

ERD Examples

Example 1

- ⦿ A company has several departments.
 - ⦿ Each department has a supervisor and at least one employee.
 - ⦿ Employees must be assigned to at least one, but possibly more departments.
 - ⦿ At least one employee is assigned to a project, but an employee may be on vacation and not assigned to any projects.
 - ⦿ The important data fields are the names of the departments, projects, supervisors and employees, as well as the supervisor and employee number and a unique project number.
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Identify Entities

- The entities in this system are Department, Employee, Supervisor and Project.
- One is tempted to make Company an entity, but it is a false entity because it has only one instance in this problem.
- True entities must have more than one instance.



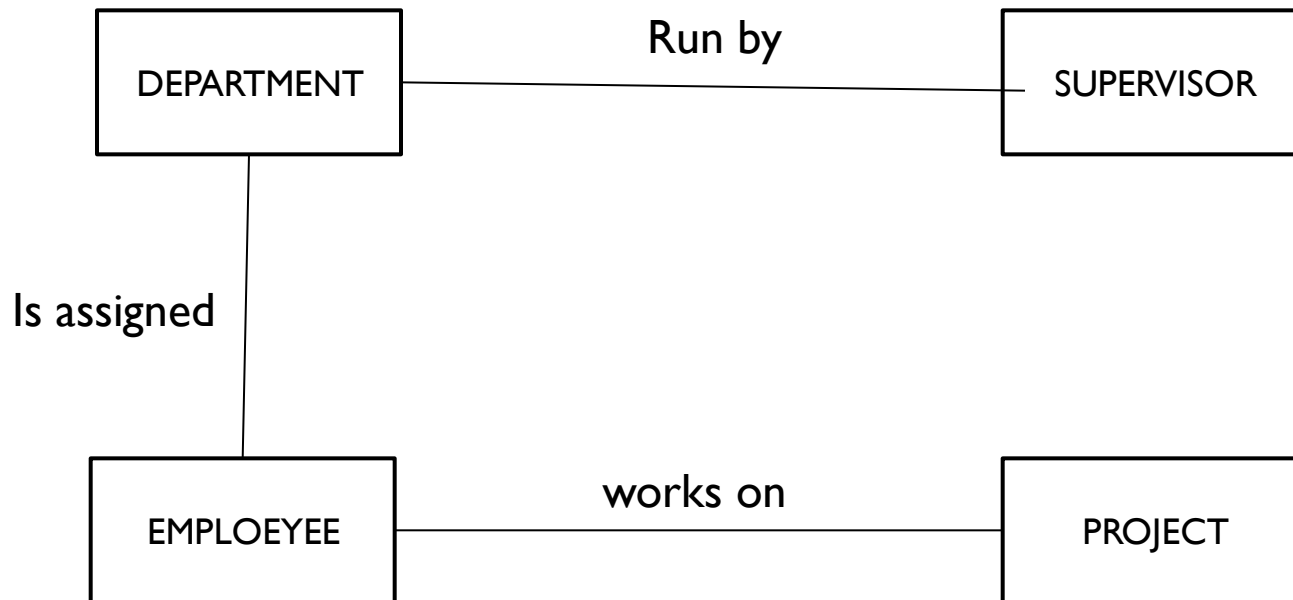
Find Relationships

- ▶ We construct the following Entity Relationship Matrix:

	Department	Employee	Supervisor	Project
Department		is assigned	run by	
Employee	belongs to			works on
Supervisor	runs			
Project		uses		



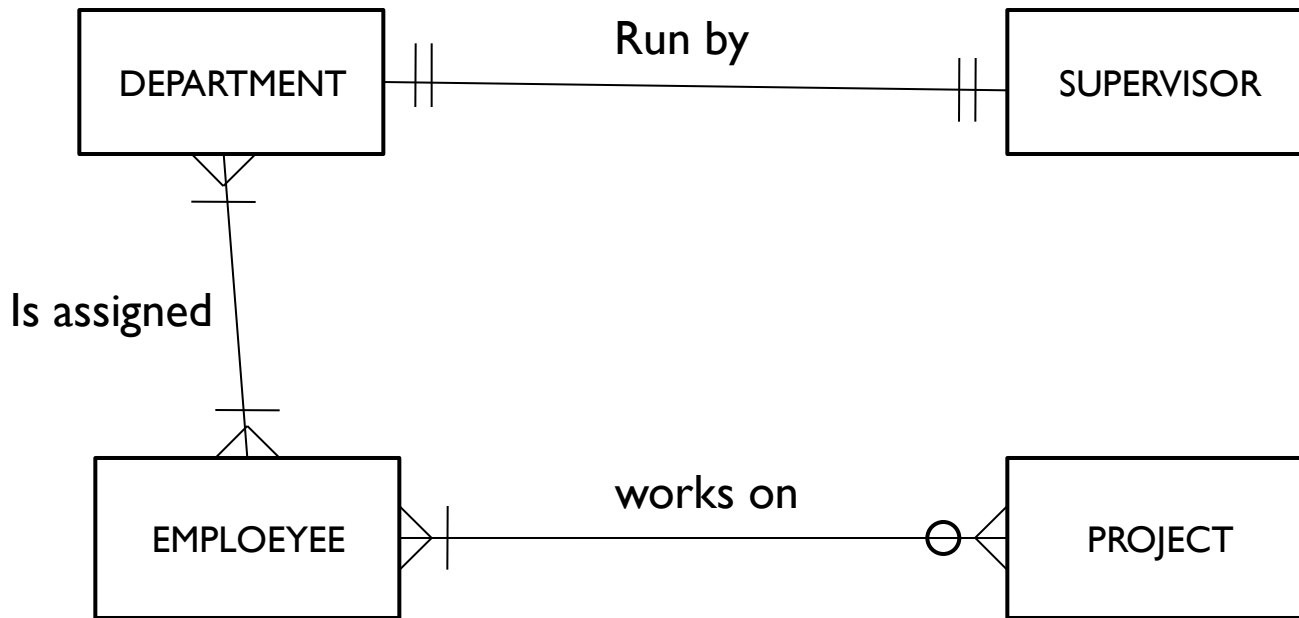
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- ▶ We connect the entities whenever a relationship is shown in the entity Relationship Matrix.



Fill in Cardinality

- From the description of the problem we see that: Each department has exactly one supervisor.
- A supervisor is in charge of one and only one department.
- Each department is assigned at least one employee.
- Each employee works for at least one department.
- Each project has at least one employee working on it.
- An employee is assigned to 0 or more projects.





Define Primary Keys

- The primary keys are Department Name, Supervisor Number, Employee Number, Project Number.



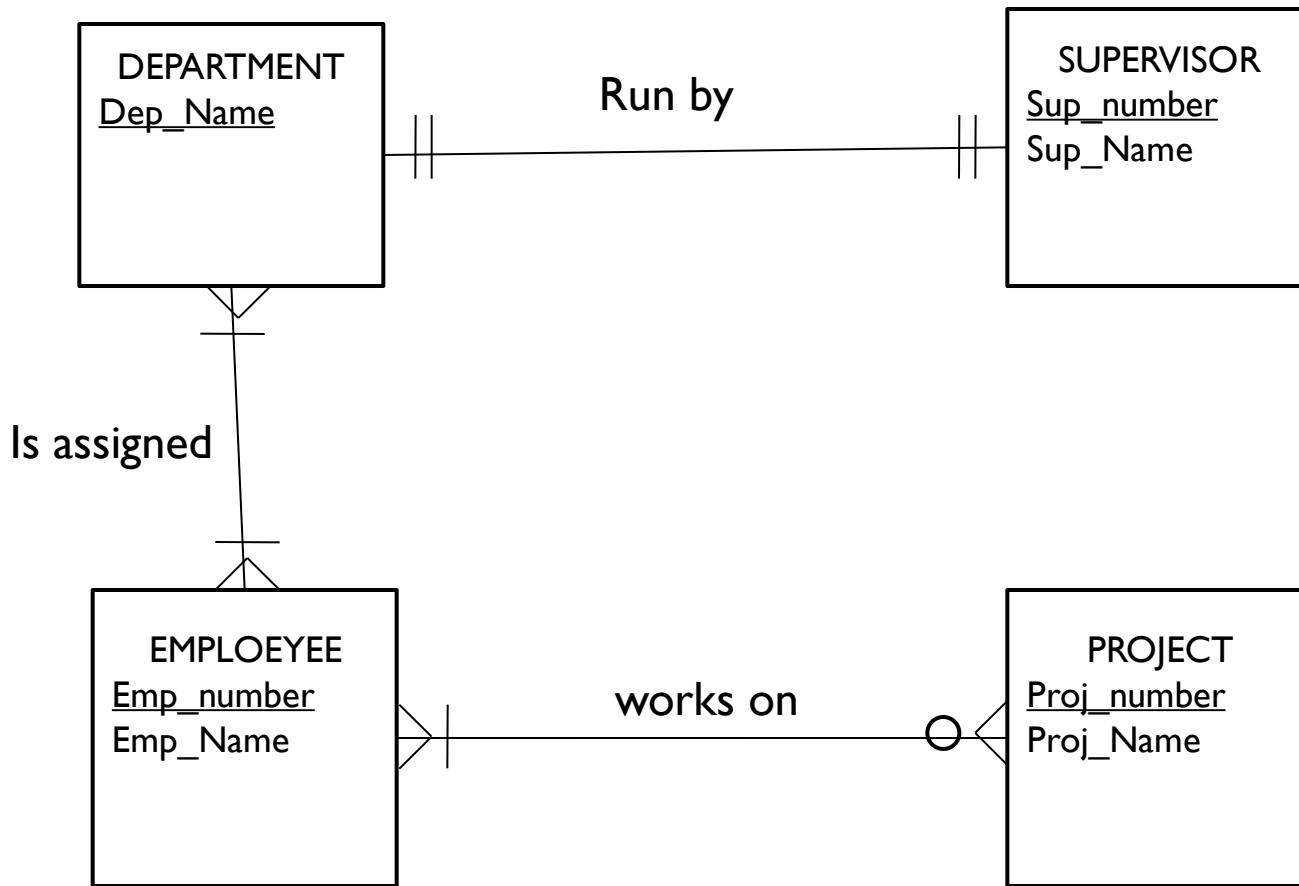
Identify Attributes

- The only attributes indicated are the names of the departments, projects, supervisors and employees, as well as the supervisor and employee NUMBER and a unique project number.



Attribute	Entity	Attribute	Entity
Department Name	Department	Supervisor Number	Supervisor
Employee Number	Employee	Supervisor Name	Supervisor
Employee Name	Employee	Project Name	Project
		Project Number	Project





Example 2

- ◉ Students are subdivided into graduate and undergraduate students. Students take a course in a particular semester and receive a grade for their performance. Sometimes students take the same course again in a different semester. There are no limits on how many courses a student can take, and on how many students completed a particular course.
 - ◉ Each graduate student has exactly one advisor, who must be a professor, whereas each professor is allowed to be the advisor of at most 20 students. Courses have a unique course number and a course title. Students and professors have a name and a unique ssn; students additionally have a gpa; moreover, graduate students have a GRE-score, and undergraduate students have a single or multiple majors. Professors can be students and take courses, but graduate students cannot be undergraduate students.
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