

Entity Sets

An entity set can be viewed as either:

- a set of entities with the same set of attributes (extensional)
- an abstract description of a class of entities (intensional)

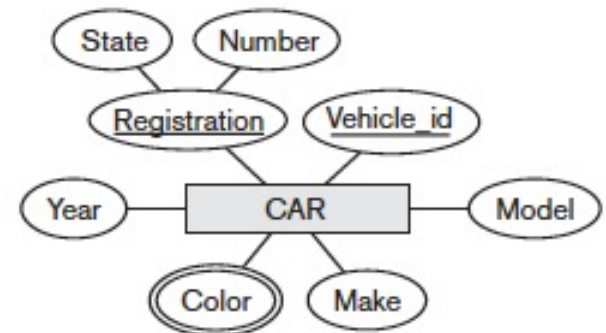
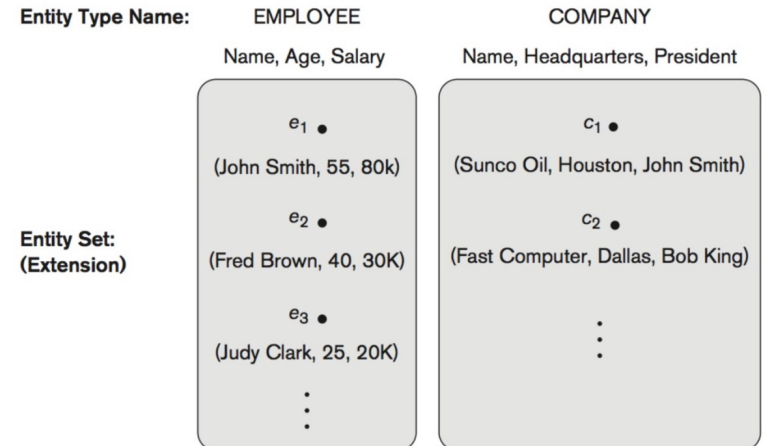
Key (superkey): any set of attributes whose set of values are distinct over entity set

- natural (e.g., name+address+birthday) or artificial (e.g., SSN)

Candidate key = minimal superkey (no subset is a key)

Primary key = candidate key chosen by DB designer

Keys are indicated in ER diagrams by underlining



Superkeys, Candidate Keys, Primary key

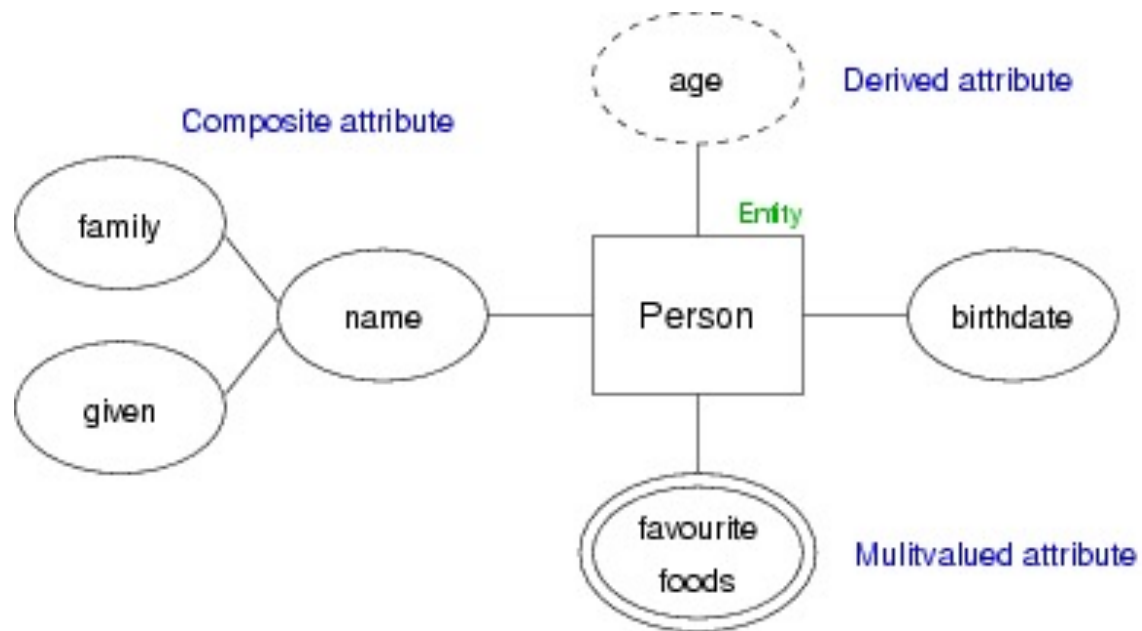
CAR

<u>License_number</u>	Engine_serial_number	Make	Model	Year
Texas ABC-739	A69352	Ford	Mustang	02
Florida TVP-347	B43696	Oldsmobile	Cutlass	05
New York MPO-22	X83554	Oldsmobile	Delta	01
California 432-TFY	C43742	Mercedes	190-D	99
California RSK-629	Y82935	Toyota	Camry	04
Texas RSK-629	U028365	Jaguar	XJS	04

Let's identify superkeys and candidate keys

Entity-Relationships

Example of attribute notations



Relationship Sets

Relationship: an association among several entities

- e.g., Customer(9876) is the owner of Account(12345)

Relationship set: collection of relationships of the same type

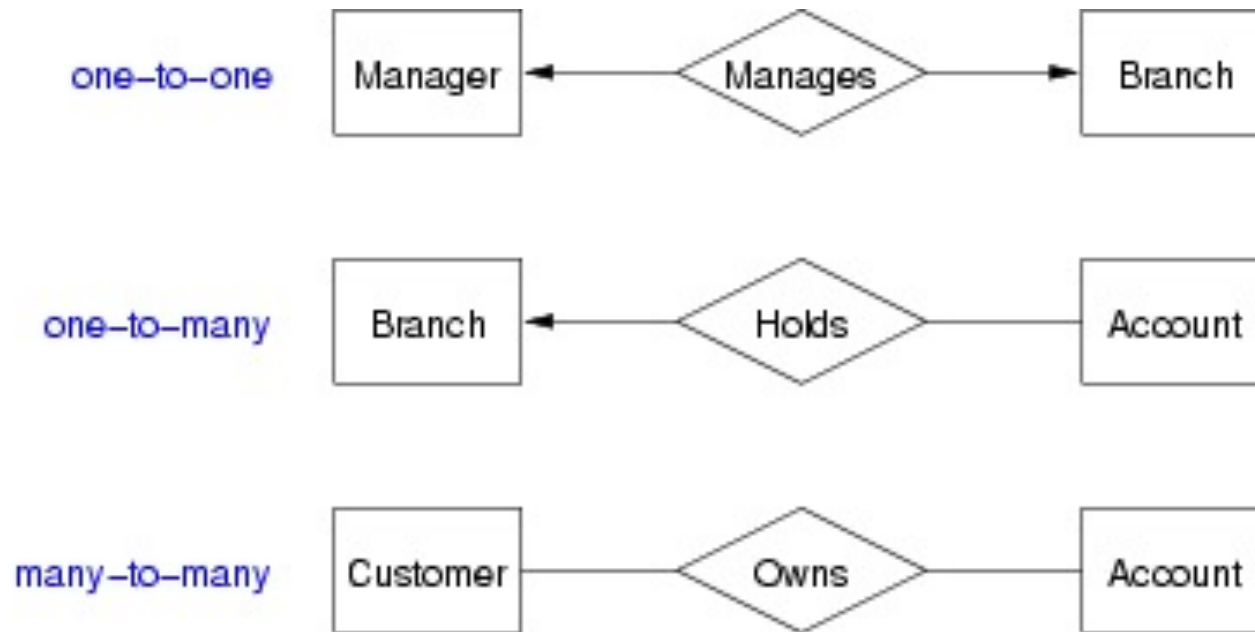
- Degree = # entities involved in reln (in ER model, ≥ 2)
- Cardinality = # associated entities on each side of reln
- Participation = must every entity be in the relationship

Example: relationship participation



Relationship Sets

Examples: Relationships



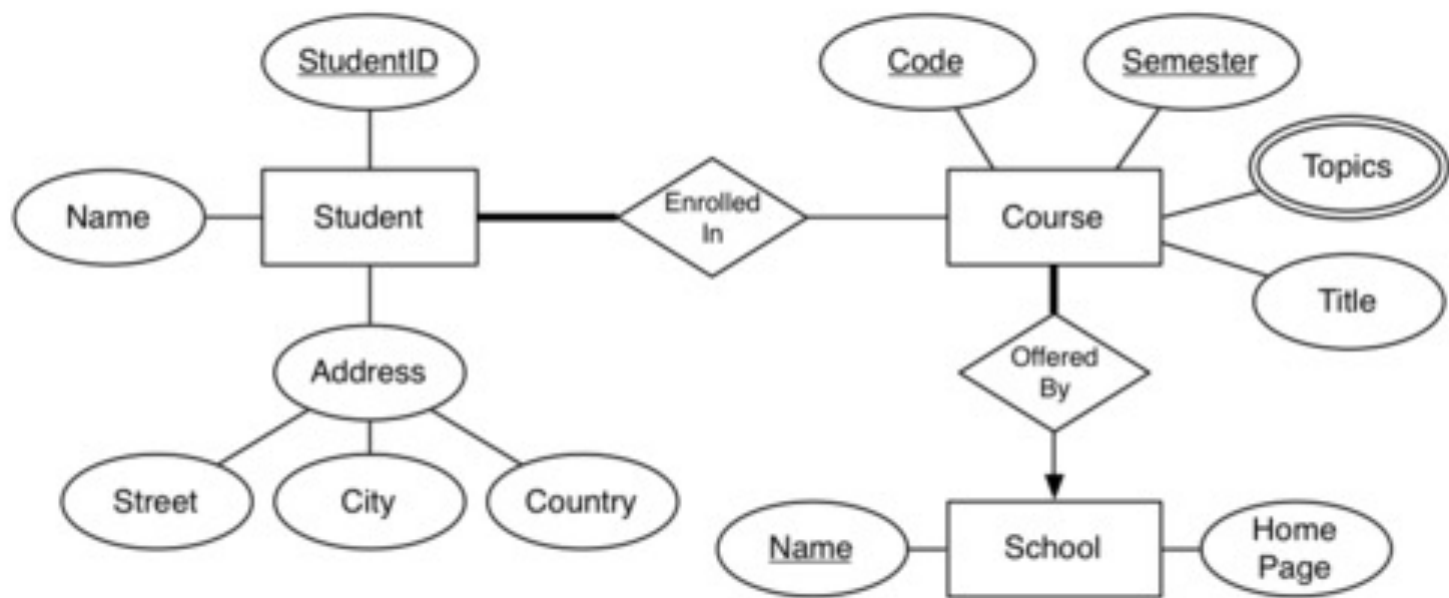
Exercise 2: Relationship Semantics

Describe precisely the scenarios implied by the following relationships:

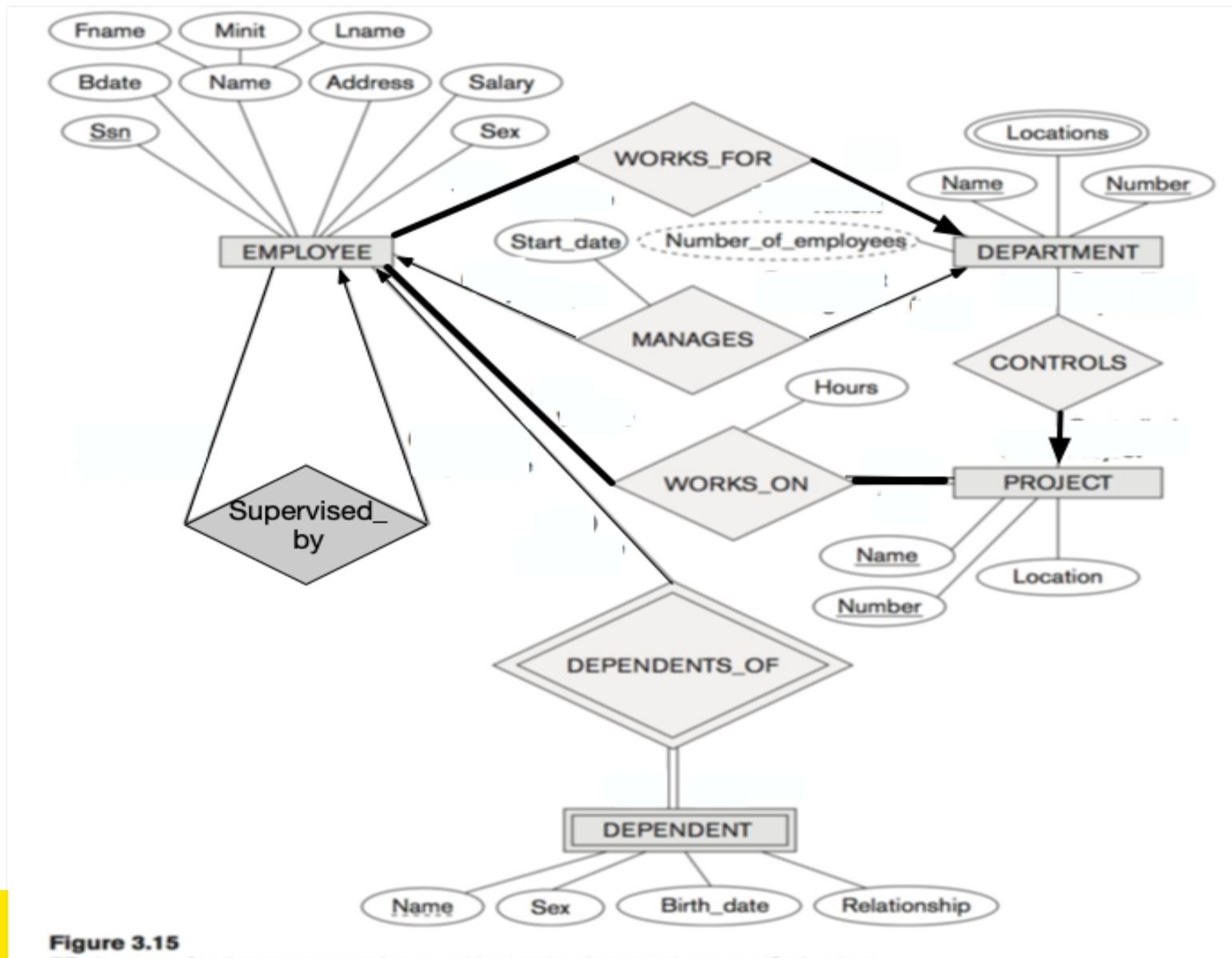


ER: the story so far

Entities, relationships, attributes, keys, cardinality, participation, ...



Exercise: Write down some facts expressed in this ER

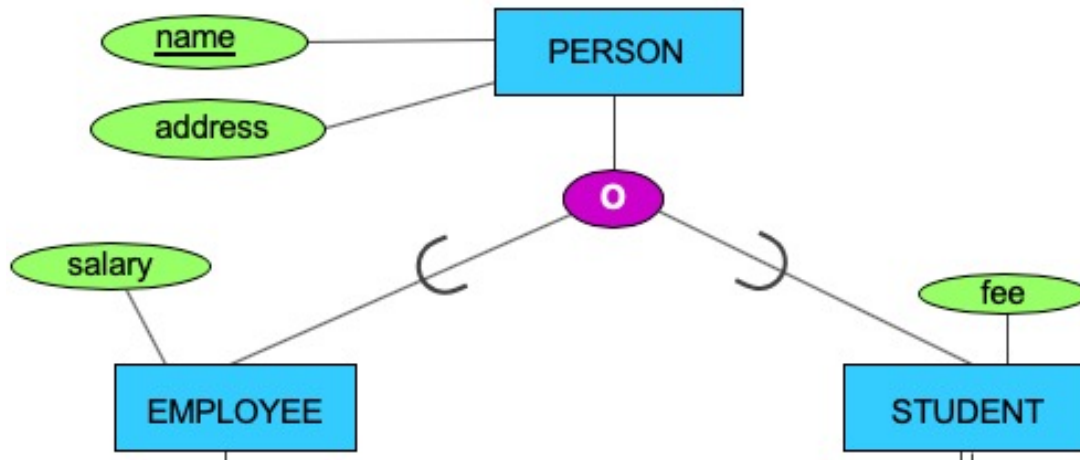


Subclasses (Specialisation/Inheritance)

An entity can be *specialised* into sub grouping:

A *subclass* of an entity set A is a set of entities:

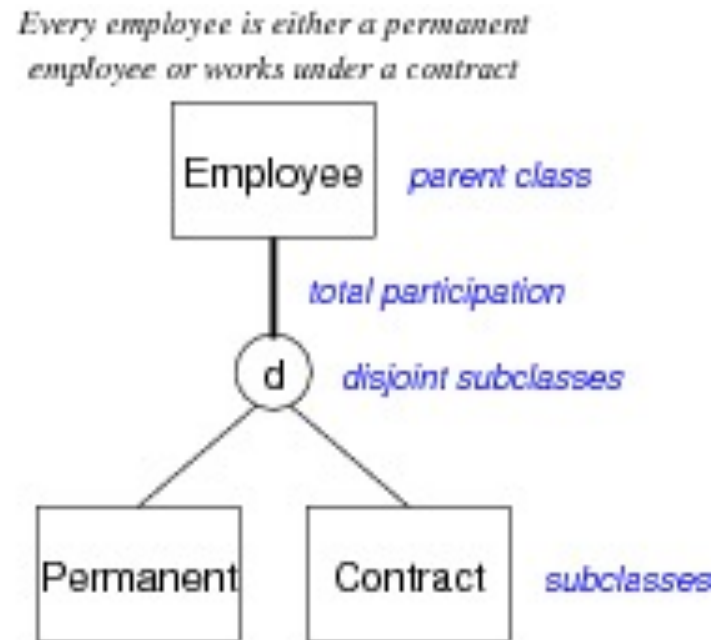
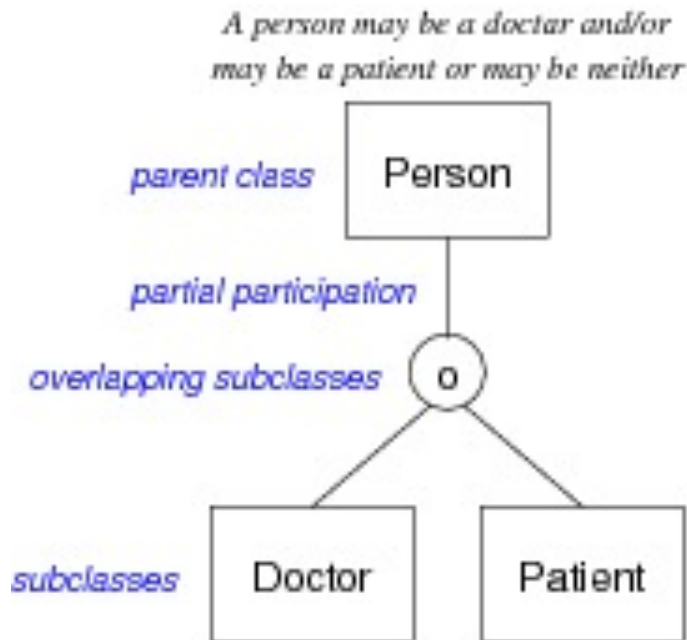
- with all attributes of A , plus (usually) its own attributes
- that is involved in all of A 's relationships, plus its own
- i.e., subclass *inherits* attributes and relationships from its parent



Subclasses (Specialisation/Inheritance)

Properties of subclasses:

- *overlapping* or *disjoint* (can an entity be in multiple subclasses?)
- *total* or *partial* (does every entity have to also be in a subclass?)



A class/subclass relationship is often called an IS-A (or IS-AN) relationship because of the way we refer to the concept. We say a DOCTOR is a PERSON ...

Exercise: ER diagram

Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):

- the NHL has many teams,
- each team has a name, a city, a coach, a captain, and a set of players,
- each player belongs to only one team,
- each player has a name, a position (such as left wing or goalie), a skill level, and
- a set of injury records,
- a team captain is also a player,
- a game is played between two teams (referred to as `host_team` and `guest_team`)
- and has a date (such as May 11th, 1999) and a score (such as 4 to 2).

Construct a clean and concise ER diagram for the NHL database.

Exercise: Subclasses in the University

- Every person has a name and an address. A person is uniquely identified by their name.
- At a university, there are two groups of persons, employees and students. **Every employee receives a salary, while every student pays a fee.**
- Among the employees, there is research and teaching staff. An employee can belong to both groups.
- Among the teaching staff, there are lecturers and tutors. **A tutor works for several courses.**
- Every student is either a postgraduate student or an undergraduate student.
- A postgraduate student has **a thesis title, on which he/she is working.**
- Every undergraduate student **is working on a project.**
- Every undergraduate student is supervised by a member of the teaching staff.