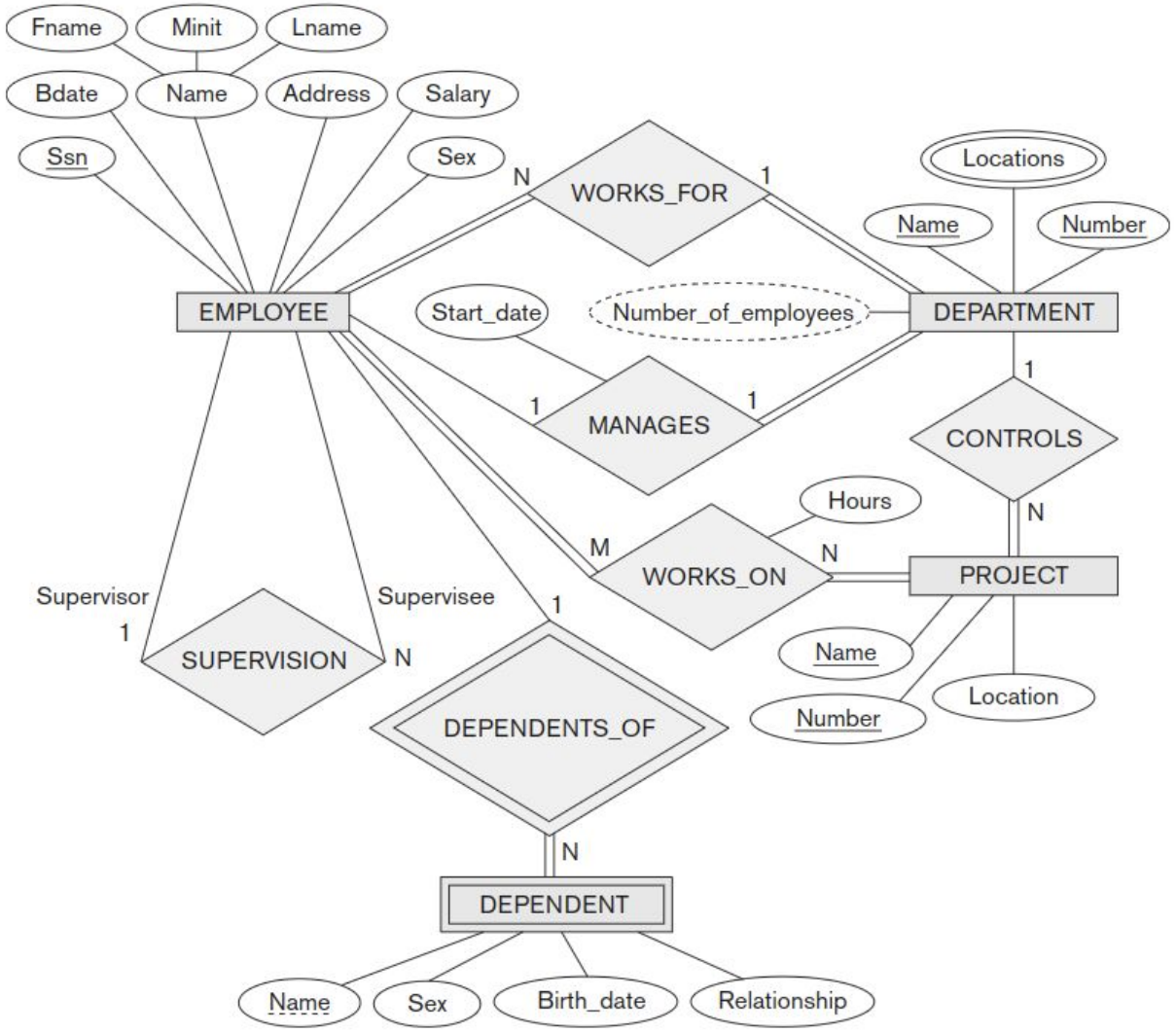
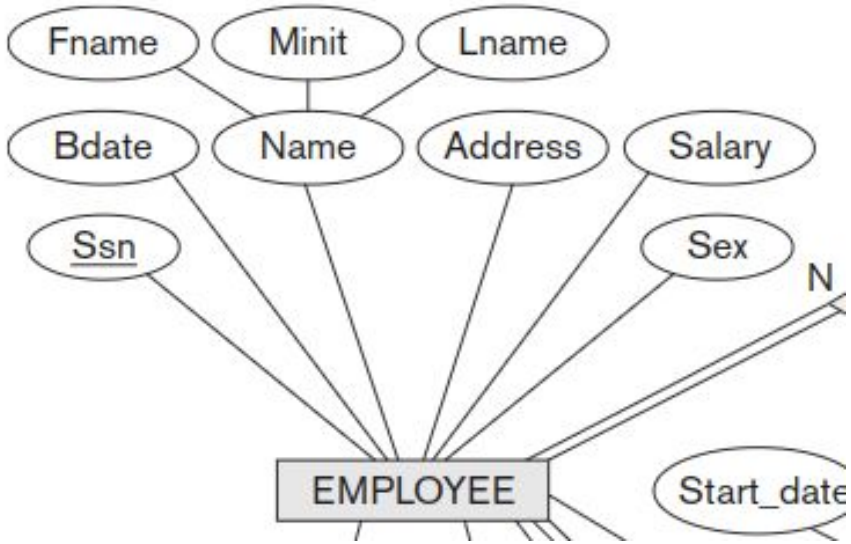


Mapping ER to Tables

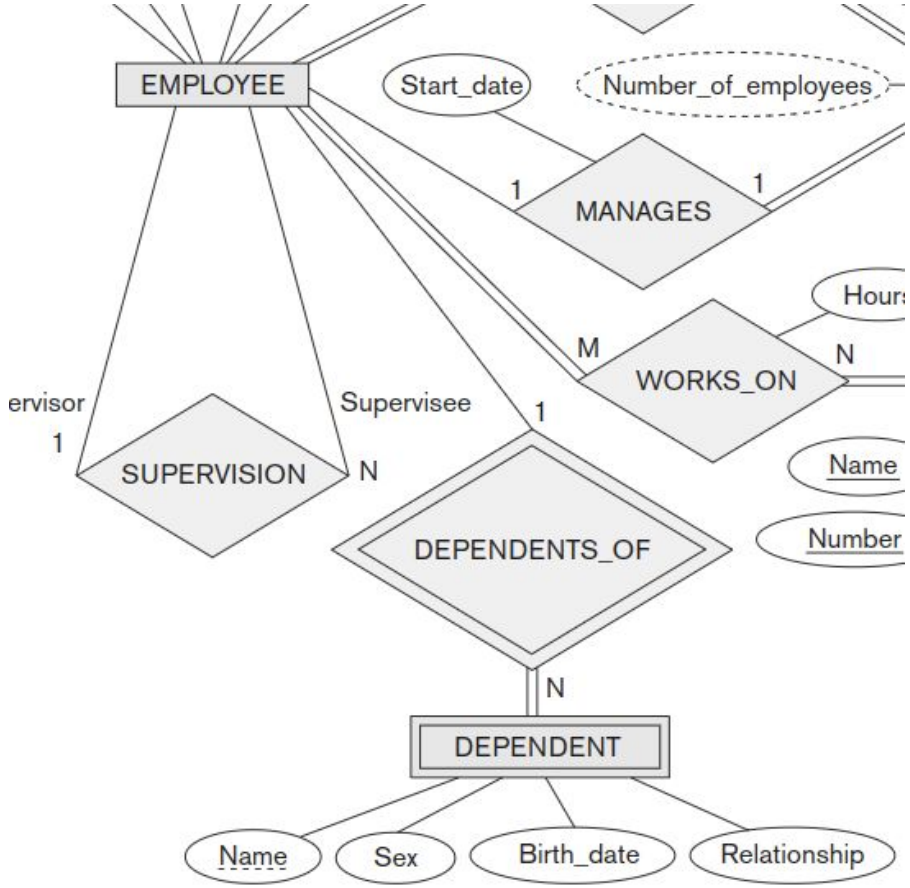
- → Step 1: Mapping of Regular Entity Types.
- → Step 2: Mapping of Weak Entity Types.
- → Step 3: Mapping of Binary 1:1 Relationship Types.
  - → Foreign key approach
  - → Merged relation approach
  - → Cross-reference or relationship relation approach
- → Step 4: Mapping of Binary 1:N Relationship 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




```sql
create table employee
(
    ssn     int primary key,
    bdate   date,
    fname   varchar,
    minit   varchar,
    lname   varchar,
    address varchar,
    salary  real,
    sex     varchar
);
```

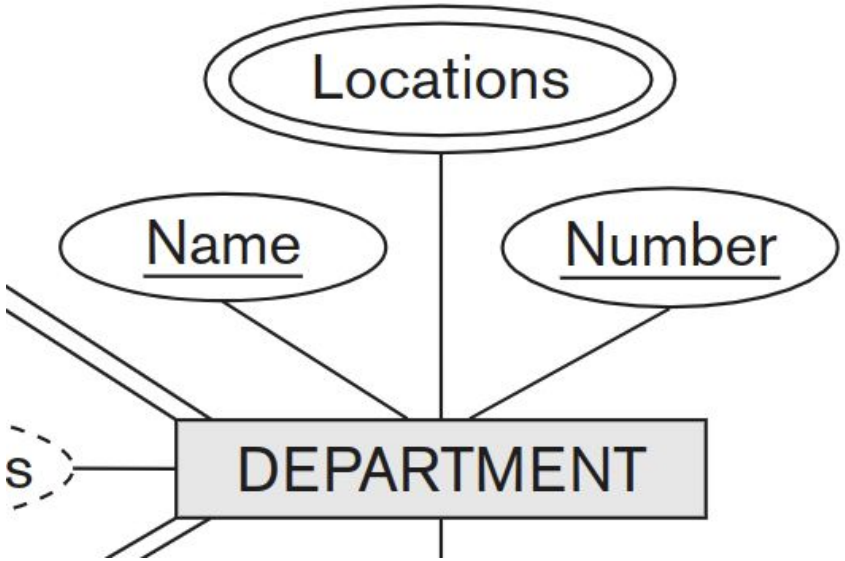
Weak entities




```sql
create table dependent
(
    employee_ssn int references employee (ssn),
    name         varchar,
    sex          varchar,
    birth_date   date,
    relationship varchar,
    primary key (employee_ssn, name)
);
```

Multi-valued attributes

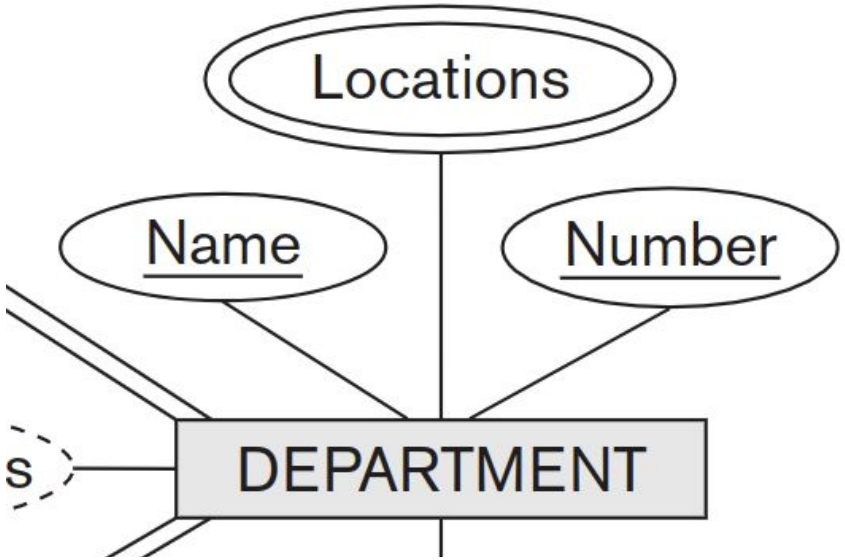
```sql
create table department
(
    number int,
    name   varchar unique ,
    primary key (number, name)
);
```




```sql
create table department_locations
(
    department_number int,
    department_name varchar,
    location varchar,
    foreign key (department_number, department_name) references department(number, name),
    primary key (department_number,department_name,location)
);
```

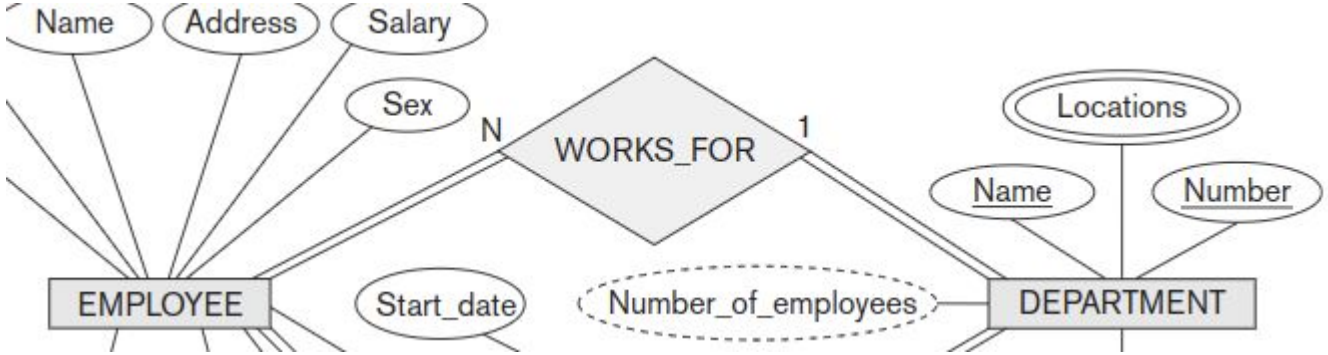
Multi-valued attributes

```sql
create table department
(
    number int,
    name   varchar unique ,
    primary key (number, name)
);
```



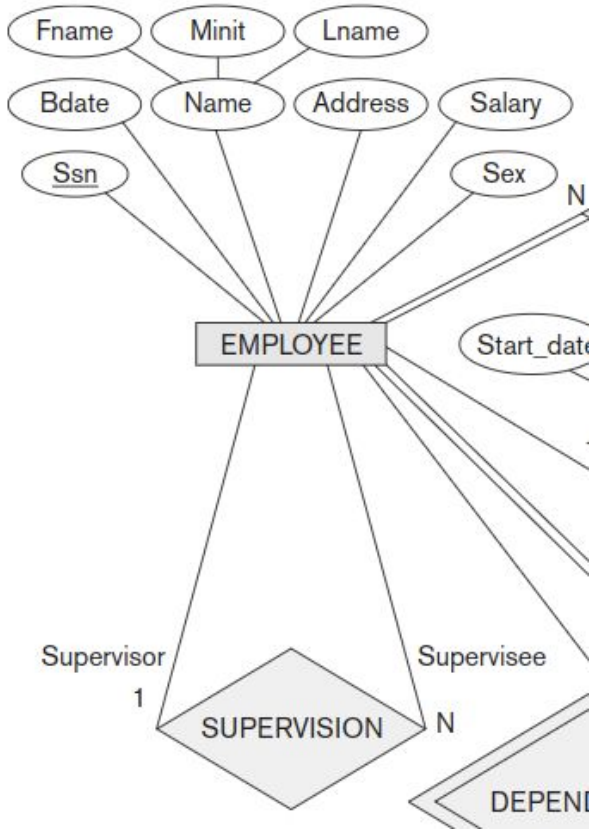

```sql
create table department_locations
(
    department_number int,
    department_name varchar,
    location varchar,
    foreign key (department_number, department_name) references department(number, name),
    primary key (location)
);
```

Total participation



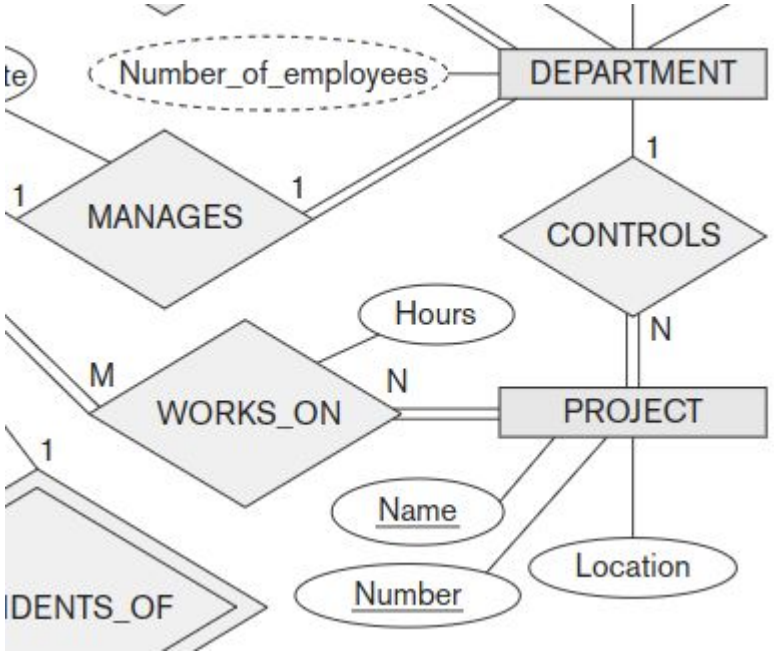

```sql
create table employee
(
    ssn     int primary key,
    bdate   date,
    fname   varchar,
    minit   varchar,
    lname   varchar,
    address varchar,
    salary  real,
    sex     varchar,
    department_number int,
    department_name varchar,
    foreign key (department_number,department_name) references department(number, name)
);
```

Recursive relationship




```sql
create table employee
(
    ssn     int primary key,
    bdate   date,
    fname   varchar,
    minit   varchar,
    lname   varchar,
    address varchar,
    salary  real,
    sex     varchar,
    department_number int,
    department_name varchar,
    foreign key (department_number,department_name) references department(number, name),
    super_ssn int references employee(ssn)
```

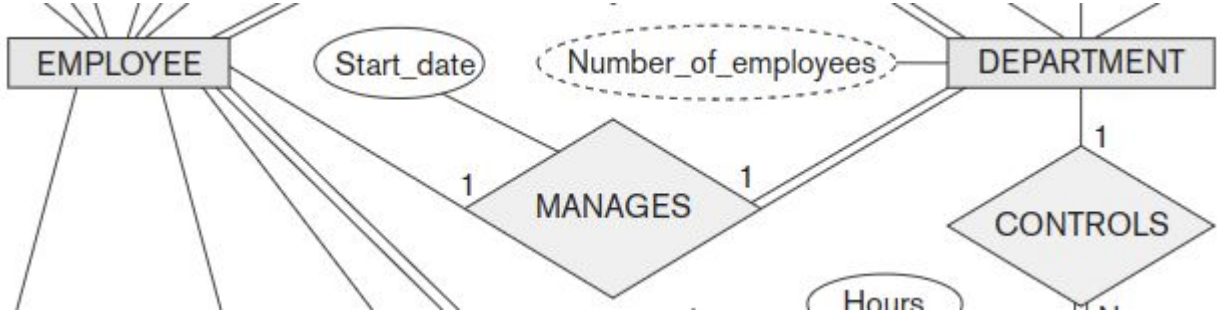
Many-to-many + more




```sql
create table project
(
    name     varchar,
    number   int,
    location varchar,
    department_number int,
    department_name varchar,
    foreign key (department_number, department_name) references department (number, name),
    primary key (name,number)
);

create table works_on
(
    employee_ssn   int references employee (ssn),
    project_name   varchar,
    project_number int,
    hours          int,
    foreign key (project_name, project_number) references project (name, number),
    primary key (employee_ssn, project_name, project_number)
);
```

One-to-one




```sql
create table department
(
    number int,
    name   varchar unique,
    manager_ssn int references employee(ssn),
    manager_start_date date,
    primary key (number, name)
);
```

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
```

```
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,
```

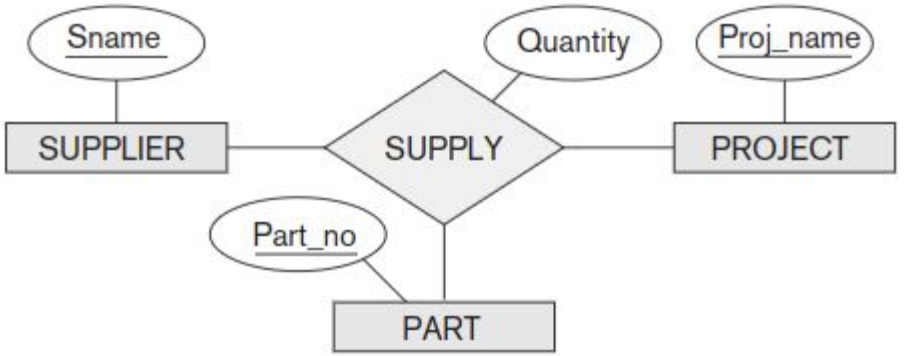
```
[2022-03-07 12:00:20] [42P01] ERROR: relation "department" does not exist
```

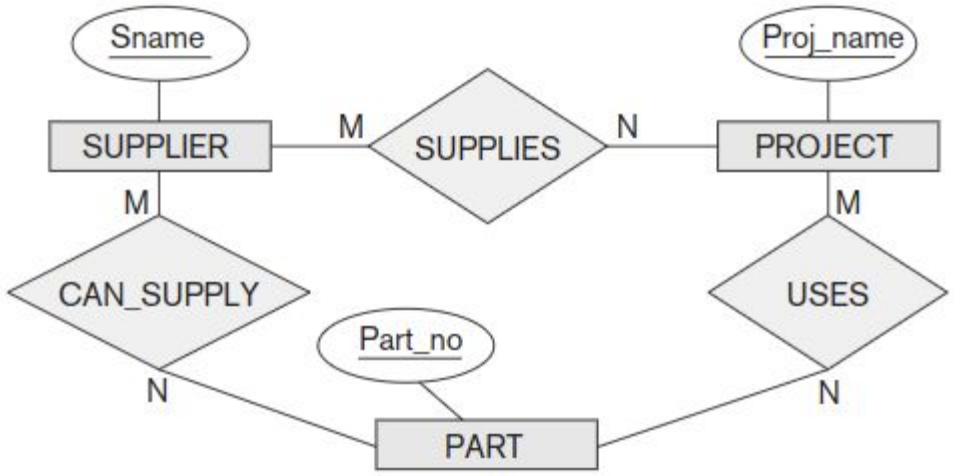
```
30      salary          real,
31      sex             varchar,
32      department_number int,
33      department_name   varchar,
34      foreign key (department_number, department_name) references department (number, name),
35      super_ssn       int references employee (ssn)
36  );
```

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





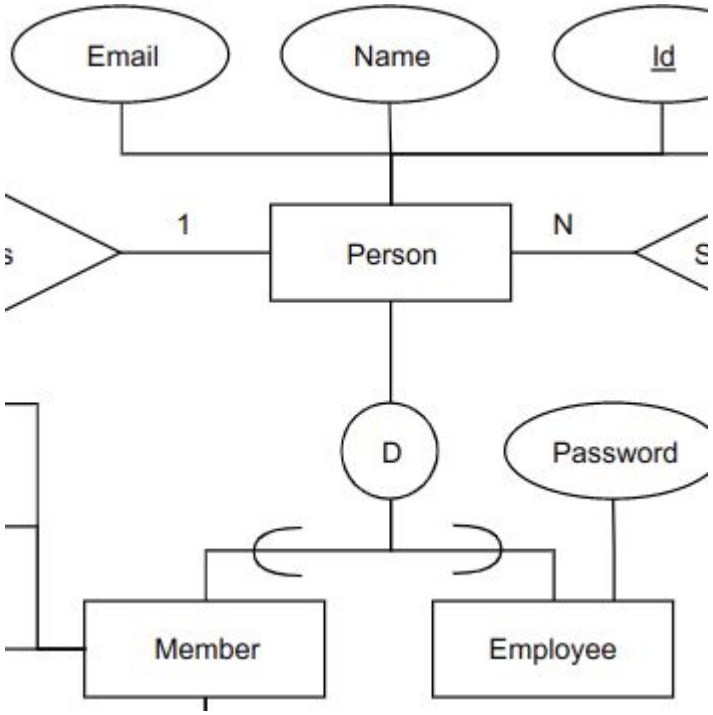

```sql
create table supplier
(
    name varchar primary key
);

create table project
(
    name varchar primary key
);

create table part
(
    number int primary key
);

create table supply
(
    supplier_name varchar references supplier(name),
    project_name varchar references project(name),
    part_number int references part(number),
    primary key (supplier_name,project_name,part_number),
    quantity int
);
```

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 );
```