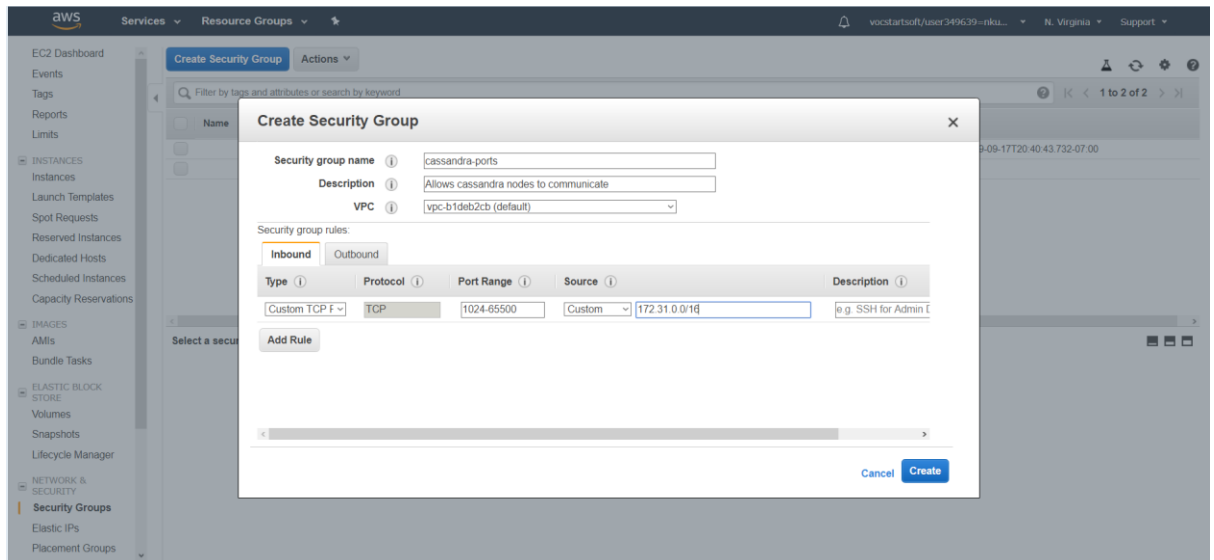
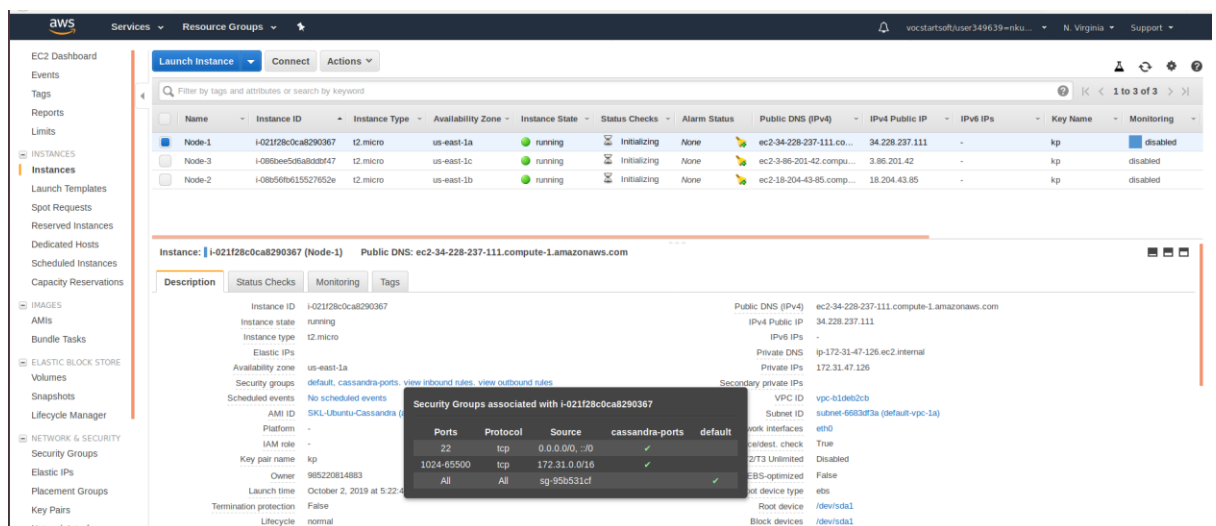


Lab: Cassandra setup | Master-less architecture

1. Create a security group : 'cassandra-ports'



2. Launch 3 EC2 instance each one in different Availability zones using community AMI (SKL-Ubuntu-Cassandra)



3. Node-1 cassandra config setup in AZ-1a

```

File Edit View Search Terminal Tabs Help
ubuntu@ip-172-31-37-45: /opt/apache-cassandra-3.11.1/conf
ubuntu@ip-172-31-37-45: /opt/apache-cassandra-3.11.1/conf
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf

kumar@ubuntu:~/Desktop$ ssh -l kp.pen ubuntu@18.206.218.44
The authenticity of host '18.206.218.44 (18.206.218.44)' can't be established.
ECDSA key fingerprint is SHA256:nontZWnJ3YwSKt1B3UIMZkZx2cng+YfgPcWhtc.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '18.206.218.44' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 16.04.3 LTS (GNU/Linux 4.4.0-1047-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

226 packages can be updated.
142 updates are security updates.

*** System restart required ***
Last login: Sun Jan 28 15:55:31 2018 from 106.200.196.203
ubuntu@ip-172-31-37-45:~$ cd /opt/
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1$ cd conf/
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$ sed -i 's'=MOD_CLUSTER_NAME=GL-Cluster=g' cassandra.yaml
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$ sed -i 's'=MOD_IP_ADDRESS=172.31.37.45=g' cassandra.yaml
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$ sed -i 's'=MOD_SEED_LIST=172.31.15.95=g' cassandra.yaml
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$ sed -i 's'=MOD_DATACENTER=dc1=g' cassandra-rackdc.properties
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$ sed -i 's'=MOD_RACK=r1=g' cassandra-rackdc.properties
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$ cd cassandra
ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$ cd java HotSpot(TM) 64-Bit Server VM warning: Cannot open file /opt/apache-cassandra-3.11.1/logs/gc.log due to No such file or directory

CompilerOracle: dontInLine org/apache/cassandra/db/Column$Serializer.serializeLargeSubset (Lorg/apache/cassandra/io/uttl/DataInputPlus;Lorg/apache/cassandra/db/Column;I)Lorg/apache/cassandra/db/Column;
CompilerOracle: dontInLine org/apache/cassandra/db/Column$Serializer.serializeLargeSubset (Ljava/util/Collection;I)Lorg/apache/cassandra/db/Column;Lorg/apache/cassandra/io/uttl/DataOutputPlus;J
CompilerOracle: dontInLine org/apache/cassandra/db/Column$Serializer.serializeLargeSubset (Ljava/util/Collection;I)Lorg/apache/cassandra/db/Column;I
CompilerOracle: dontInLine org/apache/cassandra/db/commitlog/AbstractCommitLogSegmentManager.advanceAllocatingFrom (Lorg/apache/cassandra/db/commitlog/CommitLogSegment;J
CompilerOracle: dontInLine org/apache/cassandra/db/transform/StoppingTransformation.stop (J
CompilerOracle: dontInLine org/apache/cassandra/db/transform/StoppingTransformation.stopInPartition (J
CompilerOracle: dontInLine org/apache/cassandra/io/uttl/BufferedDataOutputStreamPlus.doFlush (J
CompilerOracle: dontInLine org/apache/cassandra/io/uttl/BufferedDataOutputStreamPlus.writeException (J
CompilerOracle: dontInLine org/apache/cassandra/io/uttl/BufferedDataOutputStreamPlus.writeLow (J
CompilerOracle: dontInLine org/apache/cassandra/io/uttl/RebufferingInputStream.readPrimitiveLowly (I)
CompilerOracle: inLine org/apache/cassandra/db/rows/UnfilteredSerializer.serializeRowBody (Lorg/apache/cassandra/db/rows/Row;Lorg/apache/cassandra/db/SerializationHeader;Lorg/apache/cassandra/io/uttl/DataOutputPlus;)

ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$ nodetool status
Datacenter: dc1
=====
Status=Up/Down
-- State=Normal/Leaving/Joining/Moving
-- Address Load Tokens Owns (effective) Host ID Rack
UN 172.31.15.95 249.46 KIB 256 60.7% 2c9e9965-759e-45bd-b957-d58269dc4775 r1
UN 172.31.37.45 89.43 KIB 256 64.1% 2d4911e5-60e7-4809-b8f6-27d0bb48692 r2
UN 172.31.95.92 262.87 KIB 256 67.2% 3328fbc6-6217-4b4b-a294-ba82fdeete5e r3

ubuntu@ip-172-31-37-45:~$ cd /opt/apache-cassandra-3.11.1/conf$

```

4. Node-2 cassandra config setup in AZ-1b

```

ubuntu@ip-172-31-47-128: /opt/apache-cassandra-3.11.1/bin
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1$ cd conf/
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf$ sed -i 's'#M0D_CLUSTER_NAME=cl-Cluster.gss' cassandra.yaml
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf$ sed -i 's'#M0D_IP_ADDRESS=172.31.15.95#g' cassandra.yaml
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf$ sed -i 's'#M0D_SEED_LIST=172.31.15.95#g' cassandra.yaml
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf$ sed -i 's'#M0D_DATACENTER=dc1g' cassandra-rackdc.properties
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf$ sed -i 's'#M0D_RACK=rp2zg' cassandra-rackdc.properties
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf$ cd ..
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1$ cd bin
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/bin$ java HotSpot(TM) 64-Bit Server VM warning: Cannot open file /opt/apache-cassandra-3.11.1/logs/gc.log due to No such file or directory

CompilerOracle: dontInline org/apache/cassandra/db/ColumnsSerializer.serializeLargeSubset (Lorg/apache/cassandra/to/uttl/DataInputPlus;Lorg/apache/cassandra/db/Columns;I)Lorg/apache/cassandra/db/Column;
CompilerOracle: dontInline org/apache/cassandra/db/ColumnsSerializer.serializeLargeSubset (Ljava/util/Collection;Lorg/apache/cassandra/db/Columns;I)Lorg/apache/cassandra/db/Column;
CompilerOracle: dontInline org/apache/cassandra/db/ColumnsSerializer.serializeLargeSubsetSet (Ljava/util/Collection;I)Lorg/apache/cassandra/db/Columns;I
CompilerOracle: dontInline org/apache/cassandra/db/ColumnT/AbstractColumnSegmentManager.advanceALocatingFrom (Lorg/apache/cassandra/db/ColumnT/ColumnSegment;J)V
CompilerOracle: dontInline org/apache/cassandra/db/transform/BaseTransformer.tryGetMoreContents (I)Z
CompilerOracle: dontInline org/apache/cassandra/db/transform/StopTransformTransformer.stop (I)V
CompilerOracle: dontInline org/apache/cassandra/db/transform/StopTransformTransformer.stopPartition (J)V
CompilerOracle: dontInline org/apache/cassandra/to/uttl/BufferedDataOutputStreamPlus.doFlush (I)V
CompilerOracle: dontInline org/apache/cassandra/to/uttl/BufferedDataOutputStreamPlus.writeExcessSlow (I)V
CompilerOracle: dontInline org/apache/cassandra/to/uttl/BufferedDataOutputStreamPlus.writeSlow (I)V
CompilerOracle: dontInline org/apache/cassandra/to/uttl/BufferedDataOutputStream.readPrintInttivelySlow (I)I
CompilerOracle: inline org/apache/cassandra/db/rows/UnfilteredSerializer.serializeRowBody (Lorg/apache/cassandra/db/rows/Row;I)Lorg/apache/cassandra/db/SerializationHeader;I
Lorg/apache/cassandra/to/uttl/DataOutputPlus;J
CompilerOracle: inline org/apache/cassandra/to/uttl/Memory.checkBounds (J)J
CompilerOracle: inline org/apache/cassandra/to/uttl/SafetyMemory.checkBounds (J)J
CompilerOracle: inline org/apache/cassandra/uttl/AsymmetricCOrdering.selectBoundary (Lorg/apache/cassandra/uttl/AsymmetricCOrdering;O)I
CompilerOracle: inline org/apache/cassandra/uttl/AsymmetricCOrdering.strictnessOfLessThan (Lorg/apache/cassandra/uttl/AsymmetricCOrdering;O)I
CompilerOracle: inline org/apache/cassandra/uttl/BloomFilter.indexes (Lorg/apache/cassandra/uttl/Filter/FilterKey;I)I
CompilerOracle: inline org/apache/cassandra/uttl/BloomFilter.setIndexes (J)I
CompilerOracle: inline org/apache/cassandra/uttl/ByteBufferUtl.compare (Ljava/nio/ByteBuffer;[B)I
CompilerOracle: inline org/apache/cassandra/uttl/ByteBufferUtl.compare ([BLjava/nio/ByteBuffer;I)
CompilerOracle: inline org/apache/cassandra/uttl/ByteBufferUtl.compareSigned (Ljava/nio/ByteBuffer;Ljava/nio/ByteBuffer;I)
CompilerOracle: inline org/apache/cassandra/uttl/FastByteOperations.SinsafeOperations.compareTo (Ljava/lang/Object;JILjava/lang/Object;J)I
CompilerOracle: inline org/apache/cassandra/uttl/FastByteOperations.SinsafeOperations.compareTo (Ljava/lang/Object;JILjava/nio/ByteBuffer;I)
CompilerOracle: inline org/apache/cassandra/uttl/FastByteOperations.SinsafeOperations.compareTo (Ljava/nio/ByteBuffer;Ljava/nio/ByteBuffer;I)
CompilerOracle: inline org/apache/cassandra/uttl/VintCodec.encodeInt (J)I
INFO [main] 2019-10-02 14:28:43.748 YamlConfigurationLoader.java:189 - Configuration location: file:/opt/apache-cassandra-3.11.1/conf/cassandra.yaml
--snapshot-top; backpressure.enabled=false; backpressure.strategy=org.apache.cassandra.net.RateBasedBackPressure(high_ratio=0.9, factor=5, flow=FAST); batch_size_fall_threshold_in_kb=50; batch_size_warn_threshold_in_kb=5; Batchlog replay throttle_in_kb=1024; Broadcast address=null; Broadcast rpc_address=null; buffer_pool.use_heap_if_exhausted=true; cache_contention_timeout_in_ms=1000; cdc.enabled=true; cdc.log_group_name=cdc; cdc.log_space_in_mb=0; client_encryption_options=REDACTED; cluster.name=dc1-Cluster; column_index_cache_size_in_kb=2; column_index_size_in_kb=64; commit_failure_policy=stop; commitlog_compression=null; commitlog_directory=/opt/cassandra-data/commitlog; commitlog_max_compression_buffers_in_pool=3; commitlog_periodic_queue_size=1; commitlog_segment_size_in_mb=32; commitlog_sync=periodic; commitlog_sync_batch_window_in_ms=null; commitlog_sync_period_in_ms=10000; commitlog_total_space_in_mb=null; compaction_large_partition_warning_threshold_in_mb=100; compaction_throughput_mb_per_sec=1; concurrent_compactions=null; concurrent_counter_writes=32; concurrent_materialized_view_writes=32; concurrent_reads=32; concurrent_replicates=32;
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/bin$ ./nodetool status
Datacenter: dc1
*****
Status=Up/Down
/I=State/Normal/Leaving/Joining/Moving
-- Address Load Tokens Owns (effective) Host ID Rack
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/bin$

```

5. Node-3 cassandra config setup in AZ-1c

```
ubuntu@ip-172-31-47-126: /opt/apache-cassandra-3.11.1/bin$  
Last login: Sun Jan 28 15:55:31 2018 from 106.200.196.203  
ubuntu@ip-172-31-95-92:~$ cd /opt/  
ubuntu@ip-172-31-95-92: /opt$ cd apache-cassandra-3.11.1/  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1$ cd conf/  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ sed -i 's=MOD_CLUSTER_NAME=GL-Cluster=g' cassandra.yaml  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ sed -i 's=MOD_IP_ADDRESS=172.31.95.92=g' cassandra.yaml  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ sed -i 's=MOD_SEED_LIST=172.31.15.95=g' cassandra.yaml  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ sed -i 's=MOD_DATACENTER=dc1=g' cassandra-rackdc.properties  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ sed -i 's=MOD_RACK=3=g' cassandra-rackdc.properties  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ cd ..  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1$ cd bin  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/bin$ cassandra  
Warning: Cannot open file /opt/apache-cassandra-3.11.1/logs/gc.log due to No such file or directory  
CompilingOracle: dontinline org/apache/cassandra/db/columns$Serializer.deserializeLargeSubset (Lorg/apache/cassandra/lo/uttl/DataInputPlus;Lorg/apache/cassandra/db/columns;I)Lorg/apache/cassandra/db/column$  
CompilingOracle: dontinline org/apache/cassandra/db/columns$Serializer.serializeLargeSubset (Lorg/apache/cassandra/lo/uttl/DataOutputPlus;Lorg/apache/cassandra/db/columns;I)V  
CompilingOracle: dontinline org/apache/cassandra/db/columns$Serializer.serializeLargeSubsetSize (Lorg/apache/cassandra/lo/uttl/DataOutputPlus;Lorg/apache/cassandra/db/columns;I)V  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/bin$ nodetool status  
Datacenter: dc1  
=====  
Status=Up/Down  
-- State=Normal/Leaving/Joining/Moving  
-- Address Load Tokens Owns (effective) Host ID Rack  
UN 172.31.15.95 108.8 KIB 256 100.0% d5ce9965-759e-45bd-b957-d58209dc4f75 r2  
UN 172.31.95.92 108.4 KIB 256 100.0% 3328fbc6-6217-4b4b-a294-ba02fdee1e36 r3  
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/bin$
```

6. Login to cqlsh and create table with data

```
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf$ cqlsh 172.31.37.45 -u cassandra -p cassandra  
Connected to GL-Cluster at 172.31.37.45:9042.  
[cqlsh 5.0.1 | Cassandra 3.11.1 | CQL spec 3.4.4 | Native protocol v4]  
Use HELP for help.  
cassandra@cqlsh> ALTER KEYSPACE "system_auth" WITH REPLICATION = {'class': 'NetworkTopologyStrategy', 'dc1': 3};  
cassandra@cqlsh> CREATE KEYSPACE IF NOT EXISTS starfleet WITH replication = {'class': 'NetworkTopologyStrategy', 'dc1': 3};  
cassandra@cqlsh> CREATE TABLE starfleet.user (  
... user_id VARCHAR,  
... location VARCHAR,  
... display_name VARCHAR,  
... first_name VARCHAR,  
... last_name VARCHAR,  
... PRIMARY KEY (user_id, location)  
... );  
cassandra@cqlsh> INSERT INTO starfleet.user (user_id, location, display_name, first_name, last_name)  
... VALUES ('u1', 'earth1', 'Kirk', 'William', 'Shatner');  
cassandra@cqlsh> INSERT INTO starfleet.user (user_id, location, display_name, first_name, last_name)  
... VALUES ('u2', 'vulcan', 'Spock', 'Leonard', 'Nimoy');  
cassandra@cqlsh> select * from starfleet.user  
... ;  
user_id | location | display_name | first_name | last_name  
-----  
u2 | vulcan | Spock | Leonard | Nimoy  
u1 | earth1 | Kirk | William | Shatner  
(2 rows)  
cassandra@cqlsh>
```

7. Changing CONSISTENCY level

```
File Edit View Search Terminal Tabs Help  
ubuntu@ip-172-31-15-95: /opt/apache-cassandra-3.11.1/conf$  
cassandra@cqlsh> CONSISTENCY  
Current consistency level is ONE.  
cassandra@cqlsh> CONSISTENCY ALL  
Consistency level set to ALL.  
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';  
InvalidRequest: Error from server: code=2200 [Invalid query] message="Undefined column name user_id"  
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';  
user_id | location | display_name | first_name | last_name  
-----  
u2 | vulcan | Spock | Leonard | Nimoy  
(1 rows)  
cassandra@cqlsh>
```

8. Shutting down the Node-3 in AZ-c

```
ubuntu@ip-172-31-37-45: /opt/apache-cassandra-3.11.1/conf
29704554641, 327065379876581777, 3351357180210663954, 3480654028963613836, 3610981436506828591, 3739624994953384813, 3744426175281201695, 3841452230548246136, 396456266534000032, 3986889731645666312, 4
201377234613220, 401886934866879619, 413461897435158962, 418419121829338297, 4269966326986969979, 443741069728256228, 447293811192827887, 449468375198623533, 462981873103899550, 46382968155935963
473541610886080744, 48829687912424672147, 4854671039621808568, 4912080847916633107, 495140256836724056, 5046907175452293329, 5056829126166591346, 5082255836888228485, 5142819396483960772, 5159383652557
573, 5262058723608053424, 53876548901161875, 540091465401753013, 5481877178313377046, 5502894860274210421, 5631519502911339578, 5632401613345930511, 567423570276900836, 5731339215921115136, 580190599807
21790, 5842270108760857859, 5938554732862825507, 5977252970737971923, 6019216157881920184, 6047338157759891588, 6050256465170503146, 6059778245649607960, 6063868958497845257, 6157430935995450674, 619625
820287471, 6221590834255224642, 6223432471126834922, 6389619409572607266, 6392710658830031078, 6565774927262831366, 657429457139917779, 665804683772918665, 668381477424250178, 6761008742174474547, 676
5021657694443, 687082581903946894, 6900978725742033749, 6953016912238422634, 7005423661096661799, 7043629268114256709, 714896146873888881, 7153684756246443841, 7282019537975908593, 7613694226875518586,
16093998911686451, 7782970628413138184, 7918802331000547176, 7933371742015451381, 8021282974293098997, 8135362522900513008, 8417216688888283692, 8500118667085552882, 853372900645229574, 8600849475947274
8, 8608694428102939784, 865208845119321074, 8726050877216365168, 8765833642562887636, 8828097001916473639, 9012802987720077138, 901364483554584613, 9056287424107504581, 910070333396586767, 913966328147
64474, 9148996837570440454, 99034915436099851]
INFO [main] 2019-10-04 17:50:20,656 StorageService.java:1442 - JOINING: Finish joining ring
INFO [main] 2019-10-04 17:50:20,779 StorageService.java:2268 - Node /172.31.95.92 state jump to NORMAL
INFO [main] 2019-10-04 17:50:20,805 AuthCache.java:172 - (Re)initializing CredentialScache (validity period/update interval/max entries) (2000/2000/1000)
INFO [main] 2019-10-04 17:50:20,814 Gossiper.java:1655 - Waiting for gossip to settle...
INFO [HANDSHAKE - /172.31.15.95] 2019-10-04 17:50:20,944 OutboundTcpConnection.java:560 - Handshaking version with /172.31.15.95
INFO [GossipStage:1] 2019-10-04 17:50:20,958 Gossiper.java:1065 - Node /172.31.15.95 has restarted, now UP
INFO [GossipStage:1] 2019-10-04 17:50:20,979 StorageService.java:2268 - Node /172.31.15.95 state jump to NORMAL
INFO [GossipStage:1] 2019-10-04 17:50:20,985 TokenMetadata.java:479 - Updating topology for /172.31.15.95
INFO [GossipStage:1] 2019-10-04 17:50:20,986 TokenMetadata.java:479 - Updating topology for /172.31.15.95
INFO [RequestResponseStage:2] 2019-10-04 17:50:21,007 Gossiper.java:1031 - InetAddress /172.31.15.95 is now UP
INFO [main] 2019-10-04 17:50:28,817 Gossiper.java:1686 - No gossip backlog; proceeding

ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ nodetool status
Datacenter: dc1
=====
Status=Up/Down
-- State=Normal/Leaving/Joining/Moving
-- Address Load Tokens Owns (effective) Host ID Rack
UN 172.31.15.95 249.46 KIB 256 100.0% d5ce9965-759e-45bd-8957-d58269dc4f75 r2
UN 172.31.95.92 262.87 KIB 256 100.0% 3328fbc6-6217-4b4b-a294-ba82fdee1e56 r3

ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ nodetool status
Datacenter: dc1
=====
Status=Up/Down
-- State=Normal/Leaving/Joining/Moving
-- Address Load Tokens Owns (effective) Host ID Rack
UN 172.31.15.95 387.53 KIB 256 100.0% d5ce9965-759e-45bd-8957-d58269dc4f75 r2
UN 172.31.37.45 111.37 KIB 256 100.0% 2e4911e5-60e7-4809-88f6-27d88bb48692 r1
UN 172.31.95.92 287.31 KIB 256 100.0% 3328fbc6-6217-4b4b-a294-ba82fdee1e56 r3

ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$ nodetool stopdaemon
WARN 18:40:44,480 Small commitlog volume detected at /opt/cassandra-data/commitlog; setting commitlog_total_space_in_mb to 1969. You can override this in cassandra.yaml
WARN 18:40:44,484 Small cdc volume detected at /opt/cassandra-data/cdc_raw; setting cdc_total_space_in_mb to 984. You can override this in cassandra.yaml
WARN 18:40:44,480 Only 5.20GiB free across all data volumes. Consider adding more to your cluster or removing obsolete snapshots
Cassandra has shutdown.
ubuntu@ip-172-31-95-92: /opt/apache-cassandra-3.11.1/conf$
```

9. Observation after shutting down node-3, high consistency and lowest availability

```
ubuntu@ip-172-31-37-45: /opt/apache-cassandra-3.11.1/conf
cassandra@cqlsh> CONSISTENCY
Current consistency level is ONE.
cassandra@cqlsh> CONSISTENCY ALL
Consistency level set to ALL.
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';
InvalidRequest: Error from server: code=2200 [Invalid query] message="Undefined column name user_id"
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';

user_id | location | display_name | first_name | last_name
-----
u2 | vulcan | Spock | Leonard | Nimoy
(1 rows)

cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';
InvalidRequest: Error from server: code=2200 [Invalid query] message="Undefined column name user_id"
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';

user_id | location | display_name | first_name | last_name
-----
u2 | vulcan | Spock | Leonard | Nimoy
(1 rows)

cassandra@cqlsh> CONSISTENCY QUORUM
Consistency level set to QUORUM.
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';

user_id | location | display_name | first_name | last_name
-----
u2 | vulcan | Spock | Leonard | Nimoy
(1 rows)

cassandra@cqlsh>
```

10. Changing CONSISTENCY level to Quorum and firing same query gives output even after failure of one node as Quorum of all nodes all data centers

```
ubuntu@ip-172-31-37-45: /opt/apache-cassandra-3.11.1/conf
cassandra@cqlsh> CONSISTENCY
Current consistency level is ONE.
cassandra@cqlsh> CONSISTENCY ALL
Consistency level set to ALL.
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';
InvalidRequest: Error from server: code=2200 [Invalid query] message="Undefined column name user_id"
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';

user_id | location | display_name | first_name | last_name
-----
u2 | vulcan | Spock | Leonard | Nimoy
(1 rows)

cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';
InvalidRequest: Error from server: code=2200 [Invalid query] message="Undefined column name user_id"
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';

user_id | location | display_name | first_name | last_name
-----
u2 | vulcan | Spock | Leonard | Nimoy
(1 rows)

cassandra@cqlsh> CONSISTENCY QUORUM
Consistency level set to QUORUM.
cassandra@cqlsh> SELECT * FROM starfleet.user where user_id='u2';

user_id | location | display_name | first_name | last_name
-----
u2 | vulcan | Spock | Leonard | Nimoy
(1 rows)

cassandra@cqlsh>
```