Database Management System

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Abstract: This research paper is on the Database Management System. DBMS has been much advanced in last 20-22 years and has made an identification of its own just as other software applications. With advancement in the information technology, it has become important to maintain the software that supports data entry with accuracy and reliability. DBMS has much more advanced technology now-a-days so that we can maintain the data with an ease manner. Also DBMS softwares are available at various levels so that each and every business can afford such software application. Also there will sure innovation in the future of DBMS with advancement of information technology. And also many new DBMS software will be available at will.

Keywords: data; management; database; metadata; constraints

I. INTRODUCTION

This research paper is developed with an introduction to the DBMS. We can define the DBMS as working with the different types of data which helps in storage, retrieve and manipulation of the data. It helps the users to view the data securely. It also helps to maintain the data with a proper accuracy. DBMS acts as an intermediate between the user and the records. The user can get all the information that he needs as and when needed. The functions of DBMS have four main categories:

- Definition of Data – This function performs the structure of the table that will store the data.

- Manipulation – This function includes different types of command to insert, delete and edit of the data in the table.

- Retrieval – This function is used to view the data from the database tables.

- Database Administrator – He is responsible for all the activities that he performs with the database. He has to maintain the database properly by keeping the regular back up so that he can recover data at the time of database failure.

Data, information and knowledge are closely related terms, but each has its own role in relation to the other. Data is collected from the various sources and analysed so that we can create information suitable for making decision. We can knowledge from different types of experience dealing with information on a subject. For example, we can consider AMERICA as a data for the tourist who can take decision on where to go for a tour place in America. Now taking the different views from the different people living in America or has an idea of the different places in the America is known as Knowledge.

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III. WHAT IS MANAGEMENT SYSTEM?

A management system is a set of rules and procedures which help us to create organize and manipulate the database. It is used to manipulate the data from the database. The type of management system in the database can either manual or automatic. The data are always maintained with some specific rule. Every DBMS has its own rules and regulation that the user must have to follow. Such rules are identified as Constraints which is discussed late in this research paper.

IV. HISTORY OF DBMS

The concept of the relational model was firstly introduced by Dr. Edgar F. Codd in early's 1970. With advancement in technology, hardware became more interactive with DBMS software applications. The dominant database language, standardised SQL for the relational model, has influenced database languages for other data models. Object databases developed in the 1980s to overcome the inconvenience of object-relational impedance mismatch, which led to the coining of the term "post-relational" and

also the development of hybrid object relational databases. The normal definition of DBMS can be spoken as a software application that helps to manage with the different types of data in an easy reliable manner.

V.   DEFINITION OF DBMS

As per the definition according to textbook, DBMS is a collection of interrelated data and a set of programs to access those data in the accurate manner.

Dr. Edgar F. Codd, has an advanced view of DBMS. He said that DBMS cannot be only used for a specific purpose. But it also needs to store and retrieve the data from the different tables as well as from the different databases.

The question might arise what are databases, tables????? They both have the simple definition as….

Database is a collection of different types of tables developed for the same concept (project).

Table is a collection of different types of data in the form of columns and rows.

For e.g. We can name "SJVCollege" as a name of the database which has the different types of tables that can give information about the college as and when needed. For e.g. "admission", "fees", "streams", "faculties" etc. are the different types of tables that can be prepared kin SJVCollege database.

The main goal of DBMS is to provide an easy and reliable way to store and retrieve data from the database to the client.

VI.   WHAT IS DATABASE?

Data: It is a collection of statistics and information that has no meaning without proper arrangement like 1, Viral, Surendranagar, 9825429123, etc….are all called data. They can be considered as raw material on which the necessary procedures has to be made, because we cannot identify what is the meaning of 1, Viral, Surendranagar, 9825429123 in the above data if any fact has a particular meaning.

Record: The collection of meaningful data is called record, for e.g. in the above paragraph we can consider the data as follow:

No.	Name	City	Mobile No.
1.	Viral	Surendranagar	9825429123

So now all the data is collectively organised and we can identify each of the above data. Now we came to know that Viral is a name of a person who is living in the Surendranagar and whose mobile number is 9825429123. Such type of meaningful organised collection is called record.

VII.   DIFFERENCE BETWEEN DATABASE SYSTEM AND FILE SYSTEM

❑ **Data redundancy and inconsistency**
  Maintaining the data according to the file system is a difficult one as it will be maintained manually. So human errors create the inconsistency at the time inserting or may be deleting the data. DBMS has a specific rules and regulations which has needed to be followed so that the data can maintained accurate.

❑ **Difficulty in accessing data**
  It is very difficult to access data if we are using the file system manually. Using DBMS we can easily access the data.

❑ **Integrity problems**
  It is difficult to maintain the accurate records in the manual file system. DBMS can maintain the original record for a long time as per the user has entered.

❑ **Security problems**
  As discussed above, manual file system has to be kept under a lock so that no other can read or write. DBMS can be made password protected and changing passwords on regular basis can increase the security.

VIII.   HOW DBMS CAME?

Ordinary file system	Computerised File System	DBMS
Totally Manual	Remove Manual-Handling	Searching is Faster
Burden of Large Files	Files are easily manageable	Removal of File Mgmt
Mgmt is hard	Mgmt is convenient	Mgmt is more Convenient & Efficient
Uncomfortable with moving of Data	Easy to move Data	More easy to move data
Unreliable	Reliable & Compact	Reliability is Increased
Data Insecure	Security is Good Enough	Security is more Powerful

IX. DATA ABSTRACTION

Data Abstraction is a concept of hiding from the actual data. Abstraction is a concept which deals that useless data must be hide from the customers. Also it is based on the Object Oriented Programming of Encapsulation which means that give the customer only he wants, hide all the other data from it.

This can be implemented by writing the programming code. Give the user that he wants. Don't show the user how the data is processed. It is the common policy of every company that personal information of the company or product should not be thrown out and can only be accessed by the specific authorised person. For e.g. the user can get the details about the price of different types of mobiles from the particular websites. But he cannot get the details of how the mobile is manufactured in the company. He can take all the information about the mobile like type, features, price, facilities, etc.

So giving only the details about the mobile and hiding the steps of manufacturing of the mobile is known as data abstraction. The data abstraction is highest at the customer level. Because they are considered as the outsider third party from whom we will need to hide the data. The data abstraction security is medium at the department level of the company as they might need the basic information about the product or the category. So some data may need to be accessed by the finance department of the company to decide the price of the mobile on the base of raw materials from which the mobile is being made. Data abstraction is some-what nil at the manufacturing department or the owner of the company they has to keep the track of each and every product day-to-day.

As discussed above, manual file system has to be kept under a lock so that no other can read or write. DBMS can be made password protected and changing passwords on regular basis can increase the security.

X. DBA(DATABASE ADMINISTRATOR)

DBA – Database Administrator is a person who is responsible for all the dealing with the database. He has to arrange all the data in the proper format. He also has to organise all the data such that any data can be easily retrieved from the database as and when needed. He can perform the following tasks with the Database in the DBMS process.

1. He has to define the data abstraction as well as data independence from the database.
2. He also has to decide the storage structure of the database like sequential, index or direct.
3. He has to create a programming code in the database using his ability that what rights should a particular user has and what kind of data s/he will access and what kind of data he can't access.
4. He can create a new id for a particular user and can access rights. Also he can take back all the rights given to a particular user using Grant and Revoke Command.
5. He has to define the column attribute with a proper constraint so that each and every record can be easily identified.
6. He has to create a proper centralised database so that no unauthorised access from the third party can try to manipulate the record from the database.
7. The most important function is to create the regular backup and restore facility so that in case of hardware or software failure, all the records can be easily recovered.
8. He has also to keep certain rules and regulations of the database so that no record is violated by the database.

XI. DATA MODELS

A Data-Model is a collection of tools for describing ***Data, Relationships among Data, Semantics of Data, and Consistency Constraint***

DATA→Information
RELATIONSHIP→Relationship
SEMANTICS→Meaning
CONSISTENCY→Validity

There are two important types of Data models available in the database concept….

E-R Model	Relational Model.
1. It is a graphical representation.	1. It is a tabular representation.
2. High-level Model.	2. Low-level Model.
3. It is created using different types of symbols.	3. It is created using only table.

There are also other data models available in the database concept as follows:

1. Object Oriented Data Model
2. Network Data Model
3. Hierarchical Data Model
4. Water Fall Data Model

XII. DATABASE LANGUAGES

The following are the different types of languages that are available in the database concept as follows:

1. **DDL (Data Definition Language):** It contains the different commands to create, alter and delete the table structure. It is used to define the table structure with its data types like number, character, boolean etc… values. We can also modify the structure of the table as and when needed. We can add the fields and also remove useless fields from the tables.
2. **DML (Data Manipulation Language):** It contains the different commands to deal with records of the tables in the database. It is used to insert the records in the table. The user can also modify his or her record as and when needed. If he wants, he can delete his record from the database. But the program code has to be written by the DBA and the user will only perform an action to a particular event.

XIII. RELATIONAL DATABASE MANAGEMENT SYSTEM

This is an advanced concept of the DBMS. DBMS was only dealing with an independent entity that means table. Relational Database Management System came with the concept of dealing with more than one or a set of tables. It is totally based on the concept of Normalization which has 5 normal forms like 1NF, 2NF, 3NF, 4NF and 5NF. All the above data models are developed with an aim to develop the proper relationship between the different types of tables.

The following are the different types of relationship:
1. One-to-One: An entity in A is associated with at most one entity in B and vice-versa.
2. One-to-Many: An entity in A is associated with any number (zero or more) of entities in B but an entity in B is associated with at most one entity in A.
3. Many-to-Many: An entity in A is associated with any number (zero or more) of entities in B and vice-versa.
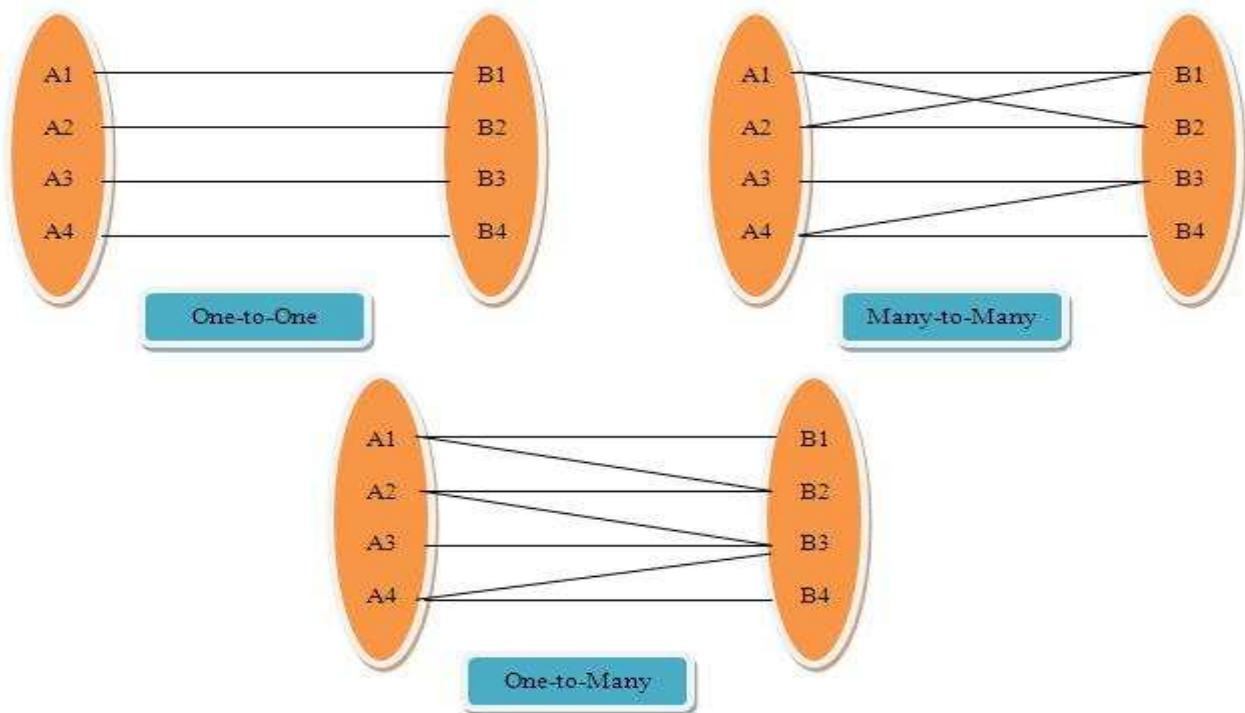
XIV. DR. E.F. CODD'S 12 RULES

Dr. E. F. Codd has developed 12 rules to specify the perfect RDBMS program. According to his concept he has said that the DBMS who follows atleast 6-7 rules can be said as the category to be kept in the RDBMS program. He has also said that the DBMS software that follows atleast 10-12 can be considered as the perfect RDBMS program. It has the following rules:
1. The Information Rule
2. Guaranteed Access Rule
3. Systematic Treatment of Null values
4. Dynamic online catalog based on the Relational Model
5. Comprehensive Data Sublanguage Rule
6. View Updating Rule
7. High-level Insert, Update and Delete
8. Physical Data Independence
9. Logical Data Independence
10. Integrity Independence
11. Distribution Independence
12. Non Subversion Rule

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Viral Rajendrakumar Dagli: I have completed B.Com. with 57% from Saurashtra University. I have also completed PGDCA with 63% from Saurashtra University. I have completed my master degree i.e. MCA from IGNOU in the year June-2013 with 61% as aggregate. I have worked as a programmer-cum-lecturer in Shree Swami Vivekanand College, Surendranagar for 5½ years. Right now I am working as Lecturer in Smt. S. J. Varmora BBA & BCA Mahilla College, Surendranagar.