Oracle to PostgreSQL beyond the Syntax:

When DBMS Design Differences Matter

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Overview

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2. (Easy) Replacements
3. Fun With Numbers
4. Rethinking Updates
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Background

Who we are:

Software Developers, Ops, “own DBAs”
Department of Revenue Accounting
Customers are some of the largest airlines worldwide

Atlantic Joint Venture

Our experience:

In 2025: Migration project from Oracle to Postgres
Learned a lot from attendance at Postgres conference in Germany and Europe

(Easy) Replacements

Easy replacements

```
(SUBSTR(import_month, 1, 4) + 1 || '00') + NVL(late_coming_months, 0)
```

```
(SUBSTR(import_month, 1, 4) + 1 || '00') + COALESCE(late_coming_months, 0)
```

```
(SUBSTR(import_month, 1, 4)::BIGINT + 1 || '00') + COALESCE(late_coming_months, 0)
```

```
((SUBSTR(import_month, 1, 4)::BIGINT + 1) * 100) + COALESCE(late_coming_months, 0)
```

How to translate DECODE?

```
SELECT DECODE(n, null, 'NULL', 1, 'One', 'Other') FROM nums;
```

n
1
2
null

result
'One'
'Other'
'NULL'

How to translate DECODE?

```
SELECT CASE n
    WHEN null::INTEGER THEN 'NULL'
    WHEN 1 THEN 'One'
    ELSE 'Other' END
FROM nums;
```

n
1
2
null

result
'One'
'Other'
'Other'

How to translate DECODE?

```
SELECT CASE
    WHEN n IS NULL THEN 'NULL'
    WHEN n = 1 THEN 'One'
    ELSE 'Other' END
FROM nums;
```

n
1
2
null

result
'One'
'Other'
'NULL'

Join on DECODE

```sql
SELECT a.n, b.n FROM nums a JOIN nums b
    ON DECODE(a.n, b.n, 1, 0) = 1;
```

```sql
SELECT a.n, b.n FROM nums a JOIN nums b
    ON CASE
        WHEN a.n IS NULL AND b.n IS NULL THEN 1
        WHEN a.n = b.n THEN 1
        ELSE 0 END = 1;
```

```sql
SELECT a.n, b.n FROM nums a JOIN nums b
    ON a.n IS NOT DISTINCT FROM b.n;
```

n
1
2
null

a.n	b.n
1	1
2	2
null	null

IS NOT DISTINCT FROM

Expression	Result
1 IS NOT DISTINCT FROM 1	true
1 IS NOT DISTINCT FROM NULL	false
NULL IS NOT DISTINCT FROM NULL	true

```sql
SELECT * FROM tbl WHERE a IS NOT DISTINCT FROM NULL

-- rewritten to
SELECT * FROM tbl WHERE a IS NULL
```

```sql
SELECT * FROM tbl WHERE a IS NOT DISTINCT FROM 1

-- rewritten to
SELECT * FROM tbl WHERE a = 1
```

```sql
SELECT * FROM tbl_one LEFT JOIN tbl_two
  ON tbl_one.a IS NOT DISTINCT FROM tbl_two.a
```

Workaround with functions

n
1
2
null

a.n	b.n
1	1
2	2
null	null

```sql
SELECT a.n, b.n FROM nums a JOIN nums b
    ON COALESCE(a.n::text, '||NULL||') = COALESCE(b.n::text, '||NULL||');
```

```sql
CREATE INDEX idx_nums_coalesce ON nums (COALESCE(n::text, '||NULL||'));
```

Fun with numbers

Fun with numbers

Oracle

```
select 1/3;

=>  0.333333333333333333333333333333333333333 -- 39 digits
```

Postgres

```
select 1/3;

=>  0
```

Postgres

```
select 1.0/3;

=>  0.33333333333333333333 -- 20 digits
```

Postgres

```
select (1.0/3)::numeric(52,40);

=>  0.3333333333333333333300000000000000000000 -- 40 digits
```

Postgres

```
select 1::numeric(52,40)/3;

=>  0.3333333333333333333333333333333333333333 -- 40 digits
```

Exact Numeric Types

Oracle:

- Only one data type: NUMBER(Precision, Scale)
  - Stored as up to 20 base-100 digits → maximum precision of 39 or 40 digits depending on the position of the decimal point
  - INT, SMALLINT, INTEGER are type aliases for NUMBER(38,0)
- Always performs “normal” decimal division
- Always returns number with max precision as result of arithmetic operations

Postgres:

- Proper SMALLINT, INTEGER, BIGINT, NUMERIC (same as DECIMAL)
- Performs integer division on integer types
- Max precision is 1000
- Inexact arithmetic operations (division, sqrt, …) return at least 16 most significant digits
  - Scale of results is at least as big as the scale of both operands

Rethinking Updates

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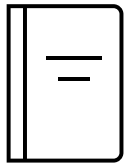
Oracle Updates

record	completed in
1	Jan ’26
2	Feb ’26
3	Mar ‘26
4	Mar ‘26
5	Mar ’26
6	Mar ‘26

record	completed in
1	Jan ’26
2	Feb ’26
3	Apr ’26
4	Apr ’26
5	Apr ’26
6	Mar ‘26



undo log

The Cost of Massive Updates

record	completed in	xmin	xmax
1	Jan ’26	100	0
2	Feb ’26	200	0
3	Mar ‘26	300	0
4	Mar ‘26	400	0
5	Mar ’26	500	0
6	Mar ‘26	600	0

record	completed in	xmin	xmax
1	Jan ’26	100	0
2	Feb ’26	200	0
3	Mar ‘26	300	700
4	Mar ‘26	400	700
5	Mar ’26	500	700
6	Mar ‘26	600	0
3	Apr ’26	700	0
4	Apr ’26	700	0
5	Apr ’26	700	0

The Cost of Massive Updates

record	completed in	xmin	xmax
1	Jan ’26	100	0
2	Feb ’26	200	0
3	Mar ‘26	300	0
4	Mar ‘26	400	0
5	Mar ’26	500	0
6	Mar ‘26	600	0

record	completed in	xmin	xmax
1	Jan ’26	100	0
2	Feb ’26	200	0
6	Mar ‘26	600	0
3	Apr ’26	700	0
4	Apr ’26	700	0
5	Apr ’26	700	0

The Cost of Massive Updates

record	completed in	xmin	xmax
1	Jan ’26	100	0
2	Feb ’26	200	0
3	<null>	300	0
4	<null>	400	0
5	<null>	500	0
6	<null>	600	0

record	completed in	xmin	xmax
1	Jan ’26	100	0
2	Feb ’26	200	0
3	<null>	300	0
4	<null>	400	0
5	<null>	500	0
6	<null>	600	700
6	Mar ’26	700	0

Key Takeaways for migrating

1. Make it run on Postgres ASAP
2. Find mistakes in translation, ensure correctness
3. Set goals for performance (benchmark old system?)
4. Optimize performance – Don’t shy away from hacks!
5. Find systematic issues
6. Go back to 4 until performance goals are met

There are bad practices in your system, you just got away with it.

Thank you for your attention!

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