



## **CPS593\_05: Database Design**

**(Division of Computer Science)**

## **Library Management System**

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# 1. INTRODUCTION

Library management System consist of list of records about management of details of students and the issues going on and also about books and all. We decided to create a database that can help organize and manage library. It is useful for any type of library but would work best for an extensive lending library with various types of media including books, magazines and journals. All the students are tracked using Student ID's and the members with member ID's. Similarly, all the books, magazines, journals and other media are recorded corresponding with their unique IDs. It would also benefit a library where record of various types of media including books, magazines, journals and other records are still on paper. As you can imagine for paper system, it makes figuring out how many books are overdue, or how many peoples owe fees, take quite a while to figure out for employees. Along with that, members can also use computers with the help of different authentication system. So that, they can browse as well as access some digital data like books, articles and many more. The system will hopefully also be more reliable and user friendly to everyone. Once system is in place, the benefits will greatly outweigh the costs of implementing the system since using computer to do most daily task will be much faster than a paper-based system.

## 2. TOOLS USED

### 1. LUCID CHART

We used Lucid chart as our Model Software for generating ERD and EER and reasons are:

1. Lucid chart is free Entity Relation diagram tool and offers free educational account for students and teachers with full access to its professional features.
2. Lucid chart also has a variety of other shape libraries to meet other diagramming needs.
3. It also generates ER diagrams from SQLs.
4. It also aims to save our time and allow us to innovate faster.
5. It can synchronize easily with Google Docs and Microsoft Office.

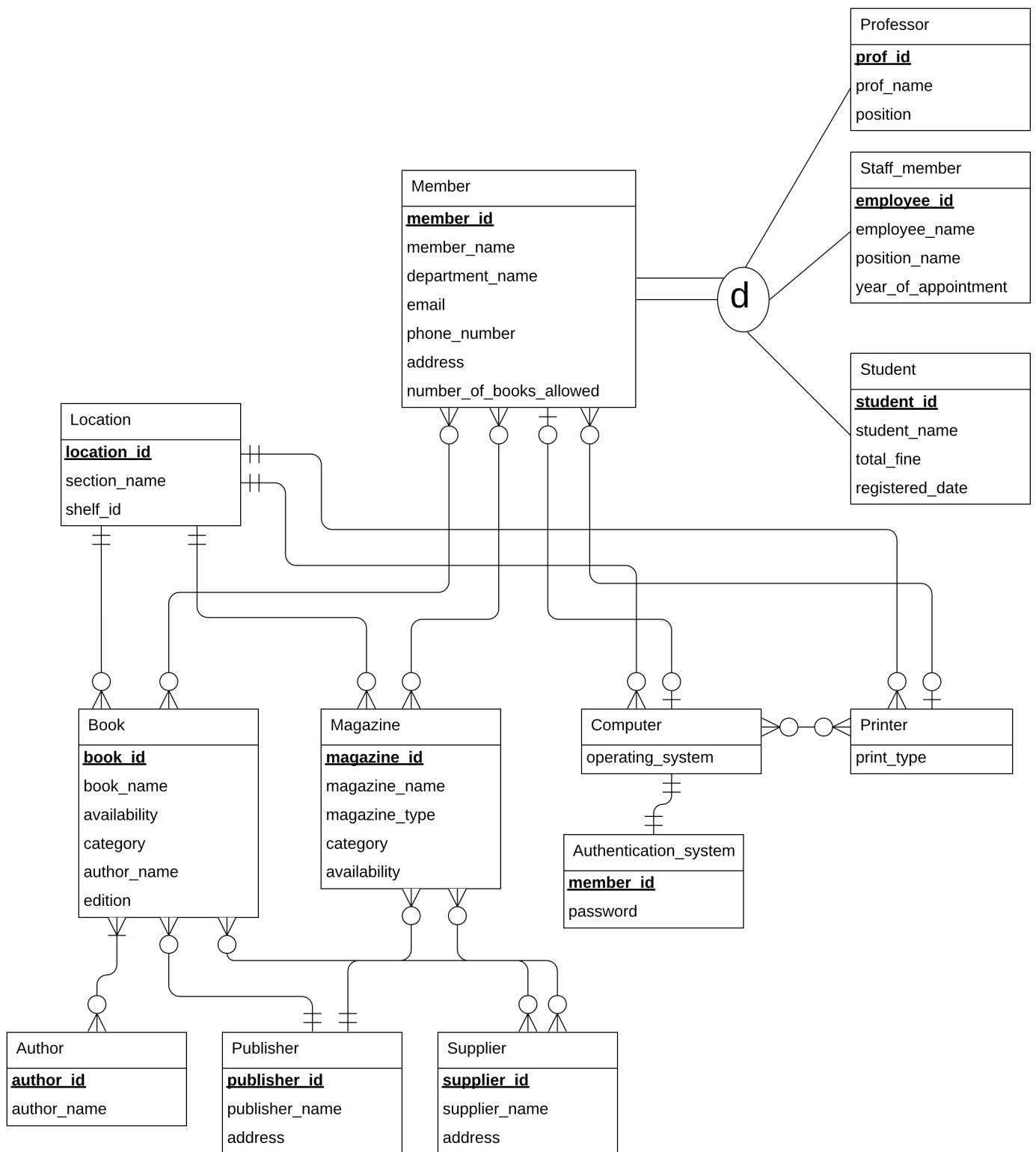
### 2. MySQL

We choose MySQL as our database management system for working on all the data and its respective queries and reasons are:

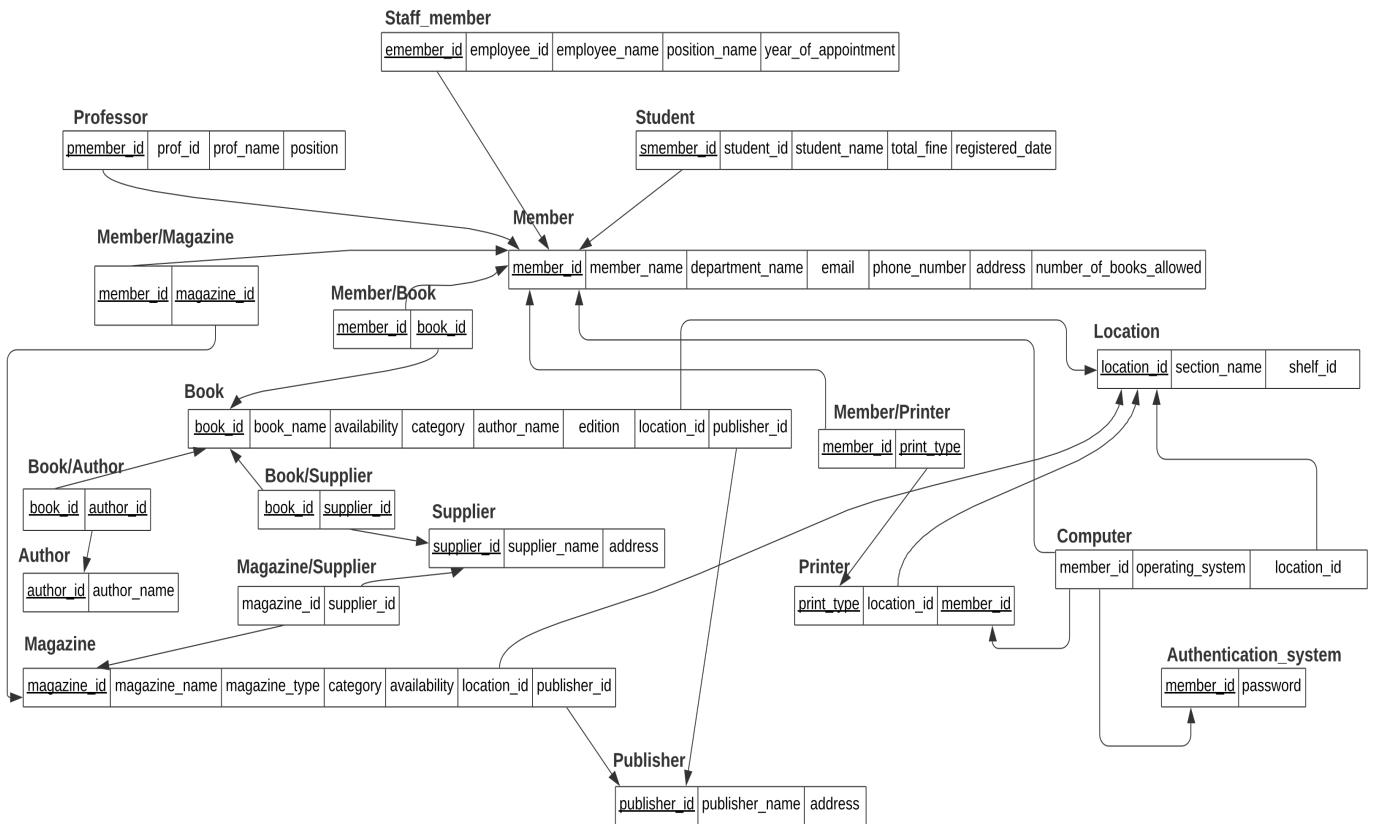
1. MySQL is free open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL).
2. Platform flexibility is main feature of MySQL which supports Windows, Linux, Unix
3. Also, it has connectors to languages like Java, C++, Python, PHP etc. since we are planning to use Java code for demonstrating connections to our database
4. From our point of view, MySQL is easy because it uses Structured Query Language which includes easy commands, anyone can understand and run to perform any particular operation like create, read, update, delete etc.

## LIBRARY MANAGEMENT SYSTEM

### 3. ENTITY RELATION DIAGRAM



## 4. RELATIONAL SCHEMA SHOWING REFERENTIAL INTEGRITY



## 5. SQL QUERIES TO CREATE TABLES AND INSERT DATA WITH OUTPUT

- CREATE TABLE MemberQ (Member\_ID int NOT NULL UNIQUE PRIMARY KEY, Member\_Name varchar(50), Department\_Name varchar(50), Email varchar(30), Phone\_Number varchar(10), Address varchar(255), Number\_of\_Books\_Allowed int);
  1. INSERT INTO MemberQ ( Member\_ID, Member\_Name, Department\_Name, Email, Phone\_Number, Address, Number\_of\_Books\_Allowed ) VALUES (2013001, 'Raj', 'Computer Science', 'sohani1@hawkmail.newpaltz.edu', 6453782349, 'New Paltz', 2);
  2. INSERT INTO MemberQ VALUES (2013004, 'Max', 'Computer Science', 'anderson2@hawkmail.newpaltz.edu', 4754262723, 'New Paltz', 3);
  3. INSERT INTO MemberQ VALUES (2017006, 'Mike', 'Management', 'hayden5@hawkmail.newpaltz.edu', 3658762789, 'New Paltz', 4);
  4. INSERT INTO MemberQ VALUES (2020002, 'Vishal', 'Physics', 'patil8@hawkmail.newpaltz.edu', 3658927893, 'New Paltz', 1);

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Primary Key Builder Test Validation Rules Modify Lookups Property Indexes Sheet Create Data Macros Rename/ Delete Macro Relationships Object Dependencies

Shows/Hide Field, Record & Table Events Relationships

All Tables Member X In1\_Member X In2\_Member X In3\_Member X In4\_Member X MemberQ X

Field Name Member\_ID Member\_Name Department\_Name Email Phone\_Number Address Number\_of\_Books\_Allowed

Data Type Number Short Text Short Text Short Text Short Text Short Text Number

Description (Optional)

MemberQ: Table

StudentQ SupplierQ PublisherQ BookQ MagazineQ PrinterQ

MemberQ: Table

General Lookup

Field Size Long Integer Format Decimal Places Auto Input Mask Caption Default Value Validation Rule Validation Text Required Yes Indexed Yes (No Duplicates) Text Align General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search

3:55 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard

Sort & Filter Records Find Text Formatting

Member X In1\_Member X In2\_Member X In3\_Member X In4\_Member X MemberQ X

Member\_ID Member\_Ne Department Email Phone\_Num Address Number\_of\_Books\_Allowed Click to Add

2013001 Raj Computer Scie sohani1@haw 6453782349 New Paltz 2

2013004 Max Computer Scie anderson2@haw 4754262723 New Paltz 3

2017006 Mike Management hayden5@haw 3658762789 New Paltz 4

2020002 Vishal Physics patil8@haw 3658927893 New Paltz 1

MemberQ: Table

StudentQ SupplierQ PublisherQ BookQ MagazineQ PrinterQ

Ready Record: 14 of 5 Type here to search

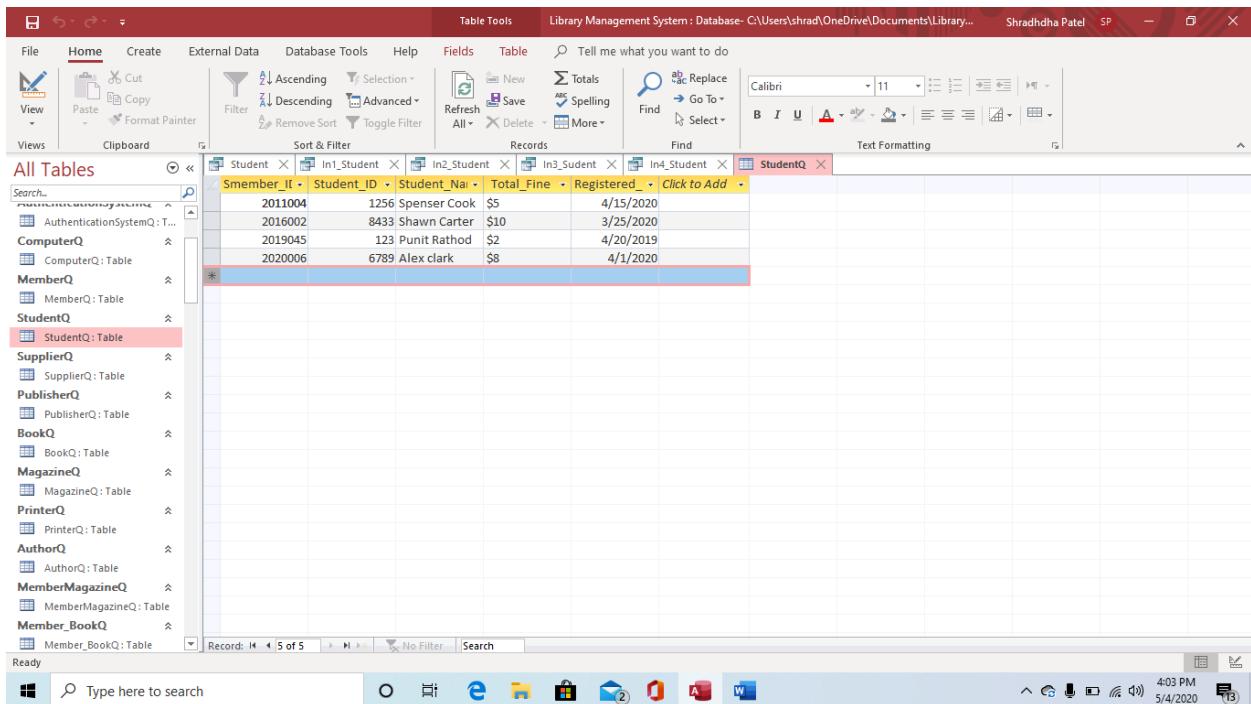
3:55 PM 5/4/2020

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE StudentQ (
   
Smember\_ID int NOT NULL UNIQUE PRIMARY KEY,
   
Student\_ID int NOT NULL,
   
Student\_Name varchar(50),
   
Total\_Fine varchar(10),
   
Registered\_Date date
 );
1. INSERT INTO StudentQ ( Smember\_ID, Student\_ID, Student\_Name, Total\_Fine, Registered\_Date )
   
VALUES (2019045, 0123, 'Punit Rathod', '\$2', '04-20-2019');
  2. INSERT INTO StudentQ ( Smember\_ID, Student\_ID, Student\_Name, Total\_Fine, Registered\_Date )
   
VALUES (2011004, 01256, 'Spenser Cook', '\$5', '04/15/2020');
  3. INSERT INTO StudentQ
   
VALUES ('2020006', '06789', 'Alex Clark', '\$8', '04/01/2020');
  4. INSERT INTO StudentQ
   
VALUES (2016002, 08433, 'Shawn Carter', '\$10', '03/25/2020');

The screenshot shows the Microsoft Access application in Design view. The 'StudentQ' table is selected. The 'Smember\_ID' field is highlighted in yellow, and the 'Registered\_Date' field is highlighted in red. The 'General' tab of the Field Properties dialog is open for the 'Smember\_ID' field, showing its data type as 'Long Integer' and its format as 'Auto'. The status bar at the bottom right shows the date as 5/4/2020 and the time as 4:03 PM.

## LIBRARY MANAGEMENT SYSTEM



The screenshot shows the Microsoft Access application interface. The 'All Tables' list on the left shows various tables: AuthenticationSystemQ, ComputerQ, ComputerQ:Table, MemberQ, MemberQ:Table, StudentQ, StudentQ:Table, SupplierQ, SupplierQ:Table, PublisherQ, PublisherQ:Table, BookQ, BookQ:Table, MagazineQ, MagazineQ:Table, PrinterQ, PrinterQ:Table, AuthorQ, AuthorQ:Table, MemberMagazineQ, MemberMagazineQ:Table, Member\_BookQ, and Member\_BookQ:Table. The 'StudentQ:Table' is highlighted. The main workspace displays the 'StudentQ' table with the following data:

SMember_ID	Student_ID	Student_Name	Total_Fine	Registered
2011004	1256	Spenser Cook	\$5	4/15/2020
2016002	8433	Shawn Carter	\$10	3/25/2020
2019045	123	Punit Rathod	\$2	4/20/2019
2020006	6789	Alex Clark	\$8	4/1/2020

- CREATE TABLE ProfessorQ (
   
PMember\_ID int NOT NULL PRIMARY KEY,
   
Prof\_ID int NOT NULL,
   
Prof\_Name varchar(50),
   
Position varchar(50)
 );
1. INSERT INTO ProfessorQ ( PMember\_ID, Prof\_ID, Prof\_Name, [Position] )
   
VALUES (1997091, 058, 'Dr. Nathan Smith', 'Associate Professor');
  2. INSERT INTO ProfessorQ ( PMember\_ID, Prof\_ID, Prof\_Name, [Position] )
   
VALUES (2009104, 778, 'Dr. Jackson Stewart', 'Assistant Professor');
  3. INSERT INTO ProfessorQ
   
VALUES (2008806, 701, 'Dr. Aaron Brown', 'Associate Professor');
  4. INSERT INTO ProfessorQ
   
VALUES (2014012, 969, 'Dr. Frankie Wright', 'Assistant Professor');

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Primary Key Builder Test Validation Rules Insert Rows Delete Rows Modify Lookups Property Indexes Sheet Create Data Rename/ Macros Relationships Object Dependencies

Tools Show/Hide Field, Record & Table Events Relationships

All Tables

Search... LocationQ LocationQ: Table ProfessorQ ProfessorQ: Table Staff\_MemberQ Staff\_MemberQ: Table AuthenticationSystemQ AuthenticationSystemQ: Table ComputerQ ComputerQ: Table MemberQ MemberQ: Table StudentQ StudentQ: Table SupplierQ SupplierQ: Table PublisherQ PublisherQ: Table BookQ BookQ: Table MagazineQ MagazineQ: Table PrinterQ PrinterQ: Table

Field Name PMember\_ID Data Type Number Description (Optional)

Prof\_ID Number Prof\_Name Short Text Position Short Text

Field Properties

General Lookup

Field Size Long Integer Format Auto Decimal Places Auto Input Mask Caption Default Value Validation Rule Validation Text Required Yes Indexed Yes (No Duplicates) Text Align General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search

4:06 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Filter Ascending Selection Descending Advanced Remove Sort Toggle Filter

Records

Find Text Formatting

Sort & Filter

Table

Professor In1\_Professor In2\_Professor In3\_Professor In4\_Professor ProfessorQ

PMember\_ID Prof\_ID Prof\_Name Position Click to Add

1997091 58 Dr. Nathan Smi Associate Prof

2008806 701 Dr. Aaron Brow Associate Prof

2009104 778 Dr. Jackson Ste Assistant Prof

2014012 969 Dr. Frankie Wri Assistant Prof

Records: 1 5 of 5 No Filter Search

Type here to search

4:06 PM 5/4/2020

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE Staff\_MemberQ(
   
Emember\_ID int NOT NULL PRIMARY KEY,
   
Employee\_ID int NOT NULL,
   
Employee\_Name varchar(50),
   
Position\_Name varchar(50),
   
Year\_of\_Appointment int
 );
  1. INSERT INTO Staff\_MemberQ ( Emember\_ID, Employee\_ID, Employee\_Name, Position\_Name, Year\_of\_Appointment )  
VALUES (2018034, 8123, 'Luke Powell', 'Information Assistant', '2018');
  2. INSERT INTO Staff\_MemberQ  
VALUES (2019604, 2556, 'Harvey Morris', 'Library Assistant', '2019');
  3. INSERT INTO Staff\_MemberQ  
VALUES (2017306, 50789, 'Stanley Scott', 'Library Clerk', 2017);
  4. INSERT INTO Staff\_MemberQ  
VALUES (2020502, 7135, 'Charles Adams', 'Program Assistant', 2020);

The screenshot shows the Microsoft Access Table Design View for the 'Staff\_MemberQ' table. The table structure is as follows:

Field Name	Data Type
Emember_ID	Number
Employee_ID	Number
Employee_Name	Short Text
Position_Name	Short Text
Year_of_Appointment	Number

The 'Emember\_ID' field is currently selected. The 'General' tab of the Field Properties dialog is open, showing the following settings:

- Field Size: Long Integer
- Format: Auto
- Decimal Places: 0
- Input Mask:
- Caption:
- Default Value:
- Validation Rule:
- Validation Text:
- Required: Yes
- Indexed: Yes (No Duplicates)
- Text Align: General

A status bar at the bottom right of the screen shows the time as 4:14 PM and the date as 5/4/2020.

## LIBRARY MANAGEMENT SYSTEM

Member_ID	Employee_ID	Employee_Name	Position_Name	Year_of_App
2017306	50789	Stanley Scott	Library Clerk	2017
2018034	8123	Luke Powell	Information Assistant	2018
2019604	2556	Harvey Morris	Library Assistant	2019
2020502	7135	Charles Adams	Program Assistant	2020

- CREATE TABLE LocationQ(

Location\_ID varchar(50) NOT NULL PRIMARY KEY,  
 Section\_Name varchar(50),  
 Shelf\_ID varchar(10)  
 );

1. INSERT INTO LocationQ ( Location\_ID, Section\_Name, Shelf\_ID )  
 VALUES ('L124', 'Technical Processing Section', 'SH11');
2. INSERT INTO LocationQ  
 VALUES ('L345', 'Circulation Section', 'SH12');
3. INSERT INTO LocationQ  
 VALUES ('L982', 'Periodical Section', 'SH13');
4. INSERT INTO LocationQ  
 VALUES ('L632', 'Reference Section', 'SH14');

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables LocationQ Field Name Field Properties

LocationQ Table Location\_ID Short Text  
Section\_Name Short Text  
Shelf\_ID Short Text

General Lookup Field Size 50  
Format  
Input Mask  
Caption  
Default Value  
Validation Rule  
Validation Text  
Required Yes  
Allow Zero Length Yes  
Indexed Yes (No Duplicates)  
Unicode Compression No  
IME Mode No Control  
IME Sentence Mode None  
Text Align General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search

6:05 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables LocationQ Section\_Name Shelf\_ID Click to Add

LocationQ Table Location\_ID Section\_Name Shelf\_ID Click to Add

L124 Technical Processing Section SH11  
L345 Circulation Section SH12  
L632 Reference Section SH14  
L982 Periodical Section SH13

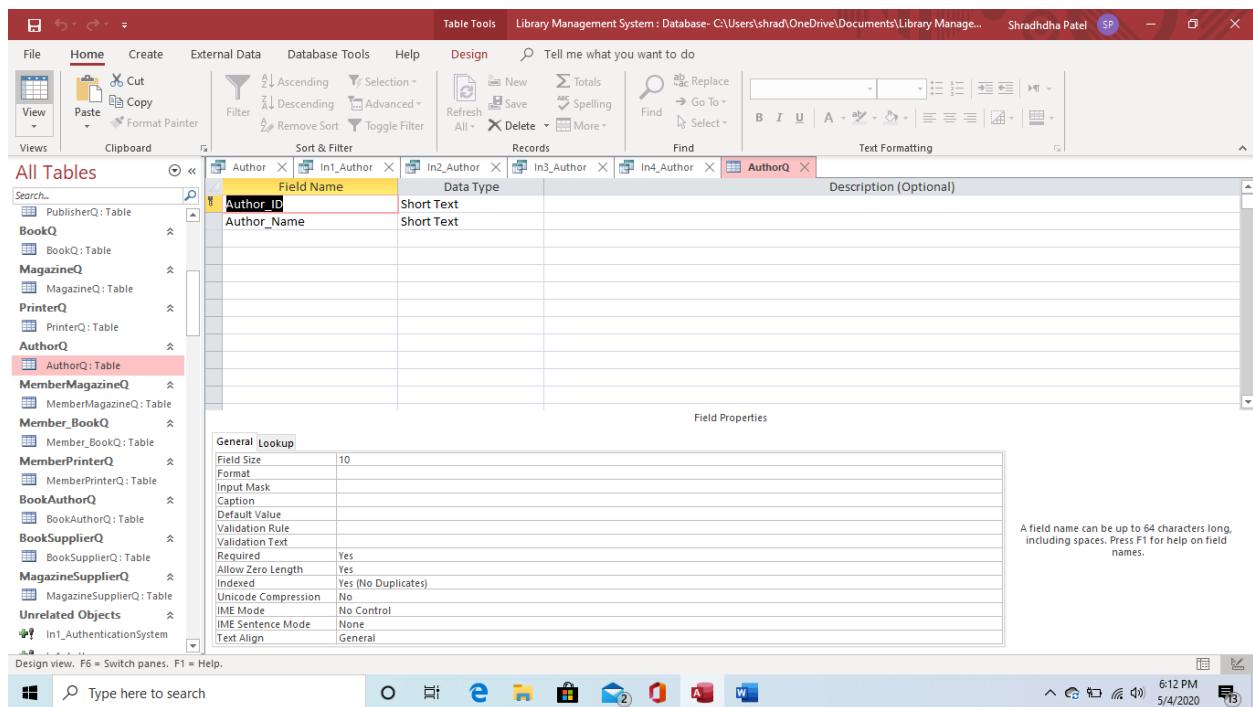
Record: 14 of 5 Search

Type here to search

6:05 PM 5/4/2020

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE AuthorQ (  
Author\_ID varchar(10) NOT NULL PRIMARY KEY,  
Author\_Name varchar(50)  
);
1. INSERT INTO AuthorQ ( Author\_ID, Author\_Name )  
VALUES ('AU11', 'Herbert Schildt');
  2. INSERT INTO AuthorQ  
VALUES ('AU12', 'Eric Verzuh');
  3. INSERT INTO AuthorQ  
VALUES ('AU13', 'Steven Agabegi');
  4. INSERT INTO AuthorQ  
VALUES ('AU14', 'Nicholas carter');



## LIBRARY MANAGEMENT SYSTEM

The screenshot shows the Microsoft Access application interface. The 'All Tables' view is open, and the 'AuthorQ' table is selected. The table contains four records:

Author_ID	Author_Name
AU11	Herbert Schildt
AU12	Eric Verzuh
AU13	Steven Agabegi
AU14	Nicholas Carter

- CREATE TABLE SupplierQ (
   
Supplier\_ID varchar(10) NOT NULL PRIMARY KEY,
   
Supplier\_Name varchar(50),
   
Address varchar(255)
 );
1. INSERT INTO SupplierQ ( Supplier\_ID, Supplier\_Name, Address )
   
VALUES ('SU11', 'Bella Book Distribution', 'Main Street Poughkeepsie');
  2. INSERT INTO SupplierQ
   
VALUES ('SU12', 'Baker and Taylor Book Services', 'Genesse Street, Kingston');
  3. INSERT INTO SupplierQ
   
VALUES ('SU13', 'New Paltz Distribution', 'Southside Avenue New Paltz');
  4. INSERT INTO SupplierQ
   
VALUES ('SU14', 'Northeast Book Services', 'Fifth Avenue Albany');

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables Supplier X In1\_Supplier X In2\_supplier X In3\_Supplier X In4\_Supplier X SupplierQ X

Field Name Data Type Description (Optional)

Supplier\_ID Short Text

Supplier\_Name Short Text

Address Short Text

Field Properties

General Lookup

Field Size 10

Format

Input Mask

Caption

Default Value

Validation Rule

Validation Text

Required Yes

Allow Zero Length Yes

Indexed Yes (No Duplicates)

Unicode Compression No

IME Mode No Control

IME Sentence Mode None

Text Align General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search

6:17 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables Supplier X In1\_Supplier X In2\_supplier X In3\_Supplier X In4\_Supplier X SupplierQ X

Supplier\_ID Supplier\_Name Address Click to Add

SU11 Bella Book Distribution Main Street Poughkeepsie

SU12 Baker and Taylor Book Services Genesse Street,Kingston

SU13 New Paltz Distribution Southside Avenue New Paltz

SU14 Northeast Book Services Fifth Avenue Albany

SupplierQ

Supplier\_ID Supplier\_Name Address Click to Add

SU11 Bella Book Distribution Main Street Poughkeepsie

SU12 Baker and Taylor Book Services Genesse Street,Kingston

SU13 New Paltz Distribution Southside Avenue New Paltz

SU14 Northeast Book Services Fifth Avenue Albany

Type here to search

6:18 PM 5/4/2020

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE PublisherQ (

Publisher\_ID VARCHAR(10) NOT NULL PRIMARY KEY,  
 Publisher\_Name varchar(50),  
 Address varchar(255)  
 );

1. INSERT INTO PublisherQ ( Publisher\_ID, Publisher\_Name, Address )  
 VALUES ('P0268', 'Random House', 'Herkimer Street Syracuse');

2. INSERT INTO PublisherQ  
 VALUES ('P0653', 'Pearson', 'Fourth Avenue New York');

3. INSERT INTO PublisherQ  
 VALUES ('P0925', 'McGraw-Hill Education', 'Chestnut street,Kingston');

4. INSERT INTO PublisherQ  
 VALUES ('P0563', 'Harper Collins', 'Hawk street New Paltz');

The screenshot shows the Microsoft Access Table Design View for the 'PublisherQ' table. The table structure is as follows:

Field Name	Data Type	Description (Optional)
Publisher_ID	Short Text	
Publisher_Name	Short Text	
Address	Short Text	

The 'Publisher\_ID' field is currently selected, and its properties are displayed in the 'Field Properties' pane:

- General: Field Size is 10, Required is Yes, Allow Zero Length is Yes, Indexed is Yes (No Duplicates), and Text Align is General.
- Lookup: Validation Rule is empty.

A tooltip on the right side of the screen states: "A field name can be up to 64 characters long, including spaces. Press F1 for help on field names." The status bar at the bottom right shows the time as 6:22 PM and the date as 5/4/2020.

## LIBRARY MANAGEMENT SYSTEM

The screenshot shows the Microsoft Access application interface. The main window displays the 'Publisher' table with the following data:

Publisher_ID	Publisher_Name	Address
P0268	Random House	Herkimer Street Syracuse
P0563	Harper Collins	Hawk street New Paltz
P0653	Pearson	Fourth Avenue New York
P0925	McGraw-Hill Education	Chestnut street, Kingston

The 'BookQ' table is highlighted in the navigation pane on the left. The status bar at the bottom shows the date and time: 6:22 PM 5/4/2020.

- CREATE TABLE BookQ (
 Book\_ID VARCHAR(10) NOT NULL PRIMARY KEY,
 Book\_Name varchar(50),
 Availability varchar(50),
 Category varchar(50),
 Author\_Name varchar(50),
 Edition varchar(50),
 Location\_ID varchar(50) NOT NULL,
 Publisher\_ID VARCHAR(10) NOT NULL,
 CONSTRAINT FK\_BookQ
 FOREIGN KEY (Location\_ID) REFERENCES LocationQ(Location\_ID),
 FOREIGN KEY (Publisher\_ID) REFERENCES PublisherQ(Publisher\_ID)
 );

1. INSERT INTO BookQ ( Book\_ID, Book\_Name, Availability, Category, Author\_Name, Edition, Location\_ID, Publisher\_ID )
   
VALUES ('B0984', 'Java- A beginner's guide', 'YES', 'Computer and Technology', 'Herbert Schildt', 'Eighth Edition', 'L124', 'P0268');

2. INSERT INTO BookQ
   
VALUES ('B0023', 'The fast forward MBA in Project Management', 'YES', 'Management and Business Administration', 'Eric Verzuh', 'Fifth Edition', 'L345',

## LIBRARY MANAGEMENT SYSTEM

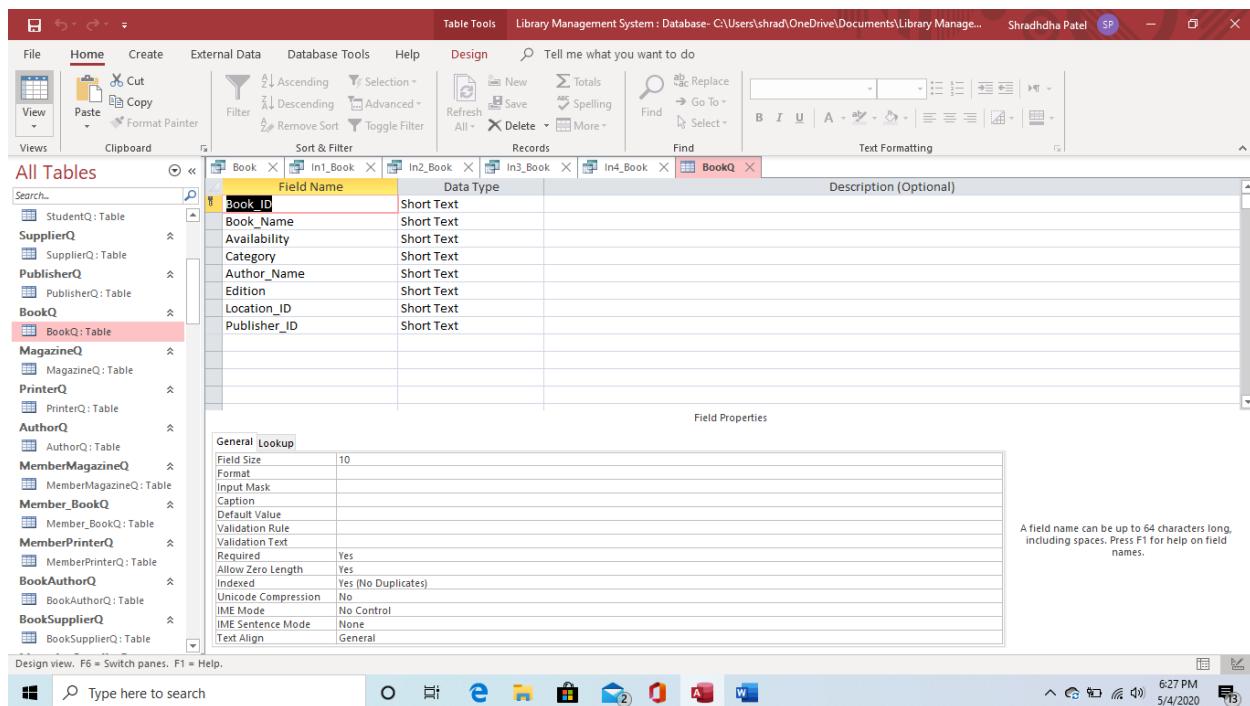
'P0653');

### 3. INSERT INTO BookQ

VALUES ('B0743', 'Step up to Medicine', 'YES', 'Medical', 'Steven Agabegi', 'Second edition', 'L982', 'P0925');

### 4. INSERT INTO BookQ

VALUES ('B0921', 'Music theory- from beginners to experts', 'YES', 'Art and Music', 'Nicholas carter', 'First Edition', 'L632', 'P0563');



The screenshot shows the Microsoft Access Table Design View for the 'BookQ' table. The 'Field Name' column is highlighted in yellow. The table structure is as follows:

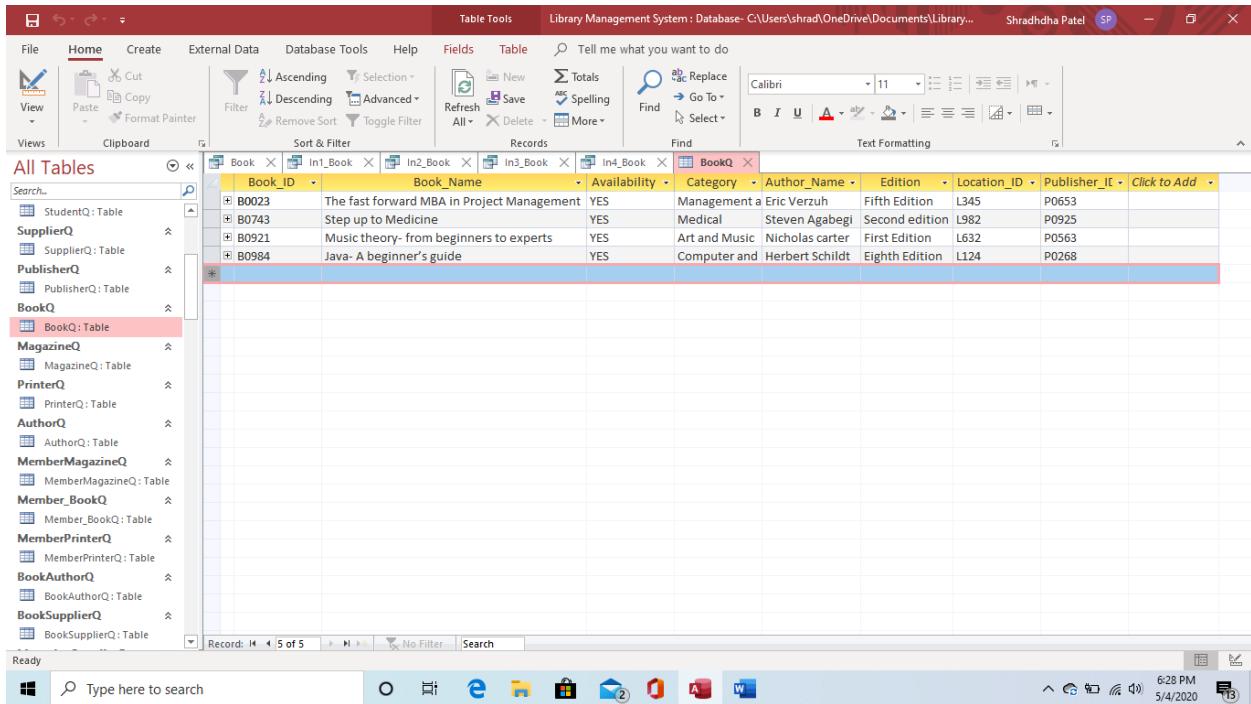
Field Name	DataType	Description (Optional)
Book_ID	Short Text	
Book_Name	Short Text	
Availability	Short Text	
Category	Short Text	
Author_Name	Short Text	
Edition	Short Text	
Location_ID	Short Text	
Publisher_ID	Short Text	

The 'General' tab of the 'Field Properties' dialog is open for the 'Book\_ID' field, showing the following settings:

- Field Size: 10
- Format:
- Input Mask:
- Caption:
- Default Value:
- Validation Rule:
- Validation Text:
- Required: Yes
- Allow Zero Length: Yes
- Indexed: Yes (No Duplicates)
- Unicode Compression: No
- IME Mode: No Control
- IME Sentence Mode: None
- Text Align: General

A note in the bottom right corner of the properties pane states: "A field name can be up to 64 characters long, including spaces. Press F1 for help on field names."

## LIBRARY MANAGEMENT SYSTEM



The screenshot shows the Microsoft Access application interface. The title bar reads "LIBRARY MANAGEMENT SYSTEM". The ribbon is visible with tabs like File, Home, Create, External Data, Database Tools, Help, Fields, and Table. The "Table" tab is selected. The main area displays the "BookQ" table in Datasheet view. The table structure is as follows:

Book_ID	Book_Name	Availability	Category	Author_Name	Edition	Location_ID	Publisher_ID	Click to Add
B0023	The fast forward MBA in Project Management	YES	Management	Eric Verzuh	Fifth Edition	L345	P0653	
B0743	Step up to Medicine	YES	Medical	Steven Agabegi	Second edition	L982	P0925	
B0921	Music theory- from beginners to experts	YES	Art and Music	Nicholas carter	First Edition	L632	P0563	
B0984	Java- A beginner's guide	YES	Computer and	Herbert Schildt	Eighth Edition	L124	P0268	

The left pane shows a list of tables: StudentQ, SupplierQ, SupplierQ, PublisherQ, PublisherQ, BookQ, BookQ, MagazineQ, MagazineQ, PrinterQ, PrinterQ, AuthorQ, AuthorQ, MemberMagazineQ, MemberMagazineQ, Member\_BookQ, Member\_BookQ, MemberPrinterQ, MemberPrinterQ, BookAuthorQ, BookAuthorQ, BookSupplierQ, BookSupplierQ. The "BookQ" table is selected and highlighted in pink.

- CREATE TABLE Member\_BookQ(  
 Member\_ID int NOT NULL UNIQUE,  
 Book\_ID VARCHAR(10) NOT NULL,  
 CONSTRAINT FK\_Member\_BookQ  
 FOREIGN KEY (Member\_ID) REFERENCES MemberQ(Member\_ID),  
 FOREIGN KEY (Book\_ID) REFERENCES BookQ(Book\_ID)  
 );
1. INSERT INTO Member\_BookQ ( Member\_ID, Book\_ID )  
 VALUES (2013001, 'B0984');
  2. INSERT INTO Member\_BookQ ( Member\_ID, Book\_ID )  
 VALUES (2013004, 'B0023');
  3. INSERT INTO Member\_BookQ  
 VALUES (2017006, 'B0743');
  4. INSERT INTO Member\_BookQ  
 VALUES (2020002, 'B0921');

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables Member\_Book X In1\_MemberBook X In2\_MemberBook X In3\_MemberBook X In4\_MemberBook X Member\_BookQ X

Field Name Member\_ID Book\_ID Data Type Number Short Text Description (Optional)

StudentQ: Table SupplierQ: Table PublisherQ: Table BookQ: Table MagazineQ: Table PrinterQ: Table AuthorQ: Table MemberMagazineQ: Table Member\_BookQ: Table MemberPrinterQ: Table MemberPrinterQ: Table BookAuthorQ: Table BookSupplierQ: Table

Member\_BookQ: Table

General Lookup

Field Size Long Integer Format Decimal Places Auto Input Mask Caption Default Value Validation Rule Validation Text Required Yes Indexed Yes (No Duplicates) Text Align General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search 6:33 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables Member\_Book X In1\_MemberBook X In2\_MemberBook X In3\_MemberBook X In4\_MemberBook X Member\_BookQ X

Member\_ID Book\_ID

2013001 B0984  
2013004 B0023  
2017006 B0743  
2020002 B0921

Member\_BookQ: Table

Record: 14 of 5 Search

Type here to search 6:33 PM 5/4/2020

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE BookAuthorQ (
 Book\_ID VARCHAR(10) NOT NULL ,
 Author\_ID varchar(10) NOT NULL,
 CONSTRAINT FK\_BookAuthorQ
 FOREIGN KEY (Book\_ID) REFERENCES BookQ(Book\_ID),
 FOREIGN KEY (Author\_ID) REFERENCES AuthorQ(Author\_ID)
 );

1. INSERT INTO BookAuthorQ ( Book\_ID, Author\_ID )
 VALUES (['B0984'], ['AU11']);

2. INSERT INTO BookAuthorQ
 VALUES (['B0023'], ['AU12']);

3. INSERT INTO BookAuthorQ
 VALUES (['B0743'], ['AU13']);

4. INSERT INTO BookAuthorQ
 VALUES (['B0921'], ['AU14']);

The screenshot shows the Microsoft Access 'Design' view for the 'BookAuthorQ' table. The table structure is as follows:

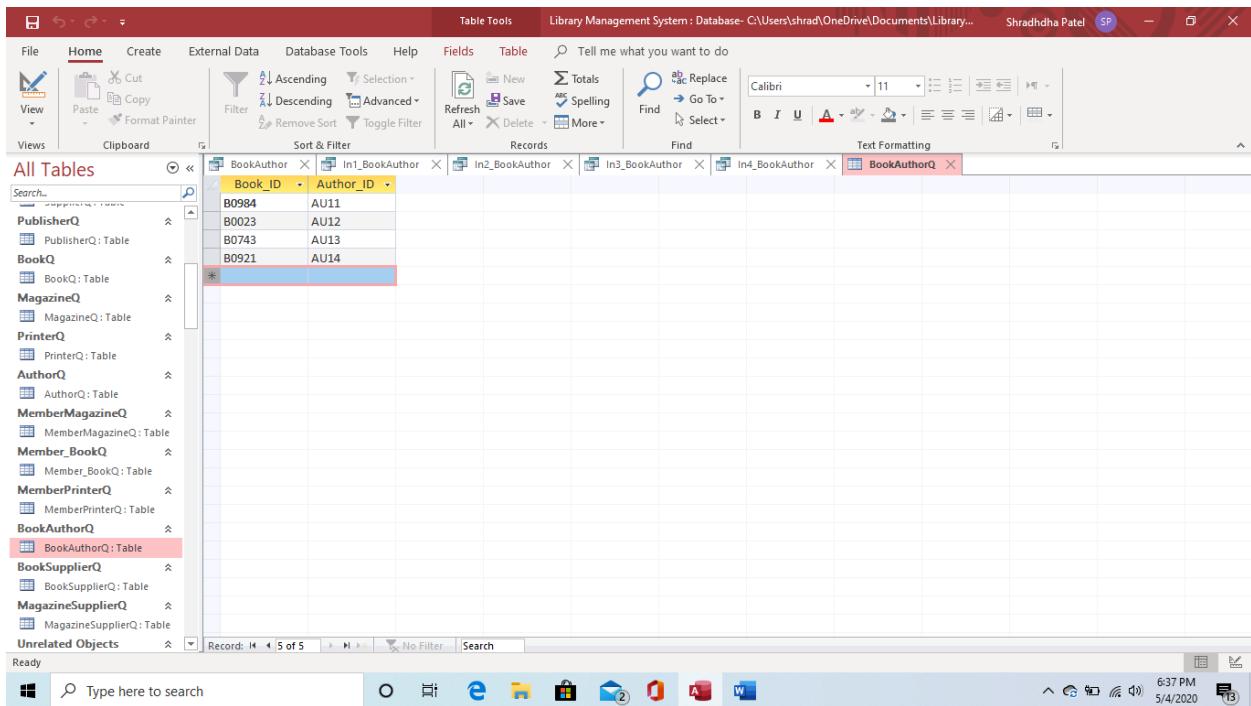
Field Name	Data Type
Book_ID	Short Text
Author_ID	Short Text

The 'Book\_ID' field is currently selected, highlighted with a yellow background. The 'General' tab of the Field Properties dialog is open, displaying the following properties:

- Field Size: 10
- Format: (empty)
- Input Mask: (empty)
- Caption: (empty)
- Default Value: (empty)
- Validation Rule: (empty)
- Validation Text: (empty)
- Required: Yes
- Allow Zero Length: Yes
- Indexed: No
- Unicode Compression: No
- IME Mode: No Control
- IME Sentence Mode: None
- Text Align: General

A status bar at the bottom right of the interface shows the time as 6:37 PM and the date as 5/4/2020.

## LIBRARY MANAGEMENT SYSTEM



The screenshot shows the Microsoft Access interface. The ribbon is visible with tabs like File, Home, Create, External Data, Database Tools, Help, Fields, and Table. The 'Table Tools' tab is selected. The status bar shows the database path: 'Library Management System : Database- C:\Users\shradh\OneDrive\Documents\Library...'. The title bar says 'LIBRARY MANAGEMENT SYSTEM'. The main area shows a list of tables under 'All Tables' and a table named 'BookAuthorQ' with data. The 'BookSupplierQ' table is highlighted in the list of tables.

Book_ID	Author_ID
B0984	AU11
B0023	AU12
B0743	AU13
B0921	AU14

- CREATE TABLE BookSupplierQ (
   
Book\_ID VARCHAR(10) NOT NULL ,
   
Supplier\_ID varchar(10) NOT NULL,
   
CONSTRAINT FK\_BookSupplierQ
   
FOREIGN KEY (Book\_ID) REFERENCES BookQ(Book\_ID),
   
FOREIGN KEY (Supplier\_ID) REFERENCES SupplierQ(Supplier\_ID)
   
);
1. INSERT INTO BookSupplierQ ( Book\_ID, Supplier\_ID )
   
VALUES (['B0984'], ['SU11']);
  2. INSERT INTO BookSupplierQ
   
VALUES (['B0023'], ['SU12']);
  3. INSERT INTO BookSupplierQ
   
VALUES (['B0743'], ['SU13']);
  4. INSERT INTO BookSupplierQ
   
VALUES (['B0921'], ['SU14']);

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables BookSupplier X In1\_BookSupplier X In2\_BookSupplier X In3\_BookSupplier X In4\_BookSupplier X BookSupplierQ X

Field Name Book\_ID Supplier\_ID Data Type Short Text Description (Optional)

PrinterQ: Table AuthorQ: Table MemberMagazineQ: Table Member\_BookQ: Table MemberPrinterQ: Table BookAuthorQ: Table BookSupplierQ: Table BookSupplierQ: Table MagazineSupplierQ: Table MagazineSupplierQ: Table Unrelated Objects: In1.AuthenticationSystem, In1\_Author, In1\_Book, In1\_BookAuthor, In1\_BookSupplier

Field Properties

General Lookup

Field Size 10 Format Input Mask Caption Default Value Validation Rule Validation Text Required Yes Allow Zero Length Yes Indexed No Unicode Compression No IME Mode No Control IME Sentence Mode None Text Align General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view, F6 = Switch panes. F1 = Help.

Type here to search 6:49 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables BookSupplier X In1\_BookSupplier X In2\_BookSupplier X In3\_BookSupplier X In4\_BookSupplier X BookSupplierQ X

Book\_ID Supplier\_ID

B0984	SU11
B0023	SU12
B0743	SU13
B0921	SU14
*	

PrinterQ: Table AuthorQ: Table MemberMagazineQ: Table Member\_BookQ: Table MemberPrinterQ: Table BookAuthorQ: Table BookSupplierQ: Table BookSupplierQ: Table MagazineSupplierQ: Table MagazineSupplierQ: Table Unrelated Objects: In1.AuthenticationSystem, In1\_Author, In1\_Book, In1\_BookAuthor, In1\_BookSupplier

Record: 14 of 5 Search

Type here to search 6:49 PM 5/4/2020

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE MagazineQ(  
Magazine\_ID VARCHAR(10) NOT NULL PRIMARY KEY,  
Magazine\_Name varchar(100),  
Magazine\_Type varchar(50),  
Category varchar(50),  
Availability varchar(50),  
Location\_ID varchar(50) NOT NULL,  
Publisher\_ID VARCHAR(10) NOT NULL,  
CONSTRAINT FK\_MagazineQ  
FOREIGN KEY (Location\_ID) REFERENCES LocationQ(Location\_ID),  
FOREIGN KEY (Publisher\_ID) REFERENCES PublisherQ(Publisher\_ID)  
);
1. INSERT INTO MagazineQ ( Magazine\_ID, Magazine\_Name, Magazine\_Type, Category, Availability, Location\_ID, Publisher\_ID )  
VALUES ('MG123', 'Popular Science', 'Science', 'Computer and Technology', 'YES', 'L124', 'P0268');
  2. INSERT INTO MagazineQ  
VALUES ('MG234', 'Bank Director Leadership', 'Business', 'Management and Business Administration', 'YES', 'L345', 'P0653');
  3. INSERT INTO MagazineQ  
VALUES ('MG568', 'Eating Well: Diet and Nutrition', 'Health and Fitness', 'Medical', 'YES', 'L982', 'P0925');
  4. INSERT INTO MagazineQ  
VALUES ('MG341', 'Variety Music News', 'Music', 'Art and Music', 'YES', 'L632', 'P0563');

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables Magazine Int\_Magazine In2\_Magazine In3\_Magazine In4\_Magazine MagazineQ

Field Name Magazine\_ID Magazine\_Name Magazine\_Type Category Availability Location\_ID Publisher\_ID

Short Text Short Text Short Text Short Text Short Text Short Text Short Text

General Lookup Field Size 10 Format Input Mask Caption Default Value Validation Rule Validation Text Required Yes Allow Zero Length Yes Indexed Yes (No Duplicates) Unicode Compression No IME Mode No Control IME Sentence Mode None TextAlign General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables Magazine Int\_Magazine In2\_Magazine In3\_Magazine In4\_Magazine MagazineQ

Magazine\_ID Magazine\_Name Magazine\_Type Category Availability Location\_ID Publisher\_ID Click to Add

MG123 Popular Science Science Computer and Technology YES L124 P0268

MG234 Bank Director Leadership Business Management and Business YES L345 P0653

MG341 Variety Music News Music Art and Music YES L632 P0563

MG568 Eating Well: Diet and Nutrition Health and Fitness Medical YES L982 P0925

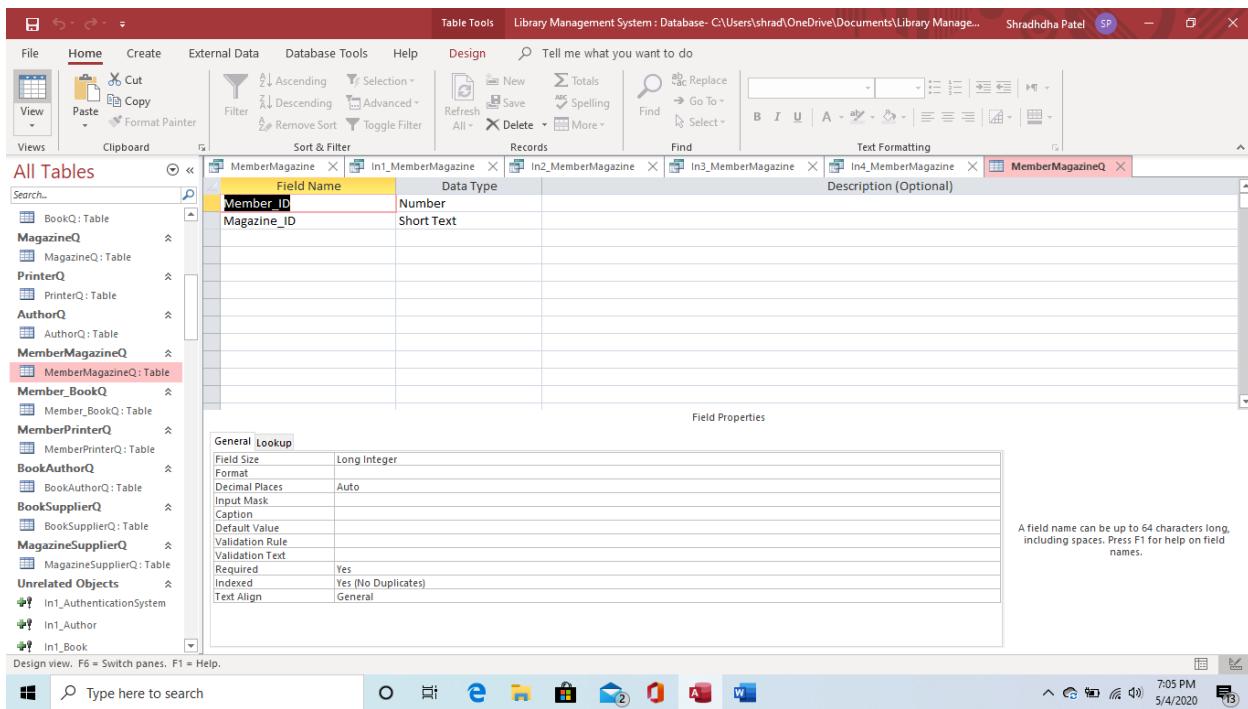
Record: 4 5 of 5 No Filter Search

Type here to search

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE MemberMagazineQ (
 Member\_ID int NOT NULL UNIQUE,
 Magazine\_ID VARCHAR(10) NOT NULL,
 CONSTRAINT FK\_MemberMagazineQ
 FOREIGN KEY (Member\_ID) REFERENCES MemberQ(Member\_ID),
 FOREIGN KEY (Magazine\_ID) REFERENCES MagazineQ(Magazine\_ID)
 );

1. INSERT INTO MemberMagazineQ ( Member\_ID, Magazine\_ID )  
VALUES (2013001, 'MG123');
2. INSERT INTO MemberMagazineQ  
VALUES (2013004, 'MG234');
3. INSERT INTO MemberMagazineQ  
VALUES (2017006, 'MG341');
4. INSERT INTO MemberMagazineQ  
VALUES (2020002, 'MG568');



## LIBRARY MANAGEMENT SYSTEM

The screenshot shows the Microsoft Access application interface. The main window displays a table named 'MemberMagazine'. The table has two columns: 'Member\_ID' and 'Magazine\_ID'. The data in the table is as follows:

Member_ID	Magazine_ID
2013001	MG123
2013004	MG234
2017006	MG341
2020002	MG568

The 'MemberMagazine' table is part of a database containing other tables such as BookQ, MagazineQ, MemberBookQ, and MemberPrinterQ. The status bar at the bottom right indicates the time is 7:06 PM and the date is 5/4/2020.

- CREATE TABLE MagazineSupplierQ (
 Magazine\_ID VARCHAR(10) NOT NULL,
 Supplier\_ID varchar(10) NOT NULL,
 CONSTRAINT FK\_MagazineSupplierQ
 FOREIGN KEY (Magazine\_ID) REFERENCES MagazineQ(Magazine\_ID),
 FOREIGN KEY (Supplier\_ID) REFERENCES SupplierQ(Supplier\_ID)
 );
1. INSERT INTO MagazineSupplierQ ( Magazine\_ID, Supplier\_ID )
 VALUES (['MG123'], ['SU11']);
  2. INSERT INTO MagazineSupplierQ
 VALUES (['MG234'], ['SU12']);
  3. INSERT INTO MagazineSupplierQ
 VALUES (['MG568'], ['SU13']);
  4. INSERT INTO MagazineSupplierQ
 VALUES (['MG341'], ['SU14']);

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables MagazineSupplier X In1\_MagazineSupplier X In2\_MagazineSupplier X In3\_MagazineSupplier X In4\_MagazineSupplier X MagazineSupplierQ X

Field Name Magazine\_ID Supplier\_ID Data Type Short Text Short Text Description (Optional)

BookQ BookQ:Table MagazineQ MagazineQ:Table PrinterQ PrinterQ:Table AuthorQ AuthorQ:Table MemberMagazineQ MemberMagazineQ:Table Member\_BookQ Member\_BookQ:Table MemberBookQ MemberBookQ:Table BookAuthorQ BookAuthorQ:Table BookSupplierQ BookSupplierQ:Table MagazineSupplierQ MagazineSupplierQ:Table MagazineSupplierQ:Table Unrelated Objects In1.AuthenticationSystem In1.Author

General Lookup Field Size 10 Format Input Mask Caption Default Value Validation Rule Validation Text Required Yes Allow Zero Length Yes Indexed No Unicode Compression No IME Mode No Control IME Sentence Mode None TextAlign General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search 7:11 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables MagazineSupplier X In1\_MagazineSupplier X In2\_MagazineSupplier X In3\_MagazineSupplier X In4\_MagazineSupplier X MagazineSupplierQ X

Magazine\_ID Supplier\_ID MG123 SU11 MG234 SU12 MG568 SU13 MG341 SU14

BookQ BookQ:Table MagazineQ MagazineQ:Table PrinterQ PrinterQ:Table AuthorQ AuthorQ:Table MemberMagazineQ MemberMagazineQ:Table Member\_BookQ Member\_BookQ:Table MemberBookQ MemberBookQ:Table BookAuthorQ BookAuthorQ:Table BookSupplierQ BookSupplierQ:Table MagazineSupplierQ MagazineSupplierQ:Table MagazineSupplierQ:Table Unrelated Objects In1.AuthenticationSystem In1.Author

Record: 4 5 of 5 No Filter Search 7:11 PM 5/4/2020

Type here to search

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE PrinterQ (

```
Print_Type varchar(20) PRIMARY KEY,  
Location_ID varchar(50) NOT NULL ,  
Member_ID int NOT NULL UNIQUE,  
CONSTRAINT FK_PriinterQ  
FOREIGN KEY (Location_ID) REFERENCES LocationQ(Location_ID),  
FOREIGN KEY (Member_ID) REFERENCES MemberQ(Member_ID)  
);
```

1. INSERT INTO PrinterQ ( Print\_Type, Location\_ID, Member\_ID )  
VALUES ('Color', 'L124', 2013001);

2. INSERT INTO PrinterQ  
VALUES ('Black and White', 'L345', 2013004);

3. INSERT INTO PrinterQ  
VALUES ('Black & White', 'L632', 2017006);

4. INSERT INTO PrinterQ  
VALUES ('Color Print', 'L982', 2020002);

The screenshot shows the Microsoft Access application in Design view. The ribbon is visible at the top with tabs for Home, Create, External Data, Database Tools, and Help. The Home tab is selected. The main area displays the 'PrinterQ' table structure. The 'Print\_Type' field is currently selected, highlighted in yellow. The table has three fields: Print\_Type, Location\_ID, and Member\_ID. The 'Print\_Type' field is defined as Short Text, 'Location\_ID' as Short Text, and 'Member\_ID' as Number. The 'Print\_Type' field is also marked as Required and allows zero length. A note in the bottom right corner of the dialog box states: 'A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.'

## LIBRARY MANAGEMENT SYSTEM

The screenshot shows the Microsoft Access application interface. The ribbon is visible at the top with tabs like File, Home, Create, External Data, Database Tools, Help, Fields, and Table. The Table Tools ribbon is selected. The main area shows the 'All Tables' list on the left, with 'PrinterQ' selected. The 'MemberPrinterQ' table is open in the center, displaying data in a grid format. The status bar at the bottom shows 'Ready', a search bar, and system information including the date and time.

Print_Type	Location_ID	Member_ID
Black & White	L632	2017006
Black and White	L345	2013004
Color	L124	2013001
Color Print	L982	2020002

- CREATE TABLE MemberPrinterQ (
   
Member\_ID int NOT NULL UNIQUE,
   
Print\_Type varchar(20) ,
   
CONSTRAINT FK\_MemberPrinterQ
   
FOREIGN KEY (Member\_ID) REFERENCES MemberQ(Member\_ID),
   
FOREIGN KEY (Print\_Type) REFERENCES PrinterQ(Print\_Type)
   
);
1. INSERT INTO MemberPrinterQ ( Member\_ID, Print\_Type )
   
VALUES (2013001, 'Color');
  2. INSERT INTO MemberPrinterQ
   
VALUES (2013004, 'Black and White');
  3. INSERT INTO MemberPrinterQ
   
VALUES (2017006, 'Black & White');
  4. INSERT INTO MemberPrinterQ
   
VALUES (2020002, 'Color Print');

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Clipboard Sort & Filter Filter Ascending Selection Advanced Descending Remove Sort Toggle Filter

New Save Totals Replace All Find Go To More Select

Find Text Formatting

All Tables

Field Name Member\_ID Data Type Number

Print\_Type Short Text

Field Properties

General Lookup

Field Size Long Integer  
Format Auto  
Decimal Places Auto  
Input Mask  
Caption  
Default Value  
Validation Rule  
Validation Text  
Required Yes  
Indexed Yes (No Duplicates)  
Text Align General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search

7:25 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Sort & Filter Filter Ascending Selection Advanced Descending Remove Sort Toggle Filter

New Save Totals Replace All Find Go To More Select

Find Text Formatting

All Tables

Member\_ID Print\_Type

2013001 Color  
2013004 Black and White  
2017006 Black & White  
2020002 Color Print

Record: 4 5 of 5 No Filter Search

Type here to search

7:25 PM 5/4/2020

## LIBRARY MANAGEMENT SYSTEM

- CREATE TABLE ComputerQ (
 Member\_ID int NOT NULL UNIQUE,
 Operating\_System varchar(50),
 Location\_ID varchar(50) NOT NULL,
 CONSTRAINT FK\_ComputerQ
 FOREIGN KEY (Location\_ID) REFERENCES LocationQ(Location\_ID),
 FOREIGN KEY (Member\_ID) REFERENCES MemberQ(Member\_ID)
 );

1. INSERT INTO ComputerQ ( Member\_ID, Operating\_System, Location\_ID )
 VALUES (2013001, 'MAC OS X', 'L124');
2. INSERT INTO ComputerQ
 VALUES (2013004, 'WINDOWS OS', 'L345');
3. INSERT INTO ComputerQ
 VALUES (2017006, 'MAC OS X', 'L982');
4. INSERT INTO ComputerQ
 VALUES (2020002, 'WINDOWS', 'L632');

The screenshot shows the Microsoft Access Database Designer view. The 'ComputerQ' table is selected in the 'All Tables' list. The 'General' tab of the 'Field Properties' dialog is open for the 'Member\_ID' field, which is defined as a 'Number' data type. The 'Operating\_System' and 'Location\_ID' fields are also defined. A note in the bottom right corner of the dialog box states: 'A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.'

Field Name	Data Type	Description (Optional)
Member_ID	Number	
Operating_System	Short Text	
Location_ID	Short Text	

## LIBRARY MANAGEMENT SYSTEM

The screenshot shows the Microsoft Access interface with the 'ComputerQ' table selected. The table structure is as follows:

Member_ID	Operating_System	Location_ID
2013001	MAC OS X	L124
2013004	WINDOWS OS	L345
2017006	MAC OS X	L982
2020002	WINDOWS	L632

- CREATE TABLE AuthenticationSystemQ (
   
Member\_ID int NOT NULL UNIQUE PRIMARY KEY,
   
Password varchar(30)
 );

1. INSERT INTO AuthenticationSystemQ ( Member\_ID, [Password] )  
VALUES (2013001, 'verygood');
2. INSERT INTO AuthenticationSystemQ  
VALUES (2013004, 'deptament123');
3. INSERT INTO AuthenticationSystemQ  
VALUES (2017006, 'building32');
4. INSERT INTO AuthenticationSystemQ  
VALUES (2020002, 'location542');

## LIBRARY MANAGEMENT SYSTEM

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Design Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables AuthenticationSystem In1\_AuthenticationSystem In2\_AuthenticationSystem In3\_AuthenticationSystem In4\_AuthenticationSystem AuthenticationSystemQ

Field Name Member\_ID Data Type Number Description (Optional)

LocationQ LocationQ: Table ProfessorQ ProfessorQ: Table Staff\_MemberQ Staff\_MemberQ: Table AuthenticationSystemQ AuthenticationSystemQ: Table ComputerQ ComputerQ: Table MemberQ MemberQ: Table StudentQ StudentQ: Table SupplierQ SupplierQ: Table PublisherQ PublisherQ: Table BookQ BookQ: Table MagazineQ MagazineQ: Table PrinterQ PrinterQ: Table

Member\_ID Number

Member\_ID Long Integer

Format Auto

Decimal Places

Input Mask

Caption

Default Value

Validation Rule

Validation Text

Required Yes

Indexed Yes (No Duplicates)

Text Align General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Type here to search

7:44 PM 5/4/2020

Table Tools Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System\Library Management System.mdb Shradhha Patel SP

File Home Create External Data Database Tools Help Fields Table Tell me what you want to do

Views Clipboard Sort & Filter Records Find Text Formatting

All Tables AuthenticationSystem In1\_AuthenticationSystem In2\_AuthenticationSystem In3\_AuthenticationSystem In4\_AuthenticationSystem AuthenticationSystemQ

Member\_ID Password Click to Add

LocationQ LocationQ: Table ProfessorQ ProfessorQ: Table Staff\_MemberQ Staff\_MemberQ: Table AuthenticationSystemQ AuthenticationSystemQ: Table ComputerQ ComputerQ: Table MemberQ MemberQ: Table StudentQ StudentQ: Table SupplierQ SupplierQ: Table PublisherQ PublisherQ: Table BookQ BookQ: Table MagazineQ MagazineQ: Table PrinterQ PrinterQ: Table

Member\_ID Password

Member\_ID Long Integer

Format Auto

Decimal Places

Input Mask

Caption

Default Value

Validation Rule

Validation Text

Required Yes

Indexed Yes (No Duplicates)

Text Align General

Calibri 11

Type here to search

7:45 PM 5/4/2020

## 6. JOIN AND QUERY OUTPUT

### ➤ INNER JOIN

1. SELECT MemberQ.Member\_Name, MemberMagazineQ.Magazine\_ID  
 FROM MemberQ  
 INNER JOIN MemberMagazineQ ON MemberQ.Member\_ID  
 =MemberMagazineQ.Member\_ID;

Member_Name	Magazine_ID
Raj	MG123
Max	MG234
Mike	MG341
Vishal	MG568

2. SELECT BookQ.Book\_Name, PublisherQ.Publisher\_Name, LocationQ.Shelf\_ID  
 FROM ((BookQ  
 INNER JOIN PublisherQ ON PublisherQ.Publisher\_ID = BookQ.Publisher\_ID)  
 INNER JOIN LocationQ ON BookQ.Location\_ID = LocationQ.Location\_ID);

## LIBRARY MANAGEMENT SYSTEM

Book_Name	Publisher_Name	Shelf_ID
Java- A beginner's guide	Random House	SH11
The fast forward MBA in Project Management	Pearson	SH12
Step up to Medicine	McGraw-Hill Education	SH13
Music theory- from beginners to experts	Harper Collins	SH14

## ➤ OUTER JOIN

[NOTE: We have added one more entry into Location Table to notice OUTER JOIN operation and here is the query for that:

```
INSERT INTO LocationQ
VALUES ('L832', 'Science Section', 'SH31');
```

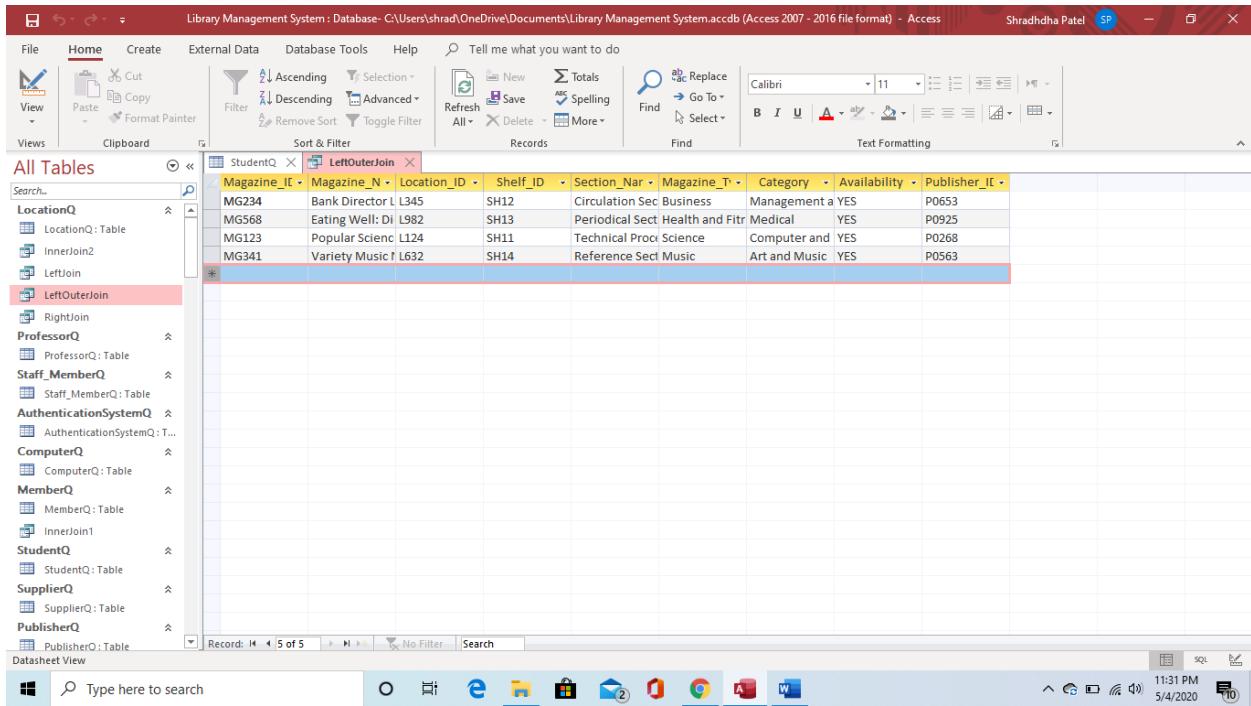
1. 

```
SELECT MagazineQ.Magazine_ID, MagazineQ.Magazine_Name,
LocationQ.Location_ID, LocationQ.Shelf_ID, LocationQ.Section_Name,
MagazineQ.Magazine_Type, MagazineQ.Category, MagazineQ.Availability,
MagazineQ.Publisher_ID

FROM MagazineQ LEFT OUTER JOIN LocationQ ON
MagazineQ.Location_ID=LocationQ.Location_ID

ORDER BY MagazineQ.Magazine_Name;
```

## LIBRARY MANAGEMENT SYSTEM

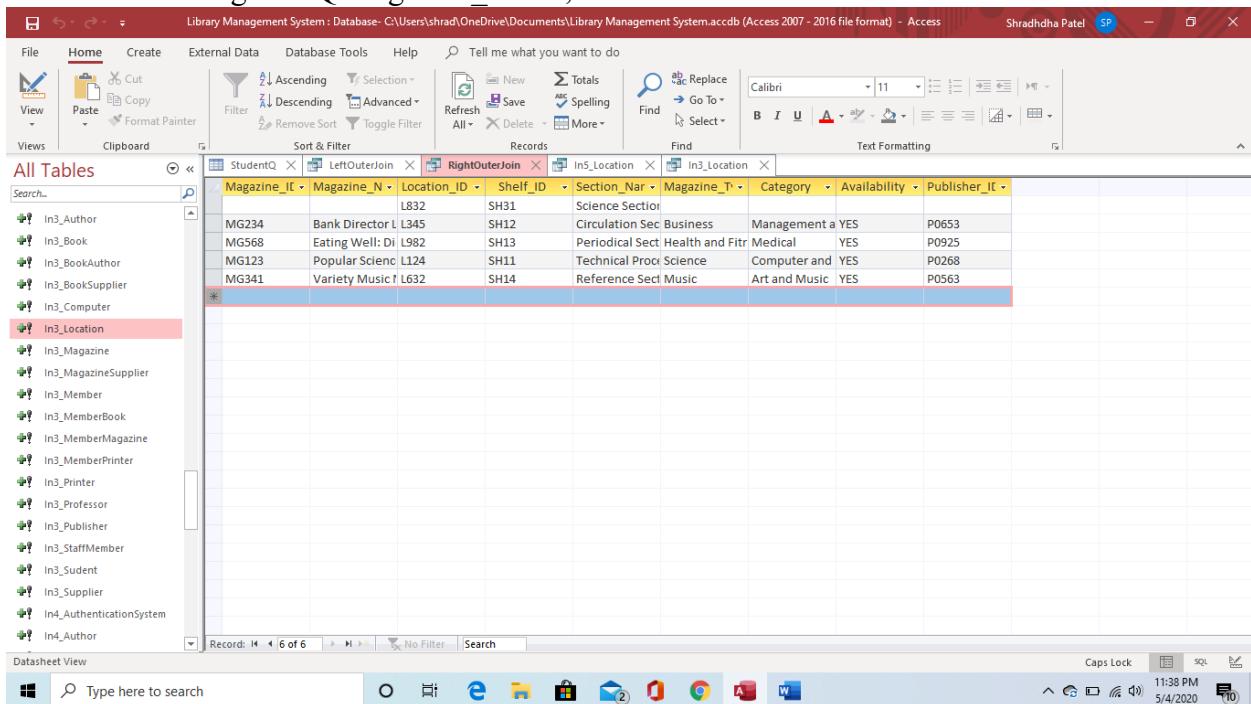


The screenshot shows the Microsoft Access interface with the following details:

- File Bar:** File, Home, Create, External Data, Database Tools, Help.
- Quick Access Bar:** Tell me what you want to do, Refresh, Save, Spelling, Find, Replace, Go To, Select, Text Formatting.
- Table List:** Shows various tables: LocationQ, LocationQ: Table, InnerJoin2, LeftJoin, LeftOuterJoin (highlighted in red), RightJoin, ProfessorQ, ProfessorQ: Table, Staff\_MemberQ, Staff\_MemberQ: Table, AuthenticationSystemQ, AuthenticationSystemQ: Table, ComputerQ, ComputerQ: Table, MemberQ, MemberQ: Table, InnerJoin1, StudentQ, StudentQ: Table, SupplierQ, SupplierQ: Table, PublisherQ, PublisherQ: Table.
- Query View:** StudentQ, LeftOuterJoin.
- Table:** Magazine\_ID, Magazine\_N, Location\_ID, Shelf\_ID, Section\_Nar, Magazine\_T, Category, Availability, Publisher\_ID.
- Data:**

Magazine_ID	Magazine_N	Location_ID	Shelf_ID	Section_Nar	Magazine_T	Category	Availability	Publisher_ID
MG234	Bank Director L	L345	SH12	Circulation Sec	Business	Management a	YES	P0653
MG568	Eating Well: Di	L982	SH13	Periodical Sect	Health and Fitr	Medical	YES	P0925
MG123	Popular Scien	L124	SH11	Technical Proci	Science	Computer and	YES	P0268
MG341	Variety Music f	L632	SH14	Reference Sect	Music	Art and Music	YES	P0563
- Bottom Bar:** Record: 4 of 5, No Filter, Search, SQL View, 11:31 PM, 5/4/2020.

2. SELECT MagazineQ.Magazine\_ID, MagazineQ.Magazine\_Name,  
 LocationQ.Location\_ID, LocationQ.Shelf\_ID, LocationQ.Section\_Name,  
 MagazineQ.Magazine\_Type, MagazineQ.Category, MagazineQ.Availability,  
 MagazineQ.Publisher\_ID  
 FROM MagazineQ RIGHT OUTER JOIN LocationQ ON  
 MagazineQ.Location\_ID=LocationQ.Location\_ID  
 ORDER BY MagazineQ.Magazine\_Name;



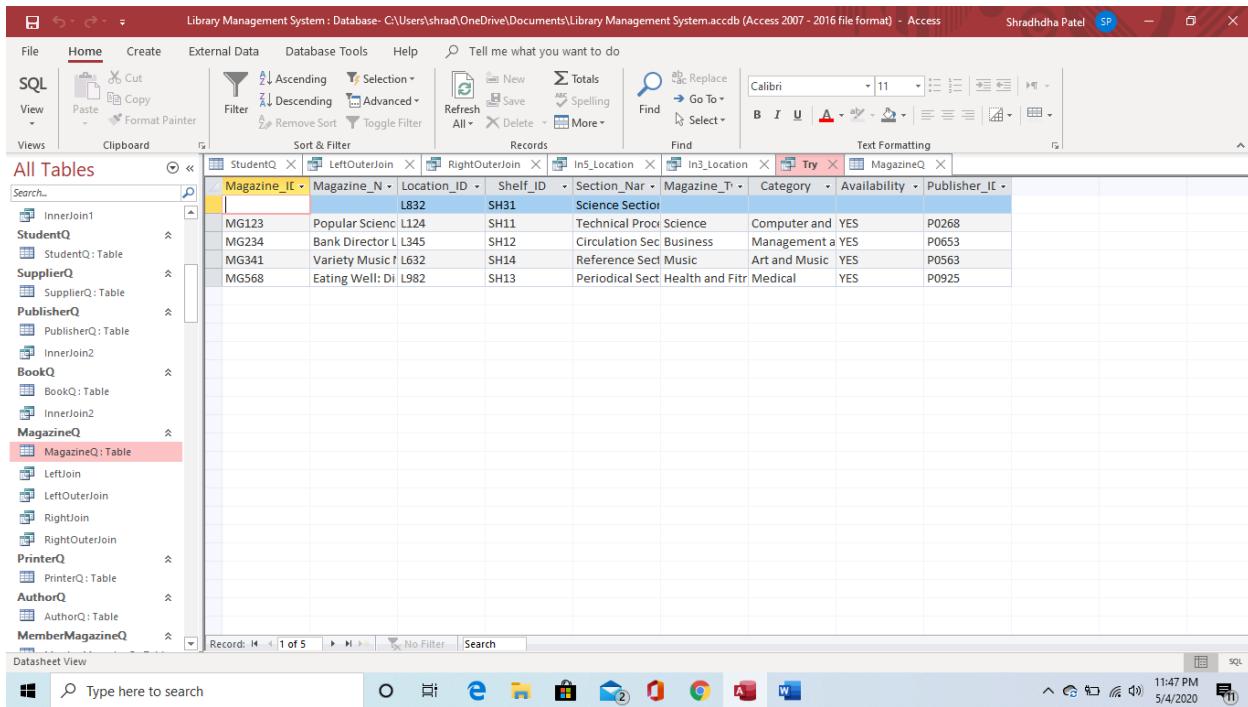
The screenshot shows the Microsoft Access interface with the following details:

- File Bar:** File, Home, Create, External Data, Database Tools, Help.
- Quick Access Bar:** Tell me what you want to do, Refresh, Save, Spelling, Find, Replace, Go To, Select, Text Formatting.
- Table List:** Shows various tables: In3\_Author, In3\_Book, In3\_BookAuthor, In3\_BookSupplier, In3\_Computer, In3\_Location (highlighted in red), In3\_Magazine, In3\_MagazineSupplier, In3\_Member, In3\_MemberBook, In3\_MemberMagazine, In3\_MemberPrinter, In3\_Printer, In3\_Professor, In3\_Publisher, In3\_StaffMember, In3\_Sudent, In3\_Supplier, In4\_AuthenticationSystem, In4\_Author.
- Query View:** StudentQ, LeftOuterJoin, RightOuterJoin, In3\_Location, In3\_Location.
- Table:** Magazine\_ID, Magazine\_N, Location\_ID, Shelf\_ID, Section\_Nar, Magazine\_T, Category, Availability, Publisher\_ID.
- Data:**

Magazine_ID	Magazine_N	Location_ID	Shelf_ID	Section_Nar	Magazine_T	Category	Availability	Publisher_ID
MG234	Bank Director L	L345	SH12	Science Sector	Business	Management a	YES	P0653
MG568	Eating Well: Di	L982	SH13	Periodical Sect	Health and Fitr	Medical	YES	P0925
MG123	Popular Scien	L124	SH11	Technical Proci	Science	Computer and	YES	P0268
MG341	Variety Music f	L632	SH14	Reference Sect	Music	Art and Music	YES	P0563
- Bottom Bar:** Record: 4 of 6, No Filter, Search, SQL View, 11:38 PM, 5/4/2020.

## LIBRARY MANAGEMENT SYSTEM

3. SELECT MagazineQ.Magazine\_ID, MagazineQ.Magazine\_Name,  
 LocationQ.Location\_ID, LocationQ.Shelf\_ID, LocationQ.Section\_Name,  
 MagazineQ.Magazine\_Type, MagazineQ.Category, MagazineQ.Availability,  
 MagazineQ.Publisher\_ID  
 FROM MagazineQ LEFT OUTER JOIN LocationQ ON  
 MagazineQ.Location\_ID=LocationQ.Location\_ID  
 UNION  
 SELECT MagazineQ.Magazine\_ID, MagazineQ.Magazine\_Name, LocationQ.Location\_ID,  
 LocationQ.Shelf\_ID, LocationQ.Section\_Name, MagazineQ.Magazine\_Type,  
 MagazineQ.Category, MagazineQ.Availability, MagazineQ.Publisher\_ID  
 FROM MagazineQ RIGHT OUTER JOIN LocationQ ON  
 MagazineQ.Location\_ID=LocationQ.Location\_ID



Library Management System : Database- C:\Users\shrad\OneDrive\Documents\Library Management System.accdb [Access 2007 - 2016 file format] - Access

Shradhha Patel SP

File Home Create External Data Database Tools Help

SQL View Clipboard

Sort & Filter Records Find Text Formatting

All Tables

MagazineQ

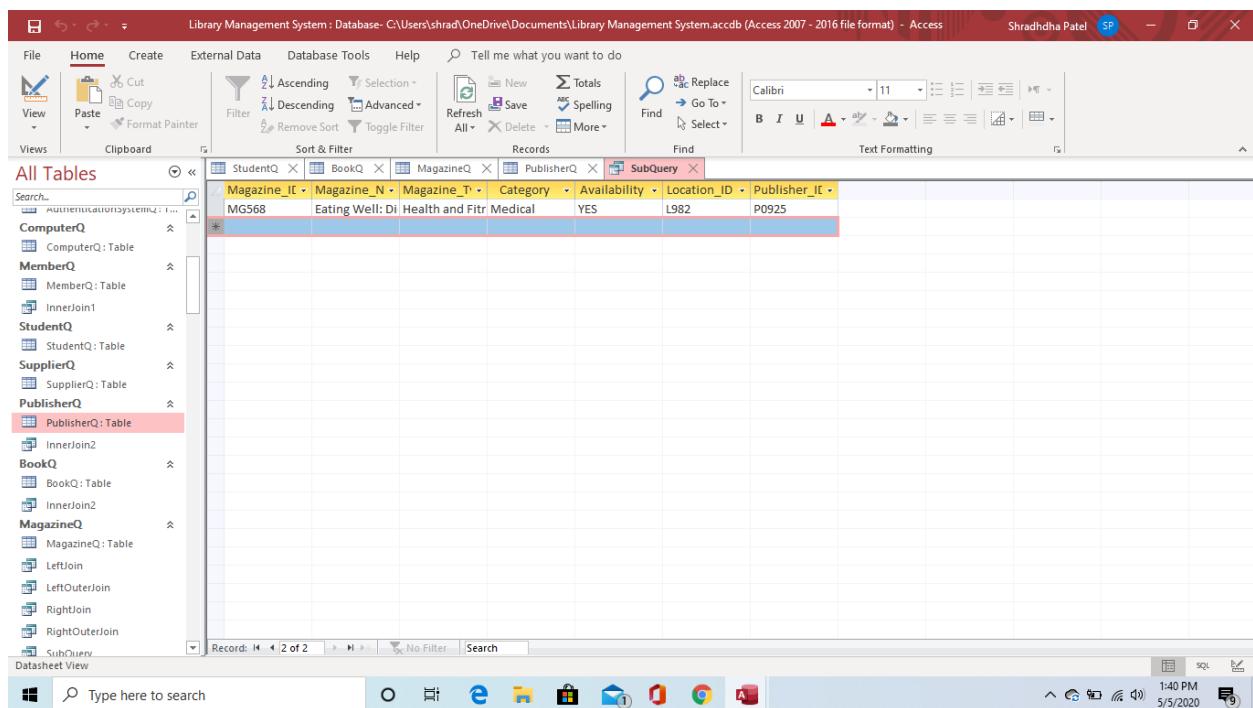
Magazine_ID	Magazine_N	Location_ID	Shelf_ID	Section_Nar	Magazine_T	Category	Availability	Publisher_ID
L832	Science Sector	SH31	L124	Popular Scienc	Computer and	YES	P0268	
MG123	L124	SH11	MG234	Bank Director	Technical Proci	YES	P0653	
MG234	L124	SH12	MG341	Circulation Sec	Science	YES	P0563	
MG341	Variety Music	L124	MG568	Reference Sect	Business	YES	P0925	
MG568	Eating Well: Di	L982		Art and Music	Medical	YES		

Record: 14 of 5

11:47 PM 5/4/2020

# ➤SUB-QUERY

1. `SELECT * FROM MagazineQ WHERE Publisher_ID > ANY (SELECT Publisher_ID FROM PublisherQ WHERE Publisher_Name=Pearson);`



The screenshot shows the Microsoft Access application interface with the following details:

- File, Home, Create, External Data, Database Tools, Help** menu bar.
- Clipboard** ribbon tab.
- Sort & Filter** ribbon tab.
- Records** ribbon tab.
- Text Formatting** ribbon tab.
- SubQuery** ribbon tab.
- All Tables** pane on the left, showing tables: ComputerQ, MemberQ, StudentQ, SupplierQ, PublisherQ (highlighted in red).
- MagazineQ** table in Datasheet View, showing the following data:

Magazine_ID	Magazine_Name	Magazine_Type	Category	Availability	Location_ID	Publisher_ID
MG568	Eating Well: Di	Health and Fitn	Medical	YES	L982	P0925

- Record: 1 of 2 of 2** status bar.
- Type here to search** search bar.
- 1:40 PM 5/5/2020** date and time.

# ➤CORRELATED SUB-QUERY

SELECT

```
m.Member_ID,
m.Member_Name,
m.Department_Name,
b.Book_Name,
b.Edition,
m.Number_of_Books_Allowed
```

FROM

```
(BookQ AS b INNER JOIN Member_BookQ AS a ON b.Book_ID=a.Book_ID)
INNER JOIN MemberQ AS m ON a.Member_ID=m.Member_ID
```

WHERE

```
m.Number_of_Books_Allowed>
(
    SELECT MIN(Number_of_Books_Allowed)
    FROM MemberQ AS s
    WHERE s.Department_Name=m.Department_Name
);
```

Member_ID	Member_Name	Department_Nam	Book_Name	Edition	Number_of
2013004	Max	Computer Science	The fast forward MBA in Project Management	Fifth Edition	3

## 6. PROGRAMMING CODE FOR CONNECTIONS

```
// Library Management System Code
//import the packages for using the classes in them into the program

import java.sql.*;

public abstract class Member {
    private String member_id;
    private String member_name;
    private String email;
    private int phone_number;
    private String address;
    private int number_of_books_allowed;
}

public boolean checkout(String memberId) {
    if(bookItem.getIsReferenceOnly()) {
        ShowError("This book is Reference only and can't be issued");
        return false;
    }
    if(!BookLending.lendBook(this.getBarcode(), memberId)){
        return false;
    }
    this.updateBookItemStatus(BookStatus.LOANED);
    return true;
}

//constructor of listMembers
public ListMembers() {
    //for setting the title for the internal frame
    super("Members", false, true, false, true);
```

```
//for setting the icon
setFrameIcon(new
ImageIcon(ClassLoader.getSystemResource("images/List16.gif")));
//for getting the graphical user interface components display
area
Container cp = getContentPane();

//for bassing the required information to the
ResultSetTableModel object
try {
    //tableModel = new
ResultSetTableModel(JDBC_DRIVER, DATABASE_URL,
DEFAULT_QUERY);
    tableModel = new ResultSetTableModel(JDBC_DRIVER,
DATABASE_URL,USER_NAME,PASSWORD,DEFAULT_QUERY);
    //for setting the Query
    try {
        tableModel.setQuery(DEFAULT_QUERY);
    }
    catch (SQLException sqlException) {
    }
}
catch (ClassNotFoundException classNotFound) {
}
catch (SQLException sqlException) {
}
//for setting the table with the information
table = new JTable(tableModel);
//for setting the size for the table
table.setPreferredSize(new Dimension(700,
200));
//for setting the font
table.setFont(new Font("Tahoma", Font.PLAIN, 12));
//for setting the scrollpane to the table
scrollPane = new JScrollPane(table);

//for setting the size for the table columns
for (int i = 0; i < 6; i++) {
```

## LIBRARY MANAGEMENT SYSTEM

```
column = table.getColumnModel().getColumn(i);
if (i == 0) //MemberID
    column.setPreferredWidth(30);
if (i == 1) //ID
    column.setPreferredWidth(20);
if (i == 2) //Name
    column.setPreferredWidth(150);
if (i == 3) //E-MAIL
    column.setPreferredWidth(120);
if (i == 4) //Major
    column.setPreferredWidth(20);
if (i == 5) //Expired
    column.setPreferredWidth(40);
}

public class Book extends Member {
    private String book_id;
    private String book_name;
    private boolean availability;
    private String category;
    private String author_name;
    private int edition;
}
public List<Book> searchByTitle(String query) {
    // return all books containing the string query in their title.
    return bookTitles.get(query);
}

//constructor of listAvailableBooks
public ListAvailableBooks() {
    //for setting the title for the internal frame
    super("Available Books", false, true, false, true);
    //for setting the icon
    setFrameIcon(new
    ImageIcon(ClassLoader.getSystemResource("images/List16.gif")));
    //for getting the graphical user interface components display
    area
    Container cp = getContentPane();
```

```
//for bassing the required information to the
ResultSetTableModel object
try {
    tableModel = new ResultSetTableModel(JDBC_DRIVER,
DATABASE_URL, USER_NAME, PASSWORD, DEFAULT_QUERY);
    //for setting the Query
    try {
        tableModel.setQuery(DEFAULT_QUERY);
    }
    catch (SQLException sqlException) {
    }
}
catch (ClassNotFoundException classNotFound) {
}
catch (SQLException sqlException) {
}
//for setting the table with the information
table = new JTable(tableModel);
//for setting the size for the table
table.setPreferredScrollableViewportSize(new Dimension(990,
200));
//for setting the font
table.setFont(new Font("Tahoma", Font.PLAIN, 12));
//for setting the scrollpane to the table
scrollPane = new JScrollPane(table);

//for setting the size for the table columns
for (int i = 0; i < 11; i++) {
    column = table.getColumnModel().getColumn(i);
    if (i == 0) //BookID
        column.setPreferredWidth(20);
    if (i == 1) //Subject
        column.setPreferredWidth(100);
    if (i == 2) //Title
        column.setPreferredWidth(150);
    if (i == 3) //Auther
        column.setPreferredWidth(50);
```

## LIBRARY MANAGEMENT SYSTEM

```
if (i == 4) //Publisher
    column.setPreferredWidth(70);
if (i == 5) //Copyright
    column.setPreferredWidth(40);
if (i == 6) //Edition
    column.setPreferredWidth(40);
if (i == 7) //Pages
    column.setPreferredWidth(40);
if (i == 8) //ISBN
    column.setPreferredWidth(75);
if (i == 9) //Library
    column.setPreferredWidth(50);
if (i == 10) //ShelfNo
    column.setPreferredWidth(30);
}
//for setting the font to the label
label.setFont(new Font("Tahoma", Font.BOLD, 14));
//for setting the layout to the panel
northPanel.setLayout(new FlowLayout(FlowLayout.CENTER));
//for adding the label to the panel
northPanel.add(label);
//for adding the panel to the container
cp.add("North", northPanel);

//for setting the layout to the panel
centerPanel.setLayout(new BorderLayout());
//for creating an image for the button
ImageIcon printIcon = new
ImageIcon(ClassLoader.getSystemResource("images/Print16.gif"));
//for adding the button to the panel
printButton = new JButton("print the books", printIcon);
//for setting the tip text
printButton.setToolTipText("Print");
//for setting the font to the button
printButton.setFont(new Font("Tahoma", Font.PLAIN, 12));
//for adding the button to the panel
centerPanel.add(printButton, BorderLayout.NORTH);
//for adding the scrollpane to the panel
```

```
centerPanel.add(scrollPane, BorderLayout.CENTER);
//for setting the border to the panel

centerPanel.setBorder(BorderFactory.createTitledBorder("Available
Books:"));
//for adding the panel to the container
cp.add("Center", centerPanel);

//for adding the actionListener to the button
printButton.addActionListener(new ActionListener() {
    public void actionPerformed(ActionEvent ae) {
        Thread runner = new Thread() {
            public void run() {
                try {
                    PrinterJob prnJob =
PrinterJob.getPrinterJob();
                    prnJob.setPrintable(new
PrintingBooks(DEFAULT_QUERY));
                    if (!prnJob.printDialog())
                        return;
                } catch (PrinterException ex) {
                    System.out.println("Printing error: "
+ ex.toString());
                }
            }
        };
        runner.start();
    }
});
//for setting the visible to true
setVisible(true);
```

```
//to show the frame
    pack();
}
}

public List<Book> searchByAuthor(String query) {
    // return all books containing the string query in their author's name.
    return bookAuthors.get(query);
}
}

public class Magazine extends Member {
    private String magazine_id;
    private String magazine_name;
    private boolean availability;
    private String category;
    private String magazine_type;
}

//for setting the Magazine information
    table = new JTable(tableModel);
    //for setting the size for the table
    table.setPreferredScrollableViewportSize(new Dimension(990,
200));
    //for setting the font
    table.setFont(new Font("Tahoma", Font.PLAIN, 12));
    //for setting the scrollpane to the table
    scrollPane = new JScrollPane(table);

    //for setting the size for the table columns
    for (int i = 0; i < 13; i++) {
        column = table.getColumnModel().getColumn(i);
        if (i == 0) //MagazineID
            column.setPreferredWidth(20);
        if (i == 1) //Subject
            column.setPreferredWidth(100);
        if (i == 2) //Title
            column.setPreferredWidth(150);
        if (i == 3) //Author
            column.setPreferredWidth(50);
```

## LIBRARY MANAGEMENT SYSTEM

```
if (i == 4) //Publisher
    column.setPreferredWidth(70);
if (i == 5) //Copyright
    column.setPreferredWidth(40);
if (i == 6) //Edition
    column.setPreferredWidth(40);
if (i == 7) //Pages
    column.setPreferredWidth(40);
if (i == 8) //NumberOfBooks
    column.setPreferredWidth(80);
if (i == 9) //ISBN
    column.setPreferredWidth(70);
if (i == 10) //Library
    column.setPreferredWidth(30);
if (i == 11) //Availble
    column.setPreferredWidth(30);
if (i == 12) //ShelfNo
    column.setPreferredWidth(30);
}
//for setting the font to the label
label.setFont(new Font("Tahoma", Font.BOLD, 14));
//for setting the layout to the panel
northPanel.setLayout(new FlowLayout(FlowLayout.CENTER));
//for adding the label to the panel
northPanel.add(label);
//for adding the panel to the container
cp.add("North", northPanel);

//for setting the layout to the panel
centerPanel.setLayout(new BorderLayout());
//for creating an image for the button
ImageIcon printIcon = new
ImageIcon(ClassLoader.getSystemResource("images/Print16.gif"));
//for adding the button to the panel
printButton = new JButton("print the books", printIcon);
//for setting the tip text
printButton.setToolTipText("Print");
//for setting the font to the button
```

```
printButton.setFont(new Font("Tahoma", Font.PLAIN, 12));
//for adding the button to the panel
centerPanel.add(printButton, BorderLayout.NORTH);
//for adding the scrollpane to the panel
centerPanel.add(scrollPane, BorderLayout.CENTER);
//for setting the border to the panel

centerPanel.setBorder(BorderFactory.createTitledBorder("Books:"));
//for adding the panel to the container
cp.add("Center", centerPanel);

//for adding the actionListener to the button
printButton.addActionListener(new ActionListener() {
    public void actionPerformed(ActionEvent ae) {
        Thread runner = new Thread() {
            public void run() {
                try {
                    PrinterJob prnJob =
PrinterJob.getPrinterJob();
                    prnJob.setPrintable(new
PrintingBooks(DEFAULT_QUERY));
                    if (!prnJob.printDialog())
                        return;
                setCursor(Cursor.getPredefinedCursor(Cursor.WAIT_CURSOR));
                prnJob.print();
            }
            setCursor(Cursor.getPredefinedCursor(Cursor.DEFAULT_CURSOR));
        );
    }
    catch (PrinterException ex) {
        System.out.println("Printing error: "
+ ex.toString());
    }
}
);
runner.start();
}
```

```
        });
        //for setting the visible to true
        setVisible(true);
        //to show the frame
        pack();
    }
}

public class Computer extends Member {
    private String operating_sysystem;
}

public class Printer extends Member {
    private String printer_type;
}

public class Professor extends Member {
    private String prof_id;
    private String prof_name;
    private String position;
}

public class Staff Member extends Member {
    private String employee_id;
    private String employee_name;
    private boolean position_name;
    private int year_of_appointment;
}

public class Student extends Member {
    private String student_id;
    private String student_name;

    private int total fine;
    private int registered_date;
}

private Connection connection = null;
private Statement statement = null;
```

```
private ResultSet resultSet = null;

private int studentID;
private int regNo;
private String password;
private String name;
private String email;
private String major;
private int numberOfBooks;
//private int mony;
private Date validUpto;
//private String URL = "jdbc:odbc:JLibrary";
private static final String DATABASE_URL =
"jdbc:mysql://localhost:3306/Library";
private static final String USER_NAME="root";
private static final String PASSWORD="nielit";
public Members() {
}
/*public Members(int memberID, int ID, String password, String
name, String email, String major, int numberOfBooks, int mony, Date
expired) {
    this.memberID = memberID;
    this.ID = ID;
    this.password = password;
    this.name = name;
    this.email = email;
    this.major = major;
    this.numberOfBooks = numberOfBooks;
    this.mony = mony;
    this.expired = expired;
}
public int getMemberID() {
    return memberID;
}

public int getRegNo() {
    return regNo;
```

```
}

public String getPassword() {
    return password;
}

public String getName() {
    return name;
}

public String getEmail() {
    return email;
}

public String getMajor() {
    return major;
}

public int getNumberOfBooks() {
    return numberOfBooks;
}

/*public int getMony() {
    return mony;
}*/

public Date getValidUpto() {
    return validUpto;
}

public void connection(String Query) {
    try {
        //Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
        Class.forName("org.gjt.mm.mysql.Driver");
    }
    catch (ClassNotFoundException cnfe) {
        System.out.println("Members.java\n" + cnfe.toString());
    }
}
```

```
        catch (Exception e) {
            System.out.println("Members.java\n" + e.toString());
        }

public abstract class Location {
    private String location_id;
    private String section_name;
    private String shelf_id;
}

public class Book extends Location {
    private String book_id;
    private String book_name;
    private boolean availability;
    private String category;
    private String author_name;
    private int edition;
}

public class Magazine extends Location {
    private String magazine_id;
    private String magazine_name;
    private boolean availability;
    private String category;
    private String magazine_type;
}

public class Computer extends Location {
    private String operating_system;
}

public class Printer extends Location {
    private String printer_type;
}

public class Printer and members extends JInternalFrame implements
Printable {
    ****
}
```

```
***      declaration of the private variables used in the program      ***
*****
```

```
//for setting the connection and statement
private Connection connection = null;
private Statement statement = null;
private ResultSet resultSet = null;

//private String URL = "jdbc:odbc:JLibrary";
private String URL = "jdbc:mysql://localhost:3306/Library";

//for creating the text area
private JTextArea textArea = new JTextArea();
//for creating the vector to use it in the print
private Vector lines;
public static final int TAB_SIZE = 10;

//constructor of JLibrary
public PrintingMembers(String query) {
    super("Printing Members", false, true, false, true);
    //for getting the graphical user interface components display
area
    Container cp = getContentPane();
    //for setting the font
    textArea.setFont(new Font("Tahoma", Font.PLAIN, 9));
    //for adding the textarea to the container
    cp.add(textArea);
    try {
        //Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
        Class.forName("org.gjt.mm.mysql.Driver");
    }
    catch (ClassNotFoundException ea) {
        System.out.println(ea.toString());
    }
    catch (Exception e) {
        System.out.println(e.toString());
    }
}*****
```

```

* for making the connection,creating the statement and update
*
* the table in the database. After that,closing the statmenet *
* and connection. There is catch block SQLException for error
*
*****
try {
    connection =
DriverManager.getConnection(URL,"root","nielit");
    statement = connection.createStatement();
    resultSet = statement.executeQuery(query);
    textArea.append("===== Members
Information =====\n\n");
    while (resultSet.next()) {
        textArea.append("Member ID: " +
resultSet.getString("MemberID") + "\n" +
"Name: " + resultSet.getString("Name") + "\n" +
"Major: " + resultSet.getString("Major") + "\n" +
"Valid Upto: " + resultSet.getString("ValidUpto")
+ "\n\n");
    }
    textArea.append("===== Members
Information =====");
    resultSet.close();
    statement.close();
    connection.close();
}
catch (SQLException SQLe) {
    System.out.println(SQLe.toString());
}
//for setting the visible to true
setVisible(true);
//to show the frame
pack();
}

public int print(Graphics pg, PageFormat pageFormat, int pageIndex)
throws PrinterException {

```

```
    pg.translate((int) pageFormat.getImageableX(), (int)
pageFormat.getImageableY());
    int wPage = (int) pageFormat.getImageableWidth();
    int hPage = (int) pageFormat.getImageableHeight();
    pg.setClip(0, 0, wPage, hPage);

    pg.setColor(textArea.getBackground());
    pg.fillRect(0, 0, wPage, hPage);
    pg.setColor(textArea.getForeground());

    Font font = textArea.getFont();
    pg.setFont(font);
    FontMetrics fm = pg.getFontMetrics();
    int hLine = fm.getHeight();

    if (lines == null)
        lines = getLines(fm, wPage);

    int numLines = lines.size();
    int linesPerPage = Math.max(hPage / hLine, 1);
    int numPages = (int) Math.ceil((double) numLines / (double)
linesPerPage);
    if (pageIndex >= numPages) {
        lines = null;
        return NO_SUCH_PAGE;
    }
    int x = 0;
    int y = fm.getAscent();
    int lineIndex = linesPerPage * pageIndex;
    while (lineIndex < lines.size() && y < hPage) {
        String str = (String) lines.get(lineIndex);
        pg.drawString(str, x, y);
        y += hLine;
        lineIndex++;
    }
    return PAGE_EXISTS;
}
```

```

protected Vector getLines(FontMetrics fm, int wPage) {
    Vector v = new Vector();

    String text = textArea.getText();
    String prevToken = "";
    StringTokenizer st = new StringTokenizer(text, "\n\r", true);
    while (st.hasMoreTokens()) {
        String line = st.nextToken();
        if (line.equals("\r"))
            continue;
        // StringTokenizer will ignore empty lines, so it's a bit
        tricky to get them...
        if (line.equals("\n") && prevToken.equals("\n"))
            v.add("");
        prevToken = line;
        if (line.equals("\n"))
            continue;

        StringTokenizer st2 = new StringTokenizer(line, " \t",
true);
        String line2 = "";
        while (st2.hasMoreTokens()) {
            String token = st2.nextToken();
            if (token.equals("\t")) {
                int numSpaces = TAB_SIZE - line2.length() %
TAB_SIZE;
                token = "";
                for (int k = 0; k < numSpaces; k++)
                    token += " ";
            }
            int lineLength = fm.stringWidth(line2 + token);
            if (lineLength > wPage && line2.length() > 0) {
                v.add(line2);
                line2 = token.trim();
                continue;
            }
            line2 += token;
        }
    }
}

```

```
        v.add(line2);
    }
    return v;
}

public abstract class Book {
    private String book_id;
    private String book_name;
    private boolean availability;
    private String category;
    private String author_name;
    private int edition;
}

public class ListAvailableBooks extends JInternalFrame {
    ****
    ***      declaration of the private variables used in the program      ***
    ****

    //for creating the North Panel
    private JPanel northPanel = new JPanel();
    //for creating the Center Panel
    private JPanel centerPanel = new JPanel();
    //for creating the label
    private JLabel label = new JLabel("THE LIST FOR THE AVAILABLE
BOOKS");
    //for creating the button
    private JButton printButton;
    //for creating the table
    private JTable table;
    //for creating the TableColumn
    private TableColumn column = null;
    //for creating the JScrollPane
    private JScrollPane scrollPane;

    //for creating an object for the ResultSetTableModel class
    private ResultSetTableModel tableModel;
```

```

 ****
 * for setting the required information for the ResultSetTableModel
class. *
****

//private static final String JDBC_DRIVER =
"sun.jdbc.odbc.JdbcOdbcDriver";
private static final String JDBC_DRIVER = "org.gjt.mm.mysql.Driver";
//private static final String DATABASE_URL = "jdbc:odbc:JLibrary";
private static final String DATABASE_URL =
"jdbc:mysql://localhost:3306/Library";
private static final String USER_NAME="root";
private static final String PASSWORD="nielit";
private static final String DEFAULT_QUERY = "SELECT
BookID,Subject,Title,Author,Publisher," +
"Copyright,Edition,Pages,ISBN,Library,ShelfNo FROM Books
WHERE Available = true";

//constructor of listAvailableBooks
public ListAvailableBooks() {
    //for setting the title for the internal frame
    super("Available Books", false, true, false, true);
    //for setting the icon
    setFrameIcon(new
    ImageIcon(ClassLoader.getSystemResource("images>List16.gif")));
    //for getting the graphical user interface components display
area
    Container cp = getContentPane();
    //for bassing the required information to the
ResultSetTableModel object
    try {
        tableModel = new ResultSetTableModel(JDBC_DRIVER,
DATABASE_URL, USER_NAME, PASSWORD, DEFAULT_QUERY);
        //for setting the Query
        try {
            tableModel.setQuery(DEFAULT_QUERY);
        }
        catch (SQLException sqlException) {

```

```
        }
    }
    catch (ClassNotFoundException classNotFound) {
    }
    catch (SQLException sqlException) {
    }
    //for setting the table with the information
    table = new JTable(tableModel);
    //for setting the size for the table
    table.setPreferredScrollableViewportSize(new Dimension(990,
200));
    //for setting the font
    table.setFont(new Font("Tahoma", Font.PLAIN, 12));
    //for setting the scrollpane to the table
    scrollPane = new JScrollPane(table);

    //for setting the size for the table columns
    for (int i = 0; i < 11; i++) {
        column = table.getColumnModel().getColumn(i);
        if (i == 0) //BookID
            column.setPreferredWidth(20);
        if (i == 1) //Subject
            column.setPreferredWidth(100);
        if (i == 2) //Title
            column.setPreferredWidth(150);
        if (i == 3) //Auther
            column.setPreferredWidth(50);
        if (i == 4) //Publisher
            column.setPreferredWidth(70);
        if (i == 5) //Copyright
            column.setPreferredWidth(40);
        if (i == 6) //Edition
            column.setPreferredWidth(40);
        if (i == 7) //Pages
            column.setPreferredWidth(40);
        if (i == 8) //ISBN
            column.setPreferredWidth(75);
        if (i == 9) //Library
```

```
        column.setPreferredWidth(50);
        if (i == 10) //ShelfNo
            column.setPreferredWidth(30);
    }
    //for setting the font to the label
    label.setFont(new Font("Tahoma", Font.BOLD, 14));
    //for setting the layout to the panel
    northPanel.setLayout(new FlowLayout(FlowLayout.CENTER));
    //for adding the label to the panel
    northPanel.add(label);
    //for adding the panel to the container
    cp.add("North", northPanel);

    //for setting the layout to the panel
    centerPanel.setLayout(new BorderLayout());
    //for creating an image for the button
    ImageIcon printIcon = new
    ImageIcon(ClassLoader.getSystemResource("images/Print16.gif"));
    //for adding the button to the panel
    printButton = new JButton("print the books", printIcon);
    //for setting the tip text
    printButton.setToolTipText("Print");
    //for setting the font to the button
    printButton.setFont(new Font("Tahoma", Font.PLAIN, 12));
    //for adding the button to the panel
    centerPanel.add(printButton, BorderLayout.NORTH);
    //for adding the scrollpane to the panel
    centerPanel.add(scrollPane, BorderLayout.CENTER);
    //for setting the border to the panel

    centerPanel.setBorder(BorderFactory.createTitledBorder("Available
Books:"));
    //for adding the panel to the container
    cp.add("Center", centerPanel);

    //for adding the actionListener to the button
    printButton.addActionListener(new ActionListener() {
        public void actionPerformed(ActionEvent ae) {
```

```
    Thread runner = new Thread() {
        public void run() {
            try {
                PrinterJob prnJob =
PrinterJob.getPrinterJob();
                prnJob.setPrintable(new
PrintingBooks(DEFAULT_QUERY));
                if (!prnJob.printDialog())
                    return;

                setCursor(Cursor.getPredefinedCursor(Cursor.WAIT_CURSOR));
                prnJob.print();

                setCursor(Cursor.getPredefinedCursor(Cursor.DEFAULT_CURSOR))
);
            }
            catch (PrinterException ex) {
                System.out.println("Printing error: "
+ ex.toString());
            }
        }
    };
    runner.start();
}
});

//for setting the visible to true
setVisible(true);
//to show the frame
pack();
}

}

public class Author extends Book {
    private String author_id;
    private String author_name;

}

public class Publisher extends Book {
```

```
private String publisher_id;
private String publisher_name;
private String address;
}

public class Supplier extends Book {
    private String supplier_id;
    private String supplier_name;
    private String address;

}

public abstract class Computer {
    private String operating_system;

}

public class SignUp extends operating_system {
    private JLabel lblUsername, lblPasswd, lblConfirmPasswd;
    public JTextField txtUser;
    private JPasswordField txtPasswd, txtConfirmPasswd;
    private JButton btnSubmit, btnCancel;
    private Connection conn=null;
    private Statement stmt;
    private static final String DATABASE_URL =
"jdbc:mysql://localhost:3306/Library";
    private static final String USER_NAME="root";
    private static final String PASSWORD="nielit";
    //private Statement stat=null;
    //private ResultSet resultSet=null;
    Dimension screen = Toolkit.getDefaultToolkit().getScreenSize();
    public SignUp(){
        super("System Signup Window");
        this.getContentPane().setLayout(null);
        this.setSize(450, 270);
        this.setResizable(false);
        this.setLocation((screen.width - 500) / 2, ((screen.height - 350) / 2));
    }
}
```

```
this.setDefaultCloseOperation(EXIT_ON_CLOSE);
lblUsername = new JLabel("Username");
lblPasswd = new JLabel("Password");
lblConfirmPasswd = new JLabel("Confirm Password");
txtUser = new JTextField();
txtPasswd = new JPasswordField();
txtConfirmPasswd = new JPasswordField();
btnSubmit = new JButton("Create");
btnCancel = new JButton("Cancel");

lblUsername.setBounds(40, 30, 100, 25);
lblPasswd.setBounds(40, 65, 100, 25);
lblConfirmPasswd.setBounds(40, 100, 200, 25);
txtUser.setBounds(230, 30, 190, 25);
txtPasswd.setBounds(230, 65, 190, 25);
txtConfirmPasswd.setBounds(230, 100, 190, 25);
btnSubmit.setBounds(110, 160, 100, 25);
btnCancel.setBounds(260, 160, 100, 25);

lblUsername.setFont(new Font("monospaced", Font.BOLD, 16));
lblPasswd.setFont(new Font("monospaced", Font.BOLD, 16));
lblConfirmPasswd.setFont(new Font("monospaced", Font.BOLD, 16));
txtUser.setFont(new Font("monospaced", Font.CENTER_BASELINE,
16));
txtPasswd.setFont(new Font("monospaced",
Font.CENTER_BASELINE, 16));
txtConfirmPasswd.setFont(new Font("monospaced",
Font.CENTER_BASELINE, 16));

this.add(lblUsername);
this.add(txtUser);
this.add(lblPasswd);
this.add(txtPasswd);
this.add(lblConfirmPasswd);
this.add(txtConfirmPasswd);
this.add(btnSubmit);
this.add(btnCancel);
```

```
ButtonListener listener = new ButtonListener();
btnSubmit.addActionListener(listener);
btnCancel.addActionListener(listener);

/*try {
    stmt.execute("SELECT * FROM Login");
    ResultSet rst = stmt.getResultSet();
    boolean datafound = rst.next();
    if (datafound) {
        btnSignup.setVisible(false);
    }
}*/
```

//con = DBConnection.getDBConnection();

} //constructor closed

```
public void Sign() {
    String username = txtUser.getText();
    String password = new String(txtPasswd.getPassword());
    String confirmPassword = new
String(txtConfirmPasswd.getPassword());
    String SQL;
    SQL = "INSERT INTO Login
VALUES("+username+","+""+password+ ")";
    try {
        Class.forName("org.gjt.mm.mysql.Driver");
        conn =
DriverManager.getConnection(DATABASE_URL,USER_NAME,PASSWO
RD);
        stmt = conn.createStatement();
        stmt.executeUpdate(SQL);
        stmt.close();
        conn.close();
        EventQueue.invokeLater(new Main(new JLibrary()));
        this.dispose();
    }
}
```

```
        }
    catch (ClassNotFoundException cnfe) {
        System.out.println(cnfe.toString());
    }
    catch (SQLException SQLe) {
        System.out.println(SQLe.toString());
    }
    catch (Exception ex) {
        JOptionPane.showMessageDialog(null, "Error on Signup
operation", "Signup Error", JOptionPane.ERROR_MESSAGE);
    }//try catch closed
    if (conn == null) {
        JOptionPane.showMessageDialog(null, "Error on establishing
database connection", "Error", JOptionPane.ERROR_MESSAGE);
        this.dispose();
    }
}//Sign() closed

private class ButtonListener implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        if (e.getSource() == btnSubmit) {
            String password = new String(txtPasswd.getPassword());
            String confirmPassword = new
String(txtConfirmPasswd.getPassword());
            if (txtUser.getText() == null || txtUser.getText().equals("")) {
                JOptionPane.showMessageDialog(null, "Enter username",
"Missing field", JOptionPane.INFORMATION_MESSAGE);
                txtUser.requestFocus();
                return;
            }
            if (password == null || password.equals("")) {
                JOptionPane.showMessageDialog(null, "Enter password",
"Missing field", JOptionPane.INFORMATION_MESSAGE);
                txtPasswd.requestFocus();
                return;
            }
            if (confirmPassword == null || confirmPassword.equals("")) {
```

```
JOptionPane.showMessageDialog(null, "Enter confirm
password", "Missing field", JOptionPane.INFORMATION_MESSAGE);
        txtConfirmPasswd.requestFocus();
        return;
    }
    if (!password.equals(confirmPassword)) {
        JOptionPane.showMessageDialog(null, "Password mismatch
!", "Mismatch", JOptionPane.WARNING_MESSAGE);
        txtPasswd.setText("");
        txtConfirmPasswd.setText("");
        txtPasswd.requestFocus();
        return;
    }
    Sign();
} else if (e.getSource() == btnCancel) {
    System.exit(0);
}//if else closed
}//actionPerformed() closed
}
}
public class Supplier extends Printer {
    private String printer_type;
}

public class Supplier Authentication_System {
    private String member_id;
    private String password;
}

    private Connection connection = null;
    private Statement statement = null;
    private ResultSet resultSet = null;

    private String userName;
    private String passwd;
```

```
private static final String DATABASE_URL =
"jdbc:mysql://localhost:3306/Library";
private static final String USER_NAME="root";
private static final String PASSWORD="nielit";
public Password() {
}
/*public Members(int memberID, int ID, String password, String
name, String email, String major, int numberOfBooks, int mony, Date
expired) {
    this.memberID = memberID;
    this.ID = ID;
    this.password = password;
    this.name = name;
    this.email = email;
    this.major = major;
    this.numberOfBooks = numberOfBooks;
    this.mony = mony;
    this.expired = expired;
}*/
```

```
public String getUsername() {
    return userName;
}
```

```
public String getPassword() {
    return passwd;
}
```

```
public boolean connection(String Query) {
    int flag=0;
    try {
        //Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
        Class.forName("org.gjt.mm.mysql.Driver");
    }
    catch (ClassNotFoundException cnfe) {
        System.out.println("Members.java\n" + cnfe.toString());
    }
    catch (Exception e) {
```

```
        System.out.println("Members.java\n" + e.toString());
    }

    try {
        connection =
DriverManager.getConnection(DATABASE_URL,USER_NAME,PASSWO
RD);
        statement = connection.createStatement();
        Statement stmt= connection.createStatement();
        stmt.execute(Query);
        ResultSet rs = stmt.getResultSet();
        boolean recordfound = rs.next();
        if (recordfound) {
            flag=1;
            resultSet = statement.executeQuery(Query);
            while (resultSet.next()) {
                userName = resultSet.getString(1);
                passwd = resultSet.getString(2);
            }
            resultSet.close();
            statement.close();
            connection.close();
        }
    }
    catch (SQLException SQLe) {
        System.out.println("Password.java inside result set\n" +
SQLe.toString());
    }
    if (flag==0)
        return false;
    else
        return true;
}

public void update(String Query) {
    try {
        //Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");p
        Class.forName("org.gjt.mm.mysql.Driver");
    }
```

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```
    }
    catch (ClassNotFoundException cnfe) {
        System.out.println("Password.java\n" + cnfe.toString());
    }
    catch (Exception e) {
        System.out.println("Password.java\n" + e.toString());
    }

    {
        connection =
DriverManager.getConnection(DATABASE_URL,USER_NAME,PASSWO
RD);
        statement = connection.createStatement();
        statement.executeUpdate(Query);
        statement.close();
        connection.close();
    }
    catch (SQLException SQLe) {
        System.out.println("Password.java\n" + SQLe.toString());
    }
}
}
```

## 7. EVOLVEMENT

In this process of project development, we have learnt lot of new knowledge and programming code from this Database design Project. Besides that, there are also some problems that appears as biggest challenge during development process.

During project design stages, the problem was how to construct the Entity-Relationship diagram and Relational Schema. For this, we referred assignments and study material of undergraduate and graduate level. We also did research via internet for more references.

After this, we started to write SQL queries for creating tables and inserting data into it. For this we used MS Access as Database. Initially we thought very easy in writing queries but while practically writing queries in MS Access, we faced difficulties in running these queries and learnt a proper syntax to write queries. But finally, we became successful in running SQL queries.

The biggest harvest gained through this project development process is importance of communication between teammates. In addition to this, discussion is needed in developing the project to match our own ideas while developing. A good communication is needed to avoid unnecessary problems appear and delay the completion time.

## 8. REFERENCES

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