

## 1. Set up 3 nodes in AWS

The screenshot shows the AWS EC2 Dashboard with the 'Instances' section selected. A search bar at the top is set to 'Filter by tags and attributes or search by keyword'. Below it is a table with columns: Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, Public DNS (IPv4), and IPv4. Three instances are listed:

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4
Node3	i-03267893b0f63cc9b	t2.micro	us-east-2c	stopped	None	None	-	-
Node1	i-0d8440879921adfa6	t2.micro	us-east-2c	stopped	None	None	-	-
Node2	i-0fdbda4e836f05feb	t2.micro	us-east-2c	stopped	None	None	-	-

Below the table, a specific instance is selected: **Instance: i-0fdbda4e836f05feb (Node2)**. The private IP is 172.31.36.200. The details panel shows:

- Instance ID: i-0fdbda4e836f05feb
- Instance state: stopped
- Instance type: t2.micro
- Elastic IPs: (dotted)
- Public DNS (IPv4): -
- IPv4 Public IP: -
- IPv6 IPs: -
- Private DNS: ip-172-31-36-200.us-east-2.compute.internal

The bottom of the screen shows the Windows taskbar with several open windows and the system tray indicating the date and time.

## 2. Access these instances (nodes) through SSH

The screenshot shows two windows side-by-side. On the left is a terminal window titled 'ubuntu@ip-172-31-37-117: ~' running on MobaXterm. The terminal session is connected to the 'Node1' instance. The user has run several commands, including:

```

Warning: Permanently added 'ec2-13-58-44-208.us-east-2.compute.amazonaws.com' (RSA)
Welcome to Ubuntu 16.04.4 LTS (GNU/Linux 4.4.0-1052-aws x86_64)

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

 Get cloud support with Ubuntu Advantage Cloud Guest:
 http://www.ubuntu.com/business/services/cloud

31 packages can be updated.
5 updates are security updates.

Last login: Sun Apr 1 03:04:10 2018 from 67.164.3.12
ubuntu@ip-172-31-37-117:~$ ls
ubuntu@ip-172-31-37-117:~$ sudo mkdir -p /db/config/data
ubuntu@ip-172-31-37-117:~$ ifconfig
eth0    Link encap:Ethernet HWaddr 0a:40:a6:be:b7:f6
        inet addr:172.31.37.117 Bcast:172.31.47.255 Mask:255.255.240.0
        inet6 addr: ::1/128 Scope:Host
          UP BROADCAST RUNNING MULTICAST MTU:65536 Metric:1
        RX packets:7423 errors:0 dropped:0 overruns:0 frame:0
        TX packets:7423 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:10201714 (10.2 MB)  TX bytes:81149 (81.1 KB)

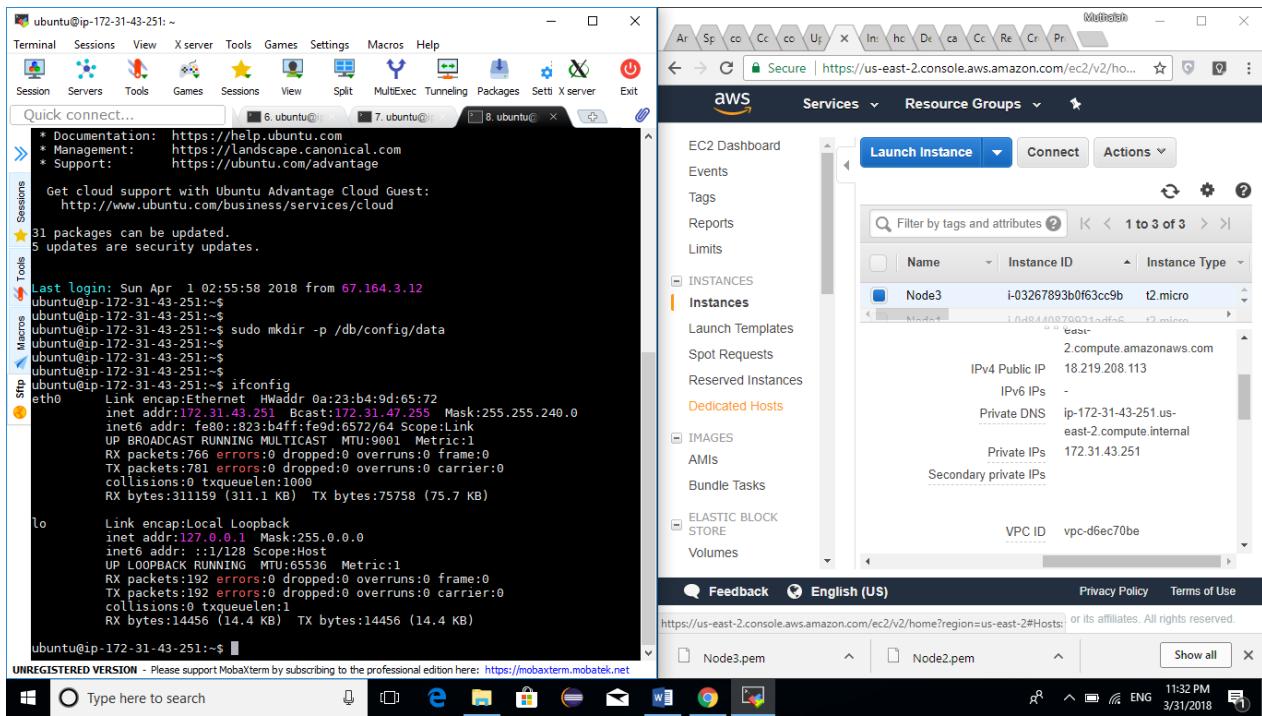
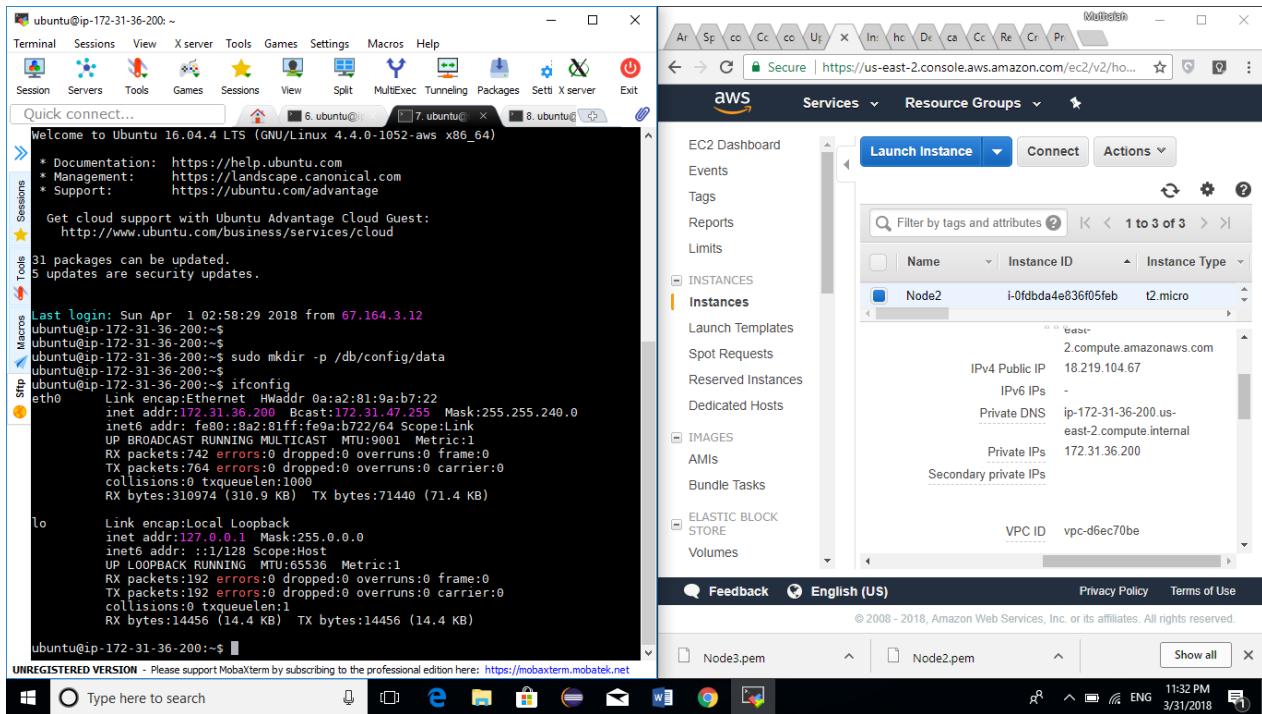
lo     Link encap:Local Loopback
        inet addr:127.0.0.1 Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING MTU:65536 Metric:1
        RX packets:192 errors:0 dropped:0 overruns:0 frame:0
        TX packets:192 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1
        RX bytes:14456 (14.4 KB)  TX bytes:14456 (14.4 KB)
ubuntu@ip-172-31-37-117:~$ 

```

On the right is the AWS EC2 Dashboard 'Instances' page, which shows the same three stopped instances: Node3, Node1, and Node2. The instance details for Node1 are visible:

- Instance ID: i-0d8440879921adfa6
- Instance type: t2.micro
- Availability Zone: us-east-2
- IPv4 Public IP: 13.58.44.208
- IPv6 IPs: -
- Private DNS: ip-172-31-37-117.us-east-2.compute.internal
- Private IPs: 172.31.37.117
- Secondary private IPs: -
- VPC ID: vpc-d6ec70be

The bottom of the screen shows the Windows taskbar with several open windows and the system tray indicating the date and time.



3. Install MongoDB in each node (i.e. instance) The following commands were executed on all 3 instances. [Did not take screen grabs for installation. But included commands. The same IPs where I installed Mongo are used in all the below screen shots below]

```
sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv
2930ADAE8CAF5059EE73BB4B58712A2291FA4AD5
```

```
echo "deb [ arch=amd64,arm64 ] https://repo.mongodb.org/apt/ubuntu xenial/mongodb-org/3.6
multiverse" | sudo tee /etc/apt/sources.list.d/mongodb-org-3.6.list
```

sudo apt-get update

sudo apt-get install -y mongodb-org

4. Create a directory to store database in each node

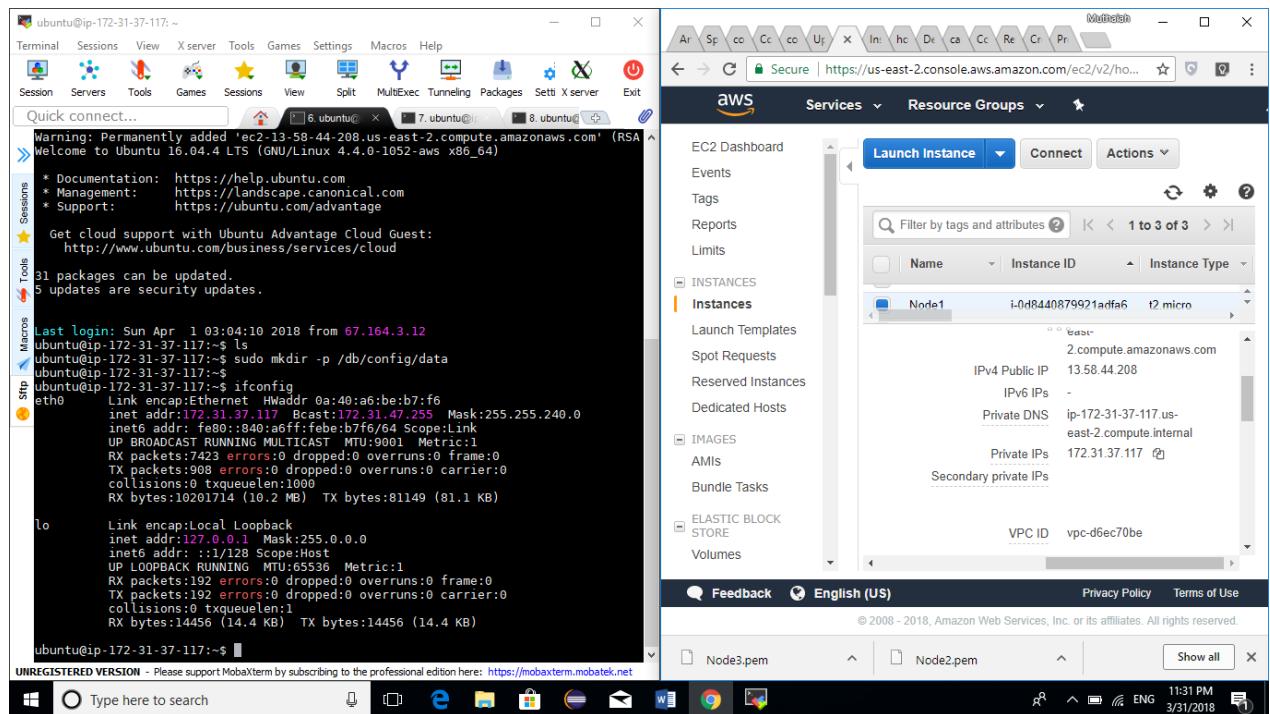
Executed the following command on all 3 instances

Sudo mkdir -p /db/config/data

5. Specify Public and Private IP Addresses of three AWS instances used in your solution

Public IP changes every time.

Node1:



## Node 2:

The screenshot shows a MobaXterm window with three sessions open. Session 6 is connected to an Ubuntu 16.04.4 LTS terminal, displaying system information and a command-line interface. Session 7 is connected to another Ubuntu terminal, and Session 8 is connected to a third Ubuntu terminal. To the right of the terminal windows is the AWS EC2 Dashboard, showing the instance named 'Node2'. The instance details include its ID (i-0fdbda4e836f05feb), type (t2.micro), and various network and VPC configurations.

## Node 3:

The screenshot shows a MobaXterm window with three sessions open. Session 6 is connected to an Ubuntu 16.04.4 LTS terminal, displaying system information and a command-line interface. Session 7 is connected to another Ubuntu terminal, and Session 8 is connected to a third Ubuntu terminal. To the right of the terminal windows is the AWS EC2 Dashboard, showing the instance named 'Node3'. The instance details include its ID (i-03267893b0f63cc9b), type (t2.micro), and various network and VPC configurations.

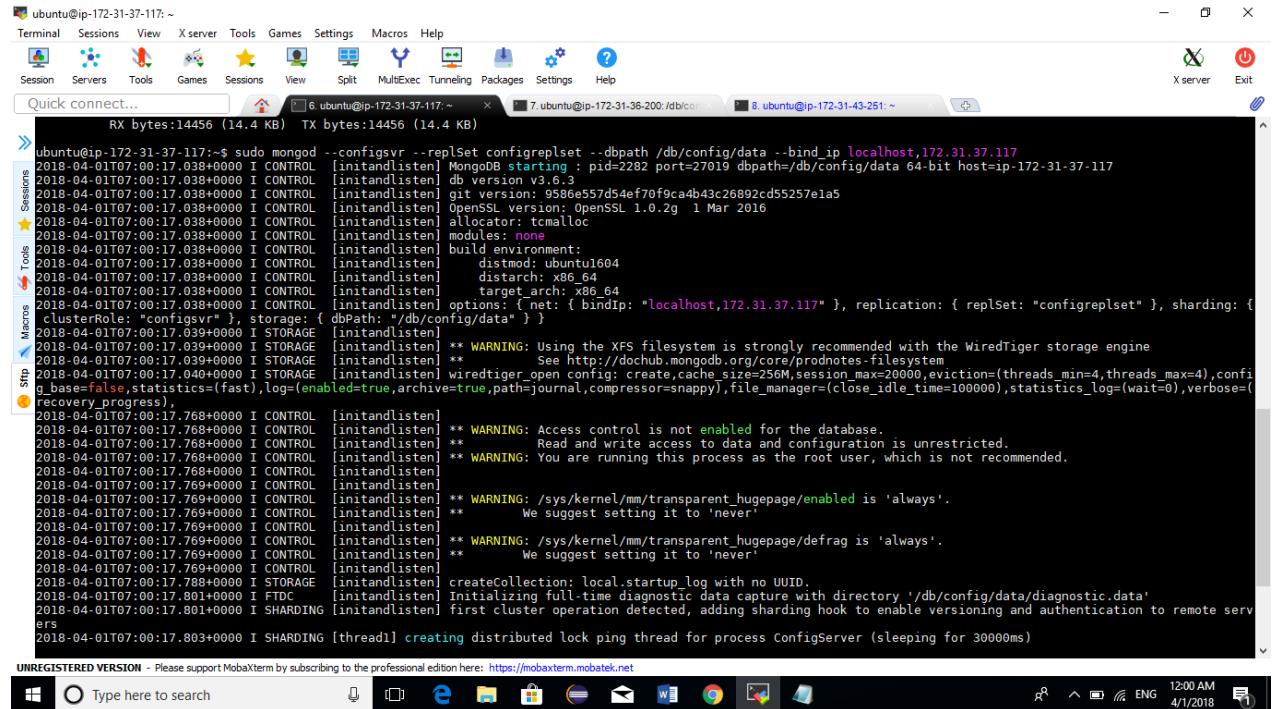
6. Set up and launch three config servers in a replica set with following commands.

```
sudo mongod --configsvr --replSet configrepset --dbpath /db/config/data --bind_ip localhost,172.31.37.117
```

```
sudo mongod --configsvr --replSet configrepset --dbpath /db/config/data --bind_ip localhost,172.31.36.200
```

```
sudo mongod --configsvr --replSet configrepset --dbpath /db/config/data --bind_ip localhost,172.31.43.251
```

Example screen shot for config server on 172.31.37.117.



The screenshot shows a terminal window in MobaXterm with several tabs open. The active tab displays the command output for launching a config server. The output shows the MongoDB process starting with pid 2282, version v3.6.3, and various system configuration details like OpenSSL version and allocator settings. It also includes several warning messages about file systems, access control, and kernel parameters. The terminal interface includes a menu bar, toolbars, and a status bar at the bottom indicating the date and time (4/1/2018, 12:00 AM).

```
Rx bytes:14456 (14.4 KB) TX bytes:14456 (14.4 KB)
>> ubuntu@ip-172-31-37-117:~ sudo mongod --configsvr --replSet configrepset --dbpath /db/config/data --bind_ip localhost,172.31.37.117
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] MongoDB starting : pid=2282 port=27019 dbpath=/db/config/data 64-bit host=ip-172-31-37-117
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] db version v3.6.3
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] git version: 9586e557d54ef70f9ca4b43c28892cd55257e1a5
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] OpenSSL version: OpenSSL 1.0.2g  1 Mar 2016
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] allocator: tcmalloc
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] modules: none
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] build environment:
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten]   distmod: ubuntu1604
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten]   distarch: x86_64
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten]   target arch: x86_64
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] options: { net: { bindip: "localhost.172.31.37.117" }, replication: { replSet: "configrepset" }, sharding: { clusterRole: "configsvr" }, storage: { dbPath: "/db/config/data" } }
2018-04-01T07:00:17.039+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T07:00:17.039+0000 I STORAGE [initandlisten] **           See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T07:00:17.040+0000 I STORAGE [initandlisten] wiredtiger_open config: create,cache_size=256M,session_max=20000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idle_time=10000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T07:00:17.768+0000 I CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T07:00:17.768+0000 I CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T07:00:17.768+0000 I CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T07:00:17.768+0000 I CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T07:00:17.769+0000 CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T07:00:17.769+0000 CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T07:00:17.769+0000 CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T07:00:17.769+0000 CONTROL [initandlisten] createCollection: local.startup_log with no UUID.
2018-04-01T07:00:17.801+0000 I FTDC [initandlisten] Initializing full-time diagnostic data capture with directory '/db/config/data/diagnostic.data'
2018-04-01T07:00:17.801+0000 I SHARDING [initandlisten] first cluster operation detected, adding sharding hook to enable versioning and authentication to remote servers
2018-04-01T07:00:17.803+0000 I SHARDING [thread1] creating distributed lock ping thread for process ConfigServer (sleeping for 30000ms)
```

```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect... 6 ubuntu@ip-172-31-37-117: ~ 7 ubuntu@ip-172-31-36-200: /db/con... 8 ubuntu@ip-172-31-43-251: ~
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] target_arch: x86_64
2018-04-01T07:00:17.038+0000 I CONTROL [initandlisten] options: { net: { bindip: "localhost,172.31.37.117" }, replication: { replSet: "configreplset" }, sharding: { clusterRole: "configsvr" }, storage: { dbpath: "/db/config/data" } }
2018-04-01T07:00:17.039+0000 I STORAGE [initandlisten]
2018-04-01T07:00:17.039+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T07:00:17.039+0000 I STORAGE [initandlisten] See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T07:00:17.040+0000 I STORAGE [initandlisten] wiredtiger_open config: create,cache_size=256M,session_max=20000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idle_time=100000),statistics_log=(wait=0),verbose=(recovered_progress)
2018-04-01T07:00:17.068+0000 I CONTROL [initandlisten]
2018-04-01T07:00:17.068+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T07:00:17.068+0000 I CONTROL [initandlisten] Read and write access to data and configuration is unrestricted.
2018-04-01T07:00:17.068+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T07:00:17.069+0000 I CONTROL [initandlisten]
2018-04-01T07:00:17.069+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T07:00:17.069+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T07:00:17.069+0000 I CONTROL [initandlisten]
2018-04-01T07:00:17.069+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T07:00:17.069+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T07:00:17.078+0000 I STORAGE [initandlisten] createCollection: local.startup_log with no UUID.
2018-04-01T07:00:17.081+0000 I FTDC [initandlisten] Initializing full-time diagnostic data capture with directory '/db/config/data/diagnostic.data'
2018-04-01T07:00:17.081+0000 I SHARDING [initandlisten] first cluster operation detected, adding sharding hook to enable versioning and authentication to remote servers
2018-04-01T07:00:17.083+0000 I SHARDING [thread1] creating distributed lock ping thread for process ConfigServer (sleeping for 30000ms)
2018-04-01T07:00:17.084+0000 I STORAGE [initandlisten] createCollection: local.m with no UUID.
2018-04-01T07:00:17.084+0000 I STORAGE [initandlisten] createCollection: local.replset.minvalid with no UUID.
2018-04-01T07:00:17.084+0000 I SHARDING [shard registry reload] Periodic reload of shard registry failed :: caused by :: ReadConcernMajorityNotAvailableYet: could not get updated shard list from config server due to Read concern majority reads are currently not possible.; will retry after 30s
2018-04-01T07:00:17.084+0000 I REPL [initandlisten] Did not find local voted for document at startup.
2018-04-01T07:00:17.084+0000 I REPL [initandlisten] Did not find local Rollback ID document at startup. Creating one.
2018-04-01T07:00:17.084+0000 I STORAGE [initandlisten] createCollection: local.system.rollback.id with no UUID.
2018-04-01T07:00:17.084+0000 I REPL [initandlisten] Initialized the rollback ID to 1
2018-04-01T07:00:17.084+0000 I REPL [initandlisten] Did not find local replica set configuration document at startup; NoMatchingDocument: Did not find replica set configuration document in local.system.replset
2018-04-01T07:00:17.084+0000 I NETWORK [initandlisten] waiting for connections on port 27019

```

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## Initiate the replica set of config servers

```

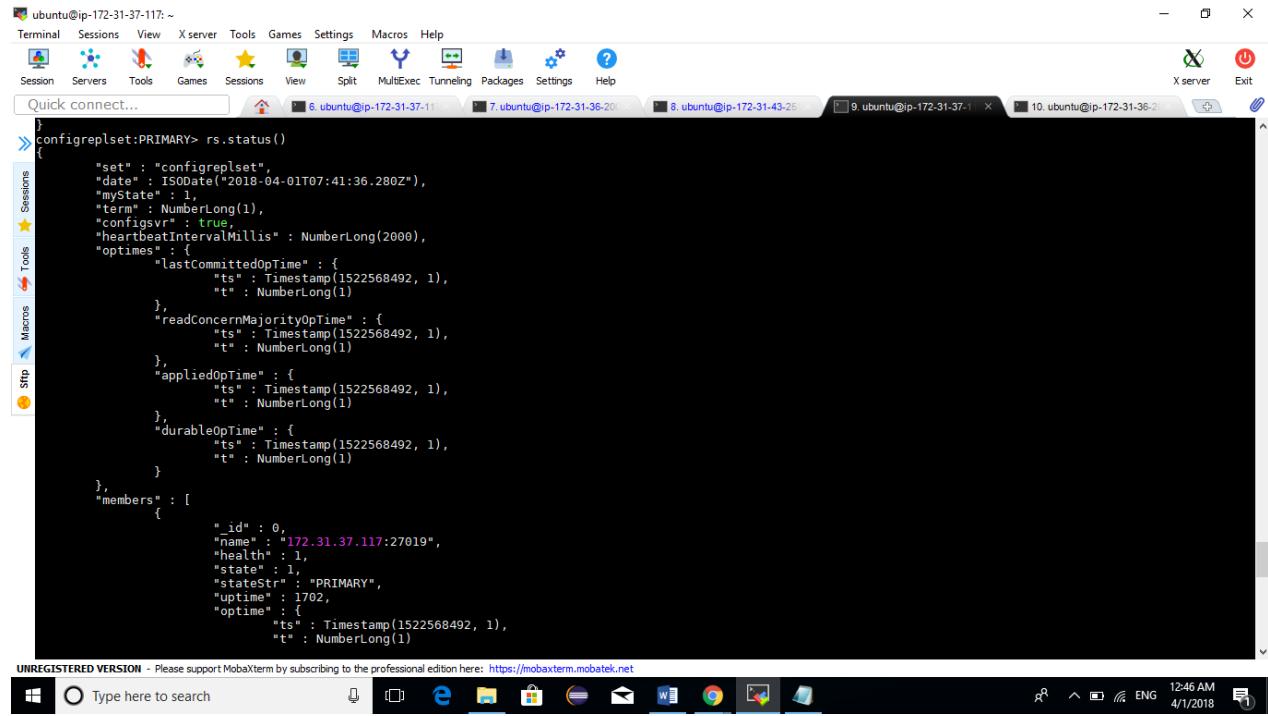
ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect... 6 ubuntu@ip-172-31-37-117: ~ 7 ubuntu@ip-172-31-36-200: /db/con... 8 ubuntu@ip-172-31-43-251: ~ 9 ubuntu@ip-172-31-37-117: ~ 10 ubuntu@ip-172-31-36-200: /db/con...
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten]
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten]
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten]

> rs.initiate()
{
  "info2" : "no configuration specified. Using a default configuration for the set",
  "me" : "172.31.37.117:27019",
  "ok" : 1,
  "operationTime" : Timestamp(1522568300, 1),
  "$gleStats" : {
    "lastOpTime" : Timestamp(1522568300, 1),
    "electionId" : ObjectId("000000000000000000000000")
  },
  "$clusterTime" : {
    "clusterTime" : Timestamp(1522568300, 1),
    "signature" : {
      "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAAA="),
      "keyId" : NumberLong(0)
    }
  }
}
configure:SECONDARY>
configure:PRIMARY>
configure:PRIMARY> rs.conf()
{
  "_id" : "configreplset",
  "version" : 1,
  "configsvr" : true,
  "protocolVersion" : NumberLong(1),

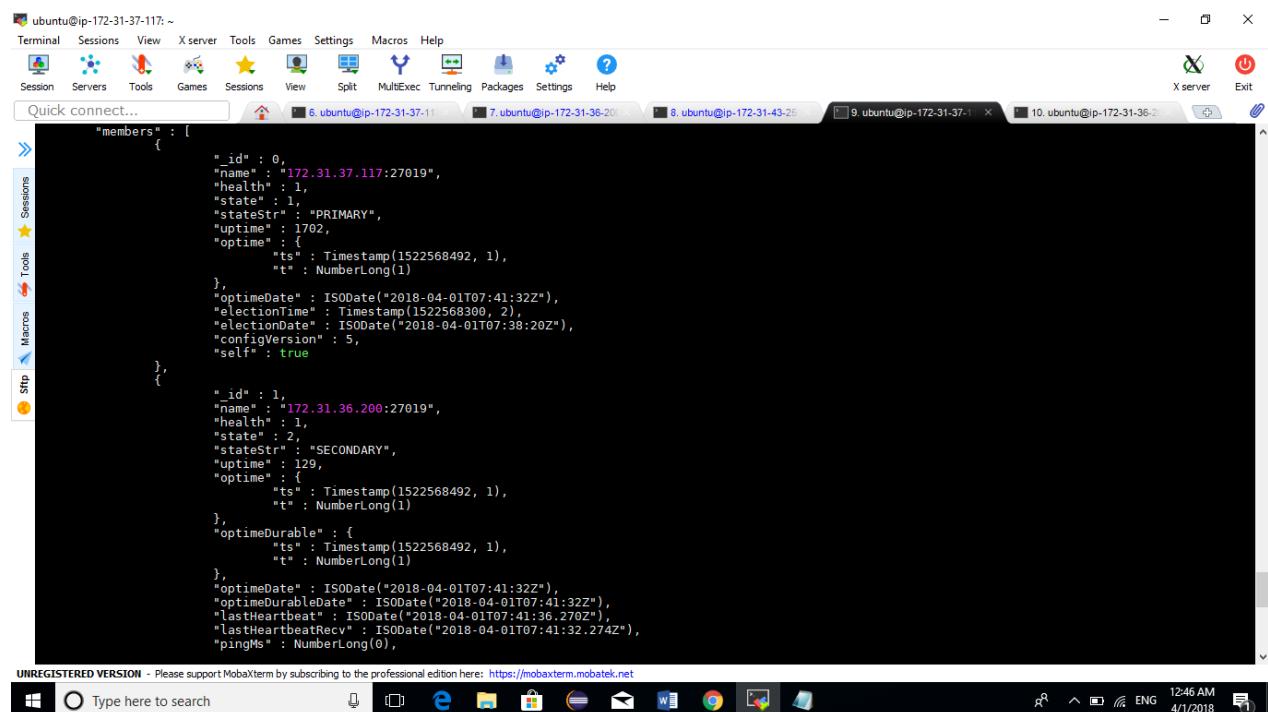
```

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## rs.status()



```
ubuntu@ip-172-31-37-117:~ 
MongoDB shell version: 3.6.3
connecting to: test
MongoDB server version: 3.6.3
connection accepted from ip-172-31-37-117:27019 db:admin
PRIMARY> rs.status()
{
  "set" : "configreplset",
  "date" : ISODate("2018-04-01T07:41:36.280Z"),
  "myState" : 1,
  "term" : NumberLong(1),
  "configsvr" : true,
  "heartbeatIntervalMillis" : NumberLong(2000),
  "optimes" : {
    "lastCommittedOpTime" : {
      "ts" : Timestamp(1522568492, 1),
      "t" : NumberLong(1)
    },
    "readConcernMajorityOpTime" : {
      "ts" : Timestamp(1522568492, 1),
      "t" : NumberLong(1)
    },
    "appliedOpTime" : {
      "ts" : Timestamp(1522568492, 1),
      "t" : NumberLong(1)
    },
    "durableOpTime" : {
      "ts" : Timestamp(1522568492, 1),
      "t" : NumberLong(1)
    }
  },
  "members" : [
    {
      "_id" : 0,
      "name" : "172.31.37.117:27019",
      "health" : 1,
      "state" : 1,
      "stateStr" : "PRIMARY",
      "uptime" : 1702,
      "optime" : {
        "ts" : Timestamp(1522568492, 1),
        "t" : NumberLong(1)
      }
    }
  ]
}
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```



```
ubuntu@ip-172-31-37-117:~ 
MongoDB shell version: 3.6.3
connecting to: test
MongoDB server version: 3.6.3
connection accepted from ip-172-31-37-117:27019 db:admin
PRIMARY> rs.status()
{
  "members" : [
    {
      "_id" : 0,
      "name" : "172.31.37.117:27019",
      "health" : 1,
      "state" : 1,
      "stateStr" : "PRIMARY",
      "uptime" : 1702,
      "optime" : {
        "ts" : Timestamp(1522568492, 1),
        "t" : NumberLong(1)
      },
      "optimeDate" : ISODate("2018-04-01T07:41:32Z"),
      "electionTime" : Timestamp(1522568300, 2),
      "electionDate" : ISODate("2018-04-01T07:38:20Z"),
      "configVersion" : 5,
      "self" : true
    },
    {
      "_id" : 1,
      "name" : "172.31.36.200:27019",
      "health" : 1,
      "state" : 2,
      "stateStr" : "SECONDARY",
      "uptime" : 129,
      "optime" : {
        "ts" : Timestamp(1522568492, 1),
        "t" : NumberLong(1)
      },
      "optimeDurable" : {
        "ts" : timestamp(1522568492, 1),
        "t" : NumberLong(1)
      },
      "optimeDate" : ISODate("2018-04-01T07:41:32Z"),
      "optimeDurableDate" : ISODate("2018-04-01T07:41:32Z"),
      "lastHeartbeat" : ISODate("2018-04-01T07:41:36.270Z"),
      "lastHeartbeatRecv" : ISODate("2018-04-01T07:41:32.274Z"),
      "pingMs" : NumberLong(0)
    }
  ]
}
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```

```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
6. ubuntu@ip-172-31-37-117 7. ubuntu@ip-172-31-36-201 8. ubuntu@ip-172-31-43-26 9. ubuntu@ip-172-31-37-117 10. ubuntu@ip-172-31-36-201
X server Exit
Sessions Tools Macros Sudo
```
{
    "lastHeartbeatRecv" : ISODate("2018-04-01T07:41:32.274Z"),
    "pingMs" : NumberLong(0),
    "syncingTo" : "172.31.37.117:27019",
    "configVersion" : 5
},
{
    "_id" : 2,
    "name" : "172.31.43.251:27019",
    "health" : 1,
    "state" : 2,
    "stateStr" : "SECONDARY",
    "uptime" : 4,
    "optime" : {
        "ts" : Timestamp(1522568492, 1),
        "t" : NumberLong(1)
    },
    "optimeDurable" : {
        "ts" : Timestamp(1522568492, 1),
        "t" : NumberLong(1)
    },
    "optimeDate" : ISODate("2018-04-01T07:41:32Z"),
    "optimeDurableDate" : ISODate("2018-04-01T07:41:32Z"),
    "lastHeartbeat" : ISODate("2018-04-01T07:41:36.271Z"),
    "lastHeartbeatRecv" : ISODate("2018-04-01T07:41:32.287Z"),
    "pingMs" : NumberLong(1),
    "syncingTo" : "172.31.37.117:27019",
    "configVersion" : 5
},
"ok" : 1,
"operationTime" : Timestamp(1522568492, 1),
"$gleStats" : {
    "lastOptime" : {
        "ts" : Timestamp(1522568492, 1),
        "t" : NumberLong(1)
    },
    "electionId" : ObjectId("7fffffff0000000000000001")
}
}
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```

Primary node:

```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
6. ubuntu@ip-172-31-37-117 7. ubuntu@ip-172-31-36-201 8. ubuntu@ip-172-31-43-26 9. ubuntu@ip-172-31-37-117 10. ubuntu@ip-172-31-36-201
X server Exit
Sessions Tools Macros Sudo
```
},
"slaveDelay" : NumberLong(0),
"votes" : 1
],
"settings" : {
    "chainingAllowed" : true,
    "heartbeatIntervalMillis" : 2000,
    "heartbeatTimeoutSecs" : 10,
    "electionTimeoutMillis" : 10000,
    "catchUpTimeoutMillis" : -1,
    "catchUpTakeoverDelayMillis" : 30000,
    "getLastErrors" : {
        "getLastErrorDefaults" : {
            "w" : 1,
            "wtimeout" : 0
        }
    },
    "replicaSetId" : ObjectId("5ac08c6cb29e91e345f576de")
}
}
configreplset:PRIMARY>
configreplset:PRIMARY> rs.add("172.31.36.200:27019")
{
    "ok" : 1,
    "operationTime" : Timestamp(1522568366, 1),
    "$gleStats" : {
        "lastOptime" : {
            "ts" : Timestamp(1522568366, 1),
            "t" : NumberLong(1)
        },
        "electionId" : ObjectId("7fffffff0000000000000001")
    },
    "$clusterTime" : {
        "clusterTime" : Timestamp(1522568366, 1),
        "signature" : {
            "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAA="),
            "keyId" : ObjectId("5a5d00000000000000000001")
        }
    }
}
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```

One of the secondary nodes below:

```
ubuntu@ip-172-31-36-200: ~
Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud

26 packages can be updated.
0 updates are security updates.

*** System restart required ***
Last login: Sun Apr  1 04:48:32 2018 from 67.164.3.12
ubuntu@ip-172-31-36-200:~$ mongo --host 172.31.36.200 --port 27019
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.36.200:27019/
MongoDB server version: 3.6.3
Welcome to the MongoDB shell.
For interactive help, type "help".
For more comprehensive documentation, see
    http://docs.mongodb.org/
Questions? Try the support group
    http://groups.google.com/group/mongodb-user
Server has startup warnings:
2018-04-01T07:26:58.451+0000 I STORAGE [initandlisten]
2018-04-01T07:26:58.451+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T07:26:58.451+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten]
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten]
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten]
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T07:26:59.505+0000 I CONTROL [initandlisten]
configreplset:SECONDARY> 
```

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## 7. Connect mongos to each config server

```
sudo mongos --configdb configreplset/172.31.37.117:27019,172.31.36.200:27019,172.31.43.251:27019 --bind_ip localhost,172.31.37.117 --port 27020
```

```
ubuntu@ip-172-31-37-117: ~
2018-04-01T08:08:14.381+0000 I CONTROL [mongosMain] target_arch: x86_64
2018-04-01T08:08:14.381+0000 I CONTROL [mongosMain] options: { net: { bindIp: "localhost,172.31.37.117", port: 27020 }, sharding: { configDB: "configreplset/172.31.37.117:27019,172.31.36.200:27019,172.31.43.251:27019" } }
2018-04-01T08:08:14.384+0000 I NETWORK [mongosMain] Starting new replica set monitor for configreplset/172.31.36.200:27019,172.31.37.117:27019,172.31.43.251:27019
2018-04-01T08:08:14.385+0000 I NETWORK [ReplicaSetMonitor::TaskExecutor-0] Successfully connected to 172.31.37.117:27019 (1 connections now open to 172.31.37.117:27019 with a 5 second timeout)
2018-04-01T08:08:14.386+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.37.117:27019
2018-04-01T08:08:14.386+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.37.117:27019
2018-04-01T08:08:14.386+0000 I SHARDING [thread] creating distributed lock ping thread for process ip-172-31-37-117:27020:1522570094:8744431214971028463 (sleeping for 30000ms)
2018-04-01T08:08:14.387+0000 I NETWORK [ReplicaSetMonitor::TaskExecutor-0] Successfully connected to 172.31.43.251:27019 (1 connections now open to 172.31.43.251:27019 with a 5 second timeout)
2018-04-01T08:08:14.388+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.37.117:27019, took 2ms (2 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.388+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.37.117:27019
2018-04-01T08:08:14.389+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.37.117:27019, took 3ms (3 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.389+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.37.117:27019
2018-04-01T08:08:14.390+0000 I NETWORK [ReplicaSetMonitor::TaskExecutor-0] Successfully connected to 172.31.36.200:27019 (1 connections now open to 172.31.36.200:27019 with a 5 second timeout)
2018-04-01T08:08:14.391+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.37.117:27019, took 2ms (4 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.392+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.37.117:27019, took 4ms (4 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.392+0000 W SHARDING [repSetDistLockPinger] pinging failed for distributed lock pinger :: caused by :: LockStateChangeFailed: findAndModify query predicate didn't match any lock document
2018-04-01T08:08:16.391+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.36.200:27019
2018-04-01T08:08:16.393+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.36.200:27019, took 2ms (1 connections now open to 172.31.36.200:27019)
2018-04-01T08:08:16.394+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.43.251:27019
2018-04-01T08:08:16.395+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.43.251:27019, took 1ms (1 connections now open to 172.31.43.251:27019)
2018-04-01T08:08:16.396+0000 W FTDC [mongosMain] FTDC is disabled because neither '--logpath' nor set parameter 'diagnosticDataCollectionDirectoryPath' are specified.
2018-04-01T08:08:16.397+0000 I NETWORK [mongosMain] Initializing full-time diagnostic data capture with directory ''
2018-04-01T08:09:14.391+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Ending idle connection to host 172.31.37.117:27019 because the pool meets constraints; 3 connections to that host remain open
```

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```

ubuntu@ip-172-31-37-117: ~
2018-04-01T08:08:14.381+0000 I CONTROL [mongosMain] target_arch: x86_64
2018-04-01T08:08:14.381+0000 I CONTROL [mongosMain] options: { net: { bindip: "localhost,172.31.37.117", port: 27020 }, sharding: { configDB: "configrepset/172.31.37.117:27019,172.31.37.117:27019,172.31.37.117:27019" } }
2018-04-01T08:08:14.384+0000 I NETWORK [mongosMain] Starting new replica set monitor for configrepset/172.31.36.200:27019,172.31.37.117:27019,172.31.43.251:27019
2018-04-01T08:08:14.385+0000 I NETWORK [ReplicaSetMonitor-TaskExecutor-0] Successfully connected to 172.31.37.117:27019 (1 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.386+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.37.117:27019
2018-04-01T08:08:14.386+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.37.117:27019
2018-04-01T08:08:14.386+0000 I SHARDING [threadId: 43251] creating distributed lock ping thread for process ip-172-31-37-117:27020:1522570094:8744431214971028463 (sleeping for 30000ms)
2018-04-01T08:08:14.387+0000 I NETWORK [ReplicaSetMonitor-TaskExecutor-0] Successfully connected to 172.31.43.251:27019 (1 connections now open to 172.31.43.251:27019)
2018-04-01T08:08:14.388+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.37.117:27019, took 2ms (2 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.388+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.37.117:27019, took 3ms (3 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.389+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.37.117:27019
2018-04-01T08:08:14.390+0000 I NETWORK [ReplicaSetMonitor-TaskExecutor-0] Successfully connected to 172.31.36.200:27019 (1 connections now open to 172.31.36.200:27019)
2018-04-01T08:08:14.391+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.37.117:27019, took 2ms (4 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.392+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.37.117:27019, took 4ms (4 connections now open to 172.31.37.117:27019)
2018-04-01T08:08:14.392+0000 W SHARDING [repSetDistLockPinger] pinging failed for distributed lock pinger :: caused by :: LockStateChangeFailed: findAndModify query predicate didn't match any lock document
2018-04-01T08:08:16.391+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.36.200:27019
2018-04-01T08:08:16.393+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.36.200:27019, took 2ms (1 connections now open to 172.31.36.200:27019)
2018-04-01T08:08:16.394+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Connecting to 172.31.43.251:27019
2018-04-01T08:08:16.395+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Successfully connected to 172.31.43.251:27019, took 1ms (1 connections now open to 172.31.43.251:27019)
2018-04-01T08:08:16.396+0000 W FTDC [mongosMain] FTDC is disabled because neither '--logpath' nor set parameter 'diagnosticDataCollectionDirectoryPath' are specified.
2018-04-01T08:08:16.396+0000 I FTDC [mongosMain] Initializing full-time diagnostic data capture with directory ''
2018-04-01T08:08:16.397+0000 I NETWORK [mongosMain] waiting for connections on port 27020
2018-04-01T08:09:14.391+0000 I ASIO [NetworkInterfaceASIO-ShardRegistry-0] Ending idle connection to host 172.31.37.117:27019 because the pool meets constraints; 3 connections to that host remain open

```

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## Changing the chunk size:

```

ubuntu@ip-172-31-37-117: ~
MongoDB shell version v3.6.3
connecting to: mongodb://127.0.0.1:27019/
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T07:13:14.360+0000 I STORAGE [initandlisten]
2018-04-01T07:13:14.361+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T07:13:14.361+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T07:13:15.394+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten]
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten]
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten]
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T07:13:15.395+0000 I CONTROL [initandlisten]
configreplset:PRIMARY> use config
switched to db config
configreplset:PRIMARY> db.settings.save({_id:"chunksize",value:1})
WriteResult({ "nMatched" : 0, "nUpserted" : 1, "nModified" : 0, "_id" : "chunksize" })
configreplset:PRIMARY>

```

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8. Set up and launch each of three shards: make sure to include the result of sh.status() before adding shards which will be done in the next task along with making a replica set

Creating a shard – shard0 and making it as a replica set by creating two more shards on other two instances.

```
ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Xserver Exit
Quick connect...
6.ubuntu@... 7.ubuntu@... 8.ubuntu@... 9.ubuntu@... 10.ubuntu@... 13.ubuntu@... 12.ubuntu@... 11.ubuntu@...
/home/ubuntu/
Name .. .cache .ssh .bash_history .bash_logout .bashrc .dbshell .mongorc.js .profile .sudo_as_admin_successful .xauthority
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] target_arch: x86_64
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] options: { net: { bindip: "localhost", port: 27021 }, replication: { replSet: "shardset1" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/shard0/data" } }
2018-04-01T08:55:12.077+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T08:55:12.078+0000 I STORAGE [initandlisten] See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T08:55:12.078+0000 I STORAGE [initandlisten] wiredtiger_open config: create,cache_size=256M/session_max=20000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idle_time=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten]
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:12.080+0000 W SHARDING [initandlisten] Started with --shardsvr, but no shardIdentity document was found on disk in admin.system.shards. This server has not yet been added to a shard cluster.
2018-04-01T08:55:12.080+0000 I STORAGE [initandlisten] This likely means this server has createdCollection: local.startup.log with no UUID.
2018-04-01T08:55:12.080+0000 I STORAGE [initandlisten] Initializing full-time diagnostic data capture with directory '/db/shard0/data/diagnostics'
2018-04-01T08:55:12.081+0000 I STORAGE [initandlisten] createCollection: local.me with no UUID.
2018-04-01T08:55:12.082+0000 I STORAGE [initandlisten] createCollection: local.replset.minvalid with no UUID.
2018-04-01T08:55:12.083+0000 I REPL [initandlisten] Did not find local voted for document at startup.
2018-04-01T08:55:12.083+0000 I REPL [initandlisten] Did not find local Rollback ID document at startup. Creating one.
2018-04-01T08:55:12.083+0000 I STORAGE [initandlisten] createCollection: local.system.rollback.id with no UUID.
2018-04-01T08:55:12.084+0000 I REPL [initandlisten] Initialized the rollback ID to 1
2018-04-01T08:55:12.085+0000 I REPL [initandlisten] Did not find local replica set configuration document at startup; NoMatchingDocument: Did not find replica set configuration document in local.system.replset
2018-04-01T08:55:12.085+0000 I NETWORK [initandlisten] Waiting for connections on port 27021
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```

```
ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Xserver Exit
Quick connect...
6.ubuntu@... 7.ubuntu@... 8.ubuntu@... 9.ubuntu@... 10.ubuntu@... 13.ubuntu@... 12.ubuntu@... 11.ubuntu@...
/home/ubuntu/
Name .. .cache .ssh .bash_history .bash_logout .bashrc .dbshell .mongorc.js .profile .sudo_as_admin_successful .xauthority
by
ubuntu@ip-172-31-37-117:~$ sudo mkdir -p /db/shard0/data
ubuntu@ip-172-31-37-117:~$ sudo mongod --replSet shardset1 --dbpath /db/shard0/data --bind_ip localhost,172.31.37.117 --port 27021
2018-04-01T08:55:12.076+0000 I CONTROL [initandlisten] MongoDB starting : pid=2946 port=27021 dbpath=/db/shard0/data 64-bit host=ip-172-31-37-117
2018-04-01T08:55:12.076+0000 I CONTROL [initandlisten] db version v3.6.3
2018-04-01T08:55:12.076+0000 I CONTROL [initandlisten] git version: 9586e557d54ef70f9ca4b43c26892cd55257ela5
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] OpenSSL version: OpenSSL 1.0.2g 1 Mar 2016
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] allocator: tcmalloc
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] modules: none
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] build environment:
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] distmod: ubuntu1604
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] distarch: x86_64
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] target_arch: x86_64
2018-04-01T08:55:12.077+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost", port: 27021 }, replication: { replSet: "shardset1" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/shard0/data" } }
2018-04-01T08:55:12.077+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T08:55:12.078+0000 I STORAGE [initandlisten] See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T08:55:12.078+0000 I STORAGE [initandlisten] wiredtiger_open config: create,cache_size=256M/session_max=20000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idle_time=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten]
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T08:55:12.080+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net
```

## Creating Shard 1 (Will be replica of shard0)

```

ubuntu@ip-172-31-36-200: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
6. ubuntu@ip-172-31-36-200 7. ubuntu@ip-172-31-36-200 8. ubuntu@ip-172-31-36-200 9. ubuntu@ip-172-31-36-200 10. ubuntu@ip-172-31-36-200 11. ubuntu@ip-172-31-36-200 12. ubuntu@ip-172-31-36-200 13. ubuntu@ip-172-31-36-200
Session Name .cache .ssh .bash_history .bash_logout .bashrc .dshell .mongorc.js .profile .sudo_as_admin_successful .Xauthority
Tools Macros Stop
ubuntu@ip-172-31-36-200: ~$ sudo mkdir -p /db/shard1/data
ubuntu@ip-172-31-36-200: ~$ sudo mongod --shardsvr --replSet shardset1 --dbpath /db/shard1/data --bind_ip localhost,172.31.36.200 --port 27021
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] MongoDB starting : pid=2843 port=27021 dbpath=/db/shard1/data 64-bit host=ip-172-31-36-200
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] db version v3.6.3
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] git version: 9586e557d54ef70f9ca4b43c26892cd55257ela5
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] OpenSSL version: OpenSSL 1.0.2g 1 Mar 2016
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] allocator: tcmalloc
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] modules: none
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] build environment:
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] distmod: ubuntu1604
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] distarch: x86_64
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] target_arch: x86_64
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] options: { net: { bindip: "localhost", port: 27021 }, replication: { replSet: "shardset1" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/shard1/data" } }
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten]
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] wiredtiger.open config: create,cache_size=256M/session_max=20000,eviction=(thread_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(lose_idletime=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten]
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
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2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten]
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2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
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2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] wiredtiger_open config: create,cache_size=256M/session_max=20000,eviction=(thread_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(lose_idletime=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten]
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2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten]
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:29.128+0000 W SHARDING [initandlisten] Started with --shardsvr, but no shardIdentity document was found on disk in admin.system.version. This most likely means this server has not yet been added to a sharded cluster.
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] createCollection: local.startup.log with no UUID.
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] createCollection: local.me with no UUID.
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] createCollection: local.replset.invalid with no UUID.
2018-04-01T08:55:29.128+0000 I REPL [initandlisten] Did not find local voted for document at startup.
2018-04-01T08:55:29.128+0000 I REPL [initandlisten] Did not find local Rollback ID document at startup. Creating one.
2018-04-01T08:55:29.128+0000 I REPL [initandlisten] Initialized the rollback ID to 0.
2018-04-01T08:55:29.128+0000 I REPL [initandlisten] Did not find local replica set configuration document at startup; NoMatchingDocument: Did not find replica set configuration document in local.system.replset
2018-04-01T08:55:29.128+0000 I NETWORK [initandlisten] waiting for connections on port 27021

```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

```

ubuntu@ip-172-31-36-200: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
6. ubuntu@ip-172-31-36-200 7. ubuntu@ip-172-31-36-200 8. ubuntu@ip-172-31-36-200 9. ubuntu@ip-172-31-36-200 10. ubuntu@ip-172-31-36-200 11. ubuntu@ip-172-31-36-200 12. ubuntu@ip-172-31-36-200 13. ubuntu@ip-172-31-36-200
Session Name .. .cache .ssh .bash_history .bash_logout .bashrc .dshell .mongorc.js .profile .sudo_as_admin_successful .Xauthority
Tools Macros Stop
ubuntu@ip-172-31-36-200: ~$ sudo mongod --shardsvr --replSet shardset1 --dbpath /db/shard1/data --bind_ip localhost,172.31.36.200 --port 27021
2018-04-01T08:55:29.127+0000 I CONTROL [initandlisten] options: { net: { bindip: "localhost", port: 27021 }, replication: { replSet: "shardset1" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/shard1/data" } }
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten]
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
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2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] wiredtiger_open config: create,cache_size=256M/session_max=20000,eviction=(thread_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(lose_idletime=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten]
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2018-04-01T08:55:29.128+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
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2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] createCollection: local.startup.log with no UUID.
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] createCollection: local.me with no UUID.
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2018-04-01T08:55:29.128+0000 I REPL [initandlisten] Did not find local voted for document at startup.
2018-04-01T08:55:29.128+0000 I REPL [initandlisten] Did not find local Rollback ID document at startup. Creating one.
2018-04-01T08:55:29.128+0000 I REPL [initandlisten] Initialized the rollback ID to 0.
2018-04-01T08:55:29.128+0000 I REPL [initandlisten] Did not find local replica set configuration document at startup; NoMatchingDocument: Did not find replica set configuration document in local.system.replset
2018-04-01T08:55:29.128+0000 I NETWORK [initandlisten] waiting for connections on port 27021

```

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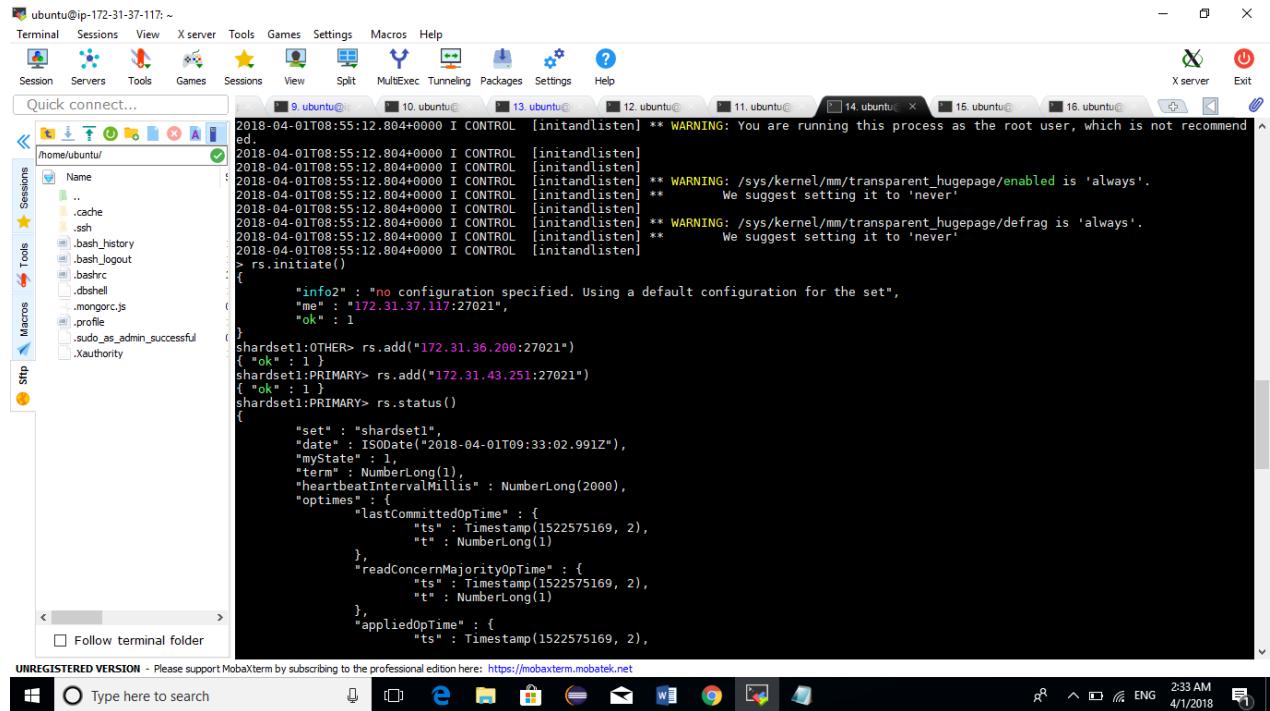
Creating Shard 2(Will be replica of shard0)

The screenshot shows a terminal window titled "ubuntu@ip-172-31-43-251:~". The terminal is displaying a MongoDB shell session. The user has run the command `sudo mkdir -p /db/shard2/data`. Subsequent log entries show the MongoDB process starting up, including the shard set configuration and various startup warnings related to XFS filesystem usage and security settings.

```
ubuntu@ip-172-31-43-251:~$ sudo mkdir -p /db/shard2/data
ubuntu@ip-172-31-43-251:~$ sudo mongod --shardsvr --repSet shardset1 --dbpath /db/shard2/data --bind_ip localhost,172.31.43.251 --port 27021
2018-04-01T08:55:38.957+0000 I CONTROL [initandlisten] MongoDB starting : pid=2735 port=27021 dbpath=/db/shard2/data 64-bit host=ip-172.31.43.251
2018-04-01T08:55:38.957+0000 I CONTROL [initandlisten] db version v2.6.2
2018-04-01T08:55:38.957+0000 I CONTROL [initandlisten] git version: 9586e557d54ef70f9ca4b43c26892cd55257e1a5
2018-04-01T08:55:38.957+0000 I CONTROL [initandlisten] OpenSSL version: OpenSSL 1.0.2g  1 Mar 2016
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] allocator: tcmalloc
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] modules: none
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] build environment:
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] distmod: ubuntu1604
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] distarch: x86_64
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] target arch: x86_64
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost,172.31.43.251", port: 27021 }, replication: { repSet: "shardset1" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/shard2/data" } }
2018-04-01T08:55:38.958+0000 I STORAGE [initandlisten]
2018-04-01T08:55:38.958+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T08:55:38.958+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T08:55:38.959+0000 I STORAGE [initandlisten] wiredtiger open config: create,cache_size=256M/session_max=20000,eviction=(thread_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idle_time=10000ms),statistics_log=(wait=0),verbose=[recovery_progress],
2018-04-01T08:55:39.679+0000 I CONTROL [initandlisten]
2018-04-01T08:55:39.679+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T08:55:39.679+0000 I CONTROL [initandlisten] ** WARNING: Read and write access to data and configuration is unrestricted.
2018-04-01T08:55:39.679+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
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2018-04-01T08:55:39.679+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T08:55:39.679+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:39.680+0000 I CONTROL [initandlisten]
2018-04-01T08:55:39.680+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T08:55:39.680+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:39.680+0000 I CONTROL [initandlisten]
```

```
ubuntu@ip-172-31-43-251: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
6. ubuntu@ip... 7. ubuntu@ip... 8. ubuntu@ip... 9. ubuntu@ip... 10. ubuntu@ip... 11. ubuntu@ip... 12. ubuntu@ip... 13. ubuntu@ip...
X server Exit
home/ubuntu/
Name .. .cache .ssh .bash_history .bash_logout .bsrvc .profile .sudo_as_admin_successful .Xauthority
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] target arch: x86_64
2018-04-01T08:55:38.958+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost,172.31.43.251", port: 27021 }, replication: { replSet: "shardset1", shardId: 1, clusterRole: "shardsvr" }, storage: { dbPath: "/db/shard2/data" } }
2018-04-01T08:55:38.958+0000 I STORAGE [initandlisten]
2018-04-01T08:55:38.958+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T08:55:38.958+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T08:55:38.959+0000 I STORAGE [initandlisten] wiredtiger_open config: create,cache_size=256M,session_max=20000,eviction=(thread_s_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idle_time=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T08:55:39.679+0000 I CONTROL [initandlisten]
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2018-04-01T08:55:39.680+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T08:55:39.680+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:39.681+0000 W SHARDING [initandlisten] Started with --shardsvr, but no shardIdentity document was found on disk in admin.system.version. This most likely means this server has not yet been added to a sharderd cluster.
2018-04-01T08:55:39.682+0000 I STORAGE [initandlisten] createCollection: local.startup.log with no UUID.
2018-04-01T08:55:39.692+0000 I FTDC [initandlisten] Initializing full-time diagnostic data capture with directory '/db/shard2/data/diagnostic_data'
2018-04-01T08:55:39.693+0000 I STORAGE [initandlisten] createCollection: local.me with no UUID.
2018-04-01T08:55:39.703+0000 I STORAGE [initandlisten] createCollection: local.replset.minval with no UUID.
2018-04-01T08:55:39.714+0000 I REPL [initandlisten] Did not find local.voted for document at startup.
2018-04-01T08:55:39.714+0000 I REPL [initandlisten] Did not find local.Rollback ID document at startup. Creating one.
2018-04-01T08:55:39.714+0000 I STORAGE [initandlisten] createCollection: local.system.rollback.id with no UUID.
2018-04-01T08:55:39.724+0000 I REPL [initandlisten] Initialized the rollback.ID to 1
2018-04-01T08:55:39.724+0000 I REPL [initandlisten] Did not find local.replica set configuration document at startup; NoMatchingDocument: Did not find replica set configuration document in local.system.replset
2018-04-01T08:55:39.724+0000 I NETWORK [initandlisten] waiting for connections on port 27021
```

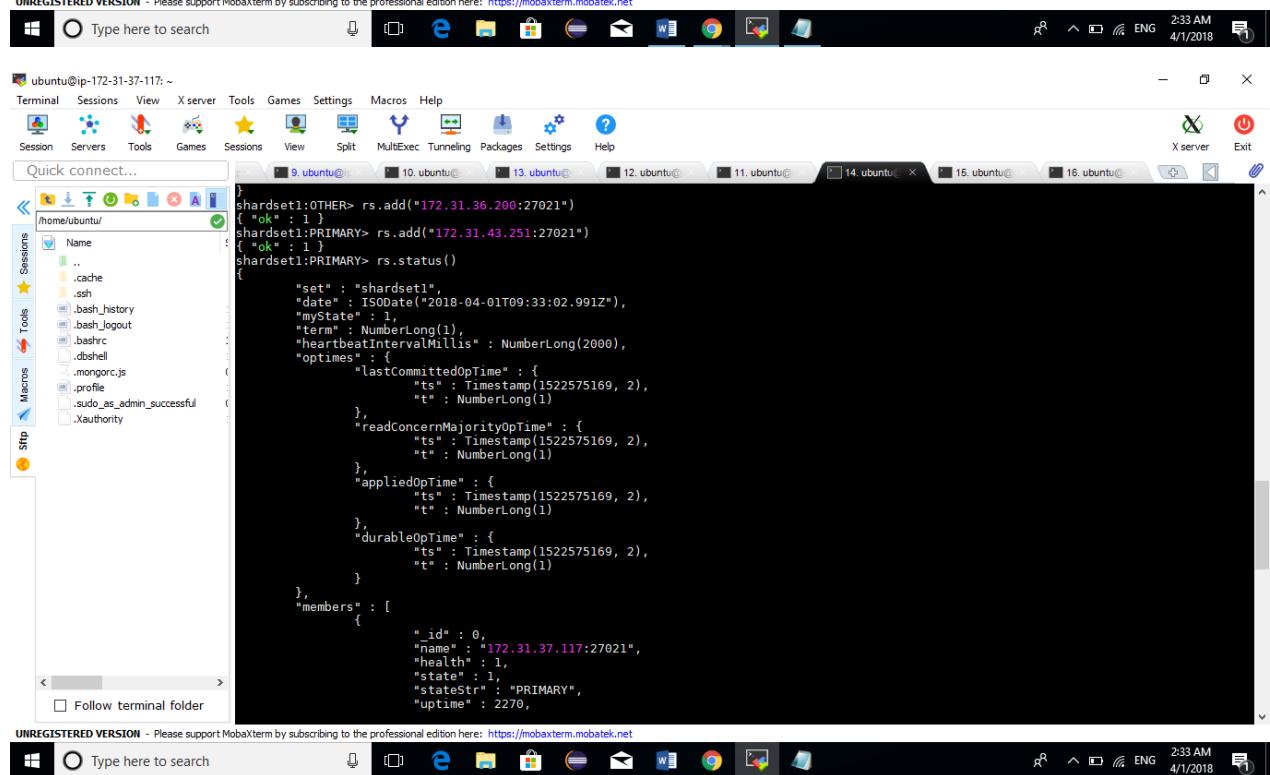
## Make above three shards as a replica set – shardset1



```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
9. ubuntu@... 10. ubuntu@... 13. ubuntu@... 12. ubuntu@... 11. ubuntu@... 14. ubuntu@... 15. ubuntu@... 16. ubuntu@...
X server Exit
2018-04-01T08:55:12.804+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T08:55:12.804+0000 I CONTROL [initandlisten]
2018-04-01T08:55:12.804+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T08:55:12.804+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:12.804+0000 I CONTROL [initandlisten]
2018-04-01T08:55:12.804+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T08:55:12.804+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:12.804+0000 I CONTROL [initandlisten]
> rs.initiate()
{
    "info2" : "no configuration specified. Using a default configuration for the set",
    "me" : "172.31.37.117:27021",
    "ok" : 1
}
shardset1:OTHER> rs.add("172.31.36.200:27021")
{ "ok" : 1 }
shardset1:PRIMARY> rs.add("172.31.43.251:27021")
{ "ok" : 1 }
shardset1:PRIMARY> rs.status()
{
    "set" : "shardset1",
    "date" : ISODate("2018-04-01T09:33:02.991Z"),
    "myState" : 1,
    "term" : NumberLong(1),
    "heartbeatIntervalMillis" : NumberLong(2000),
    "optimism" : {
        "lastCommittedOpTime" : {
            "ts" : Timestamp(1522575169, 2),
            "t" : NumberLong(1)
        },
        "readConcernMajorityOpTime" : {
            "ts" : Timestamp(1522575169, 2),
            "t" : NumberLong(1)
        },
        "appliedOpTime" : {
            "ts" : Timestamp(1522575169, 2),
            "t" : NumberLong(1)
        }
    },
    "shardSet" : "shardset1"
}
2018-04-01T09:33:02.991Z
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```



```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
9. ubuntu@... 10. ubuntu@... 13. ubuntu@... 12. ubuntu@... 11. ubuntu@... 14. ubuntu@... 15. ubuntu@... 16. ubuntu@...
X server Exit
2018-04-01T09:33:02.991Z
shardset1:OTHER> rs.add("172.31.36.200:27021")
{ "ok" : 1 }
shardset1:PRIMARY> rs.add("172.31.43.251:27021")
{ "ok" : 1 }
shardset1:PRIMARY> rs.status()
{
    "set" : "shardset1",
    "date" : ISODate("2018-04-01T09:33:02.991Z"),
    "myState" : 1,
    "term" : NumberLong(1),
    "heartbeatIntervalMillis" : NumberLong(2000),
    "optimism" : {
        "lastCommittedOpTime" : {
            "ts" : Timestamp(1522575169, 2),
            "t" : NumberLong(1)
        },
        "readConcernMajorityOpTime" : {
            "ts" : Timestamp(1522575169, 2),
            "t" : NumberLong(1)
        },
        "appliedOpTime" : {
            "ts" : Timestamp(1522575169, 2),
            "t" : NumberLong(1)
        },
        "durableOpTime" : {
            "ts" : Timestamp(1522575169, 2),
            "t" : NumberLong(1)
        }
    },
    "shardSet" : "shardset1",
    "members" : [
        {
            "_id" : 0,
            "name" : "172.31.37.117:27021",
            "health" : 1,
            "state" : 1,
            "stateStr" : "PRIMARY",
            "uptime" : 2270
        }
    ]
}
2018-04-01T09:33:02.991Z
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net

```

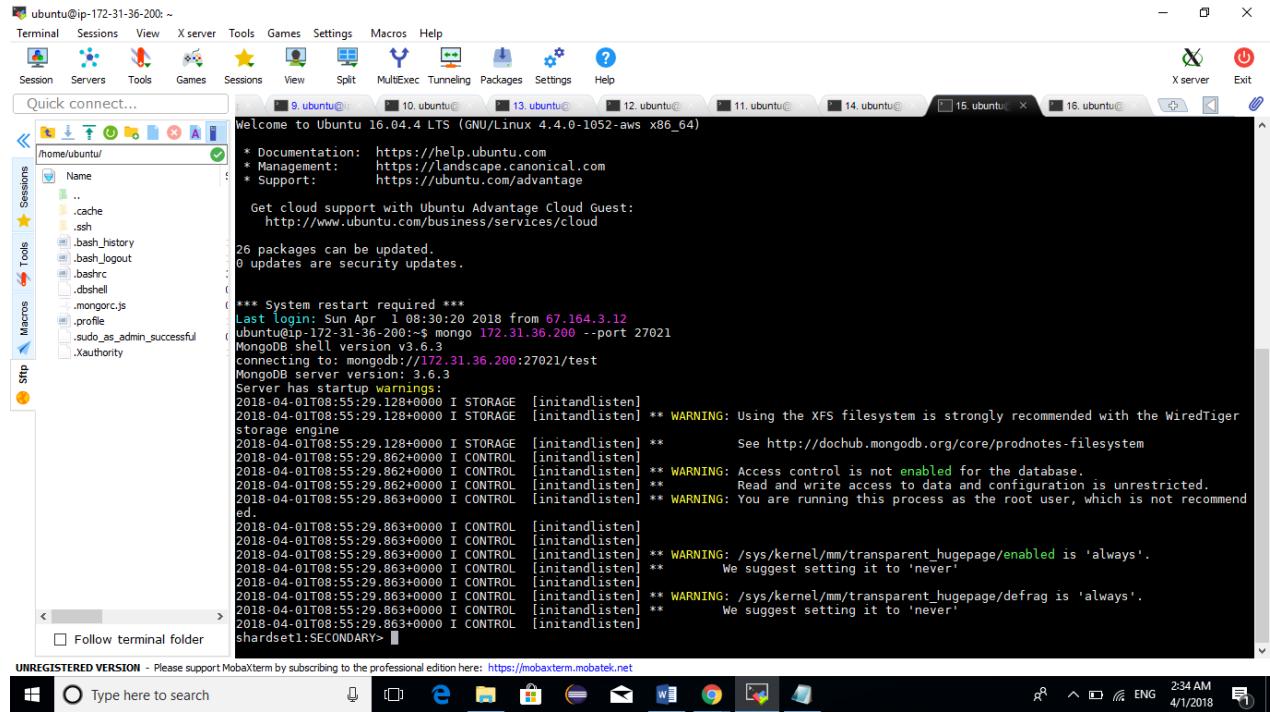
```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
9.ubuntu@... 10.ubuntu@... 11.ubuntu@... 12.ubuntu@... 13.ubuntu@... 14.ubuntu@... 15.ubuntu@... 16.ubuntu@...
/home/ubuntu/
{
  "_id": 1,
  "name": "172.31.36.200:27021",
  "health": 1,
  "state": 2,
  "stateStr": "SECONDARY",
  "uptime": 35,
  "optime": {
    "ts": Timestamp(1522575169, 2),
    "t": NumberLong(1)
  },
  "optimeDurable": {
    "ts": Timestamp(1522575169, 2),
    "t": NumberLong(1)
  },
  "optimeDate": ISODate("2018-04-01T09:32:49Z"),
  "optimeDurableDate": ISODate("2018-04-01T09:32:49Z"),
  "lastHeartbeat": ISODate("2018-04-01T09:33:01.294Z"),
  "lastHeartbeatRecv": ISODate("2018-04-01T09:33:01.297Z"),
  "pingMs": NumberLong(0),
  "syncingTo": "172.31.37.117:27021",
  "configVersion": 3
},
{
  "_id": 2,
  "name": "172.31.43.251:27021",
  "health": 1,
  "state": 2,
}

```

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## Verify for Primary and secondary in the shard set1



```

ubuntu@ip-172-31-36-200: ~
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

Welcome to Ubuntu 16.04.4 LTS (GNU/Linux 4.4.0-1052-aws x86_64)

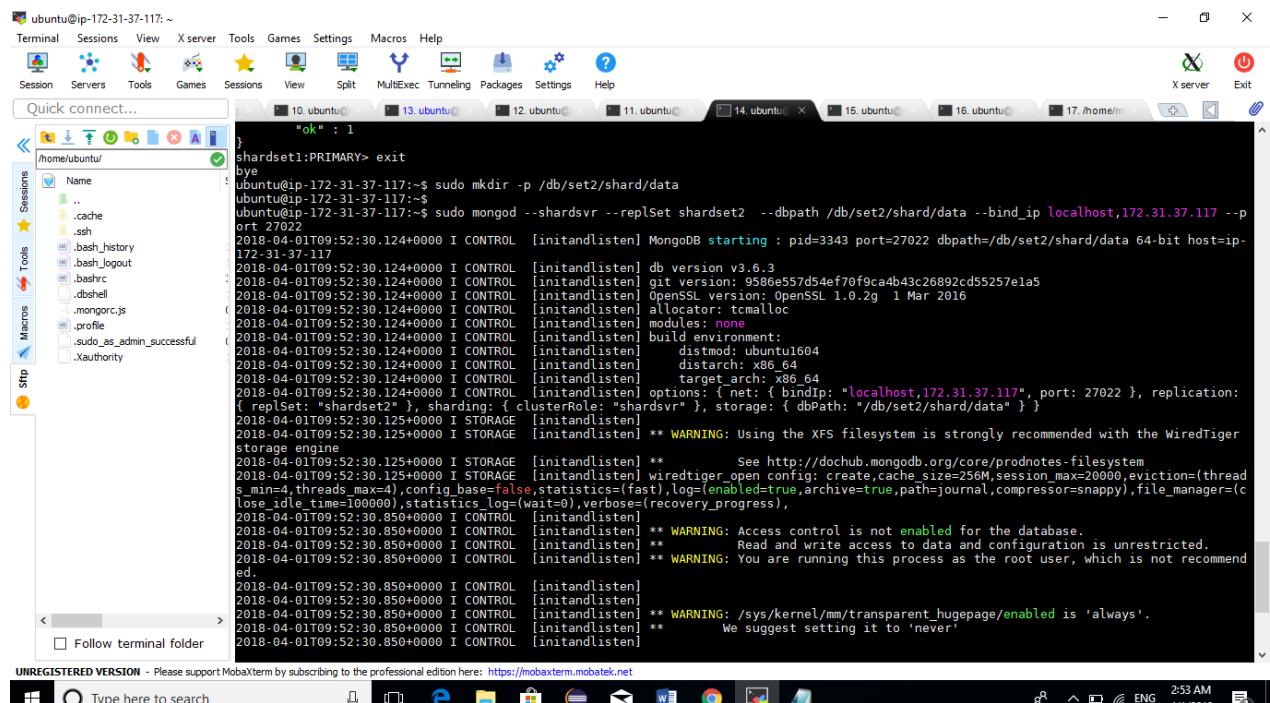
Last login: Sun Apr 1 08:30:20 2018 from 67.164.3.12
ubuntu@ip-172-31-36-200:~$ mongo 172.31.36.200 --port 27021
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.36.200:27021/test
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten]
2018-04-01T08:55:29.128+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T08:55:29.862+0000 I CONTROL [initandlisten] **
2018-04-01T08:55:29.862+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T08:55:29.862+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten]
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten]
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten]
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten]
shard1:SECONDARY> 

```

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Extra credit part: Replicate the shards by creating shardset2(One shard will be the primary for a replica set and a member of sharding) and shardset3((One shard will be the primary for a replica set and a member of sharding)):

### Shardset2 screenshots:



```

ubuntu@ip-172-31-37-117: ~
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

Welcome to Ubuntu 16.04.4 LTS (GNU/Linux 4.4.0-1052-aws x86_64)

ok : 1
shardset1:PRIMARY> exit
bye
ubuntu@ip-172-31-37-117:~$ sudo mkdir -p /db/set2/shard/data
ubuntu@ip-172-31-37-117:~$ sudo mongod --shardsvr --replicaset shardset2 --dbpath /db/set2/shard/data --bind_ip localhost,172.31.37.117 --port 27022
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] MongoDB starting : pid=3343 port=27022 dbpath=/db/set2/shard/data 64-bit host=ip-172-31-37-117
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] db version v3.6.3
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] git version: 9586e557d54ef70f9ca4b43c26892cd55257e1a5
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] OpenSSL version: OpenSSL 1.0.2g 1 Mar 2016
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] allocator: tcmalloc
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] modules: none
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] build environment:
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten]   distmod: ubuntu1604
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten]   distarch: x86_64
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten]   target_arch: x86_64
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost,172.31.37.117", port: 27022 }, replication: { replset: "shardset2" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/set2/shard/data" } }
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten]
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] wiredtiger open config: create,cache_size=256M/session_max=20000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idle_time=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten]
shard2:SECONDARY> 

```

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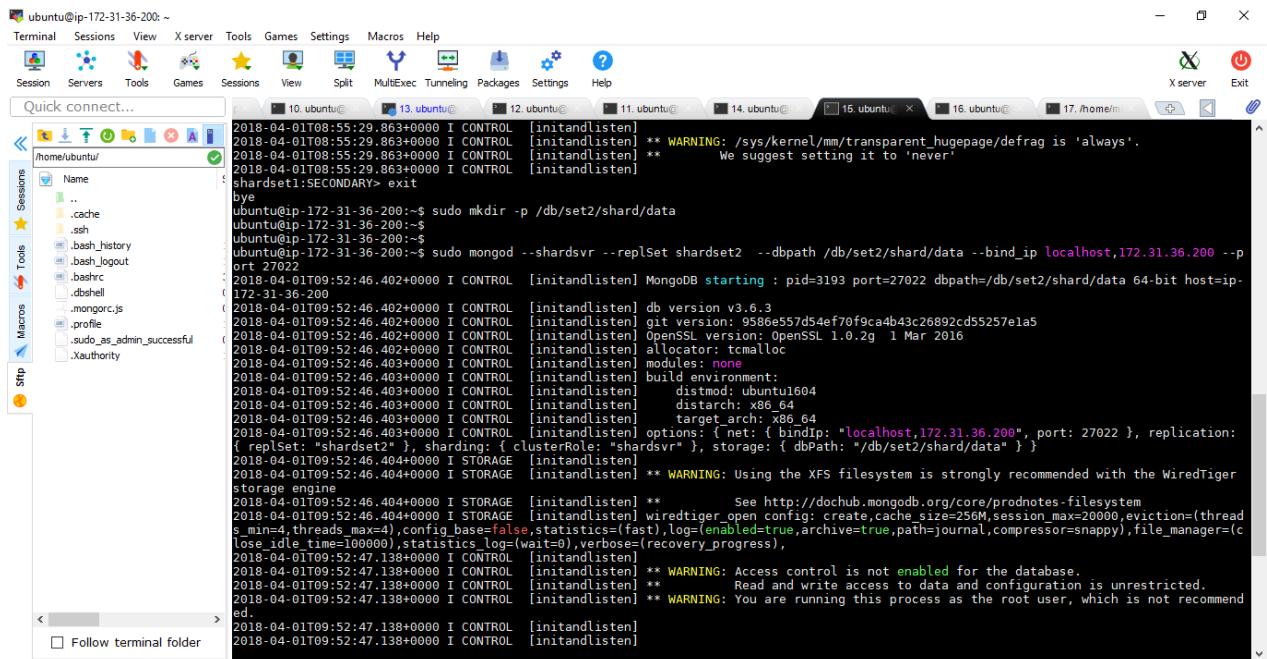
ubuntu@ip-172-31-37-117: ~

```

2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] _target_arch: x86_64
2018-04-01T09:52:30.124+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost,172.31.37.117", port: 27022 }, replication: { replSet: "shardset2" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/set2/shard/data" } }
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten]
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] wiredtiger.open config: create,cache_size=256M/session_max=20000,eviction=(thread_mins,threads_max=1),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_time=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T09:52:30.125+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:30.125+0000 W SHARDING [initandlisten] Started with --shardsvr, but no shardIdentity document was found on disk in admin.system.version. This most likely means this server has not yet been added to a sharded cluster.
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] createCollection: local.startup.log with no UUID.
2018-04-01T09:52:30.125+0000 I FTDC [initandlisten] Initializing full-time diagnostic data capture with directory '/db/set2/shard/data/diagnostic.data'
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] createCollection: local.me with no UUID.
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] createCollection: local.replset.minvalid with no UUID.
2018-04-01T09:52:30.125+0000 I REPL [initandlisten] Did not find local voted for document at startup.
2018-04-01T09:52:30.125+0000 I REPL [initandlisten] Did not find local Rollback ID document at startup. Creating one.
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] createCollection: local.system.rollback.id with no UUID.
2018-04-01T09:52:30.125+0000 I REPL [initandlisten] Initialized the rollback ID to 1
2018-04-01T09:52:30.125+0000 I REPL [initandlisten] Did not find local replica set configuration document at startup; NoMatchingDocument: Did not find replica set configuration document in local.system.replset
2018-04-01T09:52:30.125+0000 I NETWORK [initandlisten] waiting for connections on port 27022

```

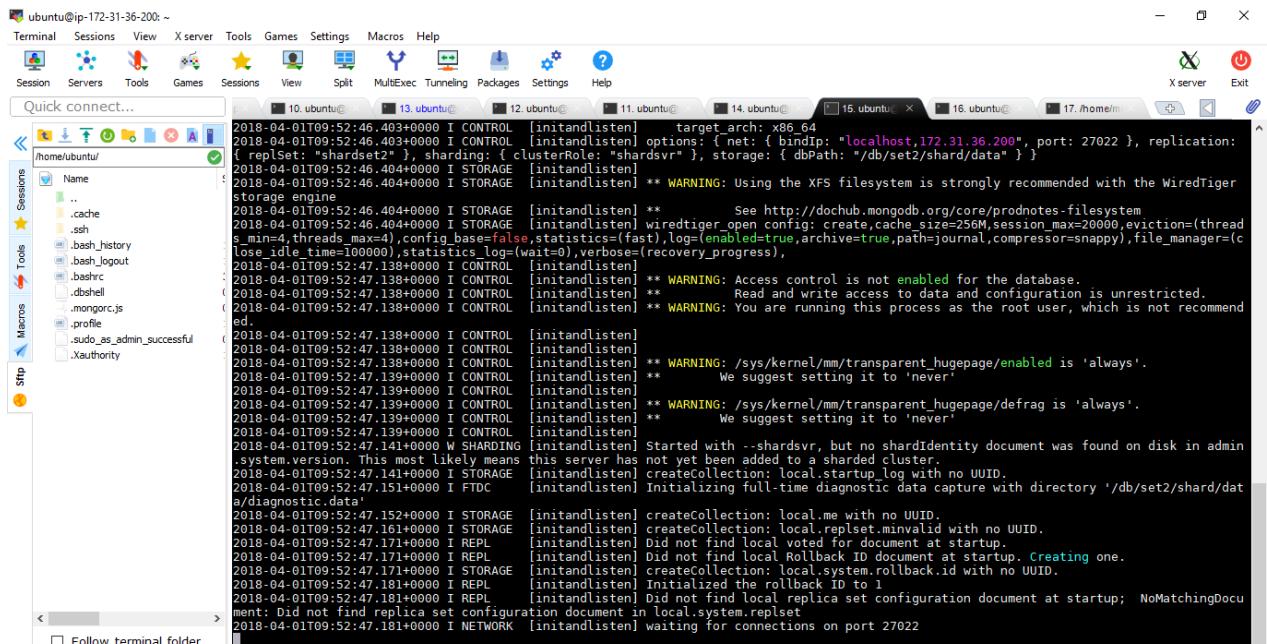
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```

ubuntu@ip-172-31-36-200: ~
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten] shardset1:SECONDARY> exit
by
ubuntu@ip-172-31-36-200:~$ sudo mkdir -p /db/set2/shard/data
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T08:55:29.863+0000 I CONTROL [initandlisten]
shardset1:SECONDARY>
2018-04-01T08:52:46.402+0000 I CONTROL [initandlisten] MongoDB starting : pid=3193 port=27022 dbpath=/db/set2/shard/data 64-bit host=ip-172-31-36-200
2018-04-01T09:52:46.402+0000 I CONTROL [initandlisten] db version v3.6.3
2018-04-01T09:52:46.402+0000 I CONTROL [initandlisten] git version: 9586e55d54ef70f9ca4b43c26892cd55257e1a5
2018-04-01T09:52:46.402+0000 I CONTROL [initandlisten] OpenSSL version: OpenSSL 1.0.2g 1 Mar 2016
2018-04-01T09:52:46.402+0000 I CONTROL [initandlisten] allocator: tcmalloc
2018-04-01T09:52:46.403+0000 I CONTROL [initandlisten] modules: none
2018-04-01T09:52:46.403+0000 I CONTROL [initandlisten] build environment:
2018-04-01T09:52:46.403+0000 I CONTROL [initandlisten] distmod: ubuntu1604
2018-04-01T09:52:46.403+0000 I CONTROL [initandlisten] distarch: x86_64
2018-04-01T09:52:46.403+0000 I CONTROL [initandlisten] target_arch: x86_64
2018-04-01T09:52:46.403+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost,172.31.36.200", port: 27022 }, replication: { replset: "shardset2" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/set2/shard/data" } }
2018-04-01T09:52:46.404+0000 I STORAGE [initandlisten]
2018-04-01T09:52:46.404+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T09:52:46.404+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T09:52:46.404+0000 I STORAGE [initandlisten] wiredtiger_open config: create,cache_size=256M/session_max=20000,eviction=(thread_s_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idletime=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten]
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten]
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten]
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```

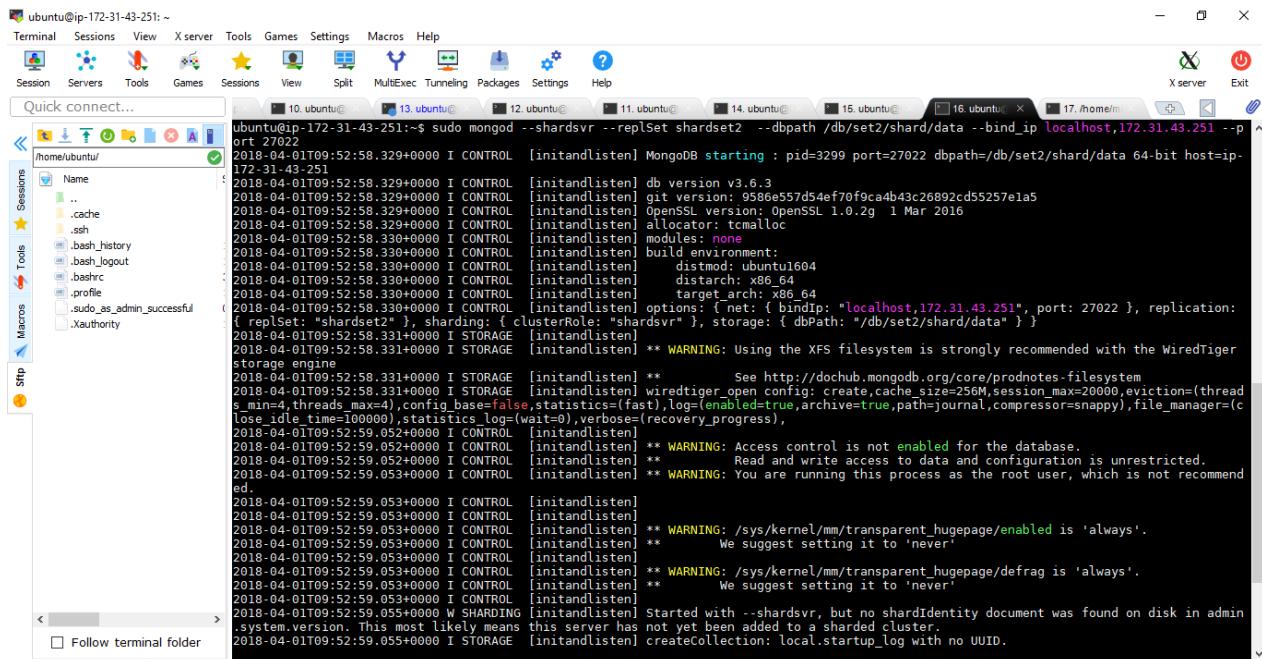
```

ubuntu@ip-172-31-36-200: ~
2018-04-01T09:52:46.403+0000 I CONTROL [initandlisten] target_arch: x86_64
2018-04-01T09:52:46.403+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost,172.31.36.200", port: 27022 }, replication: { replset: "shardset2" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/set2/shard/data" } }
2018-04-01T09:52:46.404+0000 I STORAGE [initandlisten]
2018-04-01T09:52:46.404+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T09:52:46.404+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T09:52:46.404+0000 I STORAGE [initandlisten] wiredtiger_open config: create,cache_size=256M/session_max=20000,eviction=(thread_s_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_idletime=100000),statistics_log=(wait=0),verbose=(recovery_progress),
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten]
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten]
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten]
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten]
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:47.139+0000 I CONTROL [initandlisten]
2018-04-01T09:52:47.141+0000 W SHARDING [initandlisten] Started with --shardsvr, but no shardIdentity document was found on disk in admin.system.version. This most likely means this server has not yet been added to a sharded cluster.
2018-04-01T09:52:47.141+0000 I STORAGE [initandlisten] createCollection: local.startup.log with no UUID.
2018-04-01T09:52:47.151+0000 I FTDC [initandlisten] Initializing full-time diagnostic data capture with directory '/db/set2/shard/data/diagnostic.data'
2018-04-01T09:52:47.152+0000 I STORAGE [initandlisten] createCollection: local.me with no UUID.
2018-04-01T09:52:47.161+0000 I STORAGE [initandlisten] createCollection: local.replset.minvalid with no UUID.
2018-04-01T09:52:47.171+0000 I REPL [initandlisten] Did not find local voted for document at startup.
2018-04-01T09:52:47.171+0000 I REPL [initandlisten] Did not find local Rollback ID document at startup. Creating one.
2018-04-01T09:52:47.171+0000 I STORAGE [initandlisten] createCollection: local.system.rollback.id with no UUID.
2018-04-01T09:52:47.181+0000 I REPL [initandlisten] Initialized the rollback ID to 1
2018-04-01T09:52:47.181+0000 I REPL [initandlisten] Did not find local replica set configuration document at startup; NoMatchingDocument: Did not find replica set configuration document in local.system.replset
2018-04-01T09:52:47.181+0000 I NETWORK [initandlisten] waiting for connections on port 27022
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```



ubuntu@ip-172-31-43-251: ~



```

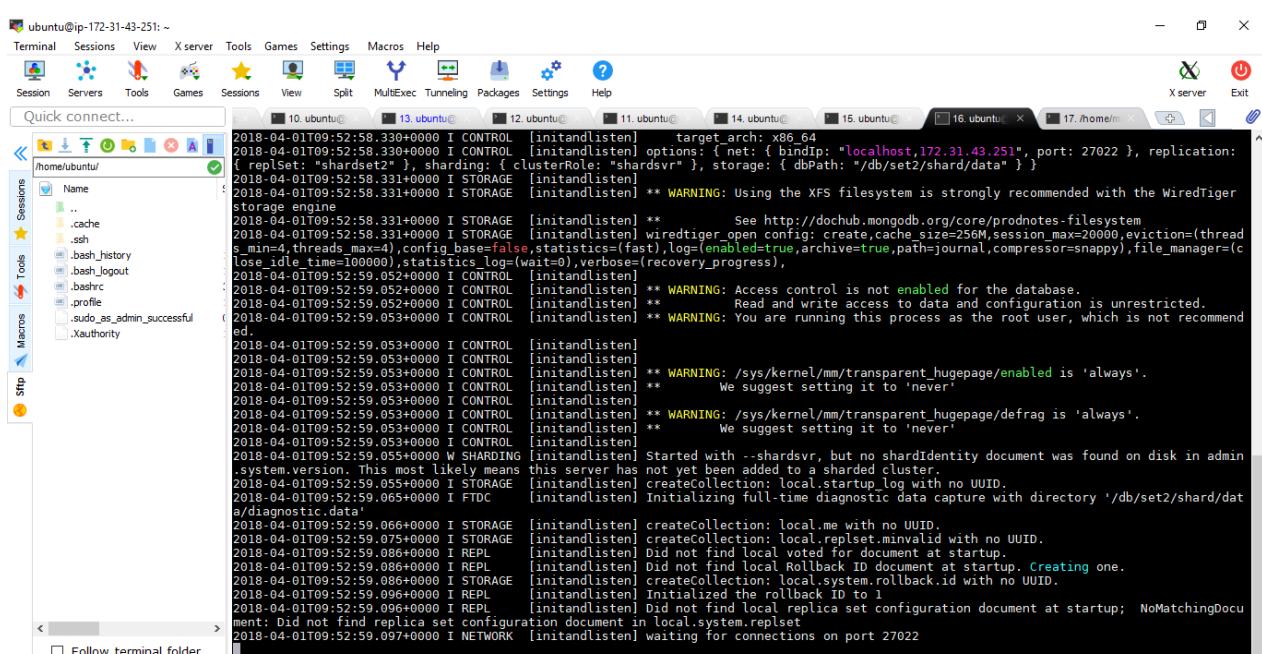
ubuntu@ip-172-31-43-251:~$ sudo mongod --shardsvr --replset shardset2 --dbpath /db/set2/shard/data --bind_ip localhost,172.31.43.251 --port 27022
2018-04-01T09:52:58.329+0000 I CONTROL [initandlisten] MongoDB starting : pid=3299 port=27022 dbpath=/db/set2/shard/data 64-bit host=ip-172-31-43-251
2018-04-01T09:52:58.329+0000 I CONTROL [initandlisten] db version v3.6.3
2018-04-01T09:52:58.329+0000 I CONTROL [initandlisten] git version: 9586e557d54ef70f9ca4b43c26892ed55257ela5
2018-04-01T09:52:58.329+0000 I CONTROL [initandlisten] OpenSSL version: OpenSSL 1.0.2g  1 Mar 2016
2018-04-01T09:52:58.329+0000 I CONTROL [initandlisten] allocator: tcmalloc
2018-04-01T09:52:58.330+0000 I CONTROL [initandlisten] modules: none
2018-04-01T09:52:58.330+0000 I CONTROL [initandlisten] build environment:
2018-04-01T09:52:58.330+0000 I CONTROL [initandlisten] distmod: ubuntu1604
2018-04-01T09:52:58.330+0000 I CONTROL [initandlisten] distarch: x86_64
2018-04-01T09:52:58.330+0000 I CONTROL [initandlisten] target_arch: x86_64
2018-04-01T09:52:58.331+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost,172.31.43.251", port: 27022 }, replication: { replset: "shardset2" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/set2/shard/data" } }
2018-04-01T09:52:58.331+0000 I STORAGE [initandlisten]
2018-04-01T09:52:58.331+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T09:52:58.331+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T09:52:58.331+0000 I STORAGE [initandlisten] wiredtiger.open config: create,cache_size=256M/session_max=20000,eviction=(thread_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_time=1000000),log_file_size=33554432,log mmap,log_session=log=(wait=0),verbose=(recovery_progress),
2018-04-01T09:52:59.052+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.052+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T09:52:59.052+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.055+0000 W SHARDING [initandlisten] Started with --shardsvr, but no shardIdentity document was found on disk in admin.system.version. This most likely means this server has not yet been added to a sharded cluster.
2018-04-01T09:52:59.055+0000 I STORAGE [initandlisten] createCollection: local.startup_log with no UUID.

```

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ubuntu@ip-172-31-43-251: ~



```

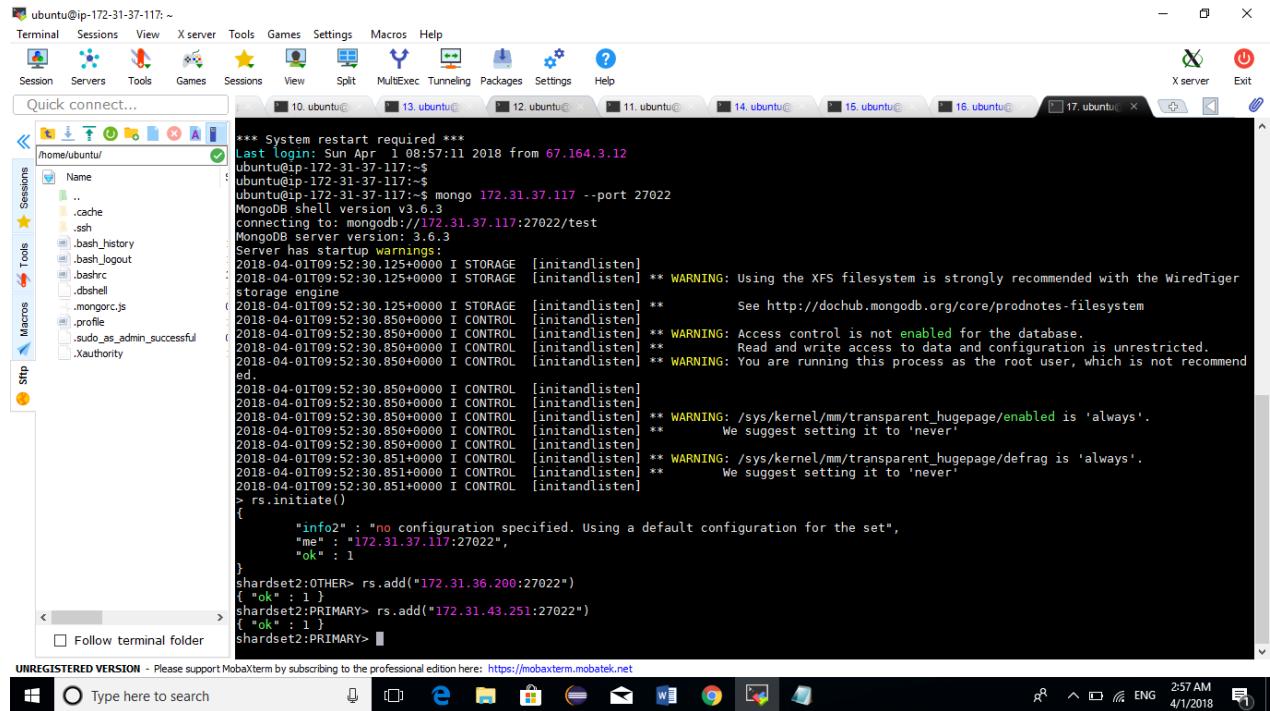
2018-04-01T09:52:58.330+0000 I CONTROL [initandlisten] target_arch: x86_64
2018-04-01T09:52:58.330+0000 I CONTROL [initandlisten] options: { net: { bindIp: "localhost,172.31.43.251", port: 27022 }, replication: { replset: "shardset2" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "/db/set2/shard/data" } }
2018-04-01T09:52:58.331+0000 I STORAGE [initandlisten]
2018-04-01T09:52:58.331+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T09:52:58.331+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T09:52:58.331+0000 I STORAGE [initandlisten] wiredtiger.open config: create,cache_size=256M/session_max=20000,eviction=(thread_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),file_manager=(close_time=1000000),log_file_size=33554432,log mmap,log_session=log=(wait=0),verbose=(recovery_progress),
2018-04-01T09:52:59.052+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.052+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T09:52:59.052+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T09:52:59.055+0000 W SHARDING [initandlisten] Started with --shardsvr, but no shardIdentity document was found on disk in admin.system.version. This most likely means this server has not yet been added to a sharded cluster.
2018-04-01T09:52:59.055+0000 I STORAGE [initandlisten] createCollection: local.startup_log with no UUID.
2018-04-01T09:52:59.065+0000 I FTDC [initandlisten] Initializing full-time diagnostic data capture with directory '/db/set2/shard/data/diagnostic.data'.
2018-04-01T09:52:59.066+0000 I STORAGE [initandlisten] createCollection: local.me with no UUID.
2018-04-01T09:52:59.075+0000 I STORAGE [initandlisten] createCollection: local.replset.invalid with no UUID.
2018-04-01T09:52:59.086+0000 I REPL [initandlisten] Did not find local voted for document at startup.
2018-04-01T09:52:59.086+0000 I REPL [initandlisten] Did not find local Rollback ID document at startup. Creating one.
2018-04-01T09:52:59.086+0000 I STORAGE [initandlisten] createCollection: local.system.rollback.id with no UUID.
2018-04-01T09:52:59.096+0000 I REPL [initandlisten] Initialized the rollback ID to 1.
2018-04-01T09:52:59.096+0000 I REPL [initandlisten] Did not find local replica set configuration document at startup; NoMatchingDocument: Did not find replica set configuration document in local.system.replset
2018-04-01T09:52:59.097+0000 I NETWORK [initandlisten] waiting for connections on port 27022

```

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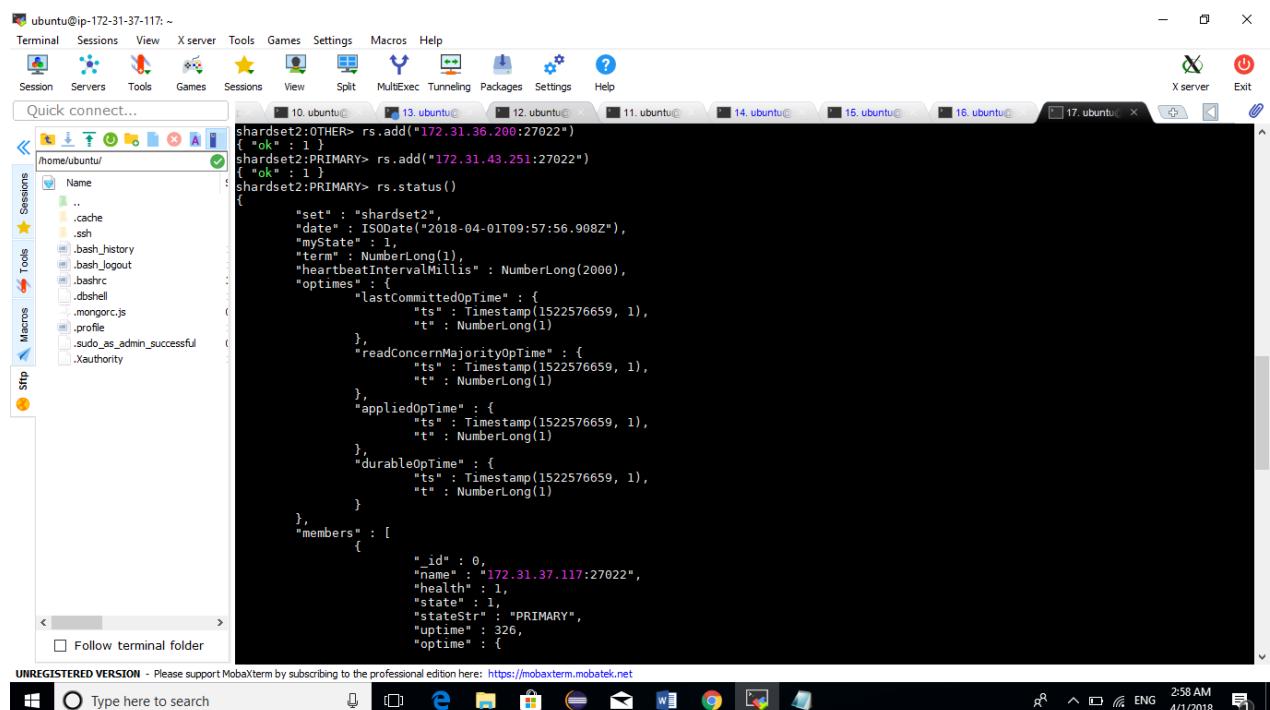


## Verify Primary and secondary for shardset2:



```
ubuntu@ip-172-31-37-117: ~
*** System restart required ***
Last login: Sun Apr 1 08:57:11 2018 from 67.164.3.12
ubuntu@ip-172-31-37-117:~$ mongo 172.31.37.117 --port 27022
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.37.117:27022/test
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine.
2018-04-01T09:52:30.125+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten]
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T09:52:30.850+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
> rs.initiate()
{
    "info2" : "no configuration specified. Using a default configuration for the set",
    "me" : "172.31.37.117:27022",
    "ok" : 1
}
shardset2:OTHER> rs.add("172.31.36.200:27022")
{
    "ok" : 1
}
shardset2:PRIMARY> rs.add("172.31.43.251:27022")
{
    "ok" : 1
}
shardset2:PRIMARY>
```

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```
ubuntu@ip-172-31-37-117: ~
shardset2:OTHER> rs.add("172.31.36.200:27022")
{
    "ok" : 1
}
shardset2:PRIMARY> rs.add("172.31.43.251:27022")
{
    "ok" : 1
}
shardset2:PRIMARY> rs.status()
{
    "set" : "shardset2",
    "date" : ISODate("2018-04-01T09:57:56.908Z"),
    "myState" : 1,
    "term" : NumberLong(1),
    "heartbeatIntervalMillis" : NumberLong(2000),
    "optimism" : {
        "lastCommittedOpTime" : {
            "ts" : Timestamp(1522576659, 1),
            "t" : NumberLong(1)
        },
        "readConcernMajorityOpTime" : {
            "ts" : Timestamp(1522576659, 1),
            "t" : NumberLong(1)
        },
        "appliedOpTime" : {
            "ts" : Timestamp(1522576659, 1),
            "t" : NumberLong(1)
        },
        "durableOpTime" : {
            "ts" : Timestamp(1522576659, 1),
            "t" : NumberLong(1)
        }
    },
    "members" : [
        {
            "_id" : 0,
            "name" : "172.31.37.117:27022",
            "health" : 1,
            "state" : 1,
            "stateStr" : "PRIMARY",
            "uptime" : 326,
            "optime" : {

```

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```
ubuntu@ip-172-31-37-117: ~
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultExec Tunneling Packages Settings Help
Quick connect... 10. ubuntu@ 13. ubuntu@ 12. ubuntu@ 11. ubuntu@ 14. ubuntu@ 15. ubuntu@ 16. ubuntu@ 17. ubuntu@ X server Exit
Sessions
Tools
Macros
Stop
{
    "_id" : 1,
    "name" : "172.31.36.200:27022",
    "health" : 1,
    "state" : 2,
    "stateStr" : "SECONDARY",
    "uptime" : 35,
    "optime" : {
        "ts" : Timestamp(1522576659, 1),
        "t" : NumberLong(1)
    },
    "optimeDurable" : {
        "ts" : Timestamp(1522576659, 1),
        "t" : NumberLong(1)
    },
    "optimeDate" : ISODate("2018-04-01T09:57:39Z"),
    "optimeDurableDate" : ISODate("2018-04-01T09:57:39Z"),
    "lastheartbeat" : ISODate("2018-04-01T09:57:55.153Z"),
    "lastheartbeatRecv" : ISODate("2018-04-01T09:57:56.156Z"),
    "pingMs" : NumberLong(0),
    "syncingTo" : "172.31.37.117:27022",
    "configVersion" : 3
},
{
    "_id" : 2,
    "name" : "172.31.43.251:27022",
    "health" : 1,
    "state" : 2,
    "stateStr" : "SECONDARY",
    "uptime" : 17,
    "optime" : {
        "ts" : Timestamp(1522576659, 1),
        "t" : NumberLong(1)
    },
    "optimeDurable" : {
        "ts" : Timestamp(1522576659, 1),
        "t" : NumberLong(1)
    },
    "optimeDate" : ISODate("2018-04-01T09:57:39Z"),
    "optimeDurableDate" : ISODate("2018-04-01T09:57:39Z"),
    "lastheartbeat" : ISODate("2018-04-01T09:57:55.153Z"),
    "lastheartbeatRecv" : ISODate("2018-04-01T09:57:56.156Z"),
    "pingMs" : NumberLong(0),
    "syncingTo" : "172.31.37.117:27022",
    "configVersion" : 3
},
```

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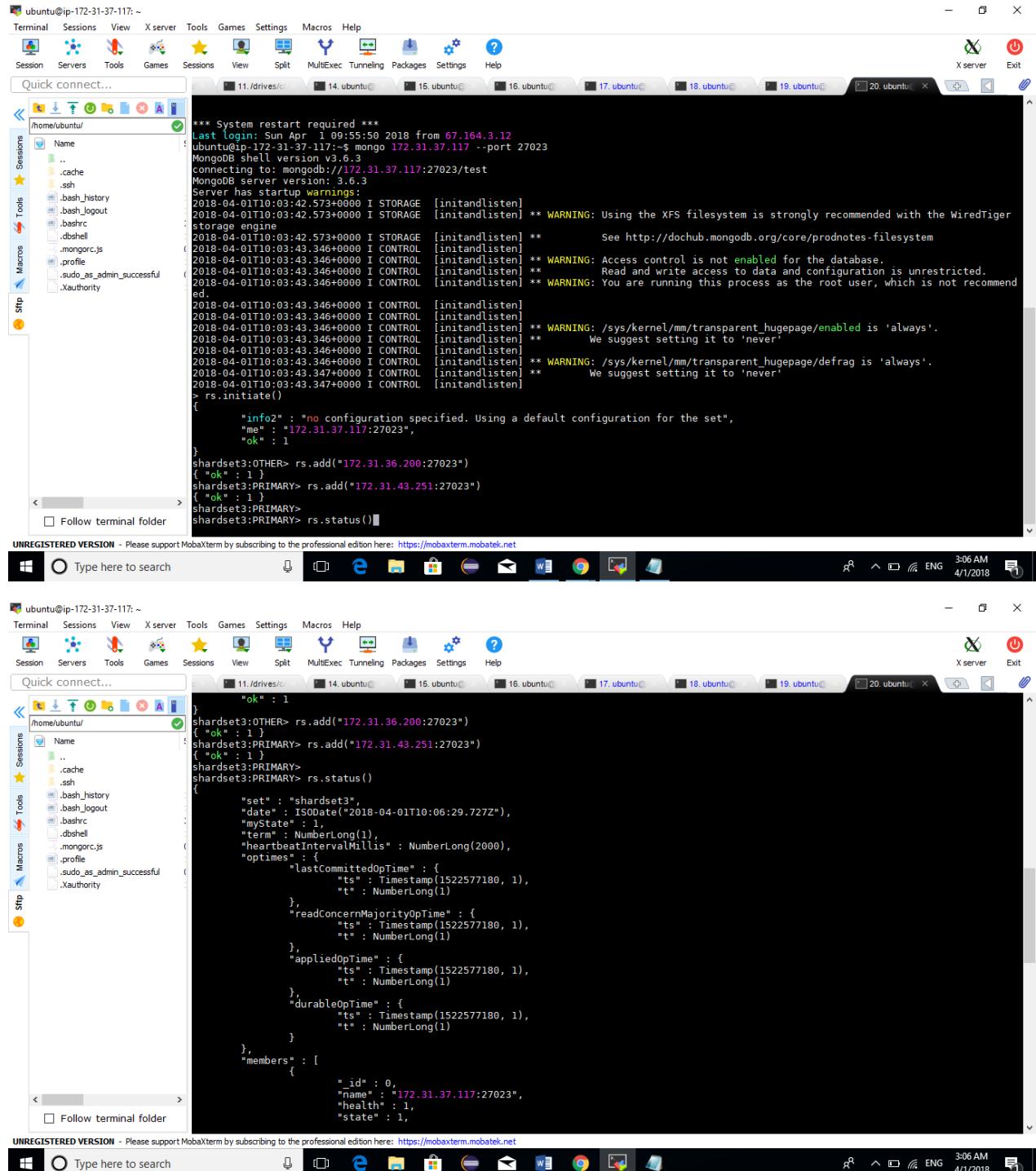


```
ubuntu@ip-172-31-37-117: ~
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
10.ubuntu@ 13.ubuntu@ 12.ubuntu@ 11.ubuntu@ 14.ubuntu@ 15.ubuntu@ 16.ubuntu@ 17.ubuntu@ + ×
Sessions Tools Macros Ssh
},
"members" : [
{
    "id" : 0,
    "name" : "172.31.37.117:27022",
    "health" : 1,
    "state" : 1,
    "stateStr" : "PRIMARY",
    "uptime" : 326,
    "optime" : {
        "ts" : Timestamp(1522576659, 1),
        "t" : NumberLong(1)
    },
    "optimeDate" : ISODate("2018-04-01T09:57:39Z"),
    "infoMessage" : "could not find member to sync from",
    "electionTime" : Timestamp(1522576615, 2),
    "electionDate" : ISODate("2018-04-01T09:56:55Z"),
    "configVersion" : 3,
    "self" : true
},
{
    "id" : 1,
    "name" : "172.31.36.200:27022",
    "health" : 1,
    "state" : 2,
    "stateStr" : "SECONDARY",
    "uptime" : 35,
    "optime" : {
        "ts" : Timestamp(1522576659, 1),
        "t" : NumberLong(1)
    },
    "optimeDurable" : {
        "ts" : Timestamp(1522576659, 1),
        "t" : NumberLong(1)
    },
    "optimeDate" : ISODate("2018-04-01T09:57:39Z"),
    "optimeDurableDate" : ISODate("2018-04-01T09:57:39Z"),
}
```

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Perform the same steps to create shardet3(Primary will be a member of the sharding scheme and is replicated using 2 other nodes)



```
ubuntu@ip-172-31-37-117: ~
*** System restart required ***
Last login: Sun Apr  1 09:55:50 2018 from 67.164.3.12
ubuntu@ip-172-31-37-117:~$ mongo 172.31.37.117 --port 27023
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.37.117:27023/test
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T10:03:42.573+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T10:03:42.573+0000 I STORAGE [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten] ** WARNING: Read and write access to data and configuration is unrestricted.
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten]
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten]
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten] We suggest setting it to 'never'
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten]
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T10:03:43.347+0000 I CONTROL [initandlisten] ** WARNING: We suggest setting it to 'never'
2018-04-01T10:03:43.347+0000 I CONTROL [initandlisten]
> rs.initiate()
{
  "info2" : "no configuration specified. Using a default configuration for the set",
  "me" : "172.31.37.117:27023",
  "ok" : 1
}
shardset3:OTHER> rs.add("172.31.36.200:27023")
{
  "ok" : 1
}
shardset3:PRIMARY> rs.add("172.31.43.251:27023")
{
  "ok" : 1
}
shardset3:PRIMARY>
shardset3:PRIMARY> rs.status()
{
  "set" : "shardset3",
  "date" : ISODate("2018-04-01T10:06:29.727Z"),
  "myState" : 1,
  "term" : NumberLong(1),
  "heartbeatIntervalMillis" : NumberLong(2000),
  "optimes" : {
    "lastCommittedOpTime" : {
      "ts" : Timestamp(1522577180, 1),
      "t" : NumberLong(1)
    },
    "readConcernMajorityOpTime" : {
      "ts" : Timestamp(1522577180, 1),
      "t" : NumberLong(1)
    },
    "appliedOpTime" : {
      "ts" : Timestamp(1522577180, 1),
      "t" : NumberLong(1)
    },
    "durableOpTime" : {
      "ts" : Timestamp(1522577180, 1),
      "t" : NumberLong(1)
    }
  },
  "members" : [
    {
      "_id" : 0,
      "name" : "172.31.37.117:27023",
      "health" : 1,
      "state" : 1,
      "stateStr" : "PRIMARY"
    }
  ]
}

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```

```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
11 ./drives/ 14. ubuntu@ 15. ubuntu@ 16. ubuntu@ 17. ubuntu@ 18. ubuntu@ 19. ubuntu@ 20. ubuntu@ X server Exit
< /> /home/ubuntu/
},
"members": [
  {
    "id": 0,
    "name": "172.31.37.117:27023",
    "health": 1,
    "state": 1,
    "stateStr": "PRIMARY",
    "uptime": 167,
    "optime": {
      "ts": Timestamp(1522577180, 1),
      "t": NumberLong(1)
    },
    "optimeDate": ISODate("2018-04-01T10:06:20Z"),
    "infoMessage": "could not find member to sync from",
    "electionTime": Timestamp(1522577135, 2),
    "electionDate": ISODate("2018-04-01T10:05:35Z"),
    "configVersion": 3,
    "self": true
  },
  {
    "id": 1,
    "name": "172.31.36.200:27023",
    "health": 1,
    "state": 2,
    "stateStr": "SECONDARY",
    "uptime": 27,
    "optime": {
      "ts": Timestamp(1522577180, 1),
      "t": NumberLong(1)
    },
    "optimeDurable": {
      "ts": Timestamp(1522577180, 1),
      "t": NumberLong(1)
    },
    "optimeDate": ISODate("2018-04-01T10:06:20Z"),
    "optimeDurableDate": ISODate("2018-04-01T10:06:20Z"),
    "lastHeartbeat": ISODate("2018-04-01T10:06:28.634Z"),
    "lastHeartbeatRecv": ISODate("2018-04-01T10:06:29.635Z"),
    "pingMs": NumberLong(0),
    "syncingTo": "172.31.37.117:27023",
    "configVersion": 3
  }
],
"ok": 1
shardset3:PRIMARY>

```

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```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
11 ./drives/ 14. ubuntu@ 15. ubuntu@ 16. ubuntu@ 17. ubuntu@ 18. ubuntu@ 19. ubuntu@ 20. ubuntu@ X server Exit
< /> /home/ubuntu/
},
"members": [
  {
    "id": 0,
    "name": "172.31.37.117:27023",
    "health": 1,
    "state": 1,
    "stateStr": "PRIMARY",
    "uptime": 167,
    "optime": {
      "ts": Timestamp(1522577180, 1),
      "t": NumberLong(1)
    },
    "optimeDate": ISODate("2018-04-01T10:06:20Z"),
    "optimeDurableDate": ISODate("2018-04-01T10:06:20Z"),
    "lastHeartbeat": ISODate("2018-04-01T10:06:28.634Z"),
    "lastHeartbeatRecv": ISODate("2018-04-01T10:06:29.635Z"),
    "pingMs": NumberLong(0),
    "syncingTo": "172.31.37.117:27023",
    "configVersion": 3
  },
  {
    "id": 1,
    "name": "172.31.43.251:27023",
    "health": 1,
    "state": 2,
    "stateStr": "SECONDARY",
    "uptime": 9,
    "optime": {
      "ts": Timestamp(1522577180, 1),
      "t": NumberLong(1)
    },
    "optimeDurable": {
      "ts": Timestamp(1522577180, 1),
      "t": NumberLong(1)
    },
    "optimeDate": ISODate("2018-04-01T10:06:20Z"),
    "optimeDurableDate": ISODate("2018-04-01T10:06:20Z"),
    "lastHeartbeat": ISODate("2018-04-01T10:06:28.634Z"),
    "lastHeartbeatRecv": ISODate("2018-04-01T10:06:29.647Z"),
    "pingMs": NumberLong(0),
    "syncingTo": "172.31.37.117:27023",
    "configVersion": 3
  }
],
"ok": 1
shardset3:PRIMARY>

```

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9. Add shards: make sure to include the result of sh.status() after adding shards

Add the shards in the mongos: (kindly ignore shardset1) I created another shard set named shardset01 with port 27024(\*\*)

## Example for adding a shard

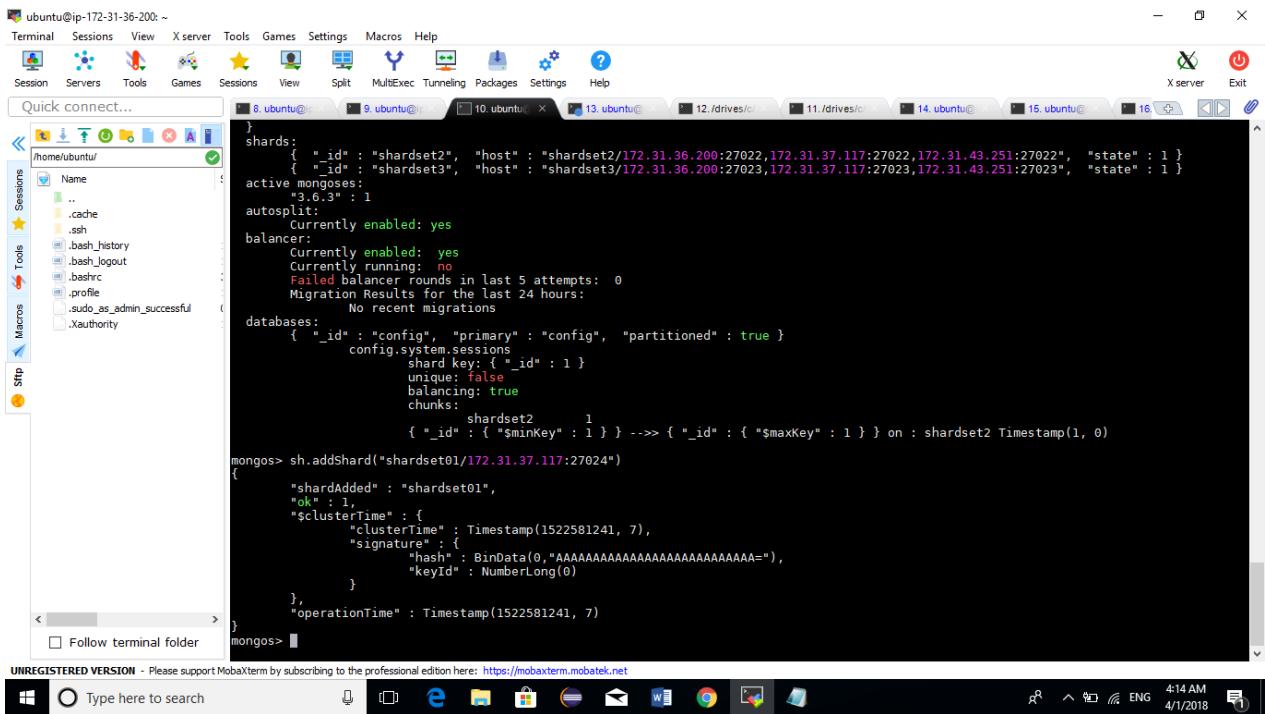
The screenshot shows a terminal window titled "mongos" in MobaXterm. The user is executing a command to add a shard to a shard set:

```
sh.addShard("shardset3/172.31.37.117:27023")
```

The response from the server includes the following fields:

- "shardAdded" : "shardset3"
- "ok" : 1
- "\$clusterTime" : {
  - "clusterTime" : Timestamp(1522579426, 6)
  - "signature" : {
    - "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAA=')
    - "keyId" : NumberLong(0)
- "operationTime" : Timestamp(1522579426, 6)

The terminal window also displays a file tree for the user's home directory (~/.ssh, .profile, etc.) and a sidebar with various tools like Sessions, Macros, and Help.



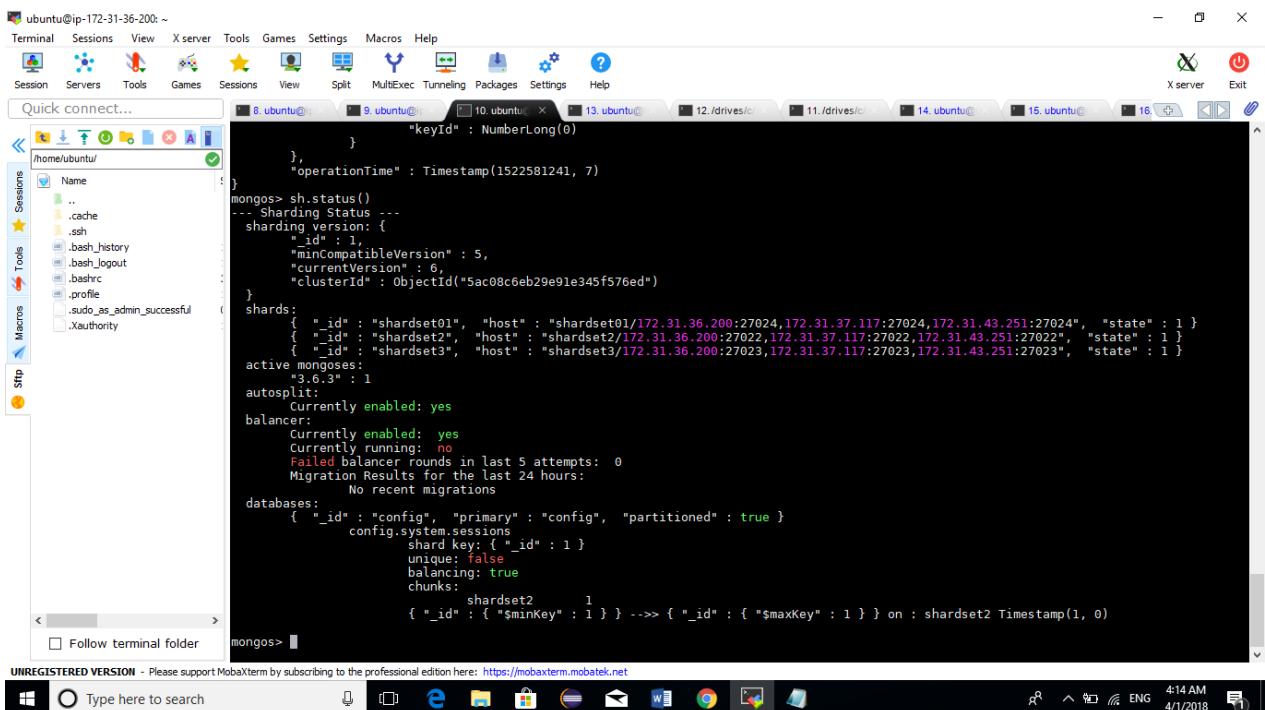
```

ubuntu@ip-172-31-36-200: ~
mongos> sh.addShard("shardset01/172.31.37.117:27024")
{
  "shardAdded" : "shardset01",
  "ok" : 1,
  "$clusterTime" : {
    "clusterTime" : Timestamp(1522581241, 7),
    "signature" : {
      "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAA="),
      "keyId" : NumberLong(0)
    }
  },
  "operationTime" : Timestamp(1522581241, 7)
}
mongos>

```

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### Shards added: Showing three shards and replicated shardsets



```

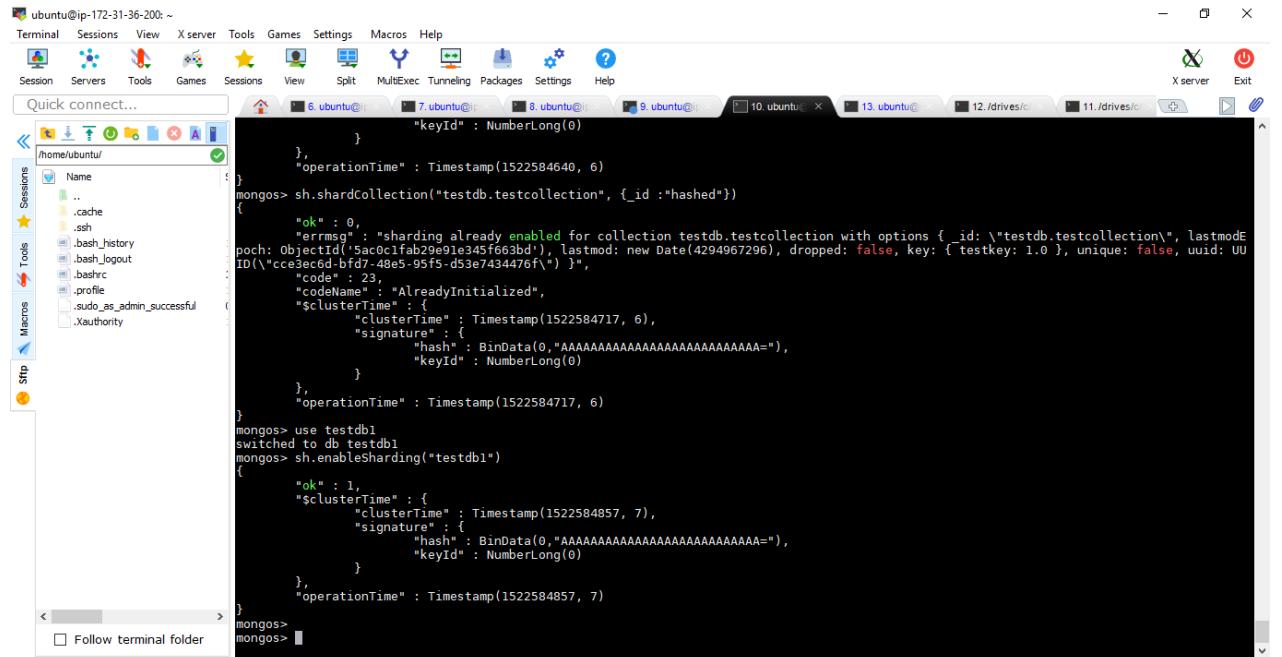
ubuntu@ip-172-31-36-200: ~
mongos> sh.status()
{
  "sharding" : {
    "version" : {
      "_id" : 1,
      "minCompatibleVersion" : 5,
      "currentVersion" : 6,
      "clusterId" : ObjectId("5ac08c6eb29e91e345f576ed")
    }
  },
  "shards" : [
    {
      "_id" : "shardset01",
      "host" : "shardset01/172.31.36.200:27024,172.31.37.117:27024,172.31.43.251:27024",
      "state" : 1
    },
    {
      "_id" : "shardset2",
      "host" : "shardset2/172.31.36.200:27022,172.31.37.117:27022,172.31.43.251:27022",
      "state" : 1
    },
    {
      "_id" : "shardset3",
      "host" : "shardset3/172.31.36.200:27023,172.31.37.117:27023,172.31.43.251:27023",
      "state" : 1
    }
  ],
  "active mongoses" : "3.6.3" : 1
}
autosplit:
  Currently enabled: yes
balancer:
  Currently enabled: yes
  Currently running: no
  Failed balancer rounds in last 5 attempts: 0
  Migration Results for the last 24 hours:
    No recent migrations
databases:
  {
    "_id" : "config",
    "primary" : "config",
    "partitioned" : true
  }
  config.system.sessions
    shard key: { "_id" : 1 }
    unique: false
    balancing: true
    chunks:
      shardset2
        shardset2
          1
  {
    "_id" : { "$minKey" : 1 } } --> { "_id" : { "$maxKey" : 1 } } on : shardset2 Timestamp(1, 0)
mongos>

```

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10. Enable shards: explain the nature of the shard key (ascending, random, or location based) and the sharding strategy (range-based or hash based)

I have used hash based key on the `_id` field as it contains unique values.



```

ubuntu@ip-172-31-36-200: ~
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
6. ubuntu@... 7. ubuntu@... 8. ubuntu@... 9. ubuntu@... 10. ubuntu@... 13. ubuntu@... 12./drives/c... 11./drives/c...
X server Exit
/home/ubuntu/
Sessions Tools Macros Ssh
Name
.. .cache .ssh .bash_history .bash_logout .bashrc .profile .sudo_as_admin_successful .Xauthority
mongos> sh.shardCollection("testdb.testcollection", {_id : "hashed"})
{
    "ok" : 0,
    "errmsg" : "sharding already enabled for collection testdb.testcollection with options {_id: \\"testdb.testcollection\\", lastModEpoch: ObjectId('5ac0c1fab29e91e345f663bd'), lastMod: new Date(4294967296), dropped: false, key: { testkey: 1.0 }, unique: false, uuid: UUID('cce3e3c6d-bfd7-48e5-95f5-d53e7434476f')}",
    "code" : 23,
    "codeName" : "AlreadyInitialized",
    "$clusterTime" : {
        "clusterTime" : Timestamp(1522584717, 6),
        "signature" : {
            "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAAA="),
            "keyId" : NumberLong(0)
        }
    },
    "operationTime" : Timestamp(1522584717, 6)
}
mongos> use testdb1
switched to db testdb1
mongos> sh.enableSharding("testdb1")
{
    "ok" : 1,
    "$clusterTime" : {
        "clusterTime" : Timestamp(1522584857, 7),
        "signature" : {
            "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAAA="),
            "keyId" : NumberLong(0)
        }
    },
    "operationTime" : Timestamp(1522584857, 7)
}
mongos>
mongos>

```

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### Hash \_id as shard key:

```

ubuntu@ip-172-31-36-200: ~
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultExec Tunneling Packages Settings Help
X server Exit
Quick connect...
6.ubuntu@... 7.ubuntu@... 8.ubuntu@... 9.ubuntu@... 10.ubuntu@... 13.ubuntu@... 12./drives/c/ 11./drives/c/
/home/ubuntu/
Name .. .cache .ssh .bash_history .bash_logout .bashrc .profile .sudo_as_admin_successful .xauthority
mongos> use testdb1
switched to db testdb1
mongos> sh.enableSharding("testdb1")
{
  "ok" : 1,
  "$clusterTime" : {
    "clusterTime" : Timestamp(1522584717, 6),
    "signature" : {
      "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAAA="),
      "keyId" : NumberLong(0)
    }
  },
  "operationTime" : Timestamp(1522584717, 6)
}
mongos>
mongos> sh.shardCollection("testdb1.testcollection", { _id:"hashed"})
{
  "collectionssharded" : "testdb1.testcollection",
  "collectionUUID" : UUID("66981ae2-c31f-4882-8a38-1eaef2b44c4a"),
  "ok" : 1,
  "$clusterTime" : {
    "clusterTime" : Timestamp(1522584921, 26),
    "signature" : {
      "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAAAA="),
      "keyId" : NumberLong(0)
    }
  },
  "operationTime" : Timestamp(1522584921, 14)
}
mongos> [REDACTED]

```

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11. Populate data in the cluster: Explain your collection and include the code to populate data and sh.status() after populating data.

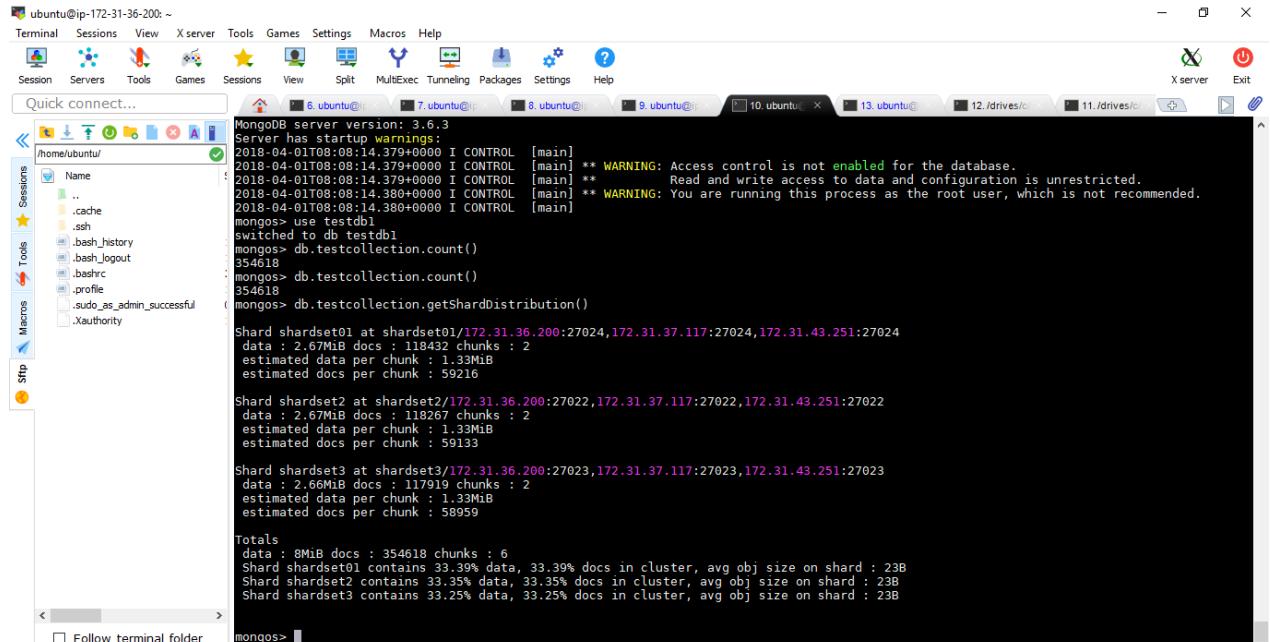
```

db = (new Mongo("172.31.37.117:27024")).getDB("testdb1")
db.testcollection.count()
for(var i=0;i<10000000;i++){
  db.testcollection.insert({"_id":"key"+i})
}

```

I stopped the loop after 354618 records got added.

## Shard distribution after populating data:



```

ubuntu@ip-172-31-36-200: ~
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T08:08:14.379+0000 I CONTROL [main] ** WARNING: Access control is not enabled for the database.
2018-04-01T08:08:14.379+0000 I CONTROL [main] ** WARNING: Read and write access to data and configuration is unrestricted.
2018-04-01T08:08:14.380+0000 I CONTROL [main] ** WARNING: You are running this process as the root user, which is not recommended.
mongos> use testdb
switched to db testdb
mongos> db.testcollection.count()
354618
mongos> db.testcollection.count()
354618
mongos> db.testcollection.getShardDistribution()
Shard shardset01 at shardset01/172.31.36.200:27024,172.31.37.117:27024,172.31.43.251:27024
  data : 2.67MiB docs : 118432 chunks : 2
  estimated data per chunk : 1.33MiB
  estimated docs per chunk : 59216

Shard shardset2 at shardset2/172.31.36.200:27022,172.31.37.117:27022,172.31.43.251:27022
  data : 2.67MiB docs : 118267 chunks : 2
  estimated data per chunk : 1.33MiB
  estimated docs per chunk : 59133

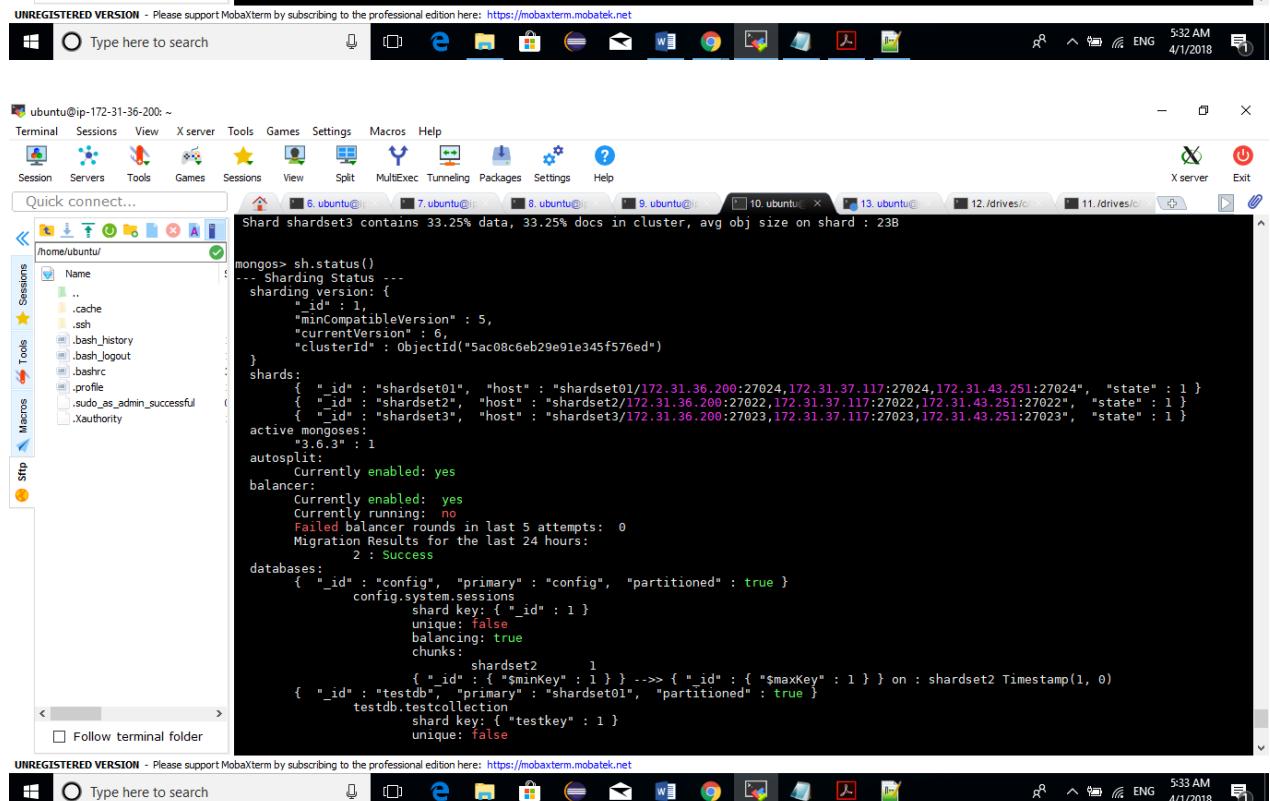
Shard shardset3 at shardset3/172.31.36.200:27023,172.31.37.117:27023,172.31.43.251:27023
  data : 2.66MiB docs : 117919 chunks : 2
  estimated data per chunk : 1.33MiB
  estimated docs per chunk : 58959

Totals
  data : 8MiB docs : 354618 chunks : 6
  Shard shardset01 contains 33.39% data, 33.39% docs in cluster, avg obj size on shard : 238
  Shard shardset2 contains 33.35% data, 33.35% docs in cluster, avg obj size on shard : 238
  Shard shardset3 contains 33.25% data, 33.25% docs in cluster, avg obj size on shard : 238

mongos>

```

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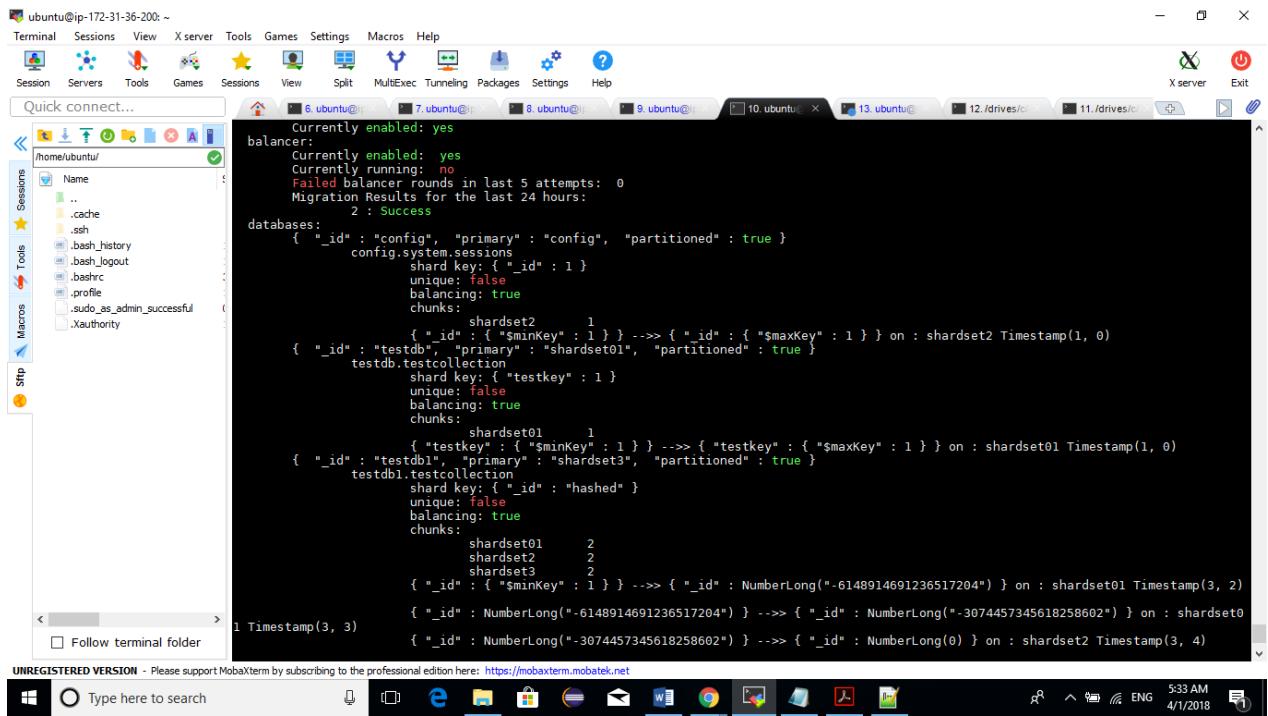
```

ubuntu@ip-172-31-36-200: ~
Shard shardset3 contains 33.25% data, 33.25% docs in cluster, avg obj size on shard : 238

mongos> sh.status()
--- Sharding Status ---
sharding version: {
  "id" : 1,
  "minCompatibleVersion" : 5,
  "currentVersion" : 6,
  "clusterVersion" : ObjectId("5ac08c6eb29e91e345f576ed")
}
shards:
  { "_id" : "shardset01", "host" : "shardset01/172.31.36.200:27024,172.31.37.117:27024,172.31.43.251:27024", "state" : 1 }
  { "_id" : "shardset2", "host" : "shardset2/172.31.36.200:27022,172.31.37.117:27022,172.31.43.251:27022", "state" : 1 }
  { "_id" : "shardset3", "host" : "shardset3/172.31.36.200:27023,172.31.37.117:27023,172.31.43.251:27023", "state" : 1 }
active mongoses:
  "3.6.3" : 1
autosplit:
  currently enabled: yes
balancer:
  Currently enabled: yes
  Currently running: no
  Failed balancer rounds in last 5 attempts: 0
  Migration Results for the last 24 hours:
    2 : Success
databases:
  { "_id" : "config", "primary" : "config", "partitioned" : true }
    config.system.sessions
      shard key: { "_id" : 1 }
      unique: false
      balancing: true
      chunks:
        shardset2
          { "_id" : { "$minKey" : 1 } } --> { "_id" : { "$maxKey" : 1 } } on : shardset2 Timestamp(1, 0)
  { "_id" : "testdb", "primary" : "shardset01", "partitioned" : true }
    testdb.testcollection
      shard key: { "testkey" : 1 }
      unique: false

```

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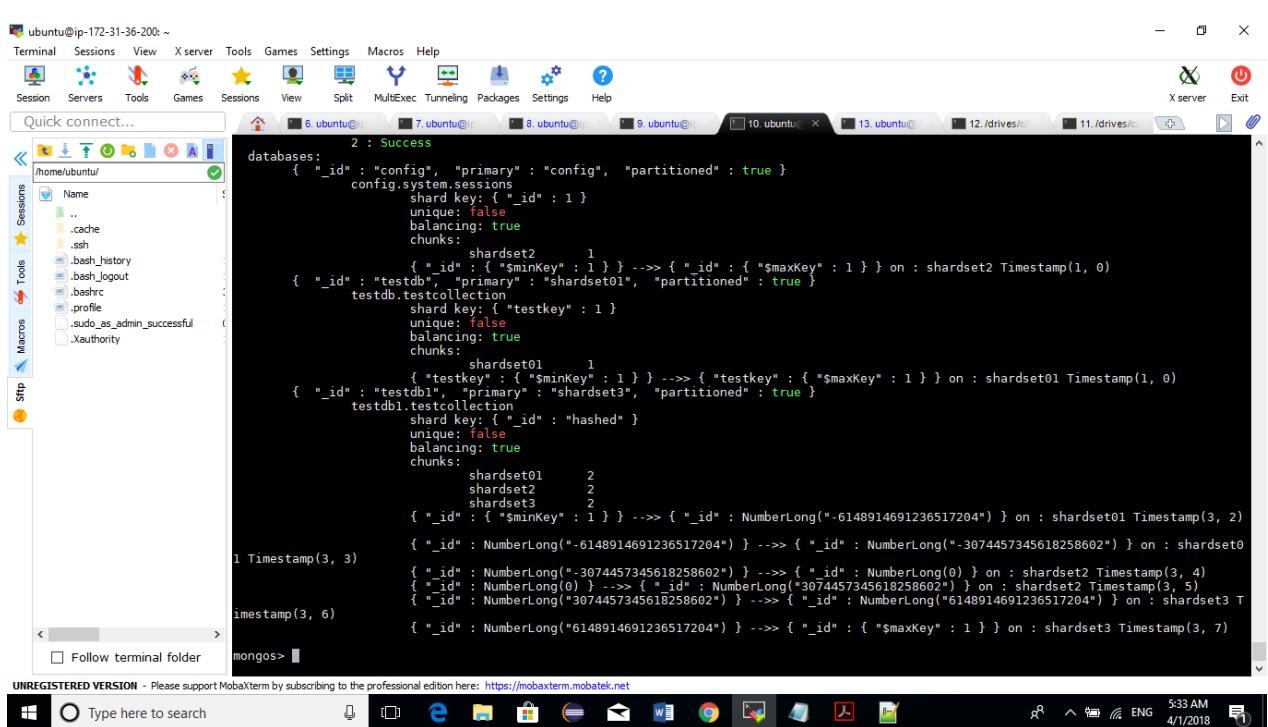


```

ubuntu@ip-172-31-36-200: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
6 ubuntu@... 7 ubuntu@... 8 ubuntu@... 9 ubuntu@... 10 ubuntu@... 13 ubuntu@... 12./drives/... 11./drives/...
X server Exit
/home/ubuntu/
Name
.. .cache .ssh .bash_history .bash_logout .bashrc .profile .sudo_as_admin_successful .xauthority
Currenty enabled: yes
balancer:
  Currently enabled: yes
  Currently running: no
  Failed balancer rounds in last 5 attempts: 0
  Migration Results for the last 24 hours:
    2 : Success
databases:
  { "_id" : "config", "primary" : "config", "partitioned" : true }
    config.system.sessions
      shard key: { "_id" : 1 }
      unique: false
      balancing: true
      chunks:
        shardset2 1
        { "_id" : { "$minKey" : 1 } } --> { "_id" : { "$maxKey" : 1 } } on : shardset2 Timestamp(1, 0)
  { "_id" : "testdb", "primary" : "shardset01", "partitioned" : true }
    testdb.testcollection
      shard key: { "testkey" : 1 }
      unique: false
      balancing: true
      chunks:
        shardset01 1
        { "testkey" : { "$minKey" : 1 } } --> { "testkey" : { "$maxKey" : 1 } } on : shardset01 Timestamp(1, 0)
  { "_id" : "testdb1", "primary" : "shardset3", "partitioned" : true }
    testdb1.testcollection
      shard key: { "_id" : "hashed" }
      unique: false
      balancing: true
      chunks:
        shardset01 2
        shardset2 2
        shardset3 2
        { "_id" : { "$minKey" : 1 } } --> { "_id" : NumberLong("-6148914691236517204" ) } on : shardset01 Timestamp(3, 2)
        { "_id" : NumberLong("-6148914691236517204" ) } --> { "_id" : NumberLong("-3074457345618258602" ) } on : shardset0
        { "_id" : NumberLong("-3074457345618258602" ) } --> { "_id" : NumberLong("0" ) } on : shardset2 Timestamp(3, 4)
        { "_id" : { "$minKey" : 1 } } --> { "_id" : NumberLong("6148914691236517204" ) } on : shardset3 Timestamp(3, 6)
        { "_id" : NumberLong("6148914691236517204" ) } --> { "_id" : { "$maxKey" : 1 } } on : shardset3 Timestamp(3, 7)
1 Timestamp(3, 3)
Follow terminal folder

```

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```

ubuntu@ip-172-31-36-200: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
6 ubuntu@... 7 ubuntu@... 8 ubuntu@... 9 ubuntu@... 10 ubuntu@... 13 ubuntu@... 12./drives/... 11./drives/...
X server Exit
/home/ubuntu/
Name
.. .cache .ssh .bash_history .bash_logout .bashrc .profile .sudo_as_admin_successful .xauthority
2 : Success
databases:
  { "_id" : "config", "primary" : "config", "partitioned" : true }
    config.system.sessions
      shard key: { "_id" : 1 }
      unique: false
      balancing: true
      chunks:
        shardset2 1
        { "_id" : { "$minKey" : 1 } } --> { "_id" : { "$maxKey" : 1 } } on : shardset2 Timestamp(1, 0)
  { "_id" : "testdb", "primary" : "shardset01", "partitioned" : true }
    testdb.testcollection
      shard key: { "testkey" : 1 }
      unique: false
      balancing: true
      chunks:
        shardset01 1
        { "testkey" : { "$minKey" : 1 } } --> { "testkey" : { "$maxKey" : 1 } } on : shardset01 Timestamp(1, 0)
  { "_id" : "testdb1", "primary" : "shardset3", "partitioned" : true }
    testdb1.testcollection
      shard key: { "_id" : "hashed" }
      unique: false
      balancing: true
      chunks:
        shardset01 2
        shardset2 2
        shardset3 2
        { "_id" : { "$minKey" : 1 } } --> { "_id" : NumberLong("-6148914691236517204" ) } on : shardset01 Timestamp(3, 2)
        { "_id" : NumberLong("-6148914691236517204" ) } --> { "_id" : NumberLong("-3074457345618258602" ) } on : shardset0
        { "_id" : NumberLong("-3074457345618258602" ) } --> { "_id" : NumberLong("0" ) } on : shardset2 Timestamp(3, 4)
        { "_id" : { "$minKey" : 1 } } --> { "_id" : NumberLong("3074457345618258602" ) } on : shardset3 Timestamp(3, 5)
        { "_id" : NumberLong("3074457345618258602" ) } --> { "_id" : NumberLong("6148914691236517204" ) } on : shardset3 T
        { "_id" : NumberLong("6148914691236517204" ) } --> { "_id" : { "$maxKey" : 1 } } on : shardset3 Timestamp(3, 7)
1 Timestamp(3, 3)
imstamp(3, 6)
mongos>

```

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Check if data is sharded and replicated:

(Login to a member of a shard scheme and check for some number of data; now login to other nodes in the replica set of that shard to check if the same count exists as part of replication)

### Shardset3 – secondary node1 and Primary(shard member) :

```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Session View Split MultExec Tunneling Packages Settings Help
Quick connect...
21.ubuntu@ 23.ubuntu@ 26.ubuntu@ 27.ubuntu@ 28./home/m 29.ubuntu@ 30.ubuntu@ 31.ubuntu@ Xserver Exit
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'.
2018-04-01T10:03:43.346+0000 I CONTROL [initandlisten]
2018-04-01T10:03:43.347+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T10:03:43.347+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'.
2018-04-01T10:03:43.347+0000 I CONTROL [initandlisten]
shardset3:PRIMARY> use testdb1
shardset3:PRIMARY> db.testcollection.count()
117919
shardset3:PRIMARY> exit
bye
ubuntu@ip-172-31-37-117:~$ mongo 172.31.36.200 --port 27023
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.36.200:27023/test
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T10:03:57.714+0000 I STORAGE [initandlisten]
2018-04-01T10:03:57.714+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T10:03:57.714+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T10:03:58.449+0000 I CONTROL [initandlisten]
2018-04-01T10:03:58.449+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T10:03:58.449+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T10:03:58.449+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T10:03:58.449+0000 I CONTROL [initandlisten]
2018-04-01T10:03:58.449+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T10:03:58.449+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'.
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten]
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'.
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten]
shardset3:SECONDARY> rs.slaveOk()
shardset3:SECONDARY> use testdb1
shardset3:SECONDARY> db.testcollection.count()
117919
shardset3:SECONDARY>

```

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### Shardset3 – secondary node2(Replicated) :

```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Session View Split MultExec Tunneling Packages Settings Help
Quick connect...
21.ubuntu@ 23.ubuntu@ 26.ubuntu@ 27.ubuntu@ 28./home/m 29.ubuntu@ 30.ubuntu@ 31.ubuntu@ Xserver Exit
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'.
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten]
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'.
2018-04-01T10:03:58.450+0000 I CONTROL [initandlisten]
shardset3:SECONDARY> rs.slaveOk()
shardset3:SECONDARY> use testdb1
shardset3:SECONDARY> db.testcollection.count()
117919
shardset3:SECONDARY> exit
bye
ubuntu@ip-172-31-37-117:~$ mongo 172.31.43.251 --port 27023
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.43.251:27023/test
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T10:04:08.124+0000 I STORAGE [initandlisten]
2018-04-01T10:04:08.124+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T10:04:08.124+0000 I STORAGE [initandlisten] ** See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T10:04:08.846+0000 I CONTROL [initandlisten]
2018-04-01T10:04:08.846+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T10:04:08.846+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T10:04:08.846+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T10:04:08.846+0000 I CONTROL [initandlisten]
2018-04-01T10:04:08.846+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T10:04:08.846+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'.
2018-04-01T10:04:08.846+0000 I CONTROL [initandlisten]
2018-04-01T10:04:08.847+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T10:04:08.847+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'.
2018-04-01T10:04:08.847+0000 I CONTROL [initandlisten]
shardset3:SECONDARY> rs.slaveOk()
shardset3:SECONDARY> use testdb1
shardset3:SECONDARY> db.testcollection.count()
117919
shardset3:SECONDARY>

```

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## Check for the corresponding replication with sharding on shardset2

```

ubuntu@ip-172-31-37-117: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
23.ubuntu 26.ubuntu 27.ubuntu 28.homeim 29.ubuntu 30.ubuntu 31.ubuntu 32.ubuntu
2018-04-01T00:04:08.846+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T00:04:08.846+0000 I CONTROL [initandlisten]
2018-04-01T00:04:08.846+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T00:04:08.847+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
shardset3:SECONDARY> rs.slaveOk()
shardset3:SECONDARY> use testdb1
shardset3:SECONDARY> db.testcollection.count()
117919
shardset3:SECONDARY> exit
bye
ubuntu@ip-172-31-37-117:~$ mongo 172.31.37.117 --port 27022
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.37.117:27022/test
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T00:52:30.125+0000 I STORAGE [initandlisten]
2018-04-01T00:52:30.125+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T00:52:30.125+0000 I STORAGE [initandlisten] See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten]
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten]
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten]
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten]
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T00:52:30.185+0000 I CONTROL [initandlisten]
shardset2:PRIMARY> use testdb1
shardset2:PRIMARY> db.testcollection.count()
118267
shardset2:PRIMARY> exit
bye

```

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```

ubuntu@ip-172-31-43-251: ~
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
12.drives/c 13.ubuntu 14.ubuntu 15.ubuntu 16.ubuntu 17.ubuntu 18.ubuntu 19.ubuntu
2018-04-01T00:52:59.053+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T00:52:59.053+0000 I CONTROL [initandlisten]
2018-04-01T00:52:59.053+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T00:52:59.053+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
shardset2:SECONDARY> rs.slaveOk()
shardset2:SECONDARY> use testdb1
shardset2:SECONDARY> db.testcollection.count()
118267
shardset2:SECONDARY> exit
bye
ubuntu@ip-172-31-43-251:~$ mongo 172.31.36.200 --port 27022
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.36.200:27022/test
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T00:52:46.404+0000 I STORAGE [initandlisten]
2018-04-01T00:52:46.404+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine
2018-04-01T00:52:46.404+0000 I STORAGE [initandlisten] See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T00:52:47.138+0000 I CONTROL [initandlisten]
2018-04-01T00:52:47.138+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T00:52:47.138+0000 I CONTROL [initandlisten] ** Read and write access to data and configuration is unrestricted.
2018-04-01T00:52:47.138+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommended.
2018-04-01T00:52:47.138+0000 I CONTROL [initandlisten]
2018-04-01T00:52:47.138+0000 I CONTROL [initandlisten]
2018-04-01T00:52:47.138+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T00:52:47.138+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
2018-04-01T00:52:47.139+0000 I CONTROL [initandlisten]
2018-04-01T00:52:47.139+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T00:52:47.139+0000 I CONTROL [initandlisten] ** We suggest setting it to 'never'
shardset2:PRIMARY> rs.slaveOk()
shardset2:PRIMARY> use testdb1
shardset2:PRIMARY> db.testcollection.count()
118267
shardset2:PRIMARY>

```

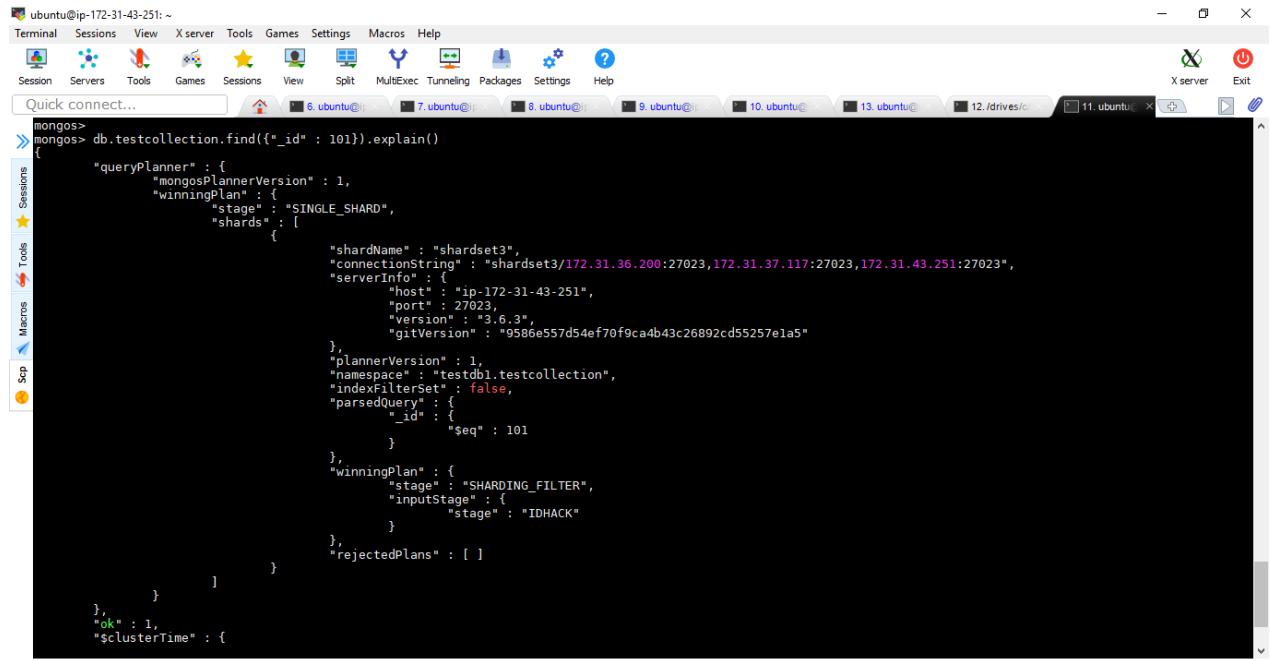
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## Check on shardset01

```
Ubuntu@ip-172-31-37-117:~$ mongo 172.31.37.117:27024
MongoDB shell version v3.6.3
connecting to: mongodb://172.31.37.117:27024/test
MongoDB server version: 3.6.3
Server has startup warnings:
2018-04-01T11:09:38.872+0000 I STORAGE [initandlisten]
2018-04-01T11:09:38.872+0000 I STORAGE [initandlisten] ** WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger
storage engine
2018-04-01T11:09:38.872+0000 I STORAGE [initandlisten] **           See http://dochub.mongodb.org/core/prodnotes-filesystem
2018-04-01T11:09:39.651+0000 I CONTROL [initandlisten]
2018-04-01T11:09:39.651+0000 I CONTROL [initandlisten] ** WARNING: Access control is not enabled for the database.
2018-04-01T11:09:39.651+0000 I CONTROL [initandlisten] **           Read and write access to data and configuration is unrestricted.
2018-04-01T11:09:39.651+0000 I CONTROL [initandlisten] ** WARNING: You are running this process as the root user, which is not recommend
ed.
2018-04-01T11:09:39.651+0000 I CONTROL [initandlisten]
2018-04-01T11:09:39.651+0000 I CONTROL [initandlisten]
2018-04-01T11:09:39.652+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/enabled is 'always'.
2018-04-01T11:09:39.652+0000 I CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T11:09:39.652+0000 I CONTROL [initandlisten]
2018-04-01T11:09:39.652+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/mm/transparent_hugepage/defrag is 'always'.
2018-04-01T11:09:39.652+0000 I CONTROL [initandlisten] **           We suggest setting it to 'never'
2018-04-01T11:09:39.652+0000 I CONTROL [initandlisten]
shardset01:PRIMARY> use testdb1
switched to db testdb1
shardset01:PRIMARY> db.testcollection.count()
118432
shardset01:PRIMARY> ■
```

```
shardset01:SECONDARY> use testdb1
switched to db testdb1
shardset01:SECONDARY> db.testcollection.count()
118432
shardset01:SECONDARY> ■
```

12. Generate one query and show which shard served the query. Used explain()  
Winning plan shows the shard used.

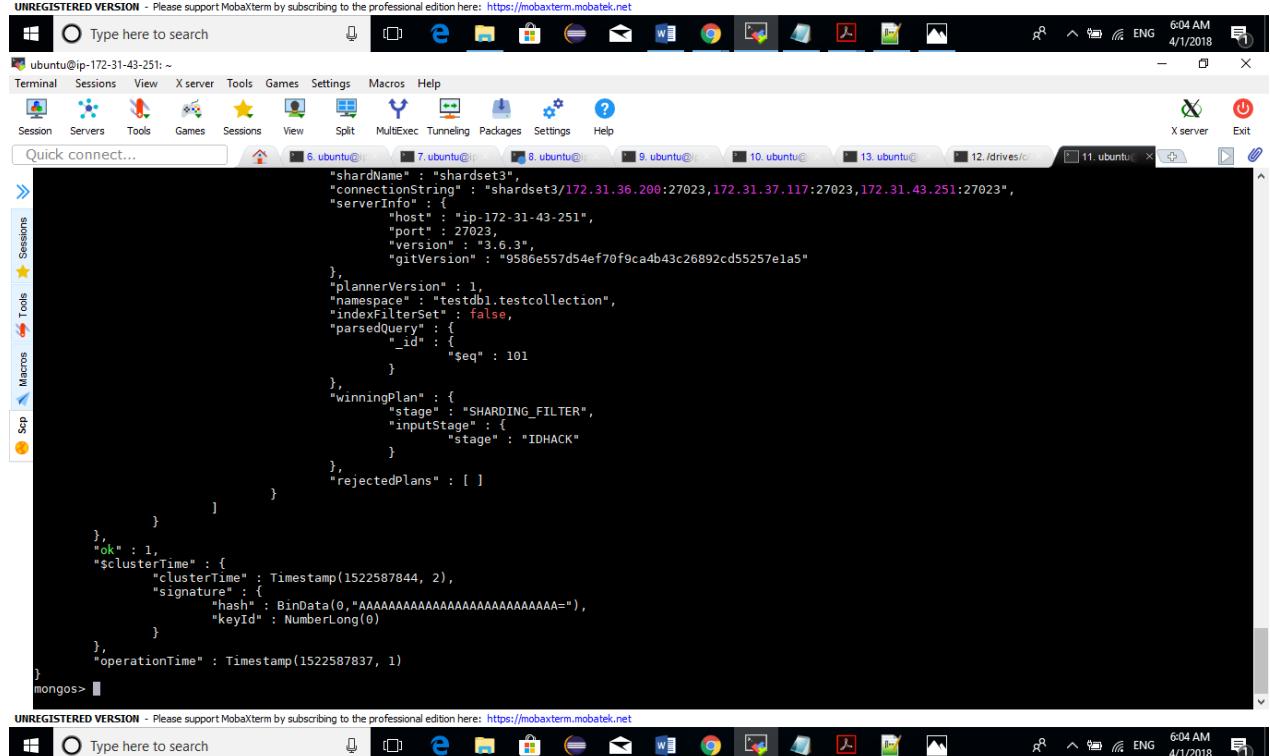


```

ubuntu@ip-172-31-43-251: ~
mongos> db.testcollection.find({_id : 101}).explain()
{
    "queryPlanner" : {
        "mongosPlannerVersion" : 1,
        "winningPlan" : {
            "stage" : "STAGE_SHARD",
            "shards" : [
                {
                    "shardName" : "shardset3",
                    "connectionString" : "shardset3/172.31.36.200:27023,172.31.37.117:27023,172.31.43.251:27023",
                    "serverInfo" : {
                        "host" : "ip-172-31-43-251",
                        "port" : 27023,
                        "version" : "3.6.3",
                        "gitVersion" : "9586e557d54ef70f9ca4b43c26892cd55257e1a5"
                    },
                    "plannerVersion" : 1,
                    "namespace" : "testdb1.testcollection",
                    "indexFilterSet" : false,
                    "parsedQuery" : {
                        "_id" : {
                            "$eq" : 101
                        }
                    },
                    "winningPlan" : {
                        "stage" : "SHARDING_FILTER",
                        "inputStage" : {
                            "stage" : "IDHACK"
                        }
                    },
                    "rejectedPlans" : [ ]
                }
            ]
        },
        "ok" : 1,
        "$clusterTime" : {
            "clusterTime" : Timestamp(1522587844, 2),
            "signature" : {
                "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAA="),
                "keyId" : NumberLong(0)
            }
        },
        "operationTime" : Timestamp(1522587837, 1)
    }
}
mongos>

```

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```

Windows PowerShell
Type here to search
ubuntu@ip-172-31-43-251: ~
mongos> db.testcollection.find({_id : 101}).explain()
{
    "queryPlanner" : {
        "mongosPlannerVersion" : 1,
        "winningPlan" : {
            "stage" : "STAGE_SHARD",
            "shards" : [
                {
                    "shardName" : "shardset3",
                    "connectionString" : "shardset3/172.31.36.200:27023,172.31.37.117:27023,172.31.43.251:27023",
                    "serverInfo" : {
                        "host" : "ip-172-31-43-251",
                        "port" : 27023,
                        "version" : "3.6.3",
                        "gitVersion" : "9586e557d54ef70f9ca4b43c26892cd55257e1a5"
                    },
                    "plannerVersion" : 1,
                    "namespace" : "testdb1.testcollection",
                    "indexFilterSet" : false,
                    "parsedQuery" : {
                        "_id" : {
                            "$eq" : 101
                        }
                    },
                    "winningPlan" : {
                        "stage" : "SHARDING_FILTER",
                        "inputStage" : {
                            "stage" : "IDHACK"
                        }
                    },
                    "rejectedPlans" : [ ]
                }
            ]
        },
        "ok" : 1,
        "$clusterTime" : {
            "clusterTime" : Timestamp(1522587844, 2),
            "signature" : {
                "hash" : BinData(0,"AAAAAAAAAAAAAAAAAAAAA="),
                "keyId" : NumberLong(0)
            }
        },
        "operationTime" : Timestamp(1522587837, 1)
    }
}
mongos>

```

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All commands to refer for the IPs and port numbers of shards and replicas.

#### CONFIGURING REPLICA SET

```
sudo mongod --configsvr --repSet configreplset --dbpath /db/config/data --bind_ip localhost,172.31.37.117
```

```
sudo mongod --configsvr --repSet configreplset --dbpath /db/config/data --bind_ip localhost,172.31.36.200
```

```
sudo mongod --configsvr --repSet configreplset --dbpath /db/config/data --bind_ip localhost,172.31.43.251
```

---

#### CONFIGURING MONGOS ADDING CONFIG SERVERS

```
sudo mongos --configdb configreplset/172.31.37.117:27019,172.31.36.200:27019,172.31.43.251:27019 --bind_ip localhost,172.31.37.117 --port 27020
```

---

#### SHARD SET 1

(primary shard0)

```
sudo mongod --shardsvr --repSet shardset01 --dbpath /db/set1/shard/data --bind_ip localhost,172.31.37.117 --port 27024
```

```
sudo mongod --shardsvr --repSet shardset01 --dbpath /db/set1/shard/data --bind_ip localhost,172.31.36.200 --port 27024
```

---

```
sudo mongod --shardsvr --repSet shardset01 --dbpath /db/set1/shard/data --bind_ip localhost,172.31.43.251 --port 27024
```

---

SHARD SET 2 [Replicating shards. If you made it, make sure to include its steps/procedure and screen-shots to show this task is accomplished.]

Created two more replicas set with each of its primary member as member as a member of the shard scheme with commands below. Screen shots included in above steps.

(Primary shard1)

```
sudo mongod --shardsvr --replicaSet shardset2 --dbpath /db/set2/shard/data --bind_ip localhost,172.31.37.117 --port 27022
```

```
sudo mongod --shardsvr --replicaSet shardset2 --dbpath /db/set2/shard/data --bind_ip localhost,172.31.36.200 --port 27022
```

```
sudo mongod --shardsvr --replicaSet shardset2 --dbpath /db/set2/shard/data --bind_ip localhost,172.31.43.251 --port 27022
```

---

### SHARD SET 3

(primary shard2)

```
sudo mongod --shardsvr --replicaSet shardset3 --dbpath /db/set3/shard/data --bind_ip localhost,172.31.37.117 --port 27023
```

```
sudo mongod --shardsvr --replicaSet shardset3 --dbpath /db/set3/shard/data --bind_ip localhost,172.31.36.200 --port 27023
```

```
sudo mongod --shardsvr --replicaSet shardset3 --dbpath /db/set3/shard/data --bind_ip localhost,172.31.43.251 --port 27023
```

---

=====

### ADDING SHARDS ON MONGOS

```
sh.addShard("shardset01/172.31.37.117:27024")
sh.addShard("shardset2/172.31.37.117:27022")
sh.addShard("shardset3/172.31.37.117:27023")
```