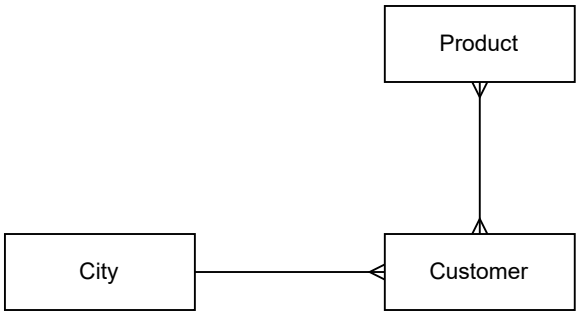
Example 6.3 in Notes: Order

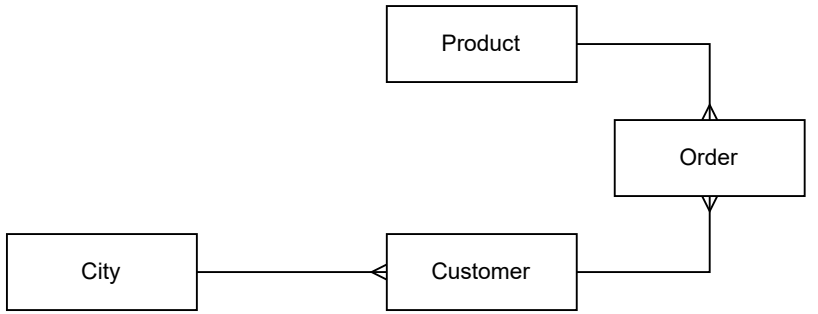
Orders Database before 3NF

- **Note that there is a M-M relationship between the Product and Customer entities. M-M relationship cannot be represented in relational tables**



Orders Database in 3NF

- **Note that the M-M relationship is being replaced by a Order Entity (a mapping table). The mapping table allows the apping of 1 Product to Many Customer and 1 Customer to Many Product**



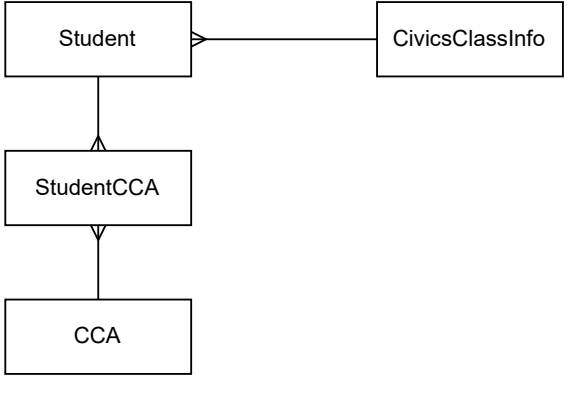

```
Product(ProductName, Price)

Customer(CustNum, CustName, CityName*)

City(CityName, CountryName)

Order (CustNum*, ProductName*)
```

Exercise 7 in Notes:



Student (MatricNo, Name. Gender, CivicClass*)

CivicClassInfo (CivicClass, CivicsTutor, HomeRoom)

StudentCCA(MatricNo*, CCAName*)

CCA (CCAName, TeacherIC)

underline means primary key
* means foreign key

Worksheet 1 : Q1

Assume that a class has only 1 teacher

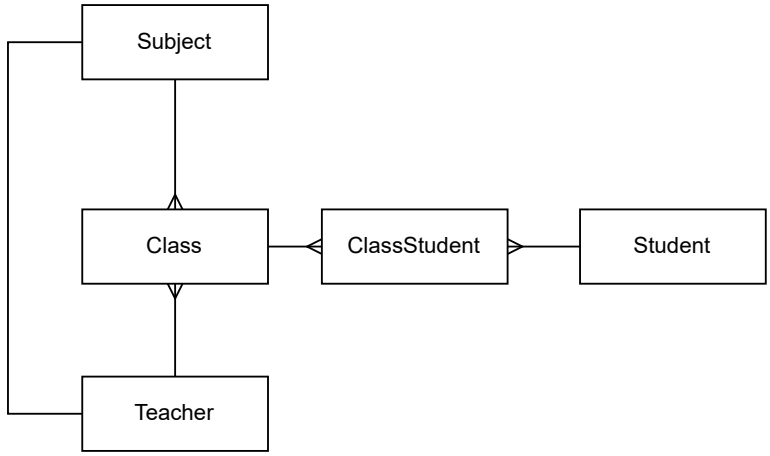
Solution 1: SubjectHead is implemented as an foreign key attribute in the Subjec table to reference the TeacherID attribute in the Teacher table. This is a 1-1 relationship.

Subject (SubjectCode, Description, SubjectHead*)

Class (ClassCode, Size, SubjectCode*, TeacherID*)

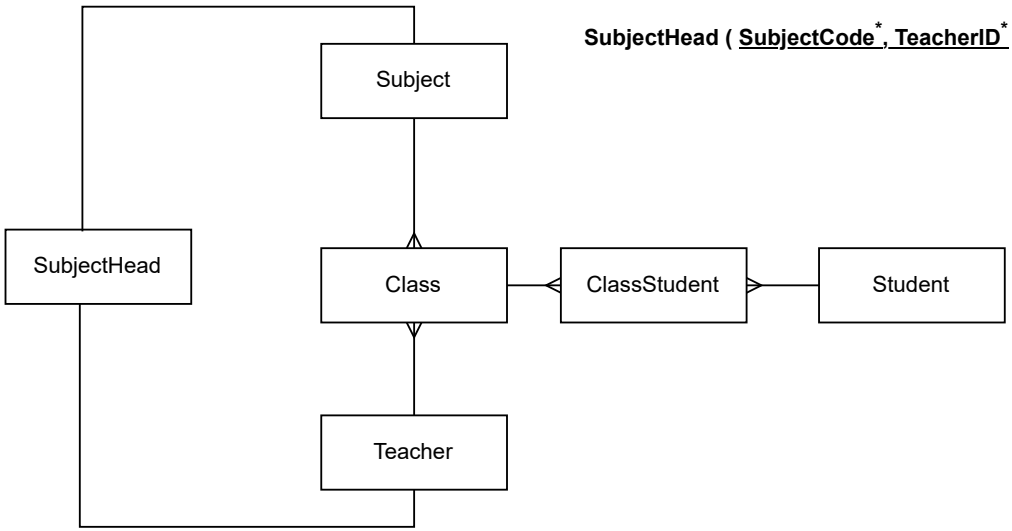
Teacher (TeacherID, Name, Department)

ClassStudent (ClassCode*, StudentCode*)

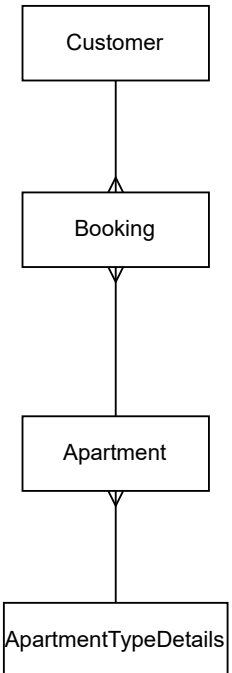


Solution 2: SubjectHead is implemented as a relationship entity with foreign keys, SubjectCode to reference the Subject table and TeacherID to reference the Teacher table. These are 1-1 relationships between SubjectHead and Teacher, SubjectHead and Subject

SubjectHead (SubjectCode*, TeacherID*)



Worksheet 1 : Q2 **Holiday Rentals**



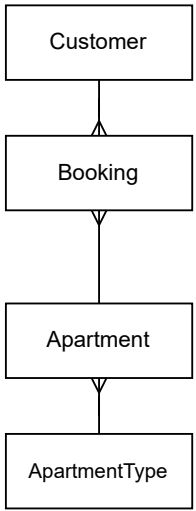
Customer (CustRef, CustName, CustAddress)

Booking(CustRef* , ApartmentNum*, BookingDate, RentalStart, RentalEnd, Deposit)

Apartment (ApartmentNum, ApartmentType*)

ApartmentTypeDetails (ApartmentType, DailyRate)

Worksheet 1 : Q3 **Vehicle Rentals**



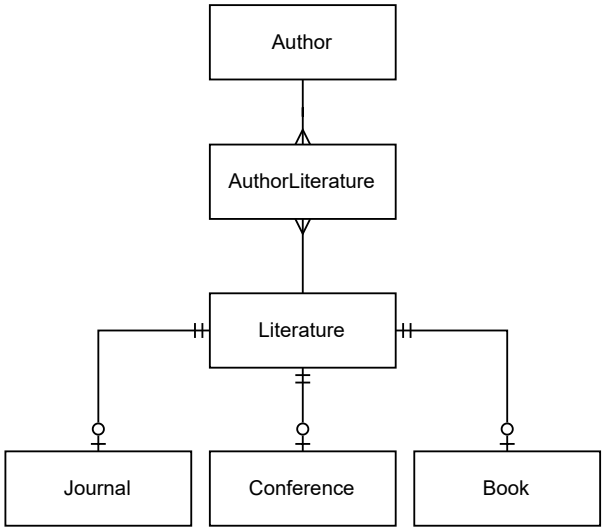
Customer (CustRef, Name, Address)

Booking (BookingDate, CustRef*, RentalStart, RegNo*, RentalEnd, Deposit

Vehicle(RegNo, VehicleType*)

VehicleType(Type, RentalRate)

Worksheet 1 : Q4 **Research References**



Author (ID, Name)

AuthorLiterature (AuthorID*, LitID*)

Literature(LitID, Title, YearPublication)

Journal (LitID*, JournalName, Volume, Issue, Pages)

Conference (LitID*, ConferenceName, Pages)

Book (LitID*, Publisher)

The Literature Entity consists of common attributes between Journal, Conference and Book. That means a Literature entity is either a Journal, Conference or Book.
Each of the Journal, Conference and Book entity has an attribute LitdID which is both a FK and PK

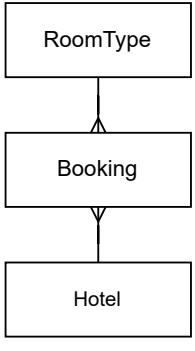
Worksheet 2 : Q1

Assume that HotelNames are unique and 1 Booking can only be used on 1 Hotel,
If 1 booking can book more than 1 Hotel then Booking will need HotelName as part of the PK

RoomType (HotelName, RoomType, RoomRate)

Booking (BookingNum, HotelName*, Date, RoomType *, NumRooms)

Hotel (HotelName, Address,Rating)



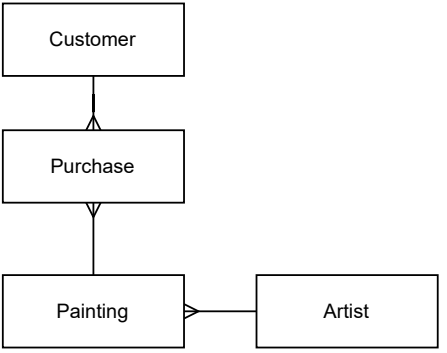
Worksheet 2 : Q2 : Art Gallery

Customer (CustID, CustName, Contact)

Purchase (CustID *, PiantID *, Date, Price)

Painting (PiantID, PaintName, ArtistID *)

Artist (ArtistID, ArtistName)



Worksheet 2 : Q3 Library

Insert anomaly will occur when a new book is purchased by the library and there are no borrower.

Delete anomaly will ccur when a borrower returns a book and the record is deleted, the book information is lost.

Update anomaly will occcur when a borrower update his email address on only some records.

1NF

Loan (CallNo, Title, Author, PublisherID, PublisherName, BorrowerID, BorrowerName, Email, LoanDate)

2NF

Book(CallNo, Title, Author, PublisherID, PublisherName)

Borower (BorrowerID, BorrowerName, Email)

Loan (CallNo *, BorrowerID *, LoanDate)

3NF

Book(CallNo, Title, Author, PublisherID*)

Borrower (BorrowerID, BorrowerName, Email)

Loan (CallNo *, BorrowerID *, LoanDate)

Publisher(PublisherID, PublisherName)