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How to combine Pgbackrest and Streaming Replication using Postgresql-16

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In this blog we are going to discuss about Combining pgBackRest and Streaming Replication

Pre-req:

- Backup server — Pgbackrest–172.18.0.30
- Primary server — Postgresql-16–172.18.0.31
- Standby server — Postgresql-16–172.18.0.32

Source:Google

In Backup server:

S-1: Install pgBackRest

Install pgBackRest on both the primary and standby servers:

```
dnf install -y https://download.postgresql.org/pub/repos/yum/reporpms/EL-8-x86_
dnf -qy module disable postgresql
dnf install -y pgbackrest
```

Pgbackrest Installation You can follow Step-1 to Step-5 from this blog

S-2: Configure Replication

Install the postgresql-16 and enable these below parameters to configure streaming replication

To configure streaming replication betweeen primary (172.18.0.31) to standby (172.18.0.32) you can refer this blog How to configure Streaming replication

S-3: Verify the replication

We can verify the replication status using below

```
postgres=# select * from pg_stat_replication;
-[ RECORD 1 ]----+------------------------------
pid              | 389822
usesysid         | 10
usename          | postgres
application_name | walreceiver
client_addr      | 172.18.0.32
client_hostname  |
client_port      | 52810
backend_start    | 2025-03-01 14:48:55.807108+00
backend_xmin     |
state            | streaming
sent_lsn         | 0/E000148
write_lsn        | 0/E000148
flush_lsn        | 0/E000148
replay_lsn       | 0/E000148
write_lag        |
flush_lag        |
replay_lag       |
sync_priority    | 0
sync_state       | async
reply_time       | 2025-03-01 16:34:40.901623+00
```

S-4: To Configure Pgbackrest

On Backup server side:

```
[postgres@pg01 pgbackrest]$ cat /etc/pgbackrest.conf

[global]
repo1-path=/var/lib/pgbackrest
repo1-retention-full=1
start-fast=y
log-level-console=info
log-level-file=debug
process-max=2
archive-timeout=1h
compress-level=3
backup-standby=y

[mycluster]
pg1-host=172.18.0.31
pg1-host-user=postgres
pg1-port=5432
pg1-path=/var/lib/pgsql/16/data
pg2-host=172.18.0.32
```

```
pg2-host-user=postgres
pg2-port=5432
pg2-path=/var/lib/pgsql/16/data
```

On Primary side:

```
postgres@pg02 ~]$ sudo cat /etc/pgbackrest.conf


[global]
repo1-host=172.18.0.30
repo1-host-user=postgres
repo1-path=/var/lib/pgbackrest
repo1-retention-full=1
start-fast=y
log-level-console=info
log-level-file=debug
compress-type=zst
compress-level=3


[mycluster]
pg1-path=/var/lib/pgsql/16/data
pg1-port=5432
```

On Standby side:

```
[postgres@pg03 log]$ sudo cat /etc/pgbackrest.conf

[global]
repo1-host=172.18.0.30
repo1-host-user=postgres
repo1-path=/var/lib/pgbackrest
repo1-retention-full=1
start-fast=y
log-level-console=info
log-level-file=debug
compress-type=zst
compress-level=3

[mycluster]
```

```
pg1-path=/var/lib/pgsql/16/data
pg1-port=5432
```

S-5: To Configure archive command :

Edit the postgresql.conf file on primary side modify these parameters and save the file

```
archive_mode=on
archive_command='pgbackrest --stanza=mycluster archive-push %p'
```

Restart the cluster

```
sudo systemctl restart postgresql-16
```

S-6: Set up Password less authentication

1. On the backup server, generate SSH keys:

```
sudo -u postgres ssh-keygen -t rsa
```

2.Copy the public key to both primary and standby servers:

```
sudo -u postgres ssh-copy-id postgres@172.18.0.31
sudo -u postgres ssh-copy-id postgres@172.18.0.32
```

3.Test the connections:

```
sudo -u postgres ssh postgres@172.18.0.31
sudo -u postgres ssh postgres@172.18.0.32
```

Note: You have provided necessary permission on these below files

```
By default, the packages create the following directories owned by postgres:

sudo chown -R postgres: /var/lib/pgbackrest
sudo chown -R postgres: /var/log/pgbackrest
sudo chown -R postgres: /var/spool/pgbackrest
```

S-6: Create Stanza

On Your Backup server you can create a stanza using below

```
[postgres@pg01 pgbackrest]$ pgbackrest --stanza=mycluster stanza-create
```

Verify the check command on primary and standby

```
postgres@pg02 ~]$ pgbackrest --stanza=mycluster --log-level-console=detail check
```

```
[postgres@pg03 ~]$  pgbackrest --stanza=mycluster --log-level-console=detail ch
```

Make sure not seeing any errors over here

S-7: Perform a Full Backup

```
[postgres@pg01 ~]$ pgbackrest --stanza=mycluster --log-level-console=detail bac
```

Incase if your archiving is not happening/not configure properly you can see the error messages

verify the backup

```
[postgres@pg02 ~]$ pgbackrest --stanza=mycluster info
stanza: mycluster
    status: ok
    cipher: none

    db (current)
        wal archive min/max (16): 00000001000000000000000D/00000001000000000000

        full backup: 20250301-145458F
            timestamp start/stop: 2025-03-01 14:54:58+00 / 2025-03-01 14:55:03+
            wal start/stop: 00000001000000000000000D / 00000001000000000000000D
            database size: 22.6MB, database backup size: 22.6MB
            repo1: backup set size: 3.2MB, backup size: 3.2MB
```

S-8: Perform backup from standby

pgBackRest can perform backups on a standby server instead of the **primary**. Both the **primary** and **secondary** databases configuration are required, even if the majority of the files will be copied from the **secondary** to reduce load on the **primary**.

Remark: To do so, you need to setup a trusted SSH communication between the hosts.

SSH to backup server perform backup from standby,alternatively execute the backup command from backupserver because The backup server (172.18.0.30) acts as a central point for managing backups .It stores all backup files and manages the backup process for both primary and standby servers.

```
pgbackrest --stanza=mycluster --type=incr --backup-standby backup
2025-03-01 17:14:12.507 P00   INFO: backup command begin 2.54.2: --archive-time
2025-03-01 17:14:13.390 P00   INFO: last backup label = 20250301-145458F, versi
2025-03-01 17:14:13.390 P00   INFO: execute non-exclusive backup start: backup
2025-03-01 17:14:13.444 P00   INFO: backup start archive = 000000010000000000000
2025-03-01 17:14:13.444 P00   INFO: wait for replay on the standby to reach 0/1
2025-03-01 17:14:13.562 P00   INFO: replay on the standby reached 0/10000028
2025-03-01 17:14:13.562 P00   INFO: check archive for prior segment 00000001000
2025-03-01 17:14:15.995 P00   INFO: execute non-exclusive backup stop and wait
2025-03-01 17:14:16.094 P00   INFO: backup stop archive = 0000000100000000000000
2025-03-01 17:14:16.104 P00   INFO: check archive for segment(s) 00000001000000
2025-03-01 17:14:17.317 P00   INFO: new backup label = 20250301-145458F_2025030
2025-03-01 17:14:17.344 P00   INFO: incr backup size = 611.3KB, file total = 96
2025-03-01 17:14:17.345 P00   INFO: backup command end: completed successfully
2025-03-01 17:14:17.345 P00   INFO: expire command begin 2.54.2: --exec-id=4869
2025-03-01 17:14:17.347 P00   INFO: repo1: 16-1 no archive to remove
2025-03-01 17:14:17.347 P00   INFO: expire command end: completed successfully
```

Verify the backup:

```
[postgres@pg01 pgbackrest]$ pgbackrest --stanza=mycluster info
stanza: mycluster
    status: ok
    cipher: none

    db (current)
        wal archive min/max (16): 00000001000000000000000D/000000010000000000000

            full backup: 20250301-145458F
                timestamp start/stop: 2025-03-01 14:54:58+00 / 2025-03-01 14:55:03+
                wal start/stop: 00000001000000000000000D / 00000001000000000000000D
                database size: 22.6MB, database backup size: 22.6MB
                repo1: backup set size: 3.2MB, backup size: 3.2MB

            incr backup: 20250301-145458F_20250301-171413I
                timestamp start/stop: 2025-03-01 17:14:13+00 / 2025-03-01 17:14:16+
                wal start/stop: 000000010000000000000010 / 000000010000000000000010
                database size: 22.6MB, database backup size: 611.3KB
                repo1: backup set size: 3.2MB, backup size: 27.0KB
                backup reference total: 1 full
[postgres@pg01 pgbackrest]$
```

This command will initiate a full backup from the standby server. The `--backup-standby` option tells pgBackRest to use the standby for the backup.

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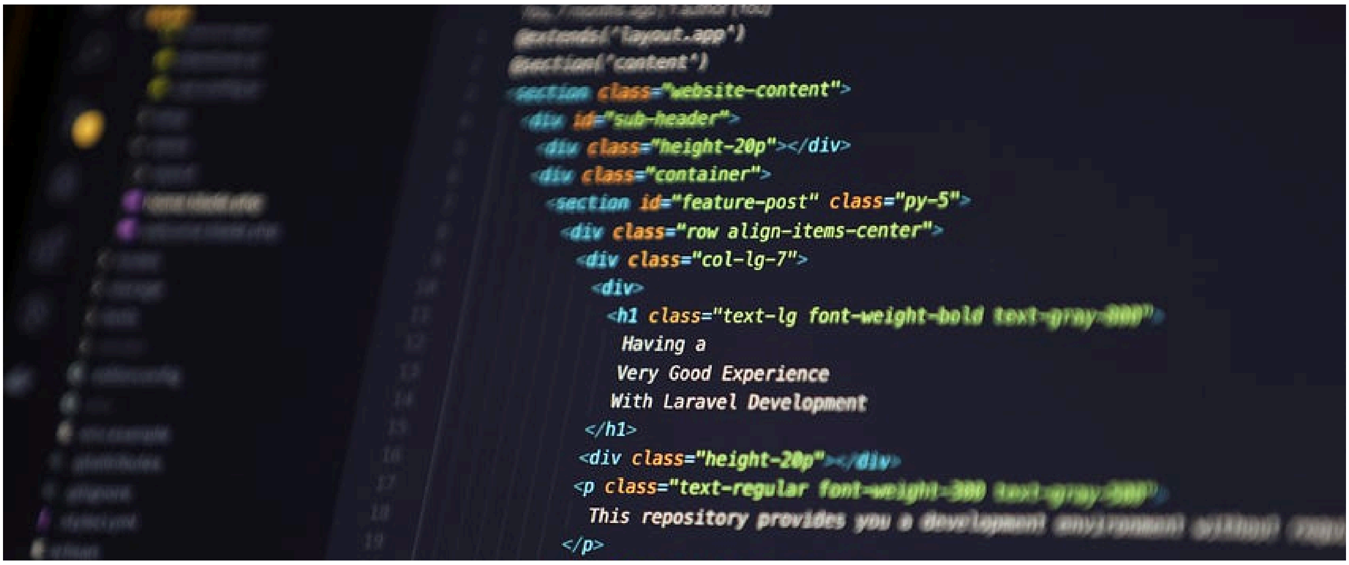

```
@extends('layout.app')
@section('content')
<section class="website-content">
  <div id="sub-header">
  <div class="height-20p"></div>
  <div class="container">
   <section id="feature-post" class="py-5">
    <div class="row align-items-center">
     <div class="col-lg-7">
      <div>
       <h1 class="text-lg font-weight-bold text-gray-800">
        Having a
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       </h1>
      <div class="height-20p"></div>
      <p class="text-regular font-weight-300 text-gray-500">
       This repository provides you a development environment without
      </p>
```

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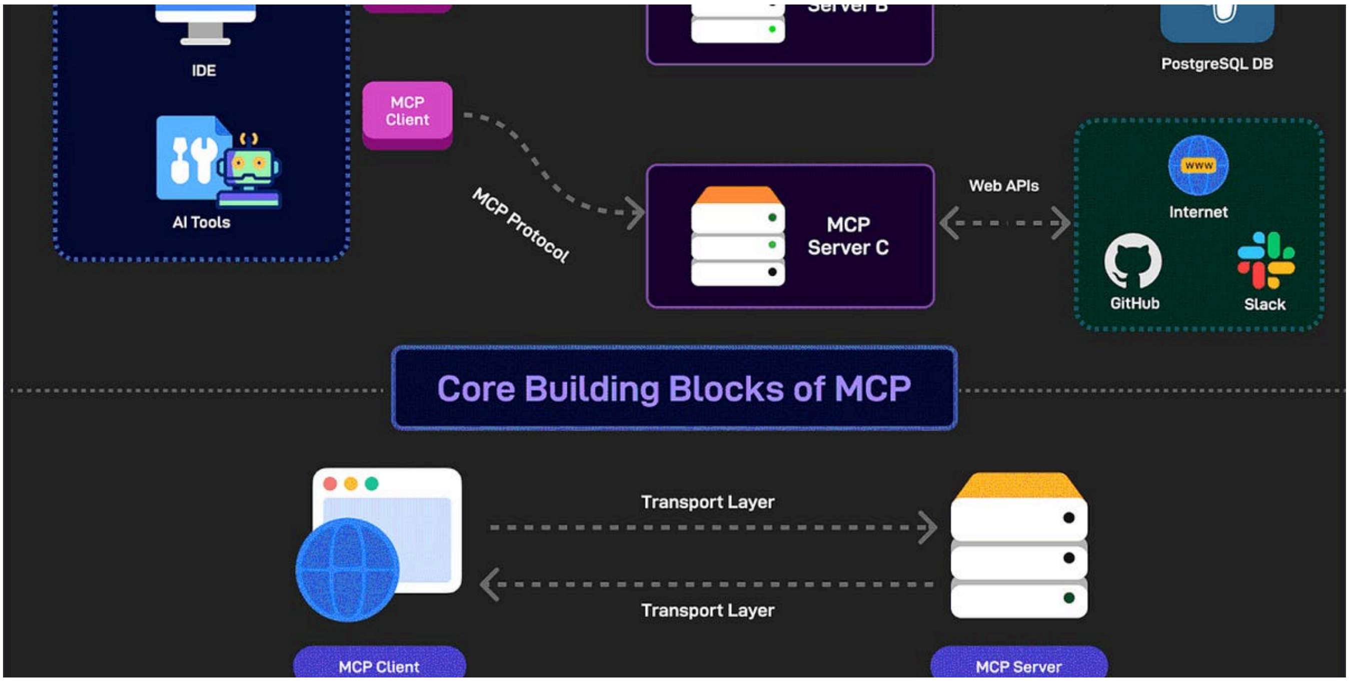

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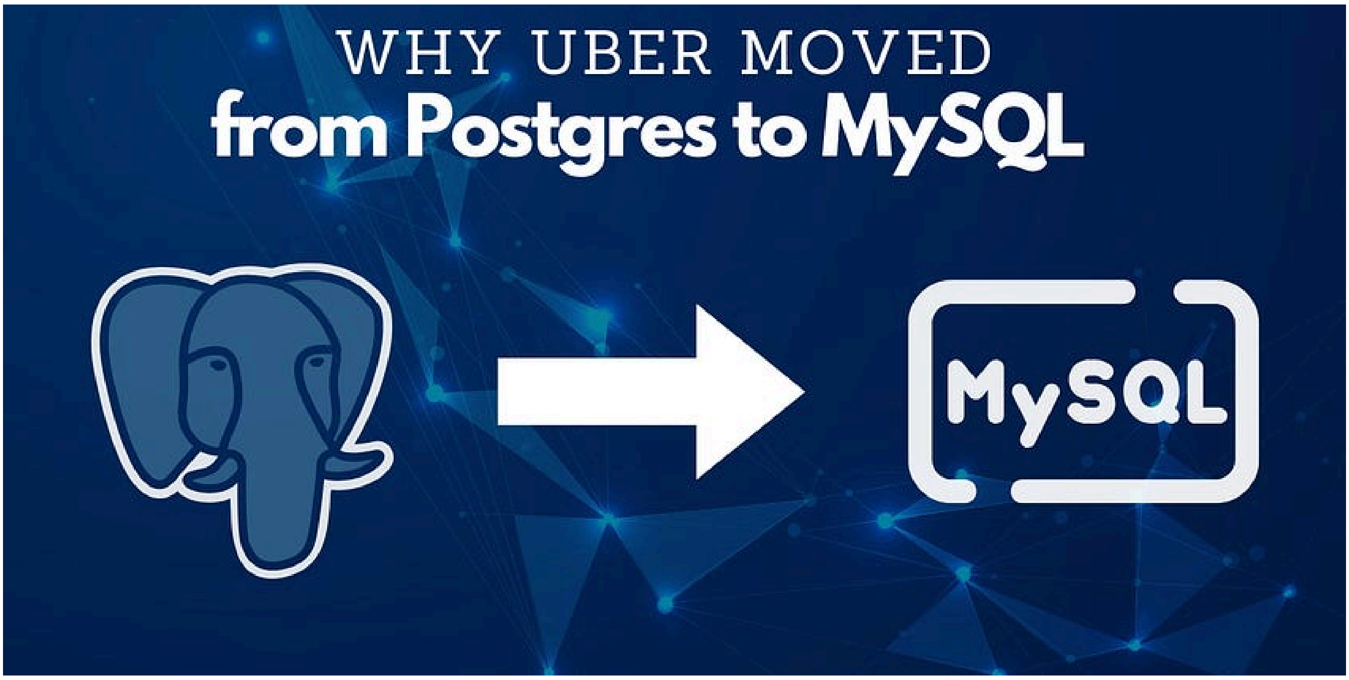

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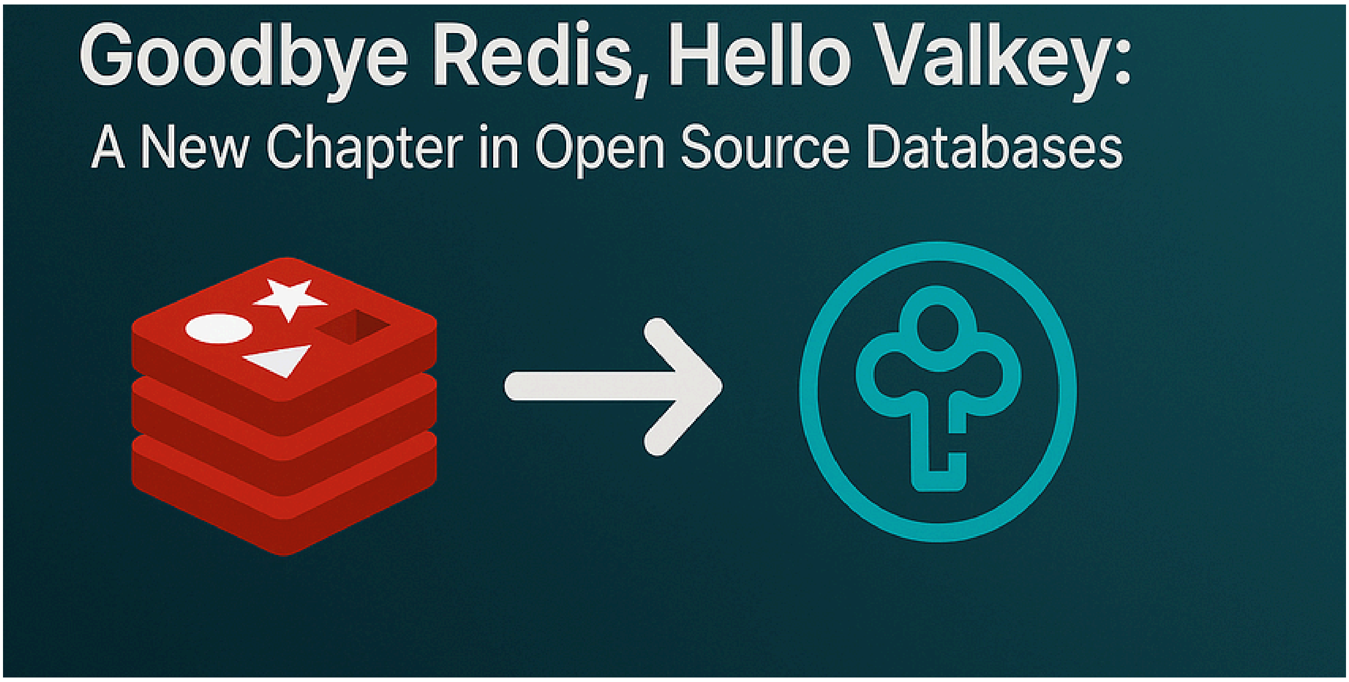
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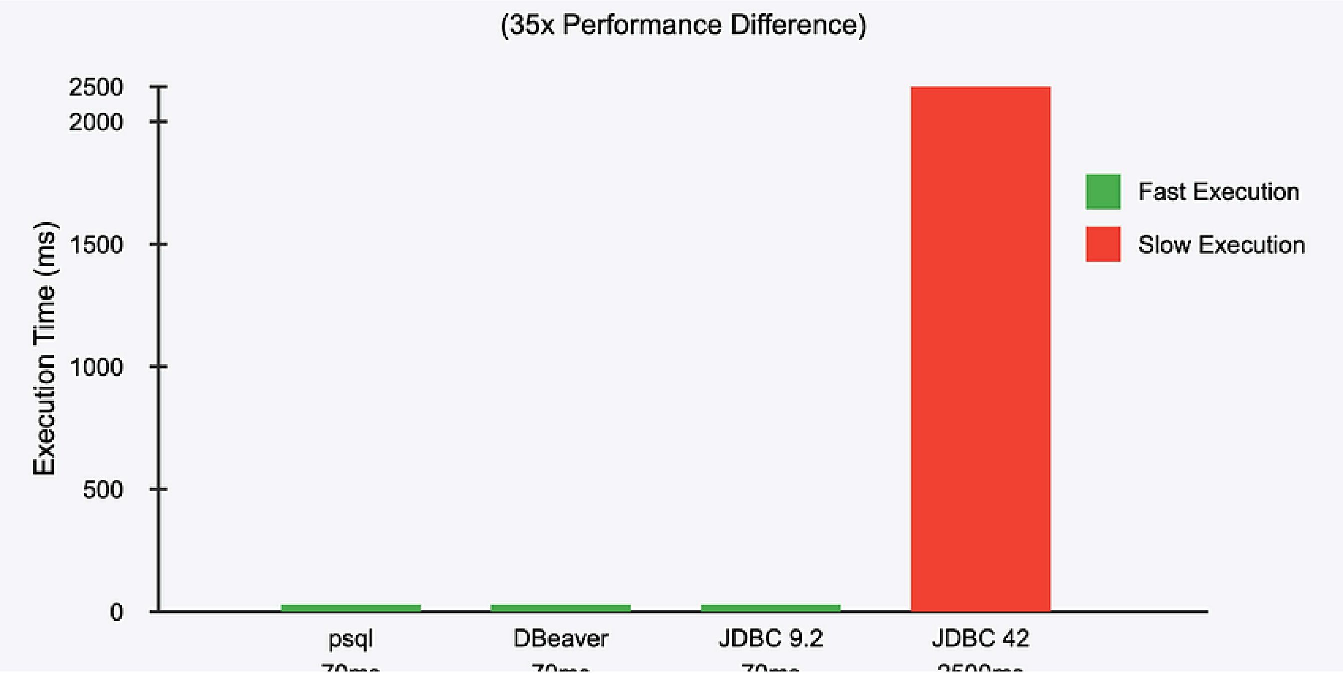

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