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Database Management System: An Introduction

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ABSTRACT: In this research paper, we'll discuss about the basic DBMS and its types. Also, we will see the utility of DBMS i.e. how it's better than the legendary/ traditional file system. In this research paper, we also have to discuss about the most important concept of ACID properties. Database can be defined as a ordered group of data saved in a computer which can be in number of ways. ACID properties are mandatory to be followed for a consistent and perfect design of a database.

KEYWORDS: DBMS, RDBMS, Object-Oriented, Network Model, Concurrency, Redundancy, ACID Properties.

I. INTRODUCTION

The full form of DBMS is Database Management System. Generally, Database can be defined as a organization and collection of data that is stored and accessed electronically [1]. The software which is used for managing the databases is called the DBMS. Excel, MySQL, Oracle, etc. are the examples of popular commercial DBMS used in different applications [2]. We can take an example of a college database. It arranges the information of students, teachers, administration staff, etc. It helps in the efficient recapturing, placing, and removal of data from database [2].

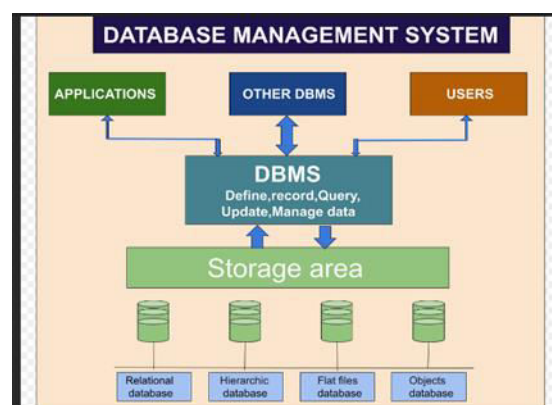


Fig. 1. Basic View Of DBMS

II. TYPES OF DBMS

Now, in this section we'll see the discrete types of database management system that are harnessed in today's world.

A. Relational Model

This model refers to the data that is arranged in two dimensional tables using rows, columns. This model is based on the Structured Query Language [4]. It is mainly used for the personal computers and also for large mainframe systems. In a relational model, to uniquely identify each record, there is a key field in every database's table. Few examples of relational model are, MySQL, Oracle Database, etc. [4].

B. Object – Oriented Model

This database model refers to the data that is represented in the form of objects. It’s basically a combination of object-oriented and concepts of relational database. This model is very easy to maintain [4].It is mainly used in OOP’s concept. The best example is the Object DB Software. Object DB Software is the most effective software for developing Java database applications by using the Java Persistence Application Programming Interface [4].

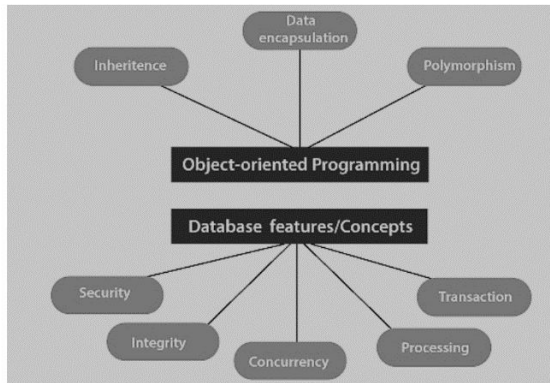


Fig. 2. Object-Oriented Programming

C. Hierarchical Model

This prototype refers to the data elements are having a one to many relationships. As the name suggests, it is a hierarchy i.e. its organized like a tree structure. Its mainly used in the industry on mainframe platforms. IBM (International Business Machines) is the best example of hierarchical model [4].

D. Model Of Network

This prototype that allows every record to have multiple child and parent records. In the year 1969, Charles Bachman developed the network model.The supreme benefit of the network model is that it supports the many-to-many relationships. Raima Database Manager, TurboIMAGE, Univac DMS-1100, etc. are the best examples of network model [5].

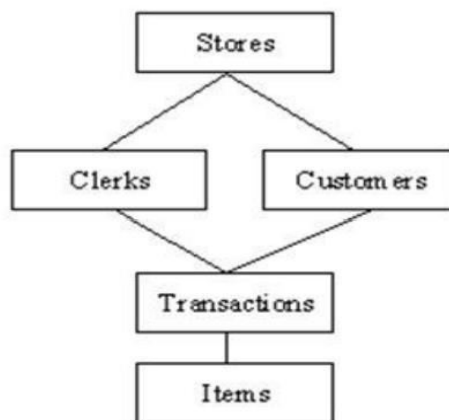


Fig. 3 Network Model

II. UTILITY OF DBMS

A. Redundancy Of Data:

In a database data redundancy arises when the same set of data is stored at different locations. In DBMS, there is very few or no data redundancy present at all [8, 13].



Fig. 4. Data Redundancy

B. Inconsistency Of Data:

When there is data redundancy then data inconsistency is guaranteed. Inconsistency of data means that the identical data which is stored on various locations match or not. If it doesn't match then the data is inconsistent. In DBMS, there is a single repository of data in which data is consistent. It is stored once and accessed by many users [8, 13].

C. Security Of Data:

In Database Management System, it ensures that only the authorized users have the access to the data and a mechanism is there to identify the authorized user and access privileges [8, 13].

D. Data Concurrency

In database mgmt. system, the data is stored in more than single servers in a network. Also, there is a mechanism that avoids or prevents the same group of data to be modified by more than one person simultaneously [8, 13].

E. Backup And Recovery Of Data:

This is one of the most important benefits of DBMS. DBMS provides a strongest framework for backup of data. All the users are not required to take the backup because the DBMS takes care of it.



Fig. 5. Data backup

III. ACID PROPERTIES IN DBMS

This is the most important and concept in database management system. Full form of ACID is Atomicity, Consistency, Isolation, Durability [10]. A transaction in a database can modify the contents of a database. They generally use read and write operations to access the data. So, to maintain or to keep a particular database consistent and updated we have to follow some properties, these we can call the ACID properties [10].

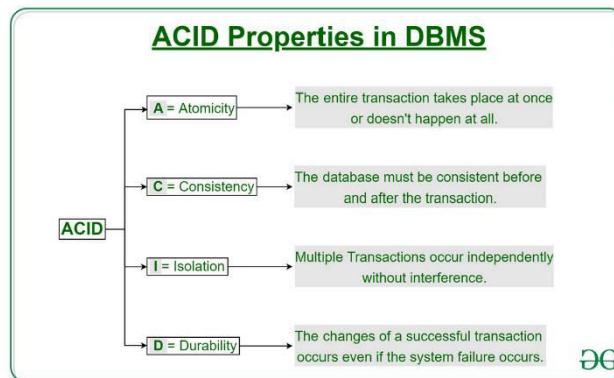


Fig. 6. Acid Properties

Atomicity simply means the transaction will occur at once or will not occur at all. The transactions never occur in a partial manner. In atomicity, there are two types of operations as follows:-

Abort:- It simply means that in case if a transactions gets aborted then the changes made to the database will not be saved.

Commit:- It simple means that in case if a transaction get committed, then the changes made to it will be visible.

Consistency generally refers to how much the database is correct before and after the transaction. The user compulsorily has to maintain the integrity constraints and the database must be consistent as well [10].

Isolation property says that more than one transaction can occur at simultaneously without interference and disturbing the state of a database. For instance, if a transaction is executing then the changes going on in a transaction cannot be visible to some another transaction until and unless that change in that transaction is permanently committed [10].

Durability property says that the in case of a system failure the transaction which has completed execution the corresponding updates and modifications of that transaction are stored in a database. Now, the updates are stored in a non-volatile memory [10].

IV. CONCLUSION

In today's world, in almost every computer system we use the database management system. It is a very important need of a company [2].

Till date the database management system has shown a very excellent progress. The database systems has centered around the languages and the conceptual tools that help users to ingress, handle and sketch databases [2].

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