JAVA INSTITUTE for Advanced Technology

INNOVATIONS FOR THE KNOWLEDGE SOCIETY

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JAVA INSTITUTE FOR ADVANCED TECHNOLOGY

UNIT NAME
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DATABASE MANAGEMENT 1

H7DX 04

H7DX 04/AS/01

NAME

NIC

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scqf
scottish credit and qualifications framework

PCJT
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This qualification has been SCQF credit rated by SQA

The database is a collection of data that can be easily managed. S.G.A.K. (2019) The database aims to customize all data easily and store all data systemically. Also, consider the security of the database too. In ancient times(The time period which doesn't use computers) man use books to store data. According to Sri Lankan history, the data comes from oral generation in ancient times. After that, they wrote it on paper and now it become a victim of technology. With the development of technology, paper-based data became a "database" to store data effectively and retrieve it easily.

The evolution of database management systems has been driven by the need to manage increasingly large and complex sets of data. Early database systems were designed to manage small amounts of data, such as a single company's financial records. As the amount of data grew, these systems became increasingly complex and difficult to use. This led to the development of more sophisticated database management systems, which were able to handle larger amounts of data and provide more advanced features for organizing and accessing that data.

One of the key developments in the evolution of database management systems was the introduction of the relational model. This model, which was first proposed by Edgar F. Codd in 1970, provided a way to organize data into tables, with each table consisting of rows and columns. This made it easier to access and manipulate data and allowed for more complex queries and operations on the data.

Another important development was the introduction of object-oriented database management systems (OODBMS). These systems were designed to manage complex data structures, such as images and video, which do not fit easily into the traditional relational model. OODBMS allowed for storing and manipulating these complex data structures, which is important for applications such as computer-aided design and video editing.

Today, database management systems have evolved to include a wide range of features and capabilities. These include support for distributed data, which allows for the management of data across multiple computers, and support for real-time data, which allows for the management of data in real time. Many database management systems also include advanced security features, such as encryption and access controls, to protect the data from unauthorized access.

In summary, the evolution of database management systems has been driven by the need to manage increasingly large and complex sets of data. This has led to the development of more sophisticated database management systems, which provide advanced features for organizing, accessing, and manipulating data.

A.A. (2022)

History of Database

- ## Flat Files:-

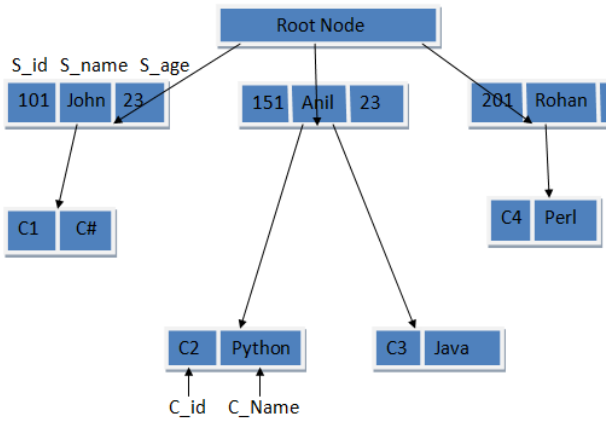
  This flat file database also known as a **Text database** was developed by **IBM** around the 1970s.In this type of database files or data are stored in a single file or table. There are no relationships among tables and cannot be multiplied.

  Examples of this database type,

  - Berkeley DB
  - SQLite
  - Mimesis
  - TheIntegrationEngineer

- ## Hierarchical database: -

  This database indicates data as hierarchically like a tree so it is called a hierarchical database. This database type was implemented around the 1960s-1990s. This database accesses the data more speedily than the Flat file database.



Publisher:- Hierarchical Database Model | Concise Guide to Hierarchical Data Model (educba.com)

- Network database: -

  A network database is a type of DBMS that is organized according to the network model. This allows for the efficient representation and manipulation of complex data structures, and supports concurrent access by multiple users. In this model, data is organized into sets, with each set containing multiple records. Each record is a collection of fields, and each field contains a single data value. It has the ability to represent complex relationships and support multiple users. multiple users can access and manipulate the data simultaneously.

  Examples:-

  - Digital Equipment Corporation DBMS-10
  - Digital Equipment Corporation DBMS-20
  - Digital Equipment Corporation DBMS-20
  - Turbo IMAGE
  - Turbo IMAGE

- Relational Database:-

  (Chat GPT openai.com) The open AI state that, 'The relational model for database management was first proposed by Edgar F. Codd in 1970. Codd's paper, "A Relational Model of Data for Large Shared Data Banks," was published in the ACM SIGMOD Record and outlined the key features and principles of the relational model. This paper is considered to be the foundation of modern relational database systems.'According to that, it can manipulate large data and deep queries. In a relational database, data is stored in tables, with each table representing a set of related data. These tables can then be linked together through a series of relationships, which allows the data to be easily found and manipulated. Each table has columns, which are the fields in the table, and rows, which are the records of the table. Data can then be queried from these tables using Structured Query Language (SQL). This is a language designed specifically for manipulating relational databases.

  Examples:-

  - Oracle
  - Microsoft
  - IBM
  - My SQL

A database management system (DBMS) is a software program that enables users to create, maintain, and interact with a database. This includes defining the data types, structures, and relationships within the data, as well as ensuring the integrity, security, and performance of the database. A DBMS allows users to store and retrieve data from the database in an efficient and organized manner. Some examples of DBMSs include MySQL, Oracle, and Microsoft SQL Server.

The relational database is the present type of database used in the industry. But there has another database type called an **Object-oriented database.** This database management system (DBMS) is based on the concept of objects, which are data elements that contain both data and associated procedures (or methods) that operate on that data.

The main advantage of an object-oriented database is it allows complex data structures. It makes it easier to manipulate real-world data and relationships. another advantage of this type of database is it is supported with C++, Java such object-oriented programming languages. It's very helpful to programmers to exchange data with database and their applications. (ChatGPT)state that ' In short, an object-oriented database is a type of DBMS that is designed to support complex data structures and object-oriented programming languages, which can make it easier to model and interact with data in a real-world environment.'Simply means, OODB (Object-oriented Database) takes Database management to a new level with easy-to-manage and manipulation. But it has some disadvantages also. One is It becomes lower efficient when data is simple.

File-Based Systems vs. DBMS,

One of the main advantages of using a DBMS is that it allows for efficient data management and organization. A DBMS allows users to store and manage large amounts of data in a central database, which is organized into tables that are easy to access and update. This makes it easier for users to access the data they need, as well as to update and maintain the data in the database. It has the best security also. so hackers can't steal data easily. It provides some security features, such as user authentication and access controls, that can be used to protect the data in the database from unauthorized access or tampering. Another advantage of the DBMS is we can back up our data to cloud storage or any other storing device. So it will help to reduce data losing anymore. DBMS allows for easier data sharing and collaboration. Because the data is stored in a database, multiple users can access and update the data at the same time, without having to worry about conflicting changes or losing data. but file-based systems can't authorize by too many peoples at once. It's the one of main disadvantages occurs in DataBase.

(javapoint.com, n.d.) img:- https://www.javatpoint.com/dbms-vs-files-system

Basis	DBMS Approach	File System Approach
Meaning	DBMS is a collection of data. In DBMS, the user is not required to write the procedures.	The file system is a collection of data. In this system, the user has to write the procedures for managing the database.
Sharing of data	Due to the centralized approach, data sharing is easy.	Data is distributed in many files, and it may be of different formats, so it isn't easy to share data.
Data Abstraction	DBMS gives an abstract view of data that hides the details.	The file system provides the detail of the data representation and storage of data.
Security and Protection	DBMS provides a good protection mechanism.	It isn't easy to protect a file under the file system.
Recovery Mechanism	DBMS provides a crash recovery mechanism, i.e., DBMS protects the user from system failure.	The file system doesn't have a crash mechanism, i.e., if the system crashes while entering some data, then the content of the file will be lost.
Manipulation Techniques	DBMS contains a wide variety of sophisticated techniques to store and retrieve the data.	The file system can't efficiently store and retrieve the data.
Problems	using some form of locking.	problems like redirecting the file while deleting some information or updating some information.
Where to use	Database approach used in large systems which interrelate many files.	File system approach used in large systems which interrelate many files.
Cost	The database system is expensive to design.	The file system approach is cheaper to design.
Data Redundancy and Inconsistency	Due to the centralization of the database, the problems of data redundancy and inconsistency are controlled.	In this, the files and application programs are created by different programmers so that there exists a lot of duplication of data which may lead to inconsistency.
Structure	The database structure is complex to design.	The file system approach has a simple structure.
Data Independence	In this system, Data Independence exists, and it can be of two types. o Logical Data Independence o Physical Data Independence	In the File system approach, there exists no Data Independence.

Let's talk about job roles in Database Management Field,

(Zippia, 2020) The data Administrator supports the promoting, sales, finance, and operations departments by providing correct, complete, and current knowledge to the client, product, inventory, and vendor. The data administrator is accountable for implementing associated execution data processing comes and creating reports to supply an understanding of sales, marketing, and buying opportunities and business trends. The role would conjointly embody change info to the company's info and official company website. Moreover, they conjointly do reports regarding knowledge analysis, foretelling, and different analysis activities that cause decision-making. Designing and implementing database systems, including determining the structure and organization of the data, as well as the security and access controls to be used, Maintaining and updating the data in the database, including adding new data, modifying existing data, and deleting outdated or unnecessary data are some occasions where Data administrator work.

When we talk about Database Administrator(DBA) is responsible for the design, implementation, maintenance, and management of an organization's database systems. This typically involves tasks such as setting up and configuring the database, ensuring that the data is secure and accessible, and monitoring and optimizing the performance of the database. He has strong technical skills with great experience in designing the database and understanding data security and privacy principles. Good communication and collaboration skills are also important, as the database administrator to manage data.

Database Designers also handle the great role of the DBMS. They have tasks such as analyzing the data requirements of the organization, determining the structure and organization of the data, and creating a logical and physical design for the database. He works with Such Applications like HeidiSQL, MySQL workbench, Navicat, etc. The creation of a whole database contains more logical part and the DB Designer need to face it. Languages such as "MYSQL query language" and more knowledge need for the Database Designer.

Designing, developing, and maintaining database-backed applications are the responsibilities of a database application developer. The user interface and business logic of the program must normally be created, and the application must be integrated with the database so that it can store and retrieve data. A database application developer should have strong technical skills, including experience with database design and implementation and a good understanding of software development principles and techniques. They should also be familiar with a variety of programming languages and frameworks that are commonly used for database-backed applications. Good communication and collaboration skills are also important as the developer will often need to work closely with other IT team members and stakeholders to ensure the application meets the organization's needs.

The end-user such as a client or customer uses the database to manipulate his unique data and access it. (Akashkumar17, 2022) These are the users who infrequently use the database.

They define their request using a sophisticated database query language. They are often middle or level managers or other infrequent browsers. They only learn a small number of facilities that they may use regularly, such as database queries.

There are other jobs like Data Scientist, Data Analyst, Data Modeler, Software Engineer, etc… But I'm not discussing them.

Summary:-

The DBMS provides users and programmers with a systematic way to create, retrieve, update and manage data. A DBMS allows users to create, update, and delete a database. It provides a way to store and retrieve data in a structured way, allowing users to efficiently manage and access large amounts of data. A DBMS typically includes a graphical user interface (GUI) that allows users to interact with the system in a user-friendly manner. It also includes tools for backing up and restoring the database, and for managing security and access control. It creates more job roles with Database Management and it is developing day by day with more features more facilities etc. Some common examples of DBMSs use mostly in the industry include MySQL, Oracle, and Microsoft SQL Server.

Thank You,

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