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Lec # 9

Database Management System

DBMS(Database Management System):

- A database management system (DBMS) refers to the technology for creating and managing databases. DBMS is a software tool to organize (create, retrieve, update and manage) data in a database

- The main aim of a DBMS is to supply a way to store up and retrieve database information that is both convenient and efficient.
- By data, we mean known facts that can be recorded and that have embedded meaning.
- Normally people use software such as DBASE IV or V, Microsoft ACCESS, or EXCEL to store data in the form of database.
- A datum is a unit of data. Meaningful data combined to form information.
- Hence, information is interpreted data - data provided with semantics. MS. ACCESS is one of the most common examples of database management software.

DATA & KNOWLEDGE:

Knowledge refers to the useful use of information. As you know, that information can be transported, stored and shared without much problem and difficulties but the same cannot be said about knowledge. Knowledge necessarily involves a personal experience and practice.

Database systems are meant to handle a large collection of information. Management of data involves both defining structures for storage of information and providing mechanisms that can do the manipulation of those stored information. Moreover, the database system must ensure the safety of the information stored, despite system crashes or attempts at unauthorized access.

- To develop software applications In less time.
- Data independence and efficient use of data.
- For uniform data administration.

- For data integrity and security.
- For concurrent access to data, and data recovery from crashes.
- To use user-friendly declarative query language.

Where is a Database Management System (DBMS) being Used?

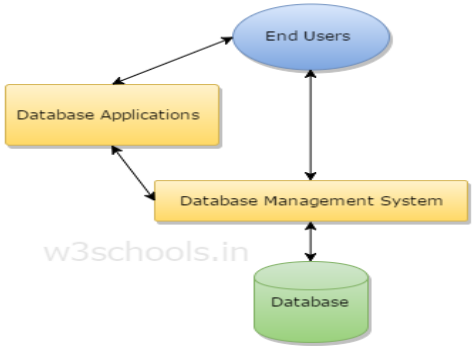
- Airlines: reservations, schedules, etc
- Telecom: calls made, customer details, network usage, etc
- Universities: registration, results, grades, etc
- Sales: products, purchases, customers, etc
- Banking: all transactions etc

Advantages of DBMS

A DBMS manage data and has many advantages. These are:

- Data independence: Application programs should be as free or independent as possible from details of data representation and storage. DBMS can supply an abstract view of the data for insulating application code from such facts.
- Efficient data access: DBMS utilizes a mixture of sophisticated concepts and techniques for storing and retrieving data competently, and this feature becomes important in cases where the data is stored on external storage devices.
- Data integrity and security: If data is accessed through the DBMS, the DBMS can enforce integrity constraints on the data.
- Data administration: When several users share the data, integrating the administration of data can offer major improvements. Experienced professionals understand the nature of the data being managed and can be responsible for organizing the data representation to reduce redundancy and make the data to retrieve efficiently.

Components of DBMS



Components of a Database Management System

- **Users:** Users may be of any kind such as DB administrator, System developer or database users.
- **Database application:** Database application may be Departmental, Personal, organization's and / or Internal.
- **DBMS:** Software that allows users to create and manipulate database access,

There are different types of database. They are:

- Bibliographic
- full-text
- numeric
- images

In a database, even the smallest portion of information becomes the data.

Example, Student is a data, roll number is a data, and the address is a data, height, weight, marks everything is data.

In brief, all the living and non-living objects in this world is a data..

A database environment is a collective system of components that comprise and regulates the group of data, management, and use of data which consist of software, hardware, people, techniques of handling database and the data also.

Here, the hardware in a database environment means the computers and computer peripherals that are being used to manage a database and the software means the whole thing right from the operating system (OS) to the application programs that includes database management software like M.S. Access or SQL Server. Again the people in a database environment include those people who administrate and use the system. The techniques are the rules, concepts, and instructions given to both the people and the software along with the data with the group of facts and information positioned within the database environment.

SQL (Structured Query Language) is a standard database programming language used for accessing and manipulating data in a database.

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For handling database and database-related programming, programmers need to have some medium, or you can say interface to particularize a set of commands or codes to deal with a database or to access database's data

What Will You Learn from SQL

SQL gives unique learning and database handling techniques on Structured Query language and will help you make better command over the SQL queries and to deal with these codes efficiently. Since SQL helps you to include database creation, database or table deletion, fetching row data and modifying those data, etc., in parallel SQL makes things automatic and smooth for end users to access and deal with that application's data efficiently.

What is SQL?

- SQL is Structured Query Language which was originally developed by IBM.
- SQL is pronounced as "sequel".
- SQL is a computer language for storing, manipulating and retrieving data in a relational database.
- SQL is the standard language for Relation Database System.

The SQL Can Do

- SQL can CREATE new databases and its objects like (table, index, views, store procedure, functions, and triggers).
- SQL can ALTER the structure of the existing databases.
- SQL can DROP(delete) objects from the database.
- SQL can TRUNCATE(remove) all records from the tables.
- SQL can COMMENT to the data dictionary.
- SQL can RENAME an object.
- SQL can SELECT(retrieve) data from the database.
- SQL can INSERT data into a table.
- SQL can UPDATE existing data within a table.

- SQL can DELETE records from a database table.
- SQL can set GRANT and REVOKE privileges of users in a database.

  - **SQL statements always start with the keywords.**
  - **SQL statement ends with a semicolon.**
  - **SQL is not case sensitive, means the update is the same as UPDATE**

SQL SYNTAX

SELECT Statement
Syntax:

```
SELECT column_name(s) FROM table_name
```

SELECT Statement with WHERE Clause
Syntax:

```
SELECT [*] FROM [TableName] WHERE [condition1]
```

SELECT Statement with WHERE AND/OR Clause
Syntax:

```
SELECT [*] FROM [TableName] WHERE [condition1] [AND [OR]] [condition2]...
```

SELECT Statement with ORDER BY
Syntax:

```
SELECT column_name()
FROM table_name
ORDER BY column_name() ASC or DESC
```

INSERT INTO Statement
Syntax:

```
INSERT INTO table_name (column, column1, column2, column3, ...)
VALUES (value, value1, value2, value3 ...)
```

UPDATE Statement
Syntax:

```
UPDATE table_name
SET column=value, column1=value1,...
WHERE someColumn=someValue
```

DELETE Statement
Syntax:

```
DELETE FROM tableName
WHERE someColumn = someValue
```

Data type	Description
SMALLINT	Integer numerical (no decimal). Precision 5
INTEGER(P) or INT(P)	Integer numerical (no decimal). Precision P
INTEGER	Integer numerical (no decimal). Precision 10
NUMERIC(P,S)	Exact numerical (Same as DECIMAL) Precision P and scale value S.
REAL	approximate numerical, mantissa precision 7
DECIMAL(P,S)	Exact numerical, 'P' is precision value and 'S' is scale value.
DOUBLE PRECISION	double precision floating point number
FLOAT(N)	Approximate numerical, floating-point with at least N digits
CHAR(N) or CHARACTER(N)	character string. fixed-length N
VARCHAR(N)	character string. Variable length. Maximum length N
BIT(N)	'N' is the number of bits to store
BIT VARYING(N)	'N' is the number of bits to store (length can vary up to N)
DATE	stores year, month, and day values
TIME	stores hour, minute and second values
TIMESTAMP	stores year, month, day, hour, minute and second values
TIME WITH	exactly same as time but also store an offset from UTC
TIME ZONE	of the time specified

SQL Command	Description
CREATE DATABASE	Creates a new database
CREATE TABLE	Creates a new table
ALTER DATABASE	Modifies a database
ALTER TABLE	Modifies a table
DROP TABLE	Deletes a table
CREATE INDEX	Creates an index
DROP INDEX	Deletes an index
SELECT	Fetch data from database tables
UPDATE	Modify data in a database table
DELETE	Deletes data from a database table
INSERT INTO	Inserts new data into a database table

Above SQL query are often used and always starts with these commands.