

Министерство науки и высшего образования Российской Федерации
Федеральное государственное автономное образовательное учреждение
Высшего образования
Факультет Программной Инженерии и Компьютерной Техники

Лабораторная работа 4 по РСХД

Вариант 98523

Группа: Р3316

Выполнили:

Сиразетдинов, Шпинаева

Проверил:

Николаев В.В.

г. Санкт-Петербург

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Задание

Работа рассчитана на двух человек и выполняется в три этапа: настройка, симуляция и обработка сбоя, восстановление.

Требования к выполнению работы

- В качестве хостов использовать одинаковые виртуальные машины.
- В первую очередь необходимо обеспечить сетевую связность между ВМ.
- Для подключения к СУБД (например, через psycopg), использовать отдельную виртуальную или физическую машину.
- Демонстрировать наполнение базы и доступ на запись на примере не менее, чем двух таблиц, столбцов, строк, транзакций и клиентских сессий.

Этап 1. Конфигурация

Развернуть postgres на двух узлах в режиме потоковой репликации. Не использовать дополнительные пакеты. Продемонстрировать доступ в режиме чтение/запись на основном сервере. Продемонстрировать, что новые данные синхронизируются на резервный сервер.

Этап 2. Симуляция и обработка сбоя

2.1 Подготовка:

- Установить несколько клиентских подключений к СУБД.
- Продемонстрировать состояние данных и работу клиентов в режиме чтение/запись.

2.2 Сбой:

- Симулировать ошибку диска на основном узле - удалить директорию PGDATA со всем содержимым.

2.3 Обработка:

- Найти и продемонстрировать в логах релевантные сообщения об ошибках.
- Выполнить переключение (failover) на резервный сервер.
- Продемонстрировать состояние данных и работу клиентов в режиме чтение/запись.

Восстановление

- Восстановить работу основного узла - откатить действие, выполненное с виртуальной машиной на этапе 2.2.
- Актуализировать состояние базы на основном узле - накатить все изменения данных, выполненные на этапе 2.3.
- Восстановить исправную работу узлов в исходной конфигурации (в соответствии с этапом 1).
- Продемонстрировать состояние данных и работу клиентов в режиме чтение/запись.

Создание виртуальных машин

1) Арендуем на яндекс клауде две виртуальные машины

cloud-sirazetdinoffazat default Compute Cloud / Виртуальные машины / Создать

Создание виртуальной машины

Образ загрузочного диска

Marketplace Container Solution Пользовательский

Поиск продукта ☐ Операционные системы

Ubuntu	24.04	CentOS OS Login	7
Debian OS Login	11	Fedora	37
UserGate NGFW	6.1.5.11134R	pfSense	14.0
Панель управления веб-серверами ...	2...	Angle	12

Показать все продукты Marketplace

Расположение

Зона доступности

Диски и файловые хранилища

disk-ubuntu-24-04-its-1747436367408 Загрузочный

Тип

Размер

Добавить

Вычислительные ресурсы

Standard High memory HighFreq CPU Shared-core GPU Своя конфигурация

2 640,92 Р в месяц

Тарифы и цены

- Intel Ice Lake. 100% vCPU
- 1 632,96 Р
- Публичный IP-адрес
- 186,62 Р
- Intel Ice Lake. RAM
- 435,46 Р
- Быстрое сетевое хранилище (SSD)
- 385,88 Р

Сэкономьте до 22%

Зарезервируйте ресурсы для
Соприте на полгода или год
и платите меньше

Подробнее

2) Настроим ssh config

Host rshd-1

HostName 62.84.113.222

User rshd

Port 22

IdentityFile ~/.ssh/ssh-key-1747436533579

Host rshd-2

HostName 62.84.113.181

User rshd

Port 22

IdentityFile ~/.ssh/ssh-key-1747436533579

3) Проверим подключение

<input type="checkbox"/>	Имя ↑↓	Cloud Backup	Статус ↑↓	ОС	Платформа ↑↓	vCPU	Доля vCPU	RAM	Прерываемая	Размер дисков	Зона доступности ↑↓	Внутренний IPv4	Публичный IPv4	Дата создания	
<input type="checkbox"/>	rshd-2	Не подключён	Running		Intel Ice Lake	2	100%	2 ГБ	Нет	30 ГБ	ru-central1-a	10.128.0.12	62.84.113.181	17.05.2025, в 02	...
<input type="checkbox"/>	rshd-1	Не подключён	Running		Intel Ice Lake	2	100%	2 ГБ	Нет	30 ГБ	ru-central1-a	10.128.0.29	62.84.113.222	17.05.2025, в 02	...

```
> ssh rshd-1
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-59-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

System information as of Fri May 16 23:10:20 UTC 2025

System load:  0.13          Processes:    135
Usage of /:   6.9% of 28.41GB Users logged in:  0
Memory usage: 9%           IPv4 address for eth0: 10.128.0.29
Swap usage:   0%

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
  just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Last login: Fri May 16 23:10:22 2025 from 90.156.228.19
rshd@rshd-1:~$

> ssh rshd-2
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-59-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

System information as of Fri May 16 23:10:58 UTC 2025

System load:  0.15          Processes:    134
Usage of /:   6.9% of 28.41GB Users logged in:  0
Memory usage: 9%           IPv4 address for eth0: 10.128.0.12
Swap usage:   0%

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
  just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Last login: Fri May 16 23:11:01 2025 from 90.156.228.19
rshd@rshd-2:~$
```

4) Установим postgresql

Для этого исполним команду

```
sudo apt install postgresql postgresql-contrib
```

Настроим репликацию

Настройка мастера

`sudo -i -u postgres`

С помощью команды `createuser --replication -P rep_user` создадим пользователя `rep_user` с паролем `password` и разрешением на репликацию

Узнаем расположение конфигурационного файла

```
Enter it again:
postgres@rshd-1:~$ psql -c 'SHOW config_file;'
config_file
-----
/etc/postgresql/16/main/postgresql.conf
(1 row)
```

Добавим в конфигурационный файл следующие строки

```
archive_mode = on
archive_command = 'cp %p /oracle/pg_data/archive/%f'
max_wal_senders = 10
wal_level = replica
wal_log_hints = on
```

Добавим в `pg_hba.conf` информацию для подключения юзера репликации

```
host      replication      rep_user      10.128.0.12/32
scram-sha-256
```

И в завершение перезагрузим сервер

```
password: password updated successfully
rshd@rshd-1:~$ sudo -i -u postgres
postgres@rshd-1:~$ systemctl restart postgresql
==== AUTHENTICATING FOR org.freedesktop.systemd1.manage-units ====
Authentication is required to restart 'postgresql.service'.
Authenticating as: root
Password:
==== AUTHENTICATION COMPLETE ====
postgres@rshd-1:~$
```

```
postgres@rshd-1:~$ cat /var/log/postgresql/postgresql-16-main.log
2025-05-16 23:21:01.729 UTC [9620] LOG: starting PostgreSQL 16.8 (Ubuntu 16.8-0ubuntu0.24.04.1) on x86_64-pc-linux-gnu, compiled by gcc (Ubuntu 13.3.0-6ubuntu2-24.04) 13.3.0, 64-bit
2025-05-16 23:21:01.729 UTC [9620] LOG: listening on IPv6 address ":::1", port 5432
2025-05-16 23:21:01.729 UTC [9620] LOG: listening on IPv4 address "127.0.0.1", port 5432
2025-05-16 23:21:01.733 UTC [9620] LOG: listening on Unix socket "/var/run/postgresql/.s.PGSQL.5432"
2025-05-16 23:21:01.752 UTC [9623] LOG: database system was shut down at 2025-05-16 23:20:55 UTC
2025-05-16 23:21:01.891 UTC [9620] LOG: database system is ready to accept connections
2025-05-16 23:26:01.772 UTC [9621] LOG: checkpoint starting: time
2025-05-16 23:26:06.056 UTC [9621] LOG: checkpoint complete: wrote 44 buffers (0.3%); 0 WAL file(s) added, 0 removed, 0 recycled; write=4.177 s, sync=0.058 s, total=4.285 s; sync files=11, longest=0.055 s, average=0.006 s; distance=261 kB, estimate=261 kB; lsn=0/1530B10, redo lsn=0/1530AD8
2025-05-16 23:31:01.156 UTC [9621] LOG: checkpoint starting: time
2025-05-16 23:31:01.645 UTC [9621] LOG: checkpoint complete: wrote 5 buffers (0.0%); 0 WAL file(s) added, 0 removed, 0 recycled; write=0.430 s, sync=0.027 s, total=0.489 s; sync files=5, longest=0.023 s, average=0.006 s; distance=3 kB, estimate=235 kB; lsn=0/15318D8, redo lsn=0/15318A0
2025-05-16 23:38:31.251 UTC [9620] LOG: received fast shutdown request
2025-05-16 23:38:31.257 UTC [9620] LOG: aborting any active transactions
2025-05-16 23:38:31.262 UTC [9620] LOG: background worker "logical replication launcher" (PID 9626) exited with exit code 1
2025-05-16 23:38:31.262 UTC [9621] LOG: shutting down
2025-05-16 23:38:31.272 UTC [9621] LOG: checkpoint starting: shutdown immediate
2025-05-16 23:38:31.326 UTC [9621] LOG: checkpoint complete: wrote 0 buffers (0.0%); 0 WAL file(s) added, 0 removed, 0 recycled; write=0.001 s, sync=0.001 s, total=0.065 s; sync files=0, longest=0.000 s, average=0.000 s; distance=0 kB, estimate=211 kB; lsn=0/1531988, redo lsn=0/1531988
2025-05-16 23:38:31.330 UTC [9620] LOG: database system is shut down
2025-05-16 23:38:31.416 GMT [9944] LOG: unrecognized configuration parameter "wal_keep_segments" in file "/etc/postgresql/16/main/postgresql.conf" line 830
2025-05-16 23:38:31.416 GMT [9944] FATAL: configuration file "/etc/postgresql/16/main/postgresql.conf" contains errors
pg_ctl: could not start server
Examine the log output.
2025-05-16 23:43:15.316 UTC [10857] LOG: starting PostgreSQL 16.8 (Ubuntu 16.8-0ubuntu0.24.04.1) on x86_64-pc-linux-gnu, compiled by gcc (Ubuntu 13.3.0-6ubuntu2-24.04) 13.3.0, 64-bit
2025-05-16 23:43:15.317 UTC [10857] LOG: listening on IPv6 address ":::1", port 5432
2025-05-16 23:43:15.317 UTC [10857] LOG: listening on IPv4 address "127.0.0.1", port 5432
2025-05-16 23:43:15.322 UTC [10857] LOG: listening on Unix socket "/var/run/postgresql/.s.PGSQL.5432"
2025-05-16 23:43:15.351 UTC [10860] LOG: database system was shut down at 2025-05-16 23:38:31 UTC
2025-05-16 23:43:15.381 UTC [10857] LOG: database system is ready to accept connections
postgres@rshd-1:~$
```

Настройка слейва

```
sudo -i -u postgres
```

Внесем в postgresql.conf

```
listen_addresses = 'localhost, 10.128.0.12'
```

Остановим сервер

```
systemctl stop postgresql
```

Удалим файлы из каталога main

```
rm -rf /var/lib/postgresql/16/main/*
```

Проведем проверку репликации. Для этого исполним команду

```
pg_basebackup -R -h 10.128.0.29 -U rep_user -D /var/lib/postgresql/16/main -P
systemctl start postgresql
```

- флаг -R означает создание файла **standby.signal**, который означает, что сервер - реплика

```
rshd@rshd-2:~$ sudo -i -u postgres
postgres@rshd-2:~$ pg_basebackup -R -h 10.128.0.29 -U rep_user -D /var/lib/postgresql/16/main -P
Password:
23158/23158 kB (100%), 1/1 tablespace
postgres@rshd-2:~$
```

Подготовка

Мастер

```
psql -c 'select client_addr, state from pg_stat_replication;'
```

```
postgres@rshd-1:~$ psql -c 'select client_addr, state from pg_stat_replication;'
 client_addr | state 
-----+-----
 10.128.0.12 | streaming
(1 row)
```

Слейв

```
psql -c 'select sender_host, status from pg_stat_wal_receiver;'
```

```
postgres@rshd-2:~$ psql -c 'select sender_host, status from pg_stat_wal_receiver;'
 sender_host | status 
-----+-----
 10.128.0.29 | streaming
(1 row)
```

Наполнение данными

На мастере подключимся с помощью команды psql

```
start transaction;
create table rshd_user(
    id serial primary key,
    name text not null,
    lab int not null
);
insert into rshd_user (name, lab) values
    ('Ульяна', 4),
    ('Азат', 4)
;
commit;
```

На локальном компьютере с помощью команды psql -h 62.84.113.222 -d postgres -U rshd

```
start transaction;
create table rshd_lab(
    id serial primary key,
    name text not null,
    status boolean not null
);
insert into rshd_lab (name, status) values
    ('Ла61', true),
    ('Ла62', true),
    ('Ла63', true),
    ('Ла64', false)
```



```
;
commit;
```

На слейве проверим что данные добавились

```
select * from rshd_user;
select * from rshd_lab;
```

```
-bash: syntax error near unexpected token `from'
postgres@rshd-2:~$ psql
psql (16.8 (Ubuntu 16.8-0ubuntu0.24.04.1))
Type "help" for help.

postgres=# select * from rshd_user;
 id | name  | lab
----+-----+----
  1 | Ульяна | 4
  2 | Азат  | 4
(2 rows)

postgres=# select * from rshd_lab;
 id | name  | status
----+-----+-----
  1 | Лаб1  | t
  2 | Лаб2  | t
  3 | Лаб3  | t
  4 | Лаб4  | f
(4 rows)

postgres=#
```

Теперь проверим что слейв работает в режиме read_only

```
create table test (id int);
```

```
postgres=# create table test (id int);
ERROR:  cannot execute CREATE TABLE in a read-only transaction
postgres=#
```

Сбой

Исполним команду на мастере

```
mv /var/lib/postgresql/16/main ~/main_save
```

Посмотрим логи:

```
rsld@rshd-1: ~$ ssh
SELECT current_schema();
2025-05-17 22:19:40.399 UTC [4367] rshd@postgres ERROR:  current transaction is aborted, commands ignored until end of transaction block
2025-05-17 22:19:40.399 UTC [4367] rshd@postgres STATEMENT:  SELECT current_schema();
2025-05-17 22:19:52.013 UTC [4378] rshd@postgres ERROR:  permission denied for schema public at character 14
2025-05-17 22:19:52.013 UTC [4378] rshd@postgres STATEMENT:  create table rshd_lab(
    id serial primary key,
    name text not null,
    status boolean not null
);
2025-05-17 22:20:45.995 UTC [4374] postgres@postgres ERROR:  relation "information_schema.role_schema_grants" does not exist at character 41
2025-05-17 22:20:45.995 UTC [4374] postgres@postgres STATEMENT:  SELECT schema_name, privilege_type
FROM information_schema.role_schema_grants
WHERE grantee = 'rshd';
2025-05-17 22:21:16.368 UTC [4159] LOG:  checkpoint starting: time
2025-05-17 22:21:17.195 UTC [4159] LOG:  checkpoint complete: wrote 9 buffers (0.1%); 0 WAL file(s) added, 0 removed, 0 recycled; write=0.005 s, sync=0.007 s, total=0.028 s; sync files=7, longest=0.006 s, average=0.001 s; distance=5 kB, estimate=14911 kB; lsn=0/E02F308, redo lsn=0/E02F200
2025-05-17 22:22:19.398 UTC [4374] postgres@postgres ERROR:  invalid privilege type INSERT for schema
2025-05-17 22:22:19.398 UTC [4374] postgres@postgres STATEMENT:  GRANT USAGE, CREATE, INSERT, UPDATE, DELETE ON SCHEMA public TO rshd;
2025-05-17 22:22:24.995 UTC [4374] postgres@postgres ERROR:  invalid privilege type UPDATE for schema
2025-05-17 22:22:24.995 UTC [4374] postgres@postgres STATEMENT:  GRANT USAGE, CREATE, UPDATE, DELETE ON SCHEMA public TO rshd;
2025-05-17 22:23:49.349 UTC [4397] rshd@postgres ERROR:  syntax error at or near ";" at character 125
2025-05-17 22:23:49.349 UTC [4397] rshd@postgres STATEMENT:  insert into rshd_lab (name, status) value
s
    ('ла61', true),
    ('ла62', true),
    ('ла63', true),
    ('ла64', false),
;
2025-05-17 22:23:55.113 UTC [4397] rshd@postgres ERROR:  current transaction is aborted, commands ignored until end of transaction block
2025-05-17 22:23:55.113 UTC [4397] rshd@postgres STATEMENT:  insert into rshd_lab (name, status) value
s
    ('ла61', true),
    ('ла62', true),
    ('ла63', true),
    ('ла64', false),
;
2025-05-17 22:26:16.247 UTC [4159] LOG:  checkpoint starting: time
2025-05-17 22:26:22.204 UTC [4159] LOG:  checkpoint complete: wrote 60 buffers (0.4%); 0 WAL file(s) added, 0 removed, 0 recycled; write=5.932 s, sync=0.008 s, total=5.957 s; sync files=51, longest=0.004 s, average=0.001 s; distance=219 kB, estimate=13442 kB; lsn=0/E0662F0, redo lsn=0/E066288
2025-05-17 22:31:16.304 UTC [4159] LOG:  checkpoint starting: time
2025-05-17 22:31:18.431 UTC [4159] PANIC:  could not open file "/var/lib/postgresql/16/main/global/pg_control": No such file or directory
2025-05-17 22:31:24.832 UTC [4158] LOG:  checkpointing process (PID 4159) was terminated by signal 6: A aborted
2025-05-17 22:31:24.832 UTC [4158] LOG:  terminating any other active server processes
2025-05-17 22:31:24.835 UTC [4158] LOG:  all server processes terminated; reinitializing
2025-05-17 22:31:24.848 UTC [4158] FATAL:  could not stat data directory "/var/lib/postgresql/16/main": No such file or directory
2025-05-17 22:31:24.848 UTC [4158] LOG:  database system is shut down
postgres@rshd-1:~$

before or while processing the request.
2025-05-17 22:31:24.848 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:31:26.235 UTC [2305] LOG:  restartpoint starting: time
2025-05-17 22:31:28.587 UTC [2305] LOG:  restartpoint complete: wrote 24 buffers (0.1%); 0 WAL file(s) added, 0 removed, 0 recycled; write=2.324 s, sync=0.005 s, total=2.352 s; sync files=21, longest=0.003 s, average=0.001 s; distance=94 kB, estimate=12107 kB; lsn=0/E07DE78, redo lsn=0/E07DE40
2025-05-17 22:31:28.587 UTC [2305] LOG:  recovery restart point at 0/E07DE40
2025-05-17 22:31:28.587 UTC [2305] DETAIL:  Last completed transaction was at log time 2025-05-17 22:30:51.586565+00.
2025-05-17 22:31:29.838 UTC [2428] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:31:29.838 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:31:34.841 UTC [2429] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:31:34.841 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:31:39.846 UTC [2432] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:31:39.846 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:31:44.849 UTC [2434] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:31:44.849 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:31:49.854 UTC [2435] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:31:49.854 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:31:54.857 UTC [2436] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:31:54.857 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:31:59.862 UTC [2439] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:31:59.862 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:32:04.865 UTC [2441] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:32:04.866 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:32:09.870 UTC [2442] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:32:09.871 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:32:14.873 UTC [2444] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:32:14.873 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:32:19.878 UTC [2446] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:32:19.878 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
2025-05-17 22:32:24.881 UTC [2448] FATAL:  could not connect to the primary server: connection to server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:32:24.882 UTC [2307] LOG:  waiting for WAL to become available at 0/E07DF40
postgres@rshd-2:~$
```

Выполним failover с помощью команды

```
/usr/lib/postgresql/16/bin/pg_ctl promote -D /var/lib/postgresql/16/main
```

Команда переключает реплику в режим read_write

```

Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:35:15.018 UTC [2307] LOG: waiting for WAL to become available at 0/E07DF40
2025-05-17 22:35:20.023 UTC [2521] FATAL: could not connect to the primary server: connection to
server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:35:20.023 UTC [2307] LOG: waiting for WAL to become available at 0/E07DF40
2025-05-17 22:35:25.026 UTC [2522] FATAL: could not connect to the primary server: connection to
server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:35:25.026 UTC [2307] LOG: waiting for WAL to become available at 0/E07DF40
2025-05-17 22:35:30.031 UTC [2527] FATAL: could not connect to the primary server: connection to
server at "10.128.0.29", port 5432 failed: Connection refused
Is the server running on that host and accepting TCP/IP connections?
2025-05-17 22:35:30.031 UTC [2307] LOG: waiting for WAL to become available at 0/E07DF40
2025-05-17 22:35:30.254 UTC [2307] LOG: received promote request
2025-05-17 22:35:30.254 UTC [2307] LOG: redo done at 0/E07DEF0 system usage: CPU: user: 0.00 s, s
ystem: 0.02 s, elapsed: 1728.31 s
2025-05-17 22:35:30.254 UTC [2307] LOG: last completed transaction was at log time 2025-05-17 22:
30:51.586565+00
2025-05-17 22:35:30.327 UTC [2307] LOG: selected new timeline ID: 2
2025-05-17 22:35:31.876 UTC [2307] LOG: archive recovery complete
2025-05-17 22:35:32.071 UTC [2305] LOG: checkpoint starting: force
2025-05-17 22:35:32.075 UTC [2304] LOG: database system is ready to accept connections
2025-05-17 22:35:32.117 UTC [2305] LOG: checkpoint complete: wrote 2 buffers (0.0%); 0 WAL file(s
) added, 0 removed, 0 recycled; write=0.010 s, sync=0.006 s, total=0.046 s; sync files=2, longest=
0.005 s, average=0.003 s; distance=0 kB, estimate=10896 kB; lsn=0/E07DFC8, redo lsn=0/E07DF90
postgres@rshd-2:~$ █

```

Добавим данные на слейве

```

insert into rshd_user (name, lab) values
    ('Ульяна', 3),
    ('Азат', 3)
;

```

Теперь наш слейв сервер стал мастером

Восстановление

Чтобы восстановить данные на мастере нужно заново сделать pg_basebackup только теперь с слейва на мастер (и без флага -R)

```
pg_basebackup -h 10.128.0.12 -U rep_user -D /var/lib/postgresql/16/main -P
```

На слейве создадим **standby.signal** чтобы просигнализировать что он снова слейв

```
touch ~/16/main/standby.signal  
systemctl restart postgresql
```

На мастере запустим сервер

```
systemctl restart postgresql
```

Проверим успешное подключение слейва к мастеру

```
2025-05-17 23:08:57.627 UTC [5158] LOG: database system is ready to accept connections  
postgres@rshd-1:~$ psql -c 'select client_addr, state from pg_stat_replication;'  
WARNING: password file "/var/lib/postgresql/.pgpass" has group or world access; permissions should be  
u=rw (0600) or less  
 client_addr | state  
-----  
 10.128.0.12 | streaming  
(1 row)  
postgres@rshd-1:~$  
Authenticating as: root  
Password:  
===== AUTHENTICATION COMPLETE =====  
postgres@rshd-2:~$ psql -c 'select sender_host, status from pg_stat_wal_receiver;'  
 sender_host | status  
-----  
 10.128.0.29 | streaming  
(1 row)  
postgres@rshd-2:~$
```

Добавим новые данные на мастере и покажем что они есть на слейве

```
update rshd_lab  
set status=false  
where name='Ла64';
```

Проверим что данные синхронизировались

```
UPDATE 1  
postgres=# update rshd_lab  
set status=true  
where name='Ла64';  
UPDATE 1  
postgres=#  
 id | name | status  
----+-----+-----  
 1  | Ла61 | t  
 2  | Ла62 | t  
 3  | Ла63 | t  
 4  | Ла64 | t  
(4 rows)  
postgres=#
```

pagebreak

Вывод

В лабораторной работе мы познакомились с конфигурацией потоковой репликации в БД postgresql и научились переключать мастер