

Recap

- entity sets, relationships, attributes
- simple, compound, multivalued, derived attributes
- participation and cardinality
- ternary relationships

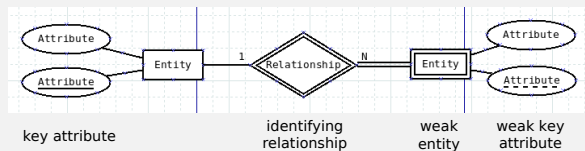
Roles

An entity set may participate more than once in a relationship.

- note: same *entity set*, not necessarily the same *entity*
 - e.g. the EMPLOYEE entity set would participate in the SUPERVISES relationship as both supervisor and employee being supervised, but the same person would not be both supervisor and supervisee in a particular instance of the relationship
- also: this is not talking about cardinality, which deals with how many instances of a relationship a given entity may participate in

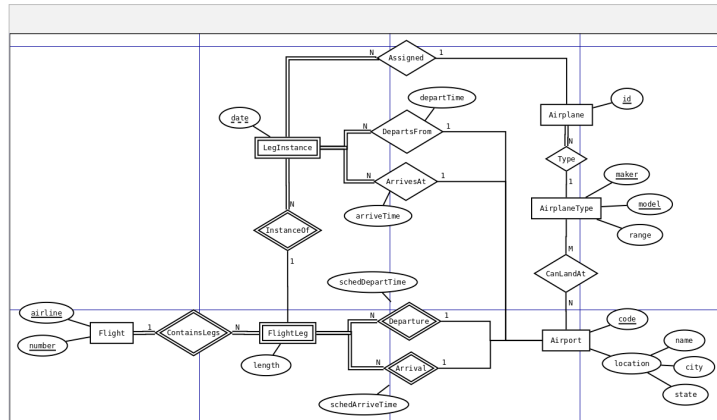
Keys and Weak Entities

- a *key* is a set of one or more attributes whose values uniquely identify each entity in an entity set
- a *weak entity type* is an entity type whose key includes attributes from another entity type
 - must participate in a many- or one-to-one *identifying relationship* with the other entity type
 - key attributes belonging to the weak entity type form a *partial* or *weak key*



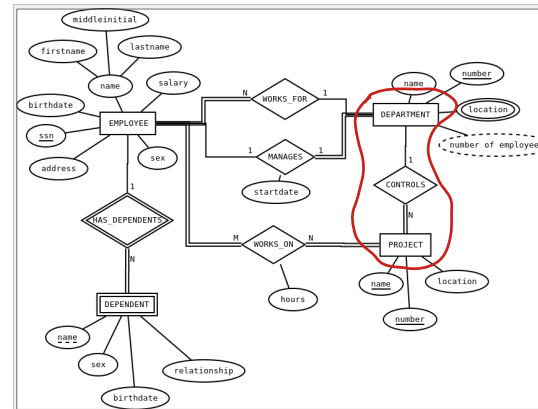
Which of the following are true statements according to the diagram?

- | | |
|--|--|
| ☐ It is possible to find the employees with a given last name. | |
| ☐ A project can be controlled by more than one department. | |
| ☐ An employee must work on multiple projects. | |
| ☐ An employee can work on a project controlled by a department that the employee doesn't work for. | |
| ☐ Two projects can have the same name. | |
| ☐ An employee must have a ssn recorded. | |
| ☐ A department can have more than one location. | |
| ☐ The number of employees in a department must be explicitly stored. | |
| ☐ An employee must have a salary recorded. | |
| ☐ An employee can work on multiple projects. | |
| ☐ Two dependents can have the same name. | |
| ☐ A project must be controlled by a department. | |
| ☐ A dependent can be uniquely identified by his or her name. | |
| ☐ A department can control more than one project. | |
| ☐ Two dependents of the same employee can have the same name as long as they have different relationships to that employee. | |
| ☐ A dependent can be uniquely identified by the employee he or she is a dependent of. | |
| ☐ A project can have more than one location. | ☐ It is possible to find all of the employees living in a given city. |
| ☐ A project can be uniquely identified by its number. | ☐ A department must control at least one project. |
| ☐ An employee can be uniquely identified by their ssn. | ☐ A department can be uniquely identified by its name or its number. |

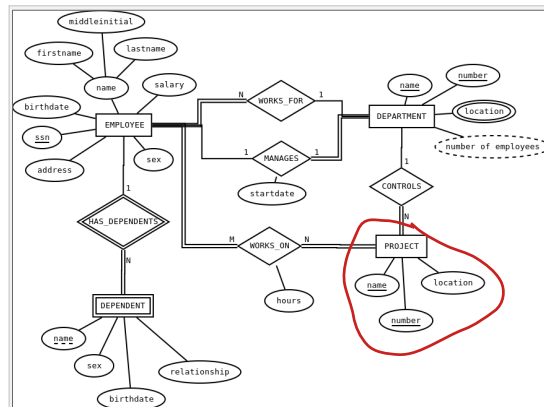


Extract the data requirements and constraints represented in the ER diagram below using user-friendly language. (Avoid database-specific technical terms.) For example:

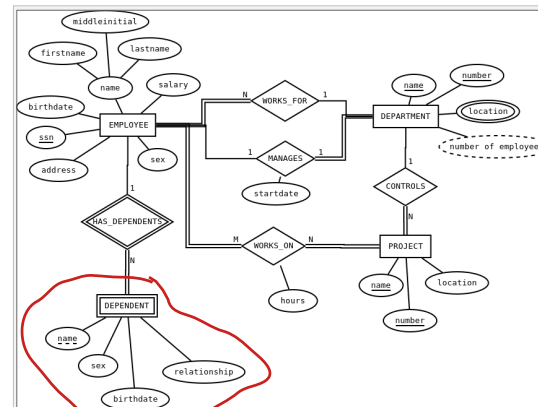
- Airports have a location (name, city, state) and are uniquely identified by their code.
- A particular airplane must have a single airplane type. There may be many airplanes with a given type.



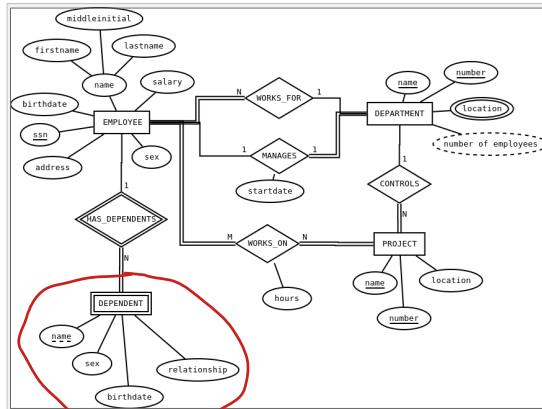
⊘ A department must control at least one project.



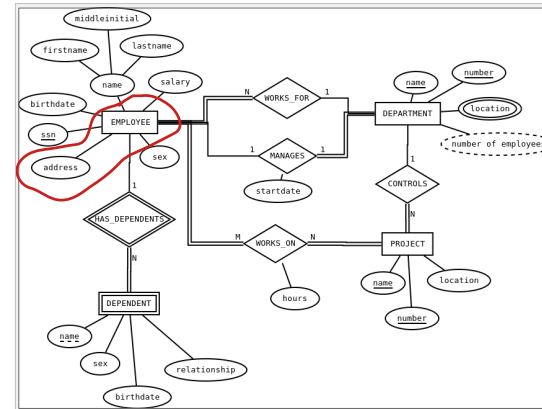
😊 Two projects can have the same name.



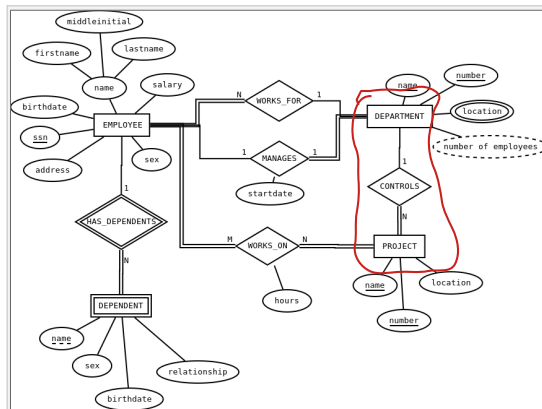
😊 Two dependents can have the same name.



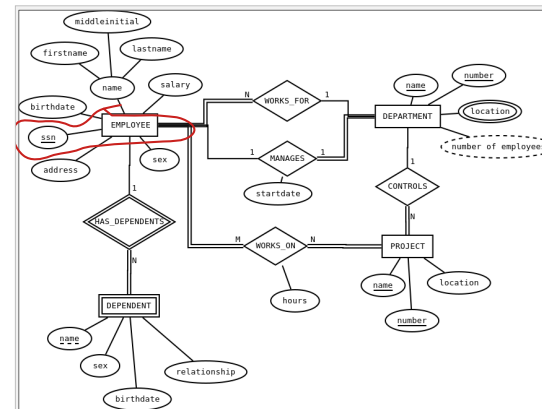
Two dependents of the same employee can have the same name as long as they have different relationships to that employee.



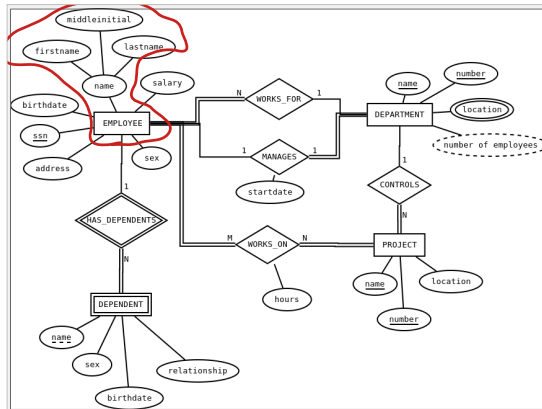
It is possible to find all of the employees living in a given city.



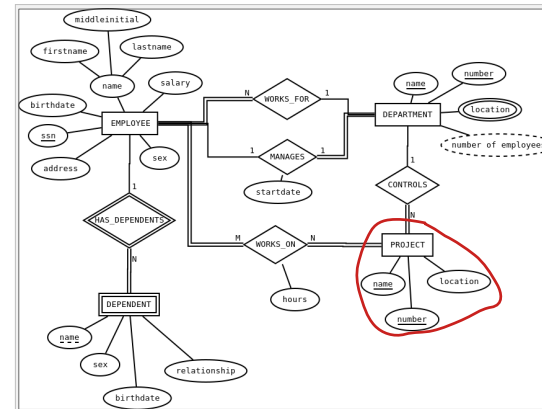
A project can be controlled by more than one department.



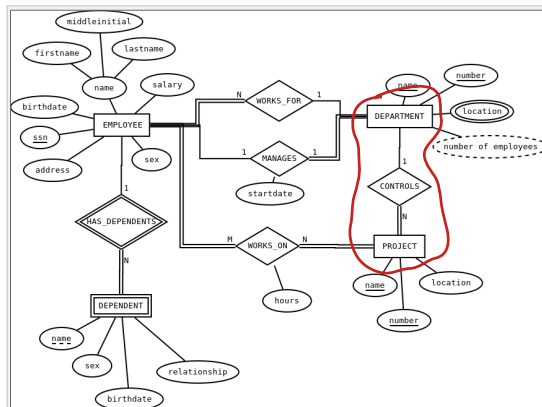
An employee must have a ssn recorded.



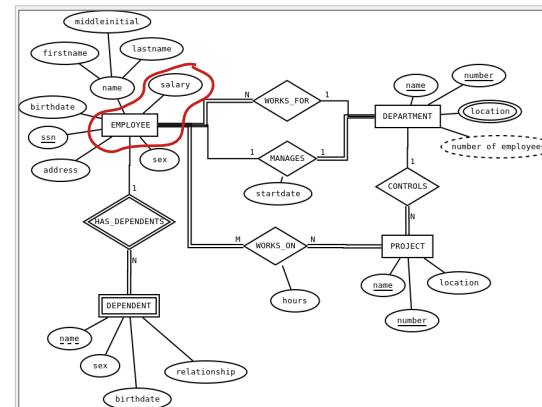
😊 It is possible to find the employees with a given last name.



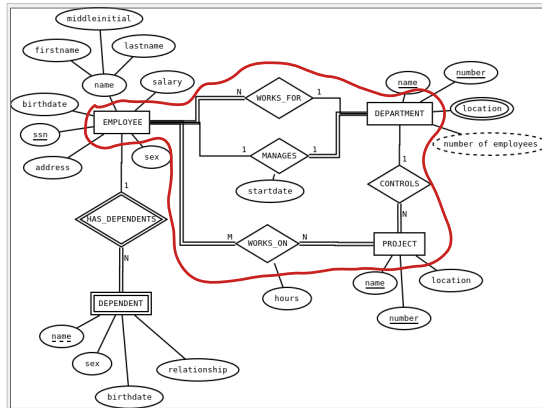
⊘ A project can have more than one location.



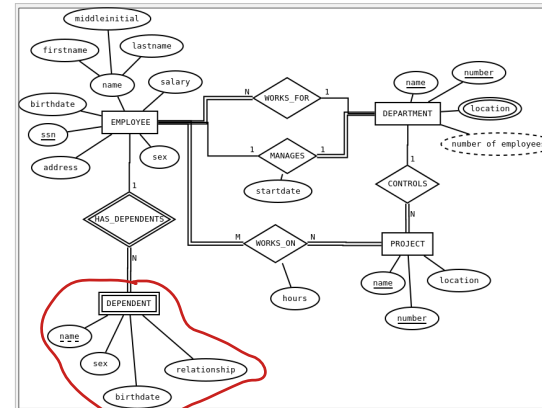
😊 A project must be controlled by a department.



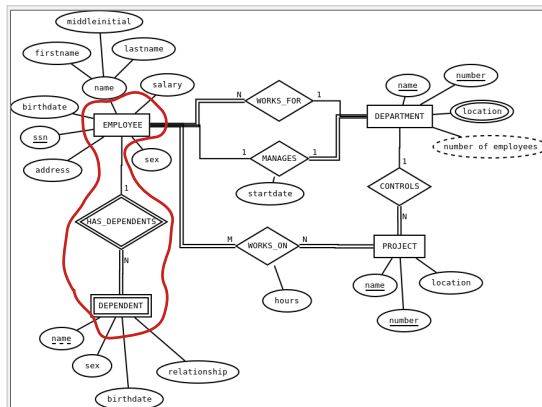
⊘ An employee must have a salary recorded.



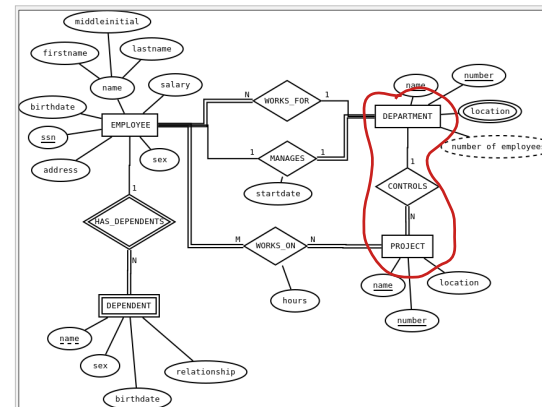
☹️ An employee can work on a project controlled by a department that the employee doesn't work for.



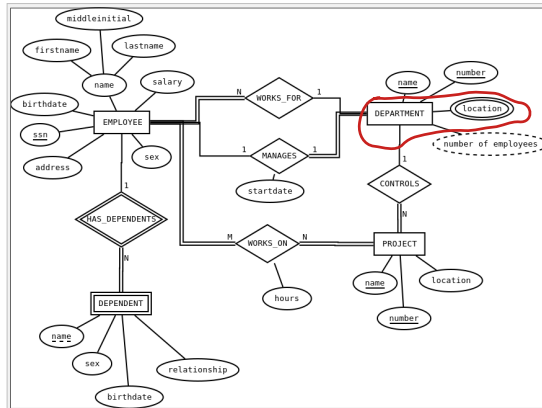
🚫 A dependent can be uniquely identified by his or her name.



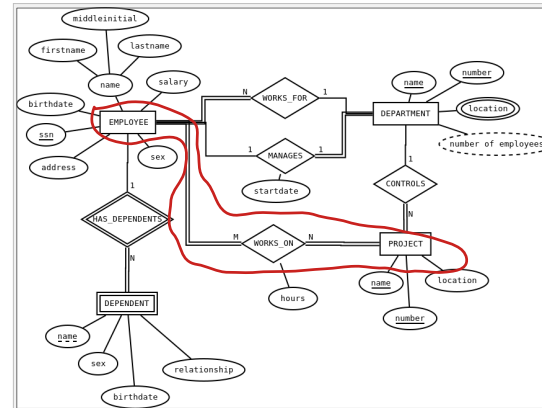
🚫 A dependent can be uniquely identified by the employee he or she is a dependent of.



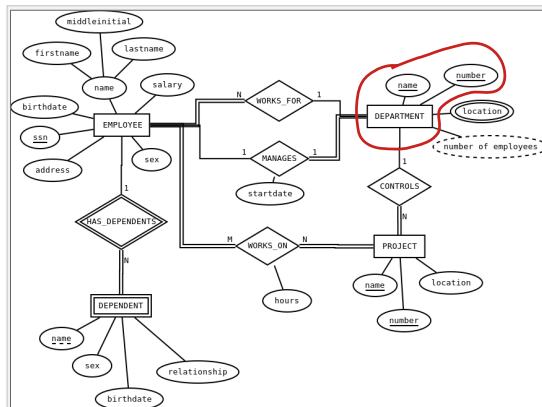
☺️ A department can control more than one project.



😊 A department can have more than one location.



😊 An employee can work on multiple projects.

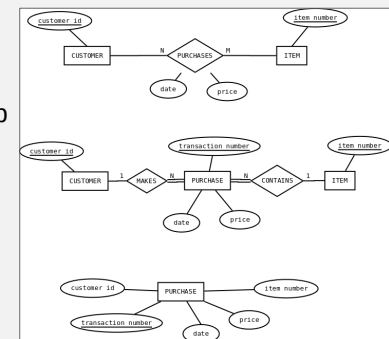


⊘ A department can be uniquely identified by its name or its number.

Questions

Can a relationship also be an entity?

- it may be possible or even reasonable to model something as an entity or as a relationship



Draw an ER diagram to model what is described below. Represent the situation as accurately as possible, including participation, cardinality, and key constraints as appropriate. Separately identify any attributes which are required (i.e. should be NOT NULL) and note any other constraints present that you did not capture in the diagram along with a reason why they were omitted. If necessary specifics are lacking in the description of the situation, make reasonable assumptions and state those assumptions.

- An insurance company keeps track of the following information about insured cars: make, model, year, primary color(s), VIN, and registration (state and number). The VIN uniquely identifies a particular car. The registration is also unique, though it can be transferred from one car to another.
- Each policy has a unique number and is associated with exactly one car. Each policy must have a primary policy holder (and there can be only one) but there can be any number of additional people covered by the policy.
- For anyone covered by a policy (primary policy holder or not), name (first and last), address, year of birth, sex, age, and marital status (single or married) is needed.
- A phone number can be recorded but isn't required.

Draw an ER diagram to model what is described below. Represent the situation as accurately as possible, including participation, cardinality, and key constraints as appropriate. Separately identify any attributes which are required (i.e. should be NOT NULL) and note any other constraints present that you did not capture in the diagram along with a reason why they were omitted. If necessary specifics are lacking in the description of the situation, make reasonable assumptions and state those assumptions.

- A movie is identified by a title, release year and country.
- A movie additionally has a running time, a rating (which may be different in different countries), a director, at least one writer (who may be credited for particular things e.g. "book" or "screenplay"), at least one genre, a cast consisting of any number of actors playing at least one role each, and a crew where each person has at least one job title.
- A movie additionally may have a release date (month, day, and year) in each of multiple countries, and may have won or been nominated for awards (with the name of the award, year, category such as "best actress", and whether or not the movie won included).
- An actor is uniquely identified by name.
- An actor additionally may have a birthdate, birth place, and biography.
- An actor additionally may have alternate names he or she has been credited as in some movies, and may have won or been nominated for awards (with the name of the award, year, category, and result listed).
- A quote consists of a sequence of lines uttered by characters in a movie. Quotes can be from a single character (such the first one below) or involve several characters (such as the second one below).

Inigo Montoya: Hello. My name is Inigo Montoya. You killed my father. Prepare to die.

Inigo Montoya: You are wonderful.
 Man in Black: Thank you; I've worked hard to become so.
 Inigo Montoya: I admit it, you are better than I am.
 Man in Black: Then why are you smiling?
 Inigo Montoya: Because I know something you don't know.
 Man in Black: And what is that?
 Inigo Montoya: I... am not lefthanded.

Draw an ER diagram to model what is described below. Represent the situation as accurately as possible, including participation, cardinality, and key constraints as appropriate. Separately identify any attributes which are required (i.e. should be NOT NULL) and note any other constraints present that you did not capture in the diagram along with a reason why they were omitted. If necessary specifics are lacking in the description of the situation, make reasonable assumptions and state those assumptions.

- Student information includes each student's name (required), ID number (required), social security number, current address and phone, permanent address and phone (required), birth date, sex, and class (first year, sophomore, junior, senior). Some applications need to refer to the city, state, and zip code of the student's permanent address and to the student's last name. Both the social security number and student ID number are unique for each student. Class is determined by the number of credits earned.
- A student's major(s) and minor(s) are also recorded. A major and a minor or second major are required to graduate.
- Course information includes the course name, course description, subject prefix (e.g. CPSC), course number, and number of credits. The subject prefix and course number uniquely identify each course. Every course must be offered by a department, and one course cannot be offered by more than one department.
- Each section of a course has an instructor, the term in which it is offered (a code which includes semester and year), and a section number. The section number distinguishes sections of the a course that are taught in the same term; its values are 1, 2, 3, etc up to the number of sections of that course taught in that term.
- Students register for particular sections of courses. At the end of the term, a grade for the course is recorded.