OVERVIEW OF DATABASE MANGEMENT SYSTEM

Engineering

Prof. Chetashri S. Bhusari	Lecturer, Vidyalankar Polytechnic Wadala, Mumbai
Prof. Sayali Kadam*	Lecturer, Vidyalankar Polytechnic Wadala, Mumbai *Corresponding Author
Prof. Bhagyshri Kulkarni	Vidyalankar Polytechnic Wadala, Mumbai

I. INTRODUCTION

A Database is a collection of related data which represents some aspect of the real world. A database system is designed to be built and populated with data for a certain task.

The DBMS manages three important things: the data, the database engine that allows data to be accessed, locked and modified -- and the database schema, which defines the database's logical structure. These three foundational elements help provide concurrency, security, data integrity and uniform administration procedures. Typical database administration tasks supported by the DBMS include change management, performance monitoring/tuning and backup and recovery. Many database management systems are also responsible for automated rollbacks, restarts and recovery as well as the logging and auditing of activity.

The DBMS is perhaps most useful for providing a centralized view of data that can be accessed by multiple users, from multiple locations, in a controlled manner. A DBMS can limit what data the end user sees, as well as how that end user can view the data, providing many views of a single database schema. End users and software programs are free from having to understand where the data is physically located or on what type of storage media it resides because the DBMS handles all requests.

Database Management System (also known as DBMS) is a software for storing and retrieving users' data by considering appropriate security measures. It allows users to create their own databases as per their requirement.

It consists of a group of programs which manipulate the database and provide an interface between the database. It includes the user of the database and other application programs. The DBMS accepts the request for data from an application and instructs the operating system to provide the specific data. In large systems, a DBMS helps users and other third-party software to store and retrieve data.

The DBMS can offer both logical and physical data independence. That means it can protect users and applications from needing to know where data is stored or having to be concerned about changes to the physical structure of data (storage and hardware). As long as programs use the application programming interface (API) for the database that is provided by the DBMS, developers won't have to modify programs just because changes have been made to the database.

II. CHARACTERISTICS OF DATABASE MANAGEMENT SYSTEM

- Provides security and removes redundancy
- Self-describing nature of a database system
- Insulation between programs and data abstraction
- Support of multiple views of the data
- Sharing of data and multiuser transaction processing
- DBMS allows entities and relations among them to form tables.
- It follows the ACID concept (Atomicity, Consistency, Isolation, and Durability).

- DBMS supports multi-user environment that allows users to access and manipulate data in parallel.

III. ADAVATGES OF DATABASE MANAGEMENT SYSTEM

- DBMS offers a variety of techniques to store & retrieve data
- DBMS serves as an efficient handler to balance the needs of multiple applications using the same data
- Uniform administration procedures for data
- Application programmers never exposed to details of data representation and storage.
- A DBMS uses various powerful functions to store and retrieve data efficiently.
- Offers Data Integrity and Security
- The DBMS implies integrity constraints to get a high level of protection against prohibited access to data.
- A DBMS schedules concurrent access to the data in such a manner that only one user can access the same data at a time.
- Reduced Application Development Time.

IV. DISADVANTAGES OF DATABASE MANAGEMENT SYSTEM

- Cost of Hardware and Software of a DBMS is quite high which increases the budget of your organization.
- Most database management systems are often complex systems, so the training for users to use the DBMS is required.
- In some organizations, all data is integrated into a single database which can be damaged because of electric failure or database is corrupted on the storage media
- Use of the same program at a time by many users sometimes lead to the loss of some data.
- DBMS can't perform sophisticated calculations.

V. TYPES OF DATABASE MANAGEMENT SYSTEM

Types of DBMS
Four Types of DBMS systems are:
- Hierarchical, Network, Relational & Object-Oriented DBMS

Hierarchical DBMS

In a Hierarchical database, model data is organized in a tree-like structure. Data is Stored Hierarchically (top down or bottom up) format. Data is represented using a parent-child relationship. In Hierarchical DBMS parent may have many children, but children have only one parent.

Network Model

The network database model allows each child to have multiple parents. It helps you to address the need to model more complex relationships like as the orders/parts many-to-many relationship. In

this model, entities are organized in a graph which can be accessed through several paths.

Relational model

Relational DBMS is the most widely used DBMS model because it is one of the easiest. This model is based on normalizing data in the rows and columns of the tables. Relational model stored in fixed structures and manipulated using SQL.

Object-Oriented Model

In Object-oriented Model data stored in the form of objects. The structure which is called classes which display data within it. It defines a database as a collection of objects which stores both data members values and operations.

VI. ARCHITECTURE OF DBMS

DBMS architecture helps in design, development, implementation, and maintenance of a database. A database stores critical information for a business. Selecting the correct Database Architecture helps in quick and secure access to this data.

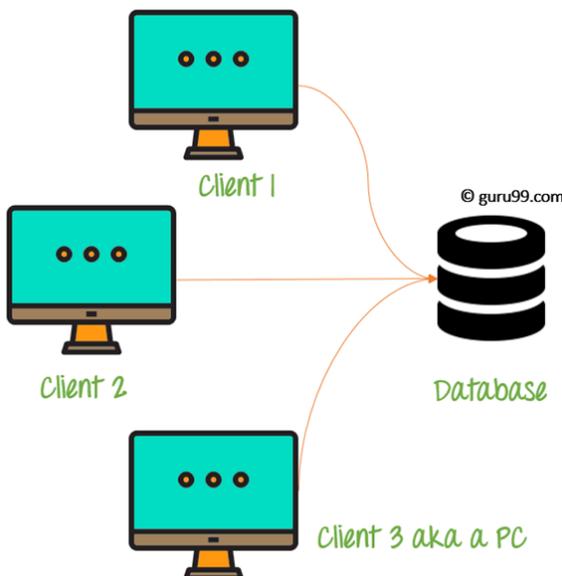## A 1. Tier Architecture

Single Tier Architecture

The simplest of Database Architecture are 1 tier where the Client, Server, and Database all reside on the same machine. Anytime you install a DB in your system and access it to practise SQL queries it is 1 tier architecture. But such architecture is rarely used in production.

B. 2-tier Architecture

A two-tier architecture is a database architecture where
1. Presentation layer runs on a client (PC, Mobile, Tablet, etc)
2. Data is stored on a Server.

An application interface which is called ODBC (Open Database Connectivity) an API which allows the client-side program to call the DBMS. Today most of the DBMS offers ODBC drivers for their DBMS. 2 tier architecture provides added security to the DBMS as it is not exposed to the end user directly.

**Example** of Two-tier Architecture is a Contact Management System created using MS- Access.

In the above 2-teir architecture we can see that one server is connected with clients 1, 2m and 3. This architecture provides Direct and faster communication.

c. 3-tier Architecture

3-tier schema is an extension of the 2-tier architecture. 3-tier architecture has following layers
1. Presentation layer (your PC, Tablet, Mobile, etc.)
2. Application layer (server)
3. Database Server
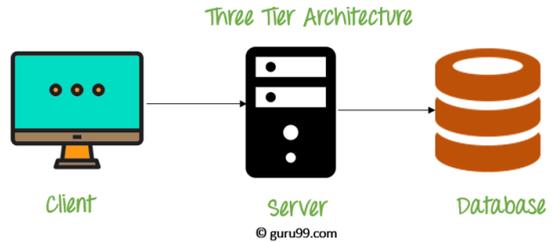
This DBMS architecture contains an Application layer between the user and the DBMS, which is responsible for communicating the user's request to the DBMS system and send the response from the DBMS to the user.

The application layer (business logic layer) also processes functional logic, constraint, and rules before passing data to the user or down to the DBMS

Three tier architecture is the most popular DBMS architecture.

The goal of Three-teir architecture is:
- To separate the user applications and physical database
- Proposed to support DBMS characteristics
- Program-data independence
- Support of multiple views of the data

Example of Three-teir Architecture
Any large website on the internet, including guru99.com ??

VII. POPULAR DBMS SOFTWARE
Popular DBMS Software :
- MySQL: Latest version 8.Language used is C and C++. Works on Linux, Windows, High Speed of processing data, use of triggers increases productivity, with rollback and commit helps in data recovery if required.
- Microsoft Access : Latest stable version 16.0.4229.1024. It's a file uploaded on the server created using ms access.It's a cheap database system used by systems on the internet mostly by e-commerce sites
- Oracle: Oracle database is the most widely used object-relational database management software. The latest version of this tool is 12c where c means cloud computing.It supports multiple Windows, UNIX, and Linux versions.It is secured, occupies less space, supports large databases, and reduces CPU time to process data. It's a commercial tool.
- PostgreSQL: It's a more advanced database.Current Version is 9.6.2.Can be used across Linux and windows operating systems.
- SQLite : It's used as a database system for mobiles, It's coded in C language. It can work on Linux, windows, mac. It does not need much space can be used for storing of websites which are small to medium.It is fast and does not need set up.
- IBM DB2:Latest release 11.1.Developed in the year 1983.The language used is Assembly Language, C, C++ for writing it.It supports multiple Windows, UNIX, and Linux versions.It is very easy to install and set up and data is easily accessible, we can save the huge amount of data almost up to pet bytes. It's a commercial tool.
- MariaDB :It Works on Mac/Unix/Linux/Windows operating systems.It's highly available, it's also scalable, it has a multicore support, it uses multiple threads, it has the support of Internet Protocol.It provides real time database access.
- Microsoft SQL Server : Developed in the year 1989.Latest updated version came in 2016.The language used is Assembly C, Linux, C++ for writing it.Microsoft SQL Server : Developed in the year 1989.Latest updated version came in 2016.The language used is Assembly C, Linux, C++ for writing it.Works on Linux and

windows operating system.It is Compatible with Oracle provides efficient management of workload and allows multiple users to use the same database.

- CouchDB: Latest stable release2.0.0.Written in Eriang Language.Works on Windows and Linux operating system.It is Secure system network, efficient error handling, an output is reliable, the output obtained does not give a delay.

VIII. APPLICATION OF DBMS
Here some application of DBMS.

Sector	Application
Banking	For customer information, account activities, payments, deposits, loans, etc.
Airlines	For reservations and schedule information.
Universities	For student information, course registrations, colleges and grades.
Telecommunication	It helps to keep call records, monthly bills, maintaining balances, etc.
Finance	For storing information about stock, sales, and purchases of financial instruments like stocks and bonds.
Sales	Use for storing customer, product & sales information.
Manufacturing	It is used for the management of supply chain and for tracking production of items. Inventories status in warehouses.
HR Management	For information about employees, salaries, payroll, deduction, generation of paychecks, etc.

IX. CONCLUSION
Hence we learned overview of database management system

REFERENCES
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2) https://beginnersbook.com/2018/11/dbms-architecture