Data protection

Enterprise applications

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Data protection

Native Ddta protection

One of the major aspects of storage design is enabling protection for PostgreSQL volumes. Customers can protect their PostgreSQL databases either by using the dump approach or by using file system backups. This section explains the different approaches of backing up individual databases or the entire cluster.

There are three approaches to backing up PostgreSQL data:

- SQL Server dump
- File-system-level backup
- Continuous archiving

The idea behind the SQL Server dump method is to generate a file with SQL Server commands that, when returned to the server, can re-create the database as it was at the time of the dump. PostgreSQL provides the utility programs `pg_dump` and `pg_dump_all` for creating individual and cluster-level backup. These dumps are logical and do not contain enough information to be used by WAL replay.

An alternative backup strategy is to use file-system-level backup, in which administrators directly copy the files that PostgreSQL uses to store the data in the database. This method is done in offline mode: the database or cluster must be shut down. Another alternative is to use `pg_basebackup` to run hot streaming backup of the PostgreSQL database.

Snapshots

Snapshot-based backups with PostgreSQL requires configuration of snapshots for datafiles, WAL files, and archived WAL files to provide full or point-in-time recovery.

For PostgreSQL databases, the average backup time with snapshots is in the range of a few seconds to a few minutes. This backup speed is 60 to 100 times faster than `pg_basebackup` and other file-system-based backup approaches.

Snapshots on NetApp storage can be both crash-consistent and application-consistent. A crash-consistent snapshot is created on storage without quiescing the database, whereas an application-consistent snapshot is created while the database is in backup mode. NetApp also ensures that subsequent snapshots are incremental-forever backups to promote storage savings and network efficiency.

Because snapshots are rapid and do not affect system performance, you can schedule multiple snapshots daily instead of creating a single daily backup as with other streaming backup technology. When a restore and recovery operation is necessary, the system downtime is reduced by two key features:

- NetApp SnapRestore data recovery technology means that the restore operation is executed in seconds.
- Aggressive recovery point objectives (RPOs) mean that fewer database logs must be applied and forward recovery is also accelerated.

For backing up PostgreSQL, you must ensure that the data volumes are protected simultaneously with (consistency-group) WAL and the archived logs. While you are using Snapshot technology to copy WAL files, make sure that you run `pg_stop` to flush all the WAL entries that must be archived. If you flush the WAL

entries during the restore, then you only need to stop the database, unmount, or delete the existing data directory and perform a SnapRestore operation on storage. After the restore is done, you can mount the system and bring it back to its current state. For point-in-time recovery, you can also restore WAL and archive logs; then PostgreSQL decides the most consistent point and recovers it automatically.

Consistency groups are a feature in ONTAP and are recommended when there are multiple volumes mounted to a single instance or a database with multiple tablespaces. A consistency group snapshot ensures all volumes are grouped together and protected. A consistency group can be managed efficiently from ONTAP System Manager and you can even clone it to create an instance copy of a database for testing or development purposes.

Data protection software

NetApp SnapCenter plugin for PostgreSQL database, combined with Snapshot and NetApp FlexClone technologies, offer you benefits such as:

- Rapid backup and restore.
- Space-efficient clones.
- The ability to build a speedy and effective disaster recovery system.

You might prefer to choose NetApp's premium backup partners such as Veeam Software and Commvault under the following circumstances:

- Managing workloads across a heterogenous environment
- Storing backups to either cloud or tape for long-term retention
- Support for a wide range of OS versions and types

SnapCenter plugin for PostgreSQL is community supported plugin and the setup and documentation is available on NetApp Automation store. Through SnapCenter, user can backup database, clone and restore data remotely.

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