**Logical Backups Using pg\_dump and pg\_restore in PostgreSQL**

**What is a Logical Backup?**

A logical backup captures the structure and contents of a PostgreSQL database in a portable format. It uses SQL commands or a custom format that can be restored later, either on the same server or a different one.

Unlike physical backups, which copy binary data files, logical backups are performed using SQL-level operations and are more flexible for version upgrades and partial restores.

Tools involved:

* pg\_dump: for creating backups.
* pg\_restore: for restoring backups (only for custom or directory formats).

**pg\_dump: Creating Logical Backups**

pg\_dump allows you to export an entire database or selected objects (like tables or schemas) to a file.

**Common Usage Examples**

1. Backup a database to a SQL file:

pg\_dump -U postgres -d mydb -f mydb\_backup.sql

1. Backup with custom format:

pg\_dump -U postgres -d mydb -F c -f mydb\_backup.dump

1. Backup a specific schema:

pg\_dump -U postgres -d mydb -n sales -f sales\_schema.sql

1. Backup a specific table:

pg\_dump -U postgres -d mydb -t employees -f employees\_table.sql

1. Backup only the schema (no data):

pg\_dump -U postgres -d mydb -s -f mydb\_schema\_only.sql

1. Backup only the data (no schema):

pg\_dump -U postgres -d mydb -a -f mydb\_data\_only.sql

**Output Formats**

* plain: Default SQL script file (human-readable).
* custom (-F c): Binary format; requires pg\_restore.
* directory (-F d): Directory with separate files for data and metadata.
* tar (-F t): Single tar archive.

**pg\_restore: Restoring from Logical Backups**

pg\_restore is used for backups created in custom, directory, or tar formats.

**Basic Restore Command**

pg\_restore -U postgres -d mydb mydb\_backup.dump

**Common Options**

* -C: Creates the database before restoring it.
* -c: Drops objects before recreating them.
* -j: Enables parallel restoration (used with directory format).
* -t: Restores a specific table.

**Example: Full Restore with Create**

pg\_restore -U postgres -C -d postgres mydb\_backup.dump

This connects to the postgres database and creates the mydb database from the backup.

**Using SQL Backup Files**

If you used a plain SQL format with pg\_dump, restore it with psql:

psql -U postgres -d mydb -f mydb\_backup.sql

**Best Practices**

* Always test restores regularly.
* Use custom or directory format for flexibility.
* Schedule regular backups and rotate old files.
* Compress backups to save space (gzip, bzip2).