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(An Autonomous Institution, Affiliated to Anna University, Chennai)

Computer Science and Engineering
UCS2404 - DATABASE MANAGEMENT SYSTEMS

LIBRARY MANAGEMENT SYSTEM

Mini Project Report Document

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IDEA AND DESIGN ASPECTS:

The database system designed for managing library operations is a thoughtfully constructed structure that aims to handle the various facets of library management seamlessly. This system ensures that all necessary information is organized, easily accessible, and maintainable, supporting a library's daily operations and strategic planning.

At the foundation of this system is the clear delineation of library locations. Each library is associated with specific geographical details, including city, country, street, and postal code. This allows for precise mapping and management of library branches, making it easy to identify and locate each branch within the system. This geographical data not only supports physical navigation but also helps in analyzing the distribution of libraries and planning for potential new branches or closures based on demographic data.

Books, one of the core elements of any library, are managed through a two-tiered approach in this system. The first tier includes immutable book information such as the title, author, genre, language, and number of pages. This information remains consistent across all libraries and provides a standardized view of the book's identity and content. The second tier involves library-specific data such as the book's price and availability status. By separating these two layers, the system allows for shared knowledge of book details while enabling individual libraries to manage their inventory according to local needs and circumstances. This method helps in maintaining a uniform cataloging system while supporting the unique operational requirements of each library branch.

The management of customers and patrons is another crucial component of the database. General customer information, including names, contact details, and dates of birth, is stored in one comprehensive section. This ensures that basic customer information is centralized and easily accessible. Building upon this, the system maintains additional details specific to library membership, such as membership expiry dates, usernames, and passwords, within another section. This layered approach reduces data redundancy by storing basic customer data once, while still allowing for detailed tracking of each customer's relationship with individual libraries. This design is efficient, scalable, and helps maintain data integrity.

Borrowing transactions are meticulously recorded in the system. The primary record of each borrowing transaction includes who borrowed the book, from which library, and the dates of borrowing and returning. This ensures that all transactions are traceable and auditable. Alongside this, the system keeps a detailed list of the specific books involved in each borrowing transaction. This two-pronged approach allows the library to handle multiple books being borrowed in a single transaction efficiently and maintain a clear borrowing history. This is critical for managing overdue books, calculating fines, and understanding borrowing patterns.

The library's computer resources are also managed within the database. The system tracks which computers are used by which patrons in each library, recording details such as the computer model and the duration of use. This tracking is essential for ensuring that computer resources are allocated effectively and that usage patterns are monitored. It also helps in identifying any maintenance needs and planning for future resource allocations.

Purchases of books by customers are another key aspect managed by the system. When a customer purchases a book, the system records the overall transaction details, such as the date of purchase and the customer involved, and lists the specific books bought. This helps the library keep accurate sales records, manage inventory levels, and provide better customer service by tracking purchase history.

Lastly, the system also manages the ordering of books from suppliers. It records detailed information about each order, including the supplier's name, order date, delivery date, and the specific books ordered, along with their quantities and costs. This comprehensive tracking helps libraries maintain optimal stock levels, manage budgets, and ensure timely restocking of popular or essential books.

In conclusion, this database design is highly organized and efficient, with a clear separation between different types of data to minimize redundancy and ensure data integrity. The system's robust relationships between various entities support comprehensive library management, from cataloging and borrowing books to managing patrons and tracking purchases and orders. This design not only facilitates smooth day-to-day operations but also provides valuable insights for strategic planning and decision-making, ensuring the library's long-term success and relevance.

Assumptions

Library

There are many libraries, each of which contain many books. A customer may purchase from a library, while a particular library may have many patrons. The library also has additional information associated with itself.

Book

A particular book along with its book I'd corresponds to a particular ID. 2 books can have the same book ID if they belong to different libraries.

Author

A particular author can write many books but one book may only have a single author.

Customer

A customer is anyone who purchases a book from any library. So a single customer may be a customer of many libraries, but that particular person has only a single customer id. However, a customer may have many patron ids associated with different libraries.

Patron

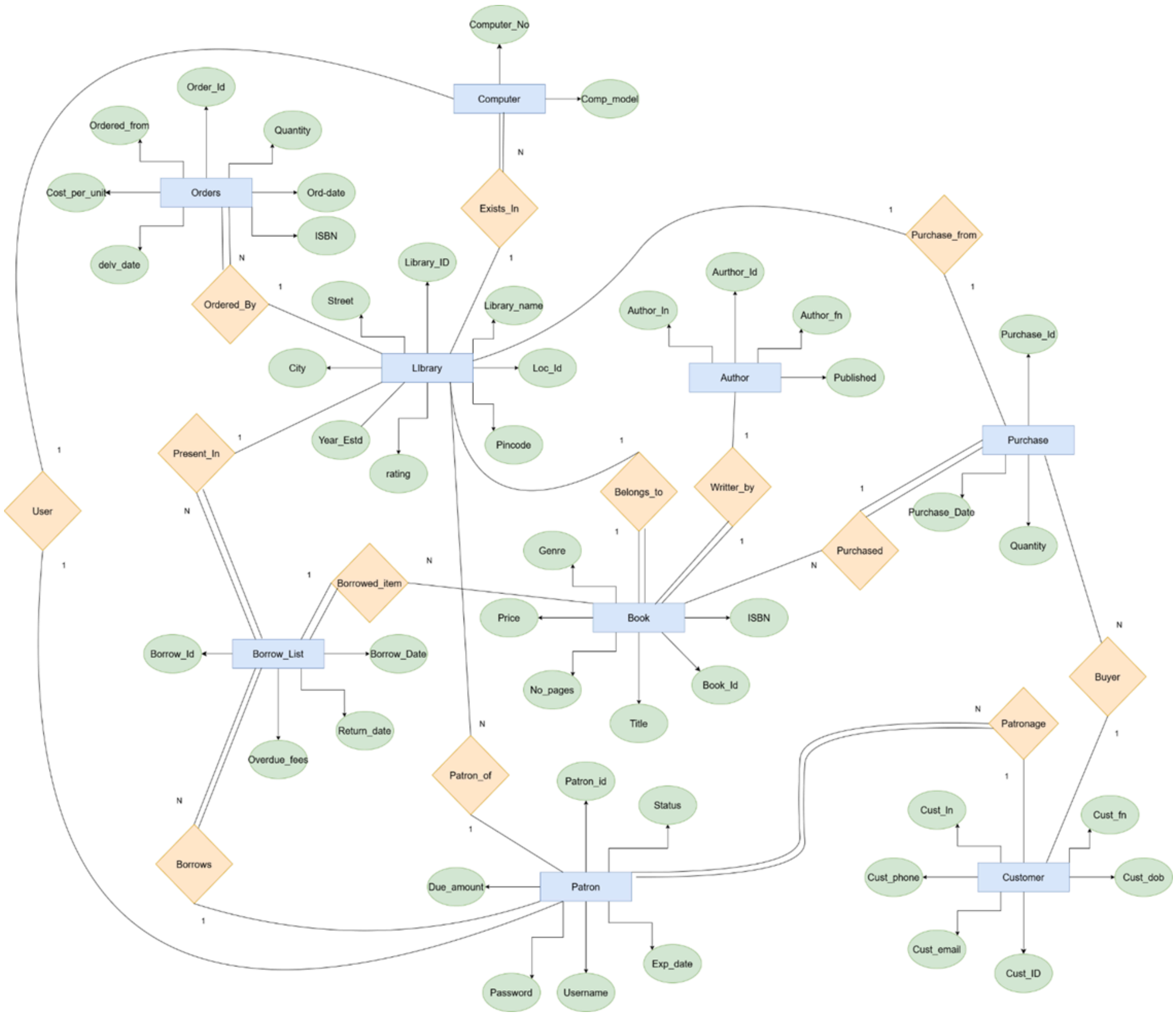
A customer may have only 1 patron id associated with a particular library. However they may be a patron of many different libraries.

Order

A particular order may be placed by a library at any point of time, consisting of many different books.

ENTITES AND ATTRIBUTES:-

ER Model Diagram:



LIBRARY:-

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE
LIBRARY_ID	LIBRARY'S UNIQUE ID	PRIMARY KEY AND CHECK	VARCHAR2
LIBRARY_NAME	LIBRARY'S NAME	NONE	VARCHAR2

LOC_ID	LOCATION ID OF LIBRARY	CHECK	VARCHAR2
PINCODE	PINCODE OF LIBRARY	NONE	NUMBER
STREET	STREET OF LIBRARY ADDRESS	NONE	VARCHAR2
CITY	CITY OF LIBRARY ADDRESS	NONE	VARCHAR2
COUNTRY	COUNTRY OF LIBRARY	NONE	VARCHAR2
YEAR ESTABLISHED	LIBRARY’S YEAR OF ESTABLISHMENT	NONE	NUMBER
RATING	RATING OF LIBRARY OUT OF FIVE	CHECK	NUMBER(2, 1)

BOOK:-

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE
BOOK_ID	BOOK’S UNIQUE ID	PRIMARY KEY AND CHECK	VARCHAR2
LIBRARY_ID	LIBRARY’S UNIQUE ID	PRIMARY KEY, FOREIGN AND CHECK	VARCHAR2
ISBN	INTERNATIONAL STANDARD BOOK NUMBER	CHECK	NUMBER
AUTHOR	AUTHOR’S UNIQUE ID	FOREIGN KEY	VARCHAR2
TITLE	BOOK TITLE	NONE	VARCHAR2

NO_PAGES	NO OF TOTAL PAGES IN BOOK	NONE	NUMBER
VOLUME_NO	VOLUME OF BOOK	NONE	NUMBER
PUBLISHER	PUBLISHER NAME	NONE	VARCHAR2
PRICE	COST OF BOOK	NONE	NUMBER(5, 2)
GENRE	GENRE OF BOOK	CHECK	VARCHAR2
LANGUAGE	PRIMARY LANGUAGE OF BOOK	CHECK	VARCHAR2

AUTHOR:

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE
AUTHOR_ID	AUTHOR’S UNIQUE ID	PRIMARY KEY AND CHECK	VARCHAR2
AUTHOR_FN	AUTHOR’S FIRST NAME	NONE	VARCHAR2
AUTHOR_LN	AUTHOR’S LAST NAME	NONE	VARCHAR2
BOOKS PUBLISHED	NUMBER OF BOOKS PUBLISHED BY AUTHOR	CHECK	NUMBER

CUSTOMER:-

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE

CUST_ID	CUSTOMER’S UNIQUE ID	PRIMARY KEY AND CHECK	VARCHAR2
CUST_FN	CUSTOMER’S FIRST NAME	NONE	VARCHAR2
CUST_LN	CUSTOMER’S LAST NAME	NONE	VARCHAR2
CUST_DOB	CUSTOMER’S DATE OF BIRTH	CHECK	DATE
CUST_PHONE	CUSTOMER’S PHONE NUMBER	CHECK	VARCHAR2
CUST_EMAIL	CUSTOMER’S EMAIL ID	CHECK	VARCHAR2

PATRON:-

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE
PATRON_ID	UNIQUE ID OF PATRON	PRIMARY KEY AND CHECK	VARCHAR2
LIBRARY_ID	UNIQUE ID OF LIBRARY OF PATRON	PRIMARY KEY AND CHECK	VARCHAR2
CUST_ID	UNIQUE ID OF CUSTOMER	FOREIGN KEY	VARCHAR2
EXPIRY_DATE	PATRONAGE EXPIRY DATE	CHECK	DATE
USERNAME	PATRON’S USERNAME	UNIQUE AND CHECK	VARCHAR2
PASSWORD	PATRON’S PASSWORD	CHECK	VARCHAR2

STATUS	ACTIVITY STATUS	CHECK (ACTIVE/INACTIVE)	VARCHAR2
DUE_AMT	TOTAL DUES ACCUMULATED BY PATRON	CHECK	NUMBER

ORDERS:-

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE
ORDER_ID	BOOK’S ORDER ID	PRIMARY KEY AND CHECK	VARCHAR2
LIBRARY_ID	UNIQUE ID OF LIBRARY OF ORDER	PRIMARY KEY, FOREIGN AND CHECK	VARCHAR2
ISBN	ISBN OF BOOK	PRIMARY KEY AND CHECK	VARCHAR2
ORDERED_FROM	DISTRIBUTER ORDERED_FROM	NONE	VARCHAR2
QUANTITY	QUANTITY ORDERED	CHECK	NUMBER
COST_PER_UNIT	COST PER UNIT ORDERED	CHECK	NUMBER
ORD_DATE	DATE ORDERED	CHECK	DATE
DELV_DATE	DATE OF DELIVERY	CHECK	DATE

BORROW_LIST:-

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE
PATRON_ID	PATRON'S ID	PRIMARY KEY, FOREIGN KEY AND CHECK	VARCHAR2
BOOK_ID	USER'S ID	PRIMARY KEY, FOREIGN KEY AND CHECK	VARCHAR2
LIBRARY_ID	UNIQUE ID OF LIBRARY OF PATRON	FOREIGN KEY AND CHECK	VARCHAR2
BORROW_ID	UNIQUE ID PERTAINING TO BORROW	PRIMARY KEY AND CHECK	VARCHAR2
BORROW_DATE	DATE BOOK IS BORROWED	CHECK	DATE
RETURN_DATE	DATE BOOK MUST BE RETURNED	CHECK	DATE
OVERDUE_FEES	OVERDUE FEES OF BORROWED BOOK	CHECK	NUMBER

COMPUTER:-

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE
COMP_NO	COMPUTER NUMBER	PRIMARY KEY AND CHECK	VARCHAR2
LIBRARY_ID	UNIQUE ID OF LIBRARY OF ORDER	PRIMARY KEY, FOREIGN AND CHECK	VARCHAR2
PATRON_ID	ID OF PATRON USING COMPUTER	FOREIGN KEY AND CHECK	VARCHAR2

COMP_MODEL	MODEL SPECIFICATIONS OF COMPUTER	NONE	VARCHAR2

PURCHASES:-

ATTRIBUTE	DESCRIPTION	CONSTRAINT	DATA TYPE
PURCHASE_ID	PURCHASE'S ID	PRIMARY KEY, FOREIGN KEY AND CHECK	VARCHAR2
CUST_ID	CUSTOMER'S ID	FOREIGN KEY AND CHECK	VARCHAR2
LIB_ID	LIBRARY'S ID	FOREIGN KEY AND CHECK	VARCHAR2
BOOK_ID	BOOK'S ID	FOREIGN KEY AND CHECK	VARCHAR2
QUANTITY	QUANTITY OF BOOK PURCHASED	CHECK	NUMBER
PURCHASE_DATE	DATE OF PURCHASE	CHECK	DATE

Functional Dependencies:

I. **LIBRARY**
   A. LIBRARY_ID
   B. LIBRARY_NAME
   C. LOC_ID
   D. PINCODE
   E. STREET
   F. CITY
   G. COUNTRY
   H. YEAR_ESTABLISHED

I. RATING

List of FD's: {A -> BCHI, C -> DEFG, AB -> CHI**}**

Finding Canonical Cover:

A^+ = {A, B, C, H, I}
AB^+ = {A, B, C, H, I}
C^+ = {C, D, E, F, G}

Removing A -> BCHI

A^+ = {A}

Therefore A -> BCHI is not redundant

Removing C -> DEFG

C^+ = {C, D, E, F, G}

Therefore C -> DEFG is not redundant

Removing AB -> CHI

AB^+ = {A, B, C, H, I}

Therefore AB -> CHI is a redundant FD

Minimal Set of FD's: {A -> BCHI, C -> DEFGI**}**

Finding the Candidate Key:

Finding the minimum closure:

$ABCDEFGHI^+$ = {A, B, C, D, E, F, G, H, I}

As A -> BHI

$ACDEFG^+$ = {A, B, C, D, E, F, G, H, I}

As C -> DEFG

AC^+ = {A, B, C, D, E, F, G, H, I}

As A -> C:

A^+ = {A, B, C, D, E, F, G, H, I}

A is not inferred from any other FD.

Therefore A is the candidate key of the relation.

II. BOOK

A. BOOK_ID
B. LIBRARY_ID
C. ISBN
D. AUTHOR
E. TITLE
F. NO_PAGES
G. VOLUME_NO
H. PUBLISHER
I. PRICE
J. GENRE
K. LANGUAGE

List of FD's: {AB -> CDEFGHIJKL, C -> DEFGHJK**}**

Finding Canonical Cover:

AB^+ = {A, B, C, D, E, F, G, H, I, J, K, L}
C^+ = {C, D, E, F, G, H, J, K}
BC^+ = {B, C, D, E, F, G, H, I, J, K}
BJ^+ = {B, J, L}

Removing AB -> CDEFGHIJK

AB^+ = {A, B}

Therefore AB -> CDEFGHIJK is not redundant

However removing just AB -> DEFGHIJK

AB^+ = {A, B, C, D, E, F, G, H, I, J, K}

Therefore AB -> DEFGHIJK is redundant

Removing C -> DEFGHJK

C^+ = {C}

Therefore C -> DEFGHJK is not redundant

Removing BC -> I

BC^+ = {B, C, D, E, F, G, H, J, K}

Therefore BC -> is not redundant

Removing BJ -> L

BJ^+ = {B, J}

Therefore BJ -> L is not redundant

Minimal Set of FD's: {AB -> C, C -> DEFGHJK, BC -> I, BJ -> L**}**

Finding the Candidate Key:

Finding the minimum closure:

$ABCDEFGHIJKL^+$ = {A, B, C, D, E, F, G, H, I, J, K, L}

As BJ -> L

$ABCDEFGHIJK^+$ = {A, B, C, D, E, F, G, H, I, J, K, L}

As C -> DEFGHJK

$ABCI^+$ = {A, B, C, D, E, F, G, H, I, J, K}

As BC -> I

AB^+ = {A, B, C, D, E, F, G, H, I, J, K}

As AB -> C:

AB^+ = {A, B, C, D, E, F, G, H, I}

A is not inferred from any other FD.
B is not inferred from any other FD.

Therefore AB is the candidate key of the relation.

III. AUTHOR

A. AUTHOR_ID
B. AUTHOR_FN
C. AUTHOR_LN
D. BOOKS_PUBLISHED

List of FD's: {A -> BCD, AB -> CD**}**

Finding Canonical Cover:

A^+ = {A, B, C, D}

AB^+ = {A, B, C, D}

Removing A -> BCD

A^+ = {A}

Therefore A -> BCD is not redundant

Removing AB -> CD

AB^+ = {A, B, C, D}

Therefore AB -> CD is redundant

Minimal Set of FD's: {A -> BCD**}**

Finding the Candidate Key:

Finding the minimum closure:

$ABCD^+$ = {A, B, C, D}

As A -> BCD

A^+ = {A, B, C, D}

A is not inferred from any other FD.

Therefore A is the candidate key of the relation.

IV. CUSTOMER

A. CUST_ID
B. CUST_FN
C. CUST_LN
D. CUST_DOB
E. CUST_PHONE
F. CUST_EMAIL

List of FD's: {A -> BCDEF, ABC -> DEF**}**

Finding Canonical Cover:

$A^+ = \{A, B, C, D\}$
$ABC^+ = \{A, B, C, D\}$

Removing A -> BCDEF

$A^+ = \{A\}$

Therefore A -> BCDEF is not redundant

Removing ABC -> CDEF

$ABC^+ = \{A, B, C, D, E, F\}$

Therefore ABC -> DEF is redundant

Minimal Set of FD’s: {A -> BCDEF**}**

Finding the Candidate Key:

Finding the minimum closure:

$ABCDEF^+ = \{A, B, C, D, E, F\}$

As A -> BCDEF

$A^+ = \{A, B, C, D, E, F\}$

A is not inferred from any other FD.

Therefore A is the candidate key of the relation.

V. **PATRON**

A. PATRON_ID
B. LIBRARY_ID
C. CUST_ID
D. EXPIRY_DATE
E. USERNAME
F. PASSWORD

G. STATUS
H. DUE_AMT

List of FD’s: {AB -> CDEFGH, BC -> A, ABC -> DEFGH**}**

Finding Canonical Cover:

AB^{+} = {A, B, C, D, E, F, G, H}
BC^{+} = {A, B, C, D, E, F, G, H}
ABC^{+} = {A, B, C, D, E, F, G, H}

Removing AB -> CDEFGH

AB^{+} = {A, B}

Therefore AB -> CDEFGH is not redundant

Therefore AB -> DEFGH is redundant

Removing BC -> A

BC^{+} = {B, C}

Therefore BC -> A is not redundant

Removing ABC -> DEFGH

BC^{+} = {A, B, C, D, E, F, G, H}

Therefore ABC -> DEFGH is redundant

Minimal Set of FD’s: {AB -> CDEFGH, BC -> A**}**

Finding the Candidate Key:

Finding the minimum closure set:

$ABCDEFGH^+$ = {A, B, C, D, E, F, G, H}

As ABC -> DEFGH

ABC^+ = {A, B, C, D, E, F, G, H}

As AB -> C

AB^+ = {A, B, C, D, E, F, G, H}

B is not inferred from any other FD.

A is inferred through the FD BC -> A
Which implies that BC^+ = {A, B, C, D, E, F, G, H}

Therefore both AB and BC are the candidate keys of the relation.

VI. ORDERS

A. ORDER_ID
B. LIBRARY_ID
C. ISBN
D. ORDERED_FROM
E. QUANTITY
F. COST_PER_UNIT
G. ORD_DATE
H. DELV_DATE

List of FD's: {AB -> DGH, ABC -> DEFGH**}**

Finding Canonical Cover:

AB^+ = {A, B, C, D, E, F, G, H}
BC^+ = {A, B, C, D, E, F, G, H}
ABC^+ = {A, B, C, D, E, F, G, H}

Removing AB -> CDEFGH

AB^+ = {A, B}

Therefore AB -> CDEFGH is not redundant

Therefore AB -> DEFGH is redundant

Removing BC -> A

BC^+ = {B, C}

Therefore BC -> A is not redundant

Removing ABC -> DEFGH

BC^+ = {A, B, C, D, E, F, G, H}

Therefore ABC -> DEFGH is redundant

Minimal Set of FD’s: {AB -> CDEFGH, BC -> A**}**

Finding the Candidate Key:

Finding the minimum closure set:

ABCDEFGH$^+$ = {A, B, C, D, E, F, G, H}

As AB -> DGH

ABCEF$^+$ = {A, B, C, D, E, F, G, H}

As ABC -> EF

ABC$^+$ = {A, B, C, D, E, F, G, H}

A is not inferred from any other FD.
B is not inferred from any other FD.
C is not inferred from any other FD.

Therefore ABC is the candidate key of the relation.

VII. **BORROW_LIST**

A. PATRON_ID
B. BOOK_ID
C. LIBRARY_ID
D. BORROW_ID
E. BORROW_DATE
F. RETURN_DATE
G. OVERDUE_FEES

List of FD's: {AB -> CEFG, CD -> AEFG**}**

Finding the Candidate Key:

Finding the minimum closure set:

`

ABCDEFG$^+$ = {A, B, C, D, E, F, G}

As AB -> CEFG

ABD^+ = {A, B, C, D, E, F, G}

B is not inferred from any other FD.
C is not inferred from any other FD.

A is inferred from the FD CD -> A
Which implies BCD^+ = {A, B, C, D, E, F, G}

Therefore both ABD and BCD are the candidate keys of the relation.

VIII. COMPUTER

A. COMP_NO
B. LIBRARY_ID
C. PATRON_NO
D. COMP_MODEL

List of FD's: {AB -> CD**}**

Finding the Candidate Key:

Finding the minimum closure set:

$ABCD^+$ = {A, B, C, D}

As AB -> CD

AB^+ = {A, B, C, D}

A is not inferred from any other FD.
B is not inferred from any other FD.

Therefore AB is the candidate key of the relation.

IX. PURCHASES

A. PURCHASE_ID
B. CUST_ID
C. LIB_ID
D. BOOK_ID

E. QUANTITY
F. PURCHASE_DATE

List of FD's: {A -> BCF, ABCD -> EF, AD -> E**}**

Finding the Candidate Key:

Finding the minimum closure set:

ABCDEF$^+$ = {A, B, C, D, E, F}

As A -> BCF

ADE$^+$ = {A, B, C, D, E, F}

As AD -> E

AD$^+$ = {A, B, C, D, E, F}

A is not inferred from any other FD.
D is not inferred from any other FD.

Therefore AD is the Candidate Key for the relation.

NORMALISATION:

In the following section, we normalize the relations to get relations in higher normal forms.

I. LIBRARY

A. LIBRARY_ID
B. LIBRARY_NAME
C. LOC_ID
D. PINCODE
E. STREET
F. CITY
G. COUNTRY
H. YEAR_ESTABLISHED
I. RATING

List of FD's: {A -> BCHI, C -> DEFG**}**
Candidate Key: A

Finding Normal Form of Relation:

The given relation does not contain any multi-valued attributes.

<u>Therefore, 1NF is satisfied.</u>

Prime Attributes = {A}
Non-Prime Attributes = {B, C, D, E, F, G, H, I}

The given relation does not contain any partial dependencies and every non-prime key attribute is fully functionally dependent on Prime attribute A.

<u>Therefore, 2NF is satisfied.</u>

There exists a transitive dependency between the primary key (A) and non-prime attributes (A -> C, C -> DEFG).
Therefore, 3NF is not satisfied.
In order to make the relation to be in 3NF, we decompose the relation into two, one where A is the prime key and other where C acts as the determinant

attribute.

Therefore, the relation becomes

LIBRARY: A, B, C, H, I - A: Prime Key
LOCATION: C, D, E, F, G - C: Prime Key

This eliminates the transitive dependency.
There are no other transitive dependencies in the relation, Thus, the relation is in 3NF.

Since in both the relations, the prime key is the superkey of all FDs.
Thus the relations are in BCNF.

II. BOOK

A. BOOK_ID
B. LIBRARY_ID
C. ISBN
D. AUTHOR
E. TITLE
F. NO_PAGES
G. VOLUME_NO
H. PUBLISHER
I. PRICE
J. GENRE
K. LANGUAGE

List of FD's: {AB -> CDEFGHIJK, C -> DEFGHJK**}**
Minimal Set of EDs: {AB -> CI, C -> DEFGHJK**}**
Candidate Key: AB

The given relation does not contain any multi-valued attributes.

Therefore, 1NF is satisfied.

Prime Attributes = {A, B}
Non-Prime Attributes = {C, D, E, F, G, H, I, J, K}

The given relation does not contain any partial dependencies and every non-prime key attribute is fully functionally dependent on Prime attribute AB.

Therefore, 2NF is satisfied.

There exists a transitive dependency between the primary key (AB) and non-prime attributes (AB -> C, C -> DEFGHJK).

Therefore, the relation becomes
BOOK: A, B, C, I - A, B: Prime Key
BOOK_DETAILS: C, D, E, F, G, H, J, K - C: Prime Key
This eliminates the transitive dependency.
There are no other transitive dependencies in the relation, Thus, the relation is in 3NF.

Since in both the relations, the prime key is the superkey of all FDs.
Thus, BCNF is satisfied.

III. AUTHOR

A. AUTHOR_ID
B. AUTHOR_FN
C. AUTHOR_LN
D. BOOKS_PUBLISHED

List of FD's: {A -> BCD**}**
Candidate Key: A

The given relation does not contain any multi-valued attributes.

Therefore, 1NF is satisfied.

Prime Attributes = {A}
Non-Prime Attributes = {B, C, D}

The given relation does not contain any partial dependencies and every non-prime key attribute is fully functionally dependent on Prime attribute A.

Therefore, 2NF is satisfied.

There are no transitive dependencies in the relation.
Therefore, 3NF is satisfied.

In the relation, the prime key is the superkey of all FDs.
Thus, BCNF is satisfied.

IV. CUSTOMER

A. CUST_ID
B. CUST_FN
C. CUST_LN
D. CUST_DOB
E. CUST_PHONE
F. CUST_EMAIL

List of FD's: {A -> BCDEF**}**
Candidate Key: A

The given relation does not contain any multi-valued attributes.

Therefore, 1NF is satisfied.

Prime Attributes = {A}
Non-Prime Attributes = {B, C, D, E, F}

The given relation does not contain any partial dependencies and every non-prime key attribute is fully functionally dependent on Prime attribute A.
Therefore, 2NF is satisfied.

There are no transitive dependencies in the relation.
Therefore, 3NF is satisfied.

In the relation, the prime key is the superkey of all FDs.
Thus, BCNF is satisfied.

V. PATRON

A. PATRON_ID
B. LIBRARY_ID
C. CUST_ID
D. EXPIRY_DATE

E. USERNAME
F. PASSWORD
G. STATUS
H. DUE_AMT

List of FD's: {AB -> CDEFGH, BC -> A**}**
Candidate Key: AB, BC

The given relation does not contain any multi-valued attributes.

Therefore, 1NF is satisfied.

Choosing AB as Prime Key:
Prime Key Choice: {A, B)
Non-Prime Attributes = {D, E, F, G, H}

The given relation does not contain any partial dependencies and every non-prime key attribute is fully functionally dependent on Prime attribute AB or BC.
Therefore, 2NF is satisfied.

There are no transitive dependencies in the relation.
Therefore, 3NF is satisfied.

In the relation, the prime key is the superkey of all FDs.
Thus, BCNF is satisfied.

VI. ORDERS

A. ORDER_ID
B. LIBRARY_ID
C. BOOK_ID
D. ORDERED_FROM
E. QUANTITY
F. COST_PER_UNIT
G. ORD_DATE
H. DELV_DATE

List of FD's: {AB -> DGH, ABC -> DEFGH}
Minimal Set of FDs: {AB -> DGH, ABC -> EF}

Candidate Key: ABC

The given relation does not contain any multi-valued attributes.

Therefore, 1NF is satisfied.

Prime Attributes = {A, B, C}
Non-Prime Attributes = {D, E, F, G, H}

The given relation contains partial dependencies. AB -> DGH
Thus, we decompose the relation into two relations for the respective FDs.

> **ORDERS:** A, B, D, G, H - Prime Key: AB
> **ORDER_LIST:** A, B, C, E, F - Prime Key: ABC

No other partial dependencies and every non-prime attribute in the decomposed relations are fully functionally dependent on the prime key of the respective relations.
Therefore, 2NF is satisfied.

There are no transitive dependencies in the above relations.
Therefore, 3NF is satisfied.

In the relation, the prime key is the superkey of all FDs.
Thus, BCNF is satisfied.

VII. BORROW_LIST

A. PATRON_ID
B. BOOK_ID
C. LIBRARY_ID
D. BORROW_ID
E. BORROW_DATE
F. RETURN_DATE
G. OVERDUE_FEES

List of FD's: {AB -> CEFG, CD -> AEFG}
Candidate Keys: ABD, BCD

The given relation does not contain any multi-valued attributes.

Therefore, 1NF is satisfied.
Choosing ABD as the prime key:
Prime Attributes = {A, B, D}
Non-Prime Attributes = {C, E, F, G}

The given relation contains a partial dependency AB -> CEFG.
Thus, we decompose the relation into two relations.

BORROW_LIST: A, B, C, E, F, G
BORROWS: A, B, D

No other partial dependencies and every non-prime attribute in the decomposed relations are fully functionally dependent on the prime key of the respective relations.
Therefore, 2NF is satisfied.

There are no transitive dependencies in the relation.
Therefore, 3NF is satisfied.

In the relation, the prime key is the superkey of all FDs.
Thus, BCNF is satisfied.

VIII. COMPUTER

A. COMP_NO
B. LIBRARY_ID
C. PATRON_NO
D. COMP_MODEL

List of FD's: {AB -> CD**}**
Candidate Key: AB

The given relation does not contain any multi-valued attributes.

Therefore, 1NF is satisfied.

Prime Attributes = {A, B}
Non-Prime Attributes = {C, D}

The given relation does not contain any partial dependencies and every non-prime key attribute is fully functionally dependent on Prime attribute AB.
Therefore, 2NF is satisfied.

There are no transitive dependencies in the relation.
Therefore, 3NF is satisfied.

In the relation, the prime key is the superkey of all FDs.
Thus, BCNF is satisfied.

IX. PURCHASES

A. PURCHASE_ID
B. CUST_ID
C. LIB_ID
D. BOOK_ID
E. QUANTITY
F. PURCHASE_DATE

List of FD's: {A -> BCF, ABCD -> EF, AD -> E**}**
Candidate Key: AD

The given relation does not contain any multi-valued attributes.

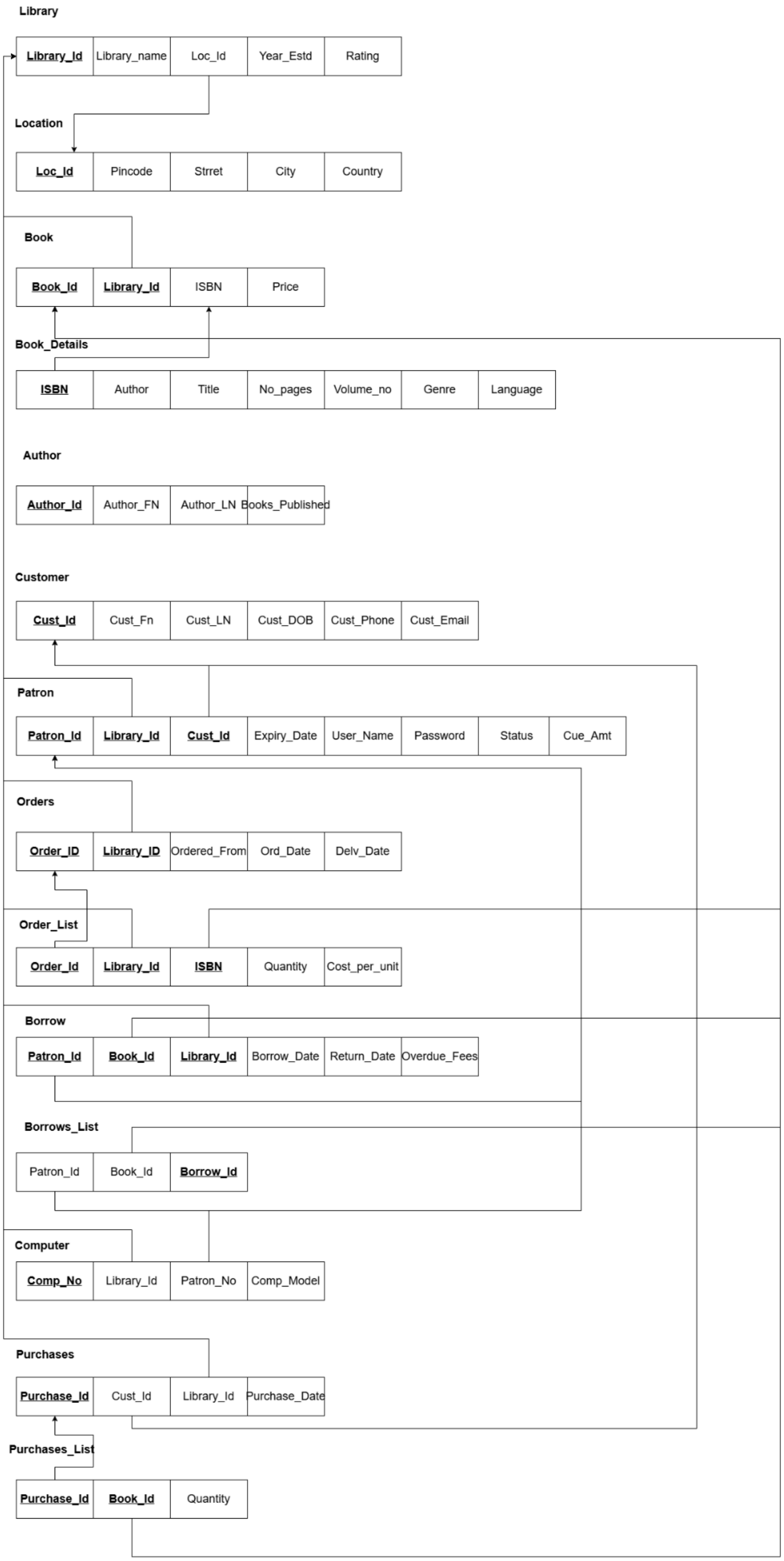
Therefore, 1NF is satisfied.

Prime Attributes = {A, D}
Non-Prime Attributes = {B, C, E, F}

The given relation contains partial dependencies: A -> BCF
Thus, we decompose the relation into two relations for the respective FDs.
PURCHASES: A, B, C, F - Prime Key: A
PURCHASE_LIST: A, D, E - Prime Key: AD

No other partial dependencies and every non-prime attribute in the decomposed relations are fully functionally dependent on the prime key of the respective relations.
Therefore, 2NF is satisfied.
There are no transitive dependencies in the relation.
Thus, the relation is in 3NF
Since in both the relations, the prime key is the superkey of all FDs.
Thus, BCNF is satisfied.

Schema Diagram for the FInal design: (Post Normalization)



Library

Library_Id	Library_name	Loc_Id	Year_Estd	Rating

Location

Loc_Id	Pincode	Strret	City	Country

Book

Book_Id	**Library_Id**	ISBN	Price

Book_Details

ISBN	Author	Title	No_pages	Volume_no	Genre	Language

Author

Author_Id	Author_FN	Author_LN	Books_Published

Customer

Cust_Id	Cust_Fn	Cust_LN	Cust_DOB	Cust_Phone	Cust_Email

Patron

Patron_Id	**Library_Id**	**Cust_Id**	Expiry_Date	User_Name	Password	Status	Cue_Amt

Orders

Order_ID	**Library_ID**	Ordered_From	Ord_Date	Delv_Date

Order_List

Order_Id	**Library_Id**	**ISBN**	Quantity	Cost_per_unit

Borrow

Patron_Id	**Book_Id**	**Library_Id**	Borrow_Date	Return_Date	Overdue_Fees

Borrows_List

Patron_Id	Book_Id	**Borrow_Id**

Computer

Comp_No	Library_Id	Patron_No	Comp_Model

Purchases

Purchase_Id	Cust_Id	Library_Id	Purchase_Date

Purchases_List

Purchase_Id	**Book_Id**	Quantity

Description of the Table and Attributes post normalization:

The database schema is designed to comprehensively manage various aspects of a library system. Below is a detailed description of each table in the database, outlining their purposes, attributes, and the relationships between them.

Location Table

Purpose: Stores detailed geographical information for each library location.

Attributes:

- `loc_id`: A unique identifier for the location, formatted to start with 'LOC'. It is the primary key.
- `pincode`: The postal code for the location.
- `street`: The street address of the location.
- `city`: The city where the location is situated. This field is mandatory.
- `country`: The country where the location is situated. This field is mandatory.

Library Table

Purpose: Contains information about each library branch.

Attributes:

- `library_id`: A unique identifier for the library, formatted to start with 'L'. It is the primary key.
- `library_name`: The name of the library.
- `loc_id`: References the `loc_id` in the `location` table to link the library to a specific location.
- `year_established`: The year the library was established.
- `rating`: The rating of the library, which must be between 0 and 5.

Book_Details Table

Purpose: Stores static information about books.

Attributes:

- isbn: The International Standard Book Number, which uniquely identifies a book. It is the primary key.
- author_name: The name of the author of the book.
- title: The title of the book.
- no_pages: The number of pages in the book.
- volume_no: The volume number, if the book is part of a series.
- genre: The genre of the book.
- language: The language in which the book is written.

Book Table

Purpose: Manages individual copies of books available in each library.

Attributes:

- book_id: A unique identifier for the book copy, formatted to start with 'B'. It, combined with library_id, forms the primary key.
- library_id: References the library_id in the library table to link the book to a specific library.
- isbn: References the isbn in the book_details table to link the book copy to its details.
- price: The price of the book.
- availible: Indicates if the book is available for borrowing (1) or not (0).

Customer Table

Purpose: Stores personal information about customers.

Attributes:

- cust_id: A unique identifier for the customer, formatted to start with 'C'. It is the primary key.
- cust_fn: The first name of the customer.
- cust_ln: The last name of the customer.
- cust_dob: The date of birth of the customer. This field is mandatory.
- cust_phone: The phone number of the customer. This field is mandatory.
- cust_email: The email address of the customer.

Patron Table

Purpose: Manages library patrons and their memberships.

Attributes:

- `patron_id`: A unique identifier for the patron, formatted to start with 'P'. It, combined with `library_id`, forms the primary key.
- `library_id`: References the `library_id` in the `library` table to link the patron to a specific library.
- `cust_id`: References the `cust_id` in the `customer` table to link the patron to their customer details.
- `expiry_date`: The expiry date of the patron's membership.
- `username`: A unique username for the patron.
- `password`: The password for the patron's account.
- `status`: The status of the patron's account, which can be 'ACTIVE' or 'INACTIVE'.
- `due_amt`: The amount due by the patron, possibly for overdue books.

Borrow Table

Purpose: Records borrowing transactions.

Attributes:

- `borrow_id`: A unique identifier for the borrow transaction, formatted to start with 'BR'. It, combined with `library_id`, forms the primary key.
- `library_id`: References the `library_id` in the `library` table to link the transaction to a specific library.
- `patron_id`: References the `patron_id` in the `patron` table to link the transaction to a specific patron.
- `borrow_date`: The date the book was borrowed.
- `return_date`: The date the book was returned.
- `overdue_fees`: The fees incurred for overdue returns.

Borrow_List Table

Purpose: Lists the books involved in each borrowing transaction.

Attributes:

- `borrow_id`: References the `borrow_id` in the `borrow` table to link to a specific transaction.
- `library_id`: References the `library_id` in the `borrow` table to link to a specific transaction.
- `book_id`: References the `book_id` in the `book` table to link to a specific book.

Computer Table

Purpose: Tracks computers available in libraries and their usage by patrons.

Attributes:

- `comp_no`: A unique identifier for the computer, formatted to start with 'C'. It, combined with `library_id`, forms the primary key.
- `library_id`: References the `library_id` in the `library` table to link the computer to a specific library.
- `patron_id`: References the `patron_id` in the `patron` table to link the computer usage to a specific patron.
- `comp_model`: The model of the computer.

Purchases Table

Purpose: Records book purchase transactions by customers.

Attributes:

- `purchase_id`: A unique identifier for the purchase transaction.
- `cust_id`: References the `cust_id` in the `customer` table to link the transaction to a specific customer.
- `library_id`: References the `library_id` in the `library` table to link the transaction to a specific library.
- `purchase_date`: The date of the purchase.

Purchases_List Table

Purpose: Lists the books involved in each purchase transaction.

Attributes:

- `purchase_id`: References the `purchase_id` in the `purchases` table to link to a specific transaction.

- `book_id`: References the `book_id` in the `book` table to link to a specific book.
- `library_id`: References the `library_id` in the `purchases` table to link to a specific transaction.
- `quantity`: The quantity of each book purchased.

Orders Table

Purpose: Manages orders placed by libraries to suppliers.

Attributes:

- `order_id`: A unique identifier for the order, formatted to start with 'O'. It, combined with `library_id`, forms the primary key.
- `library_id`: References the `library_id` in the `library` table to link the order to a specific library.
- `ordered_from`: The name of the supplier.
- `ord_date`: The date the order was placed.
- `delv_date`: The date the order was delivered.

Order_List Table

Purpose: Lists the books involved in each order transaction.

Attributes:

- `order_id`: References the `order_id` in the `orders` table to link to a specific transaction.
- `library_id`: References the `library_id` in the `orders` table to link to a specific transaction.
- `isbn`: References the `isbn` in the `book_details` table to link to a specific book.
- `quantity`: The quantity of each book ordered.
- `cost_per_unit`: The cost per unit of each book ordered.

Database Creation Code:

Java

```
DROP TABLE current_date CASCADE CONSTRAINT;
DROP TABLE order_list CASCADE CONSTRAINT;
DROP TABLE orders CASCADE CONSTRAINT;
DROP TABLE purchases_list CASCADE CONSTRAINT;
DROP TABLE purchases CASCADE CONSTRAINT;
DROP TABLE computer CASCADE CONSTRAINT;
DROP TABLE borrow_list CASCADE CONSTRAINT;
DROP TABLE borrow CASCADE CONSTRAINT;
DROP TABLE patron CASCADE CONSTRAINT;
DROP TABLE customer CASCADE CONSTRAINT;
DROP TABLE book_details CASCADE CONSTRAINT;
DROP TABLE book CASCADE CONSTRAINT;
DROP TABLE author CASCADE CONSTRAINT;
DROP TABLE location CASCADE CONSTRAINT;
DROP TABLE library CASCADE CONSTRAINT;



-- location Table
CREATE TABLE location (
    loc_id VARCHAR2(6) PRIMARY KEY CHECK (loc_id LIKE 'LOC%'),
    pincode NUMBER,
    street VARCHAR2(100),
    city VARCHAR2(100) NOT NULL,
    country VARCHAR2(100) NOT NULL
);

--library
CREATE TABLE library (
    library_id VARCHAR2(50) PRIMARY KEY CHECK (library_id LIKE 'L%'),
    library_name VARCHAR2(100),
    loc_id VARCHAR2(50) REFERENCES location(loc_id),
    year_established NUMBER,
    rating NUMBER(2,1) CHECK (rating BETWEEN 0 AND 5)
);

CREATE TABLE book_details (
    isbn NUMBER PRIMARY KEY,
    author_name VARCHAR2(50) ,
    title VARCHAR2(200),
    no_pages NUMBER,
    volume_no NUMBER,
    genre VARCHAR2(50),
    language VARCHAR2(50)
);

-- book Table
CREATE TABLE book (
    book_id VARCHAR2(4) CHECK (book_id LIKE 'B%'),
    library_id VARCHAR2(50) REFERENCES library(library_id),
    isbn NUMBER REFERENCES book_details(isbn),
    price NUMBER(5,2),
    availible NUMBER CHECK (availible IN (0, 1)),
    PRIMARY KEY (book_id, library_id)
);

-- customer Table
CREATE TABLE customer (
    cust_id VARCHAR2(4) PRIMARY KEY CHECK (cust_id LIKE 'C%'),
    cust_fn VARCHAR2(100),
    cust_ln VARCHAR2(100),
    cust_dob DATE NOT NULL,
    cust_phone VARCHAR2(20) NOT NULL,
    cust_email VARCHAR2(100)
);

-- patron Table
CREATE TABLE patron (
    patron_id VARCHAR2(4) CHECK (patron_id LIKE 'P%'),
    library_id VARCHAR2(4) REFERENCES library(library_id),
    cust_id VARCHAR2(4) REFERENCES customer(cust_id),
    expiry_date DATE,
    username VARCHAR2(50) UNIQUE,
    password VARCHAR2(50),
    status VARCHAR2(10) CHECK (status IN ('ACTIVE', 'INACTIVE')),
    due_amt NUMBER,
    PRIMARY KEY (patron_id, library_id)
);

-- borrow Table
CREATE TABLE borrow (
    borrow_id VARCHAR2(5) CHECK (borrow_id LIKE 'BR%'),
    library_id VARCHAR2(4),
    patron_id VARCHAR2(4),
    borrow_date DATE,
    return_date DATE,
    overdue_fees NUMBER,
    FOREIGN KEY (patron_id, library_id) REFERENCES
patron(patron_id, library_id),
    PRIMARY KEY (borrow_id, library_id)
);

-- borrow_list Table
CREATE TABLE borrow_list (
    borrow_id VARCHAR2(5),
    library_id VARCHAR2(4),
    book_id VARCHAR2(4),
    FOREIGN KEY (borrow_id, library_id) REFERENCES
borrow(borrow_id, library_id),
    FOREIGN KEY (book_id, library_id) REFERENCES book(book_id,
library_id),
    PRIMARY KEY (borrow_id, library_id, book_id)
);

-- computer Table
```

```
CREATE TABLE computer (
    comp_no VARCHAR2(4) CHECK (comp_no LIKE 'C%'),
    library_id VARCHAR2(4),
    patron_id VARCHAR2(4),
    comp_model VARCHAR2(100),
    FOREIGN KEY (patron_id, library_id) REFERENCES
patron(patron_id, library_id),
    PRIMARY KEY (comp_no, library_id)
);

-- purchases Table
CREATE TABLE purchases (
    purchase_id VARCHAR2(6) PRIMARY KEY,
    cust_id VARCHAR2(4) REFERENCES customer(cust_id),
    library_id VARCHAR2(4) REFERENCES library(library_id),
    purchase_date DATE
);

-- purchases_list Table
CREATE TABLE purchases_list (
    purchase_id VARCHAR2(6) REFERENCES purchases(purchase_id),
    book_id VARCHAR2(4),
    library_id VARCHAR2(4),
    quantity NUMBER,
    FOREIGN KEY (book_id, library_id) REFERENCES book(book_id,
library_id),
    PRIMARY KEY (purchase_id, book_id)
);

-- orders Table
CREATE TABLE orders (
    order_id VARCHAR2(4) CHECK (order_id LIKE 'O%'),
    library_id VARCHAR2(4) REFERENCES library(library_id),
    ordered_from VARCHAR2(100),
    ord_date DATE,
    delv_date DATE,
    PRIMARY KEY (order_id, library_id)
);

-- order_list Table
CREATE TABLE order_list (
    order_id VARCHAR2(4),
    library_id VARCHAR2(4),
    isbn NUMBER REFERENCES book_details(isbn),
    quantity NUMBER,
    cost_per_unit NUMBER,
    PRIMARY KEY (order_id, library_id, isbn),
    FOREIGN KEY (order_id, library_id) REFERENCES
orders(order_id, library_id)
);

CREATE TABLE current_date (
    cur_date DATE
);

SET SERVEROUTPUT ON;

CREATE OR REPLACE TRIGGER due_amt_trigger
AFTER UPDATE ON borrow
FOR EACH ROW
DECLARE
    overdue_fees_v NUMBER;
BEGIN
    SELECT SUM(b.overdue_fees) INTO overdue_fees_v
    FROM borrow b
    WHERE b.patron_id = :NEW.patron_id
    AND b.library_id = :NEW.library_id
    GROUP BY b.patron_id, b.library_id;

    UPDATE patron
    SET due_amt = overdue_fees_v
    WHERE :NEW.patron_id = patron_id;
```

```
END;
/

show error;

CREATE OR REPLACE TRIGGER book_purchased
AFTER INSERT ON purchases_list
FOR EACH ROW
BEGIN
    UPDATE book
    SET availible = 0
    WHERE book_id = :NEW.book_id;
END;
/

show error;

CREATE OR REPLACE TRIGGER date_changed
AFTER INSERT OR UPDATE ON current_date
FOR EACH ROW
DECLARE
    CURSOR c1 IS
    SELECT borrow_id FROM borrow;

    bid borrow.borrow_id%TYPE;
BEGIN
    OPEN c1;

    LOOP
        FETCH c1 INTO bid;
        UPDATE borrow
        SET overdue_fees = (:NEW.cur_date - return_date) * 10
        WHERE borrow_id = bid;

        EXIT WHEN c1%NOTFOUND;
    END LOOP;
```

```
END;
/

@"C:\Users\Vijay Srinivas
K\Documents\NetBeansProjects\lms_mini_project_db\inserts.sql"


-- @"C:\Users\Vijay Srinivas
K\Documents\NetBeansProjects\lms_mini_project_db\proj.sql"
```

Insertion of Test Data:

Java

```
--location
INSERT INTO location (loc_id, pincode, street, city, country)
VALUES ('LOC001', 110001, 'Connaught Place', 'New Delhi',
'India');
INSERT INTO location (loc_id, pincode, street, city, country)
VALUES ('LOC002', 400001, 'Nariman Point', 'Mumbai', 'India');
INSERT INTO location (loc_id, pincode, street, city, country)
VALUES ('LOC003', 600001, 'Mount Road', 'Chennai', 'India');
INSERT INTO location (loc_id, pincode, street, city, country)
VALUES ('LOC004', 700001, 'Park Street', 'Kolkata', 'India');
INSERT INTO location (loc_id, pincode, street, city, country)
VALUES ('LOC005', 560001, 'MG Road', 'Bangalore', 'India');

-- Insert 5 entries into the library table
INSERT INTO library (library_id, library_name, loc_id,
year_established, rating)
VALUES ('L001', 'National Library', 'LOC004', 1836, 4.8);
```

```
INSERT INTO library (library_id, library_name, loc_id,
year_established, rating)
VALUES ('L002', 'Asiatic Society Library', 'LOC002', 1804, 4.7);

INSERT INTO library (library_id, library_name, loc_id,
year_established, rating)
VALUES ('L003', 'Delhi Public Library', 'LOC001', 1951, 4.5);

INSERT INTO library (library_id, library_name, loc_id,
year_established, rating)
VALUES ('L004', 'Connemara Public Library', 'LOC003', 1896, 4.6);

INSERT INTO library (library_id, library_name, loc_id,
year_established, rating)
VALUES ('L005', 'State Central Library', 'LOC005', 1965, 4.4);

-- Insert 10 entries into the book_details table
INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780140449136, 'Homer', 'The Iliad', 704, 1, 'Epic',
'Greek');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780199535569, 'Jane Austen', 'Pride and Prejudice', 480,
1, 'Romance', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780439139595, 'J.K. Rowling', 'Harry Potter and the
Goblet of Fire', 752, 4, 'Fantasy', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780307277671, 'Khaled Hosseini', 'The Kite Runner', 371,
1, 'Drama', 'English');
```

```
INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780140449266, 'Homer', 'The Odyssey', 560, 1, 'Epic',
'Greek');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780451524935, 'George Orwell', '1984', 328, 1,
'Dystopian', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780439554930, 'J.K. Rowling', 'Harry Potter and the
Sorcerer''s Stone', 309, 1, 'Fantasy', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780316769488, 'J.D. Salinger', 'The Catcher in the Rye',
277, 1, 'Fiction', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780743273565, 'F. Scott Fitzgerald', 'The Great Gatsby',
180, 1, 'Tragedy', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780061120084, 'Harper Lee', 'To Kill a Mockingbird',
324, 1, 'Southern Gothic', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780143128540, 'Donna Tartt', 'The Goldfinch', 784, 1,
'Fiction', 'English');
```

```sql
INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780553573428, 'George R.R. Martin', 'A Game of Thrones',
835, 1, 'Fantasy', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780385472579, 'Frank Herbert', 'Dune', 896, 1, 'Science
Fiction', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780743226721, 'Gabriel Garcia Marquez', 'One Hundred
Years of Solitude', 417, 1, 'Magical Realism', 'Spanish');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780812981605, 'Yann Martel', 'Life of Pi', 326, 1,
'Adventure', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780804139021, 'Paula Hawkins', 'The Girl on the Train',
395, 1, 'Thriller', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780553386790, 'Dan Brown', 'The Da Vinci Code', 489, 1,
'Mystery', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9781400032716, 'Jhumpa Lahiri', 'The Namesake', 291, 1,
'Fiction', 'English');
```

```sql
INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780141182803, 'George Orwell', 'Animal Farm', 112, 1,
'Political Satire', 'English');

INSERT INTO book_details (isbn, author_name, title, no_pages,
volume_no, genre, language)
VALUES (9780452284241, 'Ray Bradbury', 'Fahrenheit 451', 256, 1,
'Dystopian', 'English');

-- Insert 25 entries for the first library (L001)
INSERT INTO book VALUES ('B001', 'L001', 9780140449136, 15.99,
1);
INSERT INTO book VALUES ('B002', 'L001', 9780199535569, 12.99,
1);
INSERT INTO book VALUES ('B003', 'L001', 9780439139595, 20.99,
1);
INSERT INTO book VALUES ('B004', 'L001', 9780307277671, 14.99,
1);
INSERT INTO book VALUES ('B005', 'L001', 9780140449266, 16.99,
1);
INSERT INTO book VALUES ('B006', 'L001', 9780451524935, 9.99, 1);
INSERT INTO book VALUES ('B007', 'L001', 9780439554930, 18.99,
1);
INSERT INTO book VALUES ('B008', 'L001', 9780316769488, 13.99,
1);
INSERT INTO book VALUES ('B009', 'L001', 9780743273565, 10.99,
1);
INSERT INTO book VALUES ('B010', 'L001', 9780061120084, 12.99,
1);
INSERT INTO book VALUES ('B011', 'L001', 9780143128540, 22.99,
1);
INSERT INTO book VALUES ('B012', 'L001', 9780553573428, 25.99,
1);
INSERT INTO book VALUES ('B013', 'L001', 9780385472579, 24.99,
1);
```

```
INSERT INTO book VALUES ('B014', 'L001', 9780743226721, 17.99,
1);
INSERT INTO book VALUES ('B015', 'L001', 9780812981605, 14.99,
1);
INSERT INTO book VALUES ('B016', 'L001', 9780804139021, 19.99,
1);
INSERT INTO book VALUES ('B017', 'L001', 9780553386790, 21.99,
1);
INSERT INTO book VALUES ('B018', 'L001', 9781400032716, 13.99,
1);
INSERT INTO book VALUES ('B019', 'L001', 9780141182803, 8.99, 1);
INSERT INTO book VALUES ('B020', 'L001', 9780452284241, 10.99,
1);
-- Adding duplicate entries for some books with consistent prices
INSERT INTO book VALUES ('B021', 'L001', 9780439139595, 20.99,
1); -- Duplicate
INSERT INTO book VALUES ('B022', 'L001', 9780439554930, 18.99,
1); -- Duplicate
INSERT INTO book VALUES ('B023', 'L001', 9780316769488, 13.99,
1); -- Duplicate
INSERT INTO book VALUES ('B024', 'L001', 9780451524935, 9.99, 1);
-- Duplicate
INSERT INTO book VALUES ('B025', 'L001', 9780061120084, 12.99,
1); -- Duplicate

-- Insert 10 entries for the second library (L002)
INSERT INTO book VALUES ('B001', 'L002', 9780199535569, 12.99,
1);
INSERT INTO book VALUES ('B002', 'L002', 9780439139595, 20.99,
1);
INSERT INTO book VALUES ('B003', 'L002', 9780307277671, 14.99,
1);
INSERT INTO book VALUES ('B004', 'L002', 9780140449266, 16.99,
1);
INSERT INTO book VALUES ('B005', 'L002', 9780553573428, 25.99,
1);
```

```
INSERT INTO book VALUES ('B006', 'L002', 9780385472579, 24.99, 1);
INSERT INTO book VALUES ('B007', 'L002', 9780804139021, 19.99, 1);
INSERT INTO book VALUES ('B008', 'L002', 9781400032716, 13.99, 1);
INSERT INTO book VALUES ('B009', 'L002', 9780141182803, 8.99, 1);
INSERT INTO book VALUES ('B010', 'L002', 9780452284241, 10.99, 1);

-- Insert 10 entries for the third library (L003)
INSERT INTO book VALUES ('B001', 'L003', 9780316769488, 13.99, 1);
INSERT INTO book VALUES ('B002', 'L003', 9780743273565, 10.99, 1);
INSERT INTO book VALUES ('B003', 'L003', 9780061120084, 12.99, 1);
INSERT INTO book VALUES ('B004', 'L003', 9780143128540, 22.99, 1);
INSERT INTO book VALUES ('B005', 'L003', 9780812981605, 14.99, 1);
INSERT INTO book VALUES ('B006', 'L003', 9780804139021, 19.99, 1);
INSERT INTO book VALUES ('B007', 'L003', 9780553386790, 21.99, 1);
INSERT INTO book VALUES ('B008', 'L003', 9781400032716, 13.99, 1);
INSERT INTO book VALUES ('B009', 'L003', 9780141182803, 8.99, 1);
INSERT INTO book VALUES ('B010', 'L003', 9780452284241, 10.99, 1);

INSERT INTO book VALUES ('B001', 'L004', 9780451524935, 9.99, 1);
INSERT INTO book VALUES ('B002', 'L004', 9780439554930, 18.99, 1);
INSERT INTO book VALUES ('B003', 'L004', 9780316769488, 13.99, 1);
INSERT INTO book VALUES ('B004', 'L004', 9780743273565, 10.99,
1);
INSERT INTO book VALUES ('B005', 'L004', 9780061120084, 12.99,
1);
INSERT INTO book VALUES ('B006', 'L004', 9780143128540, 22.99,
1);
INSERT INTO book VALUES ('B007', 'L004', 9780553573428, 25.99,
1);
INSERT INTO book VALUES ('B008', 'L004', 9780385472579, 24.99,
1);
INSERT INTO book VALUES ('B009', 'L004', 9780743226721, 17.99,
1);
INSERT INTO book VALUES ('B010', 'L004', 9780812981605, 14.99,
1);

-- Insert 5 entries for the fifth library (L005)
INSERT INTO book (book_id, library_id, isbn, price) VALUES
('B001', 'L005', 9780140449136, 15.99);
INSERT INTO book (book_id, library_id, isbn, price) VALUES
('B002', 'L005', 9780199535569, 12.99);
INSERT INTO book (book_id, library_id, isbn, price) VALUES
('B003', 'L005', 9780439139595, 20.99);
INSERT INTO book (book_id, library_id, isbn, price) VALUES
('B004', 'L005', 9780307277671, 14.99);
INSERT INTO book (book_id, library_id, isbn, price) VALUES
('B005', 'L005', 9780140449266, 16.99);

-- Insert 10 customer entries
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C001', 'Amit', 'Sharma',
TO_DATE('1985-05-14', 'YYYY-MM-DD'), '9876543210',
'amit.sharma@example.com');
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C002', 'Neha', 'Verma',
TO_DATE('1990-08-20', 'YYYY-MM-DD'), '9876543211',
'neha.verma@example.com');
```

```
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C003', 'Rahul', 'Gupta',
TO_DATE('1988-12-11', 'YYYY-MM-DD'), '9876543212',
'rahul.gupta@example.com');
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C004', 'Sneha', 'Kapoor',
TO_DATE('1992-03-05', 'YYYY-MM-DD'), '9876543213',
'sneha.kapoor@example.com');
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C005', 'Vikram', 'Singh',
TO_DATE('1980-07-19', 'YYYY-MM-DD'), '9876543214',
'vikram.singh@example.com');
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C006', 'Pooja', 'Mehta',
TO_DATE('1995-11-30', 'YYYY-MM-DD'), '9876543215',
'pooja.mehta@example.com');
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C007', 'Ankit', 'Jain',
TO_DATE('1983-09-23', 'YYYY-MM-DD'), '9876543216',
'ankit.jain@example.com');
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C008', 'Priya', 'Malhotra',
TO_DATE('1998-01-15', 'YYYY-MM-DD'), '9876543217',
'priya.malhotra@example.com');
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C009', 'Rohit', 'Kumar',
TO_DATE('1987-06-25', 'YYYY-MM-DD'), '9876543218',
'rohit.kumar@example.com');
INSERT INTO customer (cust_id, cust_fn, cust_ln, cust_dob,
cust_phone, cust_email) VALUES ('C010', 'Sonal', 'Chauhan',
TO_DATE('1993-10-18', 'YYYY-MM-DD'), '9876543219',
'sonal.chauhan@example.com');

-- Insert 8 patrons for the first library (L001)
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P001', 'L001',
'C001', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'amit_sharma',
'pass123', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P002', 'L001',
'C002', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'neha_verma',
'pass124', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P003', 'L001',
'C003', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'rahul_gupta',
'pass125', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P004', 'L001',
'C004', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'sneha_kapoor',
'pass126', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P005', 'L001',
'C005', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'vikram_singh',
'pass127', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P006', 'L001',
'C006', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'pooja_mehta',
'pass128', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P007', 'L001',
'C007', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'ankit_jain',
'pass129', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P008', 'L001',
'C008', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'priya_malhotra',
'pass130', 'ACTIVE', 0);

-- Insert 4 patrons for the second library (L002)
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P001', 'L002',
'C001', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'amit_sharma2',
'pass231', 'ACTIVE', 0);
```

```
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P002', 'L002',
'C003', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'rahul_gupta2',
'pass232', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P003', 'L002',
'C009', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'rohit_kumar',
'pass233', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P004', 'L002',
'C010', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'sonal_chauhan',
'pass234', 'ACTIVE', 0);

-- Insert 4 patrons for the third library (L003)
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P001', 'L003',
'C001', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'amit_sharma3',
'pass335', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P002', 'L003',
'C005', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'vikram_singh2',
'pass336', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P003', 'L003',
'C006', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'pooja_mehta2',
'pass337', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P004', 'L003',
'C008', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'priya_malhotra2',
'pass338', 'ACTIVE', 0);

-- Insert 4 patrons for the fourth library (L004)
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P001', 'L004',
'C002', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'neha_verma2',
'pass439', 'ACTIVE', 0);
```

```
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P002', 'L004',
'C003', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'rahul_gupta3',
'pass440', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P003', 'L004',
'C007', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'ankit_jain2',
'pass441', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P004', 'L004',
'C010', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'sonal_chauhan2',
'pass442', 'ACTIVE', 0);

-- Insert 2 patrons for the fifth library (L005)
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P001', 'L005',
'C004', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'sneha_kapoor2',
'pass543', 'ACTIVE', 0);
INSERT INTO patron (patron_id, library_id, cust_id, expiry_date,
username, password, status, due_amt) VALUES ('P002', 'L005',
'C009', TO_DATE('2025-06-30', 'YYYY-MM-DD'), 'rohit_kumar2',
'pass544', 'ACTIVE', 0);

-- Insert borrow records for the first library (L001)
-- Assume two patrons (P001 and P002) have multiple borrows
-- Patron P001 has multiple borrows
INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR001', 'L001', 'P001', TO_DATE('2024-06-15',
'YYYY-MM-DD'), TO_DATE('2024-07-15', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR002', 'L001', 'P001', TO_DATE('2024-06-20',
'YYYY-MM-DD'), TO_DATE('2024-07-20', 'YYYY-MM-DD'), 0);
```

```
-- Patron P002 has regular borrows
INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR003', 'L001', 'P002', TO_DATE('2024-06-16',
'YYYY-MM-DD'), TO_DATE('2024-07-16', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR004', 'L001', 'P002', TO_DATE('2024-06-21',
'YYYY-MM-DD'), TO_DATE('2024-07-21', 'YYYY-MM-DD'), 0);

-- Insert borrow records for the second library (L002)
-- Two patrons (P001 and P002) borrow books
INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR001', 'L002', 'P001', TO_DATE('2024-06-17',
'YYYY-MM-DD'), TO_DATE('2024-07-17', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR002', 'L002', 'P001', TO_DATE('2024-06-19',
'YYYY-MM-DD'), TO_DATE('2024-07-19', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR003', 'L002', 'P002', TO_DATE('2024-06-18',
'YYYY-MM-DD'), TO_DATE('2024-07-18', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR004', 'L002', 'P002', TO_DATE('2024-06-22',
'YYYY-MM-DD'), TO_DATE('2024-07-22', 'YYYY-MM-DD'), 0);

-- Insert borrow records for the third library (L003)
-- Two patrons (P001 and P002) borrow books
```

```sql
INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR001', 'L003', 'P001', TO_DATE('2024-06-19',
'YYYY-MM-DD'), TO_DATE('2024-07-19', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR002', 'L003', 'P001', TO_DATE('2024-06-21',
'YYYY-MM-DD'), TO_DATE('2024-07-21', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR003', 'L003', 'P002', TO_DATE('2024-06-20',
'YYYY-MM-DD'), TO_DATE('2024-07-20', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR004', 'L003', 'P002', TO_DATE('2024-06-22',
'YYYY-MM-DD'), TO_DATE('2024-07-22', 'YYYY-MM-DD'), 0);

-- Insert borrow records for the fourth library (L004)
-- Two patrons (P001 and P002) borrow books
INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR001', 'L004', 'P001', TO_DATE('2024-06-21',
'YYYY-MM-DD'), TO_DATE('2024-07-21', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR002', 'L004', 'P001', TO_DATE('2024-06-23',
'YYYY-MM-DD'), TO_DATE('2024-07-23', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR003', 'L004', 'P002', TO_DATE('2024-06-22',
'YYYY-MM-DD'), TO_DATE('2024-07-22', 'YYYY-MM-DD'), 0);
```

```sql
INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR004', 'L004', 'P002', TO_DATE('2024-06-24',
'YYYY-MM-DD'), TO_DATE('2024-07-24', 'YYYY-MM-DD'), 0);

-- Insert borrow records for the fifth library (L005)
-- One patron (P001) borrows books
INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR001', 'L005', 'P001', TO_DATE('2024-06-23',
'YYYY-MM-DD'), TO_DATE('2024-07-23', 'YYYY-MM-DD'), 0);

INSERT INTO borrow (borrow_id, library_id, patron_id,
borrow_date, return_date, overdue_fees)
VALUES ('BR002', 'L005', 'P001', TO_DATE('2024-06-24',
'YYYY-MM-DD'), TO_DATE('2024-07-24', 'YYYY-MM-DD'), 0);

-- Insert records for borrowings from the first library (L001)
-- Patron P001's borrows (BR001)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L001', 'B003');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L001', 'B004');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L001', 'B005');

-- Patron P002's borrows (BR003)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR003', 'L001', 'B006');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR003', 'L001', 'B007');
```

```
-- Insert records for borrowings from the second library (L002)
-- Patron P001's borrows (BR001)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L002', 'B006');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L002', 'B007');

-- Patron P002's borrows (BR003)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR003', 'L002', 'B008');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR003', 'L002', 'B009');

-- Insert records for borrowings from the third library (L003)
-- Patron P001's borrows (BR001)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L003', 'B010');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L003', 'B005');

-- Patron P002's borrows (BR003)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR003', 'L003', 'B006');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR003', 'L003', 'B007');

-- Insert records for borrowings from the fourth library (L004)
-- Patron P001's borrows (BR001)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L004', 'B003');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
```

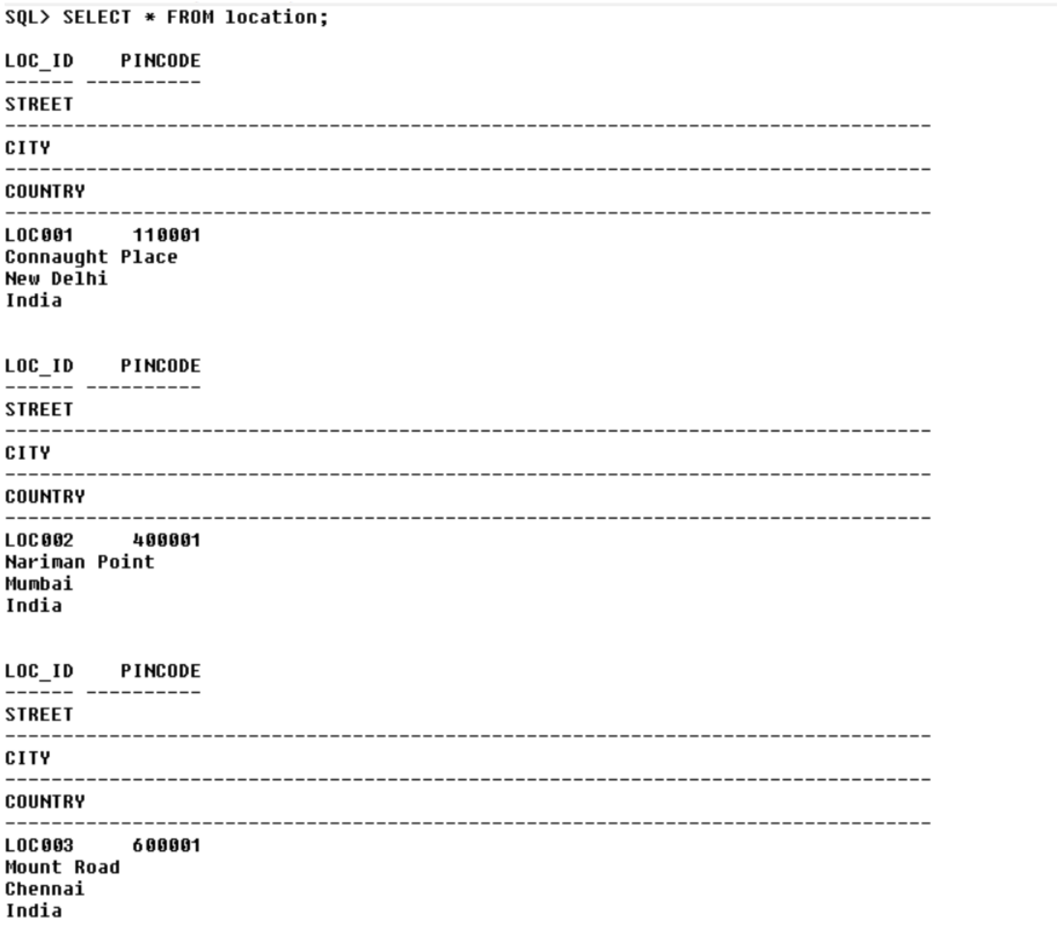
```sql
VALUES ('BR001', 'L004', 'B004');

-- Patron P002's borrows (BR003)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR003', 'L004', 'B005');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR003', 'L004', 'B006');

-- Insert records for borrowings from the fifth library (L005)
-- Patron P001's borrows (BR001)
INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L005', 'B003');

INSERT INTO borrow_list (borrow_id, library_id, book_id)
VALUES ('BR001', 'L005', 'B004');

-- Insert records for purchases by customers (non-patrons) and
patrons

-- Non-patron customer purchases
-- Assume customer C001 purchases books from library L001
INSERT INTO purchases (purchase_id, cust_id, library_id,
purchase_date)
VALUES ('PUR001', 'C001', 'L001', TO_DATE('2024-06-25',
'YYYY-MM-DD'));

INSERT INTO purchases_list (purchase_id, book_id, library_id,
quantity)
VALUES ('PUR001', 'B001', 'L001', 1);

INSERT INTO purchases_list (purchase_id, book_id, library_id,
quantity)
VALUES ('PUR001', 'B002', 'L001', 1);

-- Assume customer C002 purchases books from library L002
```

```sql
INSERT INTO purchases (purchase_id, cust_id, library_id,
purchase_date)
VALUES ('PUR002', 'C002', 'L002', TO_DATE('2024-06-26',
'YYYY-MM-DD'));

INSERT INTO purchases_list (purchase_id, book_id, library_id,
quantity)
VALUES ('PUR002', 'B001', 'L002', 1);

INSERT INTO purchases_list (purchase_id, book_id, library_id,
quantity)
VALUES ('PUR002', 'B002', 'L002', 1);

-- Patron purchases
-- Assume patron P001 (cust_id C003) purchases books from library
L003
INSERT INTO purchases (purchase_id, cust_id, library_id,
purchase_date)
VALUES ('PUR003', 'C003', 'L003', TO_DATE('2024-06-27',
'YYYY-MM-DD'));

INSERT INTO purchases_list (purchase_id, book_id, library_id,
quantity)
VALUES ('PUR003', 'B002', 'L003', 1);

INSERT INTO purchases_list (purchase_id, book_id, library_id,
quantity)
VALUES ('PUR003', 'B001', 'L003', 1);

-- Assume patron P002 (cust_id C004) purchases books from library
L004
INSERT INTO purchases (purchase_id, cust_id, library_id,
purchase_date)
VALUES ('PUR004', 'C004', 'L004', TO_DATE('2024-06-28',
'YYYY-MM-DD'));
```

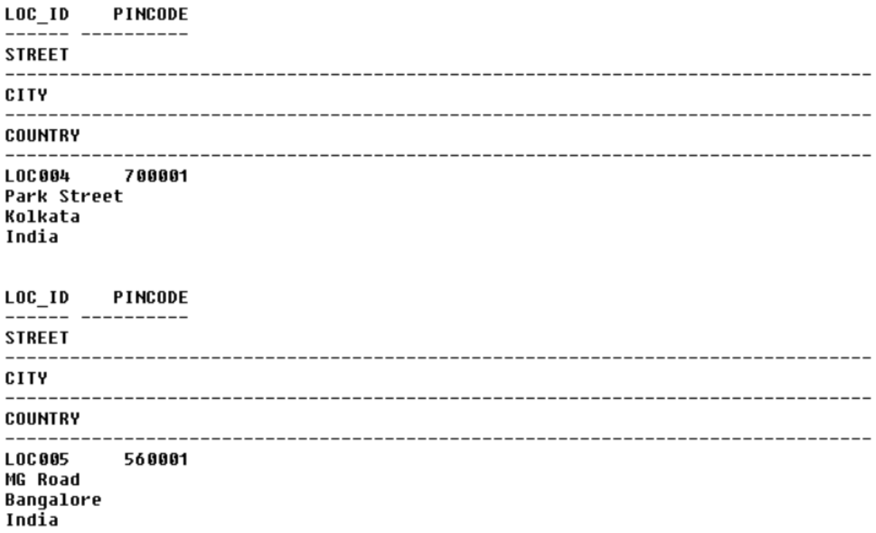
```
INSERT INTO purchases_list (purchase_id, book_id, library_id,
quantity)
VALUES ('PUR004', 'B001', 'L004', 1);

INSERT INTO purchases_list (purchase_id, book_id, library_id,
quantity)
VALUES ('PUR004', 'B002', 'L004', 1);
```

Database Content:

Location:

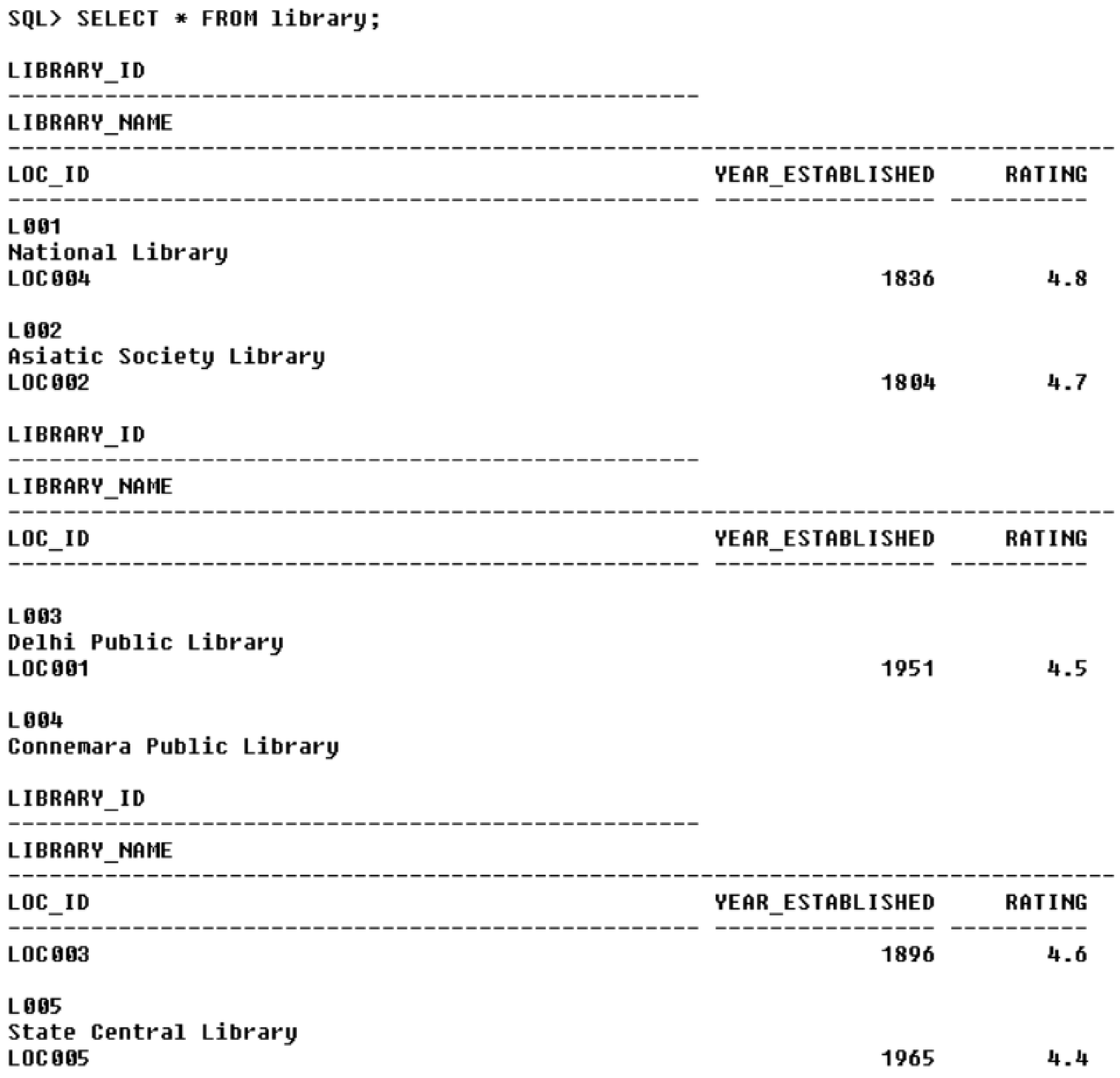


```
SQL> SELECT * FROM location;

LOC_ID    PINCODE
------ ----------
STREET
--------------------------------------------------------------------------------
CITY
--------------------------------------------------------------------------------
COUNTRY
--------------------------------------------------------------------------------
LOC001     110001
Connaught Place
New Delhi
India


LOC_ID    PINCODE
------ ----------
STREET
--------------------------------------------------------------------------------
CITY
--------------------------------------------------------------------------------
COUNTRY
--------------------------------------------------------------------------------
LOC002     400001
Nariman Point
Mumbai
India


LOC_ID    PINCODE
------ ----------
STREET
--------------------------------------------------------------------------------
CITY
--------------------------------------------------------------------------------
COUNTRY
--------------------------------------------------------------------------------
LOC003     600001
Mount Road
Chennai
India
```



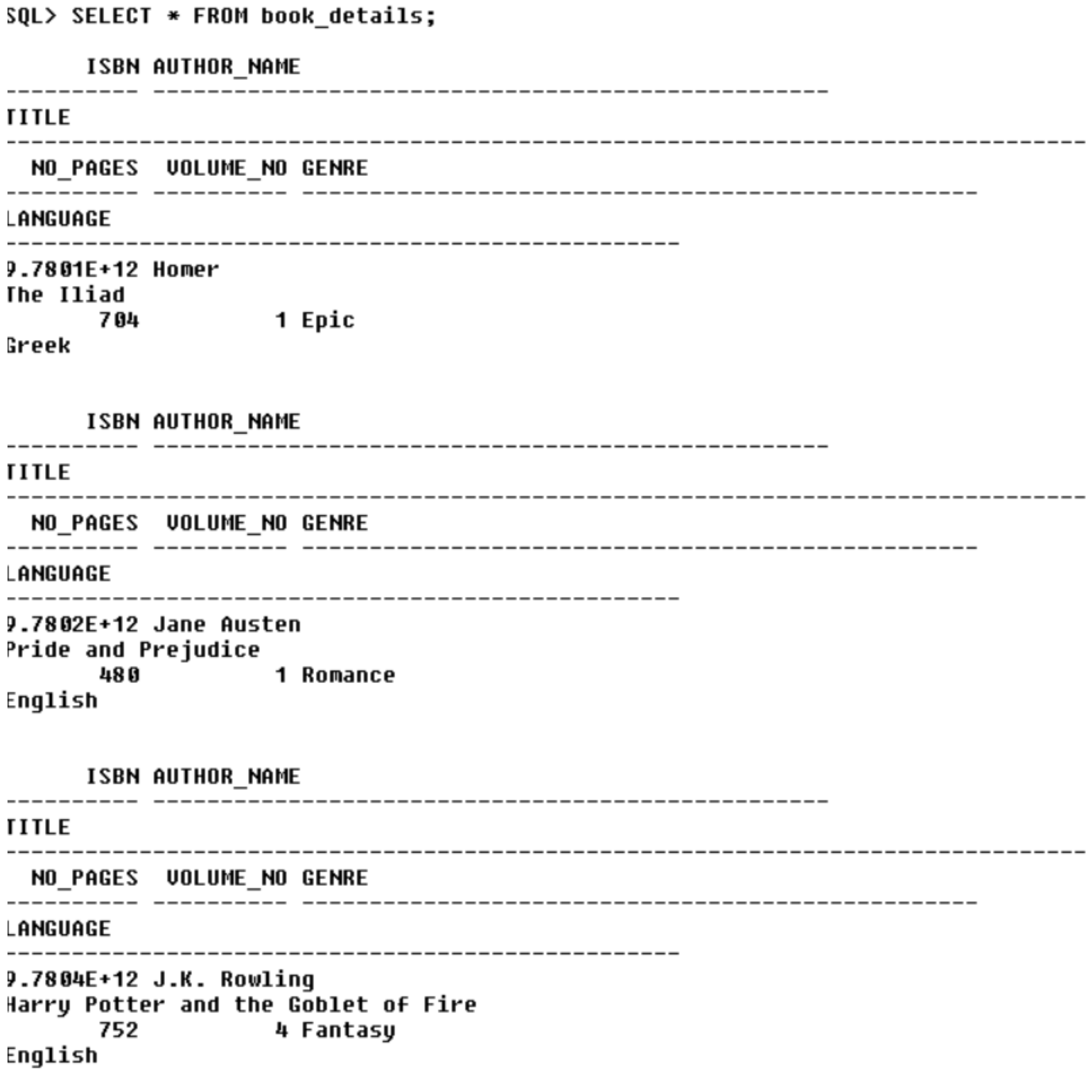
```
LOC_ID    PINCODE
------ ----------
STREET
--------------------------------------------------------------------------------
CITY
--------------------------------------------------------------------------------
COUNTRY
--------------------------------------------------------------------------------
LOC004     700001
Park Street
Kolkata
India


LOC_ID    PINCODE
------ ----------
STREET
--------------------------------------------------------------------------------
CITY
--------------------------------------------------------------------------------
COUNTRY
--------------------------------------------------------------------------------
LOC005     560001
MG Road
Bangalore
India
```

Library:

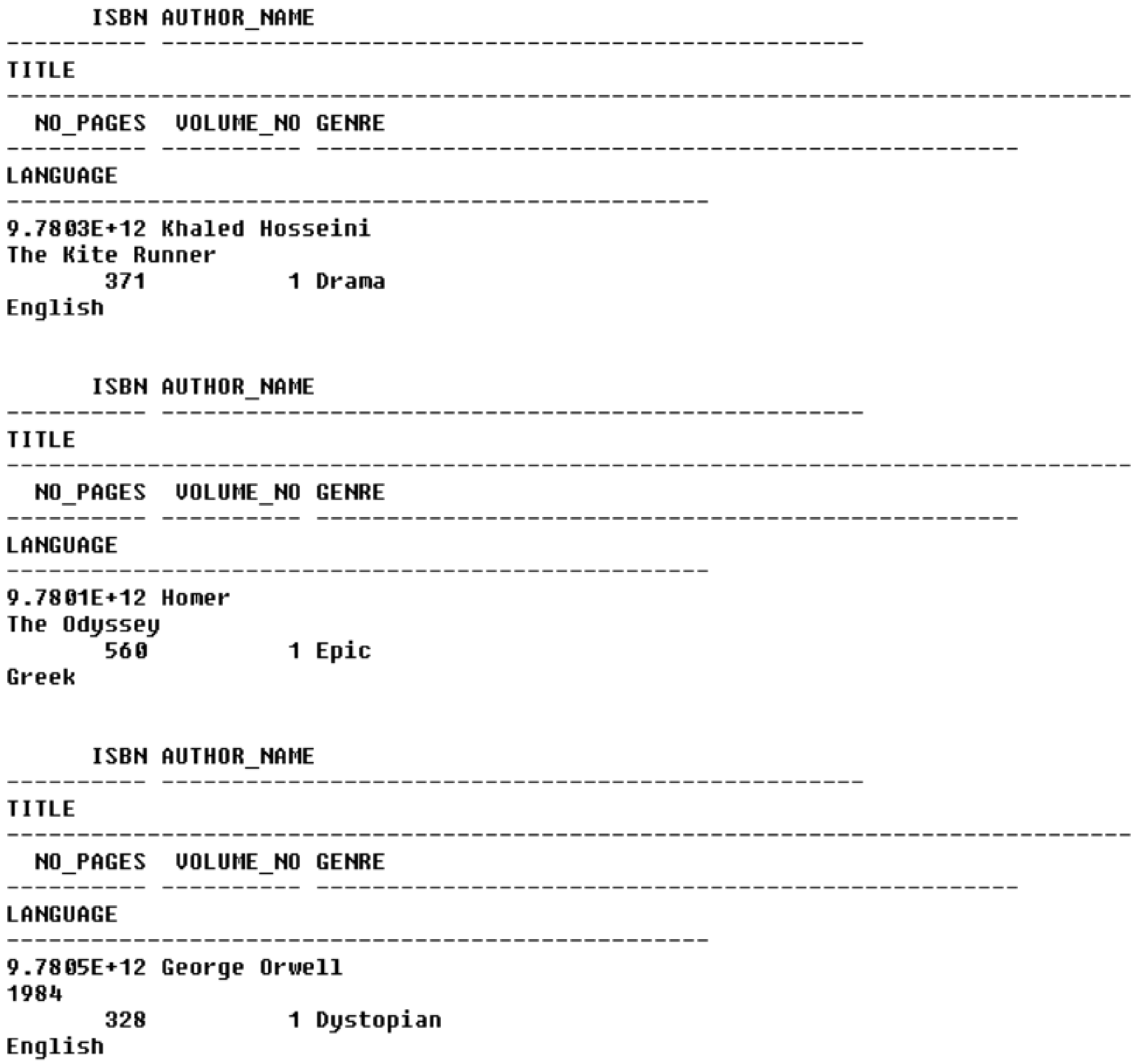


```
SQL> SELECT * FROM library;

LIBRARY_ID
--------------------------------------------------
LIBRARY_NAME
--------------------------------------------------------------------------------
LOC_ID                                             YEAR_ESTABLISHED     RATING
-------------------------------------------------- ---------------- ----------
L001
National Library
LOC004                                                         1836        4.8

L002
Asiatic Society Library
LOC002                                                         1804        4.7

LIBRARY_ID
--------------------------------------------------
LIBRARY_NAME
--------------------------------------------------------------------------------
LOC_ID                                             YEAR_ESTABLISHED     RATING
-------------------------------------------------- ---------------- ----------

L003
Delhi Public Library
LOC001                                                         1951        4.5

L004
Connemara Public Library

LIBRARY_ID
--------------------------------------------------
LIBRARY_NAME
--------------------------------------------------------------------------------
LOC_ID                                             YEAR_ESTABLISHED     RATING
-------------------------------------------------- ---------------- ----------
LOC003                                                         1896        4.6

L005
State Central Library
LOC005                                                         1965        4.4
```

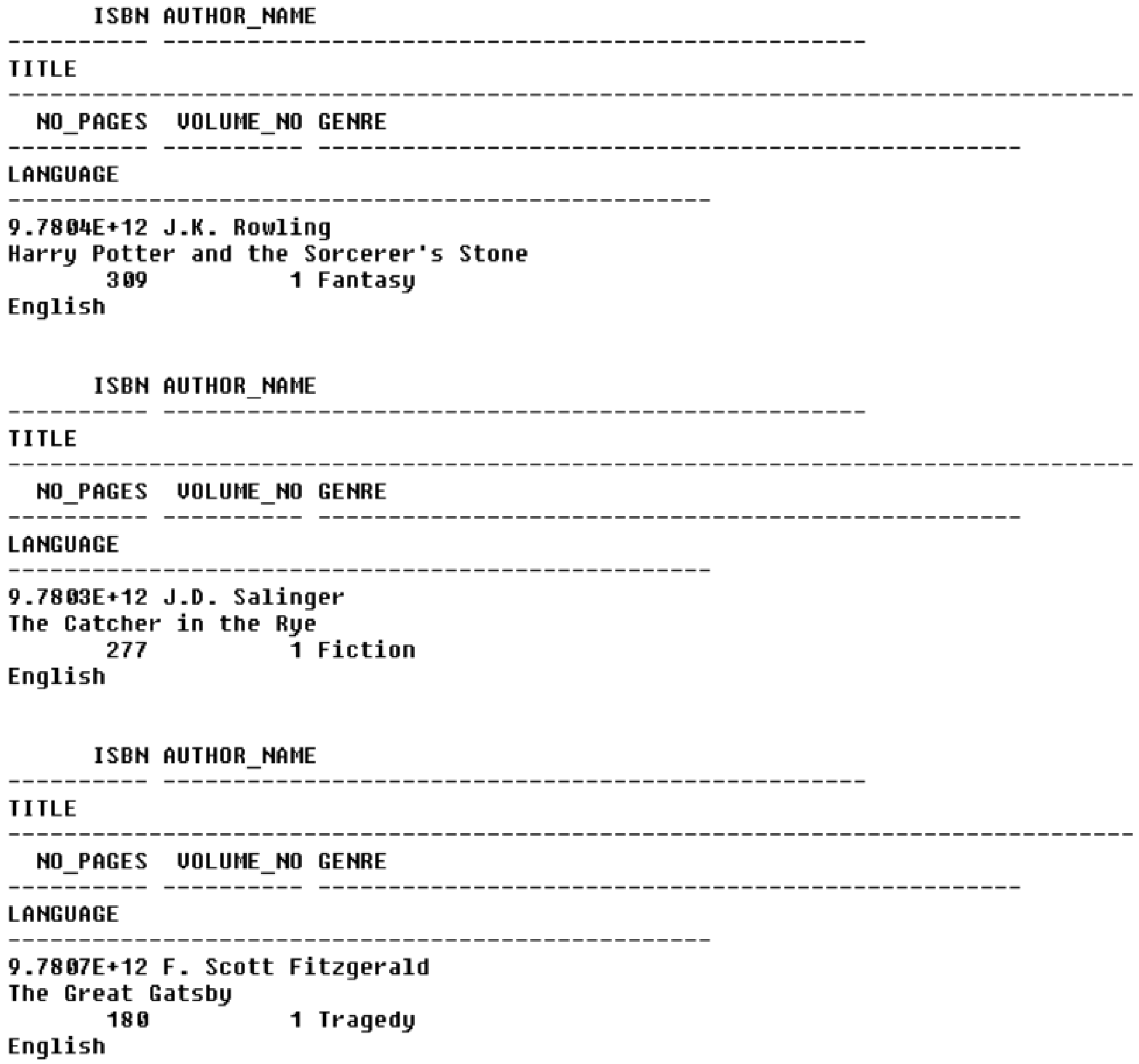
Book Details:



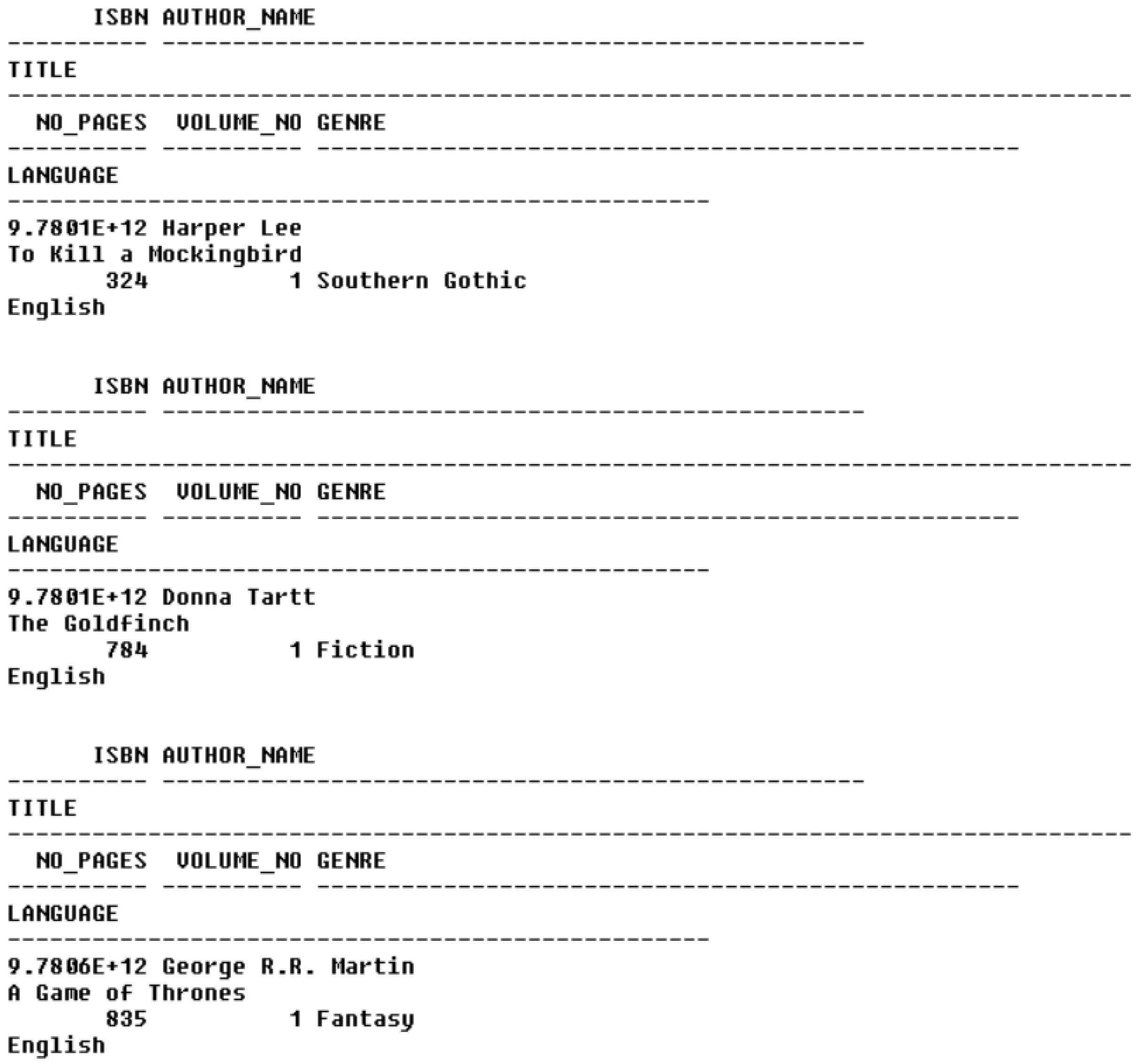
```
SQL> SELECT * FROM book_details;

      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7801E+12 Homer
The Iliad
       704          1 Epic
Greek


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7802E+12 Jane Austen
Pride and Prejudice
       480          1 Romance
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7804E+12 J.K. Rowling
Harry Potter and the Goblet of Fire
       752          4 Fantasy
English
```



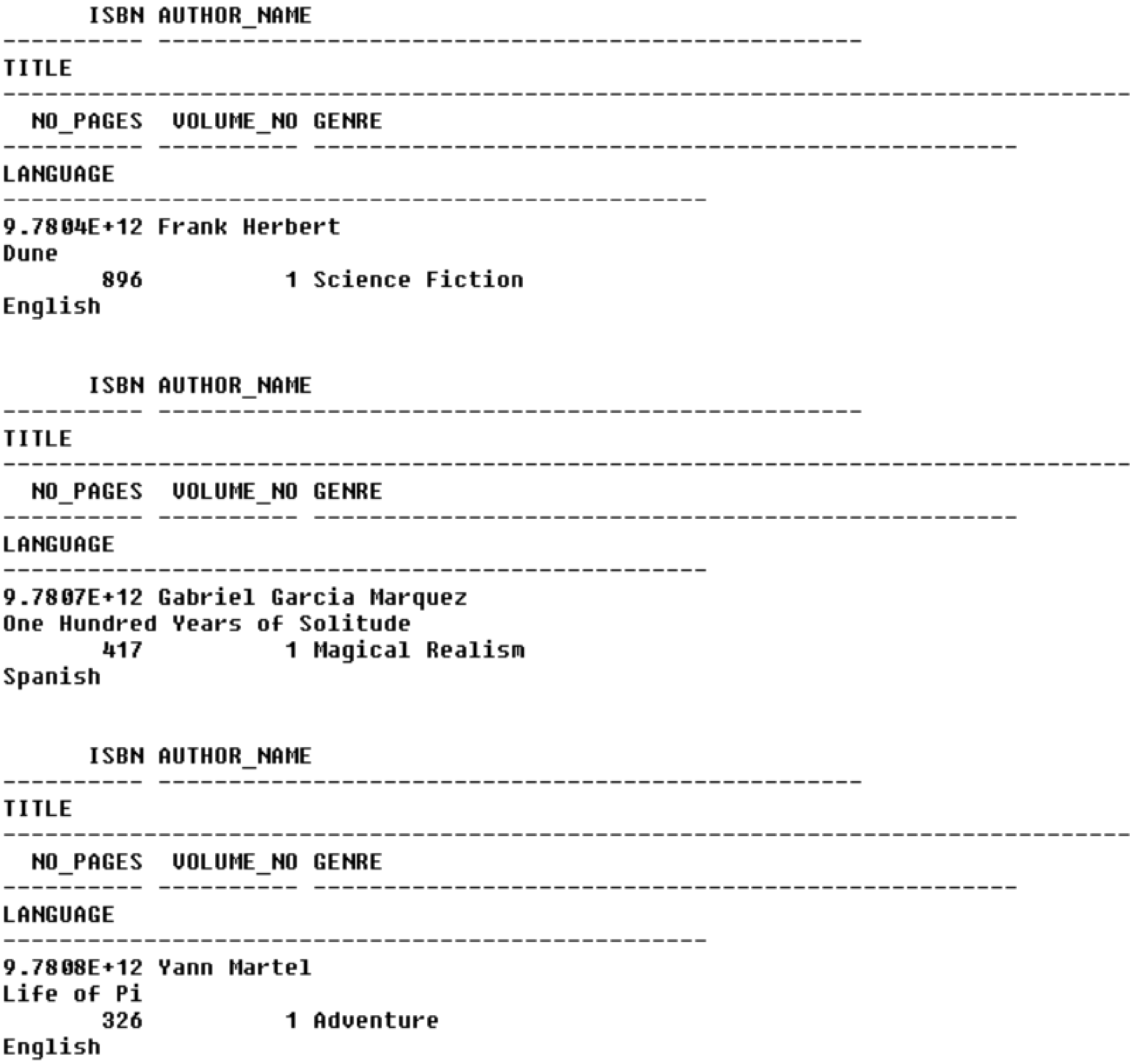
```
      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7803E+12 Khaled Hosseini
The Kite Runner
       371          1 Drama
English

      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7801E+12 Homer
The Odyssey
       560          1 Epic
Greek

      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7805E+12 George Orwell
1984
       328          1 Dystopian
English
```



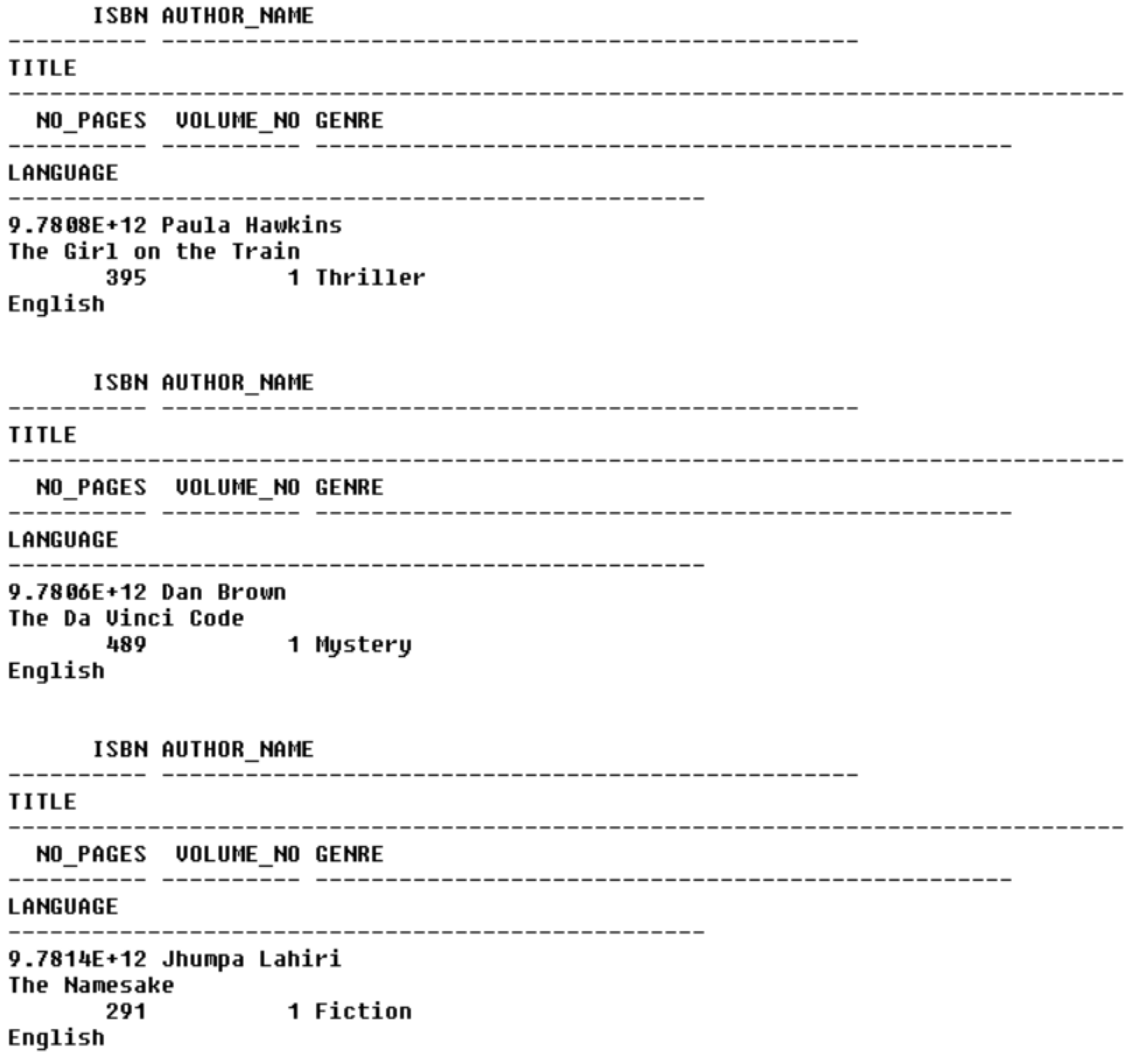
```
      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7804E+12 J.K. Rowling
Harry Potter and the Sorcerer's Stone
       309          1 Fantasy
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7803E+12 J.D. Salinger
The Catcher in the Rye
       277          1 Fiction
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7807E+12 F. Scott Fitzgerald
The Great Gatsby
       180          1 Tragedy
English
```



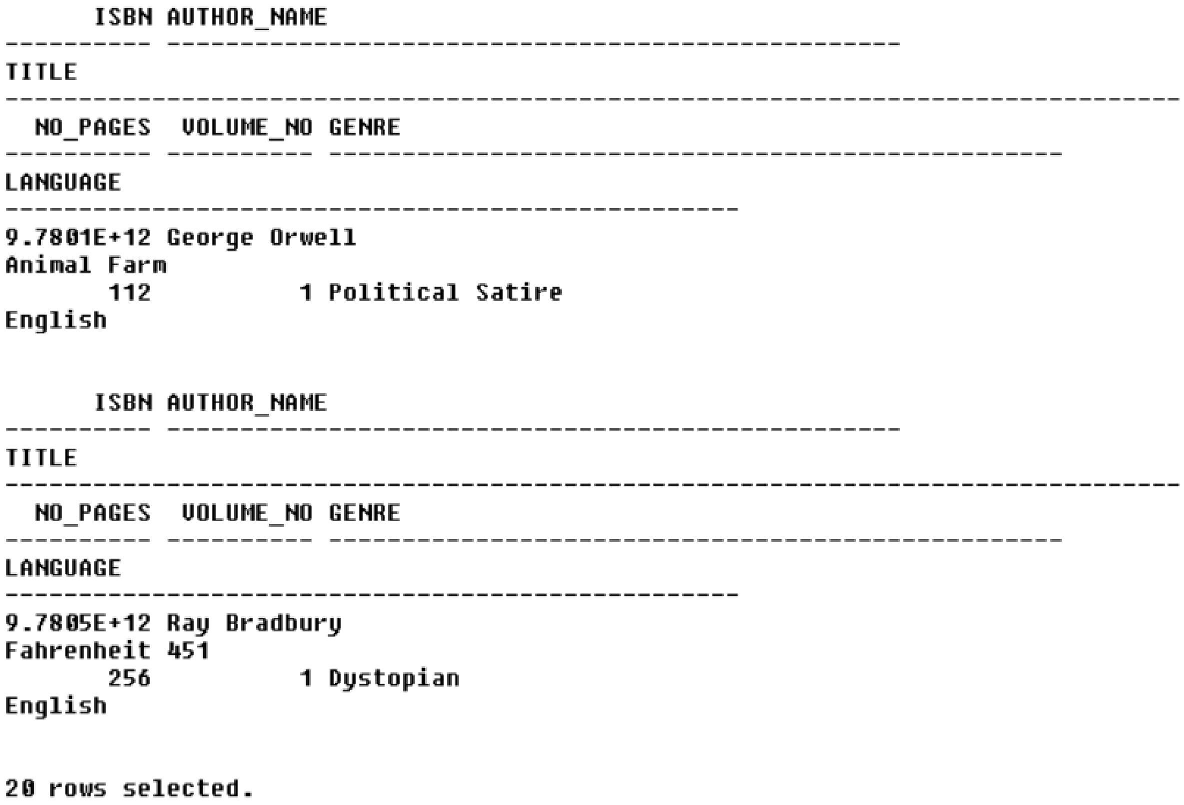
```
      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7801E+12 Harper Lee
To Kill a Mockingbird
       324          1 Southern Gothic
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7801E+12 Donna Tartt
The Goldfinch
       784          1 Fiction
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7806E+12 George R.R. Martin
A Game of Thrones
       835          1 Fantasy
English
```



```
      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7804E+12 Frank Herbert
Dune
       896          1 Science Fiction
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7807E+12 Gabriel Garcia Marquez
One Hundred Years of Solitude
       417          1 Magical Realism
Spanish


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7808E+12 Yann Martel
Life of Pi
       326          1 Adventure
English
```

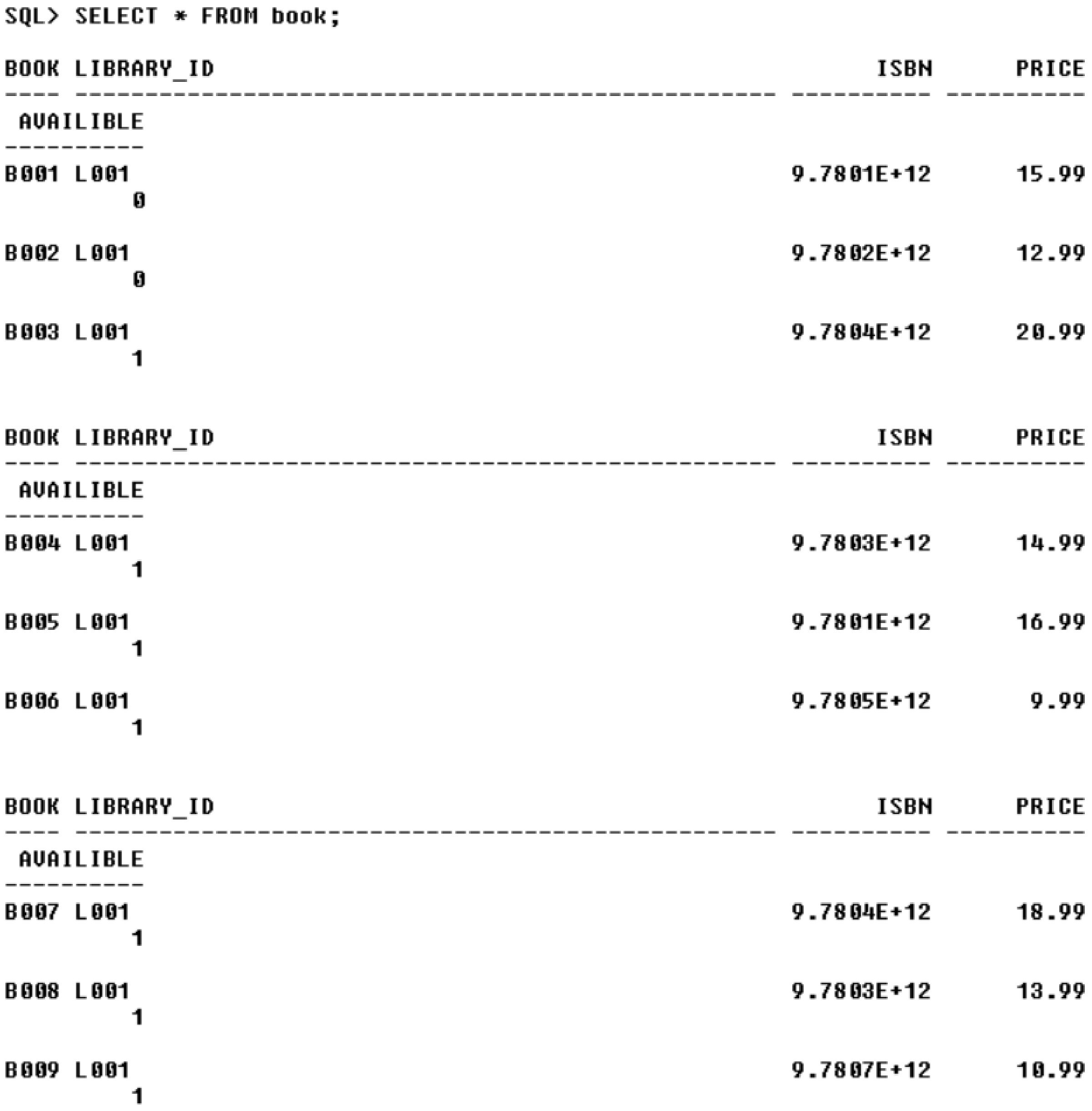


```
      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7808E+12 Paula Hawkins
The Girl on the Train
       395          1 Thriller
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7806E+12 Dan Brown
The Da Vinci Code
       489          1 Mystery
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7814E+12 Jhumpa Lahiri
The Namesake
       291          1 Fiction
English
```



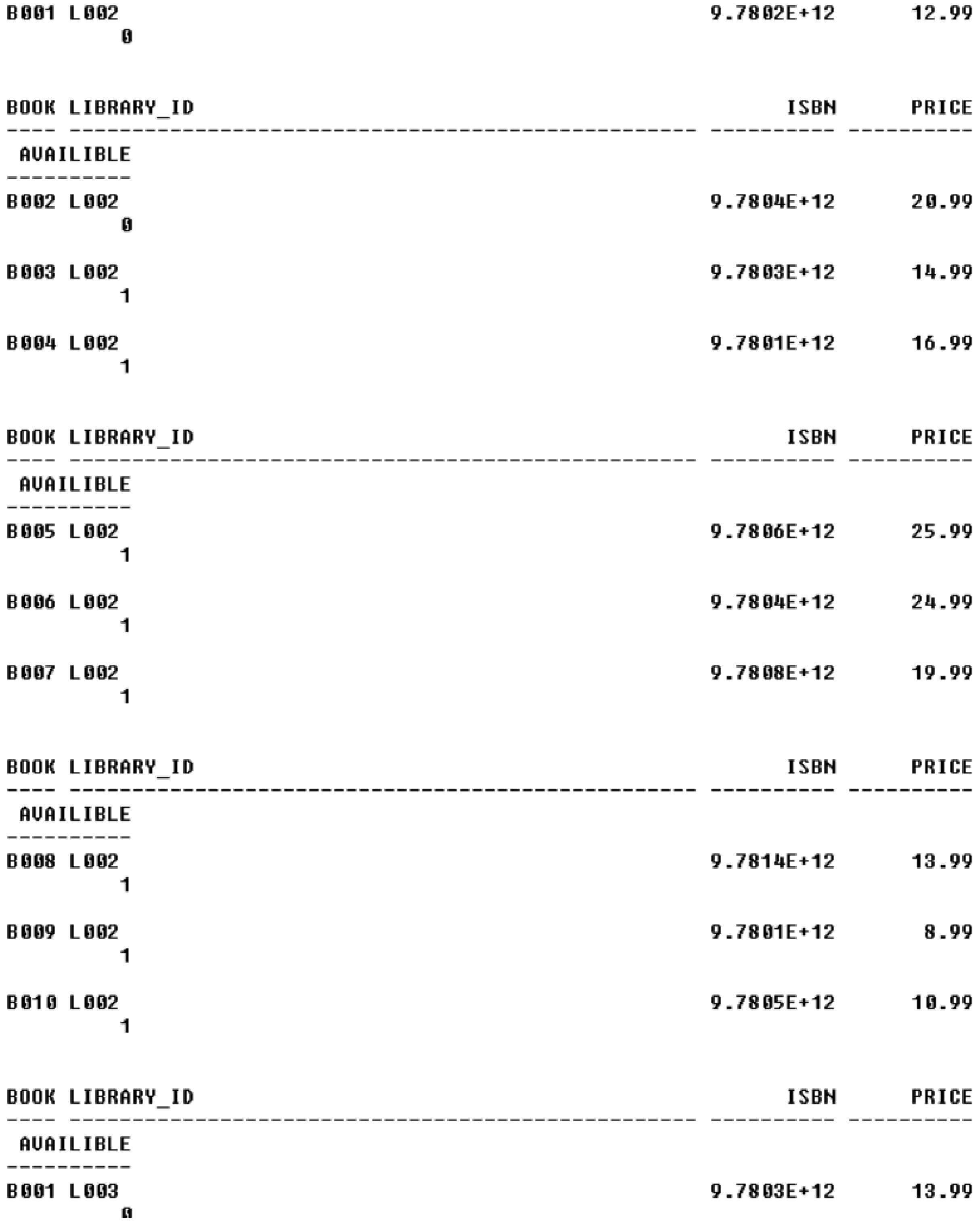
```
      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7801E+12 George Orwell
Animal Farm
       112          1 Political Satire
English


      ISBN AUTHOR_NAME
---------- --------------------------------------------------
TITLE
--------------------------------------------------------------------------------
  NO_PAGES  VOLUME_NO GENRE
---------- ---------- --------------------------------------------------
LANGUAGE
--------------------------------------------------
9.7805E+12 Ray Bradbury
Fahrenheit 451
       256          1 Dystopian
English


20 rows selected.
```

Book:

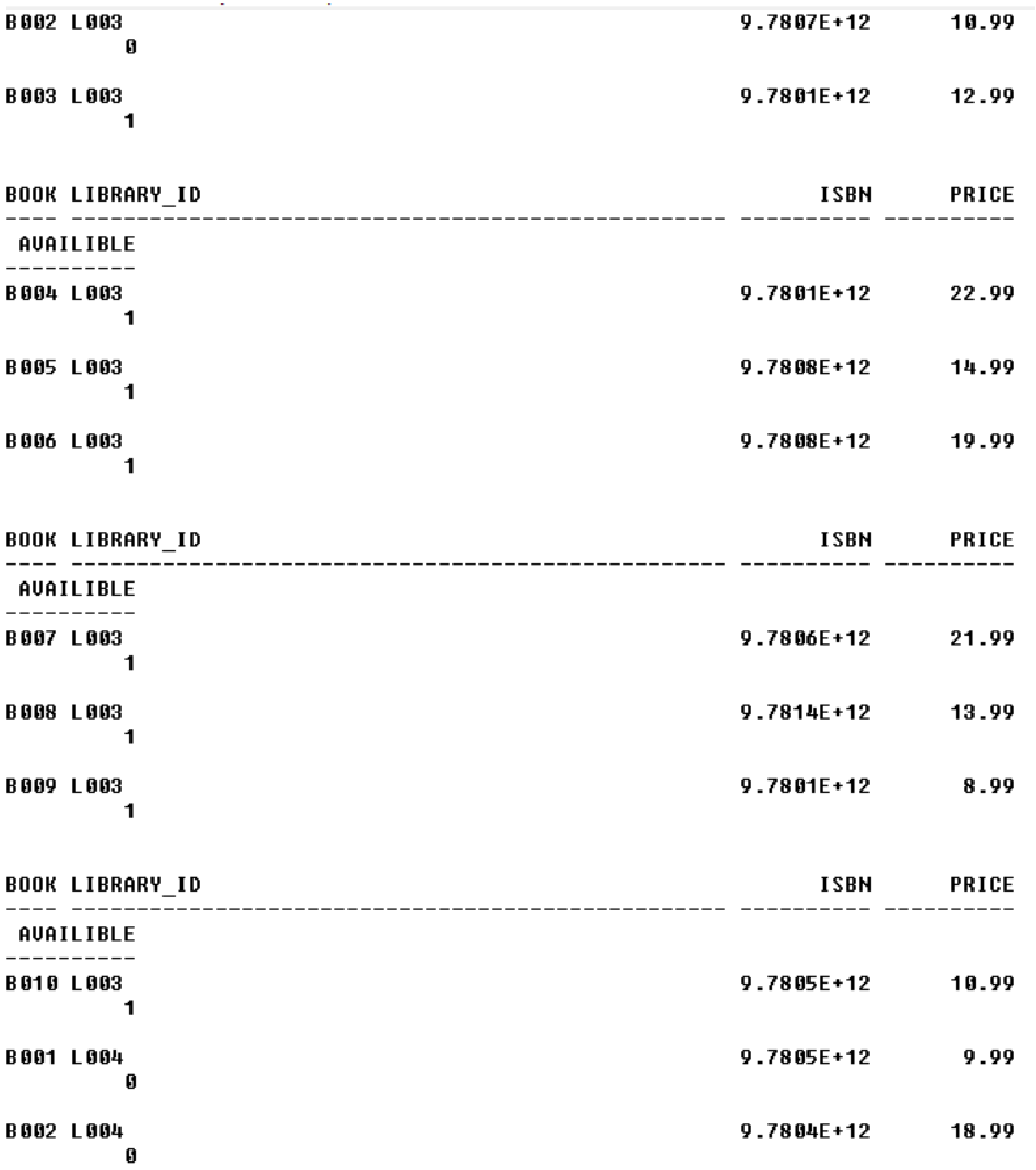


```
SQL> SELECT * FROM book;

BOOK LIBRARY_ID                                                ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B001 L001                                               9.7801E+12      15.99
         0

B002 L001                                               9.7802E+12      12.99
         0

B003 L001                                               9.7804E+12      20.99
         1


BOOK LIBRARY_ID                                                ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B004 L001                                               9.7803E+12      14.99
         1

B005 L001                                               9.7801E+12      16.99
         1

B006 L001                                               9.7805E+12       9.99
         1


BOOK LIBRARY_ID                                                ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B007 L001                                               9.7804E+12      18.99
         1

B008 L001                                               9.7803E+12      13.99
         1

B009 L001                                               9.7807E+12      10.99
         1
```

```
BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B010 L001                                               9.7801E+12      12.99
         1

B011 L001                                               9.7801E+12      22.99
         1

B012 L001                                               9.7806E+12      25.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B013 L001                                               9.7804E+12      24.99
         1

B014 L001                                               9.7807E+12      17.99
         1

B015 L001                                               9.7808E+12      14.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B016 L001                                               9.7808E+12      19.99
         1

B017 L001                                               9.7806E+12      21.99
         1

B018 L001                                               9.7814E+12      13.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B019 L001                                               9.7801E+12       8.99
         1

B020 L001                                               9.7805E+12      10.99
         1
```

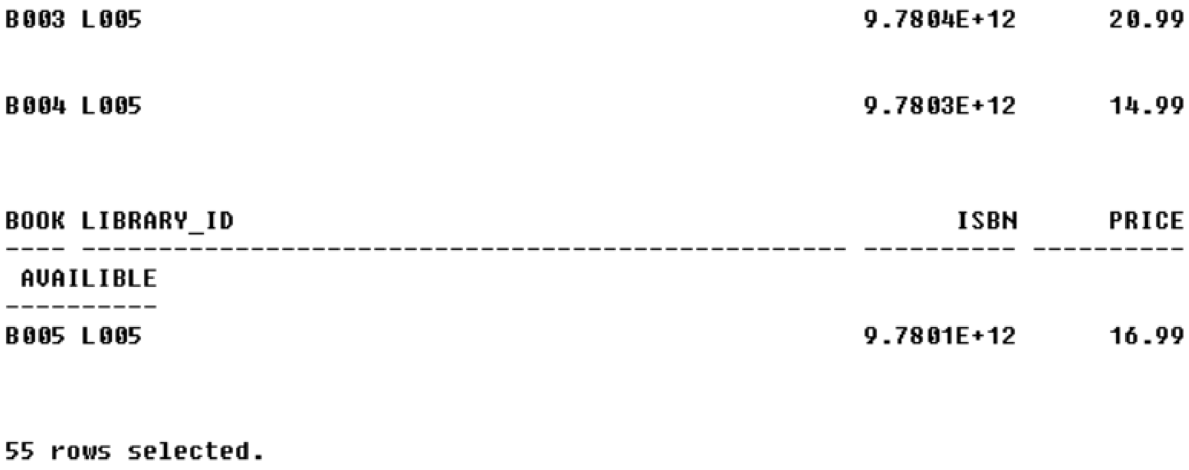


```
B001 L002                                               9.7802E+12      12.99
         0

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B002 L002                                               9.7804E+12      20.99
         0

B003 L002                                               9.7803E+12      14.99
         1

B004 L002                                               9.7801E+12      16.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B005 L002                                               9.7806E+12      25.99
         1

B006 L002                                               9.7804E+12      24.99
         1

B007 L002                                               9.7808E+12      19.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B008 L002                                               9.7814E+12      13.99
         1

B009 L002                                               9.7801E+12       8.99
         1

B010 L002                                               9.7805E+12      10.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B001 L003                                               9.7803E+12      13.99
         0
```



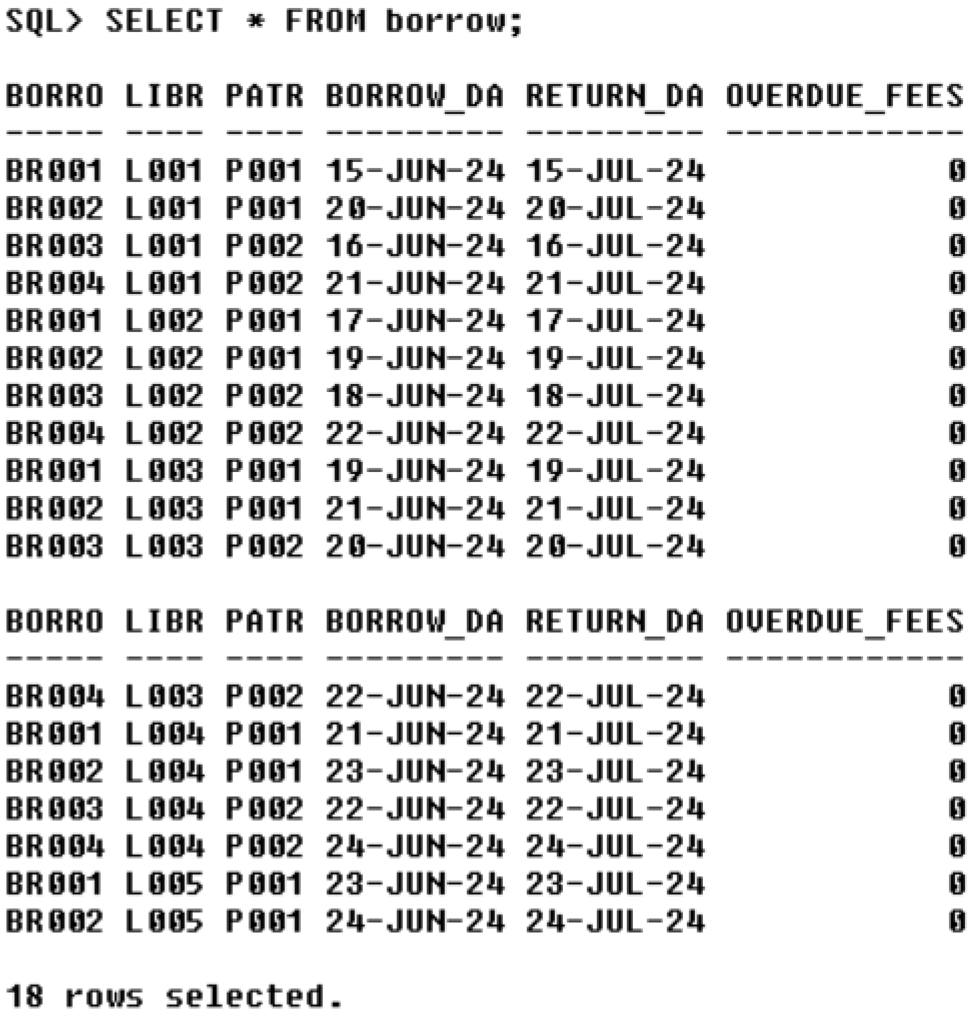
```
B002 L003                                               9.7807E+12      10.99
         0

B003 L003                                               9.7801E+12      12.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B004 L003                                               9.7801E+12      22.99
         1

B005 L003                                               9.7808E+12      14.99
         1

B006 L003                                               9.7808E+12      19.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B007 L003                                               9.7806E+12      21.99
         1

B008 L003                                               9.7814E+12      13.99
         1

B009 L003                                               9.7801E+12       8.99
         1

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B010 L003                                               9.7805E+12      10.99
         1

B001 L004                                               9.7805E+12       9.99
         0

B002 L004                                               9.7804E+12      18.99
         0
```

```
BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B003 L004                                               9.7803E+12      13.99
         1

B004 L004                                               9.7807E+12      10.99
         1

B005 L004                                               9.7801E+12      12.99
         1


BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B006 L004                                               9.7801E+12      22.99
         1

B007 L004                                               9.7806E+12      25.99
         1

B008 L004                                               9.7804E+12      24.99
         1


BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B009 L004                                               9.7807E+12      17.99
         1

B010 L004                                               9.7808E+12      14.99
         1

B001 L005                                               9.7801E+12      15.99
         0


BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B002 L005                                               9.7802E+12      12.99
         0

B003 L005                                               9.7804E+12      20.99
```



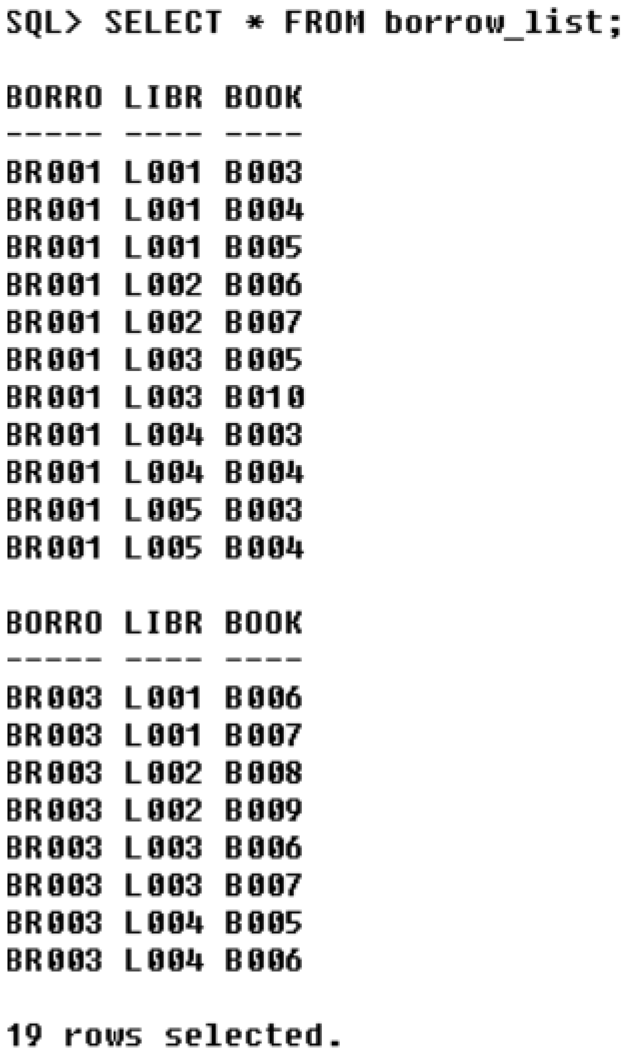
```
B003 L005                                                  9.7804E+12      20.99


B004 L005                                                  9.7803E+12      14.99


BOOK LIBRARY_ID                                                  ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B005 L005                                                  9.7801E+12      16.99


55 rows selected.
```

Borrows:



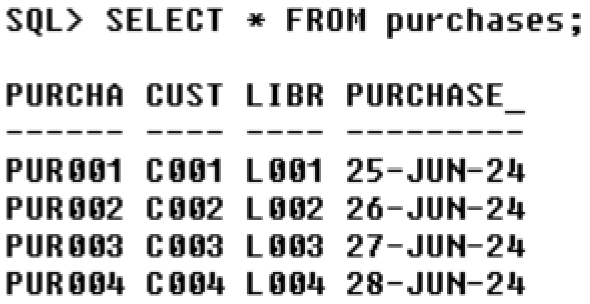
```
SQL> SELECT * FROM borrow;

BORRO LIBR PATR BORROW_DA RETURN_DA OVERDUE_FEES
----- ---- ---- --------- --------- ------------
BR001 L001 P001 15-JUN-24 15-JUL-24            0
BR002 L001 P001 20-JUN-24 20-JUL-24            0
BR003 L001 P002 16-JUN-24 16-JUL-24            0
BR004 L001 P002 21-JUN-24 21-JUL-24            0
BR001 L002 P001 17-JUN-24 17-JUL-24            0
BR002 L002 P001 19-JUN-24 19-JUL-24            0
BR003 L002 P002 18-JUN-24 18-JUL-24            0
BR004 L002 P002 22-JUN-24 22-JUL-24            0
BR001 L003 P001 19-JUN-24 19-JUL-24            0
BR002 L003 P001 21-JUN-24 21-JUL-24            0
BR003 L003 P002 20-JUN-24 20-JUL-24            0

BORRO LIBR PATR BORROW_DA RETURN_DA OVERDUE_FEES
----- ---- ---- --------- --------- ------------
BR004 L003 P002 22-JUN-24 22-JUL-24            0
BR001 L004 P001 21-JUN-24 21-JUL-24            0
BR002 L004 P001 23-JUN-24 23-JUL-24            0
BR003 L004 P002 22-JUN-24 22-JUL-24            0
BR004 L004 P002 24-JUN-24 24-JUL-24            0
BR001 L005 P001 23-JUN-24 23-JUL-24            0
BR002 L005 P001 24-JUN-24 24-JUL-24            0

18 rows selected.
```

Borrow_list:



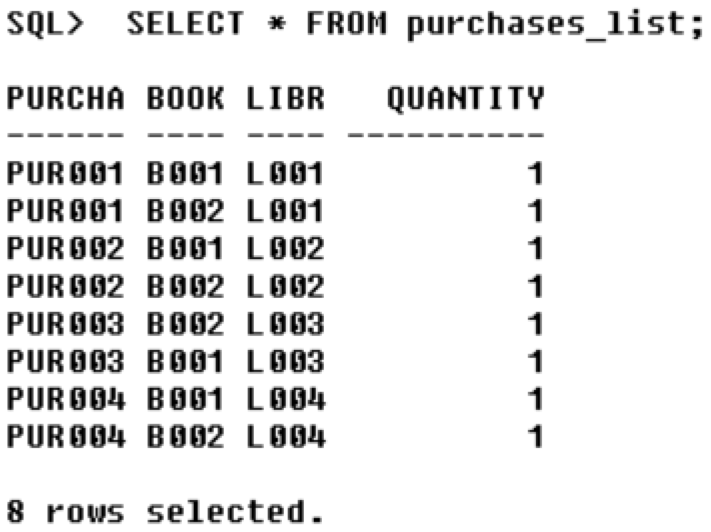
```
SQL> SELECT * FROM borrow_list;

BORRO LIBR BOOK
----- ---- ----
BR001 L001 B003
BR001 L001 B004
BR001 L001 B005
BR001 L002 B006
BR001 L002 B007
BR001 L003 B005
BR001 L003 B010
BR001 L004 B003
BR001 L004 B004
BR001 L005 B003
BR001 L005 B004

BORRO LIBR BOOK
----- ---- ----
BR003 L001 B006
BR003 L001 B007
BR003 L002 B008
BR003 L002 B009
BR003 L003 B006
BR003 L003 B007
BR003 L004 B005
BR003 L004 B006

19 rows selected.
```

Purchases:



```
SQL> SELECT * FROM purchases;

PURCHA CUST LIBR PURCHASE_
------ ---- ---- ---------
PUR001 C001 L001 25-JUN-24
PUR002 C002 L002 26-JUN-24
PUR003 C003 L003 27-JUN-24
PUR004 C004 L004 28-JUN-24
```

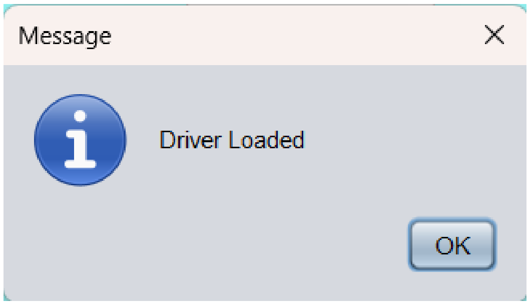
Purchase_list:



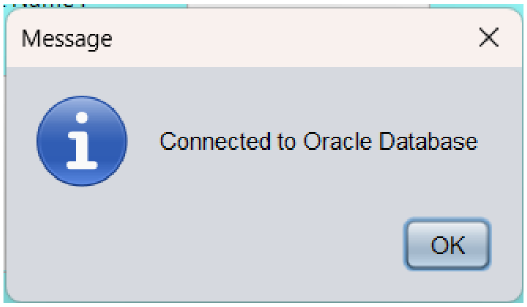
```
SQL>  SELECT * FROM purchases_list;

PURCHA BOOK LIBR   QUANTITY
------ ---- ---- ----------
PUR001 B001 L001          1
PUR001 B002 L001          1
PUR002 B001 L002          1
PUR002 B002 L002          1
PUR003 B002 L003          1
PUR003 B001 L003          1
PUR004 B001 L004          1
PUR004 B002 L004          1

8 rows selected.
```

Project Demo:

Connections:

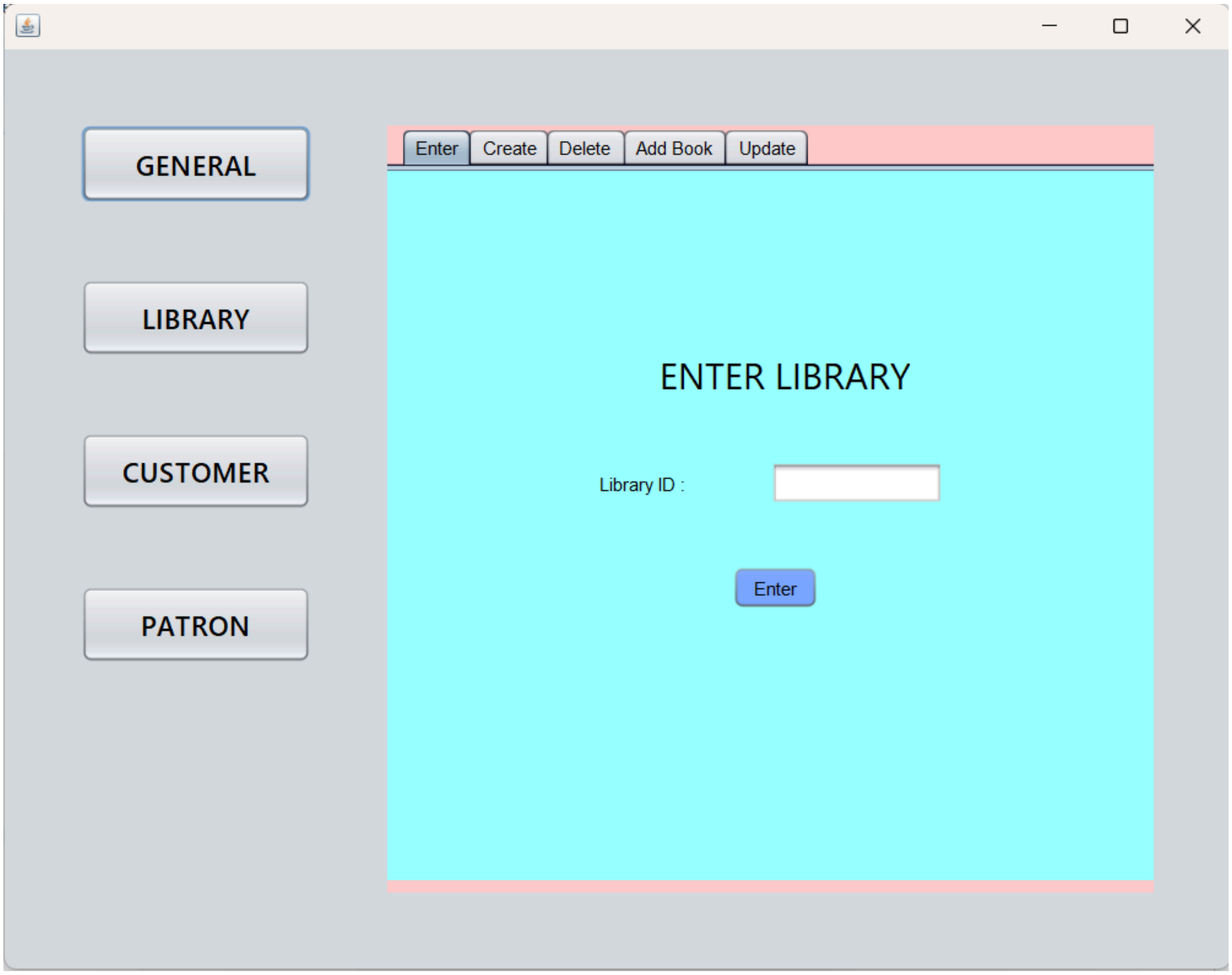


Driver Loaded

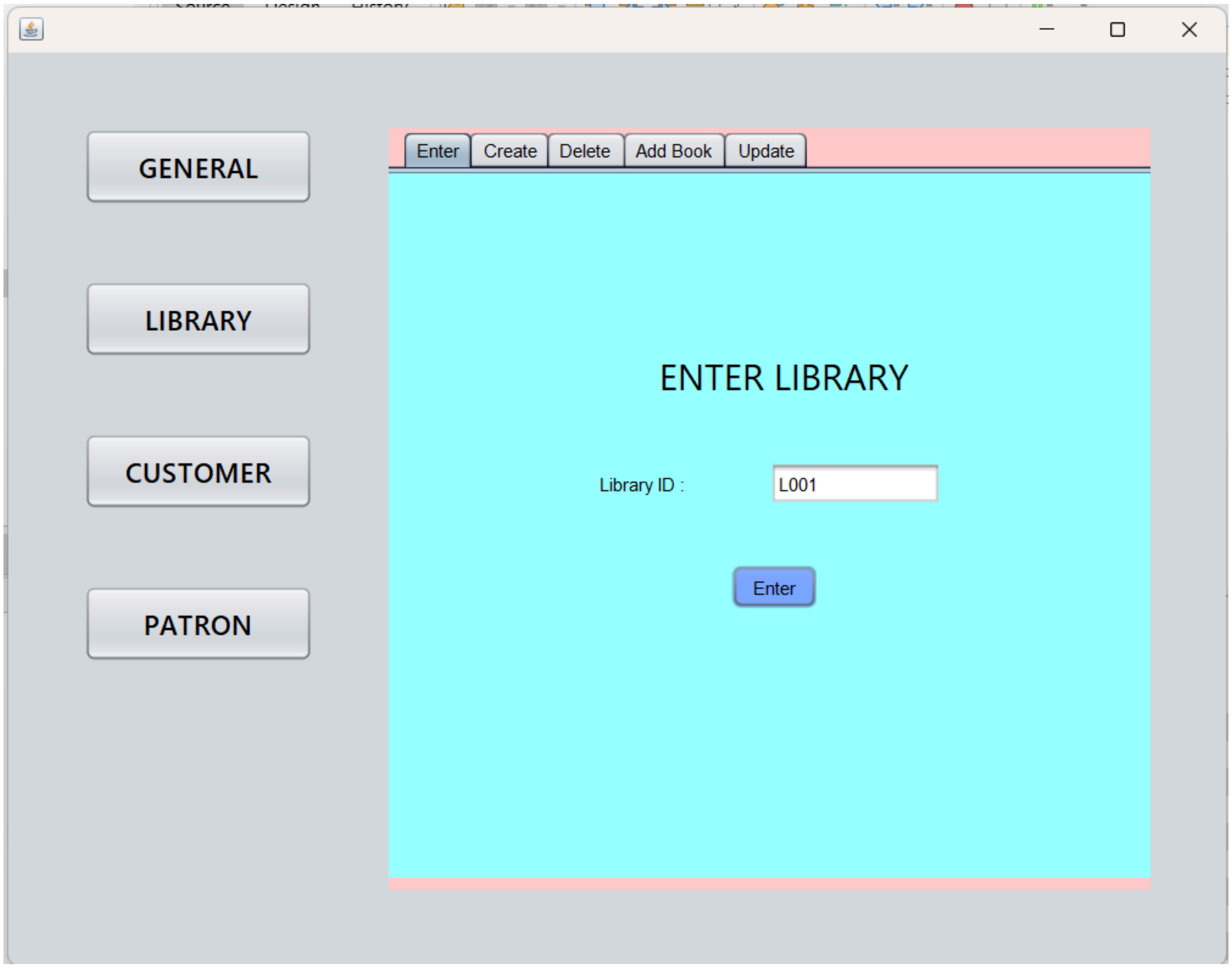


Connected to Oracle Database

Library Screen:



Until a Library is chosen, other panels cannot be accessed.

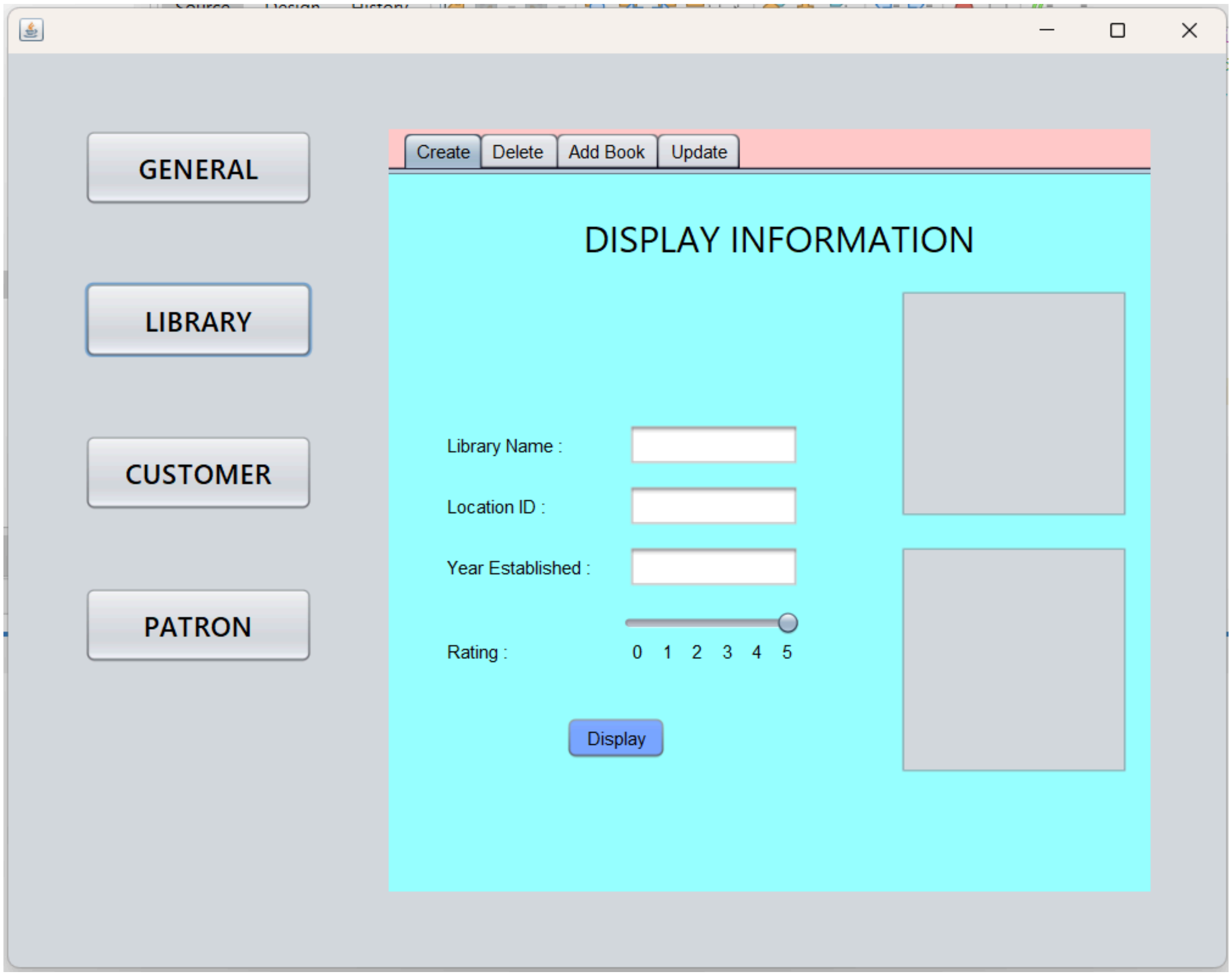


Library ID : L001

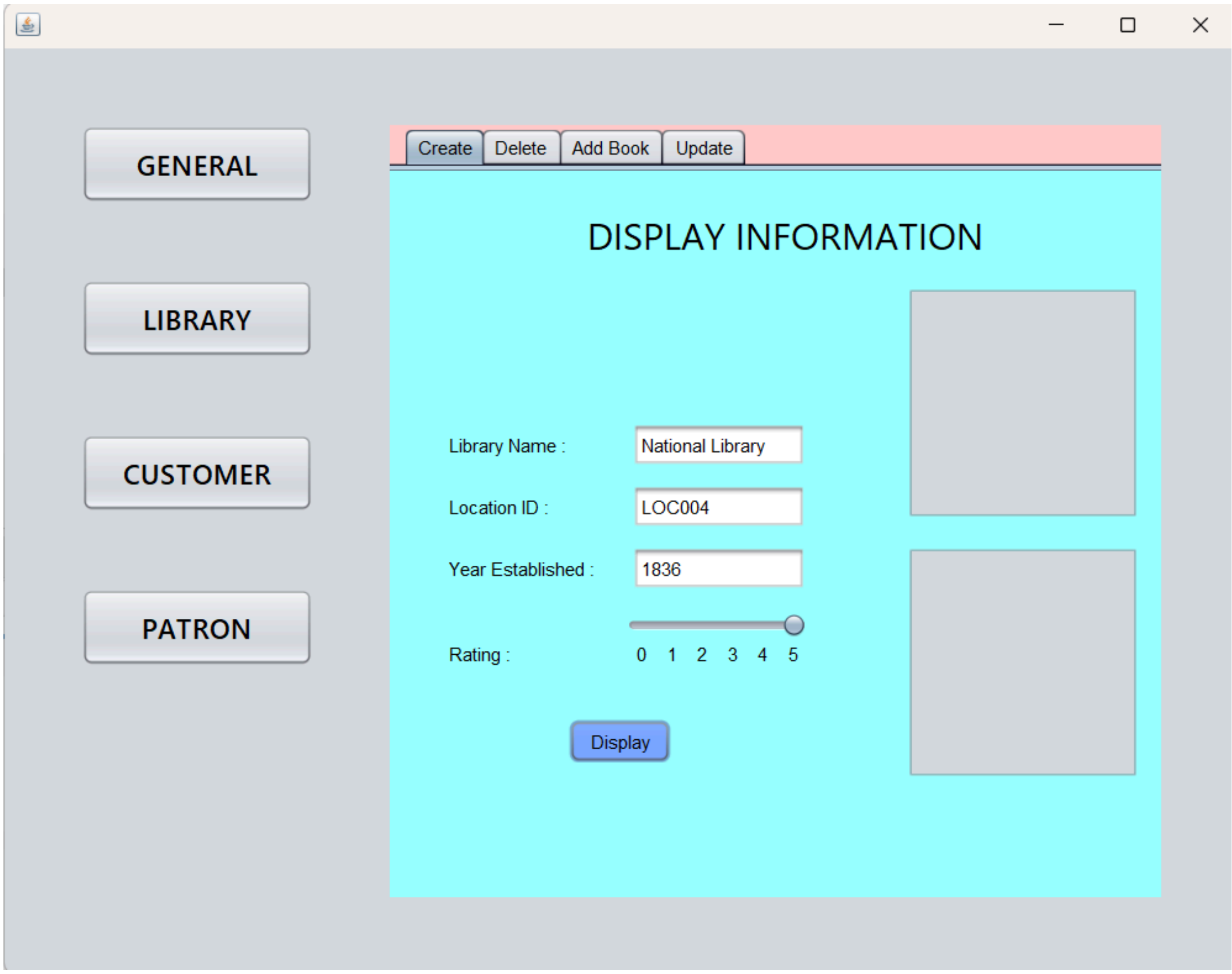
Now, other panels can be accessed.

Library Page:

Information related to the library can be viewed in this.



Clicking Display will show the information related.



DISPLAY INFORMATION

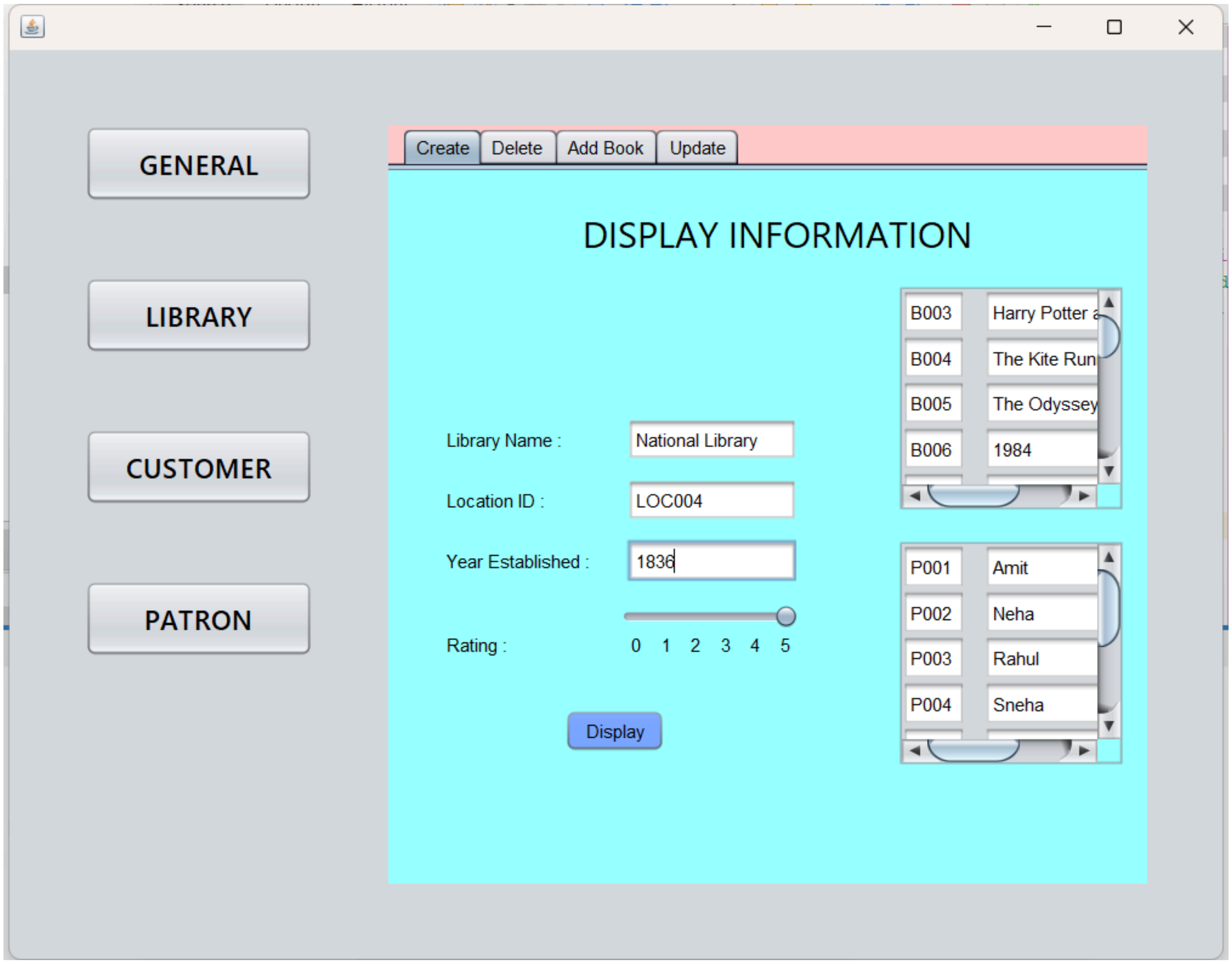
Library Name : National Library

Location ID : LOC004

Year Established : 1836

Rating :

Even the information about books and the patrons can be viewed.



DISPLAY INFORMATION

Library Name : National Library

Location ID : LOC004

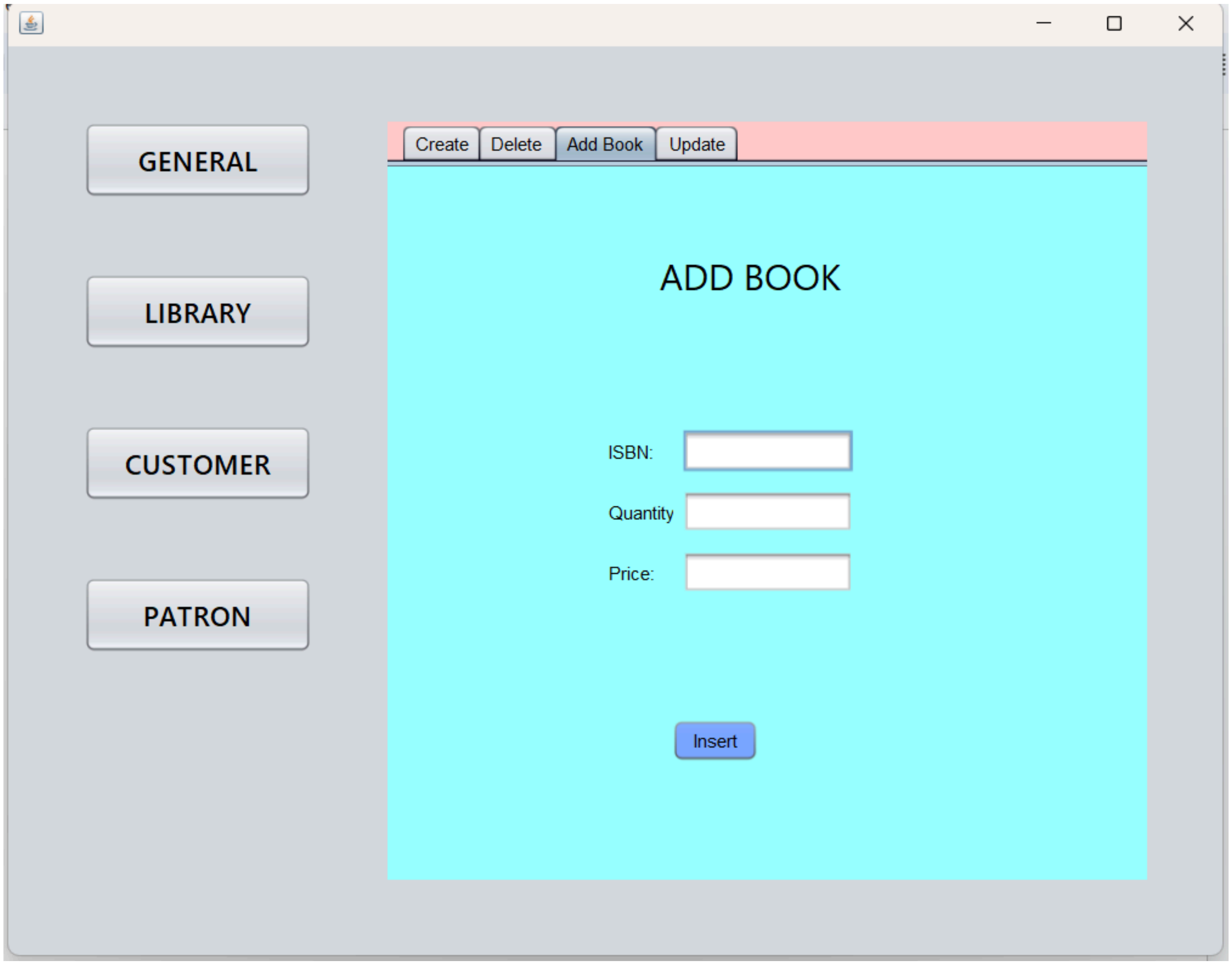
Year Established : 1836

Rating :

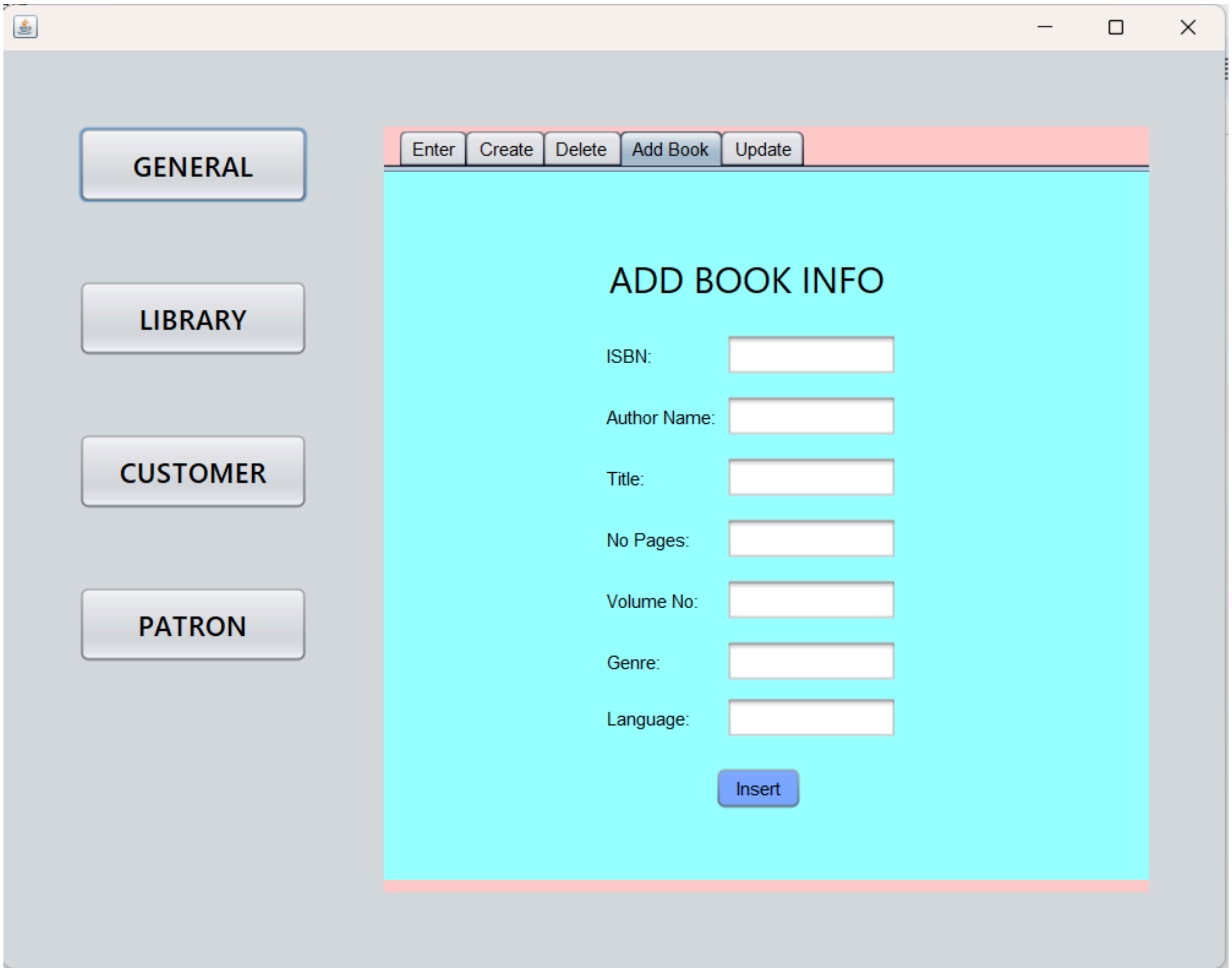
B003	Harry Potter a
B004	The Kite Runi
B005	The Odyssey
B006	1984

P001	Amit
P002	Neha
P003	Rahul
P004	Sneha

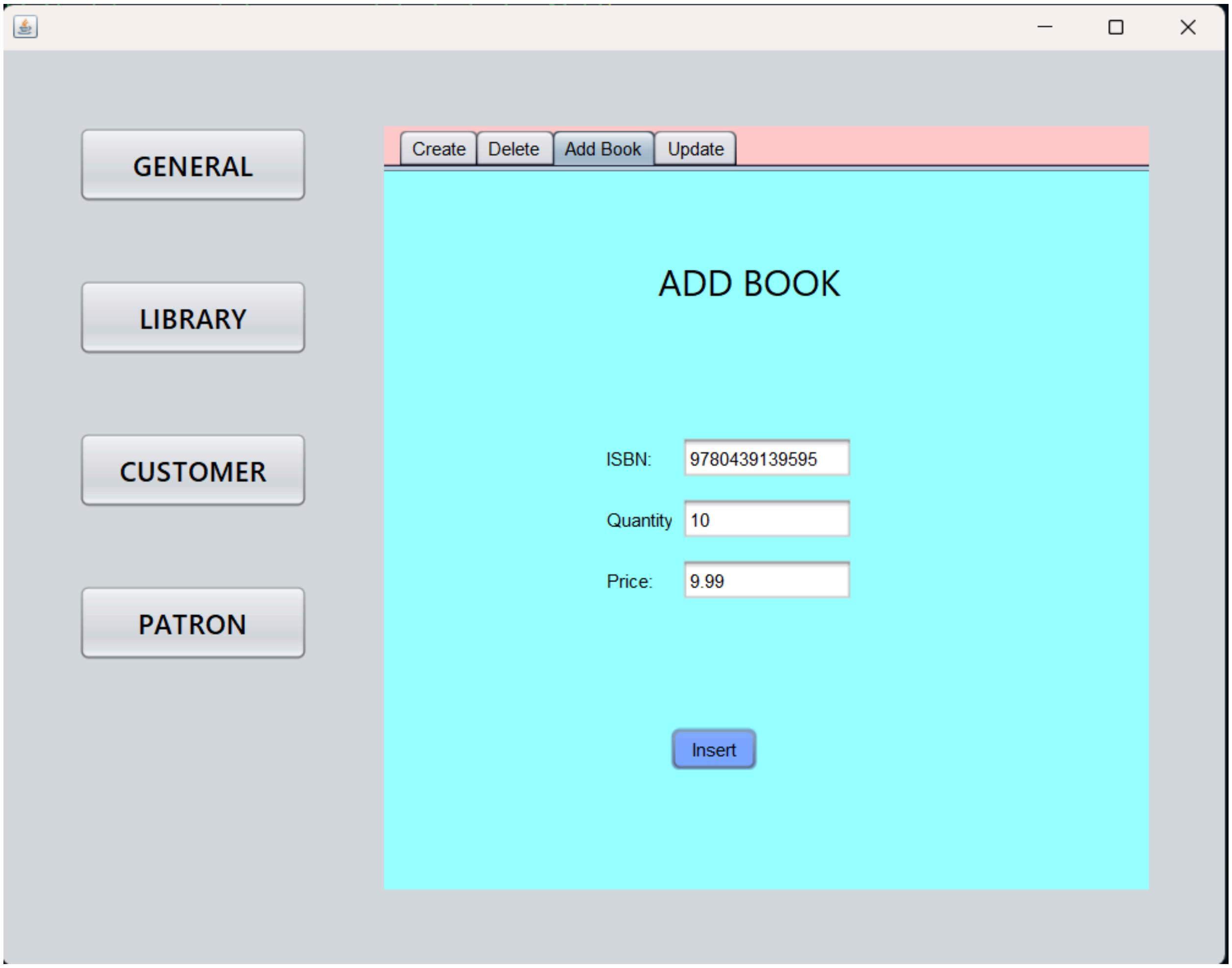
The panels can be scrolled to see the book and patron information.



The above screen can be used to add book.



Before adding a book to library, the book should be added here, to add it directly to library.

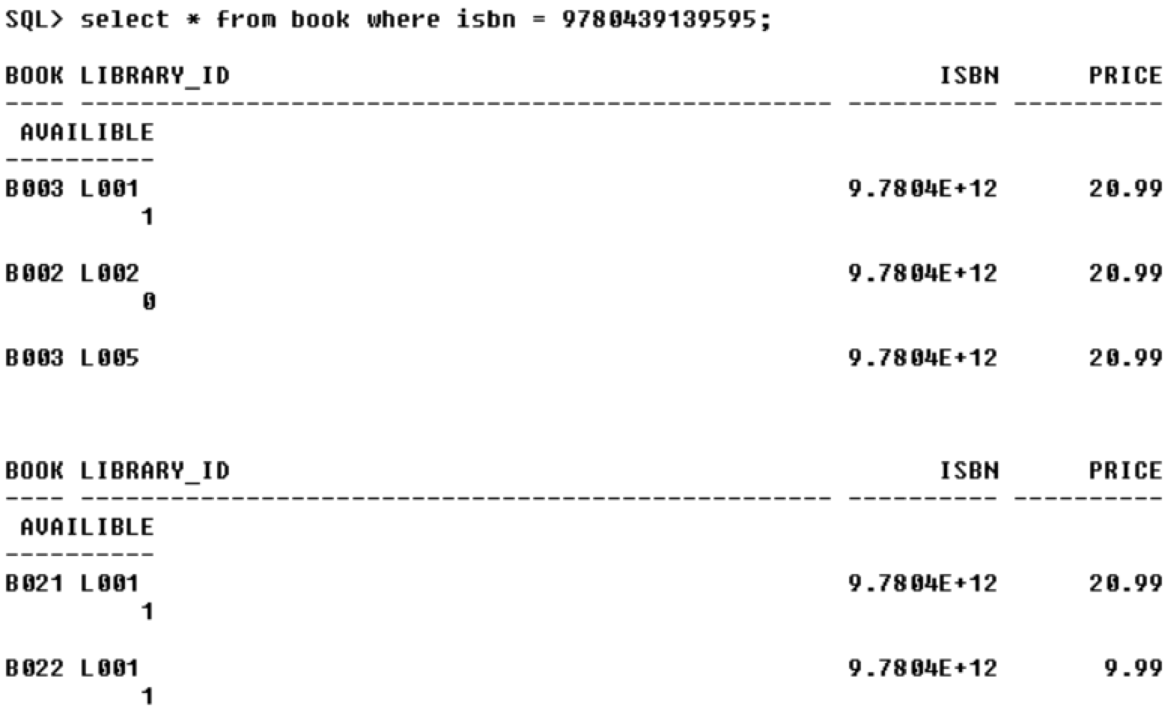


ADD BOOK

ISBN: 9780439139595

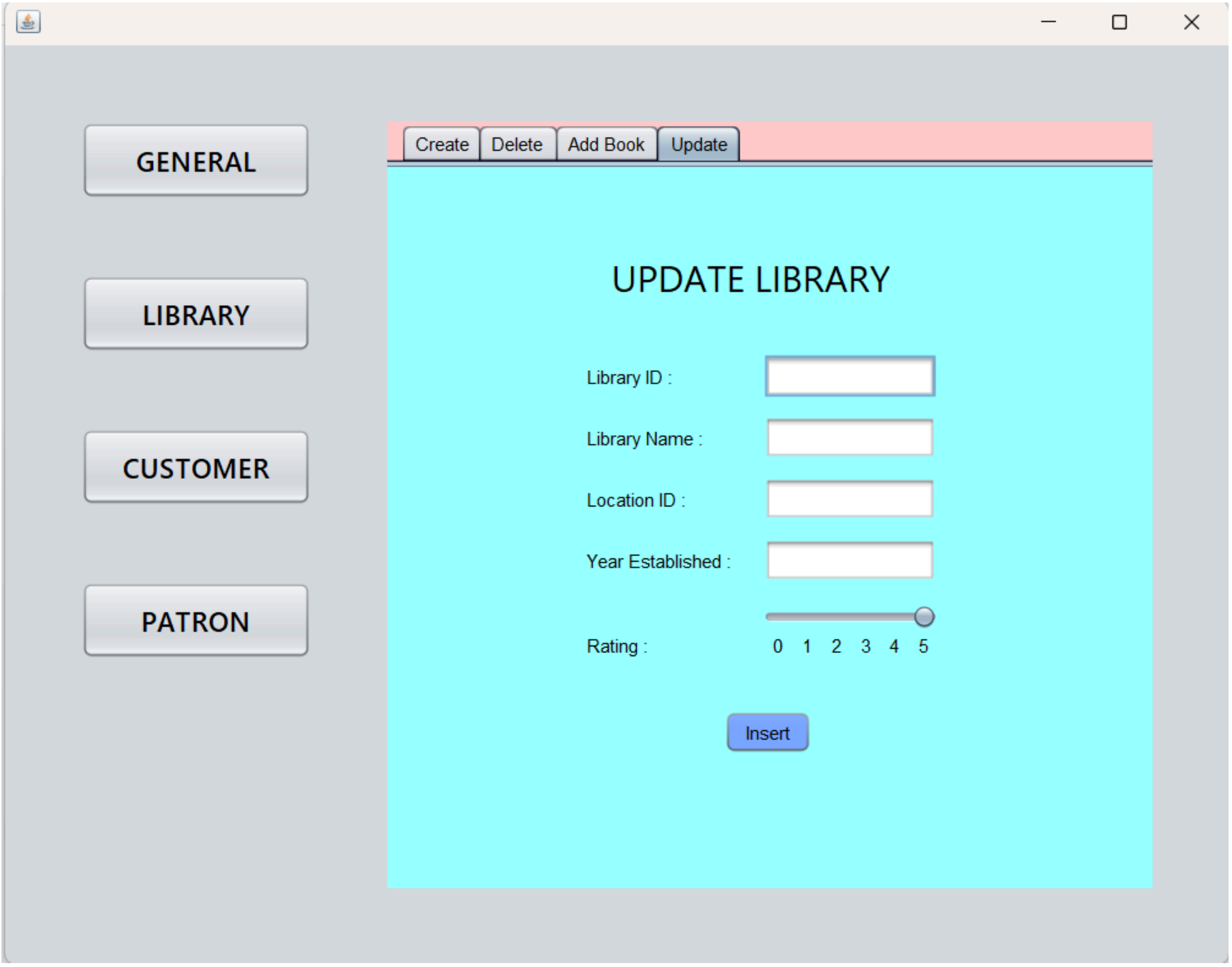
Quantity 10

Price: 9.99



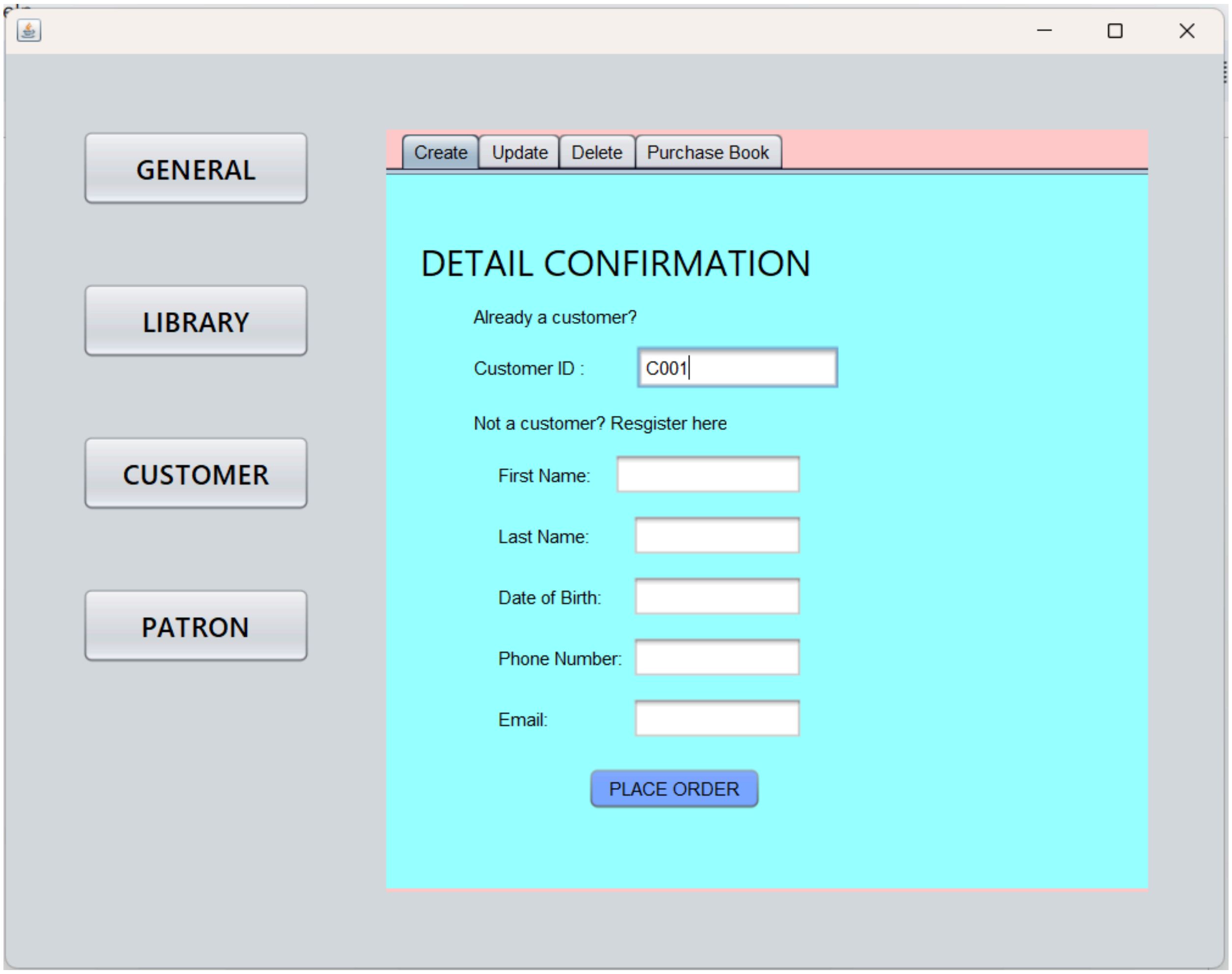
```
SQL> select * from book where isbn = 9780439139595;

BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B003 L001                                               9.7804E+12      20.99
         1

B002 L002                                               9.7804E+12      20.99
         0

B003 L005                                               9.7804E+12      20.99


BOOK LIBRARY_ID                                               ISBN      PRICE
---- -------------------------------------------------- ---------- ----------
 AVAILIBLE
----------
B021 L001                                               9.7804E+12      20.99
         1

B022 L001                                               9.7804E+12       9.99
         1
```

We can see that the book has been added. Note, the ISBN has already been added to the default database.



Can be used to update the library.
Demo skipped.

Customer Screen:



DETAIL CONFIRMATION

Already a customer?

Customer ID : C001

Not a customer? Resgister here

First Name:

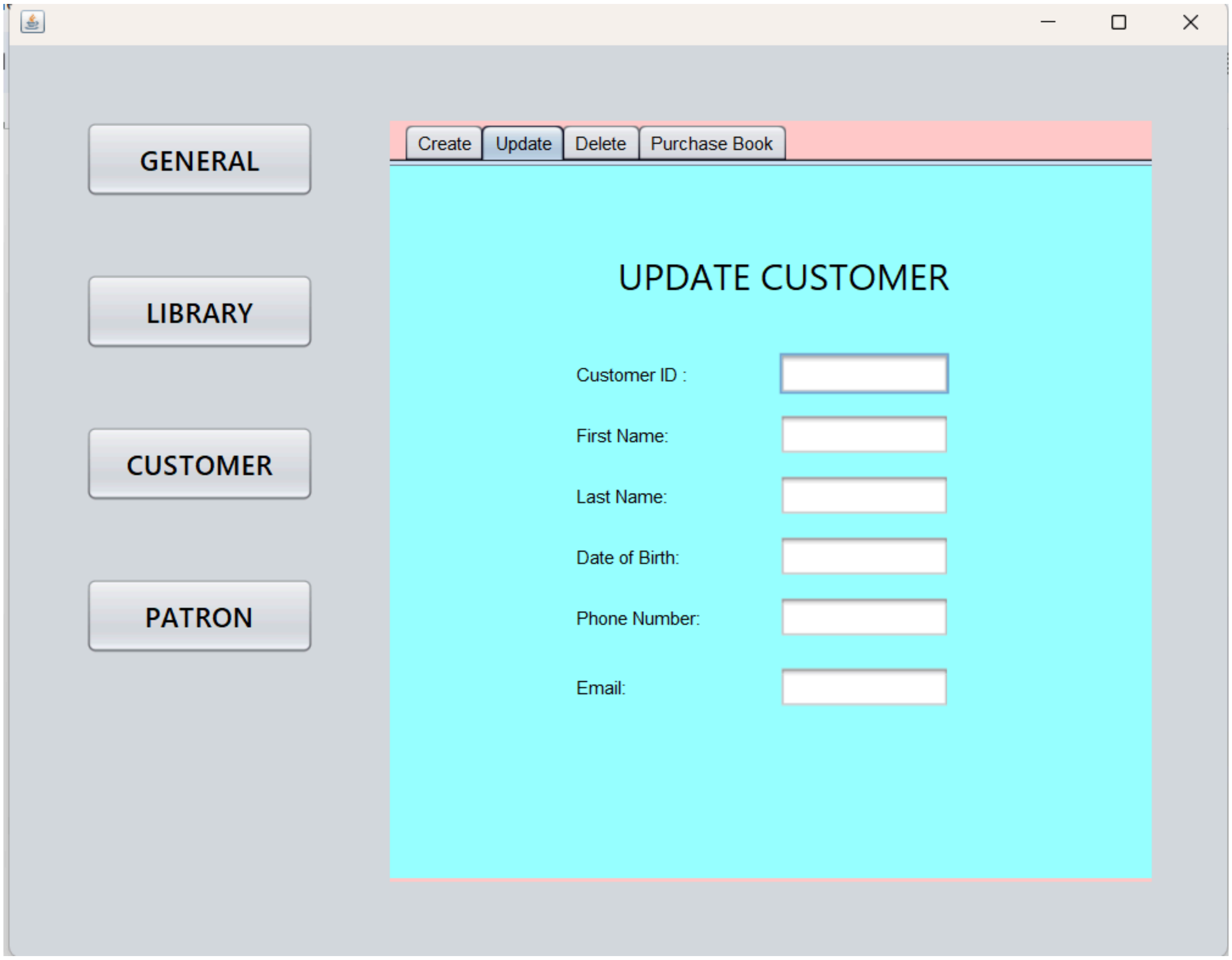
Last Name:

Date of Birth:

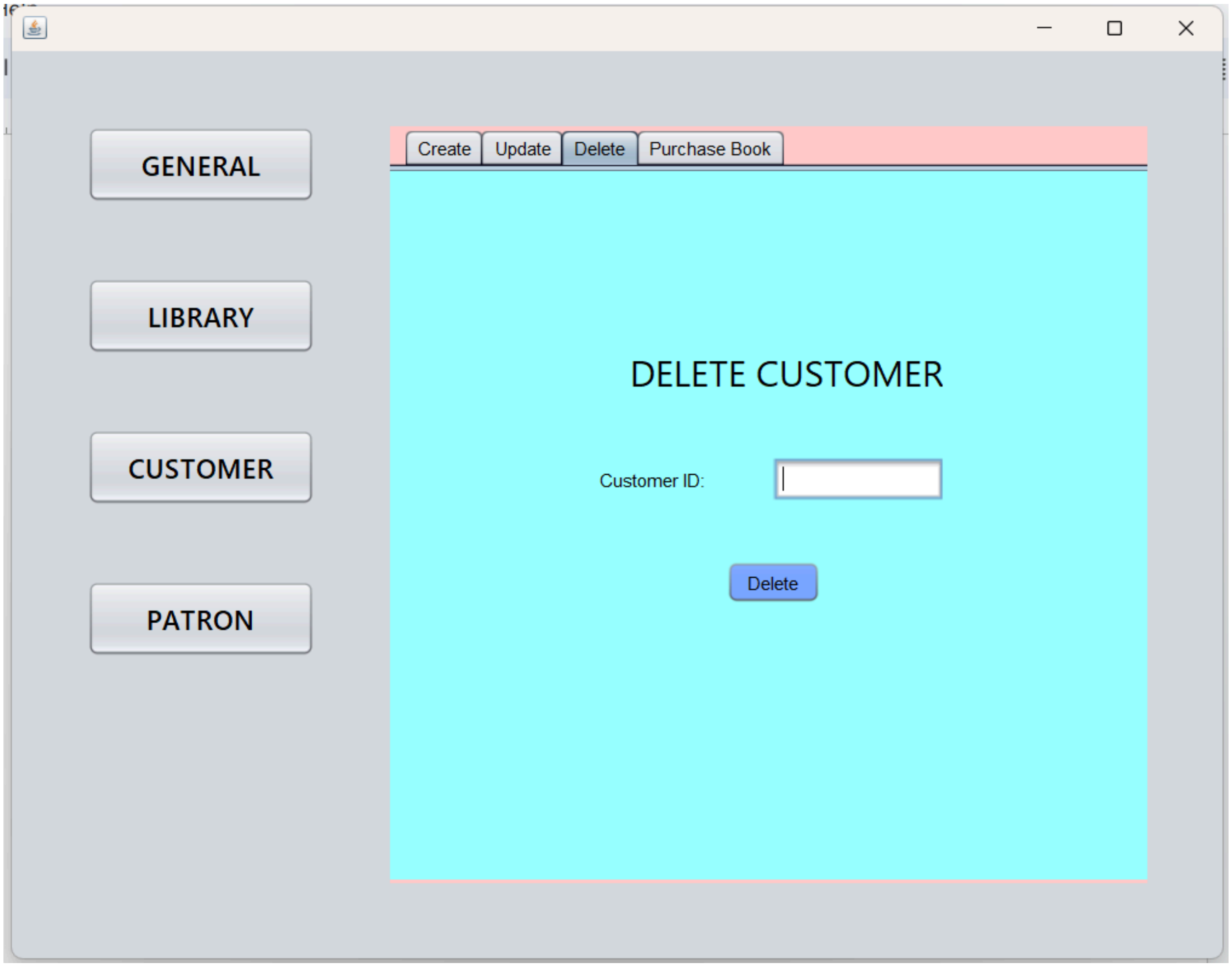
Phone Number:

Email:

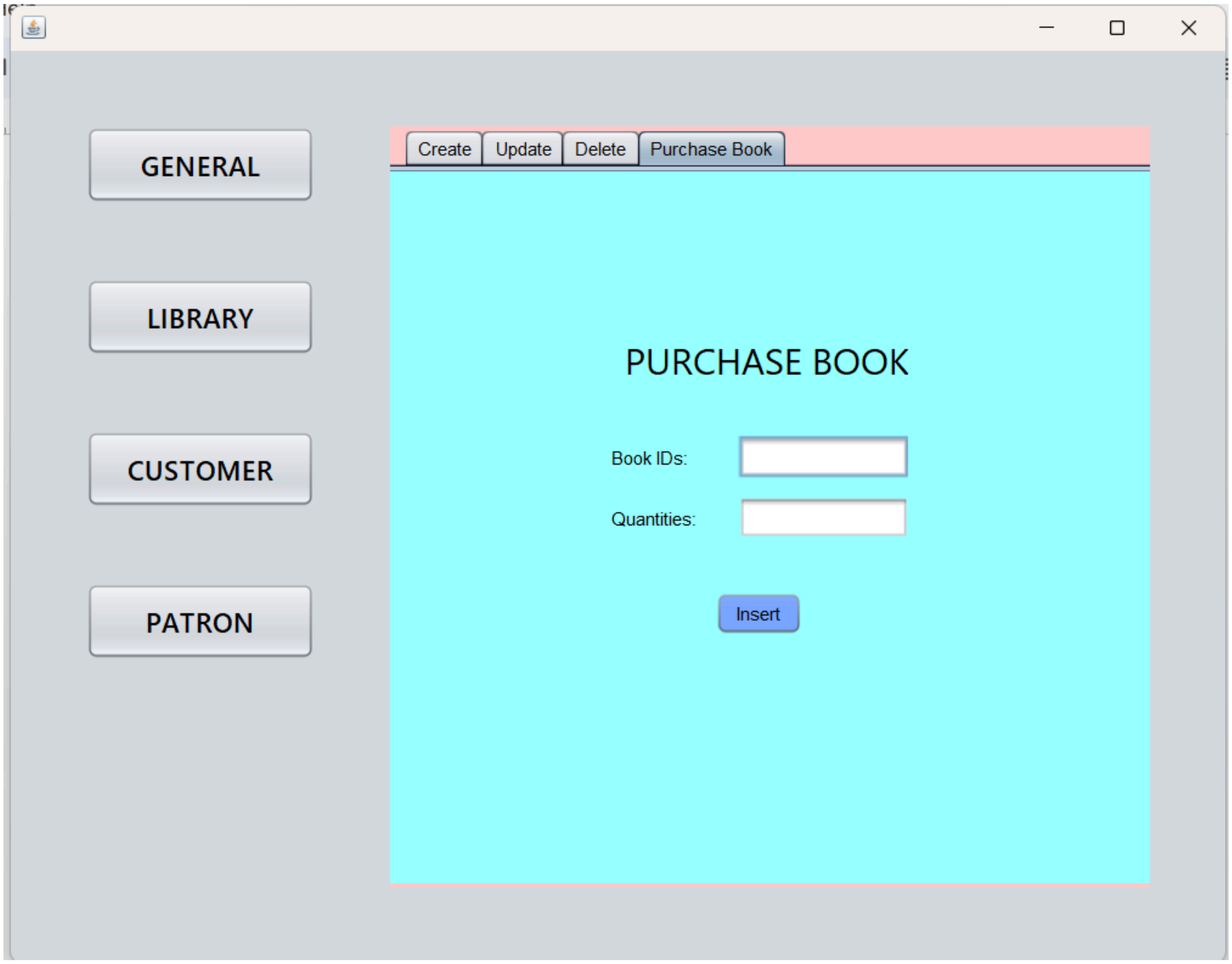
Customers are only allowed to purchase, so this directly takes to place order.
If the customer is new to library, they can fill the other details, and proceed with purchasing the book. A customer ID will be allotted to them later on.



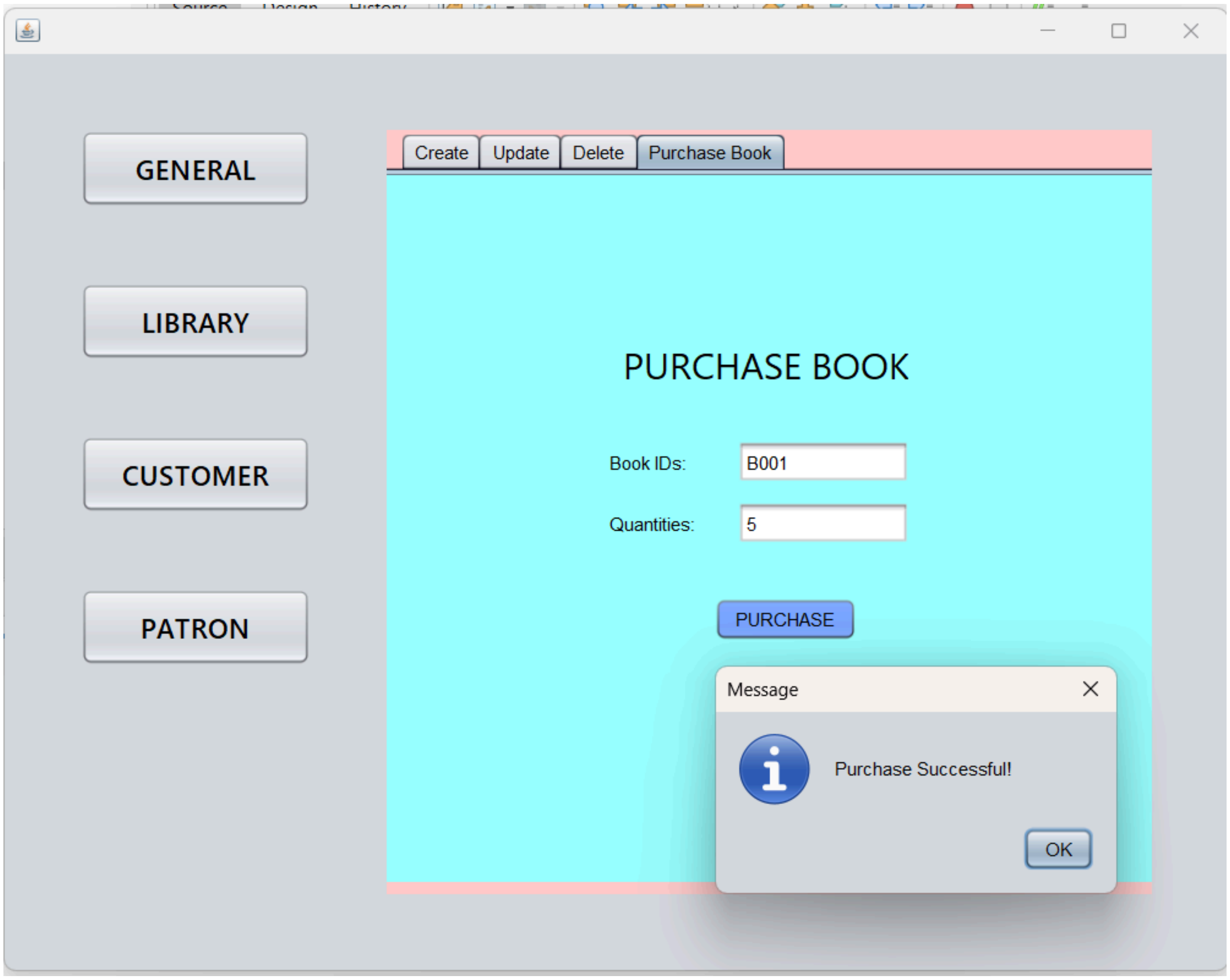
Updating customer details.



Deletes a customer.



Let’s a customer purchase a book.



PURCHASE BOOK

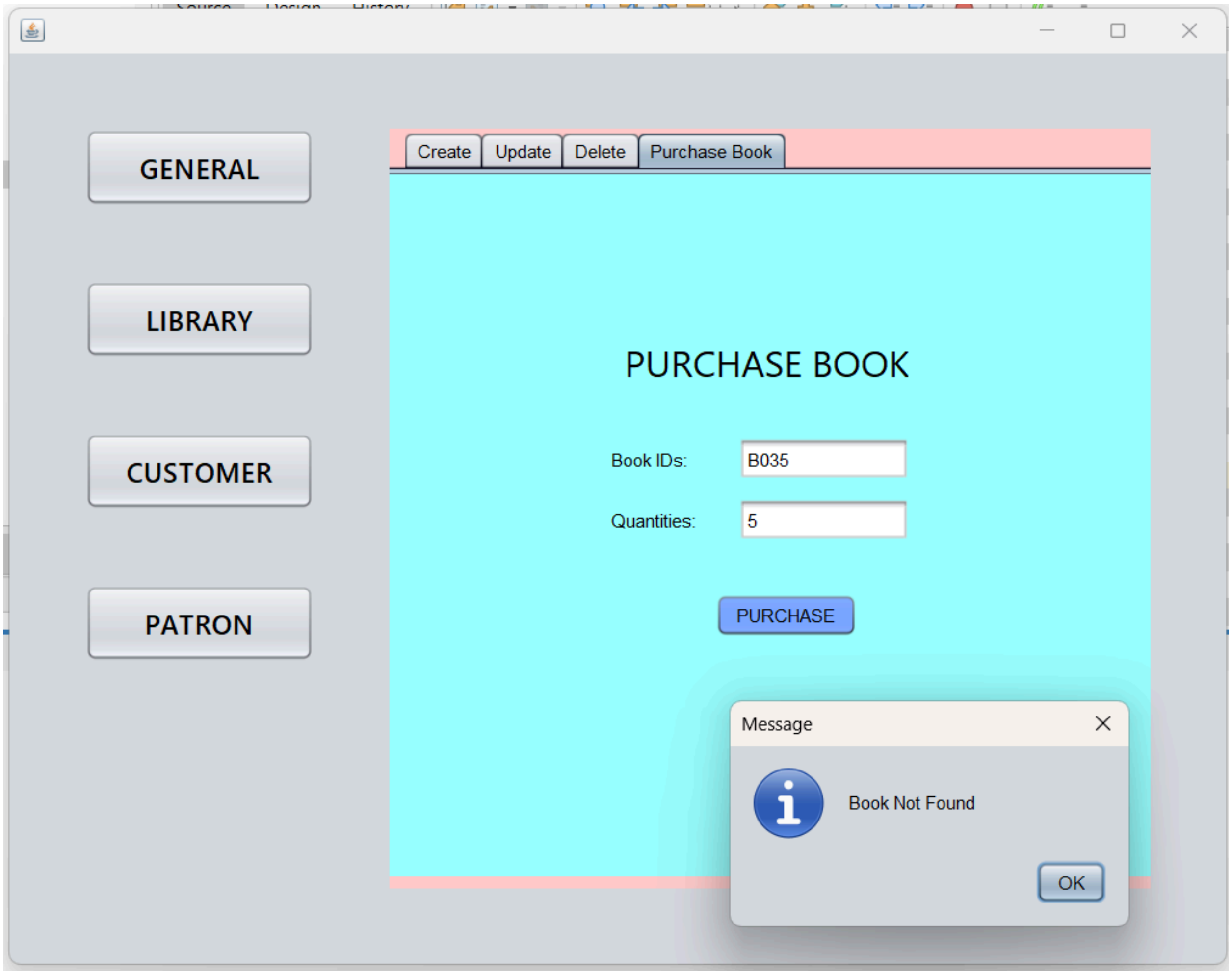
Book IDs: B001

Quantities: 5

Message

Purchase Successful!

The necessary updates such as decrementing the number of copies in the library, will be done in the backend. If book is not found, the according error is shown.

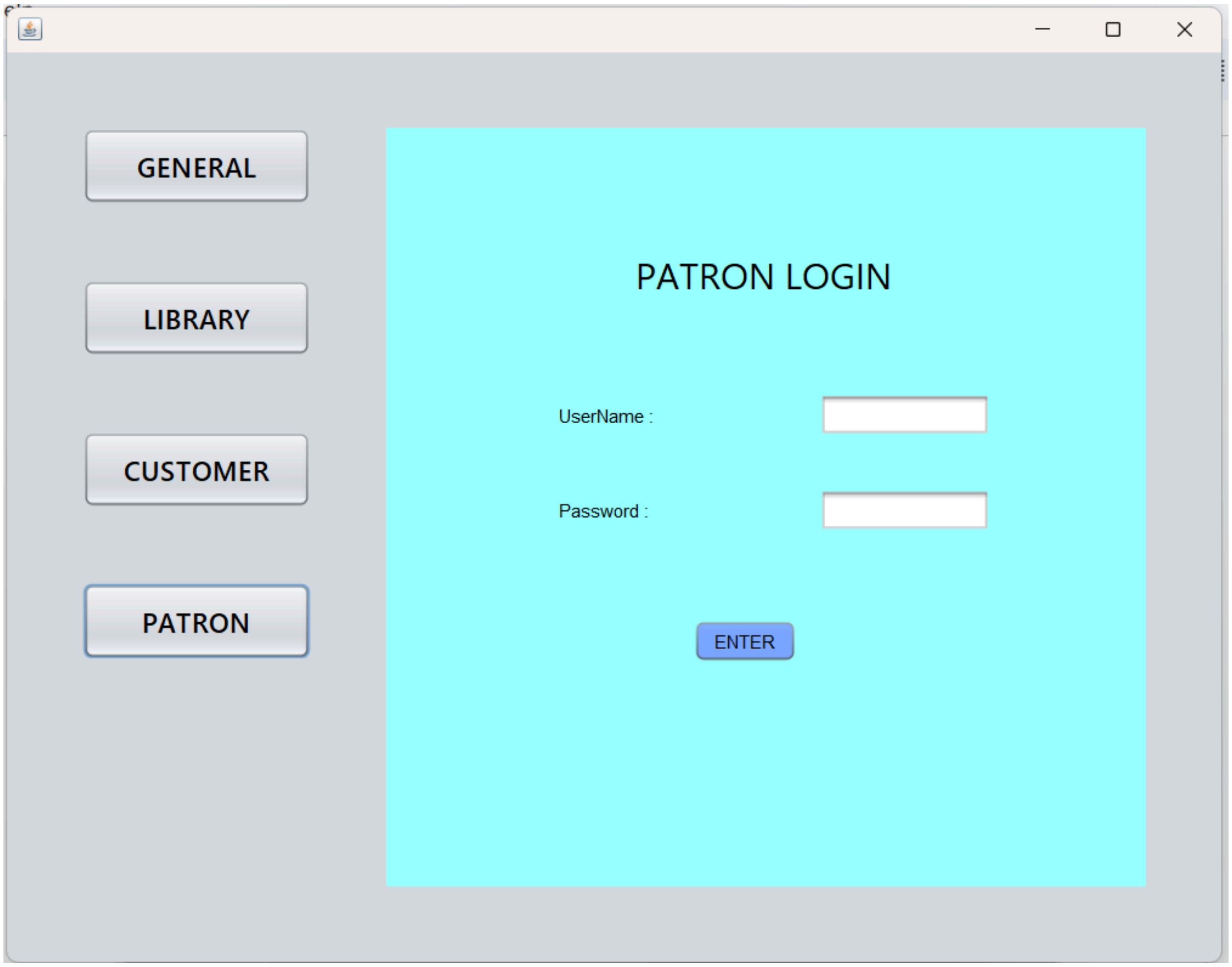


Book IDs: B035

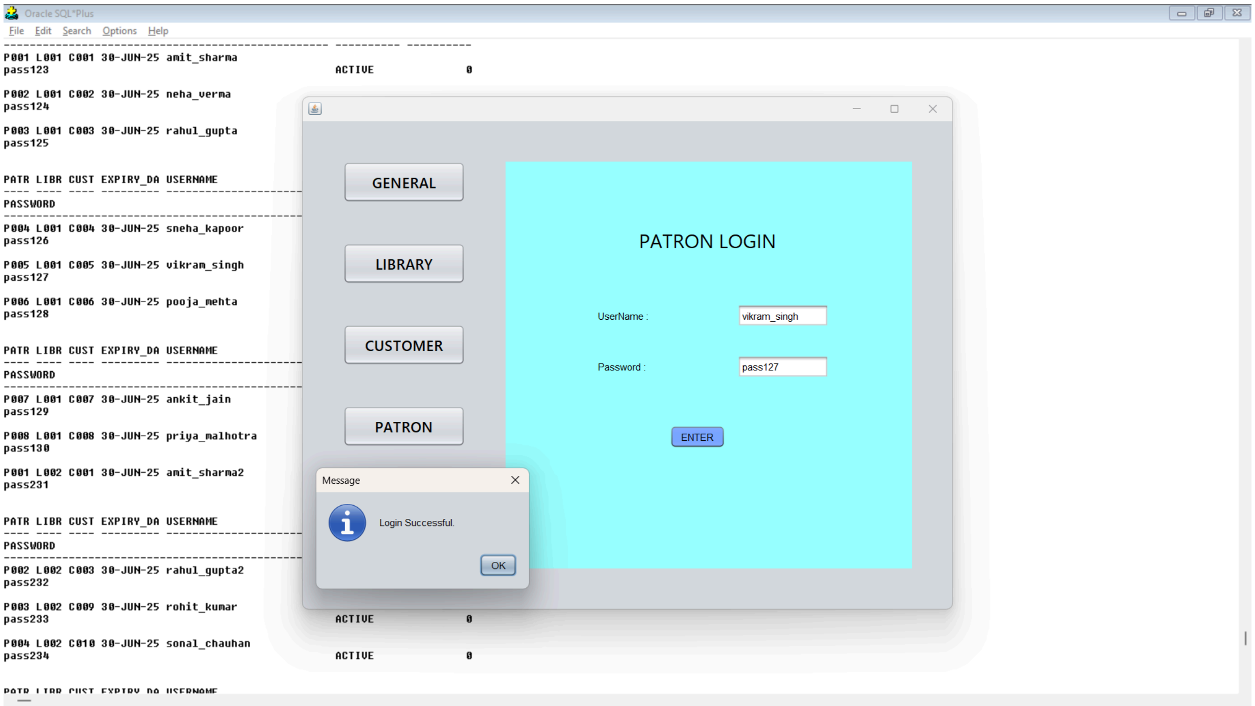
Quantities: 5

Book Not Found

<u>Patron Screen:</u>



The member of a library has a username and password, which can be used to log in for accessing further privileges.



```
-------------------------------------------------- ---------- ----------
P001 L001 C001 30-JUN-25 amit_sharma
pass123                                            ACTIVE              0

P002 L001 C002 30-JUN-25 neha_verma
pass124

P003 L001 C003 30-JUN-25 rahul_gupta
pass125


PATR LIBR CUST EXPIRY_DA USERNAME
---- ---- ---- --------- -------------------
PASSWORD
-----------------------------------------------
P004 L001 C004 30-JUN-25 sneha_kapoor
pass126

P005 L001 C005 30-JUN-25 vikram_singh
pass127

P006 L001 C006 30-JUN-25 pooja_mehta
pass128


PATR LIBR CUST EXPIRY_DA USERNAME
---- ---- ---- --------- -------------------
PASSWORD
-----------------------------------------------
P007 L001 C007 30-JUN-25 ankit_jain
pass129

P008 L001 C008 30-JUN-25 priya_malhotra
pass130

P001 L002 C001 30-JUN-25 amit_sharma2
pass231


PATR LIBR CUST EXPIRY_DA USERNAME
---- ---- ---- --------- -------------------
PASSWORD
-----------------------------------------------
P002 L002 C003 30-JUN-25 rahul_gupta2
pass232

P003 L002 C009 30-JUN-25 rohit_kumar
pass233                                            ACTIVE              0

P004 L002 C010 30-JUN-25 sonal_chauhan
pass234                                            ACTIVE              0


PATR LIBR CUST EXPIRY_DA USERNAME
```

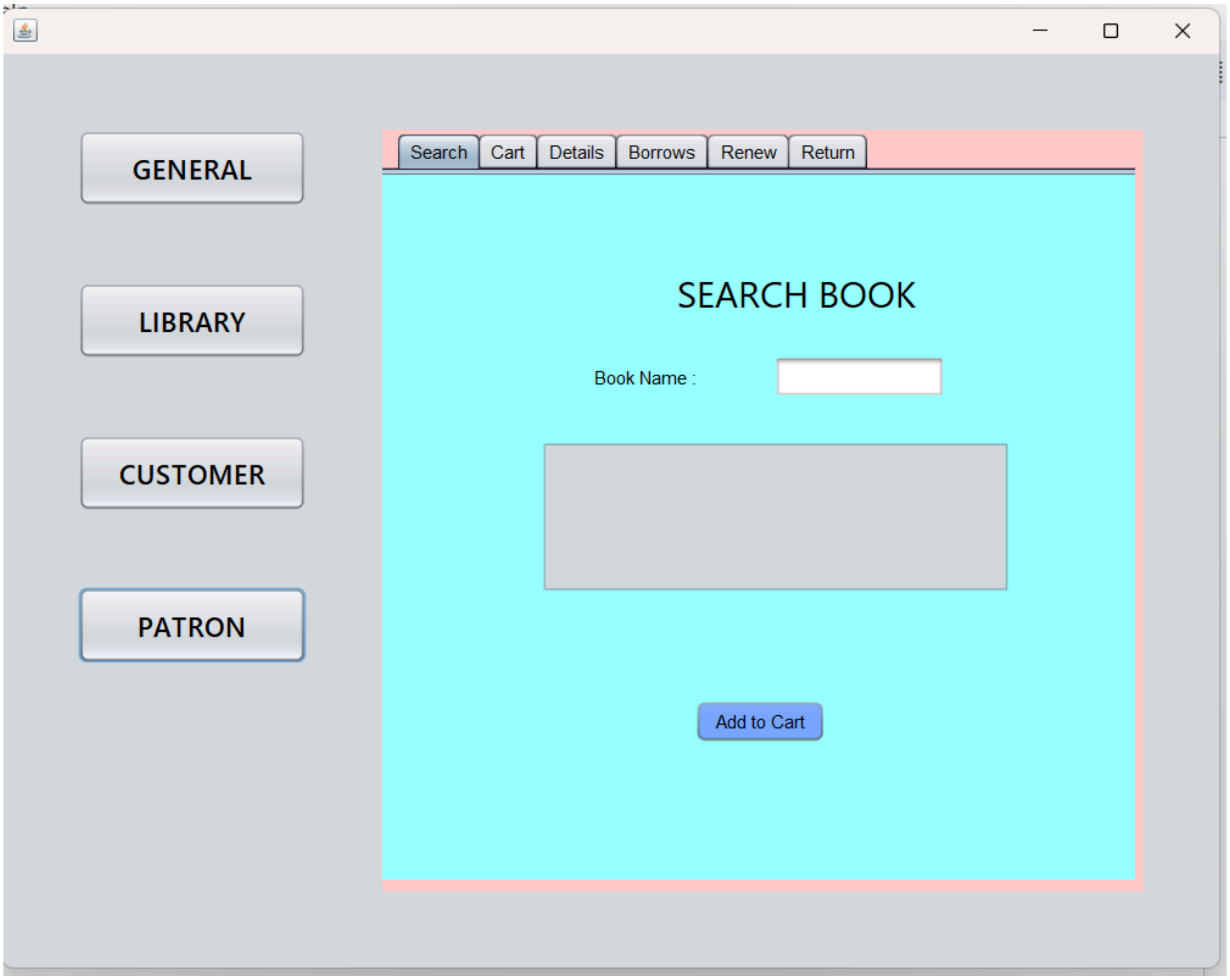
PATRON LOGIN

UserName : vikram_singh

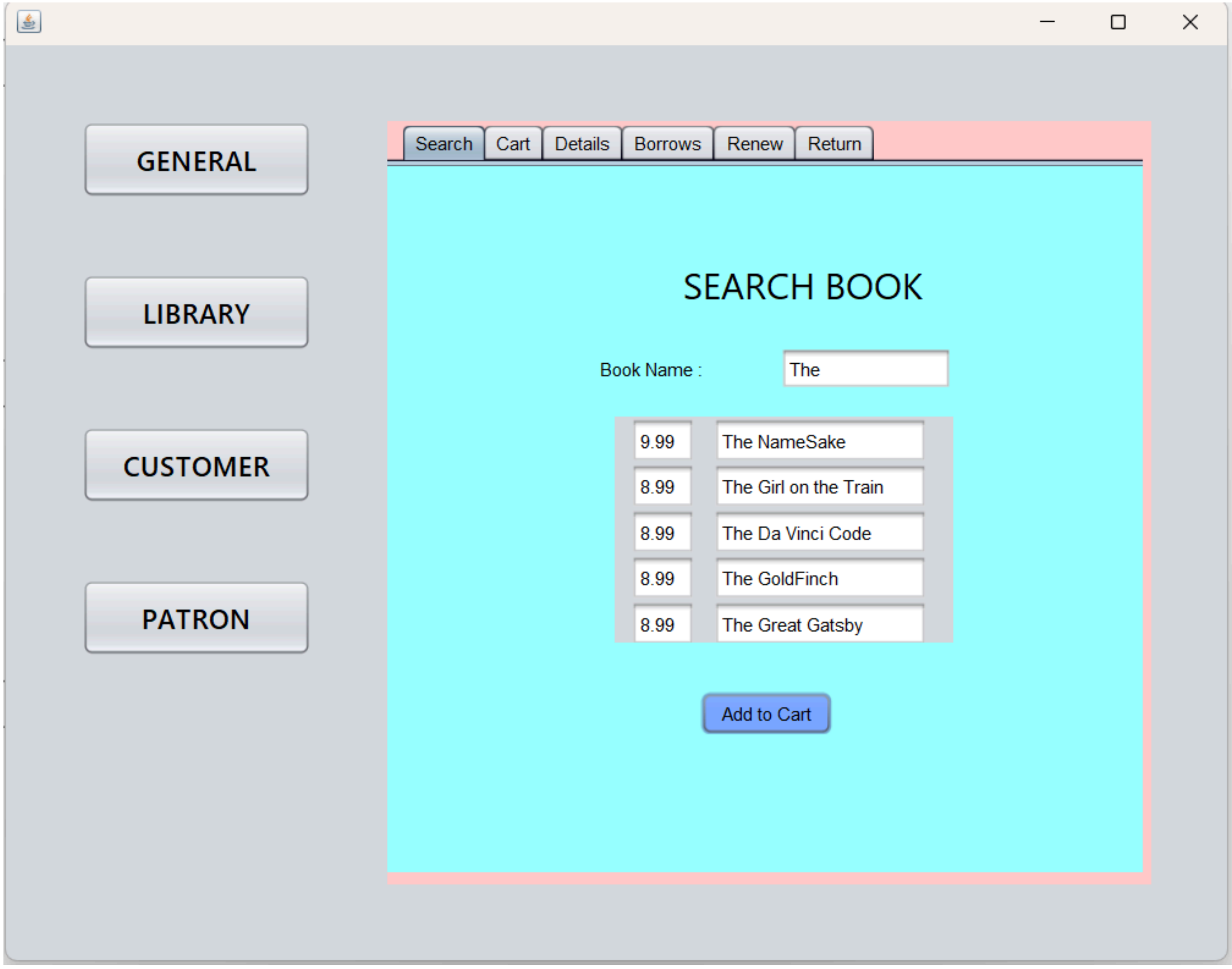
Password : pass127

Login Successful.

We used a existing patron with active status to login.
Now, clicking okay, will redirect you to the other pages in the Patron screen.



Now, we see the various options available to the patron.
They can search and add the book to cart, and then borrow those books.



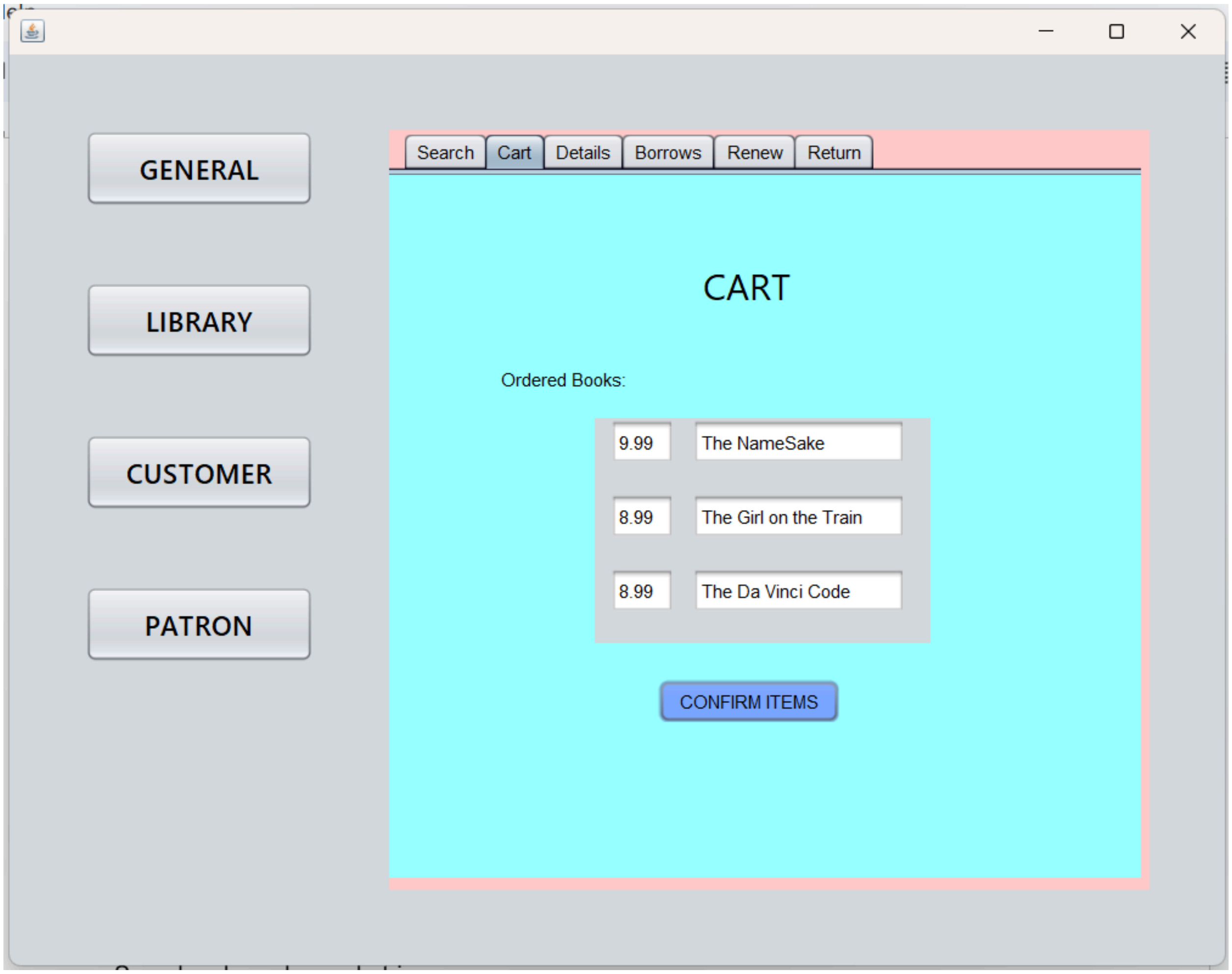
SEARCH BOOK

Book Name : The

9.99	The NameSake
8.99	The Girl on the Train
8.99	The Da Vinci Code
8.99	The GoldFinch
8.99	The Great Gatsby

Searches based on substring.
Displays the present books with matching name.

Clicking add to cart, redirects to the cart page.

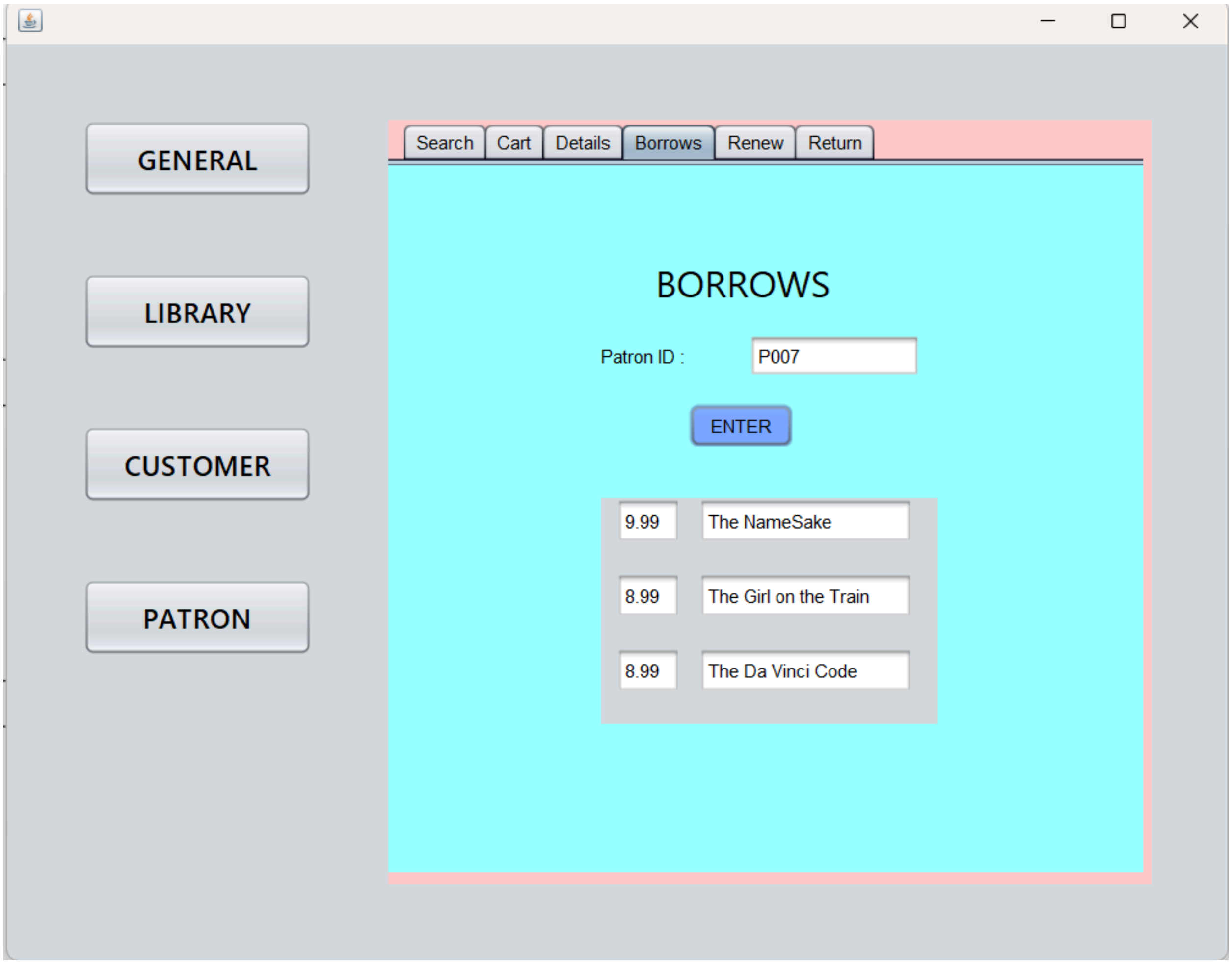


CART

Ordered Books:

9.99	The NameSake
8.99	The Girl on the Train
8.99	The Da Vinci Code

Displays the selected books.
Confirming let’s the patron borrow those books.



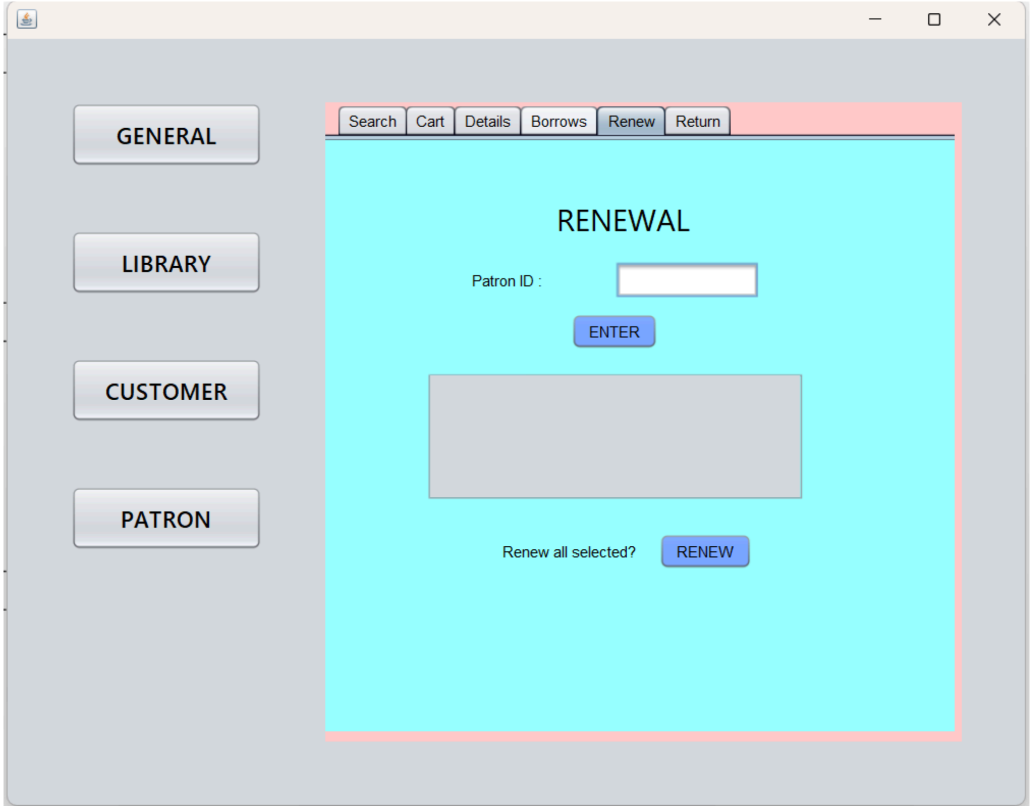
BORROWS

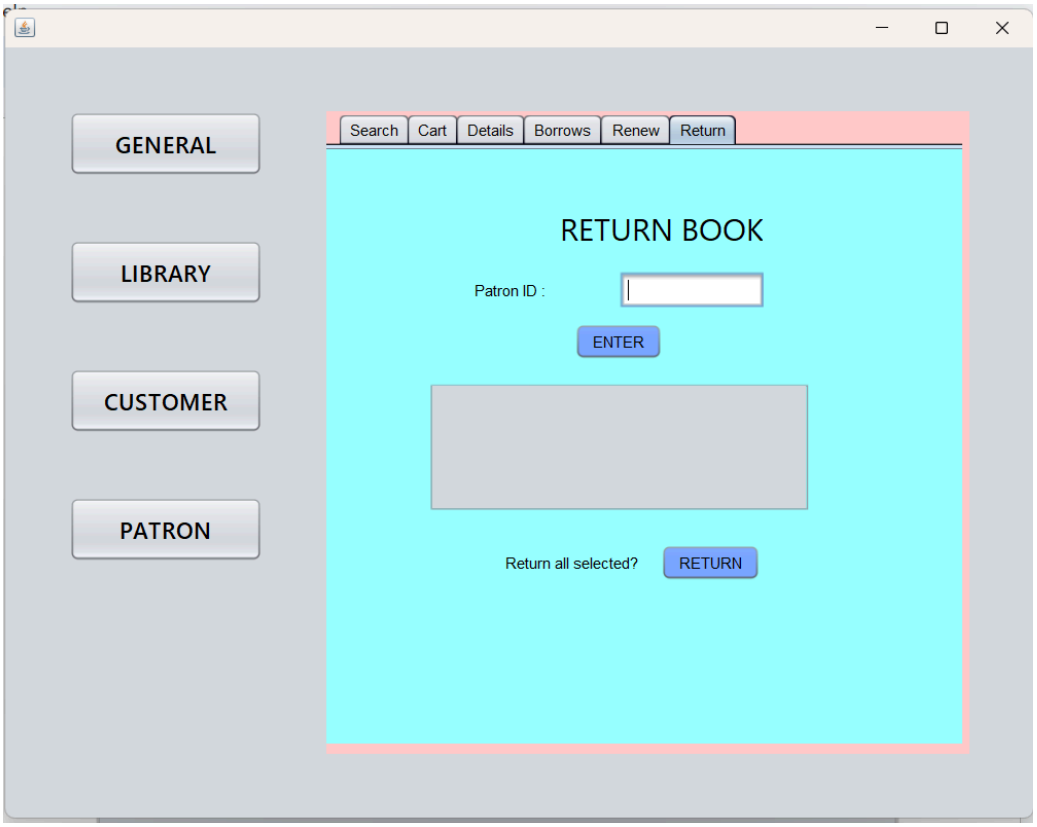
Patron ID : P007

9.99	The NameSake
8.99	The Girl on the Train
8.99	The Da Vinci Code

Tying patron ID also shows the books borrowed by the patron.

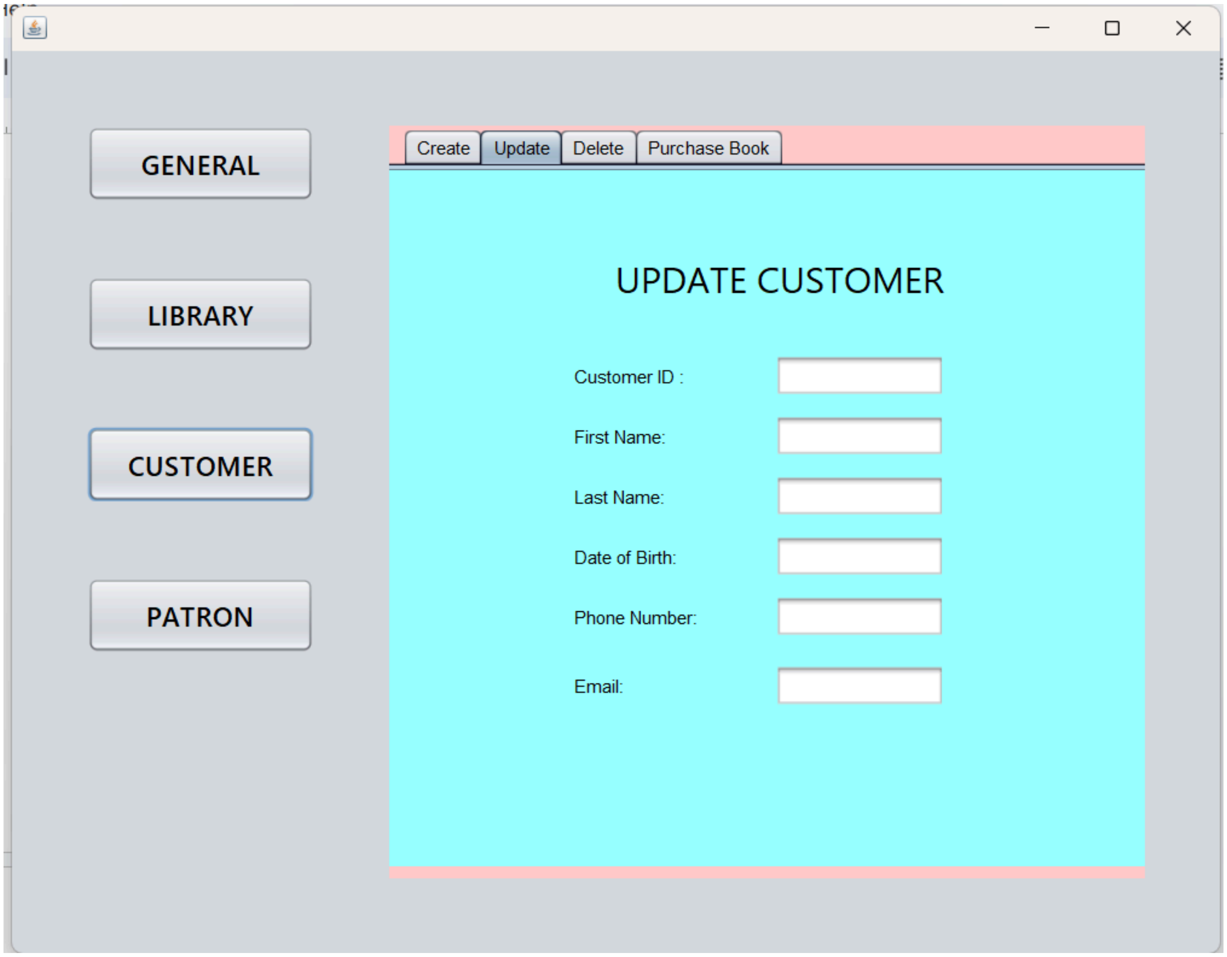
The prices of the books are also displayed.

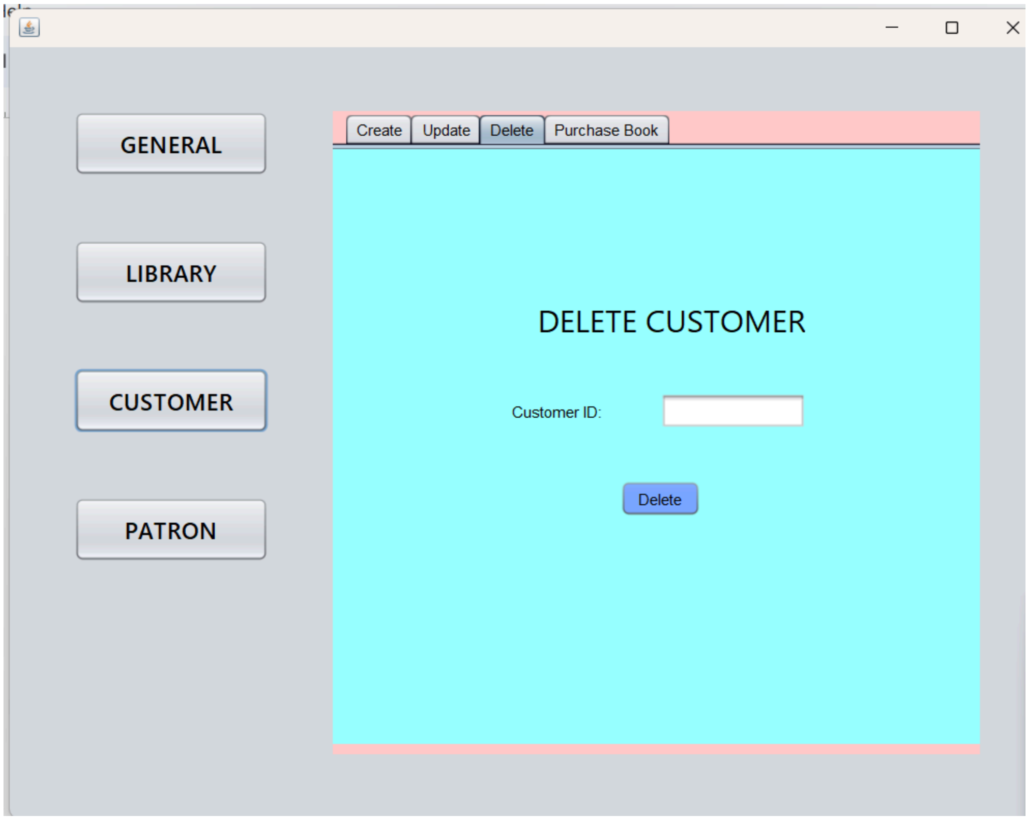




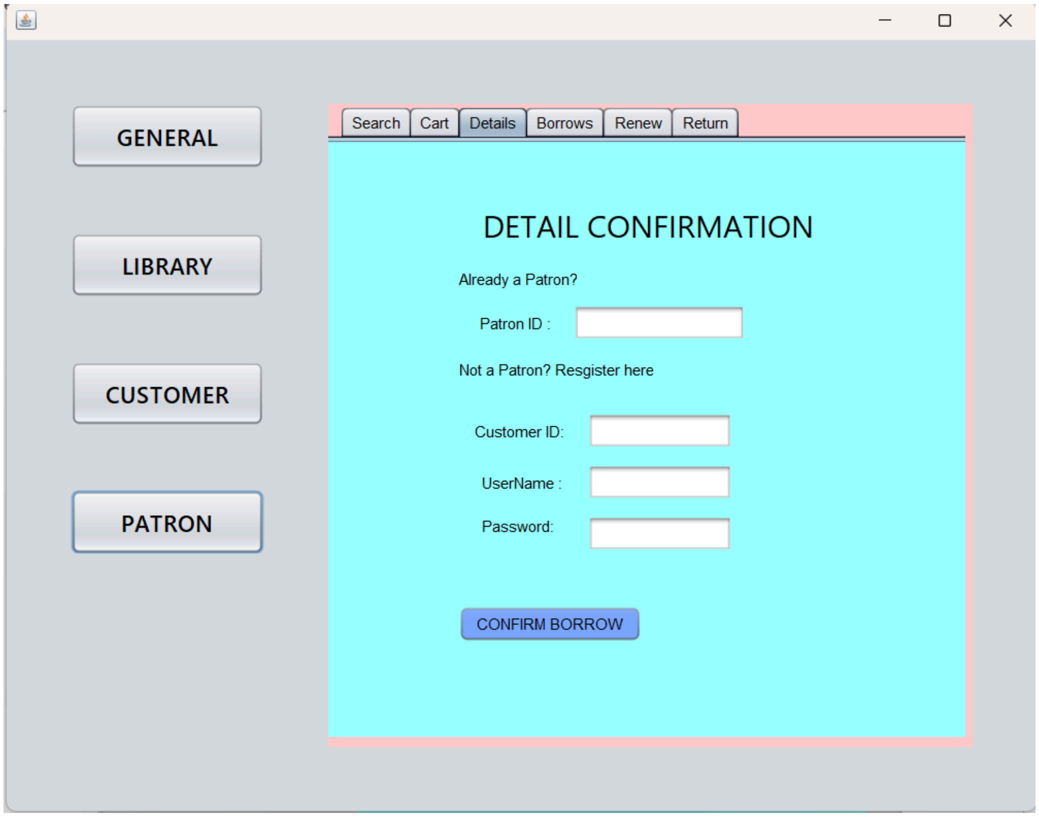
Both Renewal and Return screen works the same way as the others.

Other pages:


GENERAL
LIBRARY
CUSTOMER
PATRON
Create
Update
Delete
Purchase Book
UPDATE CUSTOMER
Customer ID :
First Name:
Last Name:
Date of Birth:
Phone Number:
Email:



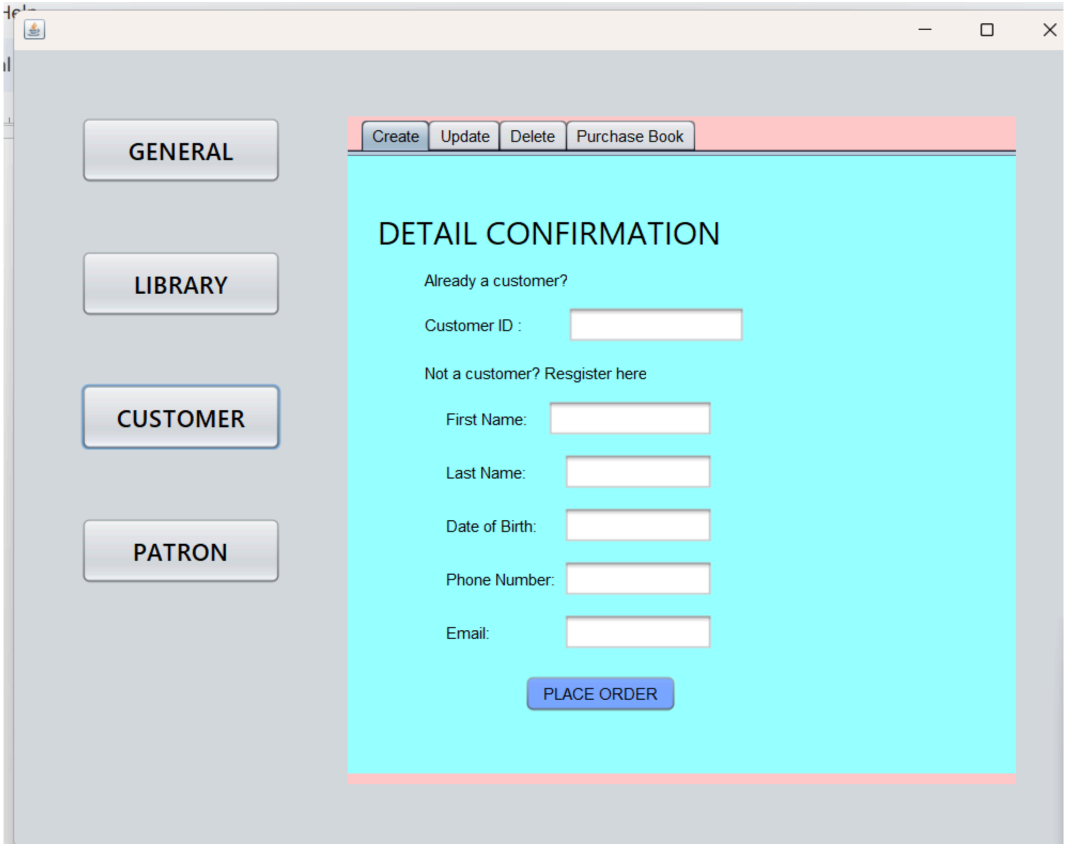
DELETE CUSTOMER



DETAIL CONFIRMATION

Already a Patron?

Not a Patron? Resgister here



DETAIL CONFIRMATION

Already a customer?

Customer ID :

Not a customer? Resgister here

First Name:

Last Name:

Date of Birth:

Phone Number:

Email:

These are some basic screens which perform similar creating Customer/ Patron or Updation, etc as demonstrated before.

Learning Outcomes:

Database Design and Implementation:

- Design relational database schemas with tables, primary keys, foreign keys, and constraints to ensure data integrity and efficiency.
- Create and manage tables, relationships, and constraints using SQL, while applying data normalization techniques to organize data and reduce redundancy.
- Implement business rules and logic within the database, ensuring data consistency and integrity through constraints like `CHECK`, `NOT NULL`, and `UNIQUE`.

SQL Proficiency and Best Practices:

- Write and execute SQL statements for creating tables, inserting, updating, and deleting data, with a focus on clean, maintainable code and proper documentation.
- Troubleshoot and handle SQL syntax errors and constraint violations effectively, and understand database error messages.
- Model real-world scenarios, such as a library system, using advanced SQL features, including composite primary keys and date functions, to manage and manipulate data accurately.