BIOTECH

DOCUMENT D'EXPLOITATION (DEX)

Procédures d'installation et de configuration

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1. Introduction

Ce document décrit les procédures d'installation, de configuration et d'exploitation de l'infrastructure BioTech. Il est destiné aux équipes d'exploitation et d'administration système.

1.1 Objectifs du document

- Fournir les procédures d'installation des serveurs
- Décrire la configuration des services (LDAP, PostgreSQL, Sauvegarde)
- Documenter les procédures de sauvegarde et restauration
- Permettre la reproductibilité de l'infrastructure

1.2 Architecture globale

VM	Hostname	Role	IP
1	bthanu01p	Annuaire LDAP (389 DS)	192.168.74.158
2	bthbdd01p	PostgreSQL Master	192.168.74.159
3	bthbdd02p	PostgreSQL Slave	192.168.74.128
4	bthstk01p	Stockage secours	192.168.74.161

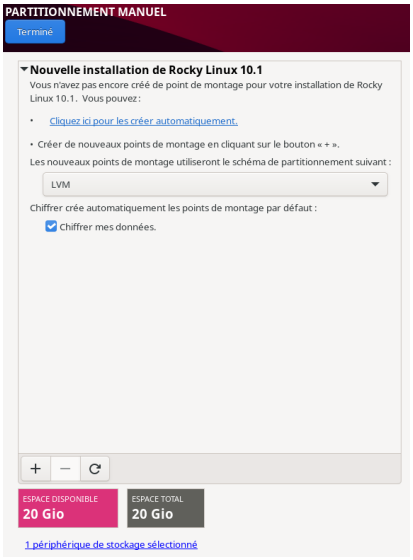
2. Installation bthanu01p (Annuaire LDAP)

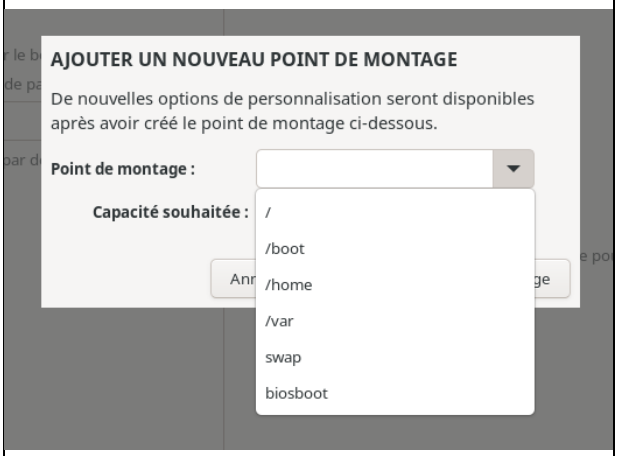
2.1 Installation Rocky Linux

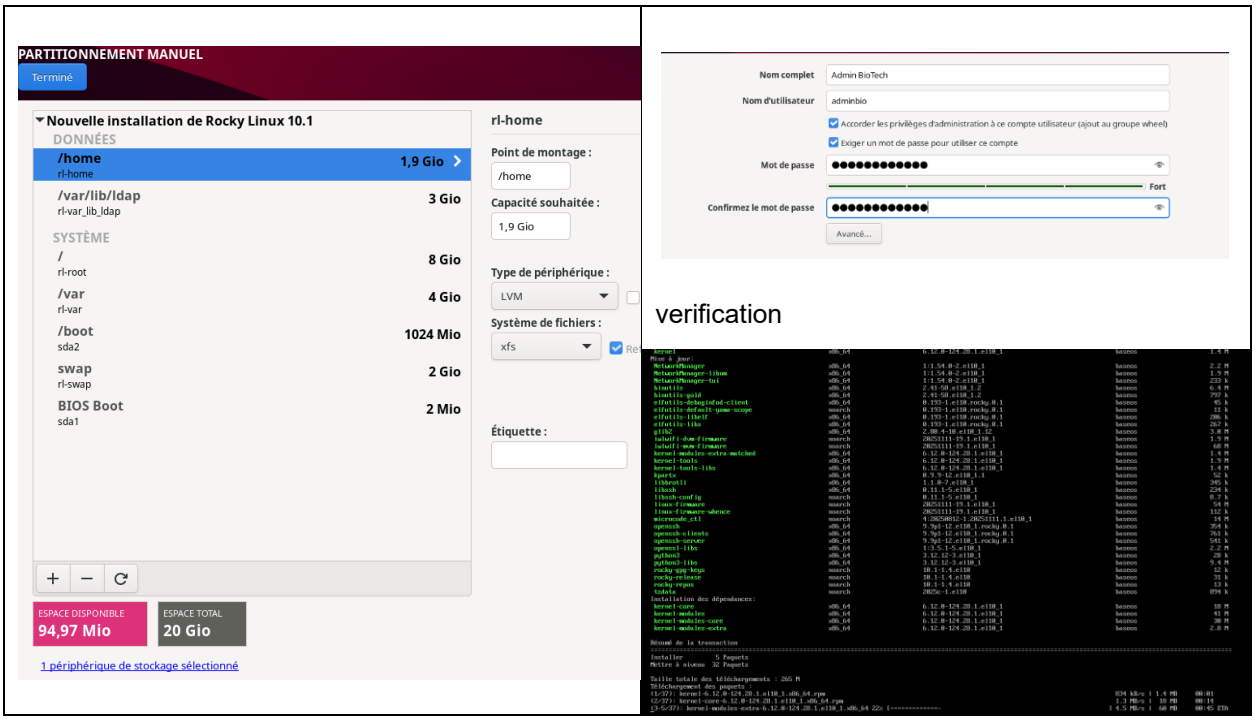
Partitionnement LVM :

Point de montage	Taille	Description
/boot	1 Go	Partition de démarrage
/	8 Go	Système racine
/var	4 Go	Données variables
/var/lib/ldap	3 Go	Données LDAP (dédié)
/home	2 Go	Répertoires utilisateurs
swap	2 Go	Mémoire virtuelle
biosboot	2 Mo	Amorce BIOS

Screen







verification

2.2 Installation 389 Directory Server

Commandes d'installation :

```
# Installation du paquet
dnf install 389-ds-base -y

# Creation du fichier de configuration
cat > /root/instance.inf << EOF
[general]
config_version = 2

[slapd]
root_password = Biotech2026!
instance_name = biotech
port = 389
secure_port = 636

[backend-userroot]
suffix = dc=biotech,dc=lan
sample_entries = yes
EOF
```

```
# Creation de l'instance
dscreate from-file /root/instance.inf

# Activation du service
systemctl enable dirsrv@biotech
systemctl start dirsrv@biotech

# Configuration du firewall
firewall-cmd --permanent --add-port=389/tcp
firewall-cmd --permanent --add-port=636/tcp
firewall-cmd --reload
```

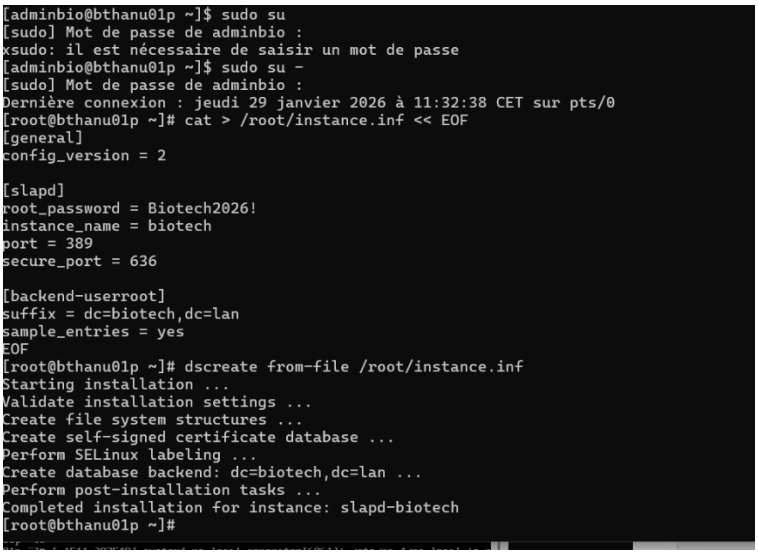
2.3 Verification

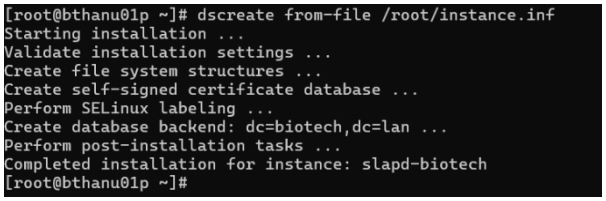
```
# Test de connexion LDAP
ldapsearch -x -H ldap://localhost -b "dc=biotech,dc=lan"

# Résultat attendu : result: 0 Success
```

Screen

Installation de l’annuaire LDAP

Création de l’instance LDAP





Vérification du status

```
[adminbio@bthanu01p ~]$ systemctl status dirsrv@biotech
● dirsrv@biotech.service - 389 Directory Server biotech.
     Loaded: loaded (/usr/lib/systemd/system/dirsrv@.service; enabled; preset: disabled)
    Drop-In: /usr/lib/systemd/system/dirsrv@.service.d
             └─custom.conf
     Active: active (running) since Tue 2026-03-10 10:41:23 CET; 1min 35s ago
 Invocation: 1ce861e8c1d743a3b425db72fee9679e
    Process: 1115 ExecStartPre=/usr/libexec/dirsrv/ds_systemd_ask_password_acl /etc/dirsrv/slapd-biotech/dse.ldif (code=exited, status=0/SUCCESS)
    Process: 1155 ExecStartPre=/usr/libexec/dirsrv/ds_selinux_restorecon.sh /etc/dirsrv/slapd-biotech/dse.ldif (code=exited, status=0/SUCCESS)
   Main PID: 1197 (ns-slapd)
     Status: "slapd started: Ready to process requests"
      Tasks: 24 (limit: 10440)
     Memory: 87.8M (peak: 88M)
        CPU: 2.832s
     CGroup: /system.slice/system-dirsrv.slice/dirsrv@biotech.service
             └─1197 /usr/sbin/ns-slapd -D /etc/dirsrv/slapd-biotech -i /run/dirsrv/slapd-biotech.pid

mars 10 10:41:21 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:21.685121013 +0100] - INFO - ldbm_instance_config_cachememsize_set - force a minimal value 512000
mars 10 10:41:21 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:21.712811945 +0100] - INFO - dbmdb_make_env - MDB environment created with maxsize=3221225472.
mars 10 10:41:21 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:21.714382203 +0100] - INFO - dbmdb_make_env - MDB environment created with max readers=126.
mars 10 10:41:21 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:21.715816779 +0100] - INFO - dbmdb_make_env - MDB environment created with max database instances>
mars 10 10:41:22 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:22.039788863 +0100] - INFO - connection_table_new - Number of connection sub-tables 1, each conta>
mars 10 10:41:22 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:22.998259399 +0100] - INFO - slapd_daemon - slapd started.  Listening on All Interfaces port 389 >
mars 10 10:41:23 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:23.001021879 +0100] - INFO - slapd_daemon - Listening on All Interfaces port 636 for LDAPS reques>
mars 10 10:41:23 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:23.002063641 +0100] - INFO - slapd_daemon - Listening on /run/slapd-biotech.socket for LDAPI requ>
mars 10 10:41:23 bthanu01p systemd[1]: Started dirsrv@biotech.service - 389 Directory Server biotech..
mars 10 10:41:25 bthanu01p ns-slapd[1197]: [10/Mar/2026:10:41:25.010505329 +0100] - INFO - vattr_check_thread - No role/cos definition in dc=biotech,dc=lan
```

Ouverture des ports du firewall

```
[root@bthanu01p ~]# firewall-cmd --permanent --add-port=389/tcp
firewall-cmd --permanent --add-port=636/tcp
firewall-cmd --reload
success
success
success
```

Test de la connexion LDAP

```
[root@bthanu01p ~]# ldapsearch -x -H ldap://localhost -b "dc=biotech,dc=lan"
# extended LDIF
#
# LDAPv3
# base <dc=biotech,dc=lan> with scope subtree
# filter: (objectclass=*)
# requesting: ALL
#

# biotech.lan
dn: dc=biotech,dc=lan
objectClass: top
objectClass: domain
dc: biotech
description: dc=biotech,dc=lan

# groups, biotech.lan
dn: ou=groups,dc=biotech,dc=lan
objectClass: top
objectClass: organizationalunit
```

```
dn: uid=demo_user,ou=people,dc=biotech,dc=lan
objectClass: top
objectClass: nsPerson
objectClass: nsAccount
objectClass: nsOrgPerson
objectClass: posixAccount
uid: demo_user
cn: Demo User
displayName: Demo User
uidNumber: 99998
gidNumber: 99998
homeDirectory: /var/empty
loginShell: /bin/false

# demo_group, Groups, biotech.lan
dn: cn=demo_group,ou=Groups,dc=biotech,dc=lan
objectClass: top
objectClass: groupOfNames
objectClass: posixGroup
objectClass: nsMemberOf
cn: demo_group
gidNumber: 99999

# search result
search: 2
result: 0 Success

# numResponses: 8
# numEntries: 7
[root@bthanu01p ~]#
```

Récap de ce qui est configuré :

- PostgreSQL installé
- Base de données biotech créée
- Utilisateur biotech_admin créé
- Utilisateur replicator pour la réplication
- Configuration réplication (wal_level, max_wal_senders, etc.)
- Accès réseau configuré (pg_hba.conf)

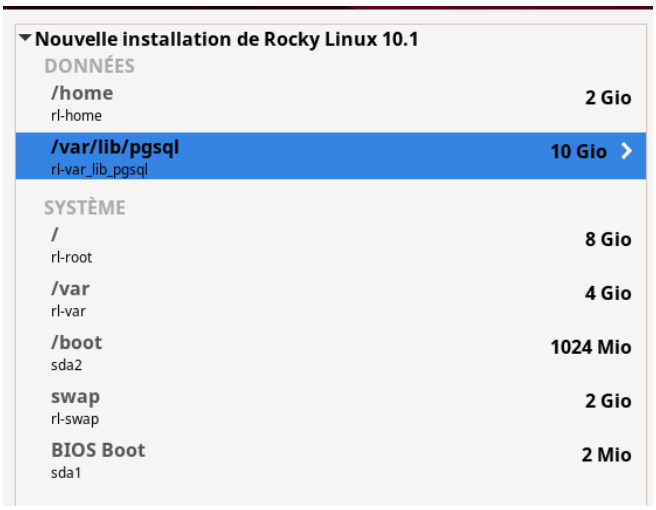
3. Installation bthbdd01p (PostgreSQL Master)

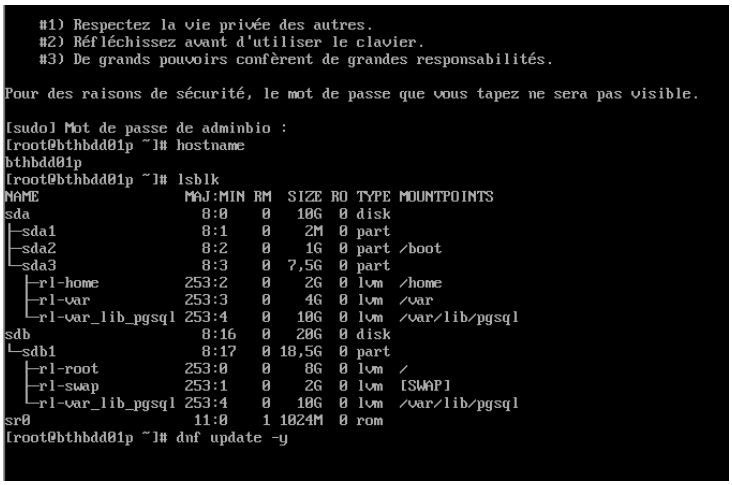
3.1 Installation Rocky Linux

Partitionnement LVM (2 disques : 20 Go + 10 Go) :

Point de montage	Taille	Description
/boot	1 Go	Partition de démarrage
/	8 Go	Système racine
/var	4 Go	Données variables
/var/lib/pgsql	10 Go	Données PostgreSQL (disque 2)
/home	2 Go	Répertoires utilisateurs
swap	2 Go	Mémoire virtuelle
biosboot	2 Mo	Amorce BIOS

Screen






```
User root = adminbio
root_password = Biotech2026!
```

3.2 Installation PostgreSQL

```
# Installation
dnf install postgresql-server postgresql -y

# Initialisation
postgresql-setup --initdb

# Demarrage
systemctl start postgresql
systemctl enable postgresql

# Configuration du firewall
firewall-cmd --permanent --add-port=5432/tcp
firewall-cmd –reload
```

3.3 Creation de la base et des utilisateurs

```
# Connexion à PostgreSQL
sudo -u postgres psql

# Creation de la base
CREATE DATABASE biotech;
CREATE USER biotech_admin WITH ENCRYPTED PASSWORD 'Biotech2026!';
GRANT ALL PRIVILEGES ON DATABASE biotech TO biotech_admin;

# Creation de l'utilisateur de replication
CREATE USER replicator WITH REPLICATION ENCRYPTED PASSWORD 'Repl2026!';
\q
```

3.4 Configuration pour la replication

Modifier /var/lib/pgsql/data/postgresql.conf :

```
listen_addresses = '*'
wal_level = replica
max_wal_senders = 3
wal_keep_size = 64MB
```

Modifier /var/lib/pgsql/data/pg_hba.conf (ajouter a la fin) :

```
host    replication     replicator      192.168.74.0/24         md5
host    all             all             192.168.74.0/24         md5
```

Redémarrer PostgreSQL :

```
systemctl restart postgresql
```

4. Installation bthbdd02p (PostgreSQL Slave)

4.1 Installation Rocky Linux

Partitionnement identique à bthbdd01p.

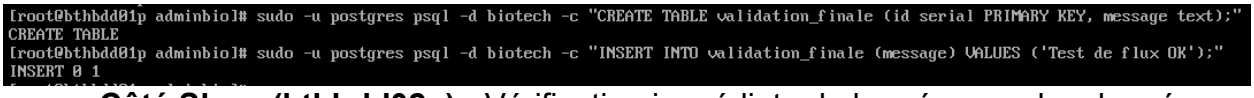
4.2 Configuration de la réplication

```
# Installation PostgreSQL
dnf install postgresql-server postgresql -y

# Arrêt du service et suppression des données
systemctl stop postgresql
rm -rf /var/lib/pgsql/data/*

# Copie des données depuis le Master
PGPASSWORD='Repl2026!' pg_basebackup -h 192.168.74.159 \
  -U replicator -D /var/lib/pgsql/data -Fp -Xs -P -R

# Correction des permissions
chown -R postgres:postgres /var/lib/pgsql/data

# Démarrage du service
systemctl start postgresql
systemctl enable postgresql
```

4.3 Vérification de la réplication

```
# Sur le Slave
sudo -u postgres psql -c "SELECT * FROM pg_stat_wal_receiver;"

# Résultat attendu : status = streaming
```

Validation fonctionnelle de la réplication à chaud :
Afin de valider l'intégrité du flux de données entre les deux instances PostgreSQL, un test d'écriture et de lecture croisée a été effectué : * **Côté Master (bthbdd01p) :** Création d'une table technique validation_finale et insertion d'une ligne de données "Test de flux OK".



- **Côté Slave (bthbdd02p) :** Vérification immédiate de la présence des données. La commande SELECT confirme que l'enregistrement a été répliqué instantanément sans erreur de cohérence.

Ce test confirme que l'architecture répond aux exigences de disponibilité et que le Slave est prêt à prendre le relais en cas de défaillance du Master (respect des contraintes PRA).

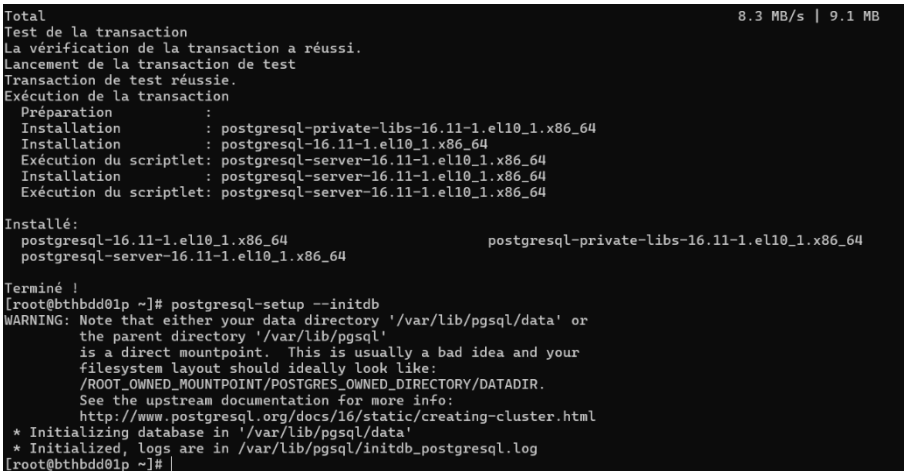
```
[adminbio@bthbdd02p ~]$ sudo -u postgres psql -d biotech -c "SELECT * FROM validation_finale;"
 id |     message
----+-----------------
  1 | Test de flux OK
(1 ligne)
```

Identifiant et mot de passe

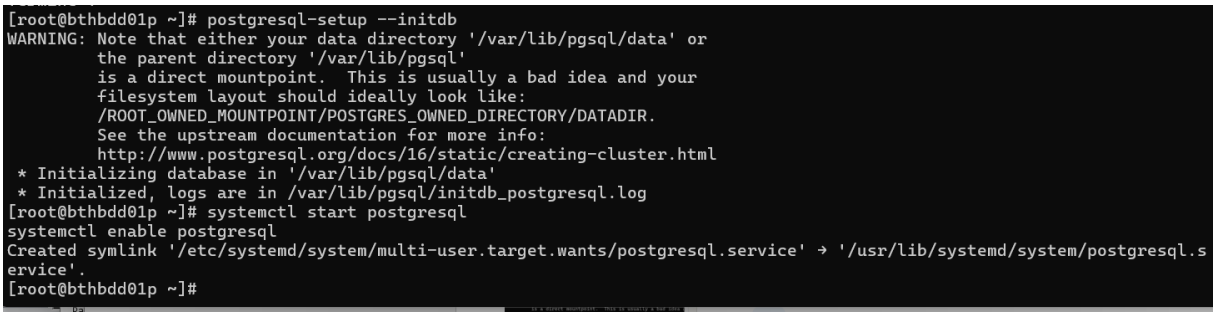
```
Root user = adminbio
root_password = Biotech2026!
```

Screen

Initialisation de la base



Demarre et activation du service



Ouvre le port PostgreSQL

```
Dernière connexion : jeudi 29 janvier 2026 à 17:11:44 CET sur pts/2
[root@bthbdd01p ~]# firewall-cmd --permanent --add-port=5432/tcp
firewall-cmd --reload
success
success
[root@bthbdd01p ~]#
```

On vérifie que PostgreSQL fonctionne

```
[root@bthbdd01p ~]# systemctl status postgresql
● postgresql.service - PostgreSQL database server
     Loaded: loaded (/usr/lib/systemd/system/postgresql.service; enabled; preset: disabled)
     Active: active (running) since Thu 2026-01-29 16:13:00 CET; 1h 1min ago
 Invocation: 927775664c3345538855d1b83b9dfca2
   Main PID: 5942 (postgres)
      Tasks: 7 (limit: 10440)
     Memory: 19.6M (peak: 22.3M)
        CPU: 910ms
     CGroup: /system.slice/postgresql.service
             ├─5942 /usr/bin/postgres -D /var/lib/pgsql/data
             ├─5943 "postgres: logger "
             ├─5944 "postgres: checkpointer "
             ├─5945 "postgres: background writer "
             ├─5947 "postgres: walwriter "
             ├─5948 "postgres: autovacuum launcher "
             └─5949 "postgres: logical replication launcher "

janv. 29 16:13:00 bthbdd01p systemd[1]: Starting postgresql.service - PostgreSQL database server...
janv. 29 16:13:00 bthbdd01p postgres[5942]: 2026-01-29 16:13:00.274 CET [5942] LOG:  redirection des traces vers le
janv. 29 16:13:00 bthbdd01p postgres[5942]: 2026-01-29 16:13:00.274 CET [5942] ASTUCE :  Les prochaines traces appar
janv. 29 16:13:00 bthbdd01p systemd[1]: Started postgresql.service - PostgreSQL database server.
lines 1-21/21 (END)
```

On se connecte au PostgreSQL et une fois dans la base de données on crée la base de biotech

```
[root@bthbdd01p ~]# sudo -u postgres psql
psql (16.11)
Saisissez « help » pour l'aide.

postgres=#
```

```
[root@bthbdd01p ~]# sudo -u postgres psql
psql (16.11)
Saisissez « help » pour l'aide.

postgres=# CREATE DATABASE biotech;
CREATE USER biotech_admin WITH ENCRYPTED PASSWORD 'Biotech2026!';
GRANT ALL PRIVILEGES ON DATABASE biotech TO biotech_admin;
\q
CREATE DATABASE
CREATE ROLE
GRANT
[root@bthbdd01p ~]#
```

Crée un utilisateur pour la réplication

```
[root@bthbdd01p ~]# sudo -u postgres psql
psql (16.11)
Saisissez « help » pour l'aide.

postgres=# CREATE USER replicator WITH REPLICATION ENCRYPTED PASSWORD 'Repl2026!';
\q
CREATE ROLE
[root@bthbdd01p ~]#
```

Permet aux autres serveurs (Slave, applications) de se connecter à PostgreSQL

```
#------------------------------------------------------------------------------
# CONNECTIONS AND AUTHENTICATION
#------------------------------------------------------------------------------

# - Connection Settings -

listen_addresses = '*'          # what IP address(es) to listen on;
                                        # comma-separated list of addresses;
                                        # defaults to 'localhost'; use '*' for all
                                        # (change requires restart)
#port = 5432                            # (change requires restart)
max_connections = 100                   # (change requires restart)
#reserved_connections = 0               # (change requires restart)
#superuser_reserved_connections = 3     # (change requires restart)
```

Active les journaux WAL nécessaires pour la réplication Master-Slave

```
#------------------------------------------------------------------------------
# WRITE-AHEAD LOG
#------------------------------------------------------------------------------

# - Settings -

wal_level = replica                     # minimal, replica, or logical
                                        # (change requires restart)
#fsync = on                             # flush data to disk for crash safety
                                        # (turning this off can cause
                                        # unrecoverable data corruption)
#synchronous_commit = on                # synchronization level;
                                        # off, local, remote_write, remote_apply, or on
#wal_sync_method = fsync                # the default is the first option
                                        # supported by the operating system:
                                        #   open_datasync
                                        #   fdatasync (default on Linux and FreeBSD)
                                        #   fsync
                                        #   fsync_writethrough
```

Autorise jusqu'à 3 serveurs Slave à se connecter pour répliquer les données

```
#------------------------------------------------------------------------------
# REPLICATION
#------------------------------------------------------------------------------

# - Sending Servers -

# Set these on the primary and on any standby that will send replication data.

max_wal_senders = 3             # max number of walsender processes
                                # (change requires restart)
#max_replication_slots = 10     # max number of replication slots
                                # (change requires restart)
#wal_keep_size = 0              # in megabytes; 0 disables
#max_slot_wal_keep_size = -1    # in megabytes; -1 disables
#wal_sender_timeout = 60s       # in milliseconds; 0 disables
#track_commit_timestamp = off   # collect timestamp of transaction commit
                                # (change requires restart)

# - Primary Server -
```

Autorise le Slave à se connecter pour la réplicationhost all all...Autorise les connexions depuis le réseau local (applications, admin)

```
 GNU nano 8.1                                        /var/lib/pgsql/data/pg_hba.conf
# include_if_exists FILE
# include_dir       DIRECTORY
#
# FILE is the file name to include, and DIR is the directory name containing
# the file(s) to include.  Any file in a directory will be loaded if suffixed
# with ".conf".  The files of a directory are ordered by name.
# include_if_exists ignores missing files.  FILE and DIRECTORY can be
# specified as a relative or an absolute path, and can be double-quoted if
# they contain spaces.
#
# -------------
# Miscellaneous
# -------------
#
# This file is read on server startup and when the server receives a
# SIGHUP signal.  If you edit the file on a running system, you have to
# SIGHUP the server for the changes to take effect, run "pg_ctl reload",
# or execute "SELECT pg_reload_conf()".
#
# ---------------------------------
# Put your actual configuration here
# ---------------------------------
#
# If you want to allow non-local connections, you need to add more
# "host" records.  In that case you will also need to make PostgreSQL
# listen on a non-local interface via the listen_addresses
# configuration parameter, or via the -i or -h command line switches.



# TYPE  DATABASE        USER            ADDRESS                 METHOD

# "local" is for Unix domain socket connections only
local   all             all                                     peer
# IPv4 local connections:
host    all             all             127.0.0.1/32            ident
# IPv6 local connections:
host    all             all             ::1/128                 ident
# Allow replication connections from localhost, by a user with the
# replication privilege.
local   replication     all                                     peer
host    replication     all             127.0.0.1/32            ident
host    replication     all             ::1/128                 ident
host    replication     replicator      192.168.74.0/24         md5
host    all             all             192.168.74.0/24         md5
```

Et là on vérifie que la réplication fonctionne et c’est bien le cas

On peut voir que

- status = streaming → Réplication active en temps réel ✓
- sender_host = 192.168.74.159 → Connecté au Master ✓
- sender_port = 5432 → Port PostgreSQL ✓

5. Installation bthstk01p (Stockage secours)

5.1 Installation Rocky Linux

Partitionnement LVM (disque 40 Go) :

Point de montage	Taille	Description
/boot	1 Go	Partition de démarrage
/	8 Go	Système racine
/var	4 Go	Données variables
/backup	20 Go	Stockage des sauvegardes
/home	2 Go	Répertoires utilisateurs
swap	2 Go	Mémoire virtuelle
biosboot	2 Mo	Amorce BIOS

5.2 Configuration du stockage

```
# Création des répertoires
mkdir -p /backup/postgresql
mkdir -p /backup/logs
chmod 700 /backup/postgresql
chmod 700 /backup/logs

# Configuration SSH pour les transferts automatiques
```

```
# Activer PermitRootLogin yes dans /etc/ssh/sshd_config
systemctl restart sshd
```

Identifiant et mot de passe

```
Root user = adminbio
root_password = Biotech2026!
```

6. Procédures de sauvegarde

6.1 Configuration SSH (sur bthbdd01p)

```
# Génération de la clé SSH
ssh-keygen -t rsa -b 4096 -N "" -f /root/.ssh/id_rsa

# Copie de la clé vers le serveur de stockage
ssh-copy-id root@192.168.74.161

# Test de connexion sans mot de passe
ssh root@192.168.74.161 "hostname"
```

6.2 Script de sauvegarde

Fichier /opt/backup_postgresql.sh :

```
#!/bin/bash

# Variables
DATE=$(date +%Y%m%d_%H%M%S)
BACKUP_DIR="/tmp/backup_pgsql"
REMOTE_HOST="192.168.74.161"
REMOTE_DIR="/backup/postgresql"
LOG_FILE="/var/log/backup_postgresql.log"

# Création du dossier local
mkdir -p $BACKUP_DIR

# Dump de la base de données
echo "[$DATE] Debut du backup" >> $LOG_FILE
sudo -u postgres pg_dumpall > $BACKUP_DIR/biotech_$DATE.sql

# Compression
gzip $BACKUP_DIR/biotech_$DATE.sql

# Transfert vers le serveur de stockage
scp $BACKUP_DIR/biotech_$DATE.sql.gz root@$REMOTE_HOST:$REMOTE_DIR/

# Nettoyage local
rm -rf $BACKUP_DIR

echo "[$DATE] Backup termine et transfère" >> $LOG_FILE
```

6.3 Planification automatique (cron)

```
# Rendre le script exécutable
chmod +x /opt/backup_postgresql.sh
```

```
# Ajouter au crontab (sauvegarde a 21h00)
crontab -e
# Ajouter la ligne :
0 21 * * * /opt/backup_postgresql.sh

# Verification
crontab -l
```

Vérification :

- Stocker les sauvegardes chiffrées
- Recevoir les dumps quotidiens à 21h00

7. Procédures de restauration

7.1 Restauration depuis le backup

```
# 1. Récupérer le backup depuis le serveur de stockage
scp root@192.168.74.161:/backup/postgresql/biotech_XXXXXXXX_XXXXXX.sql.gz /tmp/

# 2. Décompresser
gunzip /tmp/biotech_XXXXXXXX_XXXXXX.sql.gz

# 3. Restaurer
sudo -u postgres psql -f /tmp/biotech_XXXXXXXX_XXXXXX.sql

# 4. Vérifier
sudo -u postgres psql -d biotech -c "SELECT * FROM <table>;"
```

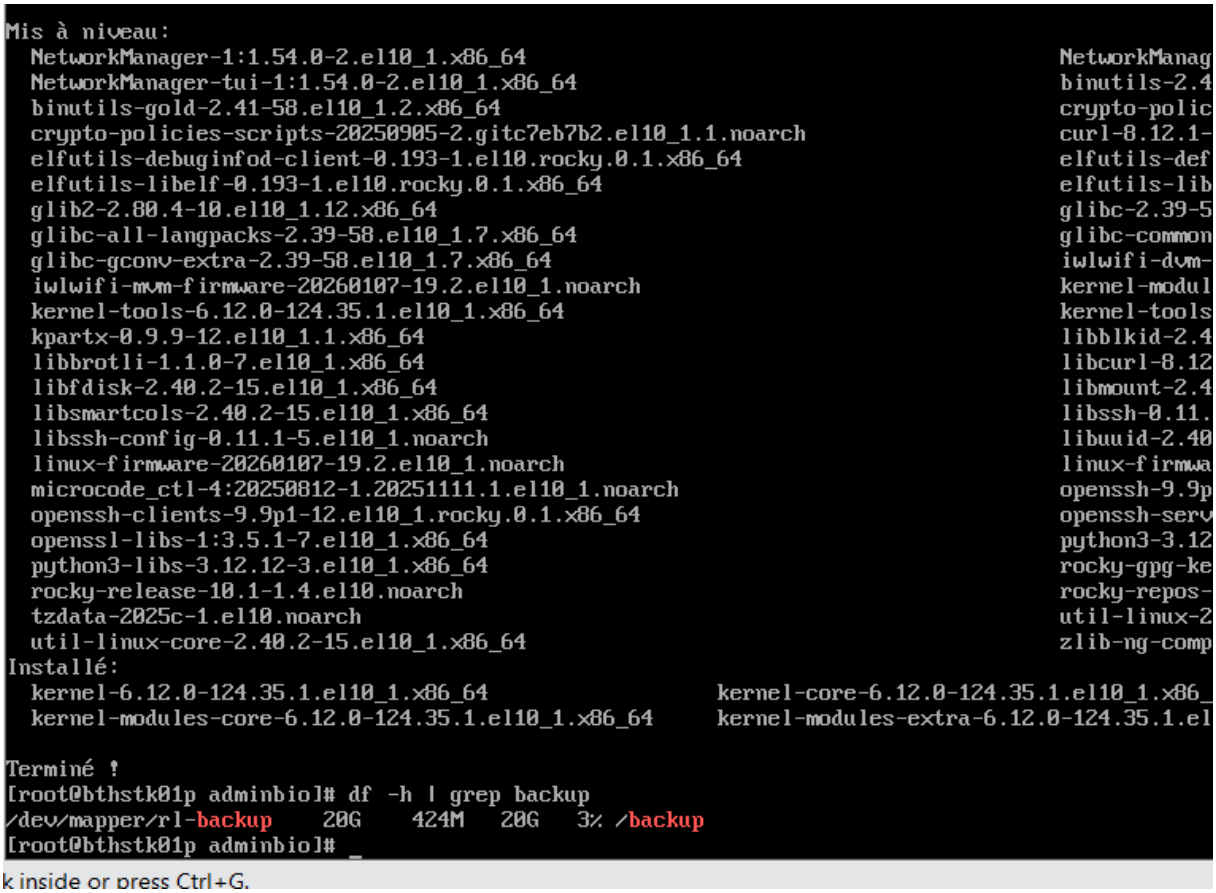
7.2 Basculement Master/Slave (failover)

En cas de panne du Master, promouvoir le Slave :

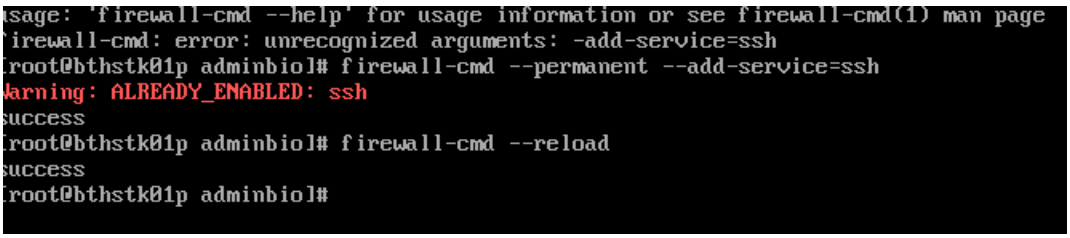
```
# Sur bthbdd02p (Slave)
sudo -u postgres pg_ctl promote -D /var/lib/pgsql/data

# Vérifier que le Slave est devenu Master
sudo -u postgres psql -c "SELECT pg_is_in_recovery();"
# Résultat attendu : f (false = mode Master)
```

Screen

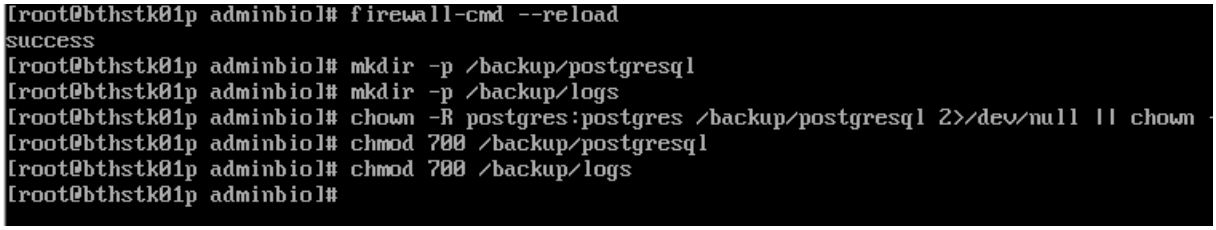
Vérification



Activation de SSH



Création des dossiers backup pour la base de données



Activation de ssh

```
#  /etc/ssh/sshd_config.d/  which will be automatically included below
Include /etc/ssh/sshd_config.d/*.conf

# If you want to change the port on a SELinux system, you have to tell
# SELinux about this change.
# semanage port -a -t ssh_port_t -p tcp #PORTNUMBER
#
#Port 22
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

#HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_ecdsa_key
#HostKey /etc/ssh/ssh_host_ed25519_key

# Ciphers and keying
#RekeyLimit default none

# Logging
#SyslogFacility AUTH
#LogLevel INFO

# Authentication:

#LoginGraceTime 2m
PermitRootLogin yes
#StrictModes yes
#MaxAuthTries 6
#MaxSessions 10

#PubkeyAuthentication yes

# The default is to check both .ssh/authorized_keys and .ssh/authorized_keys2
# but this is overridden so installations will only check .ssh/authorized_keys
AuthorizedKeysFile      .ssh/authorized_keys
"/etc/ssh/sshd_config" 130L, 3659B written
[root@bthstk01p adminbio]# systemctl restart sshd
[root@bthstk01p adminbio]# ssh-copy-id root@192.168.114.9
/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any tha
/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it i
root@192.168.114.9's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'root@192.168.114.9'"
and check to make sure that only the key(s) you wanted were added.

[root@bthstk01p adminbio]#
```

Activation ssh et copy de la clé du master a la base de données

```
[root@bthanu01p adminbio]# ssh-keygen -t rsa -b 4096 -N "" -f /root/.ssh/id_rsa
Generating public/private rsa key pair.
/root/.ssh/id_rsa already exists.
Overwrite (y/n)? y
Your identification has been saved in /root/.ssh/id_rsa
Your public key has been saved in /root/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:EeHtIhy5CP+nGV3y+Ygyf9A5iS913j82+bMzSUiJduE root@bthanu01p
The key's randomart image is:
+---[RSA 4096]----+
|        o.       |
|       o o    .  |
|  .   o o . o o  |
|   o o o o o E   |
|    o + So+oo .  |
|     . oo=*... . |
|      o o+o+ .. o|
|      o=..oo. .X |
|      o+oo. . .o@|
+----[SHA256]-----+
[root@bthanu01p adminbio]# ssh-copy-id root@192.168.74.161
/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@192.168.74.161's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'root@192.168.74.161'"
and check to make sure that only the key(s) you wanted were added.

[root@bthanu01p adminbio]# ssh root@192.168.74.161 "hostname"
bthstk01p
```

SCRIPT pour sauvegarder la BDD

```
 GNU nano 8.1                                                /opt/backup_postgresql.sh
#!/bin/bash

#variables
DATE=$(date +%Y%m%d_%H%M%S)
BACKUP_DIR="/tmp/backup/pgsql"
REMOTE_HOST="192.168.74.161"
REMOTE_DIR="/backup/postgresql"
LOG_FILE="/var/log/backup_postgresql.log"

#création du dossier local
mkdir -p $BACKUP_DIR

#DUMP de la base de données
echo "[$DATE] Début du backup" >> $LOG_FILE
sudo -u postgres pg_dumpall > $BACKUP_DIR/biotech_$DATE.sql

#Compression
gzip $BACKUP_DIR/biotech_$DATE.sql

#Transfert vers le serveur de stockage
scp $BACKUP_DIR/biotech_$DATE.sql.gz root@$REMOTE_HOST:$REMOTE_DIR/

#Nettoyage local
rm -rf $BACKUP_DIR

echo "[$DATE] Backup terminé et transféré" >> $LOG_FILE
```

Ça fonctionne sa sauvegarde sans demander de mot de passe

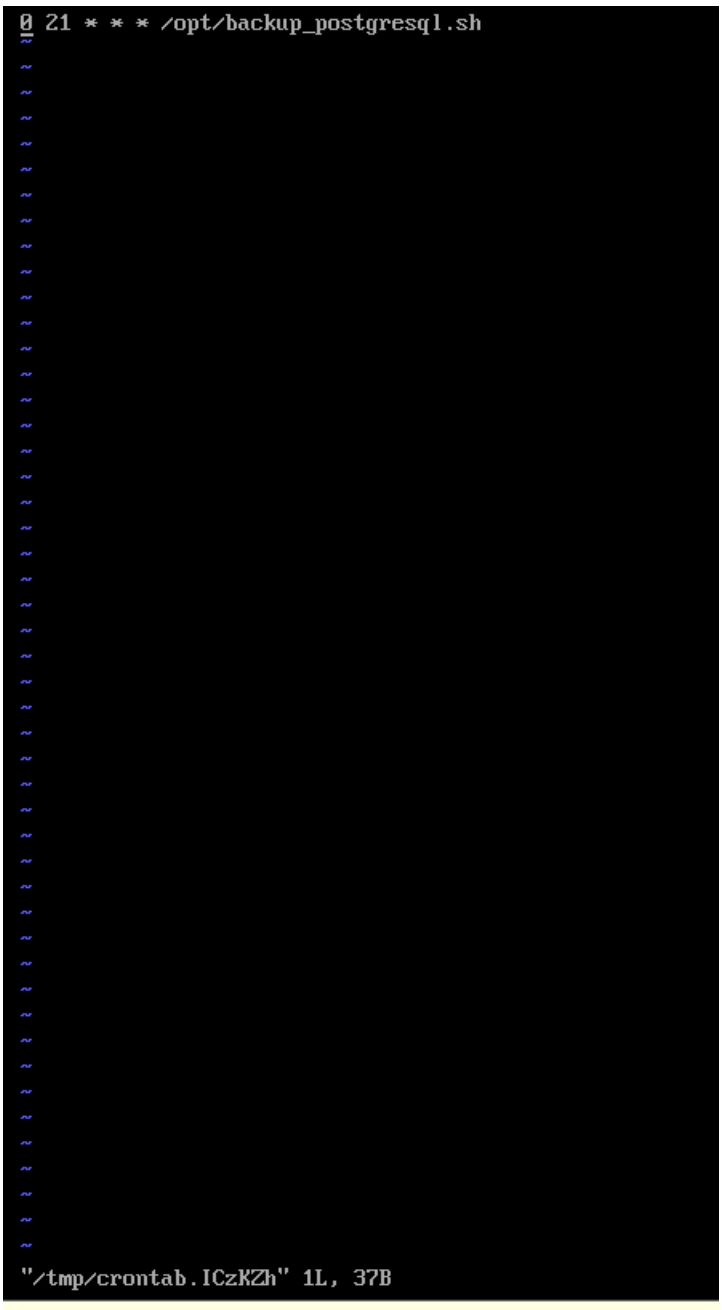
```
[root@bthbdd01p adminbiol# chmod +x /opt/backup_postgresql.sh
[root@bthbdd01p adminbiol# /opt/backup_postgresql.sh
biotech_20260310_124129.sql.gz                                    100% 1540   265.9KB/s   00:00
[root@bthbdd01p adminbiol# _
```

```
[root@bthbdd01p adminbiol# ssh root@192.168.74.161 "hostname"
bthstk01p
[root@bthbdd01p adminbiol# /opt/backup_postgresql.sh
biotech_20260310_123302.sql.gz                                    100% 1537   560.6KB/s   00:00
[root@bthbdd01p adminbiol# _
```

Vérification que le fichier est bien arrivé sur bthstk01p depuis la base de données bthbdd01p

```
[root@bthbdd01p adminbiol# ssh root@192.168.114.9 "ls -la /backup/postgresql/"
total 8
drwx------. 2 root root   82 19 févr. 13:22 .
drwxr-xr-x. 4 root root   36 19 févr. 11:44 ..
-rw-r--r--. 1 root root 1213 19 févr. 13:07 biotech_20260219_130730.sql.gz
-rw-r--r--. 1 root root 1214 19 févr. 13:22 biotech_20260219_132248.sql.gz
[root@bthbdd01p adminbiol#
```

Cron pour 21h la sauvegarde automatique



Création de la table

```
[root@bthbdd01p adminbio]# grep -i "test_crash" /tmp/biotech_20260219_132248.sql
[root@bthbdd01p adminbio]# sudo -u postgres psql -d biotech -c "CREATE TABLE test_crash (id
ERREUR:  le type « vachar » n'existe pas
LIGNE 1 : CREATE TABLE test_crash (id SERIAL, nom VACHAR(50), date_cre...
                                                 ^

[root@bthbdd01p adminbio]# sudo -u postgres psql -d biotech -c "CREATE TABLE test_crash (id
CREATE TABLE
[root@bthbdd01p adminbio]# sudo -u postgres psql -d biotech -c "INSERT INTO test_crash (nom)
INSERT 0 1
[root@bthbdd01p adminbio]# sudo -u postgres psql -d biotech -c "SELECT * FROM test_crash;"
 id |        nom
----+--------------------
  1 | Donnee avant crash
(1 ligne)

[root@bthbdd01p adminbio]# _
```

Test crash

```
SET
SET
psql:/tmp/biotech_20260219_135657.sql:100: ERREUR:  la base de données « biotech » existe déjà
ALTER DATABASE
Vous êtes maintenant connecté à la base de données « biotech » en tant qu'utilisateur « postgres ».
SET
SET
SET
SET
SET
 set_config
------------

(1 ligne)

SET
SET
SET
SET
SET
SET
CREATE TABLE
ALTER TABLE
CREATE SEQUENCE
ALTER SEQUENCE
ALTER SEQUENCE
ALTER TABLE
COPY 1
 setval
--------
      1
(1 ligne)

GRANT
Vous êtes maintenant connecté à la base de données « postgres » en tant qu'utilisateur « postgres ».
SET
SET
SET
SET
SET
 set_config
------------

(1 ligne)

SET
SET
SET
SET
[root@bthbdd01p adminbio]#
```

```
(1 ligne)

SET
SET
SET
SET
SET
SET
CREATE TABLE
ALTER TABLE
CREATE SEQUENCE
ALTER SEQUENCE
ALTER SEQUENCE
ALTER TABLE
COPY 1
 setval
--------
      1
(1 ligne)

GRANT
Vous êtes maintenant connecté à la base de données « postgres » en tant qu'utilisateur « pos
SET
SET
SET
SET
SET
 set_config
------------

(1 ligne)

SET
SET
SET
SET
[root@bthbdd01p adminbio]# sudo -u postgres psql -d biotech -c "SELECT * FROM test_crash;"
 id |        nom
----+--------------------
  1 | Donnee avant crash
(1 ligne)

[root@bthbdd01p adminbio]#
```

8. Informations de connexion

8.1 Comptes système

VM	Utilisateur	Mot de passe	Acces
Toutes	adminbio	Biotech2026!	SSH + sudo
Toutes	root	Biotech2026!	Console uniquement

8.2 Comptes applicatifs

Service	Utilisateur	Mot de passe
LDAP (389 DS)	cn=Directory Manager	Biotech2026!
PostgreSQL	biotech_admin	Biotech2026!
PostgreSQL (réplication)	replicator	Repl2026!

9. Contraintes PRA

Indicateur	Valeur	Description
PDMA	4 heures	Perte de Données Maximale Admissible
DIMA	4 heures	Durée d'Interruption Maximale Admissible

La sauvegarde quotidienne a 21h00 et la réplication Master/Slave permettent de respecter ces contraintes.

10. Contacts

Role	Nom	Email
Expert Données/Sauvegarde	[Votre nom]	[Votre email]
Responsable projet	[Nom]	[Email]