CS 5300 module1

Name Student ID

Problem #1 (15 Points)

Compare and contrast file management system and database management system against each other.

- Database management system (DBMS) is a collection of system routines designed to maintain and utilize databases — an umbrella shielding database user from hardware/software details.
- In contrast to a file management system, a database management system takes a top down approach to process the information. It provides:
  - Data independence, insulates application programs from data representation and storage details (physical data independence). Furthermore, changes in logical structure of data is hidden from applications (logical data independence).
  - Efficiency (storage and execution time), this feature is traced back to the file systems;
    - Redundancy can be reduced,
    - Data can be shared,
    - Conflicting requirements can be balanced.
  - Data integrity and security (integrity constraints)
    - Inconsistencies can be avoided,
    - Security restrictions can be applied,
    - Integrity can be maintained.
  - Data administration
  - Concurrent accesses and recovery
  - Reduced application development time.

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- In a file management system data is a collection of information sources. It was designed to support efficient storage and access to the data. In short, it mainly addresses the organization of data on secondary storage.
- A file management system:
  - Does not provide data independence.
  - Is not a robust environment.
  - Could be very efficient for a specific application.
  - In general, is not efficient for a group of applications.

Problem #2) (10 points)

Attribute *K* (possibly composite) of relation *R* is a candidate key for *R*, if and only if:

a) Uniqueness: At any point in time, no two tuples of *R* have the same value for *K*.

b) Minimality: If *K* is composite, then no components of *K* can be eliminated without destroying the uniqueness property.

Attribute *FK* (possibly composite) of base relation R_2 is a foreign key, if and only if:

a) Each value of *FK* is either wholly null or wholly non-null — (all null or none null).

b) There exists a base relation R_1 (target relation) with primary key *PK* such that each non-null value of *FK* is identical to the value of *PK* in some tuple of R_1.