1. Which employees (EID, EName) share their office with John?

Algebra:

$\Pi_{EID,ENAME}((\sigma_{ENAME=JOHN}(EMPLOYEE)) \bowtie_{EID = EID} (IN\_BUILDING) \bowtie$

$_{EID <> EID\ BID = BID\ ROOM=ROOM}(EMPLOYEE \bowtie_{EID = EID} IN\_BUILDING))$

SQL:

```
Select E2.EID, E2.ENAME
From EMPLOYEE E1, IN_BUILDING IB1,EMPLOYEE E2,IN_BUILDING IB2
Where
E1.Ename = 'JOHN'
And E1.EID = IB1.EID
And E2.EID = IB2.EID
And E1.EID <> E2.EID
AND IB1.BID = IB2.BID
AND IB1.ROOM=IB2.ROOM;
```

---

2. Who are the managers (EID, EName, DID) of the departments John works?

Answer:

Algebra:

$\Pi_{EID,ENAME}((\sigma_{ENAME='john'}(EMPLOYEE))\bowtie_{eid=eid}(IN\_DEPARTMENT)$
$\bowtie_{DID=DID}(EMPLOYEE\bowtie_{EID=DID}MANAGES\_DEPARTMENT)$

SQL :

```
SELECT E2.EID, E2.EName
FROM EMPLOYEE E1,IN_DEPARTMENT ID,
MANAGES_DEPARTMENT MD,EMPLOYEE E2
WHERE E1.EName= 'John'
AND E.EID=ID.EID
AND MD.DID=ID.DID
```

AND E2.EID=MD.EID
AND MD.DID = ID.DID
AND E2.EID = MD.EID;

---

3. Which buildings (BID, BName) host at least one employee working for the Computing department? (cross check)

Algebra:

$\Pi_{BID,\ BNAME}(IN\_BUILDING \bowtie_{bid=bid}(BUILDING) \bowtie_{EID=EID}(IN\_DEPARTMENT \bowtie_{DID=DID}(\sigma_{dname='computing'}DEPARTMENT))))$

SQL :

Select B.BID,B.BNAME

FROM BUILDING B, IN_BUILDING IB,IN_DEPARTMENT ID,

DEPARTMENT D

Where D.Dname = ‘Computing’

And IB.EID = ID.EID

And D.DID = ID.DID

And IB.BID = B.BID;

---

4. Which employees work for both the Computing and the Finance departments

SQL:

Select E.EID, E.ENAME

FROM EMPLOYEE E, IN_DEPARTMENT ID, DEPARTMENT D

WHERE D.DNAME = "Computing"

AND E.EID=ID.EID

AND D.DID=ID.DID)

INTERSECT (Select E.EID, E.ENAME

FROM EMPLOYEE E, IN_DEPARTMENT ID, DEPARTMENT D

```
WHERE D.DNAME = "Finance"

AND E.EID=ID.EID

AND D.DID=ID.DID);
```

---

5. Which employees do not work for the Computing department?

Algebra :

πEID(EMPLOYEE)-πEID(IN_DEPARTMENT⋈DID=DID
(σDName="Computing" (DEPARTMENT)))

SQL :

```
SELECT EID, EName
FROM EMPLOYEE
WHERE EID NOT IN
(SELECT E.EID, E.EName
FROM EMPLOYEE,IN_DEPARTMENTID, DEPARTMENT D
WHERE D.DName= "Computing"
AND E.EID=ID.EID
AND D.DID=ID.DID);
```

---

6. Which employees work only for the Computing department?

---

7. Which employees work for all the departments?

SQL:

```
SELECT D.DID, D.DName, E.EID, E.EName
FROM DEPARTMENT D
JOIN IN_D.ARTMENT ID ON D.DID=ID.DID
JOIN EMPLOY. E ON E.EID=ID.FID

SELECT E.EID, E.EName
FROM EMPLOY E
WHERE E.EID IN (SELECT ID.EID
            FROM IN_D.ARTM. :ENT ID
            GROUP BY ID.EID
            HAVING COUNT(DISTINCT ID.DID) =
               (SELECT COUNT(*)
                FROM DEPARTMENT));
```

8. List the number of employees working for each department.

9. Which department has the maximum number of employees working 100% for that department?

SQL:

```
SELECT DISTINCT Department_Name

FROM Employee

JOIN Department ON Department.Department_ID=Employee.Department_ID

WHERE Salary=(SELECT max(Salary) FROM Employee)

GROUP BY Department_Name

HAVING count(*)>=all(SELECT count(*) FROM Employee JOIN Department ON Department.Department_ID=Employee.Department_ID GROUP BY Department_Name)

LIMIT 1;
```

10. Find pairs of employees who work for exactly the same sets of departments [Bonus points for the students who finished too early]