A SSI design contract by not the one age of a more powerful queries. In the previous lecture, we have studied a collection of constructs for statistical analysis. This lecture will introduce another collection for enhancing the functionality of WHERE and HAVIINTEDS://powcoder.com

We will first discuss WHERE and then HAVING.

Add WeChat powcoder

Assignment Project ExampHelp where A is an attribute/value, op is an arithmetic operator (e.g., <), and v is another attribute/value.

Next, https://panwcoder.com

- v is an SQL statement
- or all order what configures avalue to the result of der

Assignment Project Exam Help

where each A_i is an attribute/value. $(A_1, ..., A_n)$ must obey the schema of the table To eturn ed by the SQL statement to the last the square of the square

The expression returns:

- true, if tuple (A. ..., An) appears in T.
 fals, dre wise VeChat powcoder

The bracket of " $(A_1, ..., A_n)$ " can be omitted if n = 1.

| dent | rank | sal

p
Γ

select of for Sof / powcoder.com where dept in (select dept from PROF where sal >= 10000)

name

Try: Add WeChat powcoder

| dept | rank | sal

-	<i>p</i> 1	Adam	CS	asst	6000	='	
A = = : = : = :	p2	B pb	EE	asso	6000	0.400	TT-1-
Assignme	рβ	Ca vin		ful	.0000	am	Help
10018	p4	Dorothy	EE	asst	5000		TTUP
	<i>p</i> 5	Emily	EE	asso	8500		
	<i>p</i> 6	Frank	CS	full	9000	-	

select of the soft of the select dept from PROF where sal >=10000

name

nid |

Try: Add WeChat powcoder select pid from PROF

where dept in (CS)

PROF **dept**

rank

	p1	Adam	CS	asst	6000		
A ==: =================================	p2	Dob	EE	asso	6000		TT-1
Assignme	р 3	Ca vin		full	.0000	am	Help
10018	p4	Dorothy	E	asst	5000		TTUP
	<i>p</i> 5	Emily	EE	asso	8500		
	<i>p</i> 6	Frank	CS	full	9000		

 $\begin{array}{c} \text{select} \ \text{pdfon Bof} / powcoder.com \\ \text{where dept in (select dept from PROF where sal} >= 10000) \end{array}$

name

Add WeChat powcoder

p1 p3

bid |

name

| dent | rank | sal

	P							
	p1	Adam	CS	asst	6000			
A = = = = = = = = = = = = = = = = = = =	p2	₽ Bob	EE	asso	8000	0.400	TT-1-	
Assignme	рβ	Ca vin	CFE	fül	.0000	am	Help	
	p4	Dorothy	E	asst	5000		P	
	<i>p</i> 5	Emily	EE	asso	8500			
	<i>p</i> 6	Frank	CS	full	9000			

select of for power of power o

Try: Add WeChat powcoder

dept rank sal

				-			
	p1	Adam	CS	asst	6000		
A = = = = = = = = = = = = = = = = = = =	p2	₽ Bob	EE	asso	8000	0.400	TT-1-
Assignme	рβ	Ca vin	CFE	fül	.000	am	Help
	p4	Dorothy	E	asst	5000		P
	<i>p</i> 5	Emily	EE	asso	8500		
	<i>p</i> 6	Frank	CS	full	9000		

select hat to be of /powcoder.com where (dept, rank) in (select dept, rank from PROF where sal >= 10000)

Add WeChat powcoder

select pid from PROF where (dept, rank) in (CS, full)

bid |

name

	pid	name	dept	rank	sal		
	p1	Adam	CS	asst	6000	-	
Assignm	P ²	≠ Boby	CF C	2554	3000	am	Haln
W221ZIIIII	C_{β}	C <u>a</u> lvin	CIC	ful	0000	alli	TICID
\mathcal{L}	p4	Dorothy	EÉ	asst	5000	='	1
		Fmily	FF	asso	8500	•	

select path PROF / POWCOder.com

where (dept, rank) in (select dept, rank from PROF where sal >= 10000)

Result: Add WeChat powcoder

10 + 4A + 4E + 4E + 990

A	pid	name	dept	rank	Tsal		TT.1
Assignn	nem	Ac <mark>am</mark>	Offe	ass	5000X	am	Help
13318	<i>p</i> 2	Bob	E	asso	8000		
	<i>p</i> 3	Calvin	CS	full	10000		
	<i>p</i> 4	Dorothy	EE	asst	5000		
1 44	p5 /	Emily	EE	assp	8500		
http	S p6	ank	V(3)) (a E	9000	om	
1100			•				

select pid from PROF

where (dept, sal) in (select dept, rank from PROF where sal >= 10000)

Add WeChat powcoder

Error! (dept, sal) does not match the schema of the table returned by

the nested SQL statement.

Membership Test

Assignment, Project Exam Help

where each A_i is an attribute/value. $(A_1, ..., A_n)$ must obey the schema of the table Treturned by the SQL statement to the hold by the SQL statement to the square of the hold by the hold by the square of the hold by the hold by the hold by the hold by the square of the ho

The expression returns:

- true, if tuple (A. ..., An) does not appear in T.
 false discovered by the true of the tuple (A. ..., An) does not appear in T.

The bracket of " $(A_1, ..., A_n)$ " can be omitted if n = 1.

PROF **dept**

rank

	p_{\perp}	Adam	C3	assi	0000		
•	p2	Bob	EĘ	asso	8000		TT 1
Assignmo		Cayline	Offe	fulf	_ Ω ρ007	am	Heln
	∠ p 4 1	Dolothy 1	LEFT	SS	5000	alli	TICIP
	<i>p</i> 5	Emily	EE	asso	8500		_
	p6	Frank	CS	full	9000		

select pdffop ROF/powcoder.com where (dept, rank) not in (select dept, rank from PROF where sal >= 10000)

name

ResultAdd WeChat powcoder

PROF dept

rank

sal

	ρ_{\perp}	Auaiii	C3	asst	0000			
	p2	Bob	EĘ	asso	8000			
Assignmo		Ca vihr	OG C	full-	±00007	am	Heln	
assignin	-p4	Dooth	LEFT	SS	5000	am	TICIP	
	<i>p</i> 5	Emily	EE	asso	8500	-	•	
	p6	Frank	CS	full	9000	•		

select pdffop ROF/powcoder.com where (dept, rank) not in (select dept, rank from PROF where sal >= 10000)

name

Result Add We Chat powcoder

select pid from PROF where (dept, rank) not in (CS, full)

pid

	p1	Adam	CS	asst	6000		
	p2	Bob	EE	asso	8000		
Aggianma	рЗ	Calvin	C\$	full	10000	0.100	II 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
IASS19111116	4	Do oth	O16	ass:	5000X	am	Help
	<i>p</i> 5	Emily	EĖ	asso	8500		P
	<i>p</i> 6	Frank	CS	full	9000		

dept rank sal

where (lept, lenk) anot in DOWCO der. COM (select dept, rank from PROF where sal >= 10000)

pid

name

Result: Add We Chat powcoder

pid p1 p2 p4 p5

Assing ment Project Exam Help A > some ([an SQL statement])

where A is an attribute value, and must obey the schema of the table T returned by the SQL/syalenest WCOGET. COM

The expression returns:

- trae, it is grave the collection policy coder false, otherwise.

dent rank

400 II a 140
m Help
P

select of for property power of power sal > some (select sal from PROF where dept = 'CS')

name

bid |

Result: Add WeChat powcoder

dept rank sal

	P							
	p1	Adam	CS	asst	6000			
A = = = = = = = = = = = = = = = = = = =	p2	₽ Bob	EE	asso	8000	0.400	TT-1-	
Assignme	рβ	Ca vin	CFE	fül	.0000	am	Help	
	p4	Dorothy	E	asst	5000		P	
	<i>p</i> 5	Emily	EE	asso	8500			
	<i>p</i> 6	Frank	CS	full	9000			

select hdftop sor powcoder.com where sal > some (select sal from PROF where dept = 'CS')

name

Result: Add WeChat powcoder

select pid from PROF where sal > some (6000, 10000, 9000)

bid |

PROF dept

rank

sal

6000

	ρ_{\perp}	Auaiii		asst	0000			
•	p2	Bob	EĘ	asso	8000			
Assignme	<u> </u>	Ca whre	CF C	full	0000	am	Heli	n
assignin	7p4	Dorothy	OF C	asst.	5000	am	1101	P
	<i>p</i> 5	Emily	ĒĒ	asso	8500		-	L
		Frank	CS	full	9000			

select pdftopR0F/powcoder.com where sal > tome (select sal from PROF where dept = CS)

name

pid

Result:

Add WeChat powcoder

p2 p3 p5 p6

Assignment Project Exam Help A > all ([an SQL statement])

where A is an attribute value, and must obey the schema of the table T returned by the SQL/syalenest WCOGET. COM

The expression returns:

- trae, it is grave the Controlled in powcoder of lase, otherwise.

dept rank sal

•				1		
<i>p</i> 1	Adam	CS	asst	6000		
p2	₽ Bob	EE	asso	8000	0.400	TT-1-
рβ	Ca vin	CFE	fül	.0000	am	Hein
р4	Dorothy	EE	asst	5000		P
<i>p</i> 5	Emily	EE	asso	8500		
<i>p</i> 6	Frank	CS	full	9000		
	p2 p8 p4 p5	p2 Epi p3 Cavin p4 Dorothy p5 Emily	p2 ED EE Ca Vin P4 Dorothy EE P5 Emily EE	p2 Epb EE asso Ca vin Ci Civil p4 Dorothy EE asst p5 Emily EE asso	p2	p2

select pdf to prof / powcoder.com where sal > all (select sal from PROF where dept = 'EE')

name

bid |

Try: Add WeChat powcoder

dept rank sal

•				1		
<i>p</i> 1	Adam	CS	asst	6000		
p2	₽ Bob	EE	asso	8000	0.400	TT-1-
	Ca vin	CFE	fül	.0000	am	Hein
p4	Dorothy	EE	asst	5000		P
<i>p</i> 5	Emily	EE	asso	8500		
<i>p</i> 6	Frank	CS	full	9000		
	p2 pB p4 p5	p2 Epi pB Cavin p4 Dorothy p5 Emily	p2 ED EE Ca Vin Dip4 Dorothy EE P5 Emily EE	p2 Epb EE asso Ca vin Ci Civil p4 Dorothy EE asst p5 Emily EE asso	p2	p2

select hat top sor powcoder.com where sal > all (select sal from PROF where dept = 'EE')

name

Try: Add WeChat powcoder

select pid from PROF where sal > all (8000, 5000, 8500)

nid |

pid name dept rank sal Adam CS 6000 asst am Help Assignmer Dorothy 5000 asst EE Emily p5 8500 asso

CS

full

9000

PROF

select but to proper years and sold (select sold from PROE where dept = 'FE')

where sal > all (select sal from PROF where dept = 'EE')

Frank

p6

Result: Add WeChat powcoder

Assignment Project Exam, Help and >=.

The senantics reach case grees with the the imening in English. For example, "< some" means "smaller than some element (in a table)".

Add WeChat powcoder

Assignment Project Exam Help Next, we will learn two more useful conditions of the form:

https://powcoder.com

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Emptiness Test

Exists

Assignments Project Exam Help

The expression returns:

- true, if the SQL statement returns a table with at least one tuple.
- . https://powcoder.com

not exists ([an SQL statement])

The expedidetuWeChat powcoder

- true, if the SQL statement returns an empty table.
- false, otherwise.

PROF	
dept	

rank

sal 6000

pid

name

Adam

•	p2	Bob	ΕĘ	asso	8000		TT 1
Assignme	2 #3	Calvin	CFF C	fulf	9 000	am	Help
rooisiiii	p41	Dorothy		asst	5006	alli	Ticip
_	<i>p</i> 5	Emily	ĒΕ	asso	8500		_
•	_			C 11	0000		

select https://spowcoder.com (select sal from PROF Observe how P is used in the where sal > P.sal) WeChat powcoder

Result:

pid р3

select pid from PROF as P_	pid	name	dept	rank	sal	
Aggigniment Pi	$\bigcap_{n=1}^{\infty}$	Adara Bob	CS EEX	A sst	60 0 80 0	eln
(select a from PROF	p3	Calvin	CS	full	10000	P
where sal $> P.sal$)	p4	Dorothy	EE	asst	5000	
,	<i>p</i> 5	Emily	EE	asso	8500	'
https://por	<u>p6</u>	Fraik	CS	full	9000	

https://powcoder.com

Transient:

select pickfrom PROF where not exist. We Chat powcoder (select sal from PROF where sal > 6000)

select_pid from PROF as P	pid	name	dept	rank	sal	
Aussergrament Project Select Strom PROF	$\binom{p_1}{p_2}$	Adara Bol	CSX FFX	J ^{sst}	60 <u>0</u> 80 0	elp
(select 🖨 from PROF	p3	Calvin	CS	full	10000	P
where sal $> P.sal$)	p4	Dorothy	EE	asst	5000	
	p5	Emily	EE	asso	8500	
https://pox	p 6	Frank	CS	full	9000	

https://powcoder.com

Transient:

select pickfrom PROF where not exist. We Chat powcoder (select sal from PROF where sal > 8000)

select pid from PROF as P_	pid	name	dept	rank	sal	
Aussignate Professional Average Profession Professional Profession Professional Pro		Adam Rot	CSX FEX	Ast T	60 00 80 00	eln
(select 🖼 from PROF	p3	Calvin	CS	full	10000	P
where sal $> P.sal$)	p4	Dorothy	EE	asst	5000	-
,	<i>p</i> 5	Emily	EE	asso	8500	•
https://pov	V ^{p6} C	ode	r.c	On	9000	-

Transient:

select pickfrom PROF where not exist. We Chat power for select sal from PROF where sal > 10000)

Aselectipid from PROE 12 Pr	pid	name	dept	rank	sal	oln
	$\sqrt{1}$	Ada n	C8	asst	60 00	CID
	p2	Bob	EE	asso	8000	· I
(select sal from PROF	p3	Calvin	CS	full	10000	•
where sal $> P.sal$)	p4	Dorothy	EE	asst	5000	
latter as //en ar	<i>p</i> 5	Emily	EE (asso	8500	
https://pov	V#6	Oue.	CC	OIL	9000	•

What is his diedy Wheter that power der

Assignment Project Exam Help

Next we extend the above discussion to HAVING.

https://powcoder.com

Add WeChat powcoder

Assignment Projects Exam Help from $T_1, ..., T_n$ where P

https://powcoder.com

where

- A.... Gadre Wee Chat powcoder

Having

The group predicate can contain conditions of the form:

Assignment Project Exam Help

- agg is an aggregate function
- https://powcoder.com
 - ${ullet}$ < some/all
 - < <= some/all</pre>

Add We Chat powcoder

- > some/all
- >= some/all
- The nested SQL statement must return a table of a single numeric column.



PROF **dept**

rank

sal

	ρ_{\perp}	Auam	C3	asst	0000		
	p2	Bob	EĘ	asso	8000		
Assignm		Ca y h	Ofe	full	<u> Φ</u>	am	Help
Assignin	-p4	Doloth	LEFT	SS	5000	am	TICIP
	<i>p</i> 5	Emily	EÉ	asso	8500		•
	p6	Frank	CS	full	9000		

select https://powcoder.com

 $\mathsf{having}\ \mathsf{avg}(\mathsf{sal}) >= \mathsf{some}\ (\mathsf{select}\ \mathsf{avg}(\mathsf{sal})\ \mathsf{from}\ \mathsf{PROF})$

name

TransiAdd WeChat powcoder

PROF **dept**

rank

sal

	ρ_{\perp}	Auaiii	03	assi	0000		
	p2	Bob	EĘ	asso	8000		
Assignmo		Ca y hr	CF C	full	<u> Φ</u>	am	Help
Assignin	-p4	Dolothy	LEFT	SS	5000	am	TICIP
	<i>p</i> 5	Emily	EÉ	asso	8500		•
	p6	Frank	CS	full	9000		

select https://powcoder.com

 $\mathsf{having}\ \mathsf{avg}(\mathsf{sal}) >= \mathsf{some}\ (\mathsf{select}\ \mathsf{avg}(\mathsf{sal})\ \mathsf{from}\ \mathsf{PROF})$

name

pid

Transied: dd PROF eChat powcoder

group by dept having avg(sal) >= some (7750)

pid	name	dept	rank	sal
p1	Adam	CS	asst	6000
p2	Bob	EE	asso	8000
р3	Calvin	CS	full	10000
1	D	Г		

Assignment Enly Officest 1850X am Help

select dept from PROF

having the property having

Result:

Add WeChat powcoder

pid	name	dept	rank	sal
p1	Adam	CS	asst	6000
p2	Bob	EE	asso	8000
р3	Calvin	CS	full	10000

Assignment Emy Of Cast 1850 am Help

select dept from PROF

group by dept having the position prowed at the property of th

Result:



	pid	name	dept	rank	sal			
	<i>p</i> 1	Adam	CS	asst	6000			
Assignme	p^2	+ EoD r	OF C	assq_	3000	am	Help	1
LIBOIZIIII		Calvin			0000	ann		,
$\boldsymbol{\mathcal{C}}$	p4	Dorothy	EÉ	asst	5000		1	
	<i>p</i> 5	Emily	EE	asso	8500			
	<i>p</i> 6	Frank	CS	full	9000			

select heters row powcoder.com

group by dept

 $\mathsf{having}\ \mathsf{avg}(\mathsf{sal}) >= \mathsf{some}\ (\mathsf{select}\ \mathsf{avg}(\mathsf{sal})\ \mathsf{from}\ \mathsf{PROF})$

Result Add We Chat powcoder

dept

	pia	name	aept	rank	sai		
•	p1	Adam	CŞ	asst	6000		TT 1
Assignm(<u>apr</u>	Epb 1º	OFF C	a95	80 007	am	Help
rosigiiii	-p3	Calvin	C ₅	full	10000	am	Help
_	p4	Dorothy	EE	asst	5000		_
	<i>p</i> 5	Emily	EE	asso	8500		
4	p6,	, Frank	CS	full	9000		

select dept in the Rox powcoder.com

group by dept

having avg(sal) >= some (select sal from PROF)

Try: Add WeChat powcoder

	pia	name	uepi	rank	Sai			
•	p1	Adam	CŞ	asst	6000		TT 1	
Assignme	<u> </u>	T Bull	OFFE	a35	80 000	am	Help	
rissignin	p	Calvin	C ₅	Yull	10000	ulli	Ticip	
_	p4	Dorothy	EE	asst	5000		_	
	<i>p</i> 5	Emily	EE	asso	8500			
•	p6,	, Frank	CS	full	9000			

https://powcoder.com

group by dept

having avg(sal) >= some (select sal from PROF)

Try: Add WeChat powcoder

select dept from PROF group by dept

having avg(sal) >= some (6000, 8000, 10000, 5000, 8500, 9000)

pid	name	dept	rank	sal
p1	Adam	CS	asst	6000
p2	Bob	EE	asso	8000
<i>p</i> 3	Calvin	CŞ	full	10000

Assignment Do Profession Land Help

Add WeChat powcoder

pid	name	dept	rank	sal
p1	Adam	CS	asst	6000
p2	Bob	EE	asso	8000
<i>p</i> 3	Calvin	CŞ	full	10000

Assignment Politic Profile ast 1890 am Help

select dept from PROF group by Hipp S: // powcoder com having avg(sal) >= some (6000, 8000, 10000, 5000, 8500, 9000)

۱r	ansie	nt: 🚤 🚤	**	_	44		4
	pid	Add	dept	e	\ha	tavao	wcoder
-	p1	Adam	CS	asst	6000	8333.33	>= some(6000, 8000
	p3	Calvin	CS	full	10000		10000, 5000
	<i>p</i> 6	Frank	CS	full	9000		8500, 9000) ?
	p2	Bob	EE	asso	8000	7166.67	>= some(6000, 8000
	p4	Dorothy	EE	asst	5000		10000, 5000
	<i>p</i> 5	Emily	EE	asso	8000		8500, 9000) ?

PROF	
dept	ı

	p1	Adam	CS	asst	6000			
•	p2	Boh	E€	asso	200 00		TT 1	
Assignme	д 3	Ca vin	OFF	fuji	0000	am	Help)
1991811111	p4	Dorothy	E	asst	5000	alli		
	<i>p</i> 5	Emily	EE	asso	8500			
	<i>p</i> 6	Frank	CS	full	9000			

select https://powcoder.com

name

having avg(sal) >= some (select sal from PROF)

ResultAdd WeChat powcoder

cs