I. Updated Requirements:

1. Staffs must be able to insert books.
2. Staffs shall be able to update books.
3. Staffs may be able to delete books.
4. Modifying data in the database should be updated for all staffs and members (teachers and students) accessing it within 3 seconds.
5. Staffs shall be able to add new borrowing record (ID-card, Phone Number and book name)
6. Members can only borrow at most 3 books and they should return it within one month.
7. The staffs and members should be able to search for books by ID, search by title and search by author.
8. Staffs shall be able to view all borrowings detail (ID-card, Phone Number and book name), while members can only view their own borrowing detail(ID-card, Phone Number and book name).
9. Borrowing record must contain student-ID, book name and phone number.
10. The database must be able to store at least 100GB worth of records. (Size of storage in database doesn't depend on the number of record).
11. The system must be written in C#.
12. The system must be able to works on both Window OS and Mac OS.

II. Using the requirement above:

1. Identify Candidate class:

- Staff
- Book
- Data
- Database
- Staff
- Member
- Teacher
- Student
- Second
- Staff
- Borrowing record

- ID-Card
- Phone Number
- Book name
- Member
- Book
- Return
- Month
- Staff
- Member
- Search
- Book-ID

- Book-title
- Book-author
- Staffs
- View
- Borrowing detail
- Student-ID
- System
- Window OS
- Mac OS

2. Refine Classes
> Remove Duplicates

- Staff
- Book
- Data
- Database

- ~~Staff~~
- Member
- Teacher
- Student

- Second
- ~~Staff~~
- Borrowing record
- ID-Card

- Phone Number
- Book name
- ~~Member~~
- ~~Book~~
- Return
- Month
- ~~Staff~~

- ~~Member~~
- Search
- Book-ID
- Book-title
- Book-author
- ~~Staff~~
- View

- Borrowing detail
- Student-ID
- System
- Window OS
- Mac OS

➢ Removing "System" class

- Staff
- Book
- Data
- Database
- ~~Staff~~
- Member
- Teacher
- Student
- Second
- ~~Staff~~

- Borrowing record
- ID-Card
- Phone Number
- Book name
- ~~Member~~
- ~~Book~~
- Return
- Month
- ~~Staff~~
- ~~Member~~

- Book-ID
- Book-title
- Book-author
- ~~Staff~~
- Borrowing detail
- Student-ID
- ~~System~~
- Window OS
- Mac OS

➢ Removing irrelevant classes

- Staff
- Book
- Data
- ~~Database~~
- ~~Staff~~
- Member
- Teacher
- Student
- ~~Second~~
- ~~Staff~~

- Borrowing record
- ID-Card
- Phone Number
- Book name
- ~~Member~~
- ~~Book~~
- Return
- Month
- ~~Staff~~
- ~~Member~~

- Book-ID
- Book-title
- Book-author
- ~~Staff~~
- Borrowing detail
- Student-ID
- ~~System~~
- ~~Window OS~~
- ~~Mac OS~~

➢ Reviewing the Redundant classes and building a Common Vocabulary

- Staff
- Book
- ~~Data~~
- ~~Database~~
- ~~Staff~~

- Member
- ~~Teacher~~
- ~~Student~~
- ~~Second~~
- ~~Staff~~

- Borrowing record
- ID-Card
- Phone Number
- ~~Book name~~
- ~~Member~~

- ~~Book~~
- ~~Return~~
- ~~Month~~
- ~~Staff~~
- ~~Member~~

- Book-ID
- Book-title
- Book-author
- ~~Staff~~

- ~~Borrowing detail~~
- ~~Student-ID~~
- ~~System~~
- ~~Window OS~~
- ~~Mac OS~~

Reviewing the Redundant classes and building a Common Vocabulary

Data, borrowing record, Borrowing detail => Borrowing record

Student-ID, ID-Card => Id card

Data, Book name, Book title => Book title

Return, Month => Due date

Teacher, Student => Member

3. Identify Responsibilities

 ➢ Reviewing Possible Attributes:

- Staff
- Book
- ~~Data~~
- ~~Database~~
- ~~Staff~~
- Member
- ~~Teacher~~
- ~~Student~~
- ~~Second~~
- ~~Staff~~

- Borrowing record
- ~~ID-Card~~
- ~~Phone Number~~
- ~~Book name~~
- ~~Member~~
- ~~Book~~
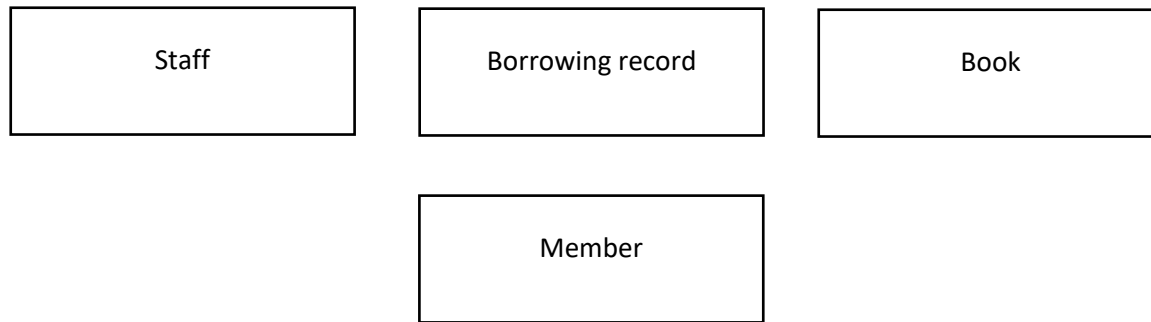- ~~Return~~
- ~~Month~~
- ~~Staff~~
- ~~Member~~

- ~~Book-ID~~
- ~~Book-title~~
- ~~Book-author~~
- ~~Staff~~
- ~~Borrowing detail~~
- ~~Student-ID~~
- ~~System~~
- ~~Window OS~~
- ~~Mac OS~~

Uncover attributes needed:

Staff: name, phone number, ID card.

Borrowing record: Borrowed date, Book amount.

Member: Occupation, Name.

```
┌─────────────────┐     ┌─────────────────┐     ┌─────────────────┐
│                 │     │                 │     │                 │
│     Staff       │     │ Borrowing record│     │     Book        │
│                 │     │                 │     │                 │
└─────────────────┘     └─────────────────┘     └─────────────────┘

                        ┌─────────────────┐
                        │                 │
                        │     Member      │
                        │                 │
                        └─────────────────┘
```

➢ Identify Method

1. Staffs must be able to insert books.
2. Staffs shall be able to update books.
3. Staffs may be able to delete books.
4. Modifying data in the database should be updated for all staffs and members (teachers and students) accessing it within 3 seconds.
5. Staffs shall be able to add new borrowing record (ID-card, Phone Number and book name)
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10. The database must be able to store at least 100GB worth of records. (Size of storage in database doesn't depend on the number of record).
11. The system must be written in C#.
12. The system must be able to works on both Window OS and Mac OS.

List of methods:

Insert book

Delete book

Update book

Add new borrowing record

Borrow book

Return book

Search book

View borrowing record

4. Create CRC cards

Staff	
Id card	
Name	
Phone number	
Insert book	Book
Update book	Book
Delete book	Book
Search book	Book
Get book id	Book
Get book title	Book
Get book author	Book
Add borrowing record	Borrowing Record
Update borrowing record	Borrowing Record
View borrowing record	Borrowing Record
Get name	Member
Get id card	Member
Get phone number	Member

Borrowing Record	
Borrowed date	
Book amount	
Due date	
Id card	
Phone number	
Book id	
Book title	
Book author	
Add borrowing record	
Update borrowing record	
View borrowing record	

Book	
Book id	
Book title	
Book author	
Insert book	
Update book	
Delete book	
Search book	
Borrow book	
Return book	
Get book id	
Get book title	
Get book author	

Member	
Occupation	
Name	
Id card	
Phone number	
Search book	Book
Borrow book	Book
Return book	Book
Get name	
Get id card	
Get phone number	