National University
of computer and emerging sciences

Course-Code: CS2005

Database Systems

Assignment 1

Topic: Entity Relationship Diagram

Diagraming Software Tool Used: Lucid Chart

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Answer to Question #1: A Music Company

Step 1:

I am breaking down the long paragraph into chunks for my better understanding

1) Music collection has various albums

2) Each album made by a musician

3) Musician has CNIC, name, address, phone number

4) A Musician makes one or more albums

5) Albums contain one or more tracks

6) Each album has exactly one musician who acts as its producer

7) Album has a title, copyright date, format, and album identifier

8) Each track belongs to exactly one album

9) A track has a time length in seconds, title, and an author

10) Every Instrument used in tracks has a name (i.e. guitar, synthesizer, and flute)

11) Each Musician may play several instruments and several musicians may play a given instrument

Step 2:

I am now Identifying the Entities

Entities:

1) Album
2) Musician
3) Track
4) Instrument

Step 3:

I am now identifying the attributes

Attributes:

1. For Albums: title, copyright date, format, album identifier
2. For Musician: CNIC, name, address, phone number
3. For track: time in seconds, title, author
4. Instrument: name

Step 4:

I am now identifying primary key attributes for the Entities

Primary Key Attributes

1) For Albums: album identifier

2) For Musician: CNIC

3) For Track: title

4) For Instrument: name

Step 5:

I am now identifying the relationship between the entities

1) **Many to Many:** Each Musician may play several instruments and several musicians may play a given instrument
   ➔ Musician-play-instrument

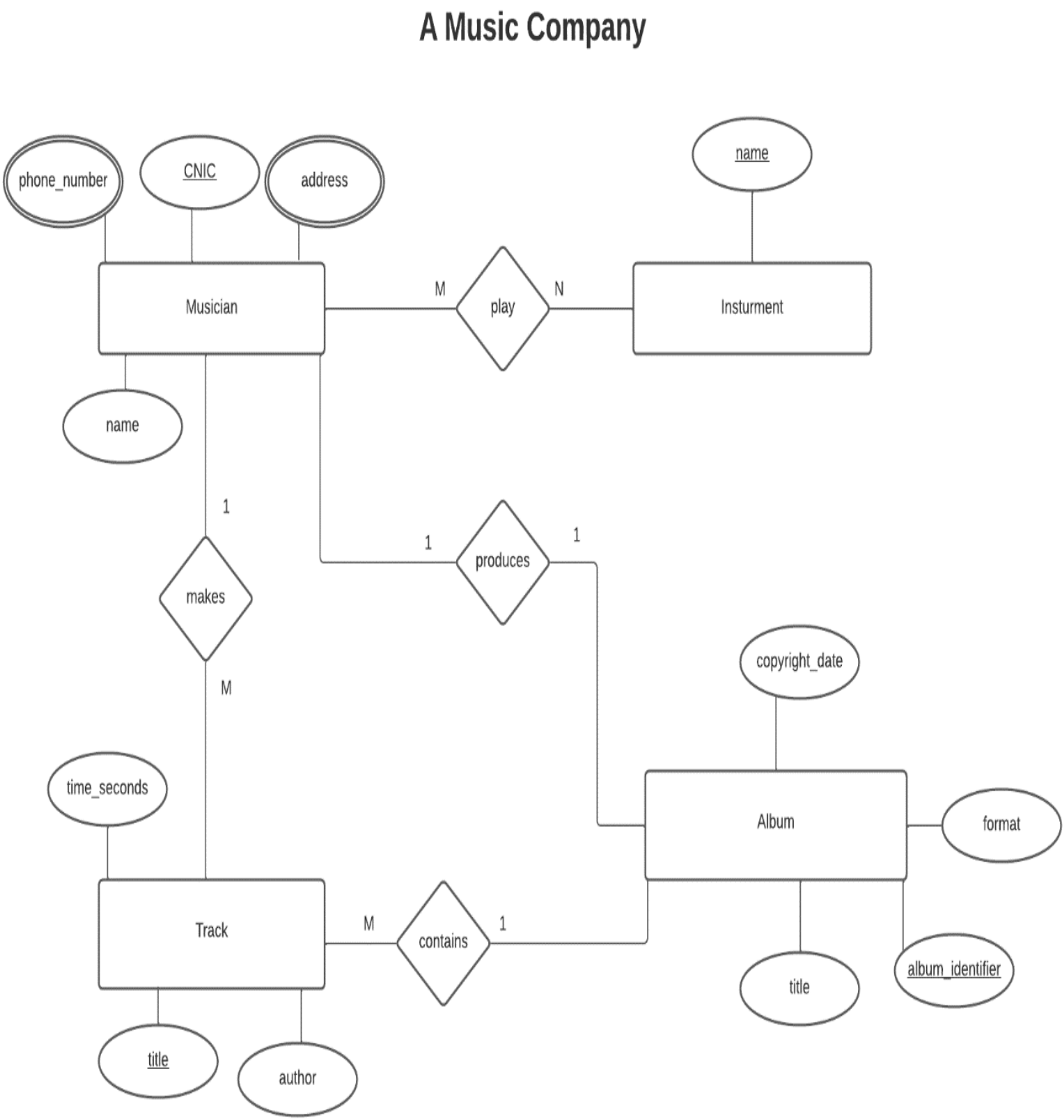
2) **One to One**: Each album has exactly one musician who acts as its producer
   ➔ Musician-produces-album

3) **One to Many:** Albums contain one or more tracks
   ➔ Album-contains-Track

4) : **One to Many:** A Musician makes one or more albums
   ➔ Musician-makes-album

Final Step:

My final ERD Model for “A Music Company”



Answer to Question #2: Ride Service Management System

Step 1:

I am breaking down the long paragraph into chunks for my better understanding

1) Store the information regarding the driver with the attributes like name, surname, date of birth, and driving license number
2) A driver drives at least one car but may drive more than one car
3) Each car has a model description, vehicle registration plate, owner id, and status about whether the company is still using the car
4) Each car is driven by exactly one driver
5) A car is registered in exactly one area
6) Each area can have several registered cars
7) Each ride is fulfilled by exactly one car
8) A customer can request more than one ride
9) The ride has starts and end times, source and target location, fare, the status of the ride (Yes/No value if a ride has been cancelled or accepted)
10) System can keep track of drivers' working hours and total earnings per month

Step 2:

I am now Identifying the Entities

Entities:

1) Driver
2) Car
3) Ride
4) Area
5) Customer

*Here I am assuming that Time is an entity which will have an attribute in hours to help system keep track of drivers' monthly earnings

6) *Time

**Here I am assuming that Money is an entity which will have an attribute of currency (in dollars) to help system keep track of drivers' monthly earnings and his/her working hours

7) **Money

Step 3:

I am now identifying the attributes

Attributes:

1) For Driver: name, surname, date of birth, driving license number
2) For Car: model description, registration plate, owner id, status (active/inactive)
3) For Ride: start time, end time, source location, target location, fare, status of the ride
4) For Area: *I assume that it will have the following attributes: area code, name, address
5) For Customer: **I assume that it will have the following attributes: name. CNIC, phone number (***I assume Customer will use only one phone number), gender, date of birth
6) For my assumed entity Time: hours
7) For my assumed entity Money: currency (dollars)

Step 4:

I am now identifying primary key attributes for the Entities

Primary Key Attributes

1) For Driver: driving license
2) For Car: registration plate
3) For Area: area code
4) For Customer: CNIC

Here I am assuming that Ride is a weak entity because it does not have a primary key of its own and it is dependent on car. So no primary key is available for Ride

Here I am also assuming that Time and Money both will not have primary key as they will also be weak entities that do not have a primary key to make them unique

Step 5:

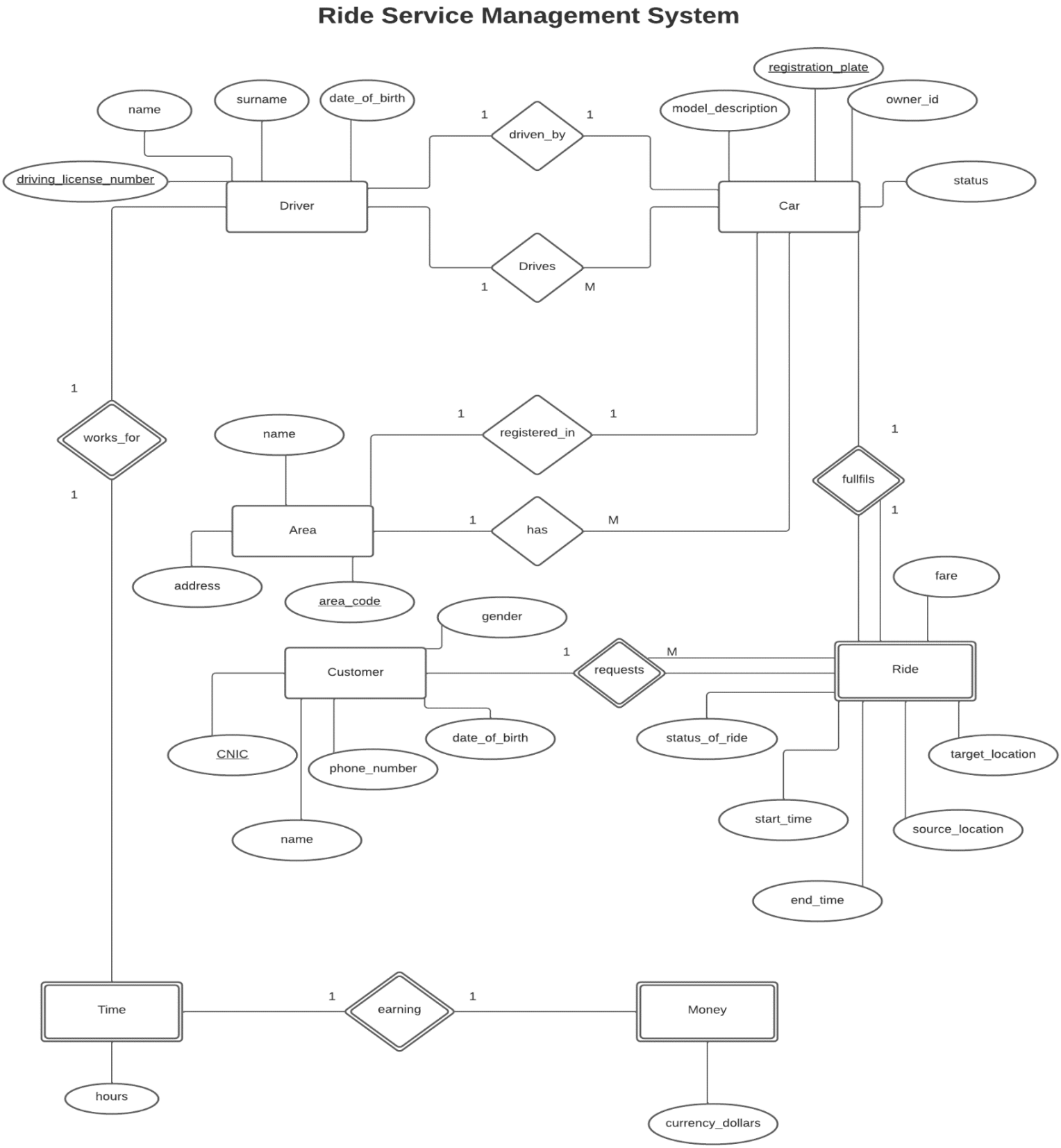
I am now identifying the relationship between the entities

1) **One to Many:** (1) A driver drives at least one car but may drive more than one car, (2) Each area can have several registered cars, (3) A customer can request more than one ride
   ➔ Driver-drives-car (1)
   ➔ Area-has-car (2)
   ➔ Customer-requests-ride (3)

2) **One to One:** (1) Each car is driven by exactly one driver, (2) A car is registered in exactly one area, (3) Each ride is fulfilled by exactly one car
   ➔ Car-driven by-driver (1)
   ➔ Car-registered in-area (2)
   ➔ Car-fulfils a-ride (3)

Final Step:

My final ERD Model for “Ride Service Management System”



Answer to Question #3: Chaklala Airport database

Step 1:

I am breaking down the long paragraph into chunks for better understanding

1) Each airplane has a registration number that is of a particular plane type
2) Each airplane is stored in a particular store
3) Each plane type has a model number, a capacity, and a weight.
4) Each store has a number, a capacity, and a location.
5) The database keeps track of the owners of each plane
6) The data base keeps track of the employees who have maintained the plane
7) Each relationship instance owns relates to any airplane to an owner and includes the purchase date.
8) Each relationship instance maintain relates to an employee to a service record
9) Each plane undergoes service many times
10) Each plane is related to several service records
11) A service record includes attributes to the date of maintenance, the number of hours spent on the work, and the type of work done.
12) An owner is either a person or a corporation
13) Each pilot has specific attributes license number and restrictions
14) Each employee has specific attributes salary and shift, etc.
15) All person entities have social security number, name, address, and telephone number.
16) Corporation entities include name, address, and telephone number
17) The database also keeps track of the types of planes each pilot is authorized to fly

18) The database also keeps track of the types of planes each employee can do maintenance work on.

Step 2:

I am now Identifying the Entities

Entities:

1) Airplane
2) Plane Type
3) Store
4) Employee
5) Pilot
6) Person
7) Corporation
8) Service Records

Step 3:

I am now identifying the attributes

Attributes:

1) For Airplane: registration number
2) For Plane Type: model number, capacity, weight
3) For Store: number, capacity, location
4) For Employee: salary, shift, *I assume an employee will have an employee ID (to be later used as a primary key)
5) For Pilot: license number, restrictions
6) For Person: social security number(ssn), name, address, telephone number
7) For Corporation: name, address, telephone number
8) For Service Records: date of maintenance, number of hours spent on the work, type of work done

Step 4:

I am now identifying primary key attributes for the Entities

Primary Key Attributes

1) For Airplane: registration number
2) For Plane Type: model number
3) For Store: number
4) For Pilot: license number
5) For Person: social security number (ssn)
6) For Corporation: name
7) For Employee: *Here I assume that an employee has an employee id (a primary key attribute)

   ** Here I am also assuming that Service Record entity will not have primary key as it will be a weak entity that does not have a primary key to make itself unique

Step 5:

I am now identifying the relationship between the entities

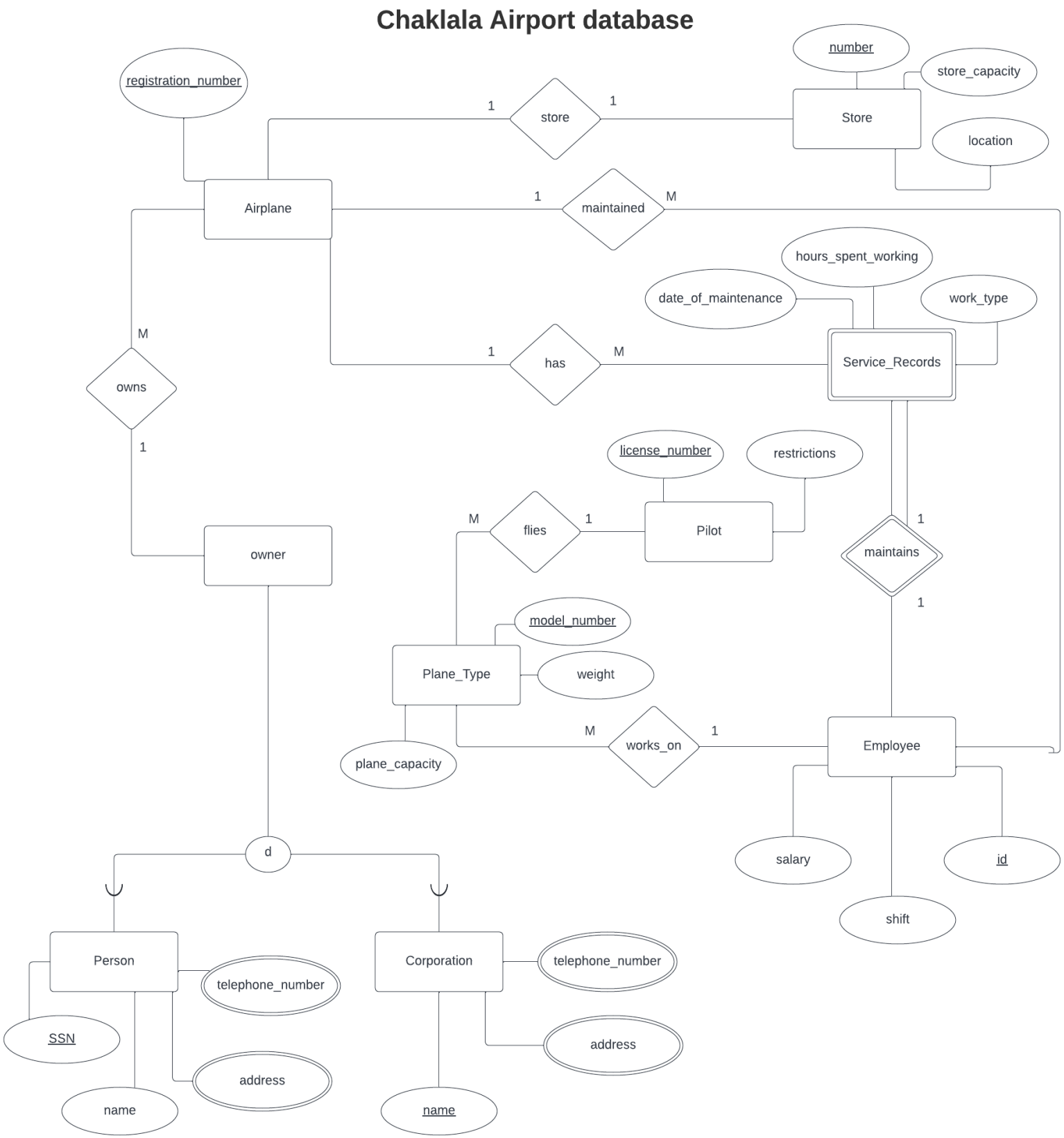
1) **One to One:** (1) Each airplane is stored in a particular store, (2) Each relationship instance maintain relates to an employee to a service record
   ➔ Airplane-store in- Store (1)
   ➔ Employee-maintains-Service Record (2)

2) **One to Many:** (1) The database keeps track of the owners of each plane; each relationship instance owns relates to any airplane to an owner and includes the purchase date, (2) Each plane is related to several service records, (3) The database also keeps track of the types of planes each pilot is authorized to fly, (4) The database also keeps track of the types of planes each employee can do maintenance work on.
   ➔ Owner-owns-Airplane (1)
   ➔ Airplane-has-Service Records (2)
   ➔ Pilot-flies-Plane Type (3)
   ➔ Employee-works on-Plane Type (4)

3) **Many to One:** (1) The data base keeps track of the employees who have maintained the plane
   ➔ Employee-maintained-Airplane (1)

Final Step:

My final ERD Model for “Chaklala Airport database”



Answer to Question #4: Kar-e-Khair Foundation

Step 1:

I am breaking down the long paragraph into chunks for better understanding

1) A manager who creates an account for every employee working in this foundation
2) The manager has an ID, a username, password
3) The charity employee has an ID, name, password, rank/status, phone number, and email id
4) Some needy people approach the manager of this foundation for any help
5) Donor also communicates with manager for providing donations
6) Needy people provide their national ID, name, password, phone number, income, the total number of family members, location, and the amount needed to the foundation
7) Each donor has specific attributes like name, CNIC, email, phone number, location, amount donated, and address.
8) Each charity employee delivers donations to many needy people
9) Each donation has its ID and type
10) A charity employee receives multiple donations
11) Many donations have many types of items
12) Each type has its ID and name
13) The items only have the total type of items in them

Step 2:

I am now Identifying the Entities

Entities:

1) Manager
2) Employee
3) Needy Person
4) Donor
5) Donation
6) Item Type

Step 3:

I am now identifying the attributes

Attributes:

1) For Manager: ID, username, password
2) For Employee: ID, name, password, rank/status, phone number, email ID
3) For Needy Person: national ID, name, password, phone number, income, total number of family members, location, amount needed
4) For Donor: name, CNIC, email, phone number, location, amount donated, address
5) For Donation: ID
6) For Item Type: ID, name

Step 4:

I am now identifying primary key attributes for the Entities

Primary Key Attributes

1) For Manager: ID
2) For Employee: ID
3) For Needy Person: national ID
4) For Donor: CNIC
5) For Donation: ID
6) For Item Type: ID

Step 5:

I am now identifying the relationship between the entities

1) **One to One:** (1) Donor communicates with manager for providing donations
   ➔ Donor-communicates-manager (1)

2) **One to Many:** (1) A manager who creates an account for every employee working in this foundation (2) Each charity employee delivers donations to many needy people (3) A charity employee receives multiple donations
   ➔ Manager-creates account-Employee (1)
   ➔ Employee-delivers donations-Needy Person (2)
   ➔ Employee-receives-Donation (3)

3) **Many to One:** (1) Some needy people approach the manager of this foundation for any help
   ➔ Needy Person-approach-Manager (1)

4) **Many to Many:** (1) Many donations have many types of items
   ➔ Donation-has-Item Type

Final Step:

My final ERD Model for "Kar-e-Khair Foundation"