MINI-KULibrary

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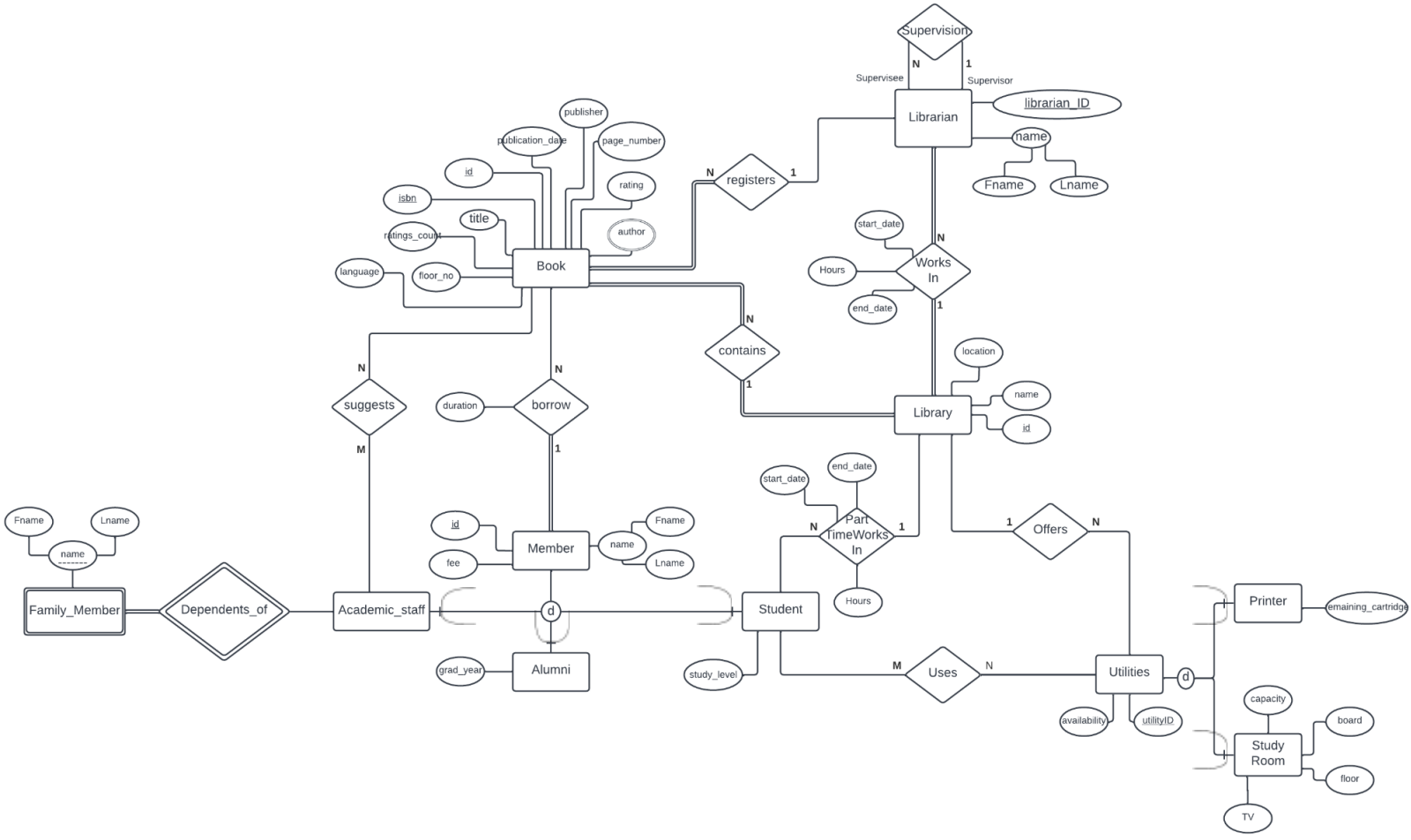
Project Description

We created a mini-library management system. Using our system, librarians and library members (students, alumni, and academic staff) will be able to do many activities such as:

Librarians can register, delete and update a book. They can also hire and fire working students and calculate the debt of any student. Moreover, they can see the students with the most working time each year. Lastly, they can see the usage frequency of each utility in the libraries.

Members can check the availability of a book, and borrow and return a book. They can also check books suggested by academic members. If they are students, they can also use the utilities in the library. If they are academic staff they can input suggested books.

Entity-Relationship Diagram



Relational Database Design

CREATE TABLE **Book** (
book_ID : INTEGER,
member_ID : INTEGER,
librarian_ID : INTEGER,
library_ID : INTEGER,
isbn : INTEGER,
title : CHAR(50),
floor_no : INTEGER,
language : CHAR(20),
ratings_count : INTEGER,
publication_date : Date,
publisher : CHAR(50),
page_number : INTEGER,
rating : DOUBLE,
borrow_duration : INTEGER,
PRIMARY KEY(book_ID, isbn),
FOREIGN KEY librarian_ID REFERENCES Librarian,
FOREIGN KEY member_ID REFERENCES Member,
FOREIGN KEY library_ID REFERENCES Library
)

CREATE TABLE **Utilities** (
utility_ID : INTEGER,
availability : CHAR(30),
PRIMARY KEY (utility_ID),
library_ID: INTEGER,
FOREIGN KEY library_ID REFERENCES Library
)

CREATE TABLE **Printer** (
utility_ID : INTEGER,
remaining_cartage : INTEGER,
PRIMARY KEY (utility_ID),
FOREIGN KEY utility_ID REFERENCES Utilities
)

CREATE TABLE **Member** (
member_ID : INTEGER,
fee : INTEGER,
fname : CHAR(50),
lname : CHAR(50),
PRIMARY KEY (member_ID)
)

CREATE TABLE **StudyRoom** (
    utility_ID : INTEGER,
    floor : INTEGER,
    capacity : INTEGER,
    tv : BOOLEAN,
    board : BOOLEAN,
    PRIMARY KEY (utility_ID),
    FOREIGN KEY utility_ID REFERENCES Utilities
)

CREATE TABLE **Student** (
    member_ID : INTEGER,
    study_level : CHAR(50),
    library_ID : INTEGER,
    end_date : DATE,
    start_date : DATE,
    work_hours : INTEGER,
    PRIMARY KEY (member_ID),
    FOREIGN KEY member_ID REFERENCES Member,
    FOREIGN KEY library_ID REFERENCES Library
)

CREATE TABLE **Alumni** (
    member_ID : INTEGER,
    grad_year : DATE,
    PRIMARY KEY (member_ID),
    FOREIGN KEY member_ID REFERENCES Member
)

CREATE TABLE **Academic_staff** (
    member_ID : INTEGER,
    PRIMARY KEY (member_ID),
    FOREIGN KEY member_ID REFERENCES Member
)

CREATE TABLE **Library** (
    library_ID : INTEGER,
    location : CHAR(50),
    library_name: CHAR(50),
    PRIMARY KEY (library_ID),
)

CREATE TABLE **Family_Member** (
member_ID : INTEGER,
fname : CHAR(30),
lname : CHAR(30),
PRIMARY KEY (fname, lname, member_ID),
FOREIGN KEY member_ID REFERENCES Academic_staff
)

CREATE TABLE **Uses** (
student_ID : INTEGER,
utility_ID : INTEGER,
PRIMARY KEY (student_ID, utility_ID),
FOREIGN KEY student_ID REFERENCES Student,
FOREIGN KEY utility_ID REFERENCES Utilities
)

CREATE TABLE **Librarian** (
librarian_ID: INTEGER,
fname: CHAR(30),
lname: CHAR(30),
library_ID : INTEGER,
supervisor_ID : INTEGER,
start_date: DATE,
end_date: DATE,
hours: INTEGER,
PRIMARY KEY (librarian_ID),
FOREIGN KEY supervisor_ID REFERENCES Librarian,
FOREIGN KEY library_ID REFERENCES Library
)

CREATE TABLE **Suggests** (
book_ID: INTEGER,
academic_staff_ID: INTEGER,
FOREIGN KEY book_ID REFERENCES Book,
FOREIGN KEY academic_staff_ID REFERENCES Member,
PRIMARY KEY (book_ID, academic_staff_ID)
)

CREATE TABLE **Author** (
book_ID : INTEGER,
authorName : CHAR(50),
PRIMARY KEY (book_ID, authorName),
FOREIGN KEY book_ID REFERENCES Book
)

Data Sources

The book's data is from the Goodreads database. We downloaded the data from here: https://www.kaggle.com/datasets/jealousleopard/goodreadsbooks?resource=download

All other data of people (members, family members, librarians) are from here: https://eforexcel.com/wp/downloads-16-sample-csv-files-data-sets-for-testing/. Some of the information is used for students, some for alumni and so on.

Other small datasets are generated by hand and by randomizing numbers.

Missing column information on books, librarians, and member tables are generated by hand and randomizing numbers.

Complex SQL Queries

1) **SELECT** M2.fname **AS** Name, M2.lname **AS** Last_Name,
A.Paycheck_After_Fee_Payment **AS** Debt
FROM (**SELECT** M.fname, M.lname, M.member_id **AS** MIDD, ST.work_hours * 10 **AS** Total_Paycheck, M.fee **AS** Total_Fee, ST.work_hours * 10 - M.fee **AS** Paycheck_After_Fee_Payment
FROM student as ST, member as M
WHERE ST.member_id = M.member_id and ST.work_hours > 0) **AS** A, member **AS** M2
WHERE M2.member_id = A.midd and A.Paycheck_After_Fee_Payment < 0 **AND** m2.member_id = '$student_id'
ORDER BY A.Paycheck_After_Fee_Payment

SELECT M2.fname **AS** Name, M2.lname **AS** Last_Name,
A.Paycheck_After_Fee_Payment **AS** Debt
FROM (**SELECT** M.fname, M.lname, M.member_id **AS** MIDD, ST.work_hours * 10 **AS** Total_Paycheck, M.fee **AS** Total_Fee, ST.work_hours * 10 - M.fee **AS** Paycheck_After_Fee_Payment
FROM student as ST, member as M
WHERE ST.member_id = M.member_id and ST.work_hours > 0) **AS** A, member **AS** M2
WHERE M2.member_id = A.midd and A.Paycheck_After_Fee_Payment < 0
ORDER BY A.Paycheck_After_Fee_Payment

There are two versions of this query. The first one takes a student id as input and shows the dept of the current student. And the second version prints out all of the students with a debt. The debt calculation is performed by first calculating the paycheck of each student who participates in the work&study program. Then it checks weather they have to pay a fine to the library or not. If so, it deducted it from their paycheck. If the total at the end is smaller than 0 than this means that the student is in debt.

2) **SELECT RANK() OVER** (**ORDER BY COUNT(*) DESC**) **AS** Usage_Rank, SR.utility_ID **AS** Room_ID, **COUNT(*) AS** Times_Used
FROM study_room **AS** sr, uses **AS** u, member **AS** m
WHERE U.s_member_ID = M.member_ID **AND** SR.utility_ID = U.utility_ID
GROUP BY SR.utility_ID

SELECT RANK() OVER (ORDER BY COUNT(*) DESC) **AS** Usage_Rank, p.utility_ID **AS** Printer_ID, count(*) **AS** Times_Used
FROM printer **AS** p, uses **AS** u, member **AS** m
WHERE u.s_member_ID = m.member_ID **AND** p.utility_ID = u.utility_ID
GROUP BY p.utility_ID

There are two versions of this query. The first one checks the information about study rooms and the second version checks printers. The queries gives a popularity ranking to the utilities according to their usage history. The more utility used, the higher it will rank.

3) **UPDATE** librarian
SET hours = hours - 1
WHERE supervisor_id = $s_ID **AND** librarian_id **IN** (**SELECT** librarian_id
FROM (**SELECT** l.librarian_id
FROM librarian **AS** l, book **AS** b, suggests **AS** s
WHERE l.librarian_id = b.librarian_id **AND** b.book_id = s.book_id
GROUP BY b.book_id
HAVING COUNT(s.book_id) > 4) **AS** A);

It takes the ID of a supervisor as input and searches for all the supervisees of the supervisor. If a book, which is registered by one of these supervisees, is recommended by 4 people from the academic staff, the working hours of the supervisee is decreased by one as an incentive move.

4) **SELECT DISTINCT** s.study_level **AS** Year, m.fname **AS** FirstName, m.lname **AS** LastName, m.member_ID **AS** ID, s.work_hours **AS** Hours
FROM member **AS** m, student **AS** s
WHERE m.member_ID = s.member_ID **AND** s.end_date **IS NOT NULL AND**
(s.work_hours, s.study_level) **IN**
(**SELECT MAX**(st.work_hours), st.study_level
FROM student **AS** st
WHERE st.end_date **IS NOT NULL**
GROUP BY st.study_level)
ORDER BY
CASE
WHEN Year = 'Freshman' **THEN** 0
WHEN Year = 'Sophomore' **THEN** 1

```
WHEN Year = 'Junior' THEN 2
WHEN Year = 'Senior' THEN 3
ELSE 4 END;
```

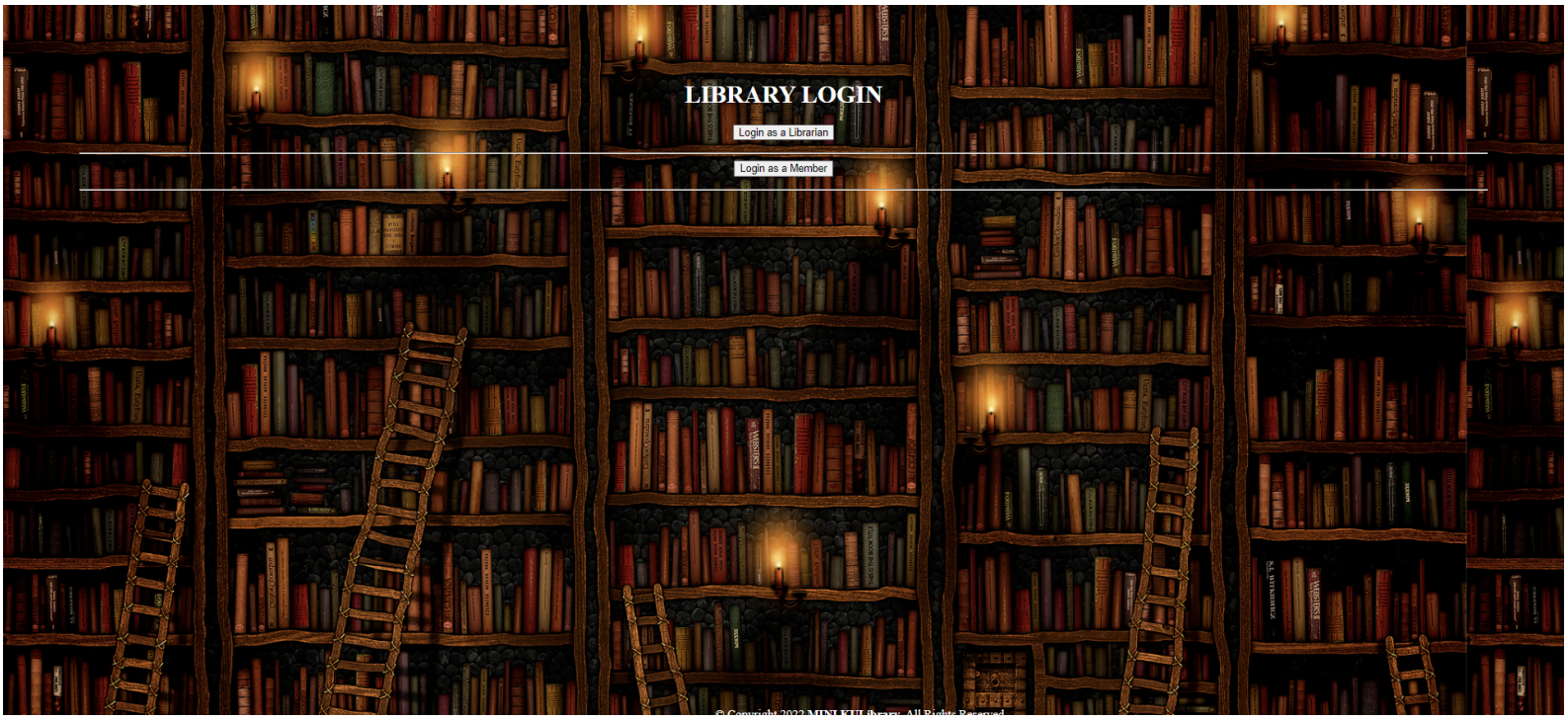
It shows the names, surnames, student IDs, working hours and study level of a student, who is working the most by considering the working hours among the same study level students. It displays the most successful students by ordering them according to their study levels.

5)
```
SELECT IF ( (SELECT COUNT(*)
              FROM Book B, Library L
              WHERE  B.library_ID = L.library_ID
                   AND B.title ='$title'
                   AND L.library_ID ='$libraryid') > 0,
            (SELECT    B.book_ID
             FROM Book B, Library L
              WHERE  B.library_ID = L.library_ID
                   AND B.title ='$title'
                   AND L.library_ID ='$libraryid'),
            (SELECT B.book_ID
              FROM Book B, Library L
              WHERE  B.library_ID = L.library_ID
                   AND B.title ='$title'
                   AND L.library_ID !='$libraryid'))
```

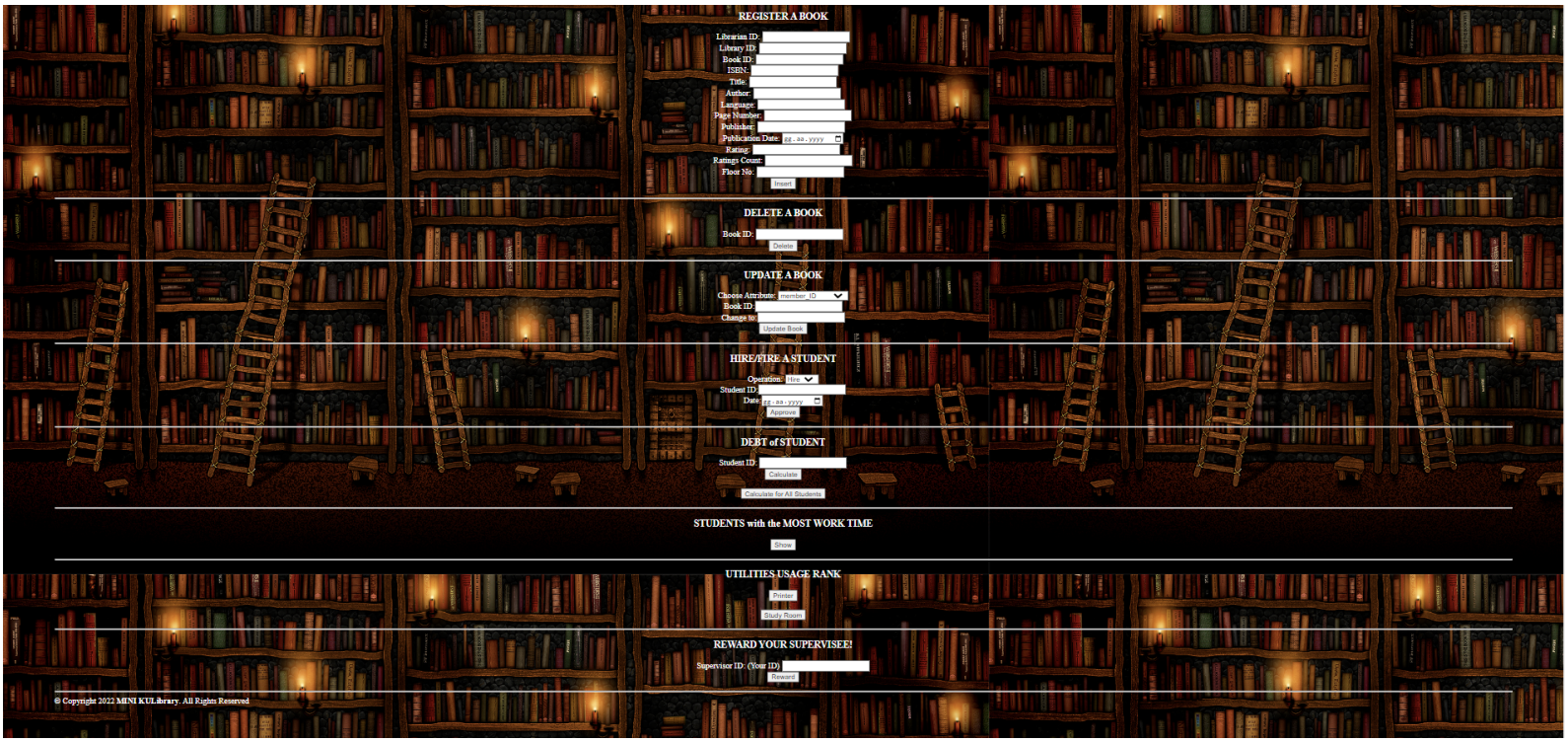
The query takes two inputs: Book title and Library id. It searches whether the given book is in the given library. If so, it prints the id of the book. If not, it searches for the book in the other libraries and gives out this information.

Screenshots

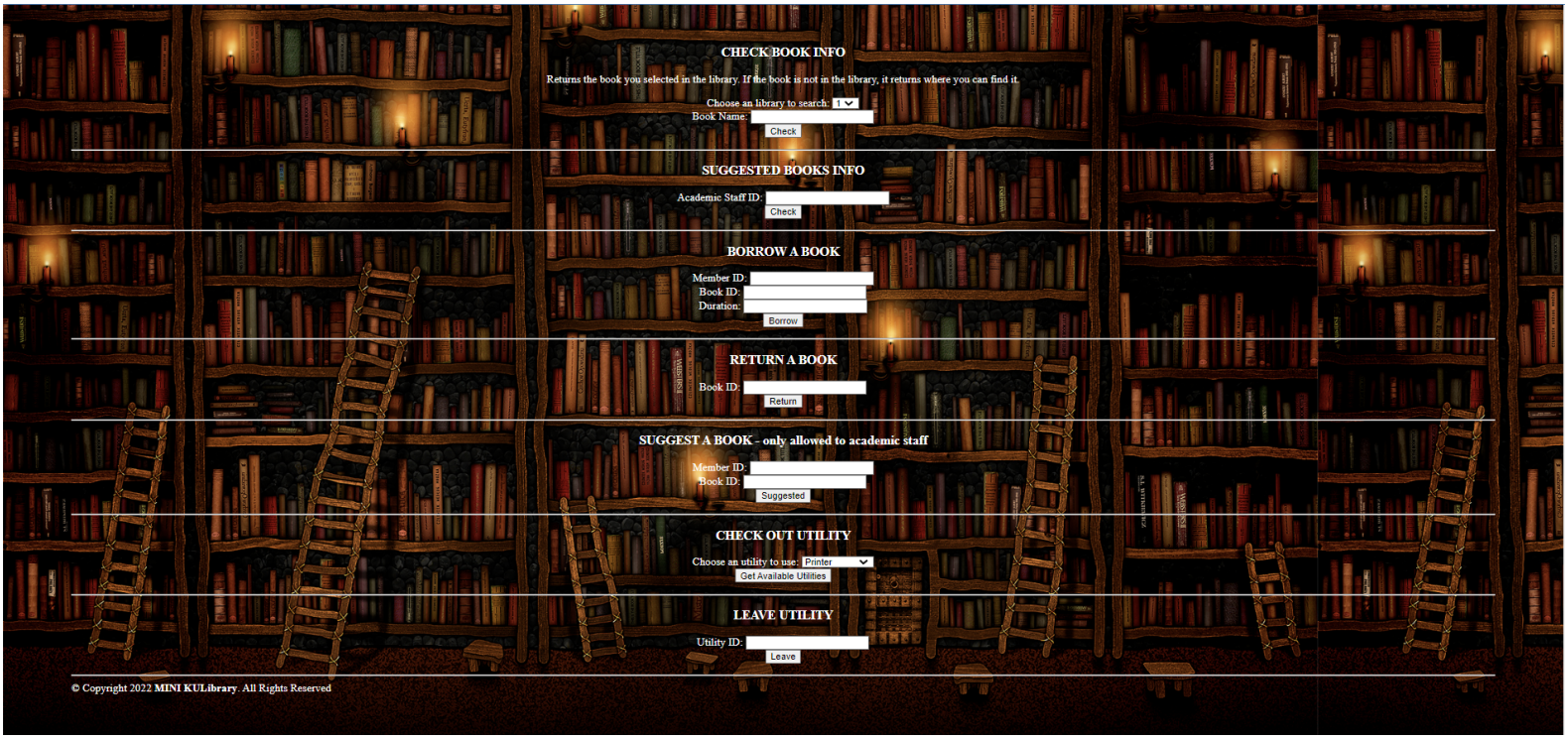
1- Login Screen:



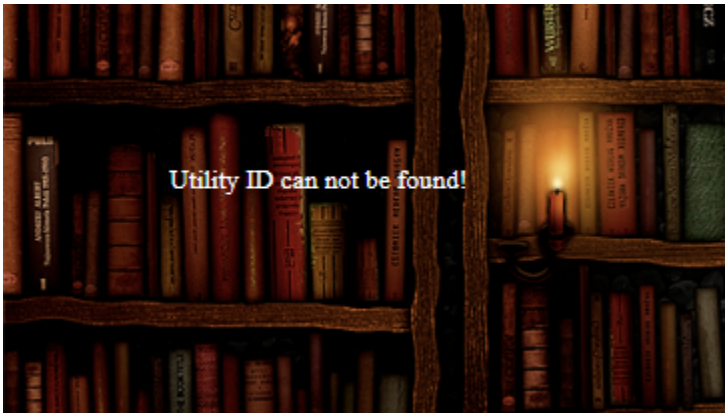
2-Librarian Screen:



3-Member Screen:



4-Example of Providing a Wrong Input:



5- Example of a Correctly Executed Complex Query: