Database Management System

Lecture 3: Database Design – Constructing ER Diagram

Chapter: 6

Contents

- Steps of ER Diagram
- Understanding Requirements
- Demonstration all steps

Steps of Constructing ERD

1. Identify the Entities Required
2. Identify the Attributes and Primary key for each Entity
3. Identify the Relationship needed
4. Identify the Cardinality Ratio and Participation
5. Draw the Diagram

Requirements (Project HRM)

- You have to develop a database for a company including some information of departments, employees and projects of the company. As mentioned that every department has many employees and each employee work for a department and each department is leading by only one manager who is also an employee. Initially a new department need not have any employee. Here, though an employee belongs a department but they can work for different projects at the same time.

Step 1: Identify Entities

- You have to develop a database for a company including some information of departments, employees and projects of the company. As mentioned that every ***department*** has many ***employees*** and each employee work for a department and each department is leading by only one ***manager*** who is also an employee. Initially a new department need not have any employee. Here, though an employee belongs a department but they can work for different ***projects*** at the same time.

Step 2: Identify Attributes and PK

- **Employees**(*id, name, email, phone, address, dob, gender, designation, salary*)

- **Departments**(*id, name, number, locations, num_of_employee, hod)*

- **Projects**(*id, name, num_of_employee, description*)

- Dependents (*employee_id, Name, Gender, dob, relationship*)

Representing Attributes with Entities

**Employees**(*id, name, email, phone, address, dob, gender, designation, salary*)
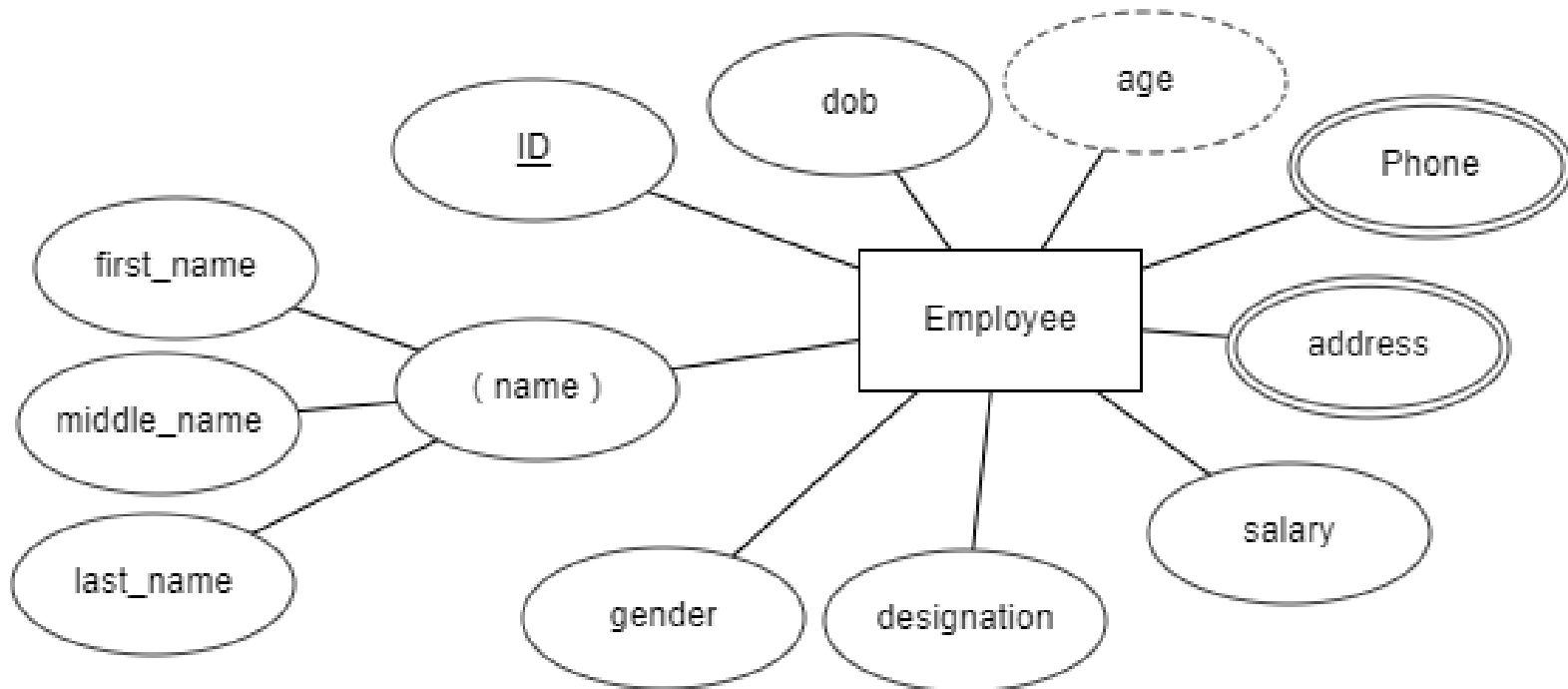
Step 3: Identify Relationship

- 1. Employees **work_for** Department
- 2. Employee **Manages** Department
- 3. Employees **work_on** Project
- 4. Employee **supervises** Employees
- 5. Employees **depends_of** Dependent
- 6. Department **Controls** Project

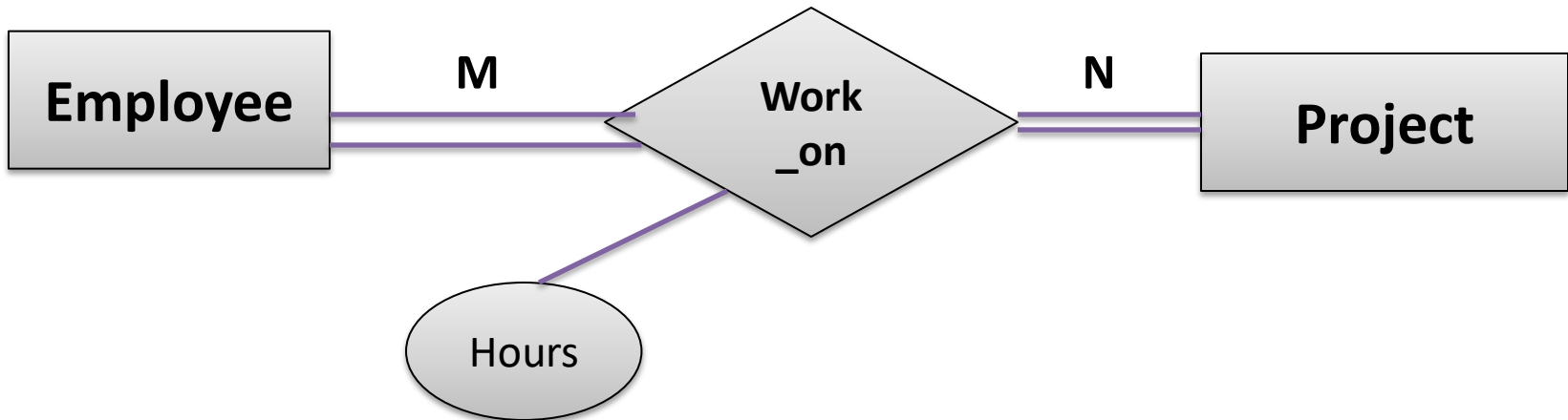# *Step 4: Cardinality Ratio and Participation (Constraints)*

- Types of Relationship/Mapping Cardinalities Ratio
  - Ask for maximum participation in a relationship
- Partial and Total Participation
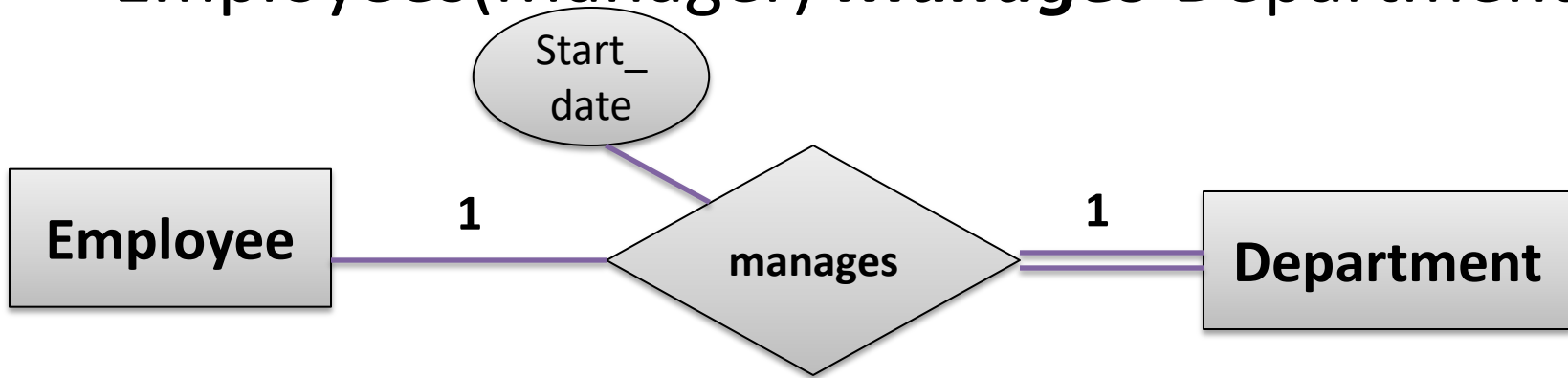 - Ask for a minimum participation in a relationship
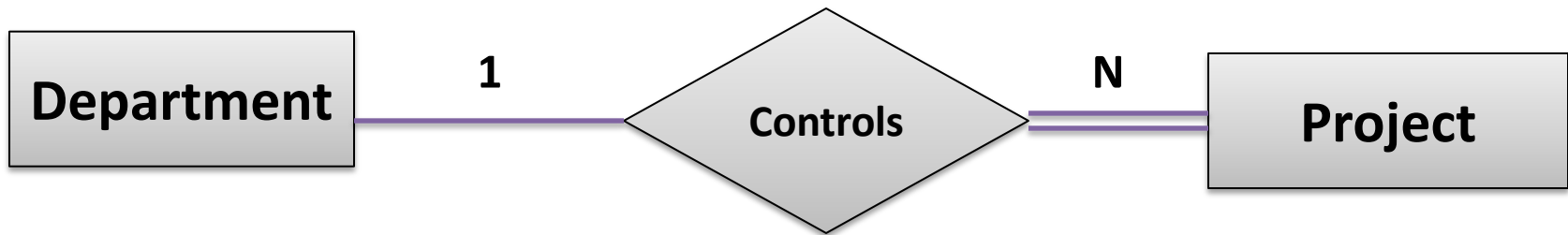
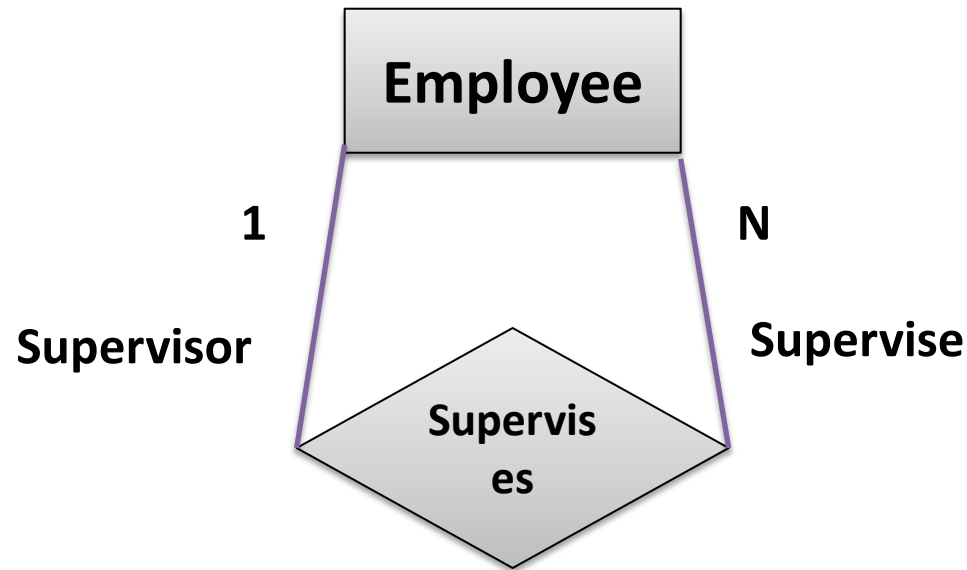- Employees ***work_for*** Department
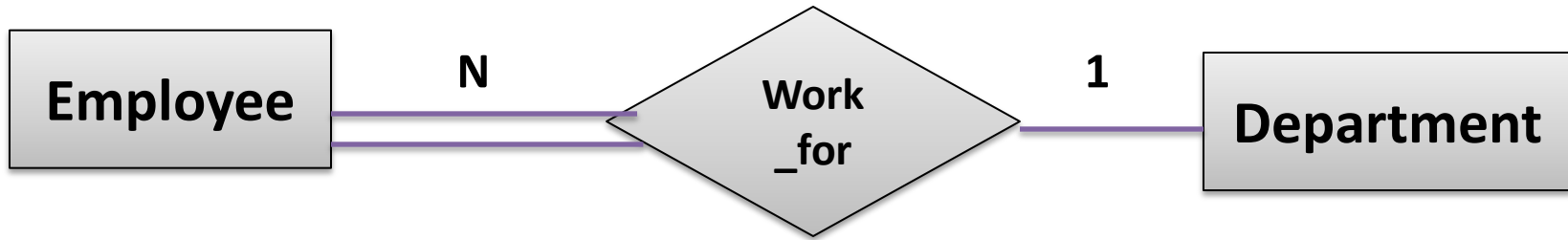
- Employees ***works_on*** Projects

- Employees(Manager) **Manages** Department

Start_date

Employee — 1 — manages — 1 — Department

- Department **Controls** Project

Department — 1 — Controls — N — Project

- Employee *supervises* Employees

Employee

1   N

Supervisor   **Supervise**

Supervis es

- Employees *depends_of* Dependent

Employee   1   **Depen ds_of**   N   **Dependent**
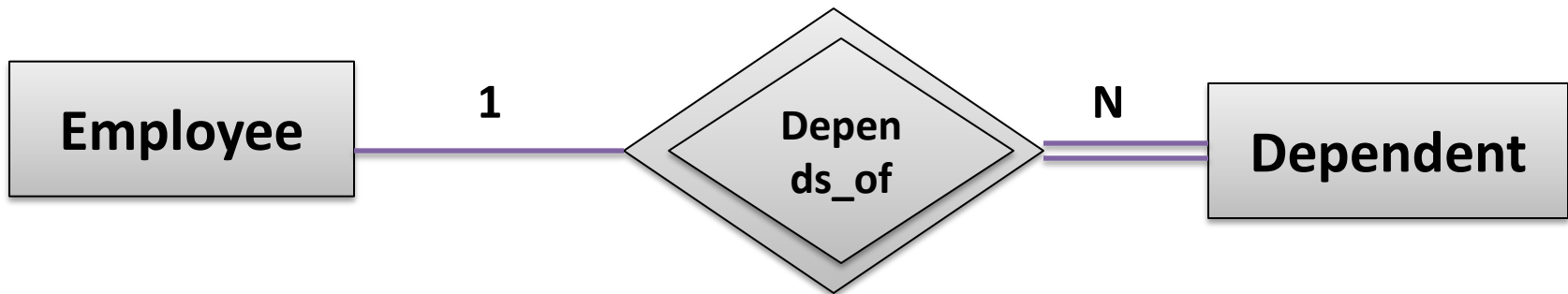
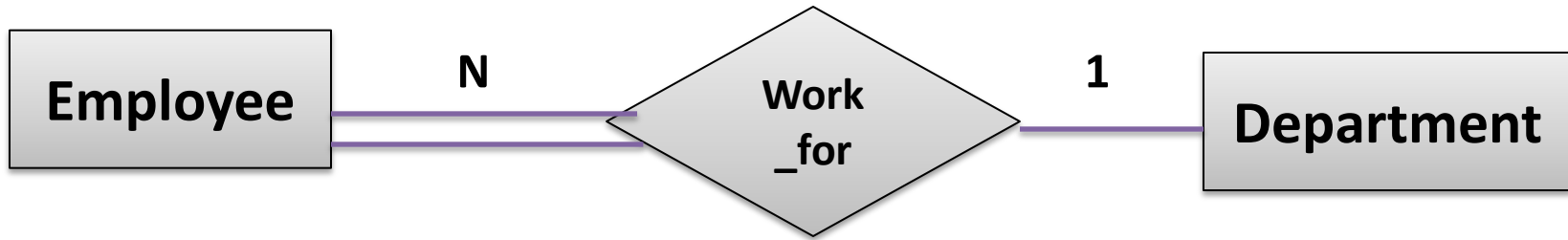# Drawing ER Diagram (Notation)
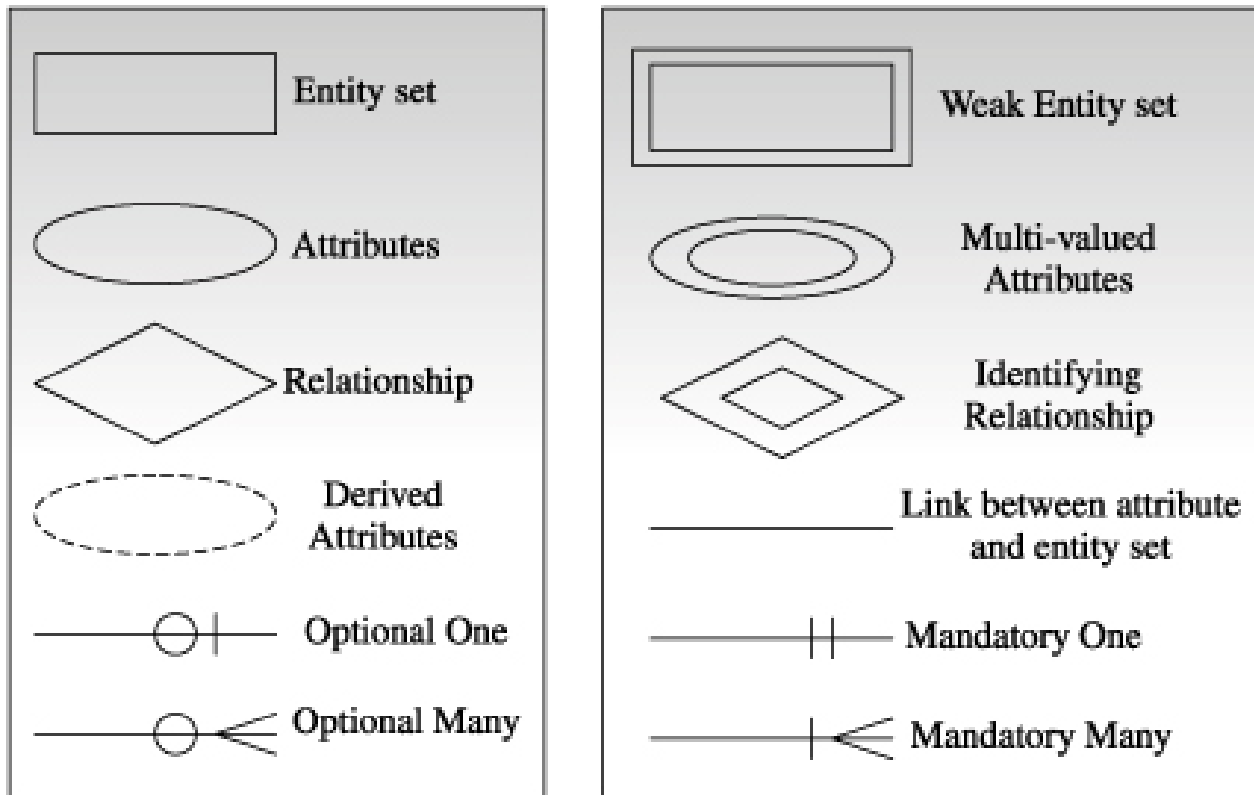
Total Participation: Double Line and
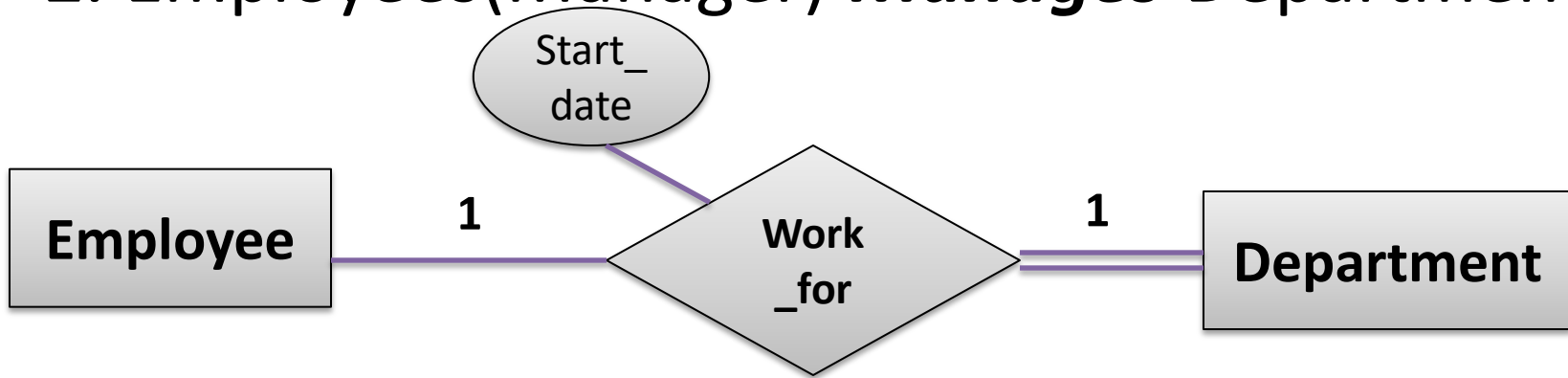**Partial Participation: Single Line**

Demonstration

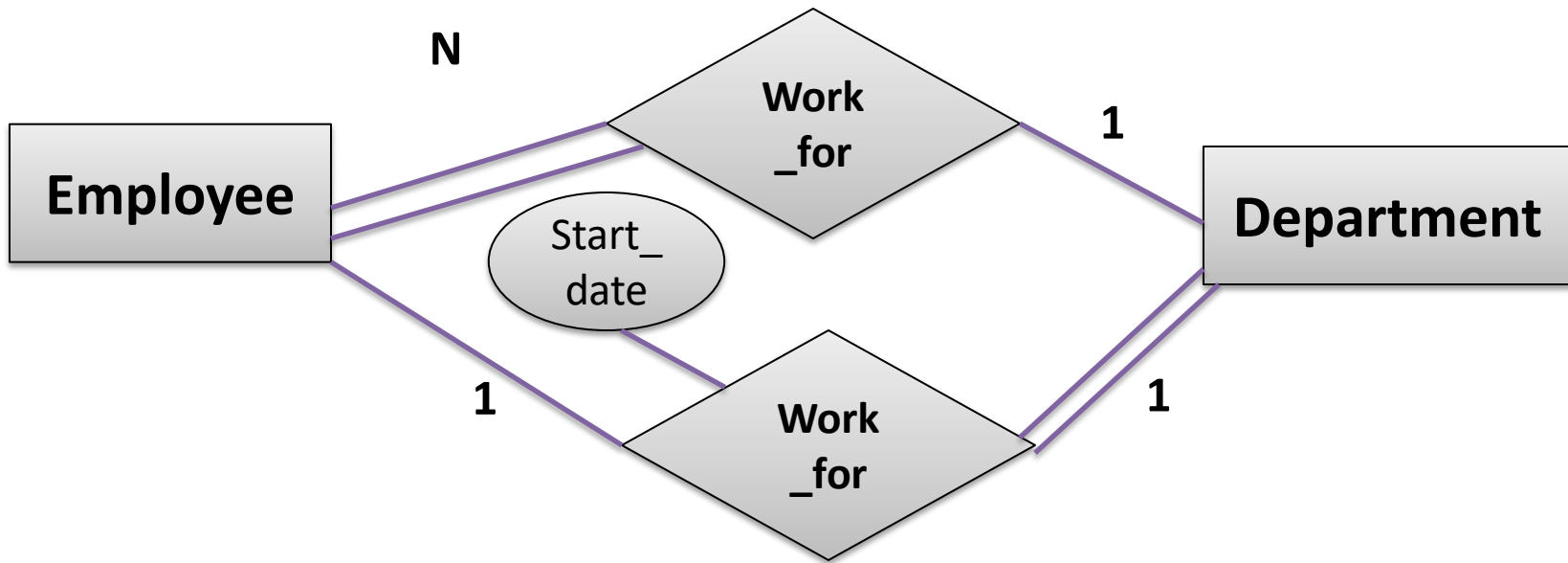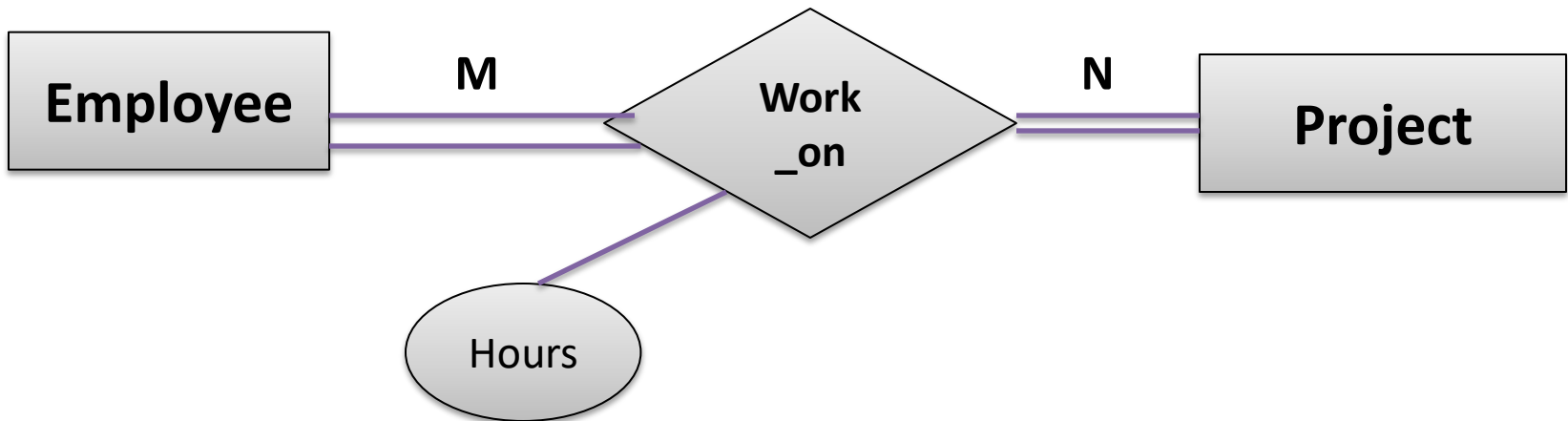- Show all relationships in a single digram

1. Employees *work_for* Department
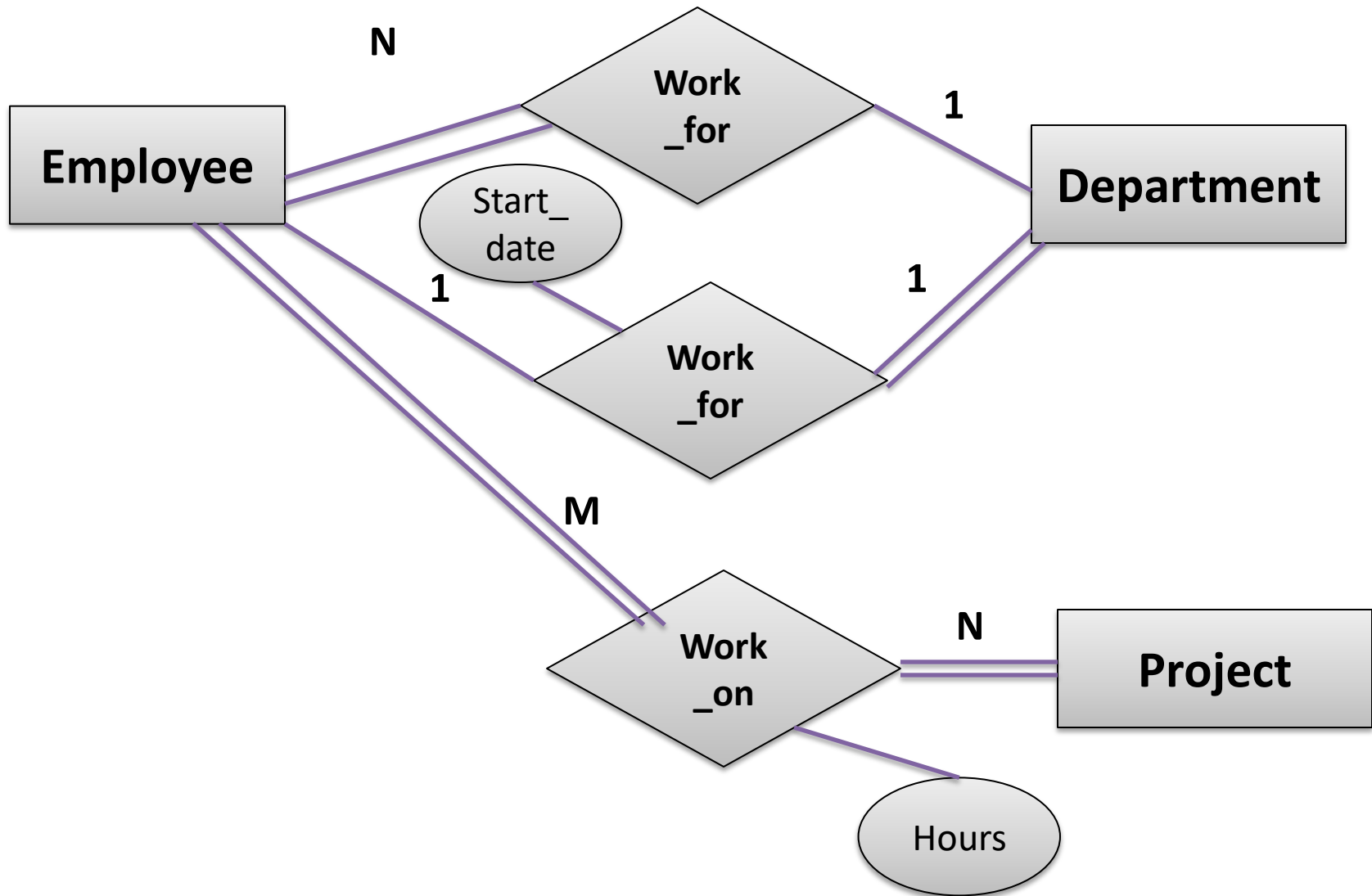
2. Employees(Manager) *Manages* Department

Relationship: 1 and 2

Employee

N

Work_for

1

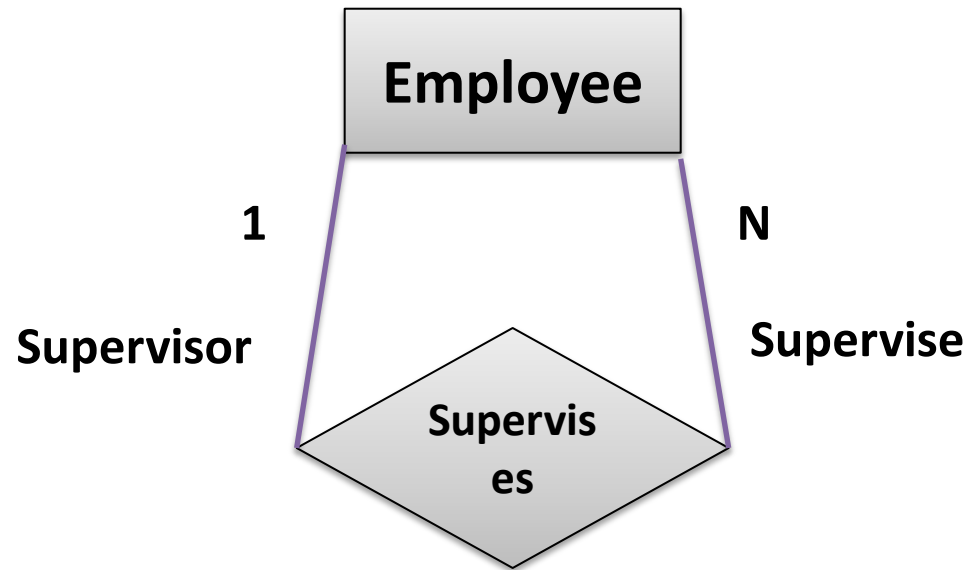Department

Start_date

1

Work_for

1

3. Employees *works_on* Project

Relationship: 1, 2 and 3

4. Employee *supervises* Employees

Employee

1   N

Supervisor   **Supervise**

Supervis es

Relationship: 1, 2, 3 and 4
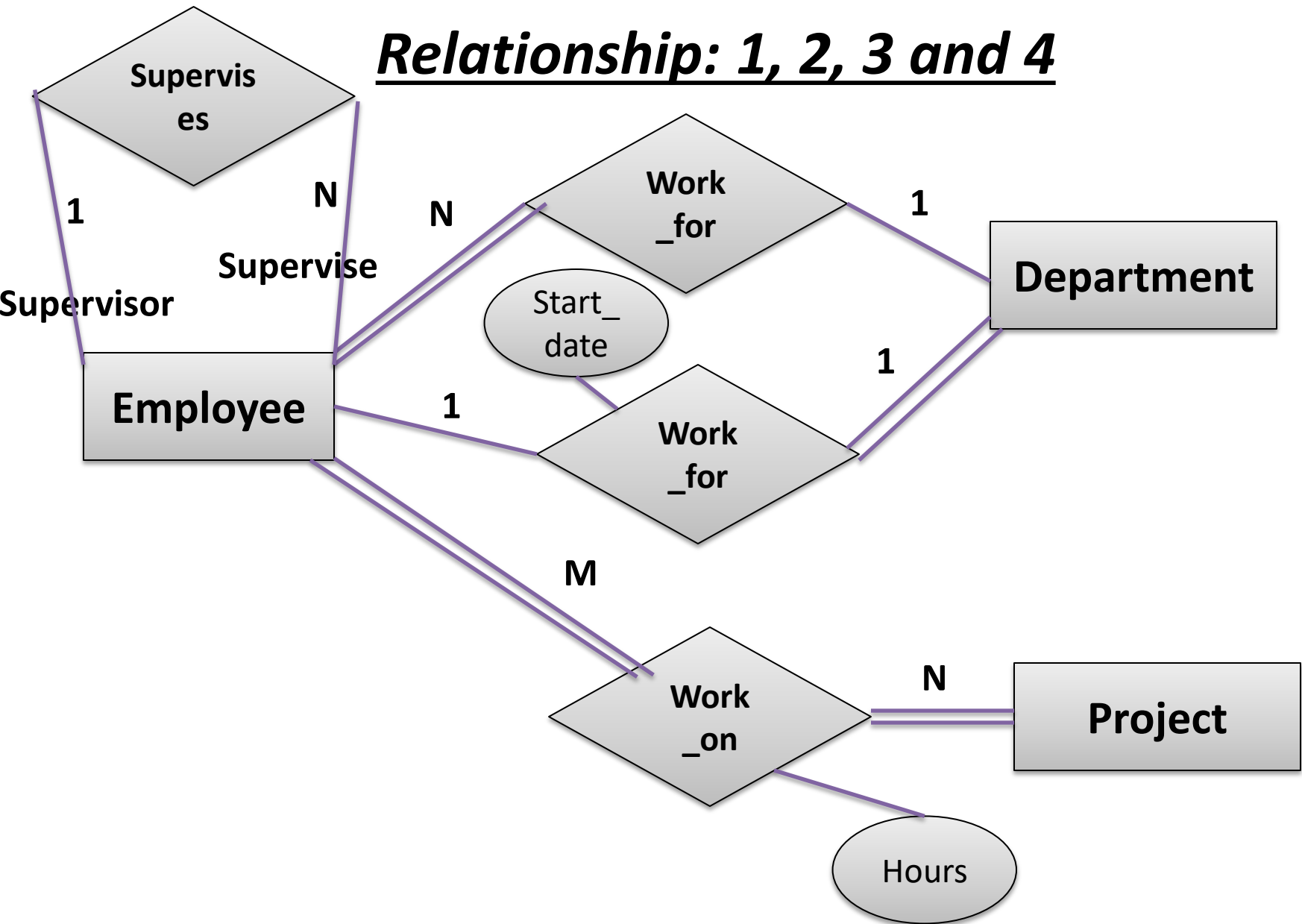
5. Employees *depends_of* Dependent

Employee —1— ◇ Depends_of ◇ —N— **Dependent**

R: 1, 2, 3, and 4, and 5

Supervises

1
Supervisor

N
Supervise

Employee

N
Work_for
1
Department

Start_date

1
Work_for
1
Department

1
Depends_of
N
Dependent

M
Work_on
N
Project

Hours

23

6. Department *Controls* Project

R: All
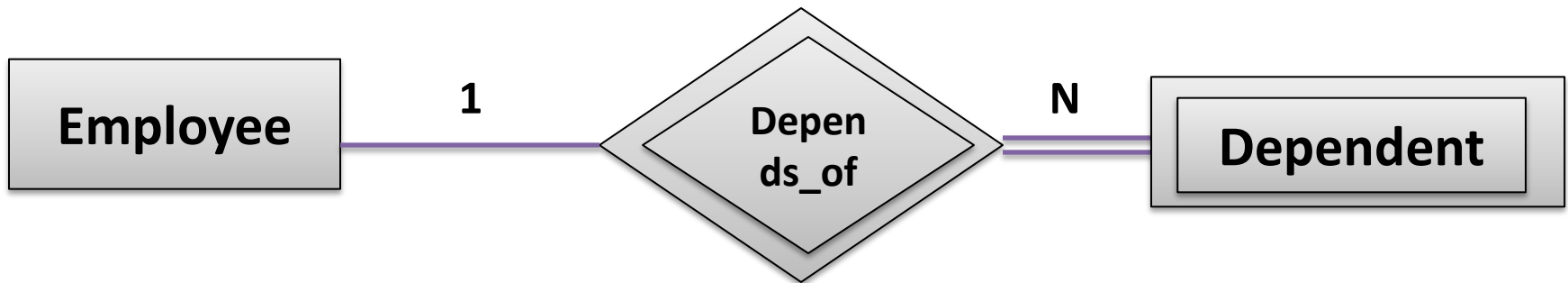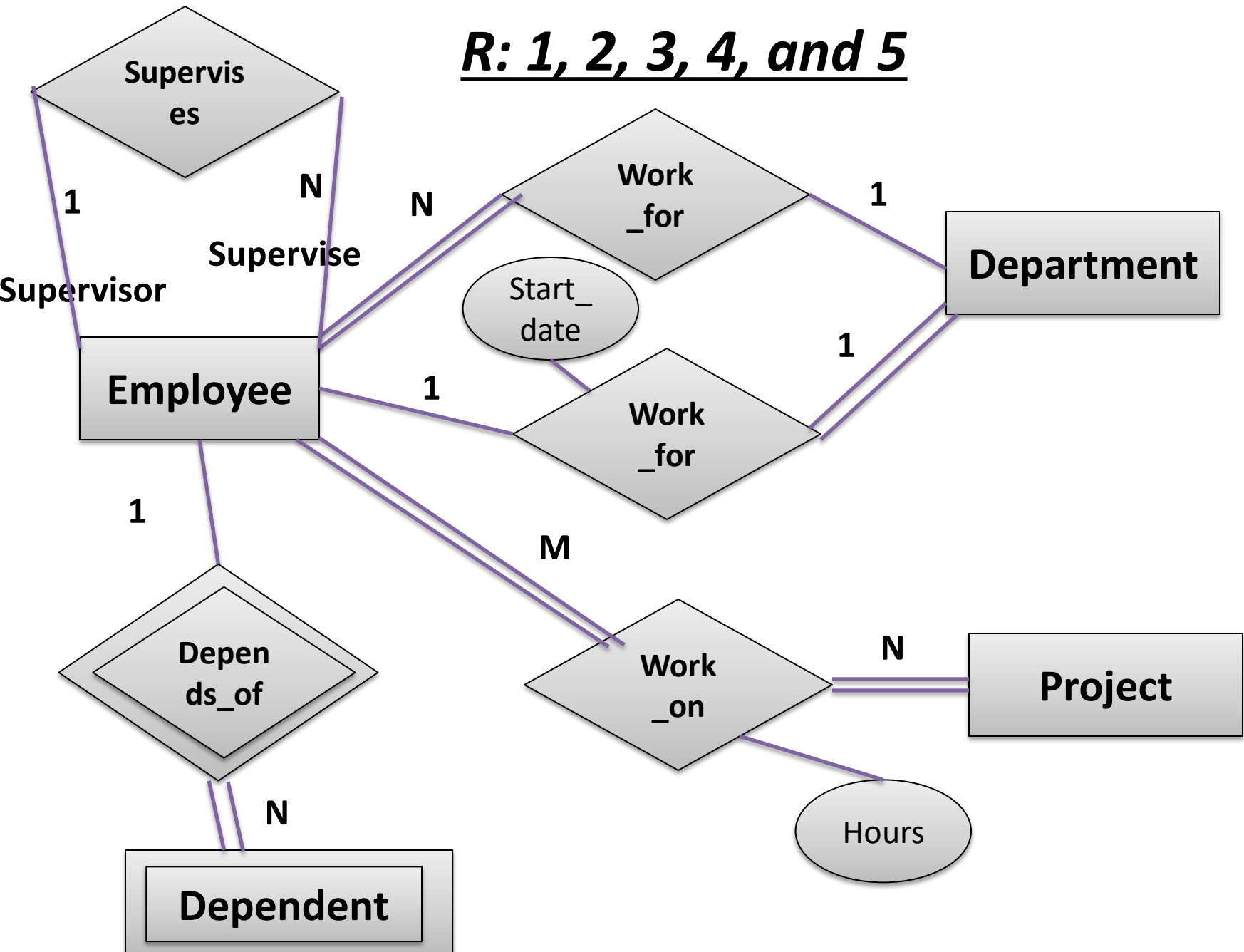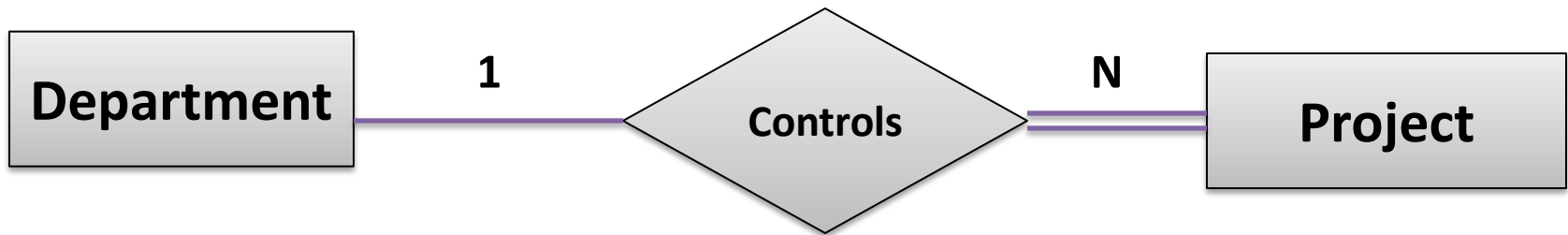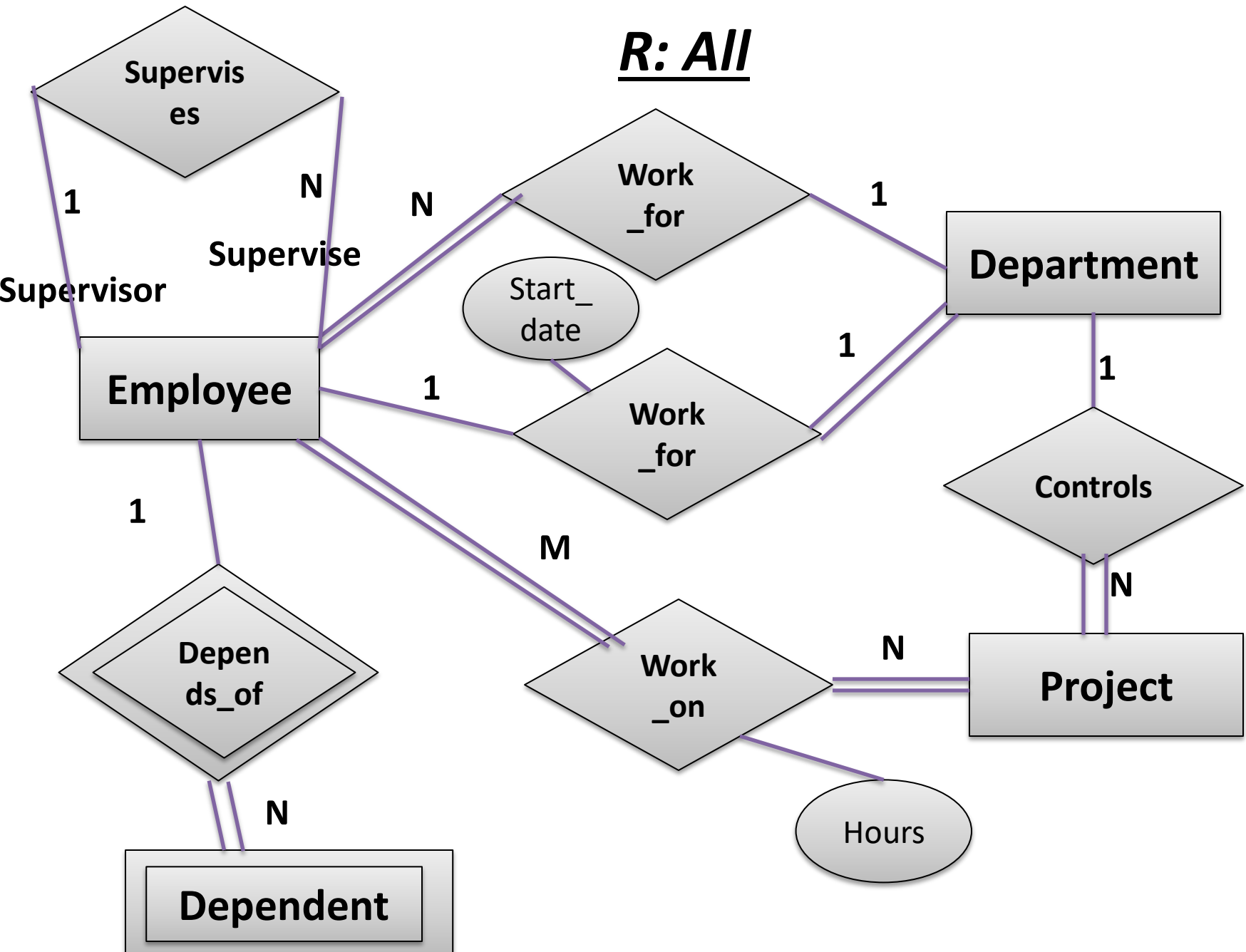
Complete ER Diagram with Entities, Relationships and Attributes

ERD Drawing Tools

https://erdplus.com/standalone (Recommended)

https://online.visual-paradigm.com/diagrams/solutions/free-erd-tool/

https://www.smartdraw.com/entity-relationship-diagram/er-diagram-tool.htm

https://www.lucidchart.com/pages/examples/er-diagram-tool
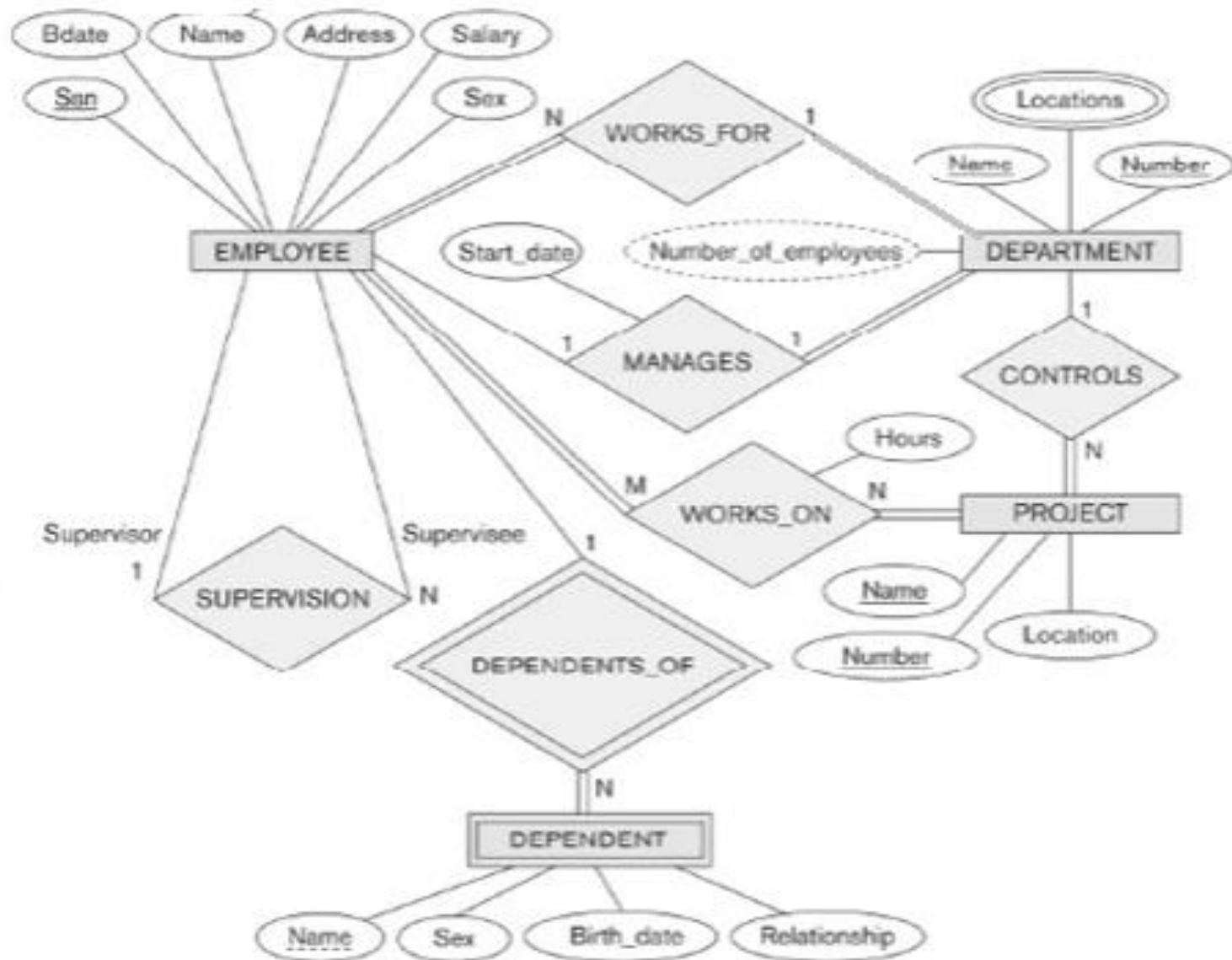
Any Questions?

Assignment 1

1. You have to develop a ***Human Resource Management*** database for a company. It requires that you have to add some information of departments, employees and projects including company. As mentioned that every department has many employees and each employee work for a department and each department is leading by only one manager who is also an employee. Initially a new department need not have any employee. Here, though an employee belongs a department but they can work for different projects at the same time. Each employee can work for different job position like Developer, Programmer and front-end designer.

2. ER diagram for university management system (from chapter 6)

3. Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received

Submission Date: Next Class
Deliverables: Hand written assignment

Chapter 6

END OF LECTURE