



Database Management System



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What is Database Management System?

A Database Management System (DBMS), or simply a Database System (DBS) consist of :

- A collection of interrelated and persistent data (usually referred to as the database (DB)).
- A set of application programs used to access, update and manage that data (which form the data management system (MS)).

Brief History

- **Early 1960s:** first general purpose database by Charles Bachman from GE. Used the network data model.
- **Late 1960s:** IBM developed Information Management System (IMS). Used the hierarchical data model. Led to SABRE, the airline reservation system developed by AA and IBM. Still in use today.
- **1970:** Edgar Code of IBM developed the relational data model. Led to several DBMS based on relational model, as well as important theoretical results. Code wins Turing award.
- **1980s:** relational model dominant. SQL standard.
- **Late 1980s, 1990s:** DBMS vendors extend systems, allowing more complex data types (images, text).

Why Use a DBMS?

- Data independence and efficient access.
- Reduced application development time.
- Data integrity and security.
- Uniform data administration.
- Concurrent access, recovery from crashes.

Purpose of DBMS

1. Data redundancy and inconsistency

- Same information may be duplicated in several places.
- All copies may not be updated properly.

2. Difficulty in new program to carry out each new task

3. Data isolation —

- Data in different formats.
- Difficult to write new application programs.
- ⑩ files and formats

Purpose of DBMS ...

Security problems

Every user of the system should be able to access only the data they are permitted to see.

- E.g. payroll people only handle employee records, and cannot see customer accounts; tellers only access account data and cannot see payroll data.
- Difficult to enforce this with application programs.

Integrity problems

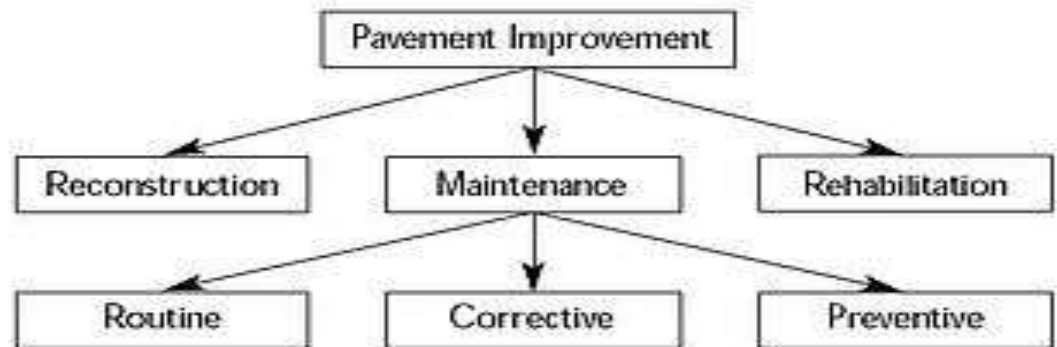
- Data may be required to satisfy constraints.
- E.g. no account balance below \$25.00.
- Again, difficult to enforce or to change constraints with the file-processing approach.

Data models

Hierarchical Model

- The hierarchical data model organizes data in a tree structure. There is a hierarchy of parent and child data segments. This structure implies that a record can have repeating information, generally in the child data segments.
- Hierarchical DBMSs were popular from the late 1960s, with the introduction of IBM's Information Management System (IMS) DBMS, through the 197

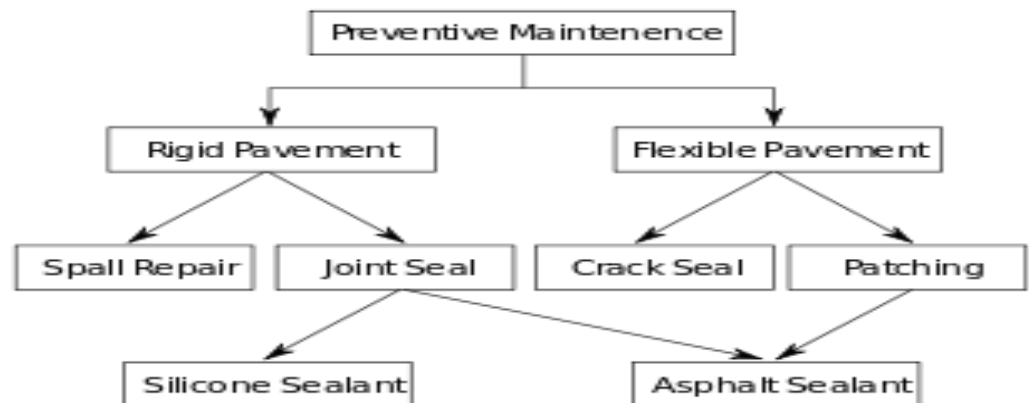
Hierarchical Model



Network Model

- The popularity of the network data model coincided with the popularity of the hierarchical data model. Some data were more naturally modeled with more than one parent per child.
- So, the network model permitted the modeling of many-to-many relationships in data. In 1971, the Conference on Data Systems Languages (CODASYL) formally defined the network model.

Network Model



Relational Model

- (RDBMS - relational database management system) A database based on the relational model developed by E.F. Code.
- A relational database allows the definition of data structures, storage and retrieval operations and integrity constraints.
- In such a database the data and relations between them are organized in tables. A table is a collection of records and each record in a table contains the same fields.

Properties of Relational Tables

- Values Are Atomic
- Each Row is Unique
- Column Values Are of the Same Kind
- The Sequence of Columns is Insignificant
- The Sequence of Rows is Insignificant
- Each Column Has a Unique Name

Components of DBMS

1. **Hardware:** Can range from a PC to a network of computers.
2. **Software:** DBMS, operating system, network software (if necessary) and also the application programs.
3. **Data:** Used by the organization and a description of this data called the schema.
4. **People:** Includes database designers, DBAs, application programmers, and end-users.
5. **Procedure:** Instructions and rules that should be applied to the design and use of the database and DBMS.

Advantage of DBMS

- **Controlling Redundancy**
- **Sharing of Data**
- **Data Consistency**
- **Integration of Data**
- **Integration Constraints**
- **Data Security**
- **Report Writers**

Advantage of DBMS...



- **Control Over Concurrency**
- **Backup and Recovery Procedures**
- **Data Independence**

Disadvantage of DBMS

- ❑ **Cost of Hardware and Software**
- ❑ **Cost of Data Conversion**
- ❑ **Cost of Staff Training**
- ❑ **Appointing Technical Staff**
- ❑ **Database Damage**

DBMS Languages

Data Definition Language-DDL

- Data Definition Language (DDL) statements are used to define the database structure or schema.

Some examples:

- CREATE - to create objects in the database
- ALTER - alters the structure of the database
- DROP - delete objects from the database
- TRUNCATE - remove all records from a table, including all spaces allocated for the records are removed
- COMMENT - add comments to the data dictionary
- RENAME - rename an object

Data Manipulation Language (DML)

Data Manipulation Language (DML) statements are used for managing data within schema objects.

Some examples:

- ❑ SELECT - Retrieve data from the a database
- ❑ INSERT - Insert data into a table
- ❑ UPDATE - Updates existing data within a table
- ❑ DELETE - deletes all records from a table, the space for the records remain
- ❑ MERGE - UPSERT operation (insert or update)
- ❑ CALL - Call a PL/SQL or Java subprogram
- ❑ EXPLAIN PLAN - explain access path to data
- ❑ LOCK TABLE - control concurrency

Thanks.....!!!!!!!



- Any Query.....!!!!!!!