Database Management System

Lecture 2: Introduction to Relational Model

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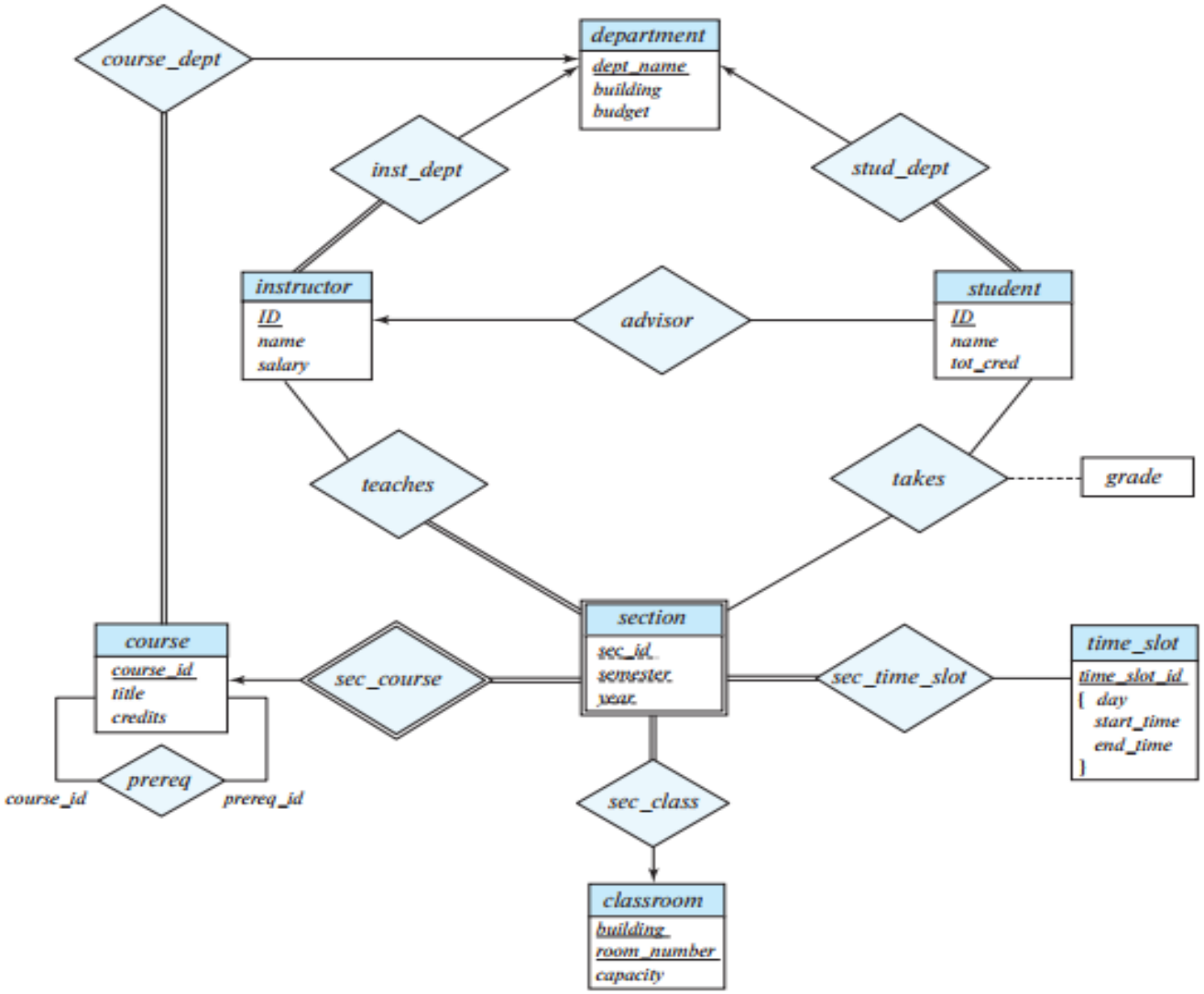
Structure of Relational Databases

- A relational database consists of a collection of **tables**
- Each table has an unique name with multiple attributes/columns
- Examples:
  - Course(course_id, course_name, credits, *department_id*)
  - Department(dept_id, dept_name, hod, location, phone)
-

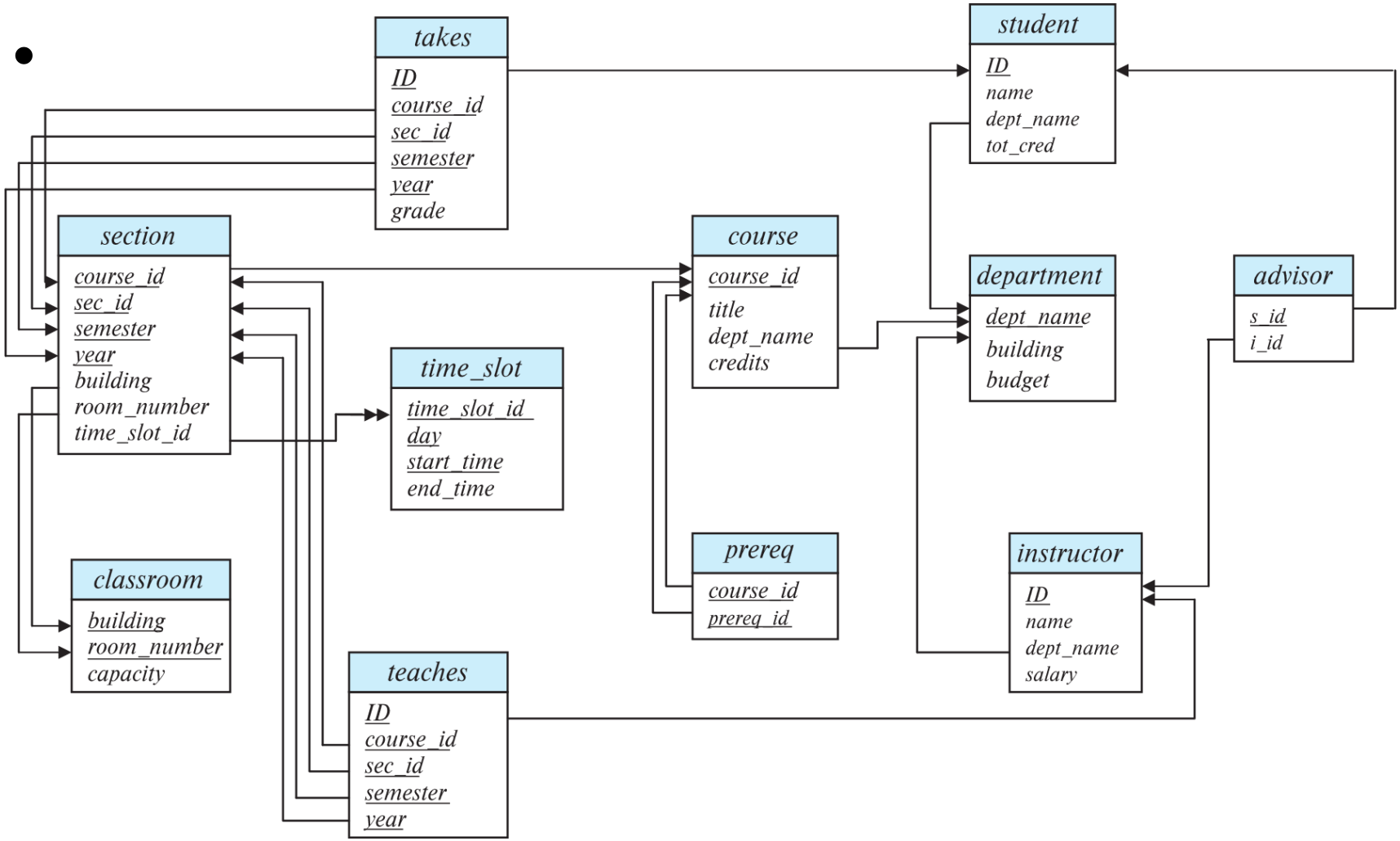
ERD for University Database



Schema for University Database

classroom(*building*, *room_number*, *capacity*)
department(*dept_name*, *building*, *budget*)
course(*course_id*, *title*, *dept_name*, *credits*)
instructor(*ID*, *name*, *dept_name*, *salary*)
section(*course_id*, *sec_id*, *semester*, *year*, *building*, *room_number*, *time_slot_id*)
teaches(*ID*, *course_id*, *sec_id*, *semester*, *year*)
student(*ID*, *name*, *dept_name*, *tot_cred*)
takes(*ID*, *course_id*, *sec_id*, *semester*, *year*, *grade*)
advisor(*s_ID*, *i_ID*)
time_slot(*time_slot_id*, *day*, *start_time*, *end_time*)
prereq(*course_id*, *prereq_id*)

Schema Diagram for University Database



Database Schema and Instance

- Database schema -- is the logical structure of the database.
- Database instance -- is a snapshot of the data in the database at a given instant in time.
- Example:
  - schema: i*nstructor* (*ID, name, dept_name, salary*)
  - Instance:

ID	*name*	*dept_name*	*salary*
22222	Einstein	Physics	95000
12121	Wu	Finance	90000
32343	El Said	History	60000
45565	Katz	Comp. Sci.	75000
98345	Kim	Elec. Eng.	80000
76766	Crick	Biology	72000
10101	Srinivasan	Comp. Sci.	65000
58583	Califieri	History	62000
83821	Brandt	Comp. Sci.	92000
15151	Mozart	Music	40000
33456	Gold	Physics	87000
76543	Singh	Finance	80000

Keys

- **Super keys**:
  - A set of attributes (one or more) that collectively identifies an entity in an entity set.
  - Example: teacher(id, name, phone, address)
  - SK: {id}, {phone}, {id, name}, {phone, name}
- **Candidate Keys**
  - A minimal super key is called a candidate key.
  - An entity set may have more than one candidate key.
  - Example: {id}, {phone}
- **Primary Keys**
  - One of the candidate keys that is selected by designer.
- **Foreign Keys**

Keys

- **Foreign Keys**
  - **Foreign keys** are the columns of a table that points to the primary key of another table
  - cross-reference between tables
  - Build a relationship among tables
  - Example:
    - Teacher(id, name, phone, address, *department_id*)
    - Department(id, name, hod, location)

- SK→CK→PK→FK

Chapter 1

END OF LECTURE