Backup and Recovery Best Practices

EDB Customer Office Hour

Starting Soon

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AGENDA

1. Why do we need backups?

1. PostgreSQL database Backup options

1. Backup strategies

1. Backup and recovery best practices

1. Demo

1. Q & A

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Why do we need backups?

- A backup is a consistent copy of the data that can be used to recover the database.
- Databases need to be backed up to avoid data loss due to:
  - User error
  - Hardware failure
  - Data corruption
- Need the ability to restore old data due to Compliance reasons
- Databases need to be quickly restored to meet the RPO and RTO requirements.
- To protect company's business and reputation

PostgreSQL database backup options

- Logical backup using pg_dump / pg_dumpall

- Physical backup using pg_basebackup, file system snapshots, or a cold backup

- EDB supported and other third party tools:

  - Barman (EDB Supported)

  - pgBackRest (EDB Supported)

  - BART (EDB Supported, but reaching EOL)

  - Veritas Netbackup (EDB partnership)

  - Other third party tools

Logical backup

pg_dump/pg_dumpall

- The pg_dump can be used to take a consistent dump of the current database.

- The pg_dumpall can be used to backup the entire cluster and all global objects.

- Dumps can be in plain-text file containing the SQL commands or in archive format.

- Command examples:

    - pg_dump –h <db host> -p <db port> -U <dbuser> -W –F <format> -f <dumpfile> [-a|-s] –d <dbname>

      (Where format can be p (plain), c (custom), d (directory), or t (tar))

    - pg_dumpall –h <db host> -p <db port> -U <dbuser> -W –f <filename> [-a|-s] [-g] –l <dbname>

Restoring logical backup

- The plain format dumps created by pg_dump can be restored in a new database, as below:

    psql –d newdb –f <dump>

- The custom, directory, or tar format dump can be restored using pg_restore utility.

- Use –clean and –create options with pg_restore to restore the backup in same database.

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Physical backup

pg_basebackup utility

- It's a utility to take a base backup of running PostgreSQL cluster

- The backup can be used to do a point-in-time recovery using the WAL files

- Makes an exact copy of cluster's files

- One can view the progress of the backup using pg_stat_progress_basebackup view.

- Examples:

  - pg_basebackup –h <remote_db_server> -p <port> -D <local data dir>

  - pg_basebackup -D - -Ft –X fetch | bzip2 > backup.tar.bz2

Physical backup

File system snapshot

- If your filesystem supports it, make a frozen snapshot of the database volume

- Copy the whole directory to a backup device

- Release the frozen snapshot

- Make sure to include all WAL files in your backup to perform a crash recovery when Postgres is started using the backed up data

Physical backup

Cold backup

- Shutdown Postgres

- Copy the entire data directory:
    - e.g. tar –cf backup.tar <PGDATA>

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Barman utility

Features

- Remote backup with rsync OR PostgreSQL protocol

- Management of multiple PostgreSQL/EPAS servers

- Support for file level incremental backups with rsync method

- WAL archiving and streaming

- WAL archive compression with gzip, bzip2

- Point-In-Time-Recovery (PITR)

- Support for Local and remote recovery (via SSH)

- Management of retention policies of backups

pgBackRest utility

Features

- Parallel backup & restore

- Local or remote operation

- Full, incremental, and differential backups

- Retention policies

- Backup integrity

- Backup encryption
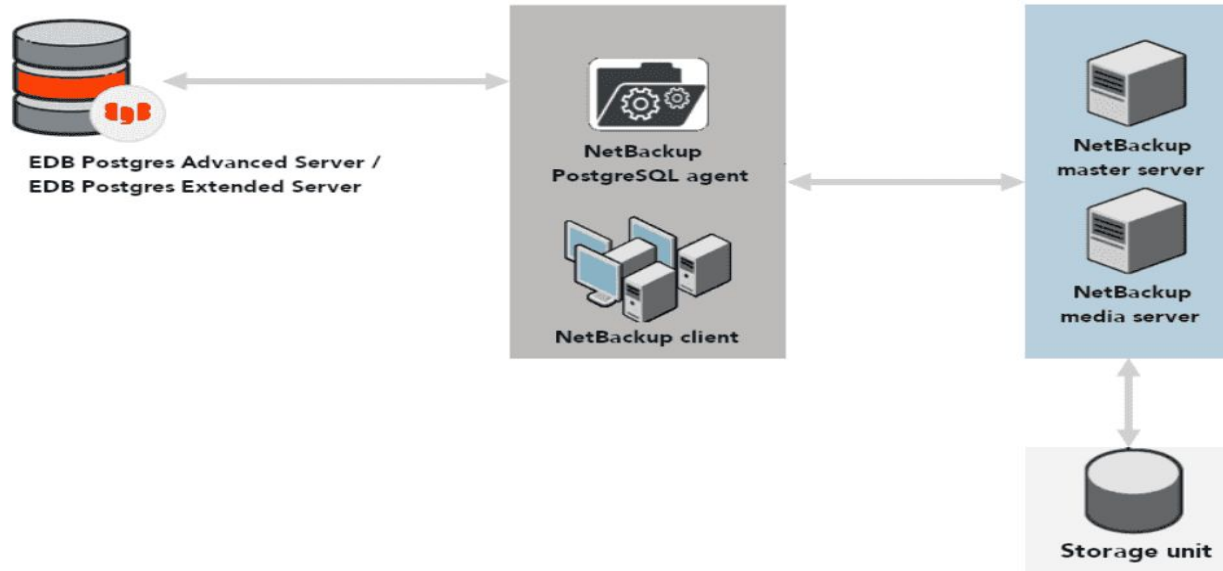
- S3, Azure, and GCS support

BART utility

(Reaching EOL)

- Backup and recovery management of local and remote database servers.

- Integrates with EDB Postgres Enterprise Manage

- Configurable retention policies

- Full and block-level incremental backup

- Parallel copy and restore

- Point-in-time recovery to specified transaction ID or timestamp

Veritas NetBackup

(EDB Partnership)

EDB Postgres Advanced Server / EDB Postgres Extended Server ← → **NetBackup PostgreSQL agent** / **NetBackup client** ← → **NetBackup master server** / **NetBackup media server** ← → **Storage unit**

Feature comparison

Feature	Barman	pgBackRest	pg_basebackup
SSH Protocol	✔	✔	
PostgreSQL protocol	✔		✔
Incremental backups	✔	✔	
RPO=0	✔		
Rate limiting	✔		✔
Custom WAL sizes	✔	✔	✔
WAL archive compression	✔	✔	✔
Backup compression		✔	
Symmetric encryption		✔	
Parallel backup and restore	✔	✔	
Partial restore (slected databases)		✔	
Centralize repository	✔	✔	
Retention policy	✔	✔	
List backup	✔	✔	
S3 support	✔	✔	
Nagios integration	✔	✔	
PEM integration	✔		
No custom scripts required	✔	✔	

Backup strategies

- Depending on the backup option and database size, decide the frequency of full and incremental/differential backup.

- Setup wal archiving to keep the wals for point-in-time recovery.

- Backup strategy should meet the RTO and RPO requirements

- Adjust your backup retention policies to meet your legal/compliance requirements

- Use 3-2-1 rule and keep 3 copies of backup: 2 local copies and 1 offsite.

- Encrypt your backup

Best practices

- Make sure to have your backup and recovery policies and procedures documented

- Keeping a copy of the backup offsite or in cloud can prevent a disaster when you lose an on-prem data center.

- Perform regular tests of your backup by doing a recovery

- Monitor your backup process and get alerted when backup fails.

- When you use logical backup method, keep in mind that it's just a snapshot of the data and the backup is not suitable for doing PITR.

- While restoring the backup, restore it in a directory other than the source data directory.

DEMO

Q & A

Resources

Barman documentation:
https://www.enterprisedb.com/docs/supported-open-source/barman/

pgBackRest documentation
https://www.enterprisedb.com/docs/supported-open-source/pgbackrest/

BAR documentation:
https://www.enterprisedb.com/docs/bart/latest/

Veritas Implementation Guide:
https://www.enterprisedb.com/docs/partner_docs/VeritasGuide/

Blog on Backup and Recovery :

https://www.enterprisedb.com/postgresql-database-backup-recovery-what-works-wal-pitr

Feature comparison of various backup tools:

https://www.enterprisedb.com/products/backup-recovery-postgresql-database-auto-restore-script-tools

Thank you

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