Overview

In this practicum you will build a database for a problem of your choice. You will describe the requirements for the project, build a conceptual data model, a logical data model, a relational schema, followed by implementing the relational schema in SQLite3, as well as a simple interface using Node.

Format

This work should be completed individually

Tasks

(10 pts) Describe the requirements of the problem with a simple document that lists the rules of the database in the problem domain language. Then describe a list of business rules and the list of possible nouns and actions you identified. I'm expecting this to be a short 1 or 2 pages document.

(15 pts) Analyze the problem and create a conceptual model in UML using a tool of your choice (e.g., LucidChart, Enterprise Architect, ArgoUML, Visual Paradigm, ERwin, TOAD) as discussed during class and provided in the references and resources below. Additional requirements and clarifications will be provided in the #general channel on Slack. The diagram must contain at least three classes, at least one to many relationship and one many to many. All relationships, except generalization, must have full multiplicity constraints and labeled as appropriate. Classes must have proper names, descriptions, and attributes with domain types. Key attributes and derived attributes must be marked. Don't build a model with more than 10 entities.

(10 pts) From the Conceptual Model, construct a logical data model expressed as an ERD using a language of your choice (other than UML) and a tool of your choice. The logical data model may not have any many-to-many relationships, so introduce association entities as needed.

(15 pts) From the logical model, define a relational schema in at least BCNF. Using functional dependencies, show that the schema in in at least BCNF.

(10 pts) Create a set of SQL data definition statements for the above model and realize that schema in SQLite3 by executing the script from the SQLite3, the console or Node. You can use DB Browser to generate these statements. Show that the tables were created and conform to the constraints through screen shots or other means.

(10 pts) Populate the tables with test data. You can use tools such as https://www.mockaroo.com/schemas (Links to an external site.) or https://www.generatedata.com/ (Links to an external site.).

(10 pts) Define and execute at least five queries that show your database. At least one query must contain a join of at least three tables, one must contain a subquery, one must be a group by with a having clause, and one must contain a complex search criterion (more than one expression with logical connectors). Experiment with advanced query mechanisms such as RCTE, PARTITION BY, or SELECT CASE/WHEN.

(20 pts) Create a basic Node + Express application that let's you create, display, modify and delete at least two of the tables with a foreign key between then. No need to have a polished interface, and you can use the code created in class as a starting point

Minimum Requirements & Grading Rubric

Conceptual Data Model in UML (Class Diagram) Diagram must be drawn using a tool.

Submission

Submit a Github Repository containing:

The requirements document as a PDF.
UML Class Diagram as an embedded JPG/PNG.
ERD as an embedded JPG/PNG and URL to its LucidChart diagram.
Definition of relational schema with proof that it is in BCNF.
SQL file (text file) with the table definitions and creation SQL statements that can be executed with SQLite3
The code of your basic application