LAB NO.: 5 **Date:**

ER MODEL AND SQL

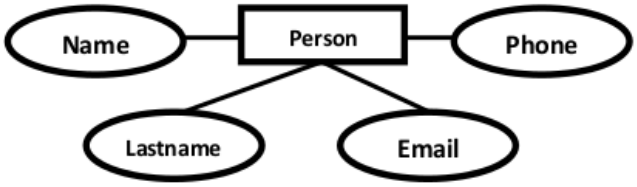
Objectives:

In this lab, student will be able to:

- Convert ER Diagram to relational schema.

Reduction of ER Diagram to Relational Schema: Refer the reference no. 5.

Entities and Simple Attributes:

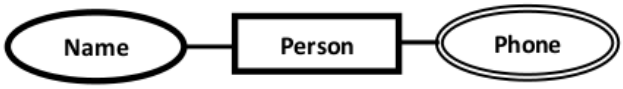


When reducing this ERD into tables we get:

Persons(personid , name, lastname, email)

Multi-Valued Attributes

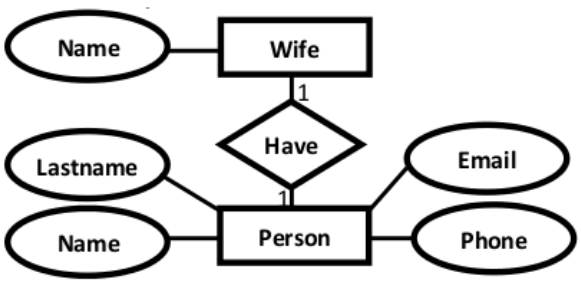
A multi-valued attribute is usually represented with a double-line oval



If you have a multi-valued attribute, take the attribute and turn it into a new entity or table of its own. Then make a 1:N relationship between the new entity and the existing one. In simple words. 1. Create a table for the attribute. 2. Add the primary (id) column of the parent entity as a foreign key within the new table as shown below:

Persons(personid , name, lastname, email)
Phones (phoneid , ***personid***, phone)

1:1 Relationships

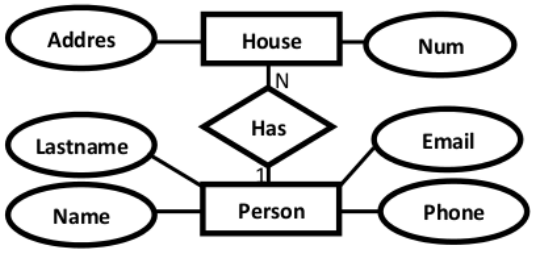


Persons(personid , name, lastname, email , ***wifeid***)
Wife (wifeid , name)

Or

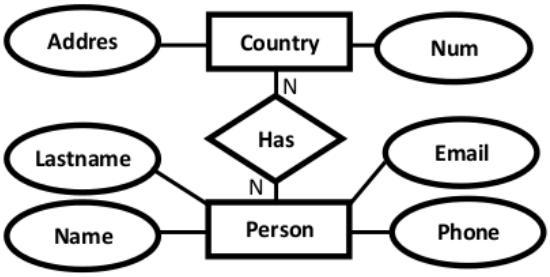
Persons(personid , name, lastname, email)
Wife (wifeid , name , ***personid***)

1:N Relationships



Persons(personid , name, lastname, email)
House (houseid , num , address, ***personid***)

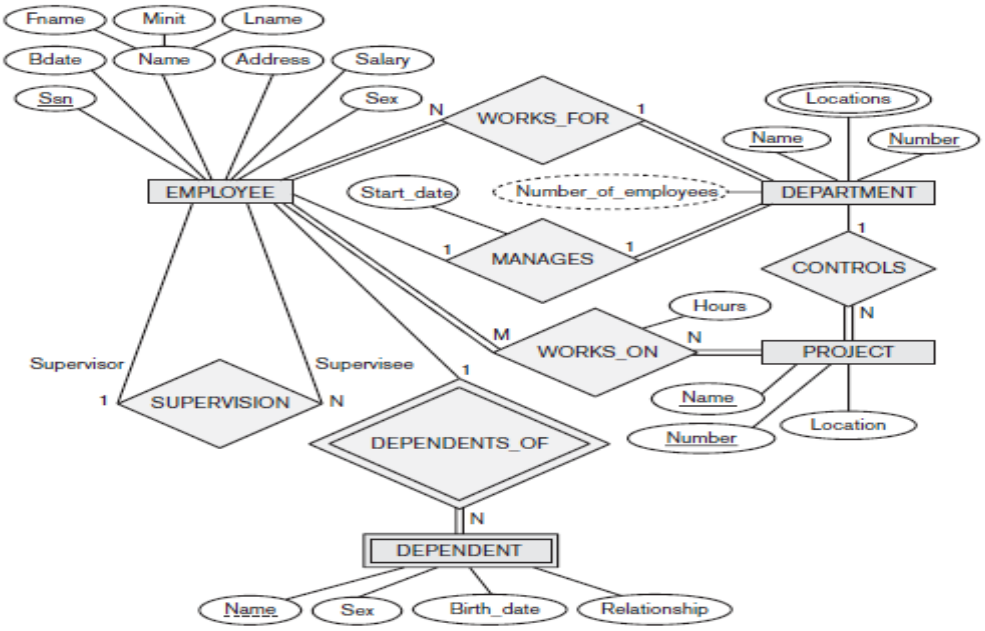
N:N Relationships



Persons(personid, name, lastname, email)
Countries(countryid, name, code)
HasRelat(hasrelatid, personid , countryid)

LAB EXERCISES:

Design the database for the following ER Diagram



Implement the following queries:

1. Retrieve the birth date and address of the employee(s) whose name is ‘John B. Smith’. Retrieve the name and address of all employees who work for the ‘Research’ department.
2. For every project located in ‘Stanford’, list the project number, the controlling department number, and the department manager’s last name, address, and birth date.
3. Find all distinct salaries of employees.
4. For each employee, retrieve the employee’s first and last name and the first and last name of his or her immediate supervisor.
5. Make a list of all project numbers for projects that involve an employee whose last name is ‘Smith’, either as a worker or as a manager of the department that controls the project.
6. Retrieve all employees who reside is in Houston, Texas.
7. Show the resulting salaries if every employee working on the ‘ProductX’ project is given a 10 percent raise.
8. Retrieve all employees in department 5 whose salary is between 30,000 and 40,000.
9. Retrieve a list of employees and the projects they are working on, ordered by department and, within each department, ordered alphabetically by last name, then first name.
10. Retrieve the names of all employees who do not have supervisors.
11. Retrieve the name of each employee who has a dependent with the same first name and is the same sex as the employee.
12. Retrieve the names of employees who have no dependents.
13. List the names of managers who have at least one dependent.

14. Retrieve the Social Security numbers of all employees who work on project numbers 1, 2, or 3.
15. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary.
16. Find the sum of the salaries of all employees of the ‘Research’ department, as well as the maximum salary, the minimum salary, and the average salary in this department.
17. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
18. For each project on which more than two employees work, retrieve the project number, the project name, and the number of employees who work on the project.
19. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than 40,000.

ADDITIONAL EXERCISE:

1. Find the names of employees who work on all the projects controlled by department number 5.
2. Find the names of all employees who have a higher salary than some instructor in ‘Research’ department.
3. Find the total number of (distinct) employees who have worked on project ‘ProductX’.