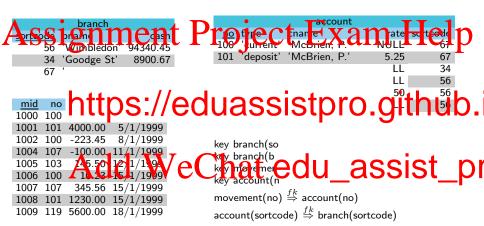
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Bank Branch Database



SQL WHERE expressions in more detail

Testing Strings against a Pattern

Assignment Project Exam Help Will return TRUE where pattern matches column. The escape_char may be used

before any of t ormal text.

- _ to m
- ** https://eduassistpro.github.
- TransactSQL Only: [ABC] to match a character

Add WeChat edu assist List customers whose first initial is P, and have one more ini

DISTINCT cname SELECT. **FROM** account cname LIKE '%, P. _ .' WHERE

SQL WHERE expressions in more detail

Testing Strings against a Pattern

Assignment Project Exam Help Will return TRUE where pattern matches column. The escape_char may be used

before any of t ormal text.

- _ to m
- ** https://eduassistpro.github.
- TransactSQL Only: [ABC] to match a character

Add WeChat edu_assist_List customers whose first initial is between A and L

DISTINCT cname SELECT **FROM** account cname LIKE '%, [A-L].%' WHERE

Processing the result of project

Modifications to data

Any processing of data to appear in a result set must be placed in the SELECT clause

ssignment Project Exam Help Abs(number) returns the absolute value of any number

- ROUND(value,dp) rounds a numeric value to dp decimal places
- Tend https://eduassistpro.github.
 - Postgres: LENGTH(object) returns the length of any object (including strings)
 - TrasnsactSQL: LEN(str) returns the length of an

Display accounts with just strame 1 at our counts as is the property of the pr

PostgresSQL

```
SELECT no.
```

ROUND(rate,1) AS rate_1dp,

SUBSTRING(cname FROM 1 FOR POSITION(',' IN cname)-1) AS surname

FROM account

Quiz 1: SQL extensions to RA select and project

			customer				
	cname	phone	address	joined	salary		
	'McBrien, P.'	'02077651234'	'123 Strand, London WC1A'	1999-01-03	30000		
	'Boyd, M.'	'02077656666'	'33 Aldwych, London'	1999-01-05	NULL		
	'Poulovassilis, A.'	'02089474321'	'13 Haydons Rd, London SW10'	1999-01-05	40000		
/	'Bathey Uni Cont	102069461111	'2. Orien Rd London 9W19	1999-01-07	45 00	1	
С	799151			лан		U	
	SELECT cna		J			I	
SUBSTRING(address, CHARINDEX(',',address)+2,LEN(address)) AS area							

FROM cust WHFRF pho

https://eduassistpro.github.

WeChat edu_assist_pr cname

London SW19 Bailey, J.

Poulovassilis, A. London SW19

London SW19

Poulovassilis, A. 13 Haydons Rd

D cname area

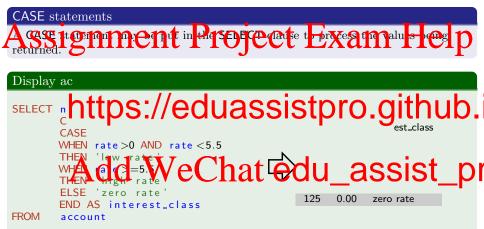
cname

area

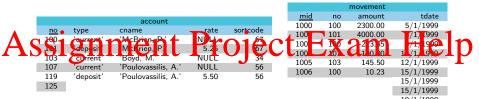
Poulovassilis. A. 13 Havdons Rd

Poulovassilis. A.

Processing the result of project: CASE statements



Need for yet another type of Join?



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Listing of m

SELECT Add WeChat Medu_assist_ pr mid 1004

account NATURAL JOIN **FROM** movement

Poulovassilis, A. Boyd, M. 1005 McBrien, P. 1006 Poulovassilis. A. 1007 McBrien. P. 1008

Poulovassilis. A.

1009

P.J. McBrien (Imperial College London)

Need for yet another type of Join?



https://eduassistpro.github.

Listing an

ы

Add WeChat edu_assist_p

SELECT

mid

FROM

account NATURAL LEFT JOIN movement



Poulovassilis, A.	1004
Boyd, M.	1005
McBrien, P.	1006
Poulovassilis, A.	1007
McBrien, P.	1008
Poulovassilis, A.	1009
Bailey, J.	NULL

Left and Right Joins

Left Join

A left join $R \stackrel{!}{\triangleright} S$ returns every row in R even if no rows in S match. In such cases where no in S in S match. In such cases values.

Right Join

A right jointtps://eduassistpro.github.where no row i R S NULL values.

Outer Join Add WeChat edu_assist_p

An outer join $R \overset{\circ}{\bowtie} S$ returns every row in R, even if no rows in S match, and also returns every row in S even if no row in R matches.

$$R \overset{\mathrm{o}}{\bowtie} S \equiv (R \overset{\mathrm{L}}{\bowtie} S) \cup (R \overset{\mathrm{R}}{\bowtie} S)$$

RA equivalent of LEFT JOIN

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 $\overset{\scriptscriptstyle{\pi_{A_1,\ldots,A}}}{Add}\overset{\scriptscriptstyle{\pi_{P_1,\ldots,A}}}{We}\overset{\scriptscriptstyle{(\pi_{P_1,\ldots,A}}}{Chat}\overset{\scriptscriptstyle{(R_1,\ldots,A)}}{edu}\underset{=}{assist}\underset{=}{\overset{\scriptscriptstyle{2)})}}{Dr}$

 \bullet $\omega(R_2)$ returns a row of NULLs with the same number of columns as R_2

Quiz 2: SQL LEFT JOIN ... ON (1)

ASSIGNMENT AND MOVEMENT AMOUNT OF THE PROPERTY OF THE PROPERTY

125

NULL

125

0.00

Quiz 3: SQL LEFT JOIN ... ON (2)

ASSISTINGENT Amount

ASSISTINGENT AMOUNT FOR THE MOVEMENT AMOUNT OF THE MOVEMENT OF THE MOVEMENT AMOUNT OF THE MOVEMENT OF THE MOVEMENT AMOUNT OF THE MOVEMENT O

What is that the street of the street when the street with the street when the



Worksheet: Left, Right and Outer Joins

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```
mid
     no amount
                  tdate
099
100
https://eduassistpro.github.
100
                        100 'current' 'McBrien, P.'
    103
        145.50 12/1/1999
                        101 'deposit'
         10.23 15/1/1999
1006 100
                        119 'deposit'
1008 101 1730.1
                        hat edu assist
1010 100
          null 20/1/1999
1011
1012 null
        600.00 20/1/1999
1013 null
        -46.00 20/1/1999
```

OLTP and OLAP

Assingments Brojecte Exams Help reads and writes to a few rows reads many rows

• 'stan

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SET cash=cash-10000.00 WHERE sortcode=56

FROM branch

CO

weChat edu_assist_pr

SET cash=cash+10000.00

WHERE sortcode=34

COMMIT TRANSACTION T1

SQL OLAP features: GROUP BY



Aggregat https://eduassistpro.github.

SUM Sum the values of all rows in the group
COUNT Count the number of non-NUL
AVG Average of the non-NULL valu
AVG Winningun value in the group
COUNT Count the number of non-NUL
AVG Average of the non-NULL value
AVG Average of the non-NULL value
COUNT COUNT COUNTY OF THE NUMBER OF

GROUP BY rules

- Only one row output per group
- ANSI SQL says must apply aggregate function to non grouped columns

SQL OLAP features: GROUP BY

mid no 1000 100 1001 101 1002 100 1004 10	2300.00 4000.00	tdate 5/1/1999 5/1/1999 8/1/1999 11 (2) 1999	: - Drawmownes C	mid 1000 1002 10 6	no 100	movement amount 2300.00 -223.45 10.23	tdate 5/1/1999 8/1/1999 5/1/1999 5/2/100
1006 100	10.23	15/1/1999		1004	107	-100.00	5/1/1/09
1007 107	345.56	15/1/1999	GROUP BY no	1007		345.56	15/1/1999
1008 101	1230.00	15/1/199					12/1/1999
1009 119	5600.00	18/1/199					18/1/1999

Example of the State of the Sta

FROM mount | AS balance , COUNT (a hould We Chat edu_assist_progroup by no Count (a hould be no Count (a hould be

GROUP BY rules

- Only one row output per group
- ANSI SQL says must apply aggregate function to non grouped columns

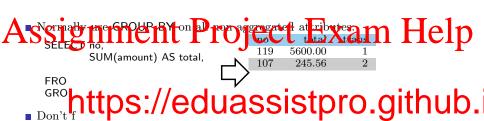
Quiz 4: GROUP BY in ANSI SQL



Which SQ https://eduassistpro.github.



SQL OLAP features: Aggregate operators



SELECT COUNT(DISTINCT no) AS active_acc

FROM Movement We Chat edu_assist_production of the control of the

SELECT COUNT(rate) AS no_rates FROM account



Quiz 5: GROUP BY over NULL values (1)

		n	novement	
	<u>mid</u>	no	amount	tdate
	0999	119	45.00	NULL
	1000	100	2300.00	5/1/1999
0	1001	101	4000 00	5/1/1919
	1002	2100	2 23 45	8/1/1999
_~	1006	2 00	10.23	15/1/1999
	1008	101	1230.00	15/1/1999
	1009			, ,

	account					
no type	cname	rate	sortcode			
100 'current'	'McBrien, P.'	NULL	67			
101 'deposité	'McBrien, P.	5.25	67	TT	- 1	1
10 1 deposit	Pu Ovassilis Bailay	A(' \ 5.50)	1776	Н	Δ	1
25 current	Bailey, U		6	\mathbf{L}		L
J						_

SELECT movement.no,

_trans , _value

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What is the result of the above energ? Add WeChat edu_assist_p

no	no_trans	min_value
119	2	45.00
101	2	1230.00
107	1	-100.00
100	3	-223.45
103	1	145.50

1010

no	no_trans	min_value
101	2	1230.00
100	4	-223.45
119	2	45.00
113		45.00

no	no_trans	min_value
101	2	1230.00
100	4	NULL
119	2	45.00

no	no_trans	min_value
101	2	1230.00
100	3	-223.45
119	2	45.00

Quiz 6: GROUP BY over NULL values (2)



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Add WeChat edu_assist balance balance balance balance no no no no NULL NULL NULL 600.00 NULL 554.00 5645.00 119 NULL 600 00 NULL -46.00119 5645.00 101 5230.00 NULL -46.00119 5645 00 101 5230.00 100 2086.78 119 5645.00 101 5230.00 100 2086.78 101 5230.00 100 2086.78 100 2086.78

GROUP BY in the RA

- An extension to the RA includes a group by operator
- In SQL, the GROUP BY operator is applied outside the $\sigma_P(\ldots\times\ldots)$ Test entire that the GROUP BY operator is applied outside the $\sigma_P(\ldots\times\ldots)$ The HAVING clause

https://eduassistpro.grthub.

Ordering of SQL clauses

Ordering of SQL clauses

Ordering of SQL clauses

- HAVING is executed after GROUP BY, but before SELECT
- Can be used to avoid divide by zero errors

SELECT no,

MAX(amount)/MIN(amount) AS variance_ratio

FROM movement

GROUP BY movement.no

HAVING MIN(amount)

SOL: A Language for Database Applications

Quiz 7: HAVING

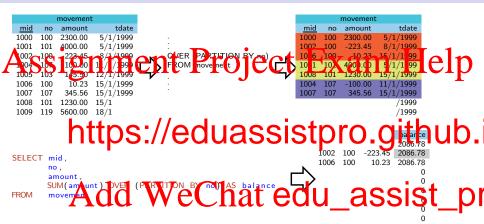


100 'curr'
101 'deposit' 'McBrien, P.' 5.25 67
103 'current' 'Boyd, M.' NULL 34
107 'current' 'Poulovassilis, A.' NULL 56
119 'deposit' 'Poulovassilis, A.' NULL 56
125 'currept' 'Brill VU WULL 66
125 'currept' 'Brill VU WULL 66

What is the result of the above query

A	В	\bigcirc C	D
no cname balance 101 McBrien, P. 5230,00	no cname balance 101 McBrien, P. 5230.00	no cname balance 100 McBrien, P. 2086,78	no cname balance 100 McBrien, P. 2086,78
	119 Poulovassilis, A. 5600.00	101 McBrien, P. 5230.00	101 McBrien, P. 5230.00 119 Poulovassilis, A. 5600.00

SQL OLAP features: PARTITION



PARTITION BY

- One row output per input row
- Aggregates apply to partition

Relationally Complete SQL

Relational Completeness

■ Relational completeness in SQL means being able to fully support the RA in

SQL_{\bullet} ssignment Project Exam Help

Aggregates require 'relationally complete' SQL

SELECT SUN https://eduassistpro.github. **FROM** movement

SELECT

Symmothet. Wite Chat edu_assist_pr

#total_balance.total,1) AS pc **FROM** movement.

#total_balance

GROUP BY movement.no, #total_balance.total

ORDER BY movement.no

Relationally Complete SQL

Relational Completeness

■ Relational completeness in SQL means being able to fully support the RA in

SQLssignment Project Exam Help

Aggregates require 'relationally complete' SQL

https://eduassistpro.github.

ROUND(100*SUM(movement.amount)/total_balance.total,1) AS pc

FROM

movement.

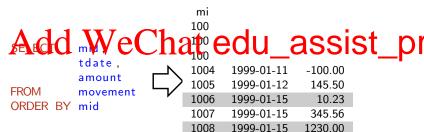
GROUP BY MALMER CO. to We Ce hat edu_assist_property order by revenue of the control of the cont

SQL OLAP features: Ordering Rows

	mia	no	amount	taate	
	1000	100	2300.00	5/1/1999	
Assignme	1001	.00	4000.00 -221.5	C ^{5/1/} ⁹⁹ 9X 21	n Heln
	1004	107	-100.00	11/1/1999	P
	1005	103	145 50	12/1/1999	

movement

https://eduassistpro.github.



1009

1999-01-18

5600.00

SQL OLAP features: Ranking Rows

Assignment Project tdate. 1000 1999-01-05 2300.00 https://eduassistpro.github.i

- RANK function provides normal concept of ranking
- ncti Wie (t sk prante e d u _assist_nti@l
- Only in Postgres since verison 9.0

Quiz 8: Execution of SQL clauses

SELECT FROM WHERE I gnment Project Exam Help ORDER BY

What ord https://eduassistpro.github.



SELECT

Assignament us for the attention of the control of

https://eduassistpro.github. **FROM** account JOIN branch Goodge St ON account.sortcode= dd WeChat edu_assist_pr account.type ORDER BY branch.sortcode,

branch bname

SQL OLAP: Pivot using CASE statements

SELECT branch sortcode, t-Project Exam Help COUNT (CASE WHEN type NOT IN ("current', 'deposit') THEN no ELSE NULL END) AS other **FROM** GROUP BY https://eduassistpro.github. **Ch**at edu_assist_pr sortcode Goodge St Wimbledon one case for each value Strand

wise to have a default case

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Pivot

```
rate sortcode
                     no type
                             cname
               tdate
    no amount
1000 1
1001 1
https://eduassistpro.github.
1005 1
                     125 'current' 'Ba
                                                56
       10.23 15/1/1999
1006 100
       345.56 15/1/1999
      1300 1500 Chatedu_assist_pr
```

3 Write an SQL query returning the scheme

(cname current balance deposit balance) that lists of e row for each customer accounts held by the customer, and a column for the net balance of all deposit accounts

4 Writ (no,c https://eduassistpro.github.

pc_cust_funds the percentage of the customer funds held in the account, and in pc_type_funds the percentage of the total funds in this p ccount.

For the Aurrent ata this should result into the Aurrent ata the Aurrent ata this should result into the Aurrent ata th

101	McBrien, P.	deposit	71.48	48.29
103	Boyd, M.	current	100.00	5.87
107	Poulovassilis, A.	current	4.20	9.91
119	Poulovassilis, A.	deposit	95.80	51.71
125	Bailey, J.	current	NULL	0.00

Worksheet: OLAP Queries in SQL (3)

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https://eduassistpro.github. ELSE null END), 0.0) AS deposit_balance

```
account LEFT JOIN movement ON
FROM
```

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```
SELECT DISTINCT account no.
      accou
      ассои
     AS DE THE SUM MOVEMENT. ABOUT OVER (PARTITION BY account type), 2
      AS pc_type_funds
```

FROM

movement ON account no=mov

Add WeChat edu_assist_pr

SQL OLAP: Un-pivot using UNION statements

Un-pivot the account table to triple format Kam Help Assignment Project 100 type current **FROM** account 101 cname McBrien, P. UNION SELECT https://eduassistpro.github. **FROM** UNION current SELECT CASTA ate AST VALOW eChate edu_assist_pr **FROM** WHERE UNION 119 56 sortcode SELECT no. 119 deposit type 'sortcode', 125 Bailey, J. cname CAST(sortcode AS VARCHAR) 125 sortcode 56 **FROM** account 125 type current

SQL Functions

FUNCTION

- Most SQL implementations support some variant of ANSI SQL FUNCTION
- 4 SS1 9 ment Project Exam Help
 Transact SQL function to return chames reformatted

SELECT @ifcname=
SUBSTRING(@cname, CHARINDEX(',',
SUBSTRING(@cname, 1, CHARINDEX(',',

RETURN AND WeChat edu_assist_present

SELECT no,
dbo.cname_to_initial_first(
account.cname) AS cname
FROM account

\Rightarrow	no	cname
	100	P.McBrien
	101	P.McBrien
	103	M.Boyd
	107	A.Poulovassilis
	119	A.Poulovassilis
	125	.J.Bailev

SQL Procedures

PROCEDURE

- No specific PROCEDURE construct in Postgres
- Assignment Project Exam Help

Transact

END

```
CREATE PHATTEPS://eduassistpro.github.

@fromhttps://eduassistpro.github.
@to_b
@to_b
@total DECIMAL(10,2)
) AS

BEGIN

UPDATE Add WeChat edu_assist_processing the process of the process
```

WHERE sortcode=@to_branch

SQL Constraints

```
\forall No, Rate.account(No, \_, \_, Rate, \_) \rightarrow Rate > 0.00
```

ALTER TABLE account Rssignment Project Exam Help

IF account CREATE FUNNTRIES ://eduassistpro.github. **BEGIN** IF EXISTS (SELECT *

And we Chat edu_assist_pr

RFTURN 1

RETURN 0 END:

ALTER TABLE account ADD CONSTRAINT check_current_account

CHECK (type <> 'current' OR dbo.is_in_current_account(no,cname,sortcode)=1);