

# Database & Database Management System

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## Abstract:

A database is a collection of related files that are usually integrated, linked or cross-referenced to one another. The advantage of a database is that data and records contained in different files can be easily organized and retrieved using specialized database management software called a database management system (DBMS) or database manager.

A database management system is a set of software programs that allows users to create, edit and update data in database files, and store and retrieve data from those database files. Data in a database can be added, deleted, changed, sorted or searched all using a DBMS. If you were an employee in a large organization, the information about you would likely be stored in different files that are linked together. One file about you would pertain to your skills and abilities, another file to your income tax status, another to your home and office address and telephone number, and another to your annual performance ratings. By cross-referencing these files, someone could change a person's address in one file and it would automatically be reflected in all the other files.

## Components Of Database Management System

There are three components of Database Management System which are as follows:

- 1. Relational Database Management System:** A **relational database management system (RDBMS)** is a database management system (DBMS) that is based on the relational model. Many popular databases currently in use are based on the relational database model. RDBMSs have become since the 1980s a predominant choice for the storage of

information in new databases used for financial records, manufacturing and logistical information, personnel data, and much more. Relational databases have often replaced legacy hierarchical databases and network databases because they are easier to understand and use. However, relational databases have been challenged by object databases, which were introduced in an attempt to address the object-relational impedance mismatch in relational database, and XML databases.

- 2. Object Oriented Database Management System:** An **object database** (also **object-oriented database management system**) is a database management system in which information is represented in the form of objects as used in object-oriented programming. Object databases are different from relational databases which are table-oriented.
- 3. Hierarchical Database Management System:** A DBMS is said to be hierarchical if the relationships among data in the database are established in such a way that one data item is present as the subordinate of another one or a sub unit. Here subordinate means that items have "parent-child" relationships among them. Direct relationships exist between any two records that are stored consecutively. The data structure "tree" is followed by the DBMS to structure the database. No backward movement is possible/allowed in the hierarchical database.
- 4. Network Database Management System:** A DBMS is said to be a Network DBMS if the relationships among data in the database are of type many-to-many. The relationships among many to many appears in the form of a network. A

network database is structured in the form of a graph that is also a data structure. Though the structure of such a DBMS is highly complicated however it has two basic elements i.e. records and sets to designate many-to-many relationships. Mainly high-level languages such as Pascal, COBOL and FORTRAN etc. were used to implement the records and set structures.

### **Database Security**

**Database security** concerns the use of a broad range of information security controls to protect databases (potentially including the data, the database applications or stored functions, the database systems, the database servers and the associated network links) against compromises of their confidentiality, integrity and availability. It involves various types or categories of controls, such as technical, procedural/administrative and physical. Database security is a specialist topic within the broader realms of computer security, information security and risk management.

Security risks to database systems include, for example:

- Unauthorized or unintended activity or misuse by authorized database users, database administrators, or network/systems managers, or by unauthorized users or hackers (e.g. inappropriate access to sensitive data, metadata or functions within databases, or inappropriate changes to the database programs, structures or security configurations);
- Malware infections causing incidents such as unauthorized access, leakage or disclosure of personal or proprietary data, deletion of or damage to the data or programs, interruption or denial of authorized access to the database, attacks on other systems and the unanticipated failure of database services;
- Overloads, performance constraints and capacity issues resulting in the inability of authorized users to use databases as intended;
- Physical damage to database servers caused by computer room fires or floods, overheating, lightning, accidental liquid spills, static discharge, electronic breakdowns/equipment failures and obsolescence;

- Design flaws and programming bugs in databases and the associated programs and systems, creating various security vulnerabilities (e.g. unauthorized privilege escalation), data loss/corruption, performance degradation etc.;
- Data corruption and/or loss caused by the entry of invalid data or commands, mistakes in database or system administration processes, sabotage/criminal damage etc.

### **Advantages Of Database Management System**

1. **Improved availability:** One of the principle advantages of a DBMS is that the same information can be made available to different users.
2. **Minimized redundancy:** The data in a DBMS is more concise because, as a general rule, the information in it appears just once. This reduces data redundancy, or in other words, the need to repeat the same data over and over again. Minimizing redundancy can therefore significantly reduce the cost of storing information on hard drives and other storage devices. In contrast, data fields are commonly repeated in multiple files when a file management system is used.
3. **Accuracy:** Accurate, consistent, and up-to-date data is a sign of data integrity. DBMSs foster data integrity because updates and changes to the data only have to be made in one place. The chances of making a mistake are higher if you are required to change the same data in several different places than if you only have to make the change in one place.
4. **Program and file consistency:** Using a database management system, file formats and system programs are standardized. This makes the data files easier to maintain because the same rules and guidelines apply across all types of data. The level of consistency across files and programs also makes it easier to manage data when multiple programmers are involved.
5. **User-friendly:** Data is easier to access and manipulate with a DBMS than without it. In most cases, DBMSs also reduce the reliance of individual users on computer specialists to meet their data needs.
6. **Improved security:** As stated earlier, DBMSs allow multiple users to access the same data resources. This capability is

generally viewed as a benefit, but there are potential risks for the organization. Some sources of information should be protected or secured and only viewed by select individuals. Through the use of passwords, database management systems can be used to restrict data access to only those who should see it.

### **Disadvantages Of Database Management System**

There are basically two major downsides to using DBMSs. One of these is cost, and the other the threat to data security.

**Cost:** Implementing a DBMS system can be expensive and time-consuming, especially in large organizations. Training requirements alone can be quite costly.

**Security:** Even with safeguards in place, it may be possible for some unauthorized users to access the database. In general, database access is an all or nothing proposition. Once an unauthorized user gets into the database, they have access to all the files, not just a few. Depending on the nature of the data involved, these breaches in security can also pose a threat to individual privacy. Steps should also be taken to regularly make backup copies of the database files and store them because of the possibility of fires and earthquakes that might destroy the system.

### **Conclusion**

A database management system is defined, as well as its purposes and functions. One of the most powerful aspects of a DBMS is the ability to organize and retrieve data from different, but related, files. However, using

databases and DBMSs has its advantages and disadvantages. As you proceed with your career, you should be aware of the tradeoffs that accompany using these computerized tools. The tradeoffs we have discussed so far include such things as the redundancy, accuracy, accessibility, and user-friendliness of data in a DBMS. Being educated about the strengths and weaknesses of DBMSs will allow you to make more effective decisions about how to organize and use data.

The research that has done on Database Management System consist of concept of DBMS, types of DBMS, security in DBMS, advantages and disadvantages of DBMS. This research on DBMS will help others to clear DBMS in much easier way that they do it before. In this research DBMS is explained in a very systematic manner clearing all the facts about it and it makes the study of DBMS much easier than before.

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