ASSIGNMENT DBI202

Topic: Database of library management system

STUDENT NAME: TRAN HOANG MINH | SE161584

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I) Introduction of the problem

In recent years, with the rapid development of information and student in universities want to collect that information in their library. However, almost libraries use physical managements (for example the librarians have to rearrange the new book by themselves when the new one comes to their libraries), trouble in identify the student who borrowed the books or lack of storage space and sometimes lose the location of some academic materials. So I think we have to create a website library management to solve this problem.

Our website can retrieve information on the computer instead of manual management. This helps the librarian keep track of each person who borrows materials, and needs to register from the library account with their student information such as their student Id, name, address, so on…. All academic materials are arranged by the author and the academic fields which are easy for readers to borrow.

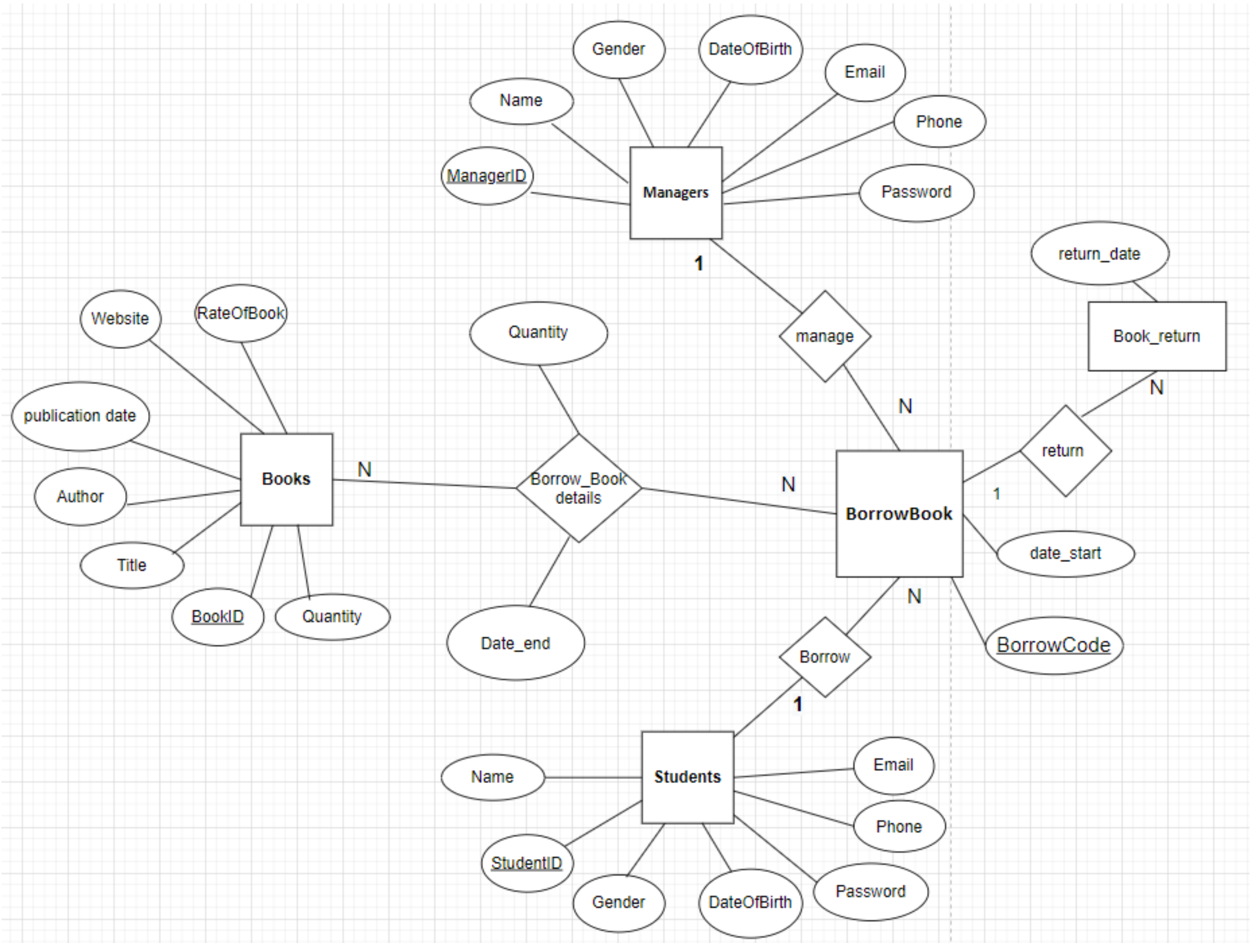
II) Define the entity in the system

- The entity Student represents the student who wants to borrow the book in the library on the website. Each Student will have the StudentID, Name, DateOfBirth, Gender, Email, Phone, and Password(to login to the website)
- In the library, the university will need a manager to manage and maintain the book in and out. Also, the Manager will manage the number of students who borrow the book. Each manager includes ManagerID, Name, DateOfBirth, Gender, Email, Phone, and Password(to login to the website)
- For each student who wants to borrow a book on a website, the information of that student and the manager to keep track of the student's info will represent in the entity BorrowBook. Every BorrowBook will have its code

for specific students and managers. The entity include BorrowCode, StudentID, ManagerID, date_start(the date student start to borrow the book)

- The Entity Book will provide the all book that the library has on the website for a student to borrow. That Entity provides BookID, Title, Author, publication_date, Quantity (The number of specific books will provide on the website), RateOfBook, Award
- The entity Borrow_Book_details stores the BorrowCode of each student who wants to borrow the number of books in the library and the deadline of return the book. It includes BorrowCode, BookID, Quantity, Date_end
- When people finish the book and want to return the book to the library. We will use the entity Book_return to show the date of returning the book. The entity Book_return is BorrowCode, return_date

III) ERD diagram

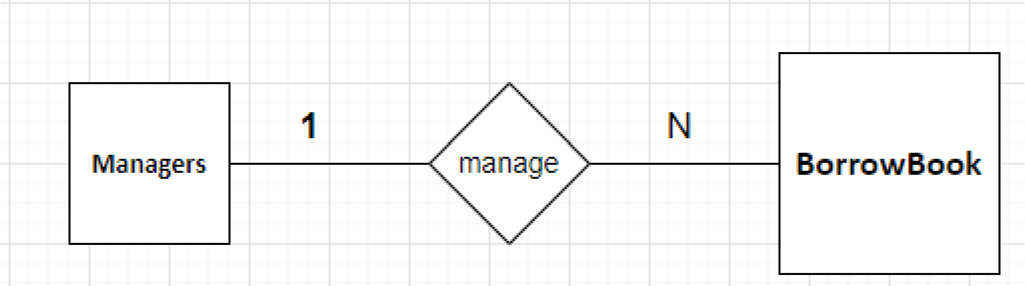


IV) Convert ERD diagram to relation diagram

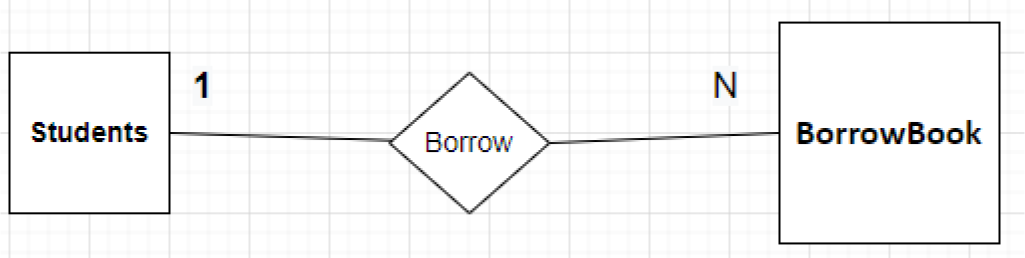
Our database library management objectives can be represented with some entities and attributes of the entity:

Managers: ManagerID, Name, DateOfBirth, Gender, Email, Phone, Password

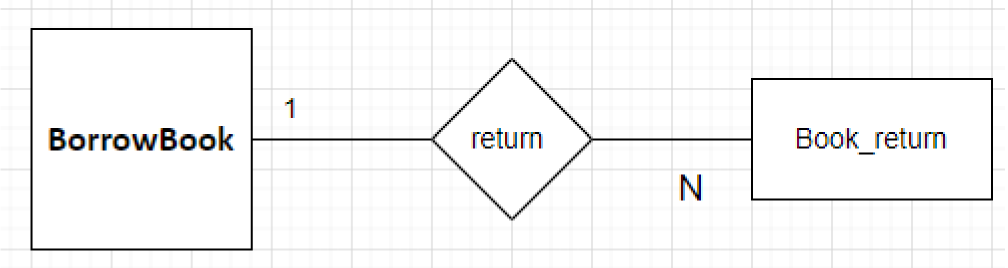
Students: StudentID, Name, DateOfBirth, Gender, Email, Phone, Password



BorrowBook: BorrowCode, StudentID, ManagerID, date_start

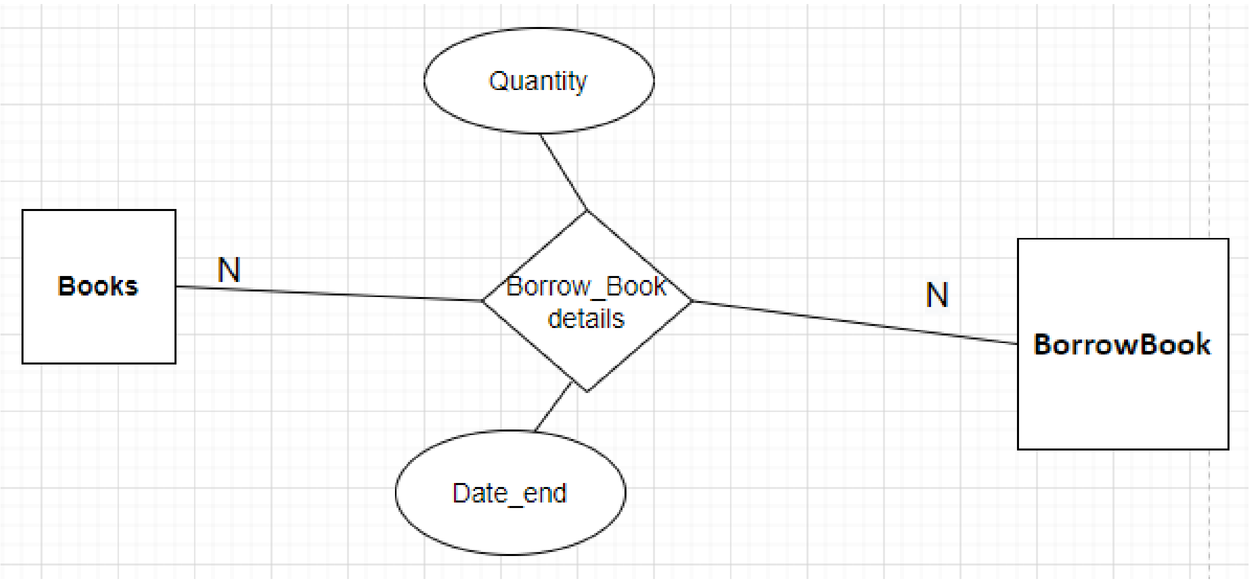


Book_return: BorrowCode, return_date



Books: BookID, Title, Author, publication_date, Quantity, Website, RateOfBook

Borrow_Book details: BorrowCode, BookID, Quantity, Date_end



V) Define input entity from data type

a/ Tables of Managers

Column Name	Description	Data Type	Length	Value
ManagerID	Each manager has their own id to distinguish from another manager	Char	50	Number, Text, Space permitted
Name	Name of the library manager	Nvarchar	100	Text, Space permitted

DateOfBirth	Date of Birth of manager	Date		Local date;
				dd = 01-31;
				mm = 01-12;
				yyyy = 1970-2022

Gender	Type of gender of each manager	Bit	1	Text, Space permitted

Email	The email address to contact another or to login to manage the website	Char	100	Number ,Text, Space permitted
Phone	Phone number to contact	Char	50	number
Password	Each manager have their own password to login in the website	Char	50	Number ,Text, Space permitted

b/ Table of Students

Column Name	Description	Data Type	Length	Value
StudentID	Each Student have their id to distinguish from another student	char	50	Number, Text, Space permitted
Name	Name of student account	nvarchar	100	Text, Space permitted

DateOfBirth	Date of Birth of student	date		Local date;
				dd = 01-31;
				mm = 01-12;
				yyyy = 1970-2022

Gender	Type of gender of each student	Bit		Text, Space permitted
Email	The email address to contact another or to login to the website	Char	100	Number ,Text, Space permitted
Phone	Phone number to contact	Char	50	number
Password	Each student has their own password to login in to the website	Char	50	Number ,Text, Space permitted

c/ Table of book

Column Name	Description	Data Type	Length	Value
BookID	Each Book have its id to keep track of them	char	50	Number ,Text, Space permitted
Title	The name of the book	nvarchar	100	Text, Space permitted
Author	The name of the writer who wrote this book	nvarchar	100	Text, Space permitted

publication_date	To know the date the book comes to public people	Date		Local date;
				dd = 01-31;
				mm = 01-12;
				yyyy = 1970-2022

Quantity	To know how many books in the website	Int	3	number
Website	The book appears of different platform	char	100	Number ,Text, Space permitted
RateOfBook	The comment of readers about this book. Is it worth reading?	Double	1	number
Award	Does this book have another trophy or certificate??	nvarchar	100	Number ,Text, Space permitted

D/ Tables of Borrow_Book

Column Name	Description	Data Type	Length	Value
BorrowCode	Each Student want to borrow book will have the Borrowcode it also manage by the managers	char	50	Number, Text, Space permitted

StudentID	Each Student have their own id to distinguish with another student	char	50	Number, Text, Space permitted
ManagerID	Each manager have their own id to distinguish with another manager	char	50	Number, Text, Space permitted

date_start	The date start to store the time student borrow the book	Date		Local date;
				dd = 01-31;
				mm = 01-12;
				yyyy = 1970-2022

E/Table of Borrow_Book_details

Column Name	Description	Data Type	Length	Value
BorrowCode	Each Student who want to borrow a book will have the Borrowcode it also managed by the managers	char	50	Number, Text, Space permitted
BookID	Each Book have its id to keep track of them	char	50	Number, Text, Space permitted
Quantity	To know how many books you want to borrow	Int	3	number

Date_end	The date ended we you have to return this book	Date		Local date;
				dd = 01-31;
				mm = 01-12;
				yyyy = 1970-2022

F/ Table of Book_return

Column Name	Description	Data Type	Length	Value

BorrowCode	Each Student who wants to borrow a book will have the Borrowcode it is also managed by the managers	char	50	Number, Text, Space permitted

return_date	Each Book has its date for the student to return the book	date		Local date;
				dd = 01-31;
				mm = 01-12;
				yyyy = 1970-2022

VI) List of constraint between entity

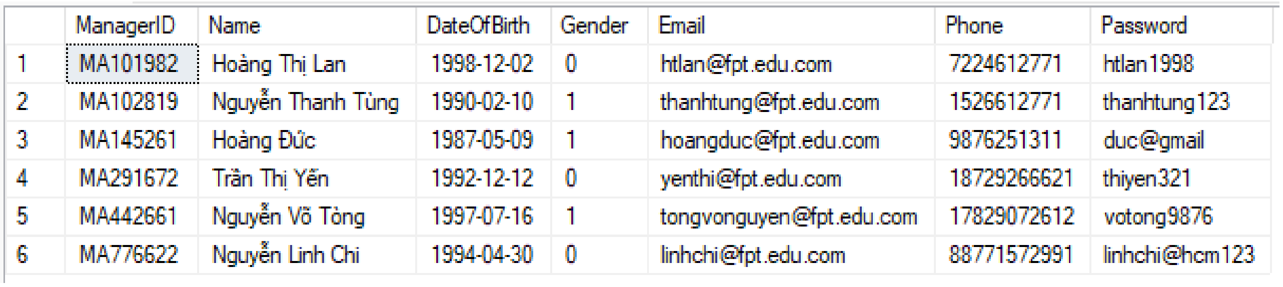
Table	Primary Key	Foreign key	Check Validate
Managers	ManagerID		NOT NULL, MA[6]
Students	StudentID		NOT NULL, FU[6]
Book_return	BorrowCode	BorrowCode	NOT NULL, BC[6]
Borrow_Book	BorrowCode		NOT NULL, BC[6]
		ManagerID	NOT NULL, MA[6]
		StudentID	NOT NULL, FU[6]
Borrow_Book_details	BorrowCode	BorrowCode	NOT NULL, BC[6]
	BookID	BookID	NOT NULL
Book	BookID		NOT NULL

VII) Set up SQL database

Create Table Managers:

```
create table [Managers](
        [ManagerID] char(50) NOT NULL PRIMARY KEY CHECK([ManagerID] like 'MA[0-9][0-9][0-9][0-9][0-9][0-9]'),
        [Name] nvarchar(100) NOT NULL,
        [DateOfBirth] date NOT NULL check([DateOfBirth] < getDate()),
        [Gender] bit NOT NULL check([Gender] like 1 or [Gender] like 0),
        [Email] char(100) NOT NULL,
        [Phone] char(50),
        [Password] char (50) NOT NULL
)
--Insert input to Managers
INSERT INTO dbo.Managers(ManagerID, Name, DateOfBirth, Gender, Email, Phone,
Password)
VALUES
('MA102819', N'Nguyễn Thanh Tùng', '1990-02-10', 1, 'thanhtung@fpt.edu.com', 1526612771,
'thanhtung123'),
('MA291672', N'Trần Thị Yến ', '1992-12-12', 0, 'yenthi@fpt.edu.com', 18729266621,
'thiyen321'),
('MA145261', N'Hoàng Đức', '1987-05-9', 1, 'hoangduc@fpt.edu.com', 9876251311,
'duc@gmail'),
('MA776622', N'Nguyễn Linh Chi', '1994-4-30', 0, 'linhchi@fpt.edu.com', 88771572991,
'linhchi@hcm123'),
('MA442661', N'Nguyễn Võ Tòng', '1997-07-16', 1, 'tongvonguyen@fpt.edu.com', 17829072612,
'votong9876'),
('MA101982', N'Hoàng Thị Lan', '1998-12-02', 0, 'htlan@fpt.edu.com', 7224612771, 'htlan1998')


--The displayment of table manager
```



	ManagerID	Name	DateOfBirth	Gender	Email	Phone	Password
1	MA101982	Hoàng Thị Lan	1998-12-02	0	htlan@fpt.edu.com	7224612771	htlan1998
2	MA102819	Nguyễn Thanh Tùng	1990-02-10	1	thanhtung@fpt.edu.com	1526612771	thanhtung123
3	MA145261	Hoàng Đức	1987-05-09	1	hoangduc@fpt.edu.com	9876251311	duc@gmail
4	MA291672	Trần Thị Yến	1992-12-12	0	yenthi@fpt.edu.com	18729266621	thiyen321
5	MA442661	Nguyễn Võ Tòng	1997-07-16	1	tongvonguyen@fpt.edu.com	17829072612	votong9876
6	MA776622	Nguyễn Linh Chi	1994-04-30	0	linhchi@fpt.edu.com	88771572991	linhchi@hcm123

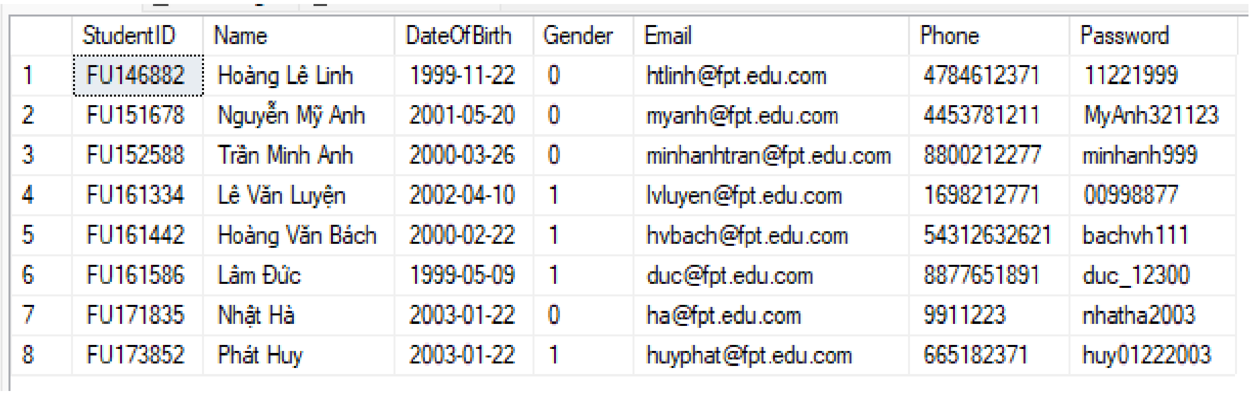
Create Table Students:

```
create table [Students](
        [StudentID] char(50) NOT NULL PRIMARY KEY CHECK([StudentID] like 'FU[0-
9][0-9][0-9][0-9][0-9][0-9]'),
        [Name] nvarchar(100) NOT NULL,
        [DateOfBirth] date NOT NULL check([DateOfBirth] < getDate()),
        [Gender] bit NOT NULL check([Gender] like 1 or [Gender] like 0),
        [Email] char(100) NOT NULL,
        [Phone] char(50),
        [Password] char (50) NOT NULL
)
```

```
--Insert input to Students


INSERT INTO dbo.Students(StudentID, Name, DateOfBirth, Gender, Email, Phone, Password)
VALUES
('FU161334', N'Lê Văn Luyện', '2002-04-10', 1, 'lvluyen@fpt.edu.com', 1698212771,
'00998877'),
('FU161442', N'Hoàng Văn Bách', '2000-02-22', 1, 'hvbach@fpt.edu.com', 54312632621,
'bachvh111'),
('FU161586', N'Lâm Đức', '1999-05-09', 1, 'duc@fpt.edu.com', 8877651891, 'duc_12300'),
('FU151678', N'Nguyễn Mỹ Anh', '2001-05-20', 0, 'myanh@fpt.edu.com', 4453781211,
'MyAnh321123'),
('FU152588', N'Trần Minh Anh', '2000-03-26', 0, 'minhanhtran@fpt.edu.com', 8800212277,
'minhanh999'),
('FU146882', N'Hoàng Lê Linh', '1999-11-22', 0, 'htlinh@fpt.edu.com', 4784612371,
'11221999'),
('FU173852', N'Phát Huy', '2003-01-22', 1, 'huyphat@fpt.edu.com', 665182371, 'huy01222003'),
('FU171835', N'Nhật Hà', '2003-01-22', 0, 'ha@fpt.edu.com', 009911223, 'nhatha2003')
```

```
--The displayment of table Students
```



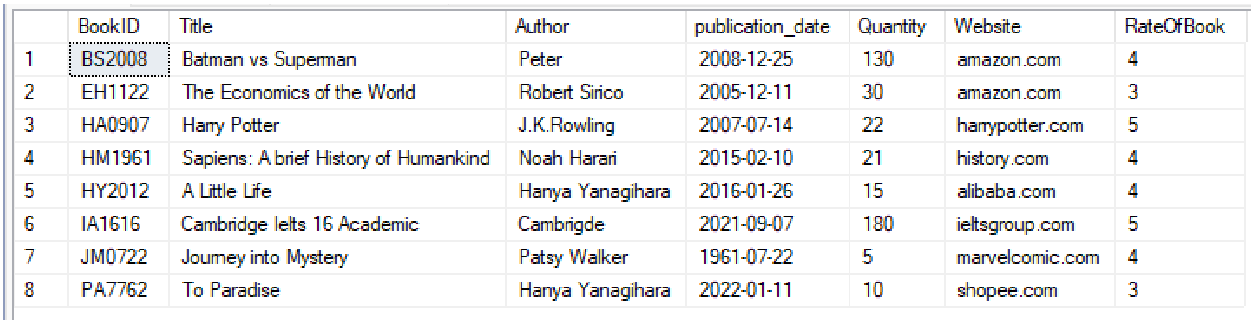
	StudentID	Name	DateOfBirth	Gender	Email	Phone	Password
1	FU146882	Hoàng Lê Linh	1999-11-22	0	htlinh@fpt.edu.com	4784612371	11221999
2	FU151678	Nguyễn Mỹ Anh	2001-05-20	0	myanh@fpt.edu.com	4453781211	MyAnh321123
3	FU152588	Trần Minh Anh	2000-03-26	0	minhanhtran@fpt.edu.com	8800212277	minhanh999
4	FU161334	Lê Văn Luyện	2002-04-10	1	lvluyen@fpt.edu.com	1698212771	00998877
5	FU161442	Hoàng Văn Bách	2000-02-22	1	hvbach@fpt.edu.com	54312632621	bachvh111
6	FU161586	Lâm Đức	1999-05-09	1	duc@fpt.edu.com	8877651891	duc_12300
7	FU171835	Nhật Hà	2003-01-22	0	ha@fpt.edu.com	9911223	nhatha2003
8	FU173852	Phát Huy	2003-01-22	1	huyphat@fpt.edu.com	665182371	huy01222003

Create Table Book:

```
CREATE TABLE [Book]
(
        [BookID] CHAR(50) PRIMARY KEY NOT NULL,
        [Title] NVARCHAR(100) NOT NULL,
        [Author] NVARCHAR(100) NOT NULL,
        [publication_date] date NOT NULL,
        [Quantity] INT CHECK([Quantity] > 0 AND [Quantity] < 200),
        [Website] CHAR(100),
        [RateOfBook] INT CHECK([RateOfBook] >= 0 AND [RateOfBook] <= 5)
)
--insert input to Book


INSERT INTO dbo.Book(BookID, Title, Author, publication_date, Quantity, Website,
RateOfBook)
VALUES
('BS2008', N'Batman vs Superman', N'Peter', '2008-12-25', 130, 'amazon.com', 4),
('EH1122', N'The Economics of the World', N'Robert Sirico', '2005-12-11', 30, 'amazon.com', 3),
('HA0907', N'Harry Potter', N'J.K.Rowling', '2007-07-14', 22, 'harrypotter.com', 5),
('HM1961', N'Sapiens: A brief History of Humankind', N'Noah Harari', '2015-02-10', 21,
'history.com', 4),
('JM0722', N'Journey into Mystery', N'Patsy Walker', '1961-07-22', 5, 'marvelcomic.com', 4),
('HY2012', N'A Little Life', N'Hanya Yanagihara', '2016-01-26', 15, 'alibaba.com', 4),
('PA7762', N'To Paradise', N'Hanya Yanagihara', '2022-01-11', 10, 'shopee.com', 3),
('IA1616', N'Cambridge Ielts 16 Academic', N'Cambrigde', '2021-09-07', 180, 'ieltsgroup.com',
5)

--The displayment of table Book
```



	BookID	Title	Author	publication_date	Quantity	Website	RateOfBook
1	BS2008	Batman vs Superman	Peter	2008-12-25	130	amazon.com	4
2	EH1122	The Economics of the World	Robert Sirico	2005-12-11	30	amazon.com	3
3	HA0907	Harry Potter	J.K.Rowling	2007-07-14	22	harrypotter.com	5
4	HM1961	Sapiens: A brief History of Humankind	Noah Harari	2015-02-10	21	history.com	4
5	HY2012	A Little Life	Hanya Yanagihara	2016-01-26	15	alibaba.com	4
6	IA1616	Cambridge Ielts 16 Academic	Cambrigde	2021-09-07	180	ieltsgroup.com	5
7	JM0722	Journey into Mystery	Patsy Walker	1961-07-22	5	marvelcomic.com	4
8	PA7762	To Paradise	Hanya Yanagihara	2022-01-11	10	shopee.com	3

Create Tables Borrow_Book

```
CREATE TABLE [Borrow_Book]
(
	[BorrowCode] CHAR(50) NOT NULL PRIMARY KEY CHECK([BorrowCode] like 'BC[0-9][0-9][0-9][0-9][0-9][0-9]'),
	[ManagerID] char(50) NOT NULL CHECK([ManagerID] like 'MA[0-9][0-9][0-9][0-9][0-9][0-9]'),
	CONSTRAINT FK_Manager_ID FOREIGN KEY([ManagerID]) REFERENCES dbo.Managers([ManagerID]),
	[StudentID] char(50) NOT NULL CHECK([StudentID] like 'FU[0-9][0-9][0-9][0-9][0-9][0-9]'),
	CONSTRAINT FK_Student_ID FOREIGN KEY([StudentID]) REFERENCES dbo.Students([StudentID]),
	date_start DATE NOT NULL
)
--insert input to Borrow_Book


INSERT INTO dbo.Borrow_Book(BorrowCode,  ManagerID,  StudentID,    date_start)
VALUES
('BC000001', 'MA101982', 'FU146882', '2021-05-29'),
('BC000002', 'MA101982', 'FU151678', '2021-12-20'),
('BC000003', 'MA102819', 'FU152588', '2022-01-21'),
('BC000004', 'MA102819', 'FU161334', '2022-01-01'),
('BC000005', 'MA102819', 'FU161442', '2022-02-26'),
('BC000006', 'MA291672', 'FU161334', '2020-12-30'),
('BC000007', 'MA442661', 'FU161442', '2021-04-29'),
('BC000008', 'MA442661', 'FU171835', '2021-11-30'),
('BC000009', 'MA291672', 'FU151678', '2021-11-30'),
('BC000010', 'MA776622', 'FU173852', '2021-11-30')

--the displayment of table Borrow_Book
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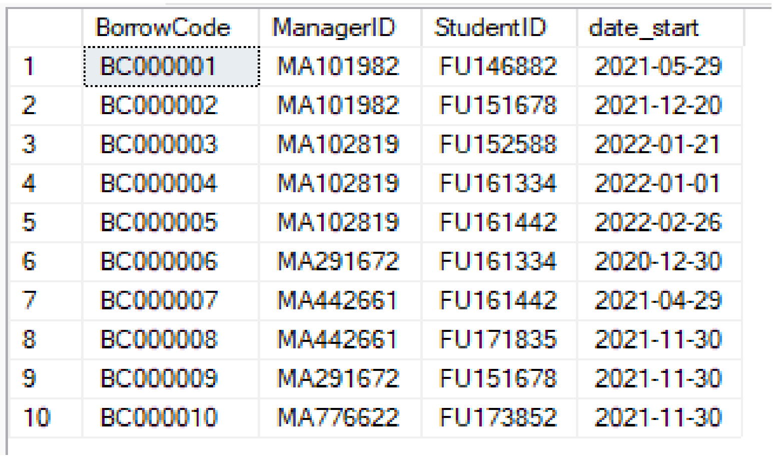


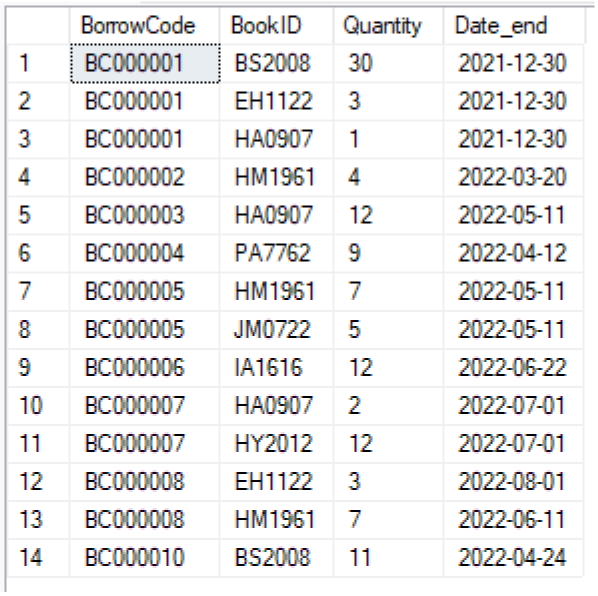
	BorrowCode	ManagerID	StudentID	date_start
1	BC000001	MA101982	FU146882	2021-05-29
2	BC000002	MA101982	FU151678	2021-12-20
3	BC000003	MA102819	FU152588	2022-01-21
4	BC000004	MA102819	FU161334	2022-01-01
5	BC000005	MA102819	FU161442	2022-02-26
6	BC000006	MA291672	FU161334	2020-12-30
7	BC000007	MA442661	FU161442	2021-04-29
8	BC000008	MA442661	FU171835	2021-11-30
9	BC000009	MA291672	FU151678	2021-11-30
10	BC000010	MA776622	FU173852	2021-11-30

Create Tables Borrow_Book_details

```
CREATE TABLE [Borrow_Book_details]
(
	[BorrowCode] CHAR(50) NOT NULL CHECK([BorrowCode] like 'BC[0-9][0-9][0-9][0-9][0-9][0-9]'),
	CONSTRAINT FK_BorrowCode FOREIGN KEY([BorrowCode]) REFERENCES dbo.[Borrow_Book]([BorrowCode]),
	[BookID] CHAR(50) NOT NULL,
	CONSTRAINT FK_Book_ID FOREIGN KEY([BookID]) REFERENCES dbo.Book([BookID]),
	[Quantity] INT NOT NULL,
	[Date_end] DATE NOT NULL,
	PRIMARY KEY([BorrowCode], [BookID])
)
--insert input to Borrow_Book_details

INSERT INTO dbo.Borrow_Book_details(BorrowCode,  BookID, Quantity,  Date_end)
VALUES
('BC000001', 'BS2008', 30, '2021-12-30'),
('BC000001', 'EH1122', 3, '2021-12-30'),
('BC000001', 'HA0907', 1, '2021-12-30'),
('BC000002', 'HM1961', 4, '2022-03-20'),
('BC000003', 'HA0907', 12, '2022-05-11'),
('BC000004', 'PA7762', 9, '2022-04-12'),
('BC000005', 'HM1961', 7, '2022-05-11'),
('BC000005', 'JM0722', 5, '2022-05-11'),
('BC000006', 'IA1616', 12, '2022-06-22'),
('BC000007', 'HY2012', 12, '2022-07-01'),
('BC000007', 'HA0907', 2, '2022-07-01'),
('BC000008', 'EH1122', 3, '2022-08-01'),
('BC000008', 'HM1961', 7, '2022-06-11'),
('BC000010', 'BS2008', 11, '2022-04-24')

--the displayment of table Borrow_Book_details
```



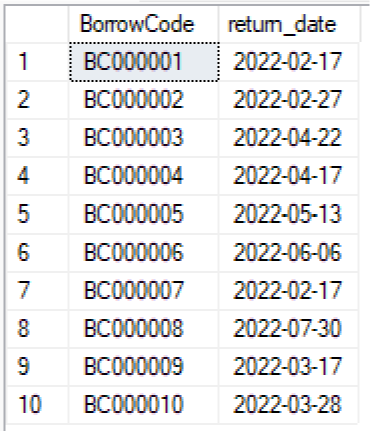
	BorrowCode	BookID	Quantity	Date_end
1	BC000001	BS2008	30	2021-12-30
2	BC000001	EH1122	3	2021-12-30
3	BC000001	HA0907	1	2021-12-30
4	BC000002	HM1961	4	2022-03-20
5	BC000003	HA0907	12	2022-05-11
6	BC000004	PA7762	9	2022-04-12
7	BC000005	HM1961	7	2022-05-11
8	BC000005	JM0722	5	2022-05-11
9	BC000006	IA1616	12	2022-06-22
10	BC000007	HA0907	2	2022-07-01
11	BC000007	HY2012	12	2022-07-01
12	BC000008	EH1122	3	2022-08-01
13	BC000008	HM1961	7	2022-06-11
14	BC000010	BS2008	11	2022-04-24

Create Tables Book_return

```
CREATE TABLE [Book_return](
        [BorrowCode]  CHAR(50) NOT NULL CHECK([BorrowCode] like 'BC[0-9][0-9][0-
9][0-9][0-9][0-9]')
        CONSTRAINT FK_BorrowCode_BookReturn FOREIGN KEY([BorrowCode])
REFERENCES dbo.[Borrow_Book]([BorrowCode]),
        [return_date] DATE NOT NULL,
        PRIMARY KEY([BorrowCode])
)
--insert input to Book_return

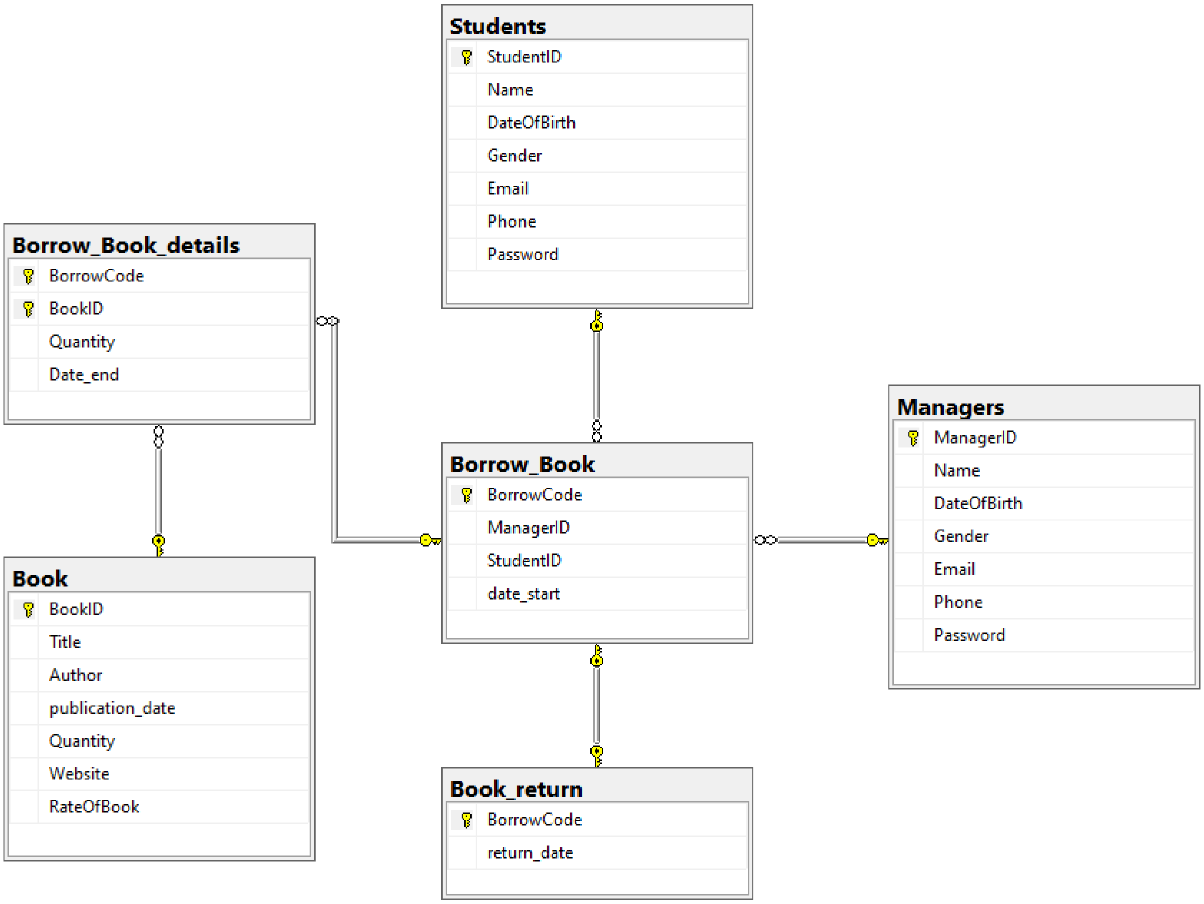
INSERT INTO dbo.Book_return(BorrowCode, return_date)
VALUES
('BC000001',  '2022-02-17'),
('BC000002',  '2022-02-27'),
('BC000003',  '2022-04-22'),
('BC000004',  '2022-04-17'),
('BC000005',  '2022-05-13'),
('BC000006',  '2022-06-06'),
('BC000007',  '2022-02-17'),
('BC000008',  '2022-07-30'),
('BC000009',  '2022-03-17'),
('BC000010',  '2022-03-28')

--the displayment of Book_return
```



	BorrowCode	return_date
1	BC000001	2022-02-17
2	BC000002	2022-02-27
3	BC000003	2022-04-22
4	BC000004	2022-04-17
5	BC000005	2022-05-13
6	BC000006	2022-06-06
7	BC000007	2022-02-17
8	BC000008	2022-07-30
9	BC000009	2022-03-17
10	BC000010	2022-03-28

Overview of database_library_management



Students
- StudentID
- Name
- DateOfBirth
- Gender
- Email
- Phone
- Password

Borrow_Book_details
- BorrowCode
- BookID
- Quantity
- Date_end

Managers
- ManagerID
- Name
- DateOfBirth
- Gender
- Email
- Phone
- Password

Borrow_Book
- BorrowCode
- ManagerID
- StudentID
- date_start

Book
- BookID
- Title
- Author
- publication_date
- Quantity
- Website
- RateOfBook

Book_return
- BorrowCode
- return_date

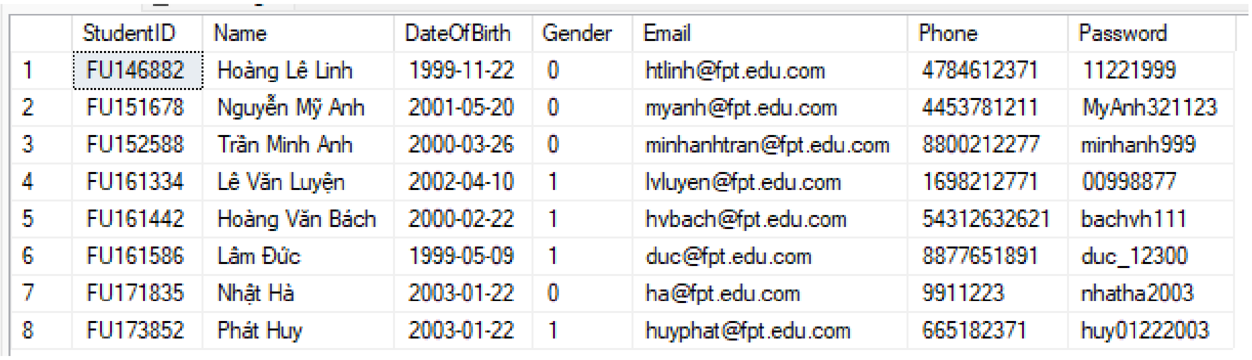
SQL COMMAND

A/ SQL ORDER BY Keyword

Code:

```
SELECT * FROM dbo.Students
ORDER BY [StudentID] ASC
```

Result:



	StudentID	Name	DateOfBirth	Gender	Email	Phone	Password
1	FU146882	Hoàng Lê Linh	1999-11-22	0	htlinh@fpt.edu.com	4784612371	11221999
2	FU151678	Nguyễn Mỹ Anh	2001-05-20	0	myanh@fpt.edu.com	4453781211	MyAnh321123
3	FU152588	Trần Minh Anh	2000-03-26	0	minhanhtran@fpt.edu.com	8800212277	minhanh999
4	FU161334	Lê Văn Luyện	2002-04-10	1	lvluyen@fpt.edu.com	1698212771	00998877
5	FU161442	Hoàng Văn Bách	2000-02-22	1	hvbach@fpt.edu.com	54312632621	bachvh111
6	FU161586	Lâm Đức	1999-05-09	1	duc@fpt.edu.com	8877651891	duc_12300
7	FU171835	Nhật Hà	2003-01-22	0	ha@fpt.edu.com	9911223	nhatha2003
8	FU173852	Phát Huy	2003-01-22	1	huyphat@fpt.edu.com	665182371	huy01222003

We use SQL query ORDER BY to sort the list ascending or descending by the values which we want it to display. Select * from **Students** to give users all record in the **Students** table and cooperate with the Order By query so the table displays all records ascending by StudentID.

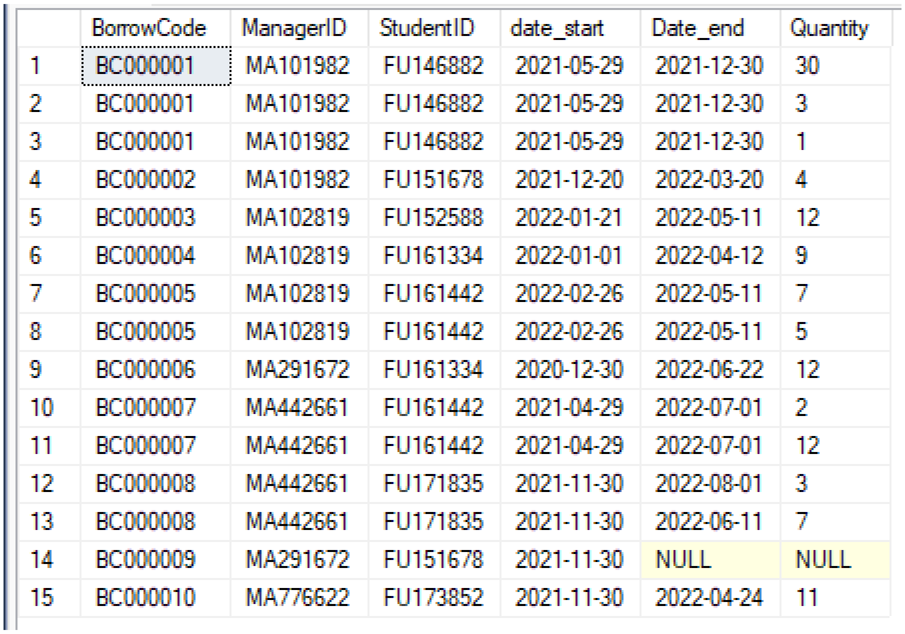
B/ SQL LEFT JOIN Keyword

Code:

```
SELECT BB.BorrowCode, BB.ManagerID, BB.StudentID, BB.date_start, BBd.Date_end,
BBd.Quantity
FROM

dbo.Borrow_Book BB LEFT JOIN dbo.Borrow_Book_details BBd ON BBd.BorrowCode =
BB.BorrowCode
```

Result:



	BorrowCode	ManagerID	StudentID	date_start	Date_end	Quantity
1	BC000001	MA101982	FU146882	2021-05-29	2021-12-30	30
2	BC000001	MA101982	FU146882	2021-05-29	2021-12-30	3
3	BC000001	MA101982	FU146882	2021-05-29	2021-12-30	1
4	BC000002	MA101982	FU151678	2021-12-20	2022-03-20	4
5	BC000003	MA102819	FU152588	2022-01-21	2022-05-11	12
6	BC000004	MA102819	FU161334	2022-01-01	2022-04-12	9
7	BC000005	MA102819	FU161442	2022-02-26	2022-05-11	7
8	BC000005	MA102819	FU161442	2022-02-26	2022-05-11	5
9	BC000006	MA291672	FU161334	2020-12-30	2022-06-22	12
10	BC000007	MA442661	FU161442	2021-04-29	2022-07-01	2
11	BC000007	MA442661	FU161442	2021-04-29	2022-07-01	12
12	BC000008	MA442661	FU171835	2021-11-30	2022-08-01	3
13	BC000008	MA442661	FU171835	2021-11-30	2022-06-11	7
14	BC000009	MA291672	FU151678	2021-11-30	NULL	NULL
15	BC000010	MA776622	FU173852	2021-11-30	2022-04-24	11

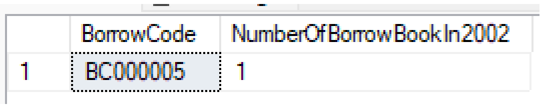
Below this picture, We left Join **Borrow_Book** with **Borrow_Book_details**. The null of the return date means that the record can not connect to any column in **Borrow_Book_details** so the SQL will set this to the null value.

C/ QUERY USING AGGREGATE FUNCTIONS

Code:

```
SELECT Br.BorrowCode, count(Br.return_date) AS NumberOfBorrowBookIn2002
FROM dbo.Book_return Br
WHERE YEAR(Br.return_date) = 2022 AND MONTH(Br.return_date) = 5
GROUP BY Br.BorrowCode
```

Result:



	BorrowCode	NumberOfBorrowBookIn2002
1	BC000005	1

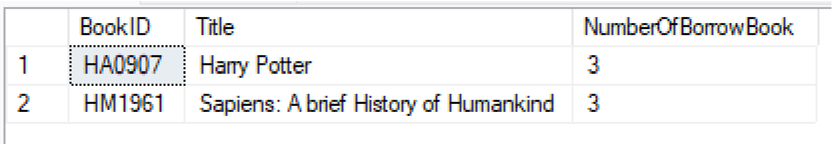
We use count() function to count the number of **BorrowCode** which students return the Book. In this picture, only 1 people have a return date of ‘May 2022’

D/ QUERY USING THE GROUP BY AND HAVING CLAUSES

Code:

```
SELECT b.BookID, b.Title, COUNT(*) AS NumberOfBorrowBook
FROM dbo.Book b JOIN dbo.Borrow_Book_details BBd ON BBd.BookID = b.BookID
GROUP BY b.BookID, b.Title
HAVING COUNT(*) >= 3
ORDER BY b.BookID ASC
```

Result:



	BookID	Title	NumberOfBorrowBook
1	HA0907	Harry Potter	3
2	HM1961	Sapiens: A brief History of Humankind	3

In this picture, we want to find the number of books which borrow greater or equal than 3 according to the ascending by the **BookID**. Then having have to use

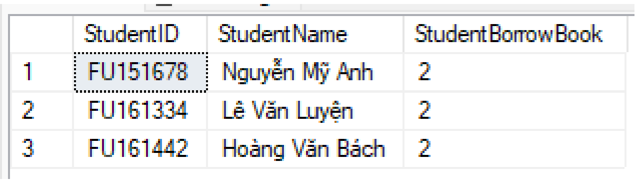
Having() and count()

E/ QUERY THAT USES A SUB-QUERY AS A RELATION

Code:

```
SELECT bb.StudentID, s.Name AS StudentName, COUNT(bb.BorrowCode) AS
StudentBorrowBook
FROM dbo.Borrow_Book  bb JOIN dbo.Students s ON s.StudentID = bb.StudentID
GROUP BY bb.StudentID, s.Name
HAVING COUNT(bb.BorrowCode) = (
                SELECT MAX(B.StudentBorrowBook) FROM(SELECT
COUNT(bb.BorrowCode) AS StudentBorrowBook
                                                FROM dbo.Borrow_Book  bb JOIN dbo.Students s
ON s.StudentID = bb.StudentID
                                                GROUP BY bb.StudentID, s.Name) AS B)
```

Result:



	StudentID	StudentName	StudentBorrowBook
1	FU151678	Nguyễn Mỹ Anh	2
2	FU161334	Lê Văn Luyện	2
3	FU161442	Hoàng Văn Bách	2

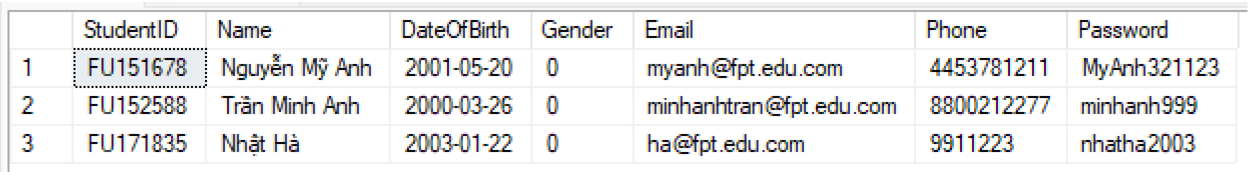
We use Group By() and Having() clauses to find the student who have the total **BorrowBook** most

F/ QUERY THAT FIND APPROXIMATE MATCHING IN THE WHERE CLAUSE

Code:

```
SELECT *
FROM dbo.Students S
WHERE S.Name LIKE 'T%' OR S.Name LIKE 'N%'
```

Result:



	StudentID	Name	DateOfBirth	Gender	Email	Phone	Password
1	FU151678	Nguyễn Mỹ Anh	2001-05-20	0	myanh@fpt.edu.com	4453781211	MyAnh321123
2	FU152588	Trần Minh Anh	2000-03-26	0	minhanhtran@fpt.edu.com	8800212277	minhanh999
3	FU171835	Nhật Hà	2003-01-22	0	ha@fpt.edu.com	9911223	nhatha2003

If we want to find the student who has name beginning with ‘N’ or ‘T’. We can use Like ‘%’ in **Students** table

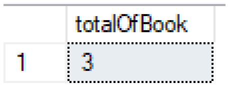
G/ STORE PROCEDURE

Code:

```
CREATE PROC count_Book @BorrowCode CHAR(50), @NumberOfBook int OUTPUT
AS
BEGIN
        SET @NumberOfBook = (
        SELECT COUNT(*)
        FROM dbo.Borrow_Book_details
        WHERE BorrowCode = @BorrowCode
        GROUP BY BorrowCode
        )
END

DECLARE @x INT
EXEC count_Book 'BC000001', @x OUTPUT
SELECT @x AS totalOfBook
```

Result:



```
   totalOfBook
1  3
```

We use the procedure to count the total number of Book student want to borrow which uses the **BorrowCode**

H/ TRIGGER PROCEDURE

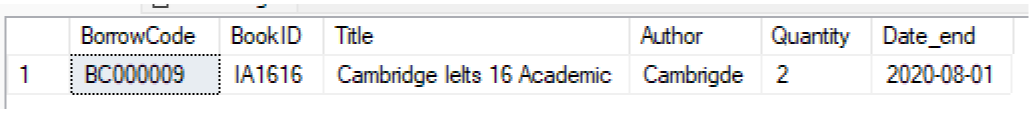
Code:

```
CREATE TRIGGER tr_insert_quantity ON Borrow_Book_details after insert
AS
BEGIN
                SELECT i.BorrowCode, i.BookID, b.Title, b.Author, i.Quantity, i.Date_end
                FROM inserted i JOIN dbo.Book b ON i.BookID = b.BookID
END

INSERT INTO dbo.Borrow_Book_details(BorrowCode, BookID, Quantity, Date_end)
```

```
VALUES ('BC000009','IA1616', 2, '2020-08-01')
```

Result:



	BorrowCode	BookID	Title	Author	Quantity	Date_end
1	BC000009	IA1616	Cambridge Ielts 16 Academic	Cambrigde	2	2020-08-01

We use trigger procedure to insert the new **BorrowCode** and display it with Title and Author of that Book