

# 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

Let's assume (generally speaking, it is reasonable to say that ...):

- \* license number is unique in cars
- \* engine serial number is unique in cars

Then, any combination of the attributes that includes any of the two attrs will be superkeys

The combinations such as "Make+Model+Year" ... should not be considered a superkey, because it may be true in this particular example of 6 cars ... but it won't be true if the table is extended with more entities

Candidate keys are license\_number and engine\_serial\_number. You can make either of them to be the primary key

# Exercise 2: Relationship Semantics

Describe precisely the scenarios implied by the following relationships:



Many to One ... optional/partial between "lecturer and teaches", mandatory/full between "course and teaches"

Some lecturers teach one course. Every course must be taught by one or more lecturers.



Many to Many ... mandatory/full between "lecturer and teaches", mandatory/full between "course and teaches"

All lecturers teach one or more courses; all courses are taught by one or more lecturers



One to One ... optional/partial between "lecturer and teaches", mandatory/full between "course and teaches"

Some lecturers teach one course; Not every lecturer teaches a course, when they teach a course, they teach one course; A course must be taught by one lecturer;

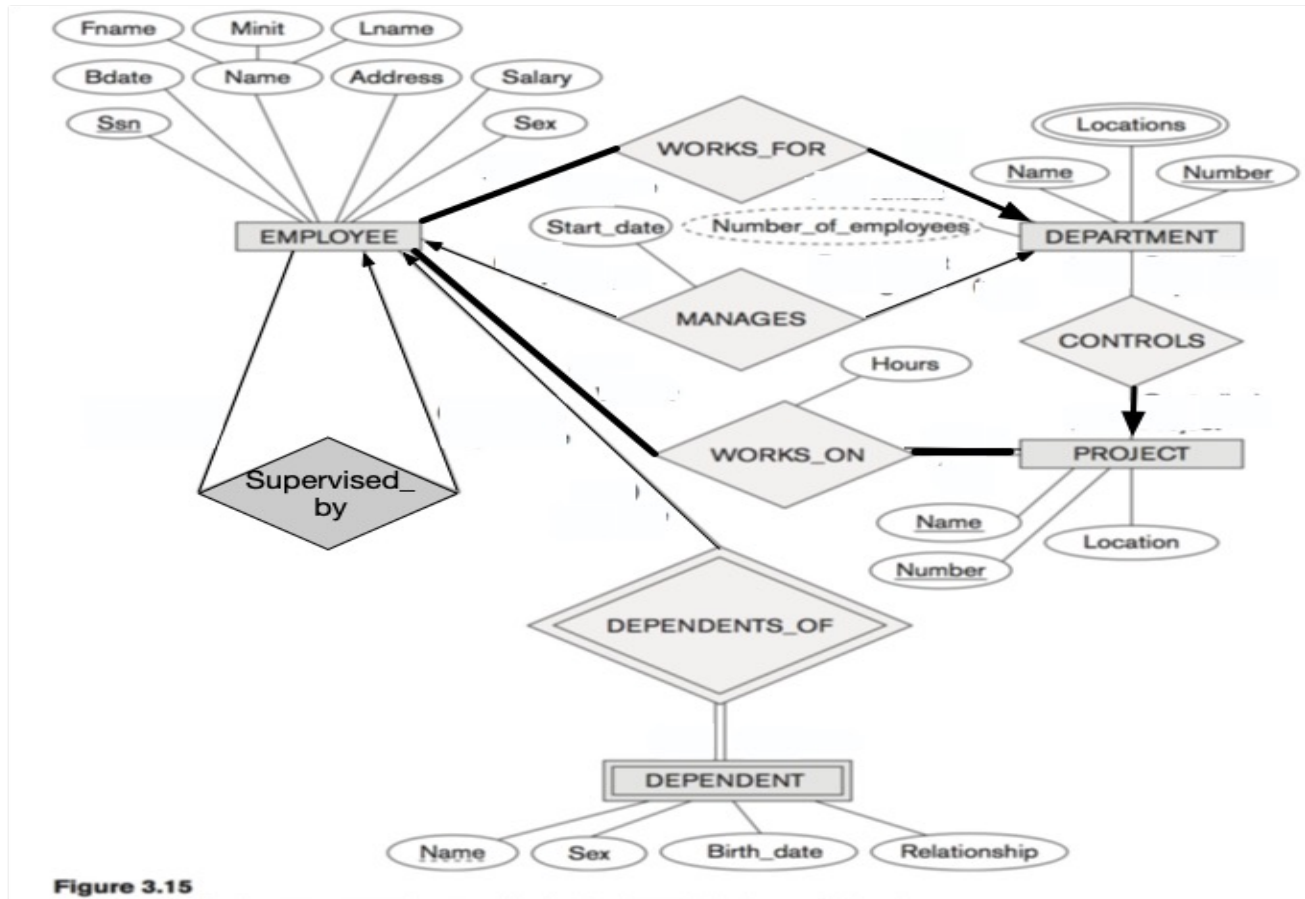
*Some of the common words you could use to describe these different relationship semantics are:*

*\* some – partial participation (e.g., some lecturers teach a course.)*

*\* all/every/each – total participation ... but be careful when choosing a word ...*

*NOTE: hope you can notice that written words could be more confusing than the ER notations ...!!!*

# Exercise: Write down some facts expressed in this ER



Similar exercise to the previous one ... There are many facts that can be expressed in writing based on this. I will leave them up to you. 😊

# 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: ER diagram

## Suggested answer

The “belong\_to” has total participations from both entities ...

(i.e., every player must belong to a team; a team must have one or more players)

During the lecture while we were discussing the injury records, I confused myself about how the participation requirement would be conflicting with weak entity concept when we do not want to say 'every player has a set of injury record'. I believe I somehow was imaging the line between player and log relationship as a thick line. But actually, it is OK for the injury record to be fully participating in “log” ... and player to be option to 'log'. I think either weak or strong is fine here. But 'weak' is probably better because the records really belong to a particular player only.

Answer :



# 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.

# Exercise: Subclasses

