Major Features: Postgres 12

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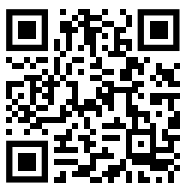
PostgreSQL is an open-source, full-featured relational database. This presentation gives an overview of the Postgres 12 release.

https://momjian.us/presentations



Last updated: September, 2020

Postgres 12 Feature Outline

1. Partitioning improvements
2. Btree improvements
3. Multi-column most-common-value statistics
4. Inline many CTE queries
5. Prepared plan control
6. Just-in-time Compilation
7. Checksum Control
8. REINDEX CONCURRENTLY

Full item list at https://www.postgresql.org/docs/12/index.html

1. Partitioning Improvements

- Thousands of partitions now efficiently processed
- Partitioned tables can now be referenced as foreign keys
- Improve COPY into partitioned tables
- Partition bounds can now be expressions
- New partition introspection SQL functions

2. Btree Improvements

- Reduce multi-column index size by using space more efficiently
- Improve performance of indexes with many duplicates
- Allow VACUUM to more efficiently remove tuples from indexes with many duplicates
- Reduce locking requirements during index updates

3. Multi-Column Most-Common-Value Statistics

Allow most-common-value statistics for multiple columns; previously only a single correlation value was recorded for multiple columns.

```
CREATE STATISTICS stts3 (mcv) ON city, state FROM zipcodes;

ANALYZE zipcodes;

SELECT m.* FROM pg_statistic_ext,
                pg_mcv_list_items(stxmcv) m WHERE stxname = 'stts3';
```

index	values	nulls	frequency	base_frequency
0	{Washington, DC}	{f,f}	0.003467	2.7e-05
1	{Apo, AE}	{f,f}	0.003067	1.9e-05
2	{Houston, TX}	{f,f}	0.002167	0.000133
3	{El Paso, TX}	{f,f}	0.002	0.000113
4	{New York, NY}	{f,f}	0.001967	0.000114
5	{Atlanta, GA}	{f,f}	0.001633	3.3e-05
6	{Sacramento, CA}	{f,f}	0.001433	7.8e-05
7	{Miami, FL}	{f,f}	0.0014	6e-05
8	{Dallas, TX}	{f,f}	0.001367	8.8e-05

4. Inline Many CTE Queries

Many common table expressions (CTE) can now be inlined:

```
-- PG 11
EXPLAIN WITH t(x) AS (SELECT 1) SELECT * FROM t;
                      QUERY PLAN
-----------------------------------------------------
 CTE Scan on t  (cost=0.01..0.03 rows=1 width=4)
   CTE t
     ->  Result  (cost=0.00..0.01 rows=1 width=4)


-- PG 12
EXPLAIN WITH t(x) AS (SELECT 1) SELECT * FROM t;
                   QUERY PLAN
----------------------------------------
 Result  (cost=0.00..0.01 rows=1 width=4)
```

5. Prepared Plan Control

Prepared statements usually use generic/prepared plans after six executions:

```
PREPARE p (INTEGER) AS
SELECT relname FROM pg_class WHERE oid = $1;

EXPLAIN EXECUTE p (1);
                                        QUERY PLAN
-----------------------------------------------------
 Index Scan using pg_class_oid_index on pg_class  …
   Index Cond: (oid = '1'::oid)

EXPLAIN EXECUTE p (1);
                                        QUERY PLAN
-----------------------------------------------------
 Index Scan using pg_class_oid_index on pg_class  …
   Index Cond: (oid = '1'::oid)
```

Prepared Plan Control

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Prepared Plan Control

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EXPLAIN EXECUTE p (1);
                                        QUERY PLAN
-----------------------------------------------------
 Index Scan using pg_class_oid_index on pg_class  …
   Index Cond: (oid = ($1)::oid)
```

plan_cache_mode

plan_cache_mode allows users to force always-custom or always-generic plans:

```
DEALLOCATE p;


PREPARE p (INTEGER) AS SELECT relname FROM pg_class WHERE oid = $1;


SET plan_cache_mode = force_generic_plan;


EXPLAIN EXECUTE p (1);
                                        QUERY PLAN
-----------------------------------------------------------
 Index Scan using pg_class_oid_index on pg_class  …
   Index Cond: (oid = ($1)::oid)
```

6. Just-in-Time Compilation

- Enable JIT by default
- Useful for data warehouse queries

7. Checksums Control

- Allow a cluster's checksum mode to be changed while is it offline
- `pg_checksums --enable --progress`
- Online change control planned

8. Reindex Concurrently

Like CREATE INDEX CONCURRENTLY, this allows REINDEX with minimal locking, specifically, just before completion:

```
CREATE TABLE test (x INTEGER);

INSERT INTO test SELECT generate_series(1, 1000);

CREATE INDEX i_test ON test (x);

REINDEX INDEX CONCURRENTLY i_test;
```

Conclusion

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