CSC3170 Tutorial of Week 2

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This chapter has described several major advantages of a database system. What are two disadvantages?

Advantages of database system

In the early days, database applications were built directly on top of file systems, which leads to:

- Data redundancy and inconsistency: data is stored in multiple file formats resulting induplication of information in different files
- Difficulty in accessing data
  - Need to write a new program to carry out each new task
- Data isolation
  - Multiple files and formats
- Integrity problems

Advantages of database system

- Atomicity of updates
  - Failures may leave database in an inconsistent state with partial updates carried out
  - Example: Transfer of funds from one account to another should either complete or not happen at all
- Concurrent access by multiple users
  - Concurrent access needed for performance
  - Uncontrolled concurrent accesses can lead to inconsistencies
    - Ex: Two people reading a balance (say 100) and updating it by withdrawing money (say 50 each) at the same time
- Security problems
  - Hard to provide user access to some, but not all, data

Database systems offer solutions to all the above problems

This chapter has described several major advantages of a database system. What are two disadvantages?

Two disadvantages associated with database systems are listed below.

a. Setup of the database system requires more knowledge, money, skills, and time.

b. The complexity of the database may result in poor performance.

List five ways in which the type declaration system of a language such as Java or C++ differs from the data definition language used in a database.

Data Definition Language (DDL)

- Specification notation for defining the database schema

  Example: **create table** *instructor* (
  ID **char**(5),
  name **varchar**(20),
  dept_name **varchar**(20),
  salary **numeric**(8,2))

Data Manipulation Language (DML)

- Language for accessing and updating the data organized by the appropriate data model
  - DML also known as query language

List five ways in which the type declaration system of a language such as Java or C++ differs from the data definition language used in a database.

a. Executing an action in the DDL results in the creation of an object in the database; in contrast, a programming language type declaration is simply an abstraction used in the program.

b. Database DDLs allow consistency constraints to be specified, which programming language type systems generally do not allow. These include domain constraints and referential integrity constraints.

c. Database DDLs support authorization, giving different access rights to different users. Programming language type systems do not provide such protection (at best, they protect attributes in a class from being accessed by methods in another class).

List five ways in which the type declaration system of a language such as Java or C++ differs from the data definition language used in a database.

d. Programming language type systems are usually much richer than the SQL type system. Most databases support only basic types such as different types of numbers and strings, although some databases do support some complex types such as arrays and objects.

e. A database DDL is focused on specifying types of attributes of relations; in contrast, a programming language allows objects and collections of objects to be created.

List six major steps that you would take in setting up a database for a particular enterprise.

Answer:

Six major steps in setting up a database for a particular enterprise are:

- Define the high-level requirements of the enterprise (this step generates a document known as the system requirements specification.)
- Define a model containing all appropriate types of data and data relationships.
- Define the integrity constraints on the data.
- Define the physical level.
- For each known problem to be solved on a regular basis (e.g., tasks to be carried out by clerks or web users), define a user interface to carry out the task, and write the necessary application programs to implement the user interface.
- Create/initialize the database.

Keyword queries used in web search are quite different from database queries. List key differences between the two, in terms of the way the queries are specified and in terms of what is the result of a query.

Answer:

Queries used in the web are specified by providing a list of keywords with no specific syntax. The result is typically an ordered list of URLs, along with snippets of information about the content of the URLs. In contrast, database queries have a specific syntax allowing complex queries to be specified. And in the relational world the result of a query is always a table.