
HKU SPACE Community College

2023-24 Associate Degree Program

Associate of Engineering

Introduction to Database Systems

Project Report

Group 5A

Library System

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Table of Contents

Cover Page	P.1
Member list	P.2
Table of Contents	P.3
Introduction	P.4
Background	P.5
User Requirement	P.6
Assumptions and limitations:	P.7-8
System Design	P.9-15
SQL code	P.16-33
Recommendations and Conclusions	P.34-35
Appendices	P.36-39

Introduction

This library database system contains several tables with detailed student, book, staff and equipment information, books/equipment borrowed/returned, donation and point punishment records. This database was created to manage the library, SQLite Studio software was used to write this Database.

The User Requirement section will list requirements that users can fulfil with this database; Assumption And Limitations section will differentiate the library's user hierarchy, describing the different rights in different user grades, describing rules and regulations in the library which may lead to decrease points in detail; Business Needs, Business Rule, ER Diagram and System Design section will describe the relationship between the tables; The SQL Code section will list the SQL codes that may be used in the subsequent; The Recommendations and Conclusion section will describe the future development recommendations in this database.

Background

The new library's establishment at HKU SPACE has necessitated the creation of a library database to manage and organize the library's resources.

The college has tasked the library administration team with the responsibility of developing this database, which will help administrators efficiently manage the library and users efficiently search for and locate books, articles, and other materials within the library's collection.

The new library is called *SPACE 2.0* Library, built in KSC.

User Requirement:

User: Student and library administer(staff)

- Book information management
- Student information management
- Device information management
- Staff information management
- Book borrowing/returning procedures
- Device borrowing/returning procedures
- Book borrowing/returning record
- A credit system

Assumptions and limitations:

Credits Policy

Credits	Maximums borrow number
76 - 100	15 book and 2 devices
51 - 75	10 book and 2 devices
26 - 50	5 book and 1 device
1 - 25	3 book and 1 device
0 or lower	0 book and device

If the student's credits are between 76-100, students can borrow up to 15 books and 2 devices.

If the student's credits are between 51-75, students can borrow up to 10 books and 2 devices.

If the student's credits are between 26-50, students can borrow up to 5 books and 1 device.

If the student's credits are between 1-25, students can borrow up to 3 books and 1 device.

If the student's credits are between 76-100, students cannot borrow any books and devices.

Credit increment and decrement:

Increment: Donate money to the library, donate \$10 to increase 1 credit

Decrement: Library rules and overdue equation

Library rules (Do not break the rules, otherwise your credit will decrease)	
1. Do not damage Books and other library materials	(-5)
2. Patrons should be quiet while in the library.	(-5)
3. Cell phones should be turned off or put in silent mode while in the library.	(-5)
4. Food and drinks are not allowed in the library.	(-5)
5. No alcoholic beverages are allowed in the library.	(-5)
6. The library's devices and internet connection should be used for educational and research purposes only.	(-5)
7. Patrons should not smoke or use tobacco products in the library.	(-5)
8. Patrons should not bring pets or animals into the library, except for service animals.	(-5)
9. Gambling is not allowed in the library.	(-5)
10. Illegal or unethical activities are not allowed in the library.	(-5)

Punishment of overdue (Do not return books late, otherwise your credit will decrease) The credits decrease will follow the equation
<i>Credit reduced = Number of overdue book(s) * Overdue days</i>

Punishment of device overdue (Do not owe return devices late, otherwise your credit will decrease) The credits decrease will follow the equation
<i>Reduce credit = Number of devices * Overdue days</i>

System Design

The database has 7 tables, they are *RECORD*, *STUDENT*, *BOOK*, *PUNISHMENT*, *DONATION*, *STAFF* and *DEVICE*.

In *RECORD* table, it has 9 attributions, which are

RECORD_ID (Primary Key): It is the primary key of the Record table

SID (foreign key): It is a foreign key of Record table, which relates to STUDENT table

BOOK_ID (foreign key): It is a foreign key of Record table, which relates to BOOK table

BORROW_DAY: It jots down the day of the borrowed book

BORROW_TIME: It jots down the times of the borrowed book

STATUS: It jots down the status of the borrowed book. It includes 4 types of content: LATE, LATE_RETURNED, RETURNED, BORROW

RETURNED_DAY: When the book's status is LATE_RETURNED or RETURNED, the content of RETURNED_DAY is not null.

DEVICE_ID (foreign key): It is a foreign key of Record table, which relates to DEVICE table

STAFF_ID (foreign key): It is a foreign key of Record table, which relates to STAFF table

In the *STUDENT* table, it contains the following:

LNAME, FNAME: It is the name of the student includes first and last name

SID (Primary Key): It is the primary key of the STUDENT table

GENDER, AGE, PHONE, SUBJECT: Contains the basic information of student.

ADDRESS_AREA, ADDRESS_ROAD, ADDRESS_BUILDING, ADDRESS_ROOM: It is the home information of a student.

CREDITS: Contains the library credits, relates to DONATE and PUNISHMENT

In the *BOOK* table, it contains the following:

BOOK_ID (Primary Key): It is the primary key of the BOOK table

BOOK_TITLE, BOOK_AUTHOR, ISBN: Contains the basic information of a book

BOOK_ATTRIBUTE: Contains two attributes of a book: 'Available' or 'Not available'

BOOK_LANGUAGE: Contains two types of language of a book which are 'Chinese' and 'English'

PUBLISHER: Contains the publisher of a book.

BOOK_TYPE: Contains different book type, such as BUSINESS, CELEBRITY, CHEMICAL

*COOK, COUNTRY, CS, LIFE, LOGIC, MANAGE, MENTAL, MENTAL HEALTH, NOVEL, SPEECH
, TEACH and TRAVEL.*

In the *PUNISHMENT* table, it contains the following:

P_ID (Primary Key): It is the primary key of PUNISHMENT table

SID (foreign key): It is a foreign key of PUNISHMENT table, which relates to STUDENT.

PUNISH_REASON: Contains the punishment reason

CREDIT_SUB: Contains the integer of credit subtraction

P_DATE: Jots down the day of this record

In *DONATION* table, it contains the following:

D_ID (Primary Key): It is the primary key of DONATION table↵

SID (foreign key): It is a foreign key of DONATION table, which relates to STUDENT.↵

DONATE: Contains the value of donate↵

CREDIT_ADD: Contains the integer of credit increasing, which according to the *DONATE* attribute↵

D_DATE: Jots down the day of this record↵

In the *STAFF* table, it has

STAFF_ID (Primary Key): It is the primary key of STAFF table

FNAME, LNAME, GENDER and PHONE: Contains the basic information of a staff member.

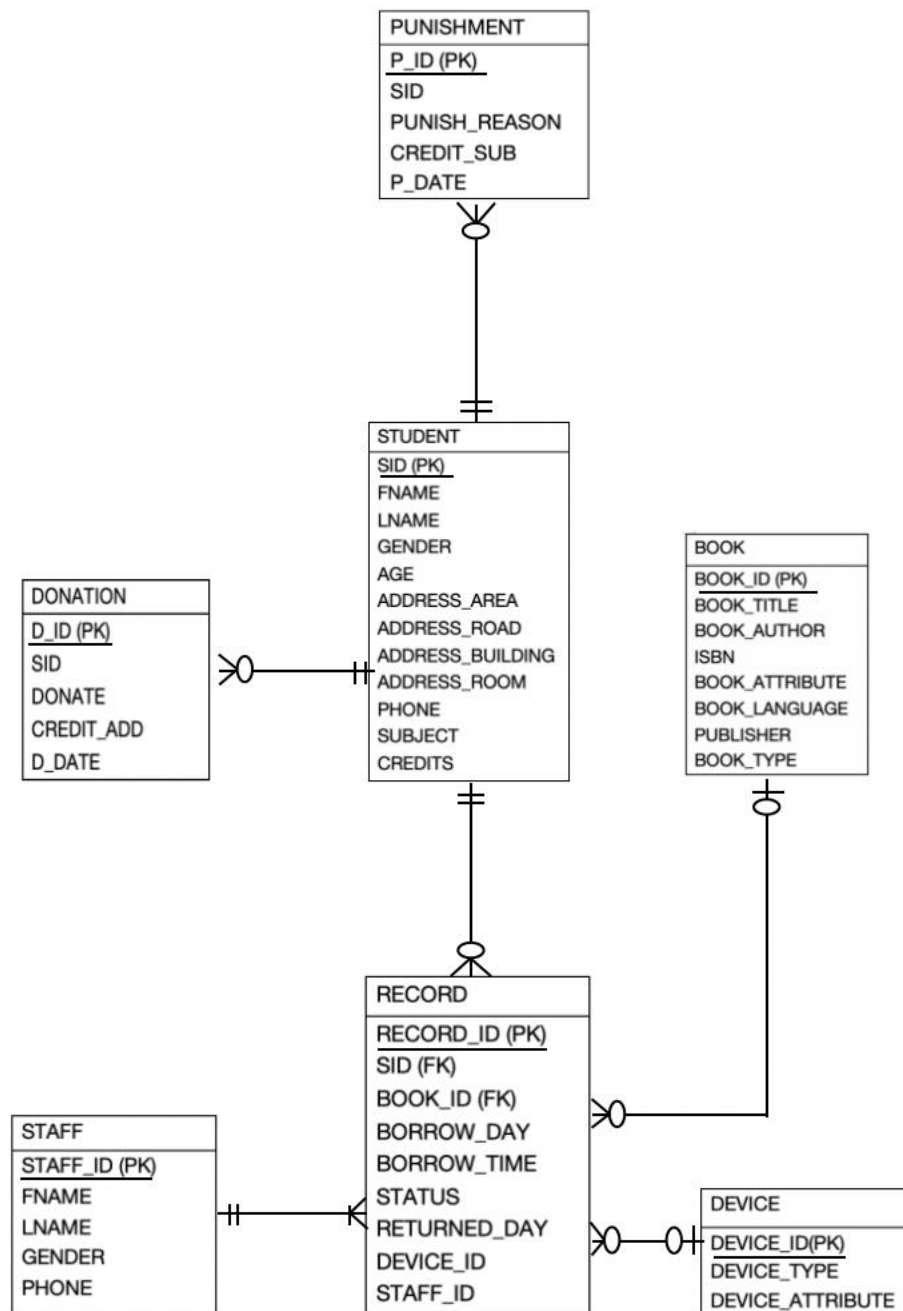
In the *DEVICE* table, it contains the following:

DEVICE_ID (Primary Key): It is the primary key of DEVICE table

DEVICE_TYPE: includes different types of devices, such as computer, tablet and room

DEVICE_ATTRIBUTE: Contains two attributes of a device: 'Available' or 'Not available'

ER diagram:



Initial setup	STUDENT: Student name, SID, Gender, Age, Address, Phone, Subject, Credits											
	NAME	LNAME	SID	GENDER	AGE	ADDRESS_AREA	ADDRESS_ROAD	ADDRESS_BUILDING	ADDRESS	PHONE	SUBJECT	CRED
	1	tan	Ta Tai	1023000	F	20	Southern District	1ST LANE KEE LUN WAI	Buckingham Building北滿大廈	1000	17628755	Associate of Geography
	2	tan	Ta Zang	1023002	F	20	Wan Chai District	2ND LANE KEE LUN WAI	Bugan Valley樓閣大廈	1001	13103195	Associate of Social Sciences
	3	tan	Ta Sit	1023003	F	19	Eastern District	3RD LANE KEE LUN WAI	Beyers Garden北麥樓	1002	39765946	Higher Diploma in Dental Hygiene
	4	tan	Ta Tai	1023004	F	18	Southern District	4TH LANE KEE LUN WAI	Beyers Mall北麥樓	1003	12295555	Associate of Business Administration
	5	tan	Ta Li	1023005	F	22	Yau Tsim Mong District	5TH LANE KEE LUN WAI	Beyers Villa北麥樓	1004	30269557	Associate of Social Sciences
	6	tan	Ta Sam	1023006	F	20	Sham Shui Po District	A KING KONG SHAN ROAD	Bao Hui Building保華大廈	1005	15697987	Associate of Geography
	7	tan	Ta Sam	1023007	F	19	Kowloon City District	A KING KONG STREET	Billy Garden碧蘭花園	1006	31041438	Higher Diploma in Engineering
	8	tan	Ta Mai	1023008	F	23	Wong Tai Sin District	A KING NGAM ROAD	Bala Court百利保	1007	17461164	Higher Diploma in Architectural Studies
	9	tan	Ta Tin	1023009	F	19	Kwai Tong District	A KING NGAM VILLAGE LANE	Bala Residence閣樓	1008	13403617	Higher Diploma in Information Security
	10	tan	Ta Kong	1023010	F	17	Tsuen Wan District	A KING NGAM VILLAGE ROAD	Bala View東海樓閣	1009	17797542	Higher Diploma in Public Relations and Corporate Communications
	11	tan	Zang Tai	1023011	M	18	Tuen Mun District	ABERDEEN MAIN ROAD	Beach Prince海濱閣	1010	17466484	Higher Diploma in sports
	12	tan	Zang Zang	1023012	F	22	Yuen Long District	ABERDEEN PRAYA ROAD	Boccon Heights華山花園	1011	11575823	Higher Diploma in Data Science
	13	tan	Zang Siu	1023013	F	20	North District	ABERDEEN RESERVOIR ROAD	Bel Mount Garden碧蘭花園	1012	11761418	Higher Diploma in Translation and Interpretation
	14	tan	Zang Jai	1023014	F	18	Tai Po District	ABERDEEN STREET	Bel Shun Centre百善中心	1013	19454402	Higher Diploma in Engineering
	15	tan	Zang Si	1023015	M	22	Sai Kung District	ABERDEEN TUNNEL	Bel Trade Commercial Building信譽商場大廈	1014	11760194	Higher Diploma in sports
BOOK: Basic information of each book												
1	BOOK_ID	BOOK_TITLE	BOOK_AUTH	ISBN	BOOK_AT	BOOK_LA	PUBLISHER	BOOK_TYPE				
2	10000	Android-移动开发一本就够.pdf	FAANHOI	9144665...	Available	Chinese	Advance Forward Education Limited	CS				
3	10001	Android4编程入门经典.pdf	FAANGEE	9004053...	Not available	English	Aristo Educational Press Ltd	CS				
4	10002	Android应用开发入门教程(经典版).pdf	FAANSEUK	9745302...	Available	Chinese	Cengage Learning Hong Kong Limited	CS				
5	10003	Android应用开发揭秘精读版.pdf	FAANGA	9887674...	Not available	English	Chinese Technical Press Ltd	CS				
6	10004	Android应用开发详解.pdf	FAANYAT	9157027...	Available	Chinese	Chung Tai Educational Press	CS				
7	10005	Android开发入门教程.pdf	FAANBAN	9018079...	Not available	English	Classroom Publications Ltd	CS				
8	10006	Android系统原理及开发要点详解.pdf	FAANGEE	9694188...	Available	Chinese	Crystal Education Publications	CS				
9	10007	Android编程入门指南_王勇编写.pdf	FAANYIN	9772570...	Not available	English	Department of Electrical and Electronic Engineering, The University of Hong Kong...	CS				
10	10008	Android系统编程.pdf	FAANGN...	9057076...	Available	Chinese	Educational Publishing House Ltd	CS				
11	10009	Google Android开发入门与实践.pdf	FAANYU	9386978...	Available	English	Erudite Publishing House	CS				
12	10010	Google.Android.SDK开发范例大全.pdf	FAANLUNG	9286810...	Not available	Chinese	Excellence Publication Company Limited	CS				
13	10011	[Android.游戏开发入门] (黄) Mario.Zechner.插图版.pdf	FAANFUK	9225003...	NA	English	Advance Forward Education Limited	CS				
14	10012	[Android软件安全与逆向分析].牛生雅.扫描版[ED0000.COM].pdf	FAANDAK	9301488...	Not available	Chinese	Aristo Educational Press Ltd	CS				
15	10013	[Publish]Android程序开发指南.pdf	FAANYAU	9154662...	NA	English	Cengage Learning Hong Kong Limited	CS				
16	10014	《Android移动应用开发从入门到精通》(张健,李卉).PDF	FAANTIN	9486362...	Not available	Chinese	Chinese Technical Press Ltd	CS				
17	10015	【迷你书】自制编程语言.pdf	FAANGAI	9559367...	Not available	English	Chung Tai Educational Press	CS				
18	10016	深入理解android.pdf	FAANHOI	9304922...	Available	Chinese	Classroom Publications Ltd	CS				
19	10017	精通Android游戏开发.pdf	FAANYUI	9253421...	Not available	English	Crystal Education Publications	CS				
20	10018	apache-the-definitive-guide-3rd-edition.pdf	FAANSEIN	9758810...	Available	Chinese	Department of Electrical and Electronic Engineering, The University of Hong Kong...	CS				
21	10019	http://docs-2.4.12.en.pdf	FAANGA	9674735...	Not available	English	Educational Publishing House Ltd	CS				
DEVICE: Device ID, Type, Status												
1	DEVICE_ID	DEVICE_TYPE	DEVICE_ATTRIBUTE									
2	1	Computer-1	Available									
3	2	Computer-2	Available									
4	3	Computer-3	Available									
5	4	Computer-4	Available									
6	5	Computer-5	Available									
7	6	Computer-6	Available									
8	7	Computer-7	Available									
9	8	Computer-8	Available									
10	9	Computer-9	Available									
11	10	Tablet-1	Available									
12	11	Tablet-2	Available									
13	12	Tablet-3	Available									
14	13	Tablet-4	Available									
15	14	ROOM-1	Available									
16	15	ROOM-2	NA									
STAFF: staff ID, Staff name, Gender, Phone number												
1	STAFF_ID	FNAME	LNAME	GENDER	PHONE							
2	20207461	Chun Hin	Jian	M	20207461							
3	20212046	Kin Long	Lai	M	20212046							
4	20214909	Pui Lam Kevin	Li	M	20214909							
5	20217036	Yi Tong	Yao	F	20217036							
Data entry by end-user	RECORD: Record ID, SID, Book ID or Device ID, 2 data 1 time, status, staff ID											

1 2 3 4 5 6 7 8 9 10	RECORD_ID	SID	BOOK_ID	BORROW_ID	BORROW_DATE	STATUS	RETURNED_DATE	DEVICE_ID	STAFF_ID
	1	10220004	10000	2024/1/1	12:00:00	RETURNED	2024/1/15	NULL	20207461
	2	10220005	10001	2024/1/2	13:00:00	BORROW	NULL	NULL	20207461
	3	10220006	10002	2024/1/3	14:00:00	RETURNED	2024/1/15	NULL	20207461
	4	10220007	10003	2024/1/4	15:00:00	BORROW	NULL	NULL	20207461
	5	10220008	10004	2024/1/5	16:00:00	RETURNED	2024/1/15	NULL	20207461
	6	10220009	10005	2024/1/6	17:00:00	BORROW	NULL	NULL	20207461
	7	10220010	10006	2024/1/7	18:00:00	LATE	2024/1/27	NULL	20207461
	8	10220011	10007	2024/1/8	19:00:00	BORROW	NULL	NULL	20207461
	9	10220012	10008	2024/1/9	20:00:00	RETURNED	2024/1/15	NULL	20207461
	10	10220013	10009	2024/1/16	21:00:00	RETURNED	2024/1/17	NULL	20207461
DONATION: Donate ID, SID, Donate, Credit add, Donate data									
	D_ID	SID	DONATE	CREDIT_ADD	D_DATE				
1	1	10220001	\$800	80	2024/1/1				
2	2	10220002	\$800	80	2024/1/2				
3	3	10220003	\$800	80	2024/1/3				
4	4	10220004	\$800	80	2024/1/4				
5	5	10220005	\$800	80	2024/1/5				
PUNISHMENT: Punishment ID, SID, Reason, Credit subtract, Punishment data									
	P_ID	SID	PUNISH_REASON	CREDIT_SUB	P_DATE				
1	1	10220006	Break rule1	5	2024/1/1				
2	2	10220007	Break rule2	5	2024/1/2				
3	3	10220008	Break rule3	5	2024/1/3				
4	4	10220009	Break rule4	5	2024/1/4				
5	5	10220010	Owe book	20	2024/1/26				
6	6	10220005	Owe book	61	2024/7/1				
7	7	10220007	Owe book	123	2024/9/1				
Data to be computed	RECODE: STATUS								
	The following SQL updates the STATUS:								
	UPDATE RECORD SET STATUS = 'RETURNED' WHERE ((JulianDay(RETURNED_DAY)-JulianDay(BORROW_DAY)) <= 14);								
	UPDATE RECORD SET STATUS = 'LATE' WHERE ((JulianDay(RETURNED_DAY)-JulianDay(BORROW_DAY)) > 14);								
	UPDATE RECORD SET STATUS = 'BORROW'								

WHERE RETURNED_DAY IS NULL;

Sample results:

	RECORD_	SID	BOOK_ID	BORROW_	BORROW_	STATUS	RETURNE	DEVICE_I	STAFF_ID
1	1	10220004	10000	2024/1/1	12:00:00	RETURNED	2024/1/15	NULL	20207461
2	2	10220005	10001	2024/1/2	13:00:00	BORROW	NULL	NULL	20207461
3	3	10220006	10002	2024/1/3	14:00:00	RETURNED	2024/1/15	NULL	20207461
4	4	10220007	10003	2024/1/4	15:00:00	BORROW	NULL	NULL	20207461
5	5	10220008	10004	2024/1/5	16:00:00	RETURNED	2024/1/15	NULL	20207461
6	6	10220009	10005	2024/1/6	17:00:00	BORROW	NULL	NULL	20207461
7	7	10220010	10006	2024/1/7	18:00:00	LATE	2024/1/27	NULL	20207461
8	8	10220011	10007	2024/1/8	19:00:00	BORROW	NULL	NULL	20207461
9	9	10220012	10008	2024/1/9	20:00:00	RETURNED	2024/1/15	NULL	20207461
10	10	10220013	10009	2024/1/16	21:00:00	RETURNED	2024/1/17	NULL	20207461

RECODE: DONATION

The following SQL updates the STATUS:

UPDATE DONATION

SET CREDIT_ADD = DONATE/10

Sample results:

	D_ID	SID	DONATE	CREDIT_ADD	D_DATE
1	1	10220001	800	80	2024/1/1
2	2	10220002	800	80	2024/1/2
3	3	10220003	800	80	2024/1/3
4	4	10220004	800	80	2024/1/4
5	5	10220005	800	80	2024/1/5

RECODE: DONATION

The following SQL updates the STATUS:

UPDATE DONATION

SET CREDIT_ADD = DONATE/10

Sample results:

SQL Code:

For Students	For administers
1. Check his/her own record <i>(For RECORD table)</i>	8. Check student late returned record/ borrowing record/ returned record <i>(For advanced checking of RECORD table)</i>
2. Check book available or not <i>(For BOOK table)</i>	9. Check the quantity of book in the library (in different type) <i>(For advanced checking of BOOK table)</i>
3. Check self-information <i>(Student table)</i>	10. Find the favorite book type in the library (in gender/ age) <i>(For advanced checking of BOOK table + Link with the STUDENT / RECORD table)</i>
4. Check DONATION record <i>(For DONATION table)</i>	11. how many students always borrow the book/device <i>(For advanced checking of STUDENT table)</i>
5. Check PUNISHMENT record <i>(For PUNISHMENT table)</i>	12. Who is the most hardworking staff <i>(For STAFF table)</i>
6. Check device available or not <i>(For DEVICE table)</i>	
7. Check the book information <i>(For BOOK table)</i>	

For student:

1. Check his/her own record (For RECORD table)

Example:(SID:1022004)

SQL Code:

```
SELECT * FROM RECORD
```

```
WHERE SID = 10220004
```

Result:







Library_Syste									
Query History									
1 SELECT * FROM RECORD									
2 WHERE SID = 10220004									
Grid view Form view									
Total rows loaded: 1									
1	RECORD	SID	BOOK ID	BORROW	BORROW	STATUS	RETURNEL	DEVICE II	STAFF ID
1	1	10220004	10000	2024/1/1	12:00:00	RETURNED	2024/1/15	NULL	20207461

2. Check book available or not (For BOOK table)

SQL Code:

```
SELECT BOOK_ID,BOOK_TITLE,BOOK_ATTRIBUTE
FROM BOOK
WHERE BOOK_ATTRIBUTE ='Available'
```

Result:

Query		History
1 SELECT BOOK_ID,BOOK_TITLE,BOOK_ATTRIBUTE		
2 FROM BOOK		
3 WHERE BOOK_ATTRIBUTE ='Available'		
Grid view		Form view
		
		
		
1		Total rows loaded: 2258
BOOK ID	BOOK TITLE	BOOK ATTRIBU
1	10000 Android+移动开发一本就够.pdf	Available
2	10002 Android应用开发入门教程(经典版).pdf	Available
3	10004 Android应用开发详解.pdf	Available
4	10006 Android系统原理及开发要点详解.pdf.pdf	Available
5	10008 Android高级编程.pdf	Available
6	10009 Google Android开发入门与实战.pdf	Available
7	10016 深入理解android.pdf	Available
8	10018 apache-the-definitive-guide-3rd-edition.pdf	Available
9	10020 Hungry.Minds.Apache.Server.2.Bible.Mar.2002.ISBN.0764548212.pdf	Available
10	10022 Blender 3D Architecture,Buildings, and Scenery.2008.pdf	Available
11	10024 Blender Incredible Machines - Design, model, and texture complex mechanical objects in Blender ...	Available
12	10026 C#图解教程(第4版).pdf	Available
13	10028 Head First C#, 3rd Edition.pdf	Available
14	10029 [C#入门经典(第5版)].(美)沃森.(美)内格尔.扫描版.pdf	Available
15	10031 Adobe dreamweaver CS5中文版经典教程.pdf	Available
16	10033 [Adobe_Creative_Team]_Adobe_Muse_Classroom_in_a_Book.pdf	Available
17	10036 fllessons.zip	Available
18	10038 Packt.ActionScript.Graphing.Cookbook.Nov.2012.ISBN.184969320X.pdf	Available
19	10040 Pro Angular, 2nd Edition.pdf	Available
20	10042 The Majesty Of Vue.js.pdf	Available
21	10044 Vuejs-2-Cookbook-master.zip	Available
22	10046 Debian GNU Linux Bible(官网教材).pdf	Available
23	10048 Wireshark Network Analysis (The Official Certified Study Guide) 2Ed 2012.pdf	Available
24	10049 Wireshark 数据包分析实战 (第二版) .pdf	Available
25	10051 [黑客之道：漏洞发掘的艺术].Jon.Erickson.扫描版.pdf	Available
26	10053 [黑武器：linux-BT4无线黑套].杨哲&许迅飞&陈伟.扫描版[www.ed2kers.com].pdf	Available
27	10056 新手易学-黑客攻防入门(第3版).华诚科技.扫描.pdf	Available
28	10058 计算机网络第五版 (谢希仁) .pdf	Available
29	10060 黑客攻防实战入门与提高.pdf	Available
30	10062 黑客社会工程学攻击档案袋.pdf	Available

3. Check self-information (For Student table)

Example:(SID:10220001)

SQL Code:

```
SELECT * FROM STUDENT WHERE SID = 10220001;
```

Result:

```
1 SELECT * FROM STUDENT WHERE SID = 10220001;
```

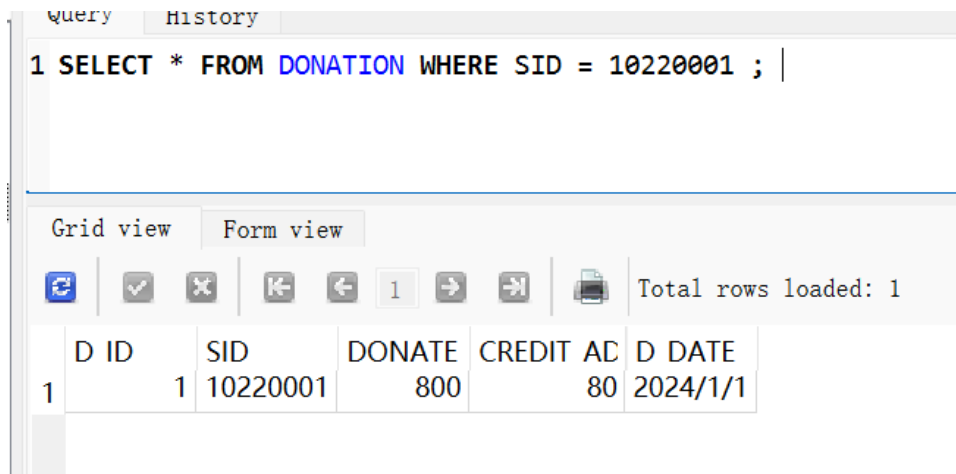
Grid view		Form view											
												Total rows loaded: 1	
1	LNAME	FNAME	SID	GENDER	AGE	ADDRESS AREA	ADDRESS ROAD	ADDRESS BUILDING	ADDRESS	PHONE	SUBJECT	CREDITS	
1	Chan	Tai Tai	10220001	F	20	Southern District	1ST LANE KEI LUN WAI	Backingham Building金漢大廈	1000	17828755	Associate of Geography	100	

4. Check donate record (For DONATION table)

Example: (SID:10220001)

SQL code

```
SELECT * FROM DONATION WHERE SID = 10220001 ;
```



The screenshot shows a database query tool interface. At the top, there are tabs for 'query' and 'History'. The 'query' tab is active, displaying the SQL query: `1 SELECT * FROM DONATION WHERE SID = 10220001 ;`. Below the query editor, there are tabs for 'Grid view' and 'Form view', with 'Grid view' selected. A toolbar with various icons (refresh, check, close, navigation, and print) is visible. To the right of the toolbar, it says 'Total rows loaded: 1'. Below the toolbar, a table displays the query results. The table has six columns: 'D ID', 'SID', 'DONATE', 'CREDIT AD', and 'D DATE'. The first row contains the values: '1', '10220001', '800', '80', and '2024/1/1'.

D ID	SID	DONATE	CREDIT AD	D DATE
1	10220001	800	80	2024/1/1

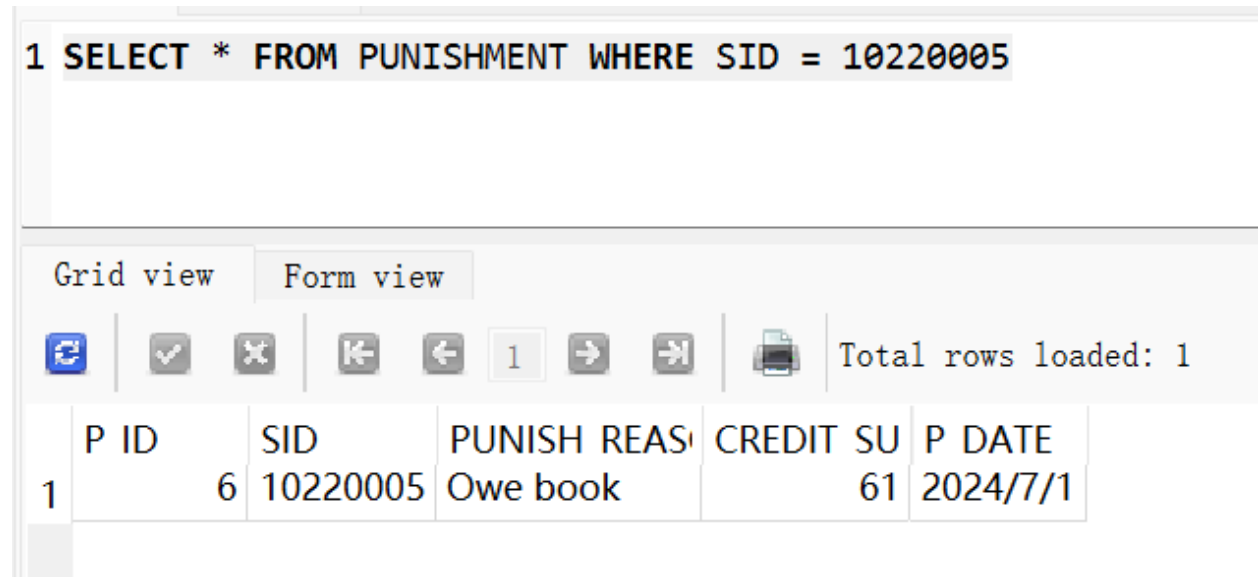
5. Check punishment record (For PUNISHMENT table)

Example: (SID:10220005)

SQL code

```
SELECT * FROM PUNISHMENT WHERE SID = 10220005
```

Result:



The screenshot shows a database query interface. At the top, the SQL query is displayed: `1 SELECT * FROM PUNISHMENT WHERE SID = 10220005`. Below the query, there are two tabs: "Grid view" (selected) and "Form view". Under the "Grid view" tab, there is a toolbar with various icons (refresh, check, close, back, forward, first, last, print) and a text box showing "Total rows loaded: 1". Below the toolbar, a table displays the query results. The table has six columns: "P ID", "SID", "PUNISH REAS", "CREDIT SU", and "P DATE". The first row of data shows: "1", "6", "10220005", "Owe book", "61", and "2024/7/1".

	P ID	SID	PUNISH REAS	CREDIT SU	P DATE
1	6	10220005	Owe book	61	2024/7/1

6. Check device available or not (For DEVICE table)

SQL Code:


```
SELECT DEVICE_ID, DEVICE_TYPE, DEVICE_ATTRIBUTE FROM DEVICE  
  
WHERE DEVICE_ATTRIBUTE = "Available";
```


Result:


```
1 SELECT DEVICE_ID, DEVICE_TYPE, DEVICE_ATTRIBUTE FROM DEVICE |  
2 WHERE DEVICE_ATTRIBUTE = "Available";
```


Grid view


Form view














1







Total rows loaded: 12

	DEVICE ID	DEVICE TYPE	DEVICE ATTRIBUTE
1	2	Computer-2	Available
2	4	Computer-4	Available
3	5	Computer-5	Available
4	6	Computer-6	Available
5	7	Computer-7	Available
6	8	Computer-8	Available
7	9	Computer-9	Available
8	10	Tablet-1	Available
9	11	Tablet-2	Available
10	12	Tablet-3	Available
11	14	ROOM-1	Available
12	15	ROOM-2	Available

REMARK: We have 15 devices but only 12 devices is available

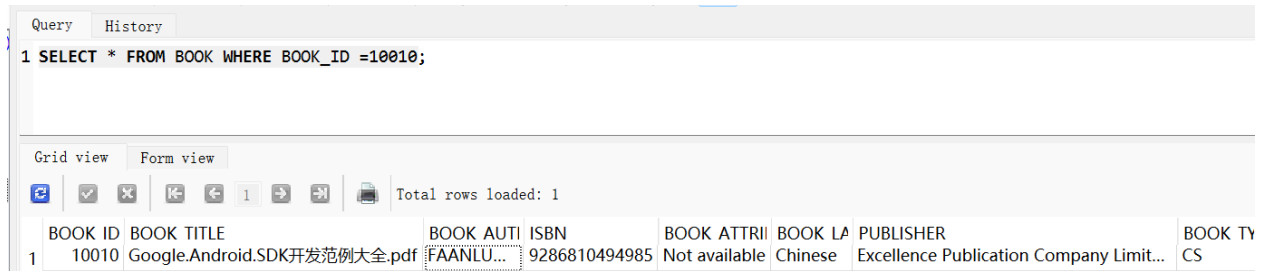
7. Show the information of a book (For BOOK table)

Example: (ID:10010)

SQL Code:

```
SELECT * FROM BOOK WHERE BOOK_ID =10010 ;
```

Result:



The screenshot shows a database query tool interface. At the top, there are tabs for 'Query' and 'History'. The 'Query' tab is active, displaying the SQL query: `1 SELECT * FROM BOOK WHERE BOOK_ID =10010;`. Below the query editor, there are tabs for 'Grid view' and 'Form view', with 'Grid view' selected. A toolbar with various icons (copy, paste, undo, redo, etc.) is visible. To the right of the toolbar, it says 'Total rows loaded: 1'. The main area displays a table with the following data:

	BOOK ID	BOOK TITLE	BOOK AUTH	ISBN	BOOK ATTR	BOOK LA	PUBLISHER	BOOK TY
1	10010	Google.Android.SDK开发范例大全.pdf	FAANLU...	9286810494985	Not available	Chinese	Excellence Publication Company Limit...	CS

For Administrators:

The administrator has permission to use the student SQL codes, but the student cannot use the administer SQL codes.

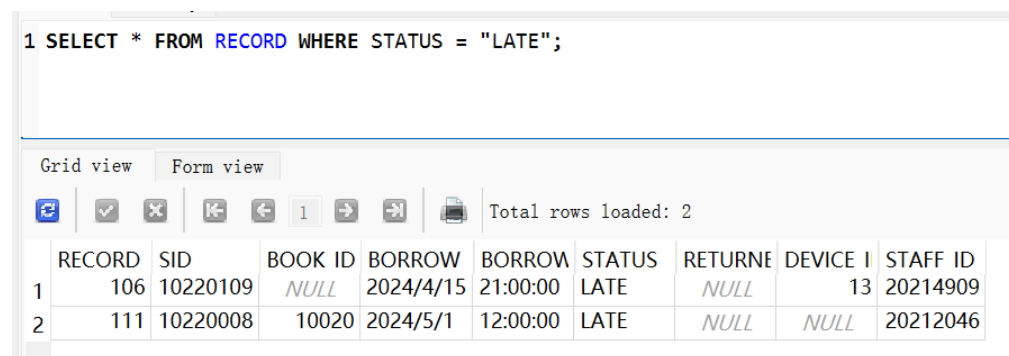
8. Check student late record/ borrowing record/ returned record/ late returned record (For advanced checking of RECORD table)

Late returned:

SQL code

```
SELECT * FROM RECORD WHERE STATUS = "LATE" ;
```

Result:



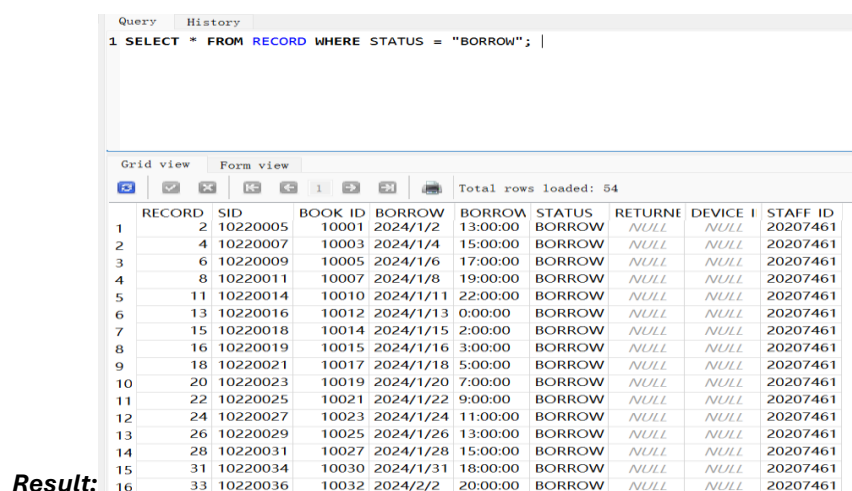
The screenshot shows a database query interface. At the top, the SQL code is entered: `1 SELECT * FROM RECORD WHERE STATUS = "LATE";`. Below the code, there are tabs for "Grid view" and "Form view", with "Grid view" selected. A toolbar contains various icons for query execution and navigation. To the right of the toolbar, it says "Total rows loaded: 2". Below the toolbar is a table with 10 columns: RECORD, SID, BOOK ID, BORROW, BORROW, STATUS, RETURNE, DEVICE I, and STAFF ID. The table contains two rows of data.

	RECORD	SID	BOOK ID	BORROW	BORROW	STATUS	RETURNE	DEVICE I	STAFF ID
1	106	10220109	NULL	2024/4/15	21:00:00	LATE	NULL	13	20214909
2	111	10220008	10020	2024/5/1	12:00:00	LATE	NULL	NULL	20212046

Borrowing record

SQL code

```
SELECT * FROM RECORD WHERE STATUS = "BORROW";
```



The screenshot shows a database query interface. At the top, the SQL code is entered: `1 SELECT * FROM RECORD WHERE STATUS = "BORROW";`. Below the code, there are tabs for "Grid view" and "Form view", with "Grid view" selected. A toolbar contains various icons for query execution and navigation. To the right of the toolbar, it says "Total rows loaded: 54". Below the toolbar is a table with 10 columns: RECORD, SID, BOOK ID, BORROW, BORROW, STATUS, RETURNE, DEVICE I, and STAFF ID. The table contains 16 rows of data, showing borrowing records.

	RECORD	SID	BOOK ID	BORROW	BORROW	STATUS	RETURNE	DEVICE I	STAFF ID
1	2	10220005	10001	2024/1/2	13:00:00	BORROW	NULL	NULL	20207461
2	4	10220007	10003	2024/1/4	15:00:00	BORROW	NULL	NULL	20207461
3	6	10220009	10005	2024/1/6	17:00:00	BORROW	NULL	NULL	20207461
4	8	10220011	10007	2024/1/8	19:00:00	BORROW	NULL	NULL	20207461
5	11	10220014	10010	2024/1/11	22:00:00	BORROW	NULL	NULL	20207461
6	13	10220016	10012	2024/1/13	0:00:00	BORROW	NULL	NULL	20207461
7	15	10220018	10014	2024/1/15	2:00:00	BORROW	NULL	NULL	20207461
8	16	10220019	10015	2024/1/16	3:00:00	BORROW	NULL	NULL	20207461
9	18	10220021	10017	2024/1/18	5:00:00	BORROW	NULL	NULL	20207461
10	20	10220023	10019	2024/1/20	7:00:00	BORROW	NULL	NULL	20207461
11	22	10220025	10021	2024/1/22	9:00:00	BORROW	NULL	NULL	20207461
12	24	10220027	10023	2024/1/24	11:00:00	BORROW	NULL	NULL	20207461
13	26	10220029	10025	2024/1/26	13:00:00	BORROW	NULL	NULL	20207461
14	28	10220031	10027	2024/1/28	15:00:00	BORROW	NULL	NULL	20207461
15	31	10220034	10030	2024/1/31	18:00:00	BORROW	NULL	NULL	20207461
16	33	10220036	10032	2024/2/2	20:00:00	BORROW	NULL	NULL	20207461

Result:

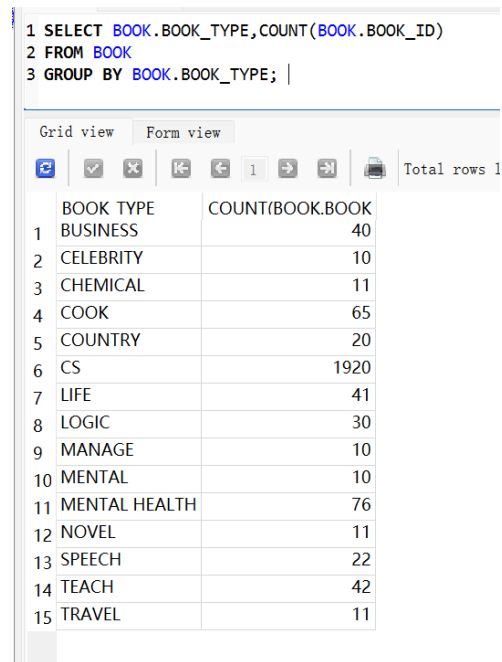
9. Check the quantity of book in the library (in different type)

(For advanced checking of BOOK table)

SQL Code:

```
SELECT BOOK.BOOK_TYPE, COUNT(BOOK.BOOK_ID)
FROM BOOK
GROUP BY BOOK.BOOK_TYPE;
```

Result:



	BOOK TYPE	COUNT(BOOK.BOOK_ID)
1	BUSINESS	40
2	CELEBRITY	10
3	CHEMICAL	11
4	COOK	65
5	COUNTRY	20
6	CS	1920
7	LIFE	41
8	LOGIC	30
9	MANAGE	10
10	MENTAL	10
11	MENTAL HEALTH	76
12	NOVEL	11
13	SPEECH	22
14	TEACH	42
15	TRAVEL	11

Branch – 9.1) Show the number of Chinese languages books

SQL Code:

```
SELECT COUNT (*) AS BOOKCOUNCHI FROM BOOK WHERE BOOK_LANGUAGE='Chinese'
```

Result:

```
1 SELECT COUNT (*) AS BOOKCOUNCHI
2 FROM BOOK
3 WHERE BOOK_LANGUAGE='Chinese'
```

Grid view		Form view	
	1		
BOOKCOUN		Total	
1	1160		

Branch - 9.2) Show the number of English languages books

SQL Code:

```
SELECT COUNT (*) AS BOOKCOUNENG FROM BOOK WHERE
BOOK_LANGUAGE='English'
```

Result:

```
Query History
1 SELECT COUNT (*) AS BOOKCOUNENG
2 FROM BOOK
3 WHERE BOOK_LANGUAGE='English'
```

Grid view		Form view	
	1		
BOOKCOUN			
1	1159		

10. Find the favorite book type in the library (in gender/ age)

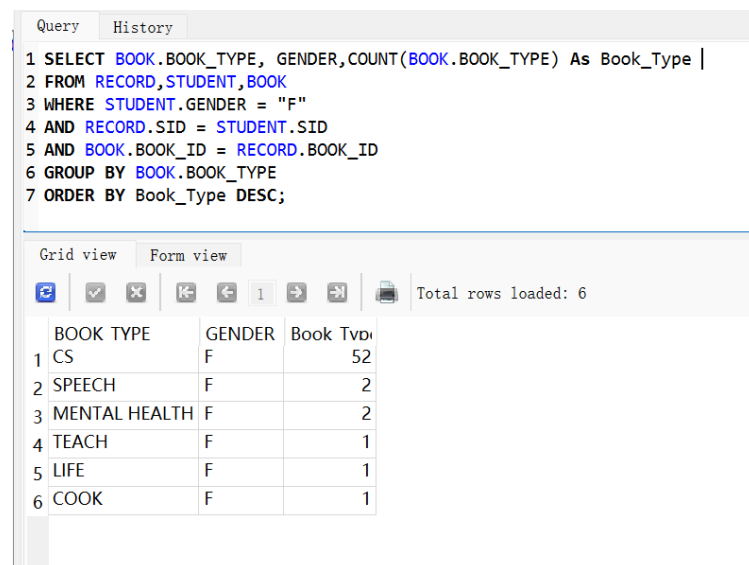
(For advanced checking of BOOK table + Link with the STUDENT / RECORD table)

Branch – 10.1) Show the number of book types borrowed by female

SQL Code:

```
SELECT BOOK.BOOK_TYPE, GENDER,COUNT(BOOK.BOOK_TYPE) As Book_Type
FROM RECORD,STUDENT,BOOK
WHERE STUDENT.GENDER = "F"
AND RECORD.SID = STUDENT.SID
AND BOOK.BOOK_ID = RECORD.BOOK_ID
GROUP BY BOOK.BOOK_TYPE
ORDER BY Book_Type DESC;
```

Result:



The screenshot shows a database query editor with a 'Query' tab selected. The SQL code is as follows:

```
1 SELECT BOOK.BOOK_TYPE, GENDER,COUNT(BOOK.BOOK_TYPE) As Book_Type |
2 FROM RECORD,STUDENT,BOOK
3 WHERE STUDENT.GENDER = "F"
4 AND RECORD.SID = STUDENT.SID
5 AND BOOK.BOOK_ID = RECORD.BOOK_ID
6 GROUP BY BOOK.BOOK_TYPE
7 ORDER BY Book_Type DESC;
```

Below the query editor, the 'Grid view' tab is selected, displaying the results of the query. The results are shown in a table with 6 rows and 3 columns: BOOK TYPE, GENDER, and Book Type. The total rows loaded is 6.

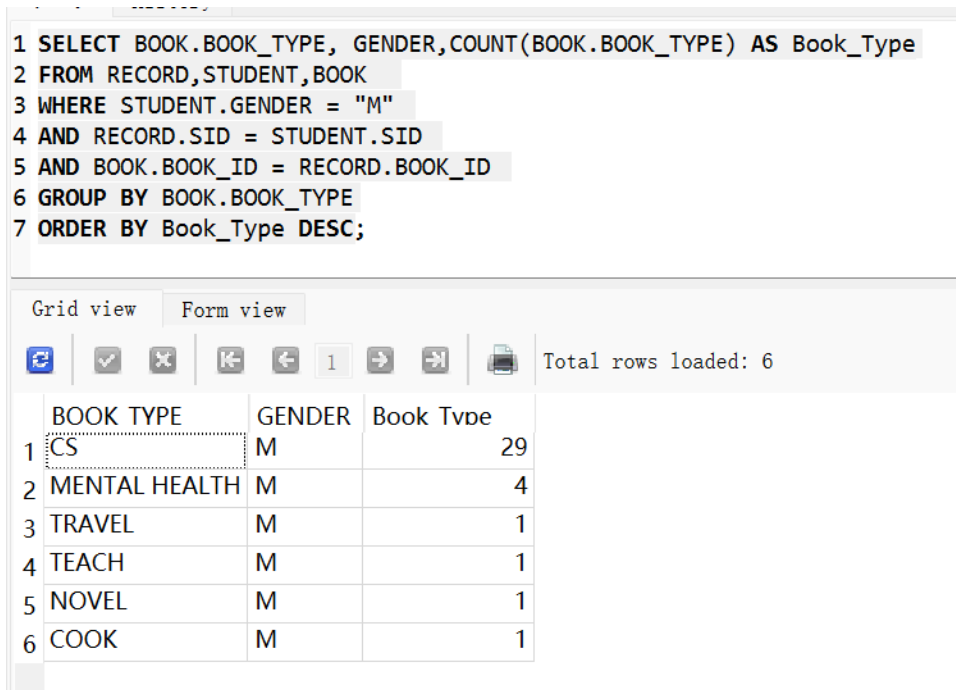
	BOOK TYPE	GENDER	Book Type
1	CS	F	52
2	SPEECH	F	2
3	MENTAL HEALTH	F	2
4	TEACH	F	1
5	LIFE	F	1
6	COOK	F	1

Branch – 10.2) Show the number of book types borrowed by male

SQL Code:

```
SELECT BOOK.BOOK_TYPE, GENDER, COUNT(BOOK.BOOK_TYPE) AS Book_Type
FROM RECORD, STUDENT, BOOK
WHERE STUDENT.GENDER = "M"
AND RECORD.SID = STUDENT.SID
AND BOOK.BOOK_ID = RECORD.BOOK_ID
GROUP BY BOOK.BOOK_TYPE
ORDER BY Book_Type DESC;
```

Result:



```
1 SELECT BOOK.BOOK_TYPE, GENDER, COUNT(BOOK.BOOK_TYPE) AS Book_Type
2 FROM RECORD, STUDENT, BOOK
3 WHERE STUDENT.GENDER = "M"
4 AND RECORD.SID = STUDENT.SID
5 AND BOOK.BOOK_ID = RECORD.BOOK_ID
6 GROUP BY BOOK.BOOK_TYPE
7 ORDER BY Book_Type DESC;
```










	BOOK TYPE	GENDER	Book Tvpe
1	CS	M	29
2	MENTAL HEALTH	M	4
3	TRAVEL	M	1
4	TEACH	M	1
5	NOVEL	M	1
6	COOK	M	1

Branch – 10.3) Show the number of book types borrowed by 18 years old students**SQL Code:**

```
SELECT BOOK.BOOK_TYPE, STUDENT.AGE, COUNT(BOOK.BOOK_TYPE)
FROM RECORD, STUDENT, BOOK
WHERE STUDENT.AGE = 18
AND RECORD.SID = STUDENT.SID
AND BOOK.BOOK_ID = RECORD.BOOK_ID
GROUP BY BOOK.BOOK_TYPE;
```

Result:

```
1 SELECT BOOK.BOOK_TYPE, STUDENT.AGE, COUNT(BOOK.BOOK_TYPE) |
2 FROM RECORD, STUDENT, BOOK
3 WHERE STUDENT.AGE = 18
4 AND RECORD.SID = STUDENT.SID
5 AND BOOK.BOOK_ID = RECORD.BOOK_ID
6 GROUP BY BOOK.BOOK_TYPE;
```

Grid view		Form view	
			
		1	
		Total rows loaded: 4	
	BOOK TYPE	AGE	COUNT(BOOK.BOOK T
1	COOK	18	1
2	CS	18	9
3	MENTAL HEALTH	18	1
4	SPEECH	18	1

11. how many students always borrow the book/device(For advanced checking of STUDENT table)

Situation: College teachers wants to encourage students to use the library, so they hope to a student list, which jots down the students who always use the library service.

For book borrowing

SQL code:

```
SELECT SID, COUNT(SID) AS TIMES FROM RECORD
```

```
WHERE (BOOK_ID IS NOT NULL)
```


```
AND (DEVICE_ID IS NULL)
```


```
GROUP BY SID ORDER BY TIMES DESC;
```


```
1 SELECT SID, COUNT(SID) AS TIMES FROM RECORD
2 WHERE (BOOK_ID IS NOT NULL)
3 AND (DEVICE_ID IS NULL)
4 GROUP BY SID ORDER BY TIMES DESC; |
```


Grid view


Form view














1







Total rows loaded: 93

	SID	TIMES
1	10220008	3
2	10220007	2
3	10220005	2
4	10220096	1
5	10220095	1
6	10220094	1
7	10220093	1
8	10220092	1
9	10220091	1
10	10220090	1
11	10220089	1
12	10220088	1

For device borrowing

SQL code:

```
SELECT SID, COUNT(SID) AS TIMES FROM RECORD
```

```
WHERE (BOOK_ID IS NULL)
```

```
AND (DEVICE_ID IS NOT NULL)
```

```
GROUP BY SID ORDER BY TIMES DESC;
```

```
1 SELECT SID, COUNT(SID) AS TIMES FROM RECORD
2 WHERE (BOOK_ID IS NULL)
3 AND (DEVICE_ID IS NOT NULL)
4 GROUP BY SID ORDER BY TIMES DESC;
```

Grid view

Form view



1



Total rows loaded: 14

	SID	TIMES
1	10220110	1
2	10220109	1
3	10220108	1
4	10220107	1
5	10220106	1
6	10220105	1
7	10220104	1
8	10220103	1
9	10220102	1
10	10220101	1
11	10220100	1
12	10220099	1

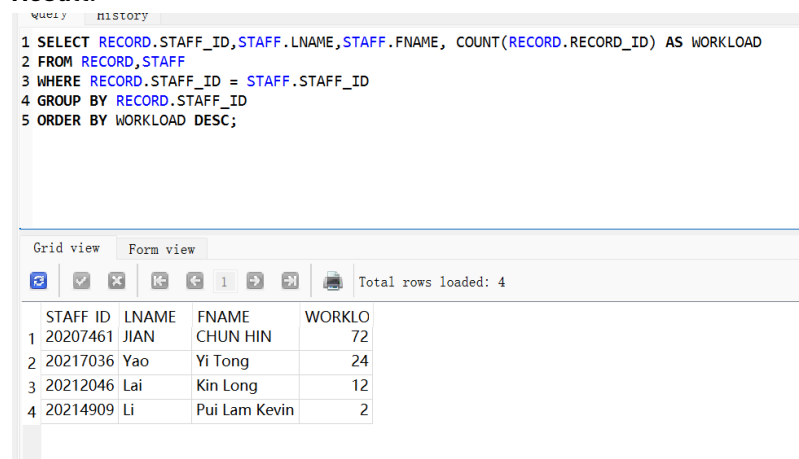
12. Who is the most hardworking staff (For STAFF table)

SQL Code:

```
SELECT RECORD.STAFF_ID,STAFF.LNAME,STAFF.FNAME, COUNT(RECORD.RECORD_ID)
AS WORKLOAD

FROM RECORD,STAFF
WHERE RECORD.STAFF_ID = STAFF.STAFF_ID
GROUP BY RECORD.STAFF_ID
ORDER BY WORKLOAD DESC;
```

Result:



The screenshot shows a database query tool interface. At the top, there are tabs for 'query' and 'history'. Below them, the SQL code is displayed in a text area. The code is as follows:

```
1 SELECT RECORD.STAFF_ID,STAFF.LNAME,STAFF.FNAME, COUNT(RECORD.RECORD_ID) AS WORKLOAD
2 FROM RECORD,STAFF
3 WHERE RECORD.STAFF_ID = STAFF.STAFF_ID
4 GROUP BY RECORD.STAFF_ID
5 ORDER BY WORKLOAD DESC;
```

Below the SQL code, there are tabs for 'Grid view' and 'Form view'. The 'Grid view' tab is selected. Below the tabs, there is a toolbar with various icons for query execution and navigation. To the right of the toolbar, it says 'Total rows loaded: 4'. Below the toolbar, there is a table with the following data:

	STAFF ID	LNAME	FNAME	WORKLO
1	20207461	JIAN	CHUN HIN	72
2	20217036	Yao	Yi Tong	24
3	20212046	Lai	Kin Long	12
4	20214909	Li	Pui Lam Kevin	2

Recommendations

Library Activity

- Student can join the library activity to increase their library's credit
- Let the library staff have more work to do, utilizing the library human resources appropriately

Advanced User Service Supporting (VIP)

- Enhance reading environment (e.g. VIP Reading Room/ Afternoon tea provided)
- Book Recommending (each week)
- Book reservation
- Provided the electric book resource

Journal service supported

- Provided journal article (e.g. Science & Nature)
- Provided article repeated content checking service

Individual and group Learning

To sum up, we acquired a lot from this project. In individual learning parts, we understood how to create an appropriate database and utilize SQL code to fulfill the user requirements. In group learning, our cooperation skill was improved through this project experience, and we became more confident in dealing with the group project.



Conclusion:

After the quality testing, no errors appeared in the database. Also, the database design fulfilled the basic demands of students and library administrators. We evaluated that this database can be used in real-life situations.



In the future, we also hope to add more functions and different content according to the above plan, to enhance our service and database efficiency. We believe that our library database can acquire a good performance in daily life.

Appendices






Library_Syste ▾ Table name: BOOK ☐ WITHOUT ROWID ☐ STRICT

	Name	Data type	Primary Key	Foreign Key	Unique	Check	Not NULL	Collate	Generated
1	BOOK_ID	INTEGER							NULL
2	BOOK_TITLE	TEXT							NULL
3	BOOK_AUTHOR	TEXT							NULL
4	ISBN	INTEGER							NULL
5	BOOK_ATTRIBUTE	TEXT							NULL
6	BOOK_LANGUAGE	TEXT							NULL
7	PUBLISHER	TEXT							NULL
8	BOOK_TYPE	TEXT							NULL





Library_Syste ▾ Table name: DEVICE ☐ WITHOUT ROWID ☐ STRICT

	Name	Data type	Primary Key	Foreign Key	Unique	Check	Not NULL	Collate	Generated
1	DEVICE_ID	TEXT							NULL
2	DEVICE_TYPE	TEXT							NULL
3	DEVICE_ATTRIBUTE	TEXT							NULL










Library_Syste ▾ Table name: DONATION ☐ WITHOUT ROWID ☐ STRICT

	Name	Data type	Primary Key	Foreign Key	Unique	Check	Not NULL	Collate	Generated
1	D_ID	INTEGER							NULL
2	SID	INTEGER							NULL
3	DONATE	NUMERIC							NULL
4	CREDIT_ADD	INTEGER							NULL
5	D_DATE	DATE							NULL





Library_Syste ▾ Table name: PUNISHMENT ☐ WITHOUT ROWID ☐ STRICT

	Name	Data type	Primary Key	Foreign Key	Unique	Check	Not NULL	Collate	Generated
1	P_ID	INTEGER							NULL
2	SID	INTEGER							NULL
3	PUNISH_REASON	TEXT							NULL
4	CREDIT_SUB	INTEGER							NULL
5	P_DATE								NULL







Library_Syste ▾ Table name: RECORD ☐ WITHOUT ROWID ☐ STRICT

	Name	Data type	Primary Key	Foreign Key	Unique	Check	Not NULL	Collate	Generated	
1	RECORD_ID	INTEGER								NULL
2	SID	INTEGER								NULL
3	BOOK_ID	INTEGER								NULL
4	BORROW_DAY	TEXT								NULL
5	BORROW_TIME	TEXT								NULL
6	STATUS	TEXT								NULL
7	RETURNED_DAY	TEXT								NULL
8	DEVICE_ID	INTEGER								NULL
9	STAFF_ID	INTEGER								NULL

Library_Syste ▾ Table name: STAFF ☐ WITHOUT ROWID ☐ STRICT

	Name	Data type	Primary Key	Foreign Key	Unique	Check	Not NULL	Collate	Generated	
1	STAFF_ID	INTEGER								NULL
2	FNAME	TEXT								NULL
3	LNAME	TEXT								NULL
4	GENDER	TEXT								NULL
5	PHONE	INTEGER								NULL

Library_Syste ▾ Table name: STUDENT ☐ WITHOUT ROWID ☐ STRICT

	Name	Data type	Primary Key	Foreign Key	Unique	Check	Not NULL	Collate	Generated	
1	LNAME	TEXT								NULL
2	FNAME	TEXT								NULL
3	SID	INTEGER								NULL
4	GENDER	TEXT								NULL
5	AGE	INTEGER								NULL
6	ADDRESS_AREA	TEXT								NULL
7	ADDRESS_ROAD	TEXT								NULL
8	ADDRESS_BUILDING	TEXT								NULL
9	ADDRESS_ROOM	TEXT								NULL
10	PHONE	INTEGER								NULL
11	SUBJECT	TEXT								NULL
12	CREDITS	INTEGER								NULL