Implementación de Base de Datos NoSQL
Trabajo Práctico Nº6
Sharding en BD MongoDB

Grupo N°

Integrantes del Grupo:

Legajo	Nombre	E-Mail

Nota: 6

1. Implementar en Sharding en BD MongoDB

1. Basados en el ReplicaSet definido en el TP Nro 5.

Para esto debemos levantar los ReplicaSet del TP 5 con la cláusula --shardsvr.
Levantamos entonces el motor primario:

```
mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Primario --port 27001 --
smallfiles --oplogSize 50
```

```
Administrator: Windows Command Processor - mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Primario --port 27001 --smallfile...

C:\Program Files\MongoDB\Server\3.0\bin>mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Primario
--port 27001 --smallfiles --oplogSize 50
2015-05-23T14:25:02.264-0300 I CONTROL  Hotfix KB2731284 or later update is not installed, will zero-out data
files
2015-05-23T14:25:02.274-0300 I JOURNAL  [initandlisten] journal dir=c:\data\Primario\journal
2015-05-23T14:25:02.284-0300 I JOURNAL  [initandlisten] recover : no journal files present, no recovery needed

2015-05-23T14:25:02.513-0300 I JOURNAL  [durability] Durability thread started
2015-05-23T14:25:02.514-0300 I JOURNAL  [journal writer] Journal writer thread started
2015-05-23T14:25:02.516-0300 I CONTROL  [initandlisten] MongoDB starting : pid=6464 port=27001 dbpath=c:\data\
Primario 64-bit host=Dell-PC
2015-05-23T14:25:02.517-0300 I CONTROL  [initandlisten] targetMinOS: Windows 7/Windows Server 2008 R2
2015-05-23T14:25:02.517-0300 I CONTROL  [initandlisten] db version v3.0.2
2015-05-23T14:25:02.517-0300 I CONTROL  [initandlisten] git version: 6201872043ecbbc0a4cc169b5482dcf385fc464f
2015-05-23T14:25:02.517-0300 I CONTROL  [initandlisten] OpenSSL version: OpenSSL 1.0.1m-fips 19 Mar 2015
2015-05-23T14:25:02.518-0300 I CONTROL  [initandlisten] build info: windows sys.getwindowsversion(major=6, min
or=1, build=7601, platform=2, service_pack='Service Pack 1') BOOST_LIB_VERSION=1_49
2015-05-23T14:25:02.518-0300 I CONTROL  [initandlisten] allocator: system
2015-05-23T14:25:02.518-0300 I CONTROL  [initandlisten] options: { net: { port: 27001 }, replication: { oplogS
izeMB: 50, replSet: "GestionClub_RPS" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "c:\data\Pr
imario", mmapv1: { smallFiles: true } } }
2015-05-23T14:25:02.576-0300 I NETWORK  [initandlisten] waiting for connections on port 27001
2015-05-23T14:25:03.148-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54134 #1 (1 connect
ion now open)
2015-05-23T14:25:03.150-0300 I NETWORK  [conn1] end connection 127.0.0.1:54134 (0 connections now open)
2015-05-23T14:25:03.838-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54137 #2 (1 connect
ion now open)
2015-05-23T14:25:03.839-0300 I NETWORK  [conn2] end connection 127.0.0.1:54137 (0 connections now open)
2015-05-23T14:25:03.851-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54139 #3 (1 connect
ion now open)
2015-05-23T14:25:04.093-0300 I REPL     [ReplicationExecutor] New replica set config in use: { _id: "GestionCl
ub_RPS", version: 2, members: [ { _id: 0, host: "localhost:27001", arbiterOnly: false, buildIndexes: true, hid
den: false, priority: 1.0, tags: {}, slaveDelay: 0, votes: 1 }, { _id: 1, host: "localhost:27002", arbiterOnly
: false, buildIndexes: true, hidden: false, priority: 1.0, tags: {}, slaveDelay: 0, votes: 1 }, { _id: 2, host
: "localhost:27003", arbiterOnly: false, buildIndexes: true, hidden: false, priority: 1.0, tags: {}, slaveDela
y: 0, votes: 1 } ], settings: { chainingAllowed: true, heartbeatTimeoutSecs: 10, getLastErrorModes: {}, getLas
tErrorDefaults: { w: 1, wtimeout: 0 } } }
2015-05-23T14:25:04.096-0300 I REPL     [ReplicationExecutor] This node is localhost:27001 in the config
2015-05-23T14:25:04.097-0300 I REPL     [ReplicationExecutor] transition to STARTUP2
2015-05-23T14:25:04.098-0300 I REPL     [ReplicationExecutor] Starting replication applier threads
2015-05-23T14:25:04.099-0300 I REPL     [ReplicationExecutor] transition to RECOVERING
2015-05-23T14:25:04.109-0300 I REPL     [ReplicationExecutor] transition to SECONDARY
2015-05-23T14:25:04.113-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27002; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:04.114-0300 I REPL     [ReplicationExecutor] Member localhost:27003 is now in state SECONDARY

2015-05-23T14:25:04.115-0300 I REPL     [ReplicationExecutor] Standing for election
2015-05-23T14:25:04.115-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27002; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:04.120-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27002; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:04.124-0300 I REPL     [ReplicationExecutor] not electing self, localhost:27003 would veto wi
th 'I don't think localhost:27001 is electable because the member is not currently a secondary; member is more
 than 10 seconds behind the most up-to-date member (mask 0xA)'
2015-05-23T14:25:04.130-0300 I REPL     [ReplicationExecutor] not electing self, we are not freshest
2015-05-23T14:25:04.210-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54143 #4 (2 connect
ions now open)
2015-05-23T14:25:06.115-0300 I REPL     [ReplicationExecutor] Standing for election
2015-05-23T14:25:06.119-0300 I REPL     [ReplicationExecutor] replSet info electSelf
2015-05-23T14:25:06.124-0300 I REPL     [ReplicationExecutor] Member localhost:27002 is now in state SECONDARY

2015-05-23T14:25:06.128-0300 I REPL     [ReplicationExecutor] replSet election succeeded, assuming primary rol
e
2015-05-23T14:25:06.132-0300 I REPL     [ReplicationExecutor] transition to PRIMARY
2015-05-23T14:25:07.111-0300 I REPL     [rsSync] transition to primary complete; database writes are now permi
tted
```

y los 2 secundarios:

```
mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Secundario_1 --port 27002
```

```
Administrator: Windows Command Processor - mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Secundario_1 --port 27002

C:\Program Files\MongoDB\Server\3.0\bin>mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Secundari
o_1 --port 27002
2015-05-23T14:25:02.877-0300 I CONTROL  Hotfix KB2731284 or later update is not installed, will zero-out data
files
2015-05-23T14:25:02.899-0300 I JOURNAL  [initandlisten] journal dir=c:\data\Secundario_1\journal
2015-05-23T14:25:02.899-0300 I JOURNAL  [initandlisten] recover : no journal files present, no recovery needed

2015-05-23T14:25:03.064-0300 I JOURNAL  [durability] Durability thread started
2015-05-23T14:25:03.066-0300 I JOURNAL  [journal writer] Journal writer thread started
2015-05-23T14:25:03.067-0300 I CONTROL  [initandlisten] MongoDB starting : pid=6196 port=27002 dbpath=c:\data\
Secundario_1 64-bit host=Dell-PC
2015-05-23T14:25:03.068-0300 I CONTROL  [initandlisten] targetMinOS: Windows 7/Windows Server 2008 R2
2015-05-23T14:25:03.068-0300 I CONTROL  [initandlisten] db version v3.0.2
2015-05-23T14:25:03.068-0300 I CONTROL  [initandlisten] git version: 6201872043ecbbc0a4cc169b5482dcf385fc464f
2015-05-23T14:25:03.069-0300 I CONTROL  [initandlisten] OpenSSL version: OpenSSL 1.0.1m-fips 19 Mar 2015
2015-05-23T14:25:03.069-0300 I CONTROL  [initandlisten] build info: windows sys.getwindowsversion(major=6, min
or=1, build=7601, platform=2, service_pack='Service Pack 1') BOOST_LIB_VERSION=1_49
2015-05-23T14:25:03.069-0300 I CONTROL  [initandlisten] allocator: system
2015-05-23T14:25:03.070-0300 I CONTROL  [initandlisten] options: { net: { port: 27002 }, replication: { replSe
t: "GestionClub_RPS" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "c:\data\Secundario_1" } }
2015-05-23T14:25:03.146-0300 I NETWORK  [initandlisten] waiting for connections on port 27002
2015-05-23T14:25:03.582-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54133 #1 (1 connect
ion now open)
2015-05-23T14:25:03.583-0300 I NETWORK  [conn1] end connection 127.0.0.1:54133 (0 connections now open)
2015-05-23T14:25:03.840-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54138 #2 (1 connect
ion now open)
2015-05-23T14:25:03.841-0300 I NETWORK  [conn2] end connection 127.0.0.1:54138 (0 connections now open)
2015-05-23T14:25:03.851-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54140 #3 (1 connect
ion now open)
2015-05-23T14:25:04.101-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54141 #4 (2 connect
ions now open)
2015-05-23T14:25:04.184-0300 I REPL     [ReplicationExecutor] New replica set config in use: { _id: "GestionCl
ub_RPS", version: 2, members: [ { _id: 0, host: "localhost:27001", arbiterOnly: false, buildIndexes: true, hid
den: false, priority: 1.0, tags: {}, slaveDelay: 0, votes: 1 }, { _id: 1, host: "localhost:27002", arbiterOnly
: false, buildIndexes: true, hidden: false, priority: 1.0, tags: {}, slaveDelay: 0, votes: 1 }, { _id: 2, host
: "localhost:27003", arbiterOnly: false, buildIndexes: true, hidden: false, priority: 1.0, tags: {}, slaveDela
y: 0, votes: 1 } ], settings: { chainingAllowed: true, heartbeatTimeoutSecs: 10, getLastErrorModes: {}, getLas
tErrorDefaults: { w: 1, wtimeout: 0 } } }
2015-05-23T14:25:04.199-0300 I REPL     [ReplicationExecutor] This node is localhost:27002 in the config
2015-05-23T14:25:04.201-0300 I REPL     [ReplicationExecutor] transition to STARTUP2
2015-05-23T14:25:04.204-0300 I REPL     [ReplicationExecutor] Starting replication applier threads
2015-05-23T14:25:04.207-0300 I REPL     [ReplicationExecutor] transition to RECOVERING
2015-05-23T14:25:04.218-0300 I REPL     [ReplicationExecutor] transition to SECONDARY
2015-05-23T14:25:04.221-0300 I REPL     [ReplicationExecutor] Member localhost:27001 is now in state SECONDARY

2015-05-23T14:25:04.224-0300 I REPL     [ReplicationExecutor] Standing for election
2015-05-23T14:25:04.225-0300 I REPL     [ReplicationExecutor] Member localhost:27003 is now in state SECONDARY

2015-05-23T14:25:04.227-0300 I REPL     [ReplicationExecutor] not electing self, localhost:27003 would veto wi
th 'I don't think localhost:27002 is electable because the member is not currently a secondary; member is more
 than 10 seconds behind the most up-to-date member (mask 0xA)'
2015-05-23T14:25:04.230-0300 I REPL     [ReplicationExecutor] not electing self, we are not freshest
2015-05-23T14:25:06.222-0300 I REPL     [ReplicationExecutor] Member localhost:27001 is now in state PRIMARY
2015-05-23T14:25:33.880-0300 I NETWORK  [conn3] end connection 127.0.0.1:54140 (1 connection now open)
2015-05-23T14:25:33.882-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54146 #5 (3 connect
ions now open)
2015-05-23T14:25:34.133-0300 I NETWORK  [conn4] end connection 127.0.0.1:54141 (1 connection now open)
2015-05-23T14:25:34.134-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54148 #6 (3 connect
ions now open)
```

```
mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Secundario_2 --port 27003
```

```
Administrator: Windows Command Processor - mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Secundario_2 --port 27003

C:\Program Files\MongoDB\Server\3.0\bin>mongod --shardsvr --replSet GestionClub_RPS --dbpath c:\data\Secundari
o_2 --port 27003
2015-05-23T14:25:03.510-0300 I CONTROL  Hotfix KB2731284 or later update is not installed, will zero-out data
files
2015-05-23T14:25:03.523-0300 I JOURNAL  [initandlisten] journal dir=c:\data\Secundario_2\journal
2015-05-23T14:25:03.523-0300 I JOURNAL  [initandlisten] recover : no journal files present, no recovery needed

2015-05-23T14:25:03.761-0300 I JOURNAL  [durability] Durability thread started
2015-05-23T14:25:03.762-0300 I JOURNAL  [journal writer] Journal writer thread started
2015-05-23T14:25:03.763-0300 I CONTROL  [initandlisten] MongoDB starting : pid=5004 port=27003 dbpath=c:\data\
Secundario_2 64-bit host=Dell-PC
2015-05-23T14:25:03.764-0300 I CONTROL  [initandlisten] targetMinOS: Windows 7/Windows Server 2008 R2
2015-05-23T14:25:03.764-0300 I CONTROL  [initandlisten] db version v3.0.2
2015-05-23T14:25:03.765-0300 I CONTROL  [initandlisten] git version: 6201872043ecbbc0a4cc169b5482dcf385fc464f
2015-05-23T14:25:03.765-0300 I CONTROL  [initandlisten] OpenSSL version: OpenSSL 1.0.1m-fips 19 Mar 2015
2015-05-23T14:25:03.765-0300 I CONTROL  [initandlisten] build info: windows sys.getwindowsversion(major=6, min
or=1, build=7601, platform=2, service_pack='Service Pack 1') BOOST_LIB_VERSION=1_49
2015-05-23T14:25:03.766-0300 I CONTROL  [initandlisten] allocator: system
2015-05-23T14:25:03.766-0300 I CONTROL  [initandlisten] options: { net: { port: 27003 }, replication: { replSe
t: "GestionClub_RPS" }, sharding: { clusterRole: "shardsvr" }, storage: { dbPath: "c:\data\Secundario_2" } }
2015-05-23T14:25:03.838-0300 I NETWORK  [initandlisten] waiting for connections on port 27003
2015-05-23T14:25:03.848-0300 I REPL     [ReplicationExecutor] New replica set config in use: { _id: "GestionCl
ub_RPS", version: 2, members: [ { _id: 0, host: "localhost:27001", arbiterOnly: false, buildIndexes: true, hid
den: false, priority: 1.0, tags: {}, slaveDelay: 0, votes: 1 }, { _id: 1, host: "localhost:27002", arbiterOnly
: false, buildIndexes: true, hidden: false, priority: 1.0, tags: {}, slaveDelay: 0, votes: 1 }, { _id: 2, host
: "localhost:27003", arbiterOnly: false, buildIndexes: true, hidden: false, priority: 1.0, tags: {}, slaveDela
y: 0, votes: 1 } ], settings: { chainingAllowed: true, heartbeatTimeoutSecs: 10, getLastErrorModes: {}, getLas
tErrorDefaults: { w: 1, wtimeout: 0 } } }
2015-05-23T14:25:03.848-0300 I REPL     [ReplicationExecutor] This node is localhost:27003 in the config
2015-05-23T14:25:03.848-0300 I REPL     [ReplicationExecutor] transition to STARTUP2
2015-05-23T14:25:03.849-0300 I REPL     [ReplicationExecutor] Starting replication applier threads
2015-05-23T14:25:03.849-0300 I REPL     [ReplicationExecutor] transition to RECOVERING
2015-05-23T14:25:03.854-0300 I REPL     [ReplicationExecutor] transition to SECONDARY
2015-05-23T14:25:03.856-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27001; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:03.858-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27002; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:03.861-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27001; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:03.863-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27002; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:03.866-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27001; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:03.868-0300 I REPL     [ReplicationExecutor] Error in heartbeat request to localhost:27002; N
otYetInitialized Received heartbeat while still initializing replication system
2015-05-23T14:25:04.089-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54136 #1 (1 connect
ion now open)
2015-05-23T14:25:04.094-0300 I NETWORK  [conn1] end connection 127.0.0.1:54136 (0 connections now open)
2015-05-23T14:25:04.108-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54142 #2 (1 connect
ion now open)
2015-05-23T14:25:04.180-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54135 #3 (2 connect
ions now open)
2015-05-23T14:25:04.185-0300 I NETWORK  [conn3] end connection 127.0.0.1:54135 (1 connection now open)
2015-05-23T14:25:04.211-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54144 #4 (2 connect
ions now open)
2015-05-23T14:25:05.867-0300 I REPL     [ReplicationExecutor] Member localhost:27001 is now in state SECONDARY

2015-05-23T14:25:05.870-0300 I REPL     [ReplicationExecutor] Standing for election
2015-05-23T14:25:05.874-0300 I REPL     [ReplicationExecutor] replSet possible election tie; sleeping 489ms un
til 2015-05-23T14:25:06.363-0300
2015-05-23T14:25:05.876-0300 I REPL     [ReplicationExecutor] Member localhost:27002 is now in state SECONDARY

2015-05-23T14:25:06.122-0300 I REPL     [ReplicationExecutor] replSetElect voting yea for localhost:27001 (0)
2015-05-23T14:25:07.868-0300 I REPL     [ReplicationExecutor] Member localhost:27001 is now in state PRIMARY
2015-05-23T14:25:34.127-0300 I NETWORK  [conn2] end connection 127.0.0.1:54142 (1 connection now open)
2015-05-23T14:25:34.129-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54147 #5 (2 connect
ions now open)
2015-05-23T14:25:34.234-0300 I NETWORK  [conn4] end connection 127.0.0.1:54144 (1 connection now open)
2015-05-23T14:25:34.236-0300 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:54150 #6 (3 connect
ions now open)
```

[Observación] No está mal pero, para evitar confusiones, recomendaría que los nombres de carpeta para cada miembro no sea primario y secundario, porque salvo que se haga explícitamente que uno solo puede ser primario, el primario puede cambiar

2. Definir una clave para implementar Sharding

Para esto, definimos un índice sobre el campo “Apellido”, pues indexaremos sobre dicho campo. Primeramente debemos conectarnos a la instancia Primary

[Observación] Cual fue la decisión detrás de la selección del campo como clave? Por que no nr de socio o dni?

```
mongo --port 27001
```

```
Administrator: Windows Command Processor - mongo  --port 27001

C:\Program Files\MongoDB\Server\3.0\bin>mongo --port 27001
2015-05-23T14:40:58.594-0300 I CONTROL  Hotfix KB2731284 or later update is not installed, will zero-out data
files
MongoDB shell version: 3.0.2
connecting to: 127.0.0.1:27001/test
GestionClub_RPS:PRIMARY> _
```

y tras esto creamos el índice

```
use GestionClub
db.HistoriaSocio.ensureIndex({ “apellido” :1 })
```

```
Administrator: Windows Command Processor - mongo  --port 27001
GestionClub_RPS:PRIMARY> use GestionClub
switched to db GestionClub
GestionClub_RPS:PRIMARY> db.HistoriaSocio.ensureIndex({ "apellido": 1 })
{
        "createdCollectionAutomatically" : false,
        "numIndexesBefore" : 1,
        "numIndexesAfter" : 2,
        "ok" : 1
}
GestionClub_RPS:PRIMARY> _
```

3. Implementar Sharding en la BD GestionClub sobre para la colección HistoriaSocio.

Para esto será necesario crear un Config Server, y los servidores de Ruteo.

Para el servidor de configuración, ejecutamos el siguiente comando:

```
mongod --configsvr --port 27004 --dbpath c:\data\configdb --logpath log.cfgsvr --logappend
```

```
Administrator: Windows Command Processor - mongod  --configsvr --port 27004 --dbpath c:\data\configdb --logpath log.cfgsvr --logappend

C:\Program Files\MongoDB\Server\3.0\bin>mongod --configsvr --port 27004 --dbpath c:\data\configdb --logpath lo
g.cfgsvr --logappend
_
```

y para el servidor de ruteo, instanciamos un mongos:

```
mongos --configdb localhost:27004
```

```
Administrator: Windows Command Processor - mongos --configdb localhost:27004

C:\Program Files\MongoDB\Server\3.0\bin>mongos --configdb localhost:27004
2015-05-23T14:50:16.093-0300 W SHARDING running with 1 config server should be done only for testing purposes
and is not recommended for production
2015-05-23T14:50:16.161-0300 I CONTROL  Hotfix KB2731284 or later update is not installed, will zero-out data
files
2015-05-23T14:50:16.198-0300 I SHARDING [mongosMain] MongoS version 3.0.2 starting: pid=2996 port=27017 64-bit
 host=Dell-PC (--help for usage)
2015-05-23T14:50:16.198-0300 I CONTROL  [mongosMain] db version v3.0.2
2015-05-23T14:50:16.198-0300 I CONTROL  [mongosMain] git version: 6201872043ecbbc0a4cc169b5482dcf385fc464f
2015-05-23T14:50:16.199-0300 I CONTROL  [mongosMain] OpenSSL version: OpenSSL 1.0.1m-fips 19 Mar 2015
2015-05-23T14:50:16.199-0300 I CONTROL  [mongosMain] build info: windows sys.getwindowsversion(major=6, minor=
1, build=7601, platform=2, service_pack='Service Pack 1') BOOST_LIB_VERSION=1_49
2015-05-23T14:50:16.200-0300 I CONTROL  [mongosMain] allocator: system
2015-05-23T14:50:16.200-0300 I CONTROL  [mongosMain] options: { sharding: { configDB: "localhost:27004" } }
2015-05-23T14:50:16.254-0300 I SHARDING [LockPinger] creating distributed lock ping thread for localhost:27004
 and process Dell-PC:27017:1432403416:41 (sleeping for 30000ms)
2015-05-23T14:50:16.930-0300 I SHARDING [LockPinger] cluster localhost:27004 pinged successfully at Sat May 23
 14:50:16 2015 by distributed lock pinger 'localhost:27004/Dell-PC:27017:1432403416:41', sleeping for 30000ms
2015-05-23T14:50:16.954-0300 I SHARDING [mongosMain] distributed lock 'configUpgrade/Dell-PC:27017:1432403416:
41' acquired, ts : 5560bdd8396d574a114b635f
2015-05-23T14:50:16.956-0300 I SHARDING [mongosMain] starting upgrade of config server from v0 to v6
2015-05-23T14:50:16.956-0300 I SHARDING [mongosMain] starting next upgrade step from v0 to v6
2015-05-23T14:50:16.957-0300 I SHARDING [mongosMain] about to log new metadata event: { _id: "Dell-PC-2015-05-
23T17:50:16-5560bdd8396d574a114b6360", server: "Dell-PC", clientAddr: "N/A", time: new Date(1432403416957), wh
at: "starting upgrade of config database", ns: "config.version", details: { from: 0, to: 6 } }
2015-05-23T14:50:17.602-0300 I SHARDING [mongosMain] writing initial config version at v6
2015-05-23T14:50:17.621-0300 I SHARDING [mongosMain] about to log new metadata event: { _id: "Dell-PC-2015-05-
23T17:50:17-5560bdd9396d574a114b6362", server: "Dell-PC", clientAddr: "N/A", time: new Date(1432403417621), wh
at: "finished upgrade of config database", ns: "config.version", details: { from: 0, to: 6 } }
2015-05-23T14:50:17.634-0300 I SHARDING [mongosMain] upgrade of config server to v6 successful
2015-05-23T14:50:17.636-0300 I SHARDING [mongosMain] distributed lock 'configUpgrade/Dell-PC:27017:1432403416:
41' unlocked.
2015-05-23T14:50:17.808-0300 I SHARDING [Balancer] about to contact config servers and shards
2015-05-23T14:50:17.809-0300 I SHARDING [Balancer] config servers and shards contacted successfully
2015-05-23T14:50:17.812-0300 I SHARDING [Balancer] balancer id: Dell-PC:27017 started at May 23 14:50:17
2015-05-23T14:50:17.819-0300 I NETWORK  [mongosMain] waiting for connections on port 27017
2015-05-23T14:50:17.824-0300 I SHARDING [Balancer] distributed lock 'balancer/Dell-PC:27017:1432403416:41' acq
uired, ts : 5560bdd9396d574a114b6364
2015-05-23T14:50:17.914-0300 I SHARDING [Balancer] distributed lock 'balancer/Dell-PC:27017:1432403416:41' unl
ocked.
2015-05-23T14:50:27.985-0300 I SHARDING [Balancer] distributed lock 'balancer/Dell-PC:27017:1432403416:41' acq
uired, ts : 5560bde3396d574a114b6366
2015-05-23T14:50:27.997-0300 I SHARDING [Balancer] distributed lock 'balancer/Dell-PC:27017:1432403416:41' unl
ocked.
```

y ahora nos conectamos al mongos para realizar el sharding

```
mongo
```

```
Administrator: Windows Command Processor - mongo

C:\Program Files\MongoDB\Server\3.0\bin>mongo
2015-05-23T15:24:27.327-0300 I CONTROL  Hotfix KB2731284 or later update is not installed, will zero-out data
files
MongoDB shell version: 3.0.2
connecting to: test
mongos>
```

y realizamos el agregado inicial del sharding

```
sh.addShard('GestionClub_RPS/localhost:27001')
```

```
Administrator: Windows Command Processor - mongo
mongos> sh.addShard("GestionClub_RPS/localhost:27001")
2015-05-23T15:25:29.785-0300 E QUERY    SyntaxError: Unexpected token ILLEGAL
mongos> sh.addShard('GestionClub_RPS/localhost:27001')
{ "shardAdded" : "GestionClub_RPS", "ok" : 1 }
mongos>
```

habilitamos el sharding para nuestra base de datos

```
sh.enableSharding("GestionClub")
```

```
Administrator: Windows Command Processor - mongo
mongos> sh.enableSharding("GestionClub")
{ "ok" : 0, "errmsg" : "already enabled" }
mongos>
```

y realizamos el sharding sobre la colección "HistoriaSocio", bajo el índice sobre el campo "apellido"

```
sh.shardCollection('GestionClub.HistoriaSocio', { apellido: 1 }, false)
```

```
Administrator: Windows Command Processor - mongo
mongos> sh.shardCollection('GestionClub.HistoriaSocio', { apellido :1 }, false)
{ "collectionsharded" : "GestionClub.HistoriaSocio", "ok" : 1 }
mongos>
```

y ya podemos verificar que los chunks fueron creados

```
use config
db.chunks.find({}, { min:1, max: 2, shard: 1, _id:0, ns:1 }).pretty()
```

```
Administrator: Windows Command Processor - mongo
mongos> use config
switched to db config
mongos> db.chunks.find({}, { min: 1, max: 2, shard:1, _id:0, ns:1}).pretty()
{
        "ns" : "GestionClub.HistoriaSocio",
        "min" : {
                "apellido" : { "$minKey" : 1 }
        },
        "max" : {
                "apellido" : { "$maxKey" : 1 }
        },
        "shard" : "GestionClub_RPS"
}
mongos> _
```

4. Configurar un segundo ReplicaSet con 3 servidores y agregarlo al Sharding.

Para esto configuramos un nuevo nodo primario, y dos nodos secundario

```
mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\data\Primario_2 --port 27011 --smallfiles --oplogSize 50
```

```
C:\Windows\system32\cmd.exe - mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\da...
c:\mongodb\bin>mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\data\Pr
imario_2 --port 27011 --smallfiles --oplogSize 50
2015-05-24T18:33:27.453-0300
2015-05-24T18:33:27.456-0300 warning: 32-bit servers don't have journaling enabl
ed by default. Please use --journal if you want durability.
2015-05-24T18:33:27.456-0300
2015-05-24T18:33:27.462-0300 Hotfix KB2731284 or later update is not installed,
will zero-out data files
2015-05-24T18:33:27.473-0300 [initandlisten] MongoDB starting : pid=8056 port=27
011 dbpath=c:\data\Primario_2 32-bit host=nb3-PC
2015-05-24T18:33:27.474-0300 [initandlisten]
2015-05-24T18:33:27.474-0300 [initandlisten] ** NOTE: This is a 32 bit MongoDB b
inary.
2015-05-24T18:33:27.474-0300 [initandlisten] **       32 bit builds are limited
to less than 2GB of data (or less with --journal).
2015-05-24T18:33:27.474-0300 [initandlisten] **       Note that journaling defau
lts to off for 32 bit and is currently off.
2015-05-24T18:33:27.474-0300 [initandlisten] **       See http://dochub.mongodb.
org/core/32bit
2015-05-24T18:33:27.474-0300 [initandlisten]
2015-05-24T18:33:27.475-0300 [initandlisten] targetMinOS: Windows XP SP3
2015-05-24T18:33:27.475-0300 [initandlisten] db version v2.6.9
2015-05-24T18:33:27.475-0300 [initandlisten] git version: df313bc75aa94d192330cb
92756fc486ea604e64
2015-05-24T18:33:27.475-0300 [initandlisten] build info: windows sys.getwindowsv
ersion(major=6, minor=1, build=7601, platform=2, service_pack='Service Pack 1')
BOOST_LIB_VERSION=1_49
2015-05-24T18:33:27.477-0300 [initandlisten] allocator: system
2015-05-24T18:33:27.479-0300 [initandlisten] options: { net: { port: 27011 }, re
plication: { oplogSizeMB: 50, replSet: "GestionClub_RPS_2" }, sharding: { cluste
rRole: "shardsvr" }, storage: { dbPath: "c:\data\Primario_2", smallFiles: true }
 }
2015-05-24T18:33:27.497-0300 [initandlisten] allocating new ns file c:\data\Prim
ario_2\local.ns, filling with zeroes...
2015-05-24T18:33:28.747-0300 [FileAllocator] allocating new datafile c:\data\Pri
mario_2\local.0, filling with zeroes...
2015-05-24T18:33:28.752-0300 [FileAllocator] creating directory c:\data\Primario
_2\_tmp
2015-05-24T18:33:28.866-0300 [FileAllocator] done allocating datafile c:\data\Pr
```

mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\data\Secundario_3 --port 27012

```
C:\Windows\system32\cmd.exe - mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\da...
c:\mongodb\bin>mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\data\Se
cundario_3 --port 27012
2015-05-24T18:37:09.848-0300
2015-05-24T18:37:09.851-0300 warning: 32-bit servers don't have journaling enabl
ed by default. Please use --journal if you want durability.
2015-05-24T18:37:09.851-0300
2015-05-24T18:37:09.857-0300 Hotfix KB2731284 or later update is not installed,
will zero-out data files
2015-05-24T18:37:09.868-0300 [initandlisten] MongoDB starting : pid=292 port=270
12 dbpath=c:\data\Secundario_3 32-bit host=nb3-PC
2015-05-24T18:37:09.868-0300 [initandlisten]
2015-05-24T18:37:09.868-0300 [initandlisten] ** NOTE: This is a 32 bit MongoDB b
inary.
2015-05-24T18:37:09.869-0300 [initandlisten] **       32 bit builds are limited
to less than 2GB of data (or less with --journal).
2015-05-24T18:37:09.869-0300 [initandlisten] **       Note that journaling defau
lts to off for 32 bit and is currently off.
2015-05-24T18:37:09.869-0300 [initandlisten] **       See http://dochub.mongodb.
org/core/32bit
2015-05-24T18:37:09.869-0300 [initandlisten]
2015-05-24T18:37:09.870-0300 [initandlisten] targetMinOS: Windows XP SP3
2015-05-24T18:37:09.870-0300 [initandlisten] db version v2.6.9
2015-05-24T18:37:09.871-0300 [initandlisten] git version: df313bc75aa94d192330cb
92756fc486ea604e64
2015-05-24T18:37:09.872-0300 [initandlisten] build info: windows sys.getwindowsv
```

mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\data\Secundario_4 --port 27013

```
C:\Windows\system32\cmd.exe - mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\da...
c:\mongodb\bin>mongod --shardsvr --replSet GestionClub_RPS_2 --dbpath c:\data\Se
cundario_4 --port 27013
2015-05-24T18:38:21.981-0300
2015-05-24T18:38:21.984-0300 warning: 32-bit servers don't have journaling enabl
ed by default. Please use --journal if you want durability.
2015-05-24T18:38:21.984-0300
2015-05-24T18:38:21.990-0300 Hotfix KB2731284 or later update is not installed,
will zero-out data files
2015-05-24T18:38:22.001-0300 [initandlisten] MongoDB starting : pid=6372 port=27
013 dbpath=c:\data\Secundario_4 32-bit host=nb3-PC
2015-05-24T18:38:22.001-0300 [initandlisten]
2015-05-24T18:38:22.001-0300 [initandlisten] ** NOTE: This is a 32 bit MongoDB b
inary.
2015-05-24T18:38:22.001-0300 [initandlisten] **       32 bit builds are limited
to less than 2GB of data (or less with --journal).
2015-05-24T18:38:22.001-0300 [initandlisten] **       Note that journaling defau
lts to off for 32 bit and is currently off.
2015-05-24T18:38:22.002-0300 [initandlisten] **       See http://dochub.mongodb.
org/core/32bit
2015-05-24T18:38:22.002-0300 [initandlisten]
2015-05-24T18:38:22.002-0300 [initandlisten] targetMinOS: Windows XP SP3
2015-05-24T18:38:22.002-0300 [initandlisten] db version v2.6.9
2015-05-24T18:38:22.003-0300 [initandlisten] git version: df313bc75aa94d192330cb
92756fc486ea604e64
2015-05-24T18:38:22.004-0300 [initandlisten] build info: windows sys.getwindowsv
```

mongo --port 27011

cfg={_id:"GestionClub_RPS_2",members:[{_id:0,host:"localhost:27011"},{_id:1,host:"localhost:27012"},{_id:2,host:"localhost:27013"}]}

rs.initiate (cfg)

```
C:\Windows\system32\cmd.exe - mongo --port 27011
c:\mongodb\bin>mongo --port 27011
2015-05-24T18:40:21.039-0300 Hotfix KB2731284 or later update is not installed
will zero-out data files
MongoDB shell version: 2.6.9
connecting to: 127.0.0.1:27011/test
Server has startup warnings:
2015-05-24T18:33:27.474-0300 [initandlisten]
2015-05-24T18:33:27.474-0300 [initandlisten] ** NOTE: This is a 32 bit MongoDB
inary.
2015-05-24T18:33:27.474-0300 [initandlisten] **       32 bit builds are linite
to less than 2GB of data (or less with --journal).
2015-05-24T18:33:27.474-0300 [initandlisten] **       Note that journaling def
lts to off for 32 bit and is currently off.
2015-05-24T18:33:27.474-0300 [initandlisten] **       See http://dochub.mongod
org/core/32bit
2015-05-24T18:33:27.474-0300 [initandlisten]
> cfg={_id:"GestionClub_RPS_2",members:[{_id:0,host:"localhost:27011"},{_id:1,
st:"localhost:27012"},{_id:2,host:"localhost:27013"}]}
{
        "_id" : "GestionClub_RPS_2",
        "members" : [
                {
                        "_id" : 0,
                        "host" : "localhost:27011"
                },
                {
                        "_id" : 1,
                        "host" : "localhost:27012"
                },
                {
                        "_id" : 2,
                        "host" : "localhost:27013"
                }
        ]
}
>
> rs.initiate ( cfg )
{
        "info" : "Config now saved locally.  Should come online in about a min
e.",
        "ok" : 1
}
> _
```

```
rs.status()
```

```
C:\Windows\system32\cmd.exe - mongo --port 27011
> rs.status()
{
        "set" : "GestionClub_RPS_2",
        "date" : ISODate("2015-05-24T21:43:32Z"),
        "myState" : 1,
        "members" : [
                {
                        "_id" : 0,
                        "name" : "localhost:27011",
                        "health" : 1,
                        "state" : 1,
                        "stateStr" : "PRIMARY",
                        "uptime" : 605,
                        "optime" : Timestamp(1432503656, 1),
                        "optimeDate" : ISODate("2015-05-24T21:40:56Z"),
                        "electionTime" : Timestamp(1432503666, 1),
                        "electionDate" : ISODate("2015-05-24T21:41:06Z"),
                        "self" : true
                },
                {
                        "_id" : 1,
                        "name" : "localhost:27012",
                        "health" : 1,
                        "state" : 2,
                        "stateStr" : "SECONDARY",
                        "uptime" : 156,
                        "optime" : Timestamp(1432503656, 1),
                        "optimeDate" : ISODate("2015-05-24T21:40:56Z"),
                        "lastHeartbeat" : ISODate("2015-05-24T21:43:32Z"),
                        "lastHeartbeatRecv" : ISODate("2015-05-24T21:43:31Z"),
                        "pingMs" : 0,
                        "syncingTo" : "localhost:27011"
                },
                {
                        "_id" : 2,
                        "name" : "localhost:27013",
                        "health" : 1,
                        "state" : 2,
                        "stateStr" : "SECONDARY",
                        "uptime" : 154,
                        "optime" : Timestamp(1432503656, 1),
                        "optimeDate" : ISODate("2015-05-24T21:40:56Z"),
                        "lastHeartbeat" : ISODate("2015-05-24T21:43:32Z"),
                        "lastHeartbeatRecv" : ISODate("2015-05-24T21:43:32Z"),
                        "pingMs" : 0,
                        "syncingTo" : "localhost:27011"
                }
        ],
        "ok" : 1
}
GestionClub_RPS_2:PRIMARY>
```

Agregamos el ReplicaSet GestionClub_RPS_2 al Sharding

```
sh.addShard("GestionClub_RPS_2/localhost:27011")
```

```
mongos> sh.addShard("GestionClub_RPS_2/localhost:27011")
{ "shardAdded" : "GestionClub_RPS_2", "ok" : 1 }
mongos> _
```

5. Crear un archivo JSON con 10000 documentos, basado en la copia de los inserts del TP 5.

El JSON que se usará en este punto, se entregará con el resto de los documentos.

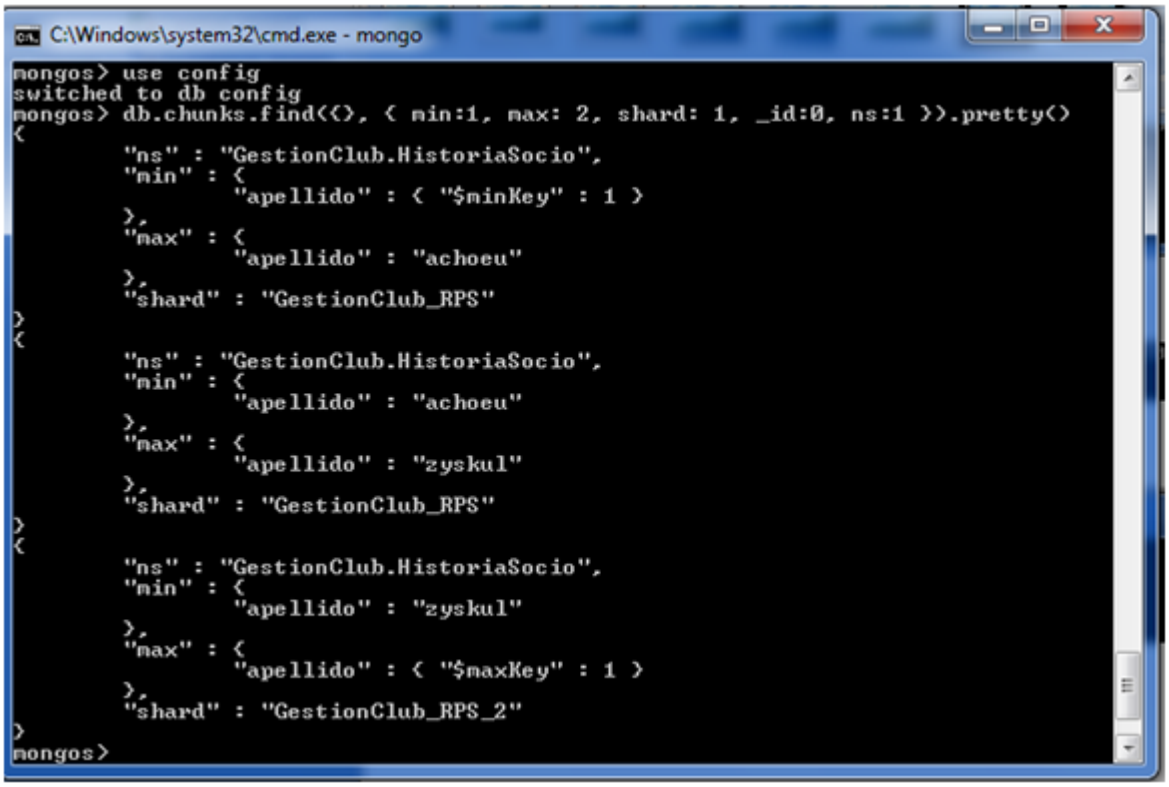
6. Realizar la inserción de los documentos de archivo creado en el punto 5.

Utilizamos la instrucción load, para la carga del JSON

```
use GestionClub
load ("/data/insert bulk.js")
```

7. Consultar los chunks creados y en qué shard están.

```
use config
db.chunks.find({}, { min:1, max: 2, shard: 1, _id:0, ns:1 }).pretty()
```



8. Definir una consulta que obtenga cierta información de la BD e informar la salida del explain.

Para este punto, tomamos como ejemplo un find a toda la colección HistoriaSocio. Se verá en el explain, como se ordena una búsqueda en paralela entre ambos replicaSet´s

```
use GestionClub
db.HistoriaSocio.find().explain()
```

```
C:\Windows\system32\cmd.exe - mongo
mongos> db.HistoriaSocio.find().explain()
{
        "clusteredType" : "ParallelSort",
        "shards" : {
                "GestionClub_RPS/localhost:27001,localhost:27002,localhost:27003
" : [
                        {
                                "cursor" : "BasicCursor",
                                "isMultiKey" : false,
                                "n" : 9996,
                                "nscannedObjects" : 9996,
                                "nscanned" : 9996,
                                "nscannedObjectsAllPlans" : 9996,
                                "nscannedAllPlans" : 9996,
                                "scanAndOrder" : false,
                                "indexOnly" : false,
                                "nYields" : 78,
                                "nChunkSkips" : 0,
                                "millis" : 35,
                                "server" : "nb3-PC:27001",
                                "filterSet" : false
                        }
                ],
                "GestionClub_RPS_2/localhost:27011,localhost:27012,localhost:270
13" : [
                        {
                                "cursor" : "BasicCursor",
                                "isMultiKey" : false,
                                "n" : 4,
                                "nscannedObjects" : 4,
                                "nscanned" : 4,
                                "nscannedObjectsAllPlans" : 4,
                                "nscannedAllPlans" : 4,
                                "scanAndOrder" : false,
                                "indexOnly" : false,
                                "nYields" : 0,
                                "nChunkSkips" : 0,
                                "millis" : 0,
                                "server" : "nb3-PC:27011",
                                "filterSet" : false
                        }
                ]
        },
        "cursor" : "BasicCursor",
        "n" : 10000,
        "nChunkSkips" : 0,
        "nYields" : 78,
        "nscanned" : 10000,
        "nscannedAllPlans" : 10000,
        "nscannedObjects" : 10000,
        "nscannedObjectsAllPlans" : 10000,
        "millisShardTotal" : 35,
        "millisShardAvg" : 17,
        "numQueries" : 2,
        "numShards" : 2,
        "millis" : 36
}
```

2. Consistencia

a) ¿Cuántos nodos tiene el cluster?

El cluster tiene dos replicaset con 3 nodos cada uno, es decir 6 nodos en total.

[Observación] El total de nodos del cluster es 8, ya que aparte de los 2 shards se tiene el mongos y el configsvr

b) ¿Cuál es el valor de N?

Siendo N la cantidad de réplicas requeridas para considerar una operación exitosa en un cluster, el valor de N sería apropiado que sea igual a 4.
[Observación] Cada replica set tiene 3 replicas, por lo tanto el valor de N es 3.

c) ¿Cuál sería una configuración adecuada de R y W para favorecer la consistencia de escritura y garantizando lecturas más rápidas?

La configuración adecuada de R y W para favorecer la consistencia de escritura y garantizando lecturas más rápidas es:

R = 1
W = 4

Este modelo garantiza lecturas rápidas pero lentifica el proceso de escritura.
[Observación] Erróneo por lo anterior. W nunca puede ser mayor que N. Para lograr una consistencia de escritura se debe configurar tal que W > N / 2. Esto se llama quorum de escritura. Con ese escenario (W > N/2) se garantiza que los datos fueron escritos en la mayoría de los nodos de la replica y eventualmente replicarán a los demas.

d) ¿Debería variar esta configuración para reforzar la consistencia de lectura? Si la respuesta es afirmativa, indicar cómo.

Si, debería variar ya que la configuración anterior favorece la consistencia de escritura. Cuánto más alto es el R mayor será la consistencia de lectura. Entonces, para favorecer dicha consistencia, elegiremos los siguientes valores:

R = 4
W = 1

Esto implica asegurar la escritura en un solo nodo, pero leer todos ellos. Si bien, pueden leerse algunos datos antiguos, se garantiza recuperar el dato más reciente.
[Observación] Si R fuera 3, la configuración seríá correcta. Sin embargo, la pregunta apuntaba a entender que una consistencia en lectura significa que W + R > N. Esto genera tres posibilidades: Favorecer la escritura, la lectura o mitad y mitad. La selección de una por sobre la otra depende de los requerimientos del sistema.