



Database Management Systems

Data Modeling Using the Entity-Relationship (ER) Model

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Database Management Systems

Slides Credits for all PPTs of this course



- The slides/diagrams in this course are an **adaptation**, **combination**, and **enhancement** of material from the below resource and persons:
- A u t h o r s l i d e s f r o m " F u n d a m e n t a l s o f D
Ramez Elamsri, Shamkant B Navathe, Pearson, 7th
Edition, 2017.

- A Real World Example to model the University database

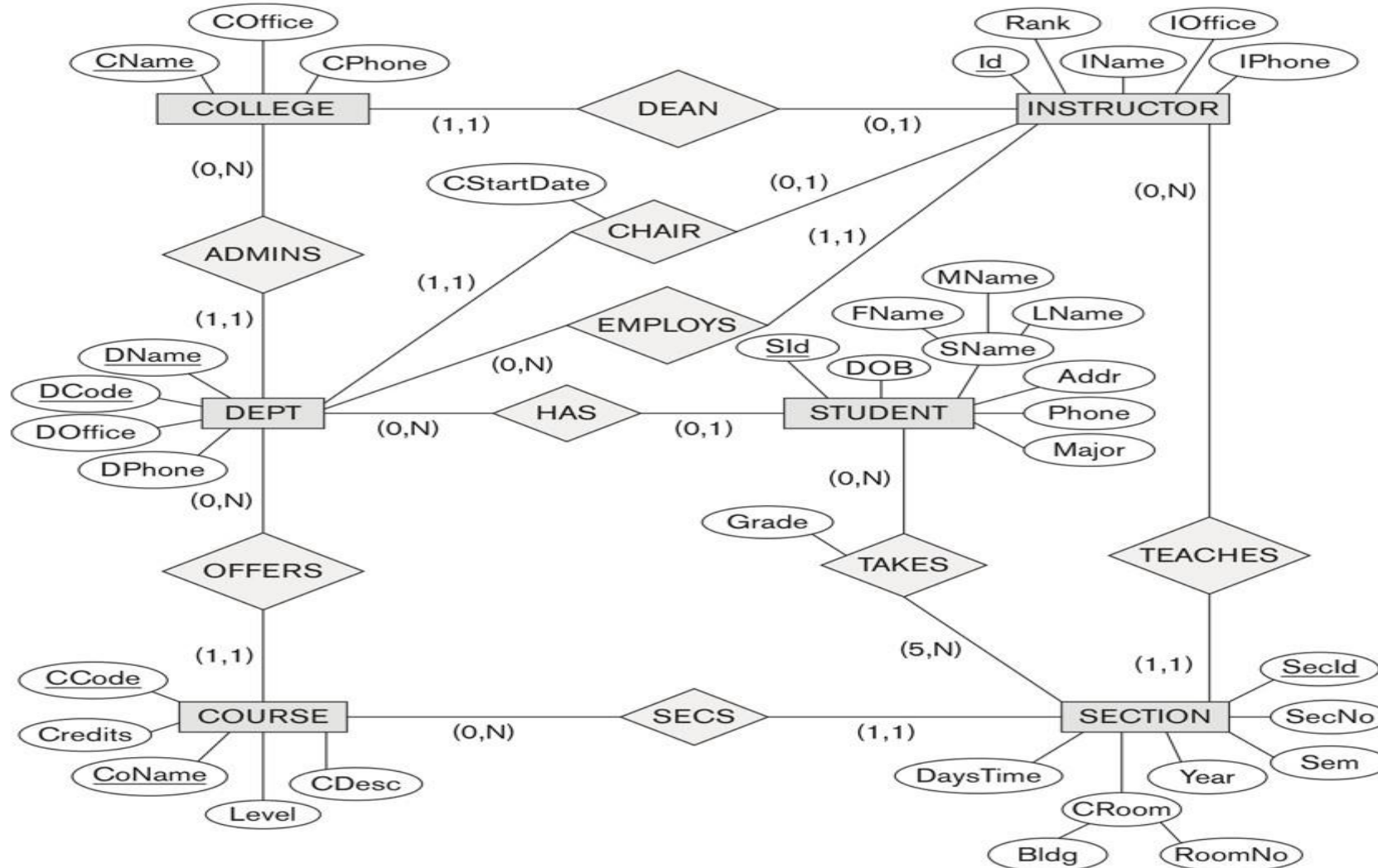
Problem Statement given:

The university is organized into colleges (COLLEGE), and each college has a unique name (CName), a main office (COffice) and phone (CPhone), and a particular faculty member who is dean of the college. Each college administers a number of academic departments (DEPT). Each department has a unique name (DName), a unique code number (DCode), a main office (DOffice) and phone (DPhone), and a particular faculty member who chairs the department. We keep track of the start date (CStartDate) when that faculty member began chairing the department.

A department offers a number of courses (COURSE), each of which has a unique course name (CoName), a unique code number (CCode), a course level (Level: this can be coded as 1 for freshman level, 2 for sophomore, 3 for junior, 4 for senior, 5 for MS level, and 6 for PhD level), a course credit hours (Credits), and a course description (CDesc). The database also keeps track of instructors (INSTRUCTOR); and each instructor has a unique identifier (Id), name (IName), office (IOffice), phone (IPhone), and rank (Rank); in addition, each instructor works for one primary academic department.

The database will keep student data (Sname (SName, composed of first name (FName), middle name (MName), last name (LName)), student id (Sid, unique for every student), address (Addr), phone (Phone), major code (Major), and date of birth (DoB). A student is assigned to one primary academic department. It is required to keep track of the student's grades in each

Courses are offered as sections (SECTION). Each section is related to a single course and a single instructor and has a unique section identifier (SecId). A section also has a section number (SecNo: this is coded as 1, 2, 3, . . . for multiple sections offered during the same semester/year), semester (Sem), year (Year), classroom (CRoom: this is coded as a combination of building code (Bldg) and room number (RoomNo) within the building), and days/times (DaysTime: for example, 09:00 am - 10:30 am, or 5:00 pm - 6:30 pm, restricted to only allowed days/time values). (Note: The database will keep track of all the sections offered for the past several years, in addition to the current offerings. The SecId is unique for all sections, not just the sections for a particular semester.) The database keeps track of the students in each section, and the grade is recorded when available (this is a many-to-many relationship between students and sections). A section must have at least five students.



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Chapter Summary



- ER Model Concepts: Entities, attributes, relationships
- Constraints in the ER model
- Using ER in step-by-step mode conceptual schema design for the COMPANY database
- ER Diagrams - Notation
- Alternative Notations – UML class diagrams, others
- Binary Relationship types and those of higher degree.

- A number of popular tools that cover conceptual modeling and mapping into relational schema design.
 - Examples: EERWin, S- Designer (Enterprise Application Suite), ER- Studio, etc.
- POSITIVES:
 - Serves as documentation of application requirements, easy user interface - mostly graphics editor support
- NEGATIVES:
 - Most tools lack a proper distinct notation for relationships with relationship attributes
 - Mostly represent a relational design in a diagrammatic form rather than a conceptual ER-based design



THANK YOU

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