PgBackMan - PostgreSQL Backup Manager

Version-1.0.0

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Source: https://github.com/rafaelma/pgbackman
Web: http://www.pgbackman.org/

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Introduction

PgBackMan is an open source tool to manage PostgreSQL backup dumps created with `pg_dump` and `pg_dumpall`.

It is designed to manage backups from thousands of databases running in multiple PostgreSQL nodes, and it supports a multiple backup servers topology.

It will also manage role and database configuration information when creating a backup of a database.

Even though a backup created with `pg_dump` / `pg_dumpall` can never guarantee a full disaster recovery of all data changed between the moment when the backup was taken and the moment of a future crash, they are still necessary if you need to archive versions of a database, move databases between PgSQL nodes and clone databases between production / pre-production and/or development servers.

They are also an easy way of taken backups of databases not requiring PITR backups.

PgBackMan is not a tool for managing PITR (Point in time recovery) backups. There are several other solutions out there that can be use for PITR backups, such as PITRTools, OmniPITR, and Barman.

About backups in PostgreSQL

PostgreSQL has two utilities `pg_dump` and `pg_dumpall` for backing up databases. These utilities make consistent backups of a database or the hole cluster even if the databases are being used concurrently. At the same time `pg_dump` and `pg_dumpall` do not block other users accessing the database when backups are been taking.

When taking a backup of a database we need this information to be sure we can make a restore that includes 100% of the data and definitions from the target database:

1. Database schema.
2. Database data.
3. Roles owning objects in the database.
4. Roles with privileges on objects in the database.
5. Roles with privileges on the database or schemas.
6. Creation of all the roles owning something or with privileges.
7. Configuration parameters defined explicitly for a role.
8. Configuration parameters defined explicitly for the database.

Unfortunately all this information cannot be obtained in a single execution for only one database. 1, 2, 3 and 4 can be obtained with `pg_dump`. 5, 7 and 8 can be obtained with a full `pg_dumpall` and 6 with a `pg_dumpall -r`.

At the same time, `pg_dumpall` will return all this information for all databases in a cluster, not only the one we want to take a backup of.

This is something that PostgreSQL will have to improve in the future so it gets easier to take a backup/snapshot of a database.

In the meantime, PgBackMan takes care of all this and it delivers all the information needed to run a 100% restore of a database when we define a backup in the system.

Main features

The main features of PgBackMan are:

- Central database with metadata information.
- PgBackMan shell for interaction with the system.
- Management of multiple backup servers
- Management of multiple PostgreSQL servers
- Management of thousands of backups dumps through a catalogue
- Manual and scheduled backups
- Management of retention policies for backups dumps..
- Fully detailed backup reports.
- Multiple database backup types, CLUSTER, FULL, SCHEMA, DATA.
- Full backup of role information for a database.
- Full backup of database configuration for a database.
- Automatic definitions of backups for all databases running in a PgSQL node.
- Semi-automatic restore procedures
- Autonomous pgbackman_dump program that function even if the central database is not available.
- Handling of error situations.
- Totally written in Python and PL/PgSQL

Future features will include:

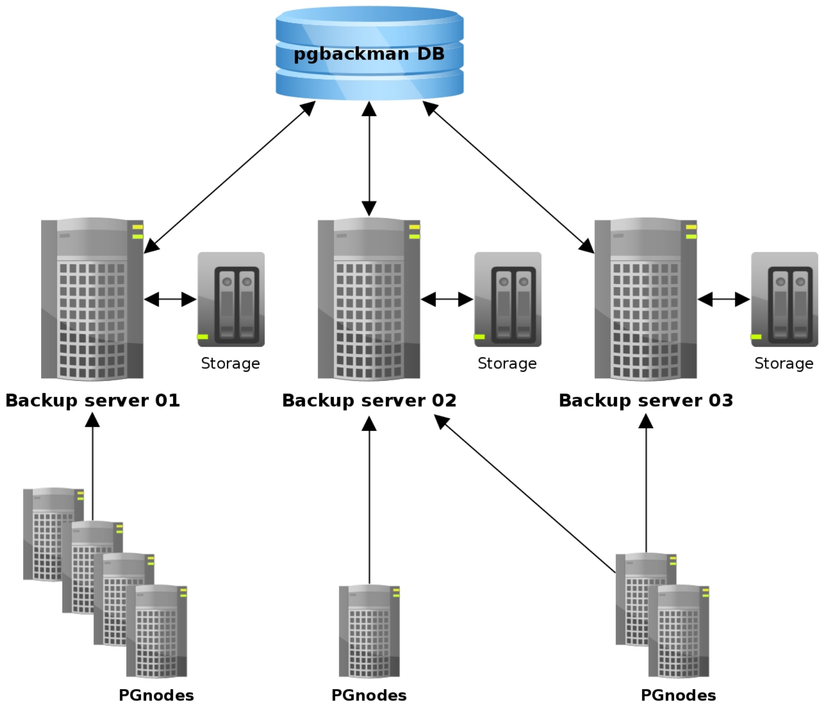
- Automatic cloning / move of databases between PgSQL nodes.
- Disk space management / planning

Architecture and components

The components forming part of PgBackMan could be listed as follows:

- **Backup servers:** One or several backup servers running PgBackMan. All SQL dumps and logfiles are saved in these servers. They need access via `libpq` to the postgreSQL nodes that will be allow to have backups in a backup server.
- **PGnodes**: PostgreSQL servers running postgreSQL databases.
- **PgBackMan DB**: Central postgreSQL metadata database used by PgBackMan. All backup servers need access to this database.
- **PgBackMan shell:** This is a program that can be run in a text terminal. It can be run in any of the backup servers registered in the system. It is the console used to manage PgBackMan.
- **pgbackman_control:** This program runs in every backup server and takes care of updating crontab files and creating AT jobs when backup, snapshots or restore definitions are created.

- **pgbackman_maintenence:** This programs runs in every backup server and runs some maintenance jobs needed by PgBackMan.
- **pgbackman_dump:** This program runs in the backup servers when a backup or snapshot has to be taken.
- **pgbackman_restore:** This program runs in the backup servers when a restore has to be run.



Installation

You will have to install the requirements and the PgBackMan software in all the servers that are going to be used as backup servers by PgBackMan.

System requirements

- Linux/Unix
- Python 2.6 or 2.7
- Python modules: - psycopg2 - argparse
- PostgreSQL >= 9.0
- AT and CRON installed and running.

Before you install PgBackMan you have to install the software needed by this tool

In systems using YUM:

```
yum install python-psycopg2 python-argparse at
```

In system using apt-get:

```
apt-get install python-psycopg2 python-argparse at
```

If you are going to install from source, you need to install also these packages:

In systems using YUM:

```
yum install python-devel python-setuptools
```

In system using apt-get:

```
apt-get install python-devel python-setuptools
```

From source

The easiest way to install PgBackMan from source is to get the last version from the master branch at the GitHub repository.

```
[root@server]# cd
[root@server]# git clone https://github.com/rafaelma/pgbackman.git

[root@server]# cd pgbackman
[root@server]# ./setup.py install
.....
```

This will install all users, groups, programs, configuration files, logfiles and the pgbackman module in your system.

Via RPM packages

RPM packages are available ...

Via Deb packages

Deb packages are available ...

pgbackman Database

After the requirements and the PgBackMan software are installed, you have to install the pgbackman database in a server running PostgreSQL

You can get

Configuration

Backup servers

A backup server needs to have access to the `pgbackman` database and to all PgSQL nodes is taken backups for. This can be done like this:

1. Update `/etc/pgbackman/pgbackman.conf` with the database parameters needed by PgBackMan to access the central metadata database. You need to define `host` or `hostaddr`, `port`, `dbname`, `database` under the section `[pgbackman_database]`.

   You can also define `password` in this section but we discourage to do this and recommend to define a `.pgpass` file in the home directory of the users `root` and `pgbackman` with this information, e.g.:

   ```
   dbhost.domain:5432:pgbackman:pgbackman_role_rw:PASSWORD
   ```

   and set the privileges of this file with `chmod 400 ~/.pgpass`.

Even a better solution will be to use the `cert` autentication for the pgbackman database user so we do not need to save passwords around.

2. Update and reload the `pg_hba.conf` file in the postgreSQL server running the pgbackman database, with a line that gives access to the pgbackman database from the new backup server. We recommend to use a SSL connection to encrypt all the trafikk between the database server and the backup server, e.g.:

```
hostssl   pgbackman   pgbackman_role_rw    10.20.20.20.200/32     md5
```

3. Define the backup server in PgBackMan via the PgBackMan shell:

```
[pgbackman@pg-backup01 ~]# pgbackman

########################################################
Welcome to the PostgreSQL Backup Manager shell (v.1.0.0)
########################################################
Type help or \? to list commands.

[pgbackman]$ register_backup_server
--------------------------------------------------------
# Hostname []: pg-backup01
# Domain [uio.no]:
# Remarks []: Main backup server

# Are all values correct (yes/no): yes
--------------------------------------------------------

[Done]

[pgbackman]$ show_backup_servers
+-------+------------------+---------------------+
| SrvID | FQDN               | Remarks             |
+-------+--------------------+--------------------+
| 00001 | pg-backup01.uio.no | Main backup server |
+-------+------------------+---------------------+
```

4. Create the root directory / partition in the backup derver that will be used to save all backups, logfiles, and syem data needed by PgBackMan in

PgSQL nodes

Every PgSQL node defined in PgBackMan will need to update and reload his `pg_hba.conf` file also to give access to the admin user (`postgres` per default) from the backup serveres defined in PgBackMan, e.g.:

```
hostssl   *   postgres    10.20.20.20.200/32     md5
```

Remember that the `.pgpass` file of the `pgbackman` user in the backup server has to be updated with the information needed to access every PgSQL node we are goint to take backups for.

System administration and maintenance

PgBackMan shell

The PgBackMan interactive shell can be started by running the program `/usr/bin/pgbackman`

```
[pgbackman@pg-backup01]# pgbackman

#########################################################
Welcome to the PostgreSQL Backup Manager shell (v.1.0.0)
#########################################################
Type help or \? to list commands.

[pgbackman]$ help

Documented commands (type help <topic>):
========================================
EOF                               show_backup_server_stats
clear                             show_backup_servers
delete_backup_definition_dbname   show_empty_backup_job_catalogs
delete_backup_definition_id       show_history
delete_backup_server              show_jobs_queue
delete_pgsql_node                 show_pgbackman_config
quit                              show_pgbackman_stats
register_backup_definition        show_pgsql_node_config
register_backup_server            show_pgsql_node_stats
register_pgsql_node               show_pgsql_nodes
register_snapshot_definition      show_snapshot_definitions
shell                             update_backup_server
show_backup_catalog               update_backup_server_config
show_backup_definitions           update_pgsql_node
show_backup_details               update_pgsql_node_config
show_backup_server_config

Miscellaneous help topics:
==========================
shortcuts

Undocumented commands:
======================
help

[pgbackman]$
```

register_backup_server

This command registers a backup server in PgBackMan:

```
Command: register_backup_server [hostname] [domain] [remarks]
```

It can be run with or without parameters. e.g:

```
[pgbackman]$ register_backup_server backup01 example.org "Test server"
```

```
[pgbackman]$ register_backup_server
--------------------------------------------------------
# Hostname []: backup02
# Domain [example.org]:
# Remarks []: Test server 2

# Are all values correct (yes/no): yes
--------------------------------------------------------
```

update_backup_server

This command updates some parameters of a backup server defined in PgbackMan:

```
Command: update_backup_server [SrvID | FQDN] [remarks]
```

It can be run with or without parameters. e.g.:

```
update_backup_server 1 "Main backup server"

[pgbackman]$ update_backup_server
--------------------------------------------------------
# SrvID / FQDN []: 1
# Remarks []: Main backup server

# Are all values to update correct (yes/no): yes
--------------------------------------------------------
```

You can use the backup server ID in PgBackMan or the FQDN to choose the server to be updated.

update_backup_server_config

Not implemented.

delete_backup_server

This command deletes a backup server defined in PgBackMan:

```
Command: delete_backup_server [SrvID | FQDN]
```

It can be run with or without parameters. e.g.:

```
[pgbackman]$ delete_backup_server 2

[pgbackman]$ delete_backup_server
--------------------------------------------------------
# SrvID / FQDN: 2

# Are you sure you want to delete this server? (yes/no): yes
--------------------------------------------------------
```

You can use the backup server ID in PgBackMan or the FQDN to choose the server to be deleted.

You will get an error if you try to delete a backup server that has active backups in the catalog.

show_backup_servers

This command shows all the backup servers defined in PgbackMan

show_backup_server_config

This command shows the configuration parameters for a backup server.

It can be run with or without parameters. e.g.

show_backup_server_stats

This command shows some statistics for a backup server defined in PgBackMan.

register_pgsql_node

update_pgsql_node

update_pgsql_node_config

delete_pgsql_node

show_pgsql_nodes

show_pgsql_node_config

show_pgsql_node_stats

register_backup_definition

delete_backup_definition_id

delete_backup_definition_dbname

show_backup_definition

show_backup_catalog

show_backup_details

register_snapshot_definition

show_snapshot_definitions

show_empty_backup_catalogs

show_pgbackman_config

show_pgbackman_stats

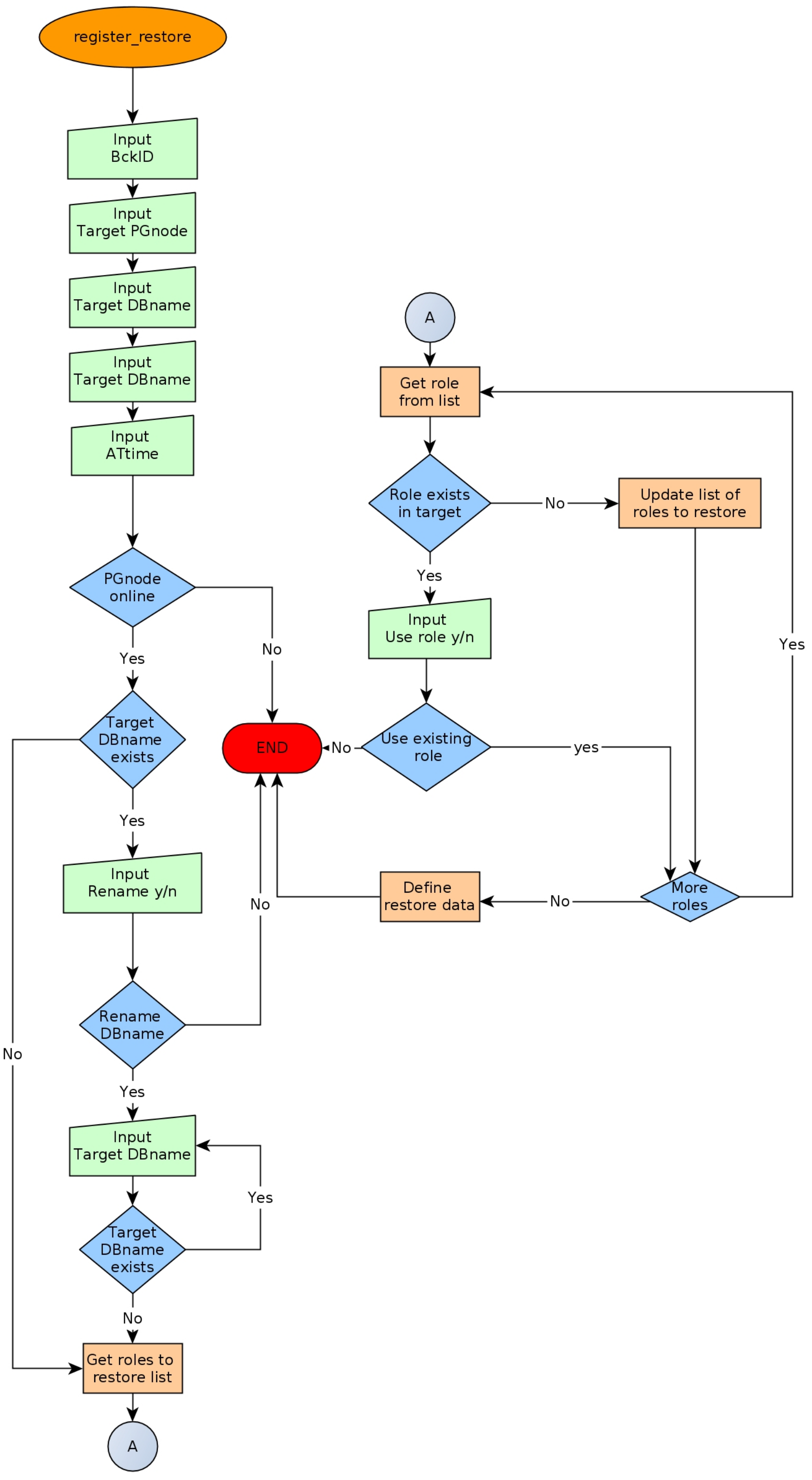
register_restore_definition

This command defines a restore job of a backup from the catalog.

It will work with parameters only if there are not conflicts in the definition.

There are some issues we have to take care when running a restore of a backup. What happens if we want to restore a backup of a database or a role that already exists in the target server?

This flowchar figure explains the logic used when restoring a backup if our restore definition create some conflicts:



Submitting a bug

PgBakMan has been extensively tested, and is currently being used in production at the University of Oslo. However, as any software, PgBackMan is not bug free.

If you discover a bug, please file a bug through the GitHub Issue page for the project at: https://github.com/rafaelma/pgbackman/issues

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