Advantages of Database Management Systems

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Abstract

A database management system (DBMS) is system software for creating and managing database. A DBMS makes it possible for end users to create, protect, read, update and delete data in a database. The most prevalent type of data management platform, the DBMS essentially serves as an interface between databases and users or application programs, ensuring that data is consistently organized and remains easily accessible.

As the volume of your data increases, so does the need for a DBMS, which is computerized system that helps to arrange large quantities of information. A DBMS can improve your data processes and increase the business value of your organization's data assets, freeing users across the organisation from repetitive and time consuming data processing tasks.

A database management system is a software tool used to create and manage one or more databases, offering an easy way to create a database, update tables, retrieve information. And enhance data. A DBMS is where data is accessed, modified and locked to prevent conflicts.

A database management system also provides tools to administer the database schema – which dictates the structure of the database itself. In many cases, the database management system will be seen only by the database developer, because the developer will provide a different front-end for the customer. This front-end could be considered, by the most technical definition, to be a database management system in its own right — however, it is more likely to go by another name, such as a customer relationship management (CRM) tool.

Introduction of Data Base Management Systems

"A database management system (DBMS) is a collection of programs that manages the database structure and controls access to the data stored in the database".

A database management system is a set of computer programmes that controls the creation, maintenance and use of the databases of an organisation and its end users. A DBMS is simply the software that permits an organisation to centralise data, manage them efficiently and provide access to the stored data by application programmes.

The development of database and DBMS is the foundation of modern methods of managing organisational data. Since quality data management implies a centralized view of data, teams need a solution that allows them to orchestrate everything, including monitoring who is accessing the system and where they're accessing it from. A database management system helps improve organizational security, integration, compliance, and performance.

Objectives:
- To Understand the basic concepts and the applications of database systems
- To Master the basics of SQL and construct queries using SQL
- To understand the relational database design principles
- To become familiar with the basic issues of transaction processing and concurrency control
- To become familiar with database storage structures and access techniques.

The Hypothesis example database:-

When Hypothesis finds a bug it stores enough information in its database to reproduce it. This enables you to have a classic testing workflow of find a bug, fix a bug, and be confident that this is actually doing the right thing because Hypothesis will start by retrying the examples that broke things last time.

DBMS Methodology:-

The methodology for the database design stage of the database system development lifecycle for relational databases. The methodology is depicted as a bit by bit guide to the three main phases of database design, namely: conceptual, logical, and physical design.

The primary aim of each phase is as follows:

- Conceptual database design - to build the conceptual representation of the database, which has the identification of the important entities, relationships, and attributes.
- Logical database design - to convert the conceptual representation to the logical structure of the database, which includes designing the relations.
- Physical database design - to decide how the logical structure is to be physically implemented (as base relations) in the target Database Management System (DBMS).

Advantages of Database Management Systems:

1.   Data Integrity

Data integrity means that the data is accurate and consistent in the database. Data Integrity is very important as there are multiple databases in a DBMS. All of these databases contain data that is visible to multiple users. So it is necessary to ensure that the data is correct and consistent in all the databases and for all the users.

Due to the Database Management System we have an access to well managed and synchronized form of data thus it makes data handling very easy and gives an integrated view of how a particular organization is working and also helps to keep a track of how one segment of the company affects another segment.

Implementing a database management system will promote a more integrated picture of your operations by easily illustrating how processes in one segment of the organization affect other segments. What once was done completely manually now can be fully automated and more accurate. The right DBMS will include flexible integration options to standardize data across multiple sources, remove duplicates, normalize, segment, and enrich data sets into custom workflows.

Data integrity means data is consistent and accurate in the database. It is essential as there are multiple databases in DBMS. All these databases contain data which is visible to multiple users. Therefore, it is essential to ensure that data is consistent and correct in all databases for all users.

Wider access to well-managed data promotes an integrated view of the organization's operations and a clearer view of the big picture. It becomes much easier to see how actions in one segment of the company affect other segments.

2.   Reducing Data Redundancy

The file based data management systems contained multiple files that were stored in many different locations in a system or even across multiple systems. Because of this, there were sometimes multiple copies of the same file which lead to data redundancy.

This is prevented in a database as there is a single database and any change in it is reflected immediately. Because of this, there is no chance of encountering duplicate data.

The major issues faced during the process of storing data are inconsistency and redundancy. Inconsistent data may lead to a big loss to an individual or a business model and the storage capacity is not utilized properly because of the data redundancy. When multiple copies with different versions or values of the same data exist in various locations, then it causes inconsistency. Data Redundancy and inconsistency can both be significantly decreased by properly designing a database with the help of a database management system.

3.   Sharing of Data

In a database, the users of the database can share the data among themselves. There are various levels of authorisation to access the data, and consequently the data can only be shared based on the correct authorisation protocols being followed.

Many remote users can also access the database simultaneously and share the data between themselves. Database administration makes it possible for consumers to access more and better-

managed data. DBMS enables end users to quickly scan their environment and react to any alterations made there.

Database management systems help users share data quickly, effectively, and securely across an organization. By providing quick solutions to database queries, a data management system enables faster access to more accurate data. End users, like salespeople, are able to speed up sales cycles and get more accurate in their sales prospecting. An advantage of the database management approach is, the DBMS helps to create an environment in which end users have better access to more and better-managed data. Such access makes it possible for end users to respond quickly to changes in their environment.

4. Data Security

Data Security is vital concept in a database. Only authorised users should be allowed to access the database and their identity should be authenticated using a username and password. Unauthorised users should not be allowed to access the database under any circumstances as it violates the integrity constraints.

The likelihood of security problems increases as a database becomes more functional and accessible. The danger to data security rises as a result of the rate at which data is shared or transferred growing along with the user base. It is frequently utilized in the business world where organizations spend a lot of time, money, and effort making sure data is protected and handled effectively. Data management systems (DBMS) offer a stronger framework for data privacy and security policies, assisting businesses in enhancing data security.

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A DBMS provides a better platform for data privacy thus helping companies to offer an improved data security.

The more users access the data, the greater the risks of data security breaches. Corporations invest considerable amounts of time, effort, and money to ensure that corporate data are used properly. A DBMS provides a framework for better enforcement of data privacy and security policies.

The more accessible and usable the database, the more it is prone to security issues. As the number of users increases, the data transferring or data sharing rate also increases thus increasing the risk of data security. It is widely used in the corporate world where companies invest money, time, and effort in large amounts to ensure data is secure and is used properly. A Database Management System (DBMS) provides a better platform for data privacy and security policies thus, helping companies to improve Data Security.

5. Privacy

The privacy rule in a database means only the authorized users can access a database according to its privacy constraints. There are levels of database access and a user can only view the data he is allowed to. For example - In social networking sites, access constraints are different for different accounts a user may want to access.

The privacy rule in a database specifies the privacy restrictions that can only be accessed by authorized users. A user can only view the data he is permitted to view since there are different degrees of database access. For instance, on social networking sites, different accounts that a user wishes to access have varying access restrictions and a user can only see his/her account details, not others.

Database management systems provide a better framework for the enforcement of privacy and security policies. By orchestrating data in a unified manner, companies can manage privacy and data security centrally, helping unify their systems of record and lower the risk of regulatory violations.

6. Backup and Recovery

Database Management System automatically takes care of backup and recovery. The users don't need to backup data periodically because this is taken care of by the DBMS. Moreover, it also restores the database after a crash or system failure to its previous condition.

Backup and recovery are handled automatically by the DBMS. Users don't need to regularly back up their data because the DBMS handles this for them. Additionally, it returns the database to its prior state following a crash or system failure.

DBMS automatically takes care of recovery and backup. The users are not required to take periodical backup as this is taken care of by DBMS. Besides, it also restores a database after a system failure or crash to prevent its previous condition.

7. Data Consistency

Data consistency is ensured in a database because there is no data redundancy. All data appears consistently across the database and the data is same for all the users viewing the database. Moreover, any changes made to the database are immediately reflected to all the users and there is no data inconsistency.

Data inconsistency occurs when different versions of matching data exist in different places in an organization. For example, one group has a client's correct email, another the correct phone number. By using a proper database management system and data quality tools, you can be sure that an accurate view of data is shared throughout your organization.

Data inconsistency occurs between files when various versions of the same data appear in different places. Data consistency is ensured in the database; there is no data redundancy. Besides, any database changes are immediately reflected by all users, and there is no data inconsistency.

Data inconsistency exists when different versions of the same data appear in different places. For example, data inconsistency exists when a company's sales department stores a sales representative's name as "Bill Brown" and the company's personnel department stores that same person's name as "William G. Brown," or when the company's regional sales office shows the price of a product as $45.95 and its national sales office shows the same product's price as $43.95. The probability of data inconsistency is greatly reduced in a properly designed database.

Findings:-

A database is an organized electronic collection of data. A database management system (DBMS) is software that **helps you create and maintain databases**. Database management system has made a revolution in all the industries that handles lots of data. All these organizations are making a huge profit just because of database management system. This is why because DBMS provides a lot benefits to all these companies and there are lots of objectives of using a database management system.

The DBMS **manages the data**; the database engine allows data to be accessed, locked and modified; and the database schema defines the database's logical structure. These three foundational elements help provide concurrency, security, data integrity and uniform data administration procedures.

Conclusion:-

In the DBMS approach, data records are consolidated into databases that can be accessed by many different application programmes. In addition, there are important software interfaces between users and databases. This helps users to easily access the records in a database. Thus, database management involves the use of database management software to control how databases are created, interrogated and maintained to provide information needed by end users and their organisations.

The DBMS serves as the intermediary between the user and the database. The database structure itself is stored as a collection of files, So, we can access the data in those files through the DBMS.

The DBMS receives all application requests and translates them into the complex operations required to fulfil those requests. The DBMS hides much of the database's internal complexity from the application programs and users.

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