Project Phase-1

Team: Up To Data

Naimeesh Narayan Tiwari - 2020101074
Soveet Kumar Nayak - 2020101086
Khushi Agarwal - 2020101092

Library

Introduction

We are modeling the Database used for managing a Library.

Library management system is a software that is used to maintain the record of the library. It contains work like the number of available books in the library, the number of books issued or returning or renewing a book or late fine charge record, etc. It is a software that helps to maintain a database that is useful to enter new books & record books borrowed by the members, with the respective issued/submission dates.
It is also convenient for the librarian to manage the process of book allotting and useful to keep a constant track of the availability of all books in the library.

Purpose

The purpose of this database is to manage the working and the functions of a library. Librarians can update the information of books and manage availability and arrival records of the books.

With the help of library management DBMS, the member can easily search and find the books and their location in the self and rack.It reduces the manual record burden of the librarian.This system will reduce all the manual work and the whole process can be managed just through single clicks and edits.

Library management system allows the librarian to maintain library resources in a more operative manner that will help to save their time

Users

The primary users of this database are the librarians and other managing teams in a library. The database can be also used by members who want to issue books and check for relationships with un-issued books.

- Naive User- People at administrative level are in the hold of this position. They access the database to view the issue/demand status of books, to add/update details of the books.
- People at administrative level will also be able run queries to analyse data

Applications

1. This DBMS is used for organizing the Library.
2. We can add/modify details of a book using this
3. We store titles, authors, and other details of a book using this database
4. This database also enables making a unique Book_id for every copy of the same titled book/same print of the book
5. This database also stores the information of members and the staff of the library
6. The database also helps in managing details of book issuing such as issue date, due date, fine charges etc.

Database Requirements

Entities

1. **Books**
    a. Book_id🔑 [NOT NULL UNIQUE]
    b. Book Name
    c. Edition [DEFAULT NULL]
    d. ISBN value
    e. Price
    f. Author_id (Multivalued attribute) [NOT NULL UNIQUE]
    g. Publisher_id [NOT NULL]
    h. Genre_id (Multivalued attribute) [NOT NULL UNIQUE]
    i. Status (Issued/currently present/demand)
2. **Magazines**
    a. Magazine_id🔑 [NOT NULL UNIQUE]
    b. Magazine Name
    c. Issue_no [NOT NULL]
    d. Volume_no [NOT NULL]

e. Publisher_id [NOT NULL UNIQUE]

3. **Genre**
    a. Genre_id🔑 [NOT NULL UNIQUE]
    b. Genre Name
    c. Synonyms (Multivalued attribute)
4. **Members**
    a. Member_id🔑 [NOT NULL UNIQUE]
    b. Government_id [NOT NULL UNIQUE]
    c. Member Name [NOT NULL] (Composite attribute)
        i. First Name
        ii. Last Name
    d. Date of Birth
    e. Age (Derived attribute)
    f. Address [NOT NULL] (Composite attribute)
        i. House number
        ii. Locality
        iii. City
        iv. Pincode
    g. Mobile_no [NOT NULL]
    h. Date of joining
    i. Membership expiration (Derived attribute)
5. **Issued**
    a. Book_id
    b. Member_id
    c. Date of Issue
    d. Due date (Derived attribute)
    e. Submission date
    f. Fine (Derived Attribute)

    [a,b,c together are partial keys]
6. **Storage**
    a. Book_id [NOT NULL] (Foreign Key)
    b. Shelf Number
    c. Rack Number
7. **Authors**
    a. Author_id🔑 [NOT NULL UNIQUE]

    b. Author Name
    c. Language (Multivalued attribute)
8. **Publishers**
    a. Publisher_id🔑 [NOT NULL UNIQUE]
    b. Publisher Name
9. **Staff**
    a. Staff_id 🔑 [NOT NULL UNIQUE]
    b. Government_id🔑 [NOT NULL UNIQUE]
    c. Staff name (Composite attribute)
    d. Staff Job (Subclass)
        i. Administrative - Designation (Director/Manager/Librarian)
        ii. Technical - Duty & Responsibility (Cleaner/Clerk/Guard)
    e. Address (Composite attribute)
    f. Mobile_no (Multivalued attribute)

Bonus: In entity type Staff,{Staff_id , Government_id } -> Super Key
{Staff_id}, {Goverment_id} -> Candidate Keys
Staff_id -> Primary Key
Goverment_id -> Alternate Key
Similarly , in the entity type member.

Weak Entity:

- Storage
- Issued

Relationships

1. Relationship 1 -> *details*
    a. Degree = 4
    b. The relationship is among Books, Authors, Publishers, Genre
    c. Ratio: M:N:1:P
2. Relationship 2 -> *stored*
    a. Degree = 2
    b. The relationship is between Storage and Books
    c. Constraint: A shelf and a rack can have at most a fixed number of books.

    d. Ratio: 1:N
3. Relationship 3 -> *publishing*
    a. Degree = 2
    b. The relationship is between Publisher and Magazine
    c. Ratio: 1:N
4. Relationship 4 -> *book issued*
    a. Degree = 3
    b. The relationship is between Books, Members, Issued
    c. Ratio: 1:1:N

n>3 Relationships:

The relationship is among Books + Genre + Author + Publisher
Degree = 4
Ratio: M:N:1:P

Functional Requirements

Modifications

1. **Insert:**
    a. Insert details of a book .
    b. Insert details of a staff
    c. Insert details of member
2. **Delete:**
    a. Delete details of a magazine.
    b. Delete details of a member.
3. **Update:**
    a. Update status/details of a book issued.
    b. Update details of storage (example- new shelf/rack added).
    c. Update details (like Mobile_no/Address) of a member/staff.

Retrievals

1. **Selection:**
    - “Select all the books of the sci-fi genre.”

- “List all the books that are issued to someone. ”
- “List all the members whose membership is about to expire in next month”
- “List all the magazine details with volume<=3.”

2. **Projection:**
    - “Project Author name and Genre of all the books under “Penguin Publication”
    - “Project Book_ids and status of all the books named ‘The Alchemist’ ”.
    - “Project all the Authors who write in ‘Hindi’ language.”
    - “Project all the member’s names who live in the city ‘Hyderabad’ ”
3. **Aggregate:**

    Various functions like
    - AVERAGE_PRICE, MAX_PRICE, MIN_PRICE [of a book]
    - Number of available books in the library.
    - MAX_Books, MIN_Books [written by a book]
    - Example: “AVERAGE_PRICE of books under “WILEY Publications” ”
4. **Search:**
    - “Searching for Books starting with the word ‘Harry’ ''
    - “Searching for Author names starting with ‘Albert’ ”
5. **Analysis:**
    - “Members of age<18 who have issued more than 15 books in the last year.”
    - “Total number of books under biography genre”
    - “Percentage of sci-fi genre books issued out of total issued books”