*Domain: Manufacturer*

A manufacturing company produces products. The following product information is stored: product name, product ID and quantity on hand. These products are made up of many components. Each component can be supplied by one or more suppliers. The following component information is kept: component ID, name, description, suppliers who supply them, and products in which they are used. Use Figure B.1 for this exercise.

Create an ERD to show how you would track this information.

Show entity names, primary keys, attributes for each entity, relationships between the entities and cardinality.

Assumptions
a) A supplier can exist without providing components.
b) A component does not have to be associated with a supplier.
c) A component does not have to be associated with a product. Not all components are used in products.
d) A product cannot exist without components.
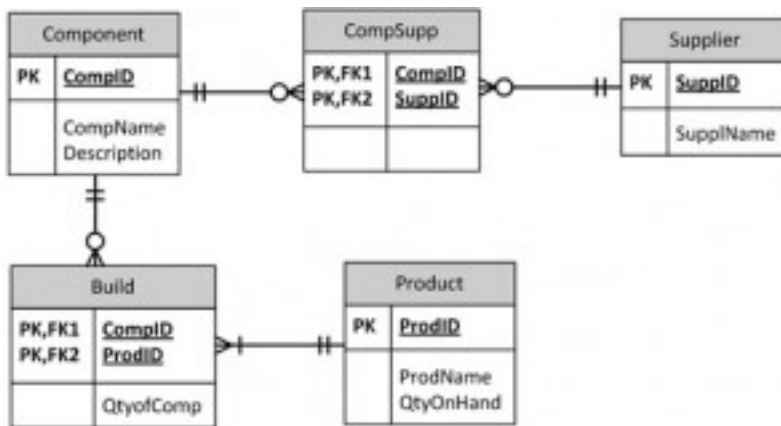
Exercise 2

Domain: Car Dealership

Create an ERD for a car dealership. The dealership sells both new and used cars, and it operates a service facility (see Figure B.2). Base your design on the following business rules:

a) A salesperson may sell many cars, but each car is sold by only one salesperson.
b) A customer may buy many cars, but each car is bought by only one customer.
c) A salesperson writes a single invoice for each car he or she sells.
d) A customer gets an invoice for each car he or she buys.
e) A customer may come in just to have his or her car serviced; that is, a customer need not buy a car to be classified as a customer.
f) When a customer takes one or more cars in for repair or service, one service ticket is written for each car.
g) The car dealership maintains a service history for each of the cars serviced. The service records are referenced by the car's serial number.
h) A car brought in for service can be worked on by many mechanics, and each mechanic may work on many cars.
i) A car that is serviced may or may not need parts (e.g., adjusting a carburetor or cleaning a fuel injector nozzle does not require providing new parts).
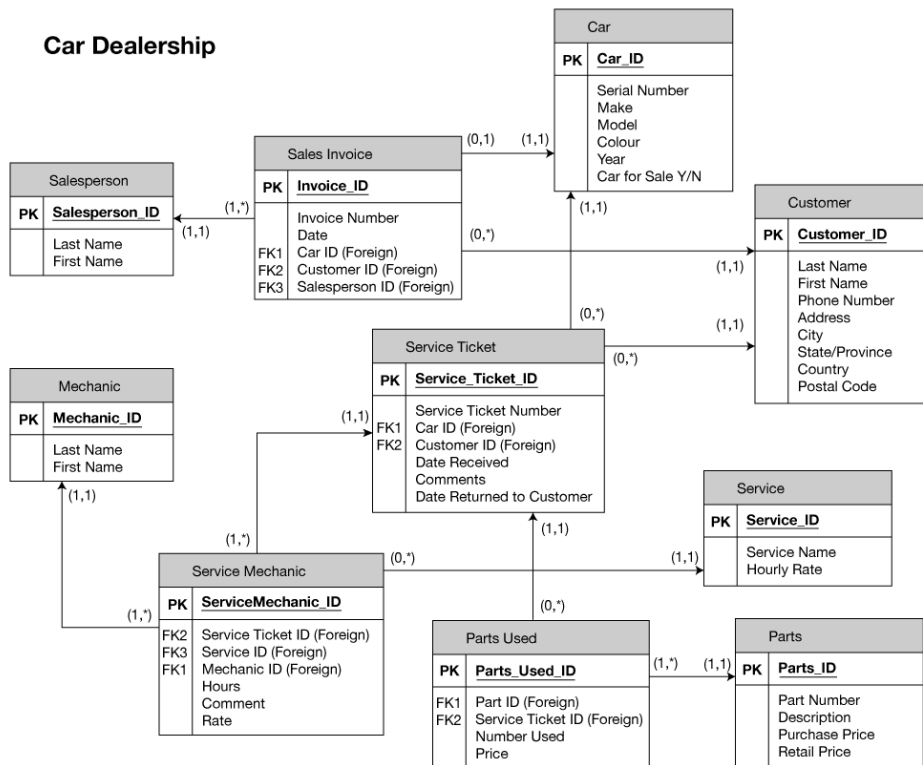
Exercise 3

Harris's Pet Store has requested you to design a database to store information on sales on animals and merchandises. The sales form is shown in the below. Answer questions 1 and 2.

SALES		
Sales No:		Date :
Customer ID: Name: Address: City, State, PostCode:	Employee ID: Name:	

Animal Sale

ID	Name	Category	Breed	DoB	Gender	Registration	Color	ListPrice	SalePrice
--	--	--	--	--	--	--	--	--	--
								Animal SubTotal:	

Merchandise Sale

Item	Description	Category	ListPrice	SalePrice	QuantitySold	TotItemSalePrice
--	--	--	--	--	--	--
					Merchandise SubTotal:	
					SubTotal:	
					Tax:	
					Total:	

a) Identify all entities and attributes for each entity from the Sales Form in the above. Provide your answer in the following format.

| ENTITY	ATTRIBUTE
CUSTOMER	**CUSTID, CUSTNAME, ADDRESS, CITY, STATE, ZIPCODE**
EMPLOYEE	**EMPID, EMPNAME**
ANIMAL	**ANIMID, ANIMNAME, ACATEGORY, BREED, DOB, GENDER, REG, COLOR, ALPRICE**
MERCHANDISE	**ITEM, DESC, MCATEGORY, MLPRICE**
SALE	**SALENO, SALEDATE, ASUBTOTAL, MSUBTOTAL, SALETAX, SALETOTAL**

b) Using your answers in Question 1 above, draw a complete conceptual Entity Relationship Model (ERM) to model the data in the Sales Form. Multiplicities and primary keys must be shown on your model.

ANIMAL

+ANIMID (PK)
+ANIMNAME
+ACATEGORY
+BREED
+DOB
+GENDER
+REG
+COLOR
+LPRICE

0..*

SOLDIN ------------ +SALEPRICE

0..*

CUSTOMER

+CUSTID (PK)
+CUSTNAME
+ADDRESS
+CITY
+STATE
+ZIPCODE

MAKE

1..1   1..*

SALE

+SALENO (PK)
+SALEDATE
+ASUBTOTAL
+MSUBTOTAL
+SALETAX
+SALETOTAL

HANDLE

1..*   1..1

EMPLOYEE

+EMPID (PK)
+EMPNAME

0..*

SELLIN ------------ +QTYSOLD
+MSPRICE
+MTOTSALEPRICE

0..*

MERCHANDISE

+ITEM (PK)
+DESC
+MCATEGORY
+MLPRICE
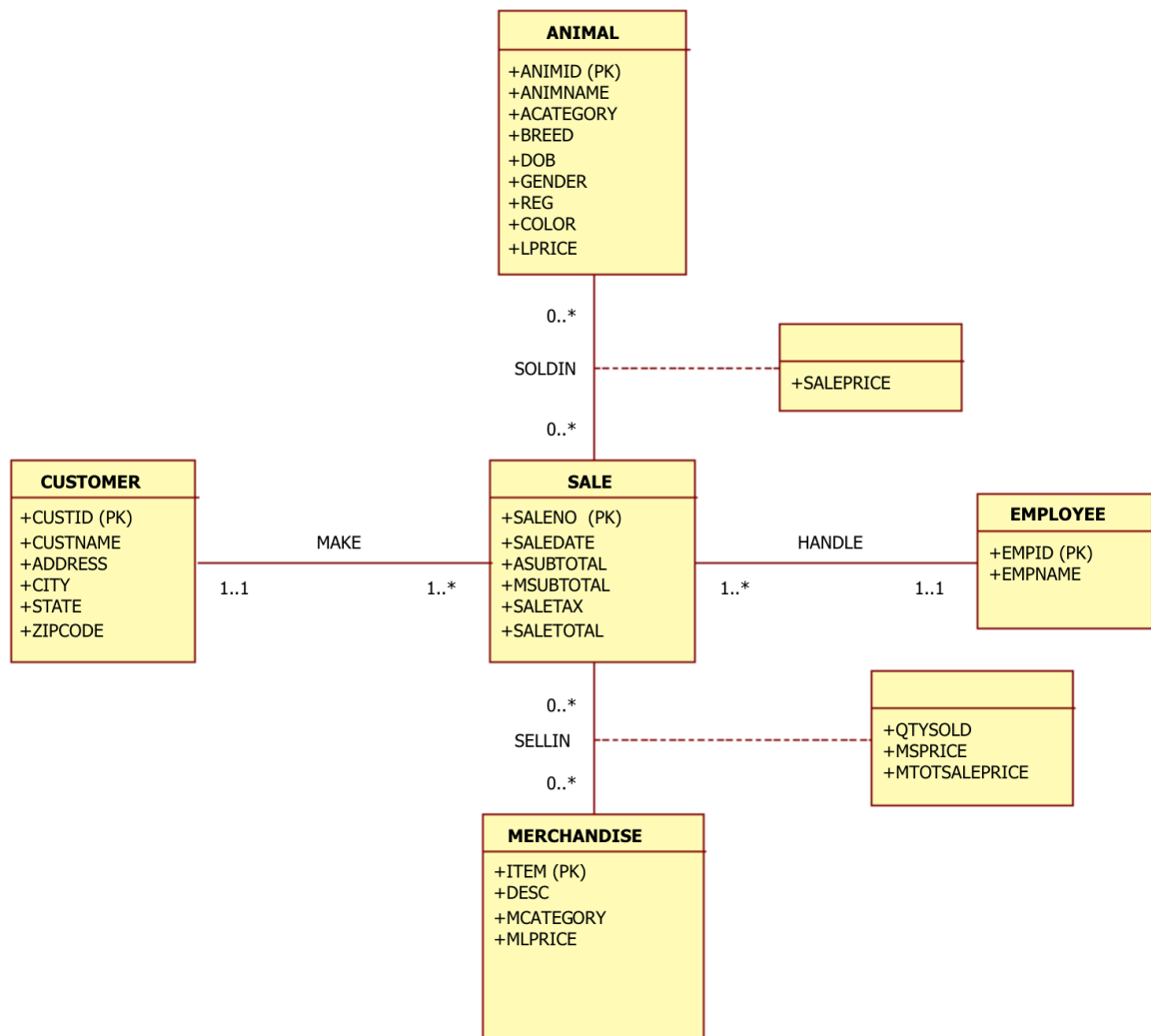
Exercise 4

You are required to create a conceptual data model of the data requirements for a company that specializes in IT training. The Company has 30 instructors and can handle up to 100 trainees per training session. The Company offers five advanced technology courses, each of which is taught by a teaching team of two or more instructors. Each instructor is assigned to a maximum of two teaching teams or may be assigned to do research. Each trainee undertakes one advanced technology course per training session.
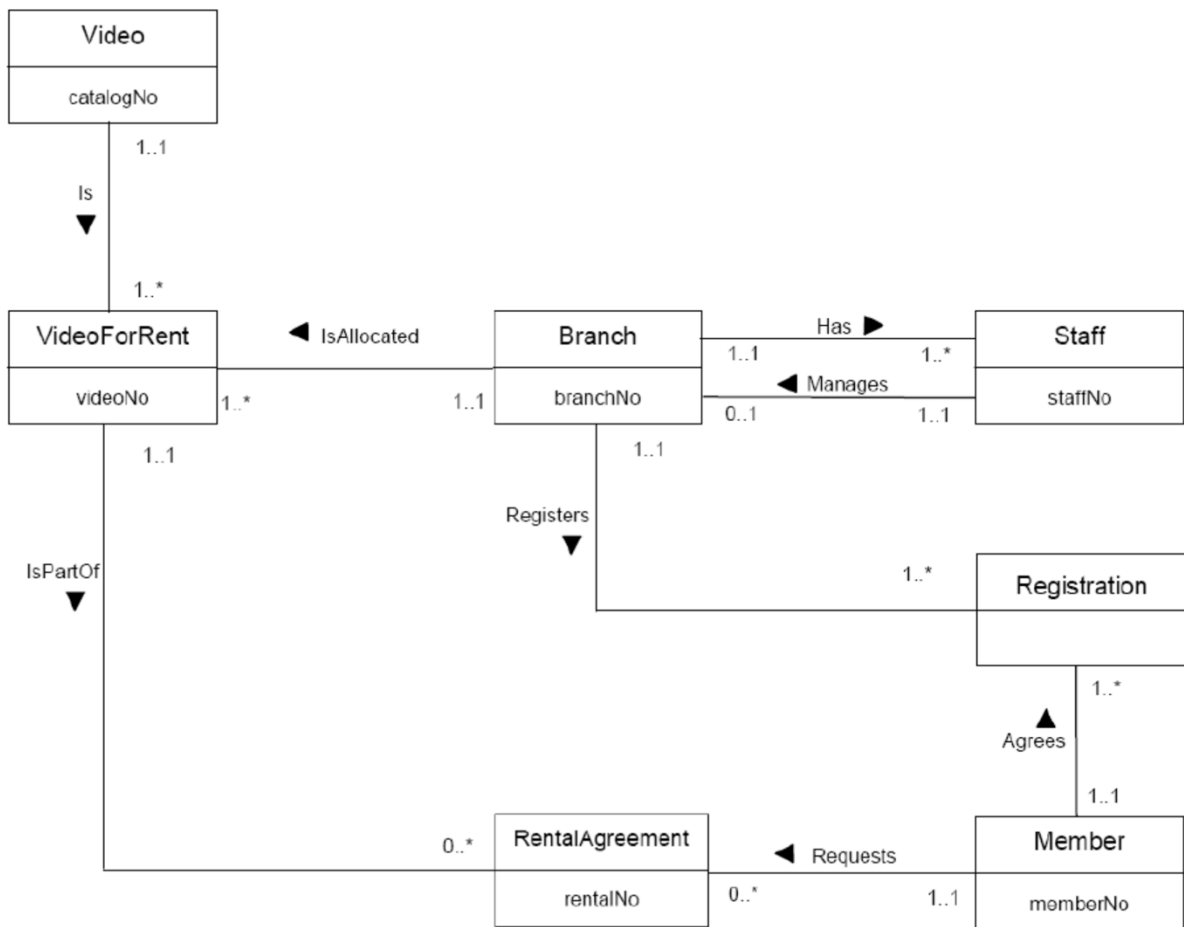
a) Identify the main entity types for the company.
b) Identify the main relationship types and specify the multiplicity for each relationship.   State any assumptions you make about the data.
c) Using your answers for (a) and (b), draw a single ER diagram to represent the data requirements for the company.
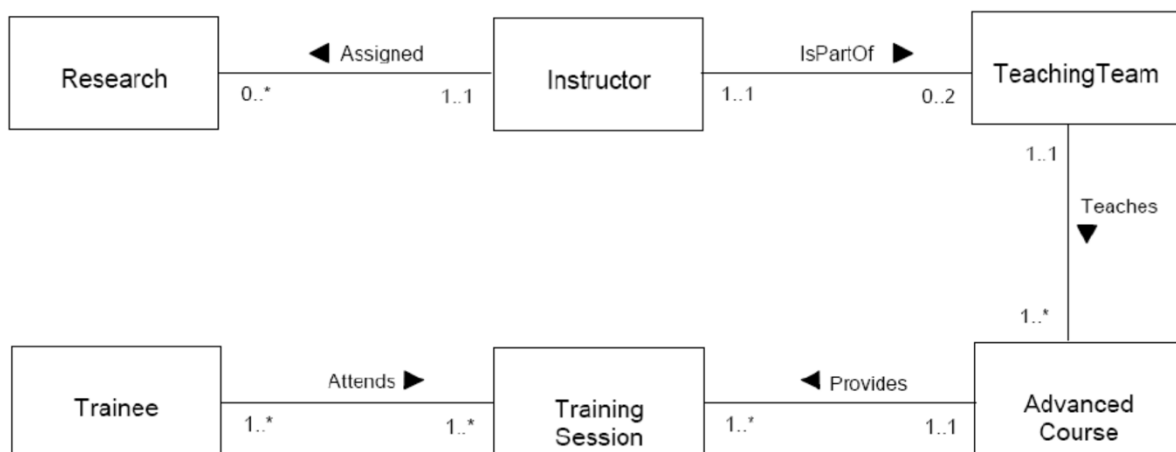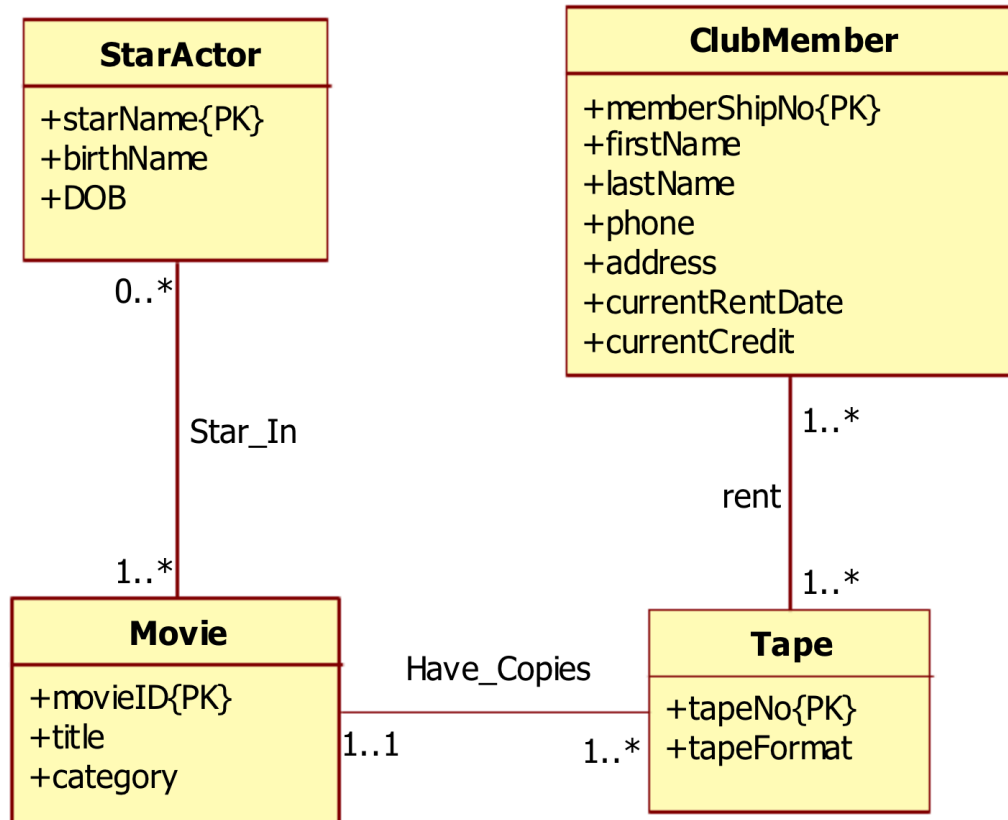
Read the following case study, which describes the data requirements for a video rental company. The video rental company has several branches throughout the USA. The data held on each branch is the branch address made up of street, city, state, and zip code, and the telephone number. Each branch is given a branch number, which is unique throughout the company. Each branch is allocated staff, which includes a Manager. The Manager is responsible for the day-today running of a given branch. The data held on a member of staff is his or her name, position, and salary. Each member of staff is given a staff number, which is unique throughout the company. Each branch has a stock of videos. The data held on a video is the catalog number, video number, title, category, daily rental, cost, status, and the names of the main actors, and the director. The catalog number uniquely identifies each video. However, in most cases, there are several copies of each video at a branch, and the individual copies are identified using the video number. A video is given a category such as Action, Adult, Children, Drama, Horror, or Sci-Fi. The status indicates whether a specific copy of a video is available for rent. Before hiring a video from the company, a customer must first register as a member of a local branch. The data held on a member is the first and last name, address, and the date that the member registered at a branch. Each member is given a member number, which is unique throughout all branches of the company.   Once registered, a member is free to rent videos, up to maximum of ten at any one   me. The data held on each video rented is the rental number, the full name and number of the member, the video number, title, and daily rental, and the date the video is rented out and date returned.   The rental number is unique throughout the company.

a) Identify the main entity types of the video rental company.
b) Identify the main relationship types between the entity types described in (a) and represent each relationship as an ER diagram.
c) Determine the multiplicity constraints for each relationship described in (b). Represent the multiplicity for each relationship in the ER diagrams created in (b).
d) Identify a1ributes and associate them with entity or relationship types. Represent each a1ributein the ER diagrams created in (c).
e) Determine candidate and primary key a1ributes for each (strong) entity type.
f) Using your answers (a) to (e) a1empt to represent the data requirements of the video rental company as a single ER diagram. State any assumptions necessary to support your design.

Exercise 6

Given the following conceptual ERD, transform it into a logical ERD.

StarActor

+starName{PK}
+birthName
+DOB

0..*

Star_In

1..*

Movie

+movieID{PK}
+title
+category

Have_Copies

1..1

ClubMember

+memberShipNo{PK}
+firstName
+lastName
+phone
+address
+currentRentDate
+currentCredit

1..*

rent

1..*

Tape

+tapeNo{PK}
+tapeFormat

1..*

ANSWER:

StarActor

+starName{PK}
+birthName
+DOB

involve

1..1   0..*

StarActorInMovie

+starName{PK}
+movieID{PK}

has

0..*   1..1

Movie

+movieID{PK}
+title
+category

1..1

have-copies

1..*

ClubMember

+memberShipNo{PK}
+firstName
+lastName
+phone
+address
+currentRentDate
+currentCredit

rent

1..1   1..*

MemberRentTape

+tapeNo{PK}
+memberShipNo{PK}

belongs

1..*   1..1

Tape

+tapeNo{PK}
+tapeFormat
+movieID