CS6360.MS1 Spring 2024

Assignment 2

The purpose of a library is to lend books. There are thousands of public libraries around the United States, and many other countries, as well. Virtually every school has a library, including UTD, but these function slightly differently. This assignment concerns a university library such as the McDermott Library here at UTD. (You, being a student, have the privilege of borrowing books from it.) Consider the following:

1. A library contains thousands of books, magazines, and other items. It may have multiple copies of the same book. It can also have electronic books. A university library also has various journals, such as CACM, IEEE Spectrum, etc. It lends CD and DVDs. The McDermott Library’s policies are found here (https://utdallas.edu/library/about-the-library/library-policies/circpolicy/) in case you’re curious, but you don’t need to follow the link to be able to do this assignment. Some books are never lent out, such as rare books, original manuscripts, and the like.
2. Students and faculty, by virtue of having a Comet card, can borrow books from the library. However, the library must have information on every borrower.
3. Different rules apply to faculty, graduate students, and undergraduates, as follows:
4. Faculty may check out up to 300 items for an entire semester.
5. Graduate students may check out up to 150 items for an entire semester.
6. Undergraduate students may check out 5 items for up to 21 days.
7. Late items are charged $0.50 per day or fraction of a day late.
8. The maximum fine is $50 for books and $25 for magazines.
9. Information on a publication includes *but is not limited to* the following: (Note that identification “numbers” below, such as the Dewey Decimal system number, are actually strings.) In the old days, this was kept in a card catalog, but no longer. Now it’s in a database, accessible through a program.
10. Title
11. Author(s) (may be more than one)
12. Edition (We’re using the seventh edition of the *Database Systems* textbook.) Different editions are considered to be a different book.
13. Publication date
14. Publisher
15. ISBN (International Standard Book Number.) Note that the hard-cover, paperback, and electronic versions of the same book have different ISBNs.
16. Dewey Decimal System number if it is non-fiction. This is not used for fiction. This number categorizes the book.
17. Library of Congress catalog number, used for all books.
18. Number of pages
19. Type of item: book, magazine, CD, etc.
20. A short description of the item. This may be more than 255 characters. For example, a description of our textbook might be something like, “A comprehensive overview of database systems, including SQL, relational algebra and calculus, normalization algorithms, query processing, and transactions.”
21. *Anything else you need. Think about what goes in this record and what does not.*
22. Information on a library user includes *but is not limited to* the following:
23. Name as first name, middle name, last name
24. UTD ID
25. NetID
26. One or more phone numbers, which could include mobile, office, and home.
27. E-mail address.
28. Possible multiple physical addresses. One would generally be a local address but another could be a home address for, for example, students from out of state or other countries.
29. Borrower type, as faculty, graduate student, undergraduate
30. Gender (might be used to suggest books)
31. Department (also might be used to suggest books)
32. Consider that there may be other information not covered by the above. I want you to think about that as you reason about how a library is run, and from some things I have given you.
33. When I say that the information “includes” what I have given you, what I mean is that you may discover other information that needs to be kept, as well.

Given the above description of a library, design a database suitable for use by the McDermott Library. Your system should be designed such that it **could** answer questions including but not limited to the following:

1. What books do we have by Shamkant Navathe?
2. What books do we have on databases?
3. Which books are overdue, and who has them?
4. What is the fine, if any, on a book when it is returned?
5. We have just acquired a book; put it into the system.
6. Find a link to the e-book of the *Big Nerd Ranch Guide to Android Programming*.
7. Where is *The Federalist Papers* physically located within the library?
8. Are there any copies of *Zen and the Art of Motorcycle Maintenance* on the shelves?
9. A library user has left the university with two books in his possession. Send him a notice that we want them back.

Specifically **create a UML, ER, or EER** diagram showing the various tables you need and the relationships between them. Write a few sentences explaining why you chose the particular kind of diagram.

A good tool to use is Visio, which is available free to you as a UTD CS student. There are other free tools you may use, as well. If we cannot tell from the name of an attribute or table what it means, you need **written** explanation. Absent that, you will lose two points each. It is also permissible to use the reverse engineering feature of some of the database tools. This will give you a starting point, not necessarily your completed diagram, since your diagram may require annotation.

Remember, if you think you have too many tables, you might have almost enough. If you have exactly two tables, you have not understood the assignment.

**To hand in:**

Your diagram stored as a PDF or PNG file, and a Word or PDF document with your explanations. No other formats can be accepted.

**Grading (total points: 100)**:

|  |  |
| --- | --- |
| Diagram follows conventions for its form. That is, for example, your ER diagram really is an ER diagram, you use the correct symbols, etc. | 30% |
| Completeness; your design covers the various cases | 50% |
| Clarity of the diagram. Your diagram is readable. | 20% |

Other grading criteria:

1. Missing a major table. -5 to -15, depending upon severity.
2. Missing a major relationship between tables: -5
3. Missing an important data element: -2 to -5, depending upon importance
4. Unnecessary tables: -3 each
5. Attributes that are in the wrong relation: -2 each
6. Data element whose meaning is not clear, either from the name or written explanation: -5 each
7. Your design cannot answer one of the questions in the list. -5 per question.
8. Storing redundant information: -5 to -10.