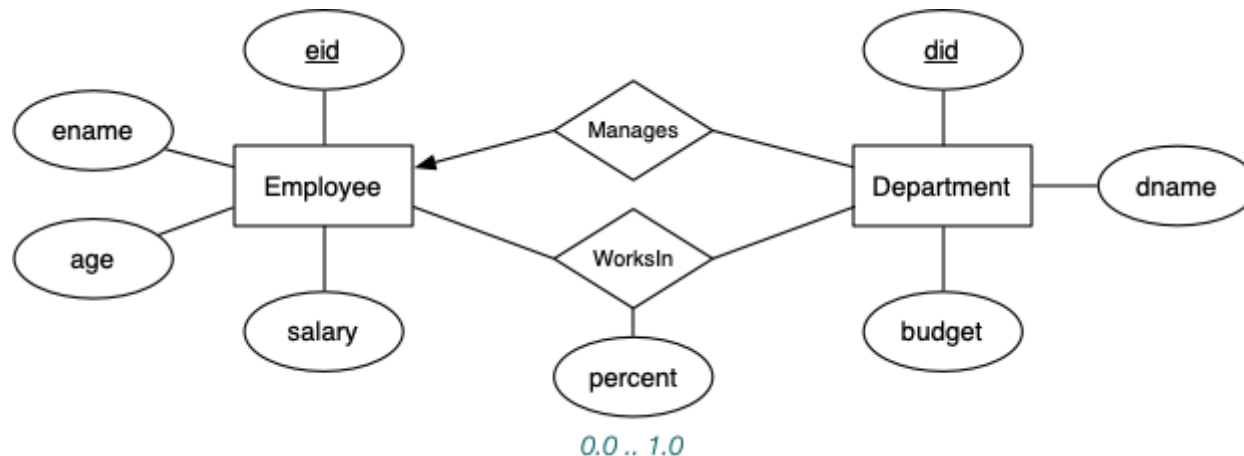


SQL Constraints, Updates and Queries

[\[Show with no answers\]](#) [\[Show with all answers\]](#)

Consider the following data model for a business organisation and its employees:



Employees are uniquely identified by an id (eid), and other obvious information (name, age, ...) is recorded about each employee. An employee may work in several departments, with the percentage of time spent in each department being recorded in the `WorksIn` relation (as a number in the range 0.0-1.0, with 1.0 representing 100%). The percentages for a given employee may not sum to one if the employee only works part-time in the organisation. Departments are also uniquely identified by an id (did), along with other relevant information, including the id of the employee who manages the department.

Based on the ER design and the above considerations, here is a relational schema to represent this scenario:

```
create table Employees (
    eid    integer primary key,
    ename  text,
    age    integer,
    salary real,
    primary key (eid)
);
create table Departments (
    did    integer primary key,
    dname  text,
    budget real,
    manager integer references Employees(eid)
);
```

```
create table WorksIn (  
    eid      integer references Employees(eid),  
    did      integer references Departments(did),  
    percent real,  
    primary key (eid,did)  
);
```

Answer each of the following questions for this schema ...

1. Does the order of table declarations above matter?

[\[show answer\]](#)

2. A new government initiative to get more young people into work cuts the salary levels of all workers under 25 by 20%. Write an SQL statement to implement this policy change.

[\[show answer\]](#)

3. The company has several years of growth and high profits, and considers that the Sales department is primarily responsible for this. Write an SQL statement to give all employees in the Sales department a 10% pay rise.

[\[show answer\]](#)

4. Add a constraint to the CREATE TABLE statements above to ensure that every department must have a manager.

[\[show answer\]](#)

5. Add a constraint to the CREATE TABLE statements above to ensure that no-one is paid less than the minimum wage of \$15,000.

[\[show answer\]](#)

6. Add a constraint to the CREATE TABLE statements above to ensure that no employee can be committed for more than 100% of his/her time. Note that the SQL standard allows queries to be used in constraints, even though DBMSs don't implement this (for performance reasons).

[\[show answer\]](#)

7. Add a constraint to the CREATE TABLE statements above to ensure that a manager works 100% of the time in the department that he/she manages. Note that the SQL standard allows queries to be used in constraints, even though DBMSs don't implement this (for performance reasons).

[\[show answer\]](#)

8. When an employee is removed from the database, it makes sense to also delete all of the records that show which departments he/she works for. Modify the CREATE TABLE statements above to ensure that this occurs.

[\[show answer\]](#)

9. When a manager leaves the company, there may be a period before a new manager is appointed for a department. Modify the CREATE TABLE statements above to allow for this.

[\[show answer\]](#)

10. Consider the deletion of a department from a database based on this schema. What are the options for dealing with referential integrity between Departments and WorksIn? For each option, describe the required behaviour in SQL.

[\[show answer\]](#)

11. For each of the possible cases in the previous question, show how deletion of the Engineering department would affect the following database:

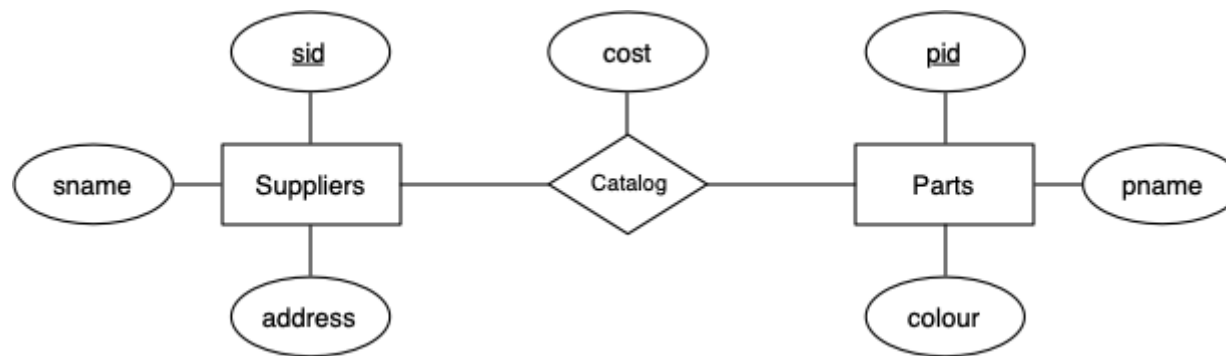
EID	ENAME	AGE	SALARY
1	John Smith	26	25000
2	Jane Doe	40	55000
3	Jack Jones	55	35000
4	Superman	35	90000
5	Jim James	20	20000

DID	DNAME	BUDGET	MANAGER
1	Sales	500000	2
2	Engineering	1000000	4
3	Service	200000	4

EID	DID	PCT_TIME
1	2	1.00
2	1	1.00
3	1	0.50
3	3	0.50
4	2	0.50
4	3	0.50
5	2	0.75

[\[show answer\]](#)

Consider the following data model for a business that supplies various parts:



Based on the ER design and the above considerations, here is a relational schema to represent this scenario:

```
create table Suppliers (  
    sid      integer primary key,  
    sname    text,  
    address  text  
);  
create table Parts (  
    pid      integer primary key,  
    pname    text,  
    colour   text  
);  
create table Catalog (  
    sid      integer references Suppliers(sid),  
    pid      integer references Parts(pid),  
    cost     real,  
    primary key (sid,pid)  
);
```

Write SQL statements to answer each of the following queries ...

Note1: all of these solutions have alternative formulations. If you think you have a better solution than the one(s) presented here, let me know.

Note2: a useful strategy, when developing an SQL solution to an information request, is to express intermediate results as views; this has been done in a few solutions here, but you might like to consider reformulating more of them with views, for clarity.

12. Find the *names* of suppliers who supply some red part.

[\[show answer\]](#)

13. Find the *sids* of suppliers who supply some red or green part.

[\[show answer\]](#)

14. Find the *sids* of suppliers who supply some red part or whose address is 221 Packer Street.

[\[show answer\]](#)

15. Find the *sids* of suppliers who supply some red part and some green part.

[\[show answer\]](#)

16. Find the *sids* of suppliers who supply every part.

[\[show answer\]](#)

17. Find the *sids* of suppliers who supply every red part.

[\[show answer\]](#)

18. Find the *sids* of suppliers who supply every red or green part.

[\[show answer\]](#)

19. Find the *sids* of suppliers who supply every red part or supply every green part.

[\[show answer\]](#)

20. Find pairs of *sids* such that the supplier with the first *sid* charges more for some part than the supplier with the second *sid*.

[\[show answer\]](#)

21. Find the *pids* of parts that are supplied by at least two different suppliers.

[\[show answer\]](#)

22. Find the *pids* of the most expensive part(s) supplied by suppliers named "Yosemite Sham".

[\[show answer\]](#)

23. Find the *pids* of parts supplied by every supplier at a price less than 200 dollars (if any supplier either does not supply the part or charges more than 200 dollars for it, the part should not be selected).

[\[show answer\]](#)