Entity Relationship Diagram (ERD) - Exercises

Exercise 1

Draw an ER diagram for the following application from the hospital:

- A doctor has one or more patients to treat
- Each doctor has an unique Doctor ID
- Each patient has a name, phone number, address and date of birth
- Patient entity is a weak entity
- Age is a derived attribute

Exercise 2

Draw an ER diagram for the following application from the ABC Company:

- Employees work for many projects and each project has many employees
- Each employee has an unique Emp_No
- Each employee has a name and name consists of first name, middle name and last name
- Each project has an unique number and name

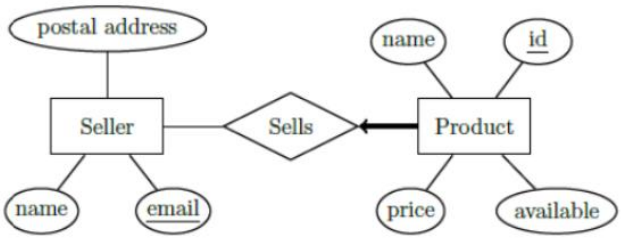
Exercise 3

The craft trading website **Itsy! Bitsy!** is setting up a database to record sellers and their products.

This requires recording the following information:

- For each seller, their name, contact email, and postal address.
- For each product, its name, price, and number available.
- Which product is from which seller.
- A unique id number for each product.

Draw an entity-relationship (ER) diagram that represents this information. Make sure to capture the constraints on the relationships involved, and designate appropriate primary keys for the entities.

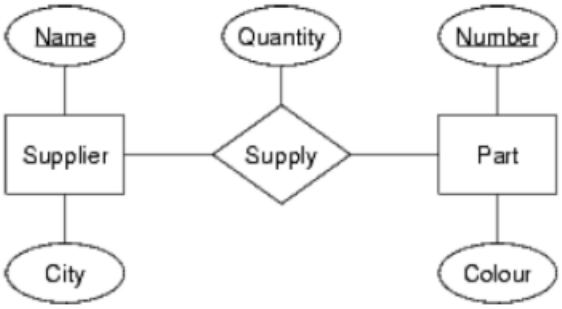


The thick arrow from *Product* to *Sells* indicates the *key constraint* and *total participation constraint* that every product must have exactly one seller.

Exercise 4

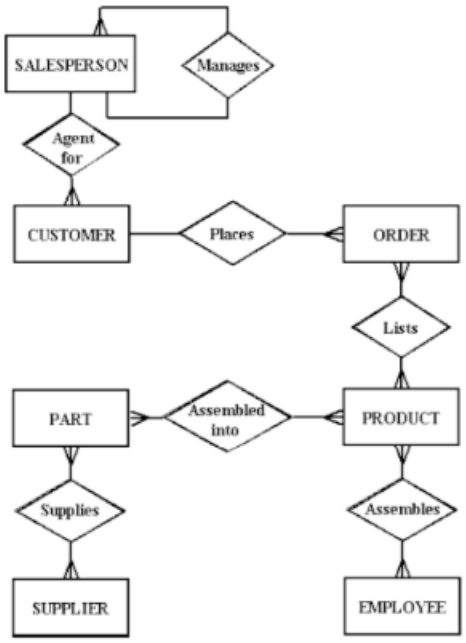
Draw an ER diagram for the following application from the manufacturing industry:

1. Each supplier has a unique name.
2. More than one supplier can be located in the same city.
3. Each part has a unique part number.
4. Each part has a colour.
5. A supplier can supply more than one part.
6. A part can be supplied by more than one supplier.
7. A supplier can supply a fixed quantity of each part.



Exercise 5

Draw the Entity- Relationship Diagram (ERD) for the following scenario: A salesperson may manage many other salespeople. A salesperson is managed by only one salespeople. A salesperson can be an agent for many customers. A customer is managed by one salespeople. A customer can place many orders. An order can be placed by one customer. An order lists many inventory items. An inventory item may be listed on many orders. An inventory item is assembled from many parts. A part may be assembled into many inventory items. Many employees assemble an inventory item from many parts. A supplier supplies many parts. A part may be supplied by many suppliers.

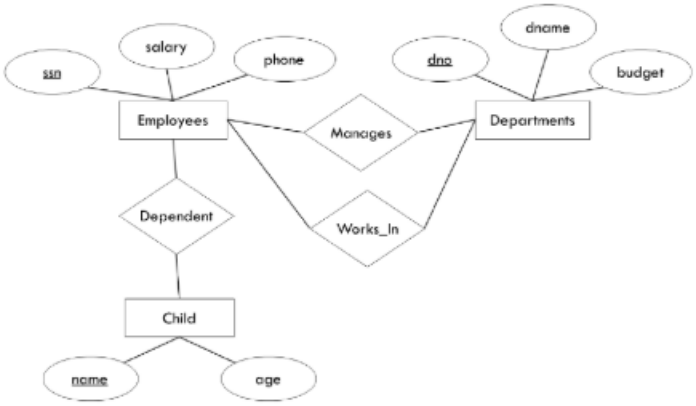


Exercise 6

A company database needs to store information about employees (identified by *ssn, with salary and phone as attributes), departments (identified by dno,* with *dname and budget as attributes), and children of employees (with name and age* as attributes).

Employees *work in departments; each department is managed by an* employee; a child must be identified uniquely by *name when the parent (who is an* employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.

Draw an ER diagram that captures this information.



Exercise 7

The organizers of the EXAM 2011 international multi-conference need to keep track of a large col-lection of workshops associated with the event. Initial requirements analysis brings out the following information about what needs to be recorded.

- Each workshop has a name, and happens on a particular date - or dates, as some workshops last more than one day.
- There are several participants, each of which may sign up to one or more workshops.
- For each participant, it is important to record their name, email address, and the workshops which they wish to attend.
- There are a number of meeting rooms at the conference venue, each of a fixed capacity. Meetings rooms are identified by a floor and room number.
- Every workshop needs an allocated meeting room; where a workshop lasts for two days, it will use the same room on both days.

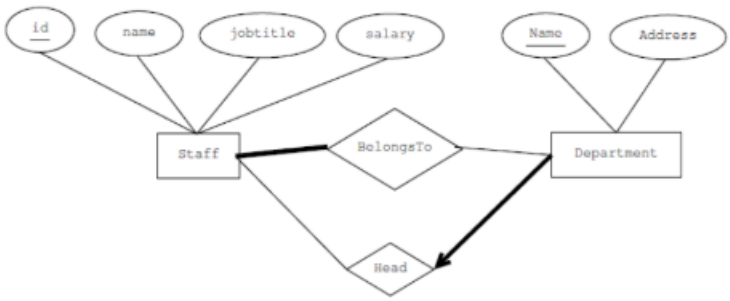
Draw an entity-relationship diagram suitable for representing this information, in particular the connections between participants, workshops, rooms, and dates.

Exercise 8

A university wants to set up a database to record details about its staff, and the departments they belong to. They intend to record the following information.

- For each member of staff, their staff identity number, name, job title, and salary.
- For each department, its name and address.
- For each member of staff, all departments that they belong to. It is required that every member of staff belongs to at least one department.
- For each department, the head of department. It is required that each department has exactly one head of department.

Draw an ER diagram that expresses the requirements for the database. Make sure that you capture all the constraints on the data mentioned above.



This includes these constraints, as required by the specification:

- A thick line of total participation from entity **Staff** to relationship **Belongs To**, recording the requirement that every member of staff must belong to some department (although still possibly more than one).
- A thick line with an arrowhead from **Department** to **Head**, capturing the constraint that every department has exactly one head of department.

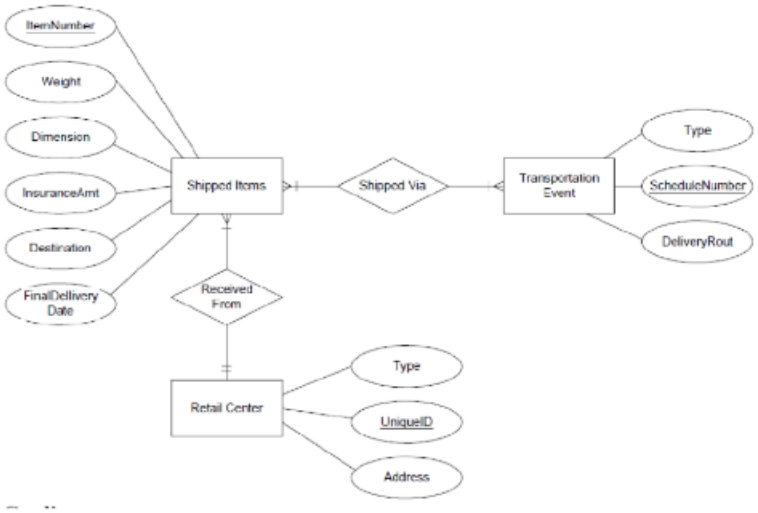
Exercise 9

Read the given scenario and answer the following questions.

UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of the UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the UPS system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight,truck), and a deliveryRoute.

i) Draw an Entity Relationship Diagram (ERD) for the above scenario by clearly identifying entities, attributes and relationships.

ii) Clearly indicate cardinality constraints in the above ERD.



Exercise 10

2) Construct an ER diagram for a Banking System by indicating the entities, relationships, cardinality and the key constraints clearly.

The General Things needed in a Banking System are: -

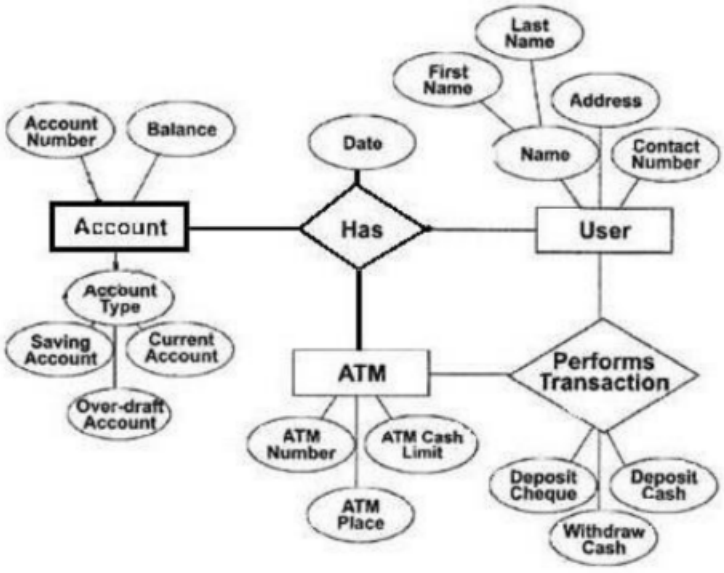
1. Person Opens an Account
2. Person using ATM for Transaction

The person opens an Account in a Bank and gets an account number and ATM card. The person can make transactions in ATM centres. The Details of the Transaction has to be maintained among three entities. i.e. User, Account, ATM

User (User_ID, Name (First_Name, Last_Name), Address, Contact_Number)

Account(Account_Number, User_ID, Account_Type (Saving_Account, Current_Account, Over_draft_Account), Balance)

ATM(ATM _Number, ATM_Place, ATM _Cash_Limit)



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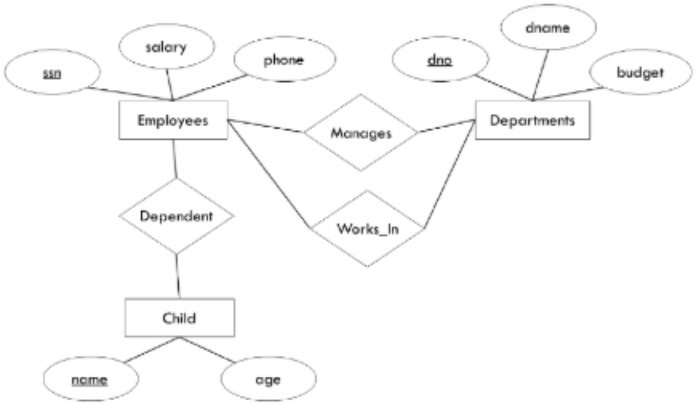

Exercise 12

Draw an ER diagram for the following scenario:

Although you always wanted to be an artist, you ended up being an expert on databases because you love to cook data and you somehow confused database with database. Your old love is still there, however, so you set up a database company, ArtBase that builds a product for art galleries. The core of this product is a database with a schema that captures all the information that galleries need to maintain.

- Galleries keep information about artists, their names (which are unique), birthplaces, age, and style of art.
- For each piece of artwork, the artist, the year it was made, its unique title, its type of art (e.g., painting, lithograph, sculpture, photograph), and its price must be stored.
- Pieces of artwork are also classified into groups of various kinds, for example, portraits, still life's, works by Picasso, or works of the 19th century; a given piece may belong to more than one group.
- Each group is identified by a name (like those just given) that describes the group.
- Finally, galleries keep information about customers. For each customer, galleries keep that person's unique name, address, total amount of dollars spent in the gallery (very important!), and the artists and groups of art that the customer tends to like.