

# **DATABASE MANAGEMENT SYSTEMS**

**UNC602**



THAPAR INSTITUTE

## **LIBRARY MANAGEMENT SYSTEM - MINI PROJECT REPORT**

# GROUP MEMBERS

Serial No.	Name	Roll No.
1.	Jayita Lakhmani	102206098
2.	Jahnavi Tiwari	102206155
3.	Dhananjay Kumar Porwal	102206074

# PROBLEM STATEMENT

Libraries deal with thousands of books, videos, and other materials that are searched up and dispatched to a large number of clients, including academics, staffs, and students. Processing customer registrations, availability of the items, issue of items, return, fines, and staff activity manually is inefficient, time-consuming, and highly error-prone and vulnerable to clerical errors. Since user activity and library resources grow, manual systems do not scale and lead to data inconsistencies, wasted resources, delayed transactions, and a poor user experience.

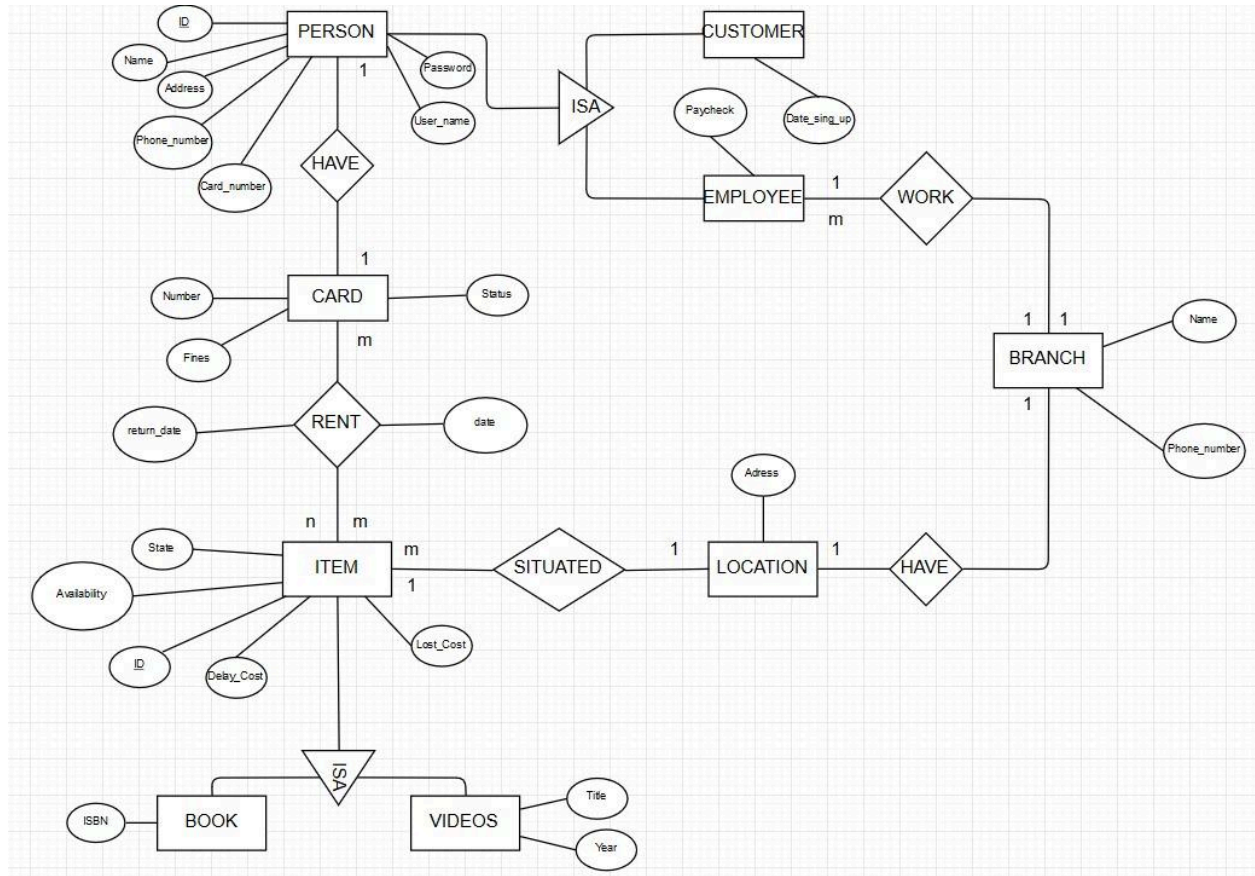
In addition to this, centralized control of the data management and secure access are not available, which will lead to misuse, duplication of multiple records, and absence of accountability. With necessity to have access to faster data in real time like current availability of products, history of rental, and penalty, which could not be gained through loose or manual systems easily.

To overcome these issues, an immediate need is felt to design a robust, relational database-based Library Management System. The system must include provision for easy management of employees and customers' information, monitor all operations pertaining to items, maintain data integrity through accurate constraints, and grant role-based access control. By frequent library automation and keeping an organized database, the system can greatly enhance efficiency, accuracy, and customer satisfaction and alleviate administrative burden.

# OBJECTIVE

- To develop and implement a relational database that effectively services all fundamental library operations.
- To keep precise records of employees, customers, books, and videos in suitable database tables and interrelationships.
- To develop standalone modules for handling customer transactions and book/video issue details.
- To implement login credentials and role-based access control for customers and staff for secure system operation.
- To establish and implement proper integrity constraints and validation checks to guarantee data accuracy and consistency.
- To utilize stored procedures and functions that allow for frequent operations with input validation and proper adherence to business logic.
- To establish unique roles with certain privileges, imposing proper control and access to various sections of the system.
- In order to mimic the rudimentary functions of a library management system using organized database structure, queries, and procedural control.

# ER DIAGRAM AND EXPLANATION



## Entity Descriptions:

1. **PERSON**: Holds personal details like ID, Name, Address, Phone\_number, Card\_number, User\_name, and Password.
2. **CUSTOMER** and **EMPLOYEE**: Specializations of the **PERSON** entity using the IS A relationship.

- A CUSTOMER *is a* PERSON with an additional attribute Date\_sign\_up.
  - An EMPLOYEE *is a* PERSON with an additional attribute Paycheck.
3. CARD: Each PERSON has one CARD with details like Number, Status, and Fines.
  4. RENT: Represents the relationship between CARD and ITEM with Date and Return\_date.
  5. ITEM: Represents books and videos, having attributes like ID, Availability, State, Delay\_Cost, and Lost\_Cost.
  6. BOOK and VIDEOS: These are specializations of ITEM using the IS A relationship
    - A BOOK *is an* ITEM with a unique ISBN.
    - A VIDEO *is an* ITEM with a Title and Year.
  7. LOCATION: Contains Address and is associated with BRANCH via HAVE relationship.
  8. BRANCH: Library branches with Name and Phone\_number.
  9. WORK: EMPLOYEEs work at a BRANCH (many to one).

10. SITUATED: ITEMS are located at a LOCATION (many to one).

Key Relationships:

- One PERSON has one CARD.
- One CARD can rent many ITEMS.
- One ITEM may be rented by many CARDS.
- One ITEM is situated at one LOCATION.
- One LOCATION is associated with one BRANCH.
- EMPLOYEEs work in a BRANCH (m:1).

# CONCLUSION

In the mini project, we designed and implemented a Library Management System with MySQL. We started by designing an Entity-Relationship (ER) diagram to represent the system structure, identify key entities like Person, Card, Item, Branch, and their relationship among themselves. This allowed us to design a good and normalized relational database schema.

We implemented the database using MySQL by running SQL statements to define tables, relations, and constraints. The system accommodates key operations such as registering employees and customers, managing library materials (videos and books), lending and returning materials, and calculating fines for lost or late materials.

This project provided us with direct experience of database design and implementation using SQL and gave us a better insight into how a relational database can be utilized to solve practical library management issues. It lays a good foundation for future projects, such as building a user interface or integrating it with a web application.