Library Management System
Entity Relationship Diagram

The main users of the library management system are the librarians and the patrons. The librarian manages the book issues and returns for the library. The main functionalities of the system will be the issue of book, return of book and searching for a book. From the defined scope the entities defined are — Librarian, Books, Patron, Authentication System, Report. The relations defined among these entities are — 'Keeps Track Of', 'Maintains', 'Manages', 'Authenticates', 'Request Book issue/Book return', 'Searches'.
The detailed description of the entities and relations are given below.

Entities:

1) Authentication System:
   Primary key : Librarian_Id
   Foreign key: -none-
   Attributes : Librarian_Id, Password
   Description : This entity stores information (ID, Password) about Librarians to authenticate them.

2) Librarian:
   Primary key : Id
   Foreign key: -none-
   Attributes : Id, Name, Password
   Description : This entity stores information about all the librarians of the Library. It stores the Id, name, password of all the librarians which is authenticated by the Authentication System.

3) Books:
   Primary key : ISBN
   Foreign key: -none-
   Attributes : ISBN, Code, Category, Title, Author, Shelf_no, Availability
   Description : This entity keeps track of all the books present in the library and their availability status. It stores the ISBN, Code,Category, Tile, Author, Shelf_no, Availability of each book.

4) Patron:
   Primary key : ID
   Foreign key: - none-
   Attributes : ID, name, Position, Fine
   Description : This entity stores information about all the patrons of the library. Each patron has an ID and the type of user they are (eg. student,faculty). The librarian keeps track of the entity.

5) Report:
   Primary key : ISBN
   Foreign key: ISBN, patron_Id
   Attributes : ISBN, patron_Id, issue_date, return_date, Fine_incurred
   Description : This entity stores information about the books issued to the patron and is handled by the librarian entity through the 'maintains' relationship. It also stores the fine incurred for a particular book.

Relations:

1) Authenticates:
   Description : This relation authenticates the librarians at the time of login.
   Entities involved :Authentication System, Librarian
   Cardinality : one - to - many relationship

2) Manages:
   Description : This is the relationship between Librarian and Books entities. The librarian entity 'manages' books in the library.
   Entities involved : Librarian, Books
   Cardinality : many - to - many relationship

3) Requests book issue/ return:
   Description : This is the relationship between patron and librarian. The patron requests for a book issue or book return to the librarian and in turn the librarian maintains a report of the books issued.
   Entities involved :Patron, Librarian
   Cardinality : one - to - zero or one relationship

4) Keeps Track Of:
   Description : this is for the librarian to keep track of all the patrons registered with the library.

Entities involved : Librarian, Patron
Cardinality : many - to - many relationship

5) <u>Searches:</u>
Description : This is used by the patron to search for the available books from the library.
Entities involved : Patron, Books
Cardinality : many - to - zero or many relationship

6) <u>Maintains:</u>
Description : this is a relationship between the librarian and report entity. The librarian entity 'maintains' a report of all the books issued to the patron.
Entities involved : Librarian, Report
Cardinality : one - to - zero or many relationship

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