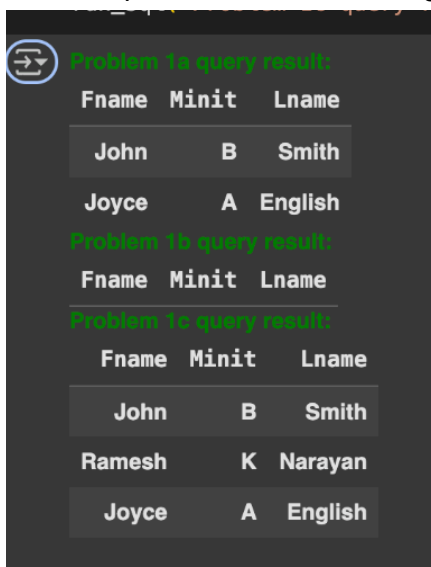# Problem 1

Problem 1a query

```
SELECT E.Fname, E.Minit, E.Lname
FROM Employee AS E
JOIN Work_on AS Wo ON E.Ssn = Wo.Essn
Join Project As P on Wo.Pno = P.Pnumber
WHERE E.Dno = 5 AND
     P.Pname = 'ProductX'
GROUP BY E.Ssn
HAVING SUM(Wo.Hours) > 10 ;
```

Problem 1b query

```
SELECT E.Fname, E.Minit, E.Lname
FROM Employee AS E
JOIN Dependent AS Dp ON E.Ssn = DP.Essn
WHERE E.Fname = Dp.Dependent_name;
```

Problem 1c query

```
SELECT E.Fname, E.Minit, E.Lname
FROM Employee AS E
JOIN Employee AS Supervisor
ON E.Super_ssn = Supervisor.Ssn
WHERE Supervisor.Fname = 'Franklin'
 AND Supervisor.Lname = 'Wong';
```

Problem 1a query result:

Fname	Minit	Lname
John	B	Smith
Joyce	A	English

Problem 1b query result:
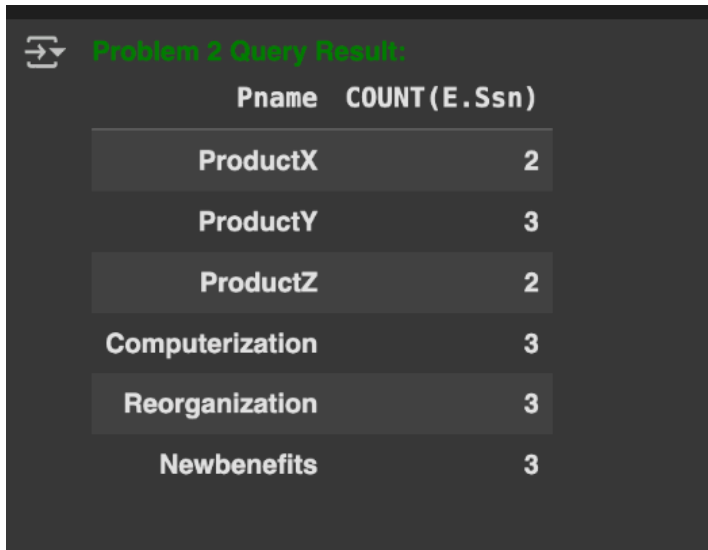
Fname	Minit	Lname

Problem 1c query result:

Fname	Minit	Lname
John	B	Smith
Ramesh	K	Narayan
Joyce	A	English

Problem 2

Problem 2 Query

```
SELECT P.Pname, COUNT(E.Ssn)
FROM Project AS P
JOIN Work_on AS Wo ON Wo.Pno = P.Pnumber
JOIN Employee AS E ON Wo.Essn = E.Ssn
GROUP BY P.Pnumber
HAVING AVG(E.Salary) > 27000;
```

Problem 2 Query Result:

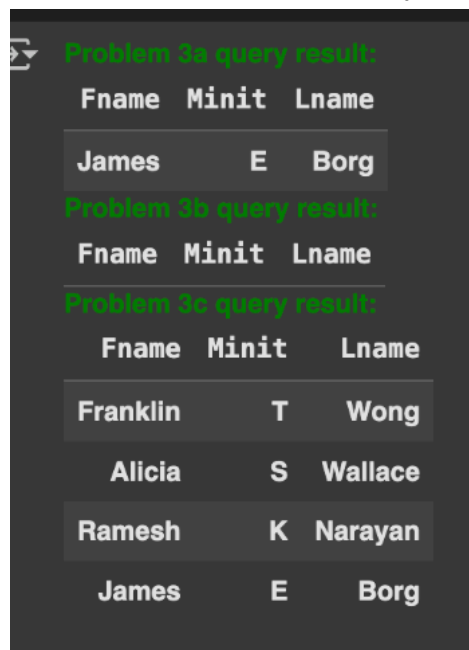| Pname	COUNT(E.Ssn)
ProductX	2
ProductY	3
ProductZ	2
Computerization	3
Reorganization	3
Newbenefits	3

Problem 3

\# Problem 3a query

```
SELECT E.Fname, E.Minit, E.Lname
FROM Employee AS E
WHERE E.Salary >= (SELECT MAX(E2.Salary)
           FROM Employee AS E2);
```

\# Problem 3b query
```
SELECT E.Fname, E.Minit, E.Lname
FROM Employee AS E
WHERE E.Super_Ssn in (SELECT E2.Ssn
           FROM Employee AS E2
           WHERE E2.Super_Ssn = '123456789');
```
\# Problem 3c query

```
SELECT E.Fname, E.Minit, E.Lname
FROM Employee AS E
WHERE E.Salary - 10000 >= (SELECT MIN(E2.Salary)
               FROM Employee AS E2);
```

Problem 3a query result:

Fname	Minit	Lname
James	E	Borg

Problem 3b query result:

Fname	Minit	Lname

Problem 3c query result:

Fname	Minit	Lname
Franklin	T	Wong
Alicia	S	Wallace
Ramesh	K	Narayan
James	E	Borg

Problem 4

Problem 4a Query

```sql
SELECT S.Name
FROM Student AS S
WHERE NOT EXISTS(
      SELECT *
      FROM Grade_report AS Gr
      WHERE S.Student_number = Gr.Student_number
       AND Gr.Grade != 'A'
);
```

Problem 4b Query

```sql
SELECT S.Name
FROM Student AS S
WHERE EXISTS(
      SELECT *
      FROM Grade_report AS Gr
      WHERE S.Student_number = Gr.Student_number
       AND Gr.Grade = 'A'
);
```

Problem 4a query result

Name

Problem 4b query result

Name
Brown

Problem 5

Problem 5 Solution

a)
user id - int (4 byte)
user name - varchar (100 byte), assuming that a name is always less than 100 characters
item id int - int (4 byte)
item name - varchar (100 byte), assuming that a name is always less than 100 characters
transaction id - long (8 byte) (big int)
amount of money ($) for the transaction (e.g. $7.81, $470.80, etc) - float(4 byte)

b. The size of each row is 220 byte maximum.
c. If there is 1 trillion transaction, the database will have about 220 TB of data