Project Team 6

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Database Design and Final ERD

Database Design

1. Database Purpose:

The mission of this database is to maintain the data of a student library rental system. It is used to keep better tracks of the books. The database can also be used to keep the record of comments on the books as well as check the renter cards active status. The entities of this database are book information, book copy, books type, author information, publishing house, student information, renter card information, college information, rental status, rentern status, comments and library staff information.The database will be used by the department of student administration and library staff.

1. Business Problems Addressed:

* Allow the department of student administration or library staff to generate the rental report from students
* Provide rental information to improve the service of the school library. (e.g., increase the amount of books related to database if a lot of student try to rent from the student library. )
* Allow the library staff to efficiently remind students about the returning date and have a flexible book schedule.
* Allow the students and library staff to learn the feedback on the books. (e.g. from 1 to 5, how would you rate the book)
* Allow library staff to check the active status of renter cards

1. Business Rules

* Each book should at least have ISBN, book name, author, publishing house, and available amount.
* Each student should at least have a student ID, first name, last name, gender, contact number, email address, and college of school.
* Each library staff should at least have a staff ID, first name, last name, and contact information.
* Each rental status should at least have ISBN of book and student ID, the renting date and returning date should be auto-generated from the library system.

1. Design Requirements

* Using Crow’s Foot Notation
* Specifying the primary key and foreign key in each table.
* Drawing identity lines between the tables to show the relationships between each other. The type of identity line(identity line or no-identity line) is considered and generated by Crow’s Foot Notation. This line should be pointed directly to the table if they have an identity relationship or no-identity relationship.

1. Design Decisions

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| --- | --- | --- |
| **Entity Name** | **Why Entity Included** | **How Entity is Related to Other Entities** |
| Books Information | Collecting information about books in the library is one of the primary purposes of the database. Including basic information of books and availability and storage location in the library. | The book entity’s primary key book\_id, relates it to book copy, book type, author, publishing house, comment, rental and return status. |
| Library Staff Information | Tracking staff who process each order is an important function. | The Library Staff Information is related to the Rental Status entity and the Return Status entity through an associative entity due to the one-to-one relationship. One order may only have one staff to be handled at a one time. |
| Book Copy | Each original book in the library has several copies, the book copy entity is created to identify these copies. | The Book Copy entity is directly related to the Book Information entity through the copy ID attribute due to the many-to-one relationship. Multiple copy versions may come from one book. And both one-to- one relationship with return and rental table. |
| Books’ Type | The book type entity contains the name of the book type. | The Books’ Type entity is directly related to the Book Information entity through an associative entity due to the one-to-many relationship. One Book Type may have many books. |
| Author Information | The author entity provides author information of each book in the library. | The Author Information entity is directly related to the Book Information entity through an associative entity due to the one-to-many relationship, which means authors can write many books. |
| Publishing House | The publishing house entity tracks names and details of publishing houses of books. | The Publishing House entity is directly related to the Book Information entity through an associative entity due to the one-to-many relationship. One Publishing House may release many books. |
| Student Information | Another key function of this database is to track who rents or return books in the library. This entity also provides detailed information of the user. | As one of the core tables, Student Information related to College entity with college name due to a many-to-one relationship, to Rental Card Info entity with Card Number due to a one-to-one relationship. |
| Recter Card Info | The card entity contains the card id of each user. | The Rental Card Info entity is directly related to the Student Information entity through an associative entity due to the one-to-one relationship, which means that one card number only belongs to one student. |
| College Information | The college entity contains the name and address of users’ college. | The College Information entity is directly related to the Student Information entity through an associative entity due to the one-to-many relationship. There are many students in a college. |
| Rental Status | One of main features is tracking rental data for each user. Including book id and rental date. | As one of the core entities of the whole database, the rental status has rental id as a primary key and related to the Student Information, Staff Information due to the one-to-one relationship.One order may be made by the one staff or student. |
| Return Status | One of main features is tracking return data for each user. The return entity has a due date for each order. | As one of the core entities of the whole database, the return status has return id as a primary key and related to the Student Information, Staff Information due to the one-to-one relationship.Many orders may be made by the same staff or student. |
| Comment | The comment entity provides user comments on books. Students may be interested in whether the book is worth borrowing. | The Comment entity is directly related to the Book Information entity through an associative entity due to the many-to-one relationship, which means that one book may have many comments. |

Correction：

1.Remove StudentID from Card Info table.

2.Change the availability(show true or false that the books are available to rent) into Avail Status(Rent copy of the books, show the remaining numbers of the copy).

3.Remove the Location attribute from Book Info Table.

4.Remove BookID from Rental Status and Return Status Table.

5.Remove the relationship of Book Info with Rental and Return status, add the one-to-one relationship between the Book Copy of Rental and Return Status.

Final ERD:

