Introduction:
- Project Overview:
    - This database's purpose is to simplify the management of a modern
      library system's core operations. Core operations include
      resource cataloging, client interactions, and transaction
      workflows. The entities integrated into the database are books,
      digital media, clients, staff, and membership types to allow for
      actions such as borrowing, reservations, and notifications.
      This system will track these actions, calculate fines, and
      monitor the availability of physical and digital resources.
      Relationships between entities ensure seamless coordination, like
      linking clients to their transactions or reservations, staff to
      system management, and membership types to borrowing privileges.
      The database supports real-time updates for availability,
      automated overdue notifications, and dynamic fine calculations,
      which align with the library's goals of accessibility, accuracy,
      and user satisfaction.
- Scope:
    - The scope of this database will cover resource management, client
      management, transaction workflows, notifications, and staff
      operations. Resource management will involve cataloging books and
      digital media with metadata and tracking availability. Client
      management will involve storing client details, membership types,
      and account statuses, with borrowing limits tied to membership
      tiers. Transactional workflows will involve managing checkouts,
      returns, reservations, and fines, with automated status updates.
      Notifications will be sent out for due dates, overdue items, and
      reservation availability. And lastly, staff operations will
      involve recording staff contact details for internal management.
      The information that is out of scope is integration with external
      e-book platforms, mobile app interfaces, payment processing for
      fine, advanced analytics or predictive modeling for inventory,
      and inter-library loan systems beyond the local branch network.
      The system serves as a foundational tool for daily operations,
      with scalability for future enhancements like API expansions.
- Glossary:
    - Book_ID/Media_ID: Unique numeric identifier for physical/digital
      resources.
    - Title: Title of a book/digital media.
    - Author/Creator: The person who made the book/digital media.
    - Genre: Genre of a book/digital media.
    - Publication_Year: Year that a book/digital media was published.
    - Format: Type of digital media.

- ISBN: Unique identifier used to identify a book or other publication.
- ENUM: Enumerated data type.
- VARCHAR: Variable-length character string.
- Item_ID: Foreign key identifier used for identifying a book or digital media.
- Client_ID: Unique identifier for library clients, linked to transactions and reservations.
- Name: Name of each client.
- DOB: Date of birth.
- Contact_Info: Contact information of the clients.
- Work_Phone_Number: Phone number of those on staff.
- Work_Email: Email address of those on staff.
- Membership_Type: Tier (Regular, Student, Senior) determining borrowing limits and fees.
- Transaction_ID: Unique identifier for a checkout-return event/tied to fines.
- Reservation_ID: Identifier for holds placed on unavailable items.
- Reservation_Date: The date of the reservation.
- Reserving_Limit: Maximum reservations that a client can book.
- Availability_Status: Current state of a resource (Available/Checked Out/ Reserved).
- Return_Date: The date that the book/digital media was returned.
- Due_Date: The date that the book/digital media HAS to be returned.
- Borrowing_Limit: Maximum items a client can borrow based on their membership
- Borrow_Date: The date that the book/digital media is borrowed.
- Fine_Amount: The amount of any fine that is charged for either returning the book/digital media late or losing/destroying the book/digital media.
- Late_Fee_Rate: The fee per day for overdue items is defined by membership type.
- OPAC: Online catalog for clients to search resources (implied by Title/Author attributes).
- Hold: Synonym for reservations (active, fulfilled, or canceled).
- Staff_ID: Unique identifier for library employees.
- Notification_ID: A unique identifier is used to identify notifications.
- Message: The message in the notification sent to the client.
- Sent_Date: The date that the notification got sent on.
- Account_Status: Shows whether a client's account is active or not.

- Status: Tracks the status of a reservation

ER Modeling Components:
- Books
    - Attributes
        - Book_ID (Primary Key, INT) (0 < n < 1000000000)
        - Title (VARCHAR)
        - Author (VARCHAR)
        - ISBN (INT, Unique) (0 < n < 10000000000000)
        - Publication_Year (INT)
        - Genre (VARCHAR)
        - Availability_Status (ENUM: 'Available', 'Checked Out', 'Reserved')
    - Relationships
        - Books are borrowed through borrowing transactions
            - A Book can be involved in 0..* Borrowing Transactions (historical or active)
        - Books are reserved through reservations
            - A Book can be involved in 0..* Reservations (historical or active)
- Digital Media
    - Attributes
        - Media_ID (Primary Key, INT) (0 < n < 1000000000)
        - Title (VARCHAR)
        - Creator (VARCHAR)
        - Format (ENUM: 'eBook', 'Audiobook', 'DVD', etc.)
        - Pubication_Year (INT)
        - Genre (VARCHAR)
        - Availability_Status (ENUM: 'Available', 'Checked Out', 'Reserved')
    - Relationships
        - Digital Media can have Reservations
            - A Digital Media item can have 0..* Reservations
        - Digital Media can be involved in Borrowing Transactions
            - A Digital Media item can be involved in 0..* Borrowing Transactions
- Clients
    - Attributes
        - Client_ID (Primary Key, INT) (0 < n < 1000000000)
        - Name (VARCHAR)
        - Contact_Info (VARCHAR)

- Membership_Type (ENUM: 'Regular', 'Student', 'Senior Citizen')
- Account_Status (ENUM: 'Active', 'Suspended')
        - Relationships
            - Clients can perform Borrowing Transactions
                - A Client may perform 0..10 Borrowing Transactions
            - Clients can make a Reservation
                - A Client may have 0..10 Reservations
            - Clients can receive Notifications
                - A Client may receive 0..* Notifications
                - Each Notification is sent to 1..1 Client
            - Clients have a Membership Type
                - Each Client is associated with 1..1 Membership Type
                - Each Membership Type can be linked to 0..* Clients
- Membership Types
    - Attributes
        - Membership_Type (Primary Key, ENUM: 'Regular', 'Student', 'Senior Citizen')
        - Borrowing_Limit (INT)
        - Reserving_Limit (INT)
        - Late_Fee_Rate (DECIMAL)
    - Relationships
        - Memberships are linked to Clients
            - Each Membership Type can be linked to 0..* Clients
- Borrowing Transactions
    - Attributes
        - Transaction_ID (Primary Key, INT) (0 < n < 1000000000)
        - Client_ID (Foreign Key referencing Clients)
        - Item_ID (Foreign Key referencing Books, Digital Media)
        - Borrow_Date (DATE)
        - Due_Date (DATE)
        - Return_Date (DATE)
        - Fine_Amount (DECIMAL) (0 < n < inf)
    - Relationships
        - Client ↔ Borrowing Transactions
            - Each Borrowing Transaction is linked to 1..1 Client
        - Digital Media ↔ Borrowing Transactions
            - Each Borrowing Transaction (if the item is Digital Media) references 1..1 Digital Media
        - Book ↔ Borrowing Transactions
            - Each Borrowing Transaction (if the item is a Book) references 1..1 Book
- Reservations

- Attributes
    - Reservation_ID (Primary Key, INT) (0 < n < 1000000000)
    - Client_ID (Foreign Key referencing Clients)
    - Item_ID (Foreign Key referencing Books, Digital Media)
    - Reservation_Date (DATE)
    - Status (ENUM: 'Active', 'Fulfilled', 'Cancelled')
- Relationships
    - Client ↔ Reservation
        - Each Reservation is made by 1..1 Client
    - Digital Media ↔ Reservation
        - Each Reservation (if the item is Digital Media) references 1..1 Digital Media
    - Book ↔ Reservation
        - Each Reservation (if the item is a Book) references 1..1 Book
- Notifications
    - Attributes
        - Notification_ID (Primary Key, INT) (0 < n < 1000000000)
        - Client_ID (Foreign Key referencing Clients)
        - Message (TEXT)
        - Sent_Date (DATE)
    - Relationships
        - Clients ↔ Notifications
            - Each Notification is sent to 1..1 Client.
- Staff
    - Attributes
        - Staff_ID (Primary Key, INT) (0 < n < 1000000000)
        - Name (VARCHAR)
        - DOB (DATE)
        - Work_Phone_Number (VARCHAR)
        - Work_Email (VARCHAR)
    - Relationships
        - Staff inherits Clients

ER Model: