

CSE 412 - Assignment 2

Bhavya Patel - ASU ID: 1225740997

P1:

Relation Algebra:

$$\pi_{s_name, s_address, s_phone} (\tau_{s_acctbal} (\sigma_{s_acctbal < 0} (Supplier)))$$

SQL Query:

```
SELECT s_name, s_address, s_phone FROM supplier
WHERE s_acctbal < 0
ORDER BY s_acctbal
LIMIT 10;
```

Result:

	s_name character (25)	s_address character varying (40)	s_phone character (15)
1	Supplier#000009795	80TciWrTnRVbFAUUrqEg	23-628-902-10...
2	Supplier#000007259	S1U6lyVlF4HUUwbQyo5JzCxL7Y mcodVZXj ...	20-445-712-82...
3	Supplier#000008927	LgwVct4dJnK59FBF50U4lvb6lNGeO9iD9IHkz	10-485-509-98...
4	Supplier#000003934	,KA9SfSroSuN5YMb46WxlzJQA	19-683-401-13...
5	Supplier#000007956	vmAYh95Lr3f2kKHI6kRX2G7	16-947-231-89...
6	Supplier#000005298	jtFU3iIMXr18ExQQAQRlyCtOOITSBf9eauEhK	12-327-575-43...
7	Supplier#000001764	7nVLpQw9JWeN94kqw	27-200-805-41...
8	Supplier#000008224	TWxt9f,LVER	13-845-388-70...
9	Supplier#000001870	Iaa9 Fntbx4kHd	22-681-122-23...
10	Supplier#000001654	5F6ZEzmh6PWDS	12-219-980-38...

P2:

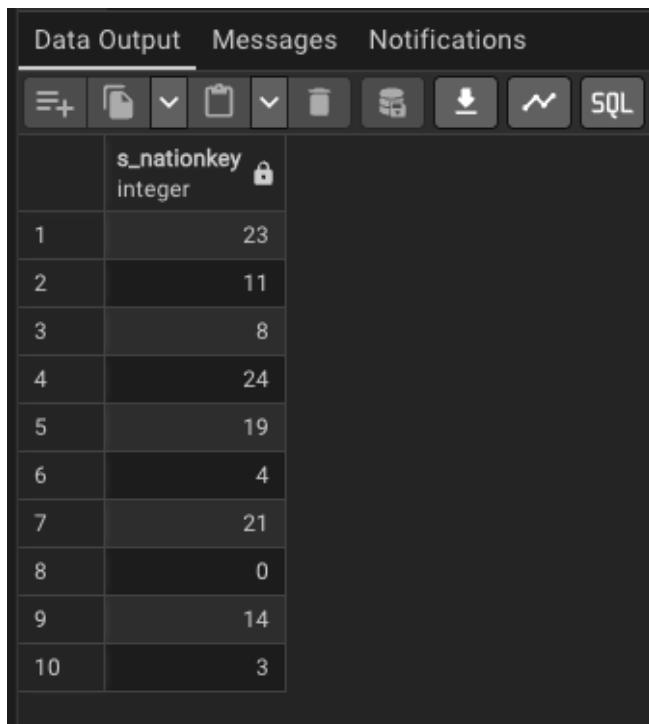
Relation Algebra:

$$\pi_{s_nationkey} (\sigma_{s_acctbal > 5000}(\text{Supplier}))$$

SQL Query:

```
SELECT DISTINCT s_nationkey
FROM supplier
WHERE s_acctbal > 5000
LIMIT 10;
```

Result:



The screenshot shows a software interface for running SQL queries. At the top, there are tabs for "Data Output", "Messages", and "Notifications". Below the tabs is a toolbar with various icons for file operations like opening, saving, and printing. The main area is a table displaying the results of the executed query. The table has two columns: the first column is labeled "s_nationkey" and the second column is labeled "integer". The data consists of 10 rows, each containing a value from 1 to 10. Row 1 contains 23, Row 2 contains 11, Row 3 contains 8, Row 4 contains 24, Row 5 contains 19, Row 6 contains 4, Row 7 contains 21, Row 8 contains 0, Row 9 contains 14, and Row 10 contains 3.

	s_nationkey integer
1	23
2	11
3	8
4	24
5	19
6	4
7	21
8	0
9	14
10	3

P3:

SQL Query:

```
SELECT ps_suppkey AS SupplierKey, COUNT(DISTINCT ps_partkey) AS NumParts
FROM partsupp
GROUP BY ps_suppkey
LIMIT 10;
```

Result:

The screenshot shows a software interface for managing database queries. At the top, there are three tabs: "Data Output" (which is selected), "Messages", and "Notifications". Below the tabs is a toolbar with several icons: a plus sign, a file icon, a dropdown arrow, a clipboard icon, another dropdown arrow, a trash can, a download icon, a refresh icon, and a SQL icon. The main area displays a table with two columns: "supplierkey" and "numparts". The "supplierkey" column contains integer values from 1 to 10, and the "numparts" column contains the value 80 for each row. The table has a dark header row and light gray body rows.

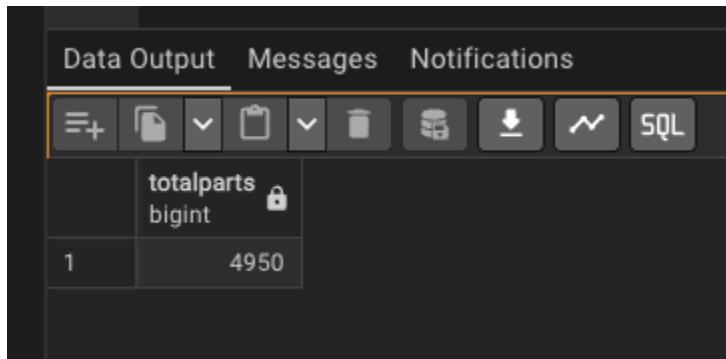
	supplierkey	numparts
1	1	80
2	2	80
3	3	80
4	4	80
5	5	80
6	6	80
7	7	80
8	8	80
9	9	80
10	10	80

P4:

SQL Query:

```
SELECT COUNT(*) AS TotalParts  
FROM part  
WHERE p_retailprice > 2000  
LIMIT 10;
```

Result:



The screenshot shows a software interface for viewing SQL query results. At the top, there are three tabs: "Data Output" (which is selected), "Messages", and "Notifications". Below the tabs is a toolbar with several icons: a plus sign, a file icon, a dropdown arrow, a clipboard icon, another dropdown arrow, a trash bin, a download icon, a refresh icon, and a "SQL" button. The main area displays a single row of data in a table format. The table has two columns: the first column contains the value "1", and the second column contains the value "4950". Above the table, the column name "totalparts" is listed, along with its data type "bigint" and a small lock icon.

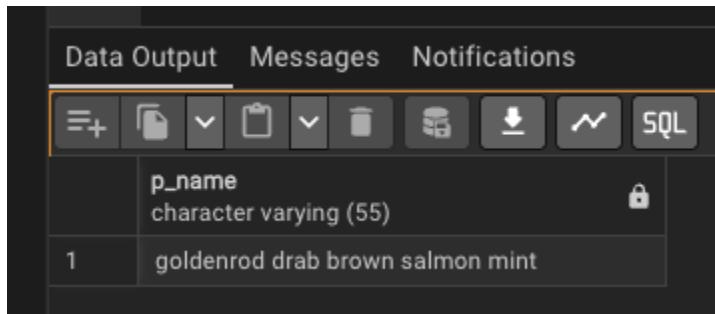
	totalparts
1	4950

P5:

SQL Query:

```
SELECT p_name
FROM part
WHERE p_retailprice = (SELECT MAX(p_retailprice) FROM part)
LIMIT 10;
```

Result:



The screenshot shows a software interface for managing database queries and results. At the top, there are three tabs: "Data Output" (which is selected), "Messages", and "Notifications". Below the tabs is a toolbar with several icons: a plus sign, a file icon, a dropdown arrow, a clipboard icon, another dropdown arrow, a trash bin, a refresh icon, a download icon, and an SQL icon. The main area displays a table with one row of data. The table has two columns: the first column contains the number "1", and the second column contains the string "goldenrod drab brown salmon mint". Above the first column, the column header "p_name" is shown, along with the type information "character varying (55)" and a lock icon.

	p_name
1	goldenrod drab brown salmon mint

P6:

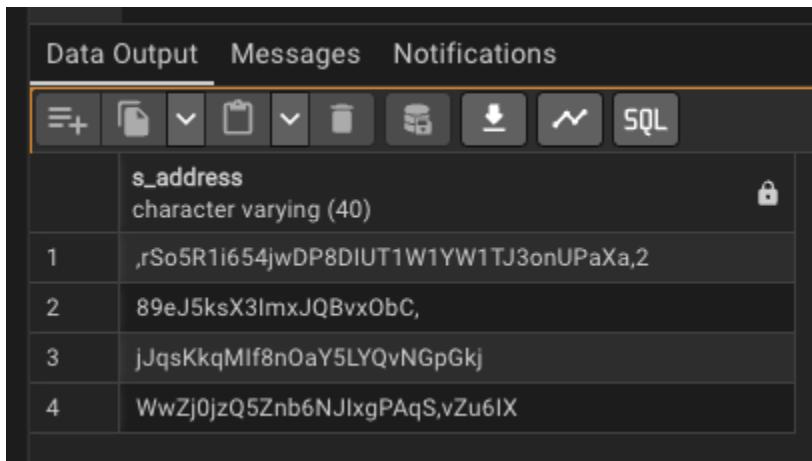
Relation Algebra:

$$\pi_{s_address}(\sigma_{p_name='goldenrod lavender spring chocolate lace'}(Part)) \bowtie_{p_partkey=ps_partkey} (PartSupp) \bowtie_{ps_supplier=s_suppkey} (Supplier)$$

SQL Query:

```
SELECT DISTINCT s.s_address
FROM supplier AS s
JOIN partsupp AS ps ON s.s_suppkey = ps.ps_suppkey
JOIN part AS p ON p.p_partkey = ps.ps_partkey
WHERE p.p_name = 'goldenrod lavender spring chocolate lace'
ORDER BY s.s_address
LIMIT 10;
```

Result:



The screenshot shows a software interface for managing database queries and results. At the top, there are tabs for "Data Output", "Messages", and "Notifications". Below the tabs is a toolbar with various icons for file operations like saving, opening, and deleting, as well as a "SQL" button. The main area displays a table with one column labeled "s_address". The data in the table is as follows:

	s_address
1	,rSo5R1i654jwDP8DIUT1W1YW1TJ3onUPaXa,2
2	89eJ5ksX3lmxJQBvxObC,
3	jJqsKkqMlf8nOaY5LYQvNGpGkj
4	WwZj0jzQ5Znb6NJlxgPAqS,vZu6IX

P7:

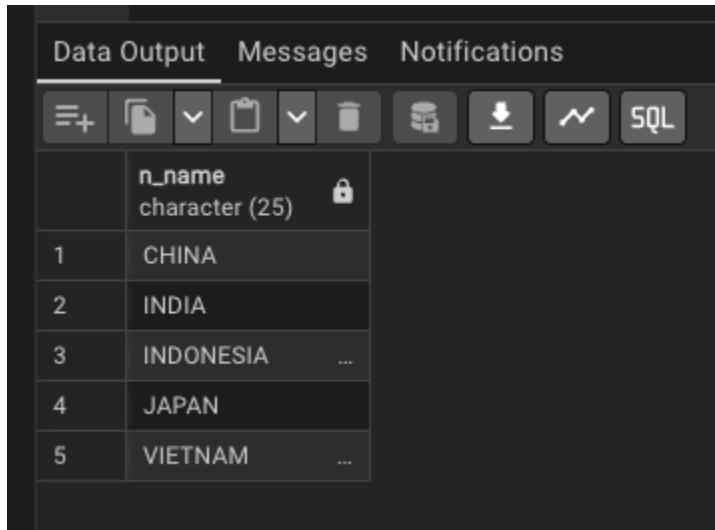
Relation Algebra:

$$\pi_{n_name}((\sigma_{r_name='ASIA'}(REGION)) \bowtie_{r_regionkey=n_regionkey} (NATION))$$

SQL Query:

```
SELECT n.n_name FROM nation AS n
JOIN region AS r ON n.n_regionkey = r.r_regionkey
WHERE r.r_name = 'ASIA'
ORDER BY n.n_name
LIMIT 10;
```

Result:



The screenshot shows a database interface with a dark theme. At the top, there are three tabs: "Data Output" (which is selected), "Messages", and "Notifications". Below the tabs is a toolbar with several icons: a plus sign, a file icon, a dropdown arrow, a clipboard icon, another dropdown arrow, a trash bin, a refresh icon, a download icon, a chart icon, and an SQL icon. The main area displays a table with the following data:

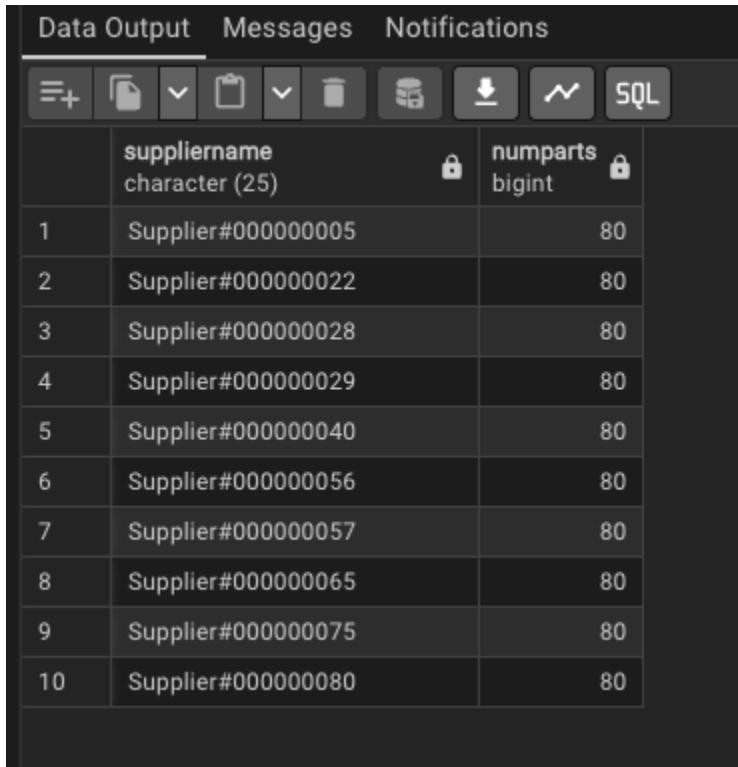
	n_name	character (25)	lock
1	CHINA		
2	INDIA		
3	INDONESIA	...	
4	JAPAN		
5	VIETNAM	...	

P8:

SQL Query:

```
SELECT s.s_name AS SupplierName, COUNT(DISTINCT ps.ps_partkey) AS NumParts
FROM supplier AS s
JOIN partsupp AS ps ON s.s_suppkey = ps.ps_suppkey
WHERE s.s_acctbal < 0
GROUP BY s.s_name
LIMIT 10;
```

Result:



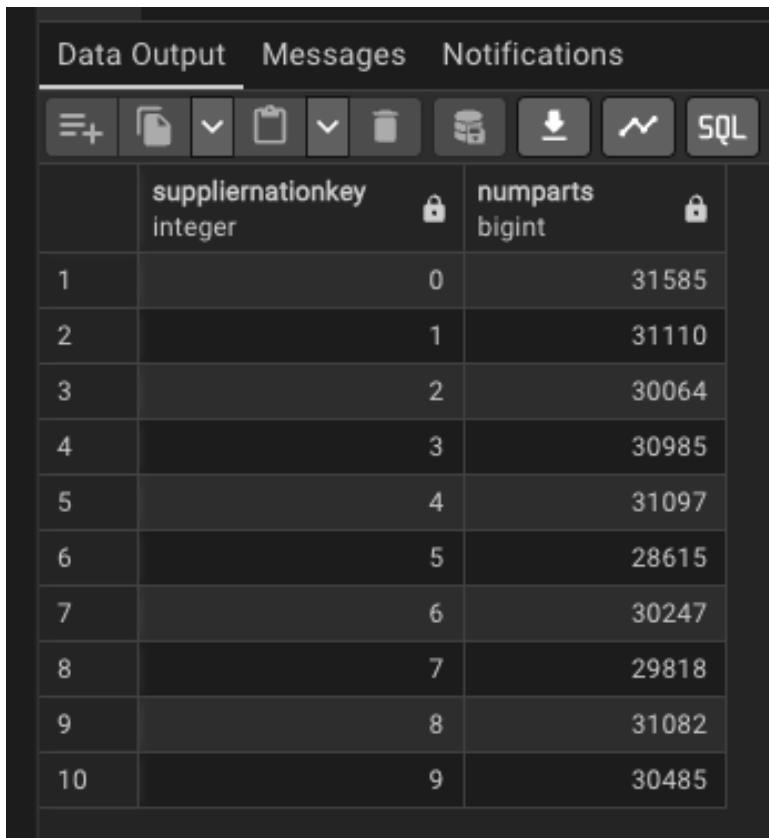
	suppliername character (25)	lock	numparts bigint	lock
1	Supplier#000000005		80	
2	Supplier#000000022		80	
3	Supplier#000000028		80	
4	Supplier#000000029		80	
5	Supplier#000000040		80	
6	Supplier#000000056		80	
7	Supplier#000000057		80	
8	Supplier#000000065		80	
9	Supplier#000000075		80	
10	Supplier#000000080		80	

P9:

SQL Query:

```
SELECT s.s_nationkey AS SupplierNationKey,  
COUNT(DISTINCT ps.ps_partkey) AS NumParts  
FROM supplier AS s  
JOIN partsupp AS ps ON s.s_suppkey = ps.ps_suppkey  
GROUP BY s.s_nationkey  
LIMIT 10;
```

Result:



The screenshot shows a software interface for managing database queries and results. At the top, there are tabs for "Data Output", "Messages", and "Notifications". Below the tabs is a toolbar with several icons: a plus sign, a file icon, a dropdown arrow, a clipboard icon, another dropdown arrow, a trash bin, a refresh icon, a download icon, a chart icon, and a "SQL" button. The main area displays a table with two columns. The first column is labeled "suppliernationkey" and has a type of "integer". The second column is labeled "numparts" and has a type of "bigint". There are two small padlock icons, one next to each column header. The table contains 10 rows, numbered 1 through 10. Row 1 has a value of 0 in the first column and 31585 in the second. Row 10 has a value of 9 in the first column and 30485 in the second.

	suppliernationkey integer	lock	numparts bigint	lock
1	0		31585	
2	1		31110	
3	2		30064	
4	3		30985	
5	4		31097	
6	5		28615	
7	6		30247	
8	7		29818	
9	8		31082	
10	9		30485	

P10:

SQL Query:

```
SELECT s.s_nationkey AS SupplierNationKey, COUNT(DISTINCT ps.ps_partkey) AS  
NumParts  
FROM supplier AS s  
JOIN partsupp AS ps ON s.s_suppkey = ps.ps_suppkey  
WHERE s.s_acctbal < 0  
GROUP BY s.s_nationkey  
LIMIT 10;
```

Result:

	supplernationkey integer	lock	numparts bigint	lock
1	0		2786	
2	1		3191	
3	2		2709	
4	3		1839	
5	4		2468	
6	5		2787	
7	6		2869	
8	7		3327	
9	8		3180	
10	9		2715	

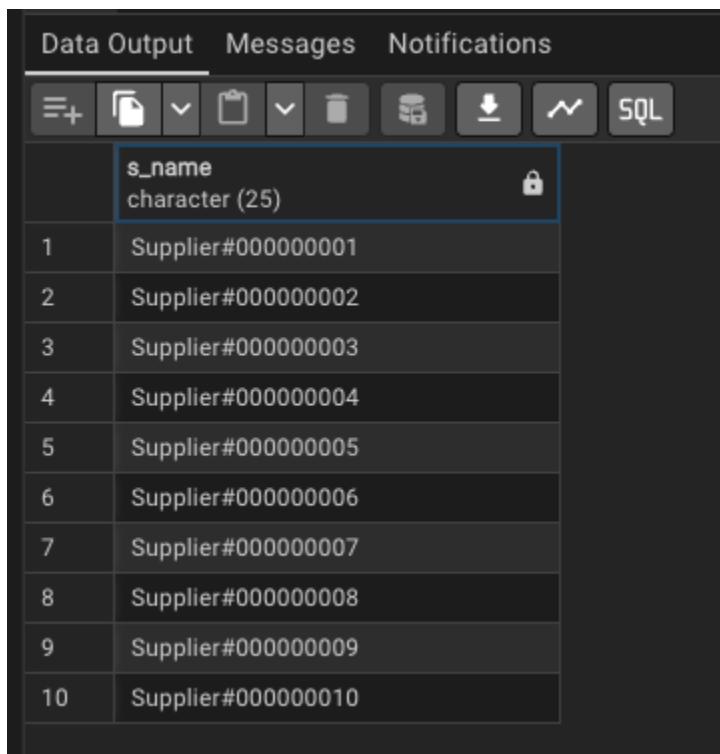
P11:

Relation Algebra:

SQL Query:

```
SELECT s.s_name
FROM supplier AS s
JOIN partsupp AS ps ON s.s_suppkey = ps.ps_suppkey
GROUP BY s.s_name
HAVING COUNT(DISTINCT ps.ps_partkey) >= 2
LIMIT 10;
```

Result:



The screenshot shows a software interface for managing database queries and results. At the top, there are tabs for "Data Output", "Messages", and "Notifications". Below the tabs is a toolbar with various icons for file operations like saving, opening, and deleting. The main area displays a table with 10 rows of data. The first column is labeled with numbers 1 through 10, and the second column is labeled "s_name" with a data type of "character (25)". A lock icon is present in the header row. The data rows show supplier identifiers starting from Supplier#000000001 up to Supplier#000000010.

	s_name
1	Supplier#000000001
2	Supplier#000000002
3	Supplier#000000003
4	Supplier#000000004
5	Supplier#000000005
6	Supplier#000000006
7	Supplier#000000007
8	Supplier#000000008
9	Supplier#000000009
10	Supplier#000000010

P12:

Relation Algebra:

SQL Query:

```
SELECT p.p_name
FROM part AS p
JOIN partsupp AS ps ON ps.ps_partkey = p.p_partkey
JOIN supplier AS s ON s.s_suppkey = ps.ps_suppkey
JOIN nation AS n ON n.n_nationkey = s.s_nationkey
GROUP BY p.p_name
HAVING COUNT(DISTINCT n.n_nationkey) >= 2
LIMIT 10;
```

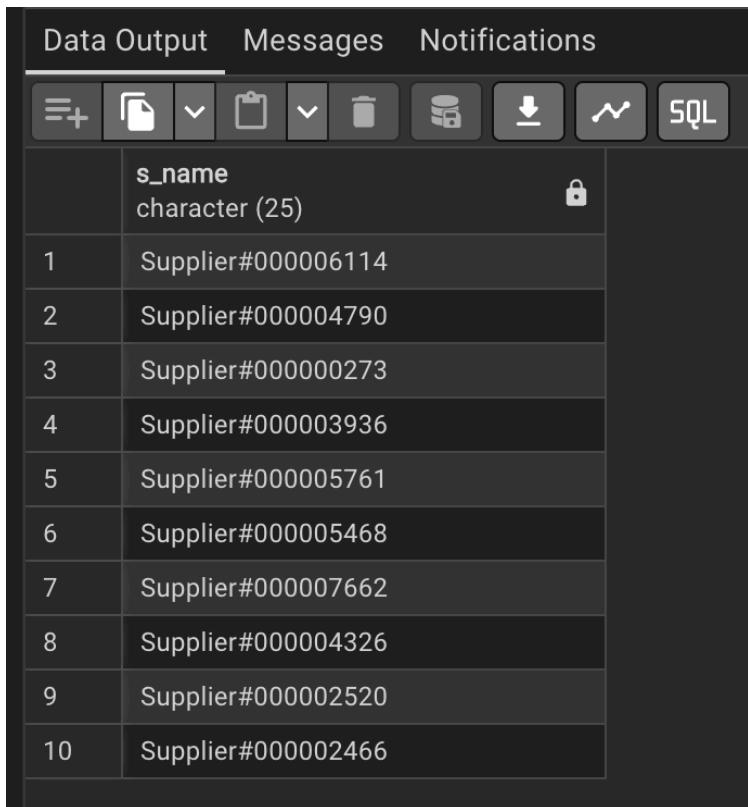
Result:

Data Output		Messages	Notifications
	p_name character varying (55)		
1	almond antique blue royal burnished		
2	almond antique cornsilk midnight medium		
3	almond antique cyan lawn pale		
4	almond antique dodger blanched burnished		
5	almond antique dodger royal pale		
6	almond antique khaki frosted deep		
7	almond antique lavender dark navajo		
8	almond antique lawn lime misty		
9	almond antique linen floral lace		
10	almond antique magenta deep blush		

P13:

```
SELECT s_name
FROM supplier
JOIN partsupp ON s_suppkey = ps_suppkey
GROUP BY s_suppkey, s_name
HAVING COUNT(ps_partkey) >= ALL (
    SELECT COUNT(ps_partkey)
    FROM partsupp
    GROUP BY ps_suppkey
)
LIMIT 10;
```

Result:



The screenshot shows a database interface with a toolbar at the top containing icons for Data Output, Messages, Notifications, and various file operations. Below the toolbar is a table with 10 rows of data. The table has two columns: a primary key column labeled with numbers 1 through 10, and a data column labeled 's_name' which contains supplier identifiers.

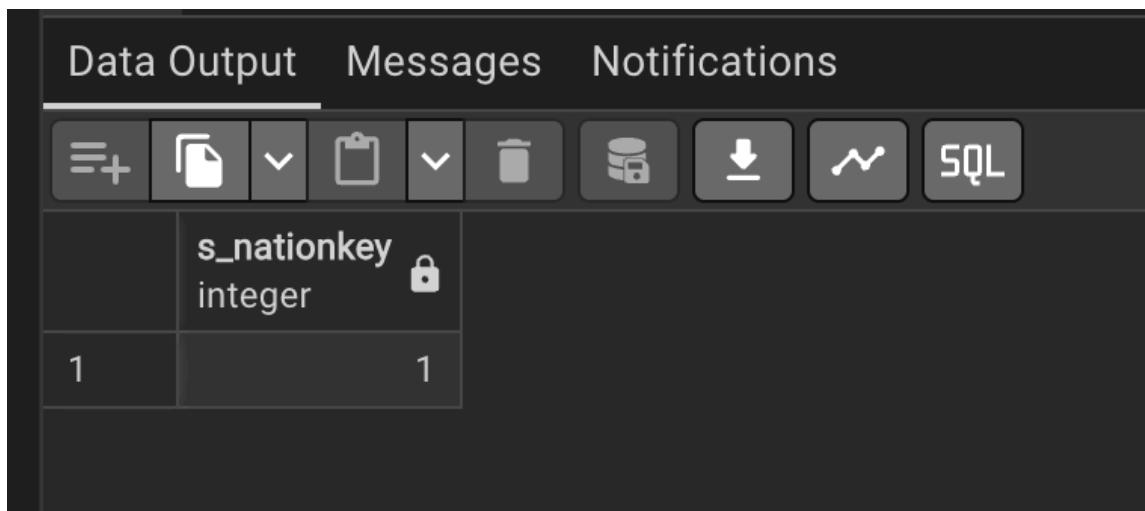
	s_name
1	Supplier#00006114
2	Supplier#00004790
3	Supplier#00000273
4	Supplier#00003936
5	Supplier#00005761
6	Supplier#00005468
7	Supplier#00007662
8	Supplier#00004326
9	Supplier#00002520
10	Supplier#00002466

P14:

SQL Query:

```
SELECT s.s_nationkey
FROM part AS p
JOIN partsupp AS ps ON p.p_partkey = ps.ps_partkey
JOIN supplier AS s ON ps.ps_suppkey = s.s_suppkey
WHERE p.p_name = 'blush thistle blue yellow saddle'
GROUP BY s.s_nationkey
ORDER BY SUM(ps.ps_availqty) DESC
LIMIT 1;
```

Result:



The screenshot shows a database interface with a dark theme. At the top, there are three tabs: "Data Output" (underlined), "Messages", and "Notifications". Below the tabs is a toolbar with several icons: a plus sign, a file, a dropdown, a clipboard, another dropdown, a trash can, a database icon, a download arrow, a chart, and an "SQL" button. The main area displays a single row of data in a table format. The table has two columns: the first column contains the value "1", and the second column contains the column name "s_nationkey" followed by the type "integer" and a lock icon. The entire row is highlighted with a light gray background.

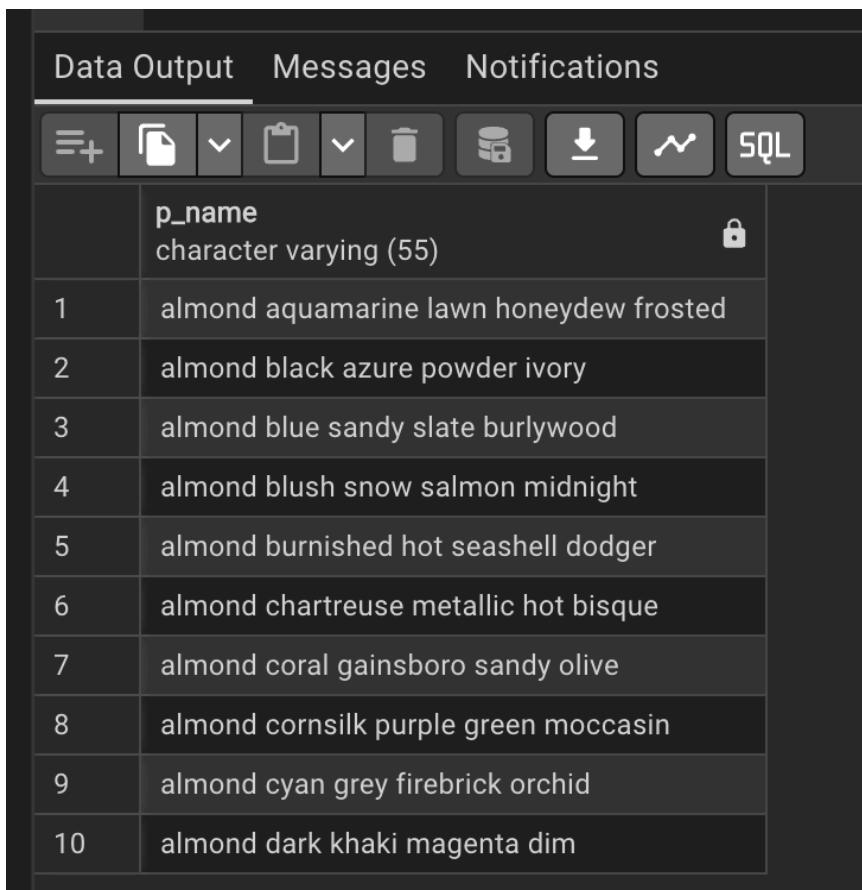
1	s_nationkey integer
1	

P15:

SQL Query:

```
SELECT p.p_name
FROM part AS p
JOIN partsupp AS ps ON p.p_partkey = ps.ps_partkey
JOIN supplier AS s ON ps.ps_suppkey = s.s_suppkey
WHERE s.s_nationkey IN (6, 12)
GROUP BY p.p_name
HAVING COUNT(DISTINCT s.s_nationkey) = 2
LIMIT 10;
```

Result:



The screenshot shows a database query results interface with a dark theme. At the top, there are three tabs: "Data Output" (which is selected), "Messages", and "Notifications". Below the tabs is a toolbar with various icons: a plus sign, a file icon, a dropdown arrow, a clipboard icon, another dropdown arrow, a trash bin, a database icon, a download arrow, a chart icon, and a "SQL" button. The main area displays a table with 10 rows of data. The first column contains numbers from 1 to 10, and the second column contains color names separated by spaces. The table has a header row with the column name "p_name" and its data type "character varying (55)". A lock icon is also present in the header row.

	p_name	lock
1	almond aquamarine lawn honeydew frosted	
2	almond black azure powder ivory	
3	almond blue sandy slate burlywood	
4	almond blush snow salmon midnight	
5	almond burnished hot seashell dodger	
6	almond chartreuse metallic hot bisque	
7	almond coral gainsboro sandy olive	
8	almond cornsilk purple green moccasin	
9	almond cyan grey firebrick orchid	
10	almond dark khaki magenta dim	