Merrick, David

CS 275

Spring 2012

9 April, 2012

Assignment 1

* 1. *Define the following terms: data, database, DBMS, database catalog, program-data independence, user view, DBA, end user, persistent object, meta-data.*

**Data**: known facts that can be recorded and that have implicit meaning. **Database**: a collection of related data. **DBMS (Database management system)**: A collection of programs that enables users to create and maintain a database. **Database catalog**: The form in which the database definition or descriptive information is stored. **Program-data independence:** the structure of data files is stored in the DBMS catalog separately from the access programs. **User view:** A subset of the database that meets the data and processing requirements of a particular group of users. **DBA (Database administrator)**: responsible for authorizing access to the database, coordinating and monitoring its use, and acquiring software and hardware resources as needed. **End user**: the person whose job requires access to the database for querying, updating, and generating reports; the database exists primarily for their use. **Persistent object**: an object that survives termination of the program execution and can later be directly retrieved by another program. **Meta-data**: The information stored in the DBMS catalog (structure of each file, type and storage format of each data item, various constraints on the data).

* 1. *What is the difference between a database schema and a database state? Describe the three-schema architecture, and discuss the differences between logical data independence and physical data independence?*

A database schema is the description of the database. This is specified during the design phase and not expected to change frequently. The database state, on the other hand, is the data in the database at a particular moment in time. This is generally expected to change frequently. The three-schema architecture separates the user applications from the physical database. It consists of the internal schema, which describes the physical storage structure of the database, the conceptual schema, which describes the structure of the whole database for a community of users, and the external schemas, each of which describes the part of the database that a particular user group is interested in and hides the rest. Logical data independence is the ability to alter the conceptual schema without changing external schemas or applications, for example, adding an item to a database. Physical data independence is the ability to change the internal schema without altering the conceptual schema, for example, providing an access path to speed up retrieval of records should not change the records themselves.

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

Users could include database administrators, administrative faculty, professors, groups of professors in a department, and students. Database administrators would need applications and permissions to directly access and modify the database and the server(s) it is hosted on, administrative faculty would need applications and permissions to view all student information in order to generate transcripts, professors would need applications and permissions to modify grades and view who is enrolled in their particular course but no other students, groups of professors would need applications and permissions to view enrollment numbers by department, and students would need applications and permissions to view their classes and grades pertaining to only themselves.

STUDENT

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Student\_number | Class | Major |
| John Doe | 1 | 2012 | Computer Science |
| Jane Doe | 2 | 2013 | Sociology |

PREREQUISITE

|  |  |
| --- | --- |
| Course\_number | Prerequisite\_number |
| CS1310 | CS1320 |
| MATH2410 | MATH2400 |

COURSE

|  |  |  |  |
| --- | --- | --- | --- |
| Course\_name | Course\_number | Credit\_hours | Department |
| Intro to computer science | CS1310 | 4 | Computer Science |
| Discrete mathematics | MATH2410 | 4 | Math |

SECTION

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Section\_identifier | Course\_number | Semester | Year | Instructor |
| 85 | MATH2410 | 4 | 12 | King |
| 91 | CS1310 | 4 | 11 | Anderson |

GRADE\_REPORT

|  |  |  |
| --- | --- | --- |
| Student\_number | Section\_identifier | Grade |
| 1 | 85 | A |
| 2 | 91 | B |

Users: Student, professor, administrative faculty.

Student view (for checking grades):

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Section\_identifier | Course\_number | Grade |
| 12 | 85 | MATH2410 | A |

Professor view (for checking who is enrolled in a course):

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Section\_identifier | Course\_number | Student Name |
| 12 | 85 | MATH2410 | John Doe |

Administrative faculty view (for checking what classes a student is enrolled in):

Student information:

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Student\_number | Class | Major |
| John Doe | 1 | 2012 | Computer Science |

Currently enrolled in:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Section\_identifier | Department | Course\_name | Course\_number | Credit\_hours |
| 85 | MATH | Discrete Mathematics | MATH2410 | 4 |
| 91 | Computer Science | Intro to Computer Science | CS1310 | 4 |