Designing database and analyzing data of Sun Medical Hospitals

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***Abstract*—** **The main use of the database is to maintain the data in the structured format and use the queries to retrieve the data. Sun Medical Hospital is a U.S based healthcare institute that provides different kinds of services to the nation. We are redesigning the current system that is used in this Institute. Adding services like dental and optical to the system which were recently expanded by SMH. This report presents the changes that we are making to the system. We provide the redesigned Entity Relation diagram that is used to understand how the organization works. The Relational Schema is provided to understand the different types of relation that is established between different entities of the organization. An entity relation matrix table is also documented to have a quick understanding of the relationships. We also populate the tables using the test data to observe the behaviour of the relations. Once the system works fine and the queries get executed correctly, the script will be run in the oracle database to create tables and the system is put into use.**

Keywords—entity relation diagram, relational schema, database, queries, entity.

##### introduction

This project is to redesign the entity relationship diagram of Sun Medical hospital and also to create a redesigned database in the Oracle Database and populate the database, also need to use the PL SQL blocks to run the different statements on the data. The SMH is a medical institute based in America. It provides different kinds of healthcare services to the nation. Initiate types of SMH services include medical support for emergency healthcare and General practical. Recently SMH intended to expand its services to include dental, optic care, etc., to their institute. Here the SMH provides us with the present system. This includes the ER diagram which we need to redesign. The optic care and dental services were added to the ER diagram where they are related. The relation schema is designed to show the different relations between the different entities of the system. This Relation schema also defines how the relations are, one to one, like one to many, many to one, many to many. The test data is also provided to populate the tables in the database with the data to test. This test data is also used to observe how the tables behave with different types of data. The tables are also assigned the data type that we are going to store in them. Primary keys and foreign keys are created to assign the unique ID to each table data and the relations between the tables. Even the tables are specified whether the field can have a null value or the value is required. Some fields are auto-incremented according to the type of data. Queries were created to retrieve different types of data from the database.

Figure 1 shows what are the changes that occurred in the new system of the Sun Medical Hospitals. Here the optician and dentist services are newly added to the Entity Relation diagram. This is the redesigned diagram of the SMH that is showing the changes in the system. The flow starts from the person to admission. If the admission is needed then the person is moved to ward else no. The staff consists of different types of surgeons and anestheist and different professionals related to different fields. The type of operation needed is selected and the operation therater is assigned with the sergeon and the anestheist. Later the patient is again moved to the ward where observation is required. Which is taken care by a staff member assigned to it.

Diagram

Fig
Fig. 1. Entity Relation Diagram showing the newly added services by Sun Medical Hospitals

Diagram

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Fig. 2. Relational Schema diagram showing how entities are connected to each other

The above figure 2 is a relational schema which represents the relation between different entities or tables in the database. The observation table consists of the staff\_id as the foreign key which is used to map this table to staff table. The observation table also consists of admission\_id as the foreign key which is used to map this table to the Admission table where the admissions of the patients is taken care of. The admission table consists of three different foreign keys that are patient\_id, ward\_code, and op\_code each of which are mapping to different tables. The patient\_id maps the admission table to the patients table which helps to retrieve patient information. The ward\_code id is used to map the admission table to ward table which is used to retrieve the ward data from the ward table. The op\_code is is used to map the admission table to operation type table which is used to retrieve the data related to type of operation that the patient has opted to have. Finallywe have operation table which consists of three foreign keys which are op\_code, staff\_id, admission\_id. The op\_code id is used to map the operation table to operation type table which maps patient to operation and surgeon. The staff\_id is used to map operation table to staff table which is used to retrieve the data related to surgeon who had done the operation. The staff\_id is used to map the operation table to the staff table which is used to retrieve the information regarding the staff participated in the operation. The admission id is used to map the admission table to the staff operation table which helps to retrieve the data related to the admission which is inter related to patient information.

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Fig. 3. Relational diagram showing the type of attributes and the relation between the entities.

##### table

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Staff | Operation | Admission | Observation | Operation\_type | Ward | Patient |
| Staff |  | 1:M |  | 1:M |  |  |  |
| Operation | 1:1 |  | 1:1 |  | 1:1 |  |  |
| Admission |  | 1:1 |  | 1:1 | 1:1 | 1:1 | 1:1 |
| Observation | 1:1 |  | 1:1 |  |  |  |  |
| Operation\_type |  | 1:1 | 1:1 |  |  |  |  |
| Ward |  |  | 1:1 |  |  |  |  |
| Patient |  |  | 1:1 |  |  |  |  |

Fig. 3. Relation Table Matrix showing enties related to each other

##### Conclusion

In this paper the redesign of ER diagram helps to better understand the changes in the services of the Sun Medical Hospital. Relational Schema is used to identify the different relations between the entities of the system. Also the Relation diagram helps understand the what types of attributes are used in this entities.

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##### References

1. M. Liu and R. Shan, "Design and implementation of the Relationlog deductive database system," Proceedings Ninth International Workshop on Database and Expert Systems Applications (Cat. No.98EX130), 1998, pp. 856-863, doi: 10.1109/DEXA.1998.707505.
2. Y. Haiyan, L. Jingsong, C. Huan, Z. Xiaoguang, T. Yu and Y. Yibing, "Performance Evaluation of Post-Relational Database in Hospital Information Systems," 2010 Second International Workshop on Education Technology and Computer Science, 2010, pp. 247-251, doi: 10.1109/ETCS.2010.134.