

Tutorial: Relational Algebra and SQL Query

Consider the following schema:

Seller (sellar_id: integer, seller_name: string, city: string) : supplier

Product (product_id: integer, product_name: string, category: string) : Parts

Price_Register (sellar_id: integer, product_id: integer, Price: real) : catalog

The Seller relation lists the products that are trade by the seller. The Product relation lists the product and respective information. The Price_Register relation lists the price on which the seller sells the product. The key fields are underlined.

Q1: Write the relational algebra for following SQL queries.

1.

```
SELECT S.seller_name
```

```
FROM Seller S, Product P, Price_Register R
```

```
WHERE P.category = 'Book' AND R.product_id = P.product_id AND R.sellar_id = S.sellar_id
```

2.

```
SELECT R.seller_id
```

```
FROM Product P, Price_Register R
```

```
WHERE (P.category = 'Book' OR P.category = 'Stationary') AND P.product_id = R.product_id
```

3.

```
SELECT R.seller_id
```

```
FROM Product P, Price_Register R
```

```
WHERE (P.category = 'Mobile' AND P.category = 'Electronics') AND P.product_id = R.product_id
```

4.

```
SELECT S.seller_id
```

```
FROM Seller S
```

WHERE S.city = 'Surat' OR S. seller_id IN (SELECT R.seller_id FROM Product P,
Price_Register R WHERE P.category = 'Cloths' AND P.product_id = R.product_id)

5.

SELECT S.seller_id

FROM Seller S

WHERE S.city = 'Nagpur' AND S. seller_id IN (SELECT R.seller_id FROM Product P,
Price_Register R WHERE P.category = 'Fruits' AND P.product_id = R.product_id)

Q2: Write the SQL query for following relational algebra.

1.

$(\pi_{\text{seller_id, product_id}} \text{Price_Register}) / (\pi_{\text{product_id}} \text{Product})$

2.

$(\pi_{\text{seller_id, product_id}} \text{Price_Register}) / (\pi_{\text{product_id}} \sigma_{\text{category='book'}} \text{Product})$

3.

$\rho(R1, \text{Price_Register})$

$\rho(R2, \text{Price_Register})$

$\pi_{R1.seller_id, R2.seller_id} (\sigma_{R1.product_id=R2. product_id \wedge R1.seller_id \neq R2.seller_id \wedge R1.price > R2.price} (R1 \times R2))$

4.

$\rho(R1, \text{Price_Register})$

$\rho(R2, \text{Price_Register})$

$\pi_{R1.product_id, \sigma_{R1.product_id = R2.product_id \wedge R1.seller_id \neq R2.seller_id}} (R1 \times R2)$

5.

$(\pi_{\text{seller_id, product_id}} \text{Price_Register}) / (\pi_{\text{product_id}} \sigma_{\text{category='Cloth'} \vee \text{category='Fashion'}} \text{Product})$