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The Importance of Using Database Management Systems in Hospitals

Abstract

1   Introduction

Database management system (DBMS) is a software which is used to manage the database.A database is a collection of inter-related data which is used to retrieve, insert and delete the data efficiently. It is also used to organize the data in the form of a table, schema, views, and reports, etc.The main function of a DBMS is to store and secure personal and corporate data.
Hospital Database System: this is an intelligent system developed to improve the quality of health services offered to individuals and to ensure safe and speedy integration of patients, doctors and health institutions.
Hospital used to store their data in traditional file system like :Microsoft Excel (compatible with windows),Open office(compatible with windows/MAC/Linux),Google docs spreadsheets(need internet access any time).The main drawback of traditional file system is data definition is part of application program which works only with specific application. Files are design driven, they require change in design   Coding whenever new kind of data occurs.

2   Hospital Database Management Systems

Hospital database systems now provide multifaceted support for the diagnosis, treatment and follow-up of diseases and their management. On a hospital database every process and all data are safely recorded and stored. Examination, medication,surgery and hospitalization reports and all the health institution's records are kept together with the finest detail about patients, and the patient is asked to re-enter each time on his / her application. Personal information (Name / Surname, Birth Place / Date, Blood Group etc.) and contact information are stored safely. Each transaction is stored securely in the database and can be queried separately. With parametric query screens and search forms, search options are offered via multiple options (Name, Gender etc.). The user-friendly, flexible and convenient search interface provides fast and easy access to information.

3 Challenges in Implementing Databases in Healthcare:

As per entity, Constrains key Domain would vary. There are few barriers for acceptance for the implementation of database in healthcare. Main barriers for the implementation of database in healthcare can be pointed out below:

1. The reimbursement mechanism

2. There is broad interest in the capture of population data for those diseases which are so costly and prevalent, still health care policy does not cover for insurance for them. Hence treatment delivery are intertwined.

3. To match the patient need to the available services by comprehensive care, needs special type of database. In this scenario, Multi-dimensional view of the database is implemented using a Network type database called as IDMS (Integrated Database Management System).

4. The Vocabulary consists of the clinical terms embodied in the schema which is bit different than normal words. E.g. cancer treatment techniques, chemotherapy, Radiotherapy etc.

5. Within single healthcare database, Various departments persists which needs department specialty clinical database. E.g. cardiology, urology, Radiology, General surgery, gynaecology, haematology, maternity, nephrology, Neurology, ophthalmology, orthopaedics, Pharmacy, Physiotherapy etc.

6. It has to maintain patient status data for routine, emergency monitoring visits. The database system should also help for scheduling appointments and billing purpose.

7. Academic Rheumatology Clinic at Stanford university has developed database where signs and symptoms of new patients can be compared with those of treated patients. The database structure of these two system differs drastically. The former reduces the patient's past history to a concise snapshots for an easy review whereas the later maintains a detailed time-oriented history for analysis. It concludes from these examples that the database model of healthcare is determined by their medical view ,rather than the facilities provided by the database system. Feedback from the treatment history and method of treatment and its impact is very useful for research. For research statistical analysis and tabular format is preferred rather than general database type. Encoding of data is very much crucial. Data to be encoded includes diagnosis, stages of disease, Patient demographic characteristics etc.. Research always demands rapid access to large quantities of data. There is cost-effectiveness issue as the technology for the specific diseases needs to be altered accordingly. The information obtained from the database plays a vital role for decision making and planning process.

4   Why do hospitals require databases

Databases in healthcare promote the clear, consistent storage of critical data like patient demographics, admissions sources and length of stay, discharge status, diagnoses and procedures, and relevant charges. All this information helps healthcare professionals learn more about which operations are working well, which could use improvement, and which are absent entirely.

Databases used in the healthcare industry can store loads of information and can assist with several tasks, including the most important healthcare mission of saving lives. Along with supporting the daily operations of healthcare professionals, databases in healthcare can promote:

Efficiency

Think of how many people per day visit a hospital, doctor's office, or other healthcare centers. All this data must be reported in detail for effective use in a healthcare database. To ensure data is optimally recorded, healthcare databases must be well-designed and simple while supporting in-depth information. Data processing must also be efficient in these databases, so healthcare professionals can quickly and easily access relevant information when necessary.

Information Exchanges

Healthcare databases store individual patient data like identification and payment methods, healthcare access and control, and other management stats. When patients require services spanning multiple healthcare providers, databases across healthcare platforms must speedily send this information between each other with no variation. Because there are often standards for workflows, this data-sharing technology is essential for keeping information organized.

Healthcare Quality Assessment

Databases in healthcare gather information from many different sources—hospitals, health departments, state and regional enterprises, and federal agencies, to name a few. By considering factors such as access to pertinent information, availability and affordability of services, use of innovation, and barriers to seeking healthcare, healthcare experts can deeply understand the quality of ongoing healthcare operations. This helps experts use healthcare databases for assessing general healthcare quality throughout a region.

Tracking and Monitoring

With help from healthcare databases, medical professionals can use reporting and logging tools to keep track of operations. This helps healthcare providers monitor health care services and improve the quality of patient care—by gaining statistics on costs, pervasive diseases, and appropriate treatments, medical staff can more easily provide patients with confident, efficient treatments. Other healthcare institutions could safely access this information for health planning, reform, and decision-making purposes.

In short, databases in healthcare improve interactions between patients and their providers. Healthcare databases assist with diagnosis and treatment, manage documentation and billing, and help reduce errors in medical operations and management. Because they limit paperwork and staff, databases in healthcare reduce medical facility running costs while improving performance.

5 Implementation of Databases in Healthcare

5.1 SOURCES OF DATA

5.1.1 Observation Method

The researcher made several visits to the hospitals to observe and analyses the mode of operation for the management.

5.1.2 Interview

The doctors and some of the personnel were interviewed in order to acquire some facts that will help in building the new system.

5.1.3 Information from Published Sources

Pieces of information were gathered from many existing publication on this subject. Several books and journals on hospital database management were consulted to get information that would be necessary for the designs of the new system.

5.1.4 Documentation and Events in the Hospitals

Many hospitals are still adopting the manual system of hospital management. This method of hospital management have continued to pose a lot of setbacks, and problems to medical practitioners, nurses, patients and other staffs both private and government hospitals.

5.2 METHODS OF KEEPING RECORDS

The hospital accumulates the files and records of patients, stock and payroll and processes them after the space of one month.

5.2.1 Input and Output System

The system constitutes of patients inventory which would contain patients records arrangement or organized in file and the general stores record which includes the

input of the quantity in stock the drug code, drug number and the expiring date of each drug in database. The output to generate from this system will be to update, add, delete, clear, and provide summary of the total monthly, yearly even daily records of events in the various departments of the hospital. It will also produce the estimate of report generated by very given module.

5.2.2   Files and Records

The files and records will both contain the detail of the event carried out in every department as performed by each particular module or form.

5.2.3   Problems and Weakness of the Current System

The problem observed in the current system has to do with cost. The startup costs are enormous. Not only must you buy equipment to record and store patient charts (much more expensive than paper and file cabinets), but efforts must be taken to convert all charts to electronic form. Patients may be in the transitional state, where old records haven't yet been converted and doctors don't always know this. Further, training on the hospital software adds additional expense in paying people to take training, and in paying trainers to teach practitioners. Also, some are concerned about the security of their medical records, which should be completely confidential. Hackers may ultimately be able to penetrate the system despite security precautions, and they may then release confidential information to others. This has some patients worried about how safe and confidential their electronic medical records really are.

5.2.4   System Design

The objective is to fully automate the operation and management of Our Lady of Mercy Medical centre, Owerri. The scope of the system is to develop a database system that automates all the activities of patients in the hospital starting from their registration to their discharge from the hospital. The system to be developed would have the following modules as seen from the case study.
1) The Administrative module
2) The Receptionist module
3) The Medical Doctor Module
4) The pharmacy Module
5) The Nurse Module
6) The Lab-Technologist module
7) The Account module

5.3 PROGRAM STRUCTURE

The Hospital database application runs in a web browser. It was specially customized for Mozilla Firefox and Safari browsers. It welcomes user to the introductory screen of the package with the following information.

1) The logo and banner of Our Lady of Mercy Hospital,
2) Login section at the left hand side, which is requesting for the username and password of the user in other to use the application,
3) Slides of pictures displaying various section and equipment of the hospital at the centre of the application,
4) And a summary information of the applicability of the Hospital application.

Username and password are necessary for one to use the application. If you click on login without providing the password, it will alert you to provide the password. Then if you provide wrong username or password, it will inform you accordingly without opening the system for you. It is designed to make use of e-mail addresses for username field. If you have a successful login process, the application will enable a hyperlink that assign duties base on user role. For instance the user role of a Nurse is different from that of a Doctor. A Doctor can prescribe a Drug to the patients whereas a Nurse cannot.

5.3.1 System Requirement

The system requirement includes the software and the hardware that make the package being developed to run effectively. It also requires networking devices that will enable connection within a Local Area Network (LAN).

5.3.2 Software Requirement

The software requirements are basically for both the server and clients. The server side requires Window Apache MySQL PHP (WAMP), whereas the clients require only the web browsers. The following are the list:

1) WAMP server
2) Web Browser (Mozilla Firefox or Safari)
3) Operating system (Windows XP, Windows 7)

5.3.3 Hardware Requirement

This affects the usability and functionality of database on the hospital management system. The software runs on a standard hardware whether in time sharing network, mainframe or minicomputers, thus the hardware requirements are: IBM Intel or Microsoft compatible computers. A hard disk capacity of at least 2 GB, random access Memory (RAM) size at least 64MB. Pentium II of speed at least 26Hz, Laser Jet/Desk jet Printer, CD/DVD writers, CD ROMs for backing

up files or DVD ROMs, A switch that connects all the client computers to the server, and network cables that connect all the hospital units to the server.

5.3.4 Database File Specification

The files and records in the database are accessed by the following methods. 1) Direct access The access of files in the database by the use of key field or index. 2) Serial access This is accomplishing in a project with use of data control to move to the next previous first or last records in the database.

5.3.5 The System Development

The development of this hospital database management system was carried out following the procedures for developing a system using system development life circle (SDLC). The system is already existing system of management in the hospital was identified, defined and followed by identifying the problems, setbacks and bottleneck of the existing system, hence the alternative solution to the problems, device and implementation to put the automated system in place, following the identification and definition of problems in our lady of mercy hospital. Feasibility study carried out to find facts will help in the modeling of the new computerized system. More so, the new system has been analyzed in terms of the problem and the setbacks facing it. Hence the development of the system emerged. Perhaps, the new system is also available for some operations like updating and modification of the programs in future, hence it is open for maintenance and well documented.

5.4 PROGRAM DESIGN

The program is designed as a web application that runs on web browsers, more especially Mozilla Firefox. The entire program development is a set of program module, each performing a specific task as shown in the general structure of the system. The program involves user interface, thereby making the developed package user friendly. The options are accessible through popup menus at the hyperlink such as Doctor's popup menu where you get view patients, Diagnose patients, subscribe drugs etc. Popup menus will only display options base on your job description or user-role. The logout button is always there beside the welcome message to allow a user to logout after usage.

5.4.1 Testing and Evaluation

First and foremost, the skeleton of the entire system was set up with a module for the initialization phase. After testing to verify accuracy, subroutines were

added. Thus, the systematic top down testing before the rest lager of complexity was added. Hence, during implementation, programmers worked on modules in parallel and periodic testing and check performance of the whole system allowed management growth in complexity without introducing untraceable bugs. This involves the training of user in the operation of a new information system.

5.4.2 System Change Over

This process can be achieved in two ways: 1) Gradual system change over 2) Direct/immediate or direct systems change over 1) Gradual system change over This happens when the new system, run alongside the manual or old system and after a period of time the old system is phased out and the new system continues. 2) Direct/immediate or direct systems change over This involves changing over directly to the en system without any significant delay.

5.4.3 System Maintenance

Maintenance function begins once the system is fully implemented. This is the process of making modification after the software has been delivered. This requires an understanding of the program. This is achieved by clearly studying the program code and associated documentation. There are usually two types of maintenance. Enhancement maintenance has to do with the modification of the software due to changes in the ever dynamic environment and corrective maintenance is carried out as a result of error discovered after delivering the software.

6 Conclusion