

PostgreSQL

The World's Most Advanced Open Source Database

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PostgreSQL is a RDBMS

- Strictly speaking, ORDBMS
- Speaks SQL
 - d'uh!
- Stores your data
 - double d'uh!
- So what now?



Distribution specific login

- RedHat and Debian use «ident»
 - su postgres -c psql
 - su postgres -c createuser kalle
- Might want to use «md5» remote?
 - Set a password!
 - \password kalle
- pg_hba.conf



Basic configuration is tiny!

- shared_buffers = 24MB?
 - $-\frac{1}{4}$ of RAM
- work $_{mem} = 1MB$?
 - Probably 10
- checkpoint_segments=3?
 - Start at 10?
- effective_cache_size=128MB?



PostgreSQL validates your data

- Encoding
 - Recommended: UTF8
- Datatype
 - Exceeding varchar length throws error
 - Invalid data format is always error
- Constraints are enforced



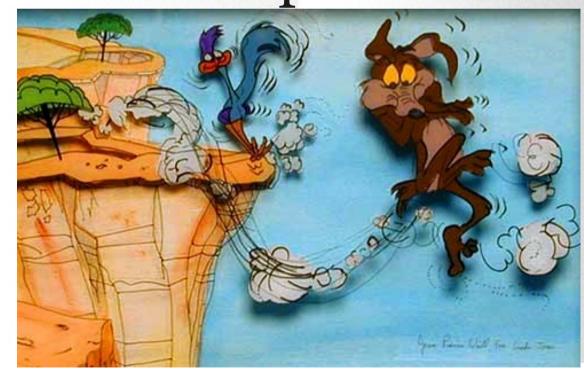
Dumps are not backups!

Slow to take on large databases



Dumps are not backups!

- Slow to take on large databases
- Only restores to backup time!
- Use PITR!
- With log shipping!





Dumps are still pretty neat...

- Transactionally safe snapshots!
- No locks
 - Well, almost, can't do DDL
- Easy format for export/import
 - Full DDL and all data included
- Always use *custom* format!



PostgreSQL is not SQLite/MySQL

(or mariadb, or drizzle, or xtradb, or ourdelta, or)

- Don't be afraid to throw work at the database
- In most cases, a lot smarter and faster!



CTEs - the road to Turing Complete

```
WITH RECURSIVE x ( s, ind ) AS
( SELECT sud, position( ' ' IN sud )
 FROM (SELECT '53 7 6 195 98 6 8 6 34 8 3 17 2 6 6
28 419 5 8 79'::text
           AS sud) xx
 UNION ALL
 SELECT substr(s, 1, ind - 1) || z || substr(s, ind + 1)
      , position(' ' IN repeat('x',ind) || substr(s, ind + 1))
 FROM x
    , (SELECT gs::text AS z FROM generate series(1,9) gs) z
 WHERE ind > 0
 AND NOT EXISTS ( SELECT NULL
                 FROM generate series (1,9) lp
                 WHERE z.z = substr(s, ((ind - 1) / 9) * 9 + lp, 1)
                 OR z.z = substr(s, mod(ind - 1, 9) - 8 + lp * 9, 1)
                 OR z.z = substr(s, mod((ind - 1)/3), 3) * 3
                                  + ((ind - 1) / 27) * 27 + 1p
                                  + ((lp - 1) / 3) * 6
                                , 1)
) SELECT s FROM x WHERE ind = 0;
```



More useful CTEs

```
WITH RECURSIVE t(id, department, name, manager) AS
(
   SELECT id, department, name, manager
   FROM emp WHERE name='Kalle'
UNION ALL
   SELECT emp.id,emp.department,emp.name,emp.manager
   FROM emp JOIN t ON t.manager=emp.id
)
SELECT * FROM t;
```



Replication is for replication

- Q: Creating a index on a 500M row table locks my table for a day!
- A: Set up a second server, enable replication, add index there, and do failover



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- Q: Creating a index on a 500M row table locks my table for a day!
- A: Set up a second server, enable replication, add index there, and do failover
 - A: Use CREATE INDEX CONCURRENTLY



Replication is for replication

- Q: Adding a column to my 100M row table locks my table for hours!
- A: Set up a second server, enable replication, add column there, and do failover
 - A: Just add the column, don't set a DEFAULT



Bottom line

- Don't assume the database can't do it
 - (better than you)
- Assume it can, only workaround when it can't



Upcoming 9.0 release

- Lots of new features!
 - Would take hours to talk about all...
- I'm just going to pick one....



Let's do a challenge

- Task: room booking system
- Requirements: support high performance and concurrency
- Problem: conflict detection and resolution?



Let's define a table

```
CREATE TABLE bookings(
  title text,
  room text,
  start timestamptz,
  end timestamptz
)
```



- The PERIOD datatype
 - Available on pgFoundry
 - Makes dealing with time intervals much nicer
 - Not a requirement, but easier
- Single datatype for start and end time



Let's define a table

```
CREATE TABLE bookings(
  title text,
  room text,
  during period
)
```



- How to prevent the same room to be booked twice?
 - Or overlapping?
- Enforced, please!
 - In the system, not in the room!
- •Ideas?



Exclusion Constraints!

```
CREATE TABLE bookings (
  title text,
  room text,
  during period,
  EXCLUDE USING gist
     (room WITH =,
     during WITH &&)
NOTICE: CREATE TABLE / EXCLUDE will create
implicit index
"bookings room during exclusion" for table
"bookings"
```



Constraint violations

```
INSERT INTO bookings values ('Features talk', 'AW1.121', period('2010-02-06 17:30', '2010-02-06 18:15'));

ERROR: conflicting key value violates exclusion constraint "bookings_room_during_exclusion"

DETAIL: Key (room, during)=(AW1.121, [2010-02-06 17:30:00+01, 2010-02-06 18:15:00+01)) conflicts with existing key (room, during)=(AW1.121, [2010-02-06 17:15:00+01, 2010-02-06 18:00:00+01)).
```



Exclusion Constraints

- Any operator that can define differences
- Typically enforces non-overlap
 - Timeframes
 - Geometric (square/circle/line)
 - Geographical regions (PostGIS)
- Enforced in the database!



Thank You!

Questions?

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