Consider the following schema:

- Suppliers(*sid: integer*, *sname: string, address: string)*
- Parts(*pid: integer*, *pname: string, color: string)*
- Catalog(*sid: integer, pid: integer*, *cost: real)*

key fields are underlined, and domain of each field is listed after field name therefore *sid* is key for Suppliers, *pid* is key for Parts, and *sid* and *pid* together form key for Catalog

Catalog relation lists prices charged for parts by Suppliers

write following queries …

1. Find the names of suppliers who supply some red part.
2. Find the sids of suppliers who supply some red or green part.
3. Find the sids of suppliers who supply some red part or are at 221 Packer Street.
4. Find the sids of suppliers who supply some red part and some green part.
5. Find the sids of suppliers who supply every part.
6. Find the sids of suppliers who supply every red part.
7. Find the sids of suppliers who supply every red or green part.
8. Find the sids of suppliers who supply every red part or supply every green part.
9. Find pairs of sids such that the supplier with the first sid charges more for some part than the supplier with the second sid.
10. Find the pids of parts supplied by at least two different suppliers.
11. Find the pids of the most expensive parts supplied by suppliers named Yosemite Sam
12. Find the pids of parts supplied by every supplier at less than $200. (If any supplier either does not supply the part or charges more than $200 for it, the part is not selected.)

Alpha

- Flights(flno: integer, from: string, to: string,distance: integer, departs: time, arrives: time)
- Aircraft(aid: integer, aname: string, cruisingrange: integer)
- Certified(eid: integer, aid: integer)
- Employees(eid: integer, ename: string, salary: integer)
- Employees relation describes pilots and other kinds of employees as well
- every pilot is certified for some aircraft (otherwise, he or she would not qualify as a pilot), and only pilots are certified to fly

1. Find the eids of pilots certified for some Boeing aircraft.
2. Find the names of pilots certified for some Boeing aircraft.
3. Find the aids of all aircraft that can be used on non-stop flights from Bonn to Madras.
4. Identify the flights that can be piloted by every pilot whose salary is more than $100,000.
5. Find the names of pilots who can operate planes with a range greater than 3,000 miles but are not certified on any Boeing aircraft.
6. Find the eids of employees who make the highest salary.
7. Find the eids of employees who make the second highest salary.
8. Find the eids of employees who are certified for the largest number of aircraft.
9. Find the eids of employees who are certified for exactly three aircraft.
10. Find the total amount paid to employees as salaries.
11. Is there a sequence of flights from Madison to Timbuktu? Each flight in the sequence is required to depart from the city that is the destination of the previous flight; the first flight must leave Madison, the last flight must reach Timbuktu, and there is no restriction on the number of intermediate flights. Your query must determine whether a sequence of flights from Madison to Timbuktu exists for any input Flights relation instance.
12. Find the names of aircraft such that all pilots certified to operate them have salaries more than $80,000.
13. For each pilot who is certified for more than three aircraft, find the eid and the maximum cruisingrange of the aircraft for which she or he is certified.
14. Find the names of pilots whose salary is less than the price of the cheapest route from Los Angeles to Honolulu.
15. For all aircraft with cruisingrange over 1000 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft.
16. Find the names of pilots certified for some Boeing aircraft.
17. Find the aids of all aircraft that can be used on routes from Los Angeles to Chicago.
18. Identify the routes that can be piloted by every pilot who makes more than $100,000.
19. Print the enames of pilots who can operate planes with cruisingrange greater than 3000 miles but are not certified on any Boeing aircraft.
20. A customer wants to travel from Madison to New York with no more than two changes of flight. List the choice of departure times from Madison if the customer wants to arrive in New York by 6 p.m.
21. Compute the difference between the average salary of a pilot and the average salary of all employees (including pilots).
22. Print the name and salary of every nonpilot whose salary is more than the average salary for pilots.
23. Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles.
24. Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles, but on at least two such aircrafts.
25. Print the names of employees who are certified only on aircrafts with cruising range longer than 1000 miles and who are certified on some Boeing aircraft.

Beta

- employee can work in more than one department; the pct time field of the Works relation shows the percentage of time that a given employee works in a given department
- Emp(eid: integer, ename: string, age: integer, salary: real)
- Works(eid: integer, did: integer, pct time: integer)
- Dept(did: integer, dname: string, budget: real, managerid: integer)

1. Print the names and ages of each employee who works in both the Hardware department and the Software department.
2. For each department with more than 20 full-time-equivalent employees (i.e., where the part-time and full-time employees add up to at least that many full-time employees), print the did together with the number of employees that work in that department.
3. Print the name of each employee whose salary exceeds the budget of all of the departments that he or she works in.
4. Find the managerids of managers who manage only departments with budgets greater than $1 million.
5. Find the enames of managers who manage the departments with the largest budgets.
6. If a manager manages more than one department, he or she controls the sum of all the budgets for those departments. Find the managerids of managers who control more than $5 million.
7. Find the managerids of managers who control the largest amounts.
8. Find the enames of managers who manage only departments with budgets larger than $1 million, but at least one department with budget less than $5 million.

- Define a table constraint on Emp that will ensure that every employee makes at
- least $10,000.
- Define a table constraint on Dept that will ensure that all managers have *age > 30.*
- Define an assertion on Dept that will ensure that all managers have *age > 30.*
- Write SQL statements to delete all information about employees whose salaries exceed that of the manager of one or more departments that they work in. Be sure to ensure that all the relevant integrity constraints are satisfied after your updates.
- Employees must make a minimum salary of $1000.
- Every manager must be also be an employee.
- The total percentage of all appointments for an employee must be under 100%.
- A manager must always have a higher salary than any employee that he or she manages.
- Whenever an employee is given a raise, the manager's salary must be increased to be at least as much.
- Whenever an employee is given a raise, the manager's salary must be increased to be at least as much. Further, whenever an employee is given a raise, the department's budget must be increased to be greater than the sum of salaries of all employees in the department.

Omega

- Student(snum: integer, sname: string, major: string,level: string, age: integer)
- Class(name: string, meets at: time, room: string, fid: integer)
- Enrolled(snum: integer, cname: string)
- Faculty(fid: integer, fname: string, deptid: integer)

1. Find the names of all Juniors (level = JR) who are enrolled in a class taught by I. Teach.
2. Find the age of the oldest student who is either a History major or enrolled in a course taught by I. Teach.

3. Find the names of all classes that either meet in room R128 or have five or more students enrolled.
4. Find the names of all students who are enrolled in two classes that meet at the same time.
5. Find the names of faculty members who teach in every room in which some class is taught.
6. Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five.
7. For each level, print the level and the average age of students for that level.
8. For all levels except JR, print the level and the average age of students for that level.
9. For each faculty member that has taught classes only in room R128, print the faculty member's name and the total number of classes she or he has taught.
10. Find the names of students enrolled in the maximum number of classes.
11. Find the names of students not enrolled in any class.
12. For each age value that appears in Students, find the level value that appears most often. For example, if there are more FR level students aged 18 than SR, JR, or SO students aged 18, you should print the pair (18, FR).

- Every class has a minimum enrollment of 5 students and a maximum enrollment of 30 students.
- At least one class meets in each room.
- Every faculty member must teach at least two courses.
- Only faculty in the department with deptid=33 teach more than three courses.
- Every student must be enrolled in the course called Math101.
- The room in which the earliest scheduled class (i.e., the class with the smallest meets at value) meets should not be the same as the room in which the latest scheduled class meets.
- Two classes cannot meet in the same room at the same time.
- The department with the most faculty members must have fewer than twice the number of faculty members in the department with the fewest faculty members.
- No department can have more than 10 faculty members.
- A student cannot add more than two courses at a time (i.e., in a single update).
- The number of CS majors must be more than the number of Math majors.
- The number of distinct courses in which CS majors are enrolled is greater than the number of distinct courses in which Math majors are enrolled.
- The total enrollment in courses taught by faculty in the department with deptid=33 is greater than the number of Math majors.
- There must be at least one CS major if there are any students whatsoever.
- Faculty members from different departments cannot teach in the same room.

To Do:
Database design, choose 5 queries from each domain to implement, as many as possible constraints
Alpha + Beta
Alpha + Omega