Modelling Database Requirements with E-R Diagrams

IS5102 – Database Management Systems

Due date: Monday 12th October (week 5), 21:00
33.3% of continuous assessment for the module
(MMS is the definitive source for deadline and credit details)

In this assignment, you are asked to model a scenario for its database aspects, using entity-relationship models to express models and requirements.

You are expected to have read and understood all the information in this specification at least a week before the deadline. You must contact the lecturer regarding any queries well in advance of the deadline.

Purpose

This practical will help practice and develop your skills in:

- analysing and defining database requirements;
- modelling data using E-R model techniques;
- understanding how to utilise functional requirements;
- understanding and reporting requirements.

Summary

This is an **individual assignment**.

In lectures we have talked about modelling database scenarios, in particular at the conceptual level using E-R models. This assignment presents a short scenario and asks you to model it using the techniques presented.

Submission

The primary output will be a **report**, which should be in **PDF format**, with sections per task as above. Include a picture (machine-generated or scanned) of your model in the report. Submit this report via MMS by the deadline, checking to make sure that the version you submit is the one you mean to submit.

Scenario

An online bookstore "Unbounded Bookworms" needs a database to manage details about books, customers, and book orders. The following initial specification has been given:

> We offer books in various formats: some books are in paperback, some in hard cover, some in e-book and some in audio versions. A book can be available in more than one edition.

Customers usually check books availability by title or author. Sometimes they ask for recommendations based on genre, so genre(s) should be stored for all books. For ordering books, we need to know the price of the book. Customers often also want to know the number of pages for paperback and hard cover editions, and the duration of recording for audio books.

Orders need to be recorded for delivery of books to customers, and should record the order date. Provision should be made for an order to possibly include many different books, which happens a lot at the start of the semester and during holidays. Also, provision should be made for an order to include multiple copies of a particular book. The total value of an order is necessary for accounting.

We also want to let our customers review books, giving their ratings on books they are reading. The store managers wish to maintain a good selection, so they want to know how many books are sold by author and by genre. To plan our direct mail advertising campaign, we also want to know which customers are making orders whose total cost is high, or making a large number of orders; thus information on customer order value and order quantity is desired. We also need to know customer names and addresses to send them our advertising leaflets.

Tasks

Task 1

From the given scenario, document the intended use of the data and any other factors that you consider relevant. You should think particularly of the questions that will be asked of the data. As part of this, come up with (at least) **three queries** that you feel are likely to be made by stakeholders (use plain English to formulate questions and queries).

Write a **specification** of the data from the scenario that will be stored in the relational database. It should be written in plain English (instead of using a formal notation). You should think of what constraints may exist on the data, and how to express any such constraints. This specification will be the basis for your database definition, so it should be as precise as possible. Document clearly any assumptions you make.

Task 2

Design a representation of the data in terms of entities, attributes and relationships between entities. Construct an **E-R diagram** to depict this representation. Your E-R diagram should be submitted electronically as part of your report. It is recommended that you use some drawing software in the construction of your model (drawing tools in Microsoft 365 components will suffice). However, if you wish, you can use scanned versions of hand-drawn diagrams. These are acceptable provided they are neat and legible.

In your report, indicate where the data to answer the queries from Task 1 lives in your data model, showing that your data model does satisfy the requirements specification.

Task 3

Reflect on the process of doing database modelling, linking back to the work done in Tasks 1 and 2. What did you feel you did well? What did you find challenging? What problems did you encounter, if any, and how did you try to resolve those? Did you find gaps between the theory taught in class and/or presented in textbooks, and the practical application? What would you do differently, if anything? This should be a **short reflective section** of your report. You can say as much or as little as you want, but as guidance, between half a page to a page should be enough.

Marking

A specification capturing the requirements, a correct E-R model which captures the scenario, and a reflective section of the report make up the basic requirements. A good report covering all of these will be sufficient to get marks up to 16.

To get the higher marks (17 and above), advanced work is required. This can include (for example)

- insightful and relevant questions for the requirements;
- exceptional clarity and understanding in the requirement specification;
- good style in E-R modelling including (for example, where applicable) weak entity sets, a range of simple, compound and derived attributes etc; or
- report demonstrating excellent understanding of the modelling process.

Policies and Guidelines

Marking

See also the standard mark descriptors in the School Student Handbook:
`https://info.cs.st-andrews.ac.uk/student-handbook/learning-teaching/feedback.html#Mark_Descriptors`

Lateness

The standard penalty for late submission applies (Scheme B: 1 mark per 8 hour period, or part thereof):
`https://info.cs.st-andrews.ac.uk/student-handbook/learning-teaching/assessment.html#Lateness_Penalties`

Good Academic Practice

The University policy on Good Academic Practice applies:
`https://www.st-andrews.ac.uk/students/rules/academicpractice/`