Entity-Relationship Data Model

Discussion Session 2
Section A
Announcement

Office hours for the weeks of October 7 and 14 will change:

*Tuesday and Wednesday*, from 11:30 to 12:30, at the TA Trailer.
ER Concepts

1. Attribute
2. Entity Set
   - Key Attribute(s)
3. Relationship Set
4. Key Constraints
5. One-to-Many Rel.
6. Many-to-Many Rel.
7. One-to-One Rel.
ER Concepts (2)

- Participation Constraints
  - Partial and Total

- Class Hierarchies
  - Overlap and Covering Constraint

- Weak Entity Set
  - Identifying Owner
  - Identifying Rel. Set
  - Partial Key Attribute(s)

- Aggregation

- Role Indicator
Exercise 1

A company database needs to store information about employees (identified by ssn, with salary and a phone as attributes), departments (identified by dno, with dname and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments, and a department should have at least one employee; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.

Draw an ER diagram that captures this information.
Exercise 2

Computer Science department frequent fliers have been complaining to LAX officials about the poor organization at the airport. As a result, the officials decided that all information related to the airport should be organized using a DBMS, and you have been hired to design the DB. Your first task is to organize the information about all the airplanes stationed and maintained at the airport. The relevant information is as follows:

- Every **airplane** has a *registration number*, and each airplane is of a specific **model**.
Exercise 2 (Cont’d)

- The airport accommodates a number of airplane models, and each model is identified by a *model number* (e.g. Boeing 767) and has a *capacity* and a *weight*.

- A number of **technicians** work at the airport. You need to store their *name, SSN, address, phone number, salary*, and the last *certification* of each technician.

- Each technician is an *expert* on one or more airplane models, and his/her expertise may overlap with that of other technicians. This information about technicians should also be stored.

- **Traffic controllers** must have an annual medical examination. For each traffic controller, you must store the *date* of their most recent exam.
Exercise 2 (Cont’d)

- All LAX employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by a social security number.

- The airport has a number of tests that are used periodically to ensure that airplanes are still airworthy. Each test has a Federal Aviation Administration (FAA) test number, a name, and a maximum possible score.

- The FAA requires the airport to keep track of each time a given airplane is tested by a given technician using a given test. For each testing event, the information needed is the date, number of hours the technician spent doing the test, and the score the airplane received on the test.
Exercise 2 (Cont’d)

1. Draw an ER diagram for the airport database. Be sure to indicate the various attributes of each entity and relationship set; also specify the key and participation constraints for each relationship set. Specify any overlap or covering constraints as well.

2. The FAA passes a regulation that tests on a plane must be conducted by a technician who is an expert on that model. How would you express this constraint in the ER diagram? If you cannot express it, explain briefly.
Questions?