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PostgreSQL 17 WAL Archiving & Point-in-Time Recovery (PITR): The Ultimate DBA Guide

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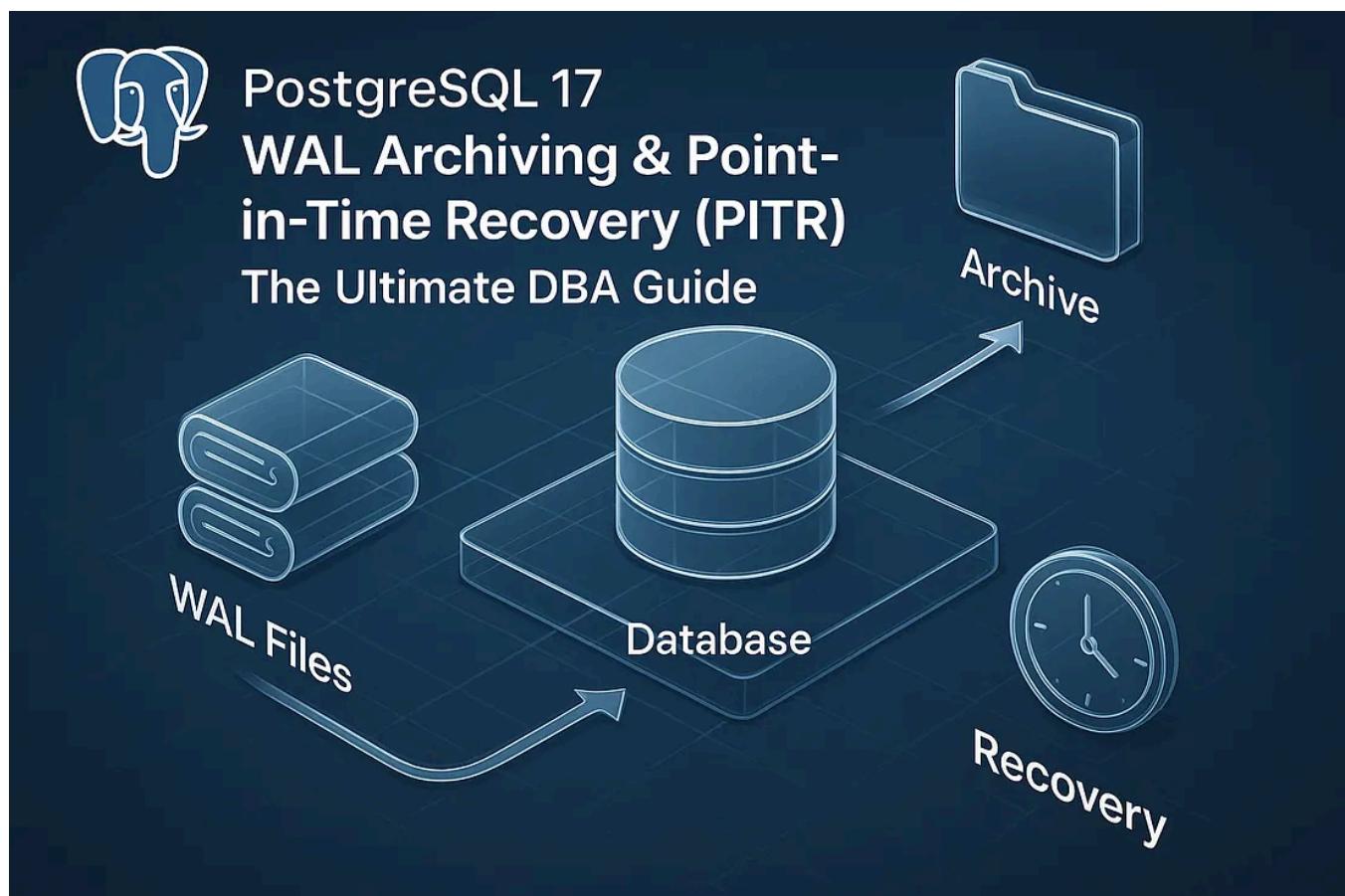
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PostgreSQL 17 continues to offer rock-solid disaster recovery capabilities through Write-Ahead Logging (WAL) and Point-in-Time Recovery (PITR). If you're a PostgreSQL DBA or architect managing critical production workloads, WAL archiving is your safety net.

In this guide, you'll learn:

- What WAL is & how it works
- How to configure WAL archiving in PostgreSQL 17
- How to monitor, troubleshoot, and verify archiving
- Best practices for PITR readiness

Let's go hands-on! 

What Is Write-Ahead Logging (WAL) in PostgreSQL?

Write-Ahead Logging (WAL) is a foundational mechanism in PostgreSQL that ensures **data integrity, durability, and crash recovery**. It's a crucial component for any serious DBA, and here's an in-depth look at its role and importance.

WAL: The Basis of Durability and Crash Recovery

What WAL Does:

- Before any changes are applied to data files, PostgreSQL first writes these changes to a **write-ahead log** — a series of sequential files (typically 16 MB each).
- This log contains every modification (INSERT, UPDATE, DELETE, DDL operations) the database performs.

Why It Matters:

- If a crash occurs (hardware failure, power loss, or OS crash), PostgreSQL uses the WAL to **replay all committed changes** that haven't yet been flushed to disk.
- This ensures that your database is always restored to the **most recent consistent state**, safeguarding against data loss.

WAL Makes PITR Possible

Point-in-Time Recovery (PITR) leverages WAL to allow you to **restore the database to any specific moment in time**, not just the moment of your last backup. Here's how it works:

1. Base backup is taken at time T_0 .
2. PostgreSQL continues generating WAL segments.
3. When needed, you restore the base backup.
4. Then you **replay WAL files** from T_0 up to your desired recovery point (e.g., a crash or a specific timestamp).

This capability is critical for recovery from:

- User errors (like a faulty UPDATE statement)
- Application bugs (mass data deletions)
- Recent crashes where you don't want to lose minutes — or even seconds — of data

Summary: Why WAL Is Essential

-  **Guarantees durability:** Committed transactions aren't lost — even if PostgreSQL hasn't yet written to data files.
-  **Enables crash recovery:** Automatically restores your database to a consistent state after unexpected failures.
-  **Supports PITR:** Lets you rewind or fast-forward database state to any timestamp since your last base backup.

Understanding WAL is essential for anyone tasked with **database reliability, performance, and recovery planning**. In our next section, we'll dive into how you **configure WAL archiving** in PostgreSQL 17 — and how to monitor it for bulletproof disaster preparedness.

🔍 Where Are WAL Files Stored?

At the heart of PostgreSQL's reliability is the Write-Ahead Log (WAL). Every change your database makes — INSERTs, UPDATEs, DELETEs — is first written to WAL files before being applied to data files. This ensures data consistency and crash recovery.

📍 Default Location: `$PGDATA/pg_wal`

- `$PGDATA` refers to your database's data directory. Common locations include `/var/lib/postgresql/<version>/main` on Linux or custom paths defined during initialization.
- Inside this directory, you'll find `pg_wal/` (in older versions, called `pg_xlog/`).
- WAL segments are fixed-size files — 16 MB by default — with names like:

```
000000010000000000000000A 000000010000000000000000B
```

- Each name encodes the log timeline and sequence. As transactions occur, PostgreSQL writes to the current segment. When it fills, it steps to a new one.

⌚ WAL Segment Lifecycle

1. **Filling:** The active segment fills up with transaction data.
2. **Switching:** On full or checkpoint, PostgreSQL creates a new segment file.
3. **Archiving or Recycling:** Depending on your configuration, the old segment is either:
 - **Archived** (saved externally) **or**
 - **Recycled** (overwritten in place for future use)

Understanding this lifecycle is crucial for ensuring data durability and recoverability.

📁 The Archive Status Directory

Inside `pg_wal`, PostgreSQL uses a directory called `archive_status/` to track the archiving progress of each WAL segment. This metadata ensures reliable archiving and recovery.

▶ Files and Their Meanings

.ready files

- Appear automatically when a WAL segment is complete and ready for archiving.
- Example: `000000010000000000000000A.ready`
- Signals your archiving process can (and should) copy the corresponding segment.

.done files

- Created when the `archive_command` successfully copies the associated WAL segment.
- Example: `000000010000000000000000A.done`
- Confirms the segment has been safely archived.

🛡 Why It Matters

- Ensures **idempotency**: if your archiver falters and retries, `.done` prevents duplicate copies.
- Prevents **coordinate chaos**: at any time, you can inspect `archive_status/` to discover what's pending or completed.
- Failure to archive (e.g., missing permissions) can result in `.ready` files stacking up—the system warns you to act.

🚀 What Is WAL Archiving?

E Definition in Action

WAL archiving moves **entire segments** from `pg_wal` to a secondary location. It's not about streaming individual changes—rather, it's segment-based, ensuring consistent units of transaction history.

Common Destinations

- Local disk directories such as `/mnt/backup/wal/`
- Mounted NFS shares
- Remote servers via SCP or rsync
- Cloud storage: AWS S3, Google Cloud Storage, Azure Blob
- Dedicated WAL archiving tools or services

The important part: the destination must be reliable, durable, and in sync with PostgreSQL's archiving.

How to Configure WAL Archiving

Let's walk through an example `postgresql.conf` configuration:

```
# Increase WAL level to support replication and archiving
wal_level = replica

# Enable archiving
archive_mode = on

# Command for copying WAL files
archive_command = 'test ! -f /mnt/backup/wal/%f && cp %p
/mnt/backup/wal/%f'

# Optionally adjust segment size (must be power of two, default
# 16MB)
# wal_segment_size = 16MB
```

- `wal_level=replica` ensures sufficient data is logged for standbys and archive.
- `archive_mode=on` turns on the archiving system.
- `archive_command` —a shell invocation—tells PostgreSQL how to move segments, using:

- %p : full path to WAL segment
- %f : segment's filename

Workflow Overview

1. WAL fills → .ready file appears.
2. archive_command runs (triggered by PostgreSQL or by an external launcher).
3. On success: WAL is copied → .done file created.
4. Segment may now be recycled.

Troubleshooting Tips

- **Permission issues:** ensure PostgreSQL can write to the archive directory.
- **Failed commands:** logs in pg_log/ show \$archive_command exit status.
- **Stuck .ready files:** any .ready older than expected indicates pipeline issues.

Why WAL Archiving Is Essential

1. Point-in-Time Recovery (PITR)

PITR lets you restore your database to an exact moment:

- Take a full backup (e.g., nightly)
- Archive ongoing WAL segments
- On failure:
- Restore backup
- Apply archived WALS using recovery tools and settings like:

```
restore_command = 'cp /mnt/backup/wal/%f %p' recovery_target_time = '2025-06-14'
```

- Replay logs up to a precise timestamp — ideal for recovering accidental deletes.

2. Avoiding WAL Recycling Pitfalls

Without archiving, WAL segments are merely recycled — erasing all older transaction history:

- You can only restore from your **last full backup**
- Any post-backup transactions become **irrecoverable**

3. Support for Disaster Recovery & Replication

- In replication setups, WAL files are shipped to standby systems.
- Even when not streaming, archived WALs can help rebuild replicas or audit transactions.



Consequences of Skipping WAL Archiving

- **Lost historical logs:** critical changes might vanish during recycling.
- **Recovery gap:** you may only restore up to your last backup snapshot.
- **Risk of data loss:** all events between backup and failure are gone.
- **Lost confidence:** in legal, financial, or compliance scenarios, this gap can be unacceptable.

Final Checklist Before Go-Live

Pre-Launch Task	Why It Matters	Verification
<code>SHOW archive_mode;</code> <code>SHOW archive_command;</code> <code>SHOW wal_level;</code>	Ensure archive pipeline is on	Query outputs
Flush WAL, check archive dir	Validate command works	<code>SELECT pg_switch_wal();</code>
Inspect <code>archive_status/</code>	Confirm <code>.ready</code> → <code>.done</code> cycle	<code>ls \$PGDATA/pg_wal/archive_status/</code>
Set monitoring/alerting	Alerts on archiving failures	Check logs or cron notifications
Include tests in backups	Verify restore works end-to-end	Periodic PITR drills

Summary

- WAL files live inside `$PGDATA/pg_wal` in predictable 16 MB segments.
- Archiving status is managed automatically using `.ready` and `.done` markers.
- WAL archiving copies entire segments out to durable storage, enabling PITR and replication support.
- Without it, PostgreSQL recycles segments and you lose post-backup history — risking data gaps.
- Checking config, monitoring status markers, and validating commands before going live is vital.

Step-by-Step: Configuring WAL Archiving in PostgreSQL 17

Setting up WAL archiving ensures you can recover your database up to any specific point in time — even if you experience data loss. Here's how to configure it properly in PostgreSQL 17.

✓ 1 Verify Current WAL Settings

Before making changes, review your existing WAL configuration with:

```
SELECT name, setting, unit
FROM pg_settings
WHERE name IN (
    'wal_level',
    'wal_keep_size',
    'archive_mode',
    'archive_command',
    'archive_timeout'
);
```

This query returns key parameters:

- **wal_level**: Controls how much detail is logged. For archiving and streaming replication, it must be set to `replica` or `logical`.
- **wal_keep_size**: Determines how many megabytes of WAL files PostgreSQL keeps in `pg_wal` to help replicas catch up.
- **archive_mode**: Indicates whether WAL archiving is currently turned on (`on`) or off (`off`).
- **archive_command**: Specifies the shell command PostgreSQL uses to copy WAL files to your archive destination.
- **archive_timeout**: Defines how often WAL files are forced to switch and get archived, even during low transaction volume.

Why check before you change?

- To confirm you're not unintentionally overwriting a working setup.
- To understand your current disaster recovery posture.
- To spot potential misconfigurations or missing settings.

✓ 2 Create WAL Archive Directory

You need a safe place where PostgreSQL can store archived WAL files:

```
mkdir -p $HOME/wal_archive  
ls -ld $HOME/wal_archive
```

Key points:

- The `-p` flag ensures creation of parent directories if they don't exist.
- `ls -ld` confirms its permissions and ownership.
- Ensure the PostgreSQL service user (e.g., `postgres`) has **write permission** in this directory.

⚠ Why this step matters:

- A misconfigured or non-writable directory will cause `archive_command` to fail.
- Archiving failures manifest as `.ready` files that never turn into `.done`, silently jeopardizing your disaster recovery capability.
- Setting up the directory correctly at the outset prevents later headaches.

✓ Summary: What You've Achieved

Step	Purpose	Verified WAL settings via SQL	Ensured preconditions for archiving are met and understood	current configuration	Created and verified archive directory	Reserved a safe, writeable destination and avoided future permission errors
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With these steps complete, you're ready for configuring `postgresql.conf`, testing your archive pipeline, and setting up recovery routines in secure storage—laying a strong foundation for full Point-in-Time Recovery (PITR).

✓ 3 Update PostgreSQL Configuration

With your archive directory ready, the next step is activating WAL archiving and fine-tuning its behavior. You can make these adjustments in one of two ways:

🔧 A. Using ALTER SYSTEM SET

This method applies changes immediately after the next restart without manually editing files:

```
ALTER SYSTEM SET archive_mode      = 'on';
ALTER SYSTEM SET wal_level        = 'replica';
ALTER SYSTEM SET archive_timeout= '1h';
ALTER SYSTEM SET wal_keep_size   = '100MB';
-- legacy alternative; modern setups prefer wal_keep_size
ALTER SYSTEM SET wal_keep_segments = '10';
ALTER SYSTEM SET archive_command =
'test ! -f /var/lib/pgsql/wal_archive/%f && cp %p /var/lib/pgsql/wal_archive/
```

What each setting does:

- **archive_mode = 'on'**

Enables the archive system to copy completed WAL segments.

- **wal_level = 'replica'**

Ensures logs include enough detail for replication and PITR.

- **archive_timeout = '1h'**

Forces a WAL file switch every hour, even during minimal activity, ensuring regular checkpointing.

- **wal_keep_size = '100MB'**

Keeps at least 100 MB of WAL data in `pg_wal` to support replicas catching up after brief delays.

- **wal_keep_segments = '10'**

(Legacy) Retains ten 16 MB WAL segments as an alternative to `wal_keep_size`.

Avoid mixing both parameters.

- **archive_command = '...'**

The shell command executed each time a WAL segment is ready to archive.

PostgreSQL replaces:

- %p with the segment's full file path
- %f with only the segment's filename

The sample uses a shell predicate (`test ! -f ...`) to avoid duplicate copies, followed by `cp` to move segments into your archive directory.



B. Editing postgresql.conf Directly

If you prefer configuration files, open `postgresql.conf` and adjust or add:

```
archive_mode      = on
wal_level        = replica
archive_timeout   = 1h
wal_keep_size    = 100MB
# wal_keep_segments = 10 # optional/legacy
```

```
archive_command = 'test ! -f /var/lib/pgsql/wal_archive/%f && cp %p
/var/lib/pgsql/wal_archive/%f'
```

After editing, save the file and proceed with a restart to apply changes.



Restart PostgreSQL to Apply Changes

Whether you used SQL commands or edited the config, restart the service to activate archiving:

```
sudo systemctl restart postgresql-13
```

After restarting, PostgreSQL will:

- Load the updated archive settings
- Adhere to the specified timeout and keep-size rules
- Begin executing `archive_command` whenever WAL segments cycle

✓ Why These Settings Matter

Configuration	Benefit
<code>archive_mode</code> & <code>wal_level</code>	Activates archiving; ensures sufficient WAL detail for replication and PITR
<code>archive_timeout=1h</code>	Prevents long delays between archived segments—even during low traffic
<code>wal_keep_size=100MB</code>	Helps replicas catch up without missing segments
<code>archive_command</code>	Controls how and where WAL segments are stored. Using <code>%p</code> and <code>%f</code> ensures uniqueness and reliability.

With these configurations in place and the service restarted, PostgreSQL is primed to archive each full WAL segment to your designated folder. The presence of `.ready` and `.done` markers in `archive_status/` will indicate progress, while your archive directory grows with time-stamped WAL segments—forming the foundation of a resilient Point-in-Time Recovery (PITR) and replication setup.

You're now ready to test the pipeline, configure your recovery options, and build confidence in your disaster recovery strategy.

✓ 5 Validate Configuration

After updating your configuration and restarting PostgreSQL, it's crucial to confirm that all settings are correctly applied and ready to work.

Double-Check Active Settings

Run this SQL query to verify your WAL-related parameters:

```
SELECT name, setting, unit
FROM pg_settings
WHERE name IN (
    'wal_level',
    'wal_keep_size',
    'wal_keep_segments',
    'archive_mode',
    'archive_command',
    'archive_timeout'
);
```

You should see output similar to:

name	setting	unit
wal_level	replica	
wal_keep_size	100	MB
wal_keep_segments	10	
archive_mode	on	
archive_command	test!-f ...	
archive_timeout	1	h

- **wal_level = replica** — Ensures transaction details are sufficient for archiving, replication, and PITR.
- **wal_keep_size = 100 MB or wal_keep_segments = 10** (legacy) — Defines how much WAL data is retained locally.
- **archive_mode = on** — Enables WAL archival.
- **archive_command** — Specifies how WAL segments are copied; verify its path and command syntax.

- `archive_timeout = 1 h` — Forces segment rotation and archival hourly, even if there's low activity.

⚠️ Important: Avoid setting both `wal_keep_size` and `wal_keep_segments` at the same time—choose one to prevent conflicts.

⌚ Forcing a WAL Switch (Manual Testing)

To test if your archive pipeline is working, manually trigger WAL segment rotation:

```
SELECT pg_switch_wal();
```

Each invocation does the following:

- Closes the current WAL segment.
- Opens a new WAL segment.
- Generates a new `.ready` status file in `archive_status/`.
- Executes `archive_command` to copy the segment to your archive directory.

🔍 What to do next:

- Check `$PGDATA/pg_wal/archive_status/` — You should see a new `.ready` file appear.
- Inspect your archive directory (`/var/lib/pgsql/wal_archive/`) for the corresponding WAL file.
- Confirm a `.done` file appears in `archive_status/`, indicating successful archival.

Run the `pg_switch_wal()` command multiple times to produce several WAL segments and confirm consistent archival behavior.

✓ Summary: What You've Achieved

By completing these steps:

1. Verified all key WAL and archive settings are correct and active.
2. Manually triggered WAL switches to validate your archive pipeline works reliably.
3. Learned to monitor for `.ready → .done` status transitions to detect any issues.

With this validation in place, you're one step closer to a fully functioning WAL archive setup — crucial for robust disaster recovery, Point-in-Time Recovery (PITR), and fault-tolerant replication.

🔴 How to Stop Archiving (Optional)

Sometimes you might need to temporarily disable WAL archiving — for maintenance, testing, or shifting to a different backup strategy. Here's how to do it safely:

```
ALTER SYSTEM SET archive_command = '/bin/false';
SELECT pg_reload_conf();
SELECT pg_switch_wal();
```

🔧 What This Does

1. **`ALTER SYSTEM SET archive_command = '/bin/false'`**
 - `archive_command` now uses `/bin/false`, a command that always exits with failure.
 - This means PostgreSQL will no longer archive WAL segments as it proceeds to invoke the command, but nothing will be copied.
2. **`SELECT pg_reload_conf();`**

- Reloads the configuration without restarting the service, so the new `archive_command` takes effect immediately.

3. `SELECT pg_switch_wal();`

- Forces a WAL segment switch. The segment won't get archived (because `archive_command` is ineffective), but it will test the change in behavior.

🎯 This method allows you to **suspend archiving cleanly**, without permanently disabling `archive_mode` or making structural config changes. To resume, restore the original `archive_command` via `ALTER SYSTEM`, reload, and WAL archiving resumes automatically.

📊 Monitoring WAL Archiving

To track how well your WAL archiving is working, PostgreSQL includes a system view:

```
SELECT *
FROM pg_stat_archiver;
```

📌 Key Fields to Monitor

- `archived_count` – Number of WAL segments successfully archived.
- `failed_count` – How many WAL segments failed to archive.
- `last_failed_time` – Timestamp of the most recent archival failure.

These metrics are crucial for spotting intermittent or persistent archiving issues — especially in production traffic.

▶️ Handling Archiving Failures

When an archive attempt fails — perhaps due to permission issues, storage problems, or a transient network error — PostgreSQL will:

1. Leave the WAL segment's `.ready` file in:

```
$PGDATA/pg_wal/archive_status/
```

2. Log the failure in `log_directory` (commonly `pg_log/`).

Recommended Failure Response

- Inspect the archives:

```
ls $PGDATA/pg_wal/archive_status/*.ready
```

- These indicate segments still pending archival.

Investigate the failure:

- Check `postgresql.log` or `pg_log/` for recent archive errors.
- Look for `ERROR` or `FATAL` messages related to `archive_command`

Fix the root cause:

- Correct directory permissions, disk space, or network access.
- Ensure destination paths exist and are writable.

Retry archiving:

- Manually copy the failed WAL segments to your archive directory.
- Optionally rerun `SELECT pg_switch_wal();` to simulate fresh segments.

Verify recovery:

- Confirm `.done` markers replace `.ready` files for each recovered segment.

Summary

- Disabling archiving is easy and reversible—just point `archive_command` at a harmless command like `/bin/false` and reload.
- The view `pg_stat_archiver` provides live statistics on archival success and failure.
- Failed archival attempts leave `.ready` files and log entries—monitor both, fix issues, and manually handle old segments to maintain a clean archive.

By understanding how to safely disable archiving, monitor its performance, and handle failures, your PostgreSQL system stays resilient and reliable even under changing conditions.

Common Causes of `.ready` Files Lingering

When you see WAL segments stuck with `.ready` status in your `archive_status/` directory, it means PostgreSQL has flagged them for archiving—but something has prevented completion. Here's a detailed look into the most common reasons behind this:

1. Archive Destination Full or Unavailable

If your archive directory (e.g., `/var/lib/pgsql/wal_archive/`) runs out of space or becomes unreachable, PostgreSQL cannot copy WAL segments. The `.ready` file remains because the segment hasn't been archived.

Signs to watch for:

- `cp` commands failing due to "No space left on device"
- I/O errors such as "Read-only file system"

2. Incorrect `archive_command`

A typo in the command, wrong path, or misused variables (`%p` vs `%f`) can break the entire pipeline. PostgreSQL will attempt the command and fail silently, leaving `.ready` files behind.

Examples:

- Path typos: `/var/lib/psql/wal_archive/` vs. `/var/lib/pgsql/...`
- Using absolute instead of relative paths, or vice versa

3. Insufficient Permissions

PostgreSQL's background process must have sufficient rights to read WAL segments and write to the archive directory.

Common mistakes:

- Archive path owned by root, not `postgres` user
- Directory missing write permission (e.g., `chmod 700` only allows access to owner)

4. Network or Storage Failures

In setups that archive to network storage (NFS, SMB), remote servers, or cloud buckets, temporary outages or latency issues can break `archive_command`.

Potential issues:

- NFS mount dropped with “Stale file handle”
- SCP or `aws s3 cp` timing out or erroring out
- Firewall rules blocking remote connections

How to Find the Root Cause

To pinpoint the issue, inspect PostgreSQL's logs for detailed error messages:

```
less /var/lib/pgsql/data/log/postgresql.log
```

Look for entries around the timestamp when `.ready` files appeared. You might see lines like:

```
ERROR: archive command failed with exit status 1
DETAIL: The failed command was: cp /var/lib/pgsql/data/pg_wal/00000001000000000000
```

These logs often include helpful information:

- Exact failure message (e.g., “permission denied”, “no space left”, “network unreachable”)
- The exact shell command PostgreSQL tried

What to Do Next

1. Free up space or repair storage if capacity is the issue.
2. Fix typos or logic errors in your `archive_command`.
3. Correct permissions — use `chown postgres:postgres /path ...` and `chmod 755`.
4. Stabilize remote storage connections, ensuring mounts are healthy and network is solid.
5. Clear stale `.ready` files and let PostgreSQL recreate them after fixing issues.
6. Test archiving with a manual WAL switch (`SELECT pg_switch_wal();`) and watch for `.done` markers.

Ensuring your archive pipeline is error-free and resilient is key to a successful disaster recovery strategy. By identifying and fixing issues early — before they escalate — you help safeguard against data loss and ensure your WAL archiving stays reliable.

Why WAL Archiving Is Critical for PITR (Point-in-Time Recovery)

WAL (Write-Ahead Logging) is one of PostgreSQL's most powerful features for ensuring data integrity. But its true strength is fully realized only when **WAL archiving** is enabled.

Many mistakenly associate WAL archiving only with streaming replication. In reality, **WAL archiving is the foundation of Point-in-Time Recovery (PITR)** — a critical capability that lets you restore your database to a specific moment in the past.

With WAL Archiving Enabled, You Can:

- 1. Restore from Any Full Backup**
 - Begin recovery using a snapshot from `pg_basebackup` or similar tools.
- 2. Replay WAL Up to a Specific Timestamp**
 - Use recovery settings like `recovery_target_time` to stop at the exact moment before a failure occurred.
- 3. Recover from Human Errors or Software Bugs**
 - Accidentally dropped a table or deleted rows? With PITR, you can roll the database back to a safer point — minutes or even seconds before the issue.

Without WAL archiving, PITR is not possible.

Once WAL segments are recycled (overwritten), you lose the ability to replay those changes. That means any user mistake or corruption after your last full backup is permanent and unrecoverable.

🔑 Key WAL Archiving Facts Recap

Concept	Description
WAL Enabled?	<input checked="" type="checkbox"/> Always enabled by default
WAL Directory	\$PGDATA/pg_wal
WAL Segment Size	16 MB per file (default, configurable during cluster init)
Archiving Required for PITR?	<input checked="" type="checkbox"/> Yes. No WAL archive = No replay = No PITR
WAL Segment States	.ready → WAL pending archiving .done → WAL successfully archived
LSN (Log Sequence Number)	Internal marker for WAL position—used during recovery and replication

Understanding these fundamentals ensures that you can effectively configure and monitor your archive strategy to support recovery goals.

🎯 Conclusion

WAL archiving isn't just a technical checkbox — it's PostgreSQL's secret weapon for true database resilience.

Here's how to stay on top of it:

- Archive all WAL segments to a secure, versioned, and durable location.
- Monitor `pg_stat_archiver` to verify archive success rates and spot failures early.
- Review logs proactively for signs of stuck `.ready` files or command failures.
- Practice PITR recovery drills in staging environments — don't wait for a real disaster to test your process.

🚀 With WAL archiving, you gain peace of mind, operational flexibility, and robust protection against even the most unexpected incidents. Treat it as an essential part of your PostgreSQL toolkit.

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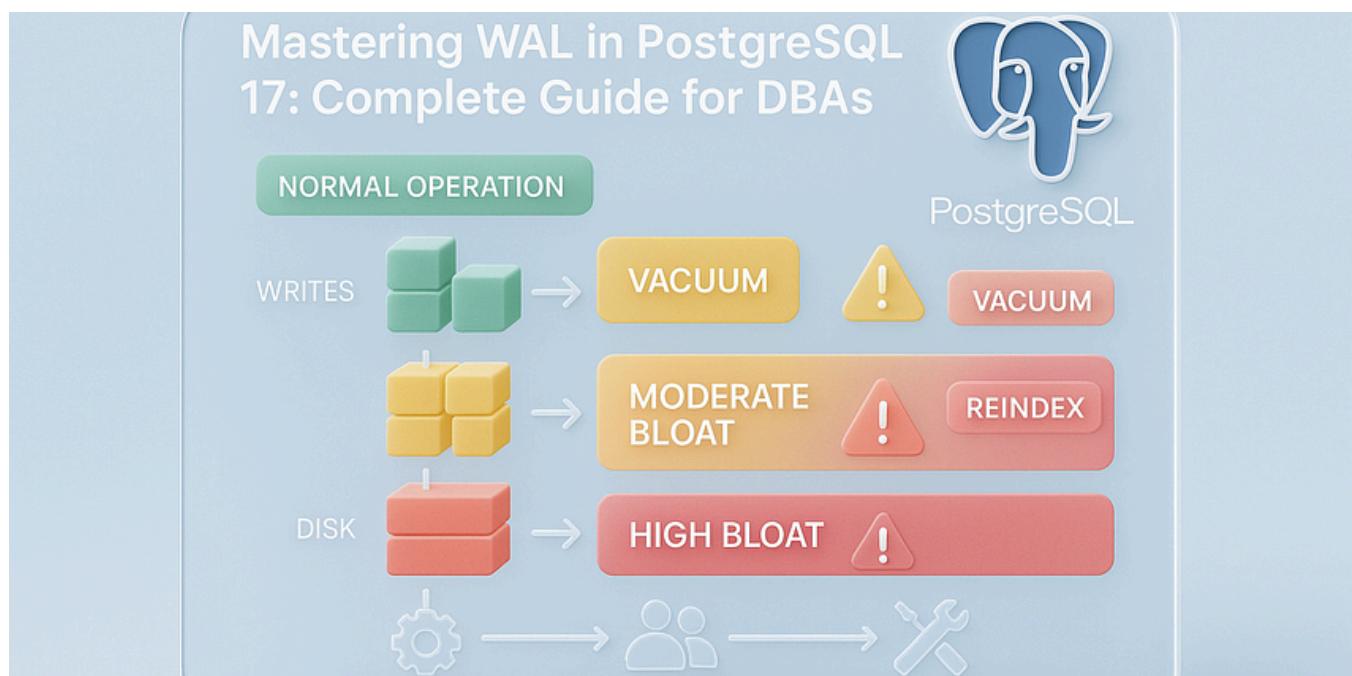
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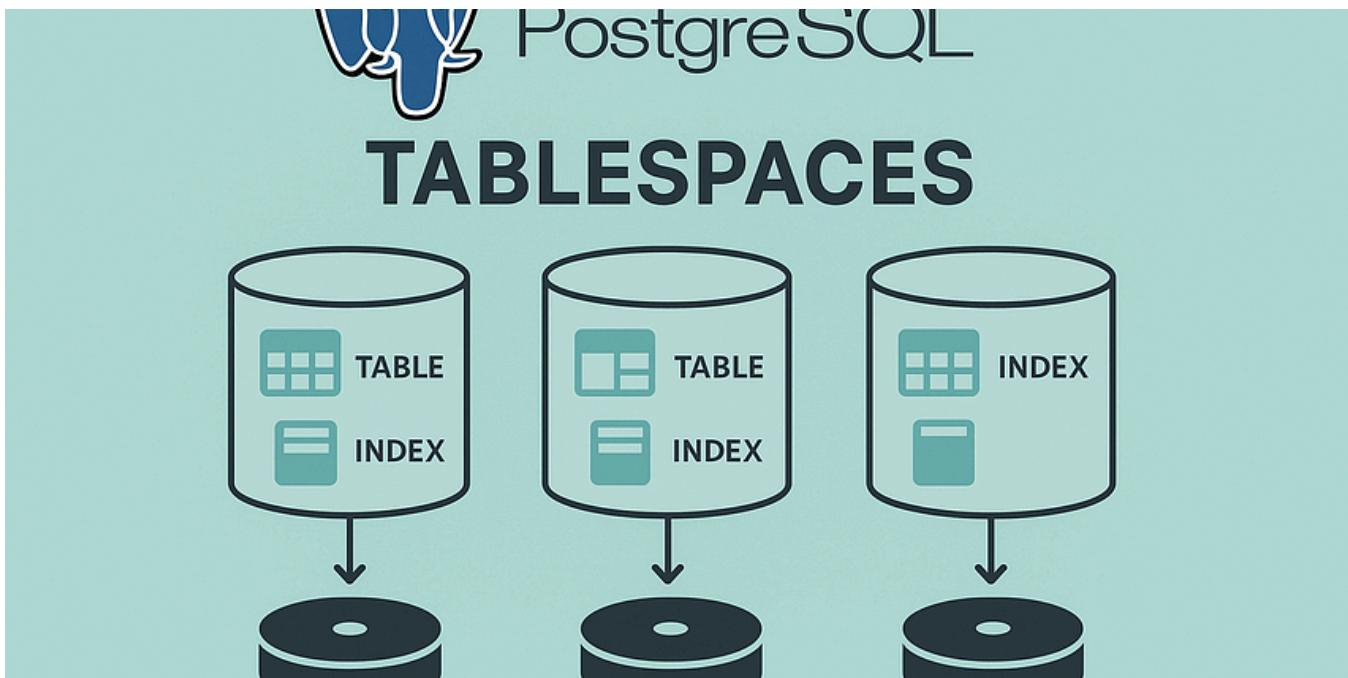
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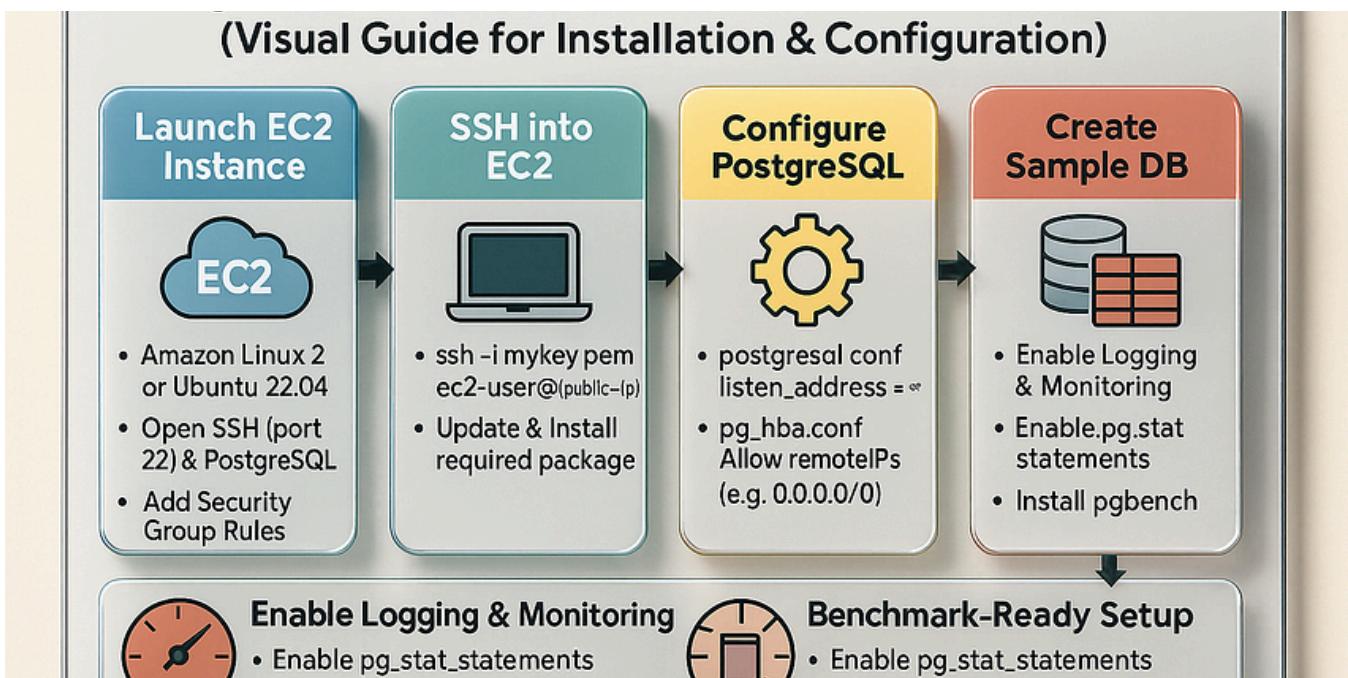
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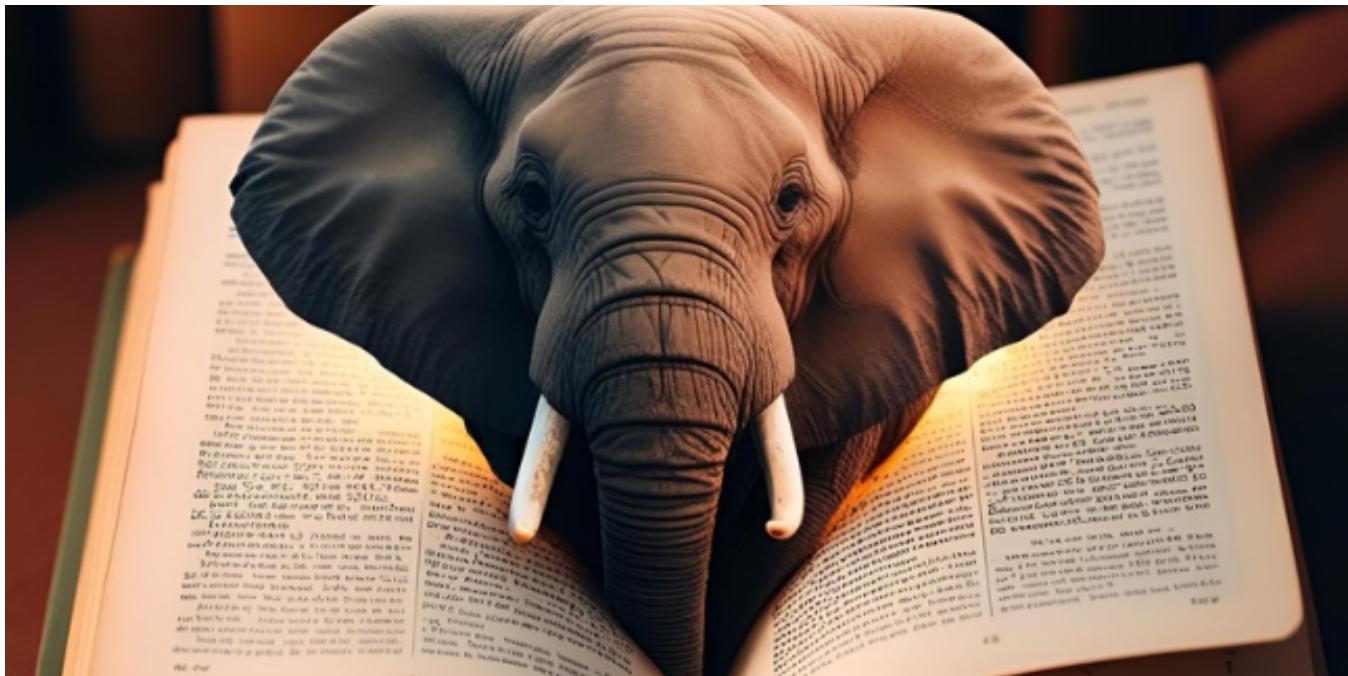
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The screenshot shows the pgAdmin interface. At the top, there is a code editor window containing the following SQL query:

```

1 explain
2 select *
3 from payment_lab
4 where customer_id=10 ;

```

Below the code editor are two tabs: "Statistics 1" and "Results 2". The "Results 2" tab is currently active, displaying a "QUERY PLAN" section. The plan shows the following steps:

- Seq Scan on payment_lab (cost=0.00..290.45 rows=23 width=26)
- Filter: (customer_id = 10)

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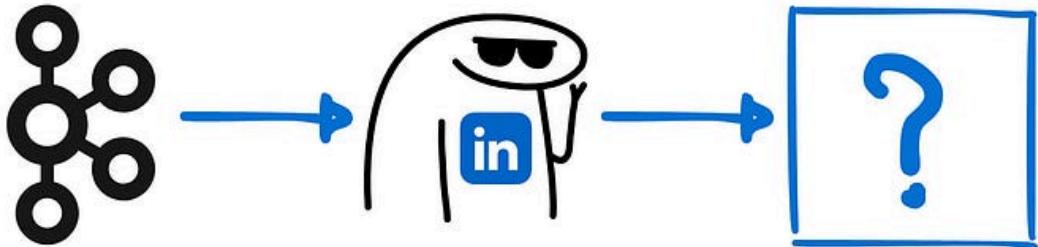
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