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The Role Of Relational Database Management System (RDBMS) Strategies In Vehicle Management Of WASA-FDA

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Abstract

Transport cell of WASA (water and sanitation agency) Faisalabad is facing problems in manual maintaining of vehicles in the organization. The cell records transactions manually on registers having many shortfalls. It is more time consuming, lack of accuracy, possibility to lose record and control. There is a need of computer based system having strong database model. The proposed system was user friendly, graphical user interphase and based on relational database management system. The entity-relationship (E-R) model, was utilized to create a conceptual database architecture for an information system that was implemented using a relational database management system. Database designers created natural third forms of associated databases for the efficient operation of an information system by using the entity-relationship data modelling technique. An interactive, efficient, user friendly, client server based system was developed by using Oracle (database) as backend and developer as front end. The proposed system was capable of generating different reports. It included all the procedures for transport facility, maintenance of vehicles and transport records. Finally, proposed system helps transport incharge to take better control over the transactions that take place between user and transport cell. This proposed system would help the staff in assembling the information in useful shape. It assists top management in interpreting the new transportation requirements, its maintenance and disposal of vehicles of WASA.

Keywords: RDBMS, transport, Oracle, Developer.

1. Introduction.

Water and sanitation agency commonly known as WASA. It provides facilities of water supply, sewerage and drainage services to the residents of Faisalabad city. High productivity in any field services organization depends upon its proper vehicle management system. High levels of mobility and productivity ensure through proper transportation systems can accommodate people's

requirements in time. Therefore, it is crucial to handle transport services in an organization effectively (Zhang et al., 2018). Due to a lack of energy and money, transport supply levels, particularly in developing nations are not upto the mark. The disparity between the availability and demand of transport has grown as urban agglomerations' populations have increased.

In addition to the aforementioned issues, the performance of transport operations may be adversely affected by the absence of timely and vital information (Stevens et al., 2002). The transport department suffer while running their fleets of vehicles necessitate constant oversight of their operations. Transport systems that are effective and well-managed, backed by information systems with decision support capabilities can provide better control over the system (Sauter, 2014). The issues mentioned above can be resolved using RDBMS (Padhy et al., 2011).

For a DSS to operate well, a well-designed information system must offer a substantial quantity of processed data, and expert system (ES) modules must be functional (Philip et al., 2016). A complete decision support system's information system and expert system (ES) modules make up its key parts. The performance of transportation systems may be efficiently monitored and evaluated with the use of the data.

The efficacy of expert system (ES) modules and the volume of processed data supplied by a well-designed information system are critical components for the correct operation of a decision support system (DSS). A comprehensive decision support system's key parts are the information system and expert system (ES) modules (Kwon et al., 2005). It is possible to track and evaluate the effectiveness of transportation networks using the data produced by operations (Zhu et al., 2018). Considering the need of the organization, the objective of the study was to propose ERD for the development of new system and explore Oracle/developer to develop new system.

2. Material and methods.

The system was designed after studying the manual system. Keeping in view the problems, suggestion and requirements of high and low level management, new system brought many changes. These changes might be in procedures or documents or even organization setup. The development of proposed system was divided into following phases

2.1 Preliminary investigation

The purpose of preliminary investigation is identification and clarification of true nature and scope of problem which exist in system request. This phase consisted of technical, operational and economic feasibility.

2.2 System analysis

Understanding of current system is very important because it is impossible to design a new system without knowing the existing system. During analysis, following steps were adopted

2.2.1 Data gathering

Gathering and analyzing of data is main step in analysis phase (Luna-Reyes & Andersen, 2003). Two common data gathering techniques are interviews and questionnaires. The sample data was collected from documents and interviews are conducted using top down approach. The interviews included transport in charge, drivers, officers and Staff.

2.2.2 Data analysis

The collected data is translated into a set of written products which serve as a foundation for the documentation of system analysis phase. They produce charts and narratives that are used to describe the system, Data Flow, Flow Diagram, Structured English and Data Dictionary are the tools to analyze the data (Leech & Onwuegbuzie, 2007).

2.2.3 Codes designing

In code designing we use the sequence of letters or numbers of data that is lengthier, cumbersome, or replace an item ambiguous. Codes serve several useful purposes. These are used to which provide important and unique identification. Codes arc shorter than the data resulting in decreasing data entry time, cost and storage requirements.

2.2.4 Important fact finding techniques

An interview is a scheduled meeting during which we obtained information from other persons about currently running system. The steps include determination who to interview, establish objectives for the interview, preparing for the interview, conduct the interview, document the interview, evaluate the interview, structured interviews were conducted with the conducted persons to get required information.

2.2.4.1 Data collection

In the process of determination requirements, I studied the existing system documentation to understand the procedure and documentation of the operating system. After this I collected those

copies of the actual forms and operating documents which are urgently and commonly used in the system.

2.2.4.2 Observations

Observation is a technique used to find facts about current operating procedures, seeing the system in action gives an additional Perspective to supplement what we have heard and read. By personal observation, l verified statements made in interviews as determined if procedures operate as specified in system

2.2.4.3 Questionnaires

Documents which consists of number of valid questions that we ask from different management and end user personal such as workloads, reports received, volumes of transitions, problems and opinions of improve the efficiently and performance of job.

2.2.4.4 Requirement for analysis

The basic purpose of the analysis requirement is to probe into the data concerning the system requirements, then present documents and organize the requirements. To document the end user requirement normally we use structured analysis for organizing documents and controlling the information system. There are a lot a methods provided by the Structured analysis. It has normally three Important parts: DFD, s, Data dictionary and Descriptions of process.

2.2.4.4 Data flow diagrams

DFD, s gives information about the exchange of data in top down environment. Process, data flow, data store and external entity symbols used by the DFD. Data is manipulated by the process. The process is represent by symbol circles or bubble represents the process. A data flow from one part to another by data flow symbols, the data flow is represented by the symbol of arrowhead. Data store is represented by two parallel lines. An external entity is a person, department, outside organization or the information system that provides data to the system or receives data or information from the system. External entity is represented by rectangle. Rectangular normally represent external entity information system uses DFD to express the movement of data. The context and zeros diagram are shown in figure 1 and 2 respectively.

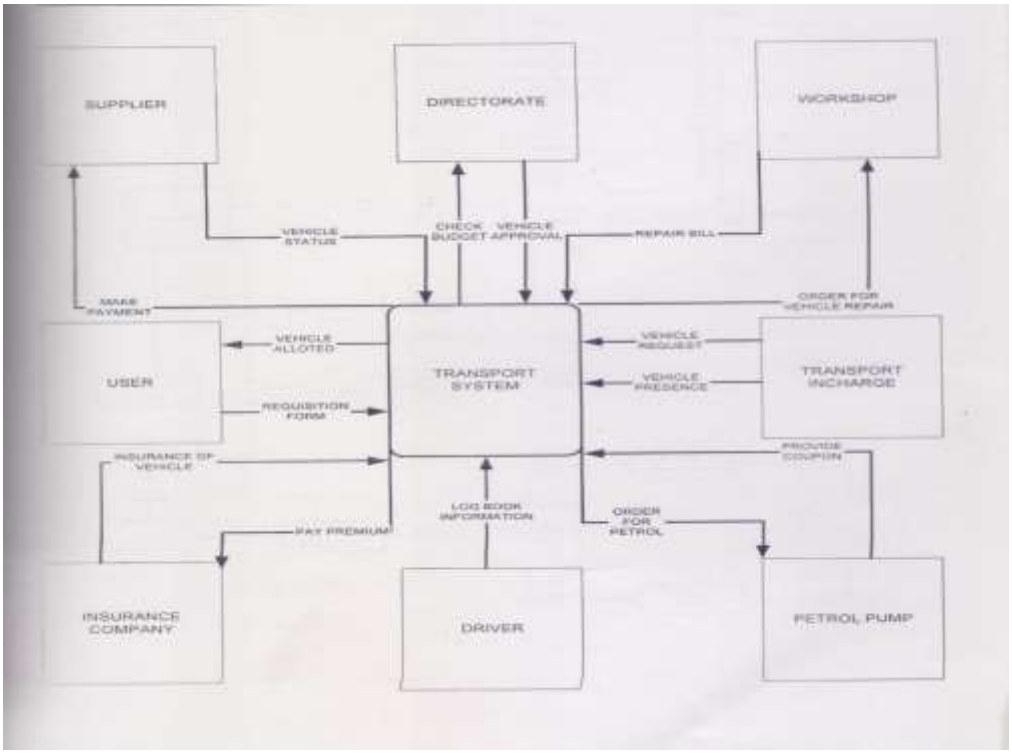

Figure 1.Context diagram for vehicle management system of WASA.

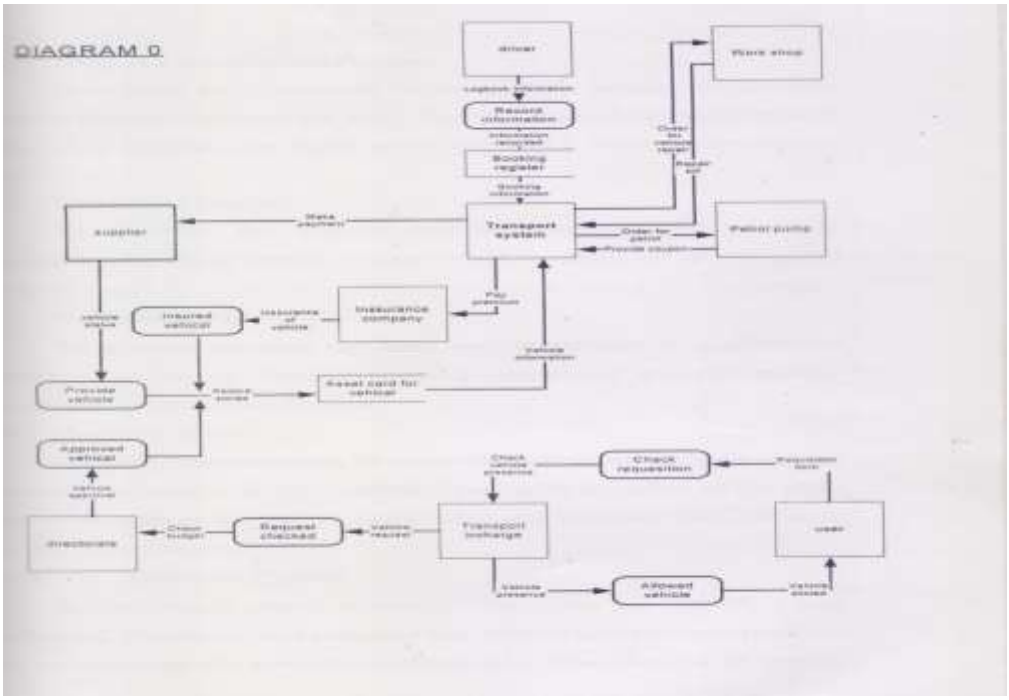

Figure 2. Diagram 0 for vehicle management system of WASA.

2.2.4.4 Data dictionary

A data dictionary performs central repository information role about the entries. It is also helpful various ways i.e. Reducing the data redundancy, Centralized control of the data elements, Controlling the data elements in a simple and affective manner. A data dictionary is a table of data about data. In data dictionary we first mention the data name associated with the system. Following are the data flow diagram of transport cell of WASA. Description tools include decision trees, decision tables and structured English are three most important process description. Structured English tools describe the logical process concisely and precisely. Standard English is normally. used which is super set of structured English. Decision tables tabulate selection structure, we use decision to simplify the conditions. Decision table is considered a better tool as complex compared to structured English. Decision tree is the graphic representation of a selection structure is decision tree. Its representation is in the form of a tree with branches to the right and with roots at the left. Decision table and decision trees are used for the same Purpose.

2.3 Design phase

In the design phase, alternative solutions are identified and evaluated. Hardware and software are selected and the specifications for constructing the system are developed. The purpose of system design is to transform the information models that were developed during analysis to model that

confirm to target technology. The design phase consists of three parts: Database Design, Input Design and Output Design.

2.3.1 Database designing

Tables and databases are two ways that data is kept safe. There are two distinct sections to the table design. An information system's logical architecture outlines the conceptual or logical connections between its constituent parts. Regardless of how they are ultimately implemented, the logical design outlines all the inputs that the system can use, all the outputs that the system must generate, and all the activities that must be carried out in order to satisfy the established system requirements. The implementation techniques themselves are not covered by the logical design. Non normalized data is transformed into normal form in the logical database design. A method of classifying data items into a set or relationship (table) is called normalization. The gathering of data items into tables that reflect entities and their connections is the normalization process. The finding that a certain set of associations has superior qualities for insertion, updating, and deletion is the foundation of the normalization hypothesis. The data items are transformed into a two-dimensional table as the initial stage of normalization. The data element must be linked to the keys and the keys must be indicated in the second phase of the normalization process. The first normal form bases the entire table row (or row) on each of the essential components. The data linked to certain portions of the public key is attempted to be indicated in the second normal form. The key and the items associated with the partial key are candidates for deletion in separate records if data items only depend on a portion of the key. Second normal form is achieved by dividing a section of the first normal table into a set of tables where each item depends only on the whole key. To provide each second normal form data item an autonomous presence in the database, the third stage is to separate the things that are not critical and that depend on one another. This is done to enable the entry of data on these things independently of the relationships in which they are involved. E-R diagram are shown in figure 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3h, 3i.

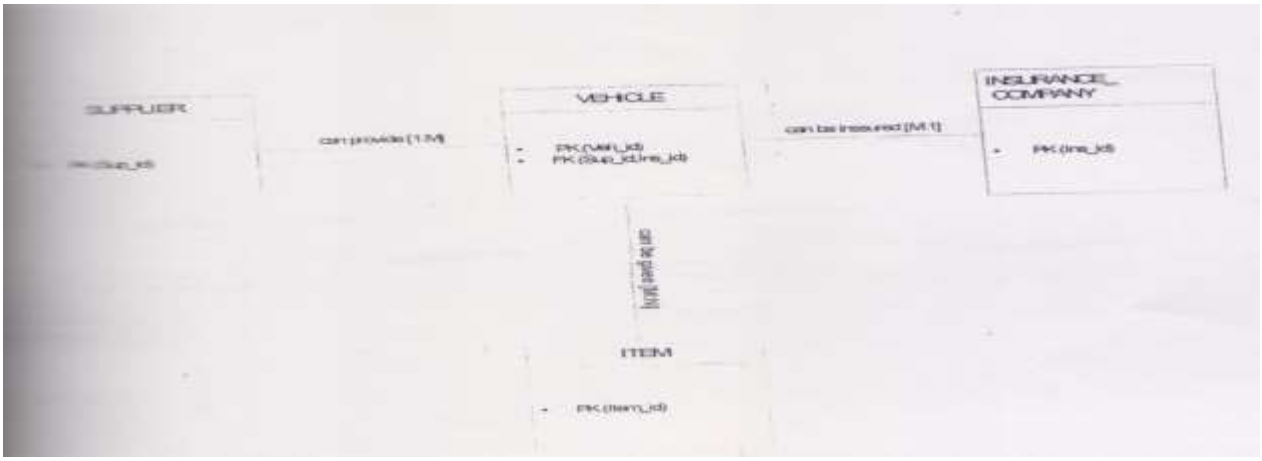

Figure 3a. Entity Relationship diagram for transport cell of WASA (supplier-vehicle-item-insurance_company)

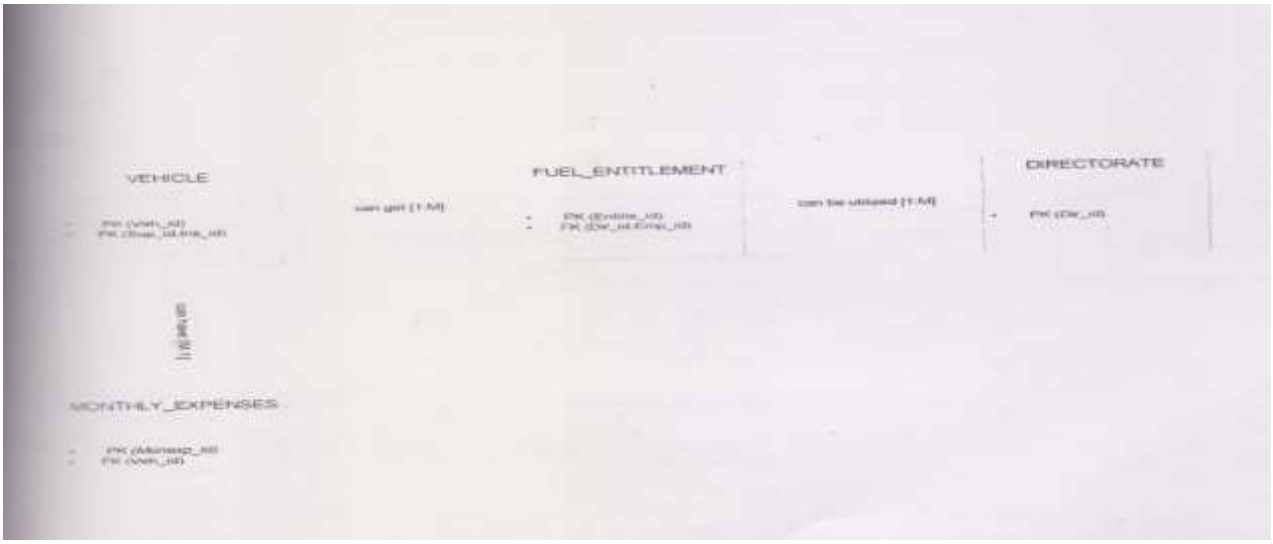

Figure 3b. Entity Relationship diagram for transport cell of WASA (vehicle-monthly_expenses-feul_entitlement-Directorate)

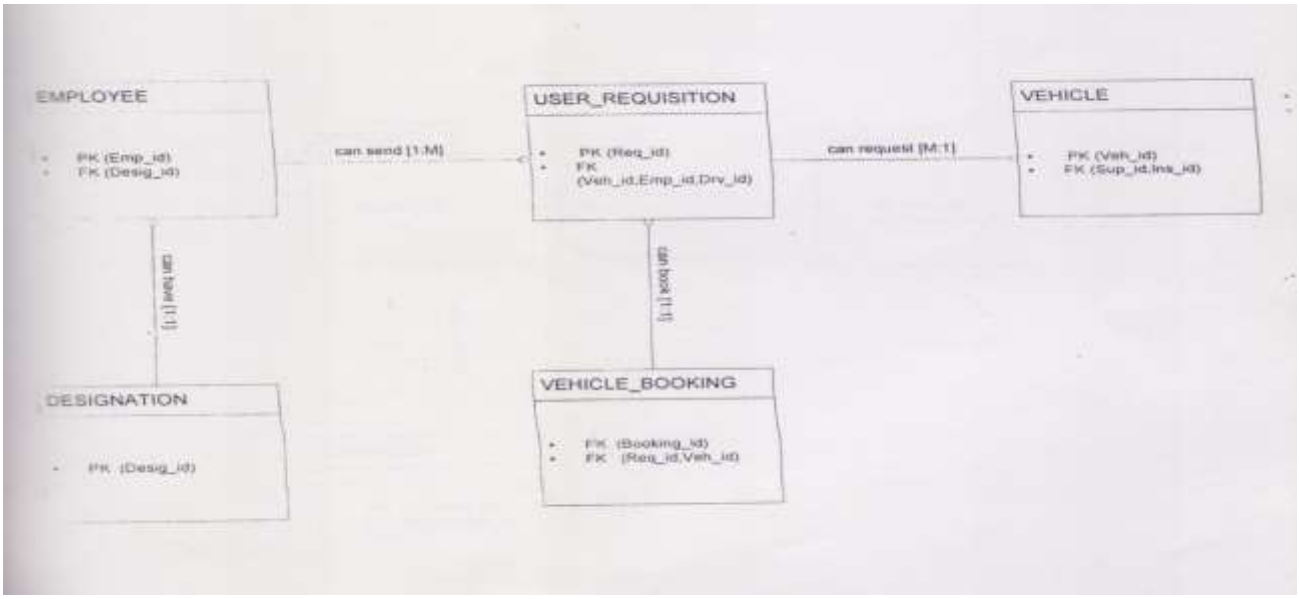

Figure 3c. Entity Relationship diagram for transport cell of WASA (employee-designation-user_requisition-vehicle- vehicle_booking)

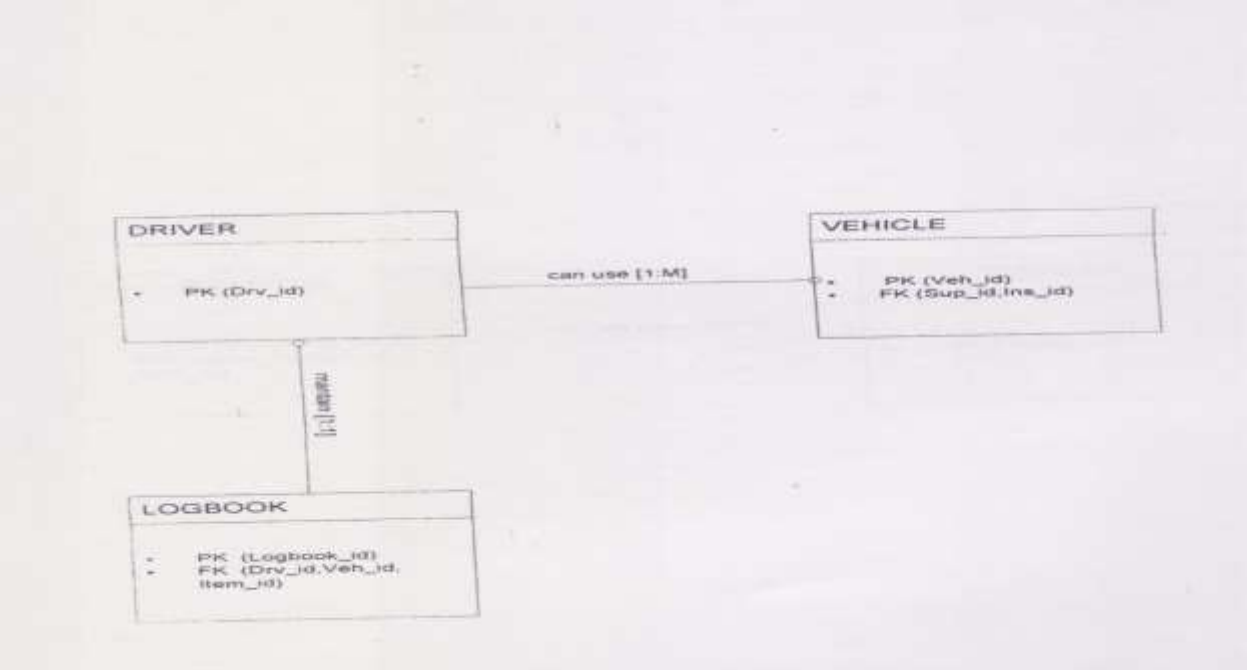

Figure 3d. Entity Relationship diagram for transport cell of WASA (vehicle-driver-logbook)

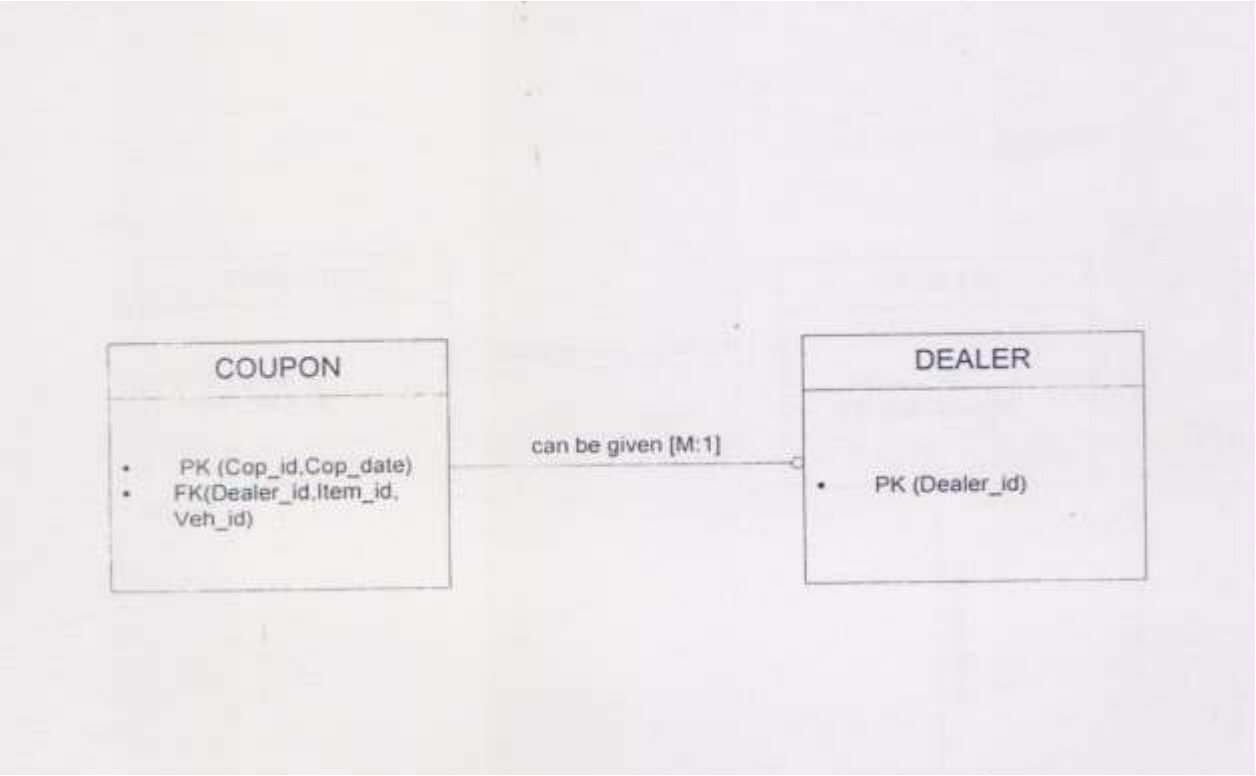

Figure 3e. Entity Relationship diagram for transport cell of WASA (coupon-dealer)

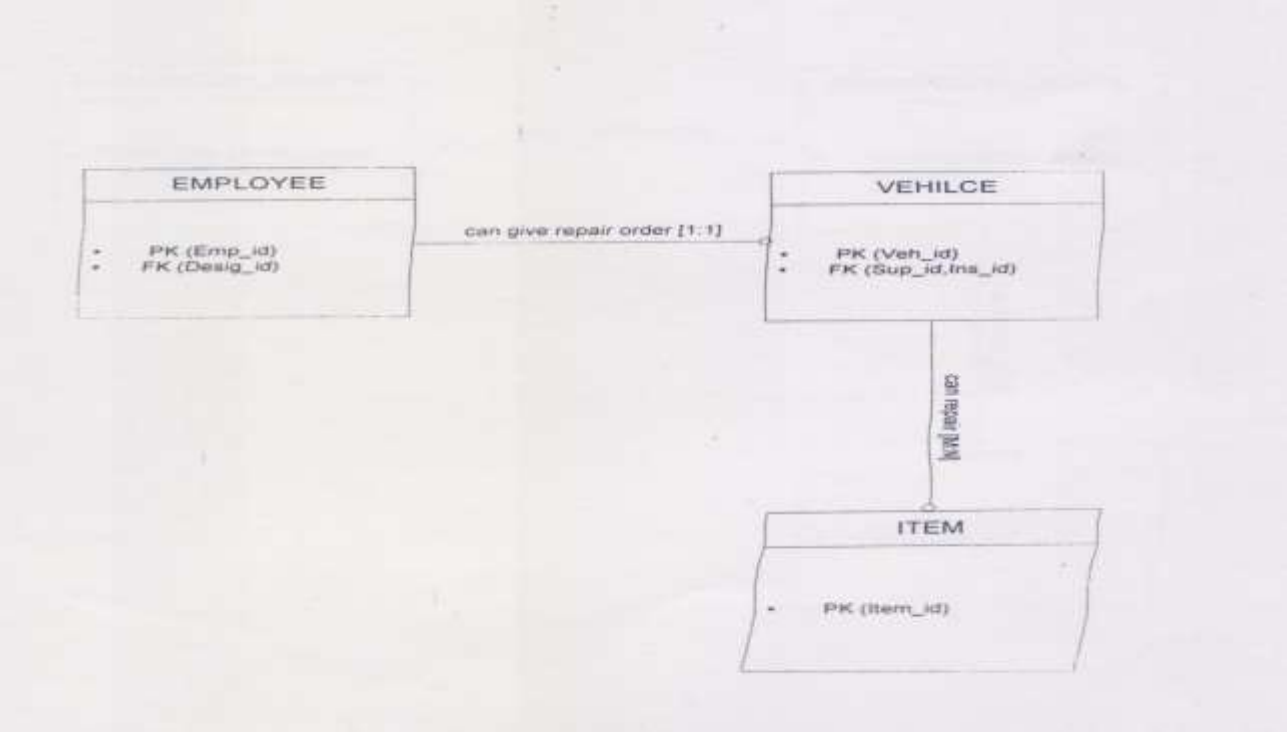

Figure 3f. Entity Relationship diagram for transport cell of WASA (employee-vehicle-item)

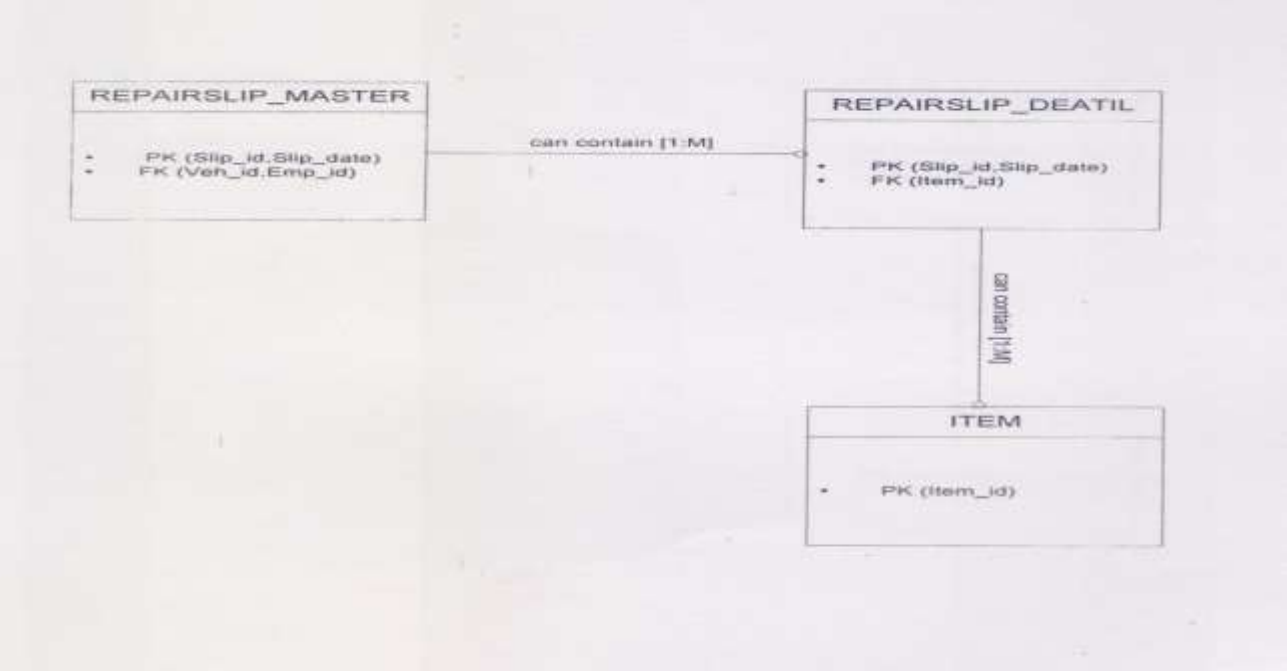

Figure 3g. Entity Relationship diagram for transport cell of WASA (repairslip_master-repairslip_detail-item)

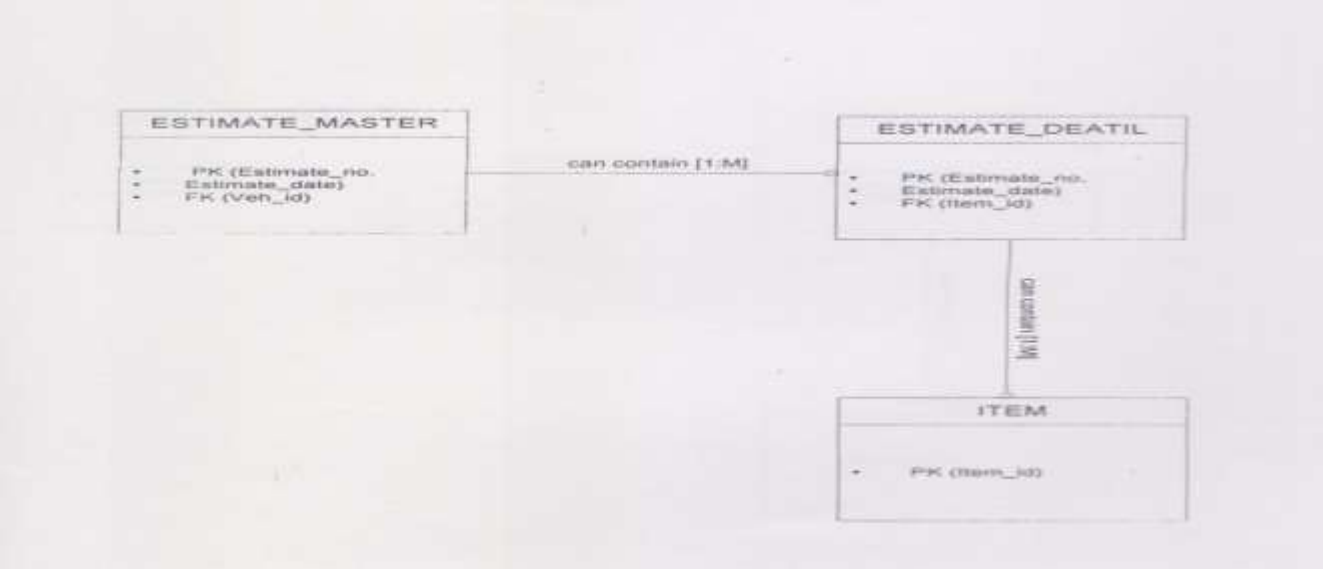

Figure 3h. Entity Relationship diagram for transport cell of WASA (estimate_master-estimate_detail-item)

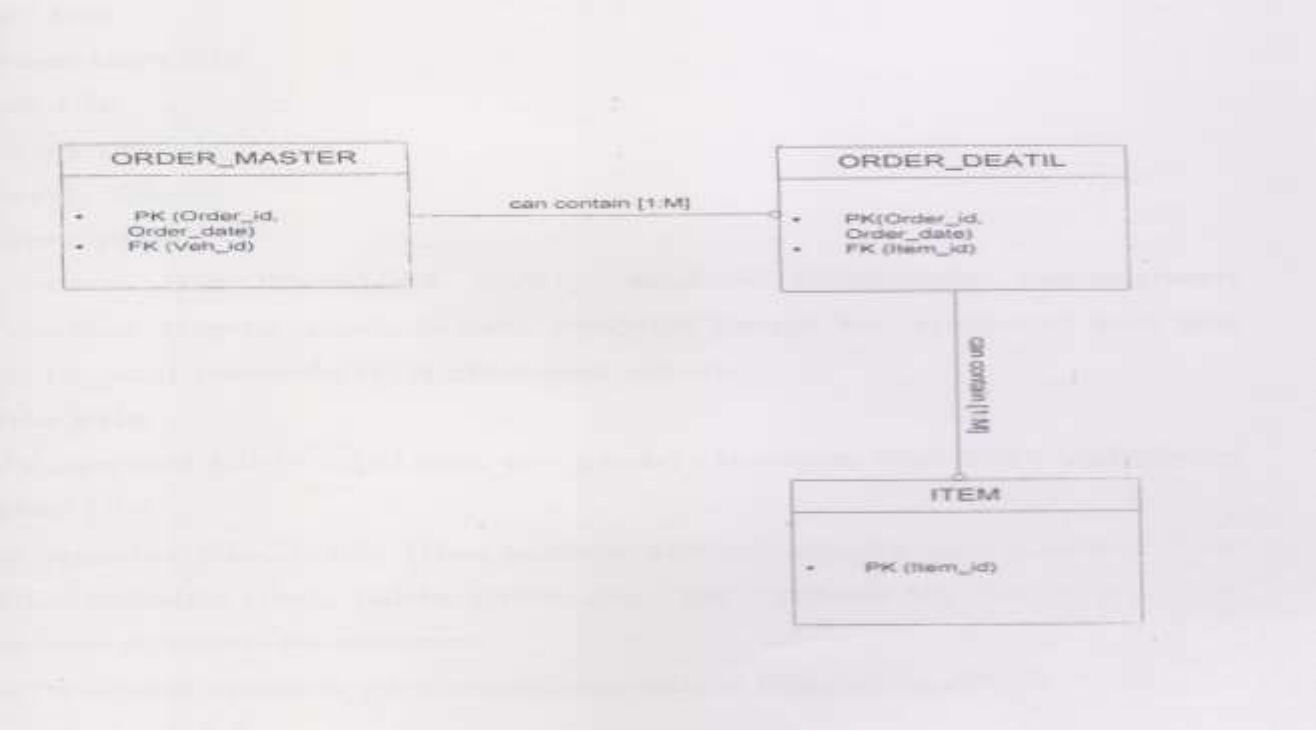

Figure 3i. Entity Relationship diagram for transport cell of WASA (order_master-order_detail-item)

2.3.2 Input design

The collection of data depends upon the input design. In order accomplish these data contents, data volume and data format were considered. All aspects of data capture and data input are maintained by input functions and specifications. To pick and identity the source data, we use the term data capture. Data entry is the process of converting source data into a computer-readable form. During data input, the computer-readable source data is actually input into the information system. Messages remain on the screen long enough to be read. Special video effects should be used sparingly, i.e. color, blinking sounds etc. Screen presentation is consistent. Terminology used is also consistent. All messages, including error messages, are understandable and politely stated.

All screen displays are attractive and un-crowded. The information on a single screen is displayed in a meaningful logical order. For online data entry, the most commonly used technique is form filling. In this technique, screen is displayed on which, data fields are entered by operator. For designing data entry screen most important technique is form filling.

2.3.3 Output design

The major function of any system is to produce required information when needed. The output of any system determines its potency, efficiency and reliability. The output information may be far the user or for the management, can be presented in different The two most common means of getting the output from a computer are the computer monitor or printer. During the designing of outputs the following factors are considered: The purpose of output, The type of information being output, Amount of information and the frequency of requirement, The circumstances For whom the output is required. The purpose of information Keeping in view all these considerations, the following reports were created : Asset Card for Vehicles report,Vehicle, Requisition Report, Vehicle Booking Report, Log Book Report, Oil Coupon Report, fuel Entitlement Report, Estimation Report

2.4 System development

The system implementation and testing is the last development phase of the development of the system. In this phase the new application programs are created, documented and tested. software selection is a difficult tasks after system requirements are determining whether particular software is capable of meeting the system requirements or not. For those that do so further needed to determine their desirability in comparison with scrutiny is other conditions. Information systems in the 1960's dominated by file system, however, since the early 1970's organizations have been gradually moving to database system. Database systems make it possible keep large volume of data available in an up to date form. As the complexity of the data and application grow, complete

relationship among data need to be modeled and maintained. DBMS are capable of providing this facility to create relationship. So it is very easy to create relationship among data Structures. DBMS provides easy consolidation of information resources in an organization. Keeping these facts in view a database management system of some kind was considered best option against the

conventional file System for developing the proposed system. ORACLE supports the largest database; it allows the full control of Space usage. ORACLE supports large number of concurrent users executing a variety of database applications operating on the same data. ORACLE users do

not suffer from slow processing performance. To protect against authorized database accessed and use, ORACLE provides security features to limit and monitor data access.

2.5 System implementation

The implementation phase is firmly aimed at ensuring a smooth and efficient take over from existing manual system to a web-based one, Here primary concern is the process of converting the data processing, of transport cell of WASA into a computerized System. There may exist contusion to some extent between these two terminologies. Conversion and implementation. Conversion is referred to the significant relationship between old system and new one whereas the practical job of putting a theoretically designed system into practice is signified as implementation. Implementation of project involves the activities like planning and scheduling of implementation process, organizational planning and personal administration, final system design and testing, establishment of standards of performance and control procedures and conversion from old to new system. The most important and considerable process of implementation entails testing the system and conversion plan.

2.6 System testing

All data is entered in an interactive manner. User-friendly Screens were used for data entry. As data entry is basically a transcription exercise. It is prone to errors. Thus to ensure correct data entry, each document should have cleared certain built-in Validation checks, before it is accepted by the computer. Person-entering data could take appropriate actions. In brief, testing of the system guarantees that all modules function are working correctly. The system is available as a backup in the event of the failure of the new system. The results obtainable by the new system can be compared with the output of the old one. Changes and adjustments can be made with great ease. User personnel can have time to become completely familiar with the new system. In order to do this, a conceptual database system based on the relational model is employed using entity-relationship diagrams (ERDs). The implementation of sophisticated relational data modelling principles with entity-relationship diagrams (ERDs) is the main concerned of the study. An appropriate tool for designing information systems that assist decision-making modules is a relational database management system that makes advantage of the potent properties of relational algebra and/or calculus. Non-procedural structured query languages (SQL), which are based on relational calculus, can significantly improve the performance of relational database management systems.

3. Results and discussions

Evaluation verifies that the new online transaction of transport cell of WASA Faisalabad meets the specified requirement, complies end user objectives and achieves anticipated benefits. The new computerized system has many advantages over the manual system, some of these advantages are.

3.1 Online accessibility

Users can access the developed system from anywhere. Hence it will be a great boast for the transport incharge to meet business demands and timely decision making.

3.2 Accuracy

The developed system is error free and accurate, so that correct and timely retrieval of information will be possible.

3.3 Economy/Time Saving

The decision-making is based on information, hence due to high processing speed the developed system takes less time to provide results.

3.4 Security

Security refers to the data security. Security in a system provides safeguards to protect system data from deliberate, accidental damages or access by unauthorized person.

3.5 User friendly

The developed system is user friendly, hence it is in use and someone with little knowledge of computer can operate it.

3.6 Accuracy of information

Since all the calculation is done automatically, so the chances of errors are very rare, which result in accuracy of the system.

3.7 Completeness of information

Computerized system gives complete information, which are required by the different-parties and higher management.

3.8 Prevention of input error

New system has provided facility to check input data. This facility will avoid the duplication of data and will prevent input errors.

Computer is playing a vital role in the calculating and managing the every kind of problems in all organizations worldwide (Stallings, 2003). Computer is being used in every sphere of life. Its uses are increasing day by day. It seems that after a few years life would be useless without the computer.

Computer is one of the powerful tools used in the present society and it has a strong impact on human lives (Rosenberg, 2013). That is why the use of computer based system in increasing day by day and is called computerization. There is not even a single field that is beyond the grip of computer. The computer helps making files in a short time, more easily and precisely reducing the labor, stationary expenditures, manpower, store records and access to the file of users (Oparaugo, 2012). Computer-based transaction of transport cell of WASA Faisalabad, Pakistan will help the transport incharge to take better control over the transactions that take place between users and transport cell. This proposed system would help the staff in assembling the information in useful shape. It will also assist top management in interpreting the new transportation requirements, its maintenance and disposal of vehicles of WASA.

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