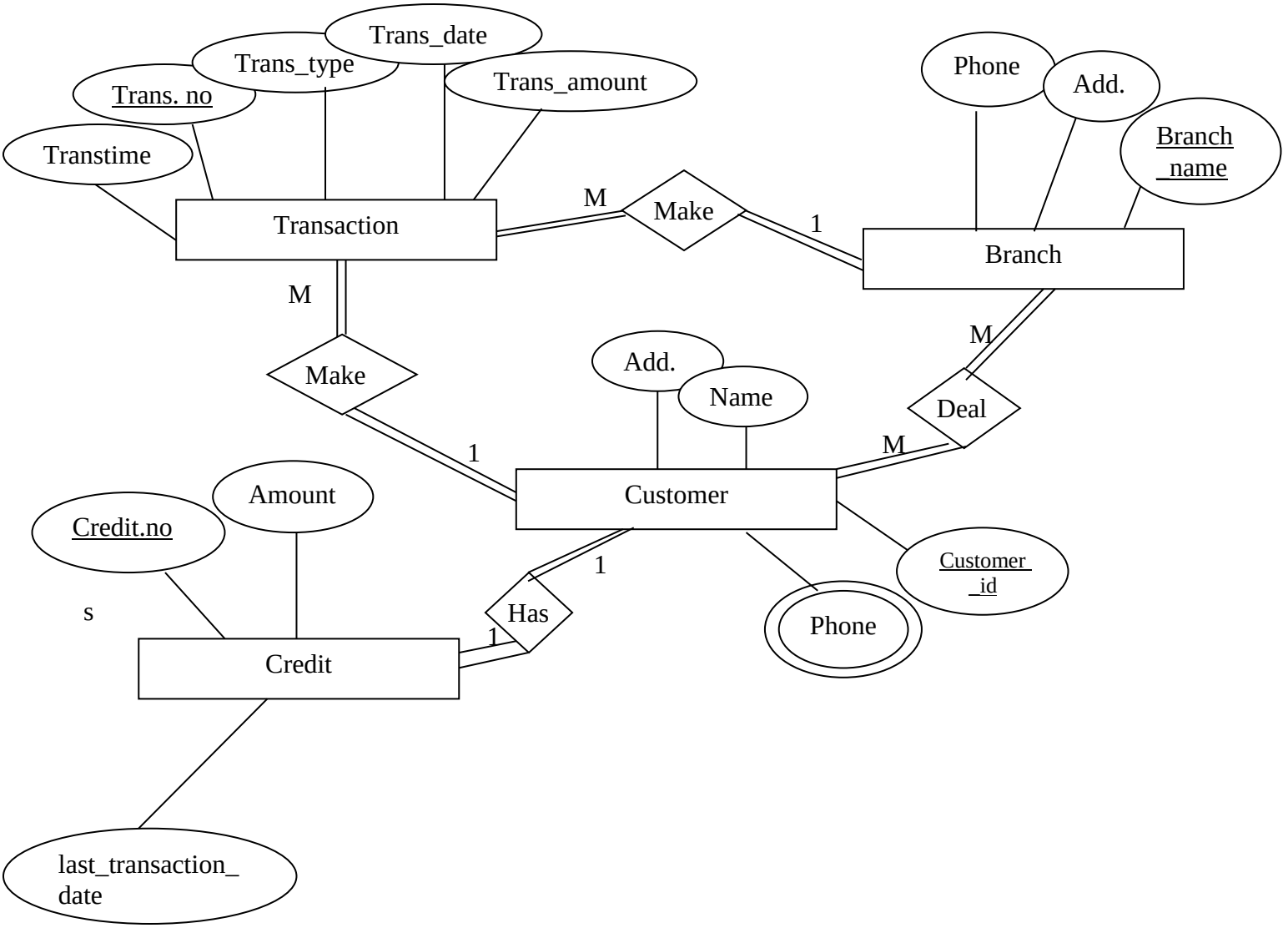
**Problem 1**

A database for a banking system is used to control withdrawal, deposit and loan transactions with customers, banks which use this system has many branches, each branch has a unique name, address (unique) and phone .The system stores information about customers as cust_id (unique), name, address, and phones. each customer has one credit identified by credit_no (unique), amount and last_transaction_date(day,month,hour),transaction_time. Customer can make any type of transactions(withdrawal,deposit) from any branch of the bank .the system record trans_no, trans_type, trans_date, trans_amount .system record the branch name where the transaction occurred.

Draw an ER diagram. Estimate any missing assumptions



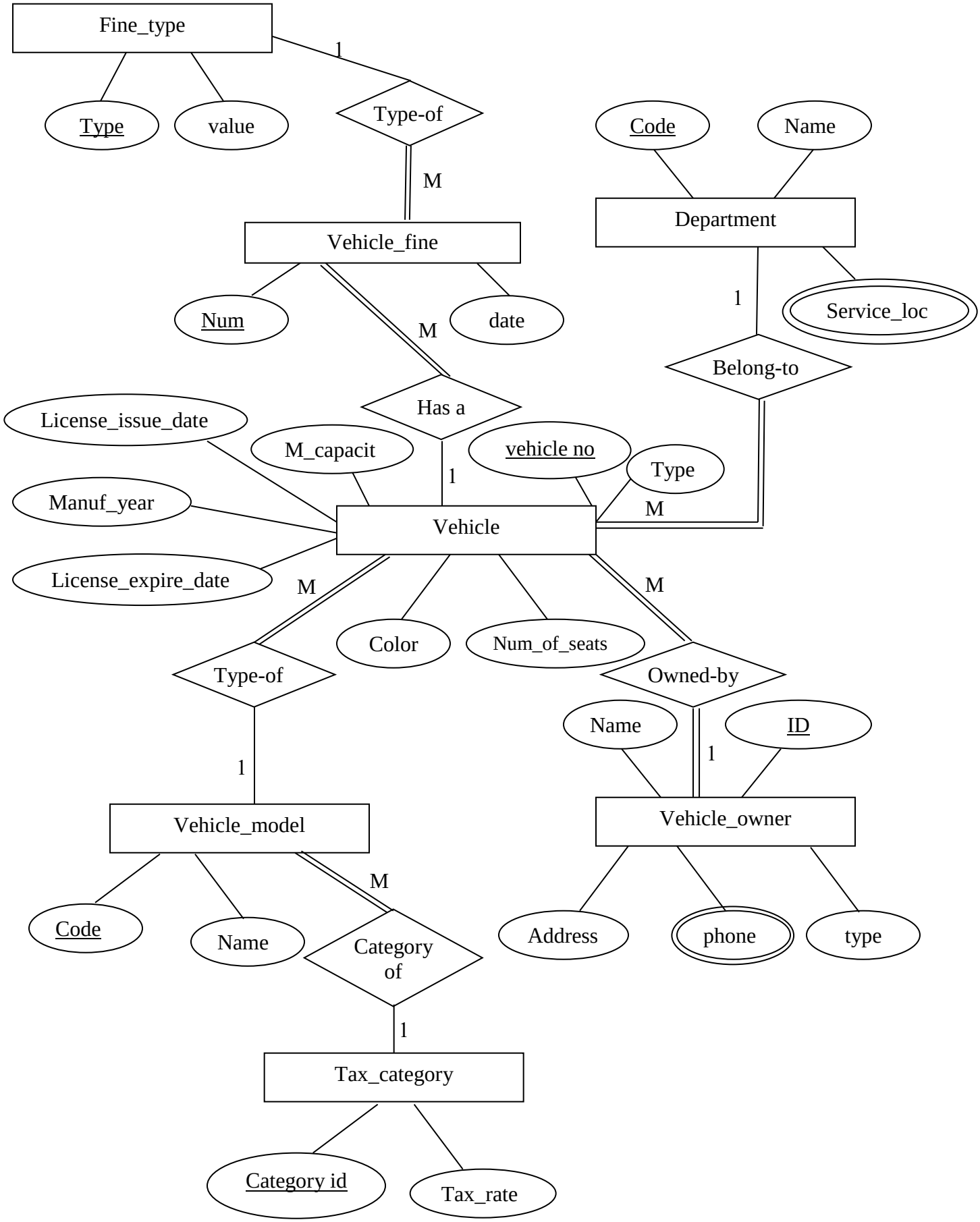
**Problem 2**

Design an ER diagram for a license issuing process of vehicles. The data requirements are as follows:

- The country is divided into departments (Cairo, Giza, Alex…etc). Each department is described by a code (unique), name (unique), and several service locations (e.g., for Cairo department, there are: Heliopolis, Nasr City, etc.).

- Each vehicle is described by a vehicle no, model(ex. Hyundai accent, Hyundai matrix ,fiat 128,fiat punto) , type(private, limousine, taxi,…etc), color, motor capacity, number of seats, manufacturing year, license issue date, license expiry date, owner, tax rate, and a set of fins. The owner, type and tax rate information are mandatory for each vehicle. Each vehicle model is identified by a code (unique), name (unique) and tax category. Each tax category has a specific tax rate and category_id. The tax category has one or more vehicle models.

- Each vehicle fin is described by a number (unique), type, date, and vehicle no. Each fin type has a specific value and description.
- Each owner is described by id (unique), name, type (individual, organization, government, etc.), address, and set of phone numbers.


Fine_type
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Type
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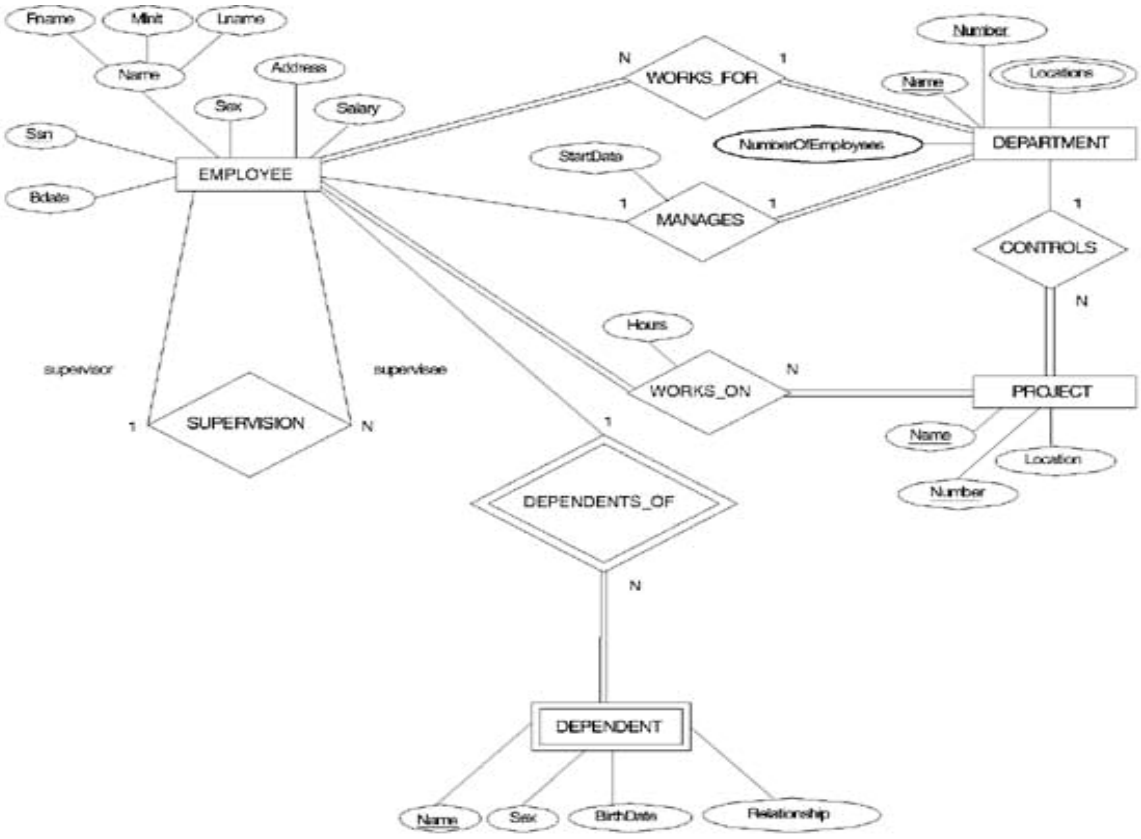
Name
Department
Vehicle_fine
1
Num
M
date
Service_loc
Belong-to
Has a
License_issue_date
M_capacit
vehicle no
Type
1
M
Manuf_year
Vehicle
License_expire_date
M
M
Color
Num_of_seats
Type-of
Owned-by
Name
ID
1
1
Vehicle_model
Vehicle_owner
M
Code
Name
Category
of
Address
phone
type
1
Tax_category
Category id
Tax_rate

- A company is organized into departments. Each department has a unique name, a unique number, and a particular employee who manages the department and several employees working in it . A department may have several locations.
- A department  may control a number of projects, each of which has a unique name, a unique number, and a single location. A  project must controlled by department.
- We store employee's name, social security number, address, salary, gender and birth date. An employee must be assigned to one department and must  work on one or more projects, which are not necessarily controlled by the same department. We keep track of the number of hours per week that an employee works on each project. We also keep track of the direct supervisor of each employee.
- We want to keep track of the dependents of each employee for insurance purposes. We keep each dependent's first name, gender, birth date and relationship to that employee.


Fname
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Sex
Salary
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EMPLOYEE
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WORKS_FOR
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Number
Name
Locations
DEPARTMENT
NumberOfEmployees
StartDate
1
MANAGES
1
1
CONTROLS
N
Hours
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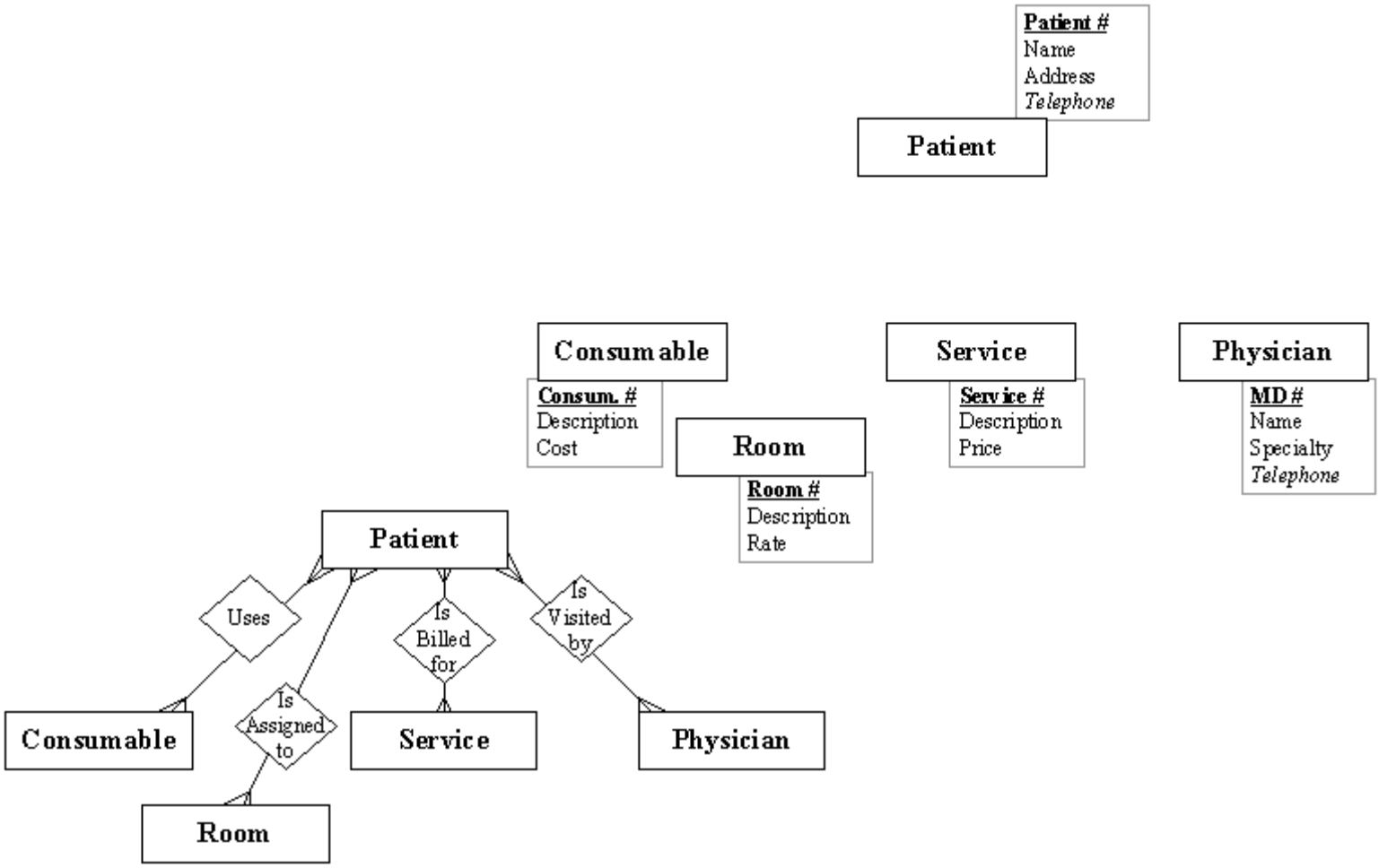
WORKS_ON
PROJECT
Name
Location
Number
supervisor
supervisee
1
SUPERVISION
N
1
DEPENDENTS_OF
N
DEPENDENT
Name
Sex
BirthDate
Relationship

- (MVH) is a small 100-bed community hospital that is trying to deliver high-quality health care while controlling costs within a service area that includes a section of central Colorado. The population of the service area is growing rapidly (at greater than 8% per year) as more people move to the area, and MVH is attempting to upgrade its information infrastructure to handle a greater patient load without a greater increase in costs. The hospital is expecting to increase by 50 beds in the next two years, and has placed money in its strategic investments fund to support the development of new information systems to support its internal medicine and surgical care divisions. Medicine accounts for 60% of the hospital's patient load and the Surgery service accounts for most of the rest.



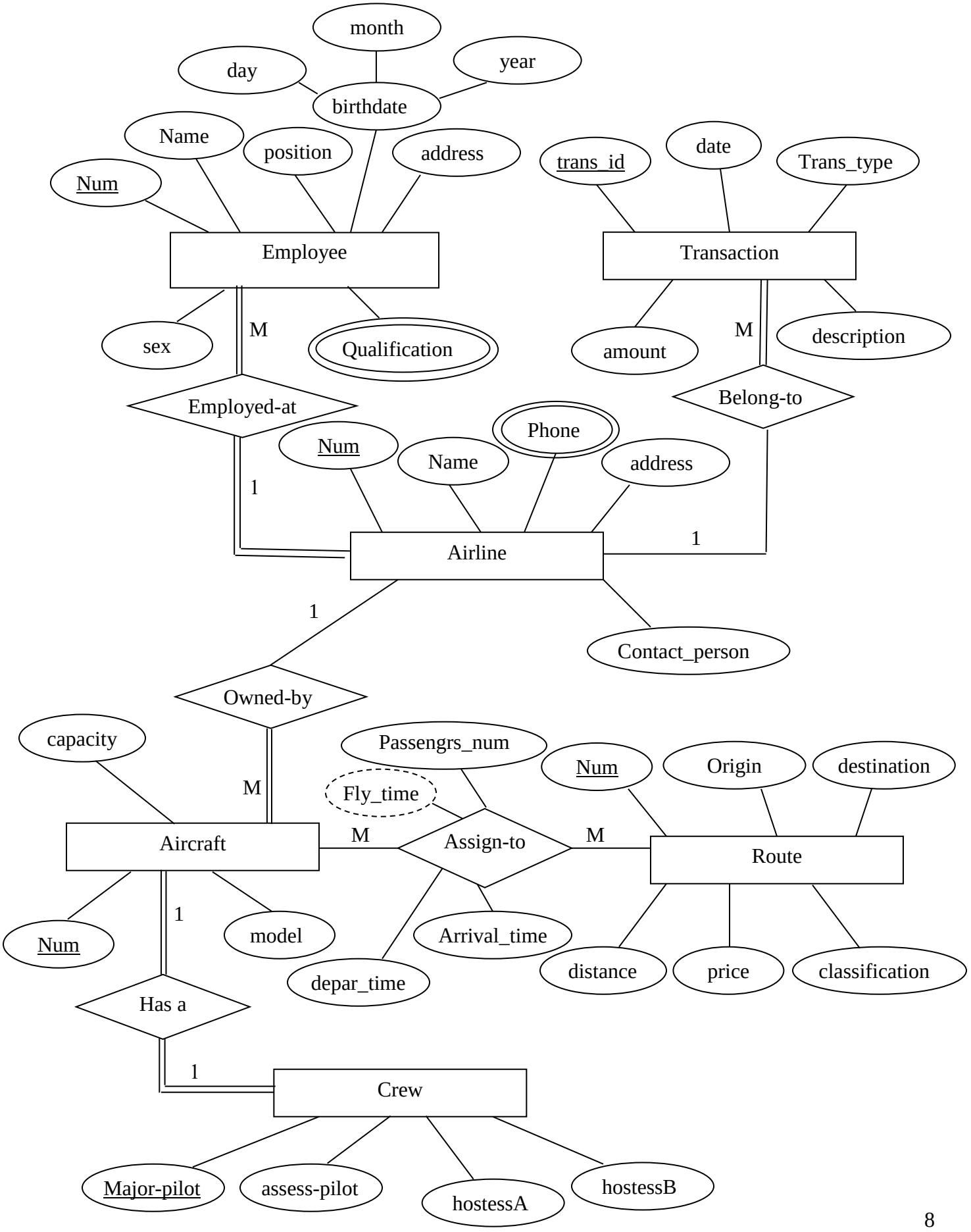
# Airlines ERD Case Solution

Major airlines companies that provide passenger services in Taiwan are: UniAir, TransAsia Airways, Far Eastern Transport, Great China Airlines etc.
Taiwan's Federal Aviation Administration (TFAA) keeps a database with lots of information on all airlines.
This information is made accessible to all airlines in Taiwan with the intention of helping the companies assess their competitive position in the domestic market. The information kept consists of:
1. Each airline has an identification number, name and address, name of the contact person and telephone numbers.
2. Each employee works in Airline Company has an employee identification number, name, address, birthday recorded as (day, month, year), sex, position with the company, and qualifications.
3. Each airline owns different aircraft models . For each aircraft an aircraft identification number, capacity, and model is recorded.
4. The aircrafts are assigned to different routes. With some information as number of passengers, departure time, arrival time and the time that aircraft spent in the flight .

Each route has a route identification number, origin, destination, classification (Into domestic or international route), distance of the route, and price charged per Passenger.

5. Each aircraft has its own crew (major pilot, assistant pilot and two hostesses) , the aircraft crew not stored as employee.

6. Each airline keeps information about their buy/sell transactions (for example selling an airplane ticket is a sell transaction, paying for maintenance is a buy transaction). Each transaction has a transaction identification number, date, description, and amount of money paid/received.
**Draw an E-R diagram for the database presented above.**


month
day
year
birthdate
Name
position
address
Num
Employee
trans_id
date
Trans_type
Transaction
sex
M
Qualification
amount
M
description
Employed-at
Belong-to
Phone
Num
Name
address
1
Airline
1
1
Contact_person
Owned-by
capacity
Passengrs_num
Num
Origin
destination
M
Fly_time
Aircraft
M
Assign-to
M
Route
1
Num
model
Arrival_time
distance
price
classification
depar_time
Has a
1
Crew
Major-pilot
assess-pilot
hostessA
hostessB