Thais Minet
3/3/18

6.7. Consider the LIBRARY relational database schema shown in Figure 6.6. Choose the appropriate action (reject, cascade, set to NULL , set to default) for each referential integrity constraint, both for the deletion of a referenced tuple and for the update of a primary key attribute value in a referenced tuple. Justify your choices.

BOOK

Note: The name of a publisher may change, but the name of the publisher associated with the book (printed in the front few pages and used for academic citations) should stay the same no matter what. So, if there really are any cases in which a publisher's name changes, then there should be another table associating a Publisher_id with one or more Publisher_names. This would allow you to consolidate the contact info in one entry while also help preserve the correct reference information for each book.

BOOK's foreign key restraint on Publisher_name should say ON UPDATE CASCADE, because the book should remain associated with the publisher's contact info (see note above for why this is broken due to the necessity of academic citation consistency), and ON DELETE REJECT, because a book needs to be associated with a publisher (again, this depends on what the library is using the publisher data for, citational data or for contact info).

BOOK_AUTHORS

Note: Similar to the Publisher_name in BOOK, it is wrong to be changing author names for books because it violates the consistency of citational stuff, but this all depends on what the library is trying to do here. Mark Twain, for example, is also named Samuel Clemens for some of this books, so really there should be a more sophisticated structure here to account for all these possibilities.

BOOK_AUTHORS foreign key constraint on book_id should say ON UPDATE CASCADE since if the Book_id in BOOK were to change the author should still be associated with the corresponding book and ON DELETE CASCADE, since the author of a book we don't have isn't necessary.

PUBLISHER

The PUBLISHER table does not have any foreign keys. So there are no constraints to create.

BOOK COPIES

BOOK_COPIES foreign key constraint on Book_id should say ON UPDATE CASCADE since if the Book_id in BOOK changes the number of copies of the given book in a given branch should still be associated with the same book in the BOOK table. It should also say ON DELETE CASCADE since if the Book_id is deleted from the BOOK table that means the book is no longer in the collection of any library so all copies of the book should be removed.

The foreign key constraint on Branch_id should be ON UPDATE CASCADE since if the Branch_id changes in the LIBRARY_BRANCH table the Branch_id of the book should still be associated with that branch. If the book were being changed to a different branch then the Branch_id in the BOOK_COPIES table should be changed for that book which would not affect what Branch_id's in the LIBRARY_BRANCH table. If a Branch_id in LIBRARY_BRANCH were to be deleted that would mean that library branch had shutdown. This means that either the books for that library should have been sold or moved to a different branch. If they were moved to a different branch then the Branch_id of the book should be changed or the No_of_copies of the book should be incremented if the other branch already has the book. This should happen before the branch is deleted. If the books were sold then they should be removed from the database anyway. So Branch_id constraint should be ON DELETE CASCADE.

BOOK_LOANS

BOOK_LOANS foreign key constraint on Book_id should say ON UPDATE CASCADE since if the Book_id in BOOK changes, the book is still checked out and should be referenced appropriately in BOOK_LOANS. It should also say ON DELETE CASCADE, since if the Book_id is deleted from the BOOK table, that means the book is no longer in the collection so it doesn't matter if a borrower has this book checked out (although that is a strange circumstance to occur, and it depends on what the library is actually trying to do with this database).

BOOK_LOANS foreign key constraint on Branch_id should say ON UPDATE CASCADE since if the Branch_id changes, the BOOK_LOAN tuple should continue to reference the appropriate branch. ON DELETE CASCADE, because if a branch is closed down, then the loaned out books probably don't matter anymore (again, this depends on what the library is actually trying to do with this database or the books should already have been associated with a new branch).

BOOK_LOANS foreign key constraint on Card_no should say ON UPDATE CASCADE since if the borrower's card number changes (due to a replacement card or some such) the borrowed book should still refer to the same borrower. ON DELETE REJECT, since

a library shouldn't be deleting the account of a borrower who hasn't returned all their books (but of course this entirely depends on the library's policies and the intended use of this database).

LIBRARY_BRANCH
The LIBRARY_BRANCH table does not have any foreign keys. So there are no constraints to create.

BORROWER
The BORROWER table does not have any foreign keys. So there are no constraints to create.