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1. Introduction

A database is the systematic assortment for the raw data and information of an organization. The database can be controlled, manipulated and managed with the help of system or software, which is called Database Management System. (Dr. Satinder Bal Gupta, 2009)

The database I have created is about the Library Database Management System. It shows how all the data are managed within the library. The Library Database Management System makes it easy and simple for it's user to access to the books and study materials and also helps the librarian to keep the track and records of all the activities. This database helps to maintain all the information related to books and study materials. It keeps the information about the public demands of the books, the types of books the readers are mostly interested in. It also keeps the records of all the books that were borrowed by the readers and the time they were returned. And also the records of the usefulness of the books available in the library.

2. Database Model

My database of library is made up of five different tables and they are Library, Author, Books, Members and Records. The 'Library' stores the information like Name, location, Email, Phone no. Similarly, 'Books' stores the information about the name of the book along with it's price and writer's name. 'Author' stores the information about the writers of the specific books and associated with study material. 'Member' stores the information about the readers or customers. 'Record' keeps the information about the dates in which the books were taken and returned by the members.

2.1 Entity Relationship Diagram

An element relationship outline (ERD) is an information displaying procedure that represents a data framework's substances and the connections between those elements. An ERD is a calculated and illustrative model of information used to speak to the element structure foundation. (Techopedia, n.d.)

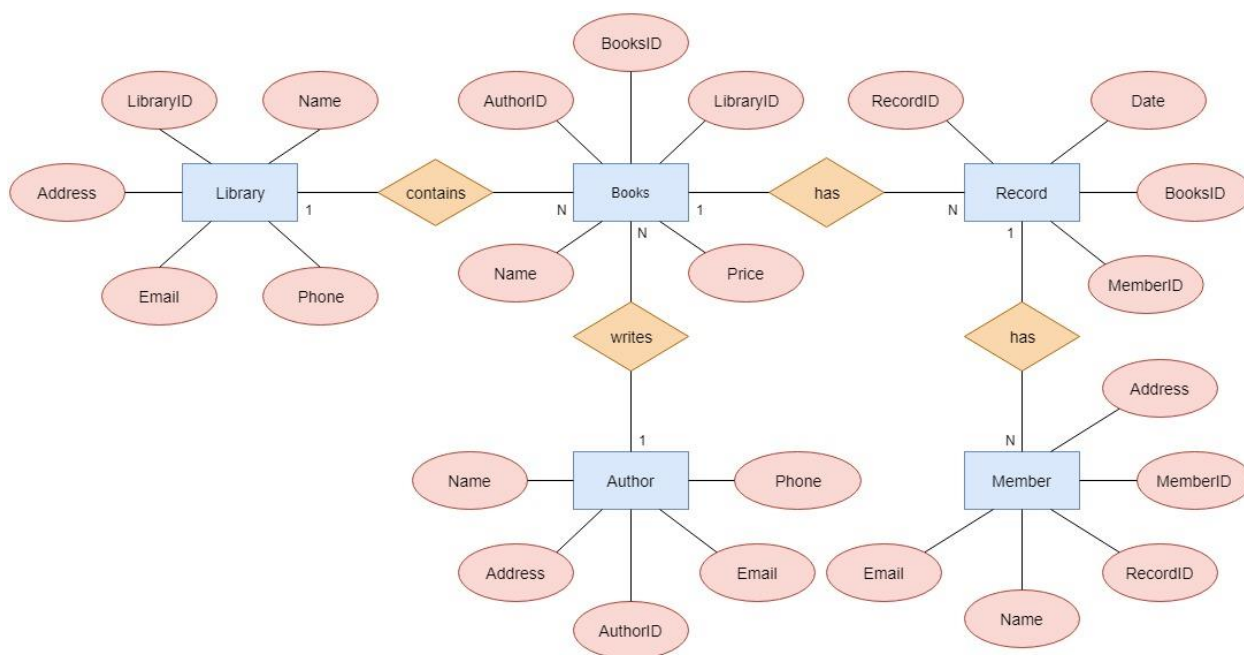


Figure 1: ER Diagram

2.2 Relational Diagram

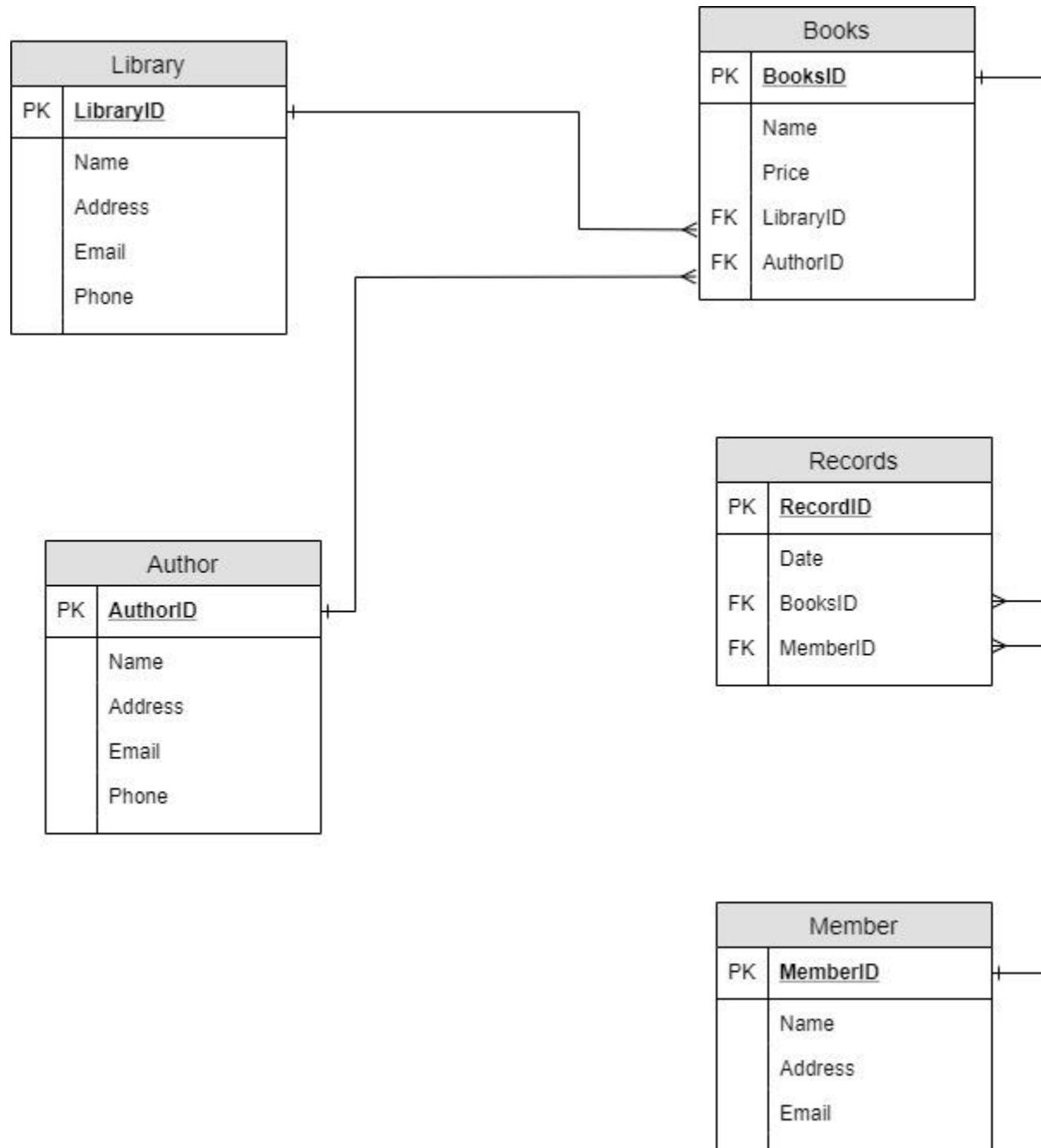


Figure 2: Relational Diagram

Table Library:

This table consist five columns and they are Name, LibraryID, Address, Email and Phone. The primary key in this table is LibraryID as each Library is assigned with their unique registration number. Name column gives the name of the library, Address gives the location, Email gives the mailID and Phone gives the contact number of the library.

Table Author:

This table contains also contain five columns and they are Name, Address, Phone, AuthorID and Email. Here, the primary key is AuthorID as all the authors have their own unique ID. Moreover, the column Name gives the name of Author. Similarly, Address gives the residential place, Phone gives the contact and Email gives the mailID of the Author.

Table Books:

This table contains five columns and they are Name, Price, LibraryID, BooksID and AuthorID. Here, the primary key is BooksID as the Books are assigned with their own unique certified numbers. The foreign keys in this table are LibraryID and BooksID references to Library and Books respectively. The Name gives the names of the books and price gives the amount of the books.

Table Member

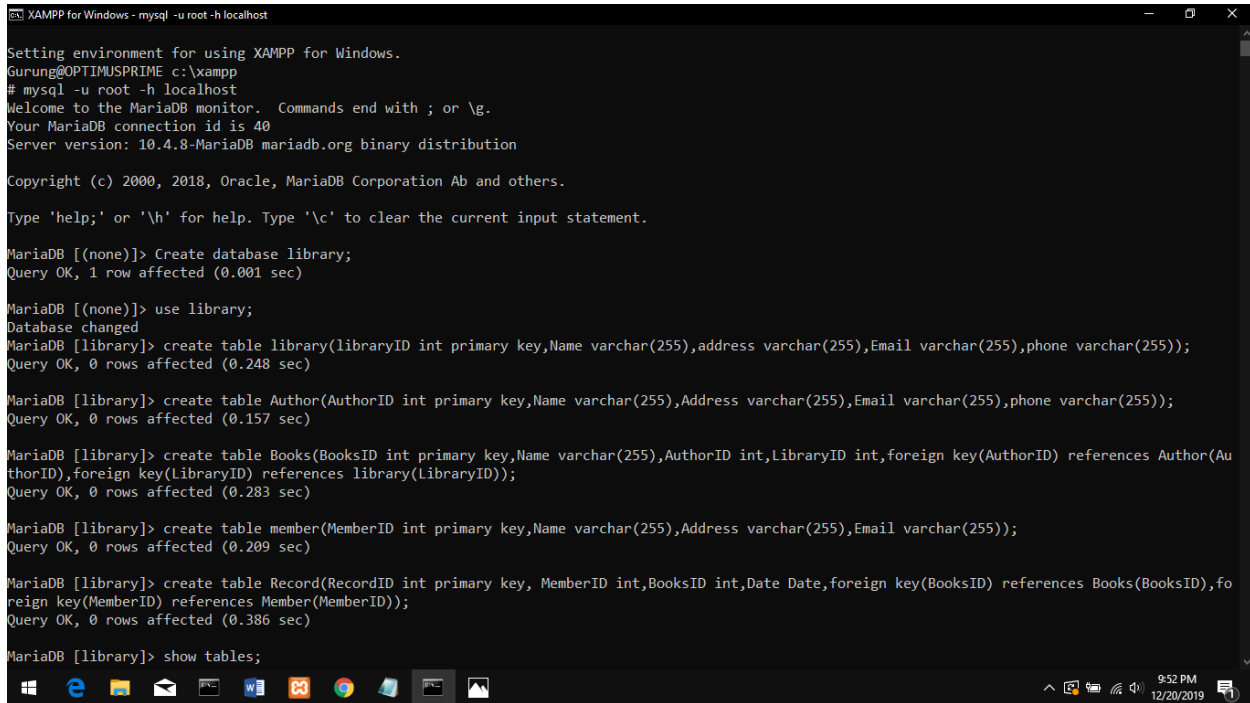
This table gives the information about the readers or the people with the membership card of the library. This table has four columns namely Name, Email, Address, MemberID and Address. Here, the primary key is MemberID is the primary key as all the members have different and unique ID number. The name column gives the name of the member, Email gives the mailID and address gives the residential place of the member.

Table Record:

This table gives the information of the record that has been kept of all the books. This table contains four columns as well. The columns are RecordID, MemberID, BooksID and date. Here, the primary key is RecordID as it is the ID of the different records in the library. The foreign keys in this table are BooksID and MemberID references to the Books and Member respectively. The date column gives the information about the date on which the books were taken and returned.

2.3 Creation Screenshots

Creation of the database 'Library' and the tables Library, Author, Books, Member and record.



```
XAMPP for Windows - mysql -u root -h localhost

Setting environment for using XAMPP for Windows.
Gurung@OPTIMUSPRIME c:\xampp
# mysql -u root -h localhost
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 40
Server version: 10.4.8-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> Create database library;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> use library;
Database changed
MariaDB [library]> create table library(libraryID int primary key,Name varchar(255),address varchar(255),Email varchar(255),phone varchar(255));
Query OK, 0 rows affected (0.248 sec)

MariaDB [library]> create table Author(AuthorID int primary key,Name varchar(255),Address varchar(255),Email varchar(255),phone varchar(255));
Query OK, 0 rows affected (0.157 sec)

MariaDB [library]> create table Books(BooksID int primary key,Name varchar(255),AuthorID int,LibraryID int,foreign key(AuthorID) references Author(Au
thorID),foreign key(LibraryID) references library(LibraryID));
Query OK, 0 rows affected (0.283 sec)

MariaDB [library]> create table member(MemberID int primary key,Name varchar(255),Address varchar(255),Email varchar(255));
Query OK, 0 rows affected (0.209 sec)

MariaDB [library]> create table Record(RecordID int primary key, MemberID int,BooksID int,Date Date,foreign key(BooksID) references Books(BooksID),fo
reign key(MemberID) references Member(MemberID));
Query OK, 0 rows affected (0.386 sec)

MariaDB [library]> show tables;
```

Figure 3: Creation of tables

2.4 Insertion Screenshots

Insertion of values in table Library

```
XAMPP for Windows - mysql -u root -h localhost

MariaDB [library]> insert into library values(12345,"Madan Library","Kathmandu","Madan@gmail.com","981-234-432");
Query OK, 1 row affected (0.061 sec)

MariaDB [library]> insert into library values(45678,"Laxmi Library","Jhapa","Laxmi@gmail.com","234-546-123");
Query OK, 1 row affected (0.074 sec)

MariaDB [library]> insert into library values(43525,"Ratna Library","Pokhara","Ratna@gmail.com","432-456-765");
Query OK, 1 row affected (0.160 sec)

MariaDB [library]> _
```

Figure 4: Insertion into table 1

Insertion of values in table Author

```
XAMPP for Windows - mysql -u root -h localhost

MariaDB [library]> insert into author values(100234,"Randy Blythe","Virginia","Randy@gmail.com","456-233-566");
Query OK, 1 row affected (0.089 sec)

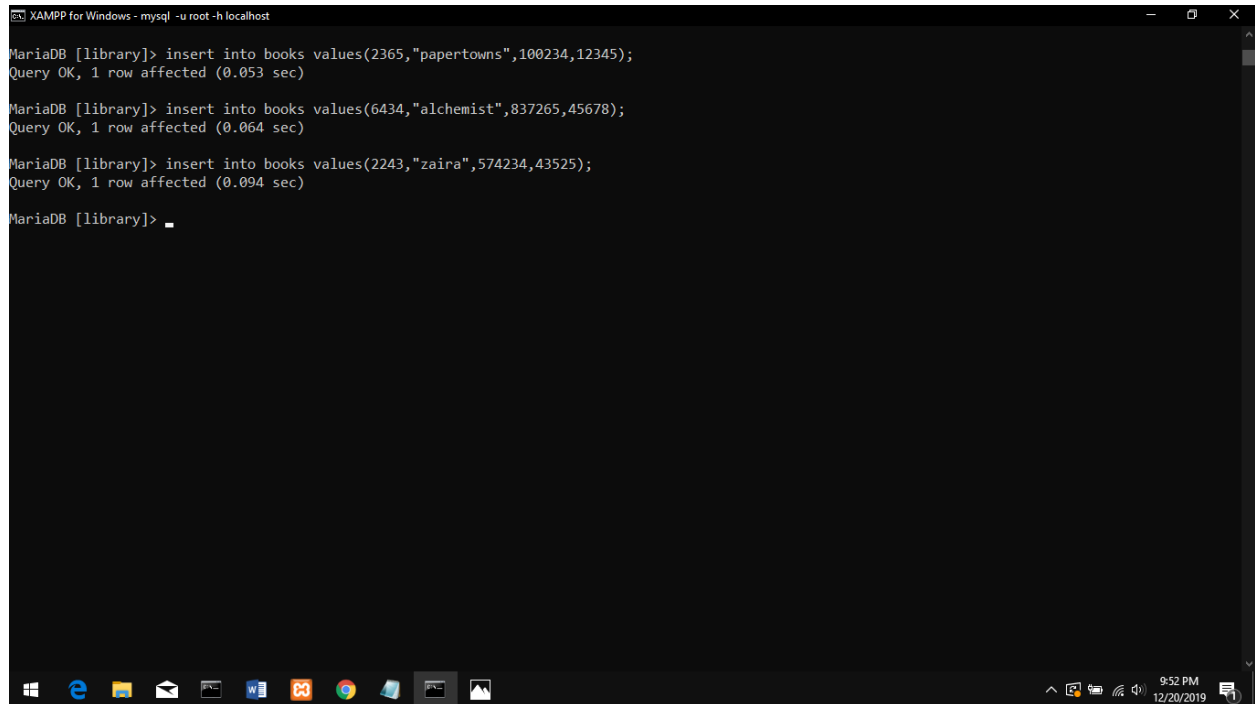
MariaDB [library]> insert into author values(837265,"Tom Araya","Seattle","Tom@gmail.com","543-677-223");
Query OK, 1 row affected (0.070 sec)

MariaDB [library]> insert into author values(574234,"James Hetfield","Kamloops","James@gmail.com","634-512-666");
Query OK, 1 row affected (0.103 sec)

MariaDB [library]> _
```

Figure 5: Insertion into table 2

Insertion of values in table Books



```
XAMPP for Windows - mysql -u root -h localhost

MariaDB [library]> insert into books values(2365,"papertowns",100234,12345);
Query OK, 1 row affected (0.053 sec)

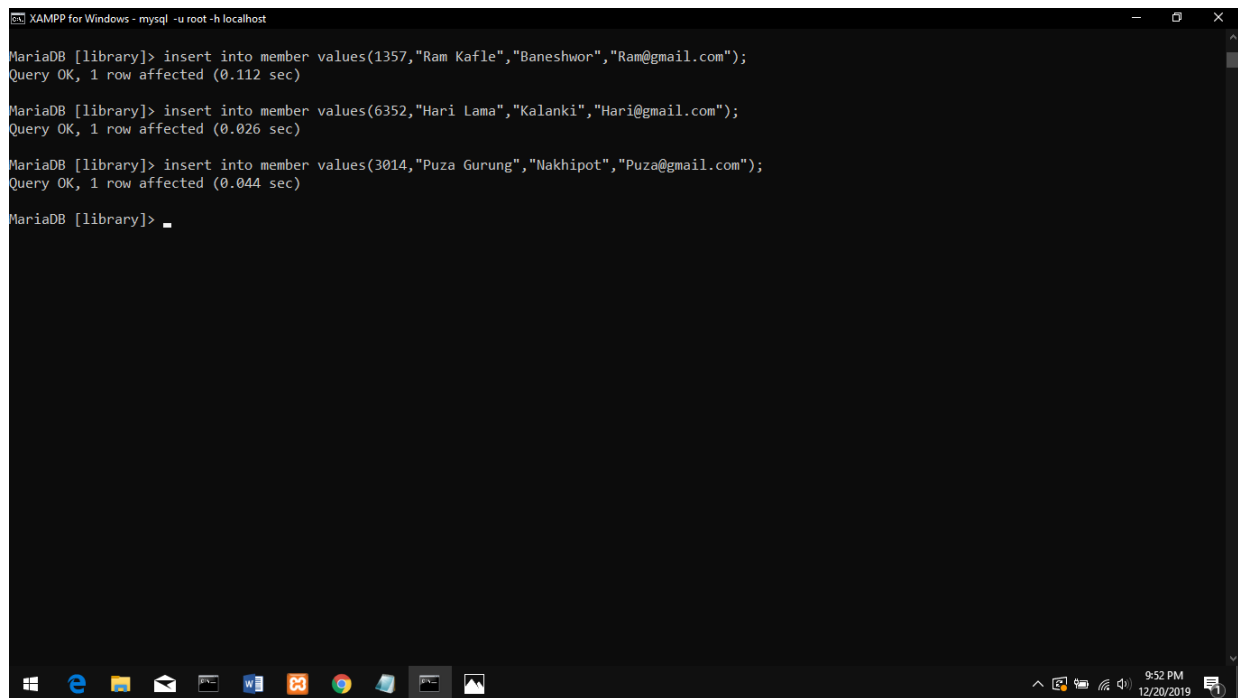
MariaDB [library]> insert into books values(6434,"alchemist",837265,45678);
Query OK, 1 row affected (0.064 sec)

MariaDB [library]> insert into books values(2243,"zaira",574234,43525);
Query OK, 1 row affected (0.094 sec)

MariaDB [library]> _
```

Figure 6: Insertion into table 3

Insertion of values in table Member



```
XAMPP for Windows - mysql -u root -h localhost

MariaDB [library]> insert into member values(1357,"Ram Kafle","Baneshwor","Ram@gmail.com");
Query OK, 1 row affected (0.112 sec)

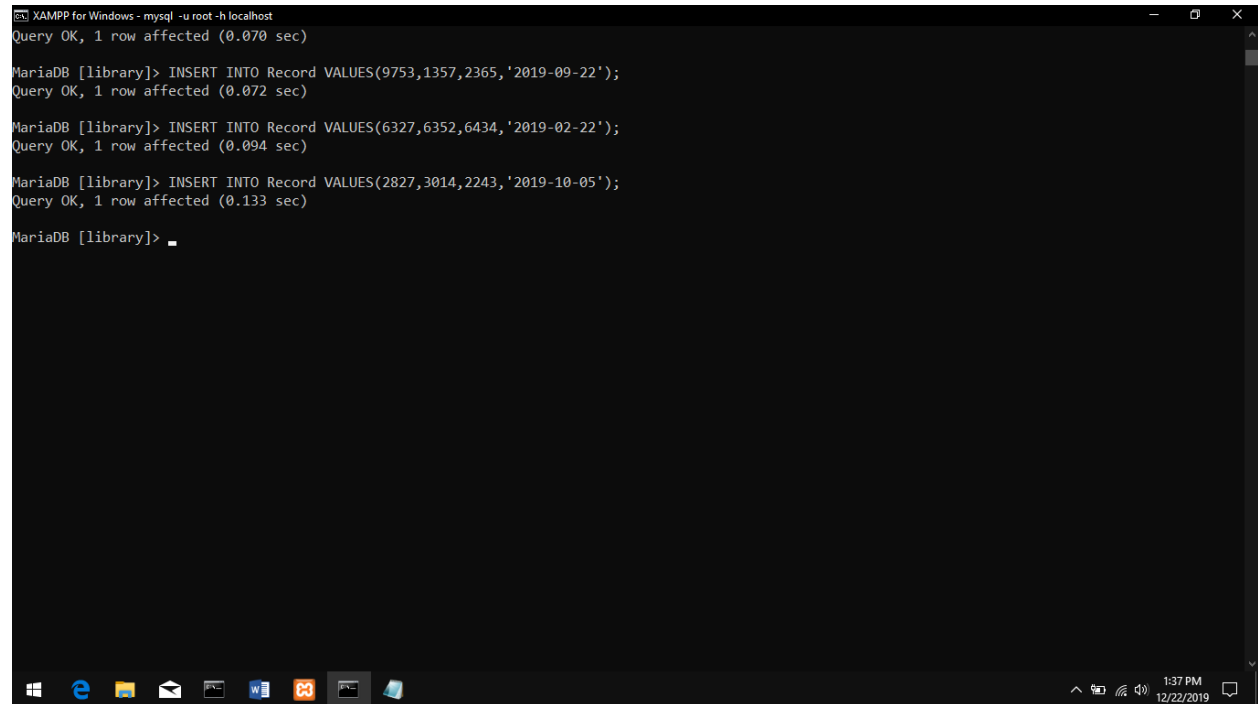
MariaDB [library]> insert into member values(6352,"Hari Lama","Kalanki","Hari@gmail.com");
Query OK, 1 row affected (0.026 sec)

MariaDB [library]> insert into member values(3014,"Puza Gurung","Nakhipot","Puza@gmail.com");
Query OK, 1 row affected (0.044 sec)

MariaDB [library]> _
```

Figure 7: Insertion into table 4

Insertion of values in table Record



```
XAMPP for Windows - mysql -u root -h localhost
Query OK, 1 row affected (0.070 sec)

MariaDB [library]> INSERT INTO Record VALUES(9753,1357,2365,'2019-09-22');
Query OK, 1 row affected (0.072 sec)

MariaDB [library]> INSERT INTO Record VALUES(6327,6352,6434,'2019-02-22');
Query OK, 1 row affected (0.094 sec)

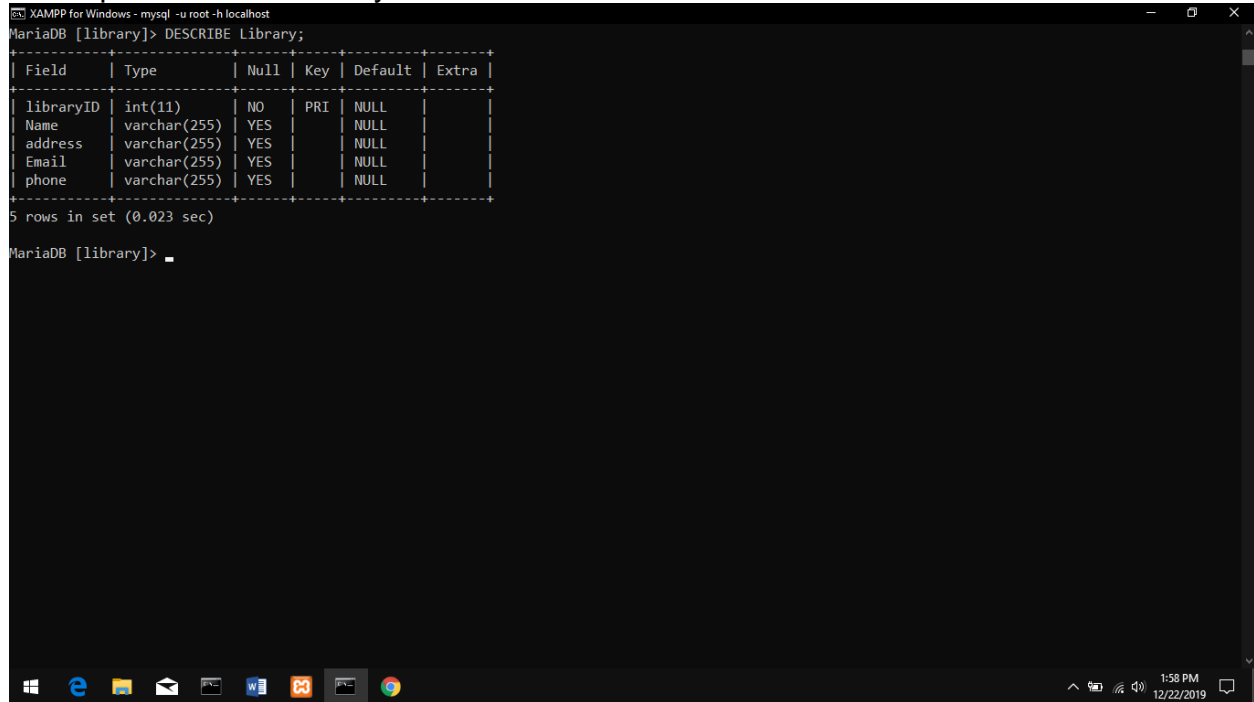
MariaDB [library]> INSERT INTO Record VALUES(2827,3014,2243,'2019-10-05');
Query OK, 1 row affected (0.133 sec)

MariaDB [library]> _
```

Figure 8: Insertion into table 5

2.5 Description Screenshots

Description of table Library



XAMPP for Windows - mysql -u root -h localhost
MariaDB [library]> DESCRIBE Library;

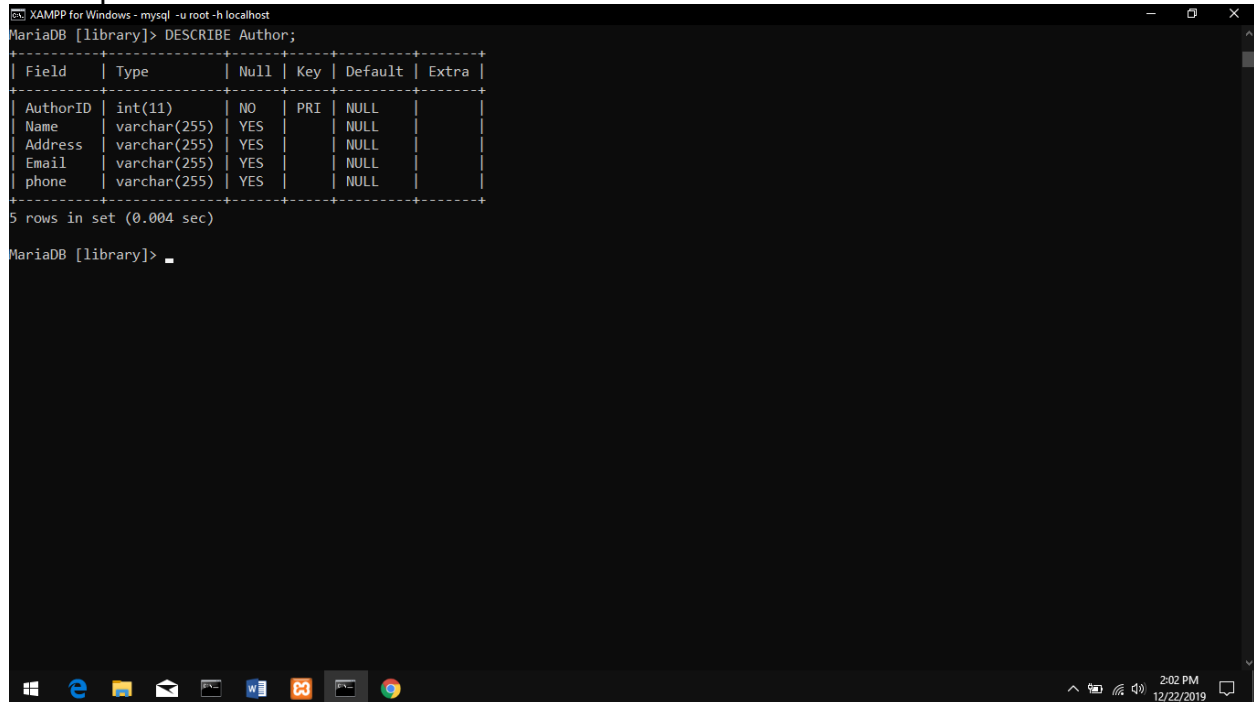
Field	Type	Null	Key	Default	Extra
libraryID	int(11)	NO	PRI	NULL	
Name	varchar(255)	YES		NULL	
address	varchar(255)	YES		NULL	
Email	varchar(255)	YES		NULL	
phone	varchar(255)	YES		NULL	

5 rows in set (0.023 sec)

MariaDB [library]> _

Figure 9: Description of table 1

Description of table Author



XAMPP for Windows - mysql -u root -h localhost
MariaDB [library]> DESCRIBE Author;

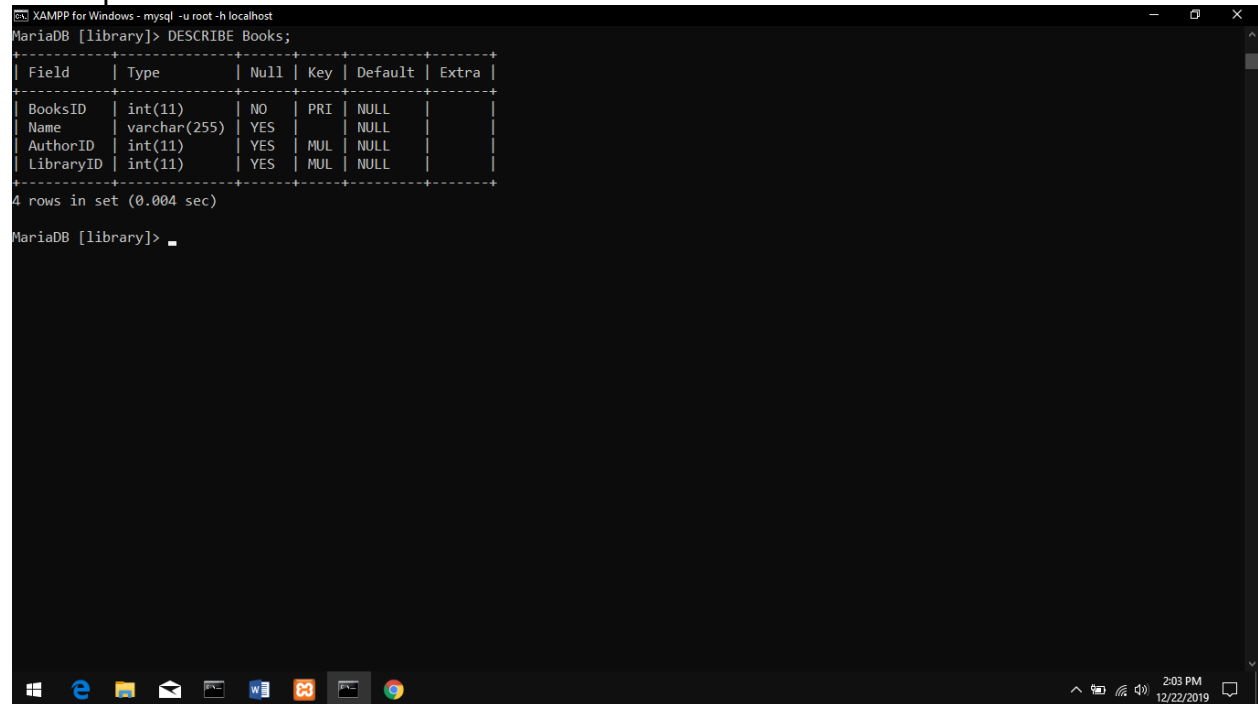
Field	Type	Null	Key	Default	Extra
AuthorID	int(11)	NO	PRI	NULL	
Name	varchar(255)	YES		NULL	
Address	varchar(255)	YES		NULL	
Email	varchar(255)	YES		NULL	
phone	varchar(255)	YES		NULL	

5 rows in set (0.004 sec)

MariaDB [library]> _

Figure 10: Description of table 2

Description of table Books

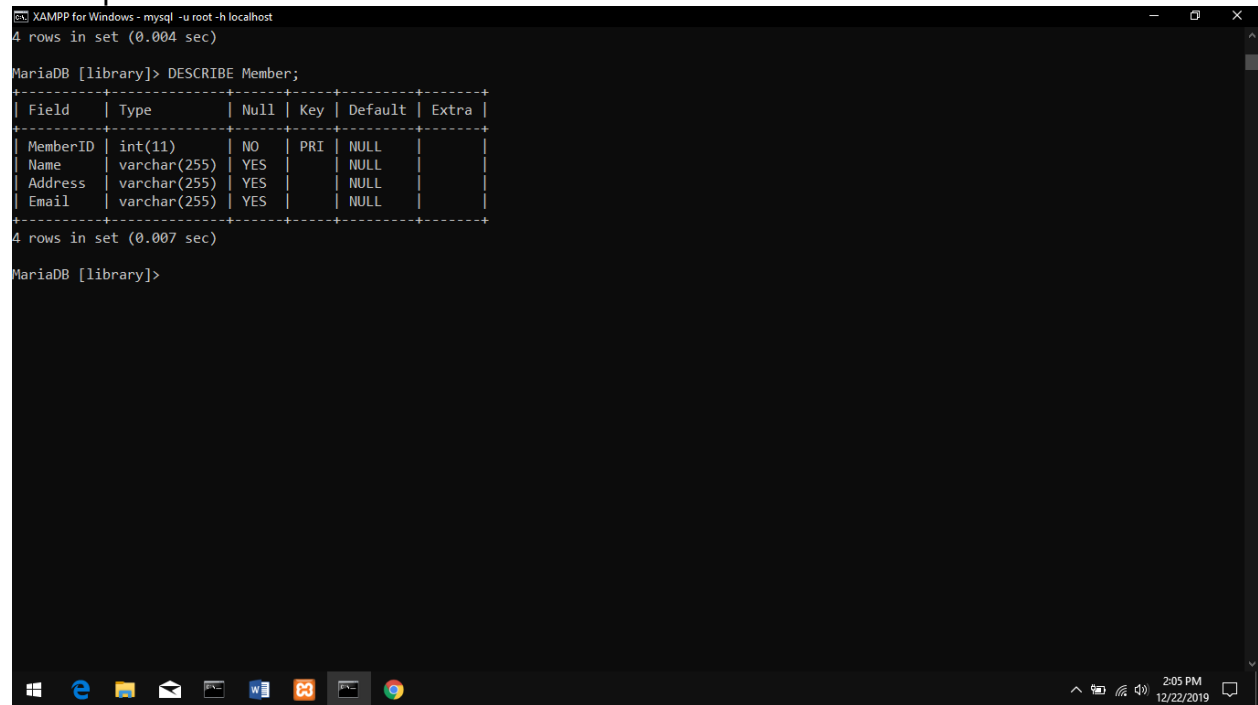


```
XAMPP for Windows - mysql -u root -h localhost
MariaDB [library]> DESCRIBE Books;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| BooksID | int(11) | NO | PRI | NULL | |
| Name | varchar(255) | YES | | NULL | |
| AuthorID | int(11) | YES | MUL | NULL | |
| LibraryID | int(11) | YES | MUL | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.004 sec)

MariaDB [library]>
```

Figure 11: Description of table 3

Description of table Member



```
XAMPP for Windows - mysql -u root -h localhost
4 rows in set (0.004 sec)

MariaDB [library]> DESCRIBE Member;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| MemberID | int(11) | NO | PRI | NULL | |
| Name | varchar(255) | YES | | NULL | |
| Address | varchar(255) | YES | | NULL | |
| Email | varchar(255) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.007 sec)

MariaDB [library]>
```

Figure 12: Description of table 4

Description of table Record

```
XAMPP for Windows - mysql -u root -h localhost
4 rows in set (0.004 sec)

MariaDB [library]> DESCRIBE Member;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| MemberID | int(11) | NO | PRI | NULL |  |
| Name | varchar(255) | YES |  | NULL |  |
| Address | varchar(255) | YES |  | NULL |  |
| Email | varchar(255) | YES |  | NULL |  |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.007 sec)

MariaDB [library]>
```

Figure 13: Description of table 5

3. Data Dictionary

A data dictionary reference contains a rundown of all documents in the database, the quantity of records in each record, and the names and sorts of each field. Most database the executives frameworks keep the information word reference escaped the clients to keep them from inadvertently annihilating its substance (Beal, n.d.)

Entity Name	Entity description	Column Name	Column description	Datatype	Length	Primary key	Foreign key	Nullable	Unique	Notes
Library	Library is a collection of books and other informative materials	Name	Name of the library	VARCHAR	255	False	False	True	False	
		Library_ID	Standard Identifier for Library registered, or ISO	INT		True	False	False	True	
		Address	Location where the Library is located	VARCHAR	255	False	False	True	False	
		Email	Mail ID of library	VARCHAR	255	False	False	True	True	
		Phone	Contact no. or phone no. of library	VARCHAR	255	False	False	True	True	

Table 1: Data Dictionary for Library

Entity name	Entity description	Column name	Column description	Data type	length	Primary key	Foreign key	Nullabl e	unique	notes
Books	The study materials found in library written by it's specific authors	Name	Name of the books	VARCHAR	255	False	False	True	True	
		Author_ID	ID of the author that uniquely identifies him, or ORC ID	INT		False	True	True	True	
		Books_ID	ISO numbers of books	INT		True	False	False	True	
		Library_ID	Standard Identifier for Library registered, or ISO	INT		False	True	True	True	

Table 2: Data Dictionaries for Books

Entity Name	Entity description	Column Name	Column description	Datatype	Length	Primary key	Foreign key	Nullable	Unique	Notes
Author	Name	Name of the author	VARCHAR	255	False	False	True	False		
	Address	Place where the author lives	VARCHAR	255	False	False	True	False		
	Email	Mail id of the author	VARCHAR	255	False	False	True	True		
	phone	Contact number of the author	VARCHAR	255	False	False	True	True		

Table 3: Data Dictionary for Author

Entity Name	Entity description	Column Name	Column description	Datatype	Length	Primary key	Foreign key	Nullable	Unique	Notes
member	The user, reader or the customer of the library	MemberID	The membership ID card	INT		True	False	True	True	
		Name	Name of the member	VARCHAR	255	False	False	True	False	
		Address	The residential place of the member	VARCHAR	255	False	False	True	False	
		Email	Mail ID of the member	VARCHAR	255	False	False	True	True	

Table 4: Data Dictionary for Member

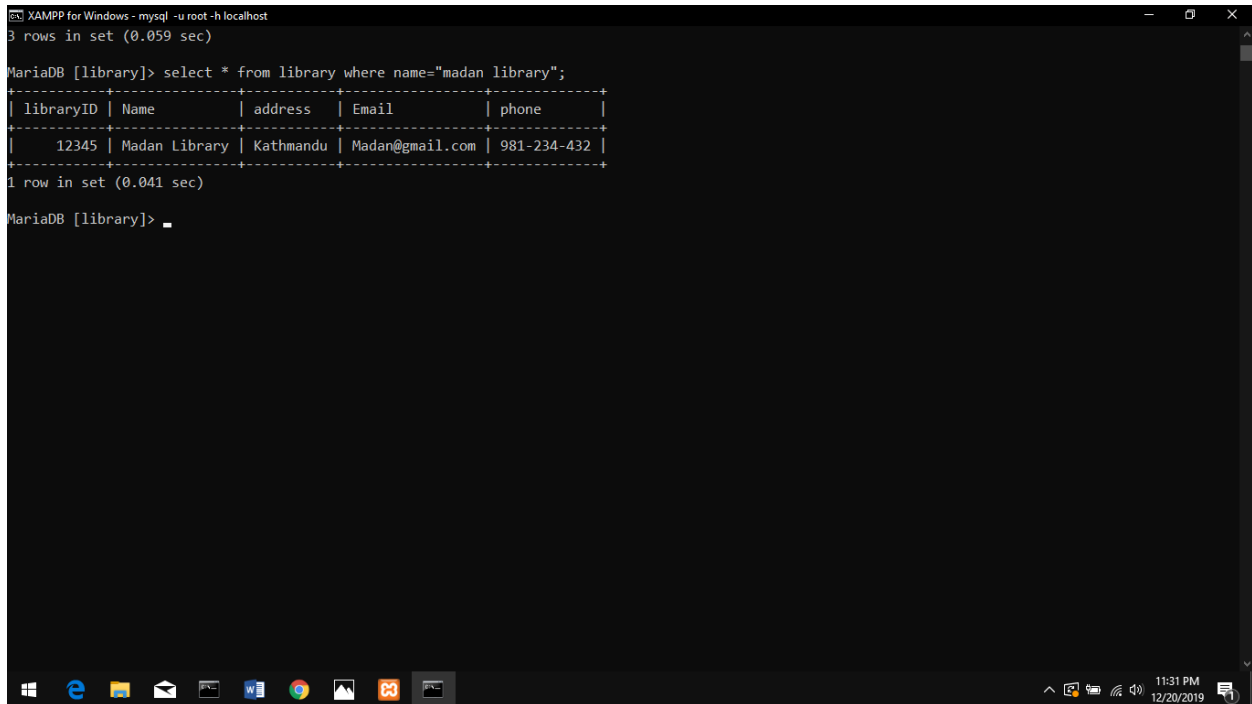
Entity Name	Entity description	Column Name	Column description	Datatype	Length	Primary key	Foreign key	Nullable	Unique	Notes
Record	The records of all the books and study materials taken by the readears	RecordID	The unique ID of different record books	INT		True	False	True	True	
		MemberID	The membership ID card	INT		False	True	True	True	
		BooksID	ISO numbers of books	INT		False	True	True	True	
		Date	Date when the books were taken and returned by the readers	VARCHAR	255	False	False	True	False	

Table 5: Data Dictionary for Record

4. Queries

Select * from Library where name="Madan library";

This query shows all the Libraries along with their data which has it's name as 'Madan Library'.



The screenshot shows a terminal window titled 'XAMPP for Windows - mysql -u root -h localhost'. The prompt is 'MariaDB [library]>'. The user has entered the query 'select * from library where name="madan library";'. The output shows '3 rows in set (0.059 sec)'. Below this, a table is displayed with the following data:

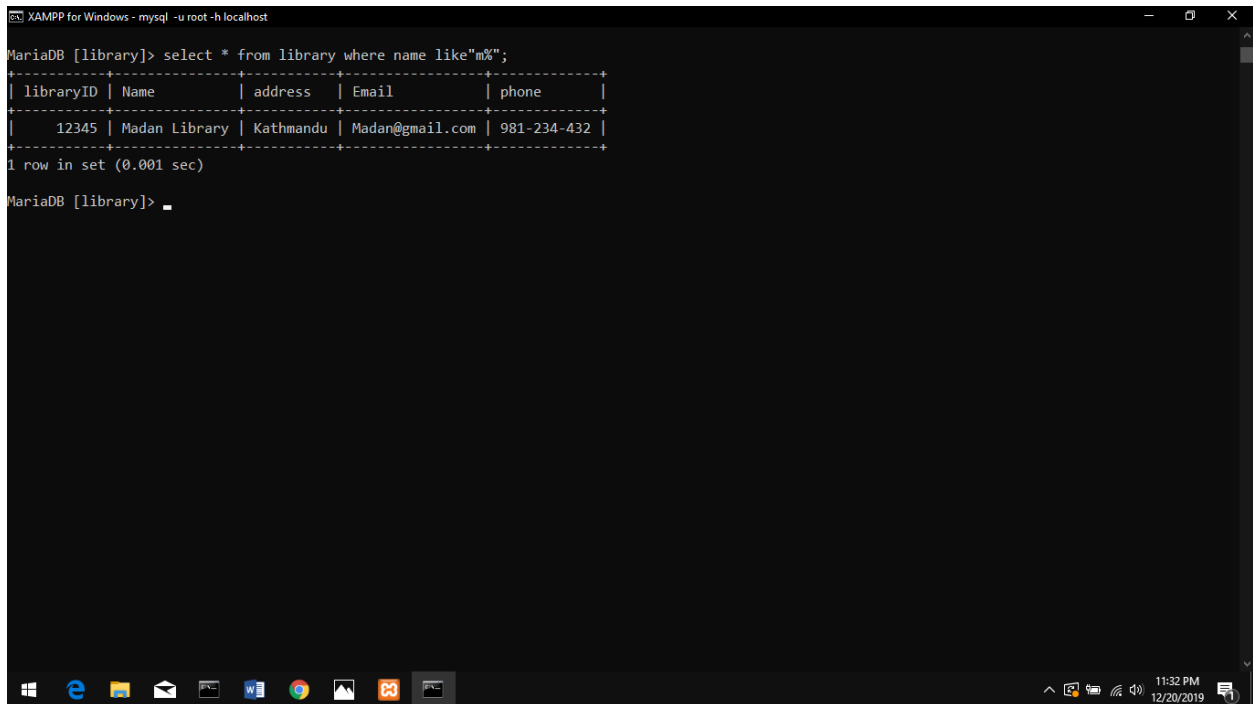
libraryID	Name	address	Email	phone
12345	Madan Library	Kathmandu	Madan@gmail.com	981-234-432

The prompt is now 'MariaDB [library]> _'.

Figure 14: Query 1

Select * from library where name like="m%";

This query gives all the data of the library whose name start with letter 'm'.



The screenshot shows a MySQL command prompt window titled "XAMPP for Windows - mysql -u root -h localhost". The prompt is "MariaDB [library]>". The user has entered the query "select * from library where name like 'm%';". The output is a table with 5 columns: libraryID, Name, address, Email, and phone. The table contains one row of data: libraryID 12345, Name Madan Library, address Kathmandu, Email Madan@gmail.com, and phone 981-234-432. Below the table, it says "1 row in set (0.001 sec)". The prompt is now "MariaDB [library]>".

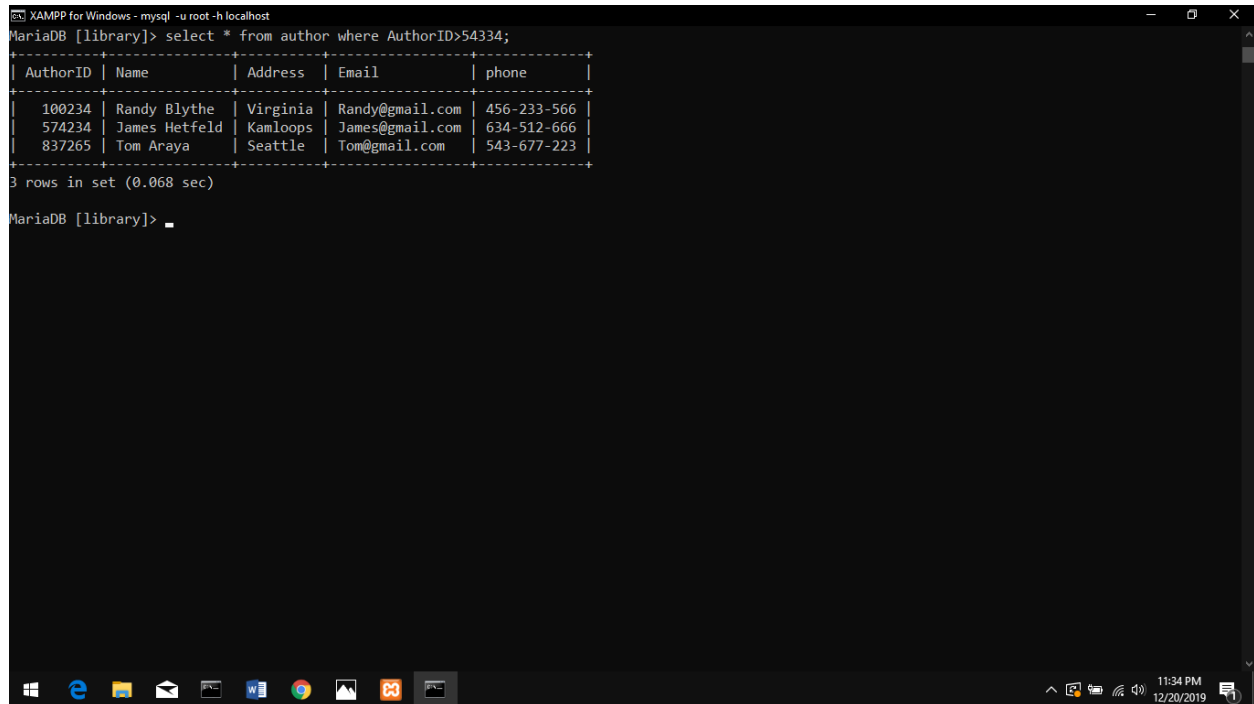
```
MariaDB [library]> select * from library where name like "m%";
+-----+-----+-----+-----+-----+
| libraryID | Name       | address | Email       | phone   |
+-----+-----+-----+-----+-----+
| 12345     | Madan Library | Kathmandu | Madan@gmail.com | 981-234-432 |
+-----+-----+-----+-----+-----+
1 row in set (0.001 sec)

MariaDB [library]>
```

Figure 15: Query 15

Select * from author where AuthorID>54334;

This query gives all the information of the authors whose AuthorID is greater than 54334.



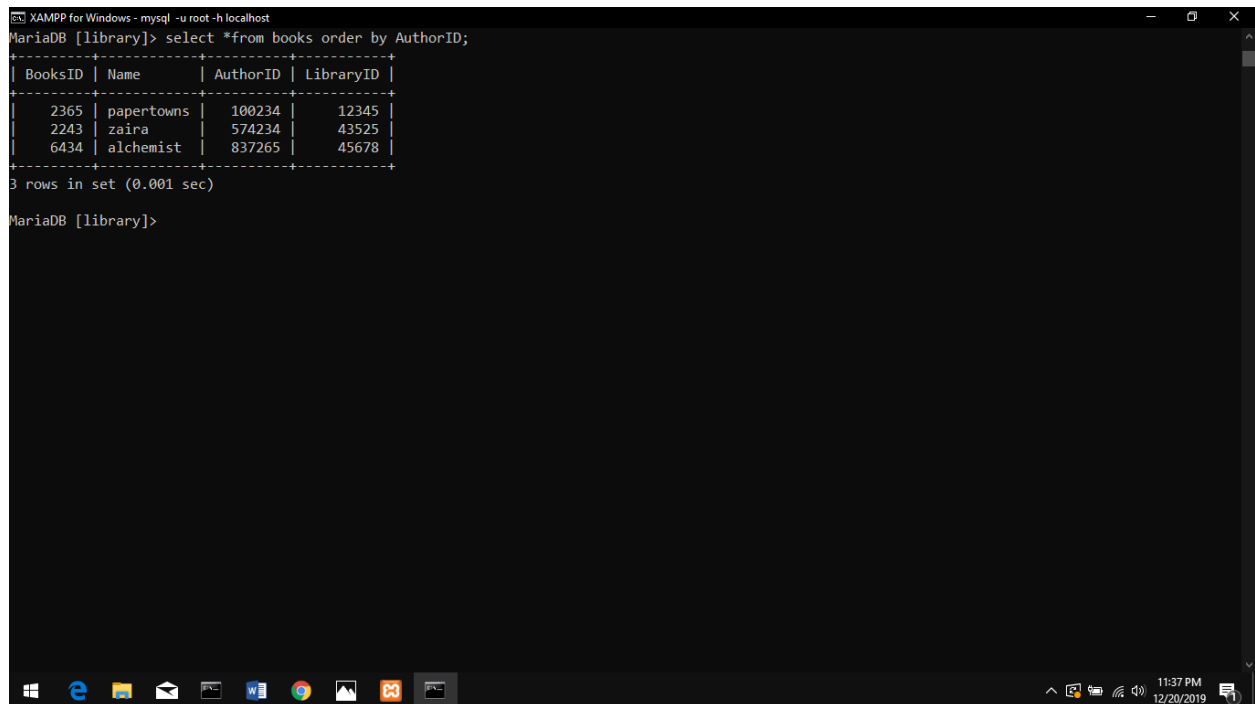
The screenshot shows a terminal window titled "XAMPP for Windows - mysql -u root -h localhost". The prompt is "MariaDB [library]>". The user has entered the query "select * from author where AuthorID>54334;". The output is a table with 5 columns: AuthorID, Name, Address, Email, and phone. There are 3 rows of data. Below the table, it says "3 rows in set (0.068 sec)". The prompt is now "MariaDB [library]>".

AuthorID	Name	Address	Email	phone
100234	Randy Blythe	Virginia	Randy@gmail.com	456-233-566
574234	James Hetfield	Kamloops	James@gmail.com	634-512-666
837265	Tom Araya	Seattle	Tom@gmail.com	543-677-223

Figure 16: Query 3

Select * from books order by AuthorID;

This query shows all the information of the authors with their AuthorID in descending order.



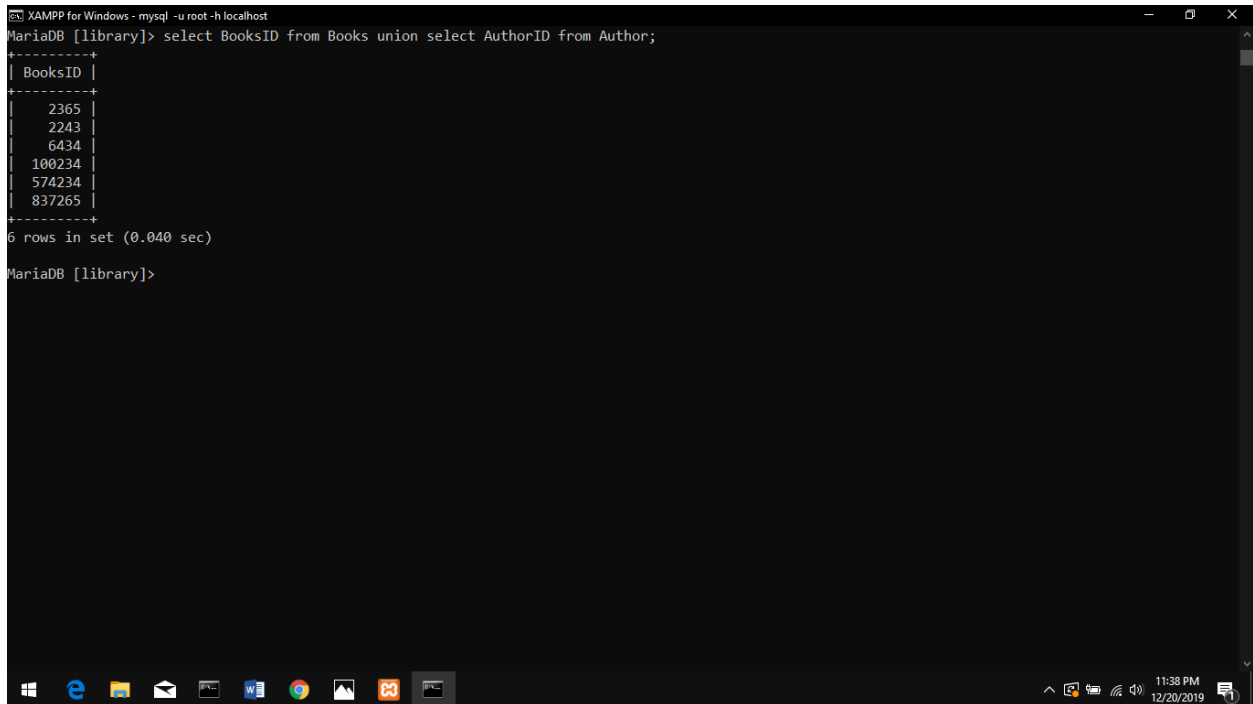
```
XAMPP for Windows - mysql -u root -h localhost
MariaDB [library]> select *from books order by AuthorID;
+-----+-----+-----+-----+
| BooksID | Name      | AuthorID | LibraryID |
+-----+-----+-----+-----+
| 2365    | papertowns | 100234    | 12345     |
| 2243    | zaira     | 574234    | 43525     |
| 6434    | alchemist  | 837265    | 45678     |
+-----+-----+-----+-----+
3 rows in set (0.001 sec)

MariaDB [library]>
```

Figure 17: Query 4

Select BooksID from Books union AuthorID from Author;

This query shows all the BooksID of the books and AuthorID of Author combined together



The screenshot shows a terminal window titled "XAMPP for Windows - mysql -u root -h localhost". The prompt is "MariaDB [library]>". The user has entered the query: "select BooksID from Books union select AuthorID from Author;". The output is a table with a single column "BooksID" containing six rows of values: 2365, 2243, 6434, 100234, 574234, and 837265. Below the table, it says "6 rows in set (0.040 sec)". The prompt is now "MariaDB [library]>". The Windows taskbar is visible at the bottom with various icons and a system clock showing 11:38 PM on 12/20/2019.

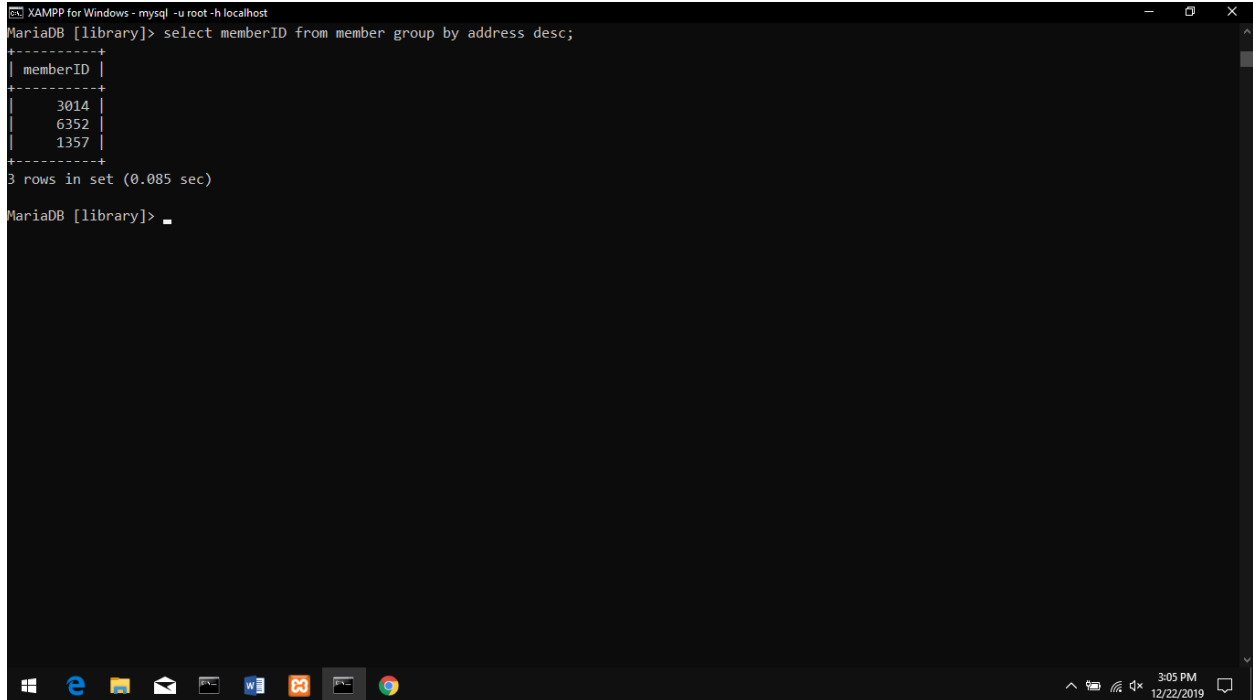
```
XAMPP for Windows - mysql -u root -h localhost
MariaDB [library]> select BooksID from Books union select AuthorID from Author;
+-----+
| BooksID |
+-----+
| 2365    |
| 2243    |
| 6434    |
| 100234  |
| 574234  |
| 837265  |
+-----+
6 rows in set (0.040 sec)

MariaDB [library]>
```

Figure 18: Query 5

Select memberID from member group by address;

This query shows all the memberID of the member grouped by their addresses in descending order.



The screenshot shows a terminal window titled 'XAMPP for Windows - mysql -u root -h localhost'. The prompt is 'MariaDB [library]>'. The user has entered the query 'select memberID from member group by address desc;'. The output is a table with one column 'memberID' and three rows of data: 3014, 6352, and 1357. Below the table, it says '3 rows in set (0.085 sec)'. The prompt is now 'MariaDB [library]> _'.

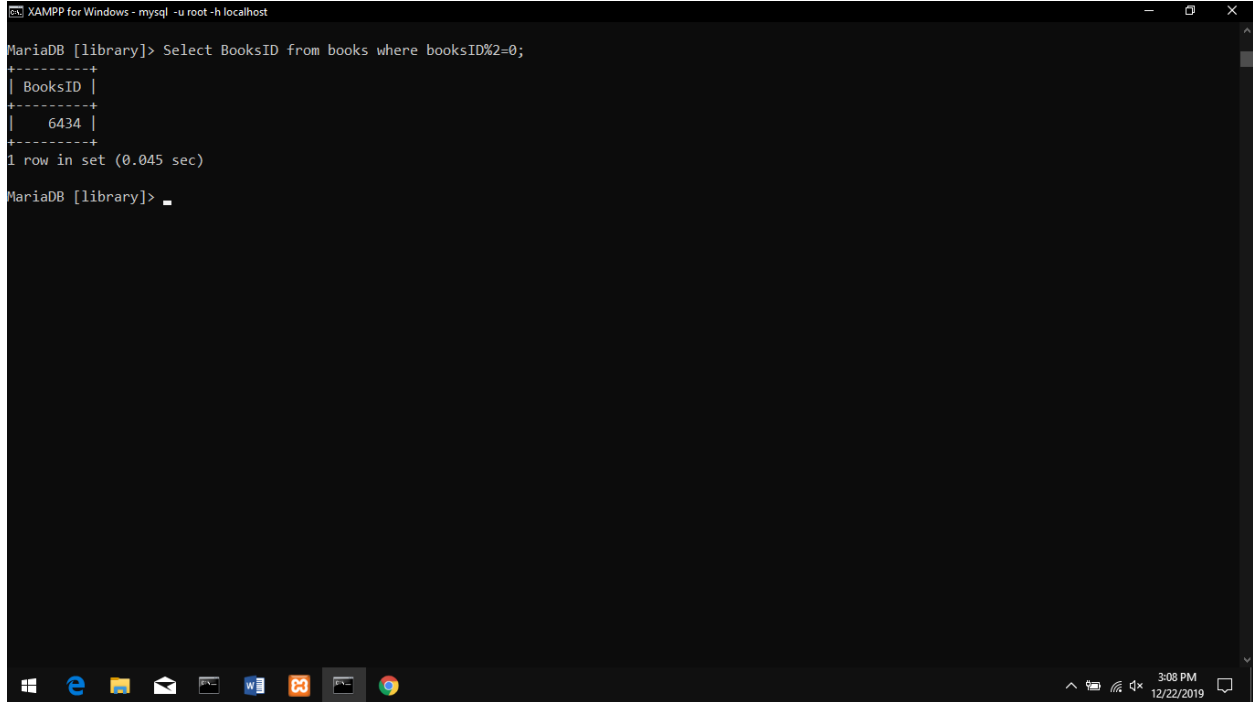
```
XAMPP for Windows - mysql -u root -h localhost
MariaDB [library]> select memberID from member group by address desc;
+-----+
| memberID |
+-----+
|      3014 |
|      6352 |
|      1357 |
+-----+
3 rows in set (0.085 sec)

MariaDB [library]> _
```

Figure 19: Query 6

Select BooksID from books where BooksID%2=0;

This query gives all the books ID with even numbers or booksID that can be divided with 2.

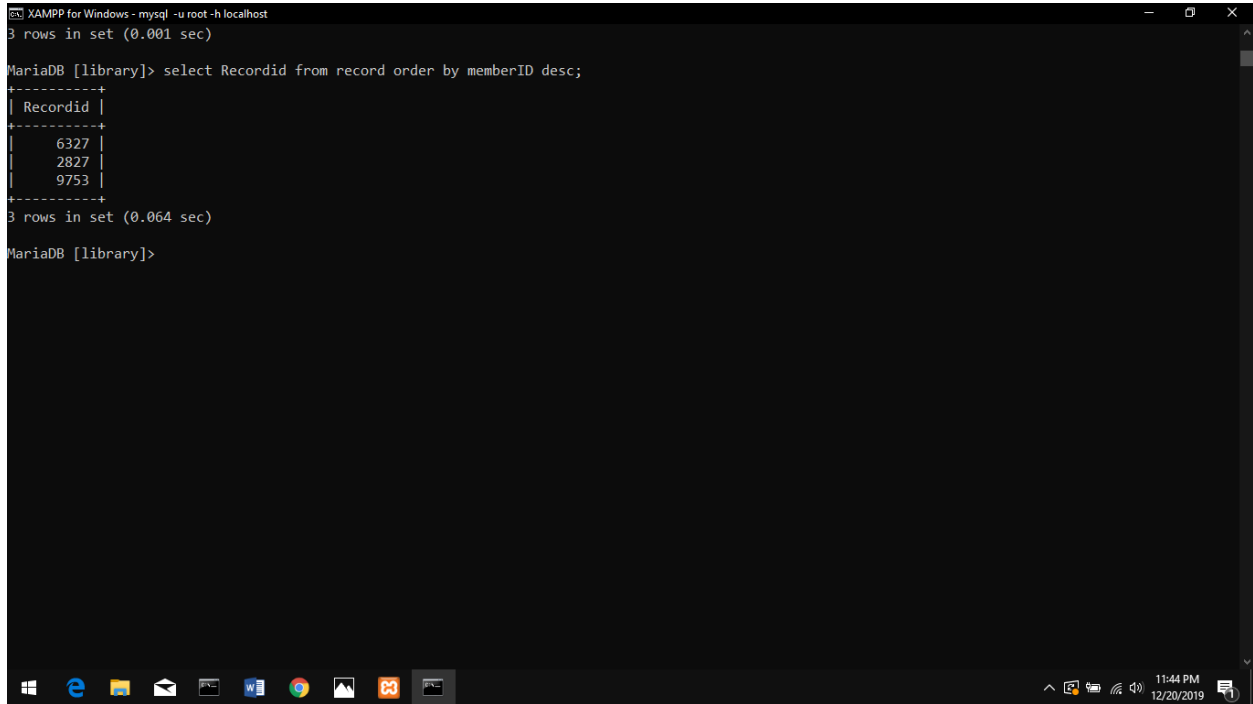
A screenshot of a MySQL command prompt window titled "XAMPP for Windows - mysql -u root -h localhost". The prompt shows the command "MariaDB [library]> Select BooksID from books where booksID%2=0;". The output is a table with one column "BooksID" and one row containing the value "6434". Below the table, it says "1 row in set (0.045 sec)". The prompt then shows "MariaDB [library]> _". The window has a standard Windows taskbar at the bottom with icons for File Explorer, Edge, and other applications. The system clock in the bottom right corner shows "3:08 PM 12/22/2019".

```
XAMPP for Windows - mysql -u root -h localhost
MariaDB [library]> Select BooksID from books where booksID%2=0;
+-----+
| BooksID |
+-----+
| 6434 |
+-----+
1 row in set (0.045 sec)
MariaDB [library]> _
```

Figure 20: Query 7

Select RecordID from Record order by memberID desc;

This query shows all the RecordID in which the memberID is in descending order.



The screenshot shows a terminal window titled "XAMPP for Windows - mysql -u root -h localhost". The prompt is "MariaDB [library]>". The user has entered the query "select Recordid from record order by memberID desc;". The output shows "3 rows in set (0.001 sec)" followed by a table with one column "Recordid" and three rows of values: 6327, 2827, and 9753. The prompt is now "MariaDB [library]>".

```
XAMPP for Windows - mysql -u root -h localhost
3 rows in set (0.001 sec)

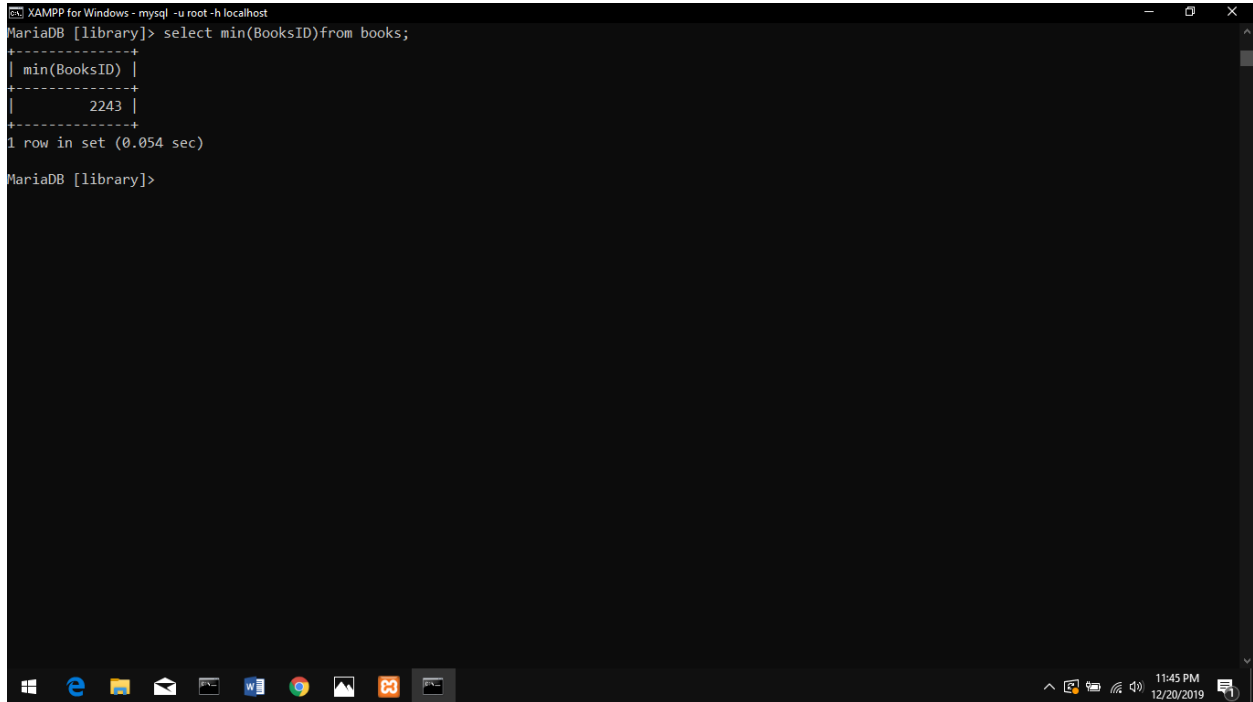
MariaDB [library]> select Recordid from record order by memberID desc;
+-----+
| Recordid |
+-----+
| 6327 |
| 2827 |
| 9753 |
+-----+
3 rows in set (0.064 sec)

MariaDB [library]>
```

Figure 21: Query 8

Select min(BooksID) from books;
the least or minimum number.

This query shows the booksID with



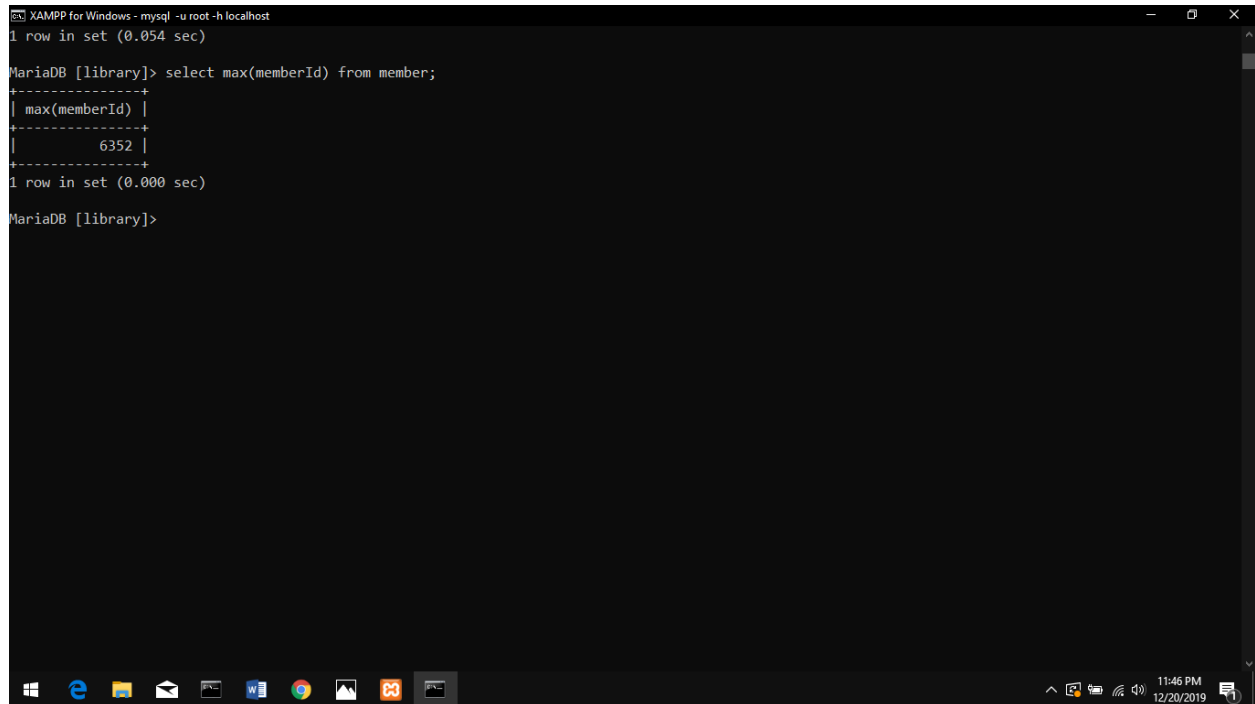
```
XAMPP for Windows - mysql -u root -h localhost
MariaDB [library]> select min(BooksID)from books;
+-----+
| min(BooksID) |
+-----+
|          2243 |
+-----+
1 row in set (0.054 sec)

MariaDB [library]>
```

Figure 22: Query 9

Select mac(memberID) from member;

This query shows the memberID with the highest or maximum value.



The screenshot shows a terminal window titled "XAMPP for Windows - mysql -u root -h localhost". The prompt is "MariaDB [library]>". The user has entered the query "select max(memberId) from member;". The output is a single row with the value 6352. The prompt is now "MariaDB [library]>".

```
XAMPP for Windows - mysql -u root -h localhost
1 row in set (0.054 sec)

MariaDB [library]> select max(memberId) from member;
+-----+
| max(memberId) |
+-----+
|          6352 |
+-----+
1 row in set (0.000 sec)

MariaDB [library]>
```

Figure 23: Query 10

5. Conclusion

After the completion of this coursework, I could find myself familiar to the knowledge of Database Management System (DBMS) along with the knowledge of MySQL. I was able to learn about the queries used in MySQL and use it too. I was able to learn about Entity Relationship Diagram (ERD) and Relational Database Management System (RDBMS). In addition, it enhanced my research skill. Along with this assignment, I was able to gain some knowledge how the Library database management system works. Most importantly, I learned about the Primary keys, foreign keys, and their use.

This module and coursework has helped me to learn how the database is managed in different organizations and companies. It also has managed in developing my research skill. However, there were some difficulties but they somehow taught me how to overcome the problems that might occur while making database. This coursework has helped me in every possible way it could.

6. References

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