Generator | Save | Delete | Edit | Cancel

tblGenerator

GID	GType	Model	ManufacturerCo	Manufacture	Power_kW	Voltage_V	Current_A	VoltageMod	Poter	Stock	Price	SalePrice
G101	24GFS	K4100D1	Mindong	Japan	24	230	1600	Exceed 95	IP22	12	£45,000.00	£54,000.00
G102	30GFS	K4100ZD	Mindong	Japan	30	230	1500	Exceed 95	IP22	12	£90,000.00	£108,000.00
G103	40GFS	R4110D40	Otis	Koren	40	230	1500	Exceed 105	IP32	12	£105,000.00	£126,000.00
G104	30GFS	K231051	Fine Generato	China	35	230	1500	Exceed 100	IP30	15	£85,000.00	£102,000.00

Record Saved into Database

Fig 4.29

Generator Form

Doric Engineering Pvt. Ltd

Generator Form

<u>GeneratorID</u>	G104	<u>Current_A</u>	1500
<u>GType</u>	30GFS	<u>V Modulation Rate</u>	Exceed 100
<u>Model</u>	Delete.....		
<u>Manufacture Country</u>	Are you sure that you want to delete?		
<u>Power_kW</u>	<input type="button" value="Yes"/> <input type="button" value="No"/>		
<u>Voltage_V</u>	230		

New Generator | Save | Delete | Edit | Cancel

tblGenerator

GID	GType	Model	ManufacturerCo	Manufacture	Power_kW	Voltage_V	Current_A	VoltageMod	Poter	Stock	Price	SalePrice
G101	24GFS	K4100D1	Mindong	Japan	24	230	1600	Exceed 95	IP22	12	£45,000.00	£54,000.00
G102	30GFS	K4100ZD	Mindong	Japan	30	230	1500	Exceed 95	IP22	12	£90,000.00	£108,000.00
G103	40GFS	R4110D40	Otis	Koren	40	230	1500	Exceed 105	IP32	12	£105,000.00	£126,000.00
G104	30GFS	K231051	Fine Generato	China	35	230	1500	Exceed 100	IP30	15	£85,000.00	£102,000.00

Record Deleted from Database

Fig 4.30

Data Search Screenshots

The screenshot shows the 'Doric Engineering Pvt. Ltd' search form. In the 'Search By Transaction' section, the 'Customer ID' option button is selected. Below it, a text box contains 'C1001'. A callout points to the 'Customer ID' option button with the text: 'The option button is used to select the search criteria (Customer ID in the Customer table)'. Another callout points to the text box with the text: 'The text box is used to enter the search "key words"'.

Fig 4.31

The screenshot shows the 'Doric Engineering Pvt. Ltd' search form. In the 'Search By Transaction' section, the 'Generator ID' option button is selected. Below it, a text box contains 'G101'. A callout points to the 'Generator ID' option button with the text: 'The option button is used to select the search criteria (Generator ID in the Generator table)'. Another callout points to the text box with the text: 'The text box is used to enter the search "key words"'.

Fig 4.32

The screenshot shows the 'Doric Engineering Pvt. Ltd' search form. In the 'Search By Transaction' section, the 'Transaction Date' option button is selected. Below it, a text box contains '17/03/2012'. A callout points to the 'Transaction Date' option button with the text: 'The option button is used to select the search criteria (Transaction Date in the Transaction Table)'. Another callout points to the text box with the text: 'The text box is used to enter the search "key words"'.

Fig 4.33

Data Report Screenshots

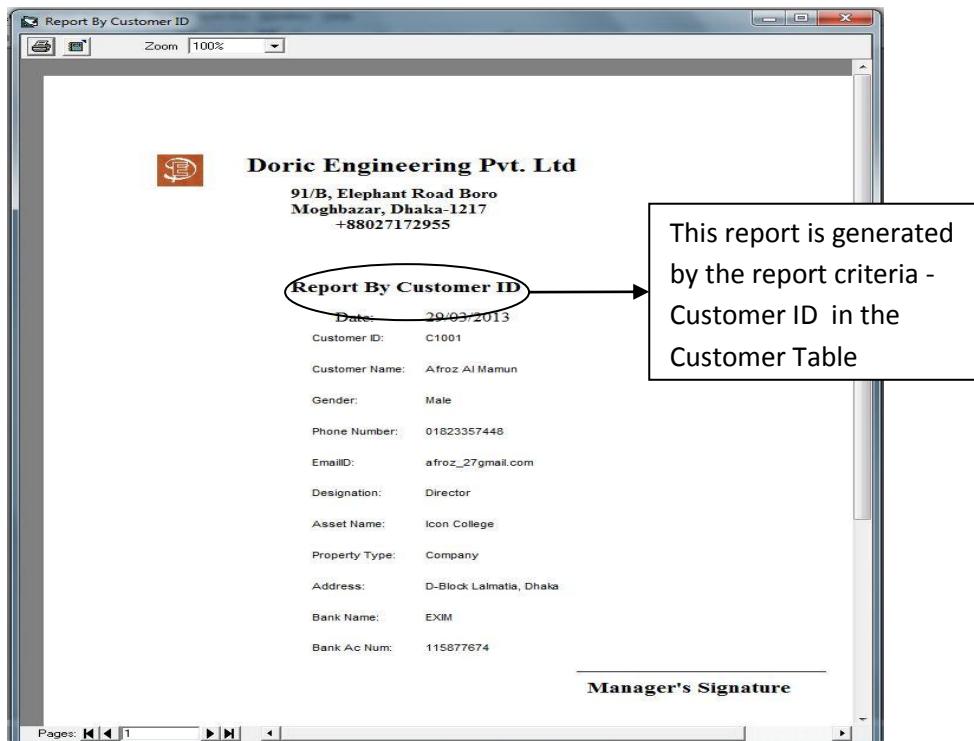


Fig 4.34

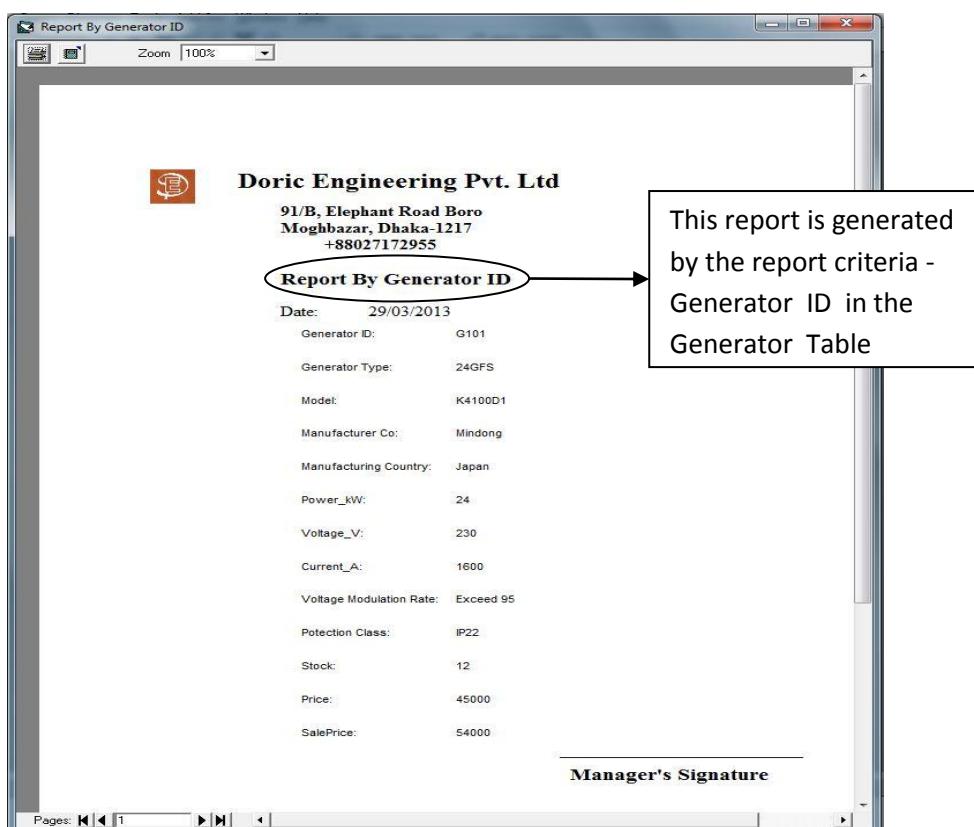


Fig 4.35

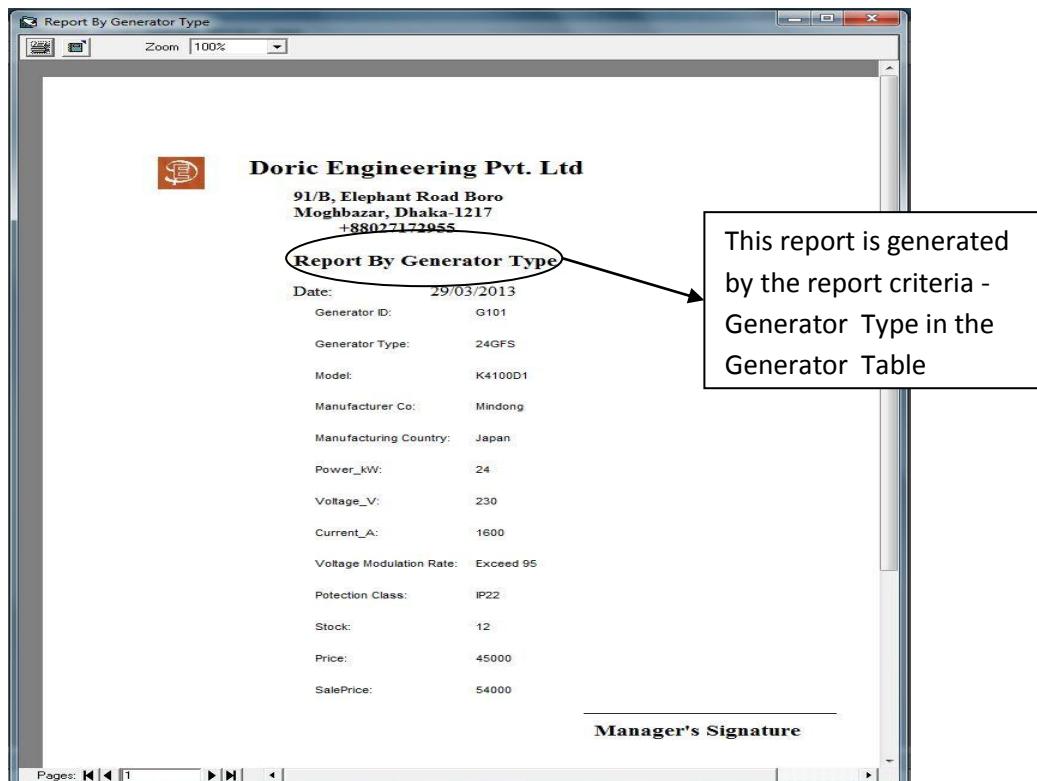


Fig 4.36

Doric Engineering Pvt. Ltd

91/B, Elephant Road Boro
Moghbaazar, Dhaka-1217
+88027172955

Report By Transaction Date

Date: 29/03/2013

TID:	GID:	CID:	DDate:	TDate:	Price:	Vat:	TotalPrice:
T10001	G101	C1001	17/03/2012	01/04/2012	54000	8100	62100
T10002	G102	C1002	17/03/2012	01/04/2012	108000	16200	124200

Manager's Signature

This report is generated by the report criteria - Transaction Date in the Transaction Table

Fig 4.37

Form Working

Transaction Form

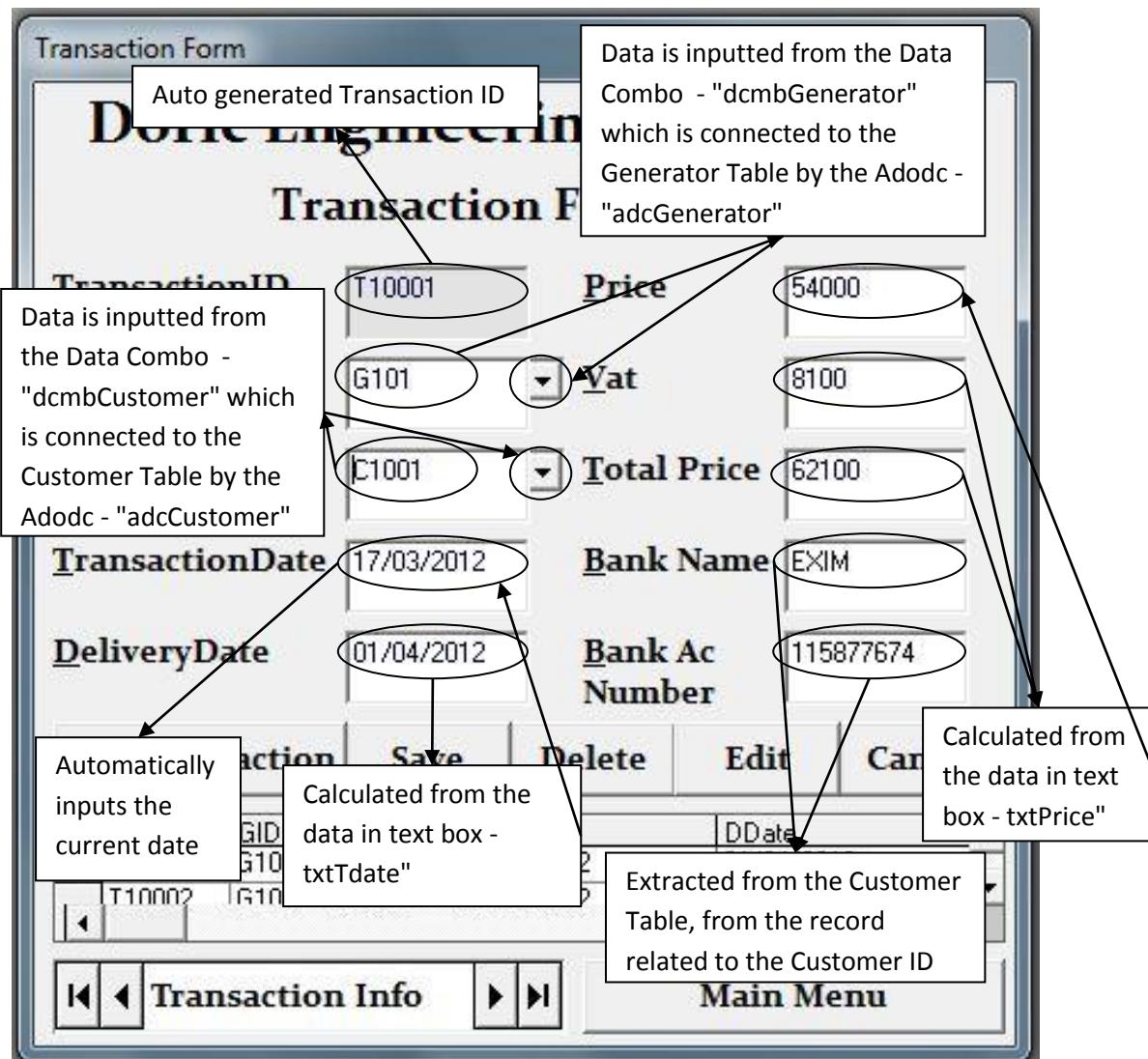


Fig 4.38

Customer Form

The screenshot shows the 'Customer Form' window. At the top center is the company name 'Doric Engineering Pvt. Ltd'. Below it is a section titled 'Customer Form'. The form contains several input fields:

- CustomerID:** C1005 (highlighted with an oval)
- Asset Name:** Amin Villa
- Customer Name:** Akbar Ovi
- Property Type:** Domestic
- Gender:** Male
- Address:** H-131, Old Dhaka
- Phone Number:** 01674711928
- Email ID:** akbar.ovvi@yahoo.com
- Bank Name:** HSBC
- Designation:** Owner
- Bank Ac Number:** 118799983

Below the form is a table showing customer data:

CID	CustomerName	Gender	PhoneNumbe
C1005	Akbar Ovi	Male	01674711928

At the bottom are buttons: New Customer, Save, Delete (highlighted with a dashed box), Edit, Cancel. To the right of the 'Delete' button is a box containing the text 'Auto generated Transaction'. To the right of the 'Save' button is a box containing the text 'Rest of the fields are manually inputted'.

Fig 4.39

Generator Form

The screenshot shows the 'Generator Form' window. At the top center is the company name 'Doric Engineering Pvt. Ltd'. Below it is a section titled 'Generator Form'. The form contains several input fields:

- GeneratorID:** G101 (highlighted with an oval)
- Current_A:** 1600
- GType:** 24GFS
- V Modulation Rate:** Exceed 95
- Model:** K4100D1
- Protection Case:** IP22
- Manufacturer:** Mindong
- Stock:** 0
- Manufacturing Country:** Japan
- Power_kw:** 24
- Voltage_V:** 230
- Price:** 45000
- Sale Price:** 54000 (highlighted with an oval)

Below the form is a table showing generator data:

GID	GType	Model	ManufacturerCo	Manufact
G101	24GFS	K4100D1	Mindong	Japan
G102	30GFS	K4100D1	Mindong	Japan

At the bottom are buttons: New Generator, Save, Delete, Edit, Cancel. To the right of the 'Delete' button is a box containing the text 'Auto generated Transaction'. To the right of the 'Save' button is a box containing the text 'Rest of the fields are manually inputted'. To the right of the 'Edit' button is a box containing the text 'Calculated from the data in text box - txtPrice"'.

Fig 4.40

System Security (Co.7)

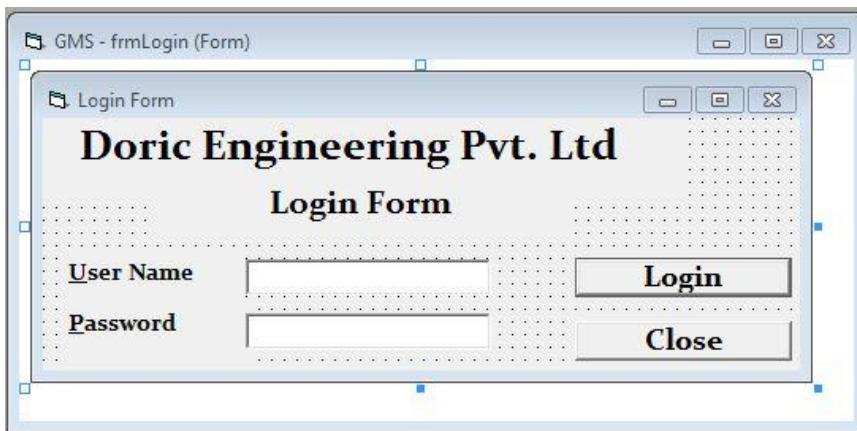


Fig 4.41

tblLogin			
UserName	Password	Designation	UserType
IFF	12345	System Analyst	Admin
Masud	67890	Manager	Admin
*			

Only the users who are registered in the database can access software

Fig 4.42

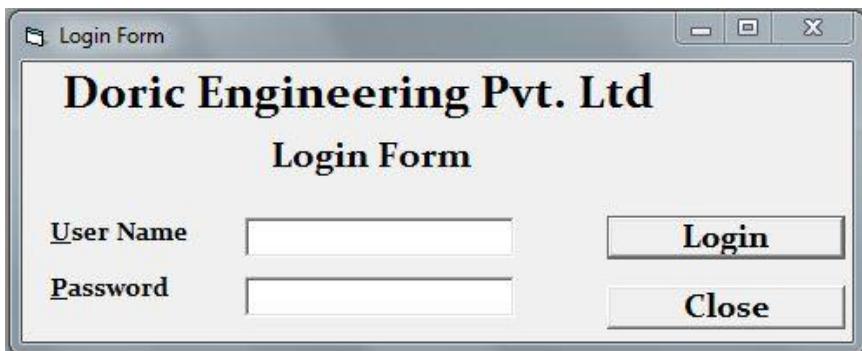


Fig 4.43

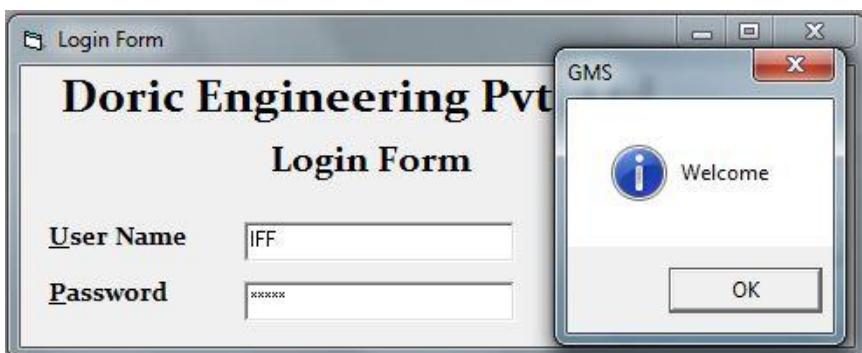


Fig 4.44

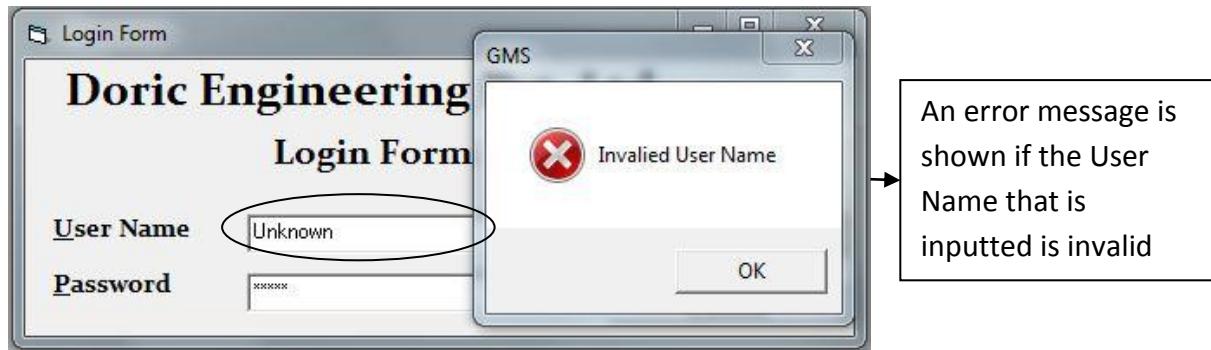


Fig 4.45



Fig 4.46

How the Security System functions

The security system uses a User Name (User ID) and Password system to allow access to the software to only authorized personnel. As the software is not installed in the company's computer and is still being tested, I am using a demo user name and password to see if the security system is functioning properly or not. The User ID and Password check refers to the data that is stored in the database for cross matching.

15. Test Results

Transaction Form

Field Name	Test Data	Data Type	Validation	Expectation	Actual Result	Fig
TID	T10005	Normal	Format Check	Accepted	Accepted	4.01
	T100057	Abnormal		Error Message	Error Message	4.02
Transaction Date	23/03/2013	Normal	Format Check	Accepted	Accepted	4.03
	23/03/13	Abnormal		Error Message	Error Message	4.04

Customer Form

Field Name	Test Data	Data Type	Validation	Expectation	Actual Result	Fig
CID	C1006	Normal	Format Check	Accepted	Accepted	4.05
	C10068	Abnormal		Error Message	Error Message	4.06
CustomerName	Zeba Farzana	Normal	Length Check	Accepted	Accepted	4.07
	Fayez Ahmed Jahangir Masud	Abnormal		Error Message	Error Message	4.08
EmailID	akbar.ovi@yahoo.com	Normal	Format Check	Accepted	Accepted	4.09
	akbarovi71	Abnormal		Error Message	Error Message	4.10
BankName	Exim	Normal	Presence Check	Accepted	Accepted	4.11
	" "	Abnormal		Error Message	Error Message	4.12
BankAcNum	118799983	Normal	Type Check	Accepted	Accepted	4.13
	11879a	Abnormal		Error Message	Error Message	4.14

Generator Form

Field Name	Test Data	Data Type	Validation	Expectation	Actual Result	Fig
GID	G104	Normal	Format Check	Accepted	Accepted	4.15
	G1045	Abnormal		Error Message	Error Message	4.16
Model	K5100ZA	Normal	Presence Check	Accepted	Accepted	4.17
	" "	Abnormal		Error Message	Error Message	4.18
Stock	17	Normal	Range Check	Accepted	Accepted	4.19
	-1	Abnormal		Error Message	Error Message	4.20
	1, 50	Extreme		Accepted	Accepted	4.21, 4.22

Errors found during testing

While performing the testing of the system I noticed some bugs. The following is about the error which I found and how I solved them.



Fig 4.47

The above figures shows screenshot of the validation on the text box `txtBankAcNum`. It shows an errors message even though no data is not present, this happened when I accidentally pressed an extra backspace during the data manipulation of the Customer Form. The code was:

```
Private Sub txtBAcNum_KeyPress(KeyAscii As Integer)
If IsNumeric(txtBAcNum.Text) = True Then
Else: MsgBox "Bank Account Number can be numeric only", vbCritical, "Error"
    txtBAcNum.Text = ""
    txtBAcNum.SetFocus
End If
End Sub
```

The error with the code was it would show an error message for any sort of key, except numeric, even if those keys were the "enter" or "backspace" keys. It would also show an error once at first if numeric data was entered. Thus I understood out that the code was under the wrong event. So I changed the code from the " `txtBAcNum_KeyPress(KeyAscii As Integer)`" to the " `txtBAcNum_LostFocus()`"

The following shows the corrected form of the code:

```
Private Sub txtBAcNum_LostFocus()
If IsNumeric(txtBAcNum.Text) = True Then
Else: MsgBox "Bank Account Number can be numeric only", vbCritical, "Error"
    txtBAcNum.Text = ""
    txtBAcNum.SetFocus
End If
End Sub
```

I also faced another problem. When I set cursor focus on text box *txtBankAcNum* (in the Customer Form) keeping the text box *txtBankName* (in the Customer Form) empty, I found out that no error message was shown. I faced the same problem with text box *txtModel* (in the Generator Form), that it did not show error message when I set focus to other textboxes keeping it blank. The code for the *txtBankName* was:

```
Private Sub txtBName_KeyPress(KeyAscii As Integer)
If KeyAscii = 13 And txtBName = "" Then
    MsgBox "Empty Field", vbCritical
    txtBName.SetFocus
ElseIf KeyAscii = 13 Then
    txtBAcNum.SetFocus
End If
End Sub
```

So I identified that the validation would only work if I pressed the "enter" key while my cursor key is focussed on that text box. So I corrected the error and made the validation universal, that it would show "error message", whenever I will change the cursor focus while keeping it blank. I did it by changing the event from "txtBName_KeyPress(KeyAscii As Integer)" to "txtBName_LostFocus()" and by editing the code to meet the new correction.

The following shows the corrected code:

```
Private Sub txtBName_LostFocus()
If txtBName = "" Then
    MsgBox "Empty Field", vbCritical
    txtBName.SetFocus
End If
End Sub
```

I did the similar thing with the text box *txtModel*. Its code was:

```
Private Sub txtModel_KeyPress(KeyAscii As Integer)
If KeyAscii = 13 And txtModel = "" Then
    MsgBox "Empty Field", vbCritical
    txtModel.SetFocus
ElseIf KeyAscii = 13 Then
    txtMan.SetFocus
End If
End Sub
```

I changed the the event from "txtModel_KeyPress(KeyAscii As Integer)" to "txtModel_LostFocus()" and by editing the code to meet the new correction. The following shows the corrected code:

```
Private Sub txtModel_LostFocus()
If txtModel = "" Then
    MsgBox "Empty Field", vbCritical
    txtModel.SetFocus
End If
End Sub
```

I faced another problem with the stock management. Whenever I would save the record in the Transaction Form, a quantity of "1" would be subtracted from the stock in the Generator Table, even though no new generator was bought. So, I found out that the code needed some readjustments so that the software can function properly. The following is the old code:

```
adcTransaction.Recordset.Update
s=adcGenerator.Recordset.Fields("Stock").Value
s = s - 1
With adcGenerator.Recordset
    .Fields("Stock") = s
    .Update
End With
MsgBox "Record Saved Successfully", vbInformation, "Saved....."
```

The following is the new code that I added to the software different parts of the software:

```
Dim stockconf As Boolean
```

```
Private Sub cmdNewTransaction_Click()
stockconf = True
End Sub
```

```
Private Sub cmdSave_Click()
If stockconf = True Then
    s = adcGenerator.Recordset.Fields("Stock").Value
    s = s - 1
    With adcGenerator.Recordset
        .Fields("Stock") = s
        .Update
    End With
    stockconf = False
End If
    MsgBox "Record Saved Successfully", vbInformation, "Saved....."
End If
End Sub
```

16. Technical Documentation

By using the data in the technical documentation a system analyst can understand how the system works and can perform software updates and amendments. It contains an overall system flowchart, top-down design of the system, flowcharts of data manipulation, search, transaction processing. It also contains the file structure of different tables and relationship between the tables. It also contains the hardware and software requirement to use/update the current software.

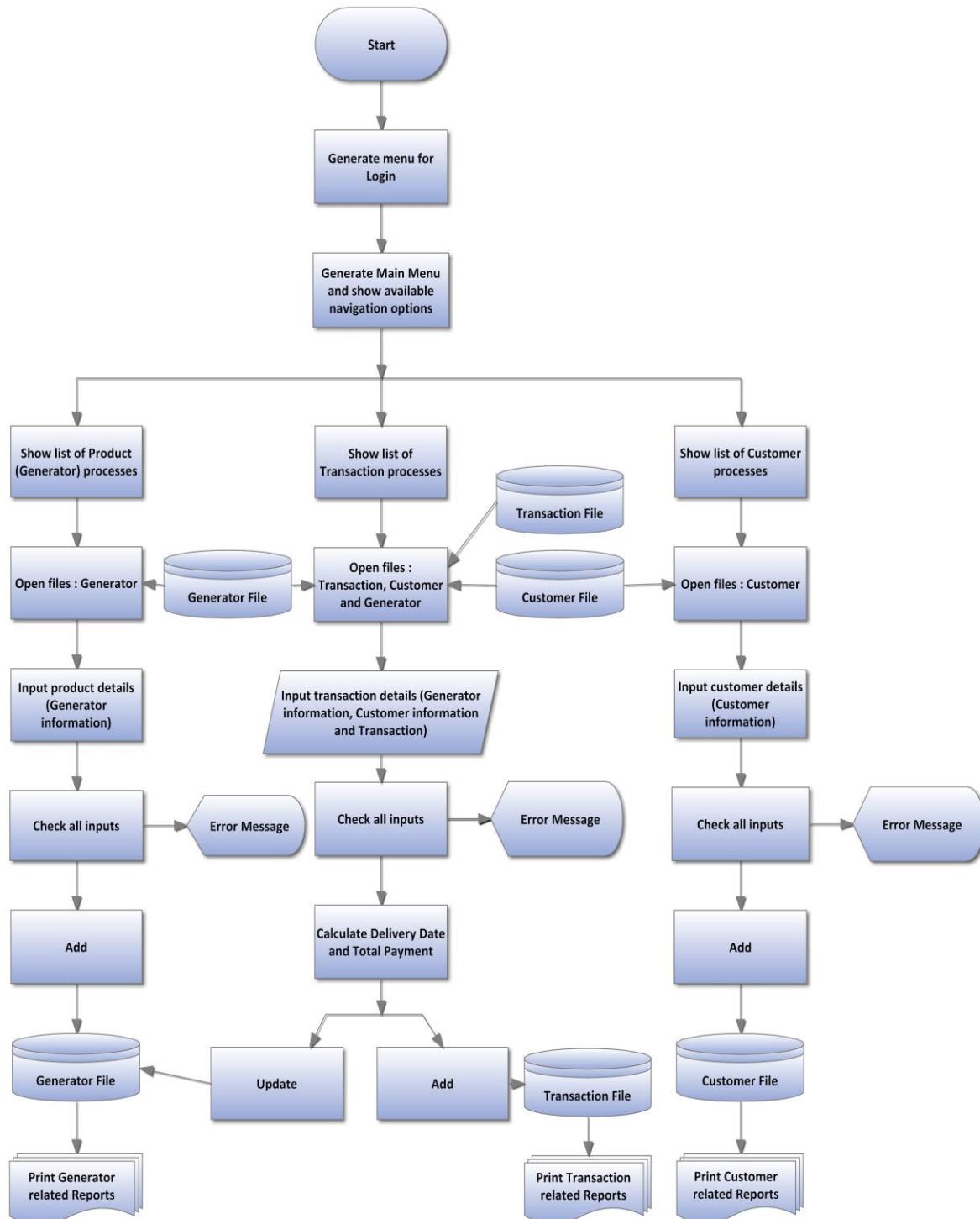
Features of the New Software

- It provides a user interface to manipulate the data in the database such as adding, editing, and deleting).
- It provides a query interface to perform data search and report relating to the selected criteria, by inserting key words related to the criteria and requested data.
- It allows navigation to and from the different forms of the software by using a central Main Menu.
- It provides a security system so that only authorized people can login to the system.
- It provides validation for different sorts of data to prevent any errors.

I performed testing of the system using a test strategy and also showed the test results. To see them, check in testing phase (Pg 52-56, 66-67; Fig 4.01-4.22, 4.41-4.46).

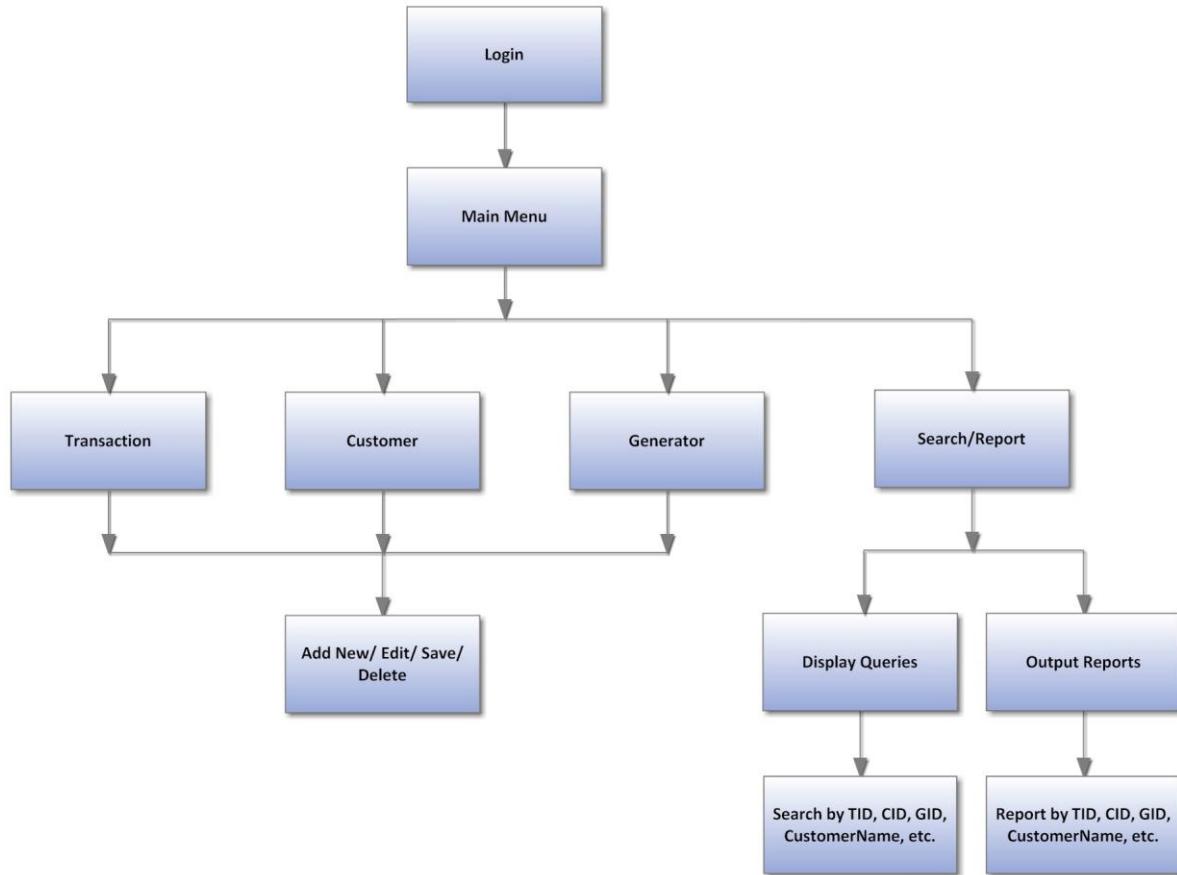
To see the codes, see Coding (Pg 43-50).

Overall System Flowchart (Fig 5.01)



Top-down design of the new system (Fig 5.02):

To show a helicopter view of the new system and its processes



Other flowcharts for different processes:

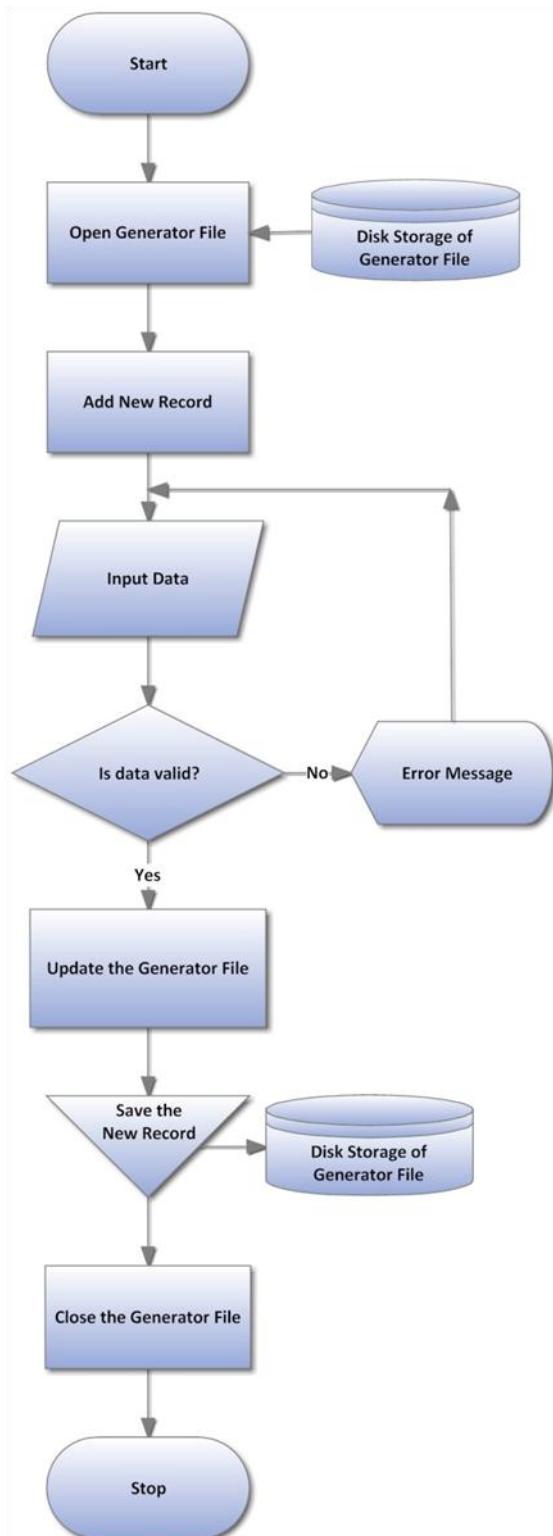


Fig 5.03: Adding a New Record in Generator Table

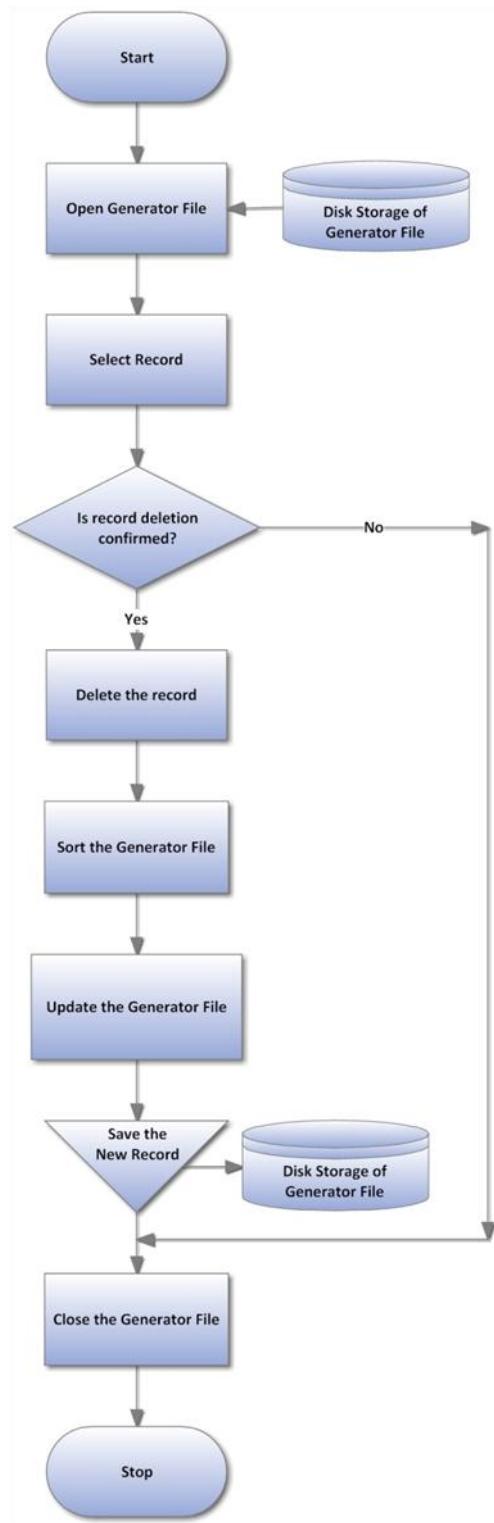


Fig 5.04: Deleting a Record in Generator Table

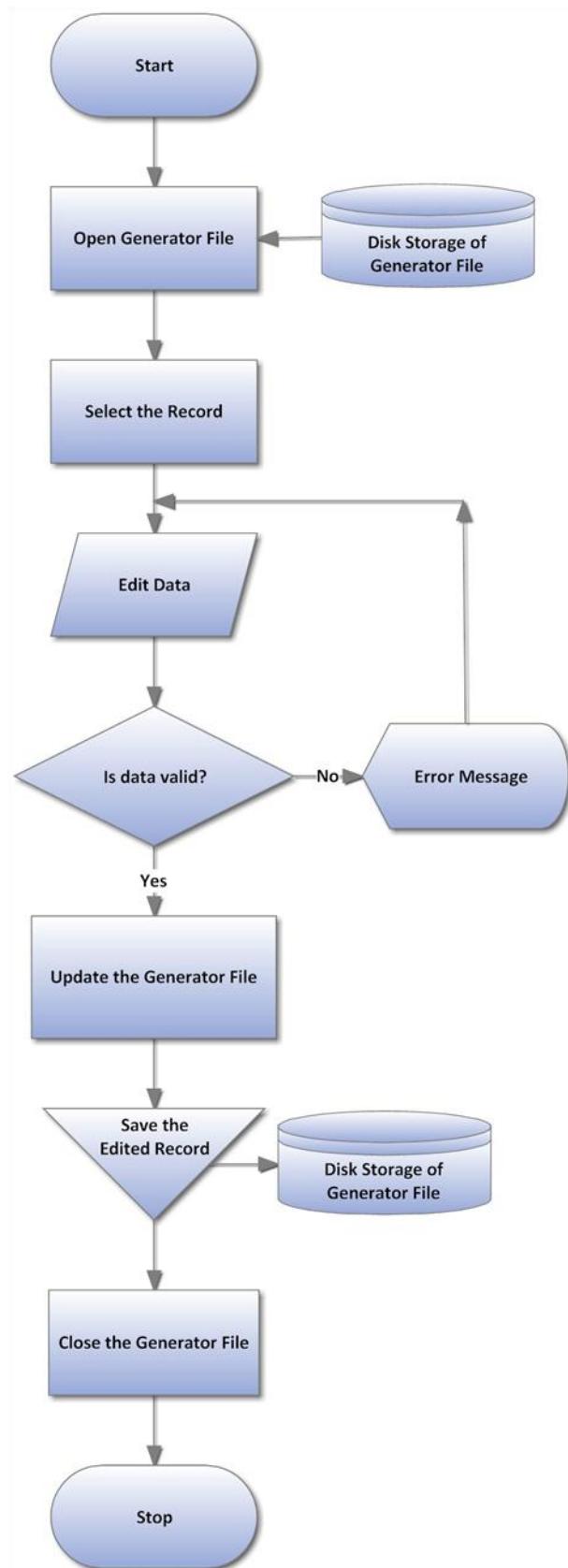


Fig 2.06: Editing a Record in Generator Table

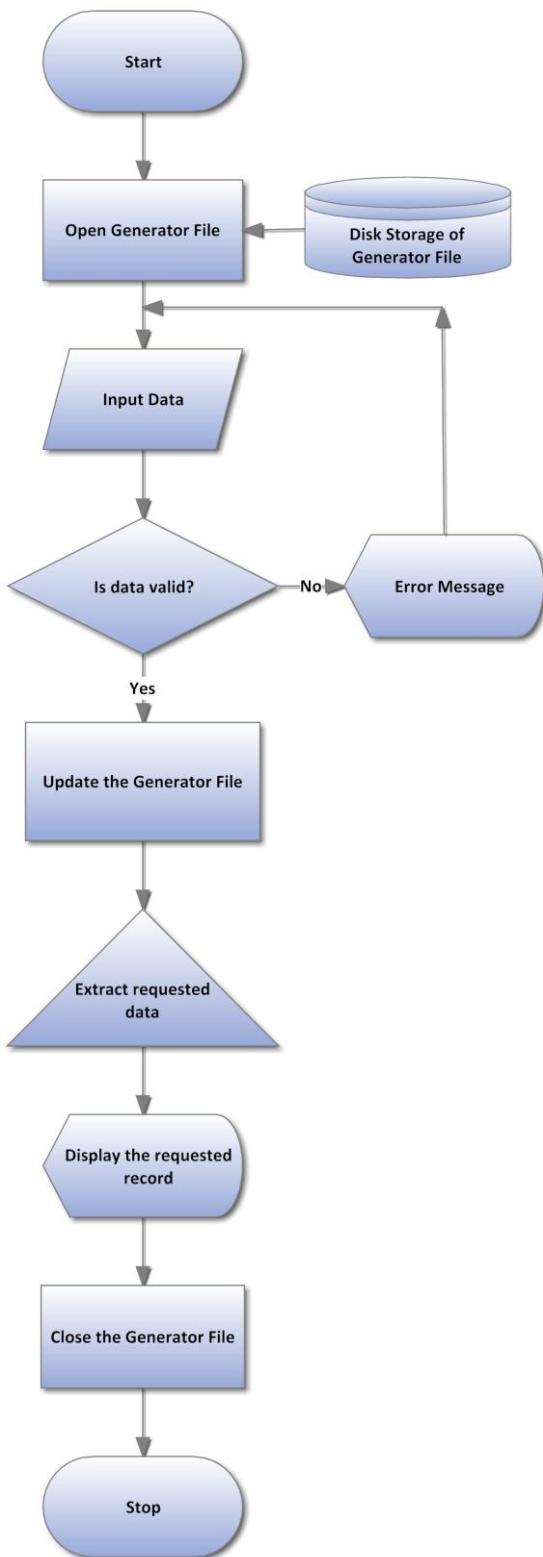


Fig 2.07: Searching a Record in Generator Table

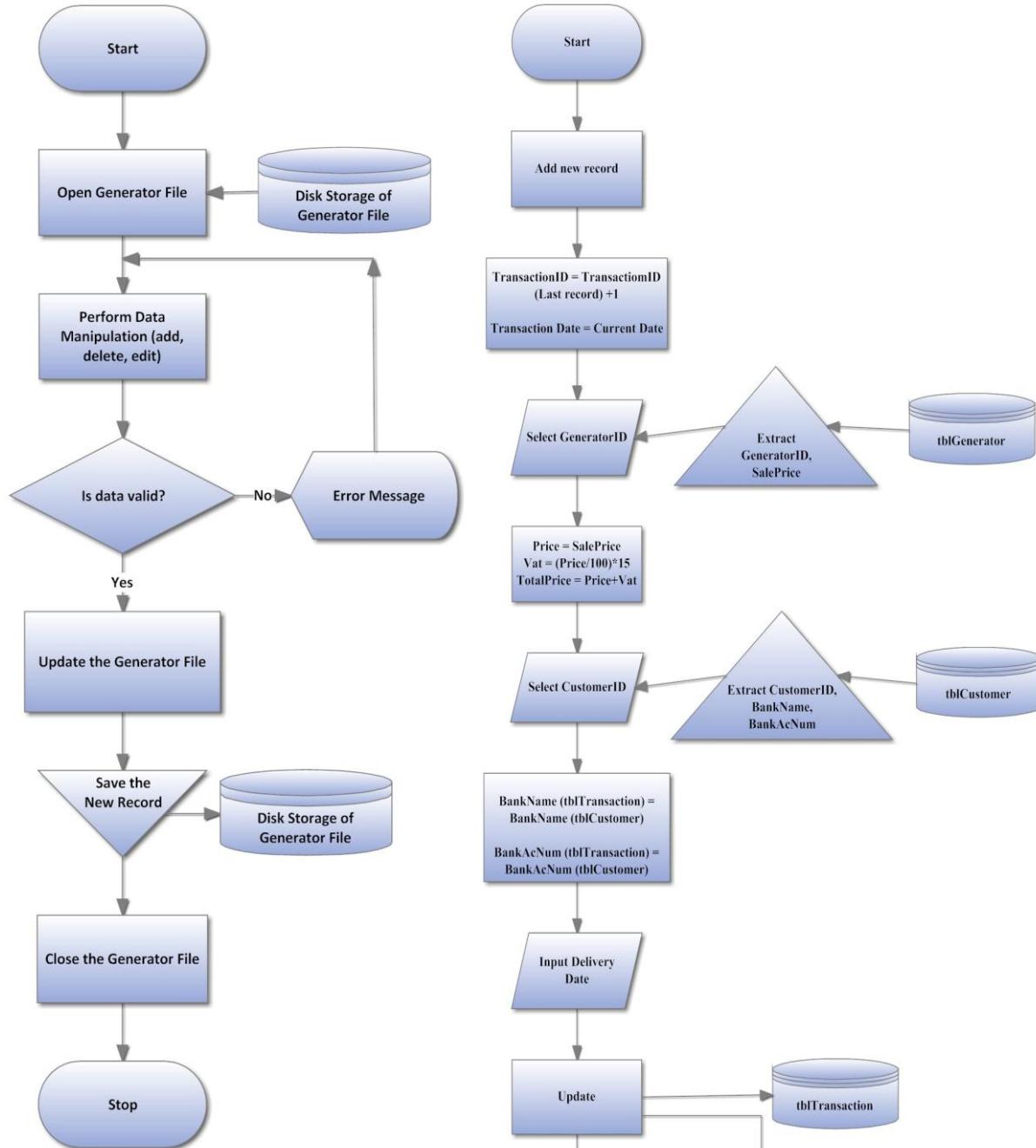


Fig 2.08: Saving a Record in the Generator Table

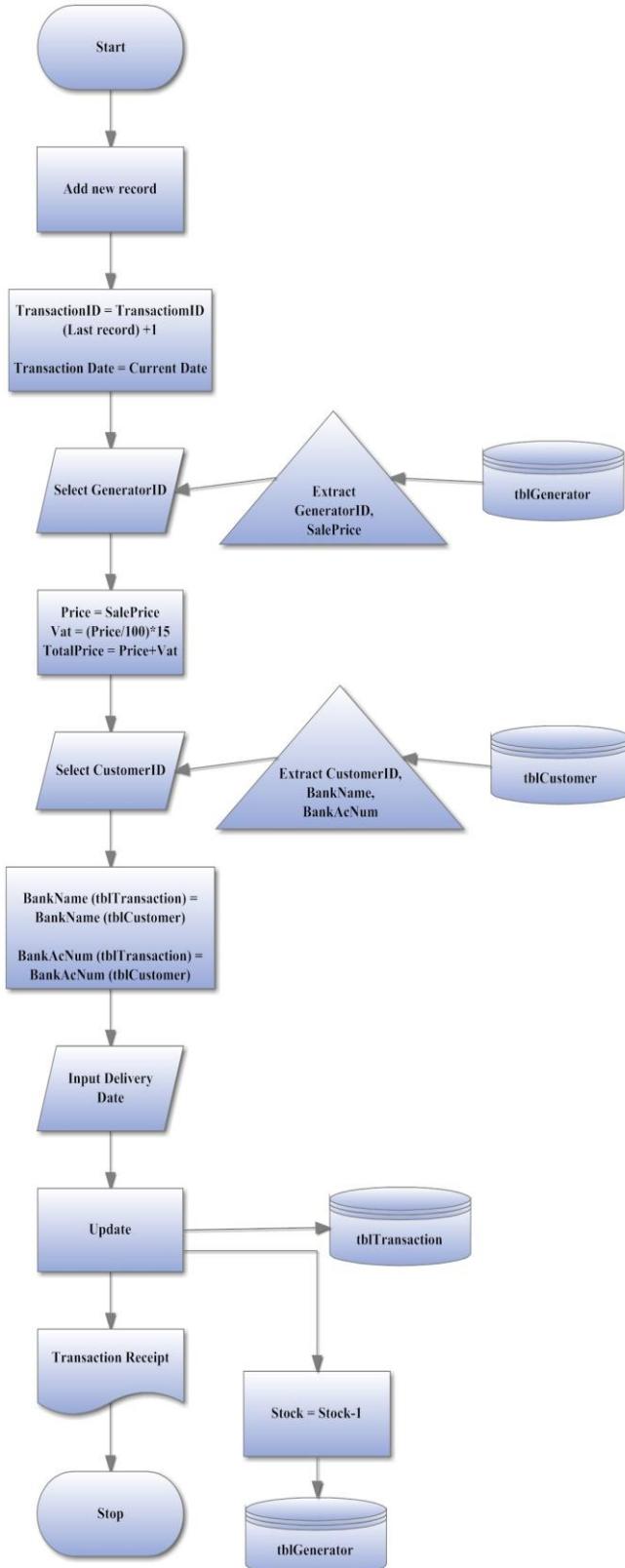
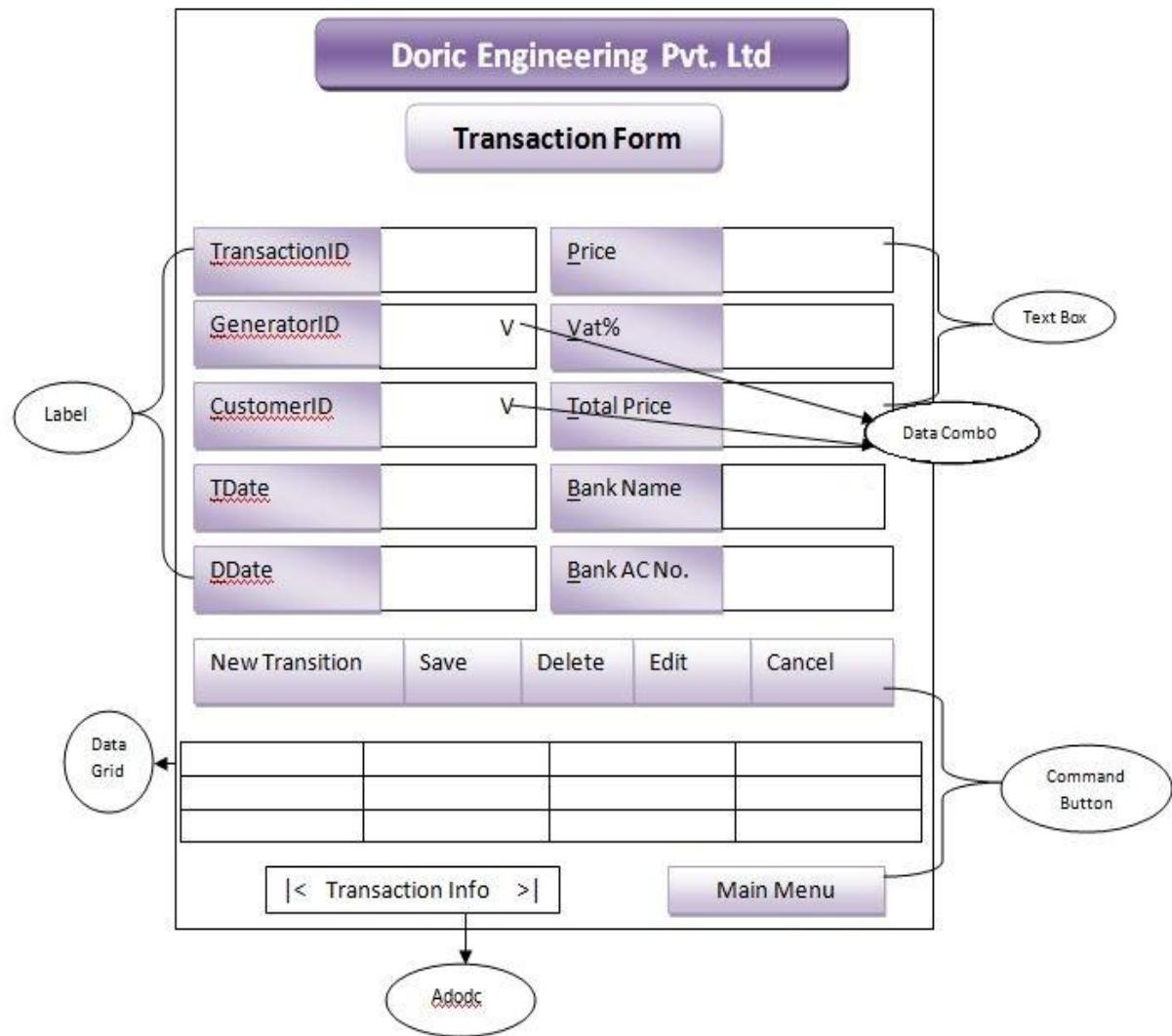


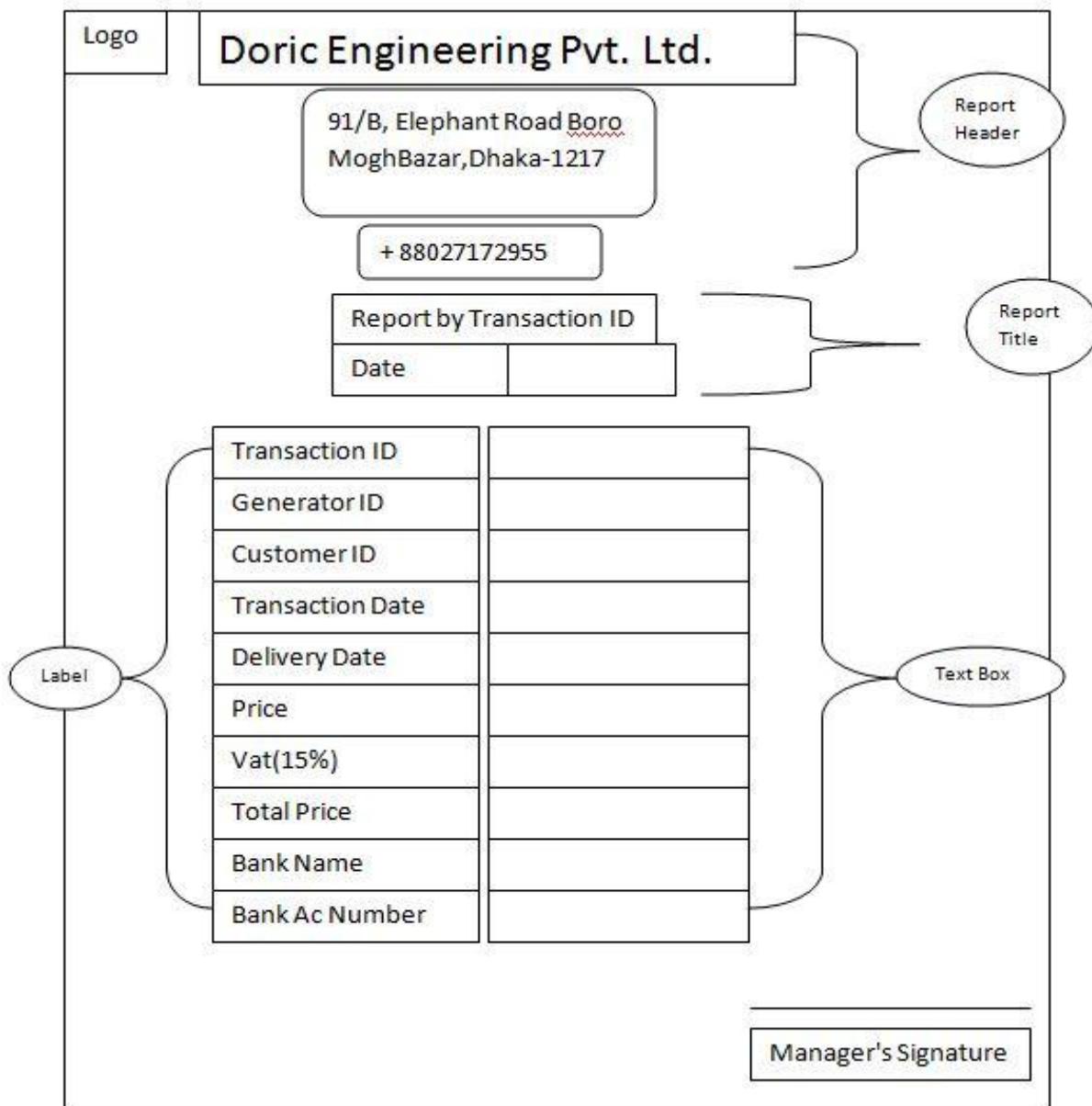
Fig 2.09: Transaction Processing

Input Layout of the Transaction Form (Fig 5.09)



The input layout of the Customer Form and the Generator Form are similar to the input layout of the Transaction Form (Fig 2.10).

Output Layout of the Transaction Report (Fig 5.10)



The design output layout of the Customer Report, Generator Report, etc is similar to that of the Transaction Report (Fig 2.11)

Database Design:

To illustrate the database of the new system, showing tables and how data is stored with data type, field size and data format with examples. It also shows the relationship among the tables.

The designed tables are in the following page.

Transaction Table

Field Name	Data Type	Field Size	Format	Example
TID (Primary Key)	Text	6	T#####	T10001
GID	Text	4	G###	G101
CID	Text	5	C#####	C1001
TDate	Date	10	DD/MM/YYYY	17/03/2007
DDate	Date	10	DD/MM/YYYY	17/04/2007
Price	Currency	Long Integer	£.....	£50,000.00
Vat	Currency	Long Integer	£.....	£7,500.00
TotalPrice	Currency	Long Integer	£.....	£57,500.00
BankName	Text	15	N/A	EXIM
BankAcNumber	Number	Long Integer	N/A	115877674

Customer Table

Field Name	Data Type	Field Size	Format	Example
CID (Primary Key)	Text	5	C#####	C1001
CustomerName	Text	25	N/A	Afroz Al Mamun
Gender	Text	6	Male/Female	Male
PhoneNumber	Text	11	N/A	01823357448
EmailID	Text	30@.....	afroz_27@gmail.com
Designation	Text	15	N/A	Director
AssetName	Text	20	N/A	Icon College
PropertyType	Text	10	N/A	Company
Address	Text	40	N/A	D-Block Lalmatia, Dhaka
BankName	Text	15	N/A	EXIM
BankAcNum	Number	Long Integer	N/A	115877674

Generator Table

Field Name	Data Type	Field Size	Format	Example
GID (Primary Key)	Text	4	G###	G101
GType	Text	10	N/A	24GFS
Model	Text	10	N/A	K4100D1
ManufacturerCo	Text	15	N/A	Mindong
ManufacturingCountry	Text	15	N/A	Japan
Power_kW	Number	Long Integer	N/A	24
Voltage_V	Number	Long Integer	N/A	230
Current_A	Number	Long Integer	N/A	1500
VoltageModulationRate	Text	10	N/A	Exceed 95
PotetionClass	Text	10	N/A	IP22
Stock	Number	Long Integer	N/A	15
Price	Currency	Long Integer	£.....	£45,000.00
SalePrice	Currency	Long Integer	£.....	£55,000.00

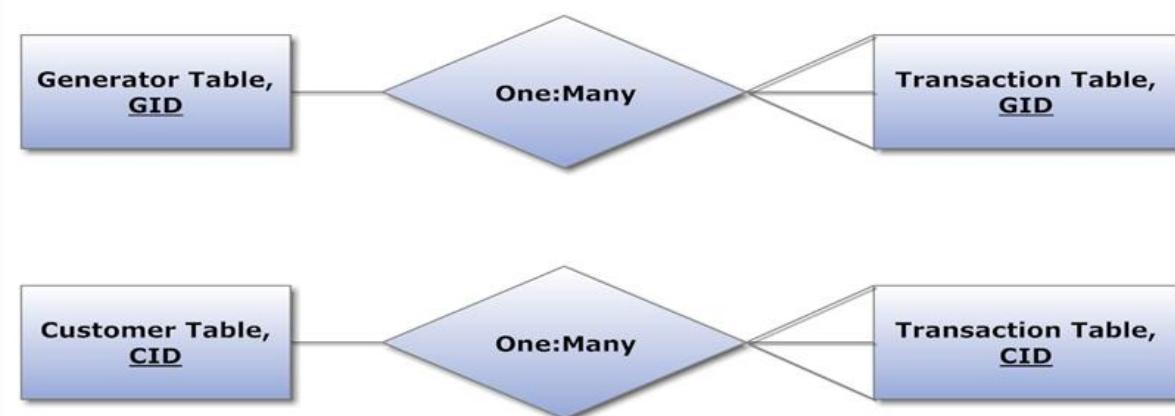
List of Variables

Variable	Purpose/Position
xTID	Transaction Form, used in auto ID generation for the Transaction ID
xCID	Customer Form, used in auto ID generation for the Customer ID
xGID	Generator Form, used in auto ID generation for the Generator ID
d	Used to hold the string command for the delete function, in Transaction Form, Customer Form and Generator Form.
s	Used, in the Transaction Form, to hold the Numeric data of the "Stock" field in the Generator Table, subtract "1" from the stock and to update the "Stock" field.
g	Used to hold the string command for the Generator Type function, in Generator Form.
stockconf	Contains Boolean data, Used in Transaction Form for stock update.

List of Formulas

Field	Formula
Vat	txtVat = (Val(txtPrice) / 100) * 15
Total Price	txtTPrice = Val(txtPrice) + Val(txtVat)
Delivery Date	txtDDate.Text = DateAdd("d", 15, txtTDate)

The entity relationships in between the tables are as follows (Fig 5.11):



Hardware requirement

DEVICE	CONFIGURATION	Justification
Processor	Intel Core i3 (2.3 GHz)	For faster data processing
RAM	2 GB	For storing more online application data temporarily
Hard disk	500 GB	For storing more data on the database
DVD-ROM Drive	ASUS 52-X	For inputting data from optical disks
Input devices	Keyboard and Mouse	For manipulating/inputting transaction, customer, etc. details onto the database
Printer	Canon ip2772 inkjet	For printing transacting, generator, etc. reports
Monitor	17" colour monitor	For viewing the running system

Software requirements

There are many commercial software packages available to solve the drawbacks of the store. For example database software can be used to keep all the records of the store that will perform as the back-end and will also be used to store data. The front-end will be an interface created using a programming language. Both the database and the programming language will be used to establish the system, since they cannot be used alone and would easily carry out all the tasks required.

The options for the database software are:

- Microsoft Access
- Microsoft Excel
- Oracle

The options for the programming languages are:

- Visual Basic
- Quick Basic

Database Software:

Software	Advantages	Disadvantages
MS Access	<ul style="list-style-type: none"> 1. Easy to create a database. 2. Tables, forms, queries and report generating are easier by using wizard or design mode. 3. Easy to establish relationship between tables in a database. 	<ul style="list-style-type: none"> 1. Can't handle huge amount of data. 2. When access database file is used, it increases unnecessary size. 3. To solve a specific task, it needs Visual Basic programming editor or script.
MS Excel	<ul style="list-style-type: none"> 1. Excellent program to create spreadsheet for various modelling and simulation. 2. It has numerous built in functions to solve the mathematical and logical problems. 3. It has different types of charts and graphs. 	<ul style="list-style-type: none"> 1. User defined functions can't be solved since all the functions are unalterable. 2. Does not support DBMS. 3. Does not create the attractive and user friendly interfaces to run the developed application program.
Oracle	<ul style="list-style-type: none"> 1. It handles huge amount of data. 2. Complex search and report generating can be done easily. 3. It has a strong and maximum data security facility to protect the data. 	<ul style="list-style-type: none"> 1. It requires high skilled programming knowledge to develop the program. 2. It is expensive to afford. 3. It is difficult to program

Software	Advantages	Disadvantages
Visual Basic	<ul style="list-style-type: none"> 1. It is very good application developer that comes with good number of useful tools and components. 2. It is easy and convenient to write program and debug, with it is instructions that is closer to English. 3. It has an attractive and a graphical user interface. 	<ul style="list-style-type: none"> 1. Multiple projects cannot be opened or run in the same window. 2. The developer should have clear programming knowledge. 3. It needs high requirements as MS windows.
Quick Basic	<ul style="list-style-type: none"> 1. User defined functions can be solved. 2. Its syntax (instructions) is close to English statement, so it is easy to understand. 3. It includes interpreter that converts a written program into a compiled self 	<ul style="list-style-type: none"> 1. It does not have the good and attractive interfaces. 2. Too many codes (instructions) have to be written to solve the problem.

Ideal software that can be used

ORACLE 8i with Developer 2000 is very powerful to handle large amount of data which is very expedient. But it requires very high skilled and skilled programmer and also it is very expensive. Therefore I have chosen Microsoft Excel and Access.

Best software to be used to solve the problem

The database software that will be used would be Microsoft Access 2000 or higher. This will be used as data holder and the programming language would be Microsoft Visual Basic 6.0 (VB98) that will perform as the manipulator of data. It is wise to use both of these; since Access supports all the modules and Structured Query Language (SQL) required for developing the system and also it is less costly. Visual Basic will be used to create the interfaces, since it supports SQL for input and output of data to and from the database, as it will be connected to the database via Microsoft Jet Engine 4.0 using ActiveX Data Object (ADO) control.

Justifications for writing a problem

The tasks like validation checking, searching records and report generating would become handy only by a written program though programming language is a bit difficult to learn and utilize. So I used Visual Basic which is comparatively easier to write the program which has facilities that I would need to produce the software, as follows:

1. Its Graphical User Interface has a professional look but yet it is user-friendly
2. When the user writes an object's name while programming, the programming editor provides the properties and methods automatically
3. Writing the program is done conveniently as the required tools and components are provided.
4. Visual Basic programming language allows modular programming, which increases the usability of programs as a common function.
5. Different types of colour codes are used to show the different modes of the program, that helps the programmer to know whether he is going in right way or not.

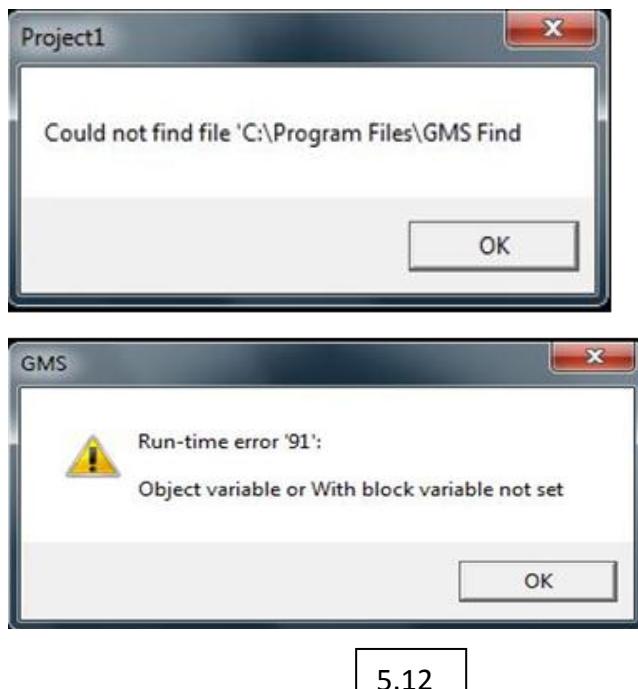
Moreover, any kind of calculation and checking can be performed. Additionally, the program would give proper security to the records by the use of passwords.

17. User Guide

Installing the software

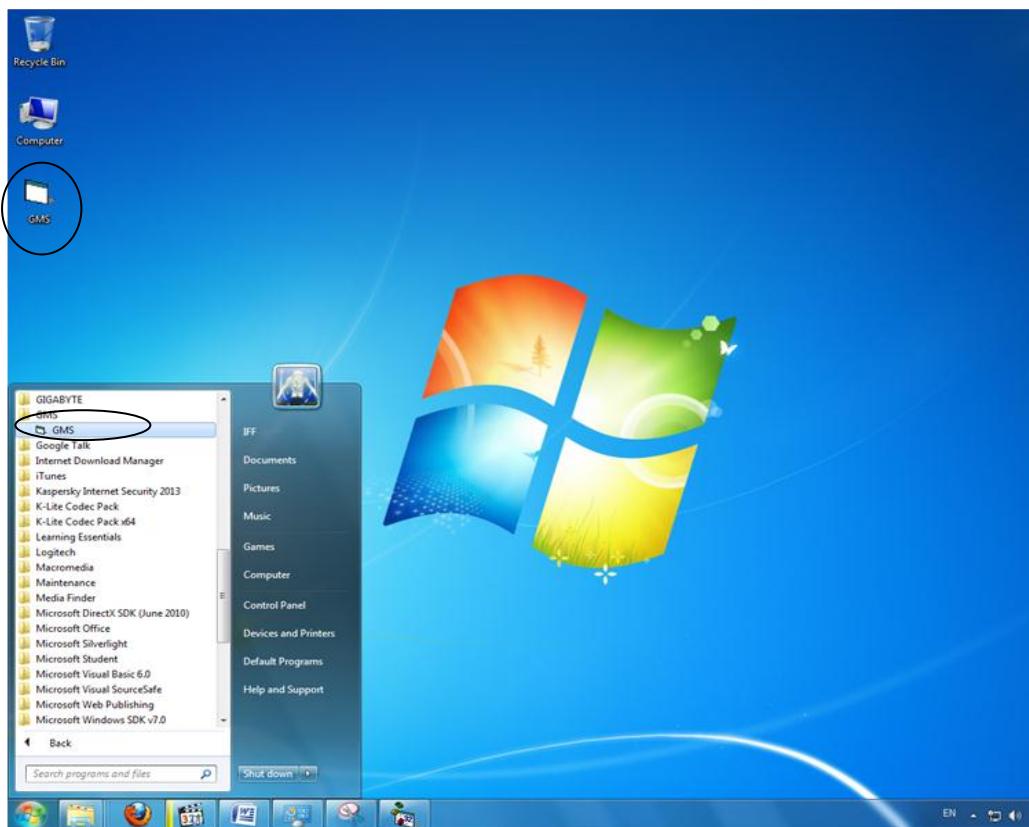
1. Insert the disk which contains the software.
2. Install the software (Make sure to install in C:\Program Files).

If the software is not installed in drive C, then the following error message will be shown (Fig 5.12).



Running the software

1. After the software is setup, then the software can be used by using the following shortcuts, either by starting it from the Start Menu-GMS-GMS.exe or by using the desktop shortcut “GMS.exe”(Fig 5.13)
2. See the following procedures of the user guide to know how to use the different functions of the software.



5.13

Security Form

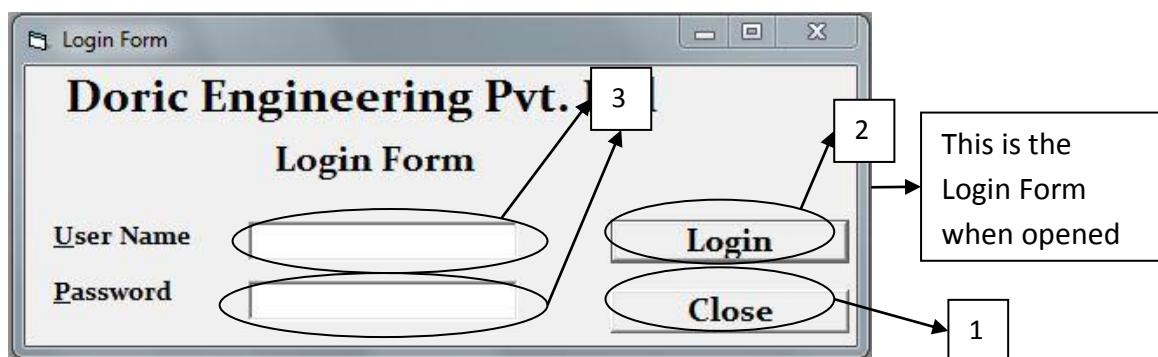


Fig 5.14

Tools of the Login Form

Label	The function it represents
1	To navigate login to the system
2	To close of the software
3	To input the user name and password

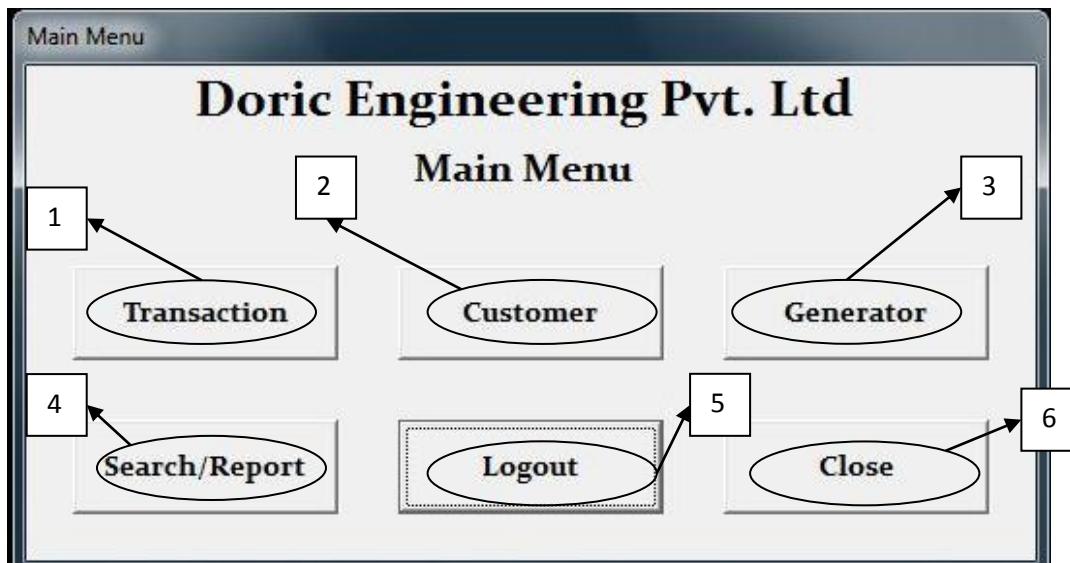


Fig 5.15

Tools of the Main Form

Label	The function it represents
1	To navigate to the Transaction From
2	To navigate to the Customer From
3	To navigate to the Generator From
4	To navigate to the Search/Reprt From
5	To Log out of the software
6	To Close the software

Transaction Form

Doric Engineering Pvt. Ltd

Transaction Form

<u>TransactionID</u>	T10001	<u>Price</u>	54000
<u>GeneratorID</u>	G101	<u>Vat</u>	8100
<u>CustomerID</u>	C1001	<u>Total Price</u>	62100
<u>TransactionDate</u>	17/03/2012	<u>Bank Name</u>	EXIM
<u>DeliveryDate</u>	01/04/2012	<u>Bank Ac Number</u>	115877674

New Transaction Save Delete Edit Cancel

TID	GID	CID	TDate	DDate
T10001	G101	C1001	17/03/2012	01/04/2012
T10002	G102	C1002	17/03/2012	01/04/2012

Transaction Info **Main Menu**

1

2

3

4

5

6

7

5.16

Tools of the Transaction Form

Label	The function it represents
1	To input data using a data combo list from the database
2	To add a new record
3	To save the record
4	To delete the record
5	To edit the record
6	To cancel the action
7	To show the database table

Generator Form

Doric Engineering Pvt. Ltd

Generator Form

<u>GeneratorID</u>	G101	<u>Current_A</u>	1600
<u>GType</u>	24GFS	<u>V Modulation Rate</u>	Exceed 95
<u>Model</u>	K4100D1	<u>Protection Case</u>	IP22
<u>Manufacturer</u>	Mindong	<u>Stock</u>	20
<u>Manufacturing Country</u>	Japan	<u>Price</u>	450000
<u>Power_kW</u>	24	<u>Sale Price</u>	540000
<u>Voltage_V</u>	230		

GID	GType	Model	ManufacturerCo	Manufact
G101	24GFS	K4100D1	Mindong	Japan
G102	30GFS	K4100D2	Mindong	Japan

5.17

Tools of the Generator Form

Label	The function it represents
1	To input data using a data combo list from the database
2	To add a new record
3	To save the record
4	To delete the record
5	To edit the record
6	To cancel the action
7	To show the database table

Customer Form

Customer Form

Doric Engineering Pvt. Ltd

Customer Form

<u>CustomerID</u>	C1001	<u>Asset Name</u>	Icon College
<u>Customer Name</u>	Afroz Al Mamun	<u>Property Type</u>	Company
<u>Gender</u>	Male	<u>Address</u>	D-Block Lalmatia, Dhaka
<u>Phone Number</u>	01823357448	<u>Bank Name</u>	EXIM
<u>Email ID</u>	afroz_27@gmail.com	<u>Bank Ac Number</u>	115877674
<u>Designation</u>	Director		

New Customer **Save** **Delete** **Edit** **Cancel**

CID	CustomerName	Gender	PhoneNumbe
C1001	Afroz Al Mamun	Male	01823357448
TMA02	Laila Faruk	Female	01912345678

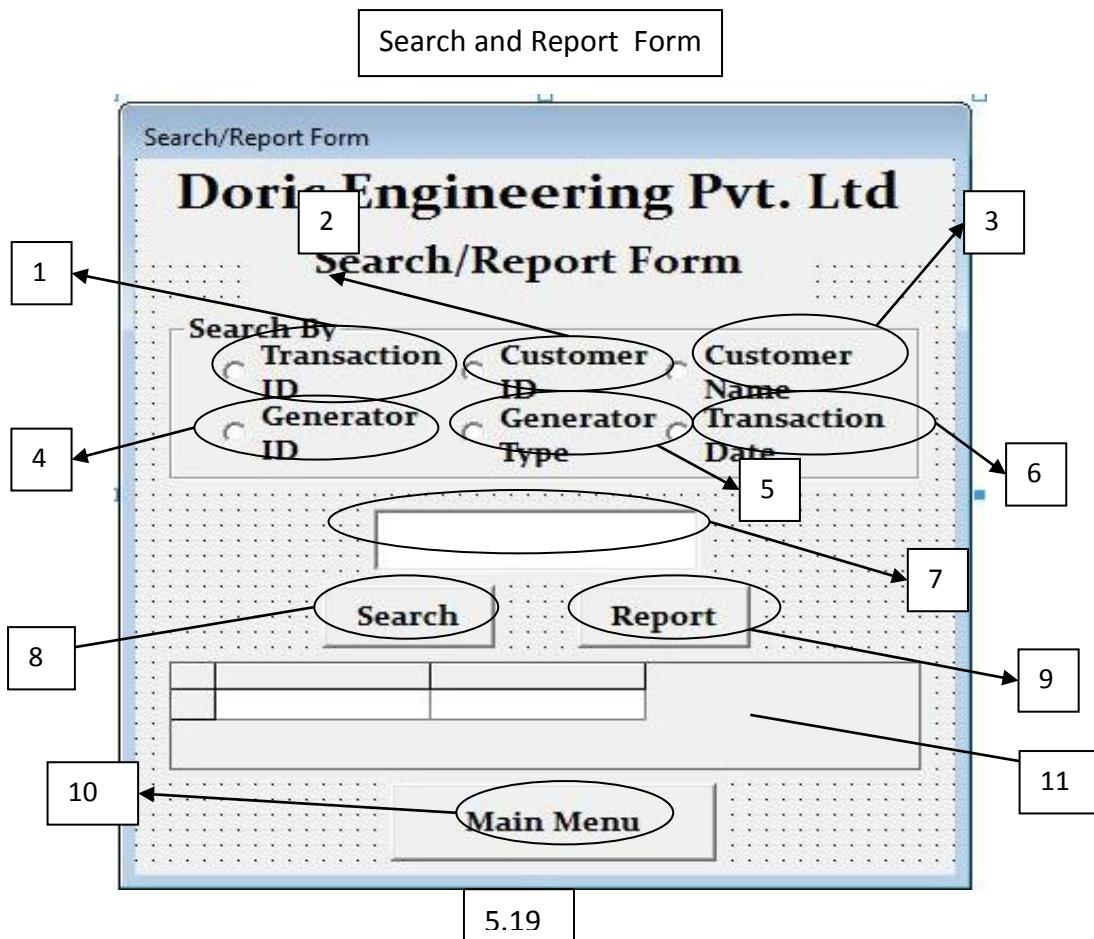
Customer Info **Main Menu**

1 2 3 4 5 6 7

5.18

Tools of the Customer Form

Label	The function it represents
1	To input data using combo list containing Boolean data
2	To add a new record
3	To save the record
4	To delete the record
5	To edit the record
6	To cancel the action
7	To show the database table



Tools of the Search and Report Form

Label	The function it represents
1	To select search criteria "Transaction ID"
2	To select search criteria "Customer ID"
3	To select search criteria "Customer Name"
4	To select search criteria "Generator ID"
5	To select search criteria "Generator Type"
6	To select search criteria "Transaction Date"
7	To input the search keyword
8	Outputs the search result
9	Outputs the report
10	Navigates to the main menu
11	Shows the search output

To see how the reports look like check in the appendix, there I have given a hardcopy print out of all the reports.

The Demo CD

I have created a Demo CD which contains videos that will show different functions of the software. It contains a tutorial of how to perform all the documented functions of the user guide.

- how to login using authorized credentials
- how to perform all the data manipulation tasks in all the forms
- how to navigate throughout the entire software
- how to perform search and report

Hardware requirement

DEVICE	CONFIGURATION	Justification
Processor	Intel Core i3 (2.3 GHz)	For faster data processing
RAM	2 GB	For storing more online application data temporarily
Hard disk	500 GB	For storing more data on the database
DVD-ROM Drive	ASUS 52-X	For inputting data from optical disks
Input devices	Keyboard and Mouse	For manipulating/inputting transaction, customer, etc. details onto the database
Printer	Canon ip2772 inkjet	For printing transacting, generator, etc. reports
Monitor	17" colour monitor	For viewing the running system

18. Evaluation of the new system

Objectives	Evidence	
	Page	Fig
Co.1 User interface	64 - 65	4.38 - 4.40
Co.2 Data storage	24 - 25	3.02, 3.04
Co.3 Avoid data duplication and redundancy	26	3.05
Co.4 Auto ID Generation	24 - 25	3.01, 3.03,
Co.5 Validation	39 - 42, 53-56	3.18 - 3.21, 4.01-4.22
Co.6 Search & Reports	37-38, 61-63	3.16-3.17, 4.31
Co.7 Security	66-67	4.41-4.46

The new software was able to accomplish all the Computer Objectives that were set. After two weeks, I received a letter from the company's Managing Director, where he stated his feedback of the new software. Then after another one week, he sent a letter regarding some new developments which he would prefer.

In his first letter, he said that he was very pleased with the software. He mentioned all the business objectives being fulfilled and that the customers are now more satisfied with the company's service.

In his second letter, he mentioned some changes he would prefer and he wanted some additional features to be included into the software. The following are a summary of the Managing Director's second letter:

1. He wished to add new users and also allow existing user to change the password.
2. He wanted the employee's payroll system to be computerized and added to the software.
3. He wanted to set the sales price independently during the transactions.

To see the letters, check in the appendix.

19. Suggested Improvements

The new system being very rigid prevents the employee for doing certain things and limits their rights of using the software. One of that is setting the delivery date and the selling price according to the company's convenience. There are also some other case where the software could be improved.

So I created a set of ideas for showing the possible improvement of the evaluated system. The following illustrates these ideas:

- The security system could be improved by adding new functions such as new user "sign up" and allowing old users to change their password according to their wish, making it more flexible.
- The transaction form could be improved by allowing the sales employees to set the sales price according to their wish, which gives more credibility to the employees.
- A new form could be added to manage the payroll of the employees, which would be only accessible by the manager and higher authorities only.
- The input of the product ID could be done by using Barcode reader and setting the product id as the barcode. This would enhance the input of data and would remove the chance of input errors.
- More validation checks could be added to further reduce the chance of any error.
- More criteria for doing search and report could be added.