

Работа с etcd-хранилищем

До начала работ произведите установку etcd:

Клонируем git-репозиторий, используя команду:

```
$ git clone -b v3.4.16 https://github.com/etcd-io/etcd.git
```

Переходим в директорию:

```
$ cd etcd
```

Запускаем скрипт для сборки etcd:

```
$ ./build
```

Для удобства, добавляем путь до директории bin:

```
$ export PATH="$PATH:`pwd`/bin"
```

Проверяем успешность сборки и установки следующей командой:

```
$ etcd --version
```

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Запускаем создание кластера etcd с наименованием "first":

```
$ etcd --name=first
```

```
filipp@filipp-notebook:~/Desktop/etcd$ etcd --name=first
2022-12-22 13:40:43.205659 I | etcdmain: etcd Version: 3.3.25
2022-12-22 13:40:43.205743 I | etcdmain: Git SHA: Not provided (use ./build instead of go build)
2022-12-22 13:40:43.205748 I | etcdmain: Go Version: go1.17.3
2022-12-22 13:40:43.205752 I | etcdmain: Go OS/Arch: linux/amd64
2022-12-22 13:40:43.205756 I | etcdmain: setting maximum number of CPUs to 8, total number of available CPUs is 8
2022-12-22 13:40:43.205762 W | etcdmain: no data-dir provided, using default data-dir ./first.etcd
2022-12-22 13:40:43.206689 I | embed: listening for peers on http://localhost:2380
2022-12-22 13:40:43.206730 I | embed: listening for client requests on localhost:2379
2022-12-22 13:40:43.215337 I | etcdserver: name = first
2022-12-22 13:40:43.215346 I | etcdserver: data dir = first.etcd
2022-12-22 13:40:43.215351 I | etcdserver: member dir = first.etcd/member
2022-12-22 13:40:43.215354 I | etcdserver: heartbeat = 100ms
2022-12-22 13:40:43.215357 I | etcdserver: election = 1000ms
2022-12-22 13:40:43.215360 I | etcdserver: snapshot count = 100000
2022-12-22 13:40:43.215369 I | etcdserver: advertise client URLs = http://localhost:2379
2022-12-22 13:40:43.215373 I | etcdserver: initial advertise peer URLs = http://localhost:2380
2022-12-22 13:40:43.215381 I | etcdserver: initial cluster = first=http://localhost:2380
2022-12-22 13:40:43.217245 I | etcdserver: starting member 8e9e05c52164694d in cluster cdf818194e3a8c32
2022-12-22 13:40:43.217265 I | raft: 8e9e05c52164694d became follower at term 0
2022-12-22 13:40:43.217277 I | raft: newRaft 8e9e05c52164694d [peers: [], term: 0, commit: 0, applied: 0, lastindex: 0, lastterm: 0]
2022-12-22 13:40:43.217281 I | raft: 8e9e05c52164694d became follower at term 1
2022-12-22 13:40:43.218763 W | auth: simple token is not cryptographically signed
2022-12-22 13:40:43.221906 I | etcdserver: starting server... [version: 3.3.25, cluster version: to_be_decided]
2022-12-22 13:40:43.222568 I | etcdserver: 8e9e05c52164694d as single-node; fast-forwarding 9 ticks (election ticks 10)
2022-12-22 13:40:43.223306 I | etcdserver/membership: added member 8e9e05c52164694d [http://localhost:2380] to cluster cdf818194e3a8c32
2022-12-22 13:40:43.317742 I | raft: 8e9e05c52164694d is starting a new election at term 1
2022-12-22 13:40:43.317810 I | raft: 8e9e05c52164694d became candidate at term 2
2022-12-22 13:40:43.317835 I | raft: 8e9e05c52164694d received MsgVoteResp from 8e9e05c52164694d at term 2
2022-12-22 13:40:43.317849 I | raft: 8e9e05c52164694d became leader at term 2
2022-12-22 13:40:43.317856 I | raft: raft.node: 8e9e05c52164694d elected leader 8e9e05c52164694d at term 2
2022-12-22 13:40:43.318094 I | etcdserver: published {Name:first ClientURLs:[http://localhost:2379]} to cluster cdf818194e3a8c32
```

Кластер etcd успешно запущен

В соседнем окне терминала выполним команду "ll" (или ls) и убедимся, что хранилище кластера "first" создано:

```
filipp@filipp-notebook:~/Desktop/etcd$ ll
total 12
drwxrwxr-x  3 filipp filipp 4096 дек 22 13:40 ./
drwxrwxrwx 11 filipp filipp 4096 дек 22 13:36 ../
drwx----- 3 filipp filipp 4096 дек 22 13:40 first.etcd/
```

Изменяем используемую версию API в утилите управления etcd:

```
$ export ETCDCTL_API=3
$ echo $ETCDCTL_API
```

```
filipp@filipp-notebook:~/Desktop/etcd$ export ETCDCTL_API=3
filipp@filipp-notebook:~/Desktop/etcd$ echo $ETCDCTL_API
3
```

Выполняем команду просмотра узлов запущенного кластера etcd в формате таблицы:

```
$ etcdctl member list -w table
```

```
filipp@filipp-notebook:~/Desktop/etcd$ etcdctl member list -w table
+-----+-----+-----+-----+-----+
| ID | STATUS | NAME | PEER ADDRS | CLIENT ADDRS |
+-----+-----+-----+-----+-----+
| 8e9e05c52164694d | started | first | http://localhost:2380 | http://localhost:2379 |
+-----+-----+-----+-----+-----+
```

Убедимся, что единственный узел кластера присутствует, наименование кластера соответствует заданному. Запоминаем идентификатор кластера (ID)

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Выполним создание снимка состояния кластера:

```
$ etcdctl snapshot save first.bak
```

```
filipp@filipp-notebook:~/Desktop/etcd$ etcdctl snapshot save first.bak
2022-12-22 13:51:48.231850 I | clientv3: opened snapshot stream; downloading
2022-12-22 13:51:48.237318 I | clientv3: completed snapshot read; closing
Snapshot saved at first.bak
```

Снепшот кластера first успешно создан под названием "first.bak"

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Имитируем ситуацию отказа кластера etcd.

Останавливаем запущенный кластер сочетанием клавиш "CTRL+C" в первом окне терминала:

```
2022-12-22 13:54:02.923152 I | etcdserver: skipped leadership transfer for
ter

filipp@filipp-notebook:~/Desktop/etcd$
```

Удаляем каталог хранилища состояния кластера "first":

```
$ rm -rf first.etcd/
```

```
filipp@filipp-notebook:~/Desktop/etcd$ ll
total 36
drwxrwxr-x  3 filipp filipp  4096 дек 22 13:51 ./
drwxrwxrwx 11 filipp filipp  4096 дек 22 13:36 ../
-rw-rw-r--  1 filipp filipp 20512 дек 22 13:51 first.bak
drwx----- 3 filipp filipp  4096 дек 22 13:40 first.etcd/
filipp@filipp-notebook:~/Desktop/etcd$ rm -rf first.etcd/
filipp@filipp-notebook:~/Desktop/etcd$ ll
total 32
drwxrwxr-x  2 filipp filipp  4096 дек 22 13:55 ./
drwxrwxrwx 11 filipp filipp  4096 дек 22 13:36 ../
-rw-rw-r--  1 filipp filipp 20512 дек 22 13:51 first.bak
filipp@filipp-notebook:~/Desktop/etcd$
```

Останавливаем службы etcd:

```
$ systemctl stop etcd
```

```

filipp@filipp-notebook:~/Desktop/etcd$ systemctl stop etcd
filipp@filipp-notebook:~/Desktop/etcd$ systemctl status etcd
○ etcd.service - etcd - highly-available key value store
   Loaded: loaded (/lib/systemd/system/etcd.service; enabled; vendor preset: enabled)
   Active: inactive (dead) since Thu 2022-12-22 13:40:20 MSK; 15min ago
     Docs: https://etcd.io/docs
           man:etcd
   Process: 923152 ExecStart=/usr/bin/etcd $DAEMON_ARGS (code=killed, signal=TERM)
  Main PID: 923152 (code=killed, signal=TERM)
    CPU: 708ms

дек 22 13:39:04 filipp-notebook etcd[923152]: raft.node: 8e9e05c52164694d elected leader
дек 22 13:39:04 filipp-notebook etcd[923152]: published {Name:filipp-notebook ClientURLs
дек 22 13:39:04 filipp-notebook etcd[923152]: ready to serve client requests
дек 22 13:39:04 filipp-notebook systemd[1]: Started etcd - highly-available key value s
дек 22 13:39:04 filipp-notebook etcd[923152]: serving insecure client requests on 127.0.
дек 22 13:40:20 filipp-notebook systemd[1]: Stopping etcd - highly-available key value s
дек 22 13:40:20 filipp-notebook etcd[923152]: received terminated signal, shutting down.
дек 22 13:40:20 filipp-notebook etcd[923152]: skipped leadership transfer for single me
дек 22 13:40:20 filipp-notebook systemd[1]: etcd.service: Deactivated successfully.
дек 22 13:40:20 filipp-notebook systemd[1]: Stopped etcd - highly-available key value s
lines 1-19/19 (END)

```

Служба успешно остановлена

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Выполняем восстановление кластера из снапшота в каталог под названием "second.etcd":

```
$ etcdctl snapshot restore first.bak --data-dir=second.etcd
```

```

filipp@filipp-notebook:~/Desktop/etcd$ etcdctl snapshot restore first.bak --data-dir=second.e
tcd
2022-12-22 13:57:47.358298 I | etcdserver/membership: added member 8e9e05c52164694d [http://l
ocalhost:2380] to cluster cdf818194e3a8c32

```

Запускаем кластер etcd под названием "second" из директории с восстановленным снапшотом:

```
$ etcd --data-dir=second.etcd --name=second
```

```

filipp@filipp-notebook:~/Desktop/etcd$ etcd --data-dir=second.etcd --name=second
2022-12-22 13:59:24.870163 I | etcdmain: etcd Version: 3.3.25
2022-12-22 13:59:24.870202 I | etcdmain: Git SHA: Not provided (use ./build instead of go build)
2022-12-22 13:59:24.870206 I | etcdmain: Go Version: go1.17.3
2022-12-22 13:59:24.870208 I | etcdmain: Go OS/Arch: linux/amd64
2022-12-22 13:59:24.870214 I | etcdmain: setting maximum number of CPUs to 8, total number of available CPUs is 8
2022-12-22 13:59:24.870246 N | etcdmain: the server is already initialized as member before, starting as etcd member...
2022-12-22 13:59:24.870439 I | embed: listening for peers on http://localhost:2380
2022-12-22 13:59:24.870473 I | embed: listening for client requests on localhost:2379
2022-12-22 13:59:24.871170 I | etcdserver: recovered store from snapshot at index 1
2022-12-22 13:59:24.876619 I | etcdserver: name = second
2022-12-22 13:59:24.876632 I | etcdserver: data dir = second.etcd
2022-12-22 13:59:24.876638 I | etcdserver: member dir = second.etcd/member
2022-12-22 13:59:24.876648 I | etcdserver: heartbeat = 100ms
2022-12-22 13:59:24.876653 I | etcdserver: election = 1000ms
2022-12-22 13:59:24.876657 I | etcdserver: snapshot count = 100000
2022-12-22 13:59:24.876666 I | etcdserver: advertise client URLs = http://localhost:2379
2022-12-22 13:59:24.877174 I | etcdserver: restarting member 8e9e05c52164694d in cluster cdf818194e3a8c32 at commit index 1
2022-12-22 13:59:24.877194 I | raft: 8e9e05c52164694d became follower at term 1
2022-12-22 13:59:24.877207 I | raft: newRaft 8e9e05c52164694d [peers: [8e9e05c52164694d], term: 1, commit: 1, applied: 1, lastindex: 1, lastterm: 1]
2022-12-22 13:59:24.877263 I | etcdserver/membership: added member 8e9e05c52164694d [http://localhost:2380] to cluster cdf818194e3a8c32 from store
2022-12-22 13:59:24.877968 W | auth: simple token is not cryptographically signed
2022-12-22 13:59:24.880148 I | etcdserver: starting server... [version: 3.3.25, cluster version: to_be_decided]

```

Кластер etcd под названием "second" запущен успешно

Выполняем команду просмотра узлов запущенного кластера etcd в формате таблицы:

```
$ etcdctl member list -w table
```

```

filipp@filipp-notebook:~/Desktop/etcd$ etcdctl member list -w table
+-----+-----+-----+-----+-----+
| ID | STATUS | NAME | PEER ADDRS | CLIENT ADDRS |
+-----+-----+-----+-----+-----+
| 8e9e05c52164694d | started | second | http://localhost:2380 | http://localhost:2379 |
+-----+-----+-----+-----+-----+

```

Убеждаемся, что кластер etcd запущен успешно, наименование соответствует заданному ("second"), а идентификатор запущенного кластера "second" соответствует идентификатору кластера "first", который мы восстановили ранее из снэпшота

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