```sql
CREATE TABLE EMPLOYEE
( Fname        VARCHAR(10)   NOT NULL,
  Minit        CHAR,
  Lname        VARCHAR(20)     NOT NULL,
  Ssn          CHAR(9)       NOT NULL,
  Bdate        DATE,
  Address      VARCHAR(30),
  Sex          CHAR(1),
  Salary       DECIMAL(5),
  Super_ssn    CHAR(9),
  Dno          INT           NOT NULL,
  PRIMARY KEY(Ssn));


CREATE TABLE DEPARTMENT
( Dname        VARCHAR(15)     NOT NULL,
  Dnumber      INT           NOT NULL,
  Mgr_ssn      CHAR(9)         NOT NULL,
  Mgr_start_date  DATE,
  PRIMARY KEY (Dnumber),
  UNIQUE    (Dname),
  FOREIGN KEY (Mgr_ssn) REFERENCES EMPLOYEE(Ssn) );


CREATE TABLE DEPT_LOCATIONS
( Dnumber      INT           NOT NULL,
  Dlocation    VARCHAR(15)     NOT NULL,
  PRIMARY KEY (Dnumber, Dlocation),
  FOREIGN KEY (Dnumber) REFERENCES DEPARTMENT(Dnumber) );


Create table PROJECT
( pname        varchar(25) not nullunique,
  pnumber      int not null primary key,
  plocation    varchar(15),
  dnum         int not null,
  foreign key(dnum) references DEPARTMENT(Dnumber));


CREATE TABLE WORKS_ON
( Essn         CHAR(9)         NOT NULL,
  Pno          INT           NOT NULL,
  Hours        DECIMAL(3,1)     NOT NULL,
  PRIMARY KEY (Essn, Pno),
  FOREIGN KEY (Essn) REFERENCES EMPLOYEE(Ssn),
  FOREIGN KEY (Pno) REFERENCES PROJECT(Pnumber) );


CREATE TABLE DEPENDENT
( Essn         CHAR(9)         NOT NULL,
```

```sql
    Dependent_name  VARCHAR(15)     NOT NULL,
    Sex         CHAR,
    Bdate           DATE,
    Relationship    VARCHAR(8),
    PRIMARY KEY (Essn, Dependent_name),
    FOREIGN KEY (Essn) REFERENCES EMPLOYEE(Ssn) );


INSERT INTO EMPLOYEE
VALUES ('Franklin','T','Wong',333445555,'1965-12-08','638 Voss, Houston
TX','M',40000,888665555,5),
        ('Alicia','J','Zelaya',999887777,'1968-01-19','3321 Castle, Spring TX','F',25000,987654321,4),
        ('Jennifer','S','Wallace',987654321,'1941-06-20','291 Berry, Bellaire
TX','F',43000,888665555,4),
        ('Ramesh','K','Narayan',666884444,'1962-09-15','975 Fire Oak, Humble
TX','M',38000,333445555,5),
        ('Joyce','A','English',453453453,'1972-07-31','5631 Rice, Houston
TX','F',25000,333445555,5),
        ('Ahmad','V','Jabbar',987987987,'1969-03-29','980 Dallas, Houston
TX','M',25000,987654321,4),
        ('James','E','Borg',888665555,'1937-11-10','450 Stone, Houston TX','M',55000,,1);

INSERT INTO DEPARTMENT
VALUES   ('Research',5,333445555,'1988-05-22'),
        ('Administration',4,987654321,'1995-01-01'),
        ('Headquarters',1,888665555,'1981-06-19');

INSERT INTO PROJECT
VALUES   ('ProductX',1,'Bellaire',5),
        ('ProductY',2,'Sugarland',5),
        ('ProductZ',3,'Houston',5),
        ('Computerization',10,'Stafford',4),
        ('Reorganization',20,'Houston',1),
        ('Newbenefits',30,'Stafford',4);

INSERT INTO WORKS_ON
VALUES   (123456789,1,32.5),
        (123456789,2,7.5),
        (666884444,3,40.0),
        (453453453,1,20.0),
        (453453453,2,20.0),
        (333445555,2,10.0),
        (333445555,3,10.0),
        (333445555,10,10.0),
        (333445555,20,10.0),
        (999887777,30,30.0);



INSERT INTO DEPENDENT
```

```
VALUES    (333445555,'Alice','F','1986-04-04','Daughter'),
        (333445555,'Theodore','M','1983-10-25','Son'),
        (333445555,'Joy','F','1958-05-03','Spouse'),
        (987654321,'Abner','M','1942-02-28','Spouse'),
        (123456789,'Michael','M','1988-01-04','Son'),
        (123456789,'Alice','F','1988-12-30','Daughter'),
        (123456789,'Elizabeth','F','1967-05-05','Spouse');

INSERT INTO DEPT_LOCATIONS
VALUES    (1,'Houston'),
        (4,'Stafford'),
        (5,'Bellaire'),
        (5,'Sugarland'),
        (5,'Houston');
```

select * from EMPLOYEE;

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Houston,TX	M	30000		5
Franklin	T	Wong	333445555	1965-12-08	638 Voss, Houston TX	M	40000	888665555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston TX	F	25000	333445555	5
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble TX	M	38000	333445555	5
James	E	Borg	888665555	1937-11-10	450 Stone, Houston TX	M	55000	NULL	1
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire TX	F	43000	888665555	4
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston TX	M	25000	987654321	4
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring TX	F	25000	987654321	4

8 rows in set (0.00 sec)

 select * from DEPARTMENT;

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Headquarters	1	888665555	1981-06-19
Administration	4	987654321	1995-01-01
Research	5	333445555	1988-05-22

3 rows in set (0.00 sec)

```
 select * from PROJECT;
+----------------+---------+-----------+-----+
| pname          | pnumber | plocation | dnum |
+----------------+---------+-----------+-----+
| ProductX       |       1 | Bellaire  |   5 |
| ProductY       |       2 | Sugarland |   5 |
| ProductZ       |       3 | Houston   |   5 |
| Computerization |      10 | Stafford  |   4 |
| Reorganization  |      20 | Houston   |   1 |
| Newbenefits    |      30 | Stafford  |   4 |
+----------------+---------+-----------+-----+
6 rows in set (0.00 sec)


 select * from DEPENDENT;
+-----------+----------------+-----+------------+--------------+
| Essn      | Dependent_name | Sex | Bdate      | Relationship |
+-----------+----------------+-----+------------+--------------+
| 123456789 | Alice          | F   | 1988-12-30 | Daughter     |
| 123456789 | Elizabeth      | F   | 1967-05-05 | Spouse       |
| 123456789 | John           | M   | 1973-04-04 | Brother      |
| 123456789 | Michael        | M   | 1988-01-04 | Son          |
| 333445555 | Alice          | F   | 1986-04-04 | Daughter     |
| 333445555 | Joy            | F   | 1958-05-03 | Spouse       |
| 333445555 | Theodore       | M   | 1983-10-25 | Son          |
| 987654321 | Abner          | M   | 1942-02-28 | Spouse       |
+-----------+----------------+-----+------------+--------------+
8 rows in set (0.00 sec)


 select * from WORKS_ON;
+-----------+-----+-------+
| Essn      | Pno | Hours |
+-----------+-----+-------+
| 123456789 |   1 |  32.5 |
| 123456789 |   2 |   7.5 |
| 333445555 |   2 |  10.0 |
| 333445555 |   3 |  10.0 |
| 333445555 |  10 |  10.0 |
| 333445555 |  20 |  10.0 |
| 453453453 |   1 |  20.0 |
| 453453453 |   2 |  20.0 |
| 666884444 |   3 |  40.0 |
| 999887777 |  30 |  30.0 |
+-----------+-----+-------+
10 rows in set (0.00 sec)
```

```
select * from DEPT_LOCATIONS;
+---------+-----------+
| Dnumber | Dlocation |
+---------+-----------+
|       1 | Houston   |
|       4 | Stafford  |
|       5 | Bellaire  |
|       5 | Houston   |
|       5 | Sugarland |
+---------+-----------+
5 rows in set (0.00 sec)
```

3a. Retrieve the name and address of all employees who work for the 'Research' department.

```
select Fname, Minit, Lname, Address
   from EMPLOYEE e, DEPARTMENT d where
   e.Dno=d.Dnumber
   and
   d.Dname="Research";
```

```
+----------+-------+---------+-----------------------+
| Fname    | Minit | Lname   | Address               |
+----------+-------+---------+-----------------------+
| John     | B     | Smith   | 731 Houston,TX        |
| Franklin | T     | Wong    | 638 Voss, Houston TX  |
| Joyce    | A     | English | 5631 Rice, Houston TX |
| Ramesh   | K     | Narayan | 975 Fire Oak, Humble TX |
+----------+-------+---------+-----------------------+
```

3b. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.

```
select e.Lname, e.Bdate, e.Address, p.pnumber, p.dnum
   from EMPLOYEE e, PROJECT p, DEPARTMENT d
   where p.plocation="Stafford" and p.dnum=d.Dnumber
   and d.Mgr_ssn=e.Ssn;
```

```
+---------+------------+----------------------+---------+------+
| Lname   | Bdate      | Address              | pnumber | dnum |
+---------+------------+----------------------+---------+------+
| Wallace | 1941-06-20 | 291 Berry, Bellaire TX |    10 |    4 |
```

| Wallace | 1941-06-20 | 291 Berry, Bellaire TX | 30 | 4 |
+---------+-----------+----------------------+---------+-----+

3c. For each employee, retrieve the employee's first and last name and the first and last name

of   his or her immediate supervisor.

```
select e1.Fname, e1.Lname, e2.Fname as manager_Fname, e2.Lname as manager_Lname
from EMPLOYEE as e1, EMPLOYEE as e2
where e2.Ssn=e1.Super_ssn;
```

Fname	Lname	manager_Fname	manager_Lname
Franklin	Wong	James	Borg
Joyce	English	Franklin	Wong
Ramesh	Narayan	Franklin	Wong
Jennifer	Wallace	James	Borg
Ahmad	Jabbar	Jennifer	Wallace
Alicia	Zelaya	Jennifer	Wallace

6 rows in set (0.00 sec)

3d. 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.

```
(select distinct pnumber
From PROJECT,DEPARTMENT,EMPLOYEE
where Dnum=Dnumber AND Mgr_ssn=Ssn AND Lname="Smith")
UNION
(Select distinct pnumber
From PROJECT,WORKS_ON,EMPLOYEE
where pnumber=Pno AND Essn=Ssn AND Lname="Smith");
```

pnumber
1
2

2 rows in set (0.00 sec)

3e. Retrieve all employees whose address is in Houston, Texas.

```
    select Fname, Minit, Lname
  from EMPLOYEE
  where Address like "%Houston%TX%";
```

```
+---------+-------+---------+
| Fname    | Minit | Lname   |
+---------+-------+---------+
| John     | B     | Smith   |
| Franklin | T     | Wong    |
| Joyce    | A     | English |
| James    | E     | Borg    |
| Ahmad    | V     | Jabbar  |
+---------+-------+---------+
5 rows in set (0.00 sec)
```

3f. Retrieve all employees in department 5 whose salary is between $30,000 and $40,000.

```
  select *
  from EMPLOYEE e, DEPARTMENT d
  where e.Dno=d.Dnumber and d.Dnumber=5
  and e.Salary between 30000 and 40000;
```

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno	Dname	Dnumber	Mgr_ssn	Mgr_start_date
John	B	Smith	123456789	1965-01-09	731 Houston,TX	M	30000		5	Research	5	333445555	1988-05-22
Franklin	T	Wong	333445555	1965-12-08	638 Voss, Houston TX	M	40000	888665555	5	Research	5	333445555	1988-05-22
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble TX	M	38000	333445555	5	Research	5	333445555	1988-05-22

3 rows in set (0.00 sec)

4a. Retrieve the names of all employees who do not have supervisors.

```
    select Fname, Minit, Lname
from EMPLOYEE e
where
not exists(select * from EMPLOYEE as s where e.Super_ssn=s.Ssn);
```

```
+-------+-------+-------+
| Fname | Minit | Lname |
+-------+-------+-------+
| John  | B     | Smith |
| James | E     | Borg  |
+-------+-------+-------+
2 rows in set (0.00 sec)
```

4b. Retrieve the name of each employee who has a dependent with the same first name and is

the same gender as the employee

```
select Fname, Minit, Lname
from EMPLOYEE e, DEPENDENT d where
e.Fname=d.Dependent_name
and
e.Sex=d.Sex;
```

```
+-------+-------+-------+
| Fname | Minit | Lname |
+-------+-------+-------+
| John  | B     | Smith |
+-------+-------+-------+
1 row in set (0.00 sec)
```

4c. Retrieve the names of employees who have no dependents.

```
    select Fname, Minit, Lname
from EMPLOYEE where
not exists(select * from DEPENDENT where Ssn=Essn);
```

```
+--------+-------+---------+
| Fname  | Minit | Lname   |
+--------+-------+---------+
```

```
| Joyce  | A   | English |
| Ramesh | K   | Narayan |
| James  | E   | Borg    |
| Ahmad  | V   | Jabbar  |
| Alicia | J   | Zelaya  |
+--------+-------+---------+
5 rows in set (0.00 sec)
```

4d. List the names of managers who have at least one dependent.

```
    select Fname, Minit, Lname
  from EMPLOYEE where
  exists(select * from DEPARTMENT where Ssn=Mgr_ssn and Dno=Dnumber)
  and
  exists(select * from DEPENDENT where Ssn=Essn);
```

```
+----------+-------+---------+
| Fname    | Minit | Lname   |
+----------+-------+---------+
| Franklin | T     | Wong    |
| Jennifer | S     | Wallace |
+----------+-------+---------+
2 rows in set (0.00 sec)
```

4e. Retrieve the Social Security numbers of all employees who work on project numbers 1, 2,

   or 3.

```
    select distinct Essn from WORKS_ON where Pno in (1,2,3);
```

```
+-----------+
| Essn      |
+-----------+
| 123456789 |
| 453453453 |
| 333445555 |
| 666884444 |
+-----------+
4 rows in set (0.00 sec)
```

4f. 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.

```
select sum(Salary), max(Salary), min(Salary), avg(salary)
from EMPLOYEE, DEPARTMENT
where Dno=Dnumber and Dname="Research";
```

```
+------------+------------+------------+------------+
| sum(Salary) | max(Salary) | min(Salary) | avg(salary) |
+------------+------------+------------+------------+
|     133000 |      40000 |      25000 | 33250.0000 |
+------------+------------+------------+------------+
1 row in set (0.00 sec)
```

4g. For each department, retrieve the department number, the number of employees in the

department, and their average salary.

```
    select Dno, count(*), avg(Salary)
from EMPLOYEE
group by Dno;
```

```
+-----+----------+------------+
| Dno | count(*) | avg(Salary) |
+-----+----------+------------+
|  1 |        1 | 55000.0000 |
|  4 |        3 | 31000.0000 |
|  5 |        4 | 33250.0000 |
+-----+----------+------------+
3 rows in set (0.00 sec)
```

BANK DATABASE:

```
create table branch(
        branch_name varchar(25),
        branch_city varchar(25),
        assets int,
        primary key(branch_name));

create table account(
        accno int,
        branch_name varchar(25),
        balance int,
        primary key(accno));

create table customer(
        customer_name varchar(25),
        customer_street varchar(25),
        customer_city varchar(25),
        primary key(customer_name));

create table depositor(
        customer_name varchar(25),
        accno int,
        primary key(customer_name,accno),
        foreign key(customer_name) references customer(customer_name),
        foreign key(accno) references account(accno) on delete cascade);

create table loan(
        loan_number int,
        branch_name varchar(25),
        amount int,
        primary key(loan_number),
        foreign key(branch_name) references branch(branch_name));

insert into branch values('jaynagar','bangalore',15000000),
                ('basavanagudi','bangalore',25000000),
                ('noida','delhi',50000000),
                ('marine drive','mumbai',40000000),
                ('green park','delhi',30000000);

insert into account values(123,'jaynagar',25000);
insert into account values(156,'jaynagar',30000);
insert into account values(456,'basavanagudi',15000);
insert into account values(789,'noida',25000);
insert into account values(478,'marine drive',48000);
insert into account values(778,'green park',60000);
```
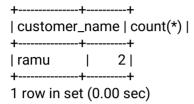
insert into account values(189,'basavanagudi',50000);

insert into customer values('ramu','jaynagar','bangalore');
insert into customer values('kumar','basavanagudi','bangalore');
insert into customer values('john','noida','delhi');
insert into customer values('mike','marine drive','mumbai');
insert into customer values('sachin','green park','delhi');

insert into depositor values('ramu',123);
insert into depositor values('ramu',156);
insert into depositor values('ramu',189);
insert into depositor values('kumar',456);
insert into depositor values('john',789);
insert into depositor values('mike','478');
insert into depositor values('sachin','778');

insert into loan values(1111,'jaynagar',250000);
insert into loan values(2222,'basavanagudi',350000);
insert into loan values(3333,'noida',150000);
insert into loan values(4444,'marine drive',1500000);
insert into loan values(5555,'green park',7500000);

```
mysql> select * from branch;
+--------------+-------------+----------+
| branch_name  | branch_city | assets   |
+--------------+-------------+----------+
| basavanagudi | bangalore   | 25000000 |
| green park   | delhi       | 30000000 |
| jaynagar     | bangalore   | 15000000 |
| marine drive | mumbai      | 40000000 |
| noida        | delhi       | 50000000 |
+--------------+-------------+----------+
5 rows in set (0.00 sec)

mysql> select * from account;
+-------+--------------+---------+
| accno | branch_name  | balance |
+-------+--------------+---------+
|   123 | jaynagar     |   25000 |
|   156 | jaynagar     |   30000 |
|   189 | basavanagudi |   50000 |
|   456 | basavanagudi |   15000 |
|   478 | marine drive |   48000 |
|   778 | green park   |   60000 |
|   789 | noida        |   25000 |
+-------+--------------+---------+
7 rows in set (0.00 sec)
```

```
mysql> select * from depositor;
+---------------+-------+
| customer_name | accno |
+---------------+-------+
| ramu          |   123 |
| ramu          |   156 |
| ramu          |   189 |
| kumar         |   456 |
| mike          |   478 |
| sachin        |   778 |
| john          |   789 |
+---------------+-------+
7 rows in set (0.00 sec)

mysql> select * from customer;
+---------------+-----------------+---------------+
| customer_name | customer_street | customer_city |
+---------------+-----------------+---------------+
| john          | noida           | delhi         |
| kumar         | basavanagudi    | bangalore     |
| mike          | marine drive    | mumbai        |
| ramu          | jaynagar        | bangalore     |
| sachin        | green park      | delhi         |
+---------------+-----------------+---------------+
5 rows in set (0.00 sec)

mysql> select * from loan;
+-------------+--------------+---------+
| loan_number | branch_name  | amount  |
+-------------+--------------+---------+
|        1111 | jaynagar     |  250000 |
|        2222 | basavanagudi |  350000 |
|        3333 | noida        |  150000 |
|        4444 | marine drive | 1500000 |
|        5555 | green park   | 7500000 |
+-------------+--------------+---------+
5 rows in set (0.00 sec)
```

5a. Find all the customers who have atleast two accounts at the main branch

select distinct(customer_name), count(*)
from account a, depositor d
where a.accno=d.accno and
 d.accno in (select accno from account where branch_name='jaynagar')

group by d.customer_name having count(*)>=2;

```
+--------------+----------+
| customer_name | count(*) |
+--------------+----------+
| ramu         |        2 |
+--------------+----------+
1 row in set (0.00 sec)
```

5b. Find all the customers who have an account at all the branches located in a specified city.

```
select d.customer_name from
account a, depositor d, branch b where
b.branch_name=a.branch_name
and
a.accno=d.accno
and
b.branch_city='bangalore'
group by customer_name having
count(distinct b.branch_name) = (select count(branch_name) from branch where
branch_city='bangalore');
```

or

5b. Find all the customers who have an account at all the branches located in a specified city

```
SELECT d.customer_name
FROM account a
JOIN depositor d ON a.accno = d.accno
JOIN branch b ON a.branch_name = b.branch_name
WHERE b.branch_city = 'bangalore'
GROUP BY d.customer_name
HAVING COUNT(DISTINCT b.branch_name) = (SELECT COUNT(branch_name) FROM branch
WHERE branch_city = 'bangalore');
```

```
+---------------+
```

```
| customer_name |
+--------------+
| ramu         |
+--------------+
1 row in set (0.00 sec)
```

5c. Demonstrate how you delete all account tuples at every branch located in a specified city

delete from account
where branch_name
in (select branch_name from branch where branch_city='delhi' and accno <> 0);

after executing the delete query output will "delete from account Query OK, 2 rows affected (0.03 sec)"

Before deletion account table

```
 select * from branch;
+-------------+------------+----------+
| branch_name | branch_city| assets   |
+-------------+------------+----------+
| basavanagudi| bangalore  | 25000000 |
| green park  | delhi      | 30000000 |
| jaynagar    | bangalore  | 15000000 |
| marine drive| mumbai     | 40000000 |
| noida       | delhi      | 50000000 |
+-------------+------------+----------+
5 rows in set (0.00 sec)
```

select * from account;

```
+-------+-------------+---------+
| accno | branch_name | balance |
+-------+-------------+---------+
|   123 | jaynagar    |   25000 |
|   156 | jaynagar    |   30000 |
|   189 | basavanagudi|   50000 |
|   333 | basavanagudi|   25000 |
|   456 | basavanagudi|   15000 |
|   478 | marine drive|   48000 |
|   778 | green park  |   60000 |
|   789 | noida       |   25000 |
+-------+-------------+---------+
8 rows in set (0.00 sec)
```

After deletion account table

```
select * from account;
+-------+-------------+---------+
| accno | branch_name | balance |
+-------+-------------+---------+
|   123 | jaynagar    |   25000 |
|   156 | jaynagar    |   30000 |
|   189 | basavanagudi|   50000 |
|   333 | basavanagudi|   25000 |
|   456 | basavanagudi|   15000 |
|   478 | marine drive|   48000 |
+-------+-------------+---------+
6 rows in set (0.00 sec)
```