Business School
UNIVERSITY OF COLORADO DENVER

Information Systems Program

Module 3
SQL Analytic Functions

Lesson 3: Window Aggregates I

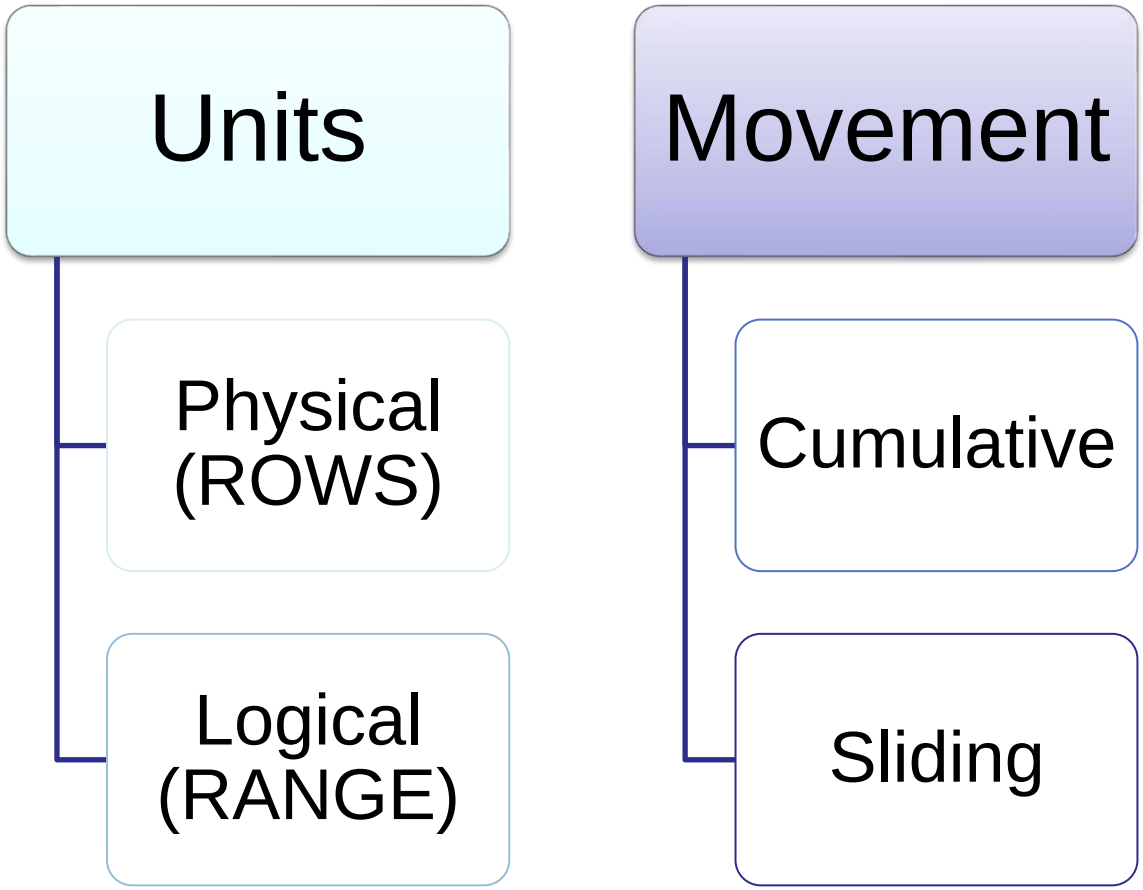
Lesson Objectives

- Understand concepts and syntax for window comparisons
- Write SELECT statements for window comparisons
- Reflect about the importance of window comparisons

Motivation

- Window comparisons common for financial analysis and forecasting
- Changes in numeric variables in sets of rows known as windows
- Examples
  - 90 day moving average of stock prices
  - Percentage annual sales growth
  - Performance of ad campaign in recent months
  - Cumulative sales performance for current year
- SQL extension for reduced skill sets, increased productivity, and improved performance

Window Concepts

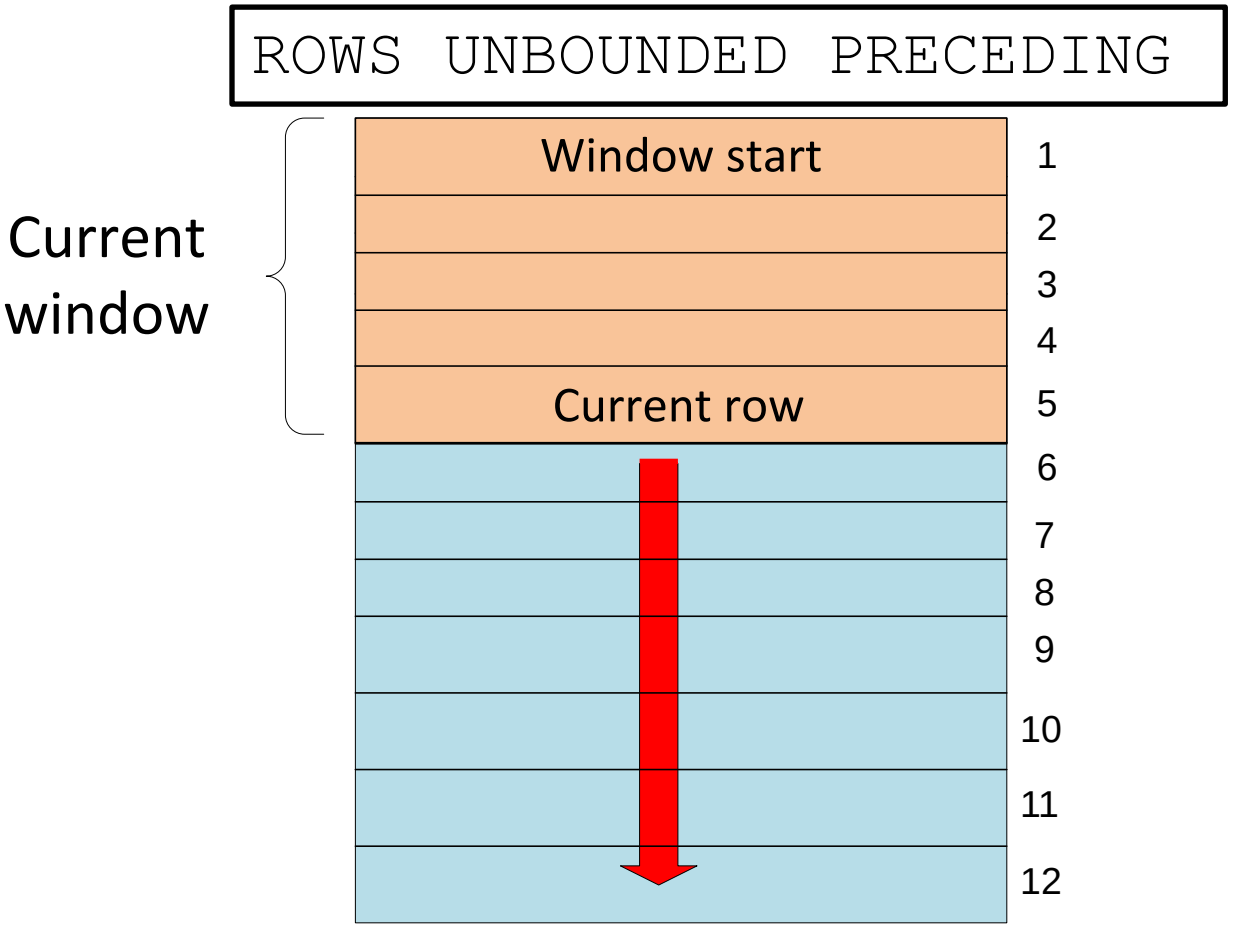


Extended Syntax for Windows

- `<AnalyticFunction> ([<column-list>]) OVER ([<partitioning>] <ordering> [<window-specification>] )`
- Applies to selected aggregate functions
- Physical window examples

```
ROWS UNBOUNDED PRECEDING
ROWS 2 PRECEDING
ROWS 3 FOLLOWING
```


Cumulative Window



Cumulative Sum of Sales Example

- Cumulative sum of dollar sales by zip code and year
- No partitioning

```
SELECT StoreZip, TimeYear, SUM(SalesDollar) AS SumSales,
  SUM(SUM(SalesDollar)) OVER
    (ORDER BY StoreZip, TimeYear
     ROWS UNBOUNDED PRECEDING ) AS CumSumSales
 FROM SSStore, SSTimeDim, SSSales
 WHERE SSSales.StoreID = SSStore.StoreId
   AND SSSales.TimeNo = SSTimeDim.TimeNo
 GROUP BY StoreZip, TimeYear;
```


Partitioned Cumulative Sum of Sales Example

- Cumulative sum of sales by zip code and year
- Partitioned by store zip

```
SELECT StoreZip, TimeYear, SUM(SalesDollar) AS SumSales,
  SUM(SUM(SalesDollar)) OVER (PARTITION BY StoreZip
    ORDER BY StoreZip, TimeYear
    ROWS UNBOUNDED PRECEDING ) AS CumSumSales
 FROM SSStore, SSTimeDim, SSSales
 WHERE SSSales.StoreID = SSStore.StoreId
   AND SSSales.TimeNo = SSTimeDim.TimeNo
 GROUP BY StoreZip, TimeYear;
```


Additional Problems

- Example 3
  - Cumulative sum of 2020 sales by item brand and month
  - Partition by item brand
  - Show item brand, month, sum of sales, and cumulative sum of sales
- Example 4
  - Cumulative sum of sales by year and item brand
  - Partition by year
  - Only include brands with more than 5 sales in a year
  - Show year, item brand, count, sum of sales, and cumulative sum of sales in the result
- Solutions in a module 3 document

Summary

- Window comparisons for common business intelligence applications
- Provide increased software development productivity and improved performance
- Syntax and examples for cumulative physical windows