LAS VEGAS

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Best Practices in SQL

Your Guides:

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Introductions

- Take 5 Minutes
- Turn to a Person Near You
- Introduce Yourself

Agenda

- Introduction
- IN vs EXISTS
- DISTINCT vs EXISTS
- OBS Filtering
- UNION Queries
- Inline Views
- Subquery Factoring
- Double Dipping
- Recursion
- Analytic Functions
- Working examples

Introduction

IN vs. EXISTS

IN is typically better when the inner query contains a small result set

EXISTS is typically better when the inner query contains a large result set

```
SELECT SRMR.FULL_NAME
FROM SRM_RESOURCES
SRMR
WHERE SRMR.ID IN (SELECT
TM.PRRESOURCEID FROM
PRTEAM TM)
```

vs

```
SELECT SRMR.FULL_NAME
FROM SRM_RESOURCES SRMR
WHERE EXISTS (SELECT 1 FROM
PRTEAM TM WHERE
TM.PRRESOURCEID = SRMR.ID)
```

DISTINCT vs. EXISTS

- EXISTS is preferable to DISTINCT
- DISTINCT produces the entire result set (including duplicates), sorts, and then filters out duplicates

```
SELECT DISTINCT SRMR.FULL_NAME
FROM SRM_RESOURCES SRMR
JOIN PRTEAM TM ON SRMR.ID = TM.PRRESOURCEID
```

- EXISTS proceeds with fetching rows immediately after the sub-query condition has been satisfied the first time

```
SELECT SRMR.FULL_NAME
FROM SRM_RESOURCES SRMR
WHERE EXISTS (SELECT 1 FROM PRTEAM TM WHERE TM.PRRESOURCEID = SRMR.ID)
```

OBS Filtering

- Multiple ways to filter based on OBS
- Many rely on complex logic, left joins to inline views, or multiple sub-queries
- Using EXISTS and the OBS_UNITS_FLAT_BY_MODE table provides an easy solution
- Filter by Unit Only, Unit and Descendants, or Units and Ancestors

```
SELECT SRMR.FULL_NAME
FROM SRM_RESOURCES SRMR
WHERE (:OBS_ID IS NULL OR
        EXISTS (SELECT 1
                FROM OBS_UNITS_FLAT_BY_MODE OBSM
                JOIN PRJ_OBS_ASSOCIATIONS OBSA ON OBSM.LINKED_UNIT_ID = OBSA.UNIT_ID AND
                        OBSA.TABLE_NAME = 'SRM_RESOURCES'
                WHERE OBSM.UNIT_ID = :OBS_ID
                AND OBSM.UNIT_MODE = NVL(:OBS_MODE, 'OBS_UNIT_AND_CHILDREN')
                AND OBSA.RECORD_ID = SRMR.ID))
```

UNION Queries

- UNION queries perform poorly as they scan through the same data multiple times
- Require any logic changes to be made in multiple locations

```
SELECT CODE, NAME, SUM(FORECAST_COST) FORECAST_COST, SUM(BUDGET_COST) BUDGET_COST
FROM (SELECT INVI.CODE, INVI.NAME, FP.TOTAL_COST FORECAST_COST, 0 BUDGET_COST
    FROM INV_INVESTMENTS INVI
    JOIN FIN_PLANS FP ON INVI.ID = FP.OBJECT_ID AND INVI.ODF_OBJECT_CODE = FP.OBJECT_CODE
    WHERE FP.IS_PLAN_OF_RECORD = 1 AND FP.PLAN_TYPE_CODE = 'FORECAST'
    UNION ALL
    SELECT INVI.CODE, INVI.NAME, 0 FORECAST_COST, FP.TOTAL_COST BUDGET_COST
    FROM INV_INVESTMENTS INVI
    JOIN FIN_PLANS FP ON INVI.ID = FP.OBJECT_ID AND INVI.ODF_OBJECT_CODE = FP.OBJECT_CODE
    WHERE FP.IS_PLAN_OF_RECORD = 1 AND FP.PLAN_TYPE_CODE = 'BUDGET')
WHERE 1=1
GROUP BY CODE, NAME
```

UNION Queries

- Most UNION queries can easily be replaced with logic

```
SELECT INVI.CODE, INVI.NAME
, SUM(CASE WHEN FP.PLAN_TYPE_CODE = 'FORECAST' THEN FP.TOTAL_COST END) FORECAST_COST
, SUM(CASE WHEN FP.PLAN_TYPE_CODE = 'BUDGET' THEN FP.TOTAL_COST END) BUDGET_COST
FROM INV_INVESTMENTS INVI
JOIN FIN_PLANS FP ON INVI.ID = FP.OBJECT_ID AND INVI.ODF_OBJECT_CODE = FP.OBJECT_CODE
WHERE 1=1
GROUP BY INVI.CODE, INVI.NAME
```

- Only use UNION when joining data from multiple tables

Inline Views

- Inline views can be very beneficial but can severely affect performance
- LEFT JOINs to large inline views is typically not a good idea

```
SELECT SRMR.FULL_NAME, SUM(AV.SLICE) AVAIL, AL.ALLOC
FROM SRM_RESOURCES SRMR
JOIN PRJ_BLB_SLICES AV ON SRMR.ID = AV.PRJ_OBJECT_ID AND AV.SLICE_REQUEST_ID = 7
LEFT JOIN (SELECT TM.PRRESOURCEID, SUM(AL.SLICE) ALLOC
        FROM PRTEAM TM
        JOIN PRJ_BLB_SLICES AL ON TM.PRID = AL.PRJ_OBJECT_ID
        WHERE AL.SLICE_REQUEST_ID = 6
        AND AL.SLICE_DATE BETWEEN '01-JAN-14' AND '30-JUN-14'
        GROUP BY TM.PRRESOURCEID) AL ON SRMR.ID = AL.PRRESOURCEID
WHERE AV.SLICE_DATE BETWEEN '01-JAN-14' AND '30-JUN-14'
GROUP BY SRMR.FULL_NAME, AL.ALLOC
ORDER BY SRMR.FULL_NAME
```

- Will talk through some examples to demonstrate alternatives

Subquery Factoring – WITH clause

- Simplify complex queries
- Reduce repeated table access by generating temporary datasets during query execution
- Can be used as an inline view or a table

```sql
WITH ALLOCS AS (
  SELECT INVI.ID, INVI.CODE, INVI.NAME, AL.SLICE_DATE, AL.SLICE
  FROM SRM_RESOURCES SRMR
  JOIN PRTEAM TM ON SRMR.ID = TM.PRRESOURCEID
  JOIN INV_INVESTMENTS INVI ON TM.PRPROJECTID = INVI.ID
  JOIN PRJ_BLB_SLICES AL ON TM.PRID = AL.PRJ_OBJECT_ID AND AL.SLICE_REQUEST_ID = 6
  WHERE SRMR.UNIQUE_NAME = 'dmatzdorf' AND AL.SLICE > 0
  AND AL.SLICE_DATE IN ('01-SEP-25', '01-OCT-25')
)
SELECT A.ID, A.CODE, A.NAME, A.SLICE_DATE, A.SLICE, 1 SORT_ORDER
FROM ALLOCS A
UNION ALL
SELECT NULL ID, NULL CODE, TO_CHAR(A.SLICE_DATE, 'Mon YY') || ' Total' NAME, A.SLICE_DATE, SUM(A.SLICE) SLICE, 2 SORT_ORDER
FROM ALLOCS A
GROUP BY A.SLICE_DATE
UNION ALL
SELECT NULL ID, NULL CODE, 'Total' NAME, NULL SLICE_DATE, SUM(A.SLICE) SLICE, 3 SORT_ORDER
FROM ALLOCS A
ORDER BY SLICE_DATE, SORT_ORDER, NAME
```

Double Dipping

- Accessing the same data twice
- Forecast and Budget totals

```
SELECT INVI.CODE
, INVI.NAME
, SUM(CASE WHEN FP.PLAN_TYPE_CODE = 'FORECAST' THEN FP.TOTAL_COST END) FORECAST_COST
, SUM(CASE WHEN FP.PLAN_TYPE_CODE = 'BUDGET' THEN FP.TOTAL_COST END) BUDGET_COST

FROM INV_INVESTMENTS INVI
JOIN FIN_PLANS FP ON INVI.ID = FP.OBJECT_ID AND INVI.ODF_OBJECT_CODE = FP.OBJECT_CODE

WHERE FP.IS_PLAN_OF_RECORD = 1

GROUP BY INVI.CODE
, INVI.NAME
```

- Availability vs Allocation vs ETC vs Actuals

Recursion

- Using the WITH clause to recurse
- Get OBS Full Path

```
WITH OBS_PATH (ID, TYPE_ID, UNIQUE_NAME, NAME, LVL, OBS_PATH) AS (
  SELECT OBSU.ID, OBSU.TYPE_ID, OBSU.UNIQUE_NAME, OBSU.NAME, 1 LVL
  , '/' || OBSU.NAME OBS_PATH
  FROM PRJ_OBS_UNITS OBSU
  WHERE OBSU.PARENT_ID IS NULL
  UNION ALL
  SELECT OBSU.ID, OBSU.TYPE_ID, OBSU.UNIQUE_NAME, OBSU.NAME
  , OBS.LVL + 1 LVL, OBS.OBS_PATH || '/' || OBSU.NAME OBS_PATH
  FROM PRJ_OBS_UNITS OBSU
  JOIN OBS_PATH OBS ON OBSU.PARENT_ID = OBS.ID
  WHERE 1=1
)

SELECT OBST.UNIQUE_NAME OBS_TYPE_CODE
, OBST.NAME OBS_TYPE
, OBSP.UNIQUE_NAME
, OBSP.NAME
, OBSP.LVL
, OBSP.OBS_PATH
FROM PRJ_OBS_TYPES OBST
JOIN OBS_PATH OBSP ON OBST.ID = OBSP.TYPE_ID
WHERE OBST.UNIQUE_NAME = 'dlm_project_obs'
```

Best Practices

- **Avoid SELECT *** – Retrieve only the columns you actually need.
- **Use Appropriate Joins** – Choose INNER, LEFT, or RIGHT joins based on actual requirements.
- **Filter Early** – Apply WHERE and JOIN conditions to reduce data sets before grouping or ordering.
- **Write Readable Queries** – Use consistent formatting, meaningful aliases, and clear indentation.
- **Test with Realistic Data Volumes** – Ensure performance and behavior hold up in production-sized data.
- **Leverage Set-Based Operations** – Avoid row-by-row (cursor) processing when possible.
- **Use Proper Indexing** – Match indexes to query patterns to improve performance.

Analytic Functions

What Are Analytic Functions

- Used to compute aggregate values based on a group of rows
- Similar to aggregate functions but return multiple rows
- Can only appear in the SELECT or ORDER BY clause
- Used to compute cumulative, moving aggregates
- Operate with OVER() and optional PARTITION BY / ORDER BY clauses to define the calculation window

Why Use Analytic Functions

- **Preserve Detail** – Return aggregated metrics while keeping all individual rows visible.
- **Enhanced Analysis** – Enable calculations like rankings, running totals, and moving averages directly in SQL.
- **Performance Gains** – Reduce the need for complex self-joins or multiple subqueries.
- **Flexible Windows** – Allow calculations over dynamic ranges using PARTITION BY and ORDER BY
- **Accurate Insights** – Handle complex reporting needs (e.g., "top N per group" or period-over-period comparisons) with minimal SQL complexity

Available Functions

- AVG
- CORR
- COUNT
- COVAR_POP
- COVAR_SAMP
- CUME_DIST
- DENSE_RANK
- FIRST
- FIRST_VALUE
- LAG
- LAST
- LAST_VALUE
- LEAD
- LISTAGG
- MAX
- MEDIAN
- MIN
- NTH_VALUE
- NTILE
- PERCENT_RANK
- PERCENTILE_CONT
- PERCENTILE_DISC
- RANK
- RATIO_TO_REPORT
- REGR_
- ROW_NUMBER
- STDDEV
- STDDEV_POP
- STDDEV_SAMP
- SUM
- VAR_POP
- VAR_SAMP
- VARIANCE

Selecting Specific Records

- ROW_NUMBER – Assign a unique sequential value to each row
- LAG/LEAD – Finds rows a number of rows from the current row
- FIRST_VALUE/LAST_VALUE – Finds first or last value in an ordered group
- RANK/DENSE_RANK – Rank items in a group
- SUM – Compute running totals
- Most recent status report

```
SELECT INVI.CODE
, INVI.NAME
, SR.REPORT_DATE
, SR.RNUM

FROM INV_INVESTMENTS INVI
JOIN (SELECT SR.ID
      , SR.ODF_PARENT_ID
      , SR.COP_REPORT_DATE REPORT_DATE
      , ROW_NUMBER() OVER (PARTITION BY SR.ODF_PARENT_ID
                           ORDER BY SR.COP_REPORT_DATE DESC, SR.CREATED_DATE DESC) RNUM
      FROM ODF_CA_COP_PRJ_STATUSRPT SR
      WHERE 1=1) SR ON INVI.ID = SR.ODF_PARENT_ID AND SR.RNUM = 1

WHERE 1=1
```

Summing

- SUM – Calculate total allocations
- RATIO_TO_REPORT – Calculate percentage of total allocations
- SUM – Calculate total allocation hours
- SUM ORDER BY – Running allocation hours

Window clause

- BETWEEN … AND
- UNBOUND PRECEDING
- UNBOUND FOLLOWING
- CURRENT ROW
- X PRECEDING OR X FOLLOWING

SQL Tuning 2025 Queries.txt

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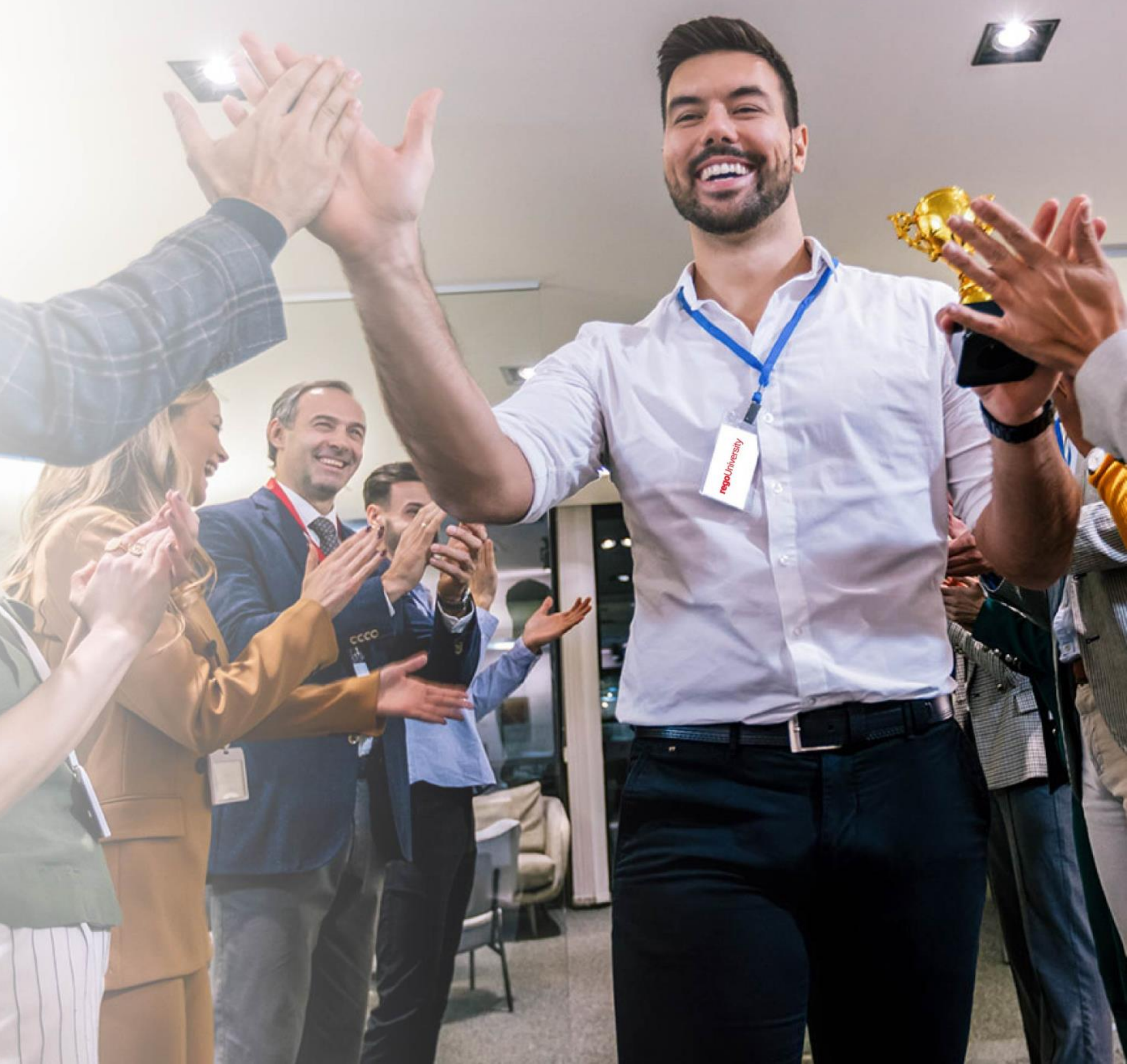

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