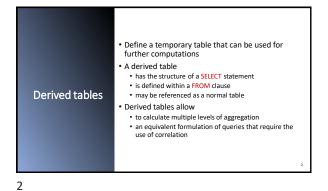


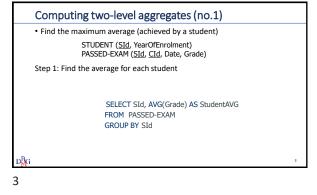
SQL language: advanced queries

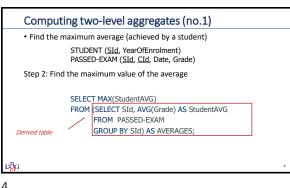
➢ Derived tables ≻CTE

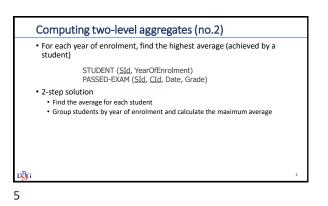
- ➤Spatial queries
- ➢JSON queries

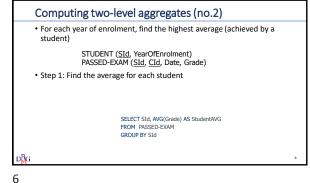
DBG

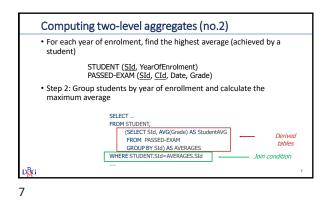




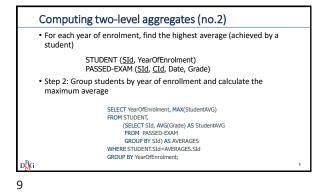


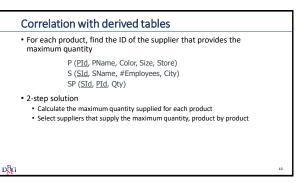


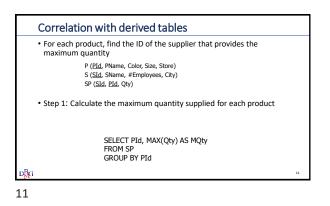


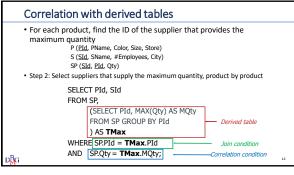


 For each student) 	year of enrolment, find the highest average (achieved by a	
	STUDENT (<u>SId</u> , YearOfEnrolment) PASSED-EXAM (<u>SId</u> , <u>CId</u> , Date, Grade)	
•	roup students by year of enrollment and calculate the n average	
	SELECT FROM STUDENT, (SELECT SId, AVG(Grade) AS StudentAVG FROM PASSED-EXAM GROUP BY SId) AS AVERAGES WHERE STUDENT.SId=AVERAGES.SId GROUP BY YearOfEnrolment;	

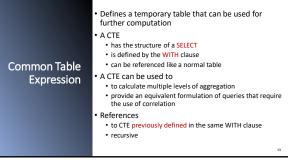


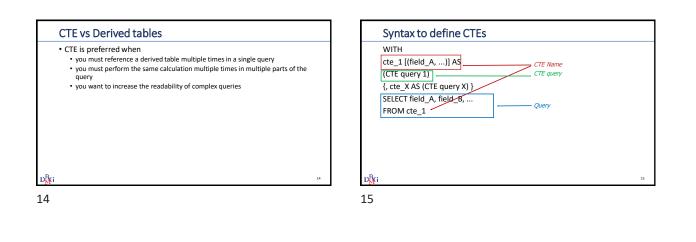


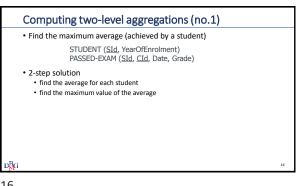


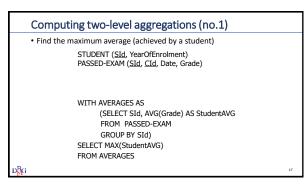














Calculating aggregations with different granularities

• Find all airlines where the average salary of all pilots of that airline is higher than the average of the salaries of all pilots in the database

PILOTS (PID, Name, Surname, Airline, Salary)

- 3-step solution:
 - find the average salary for each airlinefind the average salary considering all pilots
 - find airlines with an average salary higher than the global average salary
- DBG

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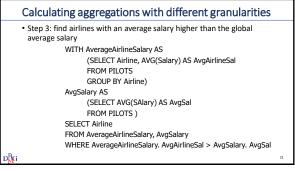
Calculating aggregations with different granularities • Step 1: find the average salary for each airline WITH AverageAirlineSalary AS (SELECT Airline, AVG(Salary) AS AvgAirlineSal FROM PILOTS GROUP BY Airline)

₽<mark>₿</mark>G

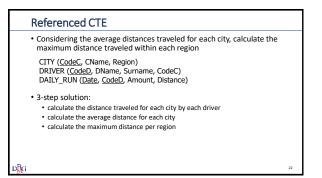
18

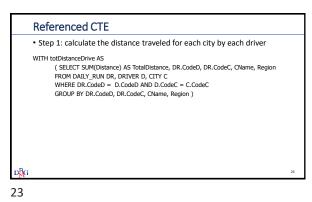
Calculating aggregations with different granularities • Step 2: find the average salary considering all pilots WITH AverageAirlineSalary AS (SELECT Airline, AVG(Salary) AS AvgAirlineSal FROM PILOTS GROUP BY Airline), AvgSalary AS (SELECT AVG(Salary) AS AvgSal FROM PILOTS)

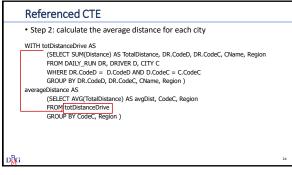
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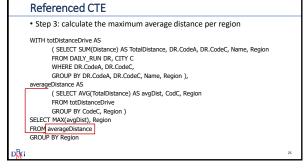








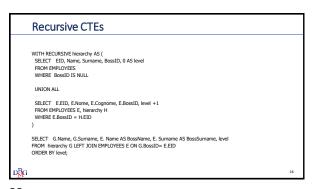


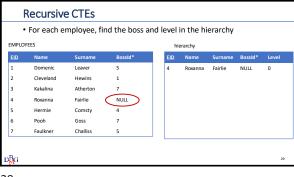


WITH RECURSIVE		
cte_1 AS	Name of CTE	
(CTE query 1	Initial query	
UNION ALL		
CTE query 2	Recursive query	
)		
SELECT *		
FROM cte_1		
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Recursive CTEs • For each employee, find the boss and level in the hierarchy EMPLOYEES (EID, Name, Surname, BossID*) EID Name Surname BossId*

EID	Name	Surname	Bossid*
1	Domenic	Leaver	5
2	Cleveland	Hewins	1
3	Kakalina	Atherton	7
4	Roxanna	Fairlie	NULL
5	Hermie	Comsty	4
6	Pooh	Goss	7
7	Faulkner	Challiss	5





EMPLOYEES				hierarchy				
EID	Name	Surname	BossId*	EID	Name	Surname	BossId*	Level
1	Domenic	Leaver 🔇	5	4	Roxanna	Fairlie	NULL	0
2	Cleveland	Hewins	1	5	Hermie	Comsty	4	1
3	Kakalina	Atherton	7	1	Domenic	Leaver	5	2
4	Roxanna	Fairlie	NULL	7	Faulkner	Challiss	5	2
5	Hermie	Comsty 🤇	$4 \rightarrow$					
6	Pooh	Goss	7					
7	Faulkner	Challiss 🔇	5					

MPLO	/EES			h	ierarchy			
EID	Name	Surname	BossId*	EID	Name	Surname	BossId*	Leve
1	Domenic	Leaver (5	4	Roxanna	Fairlie	NULL	0
2	Cleveland	Hewins (1	5	Hermie	Comsty	4	1
3	Kakalina	Atherton (1	Domenic	Leaver	5	2
4	Roxanna	Fairlie	NULL	7	Faulkner	Challiss	5	2
5	Hermie	Comsty 🤇	4	3	Kakalina	Atherton	7	3
6	Pooh	Goss 🤇	7	6	Pooh	Goss	7	3
7	Faulkner	Challiss 🤇	5	2	Cleveland	Hewins	1	3

Spatial data can be represented by different generative services.
Point
Polygon
Hues,
Iter.
MSQL provides functions to:
create geometries in various formats (WKT, WKB, internal)
convert geometries between different formats
access the qualitative or quantitative properties of a geometry
describe the relationships between two geometries
create new geometries from existing ones

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