

CS 442 HW 4

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Relational Schema

- Emp(eid: Integer, ename: string, age: Integer, salary: real)
- Work(eid: Integer, did: Integer)
- Dept(did: Integer, budget: real, managerid: Integer, dname: string)

Problem 1 Find the name of the employees who work in Hardware department

```
SELECT E.ename
FROM (Emp E) NATURAL JOIN (Work W) NATURAL JOIN (Dept D)
WHERE D.dname = "Hardware"
```

Problem 2 Find the name of the employee(s) in Hardware department who had the highest salary

```
SELECT E.ename
FROM (Emp E) NATURAL JOIN (Work W) NATURAL JOIN (Dept D)
WHERE D.dname = "Hardware" AND
      E.salary >= ALL(SELECT MAX(E2.salary)
                      FROM (Emp E2) NATURAL JOIN (Work W2) NATURAL JOIN (Dept D2)
                      WHERE D2.dname = "Hardware")
```

Problem 3 Find the name and age of all employees who work in both Hardware and Software department

```
SELECT E.ename, E.age
FROM (Emp E) NATURAL JOIN (Work W) NATURAL JOIN (Dept D)
WHERE D.dname = "Hardware"
INTERSECT
SELECT E.ename, E.age
FROM (Emp E) NATURAL JOIN (Work W) NATURAL JOIN (Dept D)
WHERE D.dname = "Software"
```

Problem 4 Find the id of managers who control the largest total amounts of budget.

```

SELECT D.managerid
FROM Dept D
GROUP BY D.managerid
HAVING SUM(D.budget >= ALL(SELECT SUM(D2.budget)
                           FROM Dept D2
                           GROUP BY D2.managerid))

```

Problem 5 Find the id of the managers who manage only the departments whose budget is at least 1 million dollars.

```

SELECT D.managerid
FROM Dept D
WHERE D.budget >= 1,000,000
EXCEPT
SELECT D.managerid
FROM Dept D
WHERE D.budget < 1,000,000

```

Problem 6 Find the name of all employees whose salary exceeds the budget of each department that the employee works in

```

SELECT E.ename
FROM Emp E
WHERE E.salary > ALL(SELECT D.budget
                    FROM Dept D, Works W
                    WHERE E.eid = W.eid AND
                          W.did = D.did)

```

Problem 7 Find the name of managers who manage the department of the largest budget

```

SELECT E.ename
FROM Emp E
WHERE E.eid = ANY(SELECT D.managerid
                  FROM Dept D
                  WHERE D.budget >= ALL(SELECT D2.budget
                                       FROM Dept D2))

```

Problem 8 For each department, return the average salary of all employees working in this department

```

SELECT AVG(E.salary)
FROM (Emp E) NATURAL JOIN (Works W)
GROUP BY W.did

```

Problem 9 Find the name of employees who work in more than 3 departments

```

SELECT E.ename
FROM (Emp E) NATURAL JOIN (Works W)
GROUP BY E.eid
HAVING COUNT(W.did) > 3;

```