Project Assignment

1   Introduction

The goal of this project is to give you practical experience with information system (particularly database) design. You will learn to use standard methods and models used in database design to create a simple information system yourselves beginning with an informal specification and continuing to less and less abstract models until the implementation itself.

The choice of topic for your project is left to you, however, it has to comply with several required criteria.

2   Specifications

The realisation of any information system starts with drafting an informal specification in terms of concepts and facts of the universe that is to be modelled by the information system and operations that any of the users can perform on the data. You are free to create your specification yourself, however, it has to comply with the below listed criteria to fit the framework of the course. Before you start working on your project, I will have to validate the proposed specification. You are thus advised to submit your specification (or a sufficiently advanced draft) as soon as possible.

Each information system project has to meet the following requirements :
— Use a database managed by DBMS of choice, coupled with a web application facilitating the user interface.
— Model of a rich universe (in terms of concepts and facts/relations connecting them).
— Multi-user support.
— Multiple user roles.
— Dynamic database (possibility of creating/updating/deleting at least some of the data).
— Processing large volumes of data. (Ideally based on an existing free data base. [1]) ;
— Allows complex operations on the data.

The requirements are specified considerably loosely and should serve more or less as guidelines for your specification.

For your specification, it is enough to submit an informal document that explains the following information in depth and in a sufficiently clear manner.
— The modelled universe, the concepts and facts linking them.
— The different roles a user can assume and operation that a user can perform under each of these roles.

Example (draft)   Service for Parisian cyclists based on a public database of city hall of Paris. [2] The service should provide information on the bicycle stand locations, bike paths, addresses, roads, traffic information and stations of the *Vélib*. The users would be allowed to search for the closest *Vélib* station or bicycle stand, find the best way between two *Vélib* stations, bicycle stands or addresses according to various optimality criteria (time, distance, traffic, bike path availability, etc.), but also exchange and collaborate by sharing itineraries, posting reviews of various points of interest or feasibility/traffic reviews for individual roads – which could be used as optimality criteria in subsequent pathfinding.

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1. DataPortals.org
2. https://opendata.paris.fr.

3 Instructions

3.1 General

The project will be done in three phases, corresponding to gradual refinement of the model from more to less abstract :

1. Conceptual Analysis.
2. Logical Design.
3. Physical Design and Implementation.

Unless you want to run a risk of having to start over, please end me your informal specification for validation before proceeding with working on the project. It is advised to have the specification ready for validation by the second lesson of the course, not to impede you in submitting each phase of the project on time. . Each phase will by submitted and graded separately. The deadlines and format for each submission are listed in the respective subsections.

Failure to meet the deadline for any of the project phases is rewarded by -1 point for each day of tardiness. In case there are any issues with the deadlines, let me know beforehand and we will try to find a solution.

All project and course related material is to be sent directly to me on juraj.kolcak@lsv.fr. I will try to respond in timely fashion and acknowledge the successful receipt of any documents.

Models and technologies to use :
— Conceptual Analysis : Enhanced Entity-Relationships Model (will be covered in the course).
— Logical Design : Relational Model.
— Physical Design : Relational (SQL based) DBMS (Database Management System).
— Web Server : PHP/anything you prefer.

3.2 Conceptual Analysis

Entails the following :

1. *Informal specification*, as defined above.
2. *Conceptual Schema (EER)*, if at all possible, respect the formalism we use in class. Other than that, there are no requirements other than readability. For those interested DB-MAIN looks like a usable software.
3. *Integrity Constraints*, list all additional integrity constraints that apply in your case, but are not captured by the EER diagram.
4. *Documentation*, explain complex constructions where necessary (not obvious from the specification), what where the reasons/limitations for including them etc.
5. *Functional Analysis*, informally describe all the use-cases in your diagram, i.e. describe the operations that can be done by any user at any time.

Deadline : Friday 23/02/2018.

3.3 Logical Design

Entails the following :

1. *Translation of EER Schema*, relations and keys identified by translating the EER schema into relational.
2. *Relational Schema*, the final, complete relational schema. If at all possible, respect the formalism we use in class. Other than that, there are no requirements other than readability.
3. *Documentation*, explain all nontrivial choices you have made, either during the translation or in subsequent refinement of the relational schema.
4. *Integrity Constraints*, list all additional integrity constraints that apply in your case, but are not captured by the relational diagram.

Deadline : Friday 16/03/2018.

3.4 Physical Design and Implementation

Entails the following :

1. *Database indexes*, list all the indexes you used in your database with justifications why including them is beneficial.

2. *Integrity Constraint Implementation*, document how each of the integrity constraints for your database is implemented and what influenced your choice.

3. *Functionality Documentation*, describe how each of the functional requirements on your database is implemented and what influenced your choice.

4. *Source Archive*, an archive with sources for your application, including :
   — SQL code used to create your database.
   — SQL code for additional integrity constraints and other functionalities of the information system.
   — Scripts and SQL code to import test data into the database.
   — Source code of the web application.
   — A short README file with all instruction you consider necessary for the use of the web application.

Deadline : Friday 18/05/2018.

3.5 Presentation

Each team will have a short presentation of their information system (15 min) that may be followed by a short question session. The presentations will take place on the last session (25/05/2018).