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Assignment 1 DSE6210

Textbook Exercises 1.1, 1.9, 1.10, 2.12

1.1 Define the following terms: *data, database, DBMS, database system, database catalog, program-data independence, user view, DBA, end user, canned transaction, deductive database system, persistent object, meta-data, and transaction-processing application.*

Data: known facts that can be recorded and that have implicit meaning (p. 4)

Database: collection of related data (p. 4)

DBMS: database management system; a computerized system that enables users to create and maintain a database (p. 6)

Database system: database and DBMS software together (p. 6)

Database catalog: part of database system where definition of database structure and constraints is stored; contains information such as the structure of each file, the type and storage format of each data item, and the various constraints on the data; stores meta-data (p. 10)

Program-data-independence: property of DBMS access programs in which the structure of data files is stored in the DBMS catalog separately from the access programs

User view: subset of the database user is interested in or has access to (p. 13)

DBA: database administrator; responsible for authorizing access to the database, coordinating and monitoring its use, and acquiring software and hardware resources as needed; accountable for problems such as security breaches and poor system response time (p. 15)

End user: people whose jobs require access to the database for querying, updating, and generating reports (p. 15)

Canned transactions: standard types of queries and updates by naïve or parametric users that have been carefully programmed and tested (p. 16)

Deductive database system: database systems that provide capabilities for defining deduction rules for inferencing new information from the stored database facts (e.g. using rules to determine students on probation based on student records) (p. 22)

Persistent object: survives the termination of program execution and can later be directly retrieved by another program (e.g. complex data structures in Java and C++) (p. 19)

Meta-data: describes the structure of the primary database (p. 10)

Transaction processing application: applications used by end users that help ensure concurrent transactions operate correctly and efficiently (p. 14)

1.9 Describe the role of concurrency control in DBMS. Support your answer with an example of transactions in a multiuser environment.

Concurrency Control: ensuring that several users trying to update the same data do so in a controlled manner so that the result of the updates is correct (p. 13-14)

Transaction: executing a program or process that includes one or more database accesses, such as reading or updating of database records (p. 14)

Concurrency control allows multiple users to access and update a database at the same time while ensuring efficiency and accuracy. It is essential in achieving the goals of a multiuser DBMS, which are to allow multiple users to access a database and to maintain accurate records in the database. An example of transactions in a multiuser environment is deposits and withdrawals from a bank account. Multiple transactions, such as direct deposit of a paycheck and cashing of a check written by the account holder, may need to be processed simultaneously. Concurrency control allows for both the account holder’s employer and the bank cashing the check to access the bank account at the same time and for the account balance to be correctly updated after the transactions.

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1.10 Specify all the relationships among the records of the database shown in figure 1.2.

Course\_number is the primary key for PREREQUISITE and a foreign key for COURSE

Section\_identifier is a primary key for SECTION and a foreign key for GRADE\_REPORT

Student\_number is a primary key for GRADE\_REPORT and a foreign key for STUDENT

2.12 Think of different users for the database shown in Figure 1.2. What types of applications would each user need? To which user category would each belong, and what type of interface would each need?

Naïve/parametric end users: students, professors, registrar, academic services, bursar

Sophisticated end users: business/marketing analysts for college

Casual users: department heads, Dean’s office

Students, professors, the Registrar’s office, Academic Services, and the Bursar are all naïve or parametric users that need to view and/or update the database. Students will want to view their grades, courses, and pre-requisites for courses. They may need menu-based, mobile application, and keyword-based database search interfaces to make finding information easy. Their access to the database must be limited to only their own grades and student information to protect privacy. Professors and the Registrar’s office would need a way to update grades and course listings, respectively. They may require a special interface with the functions that they will repeatedly use to update the database. Similar to the student user, Academic Services and the Bursar will need to view student information like grades and number of enrolled credits. They may require a menu-based or keyword-based interface to easily search through student records without knowledge of the how the database works or knowledge of database languages.

Sophisticated end users accessing the database may be business analysts employed by the college. They may need to query large amounts of data and apply statistical analysis to them to inform business or marketing decisions. To do so, they may prefer an interface where they can use query language commands to access the database.

Azure SQL

Once you have built your database, execute the lab\_exercise.sql query. Please submit the results as a CSV. Note: the name of your schema may differ, if so replace [dbo] in each of my table references with the name of your schema.

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