PgSaturday - Dallas
2025

POSTGRESQL 17 & 18: THE GROUND-BREAKING FEATURES YOU CAN'T IGNORE

Vivek Singh

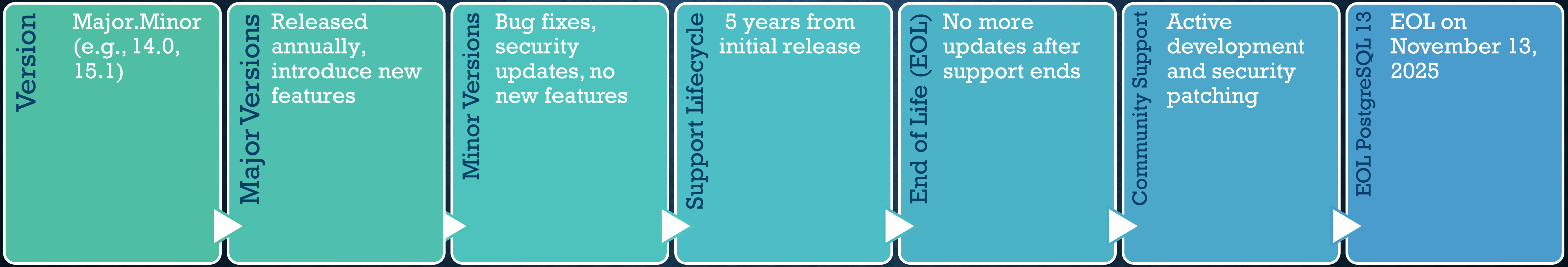
Principal Database Specialist – PostgreSQL

Amazon Web Services

AGENDA

- PostgreSQL Versioning and EOL Cycles
- PostgreSQL 16 Features Recap
- PostgreSQL 17 and 18 Release Dates
- PostgreSQL 17 New Features
  - Demo
- PostgreSQL 18 New Features

POSTGRESQL VERSIONING AND EOL CYCLES



Version

Major.Minor (e.g., 14.0, 15.1)

Major Versions

Released annually, introduce new features

Minor Versions

Bug fixes, security updates, no new features

Support Lifecycle

5 years from initial release

End of Life (EOL)

No more updates after support ends

Community Support

Active development and security patching

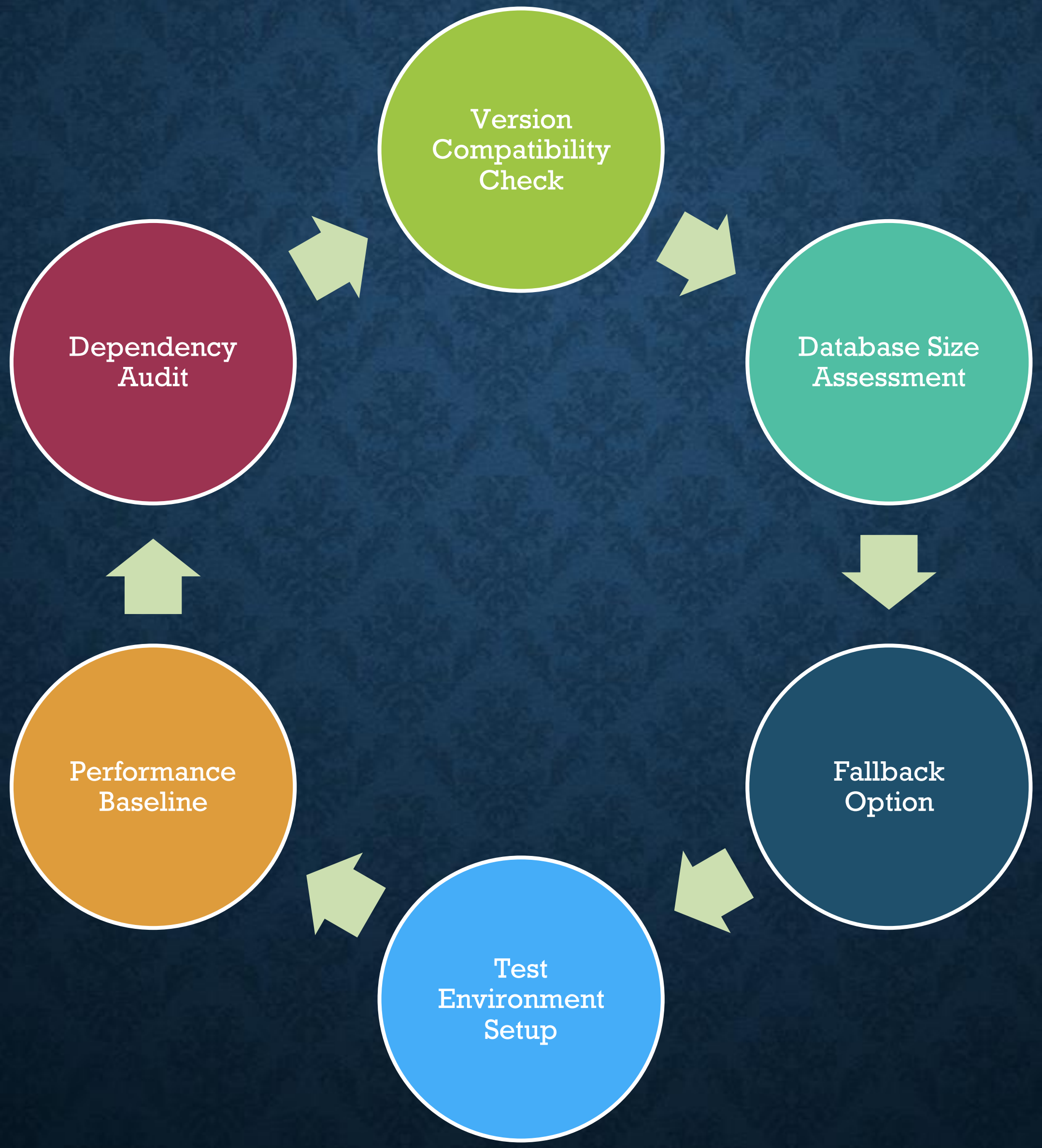
EOL PostgreSQL 13

EOL on November 13, 2025

RISKS OF NOT UPGRADING POSTGRESQL DATABASE

- Lack of New Features
- Increased Maintenance Costs
- Contractual Obligations
- Compliance Concerns
- Technical Debt Accumulation

UPGRADE TO PG17 - PRE UPGRADE PLANNING



Version Compatibility Check

Database Size Assessment

Fallback Option

Test Environment Setup

Performance Baseline

Dependency Audit

UPGRADE STRATEGIES

pg_upgrade

- Fast, especially for large databases
- Preserves database objects and data
- Requires sufficient disk space for both old and new clusters
- Can be complex to set up, especially for inexperienced users

Dump and Restore

- Simple and straightforward method
- Works across all PostgreSQL versions
- Can be very slow for large databases
- May require a lot of disk space for the dump file

Logical Replication

- Allows for near-zero downtime upgrades
- Can upgrade across major versions
- Can be complex to set up and manage
- May require schema changes to be applied manually

Slony/ Bucardo

- Allows for near-zero downtime upgrades
- Can replicate across different PostgreSQL versions
- Requires changes to the database schema
- Can introduce latency in data replication

POSTGRESQL 17 AND 18

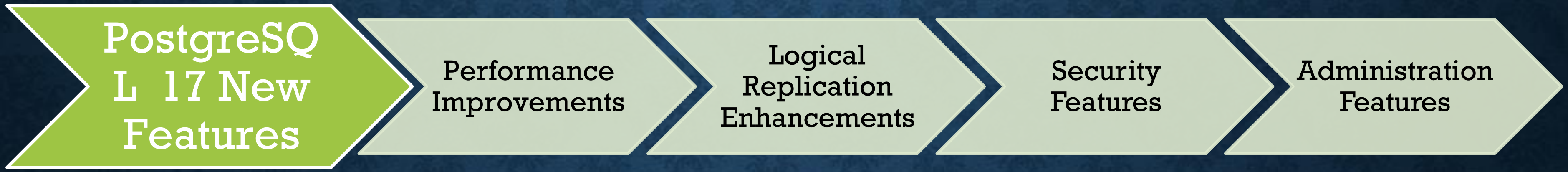
- PostgreSQL 17
  - First Release : September 26, 2024
  - Final Release: November 8, 2029

- PostgreSQL 18
  - First Release : September, 2025 *(expected)*
  - Final Release: November 8, 2030 *(expected)*

POSTGRESQL 16 RECAP

Query Performance	Parallelized joins Improved vacuum
Logical Replication	Bidirectional replication Logical replication from standby
Improved Monitoring	New system views for monitoring Enhanced pg_stat_statements
Extended Storage Options	Compression support for WAL Improved TOAST compression

POSTGRESQL 17 NEW FEATURES



PostgreSQ
L 17 New
Features

Performance Improvements

Logical Replication Enhancements

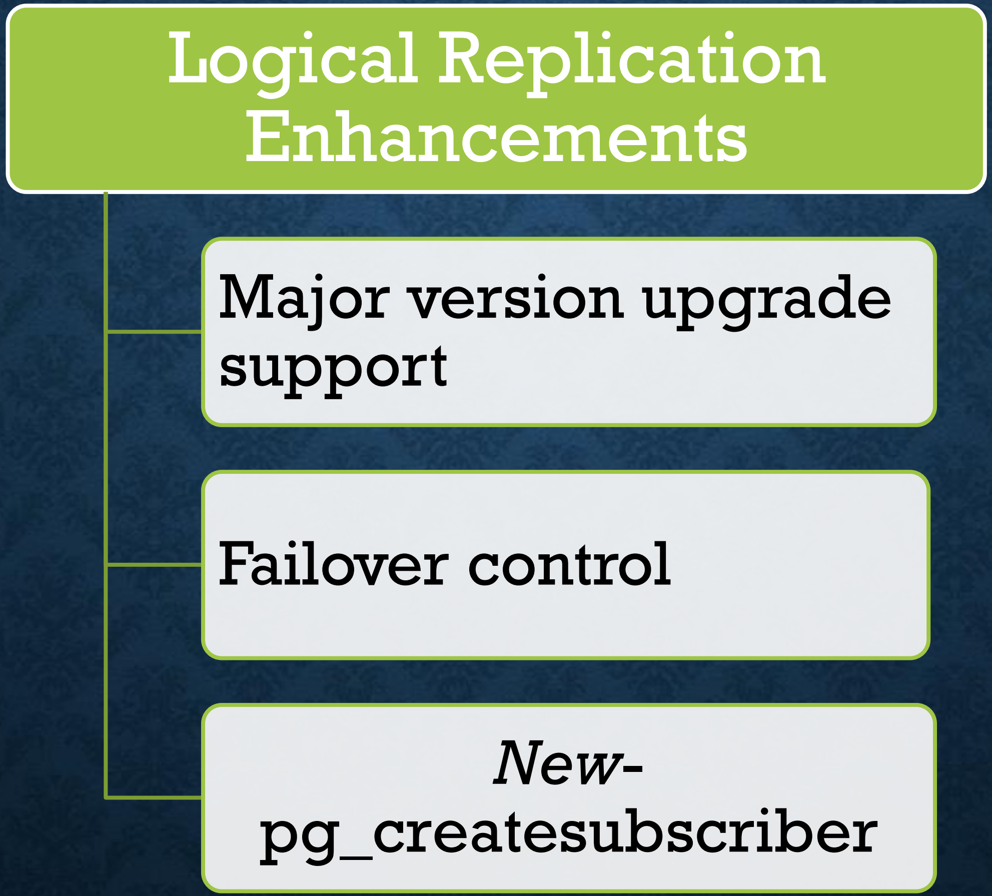
Security Features

Administration Features

PG17 - PERFORMANCE IMPROVEMENTS

- Significant VACUUM Improvements
- I/O Layer Improvements
- Enhanced Query Execution
- More SIMD Support
- Improvements in CTE Processing

PG17- LOGICAL REPLICATION ENHANCEMENTS



Logical Replication Enhancements

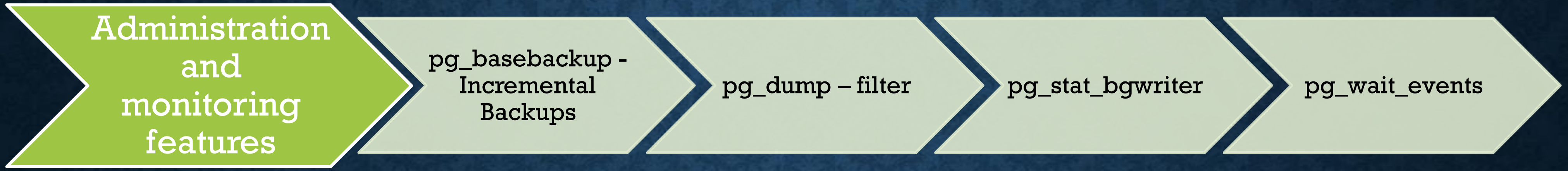
- Major version upgrade support
- Failover control
- *New*- pg_createsubscriber

PG17 – SECURITY FEATURES

Security Features

- TLS option –sslnegotiation
- pre defined role – pg_maintain

PG17 - ADMINISTRATION FEATURES



Administration and monitoring features

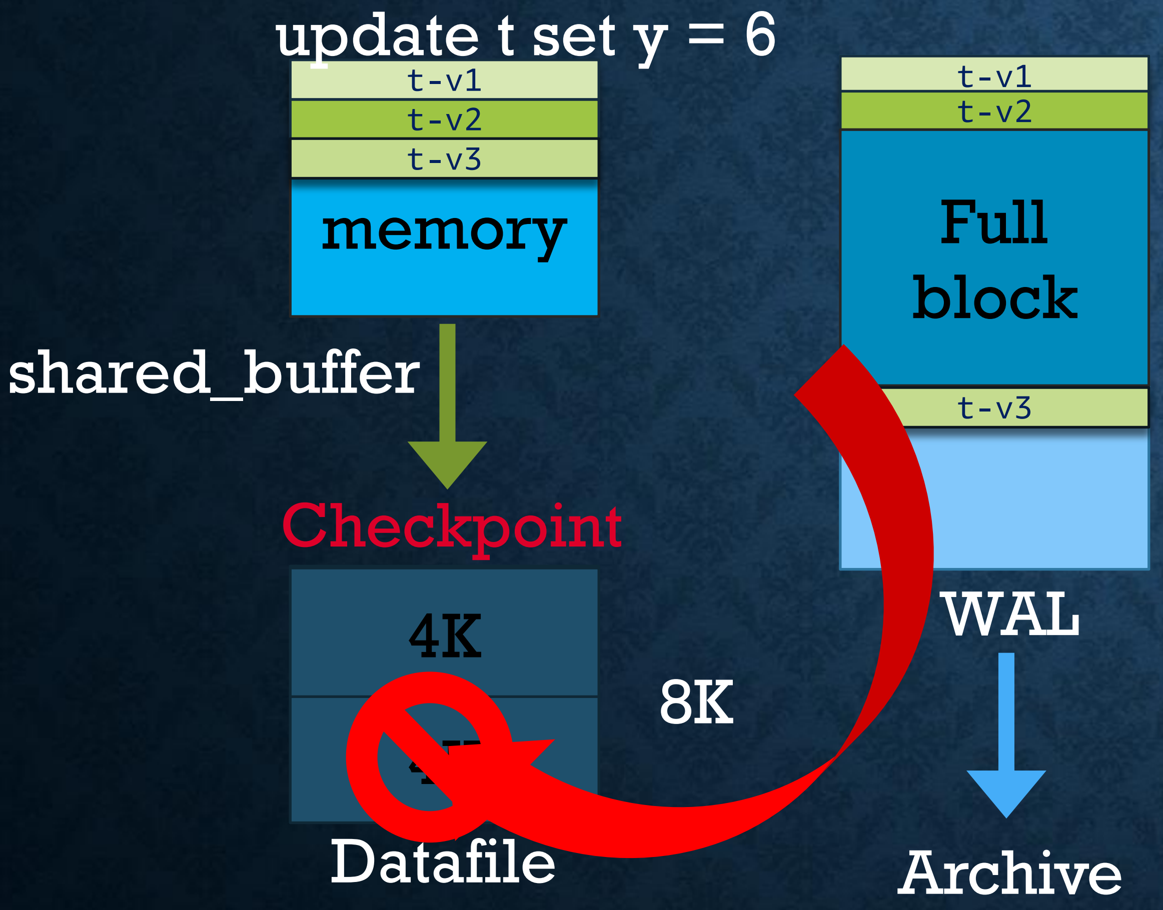
pg_basebackup - Incremental Backups

pg_dump – filter

pg_stat_bgwriter

pg_wait_events

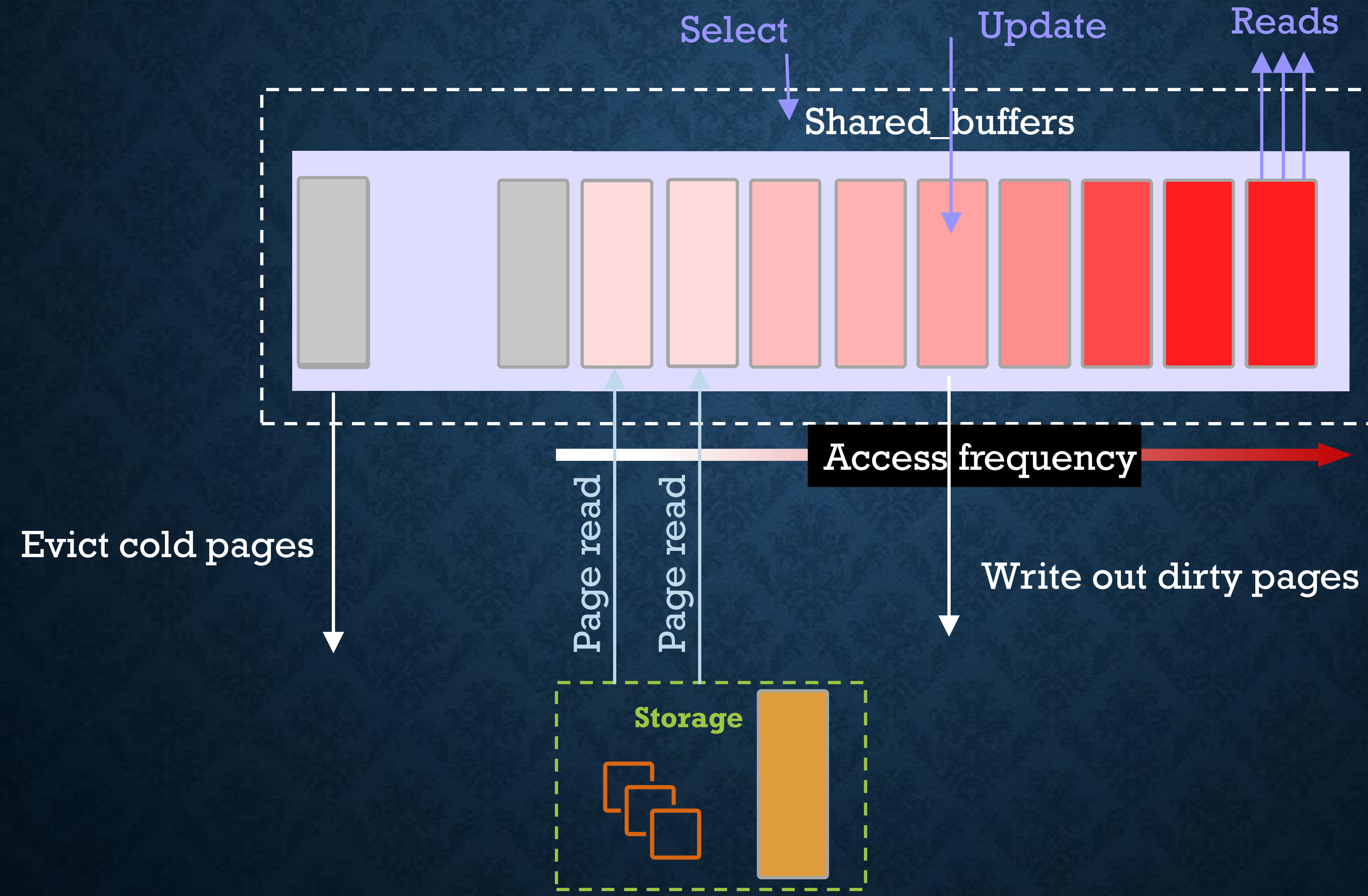
POSTGRESQL I/O



1. Write it to the WAL log
2. Update Shared Buffers
3. Checkpoint
4. Write to the disk

- Dirty Buffer Flushing
  - Checkpoint
    - Too often: More Full Page Writes
    - Too far: longer recovery times
  - Background Writer

SHARED_BUFFERS



background writer

checkpointer

BACKGROUND WRITER, CHECKPOINT

< PG17

```
postgres=# select * from pg_stat_bgwriter;
-[ RECORD 1 ]---------+------------------------------
checkpoints_timed     | 0      > checkpoint_timeout
checkpoints_req       | 6      > max_wal_size
checkpoint_write_time | 72441
checkpoint_sync_time  | 3838
buffers_checkpoint    | 6380       dirty buffers written by checkpointer
buffers_clean         | 16248  dirty buffers written by background writer
maxwritten_clean      | 161
buffers_backend       | 520106 dirty buffers written by backend
buffers_backend_fsync | 0
buffers_alloc         | 465918
stats_reset           | 2024-04-09 13:54:18.683023-05
```

- Keep buffers_backend close to 0 as possible
- 17+, this info will be spread between *pg_stat_bgwriter*, *pg_stat_checkpointer*, *pg_stat_io*

BACKGROUND WRITER, CHECKPOINT

PG17

```
postgres=*# select * from pg_stat_bgwriter;
-[ RECORD 1 ]----+------------------------------
buffers_clean    | 0
maxwritten_clean | 0
buffers_alloc    | 1192
stats_reset      | 2024-05-10 18:36:01.451167-04
```

- Removed checkpoints_timed & req
- Removed write_time & sync_time
- Removed buffers_checkpoint, backend & fsync

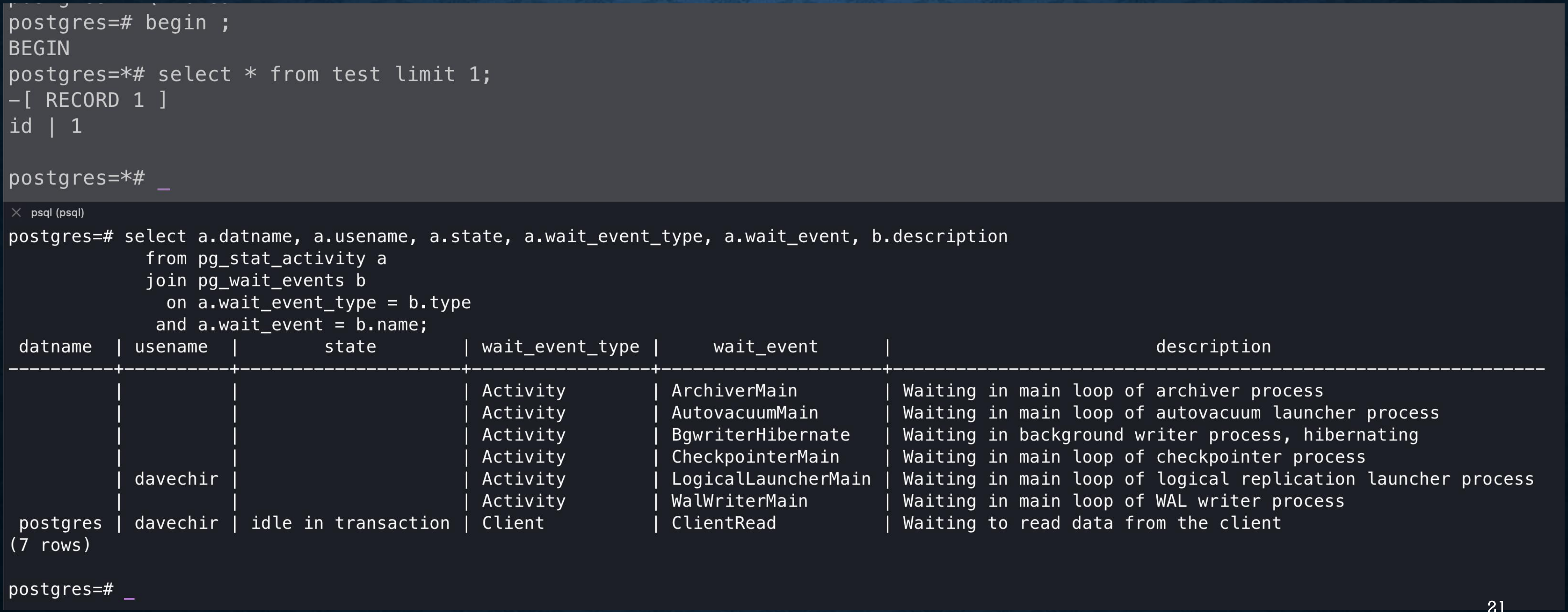
BACKGROUND WRITER, CHECKPOINT

PG17

```
postgres=# select  * from pg_stat_checkpointer;
-[ RECORD 1 ]-------+------------------------------
num_timed           | 8
num_requested       | 3
restartpoints_timed | 0
restartpoints_req   | 0
restartpoints_done  | 0
write_time          | 3351
sync_time           | 8
buffers_written     | 204
stats_reset         | 2024-05-10 18:36:01.451167-04
```

PG17

PG_WAIT_EVENTS



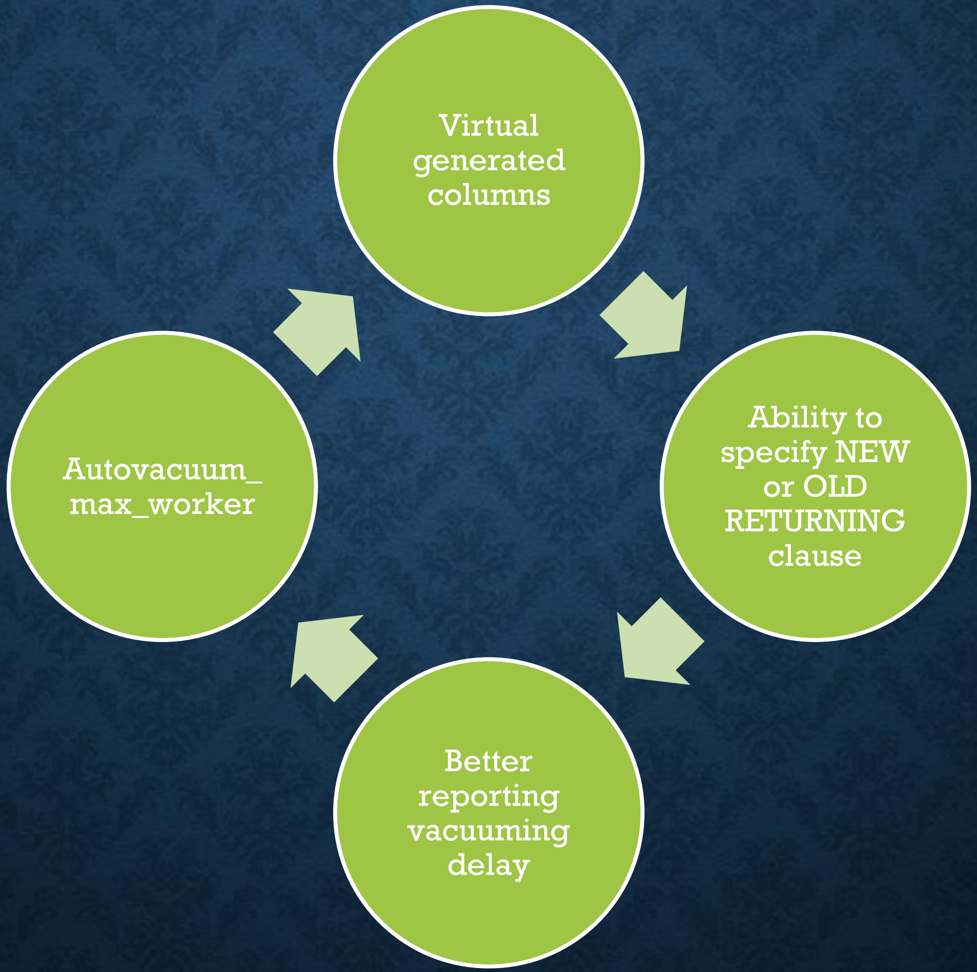
```
postgres=# begin ;
BEGIN
postgres=*# select * from test limit 1;
-[ RECORD 1 ]
id | 1

postgres=*# _
```

```
postgres=# select a.datname, a.usename, a.state, a.wait_event_type, a.wait_event, b.description
             from pg_stat_activity a
             join pg_wait_events b
               on a.wait_event_type = b.type
              and a.wait_event = b.name;
 datname  | usename  |        state        | wait_event_type |     wait_event      |                          description
----------+----------+---------------------+-----------------+---------------------+--------------------------------------------------------------
          |          |                     | Activity        | ArchiverMain        | Waiting in main loop of archiver process
          |          |                     | Activity        | AutovacuumMain      | Waiting in main loop of autovacuum launcher process
          |          |                     | Activity        | BgwriterHibernate   | Waiting in background writer process, hibernating
          |          |                     | Activity        | CheckpointerMain    | Waiting in main loop of checkpointer process
          | davechir |                     | Activity        | LogicalLauncherMain | Waiting in main loop of logical replication launcher process
          |          |                     | Activity        | WalWriterMain       | Waiting in main loop of WAL writer process
 postgres | davechir | idle in transaction | Client          | ClientRead          | Waiting to read data from the client
(7 rows)

postgres=# _
```

PG18 NEW FEATURES - UPCOMING



Virtual generated columns

Ability to specify NEW or OLD RETURNING clause

Better reporting vacuuming delay

Autovacuum_ max_worker

CALL TO ACTION

- PostgreSQL versioning: https://www.postgresql.org/support/versioning/
- PostgreSQL 17 release notes: https://www.postgresql.org/docs/current/release-17.html
- PostgreSQL 17 highlights: https://www.postgresql.org/about/news/postgresql-17-released-2936/
- PostgreSQL 18 updates: https://pgpedia.info/postgresql-versions/postgresql-18.html

Q&A

Thank you!

Vivek Singh

Principal Database Specialist at AWS