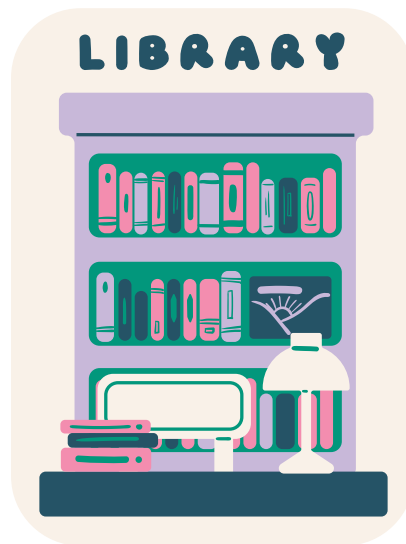


IT332 – ADVANCED DATABASE

# Project file



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# 1. Requirements Document

## 1.1 Data Requirements

### **Catalog Service Schema:**

#### *Book :*

There are a lot of books in the library, and every book has a unique number called an ISBN (International Standard Book Number), which is assigned using the ISBN-13 method ,Author ,Publisher, Description, and Status (Available/Unavailable).

#### *Video Recording:*

There is a collection of video recording at the library. Every recording is given a unique ID and has certain characteristics, like, publisher, title, and a description of the subject matter covered in the recording.

Furthermore, the library keeps track of where each recording is located on the library (like in shelves 1 and 2 ).

#### *Sound Recording:*

There is a collection of sound recording at the library. Every recording is given a unique ID and has certain characteristics, like, publisher, title, and a description of the subject matter covered in the recording.

Furthermore, the library keeps track of where each recording is located on the library (like in shelves 1 and 2 ).

#### *Thesis:*

The library has a large collection of theses. A thesis is a scholarly document written by a student or researcher that presents original research and findings on a specific topic. Every thesis is given a unique ID (Call Number) and includes all the necessary information, including the thesis author, detailed description, and location on the library (like in shelf 3).

### *Journal:*

In addition, the library has a sizable collection of journals. Journals are publications that are released periodically, such as monthly, quarterly, or annually, and they often contain scholarly articles, research papers, or other valuable information within a specific field or discipline. Every journal has an ID (Call Number), and it comes with relevant details like the title, a description that provides insight into the contents of the journal, and the availability status, which indicates whether the journal is available for use right now or not.

### *Collection:*

There are several collections in the library, and each collection item is identified by its unique name, type, and serial number.

### *Room:*

Members can reserve a number of different types of rooms within the library, such as lab, reading room, or working room. Every room has a special room ID and is classified according to its type. Members of the library are able to reserve rooms for a set amount of time, expressed in hours. Furthermore, according to the state of the reservation, each room is shown as "Available" or "Not Available."

## **Circulation Service Schema:**

### *Member:*

It is necessary for individuals to join the library in order to use the services it provides. The library serves a diverse range of patrons who can take advantage of its services. In addition to their name, every member is given a unique four-digit PIN (Personal Identification Number). Members are classified according to their type, which includes university staff, postgraduate students, and undergraduates. Each category is granted a particular set of privileges. The member's date of birth, full address, phone number, joining date, and membership expiration date are further details. The membership's status is displayed as "Active" or "Expired," based on its current status.

### *Privilege:*

Each member is given different privileges depending on what type of member they are (staff, postgraduate, or student undergraduate). A privilege's details, which include the maximum number of things that can be borrowed, the maximum number of renewals allowed, and the length of time (measured in days) that the privilege holder may keep loaned items, are defined by the member-type name.

### *Loan:*

A key component of the library database is the loan table, which contains important data on borrowing requests. Every loan request is given a unique ID and contains information about the member making the request, their PIN, the item number they are requesting, the start and end dates of the loan, and the loan's status—which indicates whether or not those items have been returned.

### *Fine:*

Members who violate the library's policies, including but not limited to late returns of materials, item damage, and short-term loan theft, may be subject to fines from the circulation service. Every fine has its own unique fine ID, which includes information about the fine, the member who receives the PIN, the description of the fine's reasons, and the status of the fine, which indicates whether it has been paid or is still outstanding.

## **Short Loan Service Schema:**

Some library materials are not allowed to be checked out; they must be used exclusively on library property. This covers things like fiction novels, specialized items like well-known films, specific books, journals, essays, and digital cameras. Certain books and journals, street maps, theses, and exam papers are among the equipment items that are forbidden from being carried outside the library. You can only reserve and use these resources inside the library. The item ID, title, type, and status which indicates whether or not the item is available. These items are classified as short loans. All members are able to reserve products in case they become unavailable, however only one member at a time can reserve the same item. Members who return late after the expiry date will also be charged for the borrowing.

## 1.2 Transaction Requirements

### • Data Entry:

Enter a new Member.  
Enter a new Book.  
Enter a new Video Recording.  
Enter a new Sound Recording.  
Enter a new Thesis.  
Enter a new Journal.  
Enter a new Room.  
Enter a new Privilege.  
Enter a new Fine.  
Enter a new Loan.  
Enter a new Short Loan.

### • Data Update / Deletion:

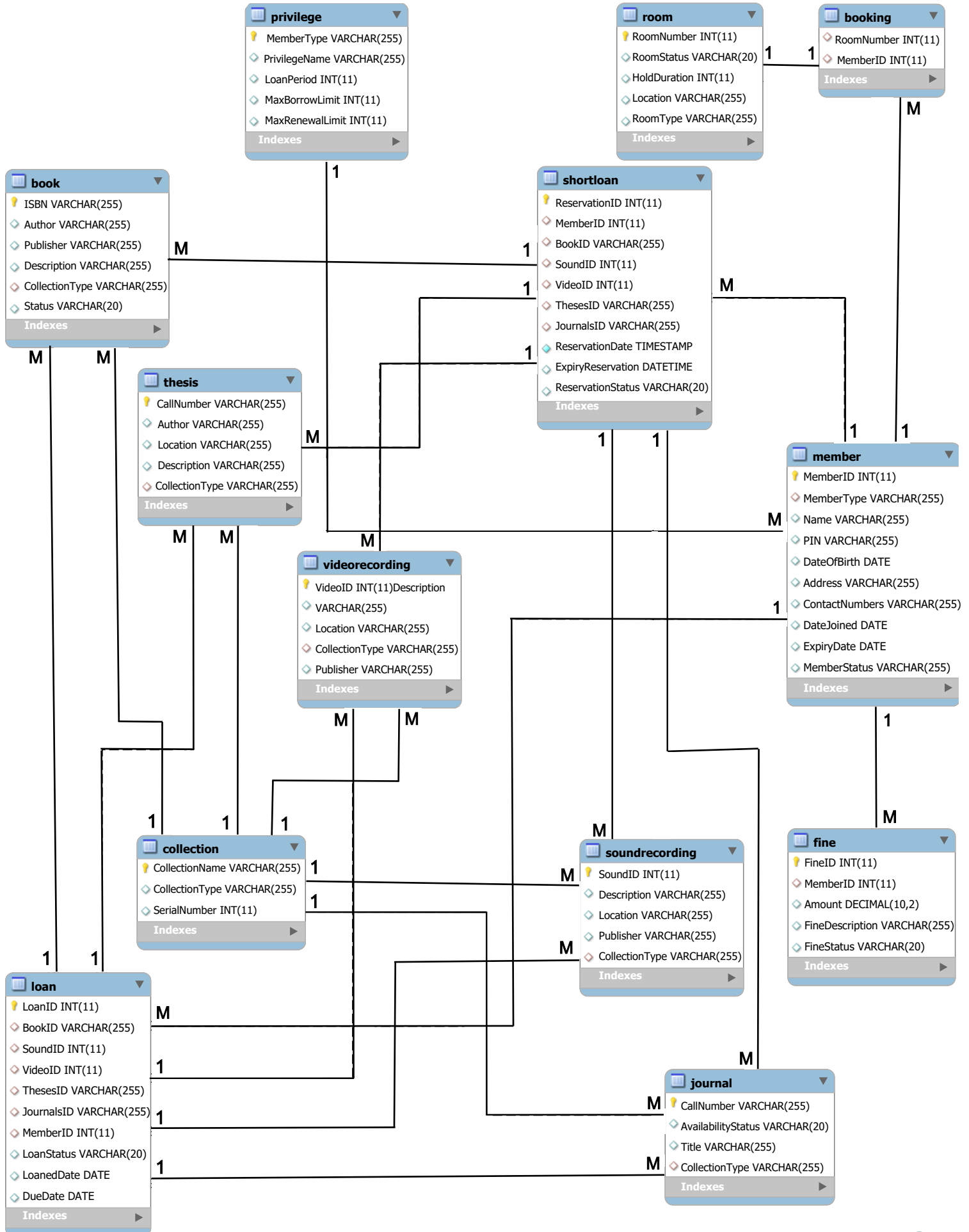
Update/delete a Member.  
Update/delete a Book.  
Update/delete a Video Recording.  
Update/delete a Sound Recording.  
Update/delete a Thesis.  
Update/delete a Journal.  
Update/delete a Room.  
Update/delete a Privilege.  
Update/delete a Fine.  
Update/delete a Loan.  
Update/delete a Short Loan.

- Data Queries

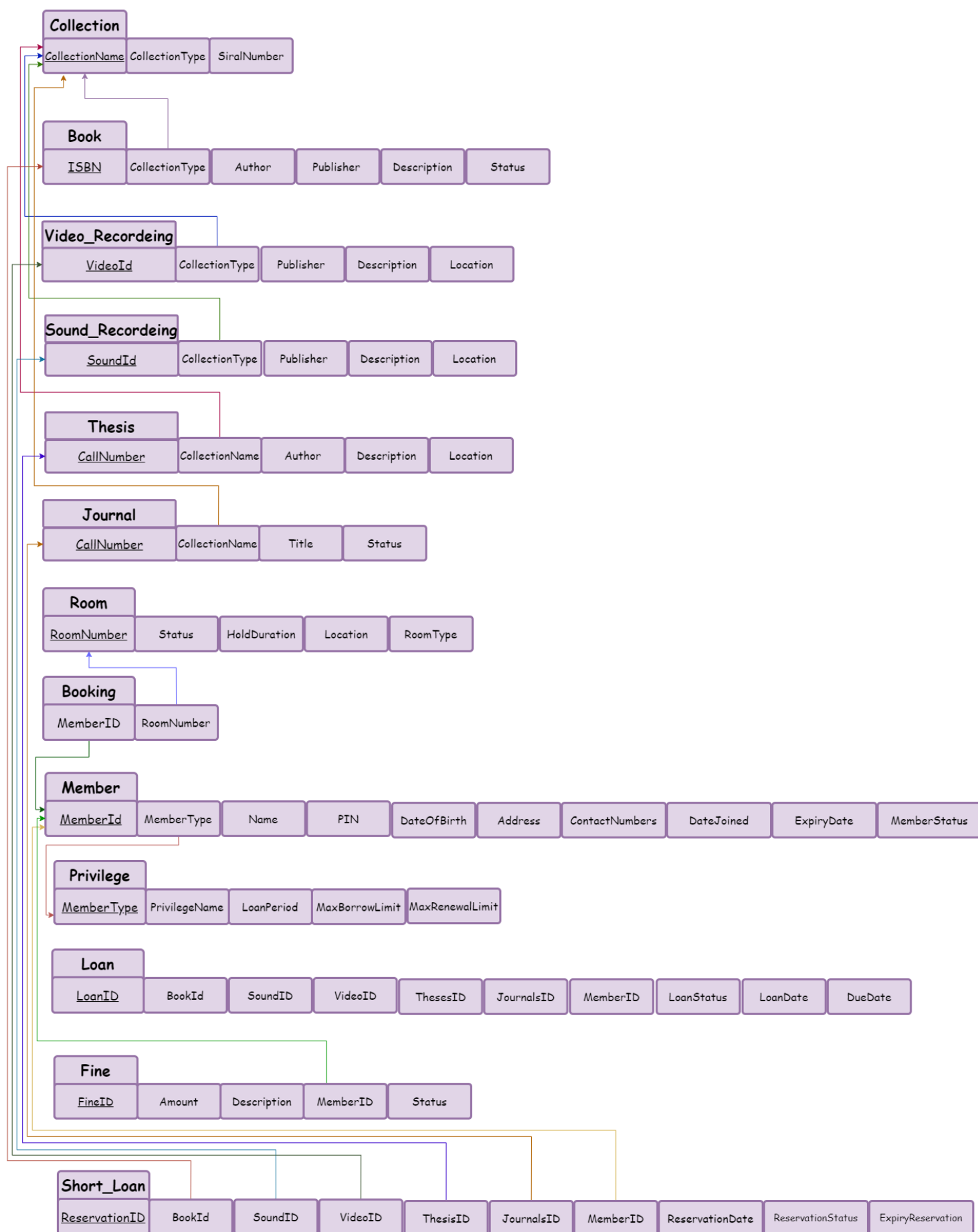
1. Retrieve all the information from the "Book" table.
2. What are the titles of all the books in the library?
3. Which books are available in the library?
4. Show the titles and authors of all the books in the library.
5. What are the titles and categories of books written by John Doe ?
6. Retrieve all the information from the "Book\_Author" table.
7. Provide the ISBN, title, author's first name, and author's last name for each book in the library.
8. Which books fall under the "Mathematics" category?
9. Retrieve all the information from the "VideoRecording" table.
10. What are the titles of videos available ?
11. Which titles belong to videos produced by National Geographic.?
12. Retrieve all the information from the "SoundRecording" table.
13. What are the titles of sound recordings available ?
14. Which titles belong to sound recordings released by Acme Audio?
15. Retrieve information about sound recordings that are currently on loan.
16. Retrieve details of overdue video loans.
17. Get information about fines that are unpaid.
18. Retrieve active short loan reservations for books.



## 2. UML Diagram



### 3. Relational Mapping



## 4. Normalization

**Book** ( ISBN , Author , Publisher , title , CollectionType , CollectionType , Status) , Status)

**Thesis** (CallNumber ,Autho,Location ,Description ,CollectionType )

**Member** (MemberID ,MemberType ,Name ,PIN ,DateOfBirth , Address,ContactNumbers ,DateJoined ,ExpiryDate ,MemberStatus );

**Loan** (LoanID ,BookID ,SoundID ,VideoID ,ThesesID ,JournalsID ,MemberID ,LoanStatus ,LoanedDate);

### 1NF:

- Contains only atomic values
- There are no repeating groups

**Book** ( ISBN , Author\_Fname , Author\_Lname , Publisher , title , CollectionType , CollectionType , Status)

**Thesis** (CallNumber ,Author\_Fname , Author\_Lname,Location ,Description ,CollectionType )

**Member** (MemberID ,MemberType ,FName,LName ,PIN ,DateOfBirth , Address,ContactNumbers ,DateJoined ,ExpiryDate ,MemberStatus );

**Loan\_Book** (LoanID ,BookID ,MemberID ,LoanStatus ,LoanedDate);

**Loan\_Sound**(LoanID ,SoundID ,MemberID ,LoanStatus ,LoanedDate);

**Loan\_Video**(LoanID ,VideoID ,MemberID ,LoanStatus ,LoanedDate);

**Loan\_Theses**(LoanID ,ThesesID ,MemberID ,LoanStatus ,LoanedDate);

**Loan\_Journals**(LoanID ,JournalsID ,MemberID ,LoanStatus ,LoanedDate);

## 2NF:

- It is in first normal form
- All non-key attributes are fully functional dependent on the primary key

**Book** ( ISBN , Publisher , title, CollectionType , Status), CollectionType , Status)

**Book\_Auother** (Auther\_ID, ISBN , Author\_Fname,Author\_Lname)

**Thesis** (CallNumber ,Location ,Description ,CollectionType )

**Thesis\_Auother** (Auther\_ID, CallNumber,Author\_Fname ,Author\_Lname )

## 3NF:

- It is in second normal form
- There is no transitive functional dependency

All tables are already in 3NF.