Chapter 2: Structured Query Language (SQL)

Laboratory Activity 3:

Laboratory Title: Structured Query Language (SQL) - Basic Queries
Chapter No. and Topic: Chapter 2 - Structured Query Language (SQL)
Discussions:
This activity covers the basics of querying data from a table using SQL.

Activity Description:
Learn how to retrieve data using SELECT, filter with WHERE clauses, and sort results using ORDER BY.

Objectives:

- Write basic SQL queries using SELECT.
- Apply filters using WHERE clauses.
- Sort results using ORDER BY.

Materials:

- MySQL Workbench or SQL client

Procedure:

1. Open MySQL Workbench and connect to the `LibraryManagement` database.
2. Retrieve all columns from the `Books` table:

```
sql

Copy code

SELECT * FROM Books;
```

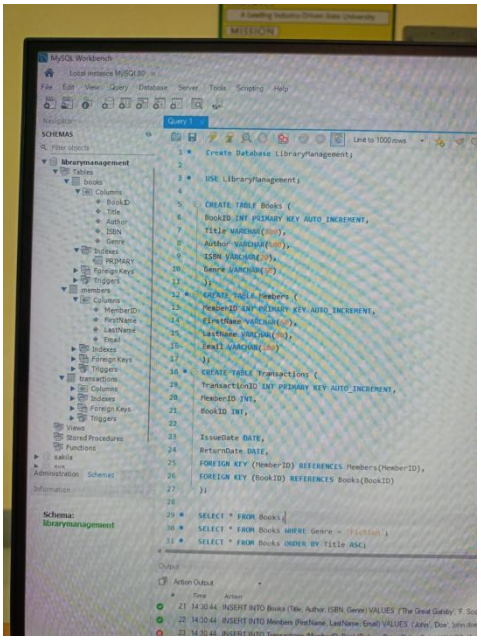
1. Retrieve books with the genre 'Fiction':

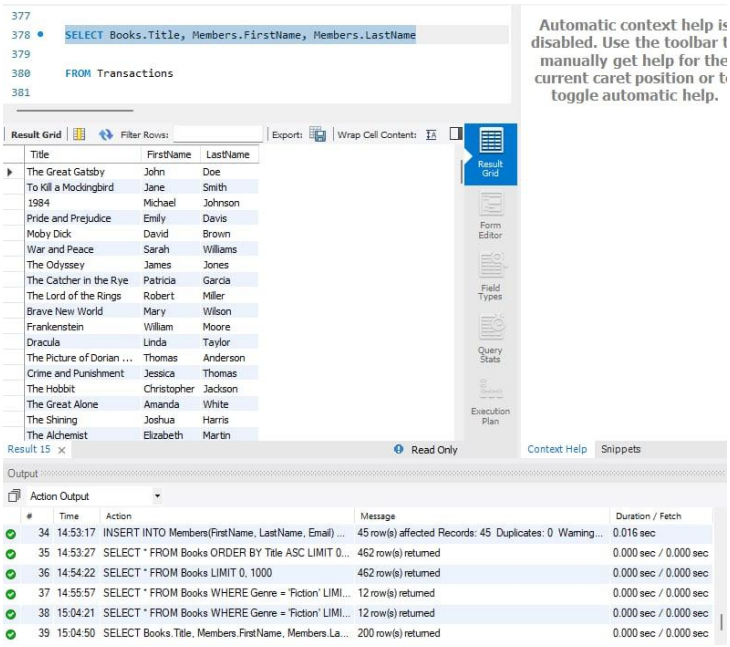
```
sql

Copy code

SELECT * FROM Books WHERE Genre = 'Fiction';
```

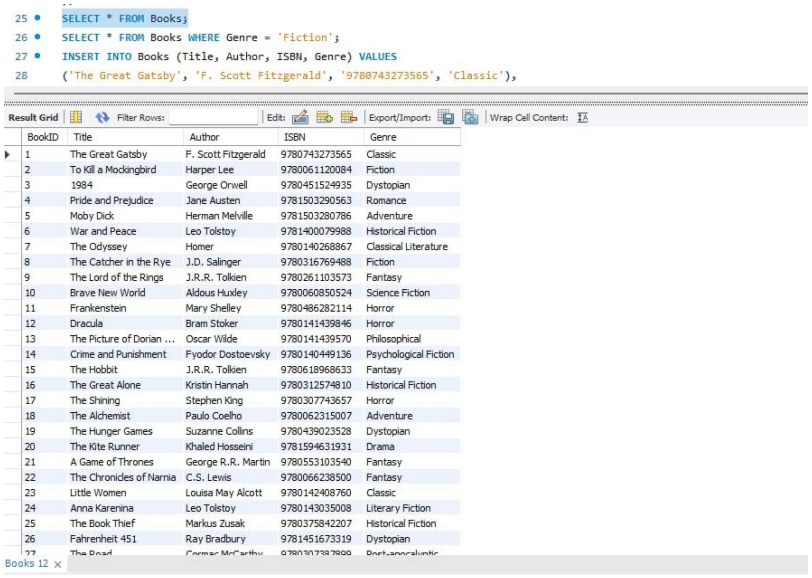
1. Sort the books by Title in ascending order:

```
sql

Copy code

SELECT * FROM Books ORDER BY Title ASC;
```

Result:
Basic queries to retrieve and filter data from the `Books` table.







Additional Questions/Discussions:

- How do WHERE and ORDER BY improve the functionality of SQL queries?

The WHERE clause improves query performance by removing extraneous records, whereas ORDER BY arranges the output for easier comprehension. Together, they improve query precision, efficiency, and usability, transforming SQL into an effective tool for managing relational databases.

Conclusions:

The WHERE and ORDER BY clauses help to optimize SQL queries by improving data filtering and organization. WHERE enhances query efficiency by getting just relevant records, whereas ORDER BY produces structured and legible results. When used together, they improve productivity, precision, and usability, making SQL a strong and dependable tool for relational database management.

Laboratory Activity 4:

Laboratory Title: SQL - JOIN Operation
Chapter No. and Topic: Chapter 2 - Structured Query Language (SQL)
Discussions:
This activity introduces students to SQL JOIN operations for combining data from multiple tables.

Activity Description:
Learn how to use INNER JOIN, LEFT JOIN, and RIGHT JOIN to combine tables.

Objectives:

- Write SQL JOIN queries to retrieve data from multiple tables.
- Use INNER JOIN, LEFT JOIN, and RIGHT JOIN.

Materials:

- MySQL Workbench or SQL client

Procedure:

1. Retrieve a list of all transactions, including book title and member name:

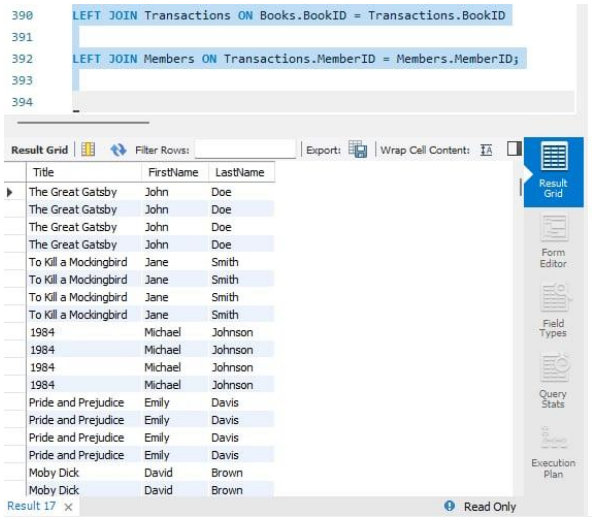
```
sql

Copy code
```

```
SELECT Books.Title, Members.FirstName, Members.LastName

FROM Transactions

INNER JOIN Books ON Transactions.BookID = Books.BookID

INNER JOIN Members ON Transactions.MemberID = Members.MemberID;
```

1. Retrieve a list of all books with transaction details, even those without transactions (LEFT JOIN):

```
sql

Copy code

SELECT Books.Title, Members.FirstName, Members.LastName

FROM Books

LEFT JOIN Transactions ON Books.BookID = Transactions.BookID

LEFT JOIN Members ON Transactions.MemberID = Members.MemberID;
```

Result:
JOIN operations linking tables to retrieve combined data.



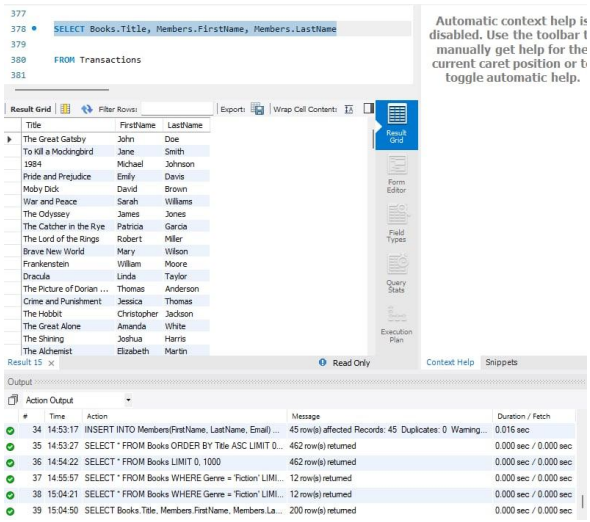
```
LEFT JOIN Transactions ON Books.BookID = Transactions.BookID

LEFT JOIN Members ON Transactions.MemberID = Members.MemberID;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Title	FirstName	LastName
The Great Gatsby	John	Doe
The Great Gatsby	John	Doe
The Great Gatsby	John	Doe
The Great Gatsby	John	Doe
To Kill a Mockingbird	Jane	Smith
To Kill a Mockingbird	Jane	Smith
To Kill a Mockingbird	Jane	Smith
To Kill a Mockingbird	Jane	Smith
1984	Michael	Johnson
1984	Michael	Johnson
1984	Michael	Johnson
1984	Michael	Johnson
Pride and Prejudice	Emily	Davis
Pride and Prejudice	Emily	Davis
Pride and Prejudice	Emily	Davis
Pride and Prejudice	Emily	Davis
Moby Dick	David	Brown
Moby Dick	David	Brown

Result Grid | Form Editor | Field Types | Query Stats | Execution Plan

Result 17 | Read Only



```
SELECT Books.Title, Members.FirstName, Members.LastName

FROM Transactions
```

Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Title	FirstName	LastName
The Great Gatsby	John	Doe
To Kill a Mockingbird	Jane	Smith
1984	Michael	Johnson
Pride and Prejudice	Emily	Davis
Moby Dick	David	Brown
War and Peace	Sarah	Williams
The Odyssey	James	Jones
The Catcher in the Rye	Patricia	Garcia
The Lord of the Rings	Robert	Miller
Brave New World	Mary	Wilson
Frankenstein	William	Moore
Dracula	Linda	Taylor
The Picture of Dorian ...	Thomas	Anderson
Crime and Punishment	Jessica	Thomas
The Hobbit	Christopher	Jackson
The Great Alone	Amanda	White
The Shining	Joshua	Harris
The Alchemist	Elizabeth	Martin

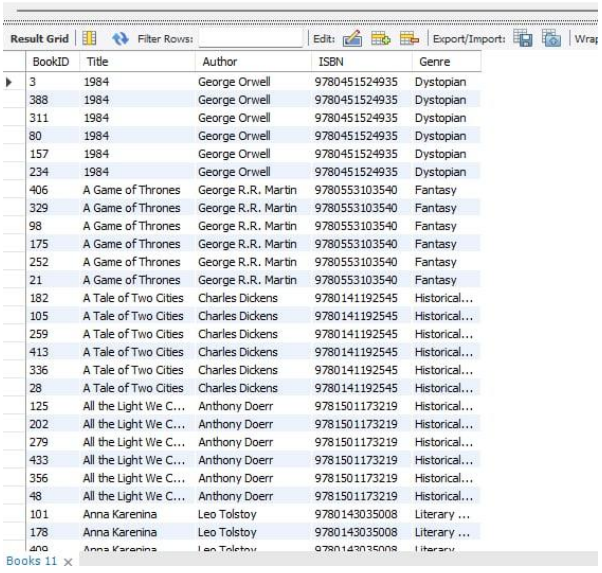
Result Grid | Form Editor | Field Types | Query Stats | Execution Plan

Result 15 | Read Only | Context Help | Snippets

Output

Action Output

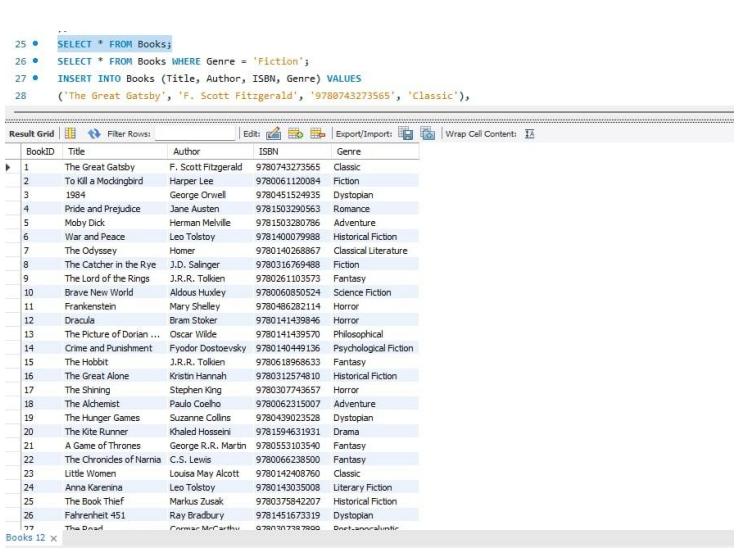
#	Time	Action	Message	Duration / Fetch
34	14:53:17	INSERT INTO Members(FirstName, LastName, Email) ...	45 row(s) affected Records: 45 Duplicates: 0 Warning...	0.016 sec
35	14:53:27	SELECT * FROM Books ORDER BY Title ASC LIMIT 0...	462 row(s) returned	0.000 sec / 0.000 sec
36	14:54:22	SELECT * FROM Books LIMIT 0, 1000	462 row(s) returned	0.000 sec / 0.000 sec
37	14:55:57	SELECT * FROM Books WHERE Genre = 'Fiction' LIMI...	12 row(s) returned	0.000 sec / 0.000 sec
38	15:04:21	SELECT * FROM Books WHERE Genre = 'Fiction' LIMI...	12 row(s) returned	0.000 sec / 0.000 sec
39	15:04:50	SELECT Books.Title, Members.FirstName, Members.La...	200 row(s) returned	0.000 sec / 0.000 sec



Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap

BookID	Title	Author	ISBN	Genre
3	1984	George Orwell	9780451524935	Dystopian
388	1984	George Orwell	9780451524935	Dystopian
311	1984	George Orwell	9780451524935	Dystopian
80	1984	George Orwell	9780451524935	Dystopian
157	1984	George Orwell	9780451524935	Dystopian
234	1984	George Orwell	9780451524935	Dystopian
406	A Game of Thrones	George R.R. Martin	9780553103540	Fantasy
329	A Game of Thrones	George R.R. Martin	9780553103540	Fantasy
98	A Game of Thrones	George R.R. Martin	9780553103540	Fantasy
175	A Game of Thrones	George R.R. Martin	9780553103540	Fantasy
252	A Game of Thrones	George R.R. Martin	9780553103540	Fantasy
21	A Game of Thrones	George R.R. Martin	9780553103540	Fantasy
182	A Tale of Two Cities	Charles Dickens	9780141192545	Historical...
105	A Tale of Two Cities	Charles Dickens	9780141192545	Historical...
259	A Tale of Two Cities	Charles Dickens	9780141192545	Historical...
413	A Tale of Two Cities	Charles Dickens	9780141192545	Historical...
336	A Tale of Two Cities	Charles Dickens	9780141192545	Historical...
28	A Tale of Two Cities	Charles Dickens	9780141192545	Historical...
125	All the Light We C...	Anthony Doerr	9781501173219	Historical...
202	All the Light We C...	Anthony Doerr	9781501173219	Historical...
279	All the Light We C...	Anthony Doerr	9781501173219	Historical...
433	All the Light We C...	Anthony Doerr	9781501173219	Historical...
356	All the Light We C...	Anthony Doerr	9781501173219	Historical...
48	All the Light We C...	Anthony Doerr	9781501173219	Historical...
101	Anna Karenina	Leo Tolstoy	9780143035008	Literary ...
178	Anna Karenina	Leo Tolstoy	9780143035008	Literary ...
409	Anna Karenina	Leo Tolstoy	9780143035008	Literary ...

Books 11

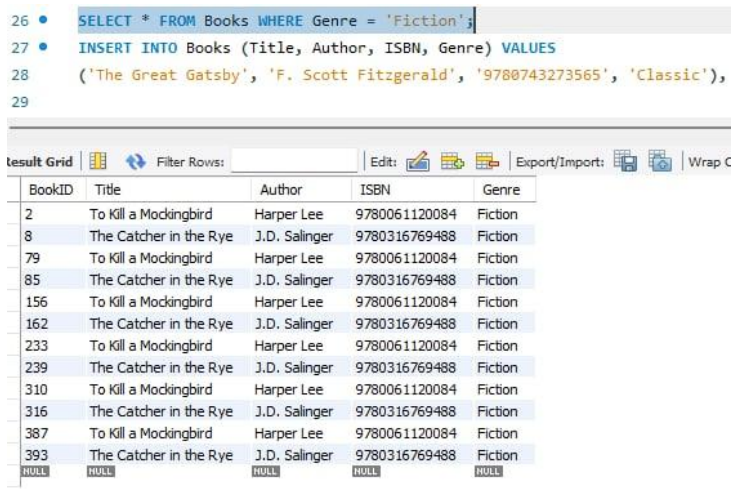


```
SELECT * FROM Books;
SELECT * FROM Books WHERE Genre = 'Fiction';
INSERT INTO Books (Title, Author, ISBN, Genre) VALUES
('The Great Gatsby', 'F. Scott Fitzgerald', '9780743273565', 'Classic'),
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

BookID	Title	Author	ISBN	Genre
1	The Great Gatsby	F. Scott Fitzgerald	9780743273565	Classic
2	To Kill a Mockingbird	Harper Lee	9780061120084	Fiction
3	1984	George Orwell	9780451524935	Dystopian
4	Pride and Prejudice	Jane Austen	9781503290563	Romance
5	Moby Dick	Herman Melville	9781503280786	Adventure
6	War and Peace	Leo Tolstoy	9781400079988	Historical Fiction
7	The Odyssey	Homer	9780140268867	Classical Literature
8	The Catcher in the Rye	J.D. Salinger	9780316769488	Fiction
9	The Lord of the Rings	J.R.R. Tolkien	9780261103573	Fantasy
10	Brave New World	Aldous Huxley	9780060850524	Science Fiction
11	Frankenstein	Mary Shelley	9780486282114	Horror
12	Dracula	Bram Stoker	9780141439846	Horror
13	The Picture of Dorian ...	Oscar Wilde	9780141439570	Philosophical
14	Crime and Punishment	Fyodor Dostoevsky	9780140449136	Psychological Fiction
15	The Hobbit	J.R.R. Tolkien	9780618968633	Fantasy
16	The Great Alone	Kristin Hannah	9780312574810	Historical Fiction
17	The Shining	Stephen King	9780307743657	Horror
18	The Alchemist	Paulo Coelho	9780062315007	Adventure
19	The Hunger Games	Suzanne Collins	9780439023528	Dystopian
20	The Kite Runner	Khaled Hosseini	9781594631931	Drama
21	A Game of Thrones	George R.R. Martin	9780553103540	Fantasy
22	The Chronicles of Narnia	C.S. Lewis	9780066238500	Fantasy
23	Little Women	Louisa May Alcott	9780142408760	Classic
24	Anna Karenina	Leo Tolstoy	9780143035008	Literary Fiction
25	The Book Thief	Markus Zusak	9780375842207	Historical Fiction
26	Fahrenheit 451	Ray Bradbury	9781451673319	Dystopian
27	The Road	Cormac McCarthy	9780307387899	Post-apocalyptic

Books 12



```
26  SELECT * FROM Books WHERE Genre = 'Fiction';
27  INSERT INTO Books (Title, Author, ISBN, Genre) VALUES
28  ('The Great Gatsby', 'F. Scott Fitzgerald', '9780743273565', 'Classic'),
29
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap

BookID	Title	Author	ISBN	Genre
2	To Kill a Mockingbird	Harper Lee	9780061120084	Fiction
8	The Catcher in the Rye	J.D. Salinger	9780316769488	Fiction
79	To Kill a Mockingbird	Harper Lee	9780061120084	Fiction
85	The Catcher in the Rye	J.D. Salinger	9780316769488	Fiction
156	To Kill a Mockingbird	Harper Lee	9780061120084	Fiction
162	The Catcher in the Rye	J.D. Salinger	9780316769488	Fiction
233	To Kill a Mockingbird	Harper Lee	9780061120084	Fiction
239	The Catcher in the Rye	J.D. Salinger	9780316769488	Fiction
310	To Kill a Mockingbird	Harper Lee	9780061120084	Fiction
316	The Catcher in the Rye	J.D. Salinger	9780316769488	Fiction
387	To Kill a Mockingbird	Harper Lee	9780061120084	Fiction
393	The Catcher in the Rye	J.D. Salinger	9780316769488	Fiction
NULL	NULL	NULL	NULL	NULL

Additional Questions/Discussions:

- How does the LEFT JOIN differ from the INNER JOIN?

When you only need matching records from both tables, use the INNER JOIN function.When you need all records from one table, even if the second table has no matches, use the LEFT JOIN function.

Conclusions:

The decision between INNER JOIN and LEFT JOIN is based on how you wish to handle unmatched records. INNER JOIN obtains only records that match in both tables, which is handy for filtering related data. In contrast, LEFT JOIN assures that all records from the left table are included, even if there are no corresponding matches in the right table, making it excellent for maintaining entire datasets. Choosing the right join type improves query accuracy and ensures meaningful data retrieval in relational databases.