447 Project Part 4

Introduction
Project Overview
This database is used in the management of a library system. It will be used by librarians to manage their library and for library members to search for, reserve, renew, return, or check out pieces of media. The system will also be used for fine tracking and management.

Project Scope
The system needs to be able to allow two main types of users, librarians and users, to perform various actions within the library system. These include checking out, holding, renewing, and returning books. The system needs to keep track of books, digital media and magazines. It also needs to have notification systems in place for reminding members of due dates and reservations. The system must also track checked out media and assign fines to member accounts for overdue media. The members must be able to generate reports about their usage history, and be able to search for specific pieces of media to place a hold or check out that item.

Platform
SQLite running inside a Docker container was used as the database platform for this project. We used SQLite because of familiarity with the product and it runs well inside of Docker containers. The advantage of using a Docker container is that we can have all of our schema and data population scripts exist inside the container, so whenever it is rebuilt the scripts are automatically run. This makes sharing the project via GitHub easy. All a new user needs to do run their own instance of the up to date database is run the command, "docker compose up", once they have cloned the repository.

Physical Schema
```
sqlite> .schema
CREATE TABLE LIBRARIAN (
    LibrarianID INTEGER PRIMARY KEY,
    Fname TEXT NOT NULL,
    Lname TEXT NOT NULL,
    Address TEXT,
    DOB DATE,
    Salary INTEGER,
    PhoneNumber TEXT,
    SSN INTEGER
);
CREATE TABLE MEMBER (
    MemberID INTEGER PRIMARY KEY,
    Fname TEXT NOT NULL,
```

```sql
    Lname TEXT NOT NULL,
    Address TEXT,
    DOB DATE,
    OutstandingFees REAL
);
CREATE TABLE MEDIA (
    MediaID INTEGER PRIMARY KEY,
    PublishDate DATE,
    Title TEXT NOT NULL,
    Status TEXT CHECK(Status IN ('available','checked_out','reserved')),
    Genre TEXT
);
CREATE TABLE BOOK (
    BookID INTEGER PRIMARY KEY,
    Authors TEXT,
    ISBN TEXT,
    FOREIGN KEY(BookID) REFERENCES MEDIA(MediaID)
);
CREATE TABLE MAGAZINE (
    MagazineID INTEGER PRIMARY KEY,
    Authors TEXT,
    ISSN TEXT,
    VolumeNumber INTEGER,
    IssueNumber INTEGER,
    FOREIGN KEY(MagazineID) REFERENCES MEDIA(MediaID)
);
CREATE TABLE DVD (
    DVDID INTEGER PRIMARY KEY,
    Creators TEXT,
    ISBN TEXT,
    Rating TEXT,
    FOREIGN KEY(DVDID) REFERENCES MEDIA(MediaID)
);
CREATE TABLE MANAGES (
    LibrarianID INTEGER,
    MemberID INTEGER,
    PRIMARY KEY (LibrarianID, MemberID),
    FOREIGN KEY (LibrarianID) REFERENCES LIBRARIAN(LibrarianID),
    FOREIGN KEY (MemberID) REFERENCES MEMBER(MemberID)
);
CREATE TABLE MANAGE (
    LibrarianID INTEGER,
    MediaID INTEGER,
    PRIMARY KEY (LibrarianID, MediaID),
```

```
        FOREIGN KEY (LibrarianID) REFERENCES LIBRARIAN(LibrarianID),
        FOREIGN KEY (MediaID) REFERENCES MEDIA(MediaID)
);
CREATE TABLE RESERVES (
        MemberID INTEGER,
        MediaID INTEGER,
        PRIMARY KEY (MemberID, MediaID),
        FOREIGN KEY (MemberID) REFERENCES MEMBER(MemberID),
        FOREIGN KEY (MediaID) REFERENCES MEDIA(MediaID)
);
CREATE TABLE LOAN (
        MemberID INTEGER,
        MediaID INTEGER,
        CheckoutDate DATE,
        ReturnDate DATE,
        Overdue BOOLEAN,
        Fee REAL,
        PRIMARY KEY (MemberID, MediaID),
        FOREIGN KEY (MemberID) REFERENCES MEMBER(MemberID),
        FOREIGN KEY (MediaID) REFERENCES MEDIA(MediaID)
);
```

Table Contents

BOOK (BookID, Authors, ISBN)
sqlite> select * from BOOK;
1|Donald Knuth|978-0201896831
2|Thomas H. Cormen, Charles E. Leiserson|978-0262033848
3|Andrew Ng, Michael Nielsen|978-0262035613
4|F. Scott Fitzgerald|978-0743273565
5|Harper Lee|978-0061120084
6|George Orwell|978-0451524935
7|Stephen Hawking|978-0553380163
8|Yuval Noah Harari|978-0062316097
9|Tara Westover|978-0399590504
10|James Clear|978-0735211292
31|J.K. Rowling|978-0747532699
32|J.R.R. Tolkien|978-0547928210
33|J.R.R. Tolkien|978-0547928227
34|Harper Lee|978-0446310789
35|Dan Brown|978-0307474278
36|John Green|978-0525478812
37|Jonathan Nolan, Christopher Nolan|978-0571539071
38|Bong Joon-ho|978-1250757929
39|Frank Herbert|978-0593201886

40|Han Kang|978-1452127181

DVD (DVDID, Creators, ISBN, Rating)
21|Frank Darabont|097360580487|R
22|Christopher Nolan|883929082957|PG-13
23|The Wachowskis|085391163297|R
24|Christopher Nolan|032429210678|PG-13
25|Quentin Tarantino|031398187608|R
26|Christopher Nolan|085391188520|PG-13
27|Robert Zemeckis|097363574842|PG-13
28|Francis Ford Coppola|097363323242|R
29|Bong Joon-ho|032429345547|R
30|Daniel Kwan, Daniel Scheinert|031398348924|R

LIBRARIAN (LibrarianID, Fname, Lname, Address, DOB, Salary, PhoneNumber, SSN)
sqlite> select * from LIBRARIAN;
1|Emily|Johnson|123 Oak Street, Lawrence, KS|1985-03-15|52000|785-555-0101|123456789
2|Michael|Chen|456 Maple Ave, Lawrence, KS|1990-07-22|48000|785-555-0102|234567890
3|Sarah|Williams|789 Elm Road, Lawrence, KS|1988-11-08|55000|785-555-0103|345678901
4|David|Martinez|321 Pine Street, Lawrence, KS|1992-05-30|47000|785-555-0104|456789012
5|Jessica|Brown|654 Cedar Lane, Lawrence, KS|1987-09-12|53000|785-555-0105|567890123
6|Robert|Davis|987 Birch Court, Lawrence, KS|1991-02-18|49000|785-555-0106|678901234
7|Amanda|Garcia|147 Willow Way, Lawrence, KS|1989-12-25|51000|785-555-0107|789012345
8|Christopher|Wilson|258 Spruce Drive, Lawrence, KS|1993-08-07|46000|785-555-0108|890123456
9|Jennifer|Taylor|369 Ash Avenue, Lawrence, KS|1986-04-14|54000|785-555-0109|901234567
10|James|Anderson|741 Poplar Street, Lawrence, KS|1994-10-29|45000|785-555-0110|112345678

LOAN (MemberID, MediaID, CheckoutDate, ReturnDate, Overdue, Fee)
sqlite> select * from LOAN;
2|2|2024-10-15|2024-11-15|1|5.5
3|7|2024-11-01|2024-12-01|0|0.0
4|12|2024-10-20|2024-11-20|0|0.0
5|19|2024-10-10|2024-11-10|1|3.75
6|22|2024-11-05|2024-12-05|0|0.0
7|28|2024-10-25|2024-11-25|0|0.0
8|2|2024-10-05|2024-11-05|1|8.25
10|7|2024-09-30|2024-10-30|1|15.0

MAGAZINE (MagazineID, Authors, ISSN, VolumeNumber, IssueNumber)
sqlite> select * from MAGAZINE;
11|National Geographic Society|0027-9358|235|1
12|Time USA LLC|0040-781X|203|5

13|Springer Nature|0036-8733|330|3
14|Condé Nast|0028-792X|100|8
15|Condé Nast|1059-1028|32|6
16|Springer Nature|0028-0836|629|8015
17|IEEE|0018-9235|61|7
18|The Atlantic Monthly Group|1072-7825|334|2
19|Kalmbach Media|0274-7529|45|9
20|Bonnier Corporation|0161-7370|86|10

MANAGE (LibrarianID, MemberID)

sqlite> select * from MANAGE;
1|1
1|2
2|5
3|10
4|15
5|20
6|22
7|25
8|28
9|30

MANAGES (LibrarianID, MedialD)

sqlite> select * from MANAGES;
1|1
1|2
2|3
3|4
3|5
4|6
5|7
6|8

MEDIA (MediaID, PublishDate, Title, Status, Genre)

sqlite> select * from MEDIA;
1|2020-01-15|The Art of Programming|available|Technology
2|2019-05-22|Data Structures and Algorithms|checked_out|Technology
3|2021-03-10|Machine Learning Fundamentals|available|Technology
4|2018-11-30|The Great Gatsby|available|Fiction
5|2022-08-18|To Kill a Mockingbird|reserved|Fiction
6|2017-05-25|1984|available|Fiction
7|2020-12-08|A Brief History of Time|checked_out|Science
8|2021-02-14|Sapiens|available|History
9|2019-09-05|Educated|available|Biography

10|2023-07-20|Atomic Habits|available|Self-Help
11|2024-01-01|National Geographic|available|Science
12|2024-02-01|Time Magazine|checked_out|News
13|2024-03-01|Scientific American|available|Science
14|2024-04-01|The New Yorker|available|Literature
15|2024-05-01|Wired|available|Technology
16|2024-06-01|Nature|reserved|Science
17|2024-07-01|IEEE Spectrum|available|Technology
18|2024-08-01|The Atlantic|available|Culture
19|2024-09-01|Discover Magazine|checked_out|Science
20|2024-10-01|Popular Science|available|Science
21|2019-05-10|The Shawshank Redemption|available|Drama
22|2020-07-15|Inception|checked_out|Sci-Fi
23|2018-03-20|The Matrix|available|Sci-Fi
24|2021-11-25|Interstellar|available|Sci-Fi
25|2017-09-08|Pulp Fiction|reserved|Crime
26|2022-04-12|The Dark Knight|available|Action
27|2019-12-30|Forrest Gump|available|Drama
28|2020-02-14|The Godfather|checked_out|Crime
29|2021-06-18|Parasite|available|Thriller
30|2023-08-22|Everything Everywhere All at Once|available|Adventure
31|1997-06-26|Harry Potter and the Philosopher's Stone|available|Fantasy
32|1954-07-29|The Fellowship of the Ring|checked_out|Fantasy
33|1937-09-21|The Hobbit|available|Fantasy
34|1960-07-11|To Kill a Mockingbird|available|Fiction
35|2003-08-01|The Da Vinci Code|reserved|Mystery
36|2012-08-20|The Fault in Our Stars|available|Romance
37|2014-11-07|Interstellar (Film Script)|available|Sci-Fi
38|2019-05-30|Parasite (Screenplay)|checked_out|Thriller
39|2020-10-03|Dune (Movie Companion)|available|Sci-Fi
40|2013-11-22|Frozen (Art Book)|available|Art

MEMBER (MemberID, Fname, Name, Address, DOB, OutstandingFees)
sqlite> select * from MEMBER;
1|Alice|Thompson|100 College Blvd, Lawrence, KS|2000-01-15|0.0
2|Bob|Miller|200 University Drive, Lawrence, KS|1998-06-22|5.5
3|Carol|Moore|300 Campus Road, Lawrence, KS|2001-03-10|0.0
4|Daniel|Jackson|400 Student Lane, Lawrence, KS|1999-11-30|12.0
5|Emma|White|500 Scholar Street, Lawrence, KS|2002-08-18|0.0
6|Frank|Harris|600 Academic Ave, Lawrence, KS|1997-05-25|3.75
7|Grace|Martin|700 Education Way, Lawrence, KS|2000-12-08|0.0
8|Henry|Clark|800 Learning Circle, Lawrence, KS|2003-02-14|8.25
9|Iris|Lewis|900 Knowledge Park, Lawrence, KS|1996-09-05|0.0
10|Jack|Walker|1000 Wisdom Court, Lawrence, KS|2001-07-20|15.0

11|Taylor|Swift|1100 Liberty St, Lawrence, KS|1989-12-13|0.0
12|Chris|Evans|1200 Liberty St, Lawrence, KS|1981-06-13|2.5
13|Zendaya|Coleman|1300 Liberty St, Lawrence, KS|1996-09-01|0.0
14|Keanu|Reeves|1400 Liberty St, Lawrence, KS|1964-09-02|0.0
15|Scarlett|Johansson|1500 Liberty St, Lawrence, KS|1984-11-22|1.0
16|Benedict|Cumberbatch|1600 Liberty St, Lawrence, KS|1976-07-19|0.0
17|Emma|Watson|1700 Liberty St, Lawrence, KS|1990-04-15|0.0
18|Leonardo|DiCaprio|1800 Liberty St, Lawrence, KS|1974-11-11|3.75
19|Jennie|Kim|1900 Liberty St, Lawrence, KS|1996-01-16|0.0
20|RM|Kim|2000 Liberty St, Lawrence, KS|1994-09-12|0.0

RESERVES (MemberID, MediaID)
sqlite> select * from RESERVES;
2|5
4|16
6|25
8|5
10|16