CMPT 354 Mini Project

MP Group 1

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Step 2: Project Specifications

2.1 Requirement Analysis

2.1.1 What data is going to be stored?

The general scope of our database will be described below, highlighting the key data that will be stored. The main data that will be stored consists of all the items within the library and the associated unique asset tag. Each item will have distinct descriptions, which we will store in our database. We will also keep track of all the people who register for a library card with their personal information. The database will also store all items borrowed/returned by the library card. The fine owed if items are late will also be stored and associated with the corresponding library card. Furthermore, we will keep data of events that are occurring in the library and where specifically in the library. In addition, we have to keep track of all employees who work at the library, and the information associated with each employee. Each employee will have a unique SIN, which will allow for easy distinction.

2.1.2 What are we going to do with the data?

With the data stored we will be able to keep track of all the items entering and leaving the library. This will increase the library's income, as we will be able to keep track of overdue items and charge fines to the appropriate library member. In addition to the information of all library cardholders, we will be able to store employee data. This will allow for easier tax seasons and allow for easier schedule creation. Furthermore, the data collected about the events that occur in the library will allow us to see what demographic enjoys what genre of events, and much more. Overall, the data that we will store will allow the library to function smoothly without the requirement of much overhead.

2.1.3 Who should access the data?

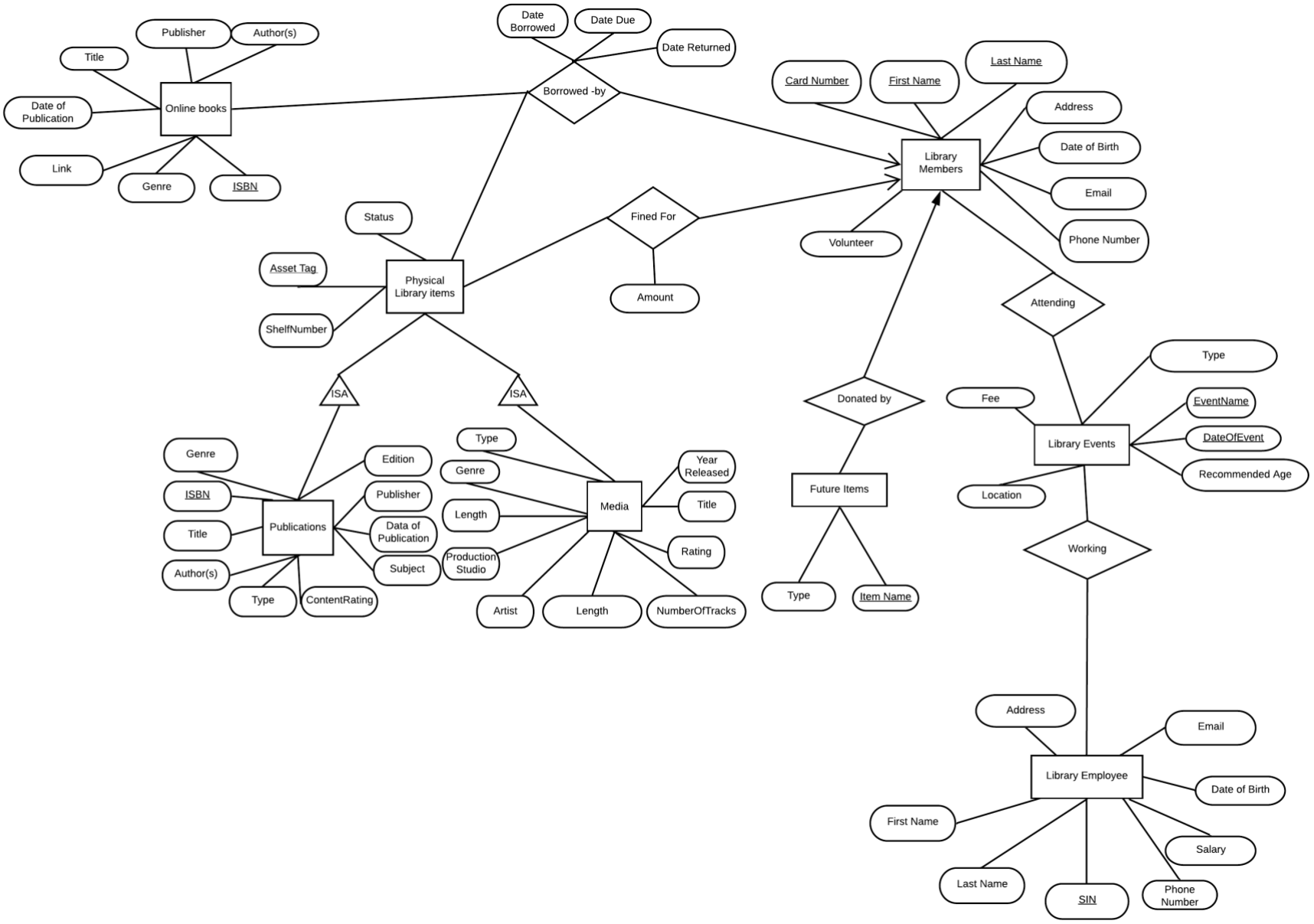
Access to the data will vary based on individuals and their ranking. Library members will have limited access to the data, mostly to the items they have signed out and what they have to return. If they have any fines due, they will be able to see that and pay for it if necessary. Library personnel will have admin permissions to modify item information, create new library members, and much more. Finally, there will be an admin account that the IT crew will have access to everything

2.2 Domain Description

- Physical library items can have a status (i.e reserved, available, checked out), and a shelf number
    - All physical library items are known by their asset tag. They also have a shelf number and status
- Books are known by their asset tag. Books also have an ISBN, title, genre, publisher, date of publication, status, shelf number, author(s), and edition
- Magazines are known by their asset tag. Magazines also have an ISBN, title, genre, publisher, date of publication, status, location, content rating

- Scientific journals are known by their asset tag. Scientific journals also have ISBN, title, genre, publisher, date of publication, status, location, subject, author(s)
- DVDs are known by asset tag. They also have a title, year released, genre, production studio, and length
- CDs & Records are known by their asset tag. They also have a title, year released, genre, artist, and number of tracks
- Video Games are known by their asset tag. We also keep their title, year released, genre, production studio and rating
- Online books are known by their ISBN. Online books have a title, date of publication, genre, link, publisher, author
- Library Members are known by their library card number, first name and last name. We keep the library member's address, date of birth, email and phone number
    - Library members may be a volunteer at the library
    - Library members may sign up for an event
    - Library members may search for an item at the library.
    - Library members may borrow an item
        - Library members can borrow a maximum of 5 items.
    - Library members may return an item
        - If physical library items are not returned by the due date, the library member is subject to a fine of a dollar a day after the due date
- Library Events are known by name and date. We also keep the fee associated with the event, location, recommended age group and type
- Library Employees are known by their SIN. We also keep their first name, last name, address, email, date of birth, salary, phone number
- Future Items are known by their item name and type of item.
    - Future items may have a donor.

Step 3: E/R Diagrams



Step 4: Anomalies

4.1 Schemas

4.1.1 Entities

- PhysicalLibraryItems(AssetTag, Status, ShelfNumber)
- Publications(AssetTag, ISBN, Title, Genre, Publisher, DateOfPublication, Status, ShelfNumber, Author(s), Edition, ContentRating, Subject)
- Media(AssetTag, Title, YearReleased, Genre, ProductionStudio, Artist, Length, NumTracks, Rating, Type)
- OnlineBooks(ISBN, Title, DateOfPublication, Genre, Link, Publisher, Author)
- Library Members(CardNumber, FirstName, LastName, Address, DateOfBirth, Email, PhoneNumber, Volunteer)
- LibraryEvents(EventName, DateOfEvent, Fee, Location, RecommendedAge, Type)
- LIbraryEmployee(SIN, FirstName, LastName, Address, Email, DateOfBirth, Salary, PhoneNumber)
- FutureItems(ItemName, Type)

4.1.2 Relations

- BorrowedBy(AssetTag, CardNumber, DateBorrowed, DateDue, DateReturned)
- DonatedBy(DonerFirstName, DonerLastName, CardNumber, ItemName)
- Attending(EventName, DateOfEvent, CardNumber, FirstName, LastName)
- Working(EventName, DateOfEvent, SIN, FirstName, LastName)
- DueFines(CardNumber, AssetTag, FirstName, LastName, Amount)

4.2 Functional Dependencies

4.2.1 Entities

- PhysicalLibraryItems: AssetTag → Status, ShelfNumber
- Publications: AssetTag , ISBN→ Edition, Title, Genre, Publisher, DateOfPublication, Status, ShelfNumber, Author(s), ContentRating, Type, Subject
- Media: AssetTag → Title, YearReleased, Genre, ProductionStudio, Artist, Length, NumTracks, Rating, Type
- Online Books: ISBN → Title, Author(s), Publisher, DateOfPublication, Genre, Link
- LibraryMembers: CardNumber → FirstName, LastName, Address, DateOfBirth, Email, PhoneNumber, Volunteer
- LibraryEvents: EventName, DateOfEvent → Fee, Location, RecommendedAge, Type
- LibraryEmployees: SIN, FirstName, LastName, → Address, PhoneNumber, DateOfBirth, Email
- FutureItems: ItemName → Type

4.2.2 Relations

- BorrowedBy: AssetTag,CardNumber → DateBorrowed, DateDue, DateReturned
- Working: EventName, DateOfEvent, SIN → FirstName, LastName

- DueFines: CardNumber, FirstName, LastName, AssetTag → Amount

4.3 Explanation

Based on the FD's displayed above it shows that all of our entities/relations have no bad FD's. Furthermore, they all follow Boyce-Codd Normal Form, which implies that all attributes on the left-hand side are keys, while all attributes on the right-hand side of the FD's are common attributes. Meaning that our database is ensured that it is free of bad functional dependencies. Proving that we do not need to redesign or decompose our entities as our database design does not have any anomalies.