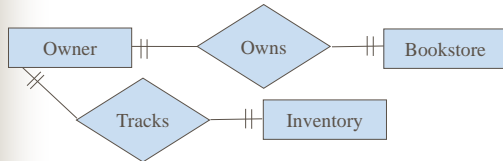


Entities

Example (Bookstore)

Mr. Miller owns a bookstore, and wants to keep track of his inventory using a database. He wants to store which books he has, and how many copies of each.



Entities

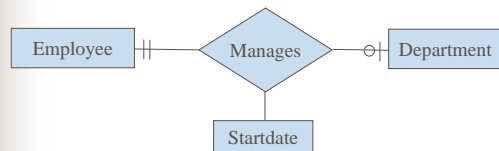
Bad example: none of the entity types should be an entity type.

Why?

An entity type should potentially have many instances:
your goal is to store information on these instances.

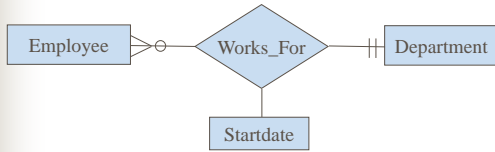
Use singular names for entities.

Attributes of Relationships



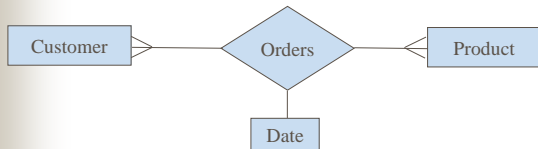
Could the attribute be placed differently?

Attributes of Relationships



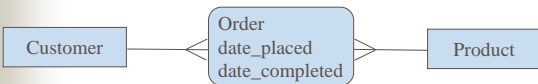
Could the attribute be placed differently?

Attributes of Relationships



Could the attribute be placed differently?

Associative Entities



Relationship versus associative entity?

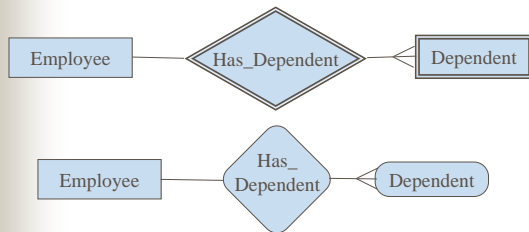
Compare to relationship design.

Weak Entity Types

- entity types without key (unique identifier)
- exist dependent on an **owner entity type**
- related by **identifying relationship**
- (**ID dependent entity**)
- drawn as double rectangular box, identifying relationship as double diamond, or by rounding edges of weak entity and identifying relation



Weak Entity Types



Weak Entity Types

- related record in the owner relationship owns weak entities related to it
- **partial key** identifies records belonging to the same owner (doubly underlined)
- weak entity types have mandatory participation (reverse not true: driver license)



Multivalued Attributes via weak entities



ER Diagram Design

- Identify entities
- Identify relationships between entities
- Find attributes, identifiers; identify weak entities

Company Example Miniworld

Company consists of departments, which have unique name and number, and are managed by one employee. We need the start date of the manager. Department might be located in several locations. Departments control projects which have unique name number, and location.

For each employee we need name, SSN, address, salary, sex, and birth date. Employee belongs to one department, but can work on multiple projects in different departments. We need to store the weekly time spent by each employee on each project. Employees have supervisors.

We need the following information on dependents: first name, sex, birth date, and relationship to employee.



Henry Books Miniworld

Ray Henry, the owner of a bookstore chain named Henry Books, has decided to store his data in a database. In running his chain of bookstores, Ray gathers and organizes information about branches, publishers, authors, and books. Each branch has a number that uniquely identifies the branch. In addition, Ray tracks the branch's name, location, and number of employees. Each publisher has a code that uniquely identifies the publisher. In addition, Ray tracks the publisher's name and city. Each author has a number that uniquely identifies the author. In addition, Ray records each author's last and first names. Each book has a code that uniquely identifies the book. For each book, Ray also tracks the title, publisher, type of book, price, and whether the book is a paperback. We also need a list of authors for each book. Finally, Ray keeps track of how many copies of each book are available at each branch.
