CS3011 Database Systems Lab

Assignment 3: Designing Database Application

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Problem Statement:

We have to design and implement web-based system to record the present and previous courses that have been or being taught by the faculties in IITH.

Design Parameters:

1. **E-R Diagram:**
   Following is the E-R diagram capturing various entities and relationships among them. The boxes in the diagram represents the entity-sets and the dashed lines denotes the relationship between entity sets. The following are the type of relationships given.
   1. There is one-to-many relationship between Department and Instructor entity, since one instructor can belong to one Department only whereas one Department can have multiple instructors.
   2. One-to-many relationship between Department and Courses.
   3. One-to-many relationship between Courses and Offered_Courses.
   4. One-to-many relationship between Offered_Courses and Schedule.

The entity Active_Semesters is to only record the current semester so that slots for a course is added only to current semester not in the past and also not in the future semesters.

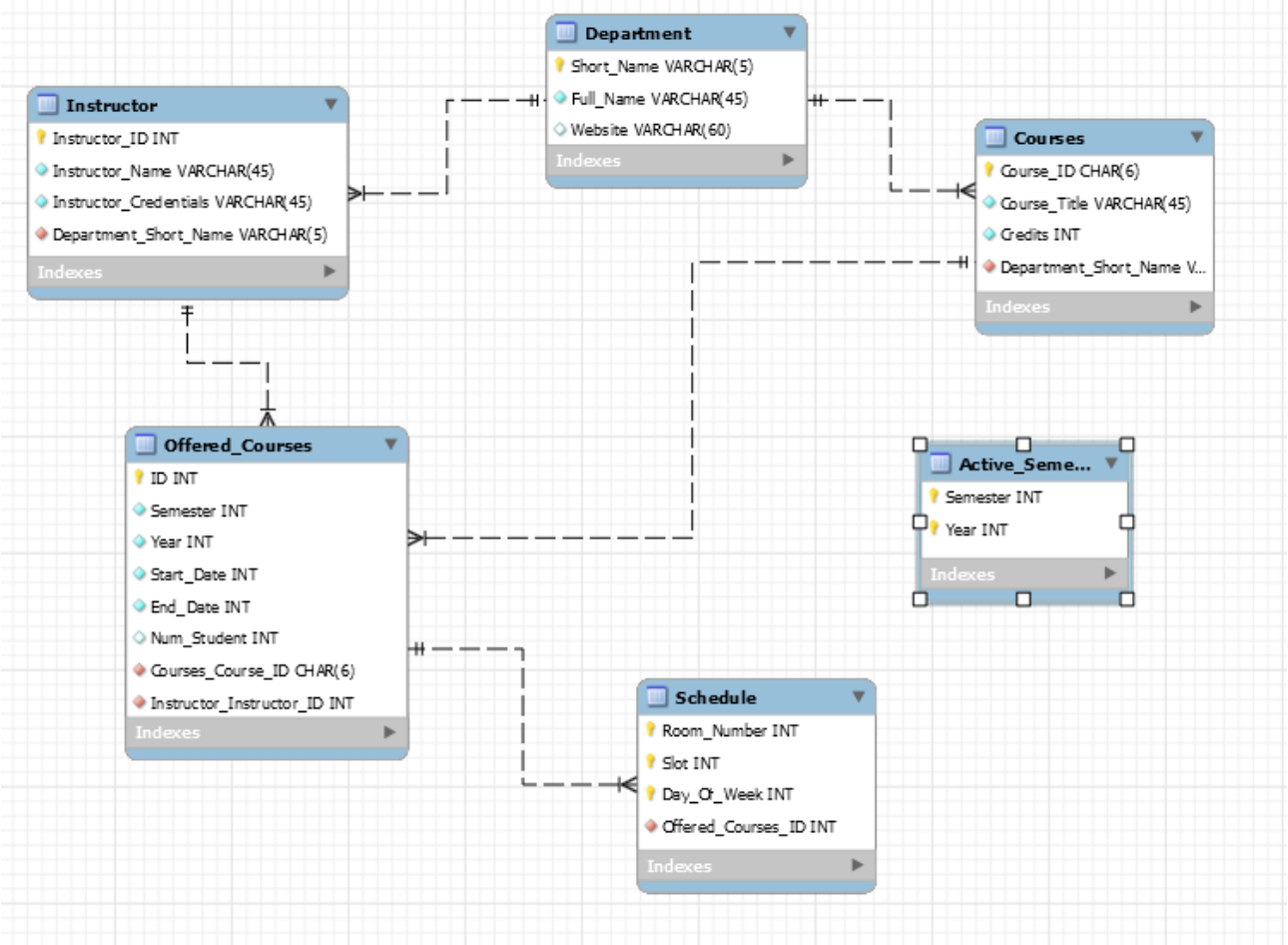

Fig: Entity-Relationship Model for Database 'iithcourses'

2. Relational Schema:

The Relational Schema generated by the above E-R diagram consists of 6 entities.

a. *Department*- It contains acronym for department, name of department and it's website with acronym as primary key.

b. *Instructor*- It contains instructor's id, name, credentials and instructor's department with instructor's id as primary key and using instructor's department as foreign key to relate with department table.

c. *Courses*- It contains course id, title, credits and offering department with course id as primary key and using offering department as foreign key which relate to department table.

d. *Offered Courses*- It basically stores information regarding the courses that are being taught or have been taught. It's attributes comprises of id, Semester, Year, Start Date and End date of a course (so that we can extend it to fractals), number of students enrolled in that course, course id and instructor id. In this we use two foreign key constraints, that is, course id to relate to Courses table and instructor id to relate to Instructor table.

e. *Schedule*- It includes timings and place of courses being taught in current semester. It contains room number, time slot, day, offered course id with triplet of room

number, time slot and day as primary key. We used offered course id as foreign key which references Offered Courses table.

f. *Active Semesters*- It just contains present semester and year so that when faculty offer courses only information corresponding to present semester can be altered.

3. Normalization:

Since we define the primary keys for each relation such that the functional dependencies would be either trivial or we can uniquely identify the whole relation using those primary keys which is the necessary condition for the relation in BNF form. Hence we can say that our relational schema is in BNF form.