

CSI2312 - Database I
Assignment 1 2016
By: Alexandre Billard (6812210)

This is an individual assignment and it is based on Chapters 1 and 2. Submit your answer via BlackBoard Learn, before the due date.

1) Database Management Systems (10 marks)

Consider the following relational schema about Kids (Campers) that register for Summer Camps in Adventures in Science in Engineering at uOttawa.

Camper (CName : string; Age : string; Email : string; tshirt : string; Fee : real)

Camp (CampID : int; CampTitle : string; EmpID : int; StartDate : date; Year : date)

Signup (CName : string; Name : string)

Mentor (EmpID : int; Name : string; EmploymentDate : date; Salary : currency)

The Database Management System (DBMS) provide, amongst others, the following five functions:

1. Uniform data administration,
2. Data independence,
3. Data integrity,
4. Concurrent access, and
5. Data security.

Explain, by using of your own examples against the database, exactly what each one of these five functions ensure.

1. Uniform data administration:

Access control and monitoring in the relational schema for Summer Camps in Adventures in Science in Engineering at uOttawa would consider the read-only options for when several users share the data. The centralization of the administration of data would allow campers and mentors to see the information such as the camp title, the start date and the end date, but not be able modify them. This idea of performance tuning by the database administrator (DBA) would be to help manage disk space management for shrinking the information to become readable on a portable device so both mentors and campers can view any updates by the camp. Concurrency control would be able to address any conflicts of editable data by any members would do not have access to it, an example of this would be when a mentor would like to change his own salary, he could not change this without access given by the camp. Furthermore, the DBMS would have schedule concurrent accesses to the data in such a manner that only privilege users such as mentors can access the DBMS as peak times to protect users from the effects of systems failures.

2. Data Independence:

The application and the database will not be depending of each other. The application that imposes an interface for the campers will not expose to details of data representation and storage. The data is structured and stored in a way to protect various changes by different

applications (e.g. SQL vs. MySQL). This data independence is achieved through the management in classification of rows and columns for the tables of campers, camp, mentors, and sign up. The independence of these tables is achieved through use of the three levels of data abstraction. This program would also have logical data independence; this ensures the protection from changes in the logical structure of data. Physical data independence is also present in the data independence in its nature of protection from changes in physical structure of data.

3. Data Integrity:

Data integrity in the notion of the Summer Camps in Adventures in Science in Engineering at uOttawa application would enforce integrity constraints as to prevent unnecessary duplication; no campers can register when there is already identical information on said camper. It would also allow for fields to be filled by those who sign up to have clear and simple answers, such as either male or female for gender fields. It would have work constraints of handling how many campers can sign up with how many mentors, or have a certain age limit for campers.

4. Concurrent access:

Concurrent access can be controlled by the allowance of transaction being performed on the DBMS. The transactions can be controlled by the Atomic, Consistent, Isolated and Durable (ACID) principles; these guidelines create the constraint to allow access with a locking mechanism. Concurrent access would be a priority in the Summer Camps in Adventures in Science in Engineering at uOttawa because it would prevent from a system malfunction if two campers want to be registered at the same time when there is only one available space remaining, the concurrent access would block the second applicant while the first applicant is filling out the registration form.

5. Data security:

The responsibility of ensuring that unauthorized data access is not permitted is crucial in the fractions of DBMS. Not everyone would be able to see the information of the campers for issues of privacy; the same notion would apply for the mentors. However, the data security would allow the mentors, which are trusted employees of the Summer Camps in Adventures in Science in Engineering at uOttawa to be able to see the information of the campers. The campers who would like to see information about mentors would have that security privilege, yet a constraint of data security would be added for them not to be able to see the mentor's salary.

2) Entity Relationship Diagrams (15 marks)

Consider the following description of the GoGoGreen electric scooter rental company that is based in Ontario. The headquarters is in Ottawa and GoGoGreen currently has ten branches throughout the province.

- Each branch has an inventory of electric scooters, all of which are recorded in a catalog.
- For each scooter, we record the unique registration number, the make (e.g. Suzuki), the model (e.g. Dolce Vita), the year of manufacturing (e.g. 2015), the rental price per hour (e.g. \$12.00 per hour), the main color (e.g. red) and the battery duration (e.g. 100 hours).
- A branch may have many scooters of the same make and model, but the registrations

number is unique throughout the company.

- Before renting a scooter from the company, a customer must first register as a member of a local branch. The data held on a member include her membership number, name, address, phone number and the date she first registered at the branch. We also record credit card details.
- Once registered, a member is free to rent a scooter for duration from (minimum) 1 hour to (maximum) 48 hours.
- The data held on each scooter rental is the rental contract number, the date, the membership number, the registration number of the scooter, the daily rental price, as well as the time rented out and returned. A status attribute is used to indicate whether a scooter is available or not.
- For each branch we record the branch number, name, address and phone number.
- Each branch has a manager, who is responsible for the day to day running of the branch. A branch also has at least two additional staff members, who are full-time employees. For each staff member, we record her name, address and social insurance number.

Draw an EER diagram for the GoGoGreen database, using the description given above. Show all your assumptions clearly.

GoGoGreen Database

