How to create a Library Management System.

A. Create database and tables

1. I wrote the following SQL script to create the db and tables.

```
create database Library
go

create table Publisher(
Name varchar (255) primary key not null,
Address varchar (255) null,
Phone varchar (255) null)
go

create table Book(
Book_ID int primary key not null,
Title varchar (255) not null,
Publisher_Name varchar (255) foreign key references Publisher(Name) not null)
go

create table Book_Authors (
Book_ID int primary key foreign key references Book(Book_ID) not null,
Author varchar (255) not null)

create table Library_Branch(
Branch_ID int not null primary key,
Branch_Name varchar (255) not null,
Address varchar (255) null)
go


create table Book_Copies(
Book_ID int not null foreign key references Book(Book_ID),
Branch_ID int not null foreign key references Library_Branch(Branch_ID),
No_Of_Copies int not null
add constraint pk_bookcopies primary key (Book_ID, Branch_ID) )
go

create table Borrower(
Card_No varchar (255) not null primary key,
Name varchar (255) not null,
Address varchar (255) not null,
Phone varchar (255) not null)
go
```

```
create table Book_Loans(
Book_ID int not null foreign key references Book(Book_ID),
Branch_ID int not null foreign key references Library_Branch(Branch_ID),
Card_No varchar (255) not null foreign key references Borrower(Card_No),
Date_Out date not null,
Due_Date date not null
constraint pk_BookLoans primary key (Book_ID, Branch_ID, Card_No))
go
```

B. Populate tables with data

I then populated each table by writing the data on a .txt file, and using the command line to enter them automatically.
This is my example of the Book table. The first column refers to the Book_Id, the second one is the Title, and the third is the Publisher_Name.

```
1,The Lost Tribe,The Publisher
2,AAA,The Publisher,
3,BBB,The Publisher
4,CCC,The Publisher
5,DDD,Publisher 2
6,FFF,Publisher 2
7,GGG,The Publisher
8,HHH,The Publisher
9,III,Publisher 2
10,JJJ,Publisher 2
11,KKK,The Publisher
12,LLL,The Publisher
13,MMM,Publisher 2
14,NNN,The Publisher
```

To enter this an a command line, you navigate to the folder containing the Library_Book.txt file, and write the following

```
BCP Library.dbo.Book IN Library _Book.txt -c -t, -T -r\n
```

C. SQL QUERIES EXAMPLES

1. To see the numbers of copies of a specific book owned by the branch in Sharpstown

```
select * from Book_Copies as copies
inner join Book as books
on copies.Book_ID = books.Book_ID

inner join Library_Branch as branch
on copies.Branch_ID = branch.Branch_ID

where books.Title = 'The Lost Tribe' and branch.Branch_Name = 'Sharpstown'
```

2. How many copies of the book titles the lost tribe are owned by each library branch

```
select * from Book_Copies as copies
inner join Book as books
on copies.Book_ID = books.Book_ID

inner join Library_Branch as branch
on copies.Branch_ID = branch.Branch_Id

where books.Title = 'The Lost Tribe'
```

3. Retrieve the name of all borrowers who do not have a book checked out

```
select * from Book_Loans as loans
right join Borrower
on loans.Card_No = Borrower.Card_No
where Book_ID is null
```

4. For each book that is loaned out from the "Sharpstown" branch and whose DueDate is today, retrieve the book title, the borrower's name, and the borrower's address.

```
select Borrower.Name, Borrower.Address, Book.Title
from Book_Loans as loans
inner join Borrower
on loans.Card_No = Borrower.Card_No
```

```
inner join Library_Branch as branch
on loans.Branch_ID = branch.Branch_ID

inner join Book
on loans.Book_ID = Book.Book_ID

where branch.Branch_Name = 'Sharpstown'
and loans.Due_Date = '2016-02-19'
```

5. For each library branch, retrieve the branch name and the total number of books loaned out from that branch.

```
select Branch_name, COUNT(loans.branch_id)
from Book_Loans as loans
left join Library_Branch as branches
on loans.Branch_ID = branches.Branch_Id
group by Branch_Name
```

6. Retrieve the names, addresses, and number of books checked out for all borrowers who have more than five books checked out.

```
select Name, COUNT(loans.card_no)as TotalLoans
from Book_Loans as loans
inner join Borrower
on loans.Card_No = Borrower.card_no
group by name
having COUNT(loans.card_no) >5
```

7. For each book authored (or co-authored) by "Stephen King", retrieve the title and the number of copies owned by the library branch whose name is "Central"

```
select Title, No_of_Copies
from Book
inner join Book_Copies as copies
on Book.Book_ID = copies.Book_Id

inner join Book_Authors as authors
on book.Book_ID = authors.Book_ID

inner join Library_Branch as branch
on branch.Branch_ID = copies.Branch_ID

where authors.Author_Name = 'Stephen King'
and branch.Branch_Name = 'Central'
```

C. STORED PROCEDURES

An example of a stored procedure for the number 7 would look like this:

```
create procedure sp_get_BookCopy#_by_LibBranch_by_Author
@Author nvarchar (255), @Branch nvarchar (255)
AS

select Title, No_of_Copies
from Book
inner join Book_Copies as copies
on Book.Book_ID = copies.Book_Id

inner join Book_Authors as authors
on book.Book_ID = authors.Book_ID

inner join Library_Branch as branch
on branch.Branch_ID = copies.Branch_ID

where authors.Author_Name = @Author
and branch.Branch_Name = @Branch
```

To execute type: `exec sp_get_BookCopy#_by_LibBranch_by_Author @Author='Stephen King', @Branch='Central'`