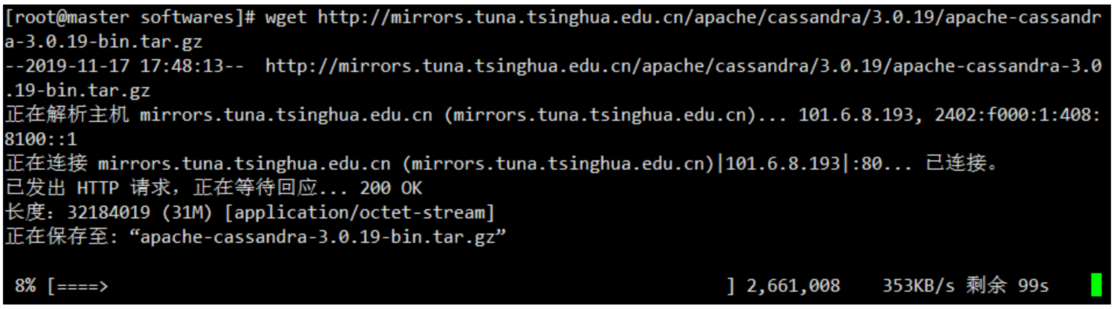
安装 Cassandra

```
cd /export/softwares/
wget
http://mirrors.tuna.tsinghua.edu.cn/apache/cassandra/3.0.19/apache-cassandra-3.0.19-bin.tar.gz
```



```
[root@master softwares]# wget http://mirrors.tuna.tsinghua.edu.cn/apache/cassandra/3.0.19/apache-cassandr
a-3.0.19-bin.tar.gz
--2019-11-17 17:48:13--  http://mirrors.tuna.tsinghua.edu.cn/apache/cassandra/3.0.19/apache-cassandra-3.0
.19-bin.tar.gz
正在解析主机 mirrors.tuna.tsinghua.edu.cn (mirrors.tuna.tsinghua.edu.cn)... 101.6.8.193, 2402:f000:1:408:
8100::1
正在连接 mirrors.tuna.tsinghua.edu.cn (mirrors.tuna.tsinghua.edu.cn)|101.6.8.193|:80... 已连接。
已发出 HTTP 请求，正在等待回应... 200 OK
长度：32184019 (31M) [application/octet-stream]
正在保存至: “apache-cassandra-3.0.19-bin.tar.gz”

 8% [====>                                         ] 2,661,008     353KB/s 剩余 99s
```

```
tar zxvf apache-cassandra-3.0.19-bin.tar.gz -C ../servers
```

```
vi /etc/profile
export CASSANDRA_HOME=/export/servers/apache-cassandra-3.0.19
export PATH=:$CASSANDRA_HOME/bin:$PATH
source /etc/profile
```

修改配置文件 cassandra.yaml

```
#进入$CASSANDRA_HOME/conf 配置文件所在的目录
cd $CASSANDRA_HOME/conf
```

a.修改 cassandra 集群的名字(默认是 Test Cluster)

```
# The name of the cluster. This is mainly used to prevent machines in
# one logical cluster from joining another.
cluster_name: 'Test Cluster'
```

b.设置集群种子节点 IP，如果多个用逗号分隔

```
# seeds is actually a comma-delimited list of addresses.
# Ex: "<ip1>,<ip2>,<ip3>"
- seeds: "192.168.52.100,192.168.52.110,192.168.52.120"
```

c.设置监听地址(本机的 IP)，是为了其他节点能与节点进行通信(默认是 localhost)，每台机器填自己机器的 IP

```
# Setting listen_address to 0.0.0.0 is always wrong.
listen_address: 192.168.52.100
```

d.开启 thrift rpc 服务(默认是 false)

```
# Whether to start the thrift rpc server.
start_rpc: true
```

e.设置 rpc 的地址(默认是 localhost)

```
# For security reasons, you should not expose this port to the internet.
Firewall it if needed.
rpc_address: 192.168.52.100
```

f.设置数据文件所在路径(默认是 $CASSANDRA_HOME/data/data)

```
# If not set, the default directory is $CASSANDRA_HOME/data/data.
data_file_directories:
     - /data1/cassandradata/data
     - /data2/cassandradata/data
     - /data3/cassandradata/data
     - /data4/cassandradata/data
     - /data5/cassandradata/data
```

g.设置 commitlog 文件所在路径(默认是 $CASSANDRA_HOME/data/commitlog)

```
# If not set, the default directory is $CASSANDRA_HOME/data/commitlog.
commitlog_directory: /data6/cassandradata/commitlog
```

问：为什么要设置 data_file_directories 和 commitlog_directory？

答：因为这两个文件很大，分散集群中磁盘 I/O 压力，前者是 cassandra 实际数据存放的目录，后者是数据写入 commitlog 的文件目录

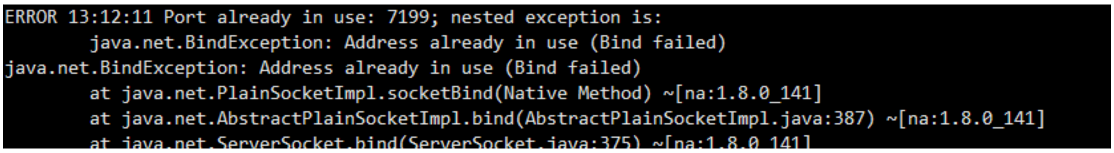
分发安装包

```
scp -r apache-cassandra-3.0.19/ node02:$PWD
scp -r apache-cassandra-3.0.19/ node03:$PWD
```

修改 $CASSANDRA_HOME/conf/cassandra.yaml 中的 listen_address 和 rpc_address 将其设置成自己的 IP

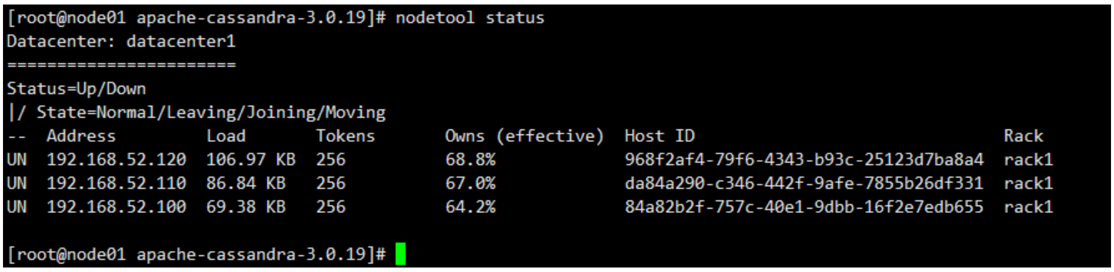
启动 cassandra

```
cassandra -r
```



```
ERROR 13:12:11 Port already in use: 7199; nested exception is:
        java.net.BindException: Address already in use (Bind failed)
java.net.BindException: Address already in use (Bind failed)
        at java.net.PlainSocketImpl.socketBind(Native Method) ~[na:1.8.0_141]
        at java.net.AbstractPlainSocketImpl.bind(AbstractPlainSocketImpl.java:387) ~[na:1.8.0_141]
        at java.net.ServerSocket.bind(ServerSocket.java:375) ~[na:1.8.0_141]
```

```
netstat -tunlp |grep 7199
cassandra -p cassandra.pid
pkill -F cassandra.pid
nodetool status
```



```
[root@node01 apache-cassandra-3.0.19]# nodetool status
Datacenter: datacenter1
=======================
Status=Up/Down
|/ State=Normal/Leaving/Joining/Moving
--  Address         Load       Tokens       Owns (effective)  Host ID                               Rack
UN  192.168.52.120  106.97 KB  256          68.8%             968f2af4-79f6-4343-b93c-25123d7ba8a4  rack1
UN  192.168.52.110  86.84 KB   256          67.0%             da84a290-c346-442f-9afe-7855b26df331  rack1
UN  192.168.52.100  69.38 KB   256          64.2%             84a82b2f-757c-40e1-9dbb-16f2e7edb655  rack1

[root@node01 apache-cassandra-3.0.19]#
```

CentOS 6.9 下将 python2.6.6 升级为 Python2.7.13

查看当前系统中的 Python 版本

```
python --version
```

返回 Python 2.6.6 为正常。

检查 CentOS 版本

```
cat /etc/redhat-release
```

返回 CentOS release 6.9 (Final) 为正常。

安装所有的开发工具包

```
yum groupinstall -y "Development tools"
```

安装其它的必需包

```
yum install -y zlib-devel bzip2-devel openssl-devel ncurses-devel sqlite-devel
```

下载、编译和安装 Python 2.7.13

```
wget https://www.python.org/ftp/python/2.7.13/Python-2.7.13.tgz
tar zxf Python-2.7.13.tgz
cd Python-2.7.13
./configure
make && make install
```

默认 Python 2.7.13 会安装在 /usr/local/bin 目录下。

```
ll -tr /usr/local/bin/python*
```

```
/usr/local/bin/python2.7
/usr/local/bin/python2.7-config
/usr/local/bin/python -> python2
/usr/local/bin/python2 -> python2.7
/usr/local/bin/python2-config -> python2.7-config
/usr/local/bin/python-config -> python2-config
```

而系统自带的 Python 是在 /usr/bin 目录下。

```
ll -tr /usr/bin/python*
```

```
/usr/bin/python2.6-config
/usr/bin/python2.6
/usr/bin/python
/usr/bin/python2 -> python
/usr/bin/python-config -> python2.6-config
```

更新系统默认 Python 版本

先把系统默认的旧版 Python 重命名。

```
mv /usr/bin/python /usr/bin/python.old
```

再删除系统默认的 python-config 软链接。

```
rm -f /usr/bin/python-config
```

最后创建新版本的 Python 软链接。

```
ln -s /usr/local/bin/python /usr/bin/python
ln -s /usr/local/bin/python-config /usr/bin/python-config
ln -s /usr/local/include/python2.7/ /usr/include/python2.7
```

以上步骤做完以后，目录 /usr/bin 下的 Python 应该是

```
ll -tr /usr/bin/python*
```

```
/usr/bin/python2.6-config
/usr/bin/python2.6
/usr/bin/python.old
/usr/bin/python2 -> python
/usr/bin/python -> /usr/local/bin/python
/usr/bin/python-config -> /usr/local/bin/python-config
```

查看新的 Python 版本

```
python --version
```

返回 Python 2.7.13 为正常。

以下步骤还是有必要的

为新版 Python 安装 setuptools

```
wget https://bootstrap.pypa.io/ez_setup.py -O - | python
```

setuptools 正确安装完成后，easy_install 命令就会被安装在 /usr/local/bin 目录下了。

```
wget https://pypi.python.org/packages/source/d/distribute/distribute-0.6.10.tar.gz
tar xf distribute-0.6.10.tar.gz
cd distribute-0.6.10
python2.7 setup.py install
wget http://curl.haxx.se/ca/cacert.pem
mv cacert.pem ca-bundle.crt
cp ca-bundle.crt /etc/pki/tls/certs/
```

为新版 Python 安装 pip

```
wget https://bootstrap.pypa.io/get-pip.py
python get-pip.py
```

至此，新版 Python 即算安装完毕了。

注意：这可能会导致以前安装过的 Python 程序运行不了或者无法重启之类的（比如著名的 Shadowsocks Python 版）。原因是旧版的 pkg_resources 位于 /usr/lib/python2.6/site-packages 下。而新版的则是在 /usr/local/lib/python2.7/site-packages 下。

所以，也许你需要重新安装一下程序。

再次注意：升级 Python 可能会导致 yum 命令不可用。解决方法如下：

编辑 /usr/bin/yum 文件，将开头第一行的

```
#!/usr/bin/python
```

改为

```
#!/usr/bin/python2.6
```

但是，这种改法，万一哪天你 yum update 了一下，yum 被升级了后，又变回老样子了。

记住旧版本 Python 2.6.6 的重要路径如下所示，在运行 yum 命令的时候，会提示你哪个 module 不存在，不存在的我们就去旧版本的路径下找，一定能找到的。找到后，复制到新版本 Python 的路径 /usr/local/lib/python2.7/site-packages/ 下即可。

/usr/lib/python2.6/site-packages/

/usr/lib64/python2.6/site-packages/

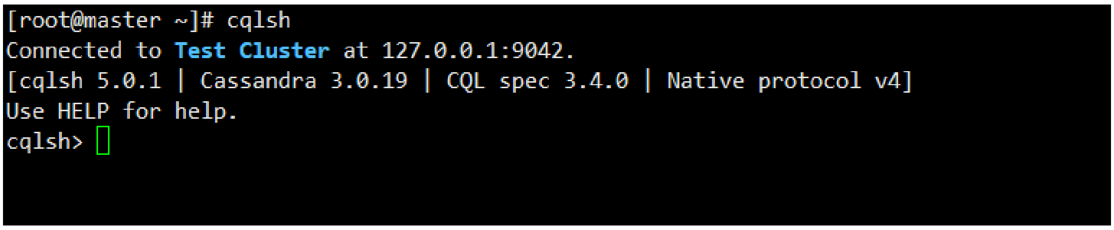
我的复制过程是这样的：

```
cp -r /usr/lib/python2.6/site-packages/yum /usr/local/lib/python2.7/site-packages/
cp -r /usr/lib/python2.6/site-packages/rpmUtils /usr/local/lib/python2.7/site-packages/
cp -r /usr/lib/python2.6/site-packages/iniparse /usr/local/lib/python2.7/site-packages/
cp -r /usr/lib/python2.6/site-packages/urlgrabber /usr/local/lib/python2.7/site-packages/
cp -r /usr/lib64/python2.6/site-packages/rpm /usr/local/lib/python2.7/site-packages/
cp -r /usr/lib64/python2.6/site-packages/curl /usr/local/lib/python2.7/site-packages/
cp -p /usr/lib64/python2.6/site-packages/pycurl.so /usr/local/lib/python2.7/site-packages/
cp -p /usr/lib64/python2.6/site-packages/_sqlitecache.so /usr/local/lib/python2.7/site-packages/
cp -p /usr/lib64/python2.6/site-packages/sqlitecachec.py /usr/local/lib/python2.7/site-packages/
cp -p /usr/lib64/python2.6/site-packages/sqlitecachec.pyc /usr/local/lib/python2.7/site-packages/
cp -p /usr/lib64/python2.6/site-packages/sqlitecachec.pyo /usr/local/lib/python2.7/site-packages/
```

cqlsh 基本用法

进入 shell

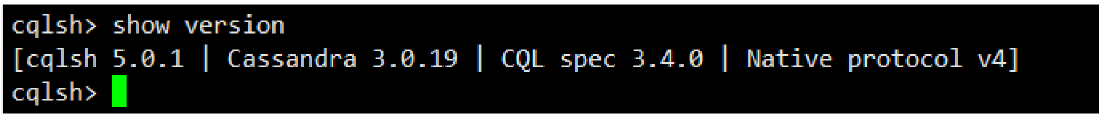
```
cqlsh
```



```
[root@master ~]# cqlsh
Connected to Test Cluster at 127.0.0.1:9042.
[cqlsh 5.0.1 | Cassandra 3.0.19 | CQL spec 3.4.0 | Native protocol v4]
Use HELP for help.
cqlsh> 
```

查看版本信息

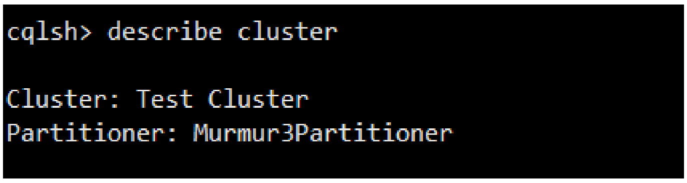
```
show version
```



```
cqlsh> show version
[cqlsh 5.0.1 | Cassandra 3.0.19 | CQL spec 3.4.0 | Native protocol v4]
cqlsh> 
```

描述集群信息

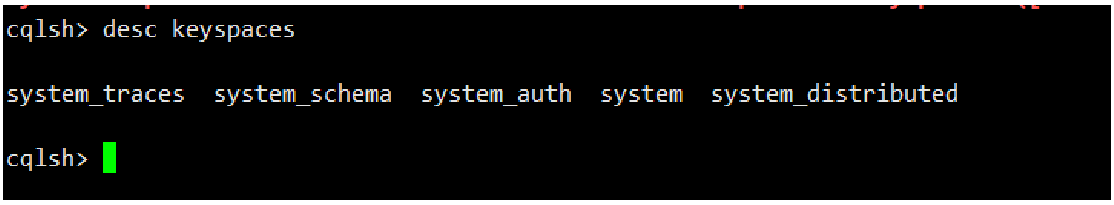
```
describe cluster
```



```
cqlsh> describe cluster

Cluster: Test Cluster
Partitioner: Murmur3Partitioner
```

查看空间列表

```
desc keyspaces
```



```
cqlsh> desc keyspaces

system_traces  system_schema  system_auth  system  system_distributed

cqlsh> 
```

键空间管理

创建键空间

简单复制策略(SimpleStrategy)

```
create keyspace ks1 with replication={'class':'SimpleStrategy','replication_factor':'1'};
```

网络拓扑复制策略(NetworkTopologyStrategy)

```
create keyspace ks1 with replication={'class':'NetworkTopologyStrategy','dc1':3,'dc2':2 } AND
```

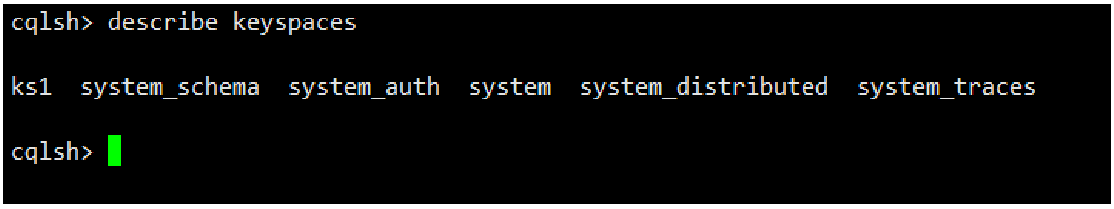
```
DURABLE_WRITES=false;
```

删除键空间

```
drop keyspace ks1
```

查看键空间列表

```
describe keyspaces
```



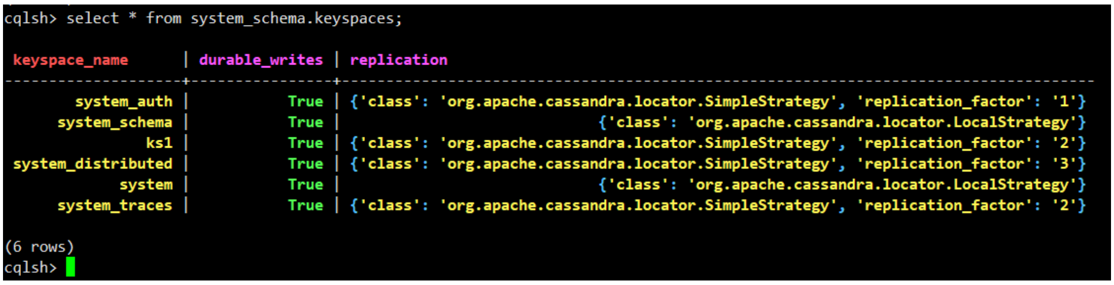
```
cqlsh> describe keyspaces

ks1  system_schema  system_auth  system  system_distributed  system_traces

cqlsh>
```

修改键空间属性

```
alter keyspace ks1 with replication ={'class':'SimpleStrategy','replication_factor':'2'};
```

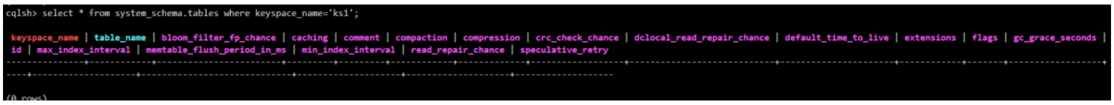
系统键空间

```
select * from system_schema.keyspaces;
```



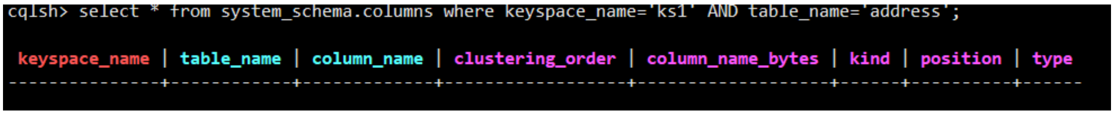
```
cqlsh> select * from system_schema.keyspaces;

 keyspace_name      | durable_writes | replication
--------------------+----------------+-------------------------------------------------------------------------------------
        system_auth |           True | {'class': 'org.apache.cassandra.locator.SimpleStrategy', 'replication_factor': '1'}
      system_schema |           True |                             {'class': 'org.apache.cassandra.locator.LocalStrategy'}
                ks1 |           True | {'class': 'org.apache.cassandra.locator.SimpleStrategy', 'replication_factor': '2'}
 system_distributed |           True | {'class': 'org.apache.cassandra.locator.SimpleStrategy', 'replication_factor': '3'}
             system |           True |                             {'class': 'org.apache.cassandra.locator.LocalStrategy'}
      system_traces |           True | {'class': 'org.apache.cassandra.locator.SimpleStrategy', 'replication_factor': '2'}

(6 rows)
cqlsh>
```

```
select * from system_schema.tables where keyspace_name='ks1';
```



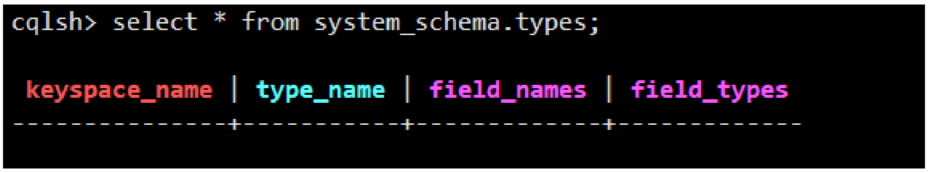
```
cqlsh> select * from system_schema.tables where keyspace_name='ks1';

 keyspace_name | table_name | bloom_filter_fp_chance | caching | comment | compaction | compression | crc_check_chance | dclocal_read_repair_chance | default_time_to_live | extensions | flags | gc_grace_seconds |
 id | max_index_interval | memtable_flush_period_in_ms | min_index_interval | read_repair_chance | speculative_retry
---------------+------------+------------------------+---------+---------+------------+-------------+------------------+----------------------------+----------------------+------------+-------+------------------+
----+--------------------+-----------------------------+--------------------+--------------------+-------------------

(0 rows)
```

```
select * from system_schema.columns where keyspace_name='ks1' AND table_name='address';
```



```
cqlsh> select * from system_schema.columns where keyspace_name='ks1' AND table_name='address';

 keyspace_name | table_name | column_name | clustering_order | column_name_bytes | kind | position | type
---------------+------------+-------------+------------------+-------------------+------+----------+------
```

```
select * from system_schema.types;
```

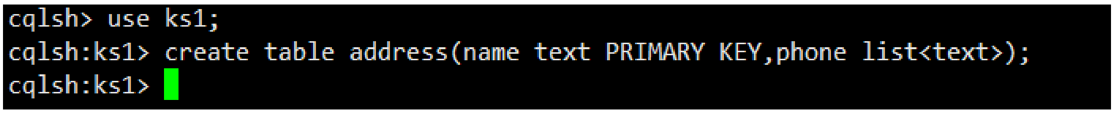


```
cqlsh> select * from system_schema.types;

 keyspace_name | type_name | field_names | field_types
---------------+-----------+-------------+-------------
```

数据表管理

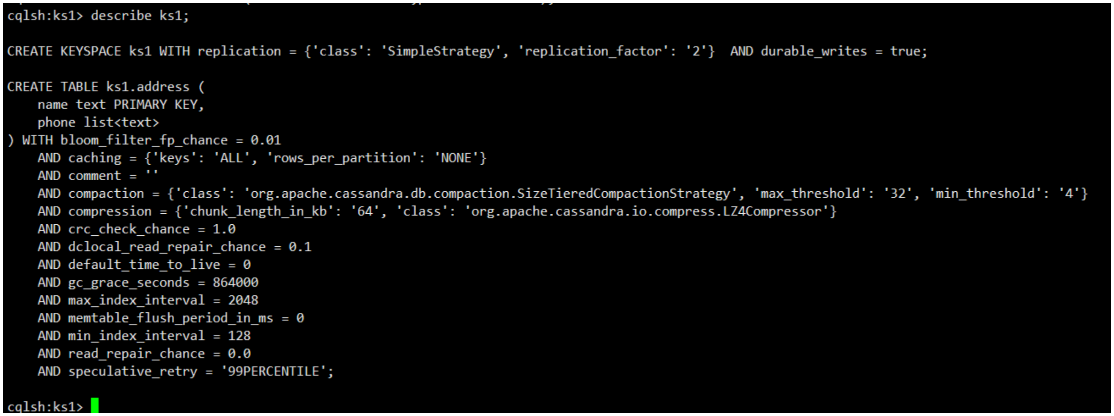
建立数据表

```
create table address(name text PRIMARY KEY,phone list<text>);
```



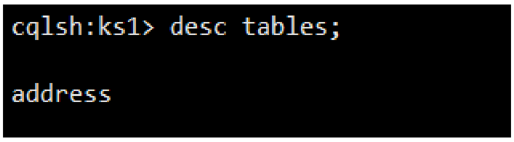
```
cqlsh> use ks1;
cqlsh:ks1> create table address(name text PRIMARY KEY,phone list<text>);
cqlsh:ks1>
```

```
describe ks1;
```



```
cqlsh:ks1> describe ks1;

CREATE KEYSPACE ks1 WITH replication = {'class': 'SimpleStrategy', 'replication_factor': '2'}  AND durable_writes = true;

CREATE TABLE ks1.address (
    name text PRIMARY KEY,
    phone list<text>
) WITH bloom_filter_fp_chance = 0.01
    AND caching = {'keys': 'ALL', 'rows_per_partition': 'NONE'}
    AND comment = ''
    AND compaction = {'class': 'org.apache.cassandra.db.compaction.SizeTieredCompactionStrategy', 'max_threshold': '32', 'min_threshold': '4'}
    AND compression = {'chunk_length_in_kb': '64', 'class': 'org.apache.cassandra.io.compress.LZ4Compressor'}
    AND crc_check_chance = 1.0
    AND dclocal_read_repair_chance = 0.1
    AND default_time_to_live = 0
    AND gc_grace_seconds = 864000
    AND max_index_interval = 2048
    AND memtable_flush_period_in_ms = 0
    AND min_index_interval = 128
    AND read_repair_chance = 0.0
    AND speculative_retry = '99PERCENTILE';

cqlsh:ks1>
```

```
desc tables;
```



```
cqlsh:ks1> desc tables;

address
```

设置复合型主键

```
create table address2(name text,phone list<text> , primary key(name));
```

修改表结构

```
alter table address add age int;
alter table address with bloom_filter_fp_chance=0.01;
```

删除数据并重建表

```
truncate address;
```

用户自定义类型

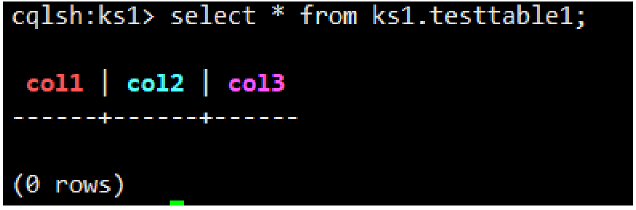
```
create type scores(subject text,score int);
```

```
drop type scores;
```

CQL 数据查询

```
create table ks1.testtable1(
col1 text,
col2 int,
col3 tuple<text,text>,
PRIMARY KEY (col1,col2)
);
```

```
select * from ks1.testtable1;
```

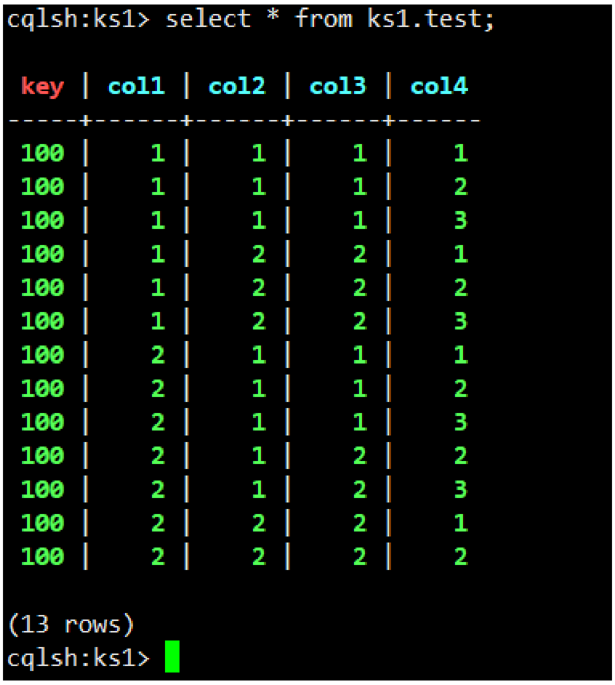


```
cqlsh:ks1> select * from ks1.testtable1;

 col1 | col2 | col3
------+------+------

(0 rows)
```

条件查询

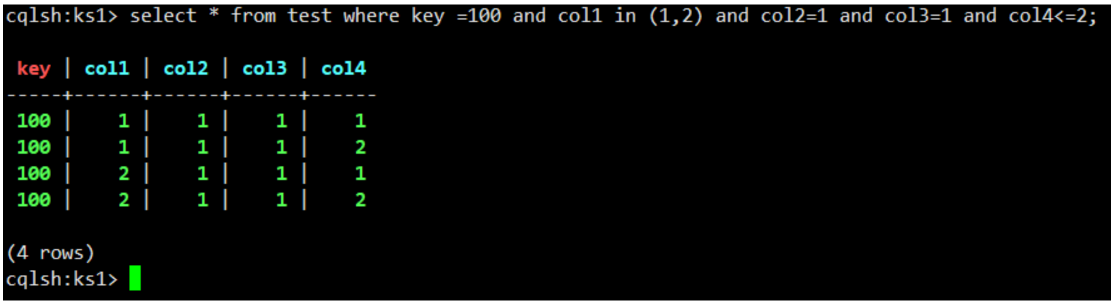
```
create table test(
key int,
col1 int,
col2 int,
col3 int,
col4 int,
primary key((key),col1,col2,col3,col4)
);
```

```
insert into ks1.test(key,col1,col2,col3,col4) values(100,1,1,1,1);
insert into ks1.test(key,col1,col2,col3,col4) values(100,1,1,1,2);
insert into ks1.test(key,col1,col2,col3,col4) values(100,1,1,1,3);
insert into ks1.test(key,col1,col2,col3,col4) values(100,1,2,2,1);
insert into ks1.test(key,col1,col2,col3,col4) values(100,1,2,2,2);
insert into ks1.test(key,col1,col2,col3,col4) values(100,1,2,2,3);
insert into ks1.test(key,col1,col2,col3,col4) values(100,1,2,2,1);
insert into ks1.test(key,col1,col2,col3,col4) values(100,2,1,2,2);
insert into ks1.test(key,col1,col2,col3,col4) values(100,2,1,2,3);
insert into ks1.test(key,col1,col2,col3,col4) values(100,2,1,1,1);
insert into ks1.test(key,col1,col2,col3,col4) values(100,2,1,1,2);
insert into ks1.test(key,col1,col2,col3,col4) values(100,2,1,1,3);
insert into ks1.test(key,col1,col2,col3,col4) values(100,2,2,2,1);
insert into ks1.test(key,col1,col2,col3,col4) values(100,2,2,2,2);
insert into ks1.test(key,col1,col2,col3,col4) values(100,1,2,2,3);
```



```
cqlsh:ks1> select * from ks1.test;

 key | col1 | col2 | col3 | col4
-----+------+------+------+------
 100 |    1 |    1 |    1 |    1
 100 |    1 |    1 |    1 |    2
 100 |    1 |    1 |    1 |    3
 100 |    1 |    2 |    2 |    1
 100 |    1 |    2 |    2 |    2
 100 |    1 |    2 |    2 |    3
 100 |    2 |    1 |    1 |    1
 100 |    2 |    1 |    1 |    2
 100 |    2 |    1 |    1 |    3
 100 |    2 |    1 |    2 |    2
 100 |    2 |    1 |    2 |    3
 100 |    2 |    2 |    2 |    1
 100 |    2 |    2 |    2 |    2

(13 rows)
cqlsh:ks1>
```

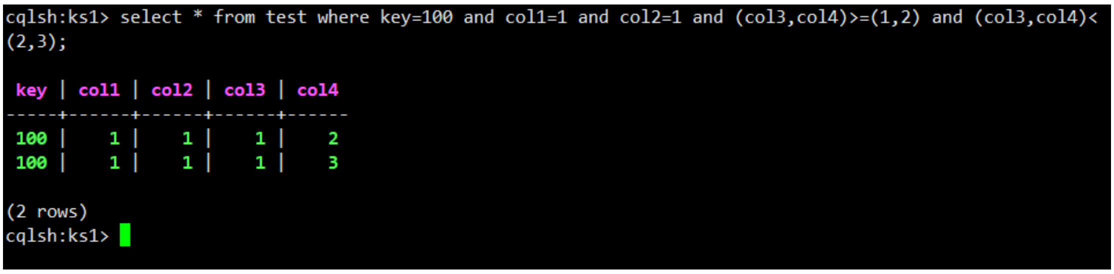
```
select * from test where key =100 and col1 in (1,2) and col2=1 and col3=1 and col4<=2;
```



```
cqlsh:ks1> select * from test where key =100 and col1 in (1,2) and col2=1 and col3=1 and col4<=2;

 key | col1 | col2 | col3 | col4
-----+------+------+------+------
 100 |    1 |    1 |    1 |    1
 100 |    1 |    1 |    1 |    2
 100 |    2 |    1 |    1 |    1
 100 |    2 |    1 |    1 |    2

(4 rows)
cqlsh:ks1>
```

切片查询

```
select * from test where key=100 and col1=1 and col2=1 and (col3,col4)>=(1,2) and (col3,col4)<(2,3);
```



```
cqlsh:ks1> select * from test where key=100 and col1=1 and col2=1 and (col3,col4)>=(1,2) and (col3,col4)<
(2,3);

 key | col1 | col2 | col3 | col4
-----+------+------+------+------
 100 |    1 |    1 |    1 |    2
 100 |    1 |    1 |    1 |    3

(2 rows)
cqlsh:ks1>
```

索引机制

建立索引

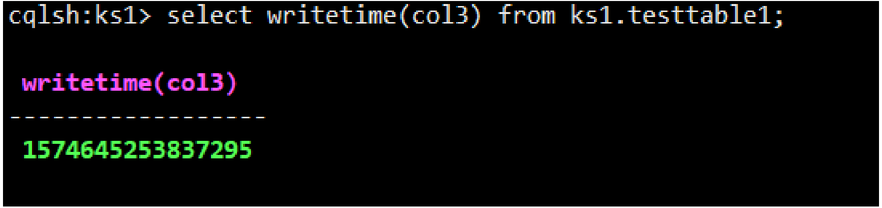
```
create index indexofaddress on address(age) ;
```

删除索引

```
drop index indexofaddress;
```

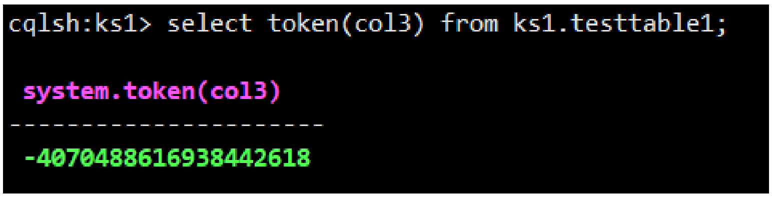
使用标量函数

```
select writetime(col3) from ks1.testtable1;
```



```
cqlsh:ks1> select writetime(col3) from ks1.testtable1;

 writetime(col3)
------------------
 1574645253837295
```

```
select token(col3) from ks1.testtable1;
```



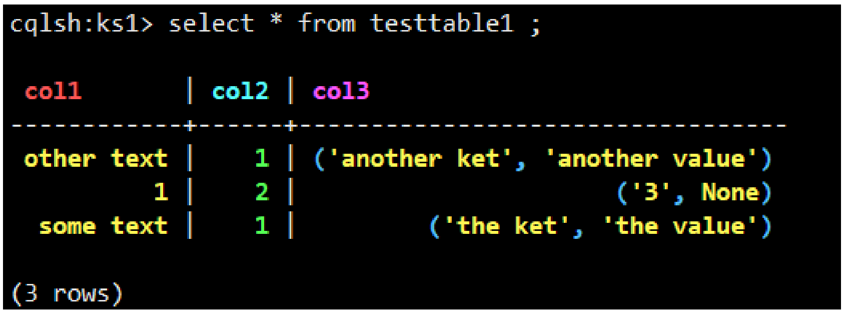
```
cqlsh:ks1> select token(col3) from ks1.testtable1;

 system.token(col3)
----------------------
 -4070488616938442618
```

数据更新

插入更新删除

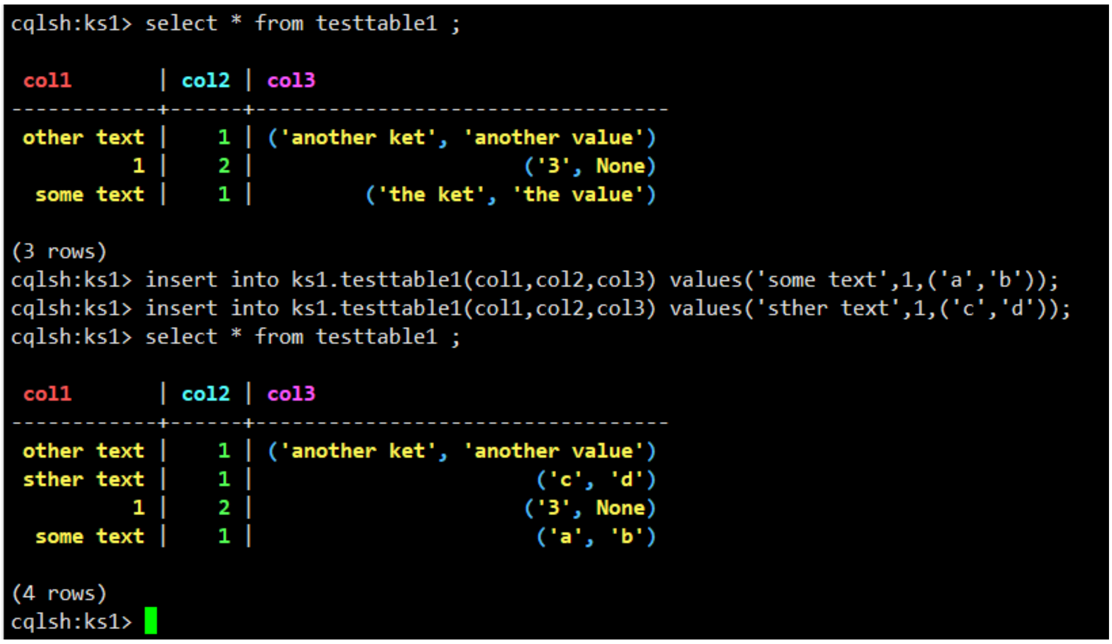
数据插入

```
insert into ks1.testtable1(col1,col2,col3) values('some text',1,('the ket','the value'));
insert into ks1.testtable1(col1,col2,col3) values('other text',1,('another ket','another value'));
```



```
cqlsh:ks1> select * from testtable1 ;

 col1       | col2 | col3
------------+------+-----------------------------------
 other text |    1 | ('another ket', 'another value')
          1 |    2 |                       ('3', None)
  some text |    1 |           ('the ket', 'the value')

(3 rows)
```

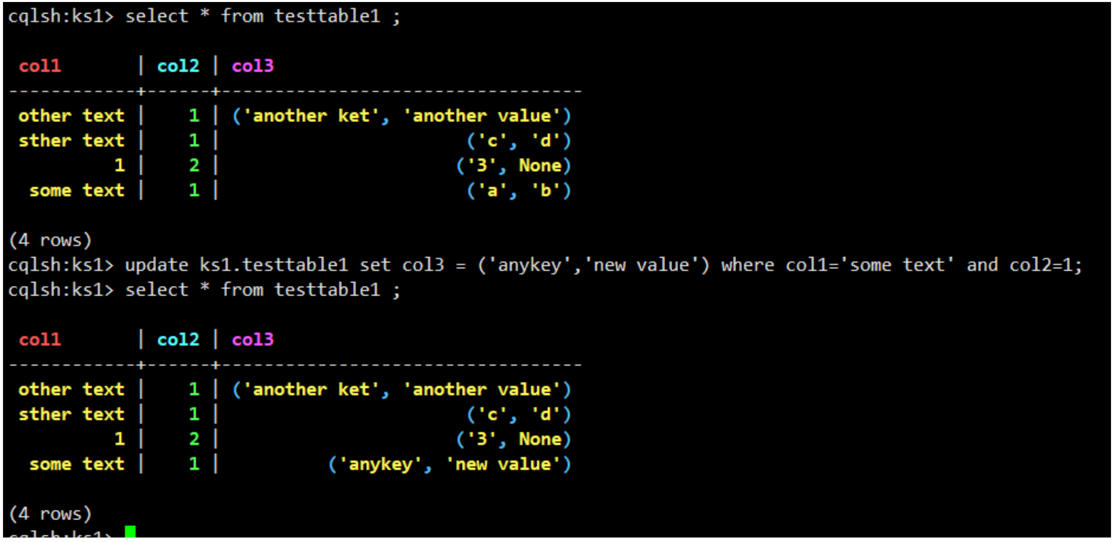
```
insert into ks1.testtable1(col1,col2,col3) values('some text',1,('a','b'));

insert into ks1.testtable1(col1,col2,col3) values('sther text',1,('c','d'));
```



```
cqlsh:ks1> select * from testtable1 ;

 col1       | col2 | col3
------------+------+-----------------------------------
 other text |    1 | ('another ket', 'another value')
          1 |    2 |                       ('3', None)
  some text |    1 |           ('the ket', 'the value')

(3 rows)
cqlsh:ks1> insert into ks1.testtable1(col1,col2,col3) values('some text',1,('a','b'));
cqlsh:ks1> insert into ks1.testtable1(col1,col2,col3) values('sther text',1,('c','d'));
cqlsh:ks1> select * from testtable1 ;

 col1       | col2 | col3
------------+------+-----------------------------------
 other text |    1 | ('another ket', 'another value')
 sther text |    1 |                        ('c', 'd')
          1 |    2 |                       ('3', None)
  some text |    1 |                        ('a', 'b')

(4 rows)
cqlsh:ks1>
```

数据更新

```
update ks1.testtable1 set col3 = ('anykey','new value') where col1='some text' and col2=1;
```



```
cqlsh:ks1> select * from testtable1 ;

 col1       | col2 | col3
------------+------+--------------------------------
 other text |    1 | ('another ket', 'another value')
 sther text |    1 |                       ('c', 'd')
          1 |    2 |                    ('3', None)
  some text |    1 |                       ('a', 'b')

(4 rows)
cqlsh:ks1> update ks1.testtable1 set col3 = ('anykey','new value') where col1='some text' and col2=1;
cqlsh:ks1> select * from testtable1 ;

 col1       | col2 | col3
------------+------+--------------------------------
 other text |    1 | ('another ket', 'another value')
 sther text |    1 |                       ('c', 'd')
          1 |    2 |                    ('3', None)
  some text |    1 |           ('anykey', 'new value')

(4 rows)
cqlsh:ks1>
```

数据删除

```
DELETE col3 FROM ks1.testtable1 WHERE col1='some test'and col2=1;
DELETE from ks1.testtable1 where col1='other text' and col2=10;
```

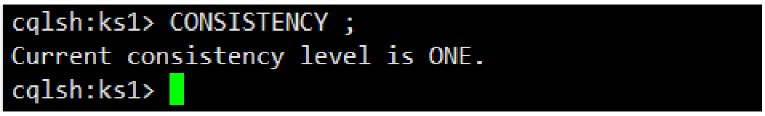
json 格式插入数据

```
insert into ks1.testtable1 JSON '{"col1":"json test","col2":1000}';
```

读写一致性

查看一致性设置

```
CONSISTENCY ;
```



```
cqlsh:ks1> CONSISTENCY ;
Current consistency level is ONE.
cqlsh:ks1>
```

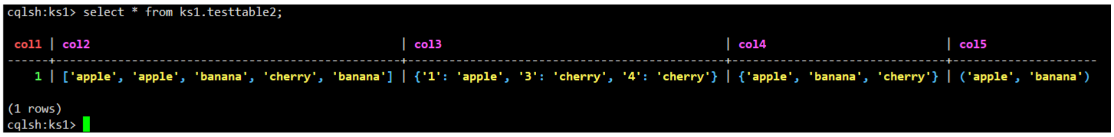
if 轻量级事物

```
insert into ks1.testtable1(col1,col2,col3) values('some test',1,('another key','another value')) if not exists;
```

集合列操作

```
create table testtable2(
col1 int PRIMARY KEY,
col2 list<text>,
col3 map<text,text>,
col4 set<text>,
col5 frozen<tuple<text,text>>
);
```

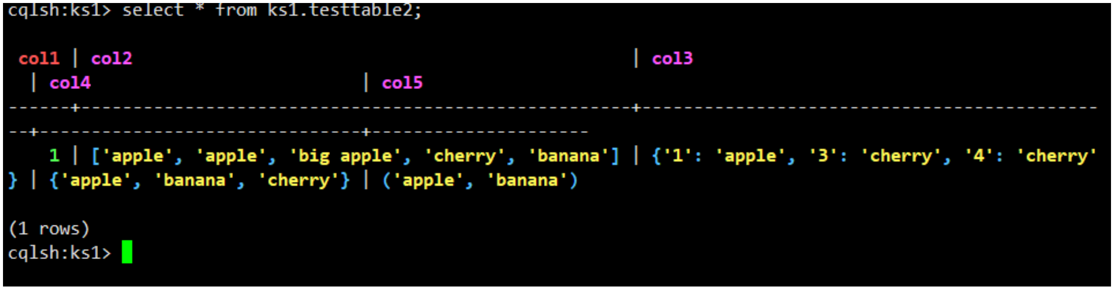
```
INSERT INTO ks1.testtable2(col1,col2,col3,col4,col5) VALUES (1,['apple','apple','banana','cherry','banana'],{'1':'apple','1':'banana','3':'cherry','4':'cherry'},{'apple','banana','cherry','apple'},('apple','banana'));
```



```
cqlsh:ks1> select * from ks1.testtable2;

 col1 | col2                                              | col3                                        | col4                           | col5
------+---------------------------------------------------+---------------------------------------------+--------------------------------+--------------------
    1 | ['apple', 'apple', 'banana', 'cherry', 'banana'] | {'1': 'apple', '3': 'cherry', '4': 'cherry'} | {'apple', 'banana', 'cherry'} | ('apple', 'banana')

(1 rows)
cqlsh:ks1>
```

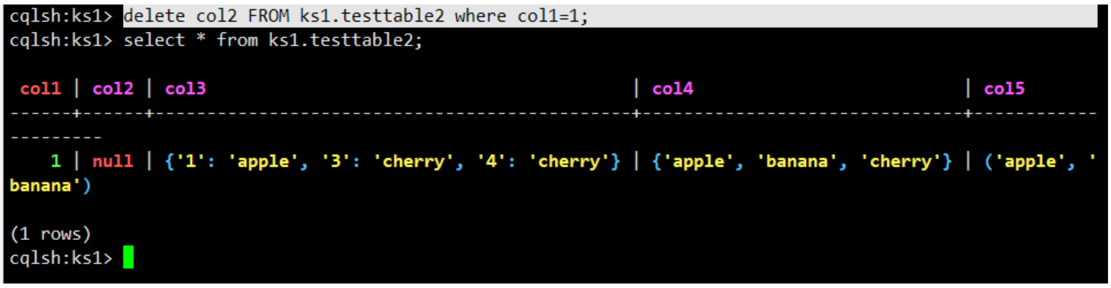
list 类型更新删除

```
update ks1.testtable2 set col2[2] = 'big apple' where col1 = 1 ;
```



```
cqlsh:ks1> select * from ks1.testtable2;

 col1 | col2                                                  | col3
  | col4                          | col5
------+-------------------------------------------------------+---------------------------------------------
--+-------------------------------+---------------------
    1 | ['apple', 'apple', 'big apple', 'cherry', 'banana'] | {'1': 'apple', '3': 'cherry', '4': 'cherry'
} | {'apple', 'banana', 'cherry'} | ('apple', 'banana')

(1 rows)
cqlsh:ks1>
```

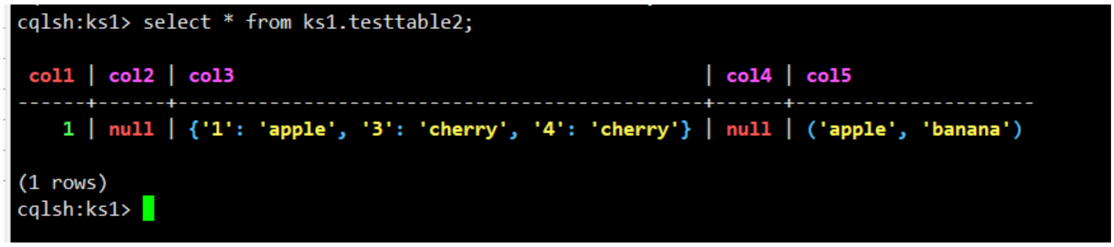
```
delete col2[2] from ks1.testtable2 WHERE col1 =1;
delete col2 FROM ks1.testtable2 where col1=1;
```



```
cqlsh:ks1> delete col2 FROM ks1.testtable2 where col1=1;
cqlsh:ks1> select * from ks1.testtable2;

 col1 | col2 | col3                                          | col4                            | col5
------+------+-----------------------------------------------+---------------------------------+-----------
---------
    1 | null | {'1': 'apple', '3': 'cherry', '4': 'cherry'} | {'apple', 'banana', 'cherry'} | ('apple', '
banana')

(1 rows)
cqlsh:ks1>
```

set 类型更新和删除

```
UPDATE ks1.testtable2 set col4=col4+{'big apple','small apple'} where col1=1;
DELETE col4 FROM ks1.testtable2 WHERE col1=1;
```

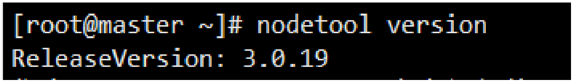


```
cqlsh:ks1> select * from ks1.testtable2;

 col1 | col2 | col3                                         | col4 | col5
------+------+----------------------------------------------+------+----------------------
    1 | null | {'1': 'apple', '3': 'cherry', '4': 'cherry'} | null | ('apple', 'banana')

(1 rows)
cqlsh:ks1>
```

nodetool 工具

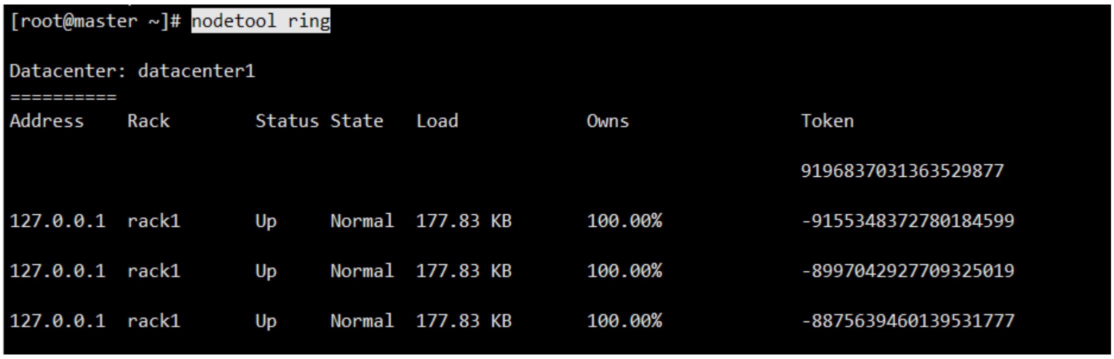
查看集群状态

```
nodetool version
```



```
[root@master ~]# nodetool version
ReleaseVersion: 3.0.19
```

```
nodetool ring
```



```
[root@master ~]# nodetool ring

Datacenter: datacenter1
==========
Address     Rack        Status State   Load            Owns                Token
                                                                           9196837031363529877
127.0.0.1   rack1       Up     Normal  177.83 KB       100.00%             -9155348372780184599
127.0.0.1   rack1       Up     Normal  177.83 KB       100.00%             -8997042927709325019
127.0.0.1   rack1       Up     Normal  177.83 KB       100.00%             -8875639460139531777
```

查看 compation 信息

```
nodetool compactionstats
```

JAVA 访问 Cassandra

修改 pom.xml

```
        <!--
https://mvnrepository.com/artifact/com.datastax.cassandra/cassandra-
```

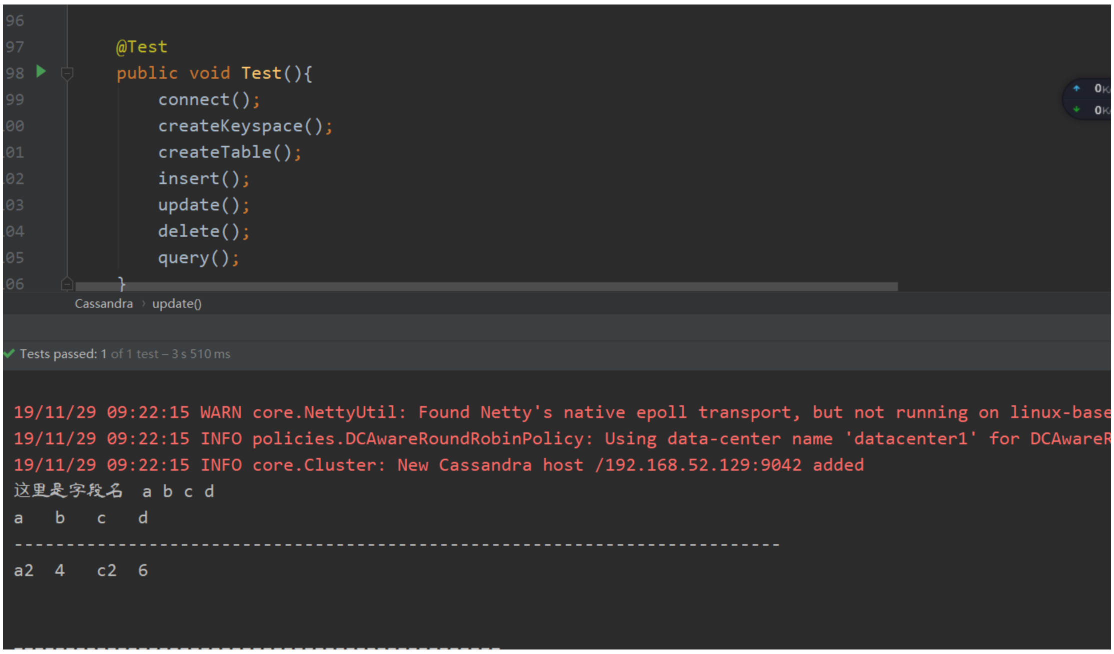
```
driver-core -->
        <dependency>
            <groupId>com.datastax.cassandra</groupId>
            <artifactId>cassandra-driver-core</artifactId>
            <version>3.7.2</version>
        </dependency>
```

```
package cassandra;
import com.datastax.driver.core.Cluster;
import com.datastax.driver.core.ColumnDefinitions.Definition;
import com.datastax.driver.core.ResultSet;
import com.datastax.driver.core.Row;
import com.datastax.driver.core.Session;
import org.testng.annotations.Test;

public class Cassandra {
    public Cluster cluster;

    public Session session;

    public void connect(){
        Cluster        culster=Cluster.builder().withClusterName("Test
Cluster").addContactPoint("192.168.52.129").build();
        session=culster.connect();
    }

    /**
     * 创建键空间
     */
    public void createKeyspace()
    {
        /**单数据中心 复制策略 : 1**/
        String cql = "CREATE KEYSPACE if not exists mydb WITH
replication = {'class': 'SimpleStrategy', 'replication_factor': '1'}";
        session.execute(cql);
    }

    /**
```

```
     * 创建表
     */
    public void createTable()
    {
        /** a,b 为复合主键 a：分区键，b：集群键**/
        String cql = "CREATE TABLE if not exists mydb.test (a text,b int,c text,d int,PRIMARY KEY (a, b))";
        session.execute(cql);
    }
    /**
     * 插入
     */
    public void insert()
    {
        String cql = "INSERT INTO mydb.test (a , b , c , d ) VALUES ( 'a2',4,'c2',6);";
        session.execute(cql);
    }

    /**
     * 修改
     */
    public void update()
    {
        // a,b 是复合主键 所以条件都要带上，少一个都会报错，而且 update 不能修改主键的值，这应该和 cassandra 的存储方式有关
        String cql = "UPDATE mydb.test SET d = 1234 WHERE a='aa' and b=2;";
        // 也可以这样 cassandra 插入的数据如果主键已经存在，其实就是更新操作
        String cql2 = "INSERT INTO mydb.test (a,b,d) VALUES ( 'aa',2,1234);";
        // cql 和 cql2 的执行效果其实是一样的
        session.execute(cql);
    }

    /**
     * 删除
```

```
      */
     public void delete()
     {
          // 删除一条记录里的单个字段 只能删除非主键，且要带上主
键条件
          String cql = "DELETE d FROM mydb.test WHERE a='aa' AND
b=2;";
          // 删除一张表里的一条或多条记录 条件里必须带上分区键
          String cql2 = "DELETE FROM mydb.test WHERE a='aa';";
          session.execute(cql);
          session.execute(cql2);
     }

     /**
      * 查询
      */
     public void query()
     {
          String cql = "SELECT * FROM mydb.test;";
          String cql2 = "SELECT a,b,c,d FROM mydb.test;";

          ResultSet resultSet = session.execute(cql);
          System.out.print("这里是字段名：");
          for (Definition definition : resultSet.getColumnDefinitions())
          {
               System.out.print(definition.getName() + " ");
          }
          System.out.println();
          System.out.println(String.format("%s\t%s\t%s\t%s\t\n%s",
"a", "b", "c", "d",
                    "-------------------------------------------------------
--------------------"));
          for (Row row : resultSet)
          {
               System.out.println(String.format("%s\t%d\t%s\t%d\t",
row.getString("a"), row.getInt("b"),
                         row.getString("c"), row.getInt("d")));
          }
```

```
    }

    @Test
    public void Test(){
        connect();
        createKeyspace();
        createTable();
        insert();
        update();
        delete();
        query();
    }
}
```

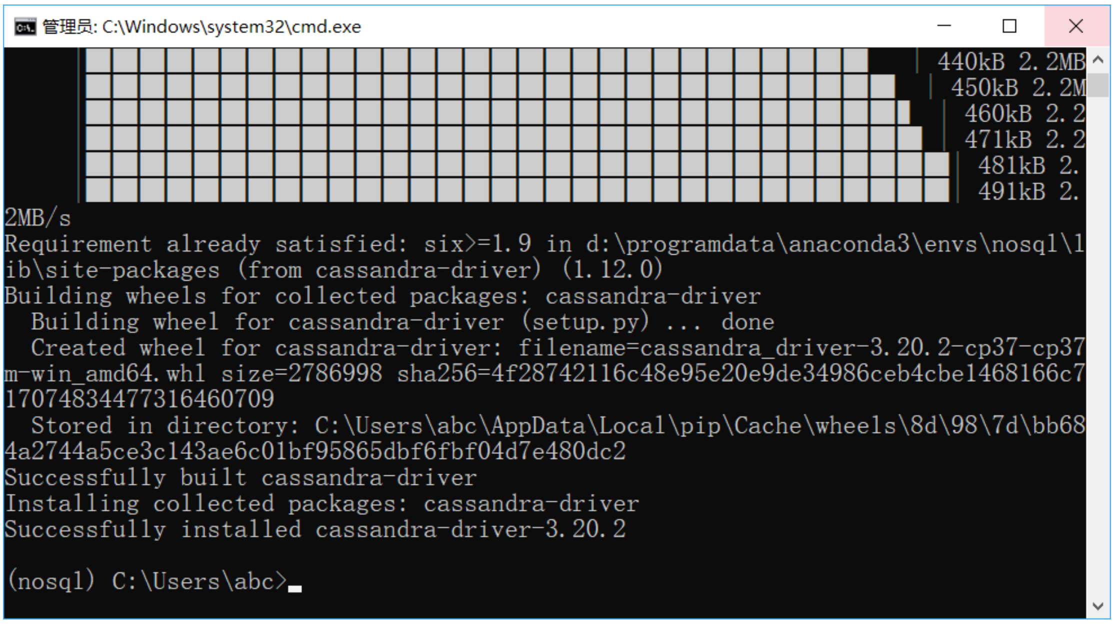


```
    @Test
    public void Test(){
        connect();
        createKeyspace();
        createTable();
        insert();
        update();
        delete();
        query();
    }
```

```
Tests passed: 1 of 1 test – 3 s 510 ms

19/11/29 09:22:15 WARN core.NettyUtil: Found Netty's native epoll transport, but not running on linux-base
19/11/29 09:22:15 INFO policies.DCAwareRoundRobinPolicy: Using data-center name 'datacenter1' for DCAwareR
19/11/29 09:22:15 INFO core.Cluster: New Cassandra host /192.168.52.129:9042 added
这里是字段名  a b c d
a   b   c   d
---------------------------------------------------------------------------
a2  4   c2  6
```

Python 访问 Cassandra

```
pip install cassandra-driver
```

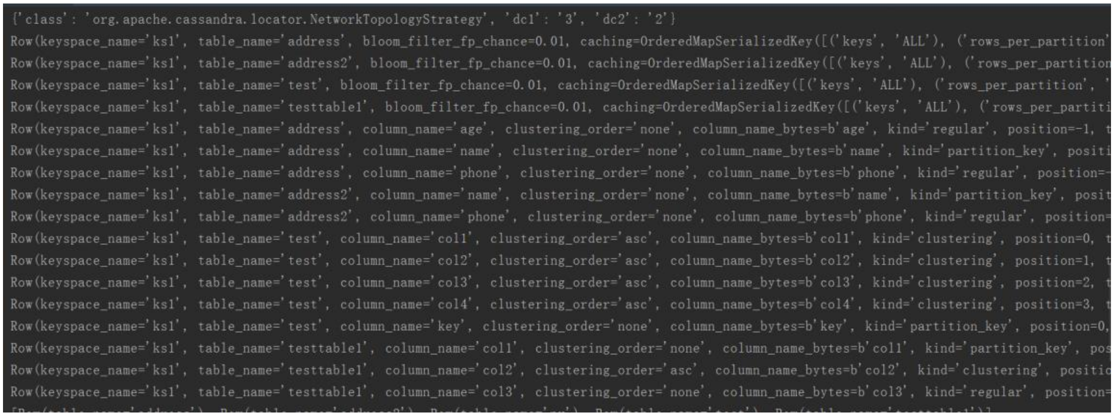


```
     |█████████████████████████████▏  | 440kB 2.2MB
     |█████████████████████████████▊  | 450kB 2.2M
     |██████████████████████████████▍ | 460kB 2.2
     |███████████████████████████████ | 471kB 2.2
     |███████████████████████████████▋| 481kB 2.
     |████████████████████████████████| 491kB 2.
2MB/s
Requirement already satisfied: six>=1.9 in d:\programdata\anaconda3\envs\nosql\l
ib\site-packages (from cassandra-driver) (1.12.0)
Building wheels for collected packages: cassandra-driver
  Building wheel for cassandra-driver (setup.py) ... done
  Created wheel for cassandra-driver: filename=cassandra_driver-3.20.2-cp37-cp37
m-win_amd64.whl size=2786998 sha256=4f28742116c48e95e20e9de34986ceb4cbe1468166c7
17074834477316460709
  Stored in directory: C:\Users\abc\AppData\Local\pip\Cache\wheels\8d\98\7d\bb68
4a2744a5ce3c143ae6c01bf95865dbf6fbf04d7e480dc2
Successfully built cassandra-driver
Installing collected packages: cassandra-driver
Successfully installed cassandra-driver-3.20.2

(nosql) C:\Users\abc>
```

```
# encoding=UTF-8
from cassandra.cluster import Cluster
cluster = Cluster(['192.168.52.129'])
cluster.port=9042
session = cluster.connect()#创建连接
session_keyspace = cluster.connect("ks1") #直接连接 keyspace
'''
对 Cassandra 进行操作
'''
#1. 创建键空间
#1.1 使用 SimpleStrategy 策略创建键空间
'''
简单复制策略是指在一个数据中心的情况下使用简单的策略.该策略中,第一个副本被放置在所选择的节点上,剩下的节点采用 Dynamo 论文中的副本策略,不考虑机架位置
'''
#'replication':n 用于指示副本数量
#session.execute("create keyspace test with replication={'class':'SimpleStrategy','replication_factor':'1'};")

#1.2 网络拓补复制策略,在该策略下,数据副本采用二级机架感知策略
#Durable_writes 默认为 true,表示数据再写入时,先持久化在预写日志中,便于故障恢复.再网络拓补复制策略下,该选项可设置为 false,但有数据丢失的风险
```

```
#session.execute("create keyspace ks3 with
replication={'class':'NetworkTopologyStrategy','dc1':3,'dc2':2} and
durable_writes=false;")

#1.4 查看键空间列表
#在 cqlsh 里可使用 describe spaces;查询键空间列表,但 execute 不支持
describe 命令
print(cluster.metadata.keyspaces)
print("\n")
# 因为 cassandra 为键值对的存储方式,所以,可使用类似显示字典内容的
方式输出键空间
for k,v in cluster.metadata.keyspaces.items():
    print(k,v)
#1.5 修改键空间属性
session.execute("alter keyspace ks1 with
replication={'class':'SimpleStrategy','replication_factor':2}")
#1.7 系统键空间
'''
    system_schema 表中存储当前所有的键空间和数据表的局部信息
(schema 信息)
'''
result_keySpace=session.execute("select * from
system_schema.keyspaces;")
for i in result_keySpace:
    print(i)
    for j in i:
        print(j)
'''
所有数据表的信息存储于系统表 system_shema.tables 中
'''
result_ks1_tables=session.execute("select * from system_schema.tables
where keyspace_name = 'ks1';")
for i in result_ks1_tables:
    print(i)
'''
所有数据表的列信息存储于 system_schema.columns 中
'''
result_ks1_columns=session.execute("select * from
system_schema.columns where keyspace_name = 'ks1';")
for i in result_ks1_columns:
    print(i)
'''
所有用户自定义数据类型都存储在 system_schema.types 中
'''
result_ks1_udf = session.execute("select * from system_schema.types")
for i in result_ks1_udf:
    print(i)



'''
创建表,在此之前需要保证是先使用目标键空间
'''
session.execute("use ks1;")
#2.1 建表操作
# session.execute("create table py(name text primary key,phone
list<text>);")
print([i for i in session.execute("select table_name from
system_schema.tables where keyspace_name='ks1';")])

# 几种特殊的数据类型：Map（键值对）、Set、list、Frozen（非具体类型，
强调对被 frozen 限制的整体的操作，例如:frozen<tuple<text,text>>）

#2.2 删除表
session.execute("drop table address;")
#2.3 设置复合型主键
'''
可直接在单一主键后加 primary key，也可单独设置。
默认情况下，复合型主键的第一个主键为分区键(列)，其他为分簇键(列)
分簇列可单独设定升序(ASC)与降序(DESC)
'''
session.execute("create table address(firstname text,lastname text,No
int,phone list<text>,primary key((firstname,lastname),No)) with clustering
order by(No DESC);")

#2.4 修改表结构
'''
```

```
alter 仅支持 add drop rename 操作
'''
session.execute("alter table address add age int;")
print([i for i in session.execute("select column_name,type from system_schema.columns where keyspace_name='ks1' and table_name='address';")])
session.execute("alter table address drop age;")
print([i for i in session.execute("select column_name,type from system_schema.columns where keyspace_name='ks1' and table_name='address';")])



#间接查询，注意：若未设置索引，查询需添加 ALLOW FILTER 子句作为条件(性能无法预测)
print([i for i in session.execute("select * from system_schema.tables where table_name='stu' allow filtering;")])

cluster.shutdown()#关闭连接
```



```
{'class': 'org.apache.cassandra.locator.NetworkTopologyStrategy', 'dc1': '3', 'dc2': '2'}
Row(keyspace_name='ks1', table_name='address', bloom_filter_fp_chance=0.01, caching=OrderedMapSerializedKey([('keys', 'ALL'), ('rows_per_partition'
Row(keyspace_name='ks1', table_name='address2', bloom_filter_fp_chance=0.01, caching=OrderedMapSerializedKey([('keys', 'ALL'), ('rows_per_partition
Row(keyspace_name='ks1', table_name='test', bloom_filter_fp_chance=0.01, caching=OrderedMapSerializedKey([('keys', 'ALL'), ('rows_per_partition', '
Row(keyspace_name='ks1', table_name='testtable1', bloom_filter_fp_chance=0.01, caching=OrderedMapSerializedKey([('keys', 'ALL'), ('rows_per_partiti
Row(keyspace_name='ks1', table_name='address', column_name='age', clustering_order='none', column_name_bytes=b'age', kind='regular', position=-1, t
Row(keyspace_name='ks1', table_name='address', column_name='name', clustering_order='none', column_name_bytes=b'name', kind='partition_key', positi
Row(keyspace_name='ks1', table_name='address', column_name='phone', clustering_order='none', column_name_bytes=b'phone', kind='regular', position=-
Row(keyspace_name='ks1', table_name='address2', column_name='name', clustering_order='none', column_name_bytes=b'name', kind='partition_key', posit
Row(keyspace_name='ks1', table_name='address2', column_name='phone', clustering_order='none', column_name_bytes=b'phone', kind='regular', position=
Row(keyspace_name='ks1', table_name='test', column_name='col1', clustering_order='asc', column_name_bytes=b'col1', kind='clustering', position=0, t
Row(keyspace_name='ks1', table_name='test', column_name='col2', clustering_order='asc', column_name_bytes=b'col2', kind='clustering', position=1, t
Row(keyspace_name='ks1', table_name='test', column_name='col3', clustering_order='asc', column_name_bytes=b'col3', kind='clustering', position=2, t
Row(keyspace_name='ks1', table_name='test', column_name='col4', clustering_order='asc', column_name_bytes=b'col4', kind='clustering', position=3, t
Row(keyspace_name='ks1', table_name='test', column_name='key', clustering_order='none', column_name_bytes=b'key', kind='partition_key', position=0,
Row(keyspace_name='ks1', table_name='testtable1', column_name='col1', clustering_order='none', column_name_bytes=b'col1', kind='partition_key', pos
Row(keyspace_name='ks1', table_name='testtable1', column_name='col2', clustering_order='asc', column_name_bytes=b'col2', kind='clustering', positic
Row(keyspace_name='ks1', table_name='testtable1', column_name='col3', clustering_order='none', column_name_bytes=b'col3', kind='regular', position=
```