Business School

UNIVERSITY OF COLORADO **DENVER**

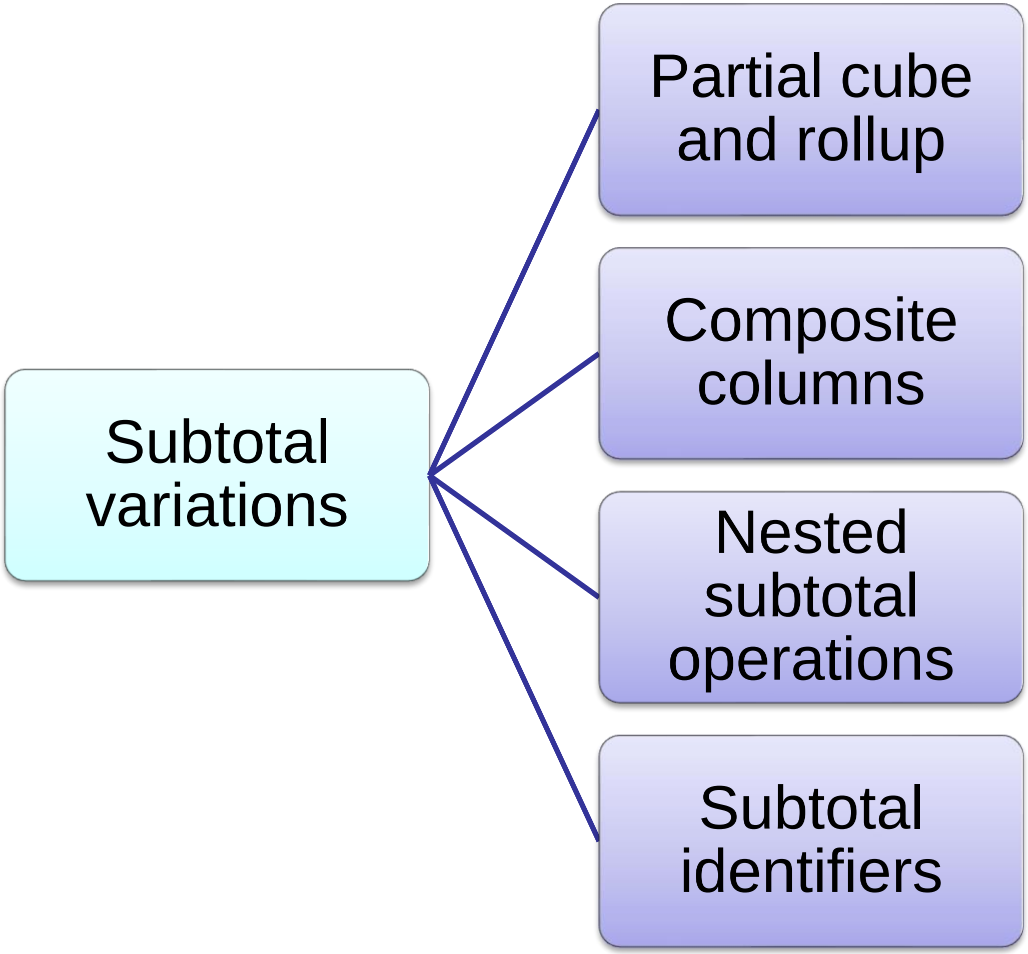
Information Systems Program

Module 2
SQL Subtotal Operators

Lesson 5: Variations of Subtotal Operators

Lesson Objectives

- Stretch your understanding of the subtotal operators
- List subtotal groups produced by subtotal variations
- Reflect on complexity and specialized usage of subtotal variations



Subtotal variations

Partial cube and rollup

Composite columns

Nested subtotal operations

Subtotal identifiers

Partial CUBE Example

- Basic elements
  - GROUP BY TimeMonth, CUBE(DivId, StoreZip)
  - Generates totals on <TimeMonth, DivId, StoreZip>, <TimeMonth, DivId>, <TimeMonth, StoreZip>, <TimeMonth>
  - TimeMonth concatenates with each CUBE subtotal group

```
SELECT TimeMonth, DivId, StoreZip,
       SUM(SalesDollar) AS SumSales
 FROM SSSales, SSStore, SSTimeDim
 WHERE SSSales.StoreId = SSStore.StoreId
   AND SSSales.TimeNo = SSTimeDim.TimeNo
   AND StoreNation IN ('USA', 'Canada')
   AND TimeYear = 2020
 GROUP BY TimeMonth, CUBE(DivId, StoreZip)
 ORDER BY TimeMonth, DivId, StoreZip;
```

Partial ROLLUP Example

- Basic elements
  - GROUP BY StoreState, ROLLUP(TimeMonth, TimeDay)
  - Generates totals on <StoreState, TimeMonth, TimeDay>, <StoreState, TimeMonth>, <StoreState>
  - StoreState concatenates with each ROLLUP subtotal group

```
SELECT StoreState, TimeMonth, TimeDay,
       SUM(SalesDollar) AS SumSales
 FROM SSSales, SSStore, SSTimeDim
 WHERE SSSales.StoreId = SSStore.StoreId
   AND SSSales.TimeNo = SSTimeDim.TimeNo
   AND StoreNation IN ('USA', 'Canada')
   AND TimeYear = 2020
 GROUP BY StoreState, ROLLUP(TimeMonth, TimeDay)
 ORDER BY StoreState, TimeMonth, TimeDay;
```

Composite Column Example

- Basic elements
  - GROUP BY ROLLUP(StoreNation, (StoreState, StoreCity))
  - Generates totals on <StoreNation, StoreState, StoreCity>, <StoreNation>, and <>.
  - Skips (StoreNation, StoreState) due to composite column (StoreState, StoreCity)

```
SELECT StoreNation, StoreState, StoreCity,
       SUM(SalesDollar) AS SumSales
 FROM SSSales, SSStore, SSTimeDim
 WHERE SSSales.StoreId = SSStore.StoreId
   AND SSSales.TimeNo = SSTimeDim.TimeNo
   AND TimeYear = 2020
 GROUP BY ROLLUP(StoreNation, (StoreState, StoreCity))
 ORDER BY StoreNation, StoreState, StoreCity;
```

Nested ROLLUP Example

- Basic elements
  - GROUP BY GROUPING SETS(TimeMonth, ROLLUP(StoreNation, (StoreState, StoreCity))
  - Generates totals on <StoreNation, StoreState, StoreCity>, <StoreNation>, <>, and <TimeMonth>.

```
SELECT TimeMonth, StoreNation, StoreState, StoreCity,
       SUM(SalesDollar) AS SumSales
 FROM SSSales, SSStore, SSTimeDim
 WHERE SSSales.StoreId = SSStore.StoreId
   AND SSSales.TimeNo = SSTimeDim.TimeNo
   AND StoreNation IN ('USA', 'Canada')
   AND TimeYear = 2020
 GROUP BY GROUPING SETS(TimeMonth,
      ROLLUP(StoreNation, (StoreState, StoreCity) ) )
 ORDER BY TimeMonth, StoreNation, StoreState, StoreCity;
```

Group Functions

- Subtotal group number provided by GROUPING_ID (Oracle) and GROUPING (PostgreSQL)
- Other functions: GROUP_ID and GROUPING in Oracle

```
-- Oracle SQL statement
-- Use GROUPING instead of GROUPING_ID for PostgreSQL
SELECT StoreZip, TimeMonth, DivId,
   SUM(SalesDollar) AS SumSales,
   GROUPING_ID(StoreZip, TimeMonth, DivId) AS Group_Level
 FROM SSSales, SSStore, SSTimeDim
 WHERE SSSales.StoreId = SSStore.StoreId
   AND SSSales.TimeNo = SSTimeDim.TimeNo
   AND StoreNation IN ('USA', 'Canada')
   AND TimeYear = 2020
 GROUP BY CUBE (StoreZip, TimeMonth, DivId)
 ORDER BY Group_Level;
```

Additional Subtotal Variation Problems

- General requirements
  - Sum store sales for USA and Canada in 2020
  - Sort in a convenient order
  - List subtotal groups and write SELECT statements
- Variation problems
  - Partial CUBE on (ItemBrand, StoreState) along with grouping on TimeMonth
  - Partial ROLLUP on (TimeQuarter, TimeMonth, TimeDay) along with grouping on ItemBrand
  - Composite column for ROLLUP ((TimeYear, TimeQuarter), TImeMonth, TimeDay) but no condition on TimeYear
  - GROUPING SETS on ItemBrand, StoreState, and ROLLUP(TimeMonth, TimeDay)

Summary

- Variations of subtotal operators for additional flexibility
  - Partial CUBE and ROLLUP operations
  - Composite columns
  - Nested CUBE and ROLLUP operations
  - Functions to identify subtotal groups
- Complex and specialized so use with caution