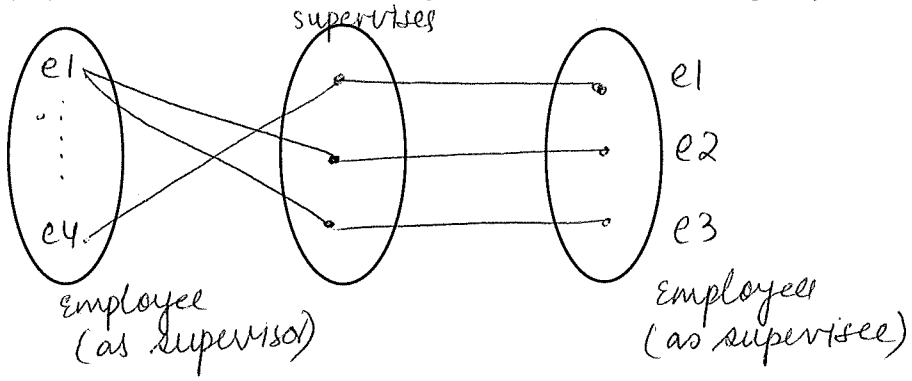
3. A company has four employees (E1, E2, E3, and E4). E1 manages E2 and E3 and E1 is managed by E4.

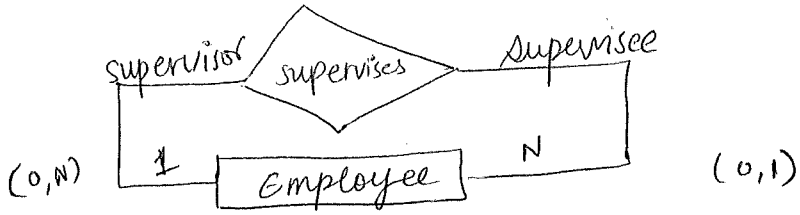


Degree = 2

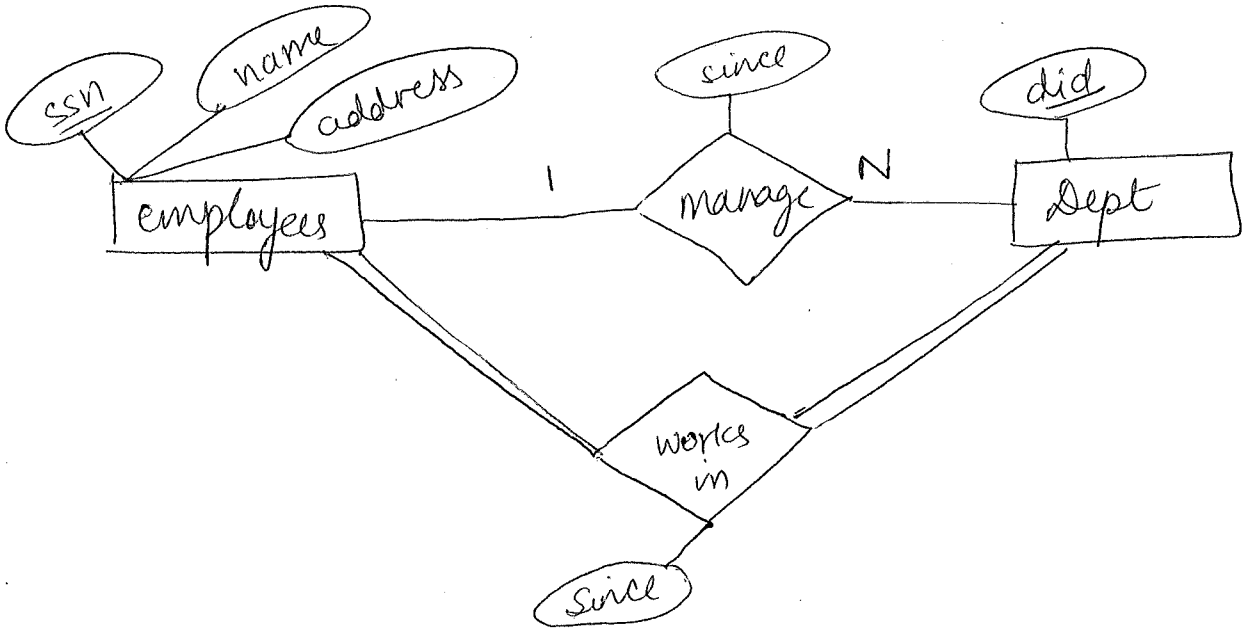
Cardinality= N 1

Participation= 0 1

Min-Max representation=



4. A company is organized into departments. There are employees that work in these departments. Each employee has an *ssn*, *name*, *address* whereas each department has a unique department id (a.k.a, *did*). The start date for each employee working in a department is recorded. Employees also manage departments. Each department has at least one manager although a single employee is allowed to manage more than one department. The start date for each manager is also recorded. Draw an ER diagram to show the entities, attributes, and relationships involved here.

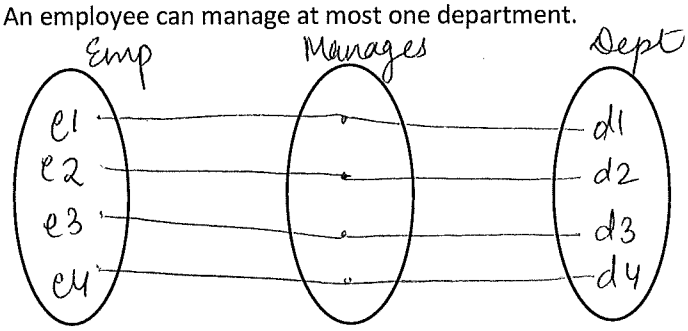


(It is natural that each employee works in at least one dept and each dept has at least one employee ⇒ Total participation in "works-in"

CS 355 KEY September 5, 2018

IN-CLASS HANDOUT

1. **Requirement Analysis:** Every department should have a manager and only one employee manages a department. An employee can manage at most one department.

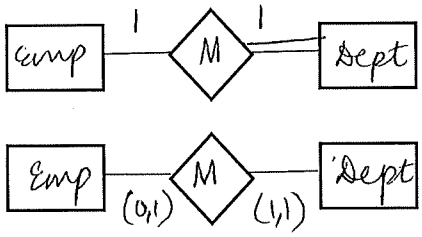


Degree = 2

Cardinality = 1 and 0

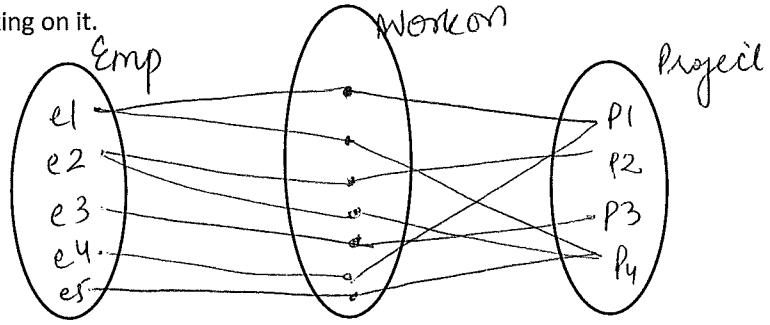
Participation = 0 and 1

Min Max representation = (0,1) (1,1)



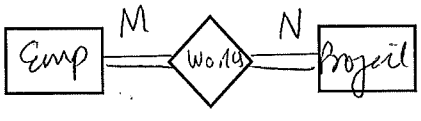
2. **Requirement Analysis:** Every employee must work on at least one project and each can work on many projects. A project can be worked on by employees and every project must have at least one employee working on it.

P1 = e1, e4
P2 = e2,
P3 = e3
P4 = e1, e2, e5



Degree = 2

Cardinality = M to N



Participation = 1 to 1

Min-Max representation = (1,N), (1,M)