CSE 4308
Database Management Systems Lab
Lab 07 Tasks & Solutions
Converting ER Models to Relational Models

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Scenario - 1

- Underline the major nouns you come across. These will usually be your entities.

- Note the verb used to describe the action of those nouns. They will hint to the relationships between those entities.

- Keep track of any additional information that may need to be declared as extra constraints i.e. constraints other than primary or foreign keys.

Bangladesh government has decided to find an online solution for the 'National library of Bangladesh' (NLB). Many branches of NLB already exist in different locations of Bangladesh.

▪ The branch information will be stored which will contain branch ID, branch name, year of establishment and address.

▪ Whenever any person will open an account, he/she will first need to register in the system. The user will need to pick a username which must be unique. Along with this his/her name, birth date, home town, occupation, gender will be stored.

▪ Every library is maintained by some employees. So the information of the staff shall also be stored in NLB online solution. NLB divides the overall staff into 3 categories (Admin, Maintenance and others). The staff information will include the staff name, his National ID number, Blood Group, job category and birth date.

▪ NLB provides flexibility to the staff to work in different branch in different shifts. So this information will also be stored in the system which will include the branch ID, day of week, starting time, and duration.

▪ NLB also needs to store information about books and publishers. Books contain information like their name, author, publisher, price, study area etc. Each branch of NLB may host these books. However, the number of copies of a book that each branch has must be stored efficiently.

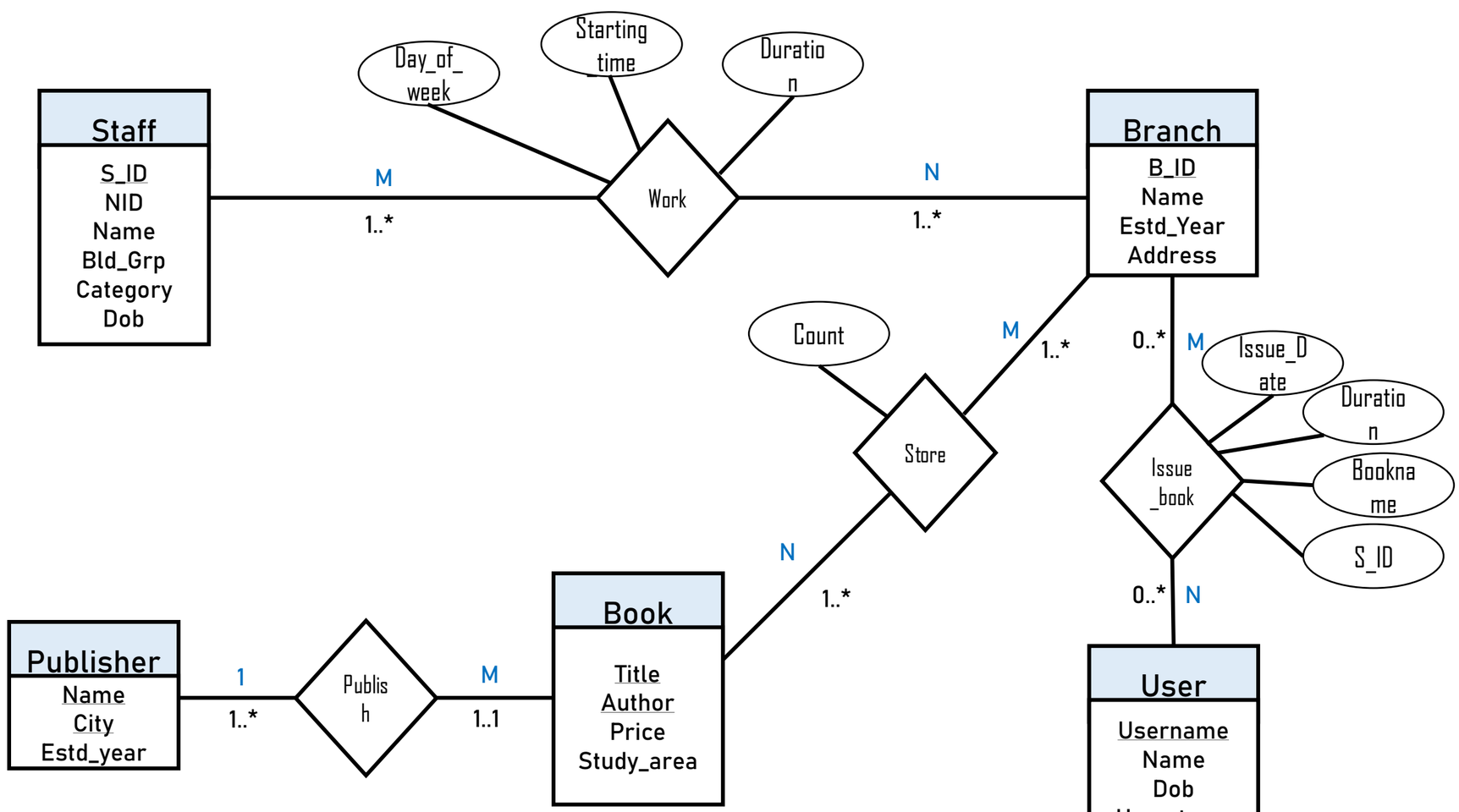
Publishers have their name, year of establishment and city of operations. Note that, the same city will not have more than one publisher with the same name.

▪ The main part of the library is issuing books. NLB wants to store the necessary information about every issued book by any user.

Every record will contain the user ID, branch ID, book name, ID of the employee who issued the book, issuing date and number of days that the user can keep the book. Each of these records can't allow null value.

But in case of the number of days of keeping the books, if the branch has a lot of copies of that book, sometimes the librarian may not mention the deadline. In those cases, the book must be returned within 15 days by default.

ERD



Tables

1. Publisher(Name,City,Estd_year)
2. Book(Title,Author,Publisher,Price,Study_area,Name,City)

3. Staff(S_ID,NID,Name,Bld_Grp,Category,Dob)
4. Branch(B_ID,Name,Estd_year,Address)
5. Staff_Work_Branch(S_ID,B_ID,Day_of_week,Start_time,Duration)
6. Branch_Store_Book(B_ID,Title,Author,Count)

7. User(Username,Name,Dob,Hometown,Occupation,Gender)
8. Branch_IssueBook_User(B_ID,Username,Issue_date,Duration, Bookname,S_ID)
(Red Font = Foreign key)

Scenario - 2

- Underline the major nouns you come across. These will usually be your entities.

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A hospital at the heart of Dhaka named IUT Medical Centre (IUTMC), is planning on restructuring their database so that all their information can be accommodated. As a programmer, you have been assigned the task of designing their database.

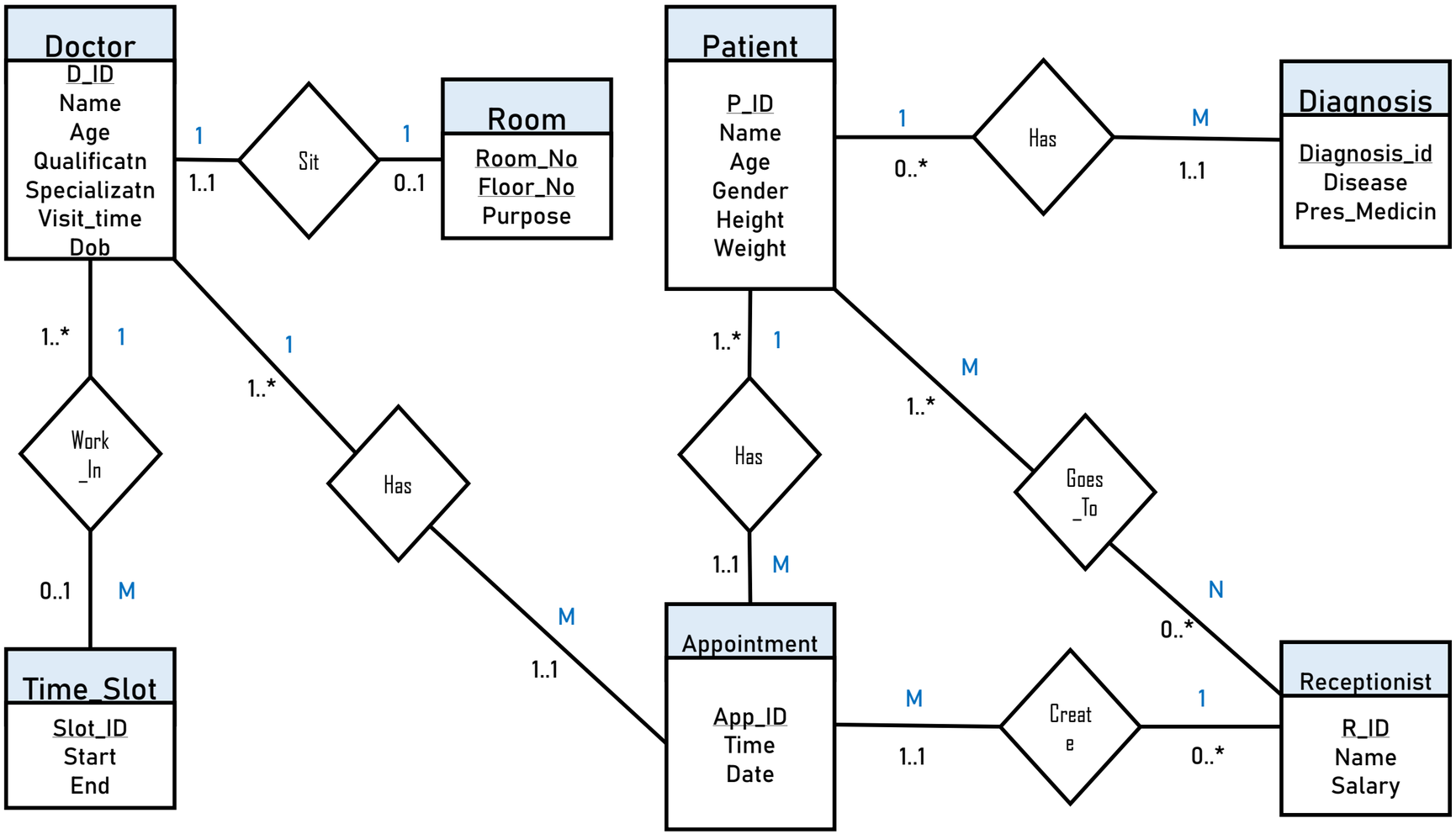
▪ IUTMC has a large number of doctors that specialize in a wide variety of fields. The information of the doctor such as his name, age, qualification, specialization and visiting time should be stored in a separate table. There can be multiple time slots during which a doctor can practice. The start and end time of each slot along with the information of which doctors are practicing at that slot should be stored in a separate table.

▪ Another table containing the information of the rooms should also be maintained. The floor at which the room is located and the purpose of that room (e.g. doctor's chamber, waiting room, ward, diagnosis room) should be kept record of.

▪ Every time a new patient comes to the hospital, a new entry is made in the database containing information such as his name, age, gender, doctor he is visiting, height, weight etc. Also, his previous medical records and any diagnosis reports will have to be stored. In case a doctor prescribes medicine, that will also have to be included under his entry. Any diagnosis report has to be kept in a separate table along with the details of the diagnosis done.

▪ Any patient that want to visit a doctor will have to first make an appointment with the doctor. A receptionist will be responsible for this appointment whose details will be stored in a separate table. Numerous receptionists work at IUTMC and they have their own information like name, salary, doctors they work for etc. The information of the appointment such as time, date, patients name, doctor's name and the receptionist responsible will have to be stored. While choosing the doctor, a patient can look for a doctor based on his field of specialization and qualification.

ERD



Tables

1. *Doctor(D_ID,Name,Age,Qualificatn,Specializatn,Visit_time,Dob)*
2. *Room(Room_no,Floor_no,Purpose,D_ID)*
3. *Time_Slot(Slot_ID,Start,End,D_ID)*
4. *Patient(P_ID,Name,Age,Gender,Height,Weight)*
5. *Diagnosis(Diagnosis_ID,Disease,Pres_Medicine,P_ID)*
6. *Receptionist(R_ID,Name,Salary)*
7. *Patient_GoesTo_Receptionist(P_ID,R_ID)*
8. *Appointment(App_ID,Time,Date,D_ID,P_ID,R_ID)*

(Red Font = Foreign key)

Scenario - 3

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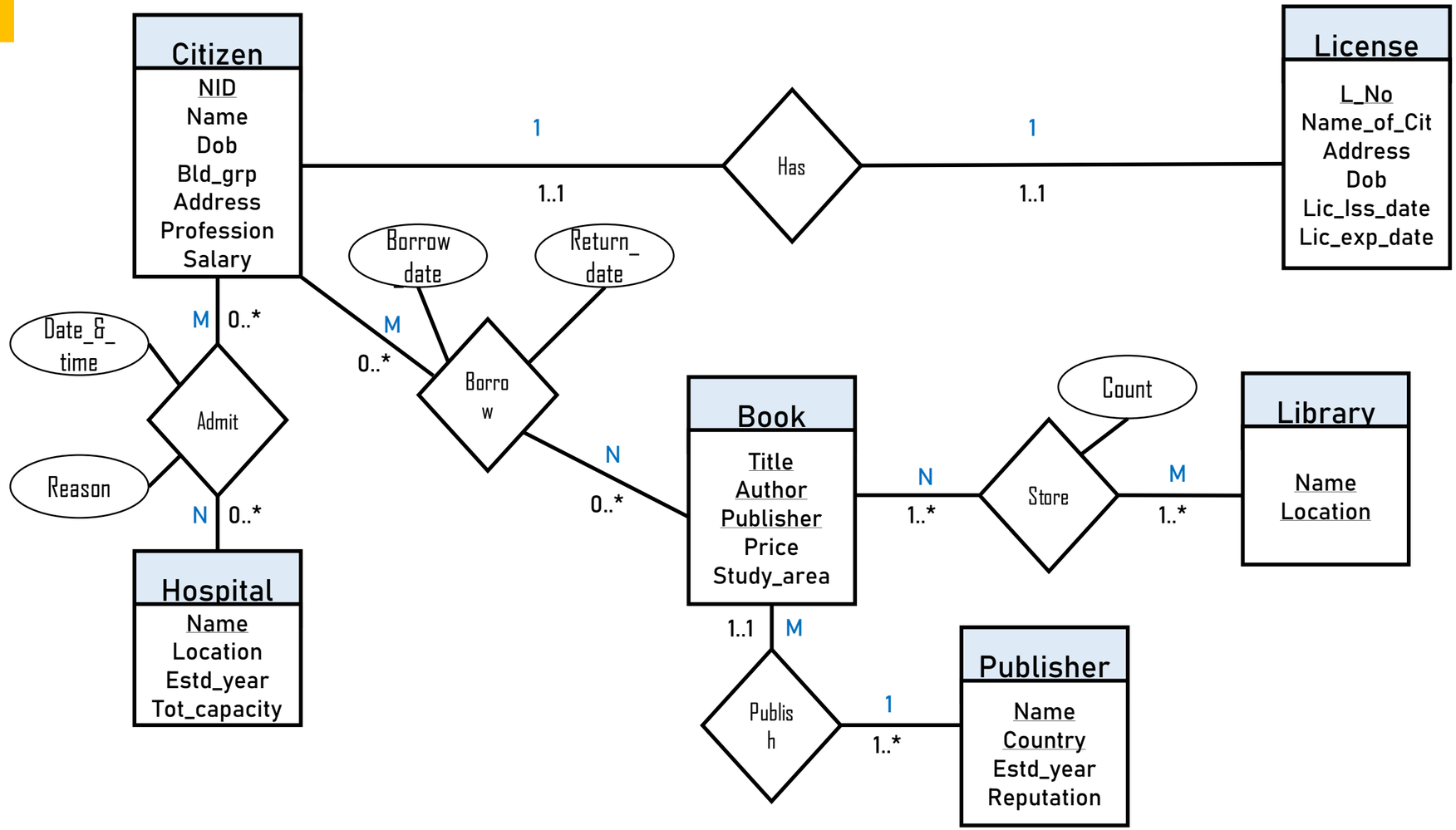
Government of Bangladesh plans to digitalize its different sectors. Each of the following points are based on a description of the desired system of a particular component and a number of requirements are identified. The components are logically connected.

▪ A national database should be maintained to store the basic information of each citizen such as Name, Date of Birth (DOB), Blood Group, Address, Profession, Salary etc.
▪ We want to store and maintain citizens' driving license information such as Name of Citizen, Address, Date of Birth, License No, License Issue Date, License Expire Date. Each Citizen may have at most one driving license.
▪ Now, medical sector should be connected to this system. To achieve this, the information of each hospital should be maintained including Name of Hospital, Location, Year of Establishment, Total Capacity etc. Citizens may be admitted to any of these hospitals but his time and reason for admission must be stored.
▪ Libraries should be digitalized too. The different libraries in the country are recognized by their name and location. Libraries store book information such as book title, price, category etc.
  – Publishers are well-known along with some additional information such as Name, Established Year, Country of origin, reputation.
  – Multiple copies of a book must be stored efficiently.
  – A citizen can borrow and return books from library. Information related to date of borrowal and date of return must be stored.

ERD



Tables (Complete yourself)

Scenario - 4

- Underline the major nouns you come across. These will usually be your entities.

- Note the verb used to describe the action of those nouns. They will hint to the relationships between those entities.

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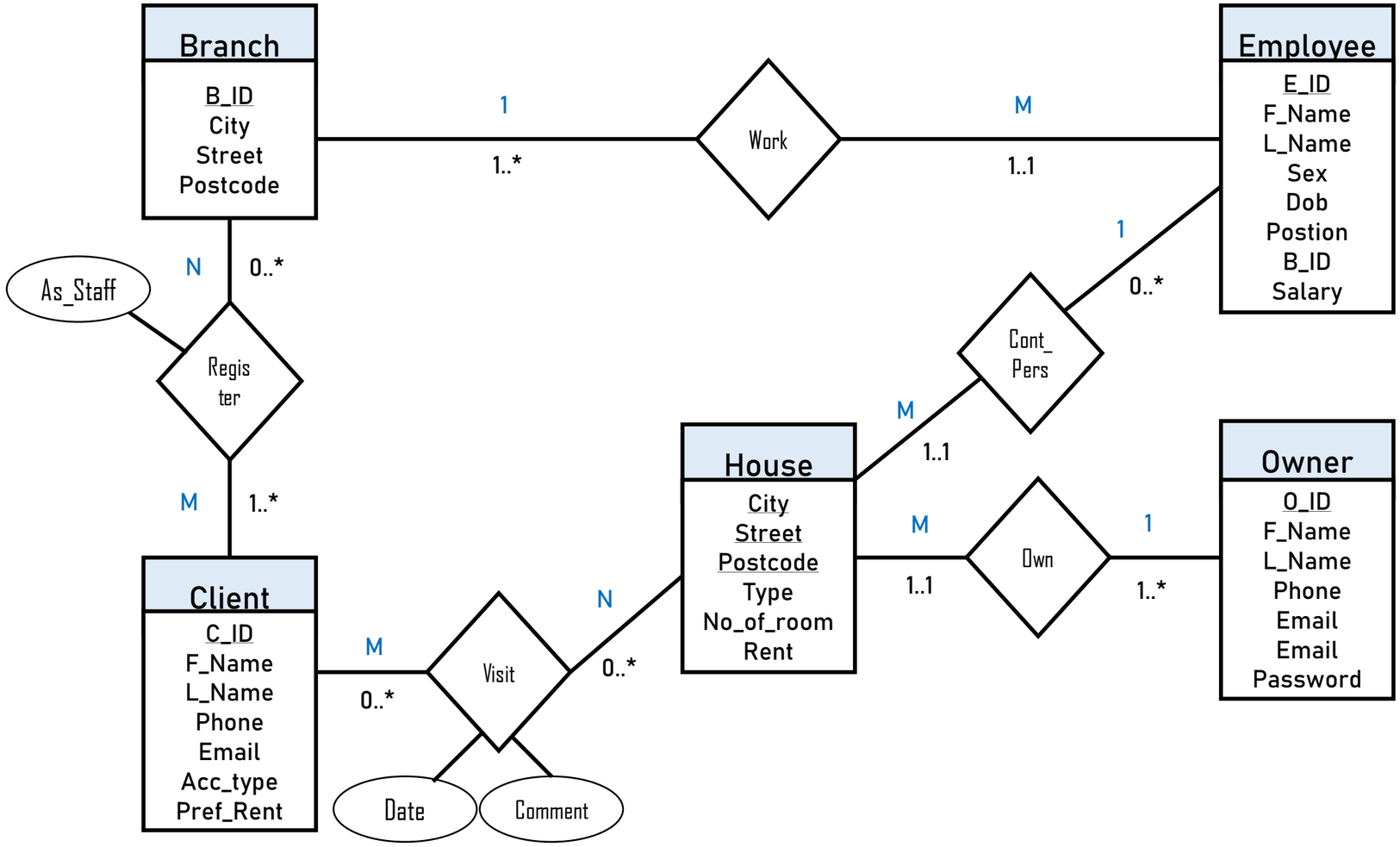
Bhalo Basha Chai - is a housing agent in Bangladesh like Bikroy.com that publishes advertisements of properties that can be rented. Previously they stored all their information in papers. Recently they have decided to use a database. They have come up with the following requirements:

▪ There are many branches of Bhalo Basha Chai throughout the country. Each branch is located in a street of a city and has a postcode.
▪ Many employees work in Bhalo Basha Chai. Upon joining the company, they provide their first name, last name, sex, date of birth. They are also appointed to a position (like manager, salesperson etc) in a specific branch. Their salaries are also recorded for tax purpose.
▪ Numerous clients rent houses from Bhalo Basha Chai. Whenever they register on the website, they provide their first name, last name, telephone number, email, preferred accommodation type and the maximum amount of rent they can afford.
▪ During registration, the client goes to a specific branch. He/she is also assigned a staff member who is their contact person. A client can register in multiple branches.
▪ Bhalo Basha Chai needs to store information about the property owners who actually own the houses. The owners register on their website by providing their first name, last name, telephone number, email and password.
▪ Bhalo Basha Chai has multiple houses for rent under them. These houses are denoted by street, city, postcode, type, number of available rooms, rent. Each property is associated with one owner, one contact person who is also a stuff of Bhalo Basha Chai and the branch the staff works in.
▪ Each client can visit a property multiple times, but not twice in a day. A client can make some comments about the property during his/her visit. The date of his/her visit also needs to be documented.

ERD



Tables (Complete yourself)