modb.pro

PostgreSQL 15部分新特性预览







- 01
- 参数相关

- 02
- 开发相关

- 03
- 并行特性





GUC参数增加内部标识管理

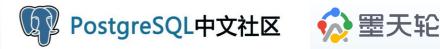




- EXPLAIN: EXPLAIN 命令中包含的参数
- NO_SHOW_ALL: SHOW ALL命令中排除的参数
- NO_RESET_ALL: RESET ALL 命令中排除的参数
- NOT_IN_SAMPLE: 不包含在 postgresql.conf模板中的参数
- RUNTIME_COMPUTED: 运行时计算的参数



参数可配置权限





■ 参数的set和alter system操作可授权

```
postgres=# grant set on parameter log_checkpoints to test;
GRANT
postgres=# grant alter system on parameter archive_mode to test;
GRANT
postgres=# select has_parameter_privilege ('test','log_checkpoints','set');
 has parameter privilege
(1 row)
postgres=# select has_parameter_privilege ('test','log_checkpoints','alter system');
 has parameter privilege
(1 row)
postgres=# select has_parameter_privilege ('test','archive_mode','alter system');
 has parameter privilege
(1 row)
```



新增参数权限系统表





■新增pg_parameter_acl系统表



自定义变量限制

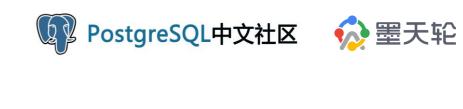




□ 已安装扩展插件名称不允许作为自定义变量前缀,否则在扩展插件加载

时会自动删除该变量

```
psql (15beta1)
Type "help" for help.
postgres=# show postgres_fdw.t1;
 postgres_fdw.t1
 abc
(1 row)
postgres=# select * from remote t1 ;
WARNING: invalid configuration parameter name "postgres_fdw.t1", removing it
DETAIL: "postgres fdw" is now a reserved prefix.
 id | val
(0 rows)
postgres=# show postgres fdw.t1;
ERROR: unrecognized configuration parameter "postgres fdw.t1"
postgres=#
postgres=# set postgres_fdw.t1 to 'aaa';
ERROR: invalid configuration parameter name "postgres fdw.t1"
DETAIL: "postgres fdw" is a reserved prefix.
```





02 开发相关



乐/知/乐/享 同/心/共/济

PostgreSQL 15部分新特性预览

第 8/21页



public模式安全增强



- □ public模式create权限默认被回收
- □ public模式owner变为pg_database_owner

← PostgreSQL v14

PostgreSQL v15 →

```
psql (15beta1)
Type "help" for help.

postgres=# \dn+ public

List of schemas

Name | Owner | Access privileges | Description

public | pg_database_owner | pg_database_owner=UC/pg_database_owner+| standard public schema

| +U/pg_database_owner | pg_database_owner |
```



NULL可设置是否允许重复





□ 唯一约束和索引可设置NULL值distinct/not distinct

PostgreSQL v14使用部分表达式限制重复NULL

CREATE UNIQUE INDEX idx_abc ON abc ((a2 is null))
WHERE a2 IS NULL;

```
postgres=# create table abc(a2 varchar(10));
CREATE TABLE
postgres=# CREATE UNIQUE INDEX idx_abc
postgres-# ON abc ((a2 is null)) WHERE a2 IS NULL;
CREATE INDEX
postgres=# insert into abc values(null);
INSERT 0 1
postgres=# insert into abc values(null);
ERROR: duplicate key value violates unique constraint "idx_abc"
DETAIL: Key ((a2 IS NULL))=(t) already exists.
```

PostgreSQL v15

UNIQUE NULLS DISTINCT
UNIQUE NULLS NOT DISTINCT

```
postgres=# create table abc (
postgres(# a2 varchar(10),
postgres(# unique NULLS NOT DISTINCT (a2)
postgres(# );
CREATE TABLE
postgres=# insert into abc values(null);
INSERT 0 1
postgres=# insert into abc values(null);
ERROR: duplicate key value violates unique constraint "abc_a2_key"
DETAIL: Key (a2)=(null) already exists.
```



jsonlog与日志分析





■ 数据库日志增加jsonlog格式

```
"timestamp":"2022-04-20 10:24:47.710 CST",
"pid":3383,
"session_id":"625f67e3.d37",
"line_num":12,
"session start":"2022-04-20 09:54:43 CST",
"txid":0,
"error severity":"LOG",
"message": "checkpoint complete: wrote 4 buffers (0.0%); 0 WAL file(s)
added, 0 removed, 0 recycled; write=0.303 s, sync=0.135 s, total=0.809
s; sync files=4, longest=0.127 s, average=0.034 s; distance=0 kB,
estimate=114 kB",
"backend type": "checkpointer",
"query_id":0
```

log_destionation='jsonlog'

```
"timestamp": "2022-04-20 10:36:26.125 CST",
"user":"postgres",
"dbname": "postgres",
"pid":3881,
"remote host":"[local]",
"session id":"625f71aa.f29",
"line num":1,
"ps":"idle",
"session start": "2022-04-20 10:36:26 CST",
"vxid":"3/2",
"txid":0.
"error severity":"LOG",
"message": "statement: select\n relname,\n relkind\nfrom\n
pg_class\nlimit 1;",
"application_name":"psql",
"backend_type":"client backend",
"query id":0
```



jsonlog与日志分析





□ 使用file_fdw映射本地日志文件

```
create foreign table pg_log_5(
isonstr text
) server local file server
options (program 'cat /opt/pgdata1500/log/pg_log_5.json |jq -cMR');
```

□ 使用物化视图及json构造函数转换json类型

```
create materialized view mv pg log 5
as select json(trim(jsonstr,'"')) as jsonlog from pg_log_5;
```

□ 使用json函数进行日志分析

```
select * from mv_pg_log_5 where jsonlog is not json;
select distinct json_query(jsonlog::jsonb,'$.error_severity')
from mv_pg_log_5;
```

https://www.modb.pro/db/411473







□新增Merge命令根据单表匹配修改另一个表(insert\update\delete)

匹配则更新,不匹配插入

merge into a_merge a using (select b.aid,b.name,b.year from b_merge b) c on (a.id=c.aid) when matched then update set year=c.year when not matched then insert values(c.aid,c.name,c.year);

仅匹配更新

merge into a_merge a using (select b.aid,b.name,b.year from b_merge b) c on (a.id=c.aid) when matched then

不匹配插入

merge into a_merge a using (select b.aid,b.name,b.year from b_merge b) c on (a.id=c.aid) when not matched then

insert values(c.aid,c.name,c.year);

update set year=c.year;

二次匹配

merge into a_merge a using (select b.aid,b.name,b.year,b.city from b_merge b) c on (a.id=c.aid)

when matched and c.city!= '江西' then update set name=c.name

when not matched and c.city = '江西' then

insert values(c.aid,c.name,c.year);



Numeric数据类型增强





PostgreSQL v14 →

Oracle的number(p, s) 类型,根据精度(p)和小数位数(s) 的不同,分别对应多种情况。

- □ 当小数位数(s)>0时
- 0 < s <= p 推荐numeric(p,s)
- p<s 推荐numeric(s,s)

- □ 当小数位数(s) < 0时
- 当p + |s| <= 4时,使用integer或者smallint
- 当4 < p+ |s| <= 9时,使用integer
- 当9 < p+ |s| <= 18时,使用bigint
- 当p+|s|>18时,使用numeric(p+|s|,0)

PostgreSQL v15 →

□ numeric(p, s) 类型 scale可以是负数 或者比precision大

```
psql (15beta1)
Type "help" for help.

postgres=# select '1234'::numeric(4,-2);
numeric
------
1200
(1 row)
```



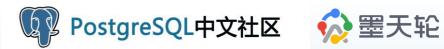








v15之前并行特性





	14	13	12	11	10	9.6	9.5
Parallel query execution on remote databases	Yes	No	No	No	No	No	No
Foreign data wrapper query parallelism	Yes	No	No	No	No	No	No
Query parallelism for RETURN QUERY	Yes	No	No	No	No	No	No
Parallelized VACUUM for Indexes	Yes	Yes	No	No	No	No	No
Parallelized CREATE INDEX for B-tree indexes	Yes	Yes	Yes	Yes	No	No	No
Parallel hash joins	Yes	Yes	Yes	Yes	No	No	No
Parallel B-tree index scans	Yes	Yes	Yes	Yes	Yes	No	No
Parallel bitmap heap scans	Yes	Yes	Yes	Yes	Yes	No	No
Parallel merge joins	Yes	Yes	Yes	Yes	Yes	No	No
Parallel full table scans (sequential scans)	Yes	Yes	Yes	Yes	Yes	Yes	No
Parallel JOIN, aggregate	Yes	Yes	Yes	Yes	Yes	Yes	No
Parallel query	Yes	Yes	Yes	Yes	Yes	Yes	No
Parallel vacuumdb jobs	Yes						
Parallel restore	Yes						
Parallel pg_dump	Yes						



并行查询增强



□ 新增distinct操作并行

```
postgres=# select version();

version

PostgreSQL 15beta1 on x86_64-pc-linux-gnu, compiled by gcc (GCC) 4.8.5 20150623 (Red Hat 4.8.5-36), 64-bit (1 row)

postgres=# explain (costs off) select distinct a from t1;

QUERY PLAN

Unique
-> Sort
Sort Key: a
-> Gather
Workers Planned: 2
-> HashAggregate
Group Key: a
-> Parallel Seq Scan on t1

(8 rows)
```



postgres_fdw下推及并行提交





□ push down CASE expressions

```
psql (14.2)
Type "help" for help.
postgres=# explain (verbose, costs off)
postgres-# select * from remote t1
postgres-# where id >
postgres-#
postgres-#
                 when val > 50 then 0
postgres-#
                 else 75
postgres-#
                end;
                                  QUERY PLAN
 Foreign Scan on public.remote t1
  Output: id, val
  Filter: (remote t1.id > CASE WHEN (remote t1.val > 50) THEN 0 ELSE 7
   Remote SQL: SELECT id, val FROM public.local t1
```

```
psql (15devel)
Type "help" for help.
postgres=# explain (verbose, costs off)
postgres-# select * from remote t1
postgres-# where id >
postgres-#
                when val > 50 then 0
postgres-#
                else 75
postgres-#
                end;
postgres-#
                                                 QUERY PLAN
 Foreign Scan on public.remote t1
  Output: id, val
  Remote SQL: SELECT id, val FROM public.local t1 WHERE ((id > (CASE W
HEN (val > 50) THEN 0 ELSE 75 END)))
(3 rows)
```

□ 支持parallel commit

postgres=# create server local_pg_server2 foreign data wrapper postgres_fdw
options (port '1500', dbname 'postgres' , parallel_commit 'true');
CREATE SERVER



服务端工具并行及压缩增强





- □ pg_basebackup支持对LZ4和Zstandard算法的压缩及解压
- □ pg_basebackup支持--compress选项控制压缩算法
- --compress=[{client|server}-]METHOD[:DETAIL]
- □ pg_basebackup文本格式支持服务端压缩后客户端存储前进行解压。
- □ pg_receivewal支持--compress选项以及LZ4压缩



服务端工具并行及压缩增强





□ PostgreSQL 15 pg_basebackup服务端压缩并行备份对比

Compression	Size -Ft (GB)	Time -Ft	Time -Fp
none	3.8	17.0	18.1
gzip	1.5	234.9	233.1
Iz4	2.0	31.5	35.1
zstd	1.3	56.1	59.1
zstd:workers=2	1.3	26.4	29.5
zstd:workers=4	1.3	15.0	21.8
zstd:workers=6	1.3	11.5	23.0
zstd:workers=8	1.3	9.9	22.9
zstd:workers=12	1.3	10.3	20.3
zstd:workers=16	1.3	10.0	20.5
zstd:workers=20	1.3	10.2	20.3
zstd:workers=24	1.3	10.1	21.0

http://rhaas.blogspot.com/2022/05/parallel-server-side-backup-compression.html

