

Working Across Projects in the Postgres Ecosystem

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Agenda

- Introduction to Barman
- Incremental Backup in Postgres 17
- Improvements in Postgres 18 for backups
- What could come beyond now

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Barman team



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Barman Team

- Martín Marqués
- Giulio Calacoci
- Israel Barth
- Andre Marchesini
- Barbara Leidens
- Gustavo Oliveira

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Barman Team

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- Robert Haas

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Main responsibilities of Barman

- Maintain a catalogue of backups
  - Invokes backup tools (`pg_basebackup` or `rsync`)
  - Have ways of archiving, directly (`barman-wal-archive`) or indirectly (`pg_receivewal`)
  - Provide means to define retention policies, and enforce them
- Be able to restore Backups

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Barman Incremental Backup before Postgres 17

- File level incremental backup
  - Requires a filesystem that supports hardlinks
  - Leverages Rsync to copy files which have changed

- Limitations
  - Copies whole files if there are changes, even if a tiny piece has changed
  - No backup compression
  - No backup encryption

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Incremental Backup in Postgres 17

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Postgres 17 and Barman to support incremental backup

- Keep it simple, don’t break existing features
  - Use similar naming convention
  - Backwards compatible in Barman
  - Restore has to be simple
- Introduce the concept of a pg_basebackup incremental backup
  - Chain backups in tree format (managed internally)
  - Add new `barman backup` option `-i/--incremental` to specify father of the incremental backup
  - Same name short-cut convention for `last/latest` backup.
  - Add also `latest-full` short-cut
- Add new metadata to track incremental backups, sizes, etc.
  - summarize_wal
  - data_checksums
  - child backup for incremental parent identification

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The Barman roadmap for Postgres incremental backups

v3.11

Features:

- Add `--incremental` option to barman backup
- New short-cut `last-full/latest-full`
- Retention policies only take into account full backups
- Refactor the disk space metadata and output format
- Add backup type information to the output of `barman list-backup`
- `barman keep` only works with full backups

Limitations:

- Tar format not supported, reason for compress backups to not be supported in incremental mode.
- Combination on backups is done on the barman node, not the target node

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The Barman roadmap for Postgres incremental backups

v3.15

Features:

- Refactor the `barman restore` command
  - Lift restriction for tar format and compressed backups
  - Permit encryption of incremental backups

Limitations:

- None 😎

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Barman to support incremental backup

- How to take an incremental backup
  - `barman backup my_server --incremental backup_id`
  - `barman backup my_server --incremental latest`
  - `barman backup my_server --incremental latest-full`

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Barman to support incremental backup

- Important notes
  - Incremental backups are not accounted when calculating retention policies
    - They are treated the same as WALs from a retention/deletion point of view
  - Deletion of a full backup cascades to all incremental backups that depend on it
  - `barman keep` can not be applied on incremental backups
    - `barman keep` with target `full` will mark as valid incremental backups in the chain

- New `barman list-backup` output

```
postgres 20250814T015515 - I - Wed Aug 14 01:55:17 2024 - Size: 35.0 MiB - WAL Size: 16.0 MiB
postgres 20250814T015504 - F - Wed Aug 14 01:55:06 2024 - Size: 54.3 MiB - WAL Size: 32.0 MiB
```


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Improvements in Postgres 18 for backups



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Postgres 18 and Barman

- Introduction of link mode to `pg_combinebackup`
  - Patch developed by Israel Barth, who is a Barman developer
- `pg_verifybackup` in tar format
  - Amul Sul

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The Barman roadmap for Postgres incremental backups

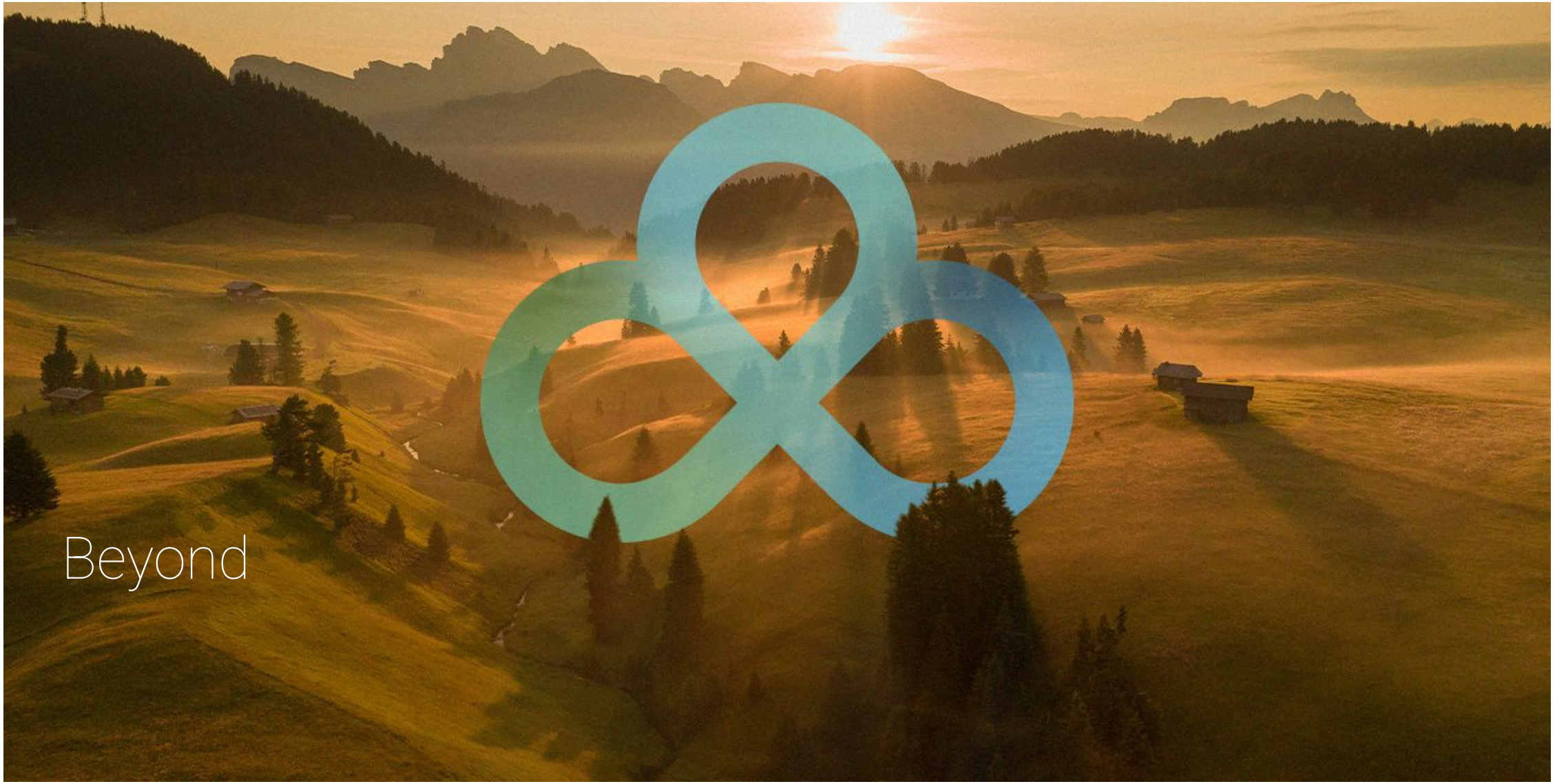
v3.16

Features:

- Add support for other copy methods while combining
  - Initially proposed around PG18 combine link-mode
  - Enhanced the proposal to include `clone` and `copy-file-range`
- Release date: this week

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SMALL TITLE: LIGHTBOX FORMAT WITH LOOP LANDSCAPE AND COPY



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Beyond Postgres 18

- Evergreen: the sliding window
- Combine backups in tar format, and with compression
  - Maybe base this on Amul's work on `pg_verifybackup`?
- Have ways to take incremental backups without `pg_basebackup`
- Ability to have the list of files needed to combine the chain of backups
- Better integration with object stores (public and private clouds)
  - This involves mainly work on Barman, but also some in Postgres
- Encryption of backups and WAL files

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The Barman roadmap for Postgres incremental backups

v3.17 and beyond

Features:

- Support `pg_verifybackup` for compressed backups
- Incremental backups in the cloud?

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Questions?



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