Name : Ramzy Izza Wardhana
Class : IUP CS B
NIM : 21/472698/PA/20322

Assignment 1 – Lab Database Report

Task 1: Create a database model of the library system

- Determine the entities that are in it and explain the attributes that make up these entities

Entities #1: Student *(Strong Entities)*

- Attribute #1: **NIM (Primary key)**
  Derived Attributes: Class Year, Faculty, Major
- Attribute #2: **Name**
  Composite Attribute: First Name, Middle Name, Last Name
- Attribute #3: **Date of Birth**
  Composite Attribute: Day, Month, Year, Age (Derived Attribute)
- Attribute #3: **Address**
  Composite Attribute: Province, City, Postal Code, District
- Attribute #4: **Sex** *(Single Value)*
- Attribute #5: **Phone Number** *(Multi Value)*
- Attribute #6: **UGM Mail** *(Single Value)*
- Attribute #7: **Student Status** *(Single Value)*

Entities #2: Book *(Strong Entities)*

- Attribute #1: **Book ID (Primary Key)**
- Attribute #2: **Book Title**
- Attribute #3: **Book Location**
- Attribute #4: **ISBN**
- Attribute #5: **Price**
- Attribute #6: **Acquired Date**
- Attribute #7: **Description**
- Attribute #8: **Category**
- Attribute #9: **Year**
- Attribute #10: **Edition**
- Attribute #11: **Author**
- Attribute #12: **Publisher**

Entities #3: Librarian(s) *(Strong Entities)*

- Attribute #1: **UGM Mail (Primary Key)**
  Composite Attributes: Password, Email, Login Authentication (Derived)
- Attribute #2: **NIP**
  Derived Attribute: Date of birth, Date of work, Sex, Worker's ID
- Attribute #3: **Name**
  Composite Attribute: First Name, Middle Name, Last Name
- Attribute #3: **Phone Number** (Multi Value)

- Determine the primary key, strong entity or weak entity, relationship, and cardinality between each entity
    1. **Primary Key:** Student (NIM), Book (BookID), Librarian (UGM Mail / Login Authentication)

       Reason: To uniquely distinguish student's information, NIM can represent as primary key because of each student will never has the same NIM and it would derive many important information.

       BookID is set as the primary key for book entity since each book has its own designated personal ID on the database system and will never conflict with each other.

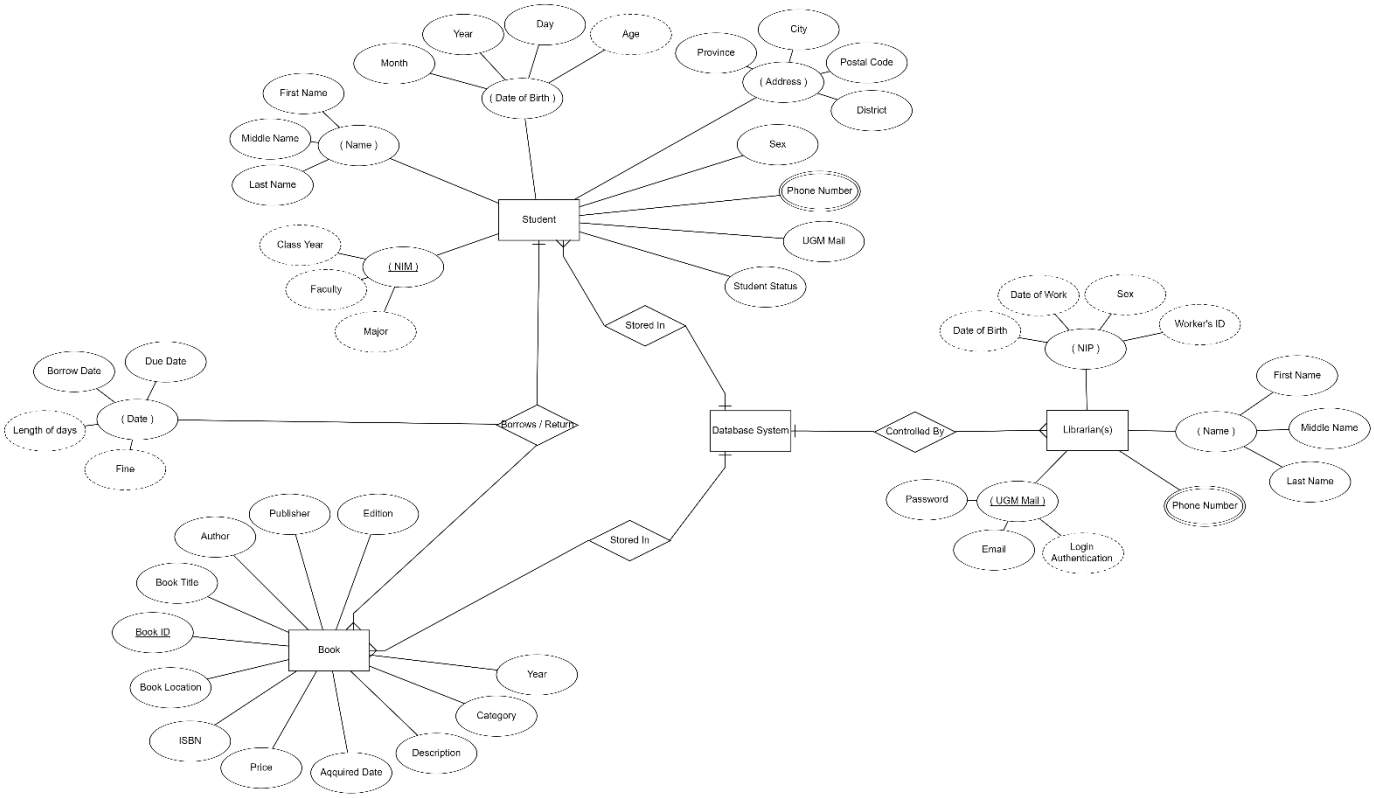
       On the other hand, librarian primary key is UGM mail / Login authentication, not NIP (Alternate key). Since the relationship that occurs between librarian and the database systems is *controlling the system*, therefore, each individual librarian must have exactly one distinct user account information to login into system which is a UGM Mail account to manage and control the library system and differentiate between other librarians.

    2. **Strong Entity:** All entity that occurs in the ERD is a strong entity since all entities has its own primary key.

    3. **Relationships**: There exist 3 relationships that connects exactly 3 entities. Namely: Borrows / Returns, Stored In, Controlled By.
        - Borrows / Returns: Relation between student and book
        - Stored In, Relation between Student's & Book's data with database systems
        - Controlled by: Relation between Database system with Librarian(s)

    4. **Cardinality:**
        a. *Student -> Borrows / Returns -> Book:* **One to Many** (A student may borrow multiple books)
        b. *Student & Book -> Stored in -> Database system:* **Many to one** (Multiple information provided by student and books will be stored in only one big database)
        c. *Database System -> Controlled by -> Librarian(s):* **One to Many** (Most of the time, database system usually has multiple users that controlled the system, therefore with one database, there exist more than one person / librarian who manage the system)

- Draw the model in ER Diagram
  More detailed image can be accessed here



- ERD is described based on the assumptions of business rules that you create yourself. Explain the assumption!

  Above, is an ER diagram that illustrates the library management systems on UGM (assumption). In hierarchy the library systems will be controlled by the admin librarian who has a personal UGM mail account as a login authentication to the database.

  In the database system, it will consist of student's and book's record data that will be stored and saved to control the flow of the book.

  If student wants to borrow a book, they will need to provide NIM and their chosen book (book_id) which then will be saved to the database consisting of borrow date and due date.

Task 2: Record company Aneka Record ERD

More detailed image can be accessed here