



IT214 Lab 3 Report
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1 Relational algebraic expressions for all queries

Relational Algebraic Expression of Queries

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- 1) $\sigma_{\text{saleprice} > 1000}(\text{Items})$
- 2) $\sigma_{\text{saleprice} > 1000 \text{ and category} = 5}(\text{Items})$
- 3) $\pi_{\text{invno}, \text{invdate}}(\sigma_{\text{customerid} = 'C05'}(\text{Invoice}))$
- 4) $\pi_{\text{itemcode}, \text{qty}, \text{rate}}(\sigma_{\text{invno} = 1}(\text{Invoicedetails}))$
- 5) $\pi_{\text{invno}, \text{invdate}}(\sigma_{\text{name} = 'Harsh'}(\text{Invoice} \bowtie_{\text{customerid} = \text{custid}} \text{Customer}))$
- 6) $\pi_{\text{inv.invno}, \text{inv.invdate}, \text{inv.customerid}}(\sigma_{\text{inv.itemcode} = 1103}(\text{Invoice inv} \bowtie_{\text{inv.itemcode} = \text{inv.itemcode}} \text{Invoicedetails invd}))$
- 7) $\pi_{\text{inv.invno}, \text{inv.itemcode}, \text{inv.qty}}(\sigma_{\text{inv.customerid} = 'C05'}(\text{Invoice inv} \bowtie_{\text{inv.invno} = \text{inv.invno}} \text{Invoicedetails invd}))$
- 8) $\pi_{\text{cust.custid}, \text{cust.name}, \text{cust.city}}(\sigma_{\text{itemcode} = 1101}(\text{Customer cust} \bowtie_{\text{cust.custid} = \text{inv.customerid}} \text{Invoice inv} \bowtie_{\text{inv.invno} = \text{inv.invno}} \text{Invoicedetails invd}))$
- 9) $\pi_{\text{it.code}, \text{it.name}}(\sigma_{\text{inv.invdate} = '2011-08-23'}(\text{Items it} \bowtie_{\text{it.code} = \text{inv.itemcode}} \text{Invoicedetails invd} \bowtie_{\text{inv.invno} = \text{inv.invno}} \text{Invoice inv}))$
- 10) $\pi_{\text{it.name}, \text{it.code}}(\sigma_{\text{inv.invdate} \geq '2011-07-01' \text{ and } \text{inv.invdate} \leq '2011-07-31' \text{ and } \text{it.category} = 3}(\text{Items it} \bowtie_{\text{it.code} = \text{inv.itemcode}} \text{Invoicedetails invd} \bowtie_{\text{inv.invno} = \text{inv.invno}} \text{Invoice inv}))$

11) $\pi_{\text{cust.custid}, \text{cust.name}, \text{cust.city}} (\sigma_{\text{it.category}=3 \text{ and } \text{cust.state}='GT'})$

Customer cust $\xrightarrow{\text{cust.custid}=\text{inv.customerid}}$ Invoice inv $\xrightarrow{\text{inv.inveno}=\text{invd.inveno}}$
 Invoicedetails invd $\xrightarrow{\text{invd.itemcode}=\text{it.code}}$ Items it))

12) $\pi_{\text{it.code}, \text{it.name}} (\sigma_{\text{inv.indate}='2011-08-23' \text{ and } \text{cust.name}='Dev'})$

Items it $\xrightarrow{\text{it.code}=\text{invd.itemcode}}$ Invoicedetails invd $\xrightarrow{\text{invd.inveno}=\text{inv.inveno}}$
 Invoice inv $\xrightarrow{\text{inv.customerid}=\text{cust.custid}}$ Customer cust))

2 SQL statements for all queries

1. Give the details of items having price > 1000

```
SELECT * FROM items WHERE saleprice > 1000;
```

The screenshot shows a PostgreSQL query editor interface. The top navigation bar includes tabs for Dashboard, Properties, SQL, Statistics, Dependencies, Dependents, and Processes. The current user is 'public/202101498@PostgreSQL*'. The query editor shows a SQL script with four queries, with the second query highlighted:

```
1 SET SEARCH_PATH TO sales;
2
3 -- 1
4 SELECT * FROM items WHERE saleprice > 1000;
5
6 -- 2
7 SELECT * FROM items WHERE saleprice > 1000 AND category = 5;
8
9 -- 3
10 SELECT invno, invdate FROM invoice WHERE customerid = 'C05';
11
12 -- 4
13 SELECT * FROM invoicedetails;
14 SELECT itemcode, qty, rate FROM invoicedetails WHERE invno = 1;
```

Below the query editor, the 'Data Output' tab is active, displaying the results of the selected query in a table format:

	code [PK] smallint	name character varying (20)	category integer	saleprice integer	stock integer	reorderlevel integer	averagepurchaseprice integer
1	1101	Printer	1	5000	100	20	4300
2	1105	Monitor	5	5500	100	10	4600

2. Give the details of items having price > 1000 and are belonging to category 5

```
SELECT * FROM items WHERE saleprice > 1000 AND category = 5;
```

Dashboard Properties SQL Statistics Dependencies Dependents Processes public/202101498@PostgreSQL*

public/202101498@PostgreSQL

Query Query History

```
1 SET SEARCH_PATH TO sales;
2
3 -- 1
4 SELECT * FROM items WHERE saleprice > 1000;
5
6 -- 2
7 SELECT * FROM items WHERE saleprice > 1000 AND category = 5;
8
9 -- 3
10 SELECT invno, invdate FROM invoice WHERE customerid = 'C05';
11
12 -- 4
13 SELECT * FROM invoicedetails;
14 SELECT itemcode, qty, rate FROM invoicedetails WHERE invno = 1;
```

Data Output Messages Notifications

	code [PK] smallint	name character varying (20)	category integer	saleprice integer	stock integer	reorderlevel integer	averagepurchaseprice integer
1	1105	Monitor	5	5500	100	10	4600

3. List the Invoices (number, date) of a customer id = 'C05'

```
SELECT invno, invdate FROM invoice WHERE customerid = 'C05';
```

The screenshot shows a PostgreSQL query editor interface. The top navigation bar includes 'Dashboard', 'Properties', 'SQL', 'Statistics', 'Dependencies', 'Dependents', and 'Processes'. The current connection is 'public/202101498@PostgreSQL*'. The query editor shows a multi-line SQL script with comments and queries. The third query, starting at line 10, is highlighted in blue and matches the query in the problem statement. Below the query editor, the 'Data Output' tab is active, displaying the results of the highlighted query in a table format.

	invno [PK] integer	invdate date
1	5	2011-08-23
2	1	2010-06-30

4. List all items (code, qty, rate) for invoice number = 1

```
SELECT itemcode, qty, rate FROM invoicedetails
WHERE invno = 1;
```

The screenshot shows a PostgreSQL query editor interface. The top navigation bar includes tabs for Dashboard, Properties, SQL, Statistics, Dependencies, Dependents, and Processes. The current user is 'public/202101498@PostgreSQL*'. The query editor shows a SQL query with line numbers 6 through 19. The query is as follows:

```
6  -- 2
7  SELECT * FROM items WHERE saleprice > 1000 AND category = 5;
8
9  -- 3
10 SELECT invno, invdate FROM invoice WHERE customerid = 'C05';
11
12 -- 4
13 SELECT itemcode, qty, rate FROM invoicedetails WHERE invno = 1;
14
15 -- 5
16 SELECT invno, invdate FROM invoice
17 JOIN customer ON custid = customerid
18 WHERE name = 'Harsh';
19
```

The query results are displayed in the 'Data Output' tab. The results are as follows:

	itemcode smallint	qty integer	rate integer
1	1101	20	10000
2	1102	30	6000
3	1103	100	25000

5. List the Invoices (number, date) of the customer named Harsh

```
SELECT invno, invdate FROM invoice
JOIN customer ON custid = customerid
WHERE name = 'Harsh';
```

The screenshot shows a PostgreSQL query editor interface. The top navigation bar includes 'Dashboard', 'Properties', 'SQL', 'Statistics', 'Dependencies', 'Dependents', and 'Processes'. The current connection is 'public/202101498@PostgreSQL*'. The query editor shows a SQL query that has been executed. The query is as follows:

```
11
12 -- 4
13 SELECT itemcode, qty, rate FROM invoicedetails WHERE invno = 1;
14
15 -- 5
16 SELECT invno, invdate FROM invoice
17 JOIN customer ON custid = customerid
18 WHERE name = 'Harsh';
19
20 -- 6
21 SELECT inv.invno, inv.invdate, inv.customerid FROM invoice AS inv
22 JOIN invoicedetails AS invd ON invd.invno = inv.invno
23 WHERE invd.itemcode = 1103;
24
```

The 'Data Output' tab is active, showing the results of the query. The results are displayed in a table with two columns: 'invno' (integer, primary key) and 'invdate' (date). The table contains two rows of data:

invno	invdate
1	2011-08-23
2	2010-06-30

6. List all invoices (inv no, date, customer rid) that have item code = 1103

```
SELECT inv.invno, inv.invdate, inv.customerid
FROM invoice AS inv
JOIN invoicedetails AS invd ON invd.invno = inv.invno
WHERE invd.itemcode = 1103;
```

Dashboard Properties SQL Statistics Dependencies Dependents Processes public/202101498@PostgreSQL*

public/202101498@PostgreSQL

Query Query History

```
16 SELECT invno, invdate FROM invoice
17 JOIN customer ON custid = customerid
18 WHERE name = 'Harsh';
19
20 -- 6
21 SELECT inv.invno, inv.invdate, inv.customerid FROM invoice AS inv
22 JOIN invoicedetails AS invd ON invd.invno = inv.invno
23 WHERE invd.itemcode = 1103;
24
25 -- 7
26 SELECT invd.invno, invd.itemcode, invd.qty FROM invoicedetails AS invd
27 JOIN invoice AS inv ON invd.invno = inv.invno
28 WHERE inv.customerid = 'C05';
29
```

Data Output Messages Notifications

	invno [PK] integer	invdate date	customerid character (3)
1	6	2011-08-23	C01
2	3	2011-07-26	C03
3	2	2011-07-05	C04
4	1	2010-06-30	C05

7. List all items (inv no, item code, qty) that customer 'C05' has bought

```
SELECT invd.invno, invd.itemcode, invd.qty
FROM invoicedetails AS invd
JOIN invoice AS inv ON invd.invno = inv.invno
WHERE inv.customerid = 'C05';
```

The screenshot shows a PostgreSQL query editor interface. The top navigation bar includes 'Dashboard', 'Properties', 'SQL', 'Statistics', 'Dependencies', 'Dependents', and 'Processes'. The current connection is 'public/202101498@PostgreSQL*'. The query editor displays a SQL query with line numbers 21 through 34. The query is a multi-part SELECT statement. The first part (lines 21-23) selects invno, invdate, and customerid from the invoice table, joined with the invoicedetails table on invno. The second part (lines 26-28) selects invno, itemcode, and qty from the invoicedetails table, joined with the invoice table on invno, and filters for customerid 'C05'. The third part (lines 31-34) selects distinct custid, name, and city from the customer table, joined with the invoice table on custid, and then with the invoicedetails table on invno, filtering for itemcode 1101. The 'Data Output' tab is active, showing a table with 5 rows and 3 columns: invno [PK] integer, itemcode [PK] smallint, and qty integer. The data rows are: (1, 1101, 20), (1, 1102, 30), (1, 1103, 100), (5, 1102, 70), and (5, 1101, 20).

```
21 SELECT inv.invno, inv.invdate, inv.customerid FROM invoice AS inv
22 JOIN invoicedetails AS invd ON invd.invno = inv.invno
23 WHERE invd.itemcode = 1103;
24
25 -- 7
26 SELECT invd.invno, invd.itemcode, invd.qty FROM invoicedetails AS invd
27 JOIN invoice AS inv ON invd.invno = inv.invno
28 WHERE inv.customerid = 'C05';
29
30 -- 8
31 SELECT DISTINCT cust.custid, cust.name, cust.city FROM customer AS cust
32 JOIN invoice AS inv ON inv.customerid = cust.custid
33 JOIN invoicedetails AS invd ON invd.invno = inv.invno
34 WHERE itemcode = 1101;
```

	invno [PK] integer	itemcode [PK] smallint	qty integer
1	1	1101	20
2	1	1102	30
3	1	1103	100
4	5	1102	70
5	5	1101	20

8. List all customers (customer id, name, city) that have bought item 1101

```
SELECT DISTINCT cust.custid, cust.name, cust.city
FROM customer AS cust
JOIN invoice AS inv ON inv.customerid = cust.custid
JOIN invoicedetails AS invd ON invd.invno = inv.invno
WHERE itemcode = 1101;
```

The screenshot shows a PostgreSQL query editor interface. The top bar includes tabs for Dashboard, Properties, SQL, Statistics, Dependencies, Dependents, and Processes. The current connection is 'public/202101498@PostgreSQL*'. The query editor shows a SQL query with line numbers 26 to 39. The query is a JOIN of customer, invoice, and invoicedetails tables to find customers who bought item 1101. The results are displayed in the 'Data Output' tab, showing a single row with custid 'C05', name 'Harsh', and city 'Jaipur'.

```
26 SELECT invd.invno, invd.itemcode, invd.qty FROM invoicedetails AS invd
27 JOIN invoice AS inv ON invd.invno = inv.invno
28 WHERE inv.customerid = 'C05';
29
30 -- 8
31 SELECT DISTINCT cust.custid, cust.name, cust.city FROM customer AS cust
32 JOIN invoice AS inv ON inv.customerid = cust.custid
33 JOIN invoicedetails AS invd ON invd.invno = inv.invno
34 WHERE itemcode = 1101;
35
36 -- 9
37 SELECT it.code, it.name FROM items AS it
38 JOIN invoicedetails AS invd ON it.code = invd.itemcode
39 JOIN invoice AS inv ON invd.invno = inv.invno
```

Data Output

	custid [PK] character (3)	name character varying (20)	city character varying (20)
1	C05	Harsh	Jaipur

9. List all items (item code, item name) sold on 2011-08-23

```
SELECT it.code, it.name FROM items AS it
JOIN invoicedetails AS invd ON it.code = invd.itemcode
JOIN invoice AS inv ON invd.invno = inv.invno
WHERE inv.invdate = '2011-08-23';
```

The screenshot shows a PostgreSQL query editor interface. The top navigation bar includes 'Dashboard', 'Properties', 'SQL', 'Statistics', 'Dependencies', 'Dependents', 'Processes', and a user connection 'public/202101498@PostgreSQL*'. Below the navigation bar is a toolbar with icons for file operations, query execution, and settings. The main area is divided into 'Query' and 'Query History' tabs. The 'Query' tab contains a SQL query with line numbers 31 through 44. The query is a JOIN of 'items', 'invoicedetails', and 'invoice' tables, filtered by 'invdate = '2011-08-23''. Below the query editor are tabs for 'Data Output', 'Messages', and 'Notifications'. The 'Data Output' tab is active, showing a table with 4 rows and 2 columns: 'code' (smallint, primary key) and 'name' (character varying (20)).

```
31 SELECT DISTINCT cust.custid, cust.name, cust.city FROM customer AS cust
32 JOIN invoice AS inv ON inv.customerid = cust.custid
33 JOIN invoicedetails AS invd ON invd.invno = inv.invno
34 WHERE itemcode = 1101;
35
36 -- 9
37 SELECT it.code, it.name FROM items AS it
38 JOIN invoicedetails AS invd ON it.code = invd.itemcode
39 JOIN invoice AS inv ON invd.invno = inv.invno
40 WHERE inv.invdate = '2011-08-23';
41
42 -- 10
43 SELECT DISTINCT it.name, it.code FROM items AS it
44 JOIN invoicedetails AS invd ON invd.itemcode = it.code
```

	code [PK] smallint	name character varying (20)
1	1102	Pen Drive
2	1101	Printer
3	1104	Mouse
4	1103	Key Board

10. List all items (item code, item name) sold in month '2011-07' from category=3

```
SELECT DISTINCT it.name, it.code FROM items AS it
JOIN invoicedetails AS invd ON invd.itemcode = it.code
JOIN invoice AS inv ON inv.invno = invd.invno
WHERE inv.invdate >= '2011-07-01' AND inv.invdate <= '2011-07-31'
AND it.category = 3;
```

The screenshot shows a PostgreSQL client interface with a top navigation bar containing 'Dashboard', 'Properties', 'SQL', 'Statistics', 'Dependencies', 'Dependents', and 'Processes'. The active tab is 'SQL', and the connection is 'public/202101498@PostgreSQL*'. Below the navigation bar is a toolbar with icons for file operations, query execution, and other functions. The main area is divided into 'Query' and 'Query History' tabs. The 'Query' tab shows a SQL query with line numbers 42 to 55. The query is highlighted in blue. Below the query is a 'Data Output' tab showing the results of the query. The results are displayed in a table with two columns: 'name' and 'code'. The first row shows 'Key Board' and '1103'.

```
42 -- 10
43 SELECT DISTINCT it.name, it.code FROM items AS it
44 JOIN invoicedetails AS invd ON invd.itemcode = it.code
45 JOIN invoice AS inv ON inv.invno = invd.invno
46 WHERE inv.invdate >= '2011-07-01' AND inv.invdate <= '2011-07-31'
47 AND it.category = 3;
48
49 -- 11
50 SELECT cust.custid, cust.name, cust.city FROM customer AS cust
51 JOIN invoice AS inv ON inv.customerid = cust.custid
52 JOIN invoicedetails AS invd ON invd.invno = inv.invno
53 JOIN items AS it ON it.code = invd.itemcode
54 WHERE it.category = 3 AND cust.state = 'GJ';
55
```

	name character varying (20)	code [PK] smallint
1	Key Board	1103

11. List customers (customer id, name, city) who are from Gujarat and have bought item items from category=3

```
SELECT cust.custid, cust.name, cust.city
FROM customer AS cust
JOIN invoice AS inv ON inv.customerid = cust.custid
JOIN invoicedetails AS invd ON invd.invno = inv.invno
JOIN items AS it ON it.code = invd.itemcode
WHERE it.category = 3 AND cust.state = 'GJ';
```

The screenshot shows a PostgreSQL query editor interface. The top navigation bar includes tabs for Dashboard, Properties, SQL, Statistics, Dependencies, Dependents, and Processes. The current user is 'public/202101498@PostgreSQL*'. The query editor shows a SQL query that is highlighted in blue. The query is as follows:

```
-- 11
SELECT cust.custid, cust.name, cust.city FROM customer AS cust
JOIN invoice AS inv ON inv.customerid = cust.custid
JOIN invoicedetails AS invd ON invd.invno = inv.invno
JOIN items AS it ON it.code = invd.itemcode
WHERE it.category = 3 AND cust.state = 'GJ';
```

Below the query editor, there is a 'Data Output' tab showing the results of the query. The results are displayed in a table with the following columns: custid, name, and city. The data is as follows:

	custid [PK] character (3)	name character varying (20)	city character varying (20)
1	C03	Tom	Diu

12. List the items (code, name) of items purchased by customer named 'Dev' on date 2011-08-23

```
SELECT it.code, it.name FROM items AS it
JOIN invoicedetails AS invd ON invd.itemcode = it.code
JOIN invoice AS inv ON inv.invno = invd.invno
JOIN customer AS cust ON inv.customerid = cust.custid
WHERE inv.invdate = '2011-08-23' AND cust.name = 'Dev';
```

The screenshot shows a PostgreSQL web interface with the following components:

- Top Bar:** Dashboard, Properties, SQL, Statistics, Dependencies, Dependents, Processes. The user is logged in as `public/202101498@PostgreSQL*`.
- Query Editor:** The query `SELECT it.code, it.name FROM items AS it JOIN invoicedetails AS invd ON invd.itemcode = it.code JOIN invoice AS inv ON inv.invno = invd.invno JOIN customer AS cust ON inv.customerid = cust.custid WHERE inv.invdate = '2011-08-23' AND cust.name = 'Dev';` is entered and highlighted in blue.
- Data Output:** A table with two columns: `code` (type: [PK] smallint) and `name` (type: character varying (20)).