

Joins ,window function ,CTE(common table expression)

**Joins:** inner, left outer join, right outer join, full outer join, anti join, left anti join , right anti join, self join ,cross join.

Left					Inner Join							
Cust_id	Name	Contact	...		Cust_id	Name	Contact	Order_id	Cust_id	Product	Price	Qty
1	Raam	98798723			1	Raam	98798723	b1		1 Laptop	35000	89
2	Shyam	597789			1	Raam	98798723	b3		1 Mouse	500	7
3	Hari	2468498			3	Hari	2468498	b2		3 Laptop	35000	8
4	Murli	1678979			4	Murli	1678979	b4		4 Keyboard	1200	8
5	Krishna	1678979										
right					left outer Join							
Order_id	Cust_id	Product	Price	Qty	Cust_id	Name	Contact	Order_id	Cust_id	Product	Price	Qty
b1		1 Laptop	35000	89	1	Raam	98798723	b1		1 Laptop	35000	89
b2		3 Laptop	35000	8	1	Raam	98798723	b3		1 Mouse	500	7
b3		1 Mouse	500	7	3	Hari	2468498	b2		3 Laptop	35000	8
b4		4 Keyboard	1200	8	4	Murli	1678979	b4		4 Keyboard	1200	8
b5		6 console	4500	9	2	Shyam	597789	null	null	null	null	null
					5	Krishna	1678979	null	null	null	null	null
					Right outer Join							
					Cust_id	Name	Contact	Order_id	Cust_id	Product	Price	Qty
					1	Raam	98798723	b1		1 Laptop	35000	89
					1	Raam	98798723	b3		1 Mouse	500	7
					3	Hari	2468498	b2		3 Laptop	35000	8
					4	Murli	1678979	b4		4 Keyboard	1200	8
					null	null	null	b5		6 console	4500	9
					Full outer Join							
					Cust_id	Name	Contact	Order_id	Cust_id	Product	Price	Qty
					1	Raam	98798723	b1		1 Laptop	35000	89
					1	Raam	98798723	b3		1 Mouse	500	7
					3	Hari	2468498	b2		3 Laptop	35000	8
					4	Murli	1678979	b4		4 Keyboard	1200	8
					2	Shyam	597789	null	null	null	null	null
					5	Krishna	1678979	null	null	null	null	null
					null	null	null	b5		6 console	4500	9
Self					Self Join							
Order date	Sales				Order date	Sales	Order date	Sales		Difference		
16-11-2025	841				16-11-2025	841	null	null		0		
17-11-2025	953				17-11-2025	953	16-11-2025	841		112		
18-11-2025	960				18-11-2025	960	17-11-2025	953		7		
19-11-2025	852				19-11-2025	852	18-11-2025	960		-108		
20-11-2025	312				20-11-2025	312	19-11-2025	852		-540		
21-11-2025	721				21-11-2025	721	20-11-2025	312		409		
22-11-2025	912				22-11-2025	912	21-11-2025	721		191		
23-11-2025	946				23-11-2025	946	22-11-2025	912		34		
24-11-2025	723				24-11-2025	723	23-11-2025	946		-223		
25-11-2025	661				25-11-2025	661	24-11-2025	723		-62		
Cross join					Cross join							
Table1	Left		Table 2	Right	Name	Subject						
Name			Subject		Raam	hindi						
Raam			hindi		Raam	english						
Shyam			english		Shyam	hindi						
Hari					Shyam	english						
Murli					Hari	hindi						
Krishna					Hari	english						
					Murli	hindi						
					Murli	english						
					Krishna	hindi						
					Krishna	english						

Anti join							
Cust_id	Name	Contact	Order_id	Cust_id	Product	Price	Qty
	2 Shyam	597789	null	null	null	null	null
	5 Krishna	1678979	null	null	null	null	null
null	null	null	b5		6 console	4500	9
Left Anti join							
Cust_id	Name	Contact	Order_id	Cust_id	Product	Price	Qty
	2 Shyam	597789	null	null	null	null	null
	5 Krishna	1678979	null	null	null	null	null
Right Anti join							
Cust_id	Name	Contact	Order_id	Cust_id	Product	Price	Qty
null	null	null	b5		6 console	4500	9

## Window function :

Over() function

```
select*,sum(creditlimit) over() as total_limit from customers;
select*,sum(creditlimit) over(partition by country) as total_limit from customers;
select*,sum(creditlimit) over(partition by country) as running_total_limit from customers;
select*,avg(creditlimit) over(partition by country) as running_total_limit from customers;
-- dec 1 2025
```

creditLimit	sum(creditlimit) over()	creditLimit	total_limit
21000.00	8254400.00	21000.00	8254400.00
71800.00	8254400.00	71800.00	8254400.00
117300.00	8254400.00	117300.00	8254400.00
118200.00	8254400.00	118200.00	8254400.00
81700.00	8254400.00	81700.00	8254400.00
210500.00	8254400.00	210500.00	8254400.00
0.00	8254400.00	0.00	8254400.00
59700.00	8254400.00	59700.00	8254400.00
64600.00	8254400.00	64600.00	8254400.00
		114900.00	8254400.00

2.

country	salesRepEmployeeNumber	creditLimit	total_limit
Australia	1611	117300.00	430300.00
Australia	1611	60300.00	430300.00
Australia	1611	51600.00	430300.00
Australia	1611	107800.00	430300.00
Australia	1611	93300.00	430300.00
Austria	1401	45300.00	117000.00
Austria	1401	71700.00	117000.00
Belgium	1401	79900.00	103400.00
Belgium	1401	23500.00	103400.00
Canada	1323	90300.00	228600.00

3.

Row\_number(),rank(),dense\_rank():

```
-- ranking part from windows -- rank,dence rank,rank
select*,row_number() over(order by creditlimit) from customers;
select*,row_number() over(order by creditlimit desc) from customers;
select*,rank() over(order by creditlimit asc) from customers;
select*, dense_rank() over(order by creditlimit asc) from customers;
```

creditLimit	dense_rank() over(order by creditlimit asc)	creditLimit	rank() over(order by creditlimit asc)
0.00	1	0.00	1
0.00	1	0.00	1
0.00	1	0.00	1
0.00	1	0.00	1
0.00	1	0.00	1
11000.00	2	0.00	1
21000.00	3	0.00	1
23000.00	4	11000.00	25
23500.00	5	21000.00	26

  

creditLimit	row_number() over(order by creditlimit)
0.00	1
0.00	2
0.00	3
0.00	4
0.00	5
0.00	6
0.00	7
0.00	8
0.00	9

Lead,Lag,first\_value,last\_value:

```
-- lead|lag :lead from first value , lag from last value
select*, lead(creditlimit) over() from customers;
select*, lag(creditlimit) over() from customers;
select*,lag(amount) over() from payments;
select*,lag(amount,2) over() from payments;
-- first value|last value
select*, first_value(creditlimit) over(partition by country)from customers;
select*, last_value(creditlimit) over(partition by country)from customers;
select*, last_value(creditlimit) over(partition by country rows between unbounded preceding and unbounded following)from customers;
```

country	salesRepEmployeeNumber	creditLimit	last_value(creditlimit) over(partition by country)
Australia	1611	117300.00	93300.00
Australia	1611	60300.00	93300.00
Australia	1611	51600.00	93300.00
Australia	1611	107800.00	93300.00
Australia	1611	93300.00	93300.00
Austria	1401	45300.00	71700.00
Austria	1401	71700.00	71700.00
Belgium	1401	79900.00	23500.00
Belgium	1401	23500.00	23500.00

country	salesRepEmployeeNumber	creditLimit	first_value(creditlimit) over(partition by country)
Australia	1611	117300.00	117300.00
Australia	1611	60300.00	117300.00
Australia	1611	51600.00	117300.00
Australia	1611	107800.00	117300.00
Australia	1611	93300.00	117300.00
Austria	1401	45300.00	45300.00
Austria	1401	71700.00	45300.00
Belgium	1401	79900.00	79900.00
Belgium	1401	23500.00	79900.00

	customerNumber				lag(amount) over()
		Refresh data re-executing the original query			
▶	103	HQ336336	2004-10-19	6066.78	NULL
	103	JM555205	2003-06-05	14571.44	6066.78
	103	OM314933	2004-12-18	1676.14	14571.44
	112	BO864823	2004-12-17	14191.12	1676.14
	112	HQ55022	2003-06-06	32641.98	14191.12
	112	ND748579	2004-08-20	33347.88	32641.98
	114	GG31455	2003-05-20	45864.03	33347.88
	114	MA765515	2004-12-15	82261.22	45864.03
	114	NP603840	2003-05-31	7565.08	82261.22
	114	NR27552	2004-03-10	44894.74	7565.08

  

creditLimit	lead(creditlimit) over()
21000.00	71800.00
71800.00	117300.00
117300.00	118200.00
118200.00	81700.00
81700.00	210500.00
210500.00	0.00
0.00	59700.00
59700.00	64600.00
64600.00	114900.00

CTE: common table expression

-- Q1 Write a CTE that aggregates the total payment amount per customer, then return only customers with total payments above 100,000

```
-- solution
WITH cte AS (
  SELECT
    customernumber,
    SUM(amount) AS total_payment
  FROM payments
  GROUP BY customernumber
  HAVING SUM(amount) > 100000
)
SELECT
  c.customernumber,
  p.amount
FROM customers c
JOIN payments p
  ON c.customernumber = p.customernumber
JOIN cte
  ON c.customernumber = cte.customernumber;
```