

DBMS ASSIGNMENT - 1

Submitted by:

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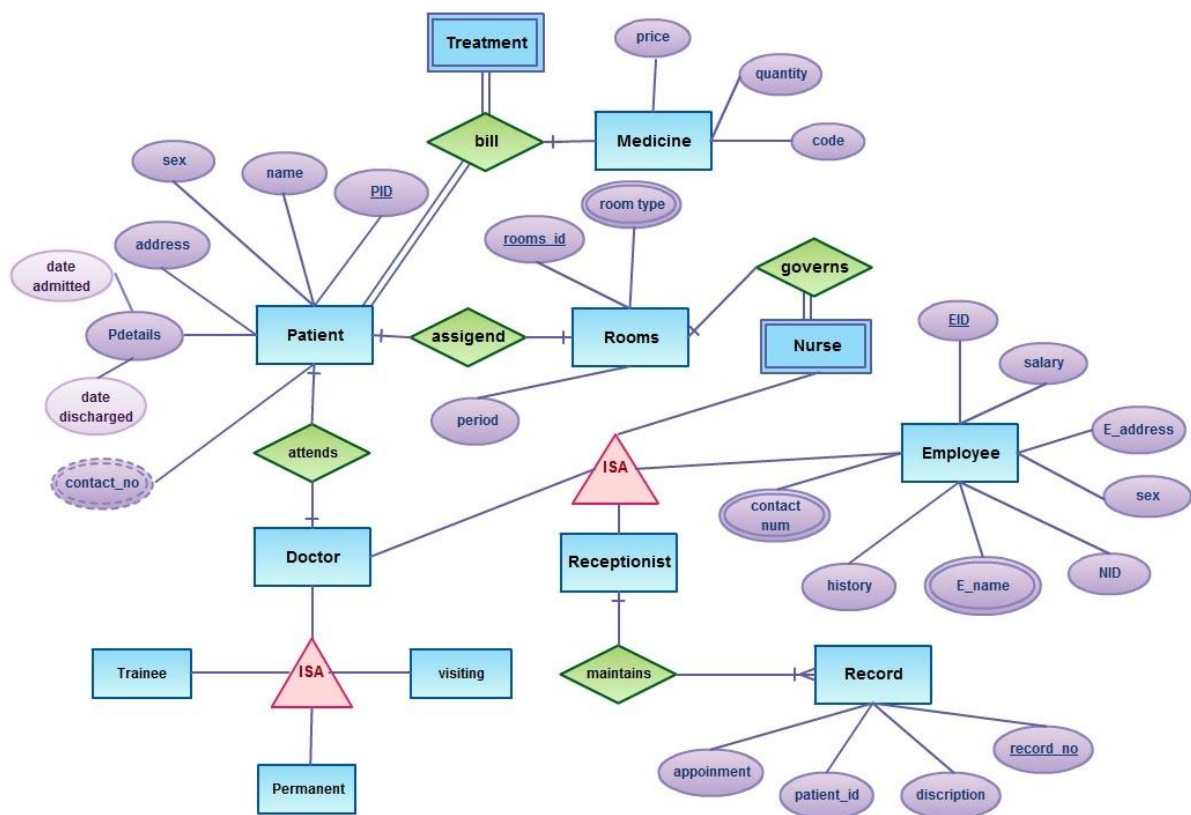
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Submitted to:

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1.

E-R Diagram for Hospital Management System



2.

Here are the 5 types of components of DBMS-

Users, Procedure, data, hardware & software.

- **Hardware:** It's one of the main components of the DBMS system. It refers to all of the Physical Devices like laptops (PCs, workstations, cybercafe, servers, and supercomputers), hard drive, chips, networking devices (Hubs, Switches, Routers, Fiber optics) and other Devices.

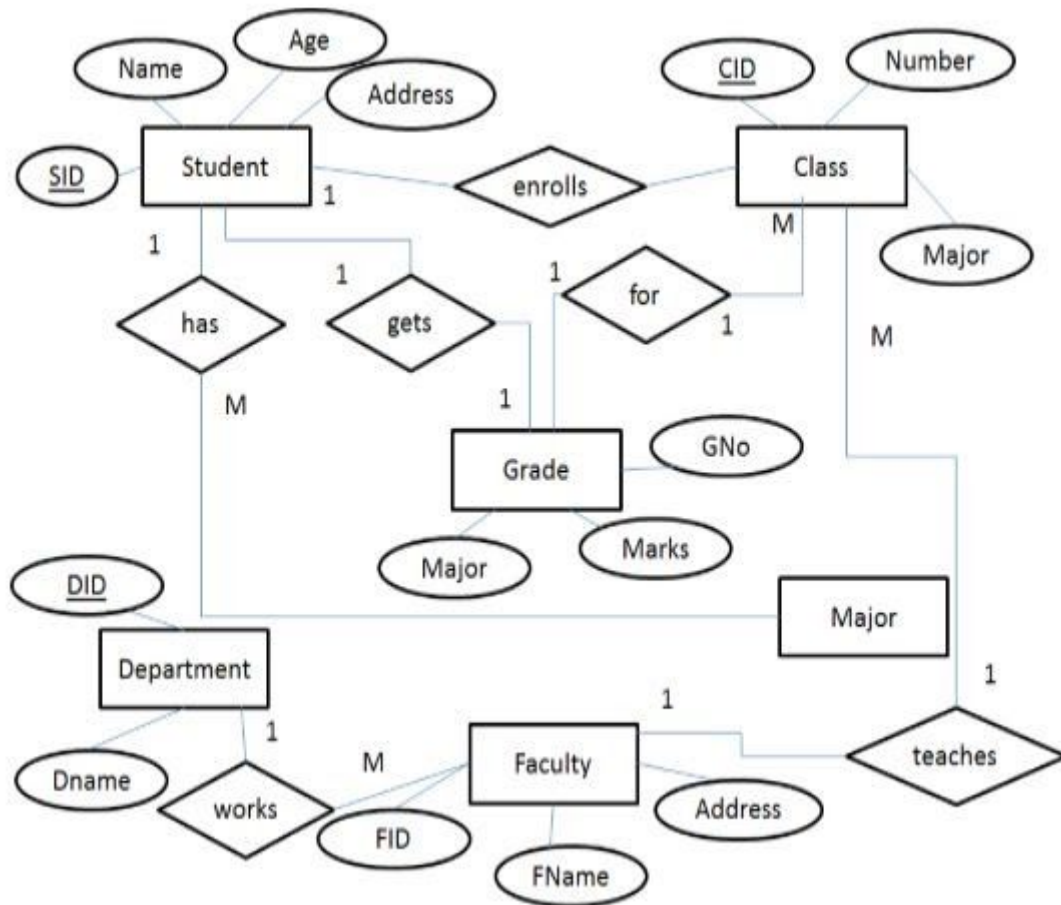
- **Software:** Although DBMS itself is the most readily identified Software but to make the database system fully functional, three kinds of softwares are needed- DBMS Software, Operating System Software, and Application Programs and Utilities.
 - a. Operating Device Software: manages all components of the hardware and makes it possible to run all other software on computers.
 - b. DBMS software: inside the database system, it handles the database. Examples of DBMS applications include MySQL from Sun and DB2 from IBM.
 - c. Application Programs: These are used in the DBMS to access and operate data and to control the computing environment in which access and manipulation of data takes place. Application programmes are the most prevalent accessible knowledge found with

- **DBMS Users:** All DBMS profiles are contained here. Five kinds of clients may be recognised in a directory regardless of the primary purpose of the job: managers, database administrators, database designers and coders, and public users. All user features are described below on the basis of the output of each user.

-- System managers inspect the overall operations of the database.

- The DBMS is managed by the database controller, also known as DBAs, which ensures that the database is running properly or not.
 - Designers of databases design the layout of a database. They are the architects of the database, in essence.
 - System analysts and coders design the entire application programmes and implement them.
 - Public users are the individuals who test the application codes for the everyday success of the organisation.
- **Procedures:** These are the guidelines and rules controlling the design and operation of the Database System. Procedures are one of the DBMS system's main components.
 - **Data:** The data provides a list of information stored in the database. Data is the source from which information is produced, the deduction of which information is to be taken into the database and how the data is to be handled is an important part of the work of the Database Designer.

3.



4.

The Data Model gives us a suggestion of how the final system will look after its full execution. It determines the elements of data and the relationships between the elements of the data. Data Models are used to demonstrate how data in the database management system is processed, linked, accessed and modified. Here, to reflect the material, we use a collection of symbols and text so that members of the organisation can interact and understand it.

In DBMS, some of the Data Models are:

1. Model Hierarchical
2. Model Network
3. Model for Entity-Relationship
4. Model Relational
5. Model Object-Oriented Data
6. Object-Model of Relational Data
7. Design for Flat Data
8. Model for Semi-Structured Data
9. Model Associative Data
10. Model of Background Data

Network Model: An extension of the hierarchical model is this model. Before the relational model, it was the most common one. The only difference is that a record may have more than one parent, since this model is the same as the hierarchical model. It substitutes a graph for the hierarchical tree. **Example:** We can see in the example below that the student node has two parents, i.e. Department and Library of CSE. This was not feasible earlier in the hierarchical model.

Features of a Network Model

1. **Ability to combine further relationships:** In this model, data is further connected as there are more relationships. This model has the potential to navigate one-to-one and many-to-many relationships as well.

2. **Many paths:** When there are more relationships, more than one path to the same record will be open. This makes access to data quick and easy.
3. **Circular Linked List:** With the aid of the circular linked list, the operations on the network model are completed. With the aid of a programme, the current status is kept and this status navigates through the documents according to the relationship.

Advantages of Network Model

- In contrast to the hierarchical model, the data can be accessed quicker. This is because the data in the network model is more connected, and there can be more than one route to reach a specific node. So, in several cases, the data can be accessed.
- As there is a relationship between parent and child, data integrity is present. Any parent record adjustment is reflected in the record of the infant.

Disadvantages of Network Model

- The scheme could become complicated as more and more partnerships need to be managed. So, in order to work with the model, a user needs to have thorough knowledge of the model.
- Any adjustment is very complicated, such as upgrading, removing, adding.

5.

The DBA is accountable for:

- * Development of conceptual and physical schemas, as well as parts of the external schema that are commonly used.

- * License and protection.

- * Availability of data and failure recovery.

- * Database tuning: To ensure sufficient performance as user needs change, the DBA is responsible for modifying the database, in particular the conceptual and physical schemes.

Even if he / she is not involved in running his or her own queries, a DBA needs to consider query optimization because some of these duties (database design and tuning) are related to query optimization. Unless the DBA knows the performance needs of commonly used queries and how these queries will be optimised and performed by the DBMS, it is not possible to make good design and tuning decisions.

6.

Single valued attributes-The value of a single attribute has just a single value. The person could only have one 'date of birth,' name,' There may be a single value for single valued attributes. Though both are valued attributes that are single.

Multivalued attributes-There may be several values in multivalued attributes. There may be multiple phone numbers, multiple degrees, etc. for a person. In the ER diagram, multivalued attributes are shown by a double line connecting to the object.

7.

The database management system provides many benefits over the file system. Few of them have the following:

- **Redundantless data-** Redundancy is eliminated by normalisation of data. No replication of data saves storage and enhances access time.
- **Consistency and integrity of data-** As we mentioned earlier, data redundancy is the root cause of data inconsistency, as data normalisation takes care of data redundancy, data inconsistency is often taken care of as part of it.
- **Data Security:** In database systems, it is simpler to add access restrictions so that only approved users can access the data. Each consumer has a different access set, so data is shielded from problems such as identity theft , data breaches, and data misuse.
- **Privacy:** Restricted access implies data privacy. Database systems handle information in such a way that the information is readily available with quick response times. Database systems handle data in such a way.
- **Simple recovery:** Since database systems retain data backups, in the event of a malfunction, it is easier to completely recover the data.
- **Flexible:** Database systems are more flexible than systems which process files.

8.

A database includes a huge amount of information. User data is not all of that stuff, some of it can be metadata etc. So, it is very important to provide data independence for a database.

Basically, data independence means that if data is altered at a level, it does not influence the view of data at the higher levels. Thus, the data at the higher levels should be independent of the alteration of the data at the lower levels..

There are two forms of data independence, i.e., Logical and physical

Data independence can be described as follows: Each higher level of the architecture of the data is resistant to changes in the architecture's next lower level.

Physical independence: The logical system remains unchanged even though, for optimization or reorganisation purposes, the storage space or form of some data is modified. It does not shift inside this external schema. Since certain physical schemes have been reorganised here, changes may be needed in this internal schema. In most databases and file environments, physical data independence is present in which hardware encoding storage, precise location of data on disc, merging of records, etc. are hidden from the user.

Logical independence: For most modifications of the logical structure, the external scheme can remain unchanged. This is particularly advantageous since no alteration or new translation of the application software is required.

9.

The significant benefit of the network model are—

1.) Conceptual simplicity: The network model is also conceptually simple and easy to build, much like the hierarchical model.

2.) Ability to manage more types of relationships-The network model can handle relationships that are one to many and many to many, which is great support in modelling real-life scenarios.

10.

We can declare that an index in one table is connected to an index in another by a foreign key relationship and allow you to impose restrictions on what can be done to the table containing the foreign key. To preserve referential integrity, the database enforces the rules of this partnership. The score table in the sample sample database, for example, includes a student ID column that we use to connect students in the student table with score records.

We didn't establish any explicit relationship between them when we created these tables in Chapter 1. If we were to do so, score.student.id would be declared a foreign key for the column of student.student.id. Unless it contains a student ID value that exists in the student table, that prevents a record from being entered into the score table. (In other words, for non-existent learners, the foreign key prevents the entry of scores.) We could also set a limit so that if a student is deleted from the student table, all corresponding records in the score table for the student should be automatically deleted as well. Since the effect of the delete cascades from one table to another, this is called cascaded delete.

11.

Relation instance: The relationship instance is a finite set of tuples in the relational database system. There are no duplicate tuples for relation instances.

Schema: A relationship schema specifies the name of the relation (table name), attributes, and their names.

Tuple: A table row reflects the record of a relationship and is known as a relationship tuple.

Domain: A collection of possible values for a specific attribute is known as a relationship domain. There is an atomic domain, which means the values are indivisible. Set of values for the EMPLOYEE FirstName attribute, for example, rel rel relation are atomic.

12.

Sales: To store customer information, information on production and details of invoices.

Airlines: we make early bookings to travel through airlines, this reservation information is stored in the database along with flight schedule.

Education sector: In schools and colleges, database systems are frequently used to store and retrieve data about student details, staff details, course details, examination details, payroll information, attendance details, fee details, etc.

Data Isolation: Because data is scattered across different files and files may be in different formats, it is difficult to write new application programmes to retrieve the appropriate data.

Application programme dependence: Changing files would result in changes to the application programmes.

Data Protection: Data should be protected from unauthorised access, such as a college student should not be able to see teachers' payroll information, such protection restrictions are difficult to apply to file processing systems.

Data redundancy: Data redundancy refers to data replication, let's assume we handle a college 's data where a student is enrolled for two classes, in such a situation the same student information would be stored twice, which would require more storage than required. Redundancy of data often leads to higher storage costs and poor time for access.

Data Isolation: Since data is spread around different files and files may be in different formats, it is difficult to write new application programmes to retrieve the required data.

13.

-- There are four types of constraints in a relational database:-

Domain constraints: Domain constraints make sure the information is configured to

The value entered in a specific column must match the data value of a particular column.

The specified form for that column. The domain data form comprises a string, character, integer, time , date, etc.

ID	NAME	COLLEGE	AGE
1100	Anam	RJIT	21
1101	Sahil	RJIT	20
1102	Meetali	RJIT	19
1103	Shivam	RJIT	C

In the table above, since its data type is integer, the Age column can not take the data as C.

2. Key constraints:-Key constraints are the set of entities that are used uniquely to define an entity within its entity sets. The Key Entity Set can have several keys, but the primary key will be one key. A primary may contain in the relational table a unique and null value.

ID	NAME	COLLEGE	AGE
1100	Anam	RJIT	21
1101	Sahil	RJIT	20
1102	Meetali	RJIT	22
1103	Shivam	RJIT	21

It must be original in the table above, so the 1001 can not be replicated.

3.Entity constraints:-The entity integrity constraints include the primary key, and the entity constraints ensure that the primary key must include the desired value of the data form requested. Therefore, the primary value does not contain a null value since the value of the primary key attribute uniquely determines the entity in the relation. It would therefore not act if it was null.

ID	NAME	COLLEGE	AGE
1100	Anam	RJIT	21
1101	Sahil	RJIT	23
1102	Meetali	RJIT	21
	Shivam	RJIT	19

The ID can not have a null value in the table above, since it is the primary key in the table, and the primary key can not have a null value.

4. Restrictions on referential integrity:-Referential integrity is a property of knowledge that states that all its references are true. In relation to the database management system, if the value of a table attribute references the value of another table attribute in the same or different relationship, then the reference value must be present.

ID	NAME	COLLEGE	AGE	CODE
1100	Anam	RJIT	21	121
1101	Sahil	RJIT	23	123
1102	Meetali	RJIT	21	125
1103	Shivam	RJIT	19	122
1104	Maroon	RJIT	21	124

	CH

In the table above, the CODE can not be 104 in the first table as it is not specified in the second table(reference).

14.

To address the limitations of the hierarchical database model , the network database model was developed. A child can be connected to multiple parents in this type of model, a function that has not been embraced by the hierarchical data model. As owners, the parent nodes are identified and the child nodes are called members.

Network Model Advantages

The network model, as seen in the diagram, can help many or many relationships. D2 and C3 have several masters each. For D2, the masters are C1 and C2, whereas B1 and B2 are for C3. The network data model will deal with many to many relationships in this way, where the hierarchical data model did not.

Network Model Drawbacks

The network model has some drawbacks, even though it is an improvement over the hierarchical model. These are – –

- Even more complex than the Hierarchical model is the network model. As such, it is hard to manage and to sustain.
- Although the Network model is more robust than the Hierarchical model, it still has issues with flexibility. By assigning them in the form of owners and representatives, not all interactions can be managed.
- The configuration of the Network Model is very complex, so in order to incorporate or change it, the programmer needs to understand it well.

15.

Integrity constraints Categories:

Various forms of limits on honesty are-

- Integrity of Domains
- Integrity Restriction of Entity
- Constraint of referential Honesty
- Main Restrictions

1. Integrity of Domain-

Integrity of the domain requires specifying a valid set of values for an attribute. You specify the type, length or size of the data, the null value permitted, the unique or

non-unique value for an attribute, the default value, the range (between values) and/or particular attribute values.

2. Integrity Restriction of Entity-

This rule states that the value of an attribute of a primary key may not be null in any database relationship.

3.Constraint of Referential Integrity-

It states that if a foreign key exists in a relationship, either the foreign key value must correspond in its home relationship to a primary key value of a certain tuple, or the foreign key value must be null.

The guidelines are:

- If matching records exist in a related table, you can't delete a record from a primary table.
- If that record has related records, you can't change the primary key value in the primary table.
- You can not enter a value which does not exist in the primary key of the primary table in the foreign key field of the related table.
- However, in the foreign key, you can enter the Null value, specifying that the records are unrelated.

4.Key Constraints-Key Constraints-

A Key Constraint is a declaration that a specific identifier for a tuple is a certain minimum subset of the fields of a relationship. Types of key limitations-

- Primary Key Restrictions
- Unique key restrictions
- Constraints of the Foreign Key
- NOT NULL limitations
- Checking Restrictions

