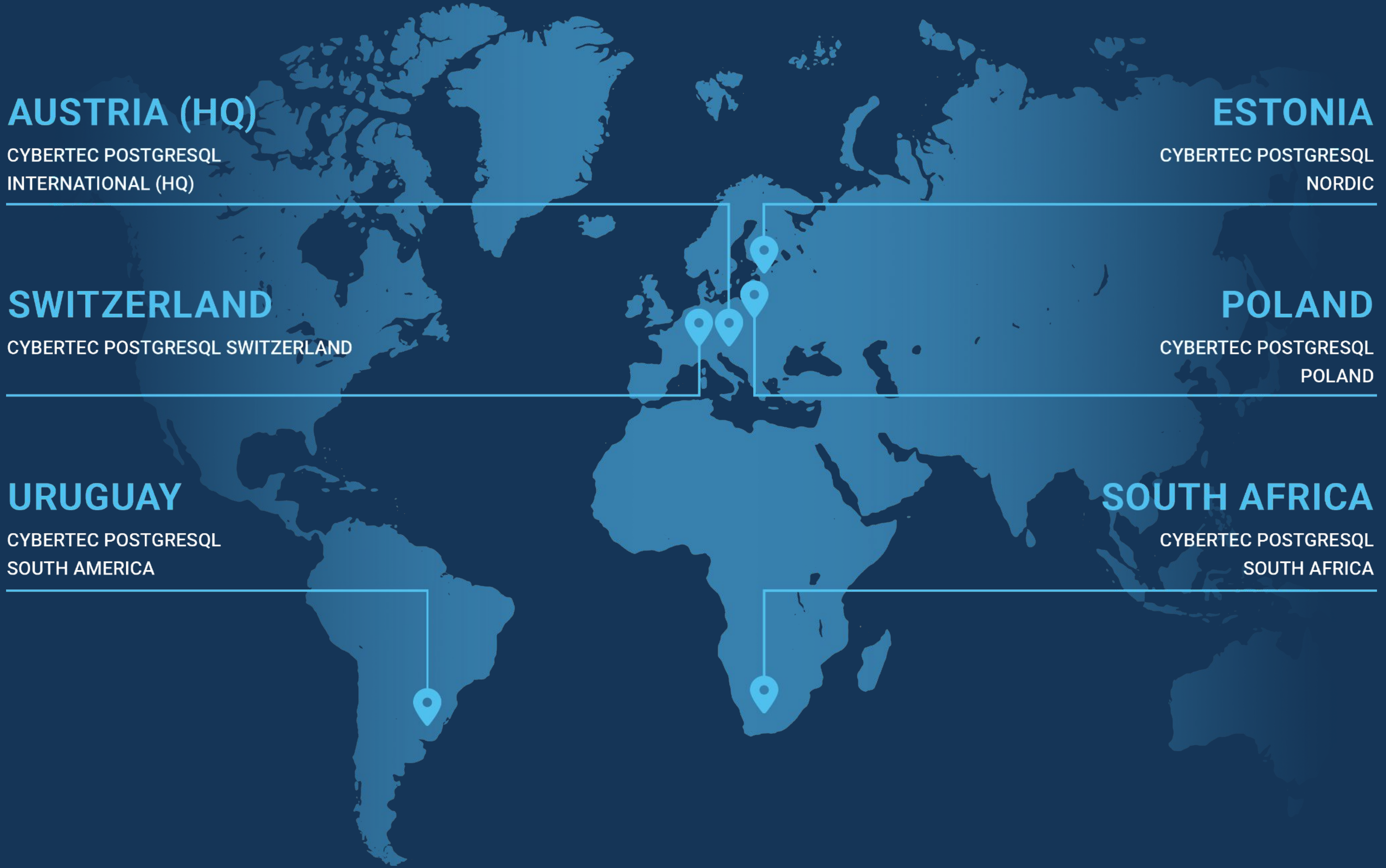
CYBERTEC

POSTGRESQL SERVICES & SUPPORT

POSTGRESQL TOOLING FOR THE COMMUNITY



AUSTRIA (HQ)

CYBERTEC POSTGRESQL
INTERNATIONAL (HQ)

ESTONIA

CYBERTEC POSTGRESQL
NORDIC

SWITZERLAND

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POLAND

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POLAND

URUGUAY

CYBERTEC POSTGRESQL
SOUTH AMERICA

SOUTH AFRICA

CYBERTEC POSTGRESQL
SOUTH AFRICA

OPEN SOURCE FOR EVERYONE

THINGS THAT WE FOUND USEFUL

“ OPEN SOURCE MEANS ”

OPEN FOR NEW IDEAS

MANY THINGS IN OUR REPOS

PERFORMANCE AND MONITORING
Tools to monitor and improve performance

AUTOMATION AND ORCHESTRATION
PostgreSQL on Kubernetes and on-prem

ADMINISTRATION AND SECURITY
Manage and secure your databases

https://github.com/cybertec-postgresql/

PERFORMANCE AND MONITORING

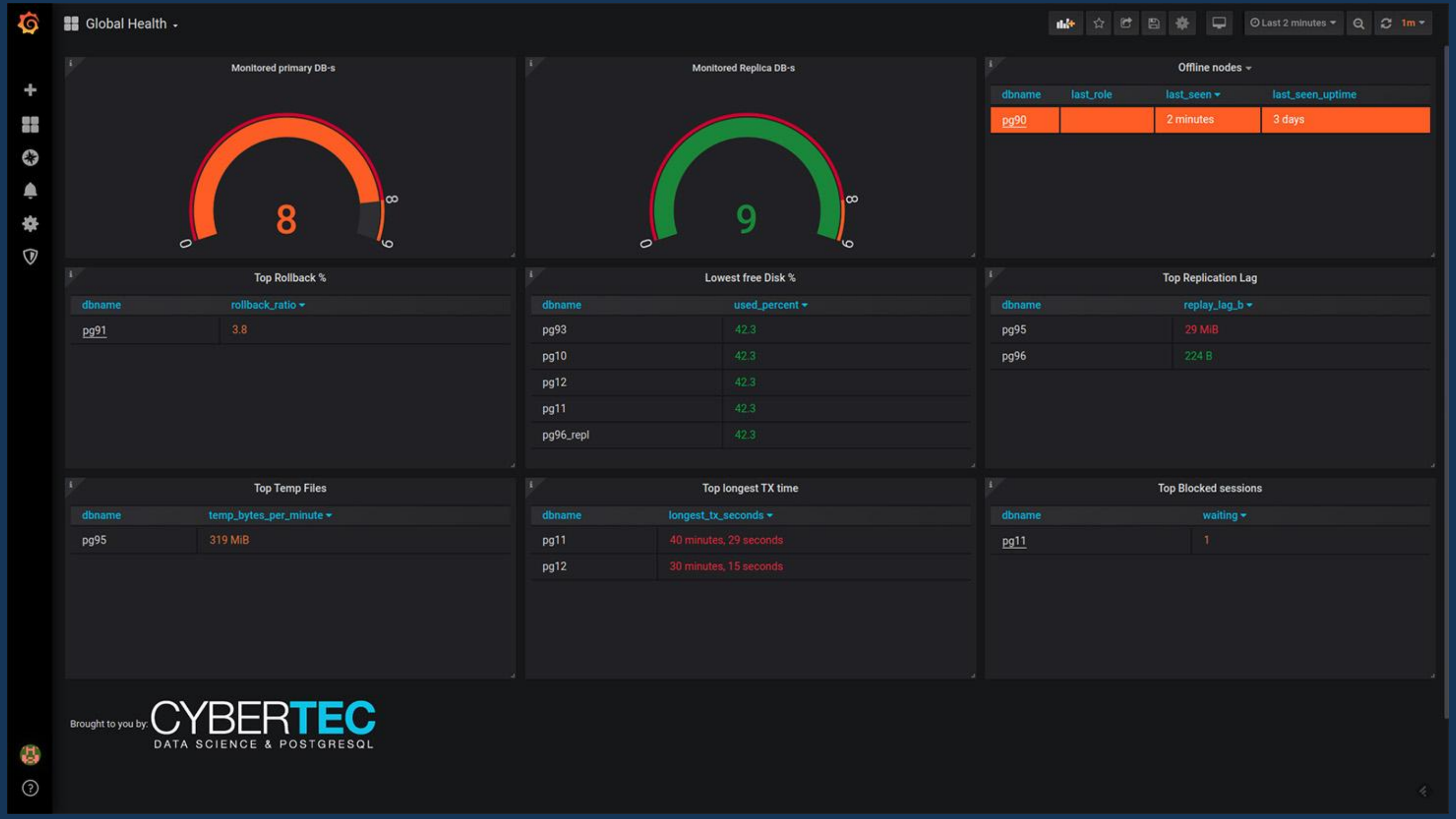
THINGS TO IMPROVE SPEED

PGWATCH2 / 3: ADVANCED MONITORING

- PostgreSQL monitoring at scale
  - We collect EVERY metric PostgreSQL provides
  - Ready made dashboards
  - Automatic service discovery
  - Support all relevant versions

← tested with 10.000 databases

- pgwatch3: Around the corner
  - More modern technology
  - Better at scale
  - More enterprise features



Offline nodes

dbname	last_role	last_seen	last_seen_uptime
pg90		2 minutes	3 days

Top Rollback %

dbname	rollback_ratio
pg91	3.8

Lowest free Disk %

dbname	used_percent
pg93	42.3
pg10	42.3
pg12	42.3
pg11	42.3
pg96_repl	42.3

Top Replication Lag

dbname	replay_lag_b
pg95	29 MiB
pg96	224 B

Top Temp Files

dbname	temp_bytes_per_minute
pg95	319 MiB

Top longest TX time

dbname	longest_tx_seconds
pg11	40 minutes, 29 seconds
pg12	30 minutes, 15 seconds

Top Blocked sessions

dbname	waiting
pg11	1

PG_SHOW_PLANS: LIVE PLAN MONITORING

- “explain” provides execution plans

- But:
    - Which plans are currently running?
    - Plans currently running or not visible
    - How can we analyze running queries?

- pg_show_plans comes to the rescue

← No performance without visibility !

PG_SHOW_PLANS: LIVE PLAN MONITORING

```
testdb=# \x

Expanded display is on.
testdb=# SELECT * FROM pg_show_plans_q;
-[ RECORD 1 ]-----------------------------------------------------------------------------------------
pid   | 11473
level | 0
plan  | Sort  (cost=72.08..74.58 rows=1000 width=80)
      |   Sort Key: pg_show_plans.pid, pg_show_plans.level
      |   ->  Hash Left Join  (cost=2.25..22.25 rows=1000 width=80)
      |         Hash Cond: (pg_show_plans.pid = s.pid)                                                +
      |         Join Filter: (pg_show_plans.level = 0)                                                +
      |         ->  Function Scan on pg_show_plans  (cost=0.00..10.00 rows=1000 width=48)             +
      |         ->  Hash  (cost=1.00..1.00 rows=100 width=44)                                         +
      |               ->  Function Scan on pg_stat_get_activity s  (cost=0.00..1.00 rows=100 width=44)
query | SELECT p.pid, p.level, p.plan, a.query FROM pg_show_plans p                                   +
      |    LEFT JOIN pg_stat_activity a                                                               +
      |    ON p.pid = a.pid AND p.level = 0 ORDER BY p.pid, p.level;
-[ RECORD 2 ]-----------------------------------------------------------------------------------------
pid   | 11517
level | 0
plan  | Function Scan on print_item  (cost=0.25..10.25 rows=1000 width=524)
query | SELECT * FROM print_item(1,20);
-[ RECORD 3 ]-----------------------------------------------------------------------------------------
pid   | 11517
level | 1
plan  | Result  (cost=0.00..0.01 rows=1 width=4)
query |
```

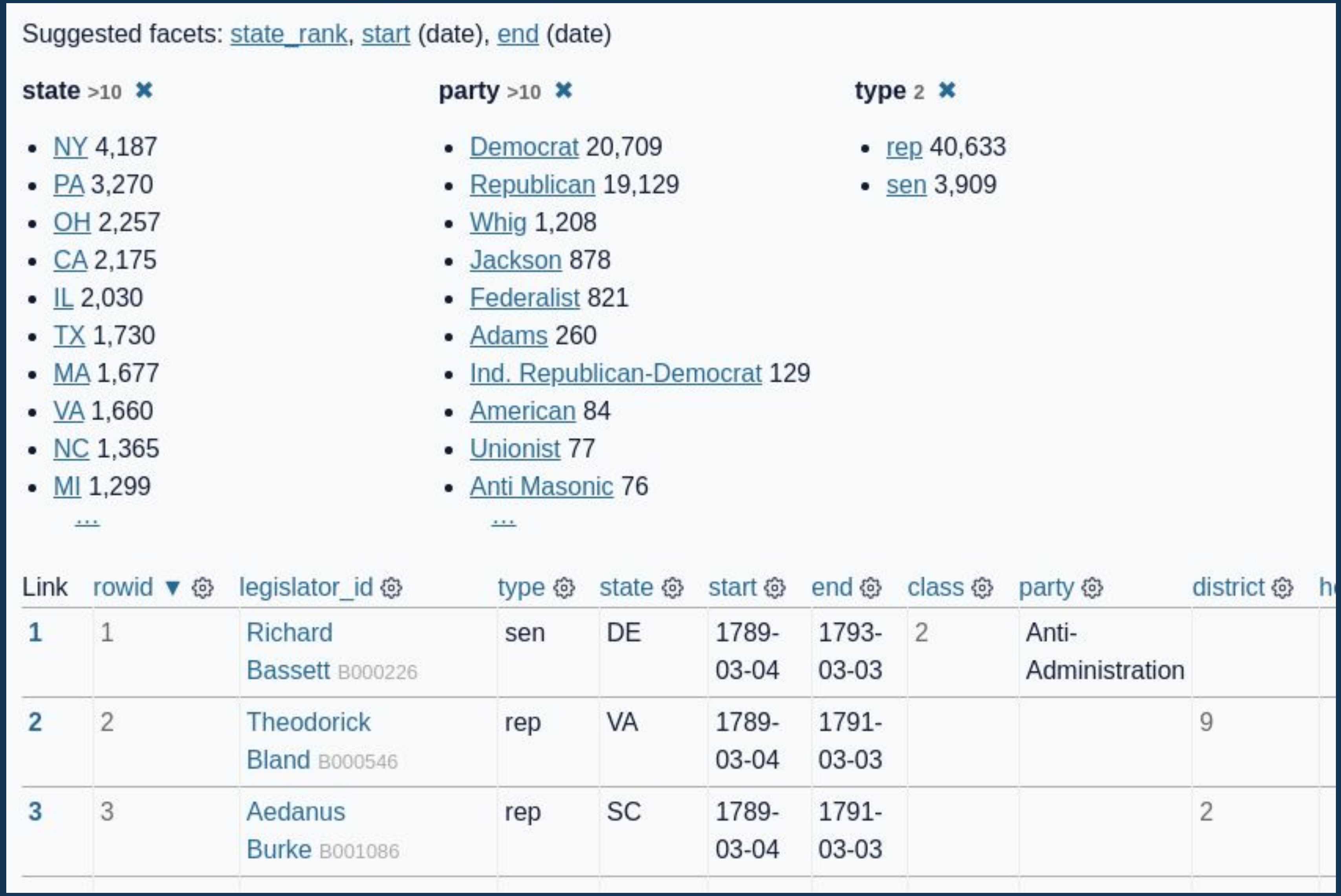
← **Real information in real time**

PGFACETING: SUPER FAST FACETING

- What is faceting in the first place?
- Why is it relevant?

An example of faceting ->

- Usually very expensive
  - Involves expensive counting
  - Slow to implement



Suggested facets: state_rank, start (date), end (date)

state >10 ✖

- NY 4,187
- PA 3,270
- OH 2,257
- CA 2,175
- IL 2,030
- TX 1,730
- MA 1,677
- VA 1,660
- NC 1,365
- MI 1,299

...

party >10 ✖

- Democrat 20,709
- Republican 19,129
- Whig 1,208
- Jackson 878
- Federalist 821
- Adams 260
- Ind. Republican-Democrat 129
- American 84
- Unionist 77
- Anti Masonic 76

...

type 2 ✖

- rep 40,633
- sen 3,909

Link	rowid ▼	legislator_id	type	state	start	end	class	party	district	h
1	1	Richard Bassett B000226	sen	DE	1789-03-04	1793-03-03	2	Anti-Administration		
2	2	Theodorick Bland B000546	rep	VA	1789-03-04	1791-03-03			9	
3	3	Aedanus Burke B001086	rep	SC	1789-03-04	1791-03-03			2	

PGFACETING: SUPER FAST FACETING

- Super fast implementation using “roaring bitmaps”
- Experiment with 100.000.000 rows
- Plain SQL takes 4 min 42 seconds

```
postgres=# SELECT facet_name, count(distinct facet_value), sum(cardinality)
           FROM faceting.count_results('documents'::regclass,
                filters => array[row('category_id', 24)]::faceting.facet_filter[])
           GROUP BY 1;
 facet_name | count |   sum
------------+-------+----------
 created    |   154 | 60812252
 finished   |   154 | 60812252
 size       |     7 | 60812252
 type       |     8 | 60812252
(4 rows)

 Time: 155.228 ms
```

https://github.com/cybertec-postgresql/pgfaceting

AUTOMATION AND ORCHESTRATION

POSTGRESQL ON KUBERNETES

AND ON-PREMISE

POSTGRESQL OPERATOR FOR KUBERNETES

- Fully functional PostgreSQL Operator for …
  - Kubernetes / OpenShift / Rancher
  - RedHat certified package available !

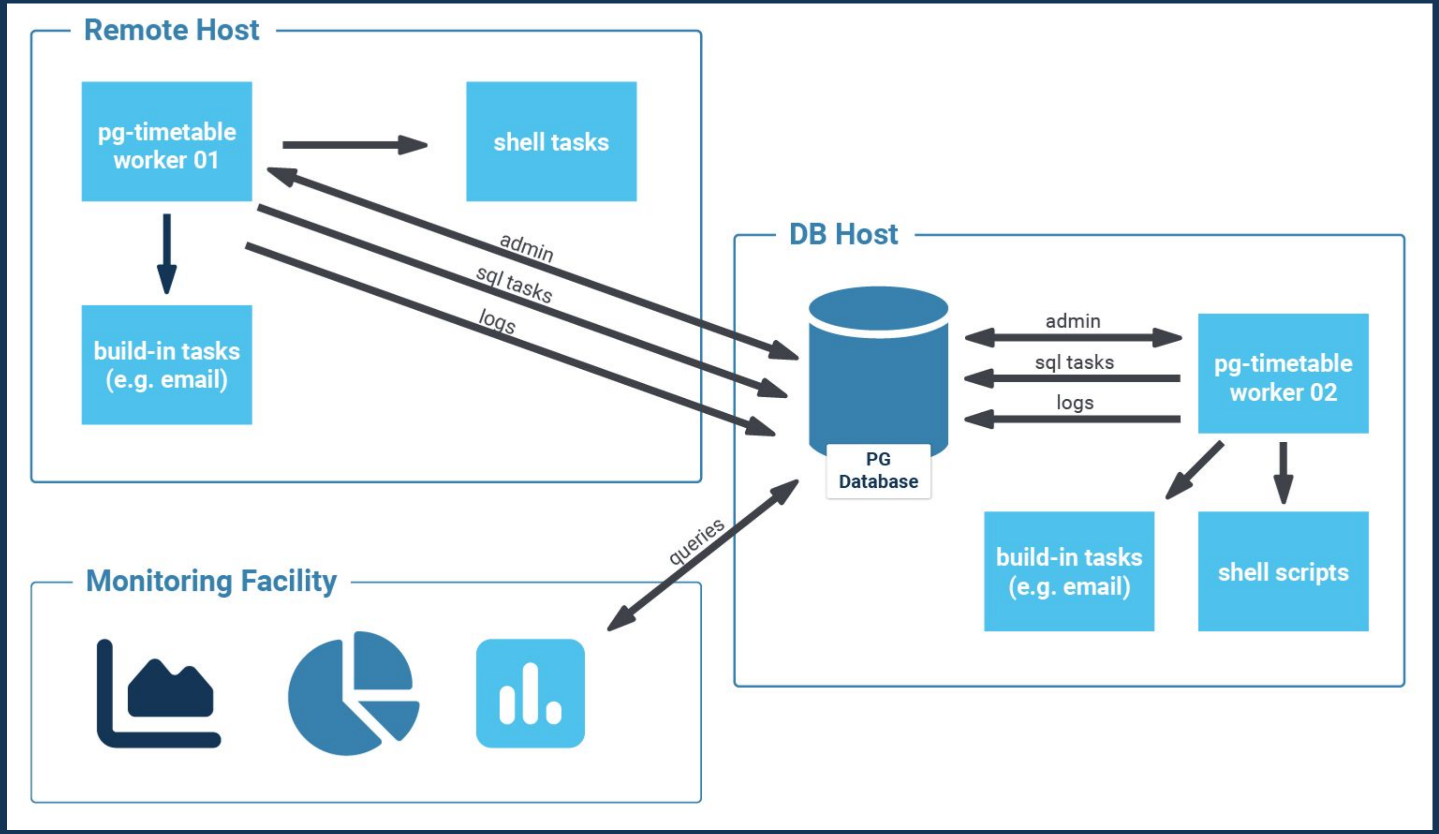
- Substantial improvements over the Zalando operator
  - Faster development cycle
  - Made for more generic needs

- Full support available provided by us
- Soon available for “Multi-Site Kubernetes”

https://github.com/cybertec-postgresql/CYBERTEC-pg-operator

PG_TIMETABLE: SCHEDULING DONE PROPERLY

- Fully features PostgreSQL scheduler
- NO server side stuff needed (processes, modules, etc).
- Single, easy to deploy binary
- Can run:
  - Single tasks
  - Chains of tasks
  - SQL, builtin and Shell tasks
- Support:
  - Non-overlapping execution
  - Async execution (“suicide jobs”)



https://github.com/cybertec-postgresql/pg_timetable

ADMINISTRATION AND SECURITY

OPERATION EXCELLENCE

PG_PERMISSIONS: AUDIT AND SECURITY

- Security audits become more frequent
- Security does matter
- How can we …
  - Compare: “Reality” vs “desired state”
  - See all permissions at one glance

- pg_permissions does all of that and more

https://github.com/cybertec-postgresql/pg_permissions

PG_PERMISSIONS: AUDIT AND SECURITY

```
test=# SELECT * FROM all_permissions WHERE role_name NOT LIKE 'pg%';
-[ RECORD 1 ]------------------------------------
object_type | TABLE
role_name   | joe
schema_name | columnar_internal
object_name | options
column_name |
permission  | SELECT
granted     | f
-[ RECORD 2 ]------------------------------------
object_type | TABLE
role_name   | joe
schema_name | columnar_internal
object_name | options
column_name |
permission  | INSERT
granted     | f
…
```

https://github.com/cybertec-postgresql/pg_permissions

PG_PERMISSIONS: AUDIT AND SECURITY

```
INSERT INTO public.permission_target
   (role_name, permissions,
    object_type, schema_name, object_name)
VALUES
   ('appuser', '{USAGE}',
    'SEQUENCE', 'appschema', 'appseq');

SELECT * FROM public.permission_diffs();
 missing | role_name | object_type | schema_name | object_name | column_name | permission
---------+-----------+-------------+-------------+-------------+-------------+------------
 f       | laurenz   | VIEW        | appschema   | appview     |             | SELECT
 t       | appuser   | TABLE       | appschema   | apptable    |             | DELETE
(2 rows)
```

https://github.com/cybertec-postgresql/pg_permissions

PG_SQUEEZE: ENDING TABLE BLOAT

- Shrink table WITHOUT excessive locking
  - Just a short lock at the end

- Shrink tables when VACUUM cannot help anymore
- Especially useful when facing “hyper bloat”
  - For example: 1 GB -> 1 TB (no way to fix with normal VACUUM)

https://github.com/cybertec-postgresql/pg_squeeze

PG_SQEEZE: AD HOC ACTION

```
CREATE EXTENSION pg_squeeze;

SELECT squeeze.squeeze_table('public', ‘t_test’);
```

Shrinking on demand

Be prepared for potential failures
It can happen by design in some cases

PG_SQEEZE: SCHEDULED ACTION

```
INSERT INTO squeeze.tables (
    tabschema,
    tabname,
    schedule,
    free_space_extra,
    vacuum_max_age,
    max_retry)
VALUES (
    'public',
    't_test',
    ('{30}', '{22}', NULL, NULL, '{3, 5}'),
    30,
    '2 hours',
    2
);
```

schedule shrinking

THERE IS A LOT MORE

AND MORE IS TO COME

ANY QUESTIONS?

FEEL FREE TO ASK

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