Homework 3

Solution 1a. Required “setup.sql” file is present in the submission folder.

Solution 1b. Here, Python Programming is used to convert the excel data into insert statements. Python Project “ExcelProject” included in the submission folder, contains “ImportExcel.py” which reads data from “purchases.xlsx”, create insert statements and write them into “insertFile.sql”(put in ExcelProject). Openpyxl library is used to parse Excel sheets.

Solution 2:

a) select distinct(buyer) from Purchase P, Product X where P.product = X.name and X.category="cell phone";

b) select distinct(buyer) from Purchase P, Product X, Company C where P.product = X.name and X.maker=C.cname and C.country="us";

c) select distinct(buyer) from Purchase P, Product X, Company C
where P.product = X.name and X.maker=C.cname and C.country="us" and buyer Not IN (select distinct(buyer) from Purchase P, Product X, Company C where P.product = X.name and X.maker=C.cname and C.country="china");

```
select distinct(P.buyer) from Purchase P
INNER JOIN Product X on P.product = X.name
INNER join Company C on X.maker=C.cname
where C.country="us"
GROUP BY P.buyer
HAVING NOT EXISTS(SELECT * FROM Purchase P1
INNER JOIN Product X1 on P1.product = X1.name
INNER join Company C1 on X1.maker=C1.cname
where P1.buyer = P.buyer and C1.country ="china");
```

d) select distinct(buyer) from Purchase P, Product X, Company C
where P.product = X.name and X.maker=C.cname and C.country="us" and P.buyer NOT IN (SELECT name from Person where city = "los angeles");

e) select distinct(buyer) from Purchase where seller = "david"
UNION
select distinct(buyer) from Purchase P, Product X, Company C
where P.product = X.name and X.maker=C.cname and C.stockPrice>100;

f) select name, price, category from Product
where price = (select max(price) from Product);

g) select product from Purchase
group by product
having count(*) >= 3;

h) select buyer from Purchase , Product
where product = name
group by buyer
having sum(price)= (select sum(price) as total from Purchase , Product
where product = name
group by buyer
ORDER by total DESC
LIMIT 1);

i) select Y.category, Z.city, count(*) as total from Purchase X, Product Y, Person Z
where X.buyer = Z.name and X.product = Y.name
group by Y.category, Z.city;

j) select category, count(*) from Purchase, Product
where product = name
group by category;

k) create View V as
select Y.category, Z.city, count(*)as total from Purchase X, Product Y, Person Z
where X.buyer = Z.name and X.product = Y.name
group by Y.category, Z.city;

l) select category, sum(total) from V
group by category;

Solution. 3:-

(a)

$$\Pi_{buyer}\left(\sigma_{(product.name \text{ AND } category = \text{"cellphone"})}(Purchase * Buyer)\right)$$

(b)

$$\Pi_{buyer}\left(\sigma_{(product.name \text{ AND } maker.cname \text{ AND } country = \text{"us"})}(Purchase * Product * Company)\right)$$

(c)

$$R_1 := \Pi_{buyer}\left(\sigma_{(product.name \text{ AND } maker.cname \text{ AND } country = \text{"us"})}(Purchase * Product * Company)\right)$$

$$R_2 := \Pi_{buyer}\left(\sigma_{(product.name \text{ AND } make.cname \text{ AND } country = \text{"china"})}(Purchase * Product * Company)\right)$$

$$Result := \sigma\,(R_1 - R_2)$$

(d) $R_1(\text{name}) := \Pi_{\text{buyer}}\left(\sigma_{\substack{\text{product = name AND}\\ \text{maker = cname AND}\\ \text{country = "us"}}}\left(\text{Purchase} * \text{Product} * \text{Company}\right)\right)$

$R_2(\text{name}) := \Pi_{\text{buyer}}\left(\sigma_{\text{city = "los angeles"}}\left(\text{Person}\right)\right)$

$\text{Result} := R_1 - R_2.$

(e) $\Pi_{\text{buyer}}\left(\sigma_{\text{seller = "david"}}\left(\text{Purchase}\right)\right)$

$\cup$

$\Pi_{\text{buyer}}\left(\sigma_{\substack{\text{product = name AND}\\ \text{maker = cname AND}\\ \text{StockPrice } > 100}}\left(\text{Purchase} * \text{Product} * \text{Company}\right)\right)$

(i) $R_1 := \sigma_{\substack{\text{buyer = Person.name}\\ \text{AND}\\ \text{Product = Product.name}}}\left(\text{Purchase} * \text{Product} * \text{Company}\right)$

$\Rightarrow \text{GAMMA}_{\text{category, city, count(*)}}\left(R1\right)$

(j) $R_1 := \sigma_{(\text{Product = name})}\left(\text{Purchase} * \text{Product}\right)$

$\Rightarrow \text{Result} := \text{GAMMA}_{\text{Category, count(*)}}\left(R1\right).$

Solution 4a.

"purchase.py" is present in the submission folder. To run use the following:

```
$ python purchase.py Mark
```

Solution 4b.

"purchase.java" is present in the submission folder. To run use the following:

```
$ javac purchase.java
$ java purchase Mark
```