Creating Database for Better Management Of Home Library Service:

The above is the Chen's Notation for my database home_library. In this I have used all my table names as the Entities and few of the column names as the attributes and the relationship between all the entities is showed as above and I have also showed the one-to-many and many-to-one relationships between the entities.

The name of the database is home_library it has been named as home_library because this whole database has been created for a free delivery service of library materials (e.g., books, magazines, DVDs etc) offered by local council libraries to the registered, eligible home-bound library members (e.g. elderly citizens, disabled, a parent with young children, carers of people with illness and/or disability etc.). I have taken the example of books in my database.
This library does not have employees it is worked out by a group of volunteers, these volunteers go to the library and picks up the resources and delivers it to the member who has requested it. The library was facing some problems in managing its volunteers so I have designed a SQL database which will solve some of the problems.

In this database I have designed 6 tables named as:

1. member
2. volunteer
3. library_coordinator
4. Resource

5. Borrowing
6. Delivery

Below is the explanation for all the tables I have designed:

The very first member table consists of information for all the members working in the library. This table stores information like membership_no (this is a primary key and it is a unique identifier which will help us to identify the people because 2 people can have the same names), their names, phone numbers which will help the volunteers to find the house easily and if they face any issues in finding the house then they can call, they can even call before leaving for the location and ask if the clients are available on the date, this will save time and money and their address or the location or the area where their house is located because this will later help us in allotting volunteers to the homes in their same area which will save their time and money. The information about the registration date could later help us know which date they have registered for the services. The information about the interview_date lets us know when the member will be interviewed by a library_coordinator and hence the eligible column shows if the member is eligible to get these services.

The second table consists of the information for all the volunteer working for the delivery of resources of the library. This table stores information like volunteer_id (this is a primary key and it is a unique identifier which will help us to identify the people because 2 people can have the same names), their names, address, phone numbers, localite column helps us know if the volunteer is a local resident which will then be easier to identify if the delivery can be made by a particular volunteer. The information about AgeBracket helps us know if the volunteer is a 'Minor', 'Major' or 'Senior' which helps us solve a problem of assigning the deliveries in case it is a 'Minor' or a 'Senior' a closer distance delivery could be assigned and a long-distance delivery could be assigned to a 'Major' which could be a hard job for a 'Minor' or 'Senior'.

The third table consists of the information for all the library_coordinator working in the library. This table stores information like coordinator_id (this is a primary key and it is a unique identifier which will help us to identify the people because 2 people can have the same names), their names, email, phone number which helps the members contact the library in case of any queries. volunteer_id column helps us in identifying if a coordinator is a volunteer too. is_coordinator_a_volunteer column checks the similarity between the coordinator_id and volunteer_id and proves if a coordinator is a volunteer.

The fourth table consists of the information for all the Resource available at the library. This table stores information like resource_id (this is a primary key and it is a unique identifier which will help us to identify the books because 2 books can have the same names), their titles, their author, descript which gives a brief about the book, genre, publisher and publish_date which shows when the book was published.

The fifth table consists of the information for all the borrowings that are made by the members. This table stores information like borrowing_id (this is a primary key and it is a unique identifier which will help us to identify the borrowing_id for all the borrowings that have been made), membership_no helps us identify which member is borrowing, resource_id helps us identify which book has been borrowed. borrowing_date shows us when the request for borrowing has been made and due_date is the date when the book is supposed to be return soon.

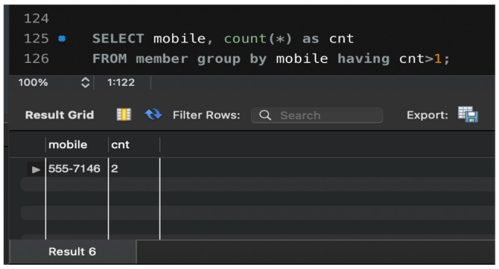
The sixth table consists of the information regarding the delivery of the books. The table stores information like delivery_id(this is a primary key and it is a unique identifier which will help us

to identify the delivery_id for all the borrowings that have been made), borrowing_id helps us in identifying which books are being borrowed, volunteer_id shows which volunteer will be making the delivery. membership_no helps the volunteer in identifying who the delivery is supposed to made to. Delivery_date shows when the delivery will be made to the member by the volunteer.

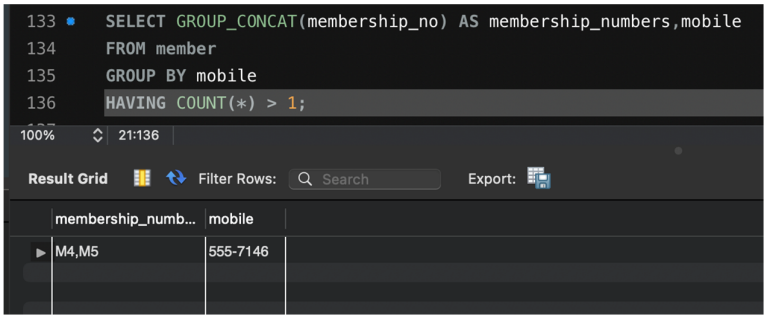
Business Problems and Their Solutions

PROBLEM 1:
Inefficiency caused by manual process of booking leading to data errors.

The most expensive resource that we have is time. So, the library should try to save the time of the people who are already contributing their time. We can see that making manual entries can be very time consuming and mistakes can be done by doing so. We have found that there are 2 duplicate entries of mobile number, and we are running the below query to check the duplicate entries.



As we can see from the below code that the mobile numbers of members with the membership_no of M4 and M5 are having the same mobile numbers, we can rectify this error by hard coding their correct mobile number and we are adding a constraint called “UNIQUE” due to which there will be no duplications in future.



Updating the data from duplicate to original is making the members less frustrated, leading to less data errors, less disappointed home-bound members, less frustrated volunteers, and overworked service coordinator because now the data is accurate and there is not much room for any error.

```
UPDATE member set mobile = '555-3589' WHERE membership_no = 'M4';
select * from member;
update member set email = 'alexchen1234@example.com' where membership_no= 'M4';
select * from member;
ALTER TABLE member ADD CONSTRAINT UNIQUE(mobile,email,membership_no);
```

This command has displayed the hard cording we have done to make the change in a duplicate entry.

PROBLEM 2:

Lack of a system for managing volunteer police clearance and health and safety training records causes manual monitoring, missing renewals, and laborious record verification. To solve this, we are using the below command. Here we are adding two new columns to our volunteer table called 'police_clearance_due_date' and 'health_and_safety_due_date' which will show us when the due date is and when a volunteer should get it renewed, which will further lessen the missing renewal dates. These due dates will also help us in checking if a volunteer is eligible to make a delivery.

```
ALTER TABLE volunteer
ADD COLUMN police_clearance_due_date DATE DEFAULT '2023-01-01',
ADD COLUMN health_and_safety_due_date DATE DEFAULT '2023-01-01';
UPDATE volunteer
SET police_clearance_due_date = '2023-04-01',
health_and_safety_due_date = '2023-06-01'
WHERE volunteer_id = 'V1';

UPDATE volunteer
SET police_clearance_due_date = '2023-06-01',
health_and_safety_due_date = '2023-04-01'
WHERE volunteer_id = 'V2';

UPDATE volunteer
SET police_clearance_due_date = '2023-07-01',
health_and_safety_due_date = '2023-08-01'
WHERE volunteer_id = 'V3';

UPDATE volunteer
SET police_clearance_due_date = '2023-08-01',
health_and_safety_due_date = '2023-09-01'
WHERE volunteer_id = 'V4';

UPDATE volunteer
SET police_clearance_due_date = '2023-09-01',
health_and_safety_due_date = '2023-10-01'
WHERE volunteer_id = 'V5';
```

The volunteer table is updated with 2 new columns, which will help us track the due dates.

PROBLEM 3:
Due to manual record-keeping, it is challenging to schedule volunteers without a current training record and/or a valid police clearance.

By running the below command, we are trying to find the volunteers who are currently eligible to deliver because their due date is after the current date and as seen as below there are three volunteers who are currently eligible to deliver, which also further indicates that there are 2 volunteers whose police clearance and health & safety have been expired and they need to renew it.

```
156 •  SELECT volunteer_id, first_name, last_name
157    FROM volunteer
158    WHERE police_clearance_due_date > CURDATE() and health_and_safety_due_date > CURDATE();
```

100% 88:158

Result Grid | Filter Rows: Search | Edit: | Export/Import:

volunteer_id	first_name	last_name
V3	Sarah	Miller
V4	Jason	Clark
V5	Sophia	Davis
NULL	NULL	NULL

This query has retrieved a list of volunteers who are currently eligible to delivery because of having proper health & safety and police clearance records.

PROBLEM 4:

Lack of transparency concerning volunteer availability for book delivery requests made by clients of libraries who are housebound.

The below query shows all the volunteers that are available to deliver on the current date. It can be also used to check the availability of a volunteer on a future date. This is a dynamic query because it changes every day according to the current date and you can check the availability daily or by hard cording the date which you need the availability for.

```
166
167 •  select volunteer_id from delivery where delivery_date != current_date();
```

100% 73:167

Result Grid | Filter Rows: Search | Export:

volunteer_id
V5
V3
V1
V2
V4

Result Grid | Form Editor

This query has retrieved the volunteers who are available to deliver on the current date.

PROBLEM 5:

Incapacity to use volunteer services to improve society beyond just offering home-bound library services.

Apart from volunteering at the library and coordinating with the interviews to check eligibility of the members, volunteers who are available and have clearance to work can help the members in need, this availability can be checked through below query.

In this query we are joining two tables volunteer and delivery. These tables are joined on a common attribute volunteer_id.

```
177
178 •  SELECT v.volunteer_id, v.first_name, v.police_clearance_due_date, v.health_and_safety_due_date, d.delivery_id,
179      d.delivery_date
180      FROM volunteer v
181      JOIN delivery d ON v.volunteer_id = d.volunteer_id
182      WHERE v.police_clearance_due_date > CURDATE()
183        AND v.health_and_safety_due_date > CURDATE()
184        AND d.delivery_date != CURDATE();
```

100% 1:179

Result Grid | Filter Rows: Search | Export:

volunteer_id	first_name	police_clearance_due_d...	health_and_safety_due_d...	delivery_id	delivery_date
V3	Sarah	2023-07-01	2023-08-01	D2	2023-04-12
V4	Jason	2023-08-01	2023-09-01	D5	2023-04-17
V5	Sophia	2023-09-01	2023-10-01	D1	2023-04-08

Result Grid | Form Editor

This query has displayed volunteers who are available to go above and beyond their duties and help the members of the library who are in need.

PROBLEM 6:

Sometimes it gets difficult to manually check which book is available at the library for borrowing.

From the below query we can check which book is available at the library.

```
173
174 •  select * from resource where resource_id in (select resource_id from borrowing where due_date< current_date());
```

100% 88:158

Result Grid | Filter Rows: Search | Edit: | Export/Import:

resource_id	title	author	descript	genre	publisher	publish_date
R1	To Kill a Mockingbird	Harper Lee	A lawyer in the Deep South defends a black ma...	Fiction	J.B. Lippincott & Co.	1960-07-11
R2	1984	George Orwell	A dystopian novel set in a totalitarian society.	Science Fiction	Secker & Warburg	1949-06-08
R3	The Lord of the Rings	J.R.R. Tolkien	A group of hobbits and other characters journey...	Fantasy	Allen & Unwin	1954-07-29
R4	Pride and Prejudice	Jane Austen	A woman navigates social status and relationshi...	Fiction	T. Egerton, Whitehall	1813-01-28
R5	The Hunger Games	Suzanne Collins	A girl is forced to compete in a brutal televised c...	Science Fiction	Scholastic	2008-09-14

Result Grid | Form Editor

This query has displayed me the list of books that are available at the library.

SUMMARY:

Hence from all the above commands and queries we have seen that manual entries can be very time consuming and give us a lot of errors, where are by running the few commands that are mentioned above we can easily track data according to our need, which in return makes decision-making easier.