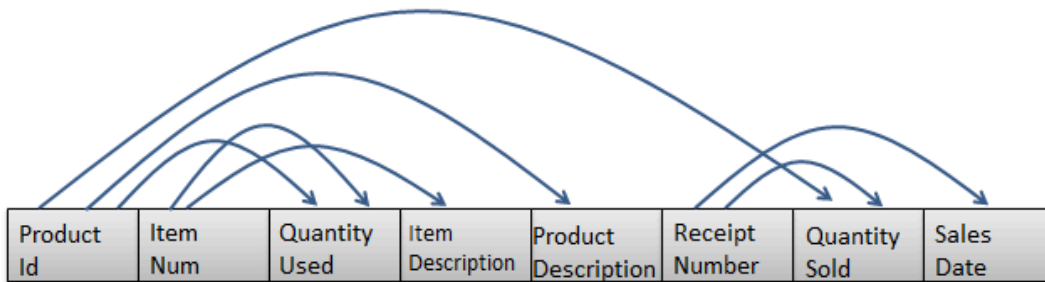


## CS443 - Assignment 3

### Question #1

Consider the following Table All information have been placed in one table. Arrows show the functional dependency. You are required to place this table in 3<sup>rd</sup> normal form.



The arrows in this question indicated the determination of two attributes. For example, the arrow that goes ProductID to ProductDescription indicates that ProductID determines the ProductDescription. This in turn means that ProductId can be considered as primary key for ProductDescription.

a) Write the tables

Product: ProductId, ProductDescription

Item: ItemNum, ItemDescription

Receipt: ReceiptNum, SalesDate

ProdItem: ProductId, ItemNum, QuantityUsed

ProdRec: ProductId, ReceiptNum, QuantitySold

b) Place the tables in 3<sup>rd</sup> normal form (if necessary)

# There is no need to set the table into the normal form since there aren't any transitive or derived dependencies to remove

Product ( ProductId , ProductDescription )

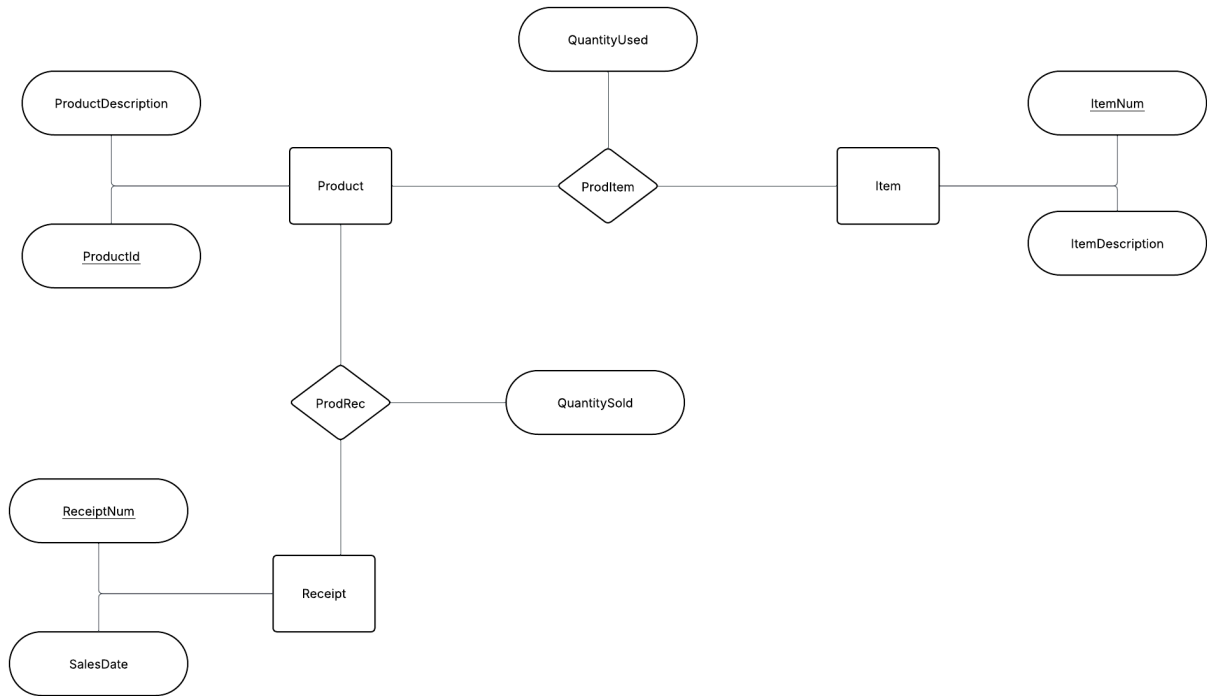
Item ( ItemNum , ItemDescription )

Receipt ( ReceiptNum , SalesDate )

ProdItem ( ProductId , ItemNum , QuantityUsed )

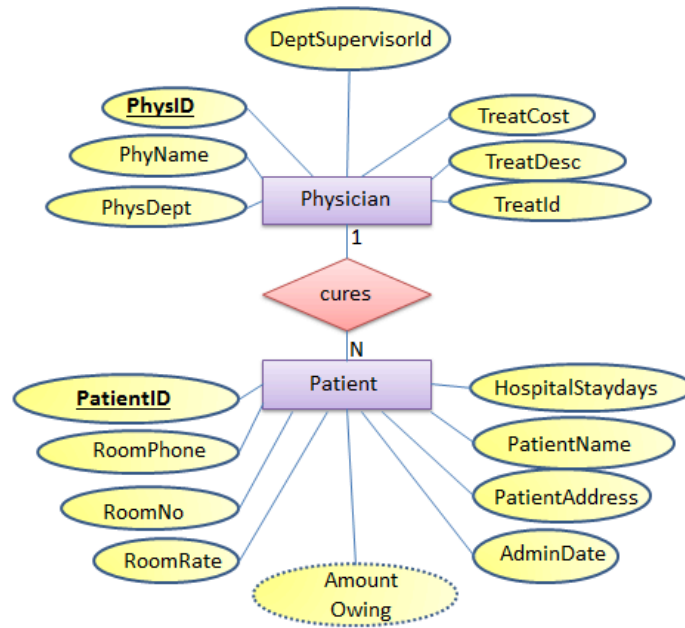
ProdRec ( ProductId , ReceiptNum , QuantitySold )

c) Create ERD based on the normalized tables



## Question #2

Consider the following ERD



Where

- PatientId: It is the identification number of each patient
- PatientName: It is the name of the patient
- PatientAddr: It is the address of the patient
- AdmitDate: It is the date when the patient is admitted to the hospital
- AmountOwing: The amount the patient owes based on his/her sickness after being discharged
- RoomNo: It is the room where the patient is kept in the hospital
- RoomPhone: The phone number in the patient's room
- HospitalStayDays: Number of days the patient would be in the hospital for treatment.
- RoomRate: The rate charged for every day the patient is in the room

In the second table:

- PhysId: It is the identification number of each physician
- PhyName: It is the name of each physician
- PhysDept: It is the department id where physician works
- DeptSupervisorId: It is the id of the physician who is in charge of managing the PhyDept. For example, suppose physician x works in department y. DeptSupervisorId is the id of the physician (not necessarily physician x) who is managing department y.
- TreatId is a number that represents the type of treatment the physician can do
- TreatDesc and TreatCost are Treatment description and treatment cost

- Each patient is assigned one doctor, but a doctor can have many patients
- There may be more than one patient in a room but each patient is kept in one room only
- There is only one phone number in each room in the hospital
- Each doctor can do only one treatment, but a treatment can be done by many doctors
- The treatment cost is fixed for each treatment
- Each doctor works in only one department, but a department can have many doctors

- Each department has 1 supervisor. This supervisor is just one of the physicians who works in that department
- A Patient is charged based on the treatment cost and number of days in hospital

Note that not all the rooms in the hospital has patient at a particular time but all patient must be in some rooms. Further, only some of the physicians are supervising the departments in the hospital; however, all departments must be managed by some physicians.

You may make any other assumption you think is necessary but you have to be very specific and realistic. You can add other assumptions but you are not allowed to change the above assumptions

Do the following

- a) Change the ERD to tables

Physician: ( PhysID , PhyName, PhysDept, DeptSupervisorId, TreatCost, TreatCost, TreatDesc, TreatId )

Patient: ( PatientID , RoomPhone, RoomNo, RoomRate, AmountOwing, AdminDate, PatientAddress, PatientName, HospitalStaydays )

- b) Place the tables in 3<sup>rd</sup> normal form

# There are derived and transitive dependencies:

# In the Physician table, the following transitive dependencies are department and treatment which means that it can be split into Physician, Department, Treatment.

# In the Patient table there are both the transitive and the derived dependencies. We can split into 2 tables: Patient and Room. The other thing is that AmountOwing would be a derived in this case since it can be calculated from the RoomRate, HospitalStaydays, and TreatCost ( RoomRate \* HospitalStaydays + TreatCost )

Physician ( PhysID , PhyName, PhysDept\*, TreatId\* )

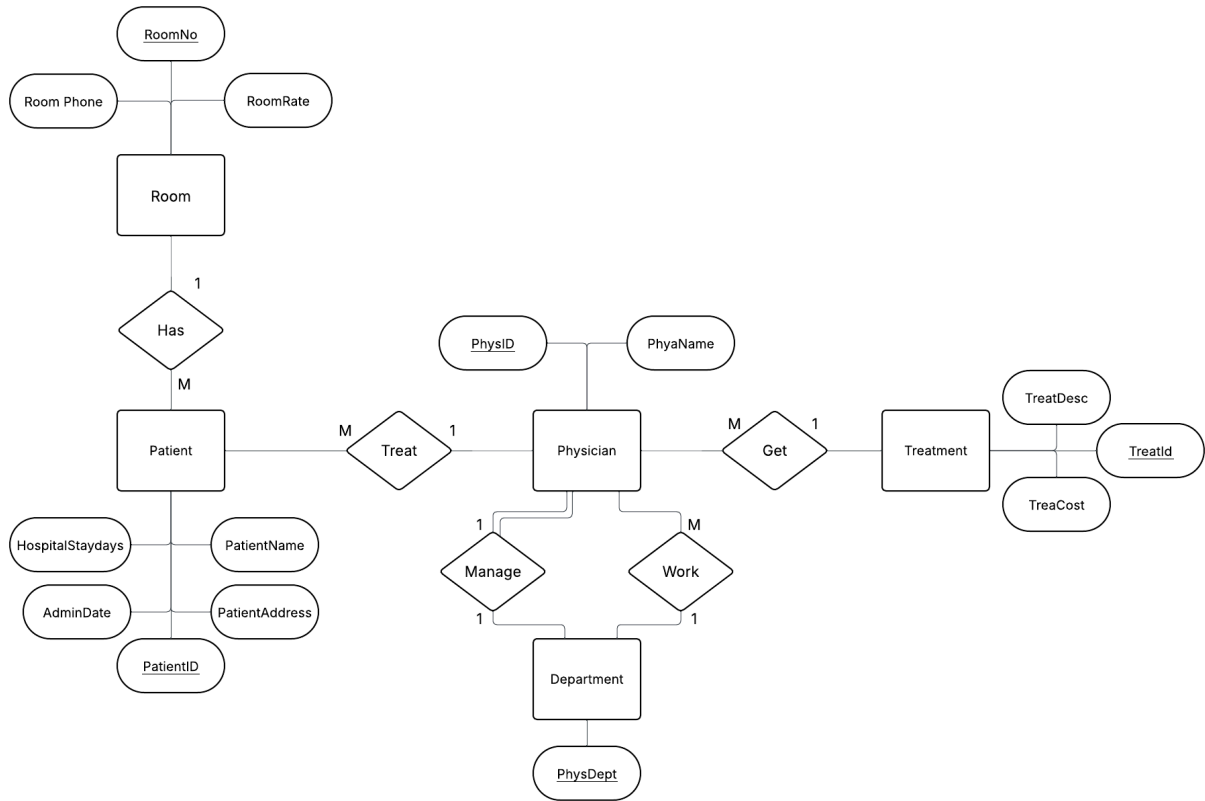
Department ( PhysDept , DeptSupervisorID\* )

Treatment ( TreatId , TreatDesc, TreatCost )

Patient ( PatientID , PatientName, PatientAddress, AdminDate, HospitalStaydays, RoomNo\* , PhysID\* )

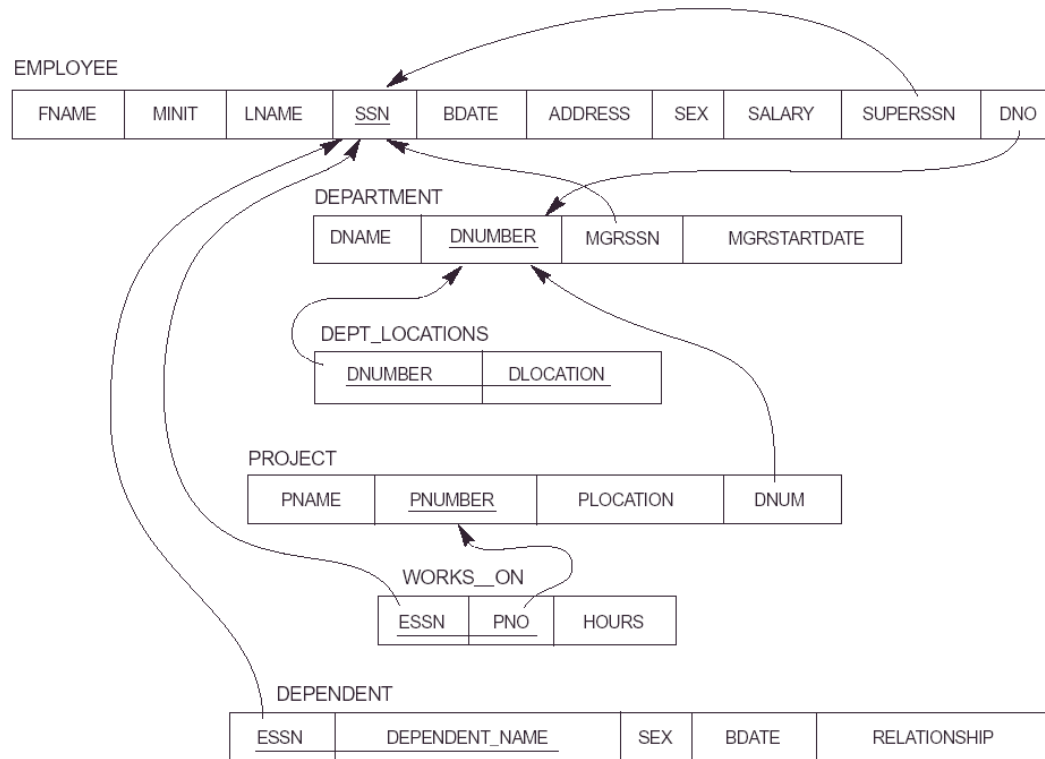
Room ( RoomNo , Room Phone, RoomRate, )

- c) Revise the given ERD based on the normalized tables



### Question 3:

The following tables are normalized. You need to create the associated ERD



## ERD

