PostgreSQL Conference
Germany 2026

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Ein Jahr PostgreSQL statt Oracle - Das Leben danach

- jonas.gassenmeyer@deutschebahn.com
- Ein Herz für relationale Datenbanken
- Nervös, weil ich ein bisschen aus dem “Konferenz-Tritt” bin

Die nächsten ~~45~~ 60 Minuten

Übertrage ~~Wissen~~ **einfach** von Oracle nach PostgreSQL

Was soll schon schief gehen?

Dann lasst uns loslegen…

```
create table demo (
 descr varchar2(10),
 col varchar2(10)
);
```

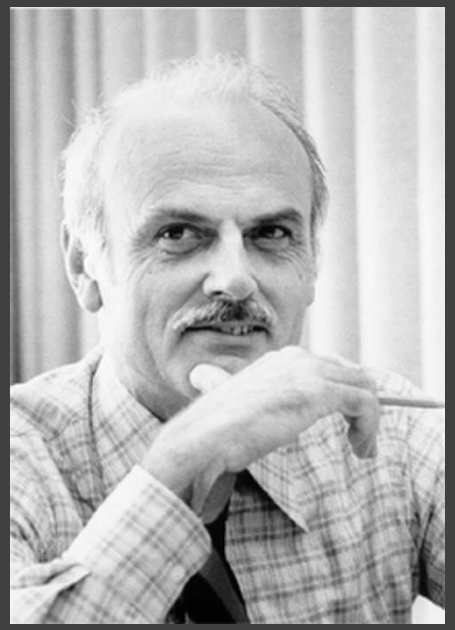

```
SQL Error [42704]: ERROR:
type "varchar2" does not
exist
```

```
create table demo (
 descr text,
 col text
);
```

```
select *
  from all_tables
 where table_name = 'demo'
;
```

```
select *
  from all_tables
 where table_name = 'demo'
;
```

```
select *
  from pg_class
 where relname = 'demo'
;
```



```
insert into demo (descr, col) values ('1 insert', '');
insert into demo (descr, col) values ('2 insert', null);
```

```
insert into demo (descr, col) values ('1 insert', '');
insert into demo (descr, col) values ('2 insert', null);
```

```
select *
  from demo
 where col is null;
```

```
insert into demo (descr, col) values ('1 insert', '');
insert into demo (descr, col) values ('2 insert', null);
```

```
select *
  from demo
 where col is null;

|descr      | col
+-----------+------------
|2 insert   | (null)
```

```
... WHERE coalesce(col, '') = ''
```

https://aws.amazon.com/blogs/database/handle-empty-strings-when-migrating-from-oracle-to-postgresql/

```
... WHERE coalesce(col, '') = ''
```

https://aws.amazon.com/blogs/database/handle-empty-strings-when-migrating-from-oracle-to-postgresql/

```
... WHERE coalesce(col, '') = ''
```

13 Word pages (3300 words)

https://aws.amazon.com/blogs/database/handle-empty-strings-when-migrating-from-oracle-to-postgresql/

```
select 'test'||null from dual;
```


```
SQL Error [42P01]: ERROR:
relation "dual" does not
exist
```

```
select 'test'||null ;
```

```
select 'test'||null ;

|?colum
+------
|(null)
```

```
select '' = '' tst;

|tst
+------------
|true
```

Boolean

```
alter table demo add primary key (descr);


insert into demo values ('key1', 'i repeat');
insert into demo values ('key1', 'i repeat');
```

```
SQL Error [1] [23000]: ORA-00001: unique
constraint (SYSTEM.SYS_C0012482) violated
```

```
SQL Error [23505]: ERROR: duplicate key value violates
unique constraint "demo_pkey"

Detail: Key (descr)=(key1) already exists.
```

```
SQL Error [1] [23000]: ORA-00001: unique
constraint (SYSTEM.SYS_C0012482) violated
```

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MERGE

https://loke.dev/blog/postgres-merge-concurrency-locking-traps

coding without RTFM

https://twitter.com/comrad_pogaca/status/1483463570109403140

```
insert into demo values ('key2', 'i repeat')
on conflict (descr)
do nothing;


insert into demo values ('key2', 'i repeat')
on conflict (descr) --pk or uk
do update set col = 'i''ve been updated';
```

```
select *
  from demo
 where descr = 'key2';


|descr|col
+-----+------------------
|key2 |i've been updated
```

Erstmal neue Testdaten

Website, Aufruf, Dauer

	url	created_at	request_duration
1	3_wbesite_url	2022-08-19 00:00:00	00:00:00.053419
2	2_wbesite_url	2022-08-18 00:00:00	00:00:16.175117
3	5_wbesite_url	2022-08-17 00:00:00	00:00:04.737701
4	10_wbesite_url	2022-08-16 00:00:00	00:00:37.549743
5	8_wbesite_url	2022-08-15 00:00:00	00:00:13.432602
6	1_wbesite_url	2022-08-14 00:00:00	00:00:18.229272
7	4_wbesite_url	2022-08-13 00:00:00	00:00:10.05484
8	6_wbesite_url	2022-08-12 00:00:00	00:00:49.272442
9	3_wbesite_url	2022-08-11 00:00:00	00:00:25.686225
10	6_wbesite_url	2022-08-10 00:00:00	00:00:20.192684
11	3_wbesite_url	2022-08-09 00:00:00	00:00:01.389349
12	9_wbesite_url	2022-08-08 00:00:00	00:00:32.105082
13	8_wbesite_url	2022-08-07 00:00:00	00:00:47.395415
14	5_wbesite_url	2022-08-06 00:00:00	00:00:53.359661
15	8_wbesite_url	2022-08-05 00:00:00	00:00:46.10167
16	3_wbesite_url	2022-08-04 00:00:00	00:00:27.322253
17	6_wbesite_url	2022-08-03 00:00:00	00:00:41.657576
18	6_wbesite_url	2022-08-02 00:00:00	00:00:27.917884
19	6_wbesite_url	2022-08-01 00:00:00	00:00:03.175308

```
select level
from dual
connect by level <= 10;
```


```
SQL Error [42601]: ERROR: syntax error at or near "by"
```

```
select generate_series(1,10) ;
```

Aber das ist ja nicht alles...

```
create table logs as

with t as (
select generate_series('2022-07-01 00:00:00'::timestamp
      , '2022-08-19 01:00:00'::timestamp, '1 day') ts


)
, rn as(
select row_number() over(order by random()) r
     , t.ts
 from t
)
, u as (
select generate_series(1, 10) || '_wbesite_url' url


)

select u.url, rn.ts created_at
     , random() * interval '1 minute' request_duration
from rn
join u
on mod(r,10) +1 =
replace(substring(u.url from 1 for 2), '_', '')::bigint
;
```


```
create table logs as (
select * from (
with t as (
select to_date('2022-07-01 00:00:00'
           , 'YYYY-MM-DD HH24:MI:SS') + level ts
  from dual
 connect by level <= 50
)
, rn as(
select row_number() over(order by dbms_random.value) r
     , t.ts
 from t
)
, u as (
select level || '_wbesite_url' url
  from dual
 connect by level <= 50
)

select u.url, rn.ts created_at
     , dbms_random.value * interval '1' minute request_duration
from rn
join u
on mod(r,10) +1 =
replace(substr(u.url, 1, 2), '_'))
)
;
```

```
create table logs as

with t as (
select generate_series('2022-07-01 00:00:00'::timestamp
      , '2022-08-19 01:00:00'::timestamp, '1 day') ts


)
, rn as(
select row_number() over(order by random()) r
    , t.ts
 from t
)
, u as (
select generate_series(1, 10) || '_wbesite_url' url


)

select u.url, rn.ts created_at
    , random() * interval '1 minute' request_duration
from rn
join u
on mod(r,10) +1 =
replace(substring(u.url from 1 for 2), '_', '')::bigint
;
```

```
create table logs as (
select * from (
with t as (
select to_date('2022-07-01 00:00:00'
           , 'YYYY-MM-DD HH24:MI:SS') + level ts
  from dual
 connect by level <= 50
)
, rn as(
select row_number() over(order by dbms_random.value) r
    , t.ts
 from t
)
, u as (
select level || '_wbesite_url' url
  from dual
 connect by level <= 50
)

select u.url, rn.ts created_at
    , dbms_random.value * interval '1' minute request_duration
from rn
join u
on mod(r,10) +1 =
replace(substr(u.url, 1, 2), '_'))
)
;
```

```
create table logs as

with t as (
select generate_series('2022-07-01 00:00:00'::timestamp
      , '2022-08-19 01:00:00'::timestamp, '1 day') ts


)
, rn as(
select row_number() over(order by random()) r
     , t.ts
 from t
)
, u as (
select generate_series(1, 10) || '_wbesite_url' url


)

select u.url, rn.ts created_at
     , random() * interval '1 minute' request_duration
from rn
join u
on mod(r,10) +1 =
replace(substring(u.url from 1 for 2), '_', '')::bigint
;
```

```
create table logs as (
select * from (
with t as (
select to_date('2022-07-01 00:00:00'
           , 'YYYY-MM-DD HH24:MI:SS') + level ts
  from dual
 connect by level <= 50
)
, rn as(
select row_number() over(order by dbms_random.value) r
     , t.ts
 from t
)
, u as (
select level || '_wbesite_url' url
  from dual
 connect by level <= 50
)

select u.url, rn.ts created_at
     , dbms_random.value * interval '1' minute request_duration
from rn
join u
on mod(r,10) +1 =
replace(substr(u.url, 1, 2), '_'))
)
;
```

```
create table logs as

with t as (
select generate_series('2022-07-01 00:00:00'::timestamp
      , '2022-08-19 01:00:00'::timestamp, '1 day') ts



)
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select row_number() over(order by random()) r
     , t.ts
 from t
)
, u as (
select generate_series(1, 10) || '_wbesite_url' url



)

select u.url, rn.ts created_at
     , random() * interval '1 minute' request_duration
from rn
join u
on mod(r,10) +1 =
replace(substring(u.url from 1 for 2), '_', '')::bigint
;
```

```
create table logs as (
select * from (
with t as (
select to_date('2022-07-01 00:00:00'
           , 'YYYY-MM-DD HH24:MI:SS') + level ts
  from dual
 connect by level <= 50
)
, rn as(
select row_number() over(order by dbms_random.value) r
     , t.ts
 from t
)
, u as (
select level || '_wbesite_url' url
  from dual
 connect by level <= 50
)

select u.url, rn.ts created_at
     , dbms_random.value * interval '1' minute request_duration
from rn
join u
on mod(r,10) +1 =
replace(substr(u.url, 1, 2), '_'))
)
;
```

```
create table logs as

with t as (
select generate_series('2022-07-01 00:00:00'::timestamp
      , '2022-08-19 01:00:00'::timestamp, '1 day') ts



)
, rn as(
select row_number() over(order by random()) r
     , t.ts
 from t
)
, u as (
select generate_series(1, 10) || '_wbesite_url' url



)

select u.url, rn.ts created_at
     , random() * interval '1 minute' request_duration
from rn
join u
on mod(r,10) +1 =
replace(substring(u.url from 1 for 2), '_', '')::bigint
;
```

```
create table logs as (
select * from (
with t as (
select to_date('2022-07-01 00:00:00'
           , 'YYYY-MM-DD HH24:MI:SS') + level ts
  from dual
 connect by level <= 50
)
, rn as(
select row_number() over(order by dbms_random.value) r
     , t.ts
 from t
)
, u as (
select level || '_wbesite_url' url
  from dual
 connect by level <= 50
)

select u.url, rn.ts created_at
     , dbms_random.value * interval '1' minute request_duration
from rn
join u
on mod(r,10) +1 =
replace(substr(u.url, 1, 2), '_'))
)
;
```

Aggregieren...z.B. Quotienten bilden...

```
select (...) / count(distinct url) over()
  from logs
;
```


```
SQL Error [0A000]: ERROR: DISTINCT is not
implemented for window functions
```

Weil wir gerade von DISTINCT sprechen...

Für jede Website nur den letzten Logeintrag und dessen request_duration?

	url	created_at	request_duration
1	3_wbesite_url	2022-08-19 00:00:00	00:00:00.053419
2	2_wbesite_url	2022-08-18 00:00:00	00:00:16.175117
3	5_wbesite_url	2022-08-17 00:00:00	00:00:04.737701
4	10_wbesite_url	2022-08-16 00:00:00	00:00:3[illegible]549743
5	8_wbesite_url	2022-08-15 00:00:00	00:00:13.432602
6	1_wbesite_url	2022-08-14 00:00:00	00:00:18.229272
7	4_wbesite_url	2022-08-13 00:00:00	00:00:10.05484
8	6_wbesite_url	2022-08-12 00:00:00	00:00:49.272442
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12	9_wbesite_url	2022-08-08 00:00:00	00:00:32.105082
13	8_wbesite_url	2022-08-07 00:00:00	00:00:47.395415
14	5_wbesite_url	2022-08-06 00:00:00	00:00:53.359661
15	8_wbesite_url	2022-08-05 00:00:00	00:00:46.10167
16	3_wbesite_url	2022-08-04 00:00:00	00:00:27.322253
17	6_wbesite_url	2022-08-03 00:00:00	00:00:41.657576
18	6_wbesite_url	2022-08-02 00:00:00	00:00:27.917884
19	6_wbesite_url	2022-08-01 00:00:00	00:00:03.175308

```
select url
     , max(request_duration) keep(dense_rank last order by created_at)
     , max(created_at)
  from logs
 group by url
;
```

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```
select distinct on (url) url, request_duration
  from logs
 order by url, created_at desc
;
```

https://www.geekytidbits.com/postgres-distinct-on/

```
select distinct on (url) url, request_duration
  from logs
 order by url, created_at desc
;
```

https://www.geekytidbits.com/postgres-distinct-on/

Arithmetik

```
select 5/2;
```

```
select 5/2;

|?column?
+--------
|        2
```

...Kein Formatierungsproblem...WYSIWYG

numeric_type **/** ***numeric_type*** → ***numeric_type***

Division (for integral types, division truncates the result towards zero)

```
5.0 / 2 → 2.5000000000000000
5 / 2 → 2
(-5) / 2 → -2
```

https://www.postgresql.org/docs/14/functions-math.html

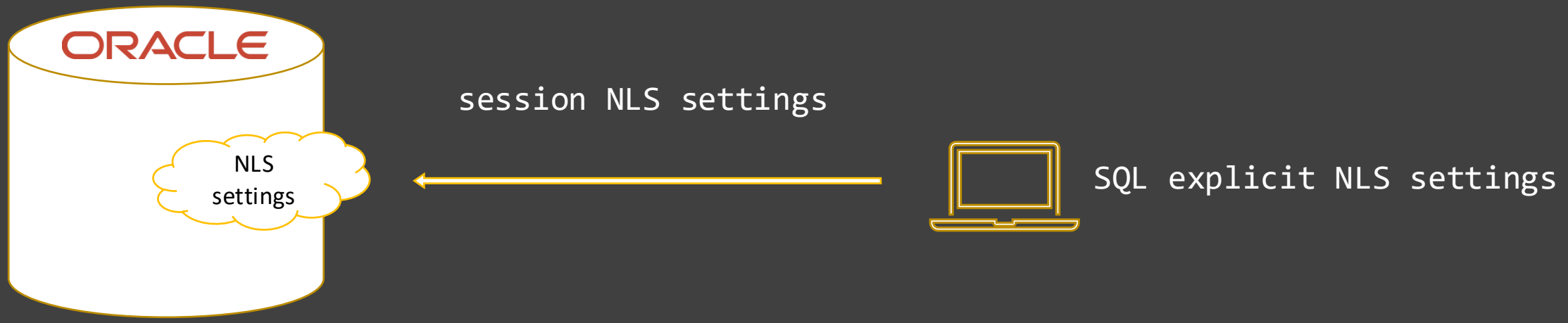
```
select 5.0/2;

select 5::float/2

select pg_typeof(5.0/2)
```


WHAT TIME IS IT

9 vs 6 fractional seconds


ORACLE
NLS
settings
session NLS settings
SQL explicit NLS settings


IANA
UTC!
set timezone = 'Europe/Berlin';
select now() at time zone 'UTC'

TIMESTAMPTZ

*“no such thing as a "server timezone" (...)The server does have a "log timezone" setting, but that's for log messages(..)The string you send to the server is assumed to be in the timezone defined by the client-controllable timezone setting, and it is **converted to UTC for storage**. (Of course, if the string you send contains an explicit zone name or UTC offset, we believe that instead; but in any case the bits on disk represent a time in UTC.)”*

https://www.postgresql.org/message-id/CADH0_2XcdBxDJMqa5q59gnPzpZO_f4E6A034R1%2B-G21-ByB2_w%40mail.gmail.com

https://www.cybertec-postgresql.com/en/time-zone-management-in-postgresql/

tsrange

multiranges (v14)

temporal constraints (v18)

https://www.cybertec-postgresql.com/en/multiranges-in-postgresql-14/

https://hashrocket.com/blog/posts/postgresql-18-temporal-constraints

Genug Syntax...

Lasst uns unter die Haube schauen

user != schema

Concurrent sessions: MVCC

MVCC

- Oracle avoids moving rows at all price
- PostgreSQL is doing something like a Copy-On-Write

https://franckpachot.medium.com/mvcc-in-oracle-vs-postgres-and-a-little-no-bloat-beauty-e3a04d6a8bd2

Bloat


WHAT ARE YOU DOING?
CLEAN UP IMMEDIATELY.
memegenerator.net

That’s the vacuum process

That’s the vacuum process


```
vacuum threshold =
    vacuum base threshold +
        (vacuum scale factor
            *  number of tuples)
```

when 20% of the rows plus 50 rows are inserted, updated, or deleted

```
postgreSQL>cat postgresql.conf | grep vacuum
#autovacuum_work_mem = -1                # min 1MB, or -1 to use maintenance_work_mem
#vacuum_cost_delay = 0                   # 0-100 milliseconds (0 disables)
#vacuum_cost_page_hit = 1                # 0-10000 credits
#vacuum_cost_page_miss = 2               # 0-10000 credits
#vacuum_cost_page_dirty = 20             # 0-10000 credits
#vacuum_cost_limit = 200                 # 1-10000 credits
#vacuum_defer_cleanup_age = 0    # number of xacts by which cleanup is delayed
#log_autovacuum_min_duration = -1        # log autovacuum activity;
#autovacuum = on                         # Enable autovacuum subprocess?  'on'
#autovacuum_max_workers = 3              # max number of autovacuum subprocesses
#autovacuum_naptime = 1min               # time between autovacuum runs
#autovacuum_vacuum_threshold = 50        # min number of row updates before
                                         # vacuum
#autovacuum_vacuum_insert_threshold = 1000      # min number of row inserts
                                         # before vacuum; -1 disables insert
                                         # vacuums
#autovacuum_analyze_threshold = 50       # min number of row updates before
#autovacuum_vacuum_scale_factor = 0.2    # fraction of table size before vacuum
#autovacuum_vacuum_insert_scale_factor = 0.2    # fraction of inserts over table
                                         # size before insert vacuum
#autovacuum_analyze_scale_factor = 0.1   # fraction of table size before analyze
#autovacuum_freeze_max_age = 200000000   # maximum XID age before forced vacuum
#autovacuum_multixact_freeze_max_age = 400000000        # maximum multixact age
                                         # before forced vacuum
#autovacuum_vacuum_cost_delay = 2ms      # default vacuum cost delay for
                                         # autovacuum, in milliseconds;
                                         # -1 means use vacuum_cost_delay
#autovacuum_vacuum_cost_limit = -1       # default vacuum cost limit for
                                         # autovacuum, -1 means use
                                         # vacuum_cost_limit
#vacuum_freeze_table_age = 150000000
#vacuum_freeze_min_age = 50000000
#vacuum_failsafe_age = 1600000000
#vacuum_multixact_freeze_table_age = 150000000
#vacuum_multixact_freeze_min_age = 5000000
#vacuum_multixact_failsafe_age = 1600000000
```

10-things-i-hate-about-postgresql

https://www.cybertec-postgresql.com/en/transaction-id-wraparound-a-walk-on-the-wild-side/

Weil wir gerade über Transaktionen sprechen...

- Tools im Default: auto commit
- DDL ist ebenfalls Transaktions-sicher (rollback)
- `PRAGMA AUTONOMOUS_TRANSACTION` existiert nicht (PL/SQL)

Performance

```
explain plan set statement_id = 'ex_plan2' for
select (...)


select plan_table_output
  from table(dbms_xplan.display(null, 'ex_plan2' ,'typical'));
```

```
explain plan set statement_id = 'ex_plan2' for
select (...)


select plan_table_output
  from table(dbms_xplan.display(null, 'ex_plan2' ,'typical'));
```

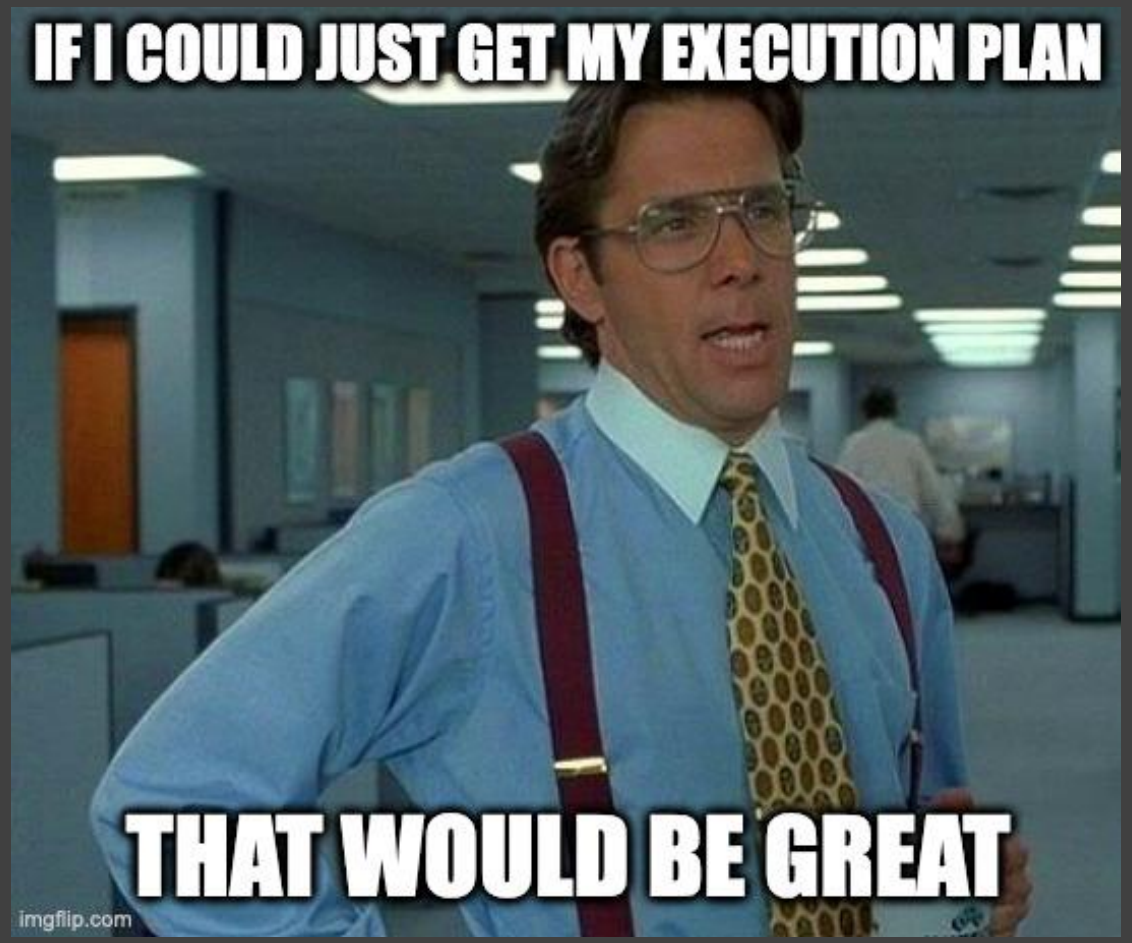
```
'TYPICAL +PEEKED_BINDS'
```

```
explain plan set statement_id = 'ex_plan2' for
select (...)


select plan_table_output
  from table(dbms_xplan.display(null, 'ex_plan2' ,'typical'));
```

```
'TYPICAL +PEEKED_BINDS'

'BASIC'
```


IF I COULD JUST GET MY EXECUTION PLAN
THAT WOULD BE GREAT
imgflip.com

```
explain (analyze, buffers)
select * from demo;
```

https://www.cybertec-postgresql.com/en/how-to-interpret-postgresql-explain-analyze-output

Query wird auch wirklich ausgeführt

```
explain (analyze, buffers)
select * from demo;
```

I/O + Buffers, Default in v18

```
explain (analyze, buffers)
select * from demo;
```

```
Gather  (cost=1209.94..958085.43 rows=4642 width=219) (actual time=1109.578..58769.059 rows=1590 loops=1)
  Workers Planned: 2
  Workers Launched: 2
  Buffers: shared hit=15078 read=642417
  ->  Hash Left Join  (cost=209.94..956621.23 rows=1934 width=219) (actual time=1650.670..58733.230 rows=530 loops=3)
        Hash Cond: ((r.vehicle_id)::text = (v.id)::text)
        Buffers: shared hit=15078 read=642417
        ->  Nested Loop Left Join  (cost=1.39..956339.89 rows=1934 width=394) (actual time=1644.500..58722.864 rows=530 loops=3)
              Buffers: shared hit=14573 read=642321
              ->  Nested Loop  (cost=0.83..915084.87 rows=1934 width=370) (actual time=1643.029..58215.242 rows=530 loops=3)
                    Buffers: shared hit=9596 read=640105
                    ->  Nested Loop  (cost=0.27..815869.64 rows=2004 width=362) (actual time=1640.491..57383.195 rows=530 loops=3)
                          Join Filter: (r.created_at >= ((now())::date - ((p.prebooking_max_threshold)::double precision * '00:00:01'::interval)))
                          Rows Removed by Join Filter: 0
                          Buffers: shared hit=4916 read=636702
                          ->  Parallel Seq Scan on rides r  (cost=0.00..765918.23 rows=6011 width=389) (actual time=1639.946..57375.890 rows=530 loops=3)
                                Filter: (((product_id)::text = 'prd_7fff391f-463a-4793-86e9-ea3574d56a6d'::text) AND ((created_at + ((prebooking_duration)::double precision * '00:00:01'::interval)) >
                                Rows Removed by Filter: 2197905
                                Buffers: shared hit=143 read=636700
                          ->  Index Scan using products_pkey on products p  (cost=0.27..8.29 rows=1 width=46) (actual time=0.009..0.009 rows=1 loops=1591)
                                Index Cond: ((id)::text = 'prd_7fff391f-463a-4793-86e9-ea3574d56a6d'::text)
                                Buffers: shared hit=4773 read=2
                    ->  Index Scan using index_requested_points_on_ride_id on requested_points rp  (cost=0.56..49.44 rows=7 width=49) (actual time=1.525..1.567 rows=1 loops=1590)
                          Index Cond: ((ride_id)::text = (r.id)::text)
                          Filter: ((waypoint_type)::text = 'origin'::text)
                          Rows Removed by Filter: 1
                          Buffers: shared hit=4680 read=3403
Planning:
  Buffers: shared hit=1145 read=197
Planning Time: 125.755 ms
JIT:
  Functions: 96
  Options: Inlining true, Optimization true, Expressions true, Deforming true
  Timing: Generation 17.975 ms, Inlining 296.459 ms, Optimization 1292.804 ms, Emission 791.845 ms, Total 2399.083 ms
Execution Time: 58846.312 ms
```

```
Gather  (cost=1209.94..958085.43 rows=4642 width=219) (actual time=1109.578..58769.059 rows=1590 loops=1)
  Workers Planned: 2
  Workers Launched: 2
  Buffers: shared hit=15078 read=642417
  ->  Hash Left Join  (cost=209.94..956621.23 rows=1934 width=219) (actual time=1650.670..58733.230 rows=530 loops=3)
        Hash Cond: ((r.vehicle_id)::text = (v.id)::text)
        Buffers: shared hit=15078 read=642417
        ->  Nested Loop Left Join  (cost=1.39..956339.89 rows=1934 width=394) (actual time=1644.500..58722.864 rows=530 loops=3)
              Buffers: shared hit=14573 read=642321
              ->  Nested Loop  (cost=0.83..915084.87 rows=1934 width=370) (actual time=1643.029..58215.242 rows=530 loops=3)
                    Buffers: shared hit=9596 read=640105
                    ->  Nested Loop  (cost=0.27..815869.64 rows=2004 width=362) (actual time=1640.491..57383.195 rows=530 loops=3)
                          Join Filter: (r.created_at >= ((now())::date - ((p.prebooking_max_threshold)::double precision * '00:00:01':::interval)))
                          Rows Removed by Join Filter: 0
                          Buffers: shared hit=4916 read=636702
                          ->  Parallel Seq Scan on rides r  (cost=0.00..765918.23 rows=6011 width=389) (actual time=1639.946..57375.890 rows=530 loops=3)
                                Filter: (((product_id)::text = 'prd_7fff391f-463a-4793-86e9-ea3574d56a6d'::text) AND ((created_at + ((prebooking_duration)::double precision * '00:00:01':::interval)) >
                                Rows Removed by Filter: 2197905
                                Buffers: shared hit=143 read=636700
                          ->  Index Scan using products_pkey on products p  (cost=0.27..8.29 rows=1 width=46) (actual time=0.009..0.009 rows=1 loops=1591)
                                Index Cond: ((id)::text = 'prd_7fff391f-463a-4793-86e9-ea3574d56a6d'::text)
                                Buffers: shared hit=4773 read=2
                    ->  Index Scan using index_requested_points_on_ride_id on requested_points rp  (cost=0.56..49.44 rows=7 width=49) (actual time=1.525..1.567 rows=1 loops=1590)
                          Index Cond: ((ride_id)::text = (r.id)::text)
                          Filter: ((waypoint_type)::text = 'origin'::text)
                          Rows Removed by Filter: 1
                          Buffers: shared hit=4680 read=3403
Planning:
  Buffers: shared hit=1145 read=197
Planning Time: 125.755 ms
JIT:
  Functions: 96
  Options: Inlining true, Optimization true, Expressions true, Deforming true
  Timing: Generation 17.975 ms, Inlining 296.459 ms, Optimization 1292.804 ms, Emission 791.845 ms, Total 2399.083 ms
Execution Time: 58846.312 ms
```

Tools?

- Instrumentation muss explizit angeschaltet werden
- Kein raw tracing einer Session

Tools?

- (kein) sampling im ASH-Stil (`pg_sentinel`)
- (keine) Hints & baselines (`pg_hint_plan`)
- Extensions statt GRANTs ;-)

Tools?

pg_ash (Feb 2026)

- (kein) sampling im ASH-Stil (`pg_sentinel`)
- (keine) Hints & baselines (`pg_hint_plan`)
- Extensions statt GRANTs ;-)

Tools?

- (kein) sampling im ASH-Stil (`pg_sentinel`)
- (keine) Hints & baselines (`pg_hint_plan`)
- Extensions statt GRANTs ;-)

pg_stat_statements

generelle, nachträgliche Analyse von schlechten SQLs

(keine Literale -> Bind Variablen)

auto_explain

detaillierte nachträgliche Analyse **eines spezielles SQLs**

(Zugriff auf Server logs)

pg_show_plans

“hands on” **während** langsame Query ausgeführt wird (zweite Session)

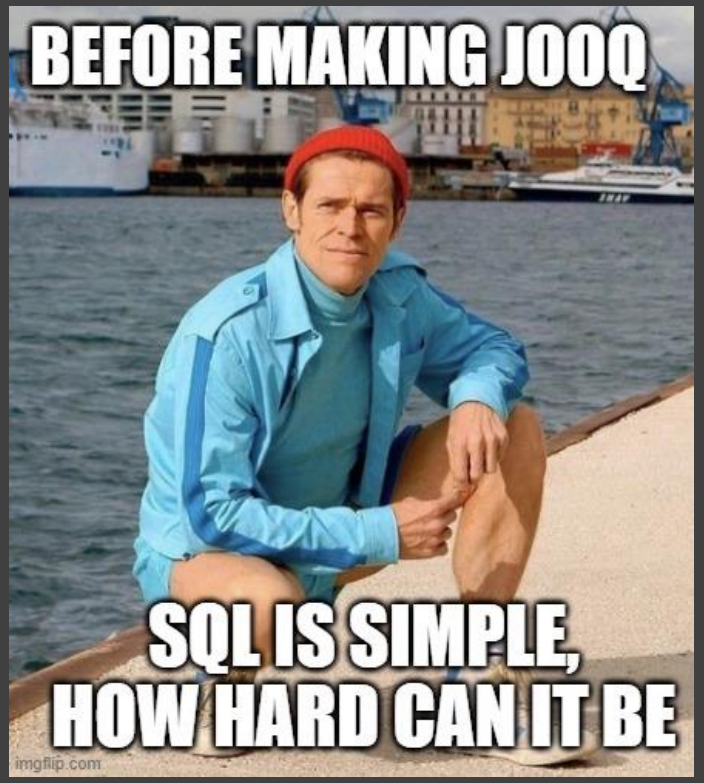
```
alter table events
  add constraint events_account_fk
  foreign key(account_id) references accounts(id)
  not valid
```

https://xata.io/blog/going-down-the-rabbit-hole-of-postgres-18-features

Herve Schweitzer (https://www.doag.org/formes/pubfiles/12736375/docs/Publikationen/DOAGNews/2021/01-2021/Seiten-aus-01_2021-Red_Stack_Magazin-Herve_Schweitzer-Wie_PostgreSQL_von_20_Jahren_Oracle_Tuning_profitieren_kann.pdf)

Fazit

Fazit


BEFORE MAKING JOOQ
SQL IS SIMPLE,
HOW HARD CAN IT BE
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imgflip.com
13 YEARS LATER
THIS RDBMS DOES
WHAT WITH *WHAT SYNTAX*??

Fazit

- Wir haben im SQL und in der Architektur Unterschiede gesehen
- Wenn es keine guten Gründe gibt, starte **neue** Projekte mit PostgreSQL
- Kenne beide Seiten und bleib’ in Übung

Empfehlungen

- Postgres Weekly postgres@cooperpress.com
- Franck Pachot
- Hironobu Suzuki (https://www.interdb.jp/pg/index.html)
- Frits Hoogland (https://dev.to/fritshooglandyugabyte)
- Markus Winand (https://use-the-index-luke.com/de)

Empfehlungen

Sign up für Mailinglisten

https://www.postgresql.org/list/

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```
>
> regards, tom lane
>
```