University of Tartu
Databases (LTAT.02.021)
Database project
Fall 2023

Project: *Construction and exploitation of a database to automate the services of the library of a university*

A local private university wishes to automate the management of items borrowed by students from its library. The objective of this project is to help them in the designing and operation.

1. Organization

The project is to be carried out in pairs. You can work on the MySQL, PostgreSQL or Oracle server seen in the different lab sessions. The rendering consists of a compressed archive containing a report in PDF format detailing your work as well as the requested deliverables. You will specify in your report the name of each member as well as the part of the work carried out by each in this project.

2. Context:

A library management system is software designed to manage the main functions necessary for the daily operation of a library. It allows the management of active resources and their availability to its members. In particular, it allows to manage the borrowing, the return and the reservation of resources. It also helps librarians to track member profiles and analyze the influx of requests for a particular subject area and to issue calls for tenders. In this project, students will be asked to propose a conceptual model of the resources available in the library in a first step, then to create the database on a data server and finally to develop a web or a native application interface to simulate different views of these data according to the users' profile.

3. Database designing

a. Specifications:

The database must allow the management of books, their borrowing and their return. The books have a common reference (International Standard Book Number) that allows them to be uniquely identified in the database. They also have a title, a language, a number of pages, the year of production, the subjects they cover, their author and publishers.

The following requirements are given to you after your interview with the business manager of the university:

- Students must be registered with the library in order to receive a library card. To do so, they must provide their first and last names, postal and e-mail addresses, and telephone numbers. They can then borrow resources from the library upon receipt of their card.
- A student registered at the university is allowed to borrow up to 5 items. The duration of the loan is 15 days maximum. If the student is not registered at the university, he can only borrow

the book resource limited to 1. A student has a code that identifies him and can have several cards that give him access to library resources such as books, computers, etc.

- The cards have a number, an activation date, a status and is given for a well identified resource (Book, computer, meeting room, ...).
- There can be more than one copy of a book. A copy has a barcode, a price, a date of purchase. Copies are arranged on rack (identified by a number) to facilitate their research.
- The system should be able to retrieve information such as who has checked out a particular book or which books are borrowed by a specific student from the library.
- We must be able to display the copies of books whose due dates have passed or the number of remaining copies of a given book.

b. Deliverable

Propose a database design to meet the above specifications. The deliverables are as follows.

- A zip file of the Conceptual Data Model (CDM) you will have designed for the database. This CDM will need to be defined as an entity-association diagram. It should be associated with explanations in your report that specify your design choices and any assumptions you have made. The entity-association diagram must use clear notations and be well presented (Merise or crow's foot). In terms of tools, you can use AnalyseSI, Looping, JMerise. You can also use evaluation versions of professional software such as PowerDesigner. In the report, don't forget to specify the name of tool used for conceptual design.
- List of structural constraints of the database.
- A script to create the tables, named create_tables.sql, corresponding to your CDM, for the Oracle or MySQL or PostgreSQL system. This script must also be clear and well presented.

c. Populating

Fill the different tables of your database according to the order of application of the integrity constraints with fictitious data.

4. Graphic interface

Using graphical development tools of your choice (Html PHP, Java, Python, etc.), develop a series of interfaces allowing you to give different views to the data saved in your database.

- Create three user profiles
    - Administrator, with the right to delete, add or modify all tables.
        - Provide an interface that allows you to create a new student and associate him with a card type.
        - An interface to activate or deactivate the status of a member's card.
        - An interface to add a resource managed by the library.
    - Library agent with the right to view student profiles, assign available resources or update the resource return.
        - Create interfaces that allow it to perform its functions, for example, to view the list of copies of books that are past their due date.
    - Students, with the right to view available resources, change their password, or list their current loans.

5. **Project follow up**
    a. Send me your work planning by 15, November
    b. At least one online meeting between November 20 and December 2