Hospital Database Project

university project

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Abstract

Hospitals are counted as essential in the gears of society, when the man gets sick he recieves aid but what is the use for aid if the hospitals are poorly managed. Rather said, overrun by an influx of patients, misorganized inventories that used to be stocked on paper. Paper, as classic as it can get, it would still stand as a backup but not quite necessarily as primary method for storing records. Our proposed solution is a database that encompasses majority of instances related to a hospital such as medical records management.

Contents

1 Introduction

The project we have decided to work on is the database for a hospital. This is a topic of dire importance in our times, because as the recent pandemic has proven, hospitals need a very well made and clear structure to be able to withstand the amount of patients they are receiving.

This is where a database comes in, such as the one we have decided to make. Databases are of crucial importance for the infrastructure of a big institution, such as a hospital, as they first and foremost allow easier management for various information that is required for the people working in it to do their jobs. For example, having a database for a hospital allows us to store information about the patients, which can then easily be accessed by a doctor through an interface in order to make quicker and better assesments of patients.

Another domain related to the operation of a hospital, that is paramount to have a well-organised database, is that of medicine management, since various medicines are used in various treatments in differing dosages, which would be extremely inefficient with the sheer amount of medicines hospitals are working with nowadays.

With these things in mind, it's no doubt that most of the modern hospitals would employ some kind of database or other digital information storage solution for proper management of their necessary information. It should be mentioned that among these modern hospitals that do use such systems for information management, in a lot of cases their security is not really up to today's standards, which is definetly something to keep in mind as it can lead to some serious problems, if, for example, a data breach was to happen and all the personal information of the patients in the hospital would be leaked out.

2 Literature Review

Data and databases in hospitals are important, because they allow specialists to improve the system. "Effective database management enables healthcare providers to make informed decisions, improve patient care, and optimize hospital operations." [1]

Hospitals work with lots of data. Without it, they can not know critical details about their patients, information about its doctors and employees, about inventory and taxes and history about everything that happened. This is the reason why databases are part of a hospital as well. History of medical data and events is essential for any hospital of any size. Hospitals need to store data such as patients records, inventory and financial and administrative data. They may also collect and store quality data and metrics, which may be used for improvement. [1]

Another important aspect about hospital data is its confidentiality. Hospitals store a great amount of personal, but necessary information about their patients and that data needs to remain confidential and needs to be protected.

"Encrypting sensitive patient data at rest and in transit is vital for preventing unauthorized access. Secure Socket Layer (SSL) and Transport Layer Security (TLS) protocols are commonly used to encrypt data transmitted between systems. Additionally, encrypting data stored in the database itself adds an extra layer of protection against data breaches." [1]

2.1 Drawbacks And Flaws

While databases definetly help optimize the process of providing health-care for institutions such as hospitals, they are no without flaws. Some of the main ones are: the large amount of raw data(which can increase the workload of the user), technical problems that can occur during the process of storing this large amount of data, potential attacks on the database through hacking and other methods leading to security and privacy issues, and storing inaccurate information which sometimes occurs due to the instantaneous nature of databases, if they are not made properly. [2]

2.2 Positive Effects On The Hospital

Besides helping medical proffesionals in ther day to day work, databases in health-care institutions can lead to good habits and procedures. [3]

Firstly there's efficiency, which is caused by the fact that the data that comes from all the people that vist a hospital every day must be reported in detail for it to be properly used in a healthcare database. Afterwards in order for said data to be recorded properly, the database must be well-designed and simple to use, containing all of the necessary in-depth

information required, while avoiding any unnecesarry information that doesn't serve a purpose in the workflow of the instituion.

Secondly we have information exchanges. Because patients may require services that span multiple healthcare providers, databases from different healthcare platforms must be able to quickly send the necessary information between each other without any variation, promoting cooperation between these healthcare providers.

Thirdly there's healthcare quality assessment. By using data from verious sources like hospitals, health departments, state and regional agencies etc., experts can more easily deduce things such as the availability, affordability, innovation and barriers to seeking healthcare of instituions in a certain region and maybe compare it with that of other regions, which can in turn lead to improvements to these things if problems are noticed.

Lastly we have tracking and monitoring. By using the data stored in this kind of a database healthcare providers can monitor health care services and improve the quality of patient care—by gaining statistics on costs, pervasive diseases, and appropriate treatments, while medical staff can more easily provide patients with confident, efficient treatments. On top of that other healthcare institutions could safely access this information for health planning, reforms, 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.

2.3 Components Of The System

A hospital management system is made up of multiple componenets which make up a robust and efficient system, but their number might change depending on the specific needs of each clinic. While our project might not include all of these, here are some of the basic components that are usually included in such a system for the record. [4]

Patient management. It is used to control patient flow. It can be used to register them, get the data of the patients' health condition, view the treatment and check the medical history and reports.

Appointment module. Deals with arranging the schedule of doctors according to the patients' application, which helps to organize the availability of medical specialists according to the needs of the patients.

Facility management. The facility management module is responsible for tracking and maintaining the room availability, the occupancy status as well as various kinds of administra-

tive documentation.

Inventory management. Controls the clinic's inventory and helps automate the entire supply chain for the convenience of the staff.

Accounting. Helps organize the financial affairs of both customers and the medical institution.

Medicine management. Contains all the usual medicines used for the specific treatments and also keeps records of a patient's medicines used for their specific treatment.

Laboratory and tests management. Manages all the test and lab results, which can be viewed by the staff and used for the patients' reports.

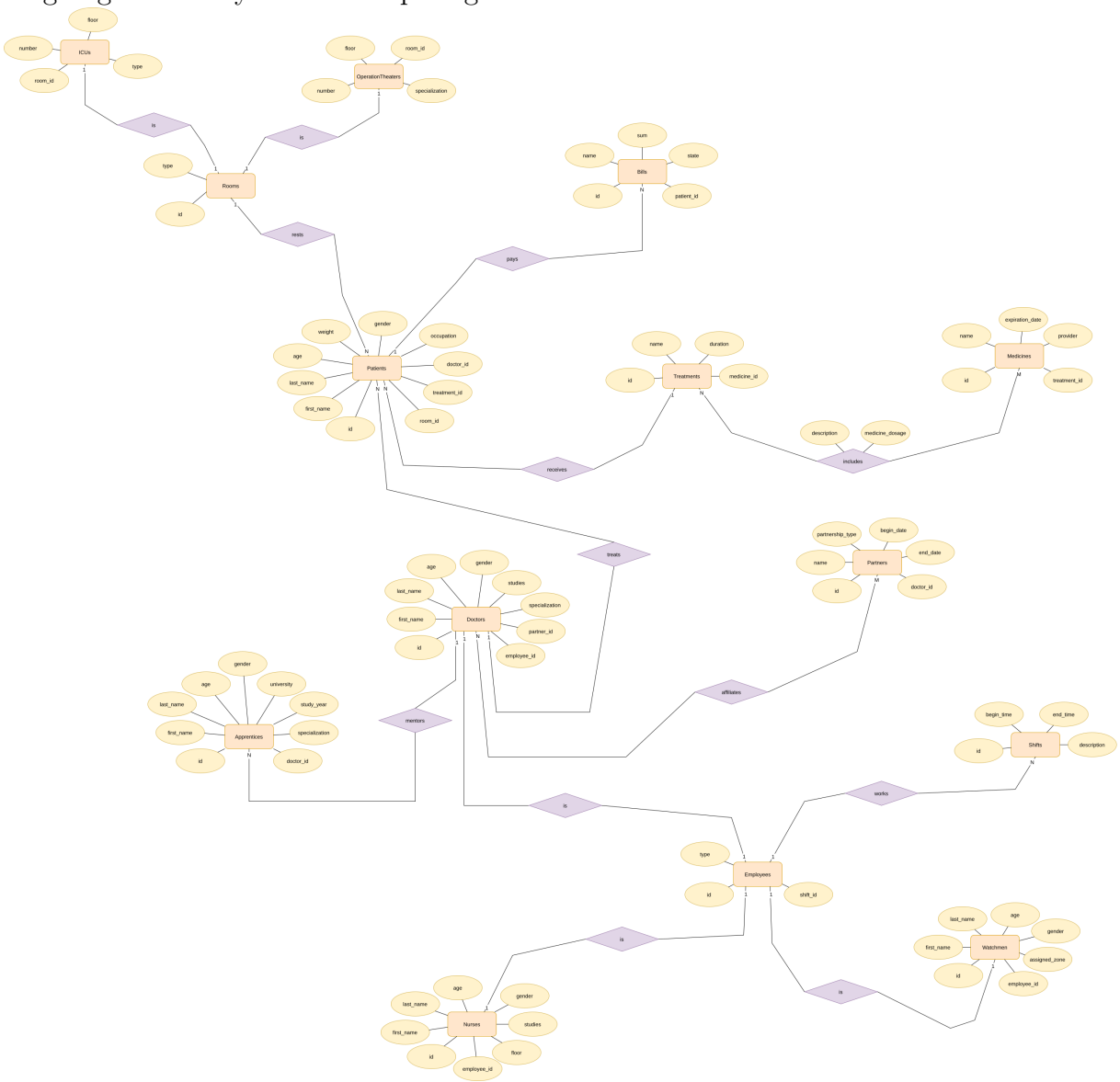
Reporting. Stores the already processed information, which helps management collect, analyze and view the performance data in a comprehensive format.

2.4 Specifics

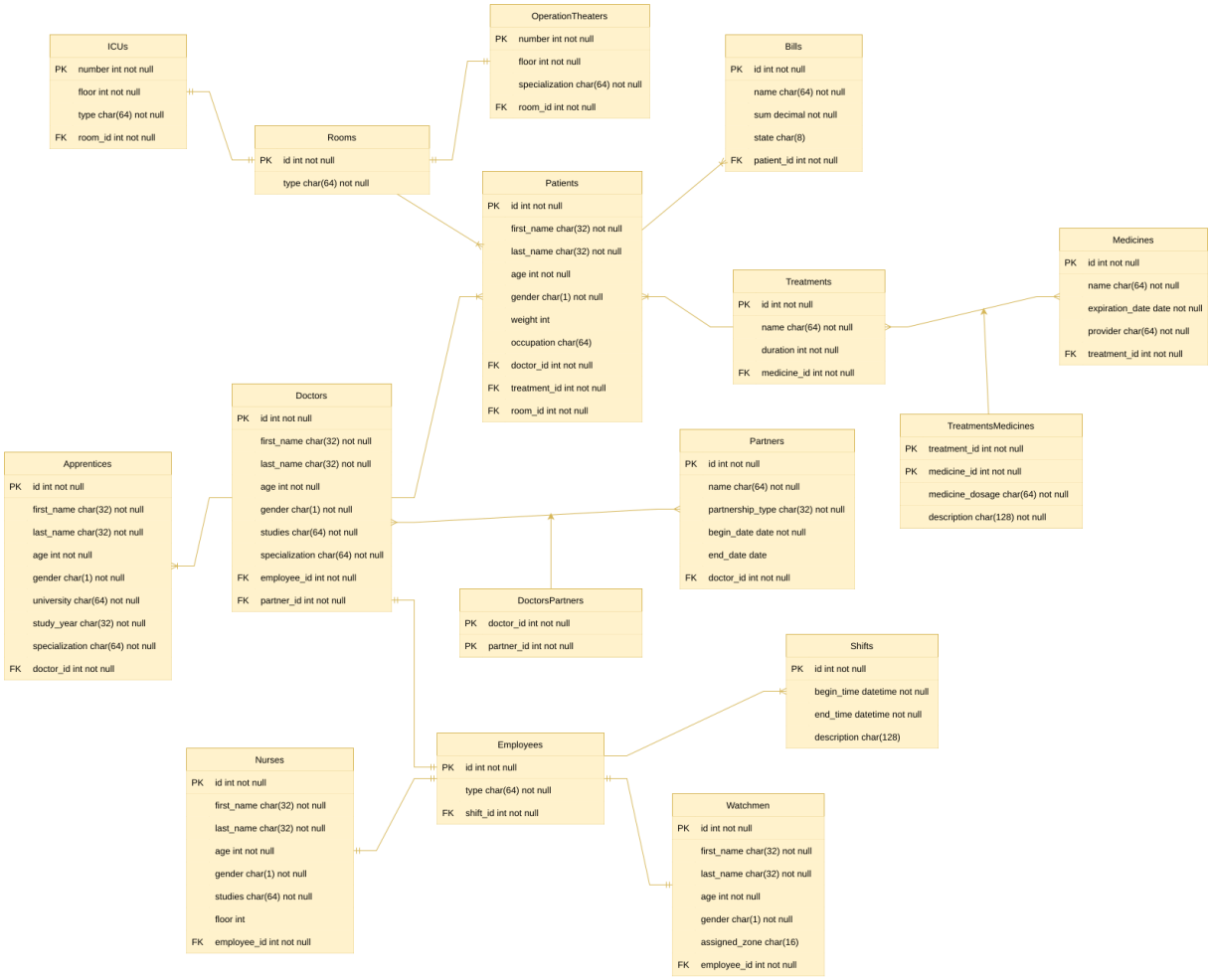
Hospital databases should be tailored to their specific needs. Not every hospital or heatlthcare organization is the same. This means that things like: data integration for connectivity with other systems, interoperability with various healthcare systems, analytics tools and user interfaces all differ from organization to organization. That is why we make our database tailored to a very small and basic hospital that doesn't do much research or analytics and that doesn't need a very complex or intricate system. [5]

3 Development

For starters, we gathered the documentation related for the project. We have gathered articles, and statistics that have been already listed in the Literature Review chapter above. Followed by designing the Entity-Relationship diagrams.



The next step in our project was creating the tables based on those listed in the E-R diagrams, and with the respective constraints. In proportion of 99% we have used constraints for foreign keys involved in One-To-Many and Many-To-Many relations between tables. Respectfully, the database has an SQL Script for purging the whole tables, destined for use only in early trials of the software.



With the tables created, we have populated each table with an respectful amount of synthetic data for testing the referntial integrity between the tables. As for the queries, our database has in storage between 20 to 25 SQL queries grouped by the following: types of rooms, patients in a certain type of room, expired medicine, detailed treatments, employees. The following task was for creating triggers for a dynamic update on certain features related to the database.

The database has 4 views which are made for three tables: medicines, doctors, nurses and watchmen's shifts specificly. The views only display the name of the employees, and their shift group. We have decided for avoiding the implementation of assertions and indices, for simplicity. As for the graphical interface, it is quite simplistic, it lists a tab of all the tables and views. We have not got around to implement updates or queries on the database from the graphical user interface. Time was a big problem and was the reason that this project ended up like this.

All development was done on Microsoft's product Visual Studio, which we used to manage a local database server and its tables. In a separate project then, in the same solution, we made the graphical user interface, which just refers to the database.

4 Results

As an overview of development. We have observed that most of the queries perform well when executed. The downside of this project is the extremely simplistic interface, and the high proportion of select queries. All has been done for simplicity, and for playing around with this concept. The DBMS is not deemed for production use, it is just a simple testing ground at the current time.

5 Conclusion

This project was an opportunity for us to learn about more advanced things about the SQL language and database systems. It was just a learning experience, even though the results ended up pretty bad. However, it is a start. Everyone starts from somewhere.

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