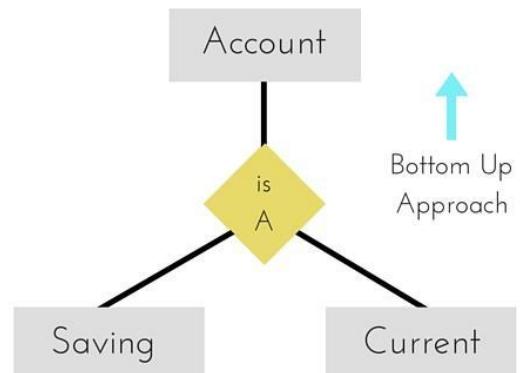


DBMS Lab Assignment -2

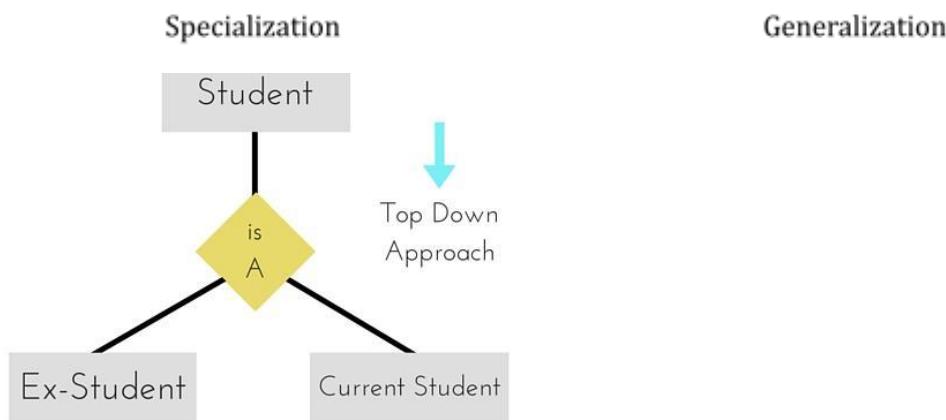
Conversion of EER Model into Relational Model

The Extended Entity-Relationship Model is a more complex and high-level model that extends an E-R diagram to include more types of abstraction, and to more clearly express constraints. All of the concepts contained within an E-R diagram are included in the EE-R model, along with additional concepts that cover more semantic information. These additional concepts include generalization, specialization, and aggregation.

Generalization is a bottom-up approach in which two lower level entities combine to form a higher level entity. In generalization, the higher level entity can also combine with other lower



level entity to make further higher level entity.



Specialization is opposite to Generalization. It is a top-down approach in which one higher level entity can be broken down into two lower level entities. In specialization, some higher level entities may not have lower-level entity sets at all.

Conversion process for Generalization/ Specialization into Relational Schema:

- Create tables for all higher-level entities.
- Create tables for lower-level entities.

- Add primary keys of higher-level entities in the table of lower-level entities.
- In lower-level tables, add all other attributes of lower-level entities.
- Declare primary key of higher-level table and the primary key for lower-level table.
- Declare foreign key constraints.

Representing Generalization (Approach #1)

Create a table for each lower-level entity set only

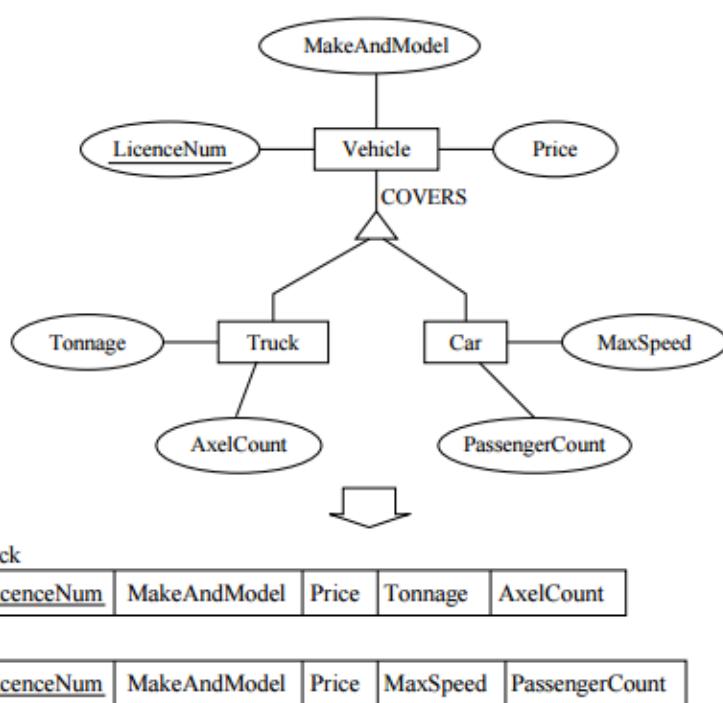
Columns of new tables should include

- Attributes of lower level entity set
- Attributes of the superset

The higher-level entity set can be defined as a view on the tables for the lower-level entity sets

Representing Generalization (Approach #1)

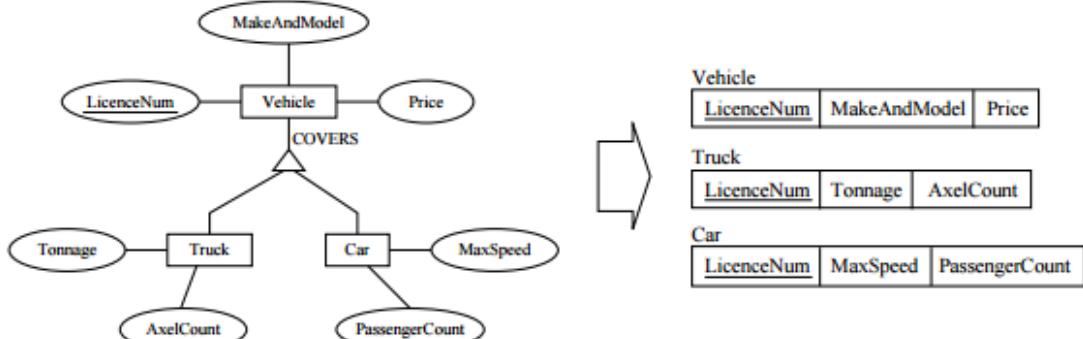
Example:



Representing Generalization (Approach #2)

Treat generalization the same as specialization.

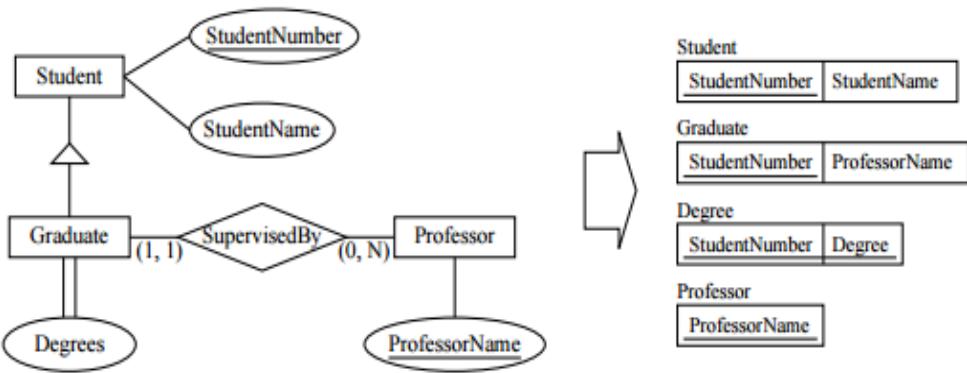
Example:



Representing Specialization

Create table for higher-level entity set, and treat specialized entity subsets like weak entity sets (without discriminators)

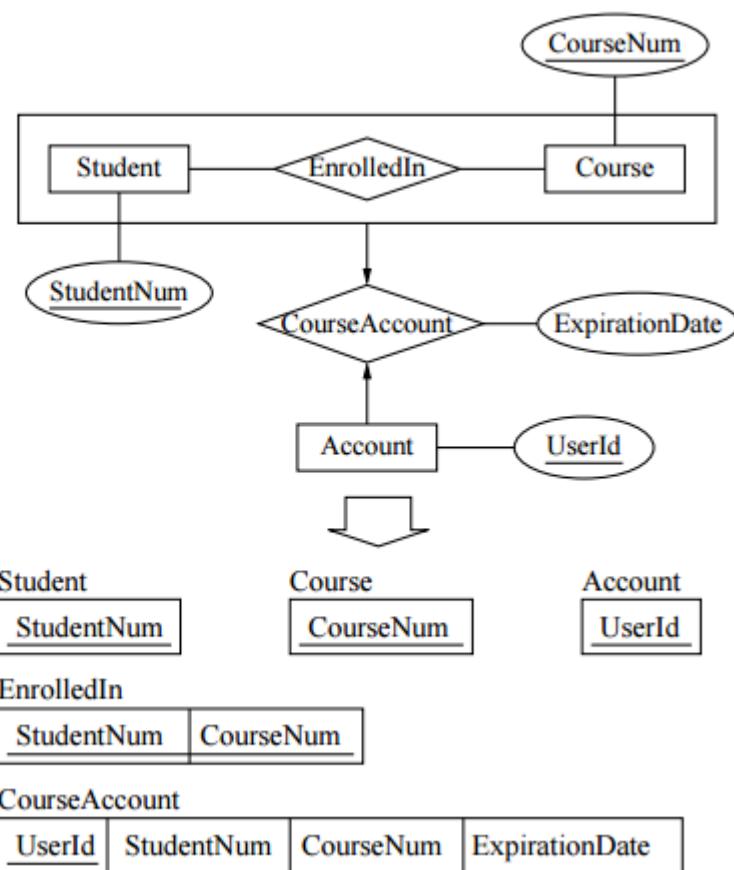
Example:



One limitation on ER model is that it cannot express relationships among relationships.

Aggregation provides best solution for this purpose. Aggregation is a process when relation between two entities is treated as a single entity. To represent relationship set involving aggregation of R, treat the aggregation like an entity set whose primary key is the primary key of the table for R.

Example:



Assignment 2 Lab Questions

Theory Questions:-

Q.1 Explain the need of EER diagrams

Ans] EER diagrams extend ER diagrams by adding concepts like generalization, specialization, and aggregation to model complex relationships. They enhance clarity, ensure better database normalization, and simplify relational model conversion.

Q.2 Explain in detail Generalization, specialization and Aggregation and how do we convert them into relational model

Ans] Generalization merges similar entities into a higher-level entity by extracting common attributes (e.g., Employee generalizing Secretary and Technician). It is converted using a single table with a type attribute or separate tables for each specialized entity referencing the generalized entity via a foreign key.

Specialization is the reverse, dividing an entity into sub-entities (e.g., Student into Freshman, Sophomore, etc.). It is converted by creating a single table with NULL values for unused attributes or separate tables inheriting the primary key from the main entity.

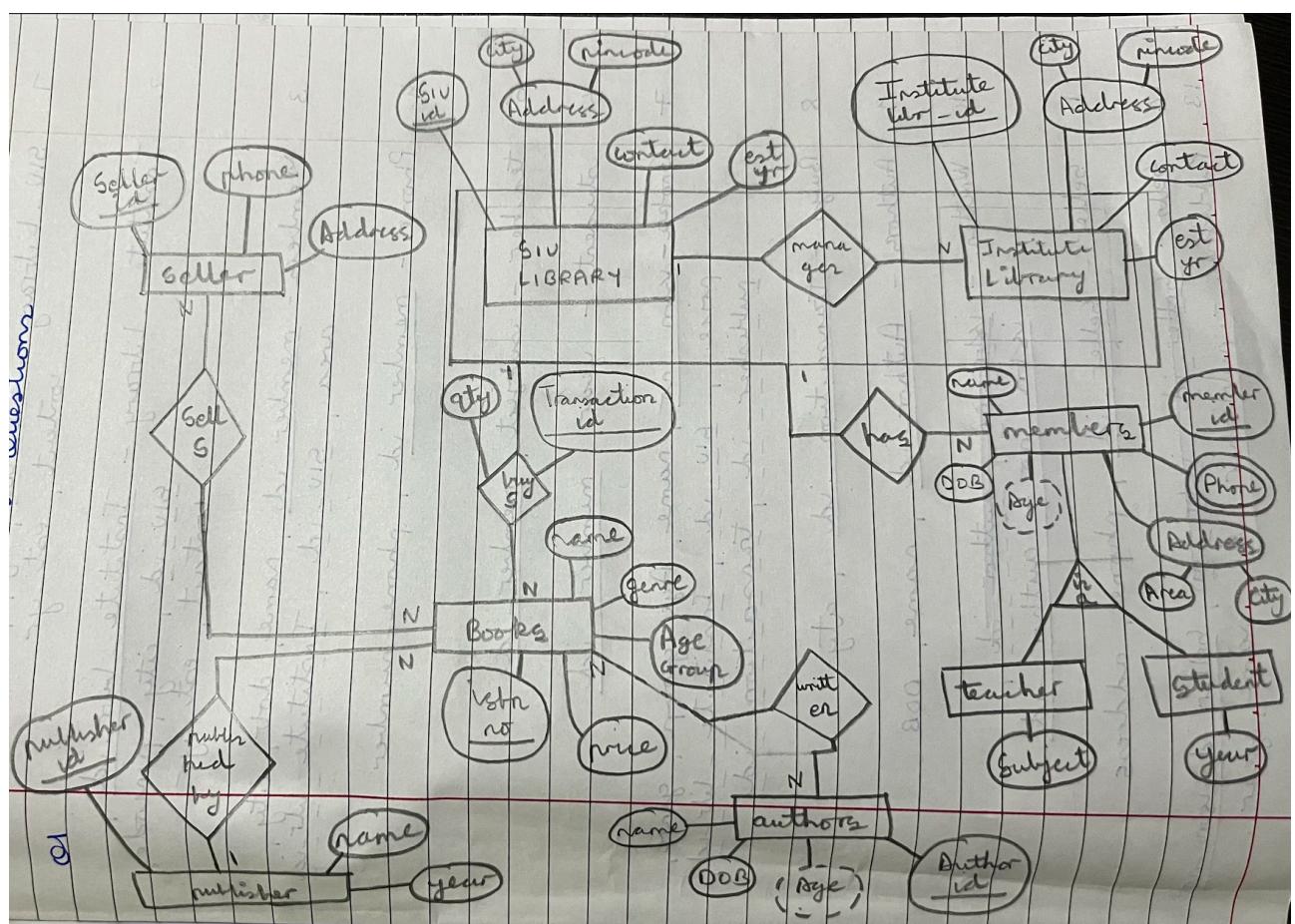
Aggregation treats a relationship as an entity when it needs to participate in another relationship. It is converted by creating a new table for the aggregated relationship with foreign keys linking involved entities.

Implementation Question:-

Q.1 Draw the EER for SIU library management and convert into relational model.

Ans]

EER Diagram :



Relational Model :

Relational Schema	
1	SIV-Library - <u>siv_id</u> , city, pincode, contact, est_yr
2	Institute_Library - <u>Institute_libr_id</u> , <u>siv_id</u> , city, pincode, contact, est_yr
3	Members - <u>member_id</u> , name, dob, city, area, <u>siv_id</u> , <u>Institute_libr_id</u>
4	Phone - <u>member_id</u> , phone-number
5	teacher - subject, <u>member_id</u>
6	student - year, <u>member_id</u>
7	Books - <u>isbn_no</u> , name, Age_group, genre, price, <u>siv_id</u> , <u>Institute_libr_id</u> , <u>publisher_id</u> , <u>transaction_id</u>
8	Buys - <u>transaction_id</u> , city
9	Authors - <u>Author_id</u> , name, DOB
10	Written - <u>isbn_no</u> , <u>author_id</u> , <u>isbn_no + author_id</u>
11	Seller - <u>Seller_id</u> , phone, address
12	Sells - <u>Seller_id</u> , <u>isbn_no</u> , <u>Seller_id + isbn_no</u>
13	Publisher - <u>publisher_id</u> , name, year

Values :

```
mysql> SELECT * FROM SIU_Library;
+-----+-----+-----+-----+
| SIU_id | city      | pincode | contact      | est_yr |
+-----+-----+-----+-----+
| 1     | Mumbai    | 400001  | 022-12345678 | 1990  |
| 2     | Delhi     | 110001  | 011-98765432 | 1985  |
| 3     | Bangalore | 560001  | 080-23456789 | 2000  |
| 4     | Chennai   | 600001  | 044-34567890 | 1995  |
+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Institute_Library;
+-----+-----+-----+-----+
| Institute_libr_id | SIU_id | city      | pincode | contact      | est_yr |
+-----+-----+-----+-----+
| 1     | 1     | Mumbai    | 400001  | 022-11112222 | 1992  |
| 2     | 2     | Delhi     | 110001  | 011-22223333 | 1990  |
| 3     | 3     | Bangalore | 560001  | 080-33334444 | 2002  |
| 4     | 4     | Chennai   | 600001  | 044-44445555 | 1998  |
+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Publisher;
+-----+-----+-----+
| Publisher_Id | name          | year |
+-----+-----+-----+
| 1     | Rupa Publications | 1945 |
| 2     | Penguin India    | 1970 |
| 3     | HarperCollins India | 1985 |
| 4     | Oxford University Press | 1990 |
+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Buys;
+-----+-----+
| transaction_id | qty   |
+-----+-----+
| 101 | 10  |
| 102 | 20  |
| 103 | 30  |
| 104 | 40  |
+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Books;
+-----+-----+-----+-----+-----+-----+-----+-----+
| isbn_no | name      | Age_group | genre      | price | SIU_id | Institute_libr_id | publisher_id | transaction_id |
+-----+-----+-----+-----+-----+-----+-----+-----+
| ISBN001 | Book One  | Adult     | Fiction    | 199.99 | 1     | 1     | 1     | 101 |
| ISBN002 | Book Two  | Young Adult | Non-Fiction | 299.99 | 2     | 2     | 2     | 102 |
| ISBN003 | Book Three | Adult     | Mystery    | 399.99 | 3     | 3     | 3     | 103 |
| ISBN004 | Book Four  | Child     | Fantasy    | 149.99 | 4     | 4     | 4     | 104 |
+-----+-----+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)
```

```

mysql> SELECT * FROM Authors;
+-----+-----+-----+
| Author_id | name      | DOB      |
+-----+-----+-----+
|      1 | R.K. Narayan | 1926-10-10 |
|      2 | Chetan Bhagat | 1974-04-22 |
|      3 | Arundhati Roy | 1961-11-24 |
|      4 | Ruskin Bond   | 1934-05-19 |
+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Members;
+-----+-----+-----+-----+-----+-----+-----+
| member_id | name      | dob      | city     | area     | SIU_id | Institute_lib_id |
+-----+-----+-----+-----+-----+-----+-----+
|      1 | Rahul Sharma | 1990-05-05 | Mumbai   | Andheri   |      1 |                 1 |
|      2 | Priya Singh   | 1992-06-06 | Delhi    | Rohini    |      2 |                 2 |
|      3 | Amit Kumar    | 1994-07-07 | Bangalore | Koramangala |      3 |                 3 |
|      4 | Sneha Patel   | 1996-08-08 | Chennai  | T. Nagar  |      4 |                 4 |
+-----+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Teacher;
+-----+-----+
| member_id | subject   |
+-----+-----+
|      1 | Mathematics |
|      2 | Science     |
|      3 | History     |
|      4 | English     |
+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Student;
+-----+-----+
| member_id | year     |
+-----+-----+
|      1 |      1 |
|      2 |      2 |
|      3 |      3 |
|      4 |      4 |
+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Phone;
+-----+-----+
| member_id | phone_number |
+-----+-----+
|      1 | 022-98765432 |
|      2 | 011-87654321 |
|      3 | 080-98765432 |
|      4 | 044-87654321 |
+-----+-----+
4 rows in set (0.00 sec)

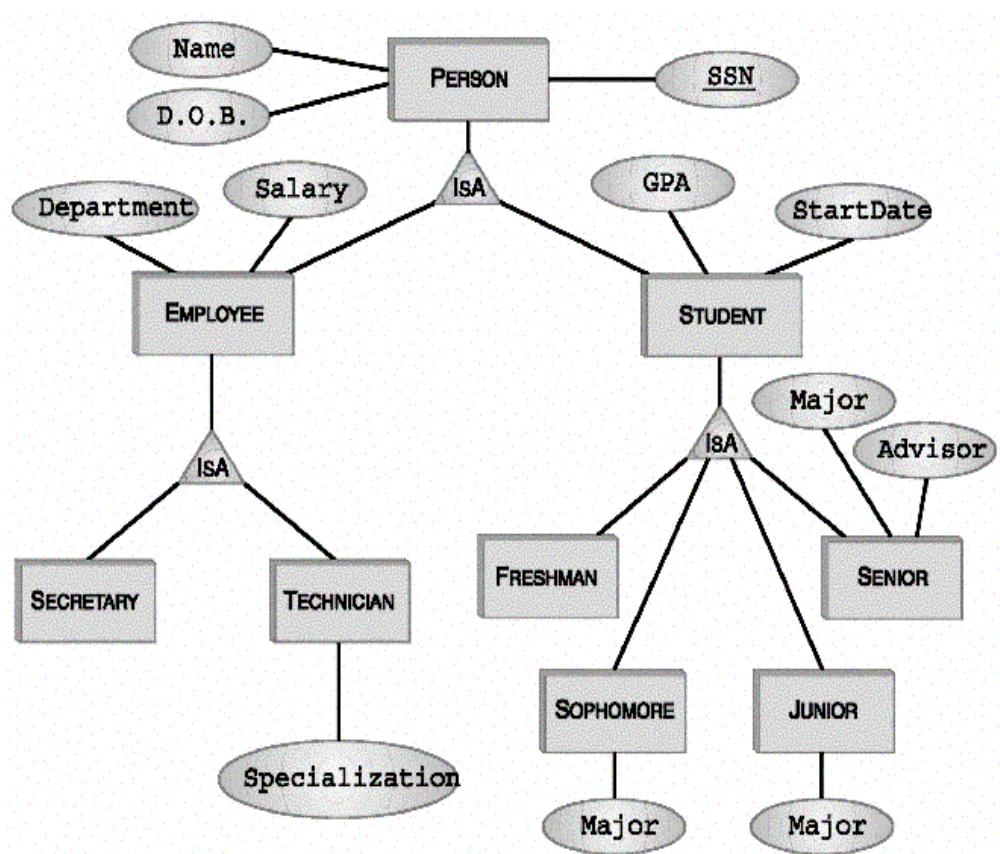
```

```
mysql> SELECT * FROM Written;
+-----+-----+
| isbn_no | author_id |
+-----+-----+
| ISBN001 | 1
| ISBN002 | 2
| ISBN003 | 3
| ISBN004 | 4
+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Seller;
+-----+-----+-----+
| Seller_id | phone | address |
+-----+-----+-----+
| 1 | 022-11223344 | 1 MG Road, Mumbai |
| 2 | 011-22334455 | Connaught Place, Delhi |
| 3 | 080-33445566 | Brigade Road, Bangalore |
| 4 | 044-44556677 | Mount Road, Chennai |
+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> SELECT * FROM Sells;
+-----+-----+
| Seller_id | isbn_no |
+-----+-----+
| 1 | ISBN001 |
| 2 | ISBN002 |
| 3 | ISBN003 |
| 4 | ISBN004 |
+-----+-----+
4 rows in set (0.00 sec)
```

Q.2 Convert following EER to relational model



Ans]

Relational Schema :

Person(SSN, Name, Dob)
 Employee(SSN, Salary, Department)
 Secretary(SSN)
 Technician(SSN, Specialization)
 Student(SSN, GPA, StartDate)
 Freshman(SSN)
 Sophomore(SSN, Major)
 Junior(SSN, Minor)
 Senior(SSN, Major, Advisor)