

**College of Computer
Department of Information Technology
IT 332 Advanced Database**

**Project (Phase 1) – Requirements Gathering and Conceptual Database
Design & Database Implementation**

Case Study – A Library Database

DUE DATE: Saturday, Oct 23th at 11:59 pm (Week 8)

WORTH 15% of final project mark.

The main campus (Almulaida) of Qassim University (QU) offers many programs of study. Almulaida campus has shown a keen interest to improve its library system by 2025. Therefore, as an exercise, the library system will be developed as a student project. The proposed library system is developed in various modules. You have been selected to develop a database for Almulaida campus library. You asked to provide a design for a database system that will store information on the book, journal, loan, member, member type, fines, and so on.

An initial requirements collection and analysis phase of the database design process has been completed. The following (very incomplete and in some situations incorrect) project specifications for the library is given in Appendix 1 below.

In the lab session, you will be provided with opportunity to ask questions from the client (tutor) to clarify requirements to the library database.

You are asked to submit the following:

- A complete requirements document (you may take Appendix 1 and modify and extend it).
- A completed conceptual database design (EER/UML Model).
- Relational Mapping & Normalization (Logical Design).
- Database implementation (Physical Design).

APPENDIX 1

Main Features

In meeting its objectives, the following main features for the proposed library system have been identified.

1. **Catalog services:** Develop a web-based searchable Catalog of resources both physical and virtual. Facilities to search the Catalog on various criteria including keywords, title, authors, subjects etc. need to be provided. In addition to the physical collection, the library also maintains a collection of online resources to which it subscribes and provides access.
2. **Circulation Service:** The circulation service provides facilities to issue and to return library resources. In order to lend library items, a person must be a member of the library. There are different types of members who are provided varying degrees of privileges.
3. **Short Loan Service:** A short loan collection exists for frequently used items.

Library Database in Details

QU's Library contains various materials both Physical and Electronic copy. Also it provides members lots of services such as: Catalog, Circulation, and Short Loan Service.

There are different types of items in **Catalog** service such as: Book, videoRecording, soundRecording, Thesis, Journal, Room, Online Database, and Collection.

The Book item can be classified as ISBN/ISSN that assign to any book with a unique number, Author, Publisher details, Book's notes, Status of book which is either available or not. The videoRecording and soundRecording can store a unique number, location, publisher details, and description. The Thesis item may store call number, Author, location, and description. The Journal will store information about articles and newspaper includes a unique call number for each field, availability and title. The Room stores some specific data such as: Room number, Status (busy/not), duration to hold it, Location and room's type (lab, reading room, or working room). The Online Database is quite different than other items in terms of privileges for the member's type (staff, student). There are a lot of Collection in the library where the data of collection item may include the name (unique), type, and serial number to each of them.

There are different types of items in **Circulation** service such as: Member, Member Type, Privilege, Loan, and Fine. There are different types of Member that participate in the library. Each member can access the library easily when becomes a member. There are also some fines may be imposed on a member who do not a cling to library rules.

The Member information has some details, which are uniquely assigned to each member. Type of member such as: Graduate or Undergraduate student, Staff and community patrons, PIN, the member name, Data of birth, the full address and contact numbers, some data about date joined and expiry as well as the member status. Each type of the Member has given some permission to get data, and the data stores on each type includes the member type, name of member, the unique number for each member and some description as well. The circulation desk will give some privileges and permission for each member depending on its type, Also, they will imposed fines on member who does not stick to the library rules. The data stored includes the privilege number which is uniquely, Name of privilege, Loan period, Maximum number of item that member can borrow it as well as Maximum number of renewal. Loans have been stored on the library database and can find out more information about it. The Loan item has a unique record, the status of availability or not, data loaned and due date. There are business rules that the library has forced on all members. These rules should be followed. Otherwise, the member how does not adhere to the library rules will be punished. Thus, the Fine item will store data includes the amount of fine, fine description, the member who gets it and its status.

Short Loan helps the library to get some materials needed which is normally unavailable because these materials out of print such as: fiction titles, or too specialized such as popular videos, some books, journals articles and digital camera. Also, there are some equipment cannot take them out such as: specific journals and books, street maps, thesis, daily newspaper and also examination papers. Every member can book items to get it when it is unavailable, but no more one can reserve the same item. In addition, the loan will be charged on members when they late return. The data will be stored on short loan includes a uniquely Call number which is assigned to each item, information about date and time reservation and expiry reservation; also it will provide some data about member's request and its status.

Submission

This is a **GROUP** project.

Group Formation

You need to work in groups of **Five members** for this project; a group of 6 or 3 members is allowed after getting the permission.

The attached form (page 5) needs to be filled and sent via email on **Sep 27th**, which determines the groups and its members. You are unable to change groups after it is formed (unless under extenuating situations with the approval of the lecturer).

Part 1: Requirements Document

Format: The requirements document **MUST** have the following sections for which it is marked:

- Data Requirements – outlining the major data items and business rules
- Transaction requirements – outlining the data manipulation and queries

Hint: Sample user specification documents are attached as Requirements Document_SAMPLE.pdf

Part 2: Documented EER/UML Model

The requirements document **MUST** have the following sections for which it is marked:

- EER/UML Model: you need to discuss the EER/UML models with your group members and select the appropriate EER/UML design for the project that best meets the data requirements and transaction requirements.

Hint: Sample EER/UML models is provided in Chapters 3 and 4 of your text. You are free to choose either EER or UML models.

Part 3: Relational Mapping & Normalization

The EER/UML diagram needs to be mapped to a relational schema and normalized. Document the relational schema in DBDL (Sample format is given below)

ISBN (id, number, itemNo)
Primary Key id
Alternate Key number
Foreign Key itemNo **references** Book (itemNo)
ON UPDATE CASCADE, ON DELETE CASCADE

Normalize the schema to the 3rd Normal Form (if any relation is not already in 3rd NF). The final normalized schema must be documented in DBDL.

Hint: Sample relational mapping is provided in Chapter 9 and Normalization in chapter 14 of your text.

Part 4: Create Database (with Constraints) and Views

Database Script:

You need to create an SQL script that creates the relational schema completed in the part 3 with all appropriate integrity constraints. You need to select data types that you think are appropriate.

You can use Oracle to create the table structure and generate the script or write manually. The script needs to be saved as ***createDB_<groupNo>.sql***.

View:

Create a view called ***vBookStatus*** for all books that are currently available in the Library, its authors and its status. Save this script as ***create_vBookStatus_<groupNo>.sql***.

Data Access:

Create a database role called “BookRole” and grant the following permissions to the role:

Permission	Database Object
SELECT	vBookStatus

Save this script as ***create_DataAccess_<groupNo>.sql***.

Write script to insert sample data and test the view. Save the script as ***test_View_<groupNo>.sql***.

Method of submission: Softcopy submission is required:

- It must be submitted as a word document via Blackboard → □Project → □Phase 1.
- Peer-assessment: Each group member must submit a filled “Peer Group Evaluation Form” (page 5) just as a softcopy via email’s instructor.

Notes:

- Ten percent of the possible maximum mark for the project item will be deducted for each day or part day that the item is late. Weekends count as one day in determining the penalty. Project items submitted more than five days after the due date will be awarded zero marks.
- All groups need to demonstrate their database implementation after submission. Each member of the group must be present at the time of the group demonstration.

Group Formation Form

GROUP NO: _____ (TO BE FILLED BY LECTURER)

GROUP MEMBERS:

I agree to participate in the mentioned group for Project (Phase 1) of **IT 332**

Student ID	Name	Group Leader

Peer Group Evaluation Form

Instructions

This form is to be completed by each student participating in a group work.

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Note: In specifying your contributions, outline the main tasks and a percentage of the contribution (out of 100%)

Section	Your Contribution	Your Group Members' Contribution
1		Member 1 (Name): Contribution: Member 2 (Name): Contribution: Member 3 (Name): Contribution: Member 4 (Name): Contribution:
2		Member 1 (Name): Contribution: Member 2 (Name): Contribution: Member 3 (Name): Contribution: Member 4 (Name): Contribution:
3		Member 1 (Name): Contribution: Member 2 (Name): Contribution: Member 3 (Name):

		Contribution: Member 4 (Name): Contribution:
4		Member 1 (Name): Contribution: Member 2 (Name): Contribution: Member 3 (Name): Contribution: Member 4 (Name): Contribution: