Breaking down WINDOW FUNCTIONS in SQL

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Window functions in SQL are powerful but complex.

So let’s break it down..

What do window functions do?

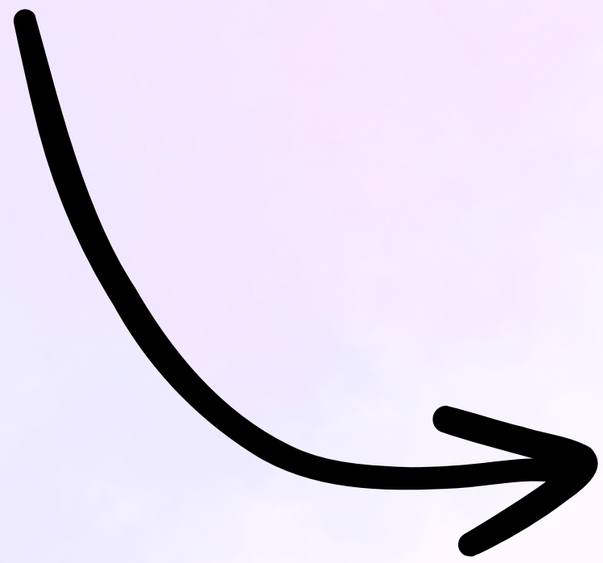
They allow access to data in other rows.

Sales Month	Sales
January	$1000
February	$2000
March	$1000
April	$3000

Unlike aggregation functions, they return **one result per row**.

Sales Month	Sales	Cumulative Sales
January	$1000	$1000
February	$2000	$3000
March	$1000	$4000
April	$3000	$7000

Let’s look at how a window function query is constructed.



We are going to calculate the cumulative total sales by products using data in this table.

Sales Month	Product	Sales
January	Watches	$1000
February	Watches	$2000
March	Watches	$1000
January	Computers	$3000
February	Computers	$3000
March	Computers	$5000

First, use an **aggregate function** or **window function** to define how to aggregate over the window.

In this case, we are using SUM( ).

Cumulative Sales by Product

```
SELECT
  SUM(sales) OVER (
    PARTITION BY product
    ORDER BY sales_month
    ROWS BETWEEN UNBOUNDED PRECEDING and CURRENT ROW
        )
```

Next, all window functions are defined by the **OVER( )** keyword

Cumulative Sales by Product

```
SELECT
  SUM(sales) OVER (
    PARTITION BY product
    ORDER BY sales_month
    ROWS BETWEEN UNBOUNDED PRECEDING and CURRENT ROW
        )
```

PARTITION BY ( ) defines how to group the data.

In this case, group by the column Product.

Cumulative Sales by Product

```
SELECT
  SUM(sales) OVER (
    PARTITION BY product
    ORDER BY sales_month
    ROWS BETWEEN UNBOUNDED PRECEDING and CURRENT ROW
          )
```

Sales Month	Product	Sales
January	Watches	$1000
February	Watches	$2000
March	Watches	$1000
January	Computers	$3000
February	Computers	$3000
March	Computers	$5000

ORDER BY ( ) defines how to sort the data within the groups.

In this case, sort by the column Sales Month.

Cumulative Sales by Product

```
SELECT
  SUM(sales) OVER (
    PARTITION BY product
    ORDER BY sales_month
    ROWS BETWEEN UNBOUNDED PRECEDING and CURRENT ROW
          )
```

Sales Month	Product	Sales
January	Watches	$1000
February	Watches	$2000
March	Watches	$1000
January	Computers	$3000
February	Computers	$3000
March	Computers	$5000

ROWS BETWEEN defines the relative window to aggregate on

In this case, from the start of the window to the current row.

Cumulative Sales by Product

```
SELECT
  SUM(sales) OVER (
    PARTITION BY product
    ORDER BY sales_month
    ROWS BETWEEN UNBOUNDED PRECEDING and CURRENT ROW
          )
```

Sales Month	Product	Sales
January	Watches	$1000
February	Watches	$2000
March	Watches	$1000
January	Computers	$3000
February	Computers	$3000
March	Computers	$5000

UNBOUNDED PRECEDING
means the start of the window is
at the beginning of the group

Cumulative Sales by Product

```
SELECT
  SUM(sales) OVER (
    PARTITION BY product
    ORDER BY sales_month
    ROWS BETWEEN UNBOUNDED PRECEDING and CURRENT ROW
          )
```

Sales Month	Product	Sales
January	Watches	$1000
February	Watches	$2000
March	Watches	$1000
January	Computers	$3000
February	Computers	$3000
March	Computers	$5000

CURRENT ROW means the end of the window is the current row

Cumulative Sales by Product

```
SELECT
  SUM(sales) OVER (
    PARTITION BY product
    ORDER BY sales_month
    ROWS BETWEEN UNBOUNDED PRECEDING and CURRENT ROW
          )
```

Sales Month	Product	Sales
January	Watches	$1000
February	Watches	$2000
March	Watches	$1000
January	Computers	$3000
February	Computers	$3000
March	Computers	$5000

Here is the final result:
cumulative sum of sales by product

Cumulative Sales by Product

```
SELECT
  SUM(sales) OVER (
    PARTITION BY product
    ORDER BY sales_month
    ROWS BETWEEN UNBOUNDED PRECEDING and CURRENT ROW
          )
```

Sales Month	Product	Sales	Cumulative Sales
January	Watches	$1000	$1000
February	Watches	$2000	$3000
March	Watches	$1000	$4000
January	Computers	$3000	$3000
February	Computers	$3000	$6000
March	Computers	$5000	$11000

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