

# PODB - Assignment 1

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## 1 Question 1

### 1.1 Introduction

I am making the ER model for Hostel Management (Hostel = Enterprise). The ER model of the database can be found in figure 1.1. It has been included in the file ER1.png in the zip archive that I uploaded.

### 1.2 Design Points

1. Student is the central entity.
2. Students can file multiple complaints. Each complaint has to be filed by some student only.
3. Each student has a room. There may be multiple students in a room. A room may be empty.
4. Student has to agree on some cloth wash scheme with a washerman. Each student can agree with only one washerman on only one scheme.
5. Students can take extras in the mess. These transactions are recorded in the mess transactions. A student can have multiple transactions for some food items. Every transaction is for some student for some food item.
6. Student can have Wash-transactions. Each such transaction is for a student.

### 1.3 Relation Schema

The tables shown in figure 1.3 can be used to store data in the database. Here, all the tables are in 3NF form. It has also been included in the file ER1Schema.png in the zip archive that I uploaded.

## 2 Question 2

### 2.1 ER Model

The ER model of the IIT Kanpur Academic Model can be found in figure 2.1. It has also been included in the file ER2.png in the zip archive that I uploaded.

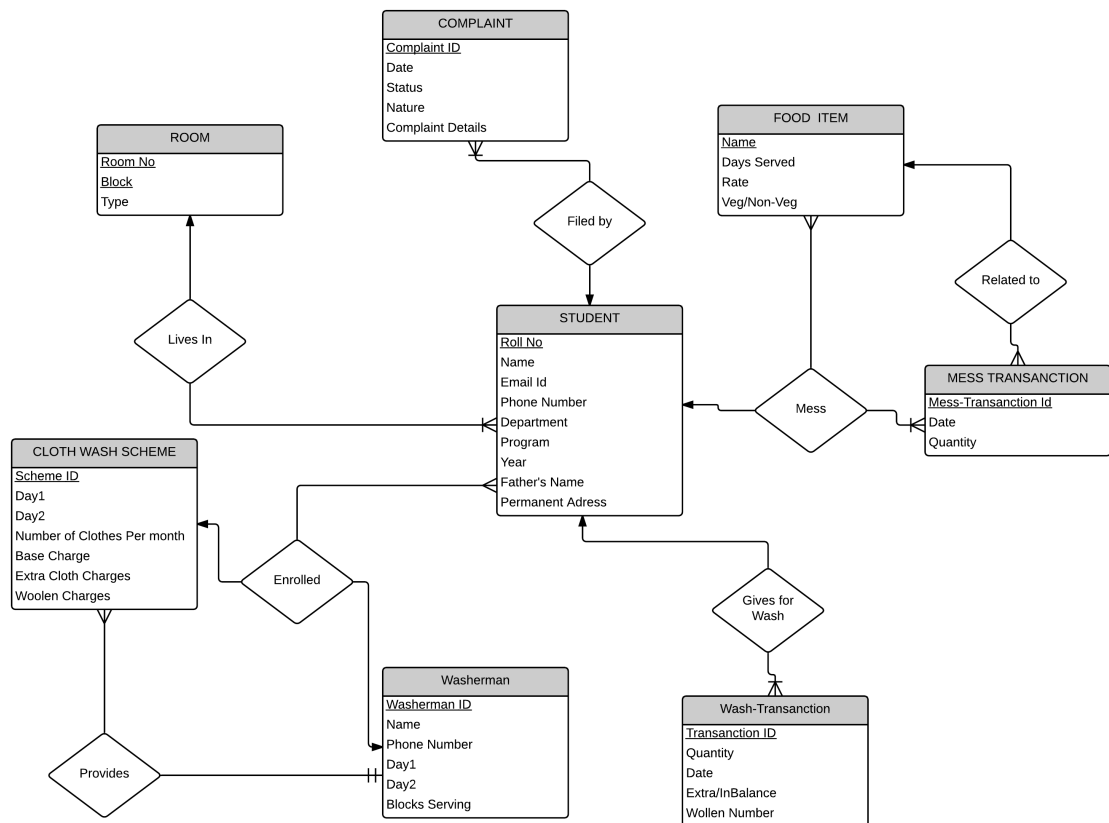


Figure 1: ER model for Hostel Management System

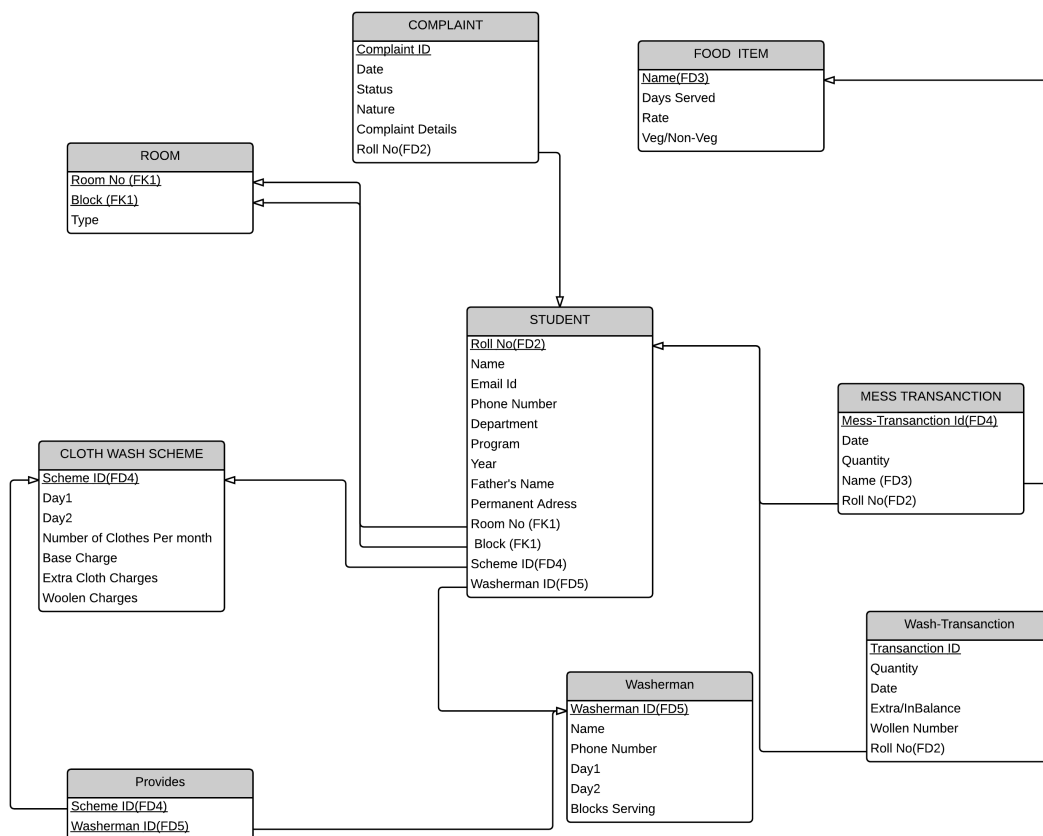


Figure 2: Database schema for Hostel Management System

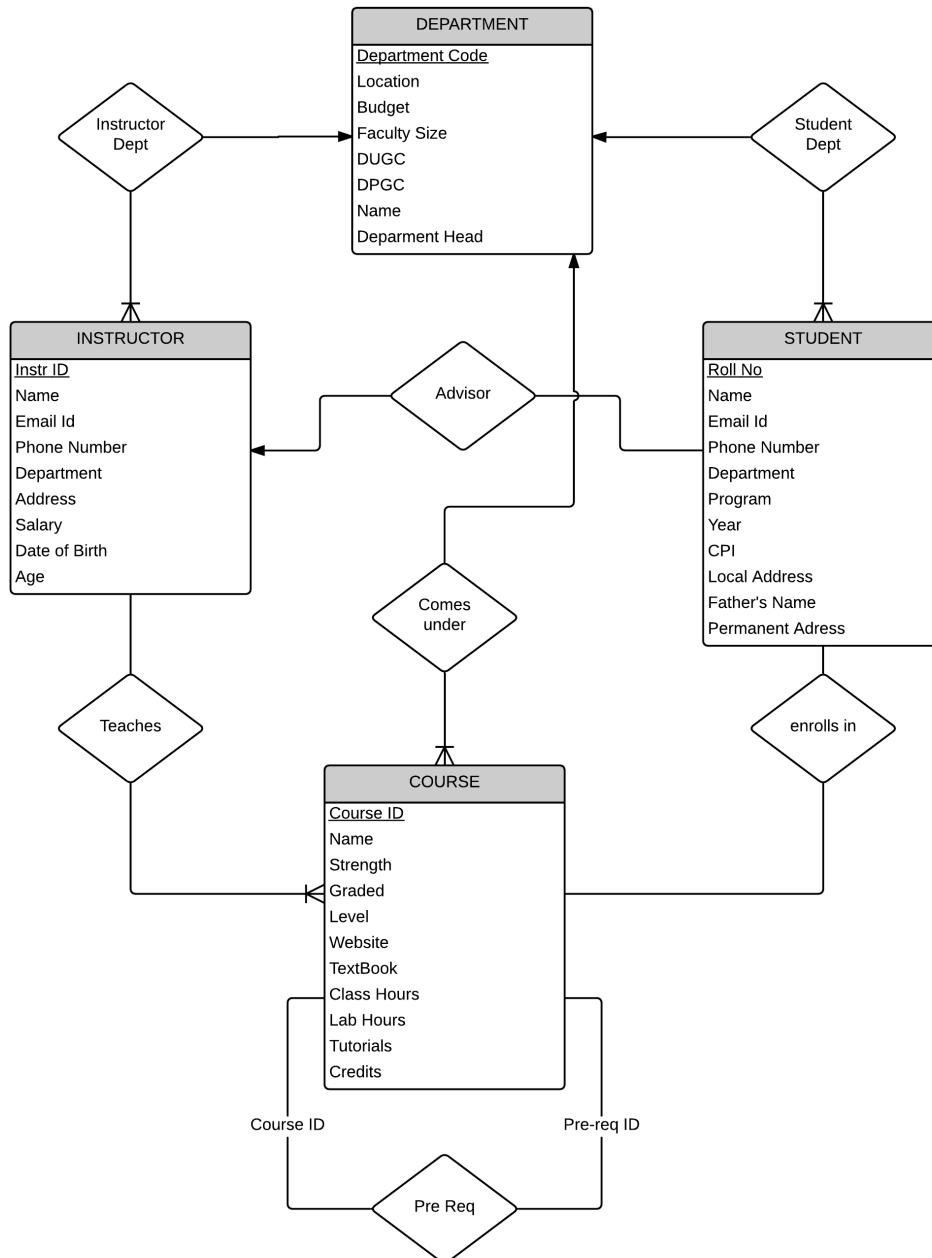


Figure 3: ER model for IIT Kanpur Academic System

## 2.2 Relation Schema

The tables shown in figure 2.6 can be used to store data in the database. It has also been included in the file ER2Schema.png in the zip archive that I uploaded.

## 2.3 Trivial Dependencies

A lot of trivial dependencies can be made and exist. Some of them are as follows :

- Roll No, Name  $\rightarrow$  Name (In relation STUDENT)
- Name , Email Id  $\rightarrow$  Name (In relation INSTRUCTOR)

Since, we can make as many trivial dependencies as we want, making and dealing with them is useless.

## 2.4 Fully Functional Dependencies

In the ER model and relation schema that I have made, some fully functional dependencies are as follows:

- All the attributes are full-functionally dependent on singleton candidate keys. Eg.
  - Department Code  $\rightarrow$  HOD (in relation DEPARTMENT)
  - Instr ID  $\rightarrow$  Name (in relation INSTRUCTOR)
  - Course Name  $\rightarrow$  Credits (in relation COURSE)
- Class House , Lab Hours , Tutorials  $\rightarrow$  Credits (in relation COURSE)
- Local Address , Name  $\rightarrow$  Roll No (in relation STUDENT, assuming that we do not have two students with same name sharing a room)
- Name , Fathers Name , Permanent Address  $\rightarrow$  Roll No
- Date of Birth , Address , Department  $\rightarrow$  Name , Phone Number , Email ID (in relation INSTRUCTOR , assuming that we do not have multiple prof. family with any two in the same department)

There may exists more fully functional dependencies in the actual IIT Kanpur academic database model. In general, whenever we have non-singleton candidate keys, We have fully functional dependencies there for all the attributes, as no subset of it would determine all the attributes.

## 2.5 Transitive Dependencies

In the ER model and relation schema that I have made, some transitive dependencies are as follows:

- HOD  $\rightarrow$  Department Code , Department Code  $\rightarrow$  Budget (in relation DEPARTMENT)
- DUGC  $\rightarrow$  Name , Name  $\rightarrow$  HOD (in relation DEPARTMENT)

There may exists more transitive dependencies in the actual IIT Kanpur academic database model. In general, whenever we have multiple candidate keys, We have fully transitive dependencies there.

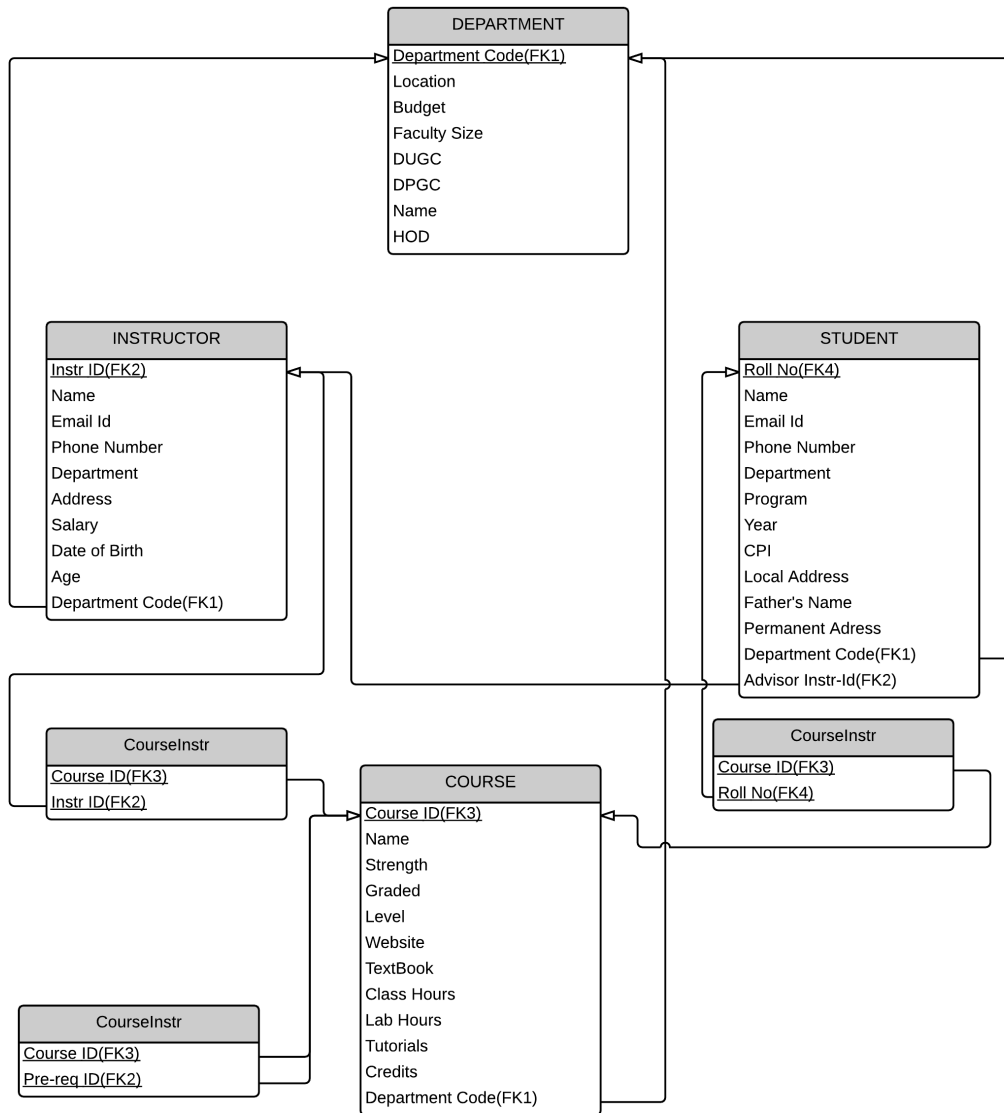


Figure 4: Database Schema for IIT Kanpur Academic System

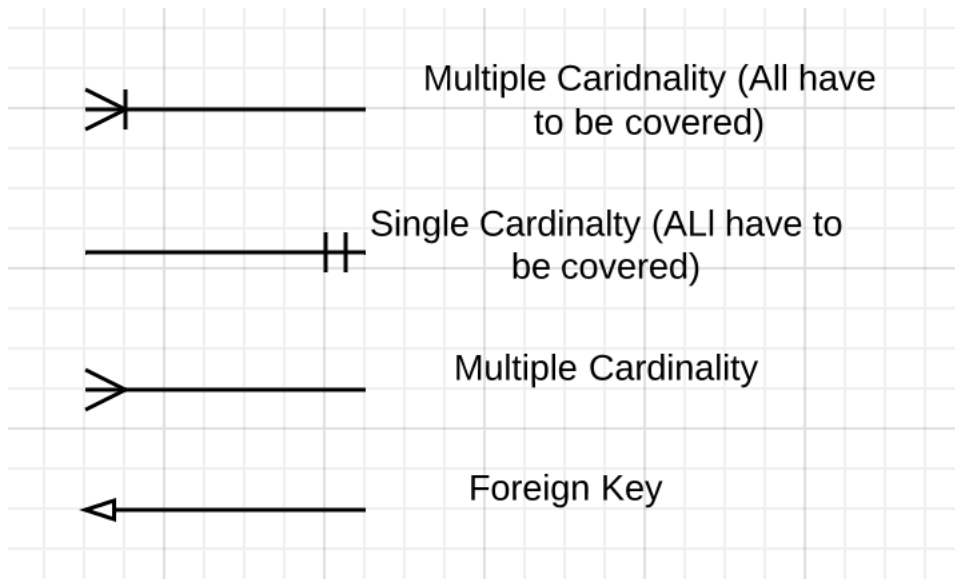


Figure 5: Standard Symbols and connectives in ER models and Schemas

## 2.6 Multivalued dependencies

We have some multivalued dependencies in the database design here. Eg :

- Name  $\twoheadrightarrow$  Salary (in relation INSTRUCTOR)
- Name  $\twoheadrightarrow$  Program (in relation STUDENT)
- Name  $\twoheadrightarrow$  CPI (in relation STUDENT)
- Strength  $\twoheadrightarrow$  Level (in relation COURSE)
- Name  $\twoheadrightarrow$  Date of Birth (in relation INSTRUCTOR)

There may exist more multivalued dependencies in the actual IIT Kanpur academic database model.