Реализация отказоустойчевого кластера PostgreSQL и проектирование базы данных

Меня хорошо видно & слышно?

👀 🔊

Защита проекта
Тема: Реализация отказоустойчевого кластера PostgreSQL и проектирование БД

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Цель и задачи проекта

Цель проекта: спроектировать базу данных, построить отказоустойчивый кластер PostgreSQL.

1. Спроектировать структуру базы данных.

2. Построить отказоустойчивый кластер PostgreSQL

3. Реализовать систему резервного копирования
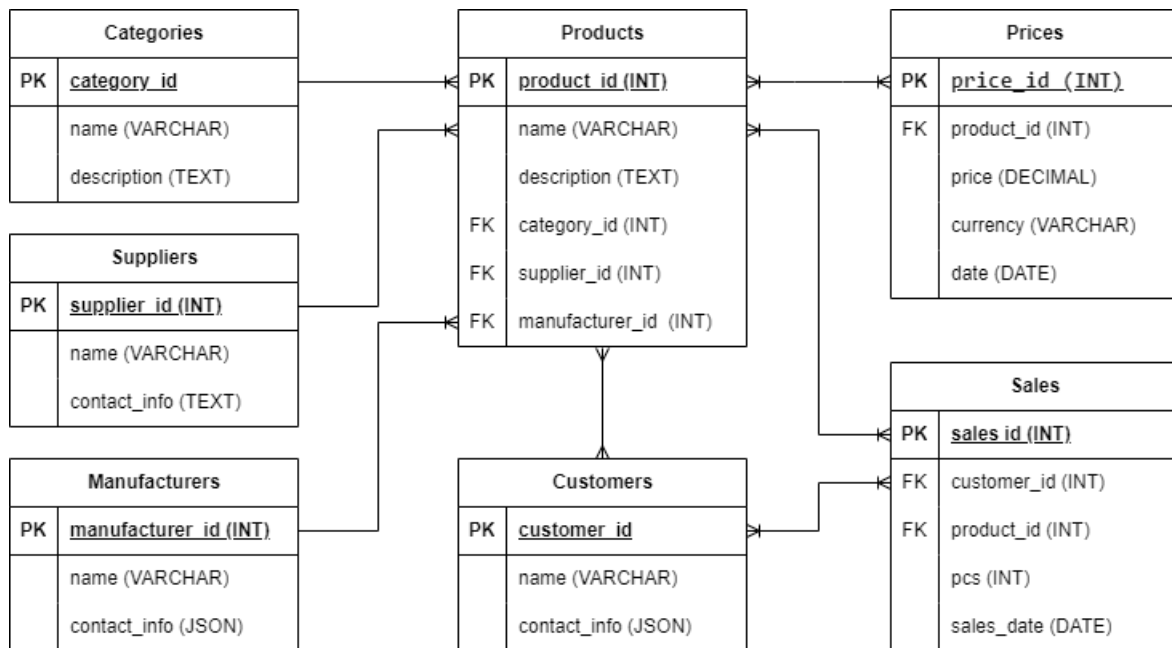
4. Система отчетов

Какие технологии использовались

1. PostgreSQL под управлением patroni

2. Etcd

3. VipManager
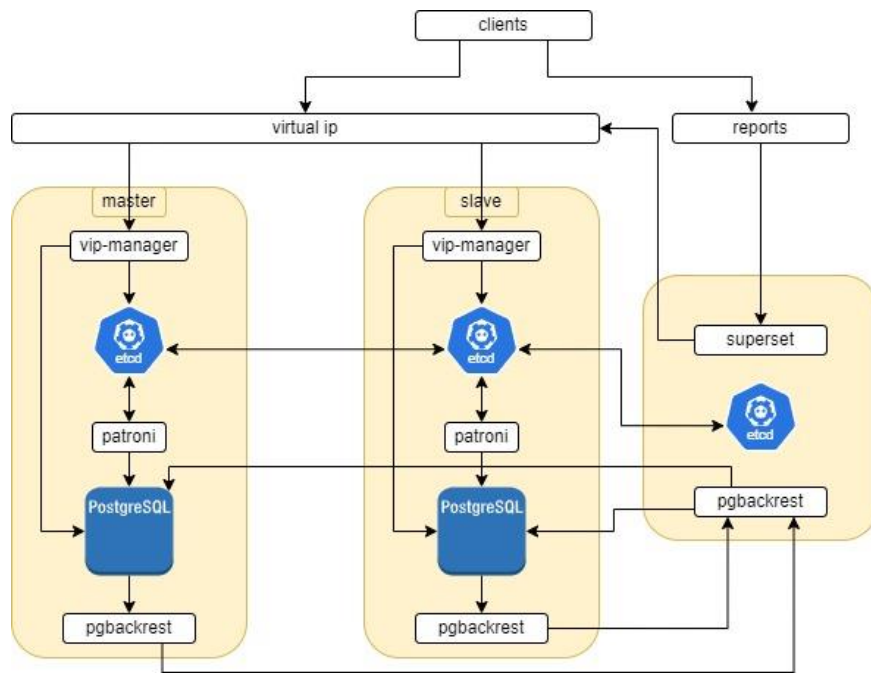
4. Apache Superset

5. pgBackRest

Что получилось

Структура БД

Архитектура системы

Кластер PostgreSQL / etcd

```
root@pg0-otus:~# patronictl -c /etc/patroni/config.yml list
+ Cluster: otus (7476070226399082672) ---------+----+----------+-------------+
| Member | Host          | Role    | State     | TL | Lag in MB | Tags        |
+--------+---------------+---------+-----------+----+----------+-------------+
| pg0    | 192.168.88.65 | Leader  | running   | 7 |           | nosync: true |
| pg1    | 192.168.88.64 | Replica | streaming | 7 |         0 | nosync: true |
+--------+---------------+---------+-----------+----+----------+-------------+
```

```
pg1-otus postgres@internetshop=# select * from newtable ;
 column1
---------
 test2
(1 row)


pg1-otus postgres@internetshop=# select * from newtable ;
 column1
---------
 test2
(1 row)


pg1-otus postgres@internetshop=# insert into newtable values ('test1');
INSERT 0 1
```

```
pg1-otus postgres@internetshop=# select * from newtable ;
 column1
---------
 test2
 test1
(2 rows)


pg0-otus postgres@internetshop=# select * from newtable ;
 column1
---------
 test2
 test1
(2 rows)
```

Кластер etcd

```
root@mysql001-otus:~# etcdctl endpoint health --cluster
http://192.168.88.60:2379 is healthy: successfully committed proposal: took = 1.973148ms
http://192.168.88.65:2379 is healthy: successfully committed proposal: took = 2.599321ms
http://192.168.88.64:2379 is healthy: successfully committed proposal: took = 2.65843ms


root@mysql001-otus:~# etcdctl endpoint status --cluster --write-out=table
```

ENDPOINT	ID	VERSION	DB SIZE	IS LEADER	IS LEARNER	RAFT TERM	RAFT INDEX	RAFT APPLIED INDEX	ERRORS
http://192.168.88.64:2379	1c938984d2e351c2	3.4.30	164 kB	false	false	91887	557	557	
http://192.168.88.60:2379	6ea35c095e2a522b	3.4.30	164 kB	false	false	91887	557	557	
http://192.168.88.65:2379	7543f4a133d1e671	3.4.30	164 kB	true	false	91887	557	557	

etcd

```
root@pg1-otus:~# etcdctl get / *
/otus/otus/config
```

```
{"archive_command":"pgbackrest --stanza=ishop archive-push
%p","log_directory":"/pg_audit","logging_collector":true,"log_truncate_on_rotation":true,"log_rotation_age":"1d","log_rotation_size":0,"
log_line_prefix":"%t [%p-%l] %r %q%u@%d ","log_filename":"postgresql-%Y-%m-%d-
%H%M.log","loop_wait":10,"maximum_lag_on_failover":1048576,"retry_timeout":10,"ttl":30}
```

```
/otus/otus/failover
```

```
{}
```

```
/otus/otus/history
```

```
[[1,67109024,"no recovery target specified","2025-02-27T15:19:38.582177+03:00","pg0"],[2,117440672,"no recovery target specified","2025-
02-27T17:08:31.591715+03:00","pg1"],[3,234881184,"no recovery target specified","2025-02-
27T17:51:27.395146+03:00","pg0"],[4,285212832,"no recovery target specified","2025-02-27T18:42:31.398089+03:00","pg1"],[5,352336560,"no
recovery target specified","2025-02-28T14:38:56.147314+03:00","pg0"],[6,352500336,"no recovery target specified","2025-03-
04T21:13:38.616000+03:00","pg0"]]
```

```
/otus/otus/initialize
```

```
7476070226399082672
```

```
/otus/otus/leader
```

```
pg0
```

```
/otus/otus/members/pg0
```

```
{"conn_url":"postgres://192.168.88.65:5432/postgres","api_url":"http://192.168.88.65:8008/patroni","state":"running","role":"primary","v
ersion":"4.0.4","tags":{"nosync":true},"xlog_location":469762800,"timeline":7}
```

```
/otus/otus/members/pg1
```

```
{"conn_url":"postgres://192.168.88.64:5432/postgres","api_url":"http://192.168.88.64:8008/patroni","state":"running","role":"replica","v
ersion":"4.0.4","tags":{"nosync":true},"xlog_location":469762800,"replication_state":"streaming","timeline":7}
```

```
/otus/otus/status
```

```
{"optime":469762800,"slots":{"pg1":469762800,"pg0":469762800},"retain_slots":["pg0","pg1"]}
```

VipManager

```
root@pg0-otus:~# cat /etc/default/vip-manager.yml
interval: 1000
trigger-key: "/otus/otus/leader"
trigger-value: "pg0"
ip: 192.168.88.123 # the virtual ip address to manage
netmask: 24 # netmask for the virtual ip
interface: enp0s3 #interface to which the virtual ip will be added
hosting-type: basic # possible values: basic, or hetzner.
dcs-type: etcd # etcd, consul or patroni
dcs-endpoints:
  - http://192.168.88.64:2379
  - http://192.168.88.65:2379
retry-num: 2
retry-after: 250  #in milliseconds
verbose: false
```

```
root@pg1-otus:~# cat /etc/default/vip-manager.yml
interval: 1000
trigger-key: "/otus/otus/leader"
trigger-value: "pg1"
ip: 192.168.88.123 # the virtual ip address to manage
netmask: 24 # netmask for the virtual ip
interface: enp0s3 #interface to which the virtual ip will be added
hosting-type: basic # possible values: basic, or hetzner.
dcs-type: etcd # etcd, consul or patroni
dcs-endpoints:
  - http://192.168.88.64:2379
  - http://192.168.88.65:2379
retry-num: 2
retry-after: 250  #in milliseconds
verbose: false
```

Система резервного копирования

```
root@pgbackrest-otus:~# cat /etc/pgbackrest.conf
[global]
process-max=6
repo1-path=/pgbackrest
repo1-retention-full-type=time
repo1-retention-full=3
repo1-retention-diff=7
start-fast=y
log-level-file=detail
config-include-path=/etc/pgbackrest/conf.d

[global:archive-push]
compress-level=3

[ishop]
pg1-host=192.168.88.65
pg1-path=/pg_data
pg1-socket-path=/var/run/postgresql
pg2-host=192.168.88.64
pg2-path=/pg_data
pg2-socket-path=/var/run/postgresql
```
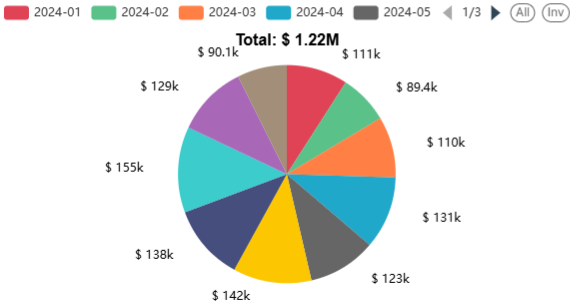
Расписание резервного копирования

```
root@pgbackrest-otus:~# crontab -l
# m h  dom mon dow    command
0 23 * * 0 sudo -u pgbackrest pgbackrest --stanza=ishop --type=full backup
0 23 * * 1-6 sudo -u pgbackrest pgbackrest --stanza=ishop --type=diff backup
```

Superset

Выводы

1. Цель проекта достигнута (кластер, БД, РК, Отчеты)

2. Есть возможность добавить PostgreSQL для отчета.

Вопросы и рекомендации

+ если есть вопросы   **—** если вопросов нет

Спасибо за внимание! ✨