National University of Singapore
School of Computing

IS2103 – Enterprise Systems Server-side Design and Development
Assignment 1: Individual Assignment
Total Marks: 7 marks

BACKGROUND

A community library in Singapore in the recent times has seen an increase in the number of library members (those who take books on loan from the library). In order to streamline the lending process of books and to reduce the workload of the staff, the library management has decided to incorporate a new Integrated Library System (ILS). The ILS will consist of i) a core backend to be developed with a component-based architecture; and ii) a book lending application to support the workflow of the library. During the initial phase of this project, you are tasked to develop a pilot system at the library to demonstrate the solution. In a typical scenario, when a new member walks into the library, he/she will be assisted by an admin staff at the lending counter. Initially, the staff will register him/her with the system using his/her national identity number (NRIC or Passport) upon which the member can lend books.

SYSTEM SPECIFICATION

The pilot system functionalities to support the use cases depicted in the UML use case diagram as shown in Figure 1.
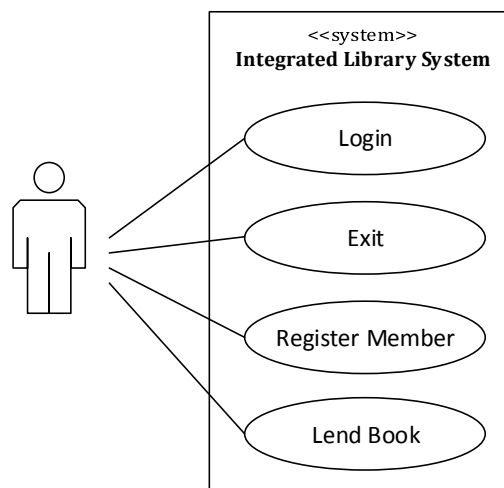

Figure 1 – Use Case Diagram

A brief description of each business use case is given in Table 1 below.

S/N	Use Case	Description/Business Rules
1	Login	• May only be performed if staff is not currently logged into the system. • Staff must be currently logged into the system to perform all other use cases.
2	Register Member	• If a member is not registered, admin staff registers a new member record in the system. The staff needs to ask and enter the following information: o First Name o Last Name o Gender o Age o Identity Number (NRIC or Passport) o Phone o Address
3	Lend Book	• Admin staff can lend books available in the library to the members.
4	Exit	• Logout if staff is currently logged in the system. • Quit the ILS terminal.

Table 1 – Use case descriptions and business rules of ILS

The logical data model of the ILS is depicted in the UML class diagram shown in Figure 2. The entity classes are required to implement system functionalities for supporting the business use cases.
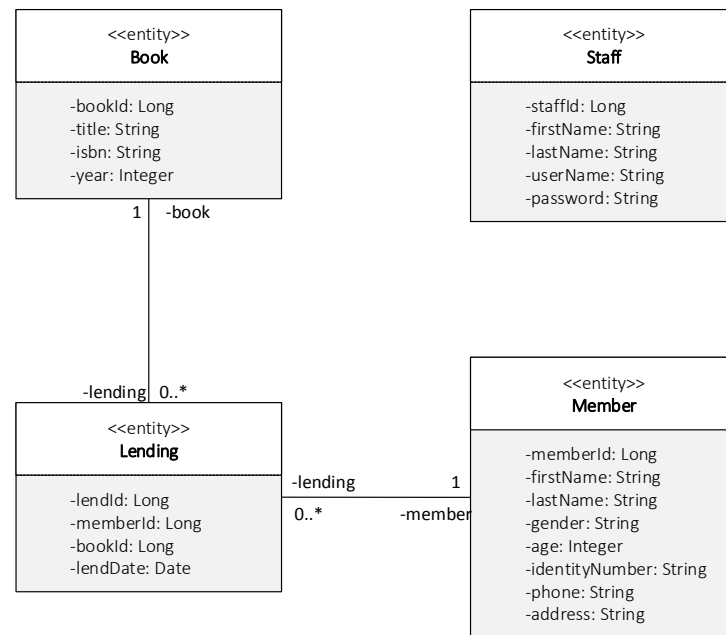

Figure 2 – Class Diagram

You are required to create the basic NetBeans project structure for the ILS together with an enterprise application client representing the Book Lending Terminal. Your NetBeans enterprise application project structure should resemble the following as shown in Table 2:

	Project Structure	Type
	IntegratedLibrarySystem-ejb	Project
	dao	Package
	LendingEntityManager.java	Class
	BookEntityManager.java	Class
	EntityManager.java	Class
	MemberEntityManager.java	Class
	StaffEntityManager.java	Class
	ejb.session.stateful	Package
	LibraryOperationController.java	Class
	LibraryOperationLocal.java	Interface
	IntegratedLibrarySystemLibrary	Project
	ejb.session.stateful	Package
	LibraryOperationRemote.java	Interface
	entity	Package
	LendingEntity.java	Class
	BookEntity.java	Class
	MemberEntity.java	Class
	StaffEntity.java	Class
	util.exception	Package
	EntityManagerException.java	Class
	InvalidLoginException.java	Class
	StaffNotFoundException.java	Class

🗋	BookNotFoundException.java	Class
🗋	MemberNotFoundException.java	Class
	BookLendingTerminalClient	Project
🗏	booklendingterminalclient	Package
🗋	Main.java	Class
🗋	MainApp.java	Class
🗋	LibraryOperationModule.java	Class

Table 2 – Project Structure for ILS

For the pilot implementation, the library has asked you to deploy the solution at the library. There are several employees as shown in Table 3.

staffId	firstName	lastName	userName	password
1	Linda	Chua	linda	password
2	Barbara	Durham	barbara	password

Table 3 – Staff Entities

A sample of the books available at the library is given in Table 4.

bookId	title	isbn	year
1	The Lord of the Rings	S18018	1954
2	Le Petit Prince	S64921	1943
3	Harry Potter and the Philosopher's Stone	S38101	1997
4	The Hobbit	S19527	1937
5	And Then There Were None	S63288	1939
6	Dream of the Red Chamber	S32187	1791
7	The Lion, the Witch and the Wardrobe	S74569	1950

Table 4 – Book Entities

In addition, the library has also provided you with sample data of their member database as shown in Table 5.

memberId	firstName	lastName	gender	age	identityNumber	phone	address
1	Tony	Teo	Male	44	S7483027A	87297373	11 Tampines Ave 3
2	Wendy	Tan	Female	35	S8381028X	97502837	15 Computing Dr

Table 5 – Member Entities

YOUR TASK

You are tasked to design and develop an appropriate component-based architecture for the pilot ILS and then implement it using the appropriate EJB session beans (refer to Table 2). For simplicity, if a book is already lent to a member, it cannot be lent again.

IMPLEMENTATION CONSIDERATIONS

1. The system will be linked with other library systems such as fine management systems, human resource (HR) systems, or financial accounting systems. During this phase of development, you are only required to implement the pilot functionalities to demonstrate the feasibility of the system at the library.
2. You must use MySQL as the relational database to implement data persistence. **You MUST setup the database connection with the following properties for proper testing of your project. Please make sure the sample data is hardcoded in your program to be programmatically inserted to the database during the initial deployment of the project.**
   a. Database Name: **librarydb**
   b. Database user: **root**
   c. Database password: **password**

3. You are expected to create a simple console interface for the library staff to perform the necessary business use cases. At the bare minimum, the system shall produce the following, but not limited to, outputs:

```
*** Welcome to Integrated Library System (ILS) ***

1: Login
2: Exit

> 1
```

```
*** ILS :: Login ***

Enter username> linda
Enter password> password
Login successful!

*** Integrated Library System (ILS) ***

You are login as Linda Chua

1: Library Operation
2: Logout

>1
```

```
*** ILS :: Library Operation ***

1: Register Member
2: Lend Book
3: Back

>1
```

```
*** ILS :: Library Operation :: Register Member ***

Enter First Name> Elroy
Enter Last Name> Tan
Enter Gender> Male
Enter Age> 37
Enter Identity Number> S81859483A
Enter Phone> 84927473
Enter Address> 1 Upper Kent Ridge Road
Member has been registered successfully!

*** ILS :: Registration Operation ***

1: Register Member
2: Lend Book
3: Back

>2
```

```
*** ILS:: Library Operation :: Lend Book ***

Enter Book Id> 1
Enter Member Identity Number> S81859483A
Book: The Lord of the Rings lent to Elroy Tan.

*** ILS:: Library Operation ***

1: Register Member
2: Lend Book
3: Back

>
```

SUBMISSION

You are required to upload your complete NetBeans project folder (as a zip file) to IVLE Workbin Assignment 1 Submission folder by 15 March 2019 23:59 hrs (Grace period of 15 minutes). Failing to do so would render you zero mark for the assignment.

EVALUATION

The following grading criteria are used for evaluation of the assignment:

- Fully functional code — 7 marks
- Partially functional code — 4 marks
- Implemented but failed to run — 2 marks
- No submission or late submission — 0 mark