ER Diagram Example

Ms. Khushbu Tikhe

Assistant Professor

Department of Electronics and Computer Science

SLRTCE, Mira Road

EX_1: ER diagram of Bank Management System

- ER diagram of Bank has the following description :

- Bank have Customer.
- Banks are identified by a name, code, address of main office.
- Banks have branches.
- Branches are identified by a branch_no., branch_name, address.
- Customers are identified by name, cust-id, phone number, address.
- Customer can have one or more accounts.
- Accounts are identified by account_no., acc_type, balance.
- Customer can avail loans.
- Loans are identified by loan_id, loan_type and amount.
- Account and loans are related to bank's branch.

ER Diagram of Bank Management System :

ER Diagram of a Bank
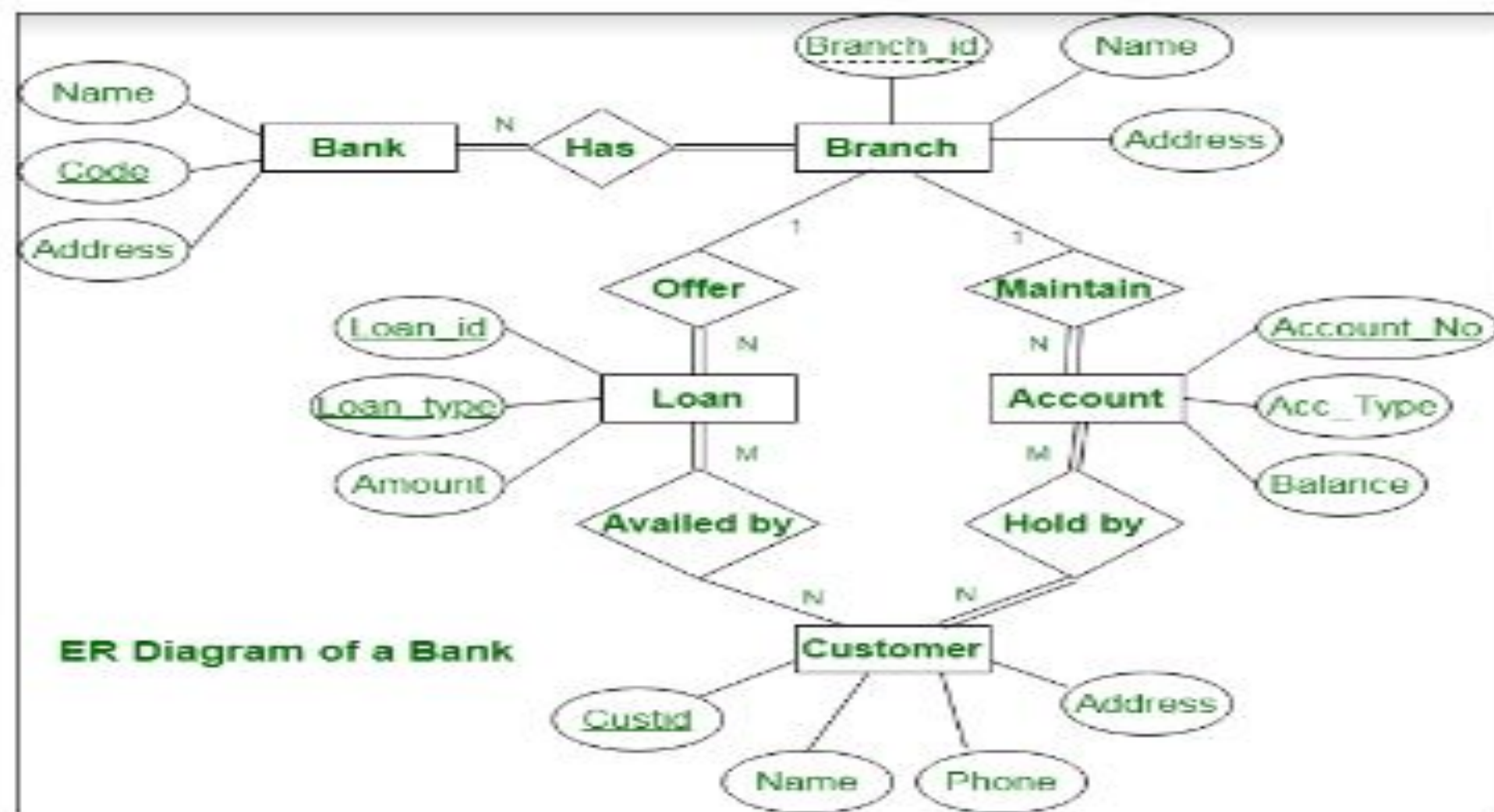
Entities and their Attributes are

- **Bank Entity :** Attributes of Bank Entity are Bank Name, Code and Address.
  Code is Primary Key for Bank Entity.

- **Customer Entity :** Attributes of Customer Entity are Customer_id, Name, Phone Number and Address.
  Customer_id is Primary Key for Customer Entity.

- **Branch Entity :** Attributes of Branch Entity are Branch_id, Name and Address.
  Branch_id is Primary Key for Branch Entity.

- **Account Entity :** Attributes of Account Entity are Account_number, Account_Type and Balance.
  Account_number is Primary Key for Account Entity.

- **Loan Entity :** Attributes of Loan Entity are Loan_id, Loan_Type and Amount.
  Loan_id is Primary Key for Loan Entity.

[Relationships]{.underline} are :

- **Bank has Branches => 1 : N**
  One Bank can have many Branches but one Branch can not belong to many Banks, so the relationship between Bank and Branch is one to many relationship.

- **Branch maintain Accounts => 1 : N**
  One Branch can have many Accounts but one Account can not belong to many Branches, so the relationship between Branch and Account is one to many relationship.

- **Branch offer Loans => 1 : N**
  One Branch can have many Loans but one Loan can not belong to many Branches, so the relationship between Branch and Loan is one to many relationship.

Relationships are

- **Account held by Customers => M : N**
  One Customer can have more than one Accounts and also One Account can be held by one or more Customers, so the relationship between Account and Customers is many to many relationship.

- **Loan availed by Customer => M : N**
  (Assume loan can be jointly held by many Customers).
  One Customer can have more than one Loans and also One Loan can be availed by one or more Customers, so the relationship between Loan and Customers is many to many relationship.
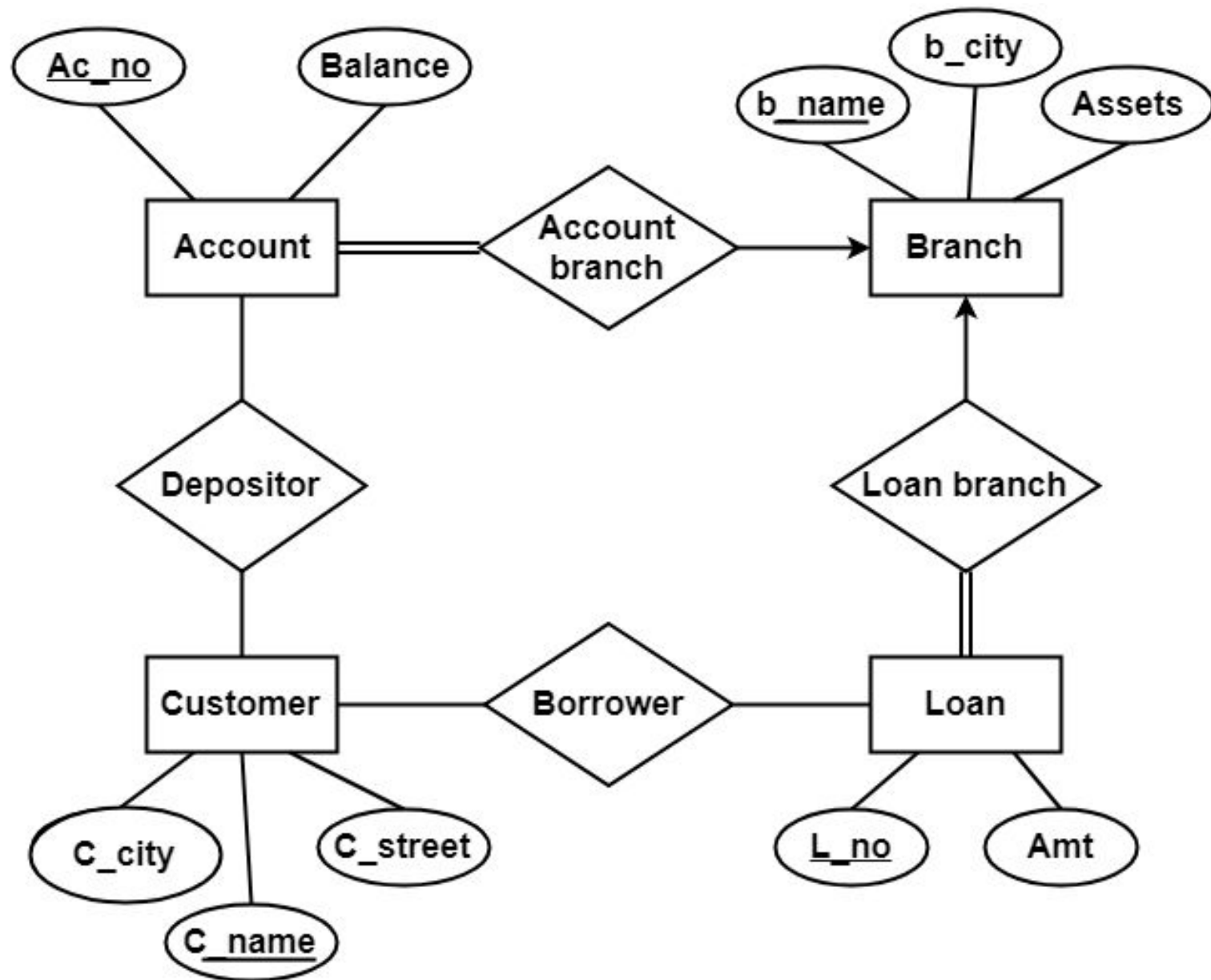
- **<u>Solution-</u>**
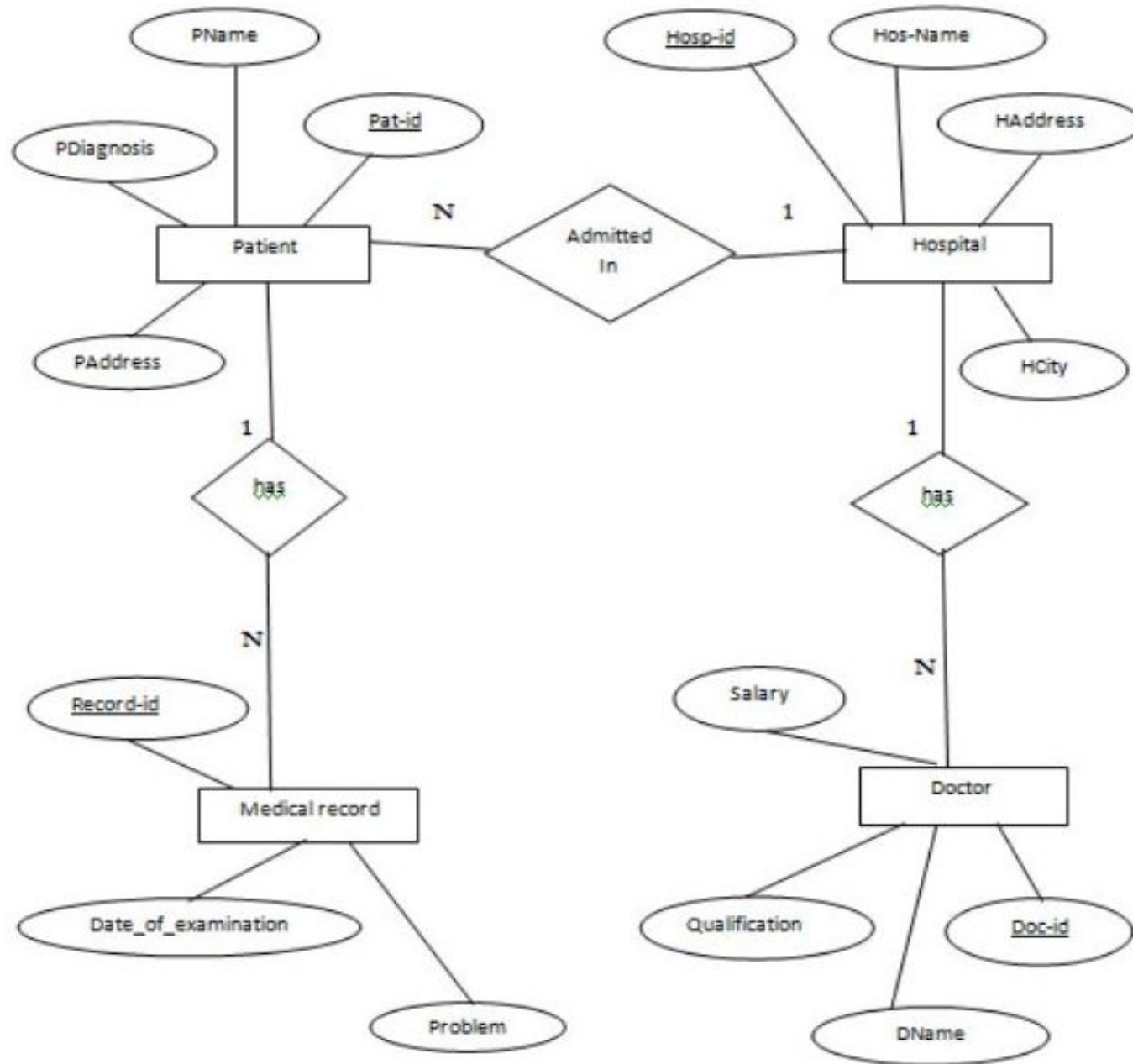- Account (<u>Ac_no</u> , Balance , <u>b_name</u>)
- Branch (<u>b_name</u> , b_city , Assets)
- Loan (<u>L_no</u> , Amt , <u>b_name</u>)
- Borrower (<u>C_name</u> , <u>L_no</u>)
- Customer (<u>C_name</u> , C_street , C_city)
- Depositor (<u>C_name</u> , <u>Ac_no</u>)
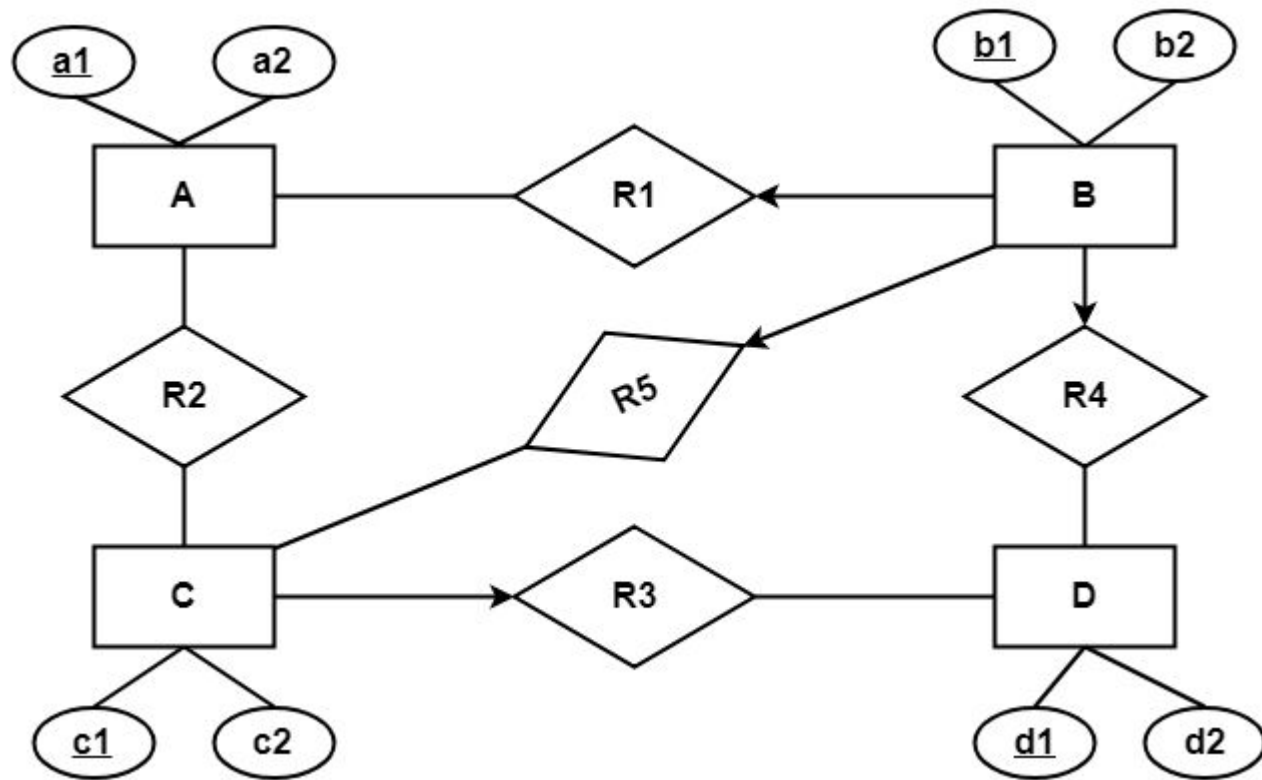
- **Solution-**
- Applying the rules, minimum 5 tables will be required-
- BR1R4R5 ($\underline{b1}$, b2 , $\underline{a1}$, $\underline{c1}$, $\underline{d1}$)
- A ($\underline{a1}$, a2)
- R2 ($\underline{a1}$, $\underline{c1}$)
- CR3 ($\underline{c1}$, c2 , $\underline{d1}$)
- D ($\underline{d1}$, d2)

ER diagram for hospital management system

Step 2: Converting the E-R Diagram into Tables

b. Converting entity to table and attribute to columns

Hospital

Hosp-id	Primary Key
HCity	
HAddress	
Hos-Name	
Pat-id	Foreign key references to Pat-id of Patient table
Doc-id	Foreign key references to Doc-id of Doctor table

Step 2 cont..

Patient

Pat-id	Primary Key
PName	
PAddress	
PDiagnosis	
Record-id	Foreign key references to Record-id of Medical Record table
Hosp-id	Foreign key references to Hosp-id of Hospital table

Medical Record

Record-id	Primary Key
Problem	
Date_of_examination	
Pat-id	Foreign key references to Pat-id of Patient table

Doctor

Doc-id	Primary Key
DName	
Qualification	
Salary	
Hosp-id	Foreign key references to Hosp-id of Hospital table

Step 3: Mapping of Attributes

- **Simple Attributes**

  Simple Attributes which can not be divided into subparts.

  Example: Salary of Doctor

  ```
        Salary
          |
          |
   ┌──────────┐
   │  Doctor  │
   └──────────┘
  ```

- **Composite Attributes**

  Composite Attributes which can be divided into subparts.

  Example: Patient Name, Doctor Name

Patient		Doctor
First_Name		First_Name
Middle_Name		Middle_Name
Last_name		Last_name

Step 4: Mapping of Relationships

b. Foreign Key approach

Hosp_patient

Pat-id	Hospital table makes foreign key references to Pat-id of Patient table
Hosp-id	Patient table makes foreign key references to Hosp-id of Hospital table

Hosp_Doctor

Hosp-id	Doctor table makes foreign key references to Hosp-id of Hospital table
Doc-id	Hospital table makes foreign key references to Doc-id of Doctor table

PatiPPatient_MedicalRecord

Pat-id	Medical Record table makes foreign key references to Pat-id of Patient table
Record-id	Patient table makes foreign key references to Record-id of Medical Record table

Step 5: Identifying the relationships

a. Hospital has a set of patients.

Therefore the relations is 1……..N.

b. Hospital has a set of doctors.

Therefore the relations is 1……..N.

c. Doctor are associated with each patient.

Therefore the relations is N……..1.

d. Each patient has record of various test and examination conducted.

Therefore the relations is 1……..N.