CMPT354
MINI PROJECT

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Table of Contents

Project Specifications

For our database design, we assumed that library names are unique, and personnel only consists of librarians. Accordingly, we got the following 9 data tables:
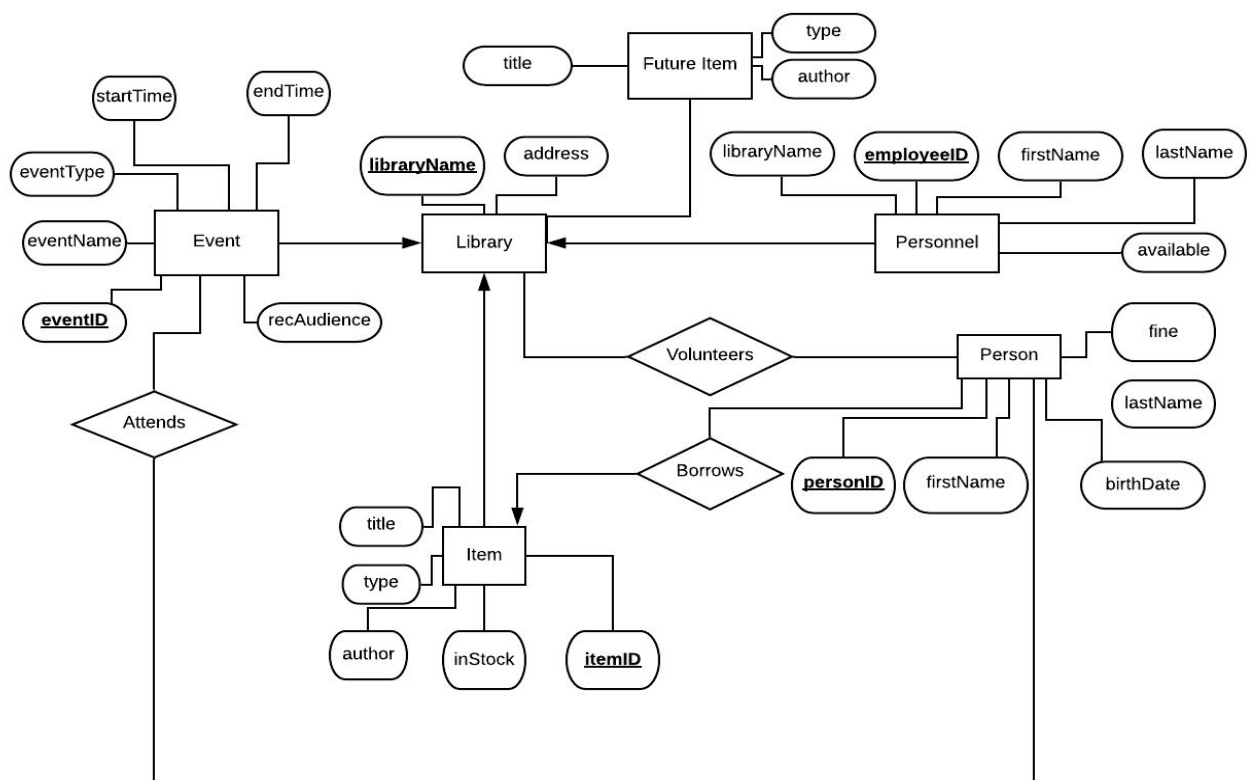
1. **Library**= {**libraryName**, address, availableRooms}
2. **Personnel**= {**employeeID**, libraryName$^{FK\text{-}Library}$, firstName, lastName, available}
3. **Item**= {**ItemID**, libraryName$^{FK\text{-}Library}$, title, type, author, inStock}
4. **FutureItems**= {libraryName$^{FK\text{-}Library}$, title, type, author}
5. **Person**= {**personID,** firstName, lastName, birthDate, fine}
6. **Volunteers**= {libraryName$^{FK\text{-}Library}$, personID$^{FK\text{-}Person}$}
7. **Borrows**= {itemID$^{FK\text{-}Item}$**,** libraryName$^{FK\text{-}Library}$**,** personID$^{FK\text{-}Person}$, dueDate}
8. **Event**= {**eventID**, libraryName$^{FK\text{-}Library}$, eventName,   eventDate, startTime, endTime, roomNumber, eventType, recAudience}
9. **Attends**= {eventID$^{FK\text{-}Event}$, libraryName$^{FK\text{-}Library}$, personID$^{FK\text{-}Person}$}

Quick Summary of the Tables:

Since library names are unique, we decided to make it the primary key of our *Library* data table. Furthermore, in order to enforce that events cannot be booked to a library that has no available rooms, *Library* also keeps track of the number of available rooms for each library. Each tuple in the *Personnel* data table is uniquely identified by employeeID, and a foreign key is used to connect the *Personnel* data table to the *Library* data table. This foreign key indicates which library employees work for. It also contains additional information about the employees: their first name, last name, and whether they are currently available or not (set to 0 for not available and 1 for available). In the *Item* data table, each item (or tuple) is uniquely identified by their own ID. Foreign key is also used to connect the Item data table to the *Library* data table to

indicate which library each item is located. The title, type (print book, online book, DVD, CD, records, science journals, etc), author (or producer), and number of items currently in stock are also maintained. Future*Item* has a foreign key to connect each item to a specific library. This table is for keeping track of items that may be added to the library. Similar to the *Item* data table, it also keeps track of the title, type, and author of the item. Each tuple in *Person* data table represents a person, and they are uniquely identified by their own ID. Each person's first name, last name, birth date, and fines they have to libraries are also kept in the table. *Volunteers* connect to *Person* and *Library* data table via foreign keys, and the purpose of this table is to keep track of who volunteers for which library. *Borrows* data table is to record who borrowed what item from which library, and when the due date for the item is. Each event in the *Event* table is uniquely identified by id. Which library the event is held is also kept track through foreign key, and the event room, name, date, time, type, and its recommended audience are also recorded. Lastly, *Attends* data table keeps track of who attends which event at which library through use of foreign keys.

ER Diagram

- **many-to-one relationships:**
  - Multiple events can be held at a library.
  - Many employees work for a library.
  - Many items are kept in the library.

- Each person can borrow many items from a library.
- **many-to-many relationships:**
  - People can volunteer for multiple libraries.
  - Copies of an item can be added to multiple libraries. (For example, 2 copies of *Lord of the Flies* may be added to both Vancouver Public Library and Coquitlam Public Library.

Anomalies

The following are non-trivial functional dependencies in our database:
- Library:
  - **libraryName** → location, availableRooms

  Since libraries are uniquely identified by their names, when a user knows the name of the library he can also find out the location and rooms that are currently available of that library. However, since location and availableRooms are not uniquely defined, they cannot tell you the libraryName or any other attributes of the table.

- Personnel:
  - **employeeID** → libraryName, firstName, lastName, available

  Since employees are uniquely identified by their ID, user can also figure out the employee's name, which library he works for, and whether they are available or not through their ID. However, since libraryName, names, and availability are not uniquely defined, they cannot tell you any other attributes of the table.

- Item:
  - **itemID** → libraryName, title, type, author, inStock

  Each item is uniquely identified by their ID. This means that itemID attribute can functionally determine the libraryName, title, type, author, and inStock attributes. However, since the other five attributes are not unique, they cannot determine other attributes of the table.

- Person:
  - **personID** → firstName, lastName, birthDate, fine

  Each person is uniquely identified by their ID. Consequently, with a person's ID, one can find the names, birth date, and fine of the person. However, with just knowing the name, birth date, and/or fine, you cannot get any other attributes of the table.

- Event:
  - **eventID** → libraryName, eventName, eventDate, startTime, endTime roomNumber, eventType, recAudience

  Each event is uniquely identified by their ID. This means that ID of an event defines other remaining attributes of the table.

SQL Schema

The following tuples were inserted to each table:

1. **Library:**

libraryName	address	phoneNumber	availableRooms
New Westminster Public Library	716 6th Ave, New Westminster	604-527-4675	5
Squamish Public Library	37907 Second Avenue, Squamish	604-892-3110	4
Surrey Public Library	10350 University Drive, Surrey	604-598-7300	3
Coquitlam Public Library	575 Poirier St., Coquitlam	604-937-4130	8
Fraser Valley Regional Library	34589 DeLair Rd, Abbotsford	604-859-7141	7
Greater Victoria Public Library	735 Broughton St., Victoria	250-940-4875	2
Port Moody Public Library	100 Newport Drive, Port Moody	604-469-4575	3
Richmond Public Library	100 7700 Minoru Gate, Richmond	604-231-6422	10
Vancouver Public Library	350 West Georgia Street, Vancouver	604-331-3603	9
Okanagan Regional Library	1430 KLO Road, Kelowna	250-860-4033	2

2. **Personnel:**

employeeID	libraryName	firstName	lastName	available
1	Vancouver Public Library	John	Do	0
2	Vancouver Public Library	Tommy	Smith	1
3	Port Moody	Emily	Swift	1

	Public Library			
4	Coquitlam Public Library	Katelyn	Kim	0
5	Coquitlam Public Library	Alex	Bart	0
6	New Westminster Public Library	Andy	Ahn	1
7	Surrey Public Library	Ryan	Lintott	1
8	Fraser Valley Regional Library	Angie	Kang	1
9	Okanagan Regional Library	Sunny	Lee	1
10	Squamish Public Library	Taylor	Yonge	1

3. **Item:**

itemID	libraryName	title	type	author	inStock
1	Coquitlam Public Library	Lord of the Flies	print book	George Orwell	3
2	Coquitlam Public Library	Lord of the Flies	online book	George Orwell	2
3	New Westminster Public Library	Anna Karenina	online book	Leo Tolstoy	0
4	Squamish Public Library	Mr. Mercedes Season 2	DVD	Culver City, CA : Sony Pictures Home Entertainment, [2019]	4
5	Port Moody Public Library	Naruto Shippuden	DVD	San Francisco,	2

				CA : Viz Media, [2010]	
6	Vancouver Public Library	Shampoo	DVD	Hal Ashby	2
7	Vancouver Public Library	Nature Reviews Immunology	scientific journal	Alexandra Flemming	1
8	Vancouver Public Library	MAD About Trump: A Brilliant Look at Our Brainless President	magazine	Various	0
9	Fraser Valley Regional Library	Rent (2005 Movie Soundtrack) Soundtrack	CD	Chef	5
10	Fraser Valley Regional Library	Pete the Cat: Big Easter Adventure	print book	James Dean	8

4. **FutureItems:**

libraryName	title	type	author
Vancouver Public Library	1984	print book	George Orwell
Vancouver Public Library	To Kill a Mockingbird	print book	Harper Lee
Vancouver Public Library	Harry Potter and the Philosopher's Stone	print book	J.K. Rowling
Fraser Valley Regional Library	The Lord of the Rings	online book	J.R.R Tolkien
Fraser Valley Regional Library	The Great Gatsby	online book	F. Scott Fitzgerald
Fraser Valley	Elle: The Modern	magazine	Carol Smith

Regional Library	Love Issue Sisterhood Now		
Port Moody Public Library	Science: Technology Transforming Biology	magazine	Sam Smith
Port Moody Public Library	Seven	CD	Timotha Lanae
Port Moody Public Library	Abbey Road	record	The Beatles
Coquitlam Public Library	Charlotte's Web	online book	E. B. White

5. **Person:**

personID	firstName	lastName	birthDate	fine
1	Lee Roy	Gomos	1998-06-16	10.00
2	Sam	Kim	1998-02-02	0.05
3	John	Do	1998-10-16	20.00
4	Saad	Hamzah	1998-03-05	30.00
5	Frank	Luong	1998-07-17	0.00
6	Michael	Cheung	1998-08-01	0.00
7	Erika	Gomos	1994-05-14	0.00
8	Enrique	Gomos	2000-06-22	25.00
9	Richard	Mac	1998-11-07	30.00
10	Brandon	Chan	1998-04-17	0.00

6. **Volunteers:**

libraryName	personID
New Westminster Public Library	1
New Westminster Public Library	5

New Westminster Public Library	3
Coquitlam Public Library	2
Coquitlam Public Library	4
Surrey Public Library	9
Surrey Public Library	10
Surrey Public Library	3
Vancouver Public Library	7
Vancouver Public Library	8

7. **Borrows:**

itemID	libraryName	personID	dueDate
5	Port Moody Public Library	1	2020-04-25
1	Coquitlam Public Library	2	2020-05-01
7	Vancouver Public Library	8	2020-05-01
9	Fraser Valley Regional Library	5	2020-06-02
5	Port Moody Public Library	6	2020-05-03
10	Fraser Valley Regional Library	4	2020-04-01
8	Vancouver Public Library	7	2020-05-14
10	Fraser Valley Regional Library	5	2020-05-01
4	Squamish Public Library	10	2020-04-20
3	New Westminster	3	2020-04-23

	Public Library		

8. Event:

eventID	libraryName	eventName	eventDate	startTime	endTime	room#	eventType	recAudience
1	Coquitlam Public Library	George Orwell Book Signing	2020-08-12	15:00:00	17:00:00	5	book signing	all ages
2	Coquitlam Public Library	Scholastic Book Fair	2020-09-12	09:00:00	15:00:00	1	book fair	all ages
3	New Westminster Public Library	Anime Marathon	2020-06-10	11:00:00	23:00:00	2	marathon	all ages
4	New Westminster Public Library	Scholastic Book Fair	2020-09-13	09:00:00	15:00:00	1	book fair	all ages
5	New Westminster Public Library	Volunteer Tutoring Session	2020-05-15	09:00:00	15:00:00	3	tutoring	high school students
6	Okanagan Regional Library	Crazy Book Exchange	2020-07-20	12:00:00	16:00:00	1	book exchange	all ages
7	Vancouver Public Library	Horror Movie Marathon	2020-10-31	18:00:00	23:00:00	4	marathon	19+
8	Port Moody Public Library	Scholastic Book Fair	2020-09-14	09:00:00	15:00:00	1	book fair	all ages
9	Fraser Valley Regional	Ladies Only Book Club	2020-08-10	09:00:00	12:00:00	2	book club	women

	Library	Meeting						
10	Squamish Public Library	Spring Book Exchange	2020-04-25	09:00:00	15:00:00	1	book exchange	all ages

9. Attends:

eventID	libraryName	personID
3	New Westminster Public Library	1
3	New Westminster Public Library	10
3	New Westminster Public Library	6
3	New Westminster Public Library	5
1	Coquitlam Public Library	2
7	Vancouver Public Library	1
7	Vancouver Public Library	4
7	Vancouver Public Library	9
8	Port Moody Public Library	3
8	Port Moody Public Library	6