ASSIGNMENT

ON

ADVANCED DBMS LAB

Submitted to:

Sr.Elsin Chakkalackal

Dept:RMCA

Submitted by:

Sreelakshmi Madhusoodhanan

RMCA S2

DIFFERENT TYPES OF DATABASE MANAGEMENT SYSTEMS

DBMS:

Database Management Systems (DBMS) are software systems used to store, retrieve, and run queries on data. A DBMS serves as an interface between an end-user and a database, allowing users to create, read, update, and delete data in the database.

DBMS manage the data, the database engine, and the database schema, allowing for data to be manipulated or extracted by users and other programs. This helps provide data security, data integrity, concurrency, and uniform data administration procedures. DBMS optimizes the organization of data by following a database schema design technique called normalization, which splits a large table into smaller tables when any of its attributes have redundancy in values. DBMS offer many benefits over traditional file systems, including flexibility and a more complex backup system.

Database management systems can be classified based on a variety of criteria such as the data model, the database distribution, or user numbers. The most widely used types of DBMS software are relational, distributed, hierarchical, object-oriented, and network.

TYPES:

- Relational database.
- Object oriented database.
- Hierarchical database.
- Network database.
- Centralised database
- Distributed database
- Personal database
- End-user database
- Commercial database
- NoSQL database
- Operational database
- Graph database

Relation Database:

- A relational database management system (RDBMS) is a system where data is organized in two-dimensional tables using rows and columns.
- This is one of the most popular data models which is used in industries. It is based on SQL.
- Every table in a database has a key field which uniquely identifies each record.
- This type of system is the most widely used DBMS.
- Relational database management system software is available for personal computers, workstation and large mainframe systems.
- For example − Oracle Database, MySQL, Microsoft SQL Server etc.

Object oriented database:

It is a system where information or data is represented in the form of objects which is used in object-oriented programming.

- It is a combination of relational database concepts and object-oriented principles.
- Relational database concepts are concurrency control, transactions, etc.
- OOPs principles are data encapsulation, inheritance, and polymorphism.
- It requires less code and is easy to maintain.

For example − Object DB software.

Hierarchical database:

It is a system where the data elements have a one to many relationship (1: N). Here data is organized like a tree which is similar to a folder structure in your computer system.

- The hierarchy starts from the root node, connecting all the child nodes to the parent node.
- It is used in industry on mainframe platforms.

For example− IMS(IBM), Windows registry (Microsoft).

Network database:

A Network database management system is a system where the data elements maintain one to one relationship (1: 1) or many to many relationship (N: N).

It also has a hierarchical structure, but the data is organized like a graph and it is allowed to have more than one parent for one child record.

Centralized Database

It is the type of database that stores data at a centralized database system. It comforts the users to access the stored data from different locations through several applications. These applications contain the authentication process to let users access data securely. An example of a Centralized database can be Central Library that carries a central database of each library in a college/university.

Advantages of Centralized Database

- It has decreased the risk of data management, i.e., manipulation of data will not affect the core data.
- Data consistency is maintained as it manages data in a central repository.
- It provides better data quality, which enables organizations to establish data standards.
- It is less costly because fewer vendors are required to handle the data sets.

Disadvantages of Centralized Database

- The size of the centralized database is large, which increases the response time for fetching the data.
- It is not easy to update such an extensive database system.
- If any server failure occurs, entire data will be lost, which could be a huge loss.

Graph database:

Graph Databases are NoSQL databases and use a graph structure for semantic queries. The data is stored in the form of nodes, edges, and properties. In a graph database, a Node represents an entity or instance such as a customer, person, or car. A node is equivalent to a record in a relational database system. An Edge in a graph database represents a relationship that connects nodes. Properties are additional information added to the nodes.

The Neo4j, Azure Cosmos DB, SAP HANA, Sparksee, Oracle Spatial and Graph, OrientDB, ArrangoDB, and MarkLogic are some of the popular graph databases. Graph database structure is also supported by some RDBMS including Oracle and SQL Server 2017 and later versions.

NoSQL database

NoSQL databases are databases that do not use SQL as their primary data access language. Graph database, network database, object database, and document databases are common NoSQL databases. This article answers the question, what is a NoSQL database.

NoSQL database does not have predefined schemas, which makes NoSQL databases a perfect candidate for rapidly changing development environments.

NoSQL allows developers to make changes on the fly without affecting applications.

NoSQL databases can be categorized into the following five major categories, Column, Document, Graph, Key-value, and Object databases.

Here is a list of 10 popular NoSQL databases:

1. Cosmos DB
2. ArangoDB
3. Couchbase Server
4. CouchDB
5. Amazon DocumentDB
6. MongoDB, CouchBase
7. Elasticsearch
8. Informix
9. SAP HANA
10. Neo4j

Distributed database

Unlike a centralized database system, in distributed systems, data is distributed among different database systems of an organization. These database systems are connected via communication links. Such links help the end-users to access the data easily. **Examples** of the Distributed database are Apache Cassandra, HBase, Ignite, etc.

Personal database

Collecting and storing data on the user's system defines a Personal Database. This database is basically designed for a single user.

Advantage of Personal Database

- It is simple and easy to handle.
- It occupies less storage space as it is small in size.

End-user database

The end user is usually not concerned about the transaction or operations done at various levels and is only aware of the product which may be a software or an application. Therefore, this is a shared database which is specifically designed for the end user, just like different levels' managers. Summary of whole information is collected in this database. End users are going to perform various database operations like querying, updating and generating reports.

The different types of end users are as follows –

- Casual end users
- Parametric end users
- Sophisticated end users
- Standalone users

Commercial database

Commercial database are that which has been created for Commercial Purpose only. They are premium and are not free like Open Source Database. In Commercial Database it is guaranteed that technical support is provided. In this Installation and updates are Administrated by software Vendor. For examples: Oracle, IBM DB2 etc.

Operational database:

Operational database management systems (also referred to as OLTP On Line Transaction Processing databases) are used to update data in real-time. These types of databases allow users to do more than simply view archived data. Operational databases allow you to modify that data (add, change or delete data), doing it in real time. OLTP databases provide transactions as the main abstraction to guarantee data consistency that guarantees the so-called ACID properties. Basically, the consistency of the data is guaranteed in the case of failures and/or concurrent access to the data. Since the early 90s, the operational database software market has been largely taken over by SQL engines. Today, the operational DBMS market (formerly OLTP) is evolving dramatically, with new, innovative entrants and incumbents supporting the growing use of unstructured data and NoSQL DBMS engines, as well as XML databases and NewSQL databases. NoSQL databases typically have focused on scalability and have renounced to data consistency by not providing transactions as OLTP systems do. Operational databases are increasingly supporting distributed database architecture that can leverage distribution to provide high availability and fault tolerance through replication and scale-out ability.

The growing role of operational databases in the IT industry is moving fast from legacy databases to real-time operational databases capable to handle distributed web and mobile demand and to address Big data challenges. Recognizing this, Gartner started to publish the Magic Quadrant for Operational Database Management Systems in October 2013. Operational databases are used to store, manage and track real-time business information. For example, a company might have an operational database used to track warehouse/stock quantities. As customers order products from an online web store, an operational database can be used to keep track of how many items have been sold and when the company will need to reorder stock. An operational database stores information about the activities of an organization, for example, customer relationship management transactions or financial operations, in a computer database.