Course: COSC457.101 – Database Management Systems

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Room: YR-304

Assignment #1 Solution

Please complete the following exercise from textbook

1. Exercise 1.8 - Identify some informal queries and update operations that you would expect to apply to the database shown in Figure 1.2 *( 2 points)*

***Answer:***

(a) (Query) List the names of all students majoring in Computer Science.

(b) (Query) What are the prerequisites of the Database course?

(c) (Query) Retrieve the transcript of Smith. This is a list of <CourseName,

SectionIdentifier, Semester, Year, Grade> for each course section that Smith has completed.

(d) (Update) Insert a new student in the database whose Name=Jackson,

StudentNumber=23, Class=1 (freshman), and Major=MATH.

(e) (Update) Change the grade that Smith received in Intro to Computer Science section

119 to B.

1. Exercise 1.10 - Specify all the relationships *( 5 points)*

***Answer:***

(a) Each SECTION record is related to a COURSE record.

(b) Each GRADE\_REPORT record is related to one STUDENT record and one SECTION record.

(c) Each PREREQUISITE record relates two COURSE records: one in the role of a course and the other in the role of a prerequisite to that course.

1. Exercise 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? *( 5 points)*

**Answer:**

(a) Registration Office User: They can enter data that reflect the registration of students in sections of courses, and later enter the grades of the students. Applications can include:

- Register a student in a section of a course

- Check whether a student who is registered in a course has the appropriate prerequisite courses

- Drop a student from a section of a course

- Add a student to a section of a course

- Enter the student grades for a section

Application programmers can write a number of canned transactions for the registration office end-users, providing them with either forms and menus, or with a parametric interface.

(b) Admissions Office User: The main application is to enter newly accepted students into the database. Can use the same type of interfaces as (a).

(c) Transcripts Office User: The main application is to print student transcripts.

Application programmers can write a canned transaction using a report generator utility to print the transcript of a student in a prescribed format. The particular student can be identified by name or social security number. Another application would be to generate grade slips at the end of each semester for all students who have completed courses during that semester. Again, this application could be programmed using a report generator utility.

1. Exercise 2.15 - Consider Figure 2.1. In addition to constraints relating the values of columns in one table to columns in another table, there are also constraints that impose restrictions on values in a column or a combination of columns within a table. One such constraint dictates that a column or a group of columns must be unique across all rows in the table. For example, in the STUDENT table, the Student\_number column must be unique (to prevent two different students from having the same Student\_number). Identify the column or the group of columns in the other tables that must be unique across all rows in the table. *( 5 points)*

***Answer:***

|  |  |
| --- | --- |
| Table | Column(s) |
| COURSE | CourseNumber  Since this contains the combination of the department and the number that must be unique within the department. Note we will overlook the fact this does not accommodate a department from offering several “Special Topics” course with the same CourseNumber but different titles. We could make this a combination of CourseNumber and CourseName, but this is more succeptible to someone mistyping while entering data. |
| PREREQUISITE | The combination of CourseNumber and PrerequisiteNumber |
| SECTION | SectionIdentifier  We assume that no two sections can have the same SectionIdentifier. If we were to consider that SectionIdentifier is unique only within a given course offered in a given term (such as section 2 of CS101) then the answer changes to the combination of SectionIdentifier, CourseNumber, Semester, and Year. |
| GRADE\_REPORT | StudentNumber and SectionIdentifier  As per assumption stated in SECTION, the SectionIdentifier will be different if a student takes the same course or a different course in another term. |