

## Project Part 3: Conceptual Modeling

Make sure all entities, relationships, entity and relationship attributes, key attributes, etc. are clearly identified and illustrated.

### **Project Overview**

This project is about creating a database system for a small library. The database will keep track of books, digital media, and magazines, as well as library members and their borrowing activities. It will help manage memberships, enforce borrowing rules, and generate useful reports to improve library operations.

### **Scope**

The project focuses on creating a database that can store and manage information about library materials and members. It will track loans, reservations, and late fees, while ensuring library rules are followed.

### **Glossary**

### **ER Model Entities**

Relationships, attributes, keys, constraints, inheritance

#### Media Items

Media Item Attributes:

- Item ID
  - Data Type: INT
  - Constraints: Primary key, Value  $\geq 0$ , NOT NULL, Auto increment
- Availability status
  - Data Type: ENUM ('Available', 'Unavailable')
  - Constraints: NOT NULL

Media Item Child Entities & Relationships:

- IS A: Media Item  $\rightarrow$  Book
- IS A: Media Item  $\rightarrow$  Magazine
- IS A: Media Item  $\rightarrow$  Digital Media

- Reserve: Media Item → Transaction [0..N]
- Free: Media Item → Transaction [0..N]

## Book

### Book Attributes:

- Title
  - Data Type: VARCHAR (100)
  - Constraints: NOT NULL
- Author
  - Data Type: VARCHAR (100)
  - Constraints: NOT NULL
- Genre
  - Data Type: VARCHAR (20)
- ISBN
  - Data Type: INT
  - Constraint: Value >= 0
- Publication year
  - Data Type: YEAR

## Magazine

### Magazine Attributes:

- Title
  - Data Type: VARCHAR (100)
  - Constraints: NOT NULL
- Issue #
  - Data Type: INT
  - Constraints: NOT NULL
- Publication date
  - Data Type: DATE

## Digital Media

### Digital Media Attributes:

- Title
  - Data Type: VARCHAR (100)
  - Constraints: NOT NULL
- Author

- Data Type: VARCHAR (100)
  - Constraints: NOT NULL
- Genre
  - Data Type: VARCHAR (20)
- ISBN
  - Data Type: INT
  - Constraint: Value  $\geq 0$
- Publication year
  - Data Type: YEAR

## Client

### Client Attributes:

- Client ID
  - Data Type: INT
  - Constraints: Primary Key, Auto increment, NOT NULL, Value  $\geq 0$
- Name
  - Data Type: VARCHAR (100)
  - Constraint: NOT NULL
- Membership Type
  - Data Type: ENUM ('Regular', 'Student', 'Senior Citizen', 'Other')
  - Constraints: NOT NULL
- Account Status
  - Data Type: ENUM ('Active', 'Suspended', 'Inactive')
  - Constraints: NOT NULL
- Email Address
  - Data Type: VARCHAR (255)
  - Constraints: UNIQUE, NOT NULL
- Phone Number
  - Data Type: VARCHAR (15)
  - Constraint: UNIQUE, NOT NULL

### Client Relationships:

- Initiate: Client  $\rightarrow$  Transaction (0:N)
- Close: Client  $\rightarrow$  Transaction (0:N)

## Transaction

### Transaction Attributes:

- Transaction ID
  - Data Type: INT
  - Constraint: UNIQUE, NOT NULL, Auto increment, Value  $\geq 0$
- Date Borrowed
  - Data Type: TIMESTAMP
  - Constraints: NOT NULL
- Date Returned
  - Data Type: TIMESTAMP
  - Constraints: IS NULL or  $\text{TIMESTAMP} \geq \text{Date Borrowed}$
- Expected Return Date
  - Data Type: TIMESTAMP
  - Constraints: NOT NULL and  $\text{TIMESTAMP} \geq \text{Date Borrowed}$
- Client ID
  - Data Type: INT
  - Constraints: Foreign Key, Auto increment, NOT NULL, Value  $\geq 0$
- Item ID
  - Data Type: INT
  - Constraints: Foreign Key, Value  $\geq 0$ , NOT NULL

### Transaction Relationships:

- Transaction  $\rightarrow$  Media Item (1:1)
- Transaction  $\rightarrow$  Client (1:1)

## ER Model

