Design and Execute a Complete Vehicle System for the MOHEDSR

Mead Ali Moter
Rafah Al-Hamdani
Israa Shehab
Wasan Ala'a alhamami
The Informatics Institute for Postgraduate Studies (IIPS-ICCI)

ARTICLE INFO

ABSTRACT

Databases touch all aspects of our lives. The database is a group of records that is arranged in a way that makes it easy to be managed, accessed and updated. The relational database can be defines as a group of data items arranged as a set of formally-described tables. Data can be accessed and reassembled in a number of different ways without having to reorganize the database tables. The Ministry of higher education and scientific research currently stores the vehicles records manually this makes it hard and difficult to manage and update these records. This project aims to develop a database management system to store and retrieve the vehicles records of the ministry of the higher education. The project's system are developed using Oracle database management software, the system provides an interface for the data entry of a new vehicle record. Updating data of a previously added record is also performed using interfaces. SQL has been used in developing the system queries to display reports and tables based on specified constrains.

1- INTRODUCTION

Databases touch all aspects of our lives. A Database management system is a computerized record-keeping system. The developed database management system are designed to manage all the types of vehicles records that belongs to the MOHEDSR's universities and institutions, and any new purchased vehicle can also be added. The system is developed in order to reduce the efforts of the vehicles records management.

A database is a collection of information that is arranged in a manner that makes it easy to be accessed, managed, and updated. In one way, databases can be classified according to types of content: bibliographic, full-text, numeric, and images. The aim of a database system is to obtain a highly organized collection of data in addition to appropriate tools and applications that aids processing and access to that data. A database can be simplified as an organized collection of a data which is related in some form, database are usually stored on disk, and may be accessed by a number of concurrent users. Generally, databases can be separated into area of applications. For example, a database could contain Human Resource (employee and payroll) data; or

it may contain accounting data; another may contain sales data; and so on. Databases are managed by a database management system (DBMS).

There is confusion between a database system and a database management system, but the two are different. Whereas a DBMS is a set of software tools that is used for storing and manipulating data. Database management systems on the other hand have many different types, such as file store, document store, and relational database management systems.

Examples of different types of databases include end-user databases, operational databases, analytical databases, distributed databases, relational databases, hierarchical databases and database models. Databases can be categorized depending on the type of their content, application area and technical aspect. For example, a deductive database is the combination of logic programming and a relational database, while graph structures are used in a graph database for representing and storing information. Database types may also include hypertext databases, parallel databases, mobile databases, cloud databases, active databases, in-memory databases, temporal databases, spatial databases, real-time databases, probabilistic databases and embedded databases

2- VEHICLES DATABASE MANAGEMENT SYSTEM

The Vehicles Database Management System (VDBMS) has been developed to the benefit of the Ministry of Higher Education and Scientific Research (MOHEDSR). The system is responsible for the management of all the vehicles owned by the MOHEDSR and that have been delivered to all MOHEDSR's universities and institutions. Many types of vehicles such as personal use cars, buses and trucks are all stored and organized by their categories.

The VDBMS has the advantage of being able to manage data effectively and allowing users to perform multiple tasks easily. The VDBMS uses a single software application to stores, organizes and manages a large amount of information. Efficiency of operations is provided in this system as well as the reduction of the overall costs. The VDBMS is important to the Ministry of higher education and scientific research because it provides a highly efficient method in handling multiple types of data. Some of the data that are easily managed with this type of system include: vehicles records, person in charge, MOHEDSR's institutions, status of the vehicle and vehicles types. This system was built with the aim to be extremely versatile.

Without VDBMS, tasks have to be done manually and take a lot of time and possibly a lot of paper work. Data can be categorized and structured to accommodate the needs of MOHEDSR. Data is entered into the system and accessed on a routine basis by specified users. Each user may be given a password to gain access to a certain part of the system. A number of users can access the system simultaneously in different ways.

The system database is relational type, this means that multiple tables are used and relationships between these tables are defined using a schema in addition to data elements. Data elements and records from each table are merged, depending on the query to be displayed in specific table or provided as a report. The obtained results are displayed in a form that uses the defined data elements whereas only the records that meet the query criteria are shown.

3-   AIM OF THE RESEARCH

This project aims to develop a database to store, organize and manage all the related to the vehicles owned by the Ministry of higher education and scientific research. The system is developed to make it easy to retrieve specific information or build custom reports about any vehicle. The stored data that contain information about the current status of any vehicle record can be update so the information will always be up-to-date. Detailed information about every vehicle is stored such as brand, Model, plate number, type and color. Figure 3.1 shows the categories of VDBMS interfaces functions.
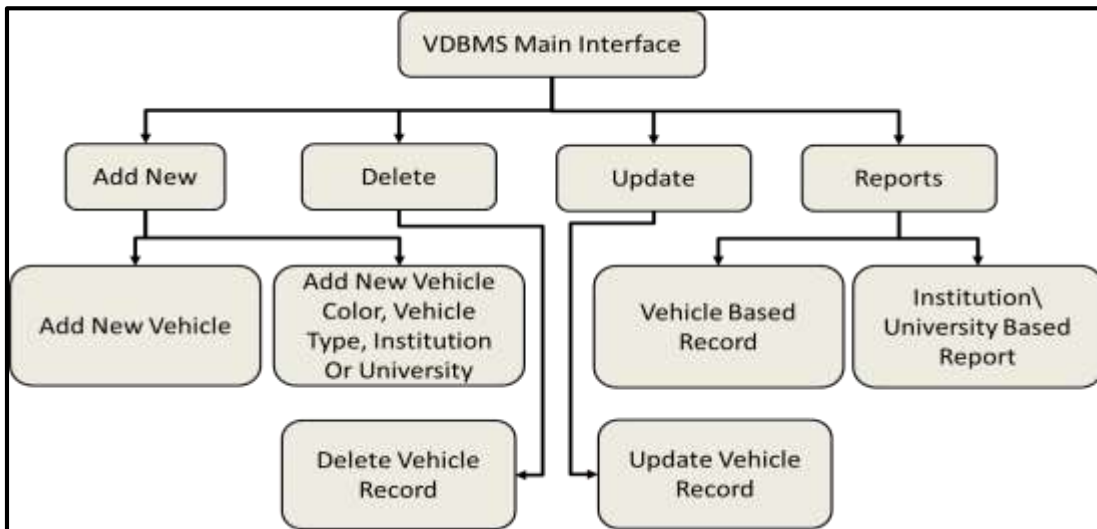

Figure 3.1: VDBMS Main Functions

3.2 VDBMS DATABASE COMPONENTS

The VDBMS database were build based on the collected requirement, it contains all the information related to the vehicles. The same information currently being written in the documents of the vehicles records has been transformed to the created database tables. The main table of the database is the VEHICLE table which contains all the related information about the vehicle and code of the other related data. Vehicle color, status, type and main type are also created in separated tables with a unique code for each. CODE_RASH table save the data about all the MOHEDSR's institutions and universities.

VEH_COLOR table contains the color name with a code number for each color, this code is the primary key of the table and used in the relation with main Vehicle table as a foreign key. Each vehicle has a current status like new, used, out of service and broken VEH_STATUS table stores the code of the status (primary key of the table) and the name of the status, the NO attributes acts as foreign key in the VEHICLE table. VEH_TYPE table has three attributes, CODE the primary key of the table, VEH_TYPE the name of the vehicle type same name registered by the vehicle manufacture, P_CODE the category code of the vehicle. CODEN_RASH table has the UCODE attribute as the primary key and other attributes that is used to store related data to the Institute or university currently using the vehicle such as

division and department names. Figure 3.2 shows the Entity diagram of the created tables and the attributes of each table.
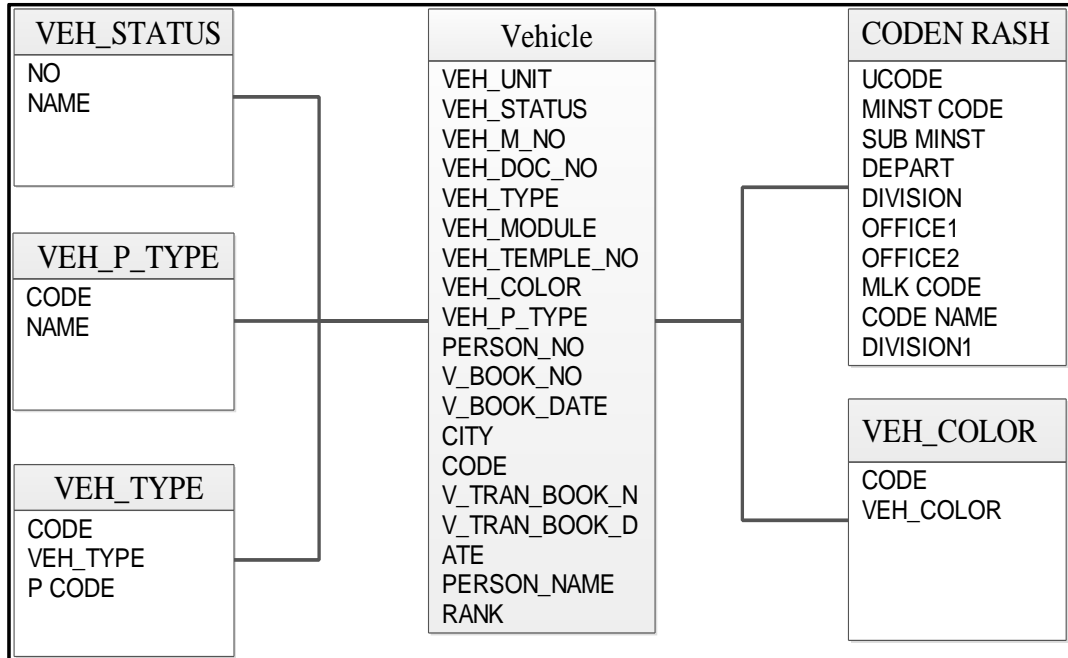

Figure 3.2: VDBMS Entity Diagram

The vehicle table contains one primary key which is the CODE attribute and five foreign keys each one of them is the primary key of the tables mentioned above. These five foreign keys are VEH_TYPE, VEH_P_TYPE, VEH_COLOR and VEH_STATUS. Other attributes store the rest of the information related to the Vehicle. Table 3.1 shows detailed information about the attributes of the VDBMS Main table (VEHICLE).

Table 3.1: VDBMS Main Table

Attributes	Type	Description(Arabic)
VEH_UNIT	NUMBER(6)	مكان عمل العجلة
VEH_STATUS	NUMBER(2)	حالة العجلة
VEH_M_NO	NUMBER(6)	رقم العجلة
VEH_DOC_NO	NUMBER(10)	رقم الوثيقة
VEH_TYPE	NUMBER(4)	نوع العجلة
VEH_MODULE	NUMBER(4)	موديل العجلة
VEH_TEMPLE_NO	VARCHAR2(30 BYTE)	رقم الهيكل
VEH_COLOR	NUMBER(2)	لون العجلة
VEH_P_TYPE	NUMBER(2)	نوع العجلة الرئيسي
PERSON_NO	NUMBER(8)	رقم مالك العجلة
V_BOOK_NO	NUMBER(6)	رقم الكتاب
V_BOOK_DATE	DATE	تاريخ الكتاب
CITY	VARCHAR2(12 BYTE)	المحافظة
CODE	VARCHAR2(5 BYTE)	الرمز
V_TRAN_BOOK_N	VARCHAR2(300 BYTE)	رقم كتاب المناقلة
V_TRAN_BOOK_DATE	DATE	تاريخ كتاب المناقلة
PERSON_NAME	VARCHAR2(150 BYTE)	اسم مالك العجلة
RANK	VARCHAR2(30 BYTE)	الدرجة الوظيفية

4-VDBMS INTERFACES

The system Interfaces were developed to cover all the database management function that the system perform. Each interface has predefined purpose, these purposes varies from adding new records, updating records to building reports. This section will introduce the functionality of each interface.

4.1 Main Interface

Through navigation to all the system interfaces can be done. Figure 4.1 shows the main interface. This interface has eight command buttons each one of them represents a link to another interface, and one command button for exiting out of the system.

Figure 4.1: VDBMS Main Interface

4.2 Adding New Vehicle Record Interface

Adding new vehicle records could be done using this interface. All the information and attributes related to the vehicle record are shown as blank text box do be filled with new vehicle information. Figure 3.4 shows the "add new vehicle" interface.

Figure 4.2: VDBMS "Add New Vehicle"
Interface

4.3 Update Vehicle Record Interface

This interface was designed based on the SQL command "Update". The main function of this interface is to update a previously added vehicle records same attributes that has been added in the "add new" interface can be seen in this interface in order to enable the user of making the required updates and changes to these attributes. Figure 3.5 shows the Update interface.

Figure 4.3: VDBMS Update Vehicle

4.4 Delete Vehicle Record Interface

Vehicle records can be deleted by selecting the delete vehicle record command button from the main interface. Any vehicle record could be deleted using the delete interface by the vehicle plate number. The records deleted from this interface will be permanently removed from the database. Figure 3.6 shows the delete interface.

Figure 4.4: VDBMS Display Interface

4.5 Records Display Interface

Clicking on the display records command buttons will navigate to another interface that contains multiple options on how the user would like to view and retrieve the vehicles records. The display interfaces with the displaying options are shown in Figure 3.7. Figure 3.8 shows the display vehicle record by vehicle plate number.

There are nine options of records displaying. All these option could be found at the display interface. These nine options are:

- Display by vehicle plate number.
- Display by the name of the employee.
- Display by chassis number.
- Display by year of manufacturing.
- Display by current university/institute owning the vehicle.
- Display by color.
- Display based on university/institute.
- Display by vehicle status.
- Display by vehicle category.
- Display by vehicle type.

Figure 4.5: VDBMS Display Interface

4.6 Coding Interfaces

The VDBMS was designed to accept adding new vehicle type, new vehicle color and adding new institution or university that has not been added previously to the system.

Adding this type of data could be done through on of the specified interfaces. Adding new vehicle type could be done by the "add new vehicle type" Interface (Figure 3.9) Adding new vehicle color could be done by the "add new vehicle color" Interface (Figure 3.10) Adding new institution or university could be done by the "add new institution or university" Interface (Figure 3.11).

Figure 4.6: VDBMS Add New Vehicle Type Interface

Figure 3.10: VDBMS Add New Vehicle Color Interface

5. CONCLUSION

This project introduced a database management system that stores organize and retrieve records of all the vehicles owned by the Iraqi Ministry of Higher Education and Scientific Research (MOHEDSR). Currently vehicles records are documented manually by the employee. This method takes a lot of time when a new vehicle is purchased out has been transferred between the ministry institutions. In addition probability of error is high. Updating status or keeping track of vehicle take a lot of time.

Using the proposed database management system reduces the efforts paid by the employees in charge of managing these vehicles and saves time while retrieving

reports of the vehicle.in addition a custom built report can be obtained from the system.

The system provides the following functions:

- Storing detailed information about the vehicle. These information include:
    - Vehicle ID (primary key).
    - Vehicle plate number.
    - Vehicle status (foreign key).
    - Document number.
    - Vehicle category (foreign key).
    - Vehicle year of manufacturing.
    - Vehicle type (foreign key).
    - Chassis number.
    - Vehicle color (foreign key).
    - Vehicle owner number.
    - Vehicle official letter Number.
    - Vehicle official letter date of the.
    - City.
    - Number of the Transfer Official letter.
    - Date of the Transfer Official letter.
    - Vehicle owner name.
    - Vehicle owner rank.
- Updating the information of the vehicle record attributes.
- Building reports of the vehicle records. these report are:
    - Report based on university or institute.
    - Report by vehicle plate number.
    - Report by vehicle type and status.
    - Report by vehicle category.

Using Oracle 10.0g database management software and the SQL commands were used to build the VDBMS. The system interfaces were designed to be easy to learn, use and administrate and effectively retrieve stored vehicles records

6.REFERENCES

[1] T. Connolly And C. Begg, "*Database Systems A Practical Approach To Design, Implementation,And Management*", 6th Ed. Pearson, 2015.

[2] M. Mannino, Database design, application development, and administration, 3rd ed. Boston: McGraw-Hill Irwin, 2007.

[3] A. Kriegel, "*Discovering SQL A Hands-On Guide for Beginners*". Indianapolis, Indiana: Wiley Publishing, Inc., 2012.

[4] T. Teorey, S. Lightstone and T. Nadeau, *"Database modeling & design",* 4th ed. Amsterdam: Elsevier, 2006.

[5] K. Kendall and J. Kendall, "*Systems analysis and design*", 8th ed. Upper Saddle River, N.J.: Prentice Hall, 2010.

[6] S. Bennett, S. Mcrobb And R. Farmer, "*Object-Oriented Systems Analysis And Design Using Uml*". London: Mcgraw-Hill, 2002.

[7] A. Dennis, B. Wixom And R. Roth, "*System Analysis And Design*", 5th Ed. Wiely, 2012.

[8] J. Price, *"Oracle database 11g SQL"*. New York: Oracle Press/McGraw-Hill, 2008.

[9] C. Zeis, C. Ruel and M. Wessler, "*Oracle 11g for dummies*". Hoboken, N.J.: Wiley, 2009.