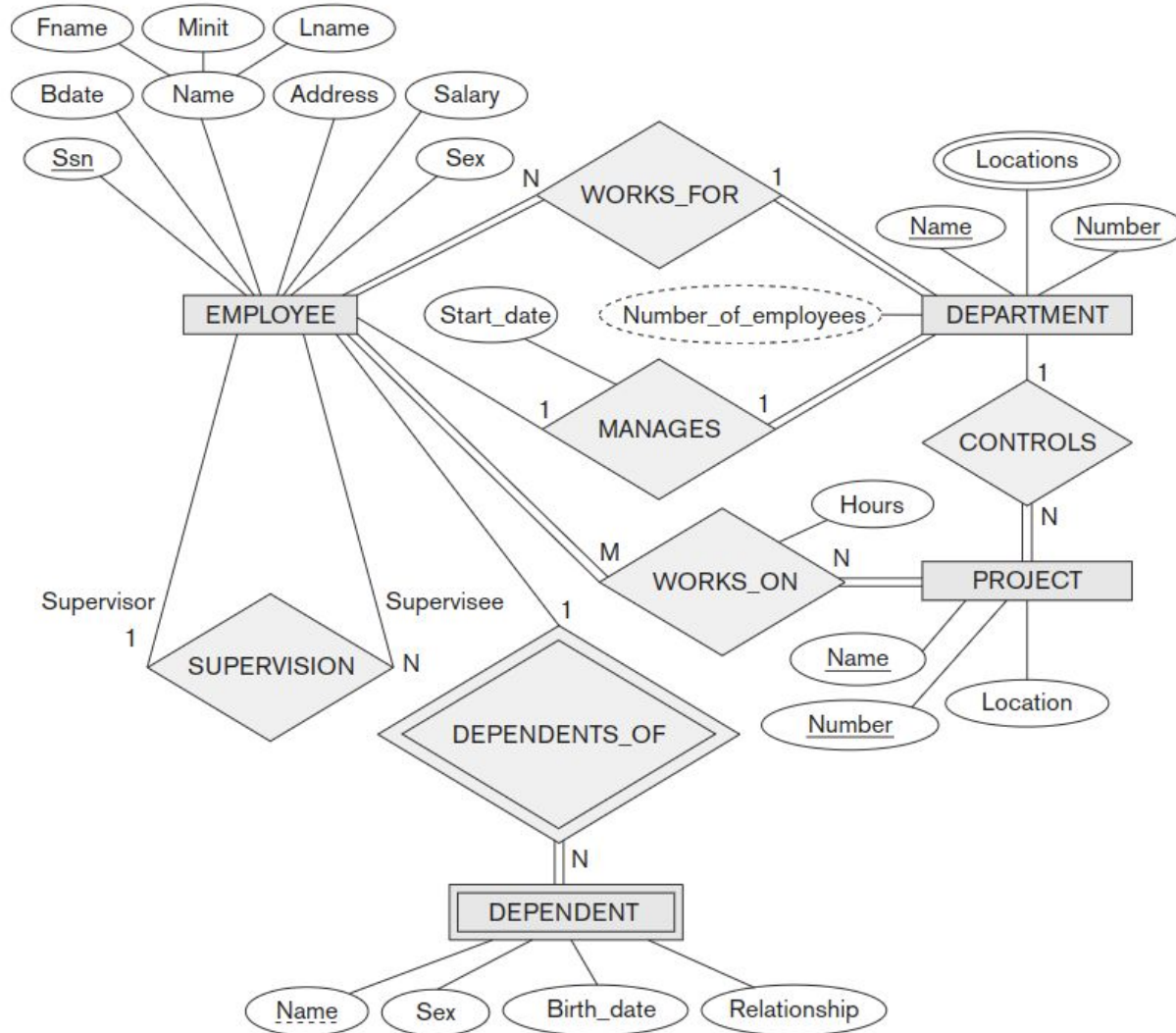


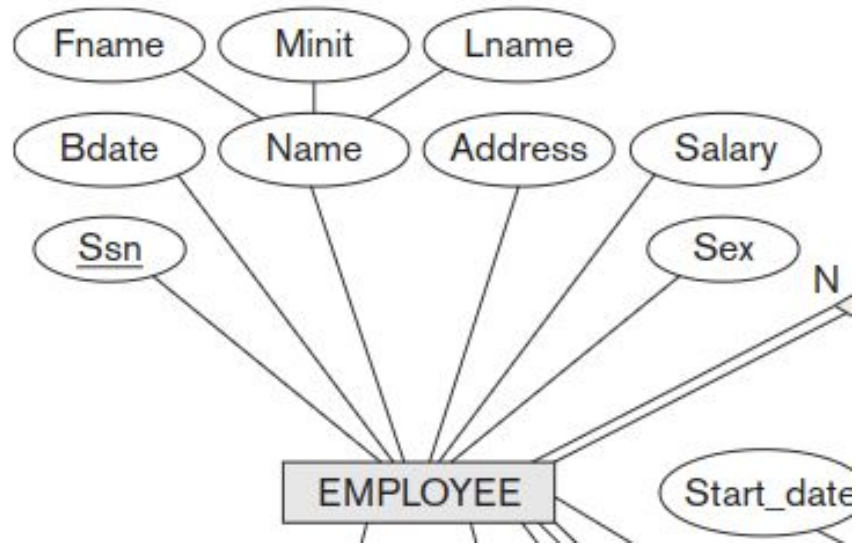
# ER and EER to Relational Mapping



# Mapping ER to Tables

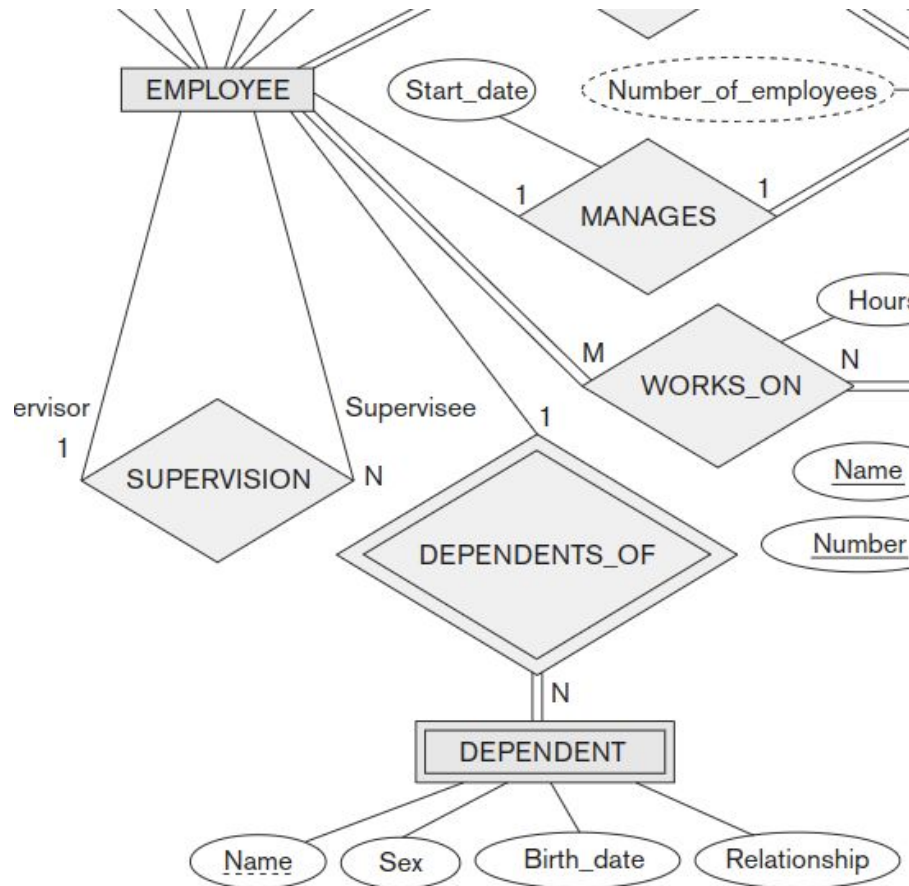
- Step 1: Mapping of Regular Entity Types.
- Step 2: Mapping of Weak Entity Types.
- Step 3: Mapping of Binary 1:1 Relationship Types.
  - Foreign key approach
  - Merged relation approach
  - Cross-reference or relationship relation approach
- Step 4: Mapping of Binary 1:N Relationship Types.
  - The foreign key approach.
  - The relationship relation approach.
- Step 5: Mapping of Binary M:N Relationship Types.
- Step 6: Mapping of Multivalued Attributes.
- Step 7: Mapping of N-ary Relationship Types.

# Regular/Strong entities



```
1 create table employee
2 (
3     ssn      int primary key,
4     bdate    date,
5     fname    varchar,
6     minit    varchar,
7     lname    varchar,
8     address  varchar,
9     salary   real,
10    sex      varchar
11 );
```

# Weak entities



```

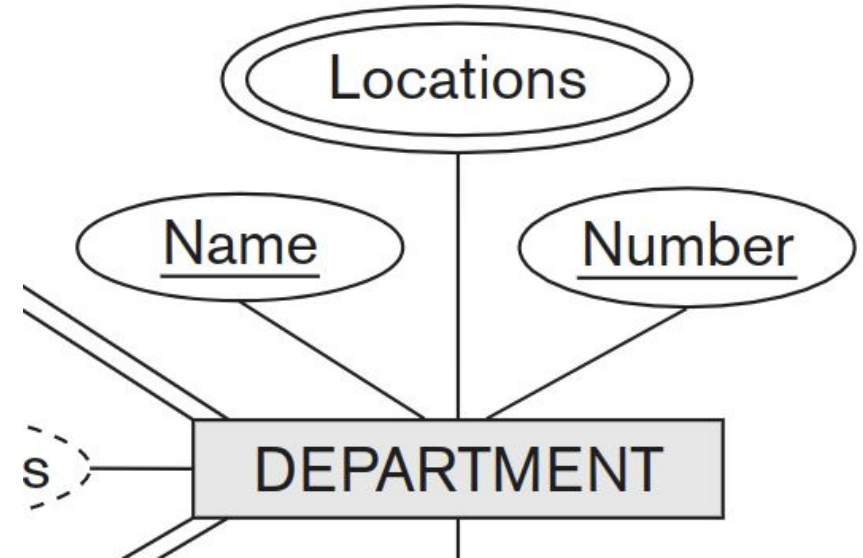
13 create table dependent
14 (
15     employee_ssn int references employee (ssn),
16     name          varchar,
17     sex           varchar,
18     birth_date    date,
19     relationship  varchar,
20     primary key (employee_ssn, name)
21 );

```

# Multi-valued attributes

```
23 create table department
24 (
25     number int,
26     name varchar unique ,
27     primary key (number, name)
28 );
```

```
30 ✓ create table department_locations
31 (
32     department_number int,
33     department_name varchar,
34     location varchar,
35     foreign key (department_number, department_name) references department(number, name),
36     primary key (department_number, department_name, location)
37 );
```

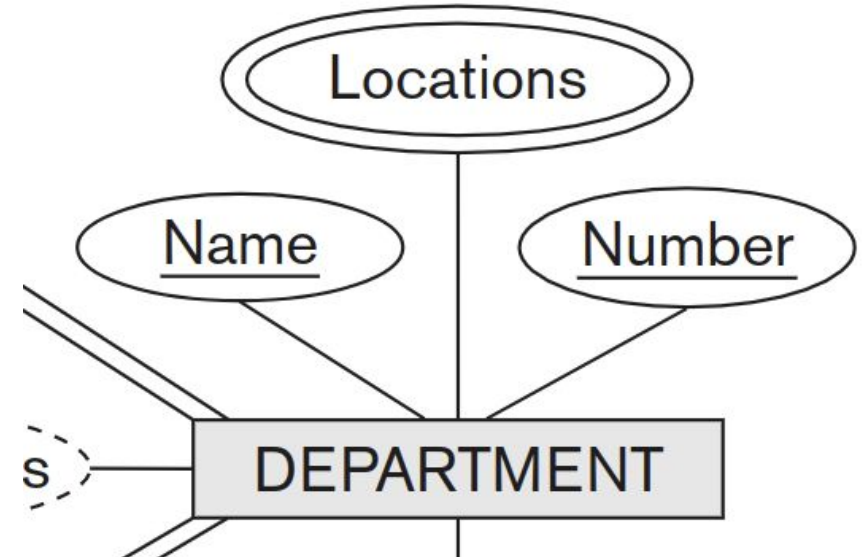




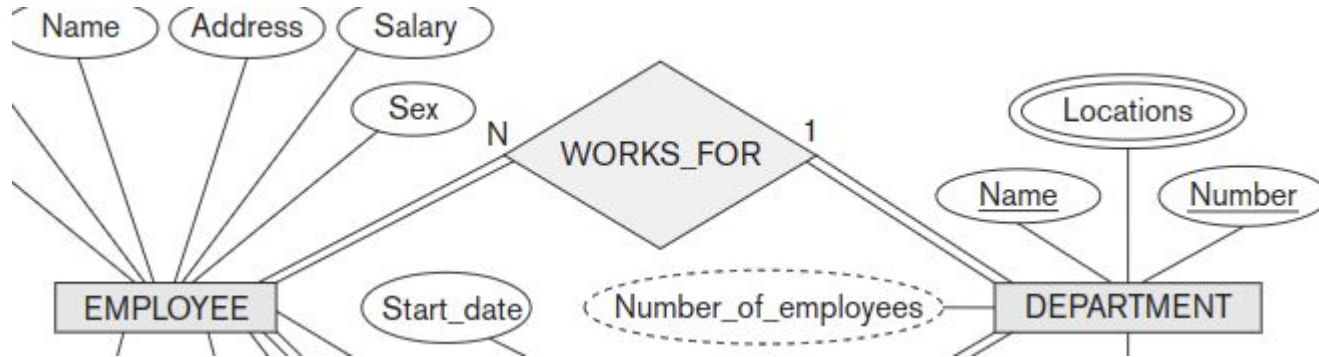
# Multi-valued attributes

```
23 create table department
24 (
25     number int,
26     name varchar unique ,
27     primary key (number, name)
28 );
```

```
30 ✓ create table department_locations
31 (
32     department_number int,
33     department_name varchar,
34     location varchar,
35     foreign key (department_number, department_name) references department(number, name),
36     primary key (location)
37 );
```



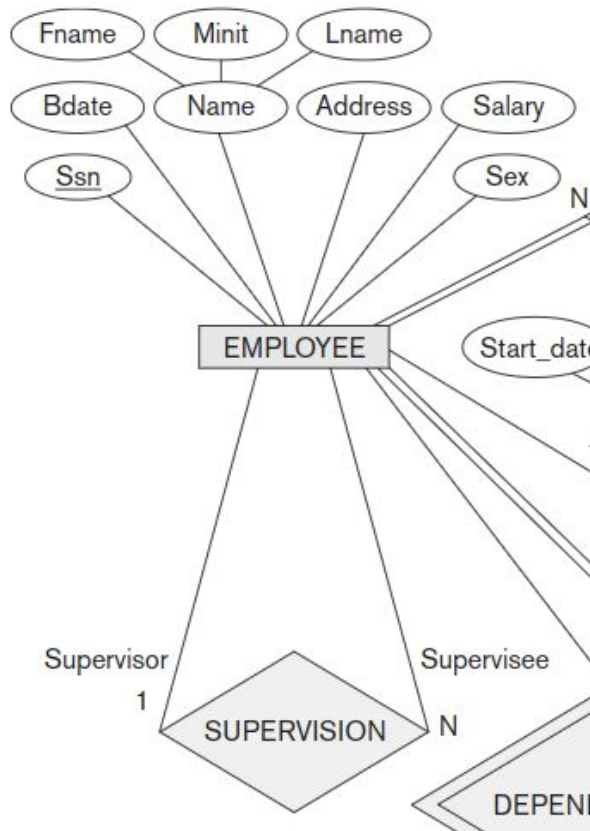
# Total participation



```

20 ✓ create table employee
21 (
22     ssn      int primary key,
23     bdate    date,
24     fname    varchar,
25     minit    varchar,
26     lname    varchar,
27     address  varchar,
28     salary   real,
29     sex      varchar,
30     department_number int,
31     department_name varchar,
32     foreign key (department_number, department_name) references department(number, name)
33 );
    
```

# Recursive relationship



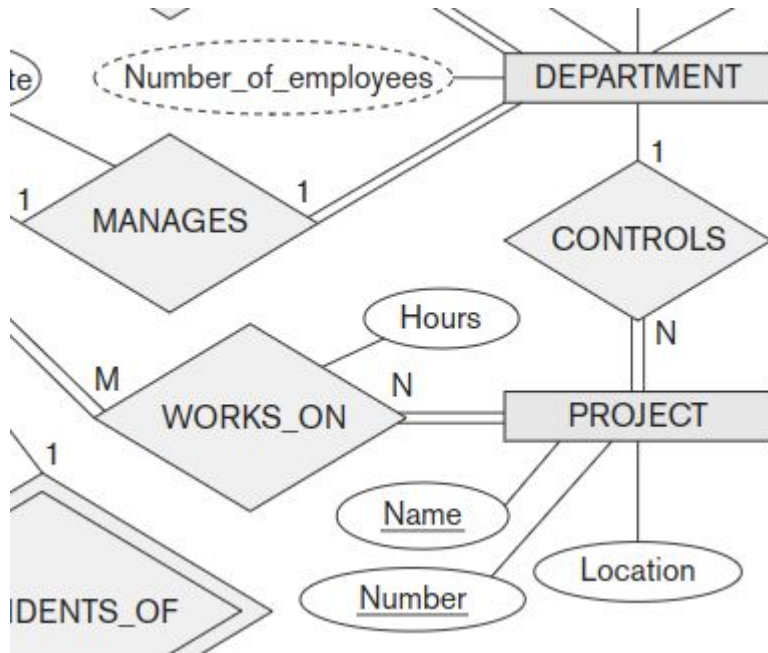
```

20 ✓ create table employee
21 (
22     ssn      int primary key,
23     bdate    date,
24     fname    varchar,
25     minit    varchar,
26     lname    varchar,
27     address  varchar,
28     salary   real,
29     sex      varchar,
30     department_number int,
31     department_name varchar,
32     foreign key (department_number, department_name) references department(number, name),
33     super_ssn int references employee(ssn)

```



# Many-to-many + more



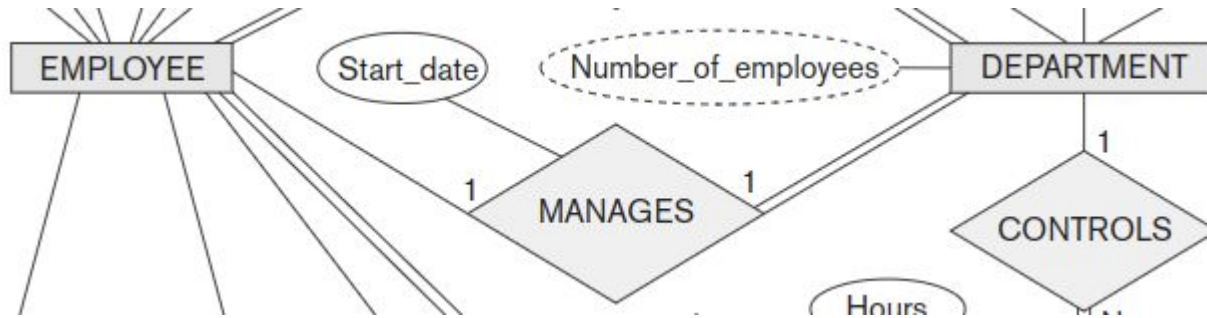
```

55 ✓ create table project
56 (
57     name    varchar,
58     number  int,
59     location varchar,
60     department_number int,
61     department_name varchar,
62     foreign key (department_number, department_name) references department (number, name),
63     primary key (name,number)
64 );

66 ✓ create table works_on
67 (
68     employee_ssn    int references employee (ssn),
69     project_name    varchar,
70     project_number  int,
71     hours           int,
72     foreign key (project_name, project_number) references project (name, number),
73     primary key (employee_ssn, project_name, project_number)
74 );

```

# One-to-one



```
13 ! create table department
14 (
15     number int,
16     name varchar unique,
17     manager_ssn int references employee(ssn),
18     manager_start_date date,
19     primary key (number, name)
20 );
```

# Spot the problem

```
13 ! create table department
14 (
15     number int,
16     name varchar unique,
17     manager_ssn int references employee(ssn),
18     manager_start_date date,
19     primary key (number, name)
20 );
22 create table employee
23 (
24     ssn int primary key,
25     bdate date,
26     fname varchar,
27     minit varchar,
28     lname varchar,
29     address varchar,
30     salary real,
31     sex varchar,
32     department_number int,
33     department_name varchar,
34     foreign key (department_number, department_name) references department (number, name),
35     super_ssn int references employee (ssn)
36 );
```

# Spot the problem

```
13 create table department
14 (
```

```
[2022-03-07 11:57:56] [42P01] ERROR: relation "employee" does not exist
```

```
15     name          varchar unique,
16
17     manager_ssn int references employee(ssn),
18     manager_start_date date,
19     primary key (number, name)
20 );
21
22 create table employee
23 (
24     ssn          int primary key,
25     bdate        date,
26     fname        varchar
```

```
[2022-03-07 12:00:20] [42P01] ERROR: relation "department" does not exist
```

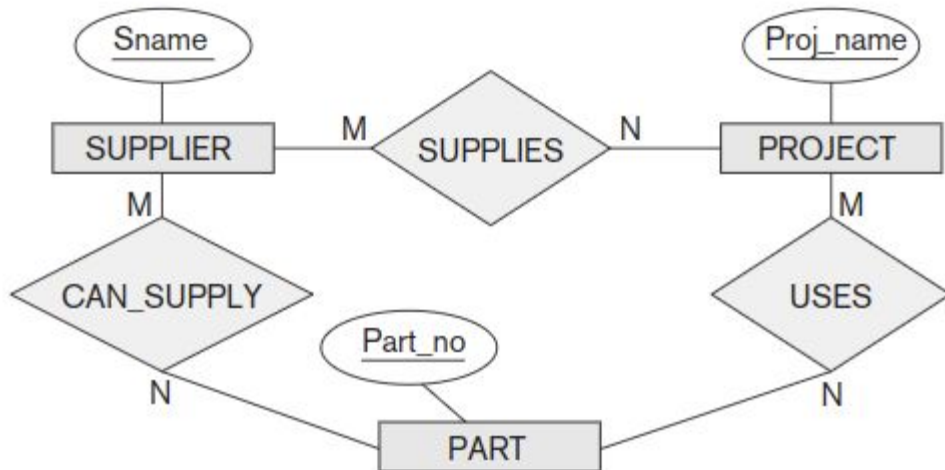
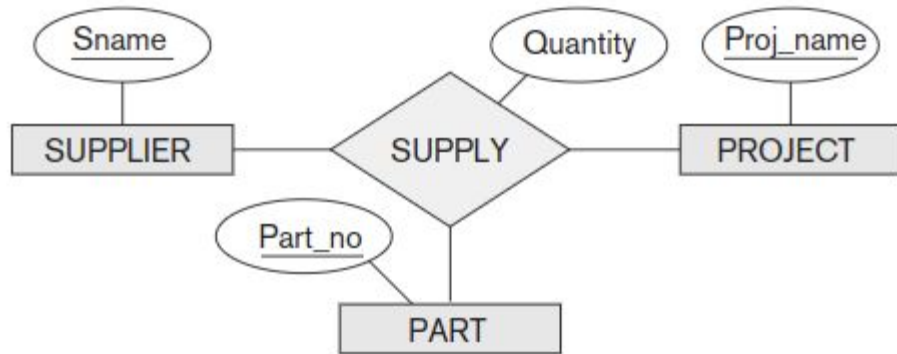
```
27
28
29     salary        real,
30
31     sex           varchar,
32
33     department_number int,
34     department_name varchar,
35     foreign key (department_number, department_name) references department (number, name),
36     super_ssn      int references employee (ssn)
37 );
```

# A solution

```
36 ✓ create table manages_department
37 (
38     manager_ssn      int unique references employee (ssn),
39     department_number int unique ,
40     department_name   varchar unique ,
41     foreign key (department_number, department_name) references department (number, name),
42     primary key (manager_ssn, department_number, department_name)
43 );
```



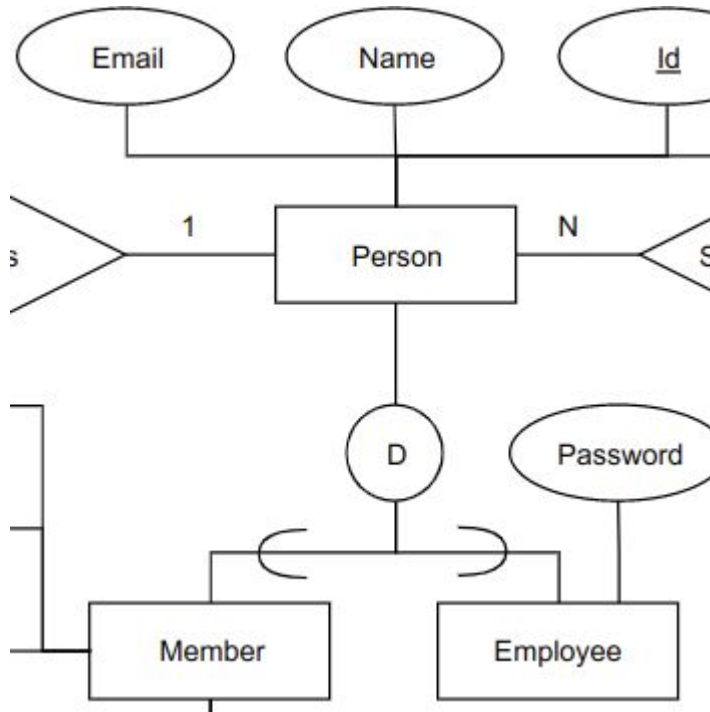
# N-ary



```

86 ✓ create table supplier
87 (
88     name varchar primary key
89 );
90
91 ✓ create table project
92 (
93     name varchar primary key
94 );
95
96 ✓ create table part
97 (
98     number int primary key
99 );
100
101 ✓ create table supply
102 (
103     supplier_name varchar references supplier(name),
104     project_name varchar references project(name),
105     part_number int references part(number),
106     primary key (supplier_name,project_name,part_number),
107     quantity int
108 );
    
```

# Inheritance



```

110 ✓ create table person(
111     id serial primary key,
112     name varchar,
113     email varchar
114 );
115
116 ✓ create table member(
117     person_id int references person(id) primary key
118 );
119
120 ✓ create table employee(
121     person_id int references person(id) primary key,
122     password varchar
123 );
    
```