

Redis cluster

Дано:

3 сервера с ОС Ubuntu

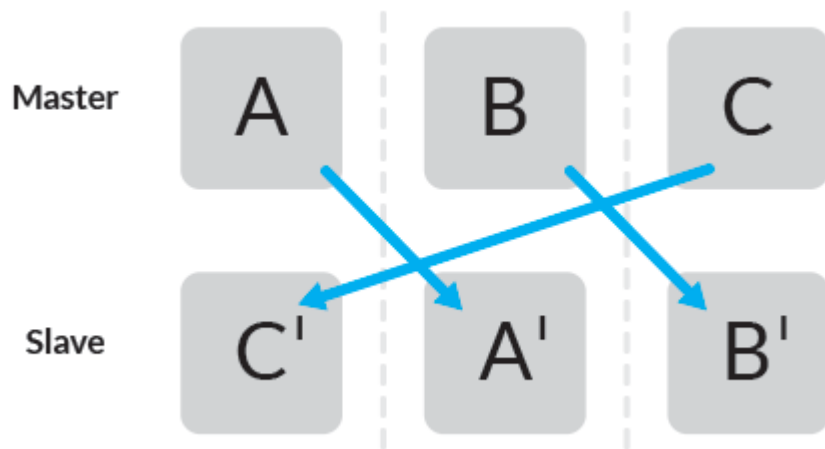
Задание:

Развернуть и настроить кластер 3
master 3 slave

Кластер позволит оставаться в работе в случае отключения сервера и при этом будет распределение данных среди master.

В данной инструкции каждый master будет подключен к одному slave.

Официальная документация рекомендует использовать 6 узлов — по одному экземпляру Redis на узле, что позволяет обеспечить большую надежность, но возможно использовать три узла со следующей топологией соединений.



Name	Master	Slave	IP
Server 1	A port 7001	C port 7003	158.160.43.51
Server 2	B port 7002	A port 7001	158.160.33.19
Server 3	C port 7003	B port 7002	158.160.36.58

Три сервера на yandex_cloud

redis 1 , redis 2, redis 3

cloud-mallinovs... infav

Compute Cloud / Виртуальные машины

Создать ВМ

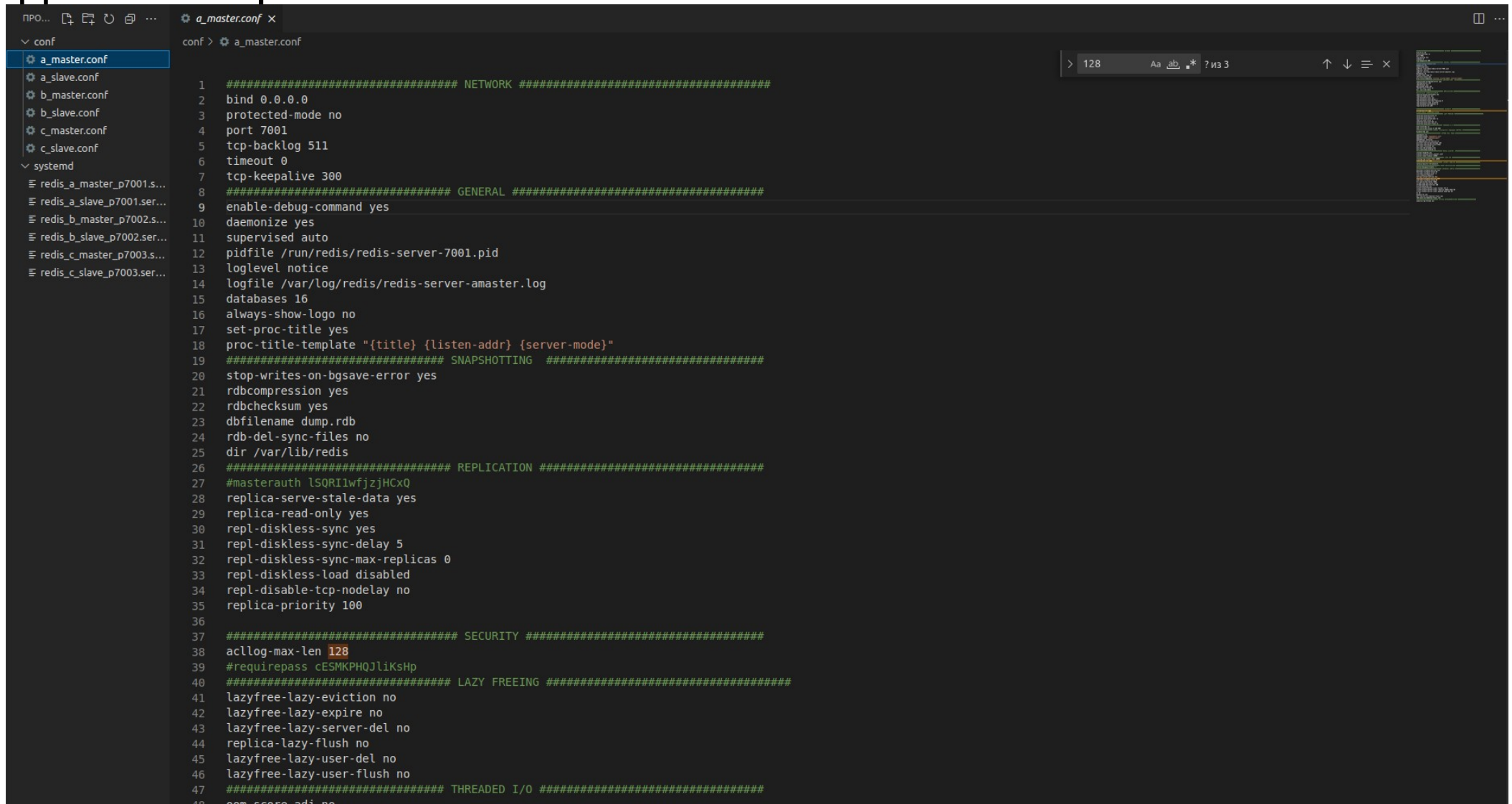
Виртуальные машины

Фильтр по имени Все статусы Все зоны доступности

<input type="checkbox"/>	Имя	Статус	ОС	Платформа	vCPU	Доля vCPU	RAM	Прерываемая	Размер дисков	Зона доступности	Внутренний IPv4	Публичный IPv4	Дата создания	Идентификатор	
<input type="checkbox"/>	redis-1	Running		Intel Ice Lake	2	20 %	2 Гб	нет	15 Гб	ru-central1-a	10.0.0.6	158.160.43.51	09.02.2023, в 14:32	fhnf72u3nvt53dvj13d	...
<input type="checkbox"/>	redis-2	Running		Intel Ice Lake	2	100 %	2 Гб	нет	15 Гб	ru-central1-a	10.0.0.32	158.160.33.19	09.02.2023, в 14:32	fhnfgclhitnepqcvdkh2	...
<input type="checkbox"/>	redis-3	Running		Intel Ice Lake	2	20 %	2 Гб	нет	15 Гб	ru-central1-a	10.0.0.21	158.160.36.58	09.02.2023, в 14:32	fhnng67t52q4pjfnd5dp0	...

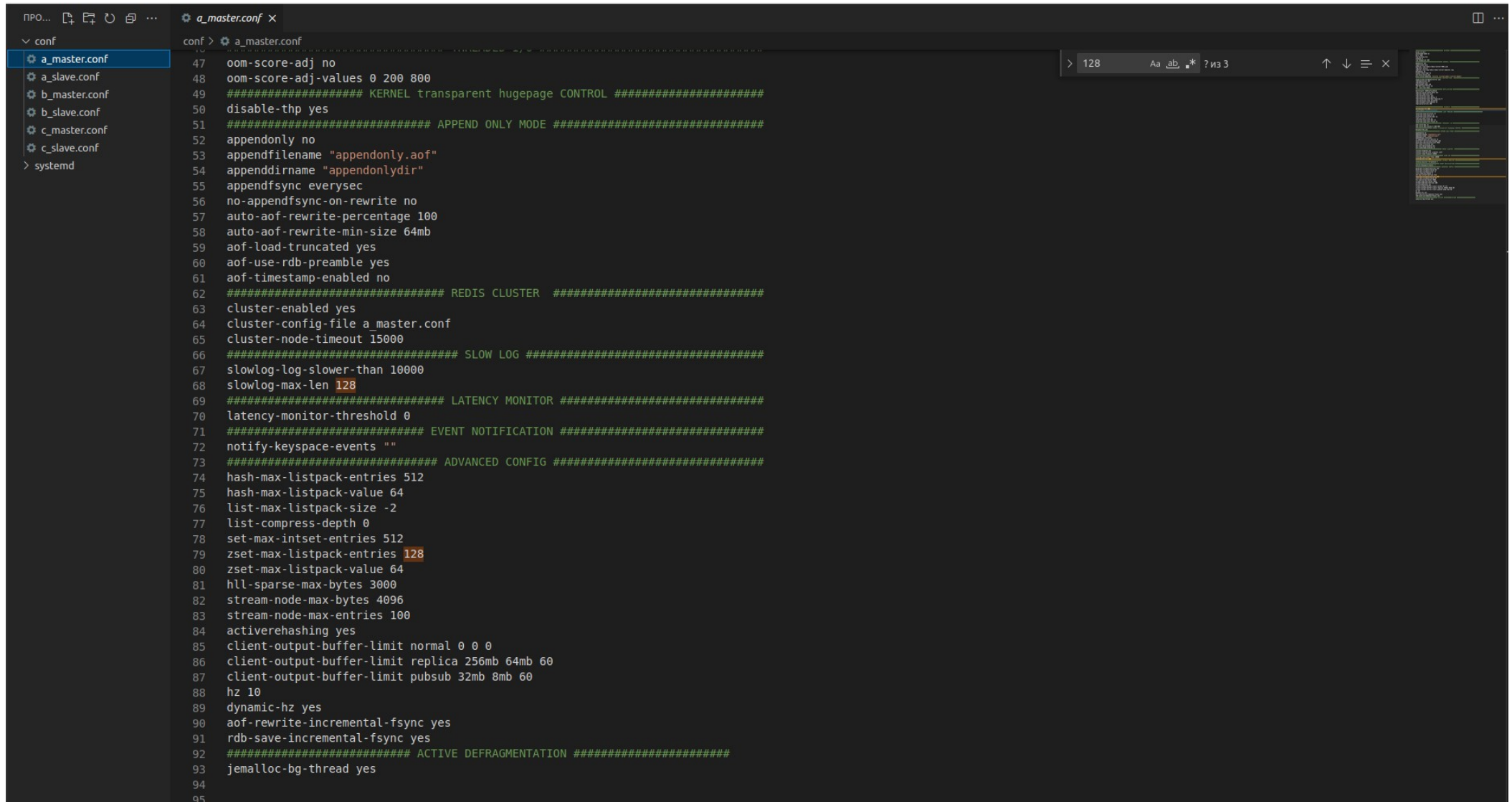
На сервере redis 1:

- установил redis.
- в директории /etc/redis/ создаю конфиг файл a_master.conf для мастера А.



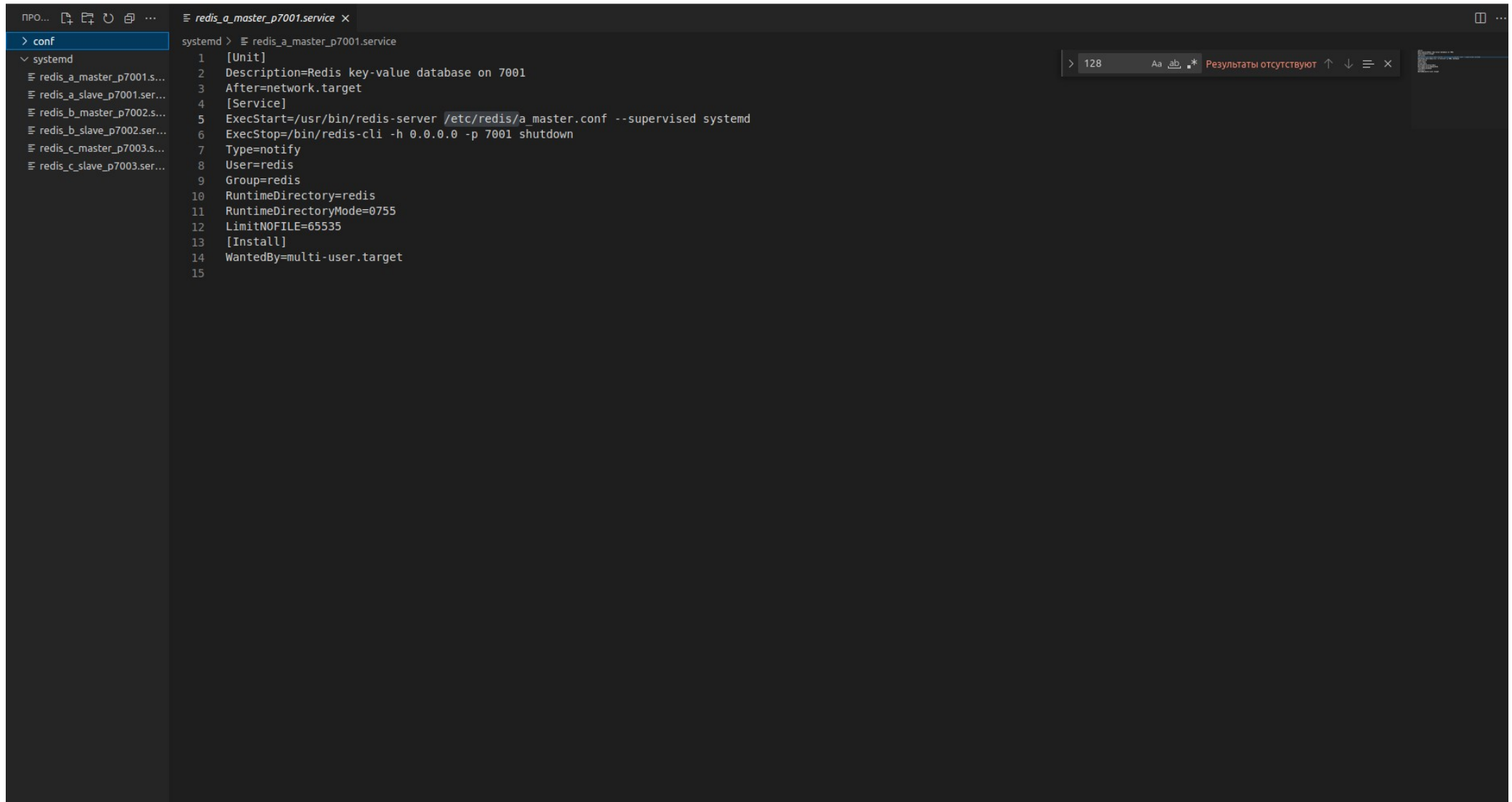
```
1 ##### NETWORK #####
2 bind 0.0.0.0
3 protected-mode no
4 port 7001
5 tcp-backlog 511
6 timeout 0
7 tcp-keepalive 300
8 ##### GENERAL #####
9 enable-debug-command yes
10 daemonize yes
11 supervised auto
12 pidfile /run/redis/redis-server-7001.pid
13 loglevel notice
14 logfile /var/log/redis/redis-server-amaster.log
15 databases 16
16 always-show-logo no
17 set-proc-title yes
18 proc-title-template "{title} {listen-addr} {server-mode}"
19 ##### SNAPSHOTTING #####
20 stop-writes-on-bgsave-error yes
21 rdbcompression yes
22 rdbchecksum yes
23 dbfilename dump.rdb
24 rdb-del-sync-files no
25 dir /var/lib/redis
26 ##### REPLICATION #####
27 #masterauth l5QRilwfjzjHCx0
28 replica-serve-stale-data yes
29 replica-read-only yes
30 repl-diskless-sync yes
31 repl-diskless-sync-delay 5
32 repl-diskless-sync-max-replicas 0
33 repl-diskless-load disabled
34 repl-disable-tcp-nodelay no
35 replica-priority 100
36
37 ##### SECURITY #####
38 accllog-max-len 128
39 #requirepass cESMKPHQJliKsHp
40 ##### LAZY FREEING #####
41 lazyfree-lazy-eviction no
42 lazyfree-lazy-expire no
43 lazyfree-lazy-server-del no
44 replica-lazy-flush no
45 lazyfree-lazy-user-del no
46 lazyfree-lazy-user-flush no
47 ##### THREADED I/O #####
48 no-tcp-nodelay
```

Продолжение a_master.conf



```
47 oom-score-adj no
48 oom-score-adj-values 0 200 800
49 ##### KERNEL transparent hugepage CONTROL #####
50 disable-thp yes
51 ##### APPEND ONLY MODE #####
52 appendonly no
53 appendfilename "appendonly.aof"
54 appenddirname "appendonlydir"
55 appendfsync everysec
56 no-appendfsync-on-rewrite no
57 auto-aof-rewrite-percentage 100
58 auto-aof-rewrite-min-size 64mb
59 aof-load-truncated yes
60 aof-use-rdb-preamble yes
61 aof-timestamp-enabled no
62 ##### REDIS CLUSTER #####
63 cluster-enabled yes
64 cluster-config-file a_master.conf
65 cluster-node-timeout 15000
66 ##### SLOW LOG #####
67 slowlog-log-slower-than 10000
68 slowlog-max-len 128
69 ##### LATENCY MONITOR #####
70 latency-monitor-threshold 0
71 ##### EVENT NOTIFICATION #####
72 notify-keyspace-events ""
73 ##### ADVANCED CONFIG #####
74 hash-max-listpack-entries 512
75 hash-max-listpack-value 64
76 list-max-listpack-size -2
77 list-compress-depth 0
78 set-max-intset-entries 512
79 zset-max-listpack-entries 128
80 zset-max-listpack-value 64
81 hll-sparse-max-bytes 3000
82 stream-node-max-bytes 4096
83 stream-node-max-entries 100
84 activerehashing yes
85 client-output-buffer-limit normal 0 0 0
86 client-output-buffer-limit replica 256mb 64mb 60
87 client-output-buffer-limit pubsub 32mb 8mb 60
88 hz 10
89 dynamic-hz yes
90 aof-rewrite-incremental-fsync yes
91 rdb-save-incremental-fsync yes
92 ##### ACTIVE DEFRAGMENTATION #####
93 jemalloc-bg-thread yes
94
95
```

Для запуска мастера А создаю сервис redis-amaster.service.



The screenshot shows a terminal window with a dark theme. The left sidebar displays a file tree under the 'conf' directory, listing several service files including 'redis_a_master_p7001.service'. The main panel shows the contents of this file, which is a systemd service unit for Redis. The configuration includes a description, dependencies on the network target, and specific commands for starting and stopping the service. The service is configured to run as the 'redis' user and group, with a runtime directory and a file descriptor limit.

```
systemd > redis_a_master_p7001.service
1  [Unit]
2  Description=Redis key-value database on 7001
3  After=network.target
4  [Service]
5  ExecStart=/usr/bin/redis-server /etc/redis/a_master.conf --supervised systemd
6  ExecStop=/bin/redis-cli -h 0.0.0.0 -p 7001 shutdown
7  Type=notify
8  User=redis
9  Group=redis
10 RuntimeDirectory=redis
11 RuntimeDirectoryMode=0755
12 LimitNOFILE=65535
13 [Install]
14 WantedBy=multi-user.target
15
```

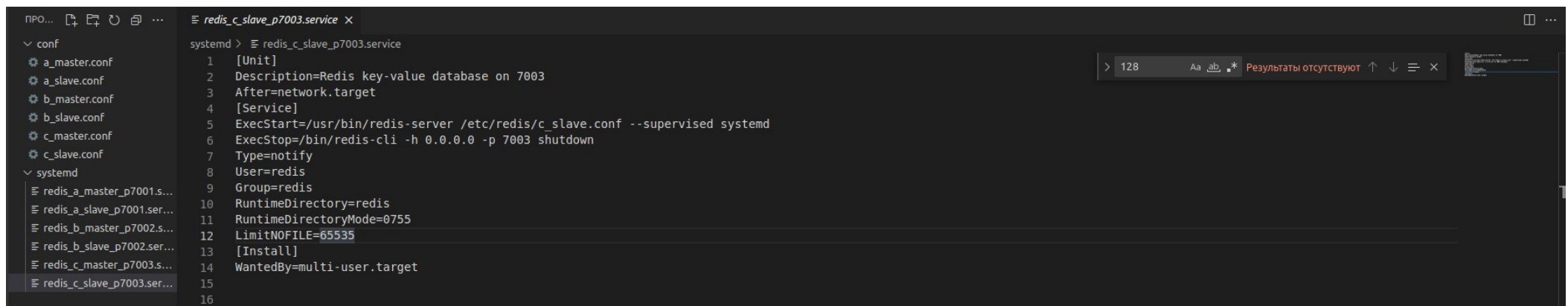
На сервере 1:

- в директории `/etc/redis/` создаю конфиг файл `c_slave.conf` для slave C.

Отличие от конфига `a_master.conf` только в строках:

- port 7003
- pidfile `/run/redis/redis-server-7003.pid`
- logfile `/var/log/redis/redis-server-cslave.log`
- cluster-config-file `c_slave.conf`

Так же создал сервис `redis-cslave.service` для запуска slave C.



The screenshot shows a terminal window with a file explorer on the left and a code editor on the right. The file explorer shows a directory structure with files like `a_master.conf`, `a_slave.conf`, `b_master.conf`, `b_slave.conf`, `c_master.conf`, and `c_slave.conf` under the `conf` directory, and service files like `redis_a_master_p7001.s...`, `redis_a_slave_p7001.ser...`, `redis_b_master_p7002.s...`, `redis_b_slave_p7002.ser...`, `redis_c_master_p7003.s...`, and `redis_c_slave_p7003.ser...` under the `systemd` directory. The code editor shows the content of the `redis_c_slave_p7003.service` file, which is a systemd service unit for Redis. The content is as follows:

```
1 [Unit]
2 Description=Redis key-value database on 7003
3 After=network.target
4 [Service]
5 ExecStart=/usr/bin/redis-server /etc/redis/c_slave.conf --supervised systemd
6 ExecStop=/bin/redis-cli -h 0.0.0.0 -p 7003 shutdown
7 Type=notify
8 User=redis
9 Group=redis
10 RuntimeDirectory=redis
11 RuntimeDirectoryMode=0755
12 LimitNOFILE=65535
13 [Install]
14 WantedBy=multi-user.target
15
16
```

На сервере 2:

- в директории /etc/redis/ создаю конфиг файлы b_master.conf и a_slave.conf для master B и slave A.

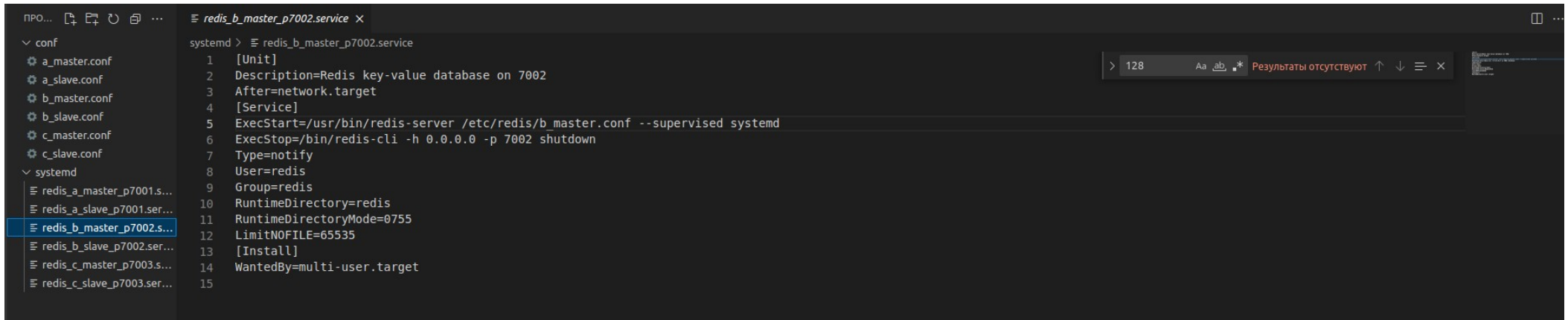
Отличие от конфига b_master.conf только в строках:

- port 7002
- pidfile /run/redis/redis-server-7002.pid
- logfile /var/log/redis/redis-server-bmaster.log
- cluster-config-file b_master.conf

Отличие от конфига a_slave.conf только в строках:

- port 7001
- pidfile /run/redis/redis-server-7001.pid
- logfile /var/log/redis/redis-server-aslave.log
- cluster-config-file b_master.conf

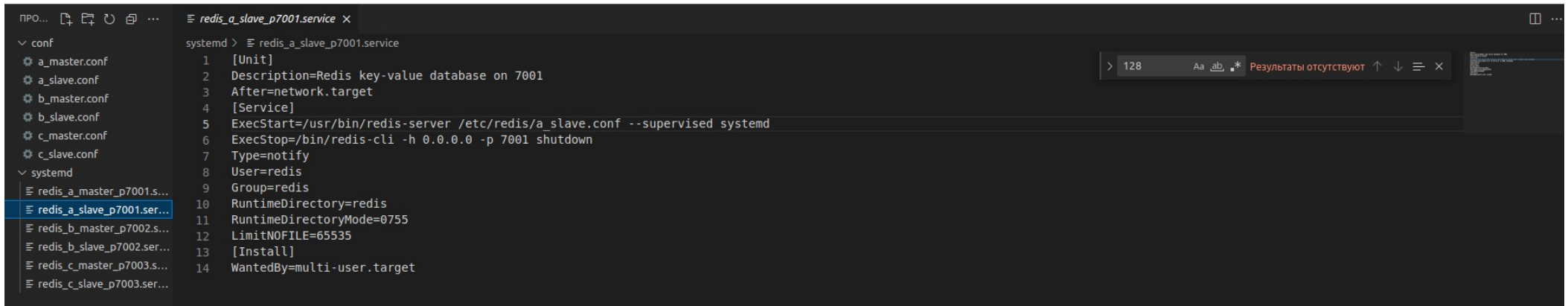
Так же создал сервис redis-bmaster.service для запуска master B.



The screenshot shows a terminal window with a file explorer on the left and a text editor on the right. The file explorer shows a directory structure with files like a_master.conf, a_slave.conf, b_master.conf, b_slave.conf, c_master.conf, c_slave.conf, and a systemd directory containing several service files. The file redis_bmaster_p7002.service is selected. The text editor shows the content of this service file, which is a systemd unit file for Redis master B.

```
systemd > redis_bmaster_p7002.service
1 [Unit]
2 Description=Redis key-value database on 7002
3 After=network.target
4 [Service]
5 ExecStart=/usr/bin/redis-server /etc/redis/b_master.conf --supervised systemd
6 ExecStop=/bin/redis-cli -h 0.0.0.0 -p 7002 shutdown
7 Type=notify
8 User=redis
9 Group=redis
10 RuntimeDirectory=redis
11 RuntimeDirectoryMode=0755
12 LimitNOFILE=65535
13 [Install]
14 WantedBy=multi-user.target
15
```

Так же создал сервис redis-aslave.service для запуска slave A.



The screenshot shows a terminal window with a file explorer on the left and a text editor on the right. The file explorer shows the same directory structure as the previous screenshot, but now the file redis_aslave_p7001.service is selected. The text editor shows the content of this service file, which is a systemd unit file for Redis slave A.

```
systemd > redis_aslave_p7001.service
1 [Unit]
2 Description=Redis key-value database on 7001
3 After=network.target
4 [Service]
5 ExecStart=/usr/bin/redis-server /etc/redis/a_slave.conf --supervised systemd
6 ExecStop=/bin/redis-cli -h 0.0.0.0 -p 7001 shutdown
7 Type=notify
8 User=redis
9 Group=redis
10 RuntimeDirectory=redis
11 RuntimeDirectoryMode=0755
12 LimitNOFILE=65535
13 [Install]
14 WantedBy=multi-user.target
15
```

На сервере 3:

- в директории /etc/redis/ создаю конфиг файлы c_master.conf и b_slave.conf для master C и slave B.

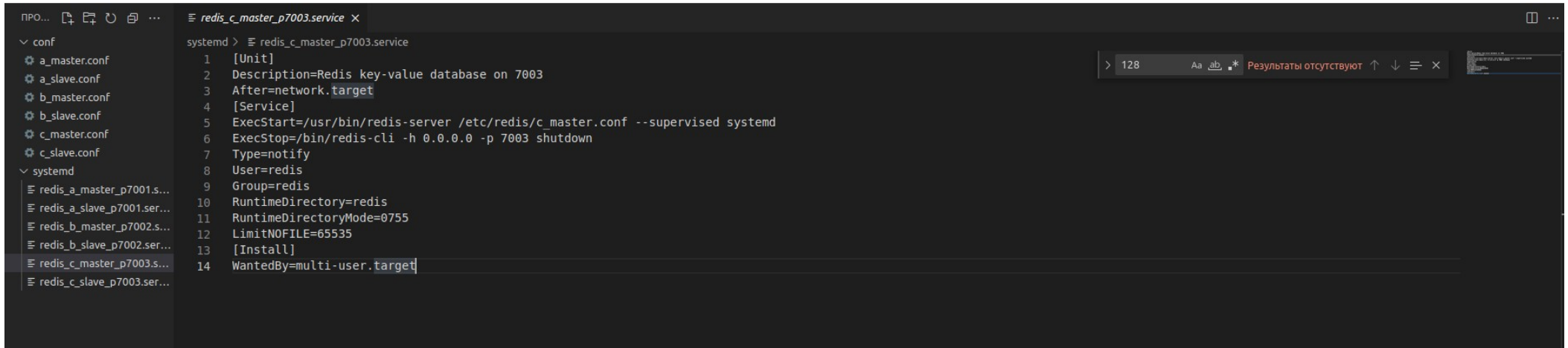
Отличие от конфига c_master.conf только в строках:

- port 7003
- pidfile /run/redis/redis-server-7003.pid
- logfile /var/log/redis/redis-server-cmaster.log
- cluster-config-file c_master.conf

Отличие от конфига b_slave.conf только в строках:

- port 7002
- pidfile /run/redis/redis-server-7002.pid
- logfile /var/log/redis/redis-server-bslave.log
- cluster-config-file b_master.conf

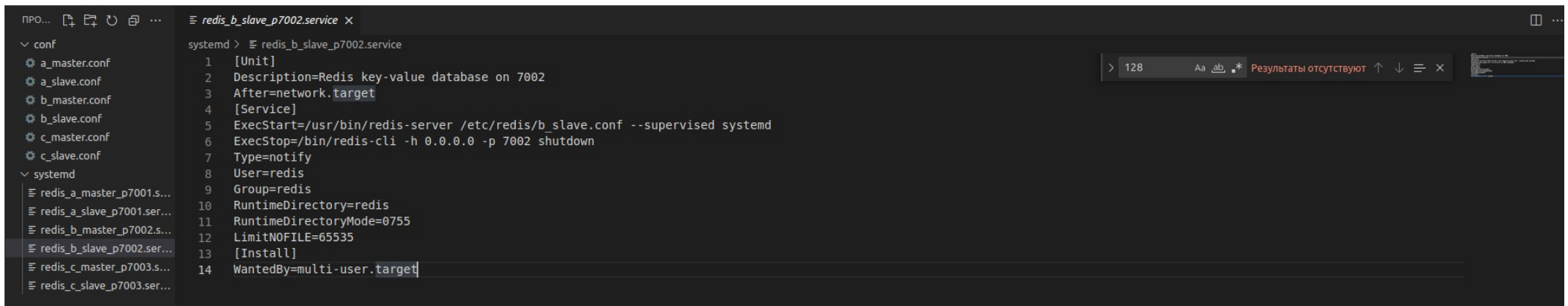
Так же создал сервис `redis-cmaster.service` для запуска master C.



The screenshot shows a terminal window with a file explorer on the left and a code editor on the right. The file explorer shows a directory structure with files like `a_master.conf`, `a_slave.conf`, `b_master.conf`, `b_slave.conf`, `c_master.conf`, and `c_slave.conf`. The code editor shows the contents of the `redis_c_master_p7003.service` file, which is a systemd service unit. The configuration includes a description, after dependencies, and execution commands for starting and stopping the service.

```
systemd > redis_c_master_p7003.service
1 [Unit]
2 Description=Redis key-value database on 7003
3 After=network.target
4 [Service]
5 ExecStart=/usr/bin/redis-server /etc/redis/c_master.conf --supervised systemd
6 ExecStop=/bin/redis-cli -h 0.0.0.0 -p 7003 shutdown
7 Type=notify
8 User=redis
9 Group=redis
10 RuntimeDirectory=redis
11 RuntimeDirectoryMode=0755
12 LimitNOFILE=65535
13 [Install]
14 WantedBy=multi-user.target
```

Так же создал сервис `redis-bslave.service` для запуска slave B.



The screenshot shows a terminal window with a file explorer on the left and a code editor on the right. The file explorer shows a directory structure with files like `a_master.conf`, `a_slave.conf`, `b_master.conf`, `b_slave.conf`, `c_master.conf`, and `c_slave.conf`. The code editor shows the contents of the `redis_b_slave_p7002.service` file, which is a systemd service unit. The configuration includes a description, after dependencies, and execution commands for starting and stopping the service.

```
systemd > redis_b_slave_p7002.service
1 [Unit]
2 Description=Redis key-value database on 7002
3 After=network.target
4 [Service]
5 ExecStart=/usr/bin/redis-server /etc/redis/b_slave.conf --supervised systemd
6 ExecStop=/bin/redis-cli -h 0.0.0.0 -p 7002 shutdown
7 Type=notify
8 User=redis
9 Group=redis
10 RuntimeDirectory=redis
11 RuntimeDirectoryMode=0755
12 LimitNOFILE=65535
13 [Install]
14 WantedBy=multi-user.target
```

На сервере 1 запустил сервисы для master A и slave C

Проверил что они запущенны.

```
root@redis-1:/etc/redis# systemctl status redis-amaster.service
● redis-amaster.service - Redis key-value database on 7001
   Loaded: loaded (/etc/systemd/system/redis-amaster.service; disabled; vendor preset: enabled)
   Active: active (running) since Thu 2023-02-09 07:37:54 UTC; 55min ago
     Main PID: 1794 (redis-server)
        Status: "Ready to accept connections"
         Tasks: 5 (limit: 2310)
        Memory: 2.8M
         CGroup: /system.slice/redis-amaster.service
                └─1794 /usr/bin/redis-server 0.0.0.0:7001 [cluster]

Feb 09 07:37:54 redis-1 systemd[1]: Starting Redis key-value database on 7001...
Feb 09 07:37:54 redis-1 systemd[1]: Started Redis key-value database on 7001.
root@redis-1:/etc/redis# systemctl status redis-cslave.service
● redis-cslave.service - Redis key-value database on 7003
   Loaded: loaded (/etc/systemd/system/redis-cslave.service; disabled; vendor preset: enabled)
   Active: active (running) since Thu 2023-02-09 07:58:26 UTC; 34min ago
     Main PID: 1879 (redis-server)
        Status: "Ready to accept connections"
         Tasks: 5 (limit: 2310)
        Memory: 2.8M
         CGroup: /system.slice/redis-cslave.service
                └─1879 /usr/bin/redis-server 0.0.0.0:7003 [cluster]

Feb 09 07:58:26 redis-1 systemd[1]: Starting Redis key-value database on 7003...
Feb 09 07:58:26 redis-1 systemd[1]: Started Redis key-value database on 7003.
root@redis-1:/etc/redis# ss -ntlp
State      Recv-Q    Send-Q    Local Address:Port    Peer Address:Port    Process
LISTEN     0          4096      127.0.0.53%lo:53      0.0.0.0:*             users:((("systemd-resolve",pid=390,fd=13))
LISTEN     0          128       0.0.0.0:22           0.0.0.0:*             users:((("sshd",pid=614,fd=3))
LISTEN     0          511       0.0.0.0:7001         0.0.0.0:*             users:((("redis-server",pid=1794,fd=6))
LISTEN     0          511       0.0.0.0:7003         0.0.0.0:*             users:((("redis-server",pid=1879,fd=6))
LISTEN     0          511       0.0.0.0:17001        0.0.0.0:*             users:((("redis-server",pid=1794,fd=8))
```

На сервере 2 запустил сервисы для master B и slave A

Проверил что они запущенны.

```
root@redis-2:/etc/redis# systemctl status redis-bmaster.service
```

```
● redis-bmaster.service - Redis key-value database on 7002
   Loaded: loaded (/etc/systemd/system/redis-bmaster.service; static; vendor preset: enabled)
   Active: active (running) since Thu 2023-02-09 08:41:57 UTC; 12min ago
     Main PID: 2074 (redis-server)
        Status: "Ready to accept connections"
         Tasks: 5 (limit: 2310)
        Memory: 2.8M
         CGroup: /system.slice/redis-bmaster.service
                 └─2074 /usr/bin/redis-server 0.0.0.0:7002 [cluster]
```

```
Feb 09 08:41:57 redis-2 systemd[1]: Starting Redis key-value database on 7002...
```

```
Feb 09 08:41:57 redis-2 systemd[1]: Started Redis key-value database on 7002.
```

```
root@redis-2:/etc/redis# systemctl status redis-slave.service
```

```
● redis-slave.service - Redis key-value database on 7001
   Loaded: loaded (/etc/systemd/system/redis-slave.service; disabled; vendor preset: enabled)
   Active: active (running) since Thu 2023-02-09 08:40:15 UTC; 14min ago
     Main PID: 2047 (redis-server)
        Status: "Ready to accept connections"
         Tasks: 5 (limit: 2310)
        Memory: 2.8M
         CGroup: /system.slice/redis-slave.service
                 └─2047 /usr/bin/redis-server 0.0.0.0:7001 [cluster]
```

```
Feb 09 08:40:15 redis-2 systemd[1]: Starting Redis key-value database on 7001...
```

```
Feb 09 08:40:15 redis-2 systemd[1]: Started Redis key-value database on 7001.
```

```
root@redis-2:/etc/redis# ss -ntlp
```

State	Recv-Q	Send-Q	Local Address:Port	Peer Address:Port	Process
LISTEN	0	4096	127.0.0.53%lo:53	0.0.0.0:*	users:(("systemd-resolve",pid=392,fd=13))
LISTEN	0	128	0.0.0.0:22	0.0.0.0:*	users:(("sshd",pid=615,fd=3))
LISTEN	0	511	0.0.0.0:7001	0.0.0.0:*	users:(("redis-server",pid=2047,fd=6))
LISTEN	0	511	0.0.0.0:7002	0.0.0.0:*	users:(("redis-server",pid=2074,fd=6))
LISTEN	0	511	0.0.0.0:17001	0.0.0.0:*	users:(("redis-server",pid=2047,fd=8))

На сервере 3 запустил сервисы для master C и slave B

Проверил что они запущенны.

```
root@redis-3:/etc/redis# systemctl status redis-cmaster.service
```

```
● redis-cmaster.service - Redis key-value database on 7003
   Loaded: loaded (/etc/systemd/system/redis-cmaster.service; disabled; vendor preset: enabled)
   Active: active (running) since Thu 2023-02-09 08:51:24 UTC; 1min 34s ago
     Main PID: 2021 (redis-server)
    Status: "Ready to accept connections"
     Tasks: 5 (limit: 2310)
    Memory: 2.9M
    CGroup: /system.slice/redis-cmaster.service
            └─2021 /usr/bin/redis-server 0.0.0.0:7003 [cluster]
```

```
Feb 09 08:51:24 redis-3 systemd[1]: Starting Redis key-value database on 7003...
```

```
Feb 09 08:51:24 redis-3 systemd[1]: Started Redis key-value database on 7003.
```

```
root@redis-3:/etc/redis# systemctl status redis-bslave.service
```

```
● redis-bslave.service - Redis key-value database on 7002
   Loaded: loaded (/etc/systemd/system/redis-bslave.service; disabled; vendor preset: enabled)
   Active: active (running) since Thu 2023-02-09 08:51:40 UTC; 1min 21s ago
     Main PID: 2044 (redis-server)
    Status: "Ready to accept connections"
     Tasks: 5 (limit: 2310)
    Memory: 2.9M
    CGroup: /system.slice/redis-bslave.service
            └─2044 /usr/bin/redis-server 0.0.0.0:7002 [cluster]
```

```
Feb 09 08:51:40 redis-3 systemd[1]: Starting Redis key-value database on 7002...
```

```
Feb 09 08:51:40 redis-3 systemd[1]: Started Redis key-value database on 7002.
```

```
root@redis-3:/etc/redis# ss -ntlp
```

State	Recv-Q	Send-Q	Local Address:Port	Peer Address:Port	Process
LISTEN	0	4096	127.0.0.53%lo:53	0.0.0.0:*	users:(("systemd-resolve",pid=391,fd=13))
LISTEN	0	128	0.0.0.0:22	0.0.0.0:*	users:(("sshd",pid=610,fd=3))
LISTEN	0	511	0.0.0.0:7002	0.0.0.0:*	users:(("redis-server",pid=2044,fd=6))
LISTEN	0	511	0.0.0.0:7003	0.0.0.0:*	users:(("redis-server",pid=2021,fd=6))
LISTEN	0	511	0.0.0.0:17002	0.0.0.0:*	users:(("redis-server",pid=2044,fd=8))

На сервере 1. Проверил командой ping что master A и salve C работают

```
root@redis-1:/etc/systemd/system# redis-cli -h 158.160.43.51 -p 7001
158.160.43.51:7001> ping
PONG
158.160.43.51:7001>
root@redis-1:/etc/systemd/system# redis-cli -h 158.160.43.51 -p 7003
158.160.43.51:7003> ping
PONG
158.160.43.51:7003> exit
root@redis-1:/etc/systemd/system#
```

На сервере 2. Проверил командой ping что master B и salve A работают

```
root@redis-2:/etc/systemd/system# redis-cli -h 158.160.33.19 -p 7002
158.160.33.19:7002> ping
PONG
158.160.33.19:7002> exit
root@redis-2:/etc/systemd/system# redis-cli -h 158.160.33.19 -p 7001
158.160.33.19:7001> ping
PONG
158.160.33.19:7001> exit
root@redis-2:/etc/systemd/system#
```

На сервере 3. Проверил командой ping что master C и salve B работают

```
root@redis-3:/etc/systemd/system# redis-cli -h 158.160.36.58 -p 7003
158.160.36.58:7003> ping
PONG
158.160.36.58:7003> exit
root@redis-3:/etc/systemd/system# redis-cli -h 158.160.36.58 -p 7002
158.160.36.58:7002> ping
PONG
158.160.36.58:7002> exit
root@redis-3:/etc/systemd/system#
```

```
Создал кластер командой redis-cli --cluster create
158.160.43.51:7001 158.160.33.19:7002 158.160.36.58:7003
158.160.33.19:7001 158.160.36.58:7002 158.160.43.51:7003 --
cluster-replicas 1
```

Проверил созданный кластер через redis-cli

```
root@redis-1:/etc/systemd/system# redis-cli -h 158.160.43.51 -p 7001
158.160.43.51:7001> CLUSTER NODES
236eef314ce1c2f98aab10211d73ad7a7c2201f2 158.160.33.19:7002@17002 master - 0 1675943808000 2 connected 5461-10922
55c72ff8152dba42a2ffe9d626f77ee5de13dd71 158.160.36.58:7003@17003 master - 0 1675943810000 3 connected 10923-16383
cee27c818b360539fe27ccbd0d4edc1912dd35b9 158.160.36.58:7002@17002 slave 236eef314ce1c2f98aab10211d73ad7a7c2201f2 0 1675943809000 2 connected
6ce2aeaba3357ec3cf877823c44a9f5b9471acea 10.0.0.6:7001@17001 myself,master - 0 1675943809000 1 connected 0-5460
9d1fc7d98de8d5d61136393c304b07b64a1b1c41 158.160.43.51:7003@17003 slave 55c72ff8152dba42a2ffe9d626f77ee5de13dd71 0 1675943810977 3 connected
04153d4613cbfe3d49795c3d6f3209a3e548d064 158.160.33.19:7001@17001 slave 6ce2aeaba3357ec3cf877823c44a9f5b9471acea 0 1675943811980 1 connected
158.160.43.51:7001>
```

Проверил что к master A подключен slave A с сервера 158.160.33.19

[illegible]

Проверил что к master B подключен slave B находящийся на сервере 158.160.36.58

```
158.160.33.19:7002> INFO REPLICATION
# Replication
role:master
connected_slaves:1
slave0:ip=158.160.36.58,port=7002,state=online,offset=1008,lag=0
master_failover_state:no-failover
master_replid:ada64697868a6538593dd22c5be3d5ee5c4a974c
master_replid2:0000000000000000000000000000000000000000
master_repl_offset:1008
second_repl_offset:-1
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:1
repl_backlog_histlen:1008
158.160.33.19:7002> |
```

Проверил что к master C подключен slave C находящийся на сервере 158.160.36.58

```
158.160.36.58:7003> INFO REPLICATION
# Replication
role:master
connected_slaves:1
slave0:ip=158.160.43.51,port=7003,state=online,offset=1050,lag=0
master_failover_state:no-failover
master_replid:f84303a2e5b03e7478b2cff4afc281ebc6aa3378
master_replid2:0000000000000000000000000000000000000000
master_repl_offset:1050
second_repl_offset:-1
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:1
repl_backlog_histlen:1050
158.160.36.58:7003> |
```

Проверил работу кластера.

На сервере 1 в master A создай имитацию недоступности master.

По итогу видно как статус master сменился на slave

```
158.160.43.51:7001> INFO REPLICATION
# Replication
role:master
connected_slaves:1
slave0:ip=158.160.33.19,port=7001,state=online,offset=2044,lag=1
master_failover_state:no-failover
master_replid:501608e379c3f4ec06fbc9fe87a9b84291205a2c
master_replid2:d653ab5a8d159bf9292215752d48b41ed9e1252c
master_repl_offset:2058
second_repl_offset:2045
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:1667
repl_backlog_histlen:392
158.160.43.51:7001> DEBUG sleep 40
OK
(40.00s)
158.160.43.51:7001> INFO REPLICATION
# Replication
role:slave
master_host:158.160.33.19
master_port:7001
master_link_status:up
master_last_io_seconds_ago:10
master_sync_in_progress:0
slave_read_repl_offset:2086
slave_repl_offset:2086
slave_priority:100
slave_read_only:1
replica_announced:1
connected_slaves:0
master_failover_state:no-failover
master_replid:b4d883cd251dd13f85e8d16dd2862fd9ff44bb48
```

На сервере 2 в slave А проверил статус до имитации отказа master и после неё.

Видно что статус со slave сменился на master

```
158.160.33.19:7001> INFO REPLICATION
# Replication
role:slave
master_host:158.160.43.51
master_port:7001
master_link_status:up
master_last_io_seconds_ago:9
master_sync_in_progress:0
slave_read_repl_offset:2058
slave_repl_offset:2058
slave_priority:100
slave_read_only:1
replica_announced:1
connected_slaves:0
master_failover_state:no-failover
master_replid:501608e379c3f4ec06fbc9fe87a9b84291205a2c
master_replid2:d653ab5a8d159bf9292215752d48b41ed9e1252c
master_repl_offset:2058
second_repl_offset:2045
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:1891
repl_backlog_histlen:168
158.160.33.19:7001>
158.160.33.19:7001>
158.160.33.19:7001> INFO REPLICATION
# Replication
role:master
connected_slaves:1
slave0:ip=158.160.43.51,port=7001,state=online,offset=2072,lag=0
master_failover_state:no-failover
master_replid:b4d883cd251dd13f85e8d16dd2862fd9ff44bb48
```

Проверил работу кластера на сервере 2.
В master В создай имитацию недоступности master.
По итогу видно как статус master сменился на slave

```
158.160.33.19:7002> INFO REPLICATION
# Replication
role:master
connected_slaves:1
slave0:ip=158.160.36.58,port=7002,state=online,offset=3196,lag=1
master_failover_state:no-failover
master_replid:91c8290444c857c6e264c952ca74230820195b5e
master_replid2:ada64697868a6538593dd22c5be3d5ee5c4a974c
master_repl_offset:3196
second_repl_offset:3197
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:3197
repl_backlog_histlen:0
158.160.33.19:7002> DEBUG sleep 40
OK
(40.00s)
158.160.33.19:7002> INFO REPLICATION
# Replication
role:slave
master_host:158.160.36.58
master_port:7002
master_link_status:up
master_last_io_seconds_ago:5
master_sync_in_progress:0
slave_read_repl_offset:3420
slave_repl_offset:3420
slave_priority:100
slave_read_only:1
replica_announced:1
connected_slaves:0
master_failover_state:no-failover
master_replid:318cd6816566e8d351cca0a9b1be9fde758f1398
```


На сервере 3 в slave B проверил статус до имитации отказа master и после неё.

Видно что статус со slave сменился на master

```
158.160.36.58:7002> INFO REPLICATION
# Replication
role:slave
master_host:158.160.33.19
master_port:7002
master_link_status:up
master_last_io_seconds_ago:8
master_sync_in_progress:0
slave_read_repl_offset:3070
slave_repl_offset:3070
slave_priority:100
slave_read_only:1
replica_announced:1
connected_slaves:0
master_failover_state:no-failover
master_replid:ada64697868a6538593dd22c5be3d5ee5c4a974c
master_replid2:0000000000000000000000000000000000000000
master_repl_offset:3070
second_repl_offset:-1
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:1
repl_backlog_histlen:3070
158.160.36.58:7002>
158.160.36.58:7002>
158.160.36.58:7002> INFO REPLICATION
# Replication
role:master
connected_slaves:1
slave0:ip=158.160.33.19,port=7002,state=online,offset=3504,lag=1
master_failover_state:no-failover
master_replid:318cd6816566e8d351cca0a9b1be9fde758f1398
```

Проверил работу кластера на сервере 3.
В master C создай имитацию недоступности master.
По итогу видно как статус master сменился на slave

```
158.160.36.58:7003> INFO REPLICATION
# Replication
role:master
connected_slaves:1
slave0:ip=158.160.43.51,port=7003,state=online,offset=3682,lag=0
master_failover_state:no-failover
master_replid:81fa13ef33b76a9c101f08c855a9ea89fb9c1c41
master_replid2:f84303a2e5b03e7478b2cfff4afc281ebc6aa3378
master_repl_offset:3682
second_repl_offset:3655
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:3655
repl_backlog_histlen:28
158.160.36.58:7003> DEBUG sleep 40
OK
(40.00s)
158.160.36.58:7003> INFO REPLICATION
# Replication
role:slave
master_host:158.160.43.51
master_port:7003
master_link_status:up
master_last_io_seconds_ago:6
master_sync_in_progress:0
slave_read_repl_offset:3878
slave_repl_offset:3878
slave_priority:100
slave_read_only:1
replica_announced:1
connected_slaves:0
master_failover_state:no-failover
master_replid:0f30929f2c4009b336e3045ad7cbffebc80b9a14
```

На сервере 1 в slave С проверил статус до имитации отказа master и после неё.

Видно что статус со slave сменился на master

```
158.160.43.51:7003> INFO REPLICATION
# Replication
role:slave
master_host:158.160.36.58
master_port:7003
master_link_status:up
master_last_io_seconds_ago:9
master_sync_in_progress:0
slave_read_repl_offset:3668
slave_repl_offset:3668
slave_priority:100
slave_read_only:1
replica_announced:1
connected_slaves:0
master_failover_state:no-failover
master_replid:81fa13ef33b76a9c101f08c855a9ea89fb9c1c41
master_replid2:f84303a2e5b03e7478b2cff4afc281ebc6aa3378
master_repl_offset:3668
second_repl_offset:3655
repl_backlog_active:1
repl_backlog_size:1048576
repl_backlog_first_byte_offset:1
repl_backlog_histlen:3668
158.160.43.51:7003>
158.160.43.51:7003>
158.160.43.51:7003> INFO REPLICATION
# Replication
role:master
connected_slaves:1
slave0:ip=158.160.36.58,port=7003,state=online,offset=3878,lag=1
master_failover_state:no-failover
master_replid:0f30929f2c4009b336e3045ad7cbffeb80b9a14
```