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Assignment 1:

1. List out several major advantages of a database system. What are the two disadvantages

Answer:

Advantages:

- Data Consistency: Database system maintain consistency of data from the entire system, even when multiple users access and update the data simultaneously

- Data Accessibility: Database system allow for quick and efficient access to data, it provides facilities to users that they can easily retrieve and analyze the information they need.

- Data isolation: Because data are scattered in various files, and files may be in different formats, users can easily write new application programs to retrieve the appropriate data in database system.

- Data Integrity and Security: Databases have built-in mechanisms to ensure data accuracy and security, such as data validation, transaction management, and encryption.
  Database system provide flexible integration to data from multiple sources, removes duplication, normalization.

- Data Recovery: Databases can be backed up and recovered in case of system failures, ensuring data availability and minimizing data loss.

- View of the data:A major purpose of a database system is to provide users with an *abstract* view of the data. That is, the system hides certain details of how the data are stored and maintained.

- Concurrent Access: Multiple users can access and update the same data simultaneously, leading to increased productivity and collaboration.

Disadvantages:

- Security: Databases contain sensitive information, making them targets for cyber attacks. Ensuring the security of the database and the information it holds can be a challenge

- Performance issues: As the number of users and transactions increase, the database system can slow down and become less responsive.

2. List 6 major steps that you would take in setting up a database for a particular system

Answer:

- Define a model containing all appropriate types of data and data relationships.
- Define the integrity constraints on the data.The data values stored in the database must satisfy certain types of **consistency constraints**.
- Define the conceptual schema for the model:The collection of information stored in the database at a particular moment is called an **instance** of the database. The overall design of the database is called the database **schema**.

- Define the physical level: *how* the data are actually stored. The physical level describes complex low-level data structures in detail.

- For each known problem to be solved on a regular basis define a view of the database and write the necessary application programs.A database system is a collection of interrelated data and a set of programs that allow users to access and modify these data. A major purpose of a database system is to provide users with an *abstract* view of the data. That is, the system hides certain details of how the data are stored and maintained.

- Create and initialize the database

3. List of 3 different types of information that a university will maintain for its system.

Answer: University is one of the most easy and relatable systems which is used in everyday life. There are various types of information which are generated and maintained by a university.

Types of information that managed by the university in there system: The university is organized into departments such as Arts, Commers, Science, Computer Science, etc.Each department is

identified by a unique name (dept name, dept ID). It also has various other attributes such as located in a particular building, and has a budget.

Each department has a list of courses it offers. Each course has associated with

it a course id, title, dept name, and credits, and all the other necessary information related to the department and the courses which are available in the respected stream

The university maintains a list of classrooms, specifying the name of the

building, room number, and room capacity.

The university also maintains a list of all classes (sections) taught. Each section is

identified by a course id, sec id, year, and semester, and has associated with it

a semester, year, building, room number, and time slot id (the time slot when the

class meets)

The system managed by the university has a structured list of students and the information related to the students such as the name of the student, student ID, parental/guidance details, phone number and the system also generates and stores the growth record of the student studying in the university.

It also stores the archived(historical) data of the alumni students.

4.Suppose you want to build a video site similar to youtube. List of all possible disadvantages of the file system. Discuss the relevance of each of these points to the storage of actual video data and to metadata about the video, such as title, the user who uploaded it, tags and which users viewed it.

Answer:

YouTube is a global online video sharing and social media platform which is widely used across the world.

Difficulty In Accessing data:

The main purpose or the goal of any video site similar to youtube is to provide data easily and without any difficulty.

If the data or in this case the video content is difficult to access by the user then it will be a greater disadvantage on the management system.

Data redundancy:

Since different people or influencers create a large volume of video content over a long period, the various files are likely to have different structures, video can be duplicated and twice the

space is consummate . Moreover, the same information may be duplicated in several places (files).

Storage is wasted and there is poor memory management.

Inconsistency:

Inconsistency is generally compounded by data redundancy. However, it is different from data redundancy and its adjacent anomalies in that it typically refers to problems with the content of a database rather than its design and structure.

If there are changes in the metadata(which can be the title, description)of the video content which are published on the site, the data or the modifying date will not be implemented to all the sources which are used by the end users making the date inconsistent.

Data isolation:

Because data which is the video content uploaded by the user are scattered in various files, and files may be in different formats such as mp4,mvk and etc, writing new programs to retrieve and play the video content can be difficult and will require a much complex system to manage.

Video content is any content format that features or includes video. Common forms of video content include vlogs, animated GIFs, live videos, customer testimonials, recorded presentations and webinars

Concurrent-access anomalies:

Video content sites such as YouTube is a global online video sharing and social media platform which is widely used across the world.

There are multiple users who access the sites at the same time and may require the same video content, so there must be a mechanism in the system to manage ‘n’ numbers of users at a single point of time concurrently.

Complexity will increase in file system and it may be the cause failure in the system while N number of users accessing various type of video content at same time

Security problems:

Not every user of Video content sites such as YouTube should be able to access all the information related to the web-site like the details of users which may be sensitive information

and i got in wrong hand and effect the user life, if the file system is used then anyone can view all the data present/stored in the system and there will be no privacy to the users information .

5.List four applications you have used that most likely employed a database system to store persistent data.

Answer:

- E-commerce websites such as Amazon and Flipkart use databases to store information about products, customer orders, and payment transactions.

- Social media platforms like Facebook and Twitter,LinkedIn use databases to store information about user profiles, posts, and interactions.

- Healthcare information systems such as Bloodbanks, use databases to store patients' medical history, treatments, and test results.

  Health-care databases are a best way to monitor and improve the value of the health-care services and the well-being of the patients, which can be achieved by making information available on access to the appropriateness, effectiveness, and quality of health-care services and providers.

- Banking systems like online banking and mobile banking apps use databases to store customer information, account transactions, and other sensitive data

6.List 4 significant differences between a file-processing system and a DBMS.

Answer:

A database-management system (DBMS) is a collection of interrelated data and a set of programs to access that data. The collection of data, usually referred to as the database, contains information relevant to an enterprise. The primary goal of a DBMS is to provide a way to store and retrieve database information that is both convenient and efficient.

In Computer Science, File Processing System (FPS) is a way of storing, retrieving and manipulating data which is present in various files. Files are used to store various documents. All files are grouped based on their categories.

Difference between a file-processing system and database-management system:

1.Query processing

Suppose that one of the university clerks needs to find out the names of all students who live within a particular postal-code area. The clerk asks the data-processing department to generate such a list. There is no efficient query processing in the file system, whereas in DBMS there is an Efficient query processing system which is used to store, modify and retrieve data . Languages such as Sql are used.

2.Data redundancy and inconsistency

Since different programmers create the files and application programs over a long period, the various files are likely to have different structures and the programs may be written in several programming languages.

Redundant data can be present in a file system.

In DBMS there is no redundant data.

For example, a changed student address may be reflected in the Music department records but not elsewhere in the file system, but in DBMS data is consistent.

3.Security

Not every user of the database system should be able to access all the data. For example, in a university, payroll personnel need to see only that part of the database that has financial information.

But, since applica- tion programs are added to the file-processing system in an ad hoc manner, enforcing such security constraints is difficult.

A major purpose of a database system is to provide users with an abstract view of the data. That is, the system hides certain details of how the data are stored and maintained. Dbms provides concepts such as views and normalization.

4.Integration

The data values stored in the database must satisfy certain types of consistency constraints.

The problem is compounded when constraints involve several data items from different files in a file system, but in Dbms there is a predefined and well structure format based in which we store the data.

There are DDL(data definition language) is used to generate a schema in sql.

7.List five responsibilities of a database management system. For each responsibility, explain the problems that would arise if the responsibility were not discharged.

Answer:

Database systems arose in response to early methods of computerized management of commercial data.There are various responsibilities which come under the database management system. If these responsibilities were not met by a given DBMS the following problems can occur

Responsibilities of a database management system:

1.Integrity Enforcement:

Integration of the is on the basic responsibility of the DBMS.

The data values stored in the database must satisfy cer- tain types of consistency constraints.

Suppose the university maintains an account for each department, and records the balance amount in each account and they also require that the account balance of a department may never fall below zero. Developers enforce these constraints in the system by adding appropriate code in the various application programs. However, when new constraints are added, it is difficult to change the programs to enforce them. The problem is compounded when constraints involve several data items from different files.

- If integration of the data is not managed properly the data structure of the database can not be applied successfully.

2.Security Enforcement:

Not every user of the database system should be able to access all the data. Security is one of the main responsibilities of the DBMS and the data can be sensitive.

For example, in a university, payroll personnel need to see only that part of the database that has financial information. They do not need access to information about academic records.

- If the data security is not properly addressed, or any security parameters are not enforced then any one can access the data and there will be no boundaries. Uses can lose sensitive or important data.

3.Backup and Recovery:

Available in a consistent state that existed prior to a failure.

Data backup must be a feature which takes the backup, meaning that it stores the data if in case the data got corrupted or deleted.

- If the DBMS does not have a systematic Backup and Recovery Data could be lost permanently, and there will be no other way to get the stored data which may be valuable to the user.

4.Concurrency Control:

For the sake of overall performance of the system and faster response, database management systems allow multiple users to update the data simultaneously.

Indeed, today, the largest Internet retailers may have millions of accesses per day to their data by shoppers. In such an environ- ment, interaction of concurrent updates is possible and may result in inconsistent data.

-Consistency constraints may be violated despite proper integrity enforcement in each transaction.

For example, incorrect bank balances might be reflected due to simultaneous withdrawals and deposits, and so on.

5.Interaction with the File Manager:

Database management systems must interact with the file management system by which it can access and use the data stored in the file, which is data stored in the computer system.

-No DBM can do without this, if there is no file manager interaction then nothing stored in the files can be retrieved.

8.Describe at-least 3 tables that might be used to store information in a social networking system such as Facebook.

Answer:

Social media are interactive technologies that facilitate the creation and sharing of information, ideas, interests, and other forms of expression through virtual communities and networks.

Facebook is a website which allows users, who sign-up for free profiles, to connect with friends, work colleagues or people they don't know, online. It allows users to share pictures, music, videos, and articles, as well as their own thoughts and opinions with however many people they like.

List of the tables use to store information in a social networking system such as Facebook:

1.USER TABLE:

A user table containing users, which attributes such as account/user name, age, gender, location/address, other profile information related to the end user which are handled and modified by the user itself.

2.COMMUNITIES/GROUPS TABLE:

It will contain the information about the communities formed by the users to share and receive related information to each other. It will also store the group member description, commutative description and various posts which are circulated in the group.

3.CONTENT TABLE:

A content table stores all the post, user-provided content,such as text and images, associated with the users who uploaded the content.