PostgreSQL mentés és helyreállítás

Előkészítő műveletek

A mentés és helyreállítás gyakorlásához szükség van egy telepített és inicializált PostgreSQL adatbázis példányra. Mentések a pg01 (192.168.100.71) gépről készülnek. Helyreállításhoz a pg03 (192.168.100.73) gépet használjuk. A hozzáférések `trust` típusú hozzáférések, a gépek jelszó nélkül érik el egymást.

Teljes mentés és helyreállítás

Elsődleges gép beállítása

Telepített komponensek ellenőrzése

```
[root@pg01 ~]# rpm -qa | grep postgresql
postgresql18-libs-18.3-1PGDG.rhel9.7.x86_64
postgresql18-18.3-1PGDG.rhel9.7.x86_64
postgresql18-server-18.3-1PGDG.rhel9.7.x86_64
```

Adatbázis inicializálás

Az inicializálás során megadjuk az adatbázis alap kódkészletét és a WAL szegmensek méretét. Ezek a paraméterek utólag nem módosíthatók.

```
[postgres@pg01 ~]$ /usr/pgsql-18/bin/initdb --encoding=UTF8 --
locale=en_US.UTF-8 --wal-segsize=32 -D /var/lib/pgsql/18/data
The files belonging to this database system will be owned by user
"postgres".
This user must also own the server process.

The database cluster will be initialized with locale "en_US.UTF-8".
The default text search configuration will be set to "english".

Data page checksums are enabled.

fixing permissions on existing directory /var/lib/pgsql/18/data ... ok
creating subdirectories ... ok
selecting dynamic shared memory implementation ... posix
selecting default "max_connections" ... 100
selecting default "shared_buffers" ... 128MB
selecting default time zone ... Europe/Budapest
creating configuration files ... ok
```

```
running bootstrap script ... ok
performing post-bootstrap initialization ... ok
syncing data to disk ... ok

initdb: warning: enabling "trust" authentication for local connections
initdb: hint: You can change this by editing pg_hba.conf or using the option
-A, or --auth-local and --auth-host, the next time you run initdb.

Success. You can now start the database server using:

    /usr/pgsql-18/bin/pg_ctl -D /var/lib/pgsql/18/data -l logfile start
```

Konfiguráció módosítása

```
[postgres@pg01 ~]$ echo $PGDATA
/var/lib/pgsql/18/data

[postgres@pg01 ~]$ cp -a $PGDATA/pg_hba.conf $PGDATA/pg_hba.conf.orig

[postgres@pg01 ~]$ cp -a $PGDATA/postgresql.conf
$PGDATA/postgresql.conf.orig

[postgres@pg01 ~]$ cat > $PGDATA/pg_hba.conf <<'EOF'
# TYPE DATABASE USER ADDRESS METHOD
local all all trust
host all all 192.168.100.73/32 trust
host all all 127.0.0.1/32 trust
host all all ::1/128 trust

local replication all trust
host replication all 192.168.100.73/32 trust
host replication all 127.0.0.1/32 trust
host replication all ::1/128 trust
EOF

[postgres@pg01 ~]$ cat > $PGDATA/postgresql.conf <<'EOF'
listen_addresses = '*'
port = 5432
max_connections = 1000
shared_buffers = 128MB
dynamic_shared_memory_type = posix
max_wal_size = 2GB
min_wal_size = 160MB
log_destination = 'stderr'
logging_collector = on
log_directory = 'log'
log_filename = 'postgresql-%a.log'
log_rotation_age = 1d
log_rotation_size = 0
log_truncate_on_rotation = on
```

```
log_line_prefix = '%m [%p] '
log_timezone = 'Europe/Budapest'
autovacuum_worker_slots = 16
datestyle = 'iso, mdy'
timezone = 'Europe/Budapest'
lc_messages = 'en_US.UTF-8'
lc_monetary = 'en_US.UTF-8'
lc_numeric = 'en_US.UTF-8'
lc_time = 'en_US.UTF-8'
default_text_search_config = 'pg_catalog.english'
EOF
```

Ellenőrzés

```
[root@pg01 ~]# systemctl start postgresql-18

[root@pg01 ~]# psql -U postgres -l
                                                    List of databases
   Name    |  Owner   | Encoding | Locale Provider |   Collate   |    Ctype
|
 Locale | ICU Rules |   Access privileges
-----------+----------+----------+-----------------+-------------+----------
---+
--------+-----------+-----------------------
 postgres  | postgres | UTF8     | libc            | en_US.UTF-8 |
en_US.UTF-8 |
        |           |
 template0 | postgres | UTF8     | libc            | en_US.UTF-8 |
en_US.UTF-8 |
        |           | =c/postgres          +
           |          |          |                 |             |
|
        |           | postgres=CTc/postgres
 template1 | postgres | UTF8     | libc            | en_US.UTF-8 |
en_US.UTF-8 |
        |           | =c/postgres          +
           |          |          |                 |             |
|
        |           | postgres=CTc/postgres
(3 rows)
```

Amennyiben tűzfal védi a gépet, engedélyezni kell a PostgreSQL forgalmat a mentő gépről.

Mentő gép beállítása

Telepített komponensek ellenőrzése

```
[root@pg03 ~]# rpm -qa | grep postgresql
postgresql18-libs-18.3-1PGDG.rhel9.7.x86_64
postgresql18-18.3-1PGDG.rhel9.7.x86_64
postgresql18-server-18.3-1PGDG.rhel9.7.x86_64
```

Alap mentés készítése

Az $PGDATA adatbázis könyvtárnak üresnek kell lennie. Ha nem üres, akkor az adatbázis leállítása után töröljük a tartalmát.

```
[root@pg03 ~]# systemctl stop postgresql-18

[root@pg03 ~]# rm -rf /var/lib/pgsql/18/data/*
```

Kapcsolat tesztelése

```
[postgres@pg03 ~]$ /usr/pgsql-18/bin/psql -h pg01 -U postgres -c 'SELECT
now()'
              now
-------------------------------
 2026-04-29 09:35:25.404765+02
(1 row)
```

Alap mentés

Mentéshez a pg_basebackup programot használjuk.

```
[postgres@pg03 ~]$ /usr/pgsql-18/bin/pg_basebackup --host=pg01 --
username=postgres --format=p --wal-method=stream --checkpoint=fast --
progress --pgdata=/var/lib/pgsql/18/backups/backup-full-$(date
+'%Y%m%dT%H%M%S')
23708/23708 kB (100%), 1/1 tablespace
```

Ugyanez a mentés rövid kapcsolókkal

```
[postgres@pg03 ~]$ /usr/pgsql-18/bin/pg_basebackup -h pg01 -U postgres -F p
-X s -c fast -P -D /var/lib/pgsql/18/backups/backup-full-$(date
+'%Y%m%dT%H%M%S')
23709/23709 kB (100%), 1/1 tablespace
```

Mentés helyreállítása

A mentés helyreállításához a mentés könyvtár tartalmát át kell másolni a $PGDATA könvtárba.

```
[postgres@pg03 ~]$ cp -a /var/lib/pgsql/18/backups/backup-
```

```
full-20260429T094626/* /var/lib/pgsql/18/data/
```

El kell indítani a `postgresql` szolgáltatást.

```
[root@pg03 ~]# systemctl restart postgresql-18
```

Ellenőrizni kell az adatbázis állapotát

```
[root@pg03 ~]# psql -U postgres -l
                                                    List of databases
   Name    |  Owner   | Encoding | Locale Provider |   Collate   |    Ctype
|
 Locale | ICU Rules |   Access privileges
-----------+----------+----------+-----------------+-------------+----------
---+
--------+-----------+-----------------------
 postgres  | postgres | UTF8     | libc            | en_US.UTF-8 |
en_US.UTF-8 |
        |           |
 template0 | postgres | UTF8     | libc            | en_US.UTF-8 |
en_US.UTF-8 |
        |           | =c/postgres          +
           |          |          |                 |            |
|
        |           | postgres=CTc/postgres
 template1 | postgres | UTF8     | libc            | en_US.UTF-8 |
en_US.UTF-8 |
        |           | =c/postgres          +
           |          |          |                 |            |
|
        |           | postgres=CTc/postgres
(3 rows)

[root@pg03 ~]# cat /var/lib/pgsql/18/data/log/postgresql-Wed.log
2026-04-29 09:55:20.315 CEST [432] LOG:  starting PostgreSQL 18.3 on x86_64-
pc-linux-gnu, compiled by gcc (GCC) 11.5.0 20240719 (Red Hat 11.5.0-11), 64-
bit
2026-04-29 09:55:20.315 CEST [432] LOG:  listening on IPv4 address
"0.0.0.0", port 5432
2026-04-29 09:55:20.315 CEST [432] LOG:  listening on IPv6 address "::",
port 5432
2026-04-29 09:55:20.316 CEST [432] LOG:  listening on Unix socket
"/run/postgresql/.s.PGSQL.5432"
2026-04-29 09:55:20.317 CEST [432] LOG:  listening on Unix socket
"/tmp/.s.PGSQL.5432"
2026-04-29 09:55:20.320 CEST [439] LOG:  database system was interrupted;
last known up at 2026-04-29 09:46:26 CEST
2026-04-29 09:55:20.395 CEST [439] LOG:  starting backup recovery with redo
LSN 0/A000028, checkpoint LSN 0/A000080, on timeline ID 1
2026-04-29 09:55:20.398 CEST [439] LOG:  redo starts at 0/A000028
2026-04-29 09:55:20.398 CEST [439] LOG:  completed backup recovery with redo
```

```
LSN 0/A000028 and end LSN 0/A000120
2026-04-29 09:55:20.398 CEST [439] LOG:  consistent recovery state reached
at 0/A000120
2026-04-29 09:55:20.398 CEST [439] LOG:  redo done at 0/A000120 system
usage: CPU: user: 0.00 s, system: 0.00 s, elapsed: 0.00 s
2026-04-29 09:55:20.409 CEST [437] LOG:  checkpoint starting: end-of-
recovery immediate wait
2026-04-29 09:55:20.416 CEST [437] LOG:  checkpoint complete: wrote 0
buffers (0.0%), wrote 3 SLRU buffers; 0 WAL file(s) added, 0 removed, 2
recycled; write=0.002 s, sync=0.001 s, total=0.008 s; sync files=2,
longest=0.001 s, average=0.001 s; distance=16384 kB, estimate=16384 kB;
lsn=0/B000028, redo lsn=0/B000028
2026-04-29 09:55:20.418 CEST [432] LOG:  database system is ready to accept
connections
```

Archív WAL mentés és helyreállítás

Elsődleges gép beállítása

```
[postgres@pg01 ~]$ psql -c "ALTER SYSTEM SET archive_command = 'test ! -f
/var/lib/pgsql/18/backups/%f && cp %p /var/lib/pgsql/18/backups/%f'"
ALTER SYSTEM

[postgres@pg01 ~]$ psql -c "ALTER SYSTEM SET archive_mode = 'on'"
ALTER SYSTEM

[root@pg01 ~]# systemctl restart postgresql-18

[postgres@pg01 ~]$ psql -c "SHOW archive_command"
                                archive_command
------------------------------------------------------------------------------
--
 test ! -f /var/lib/pgsql/18/backups/%f && cp %p
/var/lib/pgsql/18/backups/%f
(1 row)

[postgres@pg01 ~]$ psql -c "SHOW archive_mode"
 archive_mode
--------------
 on
(1 row)
```

Hozzunk létre teszt adatokat

```
[postgres@pg01 ~]$ createuser test

[postgres@pg01 ~]$ createdb -O test test
```

```
[postgres@pg01 ~]$ psql -U test -d test -c 'CREATE TABLE test (id INT, data
TEXT)'
CREATE TABLE

[postgres@pg01 ~]$ psql -U test -d test -c "INSERT INTO test (id, data)
VALUES (1, 'backup előtt')"
INSERT 0 1

[postgres@pg01 ~]$ pg_basebackup -D /var/lib/pgsql/18/backups/backup_1 -X
stream -P
31412/31412 kB (100%), 1/1 tablespace

[postgres@pg01 ~]$ psql -U test -d test -c "INSERT INTO test (id, data)
VALUES (2, 'backup után')"
INSERT 0 1

[postgres@pg01 ~]$ psql -U test -d test -c "SELECT now()"
              now
-------------------------------
 2026-04-22 02:57:53.405918+02
(1 row)

[postgres@pg01 ~]$ psql -U test -d test -c "INSERT INTO test (id, data)
VALUES (3, 'törlés előtt')"
INSERT 0 1

[postgres@pg01 ~]$ psql -U test -d test -c "SELECT now()"
              now
-------------------------------
 2026-04-22 02:58:26.462712+02
(1 row)

[postgres@pg01 ~]$ psql -U test -d test -c "DROP TABLE test"
DROP TABLE

[postgres@pg01 18]$ psql -U test -d test -c "SELECT now()"
              now
-------------------------------
 2026-04-22 02:59:25.744184+02
(1 row)

[postgres@pg01 ~]$ psql -c "SELECT * FROM test"
ERROR:  relation "test" does not exist
LINE 1: SELECT * FROM test

[postgres@pg01 ~]$ psql -c "SELECT pg_switch_wal()"
 pg_switch_wal
---------------
 0/1000C300
(1 row)
```

```
                          ^
```

Helyreállítás egy másik gépen

```
[root@pg03 ~]# rsync -a --delete root@pg01:/var/lib/pgsql/18/backups/
/var/lib/pgsql/18/backups/
root@pg01's password:

[root@pg03 ~]# systemctl stop postgresql-18

[root@pg03 ~]# rm -rf /var/lib/pgsql/18/data/*

[root@pg03 ~]# cp -a /var/lib/pgsql/18/backups/backup_1/*
/var/lib/pgsql/18/data/

[root@pg03 ~]# cat /var/lib/pgsql/18/data/postgresql.auto.conf
# Do not edit this file manually!
# It will be overwritten by the ALTER SYSTEM command.
archive_command = 'test ! -f /var/lib/pgsql/18/backups/%f && cp %p
/var/lib/pgsql/18/backups/%f'
archive_mode = 'on'

[root@pg03 ~]# export RECOVERY_TIMESTAMP='2026-04-22 04:09:07.322546+02'

[root@pg03 ~]# cat > /var/lib/pgsql/18/data/postgresql.auto.conf <<EOF
restore_command = 'cp /var/lib/pgsql/18/backups/%f %p'
recovery_target_time = '$RECOVERY_TIMESTAMP'
recovery_target_action = 'promote'
EOF

[root@pg03 ~]# cat /var/lib/pgsql/18/data/postgresql.auto.conf
restore_command = 'cp /var/lib/pgsql/18/backups/%f %p'
recovery_target_time = '2026-04-22 04:09:07.322546+02'
recovery_target_action = 'promote'

[root@pg03 ~]# touch /var/lib/pgsql/18/data/recovery.signal

[root@pg03 ~]# chown -R postgres:postgres /var/lib/pgsql/18/data/

[root@pg03 ~]# rm -rf /var/lib/pgsql/18/data/log/*

[root@pg03 ~]# systemctl restart postgresql-18

[root@pg03 ~]# psql -U test -d test -c "SELECT * FROM test"
 id |     data
----+--------------
  1 | backup előtt
  2 | backup után
  3 | törlés előtt
(3 rows)
```

```
[root@pg03 ~]# cat /var/lib/pgsql/18/data/log/postgresql-Wed.log
2026-04-22 04:45:22.243 CEST [1249] LOG:  starting PostgreSQL 18.3 on
x86_64-pc-linux-gnu, compiled by gcc (GCC) 11.5.0 20240719 (Red Hat
11.5.0-11), 64-bit
2026-04-22 04:45:22.243 CEST [1249] LOG:  listening on IPv4 address
"0.0.0.0", port 5432
2026-04-22 04:45:22.243 CEST [1249] LOG:  listening on IPv6 address "::",
port 5432
2026-04-22 04:45:22.243 CEST [1249] LOG:  listening on Unix socket
"/run/postgresql/.s.PGSQL.5432"
2026-04-22 04:45:22.244 CEST [1249] LOG:  listening on Unix socket
"/tmp/.s.PGSQL.5432"
2026-04-22 04:45:22.247 CEST [1256] LOG:  database system was interrupted;
last known up at 2026-04-22 02:56:01 CEST
cp: cannot stat '/var/lib/pgsql/18/backups/00000002.history': No such file
or directory
2026-04-22 04:45:22.347 CEST [1256] LOG:  starting backup recovery with redo
LSN 0/B000028, checkpoint LSN 0/B0000B8, on timeline ID 1
2026-04-22 04:45:22.355 CEST [1256] LOG:  restored log file
"00000001000000000000000B" from archive
2026-04-22 04:45:22.362 CEST [1256] LOG:  starting point-in-time recovery to
2026-04-22 04:09:07.322546+02
2026-04-22 04:45:22.364 CEST [1256] LOG:  redo starts at 0/B000028
2026-04-22 04:45:22.372 CEST [1256] LOG:  restored log file
"00000001000000000000000C" from archive
2026-04-22 04:45:22.385 CEST [1256] LOG:  restored log file
"00000001000000000000000D" from archive
2026-04-22 04:45:22.397 CEST [1256] LOG:  restored log file
"00000001000000000000000E" from archive
2026-04-22 04:45:22.404 CEST [1256] LOG:  completed backup recovery with
redo LSN 0/B000028 and end LSN 0/B000158
2026-04-22 04:45:22.404 CEST [1256] LOG:  consistent recovery state reached
at 0/B000158
2026-04-22 04:45:22.404 CEST [1249] LOG:  database system is ready to accept
read-only connections
2026-04-22 04:45:22.415 CEST [1256] LOG:  restored log file
"00000001000000000000000F" from archive
2026-04-22 04:45:22.430 CEST [1256] LOG:  restored log file
"000000010000000000000010" from archive
cp: cannot stat '/var/lib/pgsql/18/backups/000000010000000000000011': No
such file or directory
2026-04-22 04:45:22.440 CEST [1256] LOG:  recovery stopping before commit of
transaction 784, time 2026-04-22 04:09:58.572915+02
2026-04-22 04:45:22.440 CEST [1256] LOG:  redo done at 0/1000A220 system
usage: CPU: user: 0.00 s, system: 0.00 s, elapsed: 0.07 s
2026-04-22 04:45:22.440 CEST [1256] LOG:  last completed transaction was at
log time 2026-04-22 04:09:03.049934+02
2026-04-22 04:45:22.446 CEST [1256] LOG:  restored log file
"000000010000000000000010" from archive
cp: cannot stat '/var/lib/pgsql/18/backups/00000002.history': No such file
or directory
```

```
2026-04-22 04:45:22.458 CEST [1256] LOG:  selected new timeline ID: 2
cp: cannot stat '/var/lib/pgsql/18/backups/00000001.history': No such file
or directory
2026-04-22 04:45:22.475 CEST [1256] LOG:  archive recovery complete
2026-04-22 04:45:22.476 CEST [1254] LOG:  checkpoint starting: end-of-
recovery immediate wait
2026-04-22 04:45:22.487 CEST [1254] LOG:  checkpoint complete: wrote 36
buffers (0.2%), wrote 3 SLRU buffers; 0 WAL file(s) added, 0 removed, 5
recycled; write=0.003 s, sync=0.004 s, total=0.013 s; sync files=30,
longest=0.001 s, average=0.001 s; distance=81960 kB, estimate=81960 kB;
lsn=0/1000A220, redo lsn=0/1000A220
2026-04-22 04:45:22.490 CEST [1249] LOG:  database system is ready to accept
connections
```

Tipikus helyzetek

- Az archiválás nem tartalmazza a szükséges WAL-t ezért nem tudunk visszaállni egy megadott időpontra. Ilyenkor a forrás oldalon futtatni kell a `psql -c "SELECT pg_switch_wal()"` utasítást és újra áttölteni a helyreállító gépre.
- Ha nem hozzuk létre a '' recovery.signal '' állományt, akkor a pg_basebackup állaporta tér vissza és nem foglalkozik a recovery_target_time értékével.
- A recovery_target_action meghatározza, milyen állapotba kerüljön a postgresql a recovery során.

Ellenőrzés

Ha nincsenek pontos időadatok, akkor a WAL fájlok ellenőrzése lehet a megoldás. Ilyenkor nem a '' recovery_target_time = '' paramétert, hanem a '' recovery_target_lsn = '' paramétert adjuk meg.

A pg_waldump program segít

```
[postgres@pg01 data]$ /usr/pgsql-18/bin/pg_waldump
/var/lib/pgsql/18/backups/000000010000000000000010
rmgr: Standby     len (rec/tot):     50/    50, tx:          0, lsn:
0/10000028, prev 0/0F000158, desc: RUNNING_XACTS nextXid 782
latestCompletedXid 781 oldestRunningXid 782
rmgr: Heap        len (rec/tot):     54/   182, tx:        782, lsn:
0/10000060, prev 0/10000028, desc: INSERT off: 2, flags: 0x00, blkref #0:
rel 1663/16396/16402 blk 0 FPW
rmgr: Transaction len (rec/tot):     34/    34, tx:        782, lsn:
0/10000118, prev 0/10000060, desc: COMMIT 2026-04-22 04:08:32.694902 CEST
rmgr: Standby     len (rec/tot):     50/    50, tx:          0, lsn:
0/10000140, prev 0/10000118, desc: RUNNING_XACTS nextXid 783
latestCompletedXid 782 oldestRunningXid 783
rmgr: Heap        len (rec/tot):     75/    75, tx:        783, lsn:
0/10000178, prev 0/10000140, desc: INSERT off: 3, flags: 0x00, blkref #0:
rel 1663/16396/16402 blk 0
rmgr: Transaction len (rec/tot):     34/    34, tx:        783, lsn:
0/100001C8, prev 0/10000178, desc: COMMIT 2026-04-22 04:09:03.049934 CEST
rmgr: Standby     len (rec/tot):     50/    50, tx:          0, lsn:
```

```
0/100001F0, prev 0/100001C8, desc: RUNNING_XACTS nextXid 784
latestCompletedXid 783 oldestRunningXid 784
rmgr: Standby     len (rec/tot):     42/    42, tx:        784, lsn:
0/10000228, prev 0/100001F0, desc: LOCK xid 784 db 16396 rel 16402
rmgr: XLOG        len (rec/tot):     49/  7753, tx:        784, lsn:
0/10000258, prev 0/10000228, desc: FPI_FOR_HINT , blkref #0: rel
1663/16396/2608 blk 12 FPW
rmgr: Standby     len (rec/tot):     42/    42, tx:        784, lsn:
0/100020C0, prev 0/10000258, desc: LOCK xid 784 db 16396 rel 16405
rmgr: Standby     len (rec/tot):     42/    42, tx:        784, lsn:
0/100020F0, prev 0/100020C0, desc: LOCK xid 784 db 16396 rel 16406
rmgr: XLOG        len (rec/tot):     49/  4397, tx:        784, lsn:
0/10002120, prev 0/100020F0, desc: FPI_FOR_HINT , blkref #0: rel
1663/16396/1247 blk 14 FPW
rmgr: XLOG        len (rec/tot):     49/  8221, tx:        784, lsn:
0/10003250, prev 0/10002120, desc: FPI_FOR_HINT , blkref #0: rel
1663/16396/2610 blk 1 FPW
rmgr: XLOG        len (rec/tot):     49/  2173, tx:        784, lsn:
0/10005288, prev 0/10003250, desc: FPI_FOR_HINT , blkref #0: rel
1663/16396/1249 blk 55 FPW
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10005B08, prev 0/10005288, desc: DELETE xmax: 784, off: 1, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/2610 blk 1
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10005B40, prev 0/10005B08, desc: DELETE xmax: 784, off: 14, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10005B78, prev 0/10005B40, desc: DELETE xmax: 784, off: 15, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     59/  7959, tx:        784, lsn:
0/10005BB0, prev 0/10005B78, desc: DELETE xmax: 784, off: 40, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1259 blk 15 FPW
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007AE0, prev 0/10005BB0, desc: DELETE xmax: 784, off: 126, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/2608 blk 12
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007B18, prev 0/10007AE0, desc: DELETE xmax: 784, off: 127, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/2608 blk 12
rmgr: Standby     len (rec/tot):     66/    66, tx:          0, lsn:
0/10007B50, prev 0/10007B18, desc: LOCK xid 784 db 16396 rel 16402 xid 784
db 16396 rel 16405 xid 784 db 16396 rel 16406
rmgr: Standby     len (rec/tot):     54/    54, tx:          0, lsn:
0/10007B98, prev 0/10007B50, desc: RUNNING_XACTS nextXid 785
latestCompletedXid 783 oldestRunningXid 784; 1 xacts: 784
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007BD0, prev 0/10007B98, desc: DELETE xmax: 784, off: 13, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007C08, prev 0/10007BD0, desc: DELETE xmax: 784, off: 12, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
```

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0/10007C40, prev 0/10007C08, desc: DELETE xmax: 784, off: 11, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007C78, prev 0/10007C40, desc: DELETE xmax: 784, off: 10, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007CB0, prev 0/10007C78, desc: DELETE xmax: 784, off: 9, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007CE8, prev 0/10007CB0, desc: DELETE xmax: 784, off: 8, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007D20, prev 0/10007CE8, desc: DELETE xmax: 784, off: 5, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007D58, prev 0/10007D20, desc: DELETE xmax: 784, off: 6, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007D90, prev 0/10007D58, desc: DELETE xmax: 784, off: 7, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007DC8, prev 0/10007D90, desc: DELETE xmax: 784, off: 39, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1259 blk 15
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007E00, prev 0/10007DC8, desc: DELETE xmax: 784, off: 128, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/2608 blk 12
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007E38, prev 0/10007E00, desc: DELETE xmax: 784, off: 23, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1247 blk 14
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007E70, prev 0/10007E38, desc: DELETE xmax: 784, off: 124, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/2608 blk 12
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007EA8, prev 0/10007E70, desc: DELETE xmax: 784, off: 22, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1247 blk 14
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007EE0, prev 0/10007EA8, desc: DELETE xmax: 784, off: 123, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/2608 blk 12
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007F18, prev 0/10007EE0, desc: DELETE xmax: 784, off: 4, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007F50, prev 0/10007F18, desc: DELETE xmax: 784, off: 3, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007F88, prev 0/10007F50, desc: DELETE xmax: 784, off: 2, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10007FC0, prev 0/10007F88, desc: DELETE xmax: 784, off: 1, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 55
rmgr: XLOG        len (rec/tot):     49/  7921, tx:        784, lsn:
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0/10007FF8, prev 0/10007FC0, desc: FPI_FOR_HINT , blkref #0: rel
1663/16396/1249 blk 54 FPW
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10009F08, prev 0/10007FF8, desc: DELETE xmax: 784, off: 58, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 54
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10009F40, prev 0/10009F08, desc: DELETE xmax: 784, off: 57, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 54
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10009F78, prev 0/10009F40, desc: DELETE xmax: 784, off: 55, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 54
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10009FB0, prev 0/10009F78, desc: DELETE xmax: 784, off: 56, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1249 blk 54
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/10009FE8, prev 0/10009FB0, desc: DELETE xmax: 784, off: 41, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/1259 blk 15
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/1000A038, prev 0/10009FE8, desc: DELETE xmax: 784, off: 125, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1663/16396/2608 blk 12
rmgr: XLOG        len (rec/tot):     49/   373, tx:        784, lsn:
0/1000A070, prev 0/1000A038, desc: FPI_FOR_HINT , blkref #0: rel 1664/0/1214
blk 0 FPW
rmgr: Heap        len (rec/tot):     54/    54, tx:        784, lsn:
0/1000A1E8, prev 0/1000A070, desc: DELETE xmax: 784, off: 5, infobits:
[KEYS_UPDATED], flags: 0x00, blkref #0: rel 1664/0/1214 blk 0
rmgr: Transaction len (rec/tot):   1089/  1089, tx:        784, lsn:
0/1000A220, prev 0/1000A1E8, desc: COMMIT 2026-04-22 04:09:58.572915 CEST;
rels: base/16396/16402 base/16396/16405 base/16396/16406; dropped stats:
2/16396/16406 2/16396/16405 2/16396/16402; inval msgs: catcache 34 catcache
7 catcache 6 catcache 7 catcache 6 catcache 57 catcache 56 catcache 7
catcache 6 catcache 7 catcache 6 catcache 7 catcache 6 catcache 7 catcache 6
catcache 7 catcache 6 catcache 7 catcache 6 catcache 7 catcache 6 catcache 7
catcache 6 catcache 7 catcache 6 catcache 57 catcache 56 catcache 82
catcache 81 catcache 82 catcache 81 catcache 7 catcache 6 catcache 7
catcache 6 catcache 7 catcache 6 catcache 7 catcache 6 catcache 7 catcache 6
catcache 7 catcache 6 catcache 7 catcache 6 catcache 7 catcache 6 catcache
57 catcache 56 relcache 16406 relcache 16405 snapshot 2608 relcache 16405
snapshot 2608 snapshot 2608 snapshot 2608 relcache 16402 snapshot 2608
snapshot 1214
rmgr: Standby     len (rec/tot):     50/    50, tx:          0, lsn:
0/1000A668, prev 0/1000A220, desc: RUNNING_XACTS nextXid 785
latestCompletedXid 784 oldestRunningXid 785
rmgr: Heap2       len (rec/tot):     64/    64, tx:          0, lsn:
0/1000A6A0, prev 0/1000A668, desc: PRUNE_ON_ACCESS snapshotConflictHorizon:
784, isCatalogRel: F, nplans: 0, nredirected: 0, ndead: 3, nunused: 1, dead:
[38, 39, 40], unused: [41], blkref #0: rel 1663/16396/1259 blk 15
rmgr: Standby     len (rec/tot):     50/    50, tx:          0, lsn:
0/1000A6E0, prev 0/1000A6A0, desc: RUNNING_XACTS nextXid 785
latestCompletedXid 784 oldestRunningXid 785
rmgr: XLOG        len (rec/tot):     49/  6769, tx:          0, lsn:
```

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0/1000A718, prev 0/1000A6E0, desc: FPI_FOR_HINT , blkref #0: rel
1663/16396/2663 blk 2 FPW
rmgr: Standby     len (rec/tot):     50/    50, tx:          0, lsn:
0/1000C1A8, prev 0/1000A718, desc: RUNNING_XACTS nextXid 785
latestCompletedXid 784 oldestRunningXid 785
rmgr: XLOG        len (rec/tot):     30/    30, tx:          0, lsn:
0/1000C1E0, prev 0/1000C1A8, desc: CHECKPOINT_REDO wal_level replica
rmgr: Standby     len (rec/tot):     50/    50, tx:          0, lsn:
0/1000C200, prev 0/1000C1E0, desc: RUNNING_XACTS nextXid 785
latestCompletedXid 784 oldestRunningXid 785
rmgr: XLOG        len (rec/tot):    114/   114, tx:          0, lsn:
0/1000C238, prev 0/1000C200, desc: CHECKPOINT_ONLINE redo 0/1000C1E0; tli 1;
prev tli 1; fpw true; wal_level replica; xid 0:785; oid 24594; multi 1;
offset 0; oldest xid 722 in DB 1; oldest multi 1 in DB 4; oldest/newest
commit timestamp xid: 0/0; oldest running xid 785; online
rmgr: Standby     len (rec/tot):     50/    50, tx:          0, lsn:
0/1000C2B0, prev 0/1000C238, desc: RUNNING_XACTS nextXid 785
latestCompletedXid 784 oldestRunningXid 785
rmgr: XLOG        len (rec/tot):     24/    24, tx:          0, lsn:
0/1000C2E8, prev 0/1000C2B0, desc: SWITCH
```

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