Prac #7

SQL Practice I:

Writing/Executing basic SQL queries in MySQL Workbench to extract information from a database

Through a part of the last prac activity, you learned how to use MySQL Workbench facilities to create SQL queries and run (execute) them mainly for the purpose of data definition (creating table structures) or basic data manipulation (inserting data records to the existing tables etc.). Also, through the relevant lecture materials in this subject, you learned how to use various SQL commands to compose a correct query to respond to the various requests to extract useful information from the database.

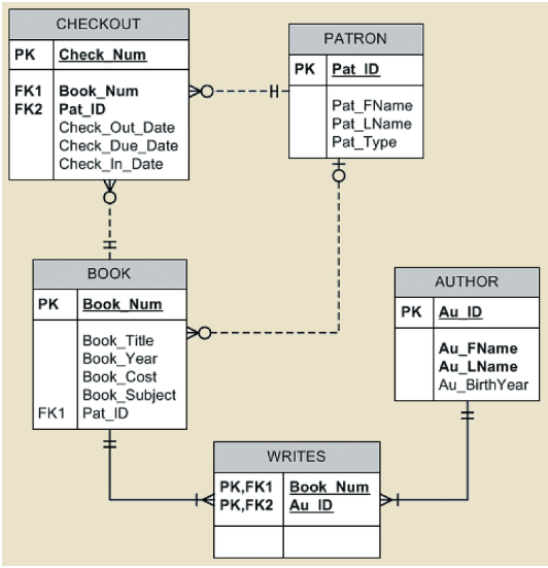
In this prac, you are going to practice basic SQL queries to extract useful information using MySQL Workbench. You will use the library database you created in previous pracs, and add a number of SQL queries to extract information from the database.

- **Learning outcomes and objectives**

  Student will be able to
  - compose various SQL queries in particular using SELECT command by adding restrictions to the search criteria.
  - use special SQL commands to restrict or adjust the way of displaying output of the query

- **Task Overview**

  Open the library database you created in the previous lab on MySQL Workbench. The conceptual model of the database is presented in the ERD as shown here.

  You will use this ERD as a quick reference when you compose SQL queries for this prac, to understand further details about this database including table structure, columns included in each table, PKs and FKs, relationships between tables etc.

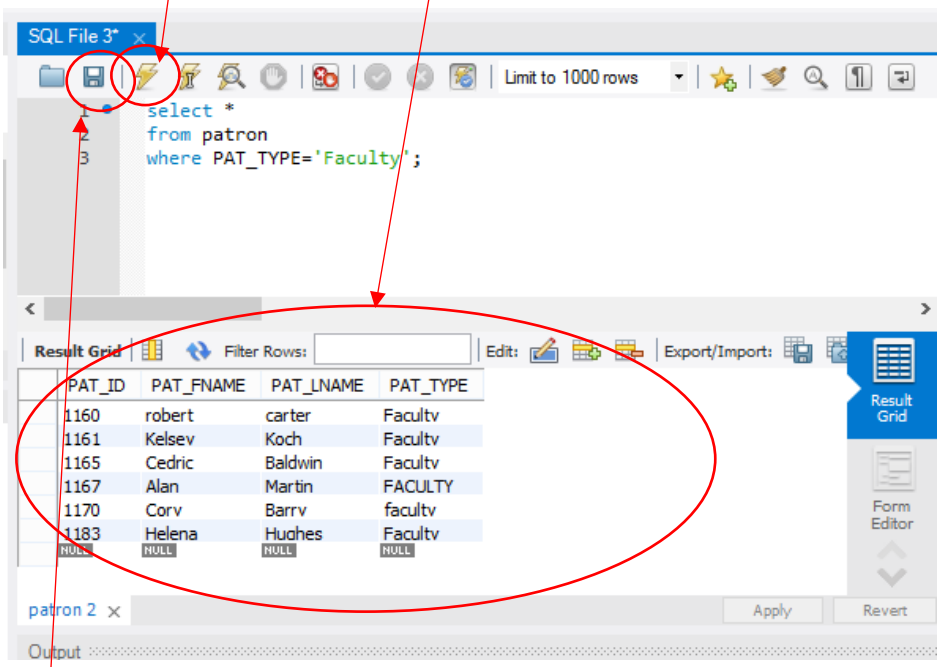
  You are given a number of exercises to practice to write/run SQL queries. Solutions are provided for you for some exercises. For each of these exercises, you will need to write/save an SQL query (though some exercises already show solutions, you are always recommended to write and run the code yourself).

  Do not forget to save each query as soon as after writing/running it. For example, save the query as 'Q1.sql' for the first question. You are required to submit a zipped directory containing all query files you completed as Q1~Q25 to be marked off for this prac activity.

As a reminder, here are the instructions to get into SQL editor in MySQL Workbench.

1. Open a new SQL query editor by clicking the SQL+ icon on the overhead menu bar.

2. Write a SQL query to complete the task given on the editor. After writing the query, click 'execute' button to run the SQL code. Once you click the execute button, the result of the query will be shown up on the result panel.



If the query is not successful, the corresponding error will be explained in the Output panel instead.

3. Save the query somewhere on your computer or portable disk.

Exercises:

For each of these exercises, a figure of the correct output is provided. If the output of the query is very large, only the first several rows of the output are shown.

Save a query for each question as the name of "Q1.sql", "Q2.sql", … You are required to submit these files (as a zipped folder) to be marked off.

Note that some questions are provided with the accompanied solution to help your learning.

1. Write a query that displays the first and last name of every patron sorted by last name and then first name. Ensure the sort is case insensitive. (See the figure below for first part of the output. The actual result will have 50 rows)

PAT_FNAME	PAT_LNAME
Vera	Alvarado
Holly	Anthony
Cedric	Baldwin
Cory	Barry
Nadine	Blair
Erika	Bowen
Gerald	Burke
Ollie	Cantrell
robert	carter
Keith	Cooley

Answer provided:

```
SELECT PAT_FNAME, PAT_LNAME
FROM PATRON
ORDER BY PAT_LNAME, PAT_FNAME;
```

2. Write a query to display the checkout number, check out date, and due date for every book that has been checked out sorted by checkout number. (See the figure below for first part of the output. The actual result will have 68 rows)

CHECK_NUM	CHECK_OUT_DATE	CHECK_DUE_DATE
91001	3/31/2017	4/14/2017
91002	3/31/2017	4/7/2017
91003	3/31/2017	4/14/2017
91004	3/31/2017	4/14/2017
91005	3/31/2017	4/7/2017
91006	4/5/2017	4/12/2017
91007	4/5/2017	4/12/2017
91008	4/5/2017	4/12/2017
91009	4/5/2017	4/19/2017
91010	4/5/2017	4/19/2017
91011	4/5/2017	4/12/2017

3. Write a query to display the book number, book title, and subject for every book sorted by book number (See the figure below for the output. The actual result will have 20 rows)

BOOK_NUM	TITLE	Subject of Book
5235	Beginner's Guide to JAVA	Programming
5236	Database in the Cloud	Cloud
5237	Mastering the database environment	Database
5238	Conceptual Programming	Programming
5239	J++ in Mobile Apps	Programming
5240	iOS Programming	Programming
5241	JAVA First Steps	Programming
5242	C# in Middleware Deployment	Middleware
5243	DATABASES in Theory	Database
5244	Cloud-based Mobile Applications	Cloud
5245	The Golden Road to Platform independence	Middleware

Answer provided:

```
SELECT BOOK_NUM, BOOK_TITLE AS TITLE, BOOK_SUBJECT AS "Subject
of Book"
FROM BOOK
ORDER BY BOOK_NUM;
```

4. Write a query to display the book number, title, and cost of each book sorted by book number (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	Replacement Cost
5235	Beginner's Guide to JAVA	59.95
5236	Database in the Cloud	79.95
5237	Mastering the database environment	89.95
5238	Conceptual Programming	59.95
5239	J++ in Mobile Apps	49.95
5240	iOS Programming	79.95
5241	JAVA First Steps	49.95
5242	C# in Middleware Deployment	59.95
5243	DATABASES in Theory	129.95
5244	Cloud-based Mobile Applications	69.95
5245	The Golden Road to Platform independence	119.95
5246	Capture the Cloud	69.95
5247	Shining Through the Cloud: Sun Programming	109.95
5248	What You Always Wanted to Know About Database, But Were Afraid to Ask	49.95

5. Write a query to display the different years in which books have been published in. Include each year only once and sort the results by year (See the figure below for the output).

BOOK_YEAR
2014
2015
2016
2017

Answer provided:

```
SELECT DISTINCT BOOK_YEAR
FROM BOOK
ORDER BY BOOK_YEAR;
```

6. Write a query to display the different subjects on which this library has books. Include each subject only once and sort the results by subject (See the figure below for the output).

BOOK_SUBJECT
Cloud
Database
Middleware
Programming

7. Write a query to display the checkout number, book number, patron ID, checkout date, and due date for every checkout that has ever occurred in the system. Sort the results by checkout date in descending order and then by checkout number in ascending order (See the figure below for first part of the output. The actual result will have 68 rows)

CHECK_NUM	BOOK_NUM	PAT_ID	CHECK_OUT_DATE	CHECK_DUE_DATE
91067	5252	1229	5/24/2017	5/31/2017
91068	5238	1229	5/24/2017	5/31/2017
91066	5242	1228	5/19/2017	5/26/2017
91064	5236	1183	5/17/2017	5/31/2017
91065	5244	1210	5/17/2017	5/24/2017
91060	5235	1209	5/15/2017	5/22/2017
91061	5246	1172	5/15/2017	5/22/2017
91062	5254	1223	5/15/2017	5/22/2017
91063	5243	1223	5/15/2017	5/22/2017
91056	5254	1224	5/10/2017	5/17/2017

Answer provided:

```
SELECT CHECK_NUM, BOOK_NUM, PAT_ID, CHECK_OUT_DATE,
CHECK_DUE_DATE
FROM CHECKOUT
ORDER BY CHECK_OUT_DATE DESC, CHECK_NUM;
```

8. Write a query to display the book title, year, and subject for every book. Sort the results by book subject in ascending order, year in descending order, and then title in ascending order (See the figure below for the output. The actual result will have 20 rows).

BOOK_TITLE	BOOK_YEAR	BOOK_SUBJECT
Capture the Cloud	2016	Cloud
Starlight Applications	2016	Cloud
Cloud-based Mobile Applications	2015	Cloud
Database in the Cloud	2014	Cloud
Beyond the Database Veil	2016	Database
What You Always Wanted to Know About Database, But Were Afraid to Ask	2016	Database
DATABASES in Theory	2015	Database
Mastering the database environment	2015	Database
Reengineering the Middle Tier	2016	Middleware
The Golden Road to Platform independence	2016	Middleware

9. Write a query to display the book number, title, and cost for all books that cost $59.95 sorted by book number (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	BOOK_COST
5235	Beginner's Guide to JAVA	59.95
5238	Conceptual Programming	59.95
5242	C# in Middleware Deployment	59.95
5251	Thoughts on Revitalizing Ruby	59.95

Answer provided:

```
SELECT BOOK_NUM, BOOK_TITLE, BOOK_COST
FROM BOOK
WHERE BOOK_COST = 59.95
ORDER BY BOOK_NUM;
```

10. Write a query to display the book number, title, and replacement cost for all books in the "Database" subject sorted by book number (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	BOOK_COST
5237	Mastering the database environment	89.95
5243	DATABASES in Theory	129.95
5248	What You Always Wanted to Know About Database, But Were Afraid to Ask	49.95
5252	Beyond the Database Veil	69.95

11. Write a query to display the checkout number, book number, and checkout date of all books checked out before April 5, 2017 sorted by checkout number (See the figure below for the output).

CHECK_NUM	BOOK_NUM	CHECK_OUT_DATE
91001	5235	3/31/2017
91002	5238	3/31/2017
91003	5240	3/31/2017
91004	5237	3/31/2017
91005	5236	3/31/2017

Answer provided:

```
SELECT CHECK_NUM, BOOK_NUM, CHECK_OUT_DATE
FROM checkout
WHERE CHECK_OUT_DATE < '2017-04-05'
ORDER BY CHECK_NUM;
```

12. Write a query to display the book number, title, and year of all books published after 2015 and on the "Programming" subject sorted by book number (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	BOOK_YEAR
5247	Shining Through the Cloud: Sun Programming	2016
5251	Thoughts on Revitalizing Ruby	2016
5253	Virtual Programming for Virtual Environments	2016
5254	Coding Style for Maintenance	2017

13. Write a query to display the book number, title, subject, and cost for all books that are on the subjects of "Middleware" or "Cloud," and that cost more than $70 sorted by book number (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	BOOK_SUBJECT	BOOK_COST
5236	Database in the Cloud	Cloud	79.95
5245	The Golden Road to Platform independence	Middleware	119.95
5250	Reengineering the Middle Tier	Middleware	89.95

Answer provided:

```
SELECT BOOK_NUM, BOOK_TITLE, BOOK_SUBJECT, BOOK_COST
FROM BOOK
WHERE (BOOK_SUBJECT = 'Middleware' OR BOOK_SUBJECT = 'Cloud')
      AND BOOK_COST > 70
ORDER BY BOOK_NUM;
```

14. Write a query to display the author ID, first name, last name, and year of birth for all authors born in the decade of the 1980s sorted by author ID (See the figure below for the output).

AU_ID	AU_FNAME	AU_LNAME	AU_BIRTHYEAR
218	Rachel	Beatney	1983
383	Neal	Walsh	1980
394	Robert	Lake	1982
438	Perry	Pearson	1986
460	Connie	Paulsen	1983
581	Manish	Aggerwal	1984
603	Julia	Palca	1988

15. Write a query to display the book number, title, and subject for all books that contain the word "Database" in the title, regardless of how it is capitalized. Sort the results by book number (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	BOOK_SUBJECT
5236	Database in the Cloud	Cloud
5237	Mastering the database environment	Database
5243	DATABASES in Theory	Database
5248	What You Always Wanted to Know About Database, But Were Afraid to Ask	Database
5252	Beyond the Database Veil	Database

Answer provided:

```
SELECT BOOK_NUM, BOOK_TITLE, BOOK_SUBJECT
FROM BOOK
WHERE Upper(BOOK_TITLE) LIKE '%DATABASE%'
ORDER BY BOOK_NUM;
```

16. Write a query to display the patron ID, first and last name of all patrons who are students, sorted by patron ID (See the figure below for first part of the output. The actual result will have 44 rows)

PAT_ID	PAT_FNAME	PAT_LNAME
1166	Vera	Alvarado
1171	Peggy	Marsh
1172	Tony	Miles
1174	Betsy	Malone
1180	Nadine	Blair
1181	Allen	Horne
1182	Jamal	Melendez
1184	Jimmie	Love
1185	Sandra	Yang
1200	Lorenzo	Torres

17. Write a query to display the patron ID, first and last name, and patron type for all patrons whose last name begins with the letter "C", sorted by patron ID (See the figure below for the output).

PAT_ID	PAT_FNAME	PAT_LNAME	PAT_TYPE
1160	robert	carter	Faculty
1208	Ollie	Cantrell	Student
1210	Keith	Cooley	STUdent

18. Write a query to display the author ID, first and last name of all authors whose year of birth is unknown. Sort the results by author ID (See the figure below for the output).

AU_ID	AU_FNAME	AU_LNAME
229	Carmine	Salvadore
262	Xia	Chiang
559	Rachel	McGill

Answer provided:

```
SELECT AU_ID, AU_FNAME, AU_LNAME
FROM AUTHOR
WHERE AU_BIRTHYEAR IS NULL
ORDER BY AU_ID;
```

19. Write a query to display the author ID, first and last name of all authors whose year of birth is known. Ensure the results are sorted by author ID (See the figure below for the output).

AU_ID	AU_FNAME	AU_LNAME
185	Benson	Reeves
218	Rachel	Beatney
251	Hugo	Bruer
273	Reba	Durante
284	Trina	Tankersly
383	Neal	Walsh
394	Robert	Lake
438	Perry	Pearson
460	Connie	Paulsen
581	Manish	Aggerwal
592	Lawrence	Sheel
603	Julia	Palca

20. Write a query to display the checkout number, book number, patron ID, check out date, and due date for all checkouts that have not yet been returned. Sort the results by book number (See the figure below for the output).

CHECK_NUM	BOOK_NUM	PAT_ID	CHECK_OUT_DATE	CHECK_DUE_DATE
91068	5238	1229	5/24/2017	5/31/2017
91053	5240	1212	5/9/2017	5/16/2017
91066	5242	1228	5/19/2017	5/26/2017
91061	5246	1172	5/15/2017	5/22/2017
91059	5249	1207	5/10/2017	5/17/2017
91067	5252	1229	5/24/2017	5/31/2017

21. Write a query to display the author ID, first name, last name, and year of birth for all authors. Sort the results in descending order by year of birth, and then in ascending order by last name (See the figure below for the output). (Note that some DBMS sort NULLs as being large and some DBMS sort NULLs as being small.)

AU_ID	AU_FNAME	AU_LNAME	AU_BIRTHYEAR
185	Benson	Reeves	1990
603	Julia	Palca	1988
438	Perry	Pearson	1986
581	Manish	Aggerwal	1984
218	Rachel	Beatney	1983
460	Connie	Paulsen	1983
394	Robert	Lake	1982
383	Neal	Walsh	1980
592	Lawrence	Sheel	1976
251	Hugo	Bruer	1972
273	Reba	Durante	1969
284	Trina	Tankersly	1961
262	Xia	Chiang	
559	Rachel	McGill	
229	Carmine	Salvadore	

22. Write a query to display the patron ID, book number, and days kept for each checkout. "Days Kept" is the difference from the date on which the book is returned to the date it was checked out. Sort the results by days kept in descending order, then by patron ID, and then by book number. (See the figure below for the output. The actual result will have 68 rows)

PATRON	BOOK	Days Kept
1165	5235	9
1209	5238	5
1160	5240	9
1160	5237	3
1202	5236	8
1203	5235	8
1174	5244	3
1181	5248	1
1170	5242	4
1161	5235	0

Answer provided:

```
SELECT PAT_ID AS PATRON, BOOK_NUM AS BOOK,
datediff(CHECK_IN_DATE, CHECK_OUT_DATE) AS "Days Kept"
FROM CHECKOUT
ORDER BY datediff(CHECK_IN_DATE, CHECK_OUT_DATE) DESC, PAT_ID,
BOOK_NUM;
```

23. Write a query to display the patron ID, patron full name, and patron type for each patron, sorted by patron ID (See the figure below for the output. The actual result will have 50 rows)

PAT_ID	Patron Name	PAT_TYPE
1160	robert carter	Faculty
1161	Kelsey Koch	Faculty
1165	Cedric Baldwin	Faculty
1166	Vera Alvarado	Student
1167	Alan Martin	FACULTY
1170	Cory Barry	faculty
1171	Peggy Marsh	STUDENT

Answer provided:

```
SELECT PAT_ID, CONCAT(PAT_FNAME, ' ', PAT_LNAME) AS "Patron
Name", PAT_TYPE
FROM PATRON
ORDER BY PAT_ID;
```

Note: CONCAT is a special function compatible with MySQL which can be used to concatenate multiple columns data into one. If you use any other DBMS, you need to refer to the manual of the DBMS for further information about the specific functions they provide for concatenating two columns data into one.

24. Write a query to display the book number, title with year, and subject for each book. Sort the results by the book number (See the figure below for the output. The actual result will have 20 rows)

BOOK_NUM	BOOK	BOOK_SUBJECT
5235	Beginner's Guide to JAVA (2012)	Programming
5236	Database in the Cloud (2012)	Cloud
5237	Mastering the database environment (2013)	Database
5238	Conceptual Programming (2013)	Programming
5239	J++ in Mobile Apps (2013)	Programming
5240	iOS Programming (2013)	Programming
5241	JAVA First Steps (2013)	Programming
5242	C# in Middleware Deployment (2013)	Middleware
5243	DATABASES in Theory (2013)	Database

25. Write a query to display the patron ID, full name (first and last), and patron type for all patrons. Sort the results by patron type and then by last name and first name. Ensure that all sorting is case insensitive. (See the figure below for the output. The actual result will have 50 rows)

PAT_ID	NAME	PAT_TYPE
1165	Cedric Baldwin	Faculty
1170	Cory Barry	faculty
1160	robert carter	Faculty
1183	Helena Hughes	Faculty
1161	Kelsey Koch	Faculty
1167	Alan Martin	FACULTY
1166	Vera Alvarado	Student
1202	Holly Anthony	Student
1180	Nadine Blair	STUDENT

This is the end of Prac #7 Lab.

You are required to submit (or show your prac tutor) a zipped folder having all SQL queries you composed for this prac (or a WORD document having all SQL queries).