

Guide: Prof. Sasikala R
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Reg No: 18MCS0020

NoSQL – Assignment 3

Create table Customers (Id int PRIMARY KEY, Name varchar, ReferredBy int, Mobile int);

Create table Invoices (Id int, BillingDate date, CustomerId int, PRIMARY KEY (Id, BillingDate));

Create index IndexMob on simplekeyspace1.Customers(Mobile);

2. The list should be ordered by billing date.

select * from Invoices where id=1008 order by BillingDate desc ;

Output:

Results	Query Trace	
id	billingdate	customerid
1008	2015-01-11	7
1008	2013-01-12	5
1008	2013-01-11	5
1008	2007-01-11	5

3. Create Customers list based on id (unique key)

create table Customers (Id uuid PRIMARY KEY, Name varchar, ReferredBy int, Mobile int);

Output:

```
cqlsh:demo> insert into Customers (Id, Name) values(now(), 'Asif');
cqlsh:demo> select * from Customers;

 id                                     | mobile | name | referredby
-----+-----+-----+-----
 e38f3830-2703-11e9-bc54-25607de025b7 | null   | Asif | null
(1 rows)
cqlsh:demo> insert into Customers (Id, Name) values(now(), 'Abhishek');
cqlsh:demo> insert into Customers (Id, Name) values(now(), 'Asif');
cqlsh:demo> select * from Customers;

 id                                     | mobile | name   | referredby
-----+-----+-----+-----
 e38f3830-2703-11e9-bc54-25607de025b7 | null   | Asif   | null
 f5402e40-2703-11e9-bc54-25607de025b7 | null   | Abhishek | null
 f986b190-2703-11e9-bc54-25607de025b7 | null   | Asif   | null
(3 rows)
```

4. Retrieve the customer details based on Mobile Number(index)

Create table Customers (Id int PRIMARY KEY, Name varchar, ReferredBy int, Mobile int);

Create index IndexMob on simplekeyspace1.Customers(Mobile);

SELECT * FROM customers WHERE mobile=40368390;

Output:

Results	Query Trace			
id	mobile	name	referredby	
5	40368390	Ram	3	
9	40368390	Balaji	7	

5. Create a simple Cassandra cluster with 3 nodes

Step 1: Installation of Cassandra on all 3 nodes.

Step 2: Each node has open communication between the other nodes. Set up the firewall rules between nodes.

System 1 - 192.168.43.152 - Asif

System 2 - 192.168.43.52 – Abhishek

System 3 - 192.168.43.115 – Vinay

```
sudo ufw allow proto tcp from 192.168.43.115 to any port 7000,9042 comment "Cassandra TCP"
```

```
sudo ufw allow proto tcp from 192.168.43.152 to any port 7000,9042 comment "Cassandra TCP"
```

```
sudo ufw allow proto tcp from 192.168.43.52 to any port 7000,9042 comment "Cassandra TCP"
```

Step 3: Edit your **cassandra.yaml** file for each node.

a) Cluster name should be same for all three nodes.

b) seeds: "192.168.43.115, 192.168.43.152, 192.168.43.52"

c) auto_default: True

d) Each node will specify listen_address and rpc_address as its own IP address.

Step 4: Run node 1 first, once this is up and running we can start the remaining nodes.

```
-- sudo cassandra -f -R (Node 1)
```

```
asif@asif-HP-Pavilion-15-Notebook-PC: /etc/cassandra

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01, 3004534724982397685, 305254997458978071, 3080962019836942628, 3087980831766755020, 3094946520032408657, 3317571439722173564, 3321188530918
68676, 3373660766870128935, 3383792369433585692, 3503612140169248868, 3602130537749131876, 3634291577223308399, 3682937617142405644, 375007303
56652788, 3930387494438659974, 3938348330266067822, 4017935606707096427, 4290635948845795254, 4370717200093252478, 4487371206983587880, 451439
2652117569133, 4628303329579989609, 4653563490478721131, 4688186710921319694, 4725448048918681531, 5010598297169513571, 5079000274767859269, 5
08027873492969285, 5088761146947573285, 5169508171010240311, 5227019050506749309, 5294611175980623500, 5353313057706825394, 545108791124095190
, 5489125328469231332, 5661922765731755673, 577682247197254355, 5809709293410354893, 584181235028703003, 5914676911983728316, 5921037197411551
67, 5921541214632209798, 5977669370007780859, 5983004094870137083, 6023133600775742787, 6041813163687046047, 6076007111950933074, 616703960683
433469, 6168870739261769358, 6318769527923964274, 634482063782489110, 636251568245178889, 6500699240179982158, 6502257348691848850, 6523829186
295901559, 6653137265112561079, 6739689111681244072, 6743452052495363391, 6794569321788271998, 6831306325777625233, 686223189156029650, 71165
00791079278631, 7122975408307702240, 7316632946351466972, 7322403776795881850, 7344275726914776282, 7365962892373638557, 7388357009019991754,
741195608011848683, 7486853381663118100, 7556913465174177807, 7929993129480101702, 7998716443479821470, 8105105034834945462, 81357569601109708
32, 830084365019371364, 834416275430118985, 8377177240387055211, 8419294978625310918, 8586548178993931940, 8599572559854665301, 8601840096182
629755, 8720108562387148718, 8796743566780323331, 8797622681944605803, 8982624897251802669, 9007829283645173045, 9095996675572928608, 92158303
87309576342, 934024546012299616]
INFO [main] 2019-02-02 17:19:28,996 StorageService.java:1446 - JOINING: Finish joining ring
INFO [GossipStage:1] 2019-02-02 17:19:29,337 Gossiper.java:1055 - Node /192.168.43.52 is now part of the cluster
INFO [RequestResponseStage-3] 2019-02-02 17:19:29,375 Gossiper.java:1019 - InetAddress /192.168.43.52 is now UP
INFO [GossipStage:1] 2019-02-02 17:19:29,393 TokenMetadata.java:479 - Updating topology for /192.168.43.52
INFO [GossipStage:1] 2019-02-02 17:19:29,393 TokenMetadata.java:479 - Updating topology for /192.168.43.52
INFO [HANDSHAKE-/192.168.43.52] 2019-02-02 17:19:29,410 OutboundTcpConnection.java:561 - Handshaking version with /192.168.43.52
WARN [GossipTasks:1] 2019-02-02 17:19:29,914 FailureDetector.java:288 - Not marking nodes down due to local pause of 37603616435 > 5000000000
INFO [main] 2019-02-02 17:19:30,137 StorageService.java:2289 - Node /192.168.43.152 state jump to NORMAL
INFO [main] 2019-02-02 17:19:30,147 Gossiper.java:1692 - Waiting for gossip to settle...
INFO [InternalResponseStage:1] 2019-02-02 17:19:33,656 ColumnFamilyStore.java:411 - Initializing abhishek.customers
INFO [InternalResponseStage:1] 2019-02-02 17:19:33,741 ColumnFamilyStore.java:411 - Initializing abhishek.customers.customers_phone_idx
INFO [InternalResponseStage:1] 2019-02-02 17:19:34,156 ColumnFamilyStore.java:411 - Initializing abhishek.invoices
INFO [main] 2019-02-02 17:19:38,149 Gossiper.java:1723 - No gossip backlog; proceeding
INFO [main] 2019-02-02 17:19:38,436 NativeTransportService.java:70 - Netty using native Epoll event loop
INFO [main] 2019-02-02 17:19:38,494 Server.java:155 - Using Netty Version: [netty-buffer=netty-buffer-4.0.44.Final.452812a, netty-codec=netty
-codec-4.0.44.Final.452812a, netty-codec-haproxy=netty-codec-haproxy-4.0.44.Final.452812a, netty-codec-http=netty-codec-http-4.0.44.Final.4528
12a, netty-codec-socks=netty-codec-socks-4.0.44.Final.452812a, netty-common-netty-common-4.0.44.Final.452812a, netty-handler=netty-handler-4.0
.44.Final.452812a, netty-tcnative=netty-tcnative-1.1.33.Fork26.142ecbb, netty-transport=netty-transport-4.0.44.Final.452812a, netty-transport-
native-epoll=netty-transport-native-epoll-4.0.44.Final.452812a, netty-transport-rxtx=netty-transport-rxtx-4.0.44.Final.452812a, netty-transport-
t-sctp=netty-transport-sctp-4.0.44.Final.452812a, netty-transport-udt=netty-transport-udt-4.0.44.Final.452812a]
INFO [main] 2019-02-02 17:19:38,495 Server.java:156 - Starting listening for CQL clients on /192.168.43.152:9042 (unencrypted)...
INFO [main] 2019-02-02 17:19:38,595 ThriftServer.java:116 - Binding thrift service to /192.168.43.152:9160
INFO [Thread-2] 2019-02-02 17:19:38,601 ThriftServer.java:133 - Listening for thrift clients...
```

Step 5: Then, we will start other two nodes

-- sudo cassandra -f -R (Node 2)

-- sudo cassandra -f -R (Node 3)

Step 6: Other two nodes connected to first node.

```
asif@asif-HP-Pavilion-15-Notebook-PC: /etc/cassandra

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INFO [GossipStage:1] 2019-02-02 18:41:42,939 TokenMetadata.java:479 - Updating topology for /192.168.43.115
WARN [MigrationStage:1] 2019-02-02 18:41:42,940 MigrationTask.java:67 - Can't send schema pull request: node /192.168.43.115 is down.
INFO [RequestResponseStage-1] 2019-02-02 18:41:42,949 Gossiper.java:1019 - InetAddress /192.168.43.115 is now UP
INFO [HANDSHAKE-/192.168.43.115] 2019-02-02 18:41:42,970 OutboundTcpConnection.java:561 - Handshaking version with /192.168.43.115
INFO [main] 2019-02-02 18:41:43,070 SecondaryIndexManager.java:509 - Executing pre-join tasks for: CFS(Keyspace='abhishek', ColumnFamily='invo
ices')
INFO [main] 2019-02-02 18:41:43,072 SecondaryIndexManager.java:509 - Executing pre-join tasks for: CFS(Keyspace='abhishek', ColumnFamily='cus
tomers')
INFO [main] 2019-02-02 18:41:43,645 StorageService.java:2289 - Node /192.168.43.152 state jump to NORMAL
INFO [main] 2019-02-02 18:41:43,655 Gossiper.java:1692 - Waiting for gossip to settle...
INFO [main] 2019-02-02 18:41:51,656 Gossiper.java:1723 - No gossip backlog; proceeding
INFO [main] 2019-02-02 18:41:51,912 NativeTransportService.java:70 - Netty using native Epoll event loop
INFO [main] 2019-02-02 18:41:51,975 Server.java:155 - Using Netty Version: [netty-buffer=netty-buffer-4.0.44.Final.452812a, netty-codec=netty
-codec-4.0.44.Final.452812a, netty-codec-haproxy=netty-codec-haproxy-4.0.44.Final.452812a, netty-codec-http=netty-codec-http-4.0.44.Final.4528
12a, netty-codec-socks=netty-codec-socks-4.0.44.Final.452812a, netty-common-netty-common-4.0.44.Final.452812a, netty-handler=netty-handler-4.0
.44.Final.452812a, netty-tcnative=netty-tcnative-1.1.33.Fork26.142ecbb, netty-transport=netty-transport-4.0.44.Final.452812a, netty-transport-
native-epoll=netty-transport-native-epoll-4.0.44.Final.452812a, netty-transport-rxtx=netty-transport-rxtx-4.0.44.Final.452812a, netty-transport-
t-sctp=netty-transport-sctp-4.0.44.Final.452812a, netty-transport-udt=netty-transport-udt-4.0.44.Final.452812a]
INFO [main] 2019-02-02 18:41:51,975 Server.java:156 - Starting listening for CQL clients on /192.168.43.152:9042 (unencrypted)...
INFO [main] 2019-02-02 18:41:52,438 ThriftServer.java:116 - Binding thrift service to /192.168.43.152:9160
INFO [Thread-2] 2019-02-02 18:41:52,566 ThriftServer.java:133 - Listening for thrift clients...
INFO [GossipTasks:1] 2019-02-02 18:45:52,203 Gossiper.java:1034 - InetAddress /192.168.43.115 is now DOWN
INFO [HANDSHAKE-/192.168.43.115] 2019-02-02 18:46:01,510 OutboundTcpConnection.java:561 - Handshaking version with /192.168.43.115
INFO [GossipStage:1] 2019-02-02 18:46:03,217 Gossiper.java:1053 - Node /192.168.43.115 has restarted, now UP
INFO [GossipStage:1] 2019-02-02 18:46:03,218 TokenMetadata.java:479 - Updating topology for /192.168.43.115
INFO [GossipStage:1] 2019-02-02 18:46:03,218 TokenMetadata.java:479 - Updating topology for /192.168.43.115
INFO [RequestResponseStage-1] 2019-02-02 18:46:03,272 Gossiper.java:1019 - InetAddress /192.168.43.115 is now UP
INFO [HANDSHAKE-/192.168.43.115] 2019-02-02 18:46:03,291 OutboundTcpConnection.java:561 - Handshaking version with /192.168.43.115
INFO [RequestResponseStage-1] 2019-02-02 18:46:03,311 Gossiper.java:1019 - InetAddress /192.168.43.115 is now UP
INFO [GossipStage:1] 2019-02-02 18:46:03,344 StorageService.java:2289 - Node /192.168.43.115 state jump to NORMAL
INFO [HANDSHAKE-/192.168.43.52] 2019-02-02 18:46:35,262 OutboundTcpConnection.java:561 - Handshaking version with /192.168.43.52
INFO [HANDSHAKE-/192.168.43.52] 2019-02-02 18:46:37,790 OutboundTcpConnection.java:561 - Handshaking version with /192.168.43.52
INFO [GossipStage:1] 2019-02-02 18:46:37,888 Gossiper.java:1053 - Node /192.168.43.52 has restarted, now UP
INFO [GossipStage:1] 2019-02-02 18:46:37,889 TokenMetadata.java:479 - Updating topology for /192.168.43.52
INFO [GossipStage:1] 2019-02-02 18:46:37,889 TokenMetadata.java:479 - Updating topology for /192.168.43.52
INFO [RequestResponseStage-1] 2019-02-02 18:46:37,943 Gossiper.java:1019 - InetAddress /192.168.43.52 is now UP
INFO [GossipStage:1] 2019-02-02 18:46:38,289 StorageService.java:2289 - Node /192.168.43.52 state jump to NORMAL
```

Step 7: Once all of services are started, we can use the **nodetool status** command to check the status of our nodes. We can run this from any Cassandra server. As you can see with the below output, all three servers are available in the **un** data centre on **rack1**.

```
asif@asif-HP-Pavilion-15-Notebook-PC: /etc/cassandra
File Edit View Search Terminal Help
asif@asif-HP-Pavilion-15-Notebook-PC:/etc/cassandra$ sudo nodetool status
[sudo] password for asif:
Datacenter: datacenter1
=====
Status=Up/Down
// State=Normal/Leaving/Joining/Moving
-- Address          Load          Tokens         Owns (effective)  Host ID                               Rack
UN 192.168.43.152    294.74 KiB    256            100.0%            d1f06af2-9365-4643-b80c-f261c7fa717f rack1
UN 192.168.43.115    249.15 KiB    256            100.0%            fc1aaa23-de36-4836-a225-4ba40fcd7856 rack1
UN 192.168.43.52     452.54 KiB    256            100.0%            e40a389a-58b9-4250-b226-ab0e10930659 rack1

asif@asif-HP-Pavilion-15-Notebook-PC:/etc/cassandra$
```

Step 8: Nodes are able to query other nodes and fetch data located at other nodes.

```
asif@asif-HP-Pavilion-15-Notebook-PC: /etc/cassandra
File Edit View Search Terminal Help
01, 3004534724982397685, 305254997458978071, 3080962019836942628, 3087980831766755020, 3094946520032408657, 3317571439722173564, 3321188530918
68676, 3373660766870128935, 3383792369433585692, 3503612140169248868, 3602130537749131876, 3634291577223308399, 3682937617142405644, 375007303
56652788, 3930387494438659974, 3938348330266067822, 4017935606707096427, 4290635948845795254, 4370717200093252478, 4487371206983587880, 451439
2652117569133, 4628303329579989609, 4653563490478721131, 4688186710921319694, 4725448048918681531, 5010598297169513571, 5079000274767859269, 5
08027873492969285, 5088761146947573285, 5169508171010240311, 5227019050506749309, 5294611175980623500, 5353313057706825394, 545108791124095190
, 5489125328469231332, 5661922765731755673, 577682247197254355, 5809709293410354893, 584181235028703003, 5914676911983728316, 5921037197411551
67, 5921541214632209798, 5977669370007780859, 5983004094870137083, 6023133600775742787, 6041813163687046047, 6076007111950933074, 616703960683
433469, 6168870739261769358, 6318769527923964274, 634482063782489110, 636251568245178889, 6500699240179982158, 6502257348691848850, 6523829186
295901559, 6653137265112561979, 6739689111681244072, 6743452052495363391, 6794569321788271998, 6831306325777625233, 6862231891560299650, 71165
00791079278631, 7122975408307702240, 7316632946351466972, 7322403776795881850, 7344275726914776282, 7365962892373638557, 7388357009019991754,
741195608011848683, 7486853381663118100, 7556913465174177807, 792999312948010702, 7998716443479821470, 8105105034834945462, 81357569601109708
32, 8300843656019371364, 834416275430118985, 8377177240387055211, 8419294978625310918, 8586548178993931940, 8599572559854665301, 8601840096182
629755, 8720108562387148718, 8796743566780323331, 8797622681944605803, 8982624897251802669, 9007829283645173045, 9095996675572928608, 92158303
87309576342, 934024546012299616]
INFO [main] 2019-02-02 17:19:28,996 StorageService.java:1446 - JOINING: Finish joining ring
INFO [GossipStage:1] 2019-02-02 17:19:29,337 Gossiper.java:1055 - Node /192.168.43.52 is now part of the cluster
INFO [RequestResponseStage-3] 2019-02-02 17:19:29,375 Gossiper.java:1019 - InetAddress /192.168.43.52 is now UP
INFO [GossipStage:1] 2019-02-02 17:19:29,393 TokenMetadata.java:479 - Updating topology for /192.168.43.52
INFO [GossipStage:1] 2019-02-02 17:19:29,393 TokenMetadata.java:479 - Updating topology for /192.168.43.52
INFO [HANDSHAKE-/192.168.43.52] 2019-02-02 17:19:29,410 OutboundTcpConnection.java:561 - Handshaking version with /192.168.43.52
WARN [GossipTasks:1] 2019-02-02 17:19:29,914 FailureDetector.java:288 - Not marking nodes down due to local pause of 37603616435 > 5000000000
INFO [main] 2019-02-02 17:19:30,137 StorageService.java:2289 - Node /192.168.43.152 state jump to NORMAL
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INFO [InternalResponseStage:1] 2019-02-02 17:19:33,741 ColumnFamilyStore.java:411 - Initializing abhishek.customers.customers_phone_idx
INFO [InternalResponseStage:1] 2019-02-02 17:19:34,156 ColumnFamilyStore.java:411 - Initializing abhishek.invoices
INFO [main] 2019-02-02 17:19:38,149 Gossiper.java:1723 - No gossip backlog; proceeding
INFO [main] 2019-02-02 17:19:38,436 NativeTransportService.java:70 - Netty using native Epoll event loop
INFO [main] 2019-02-02 17:19:38,494 Server.java:155 - Using Netty Version: [netty-buffer=netty-buffer-4.0.44.Final.452812a, netty-codec=netty
-codec-4.0.44.Final.452812a, netty-codec-haproxy=netty-codec-haproxy-4.0.44.Final.452812a, netty-codec-http=netty-codec-http-4.0.44.Final.4528
12a, netty-codec-socks=netty-codec-socks-4.0.44.Final.452812a, netty-common=netty-common-4.0.44.Final.452812a, netty-handler=netty-handler-4.0
.44.Final.452812a, netty-tcnative=netty-tcnative-1.1.33.Fork26.142ecbb, netty-transport=netty-transport-4.0.44.Final.452812a, netty-transport-
native-epoll=netty-transport-native-epoll-4.0.44.Final.452812a, netty-transport-rxtx=netty-transport-rxtx-4.0.44.Final.452812a, netty-transport-
t-sctp=netty-transport-sctp-4.0.44.Final.452812a, netty-transport-udt=netty-transport-udt-4.0.44.Final.452812a]
INFO [main] 2019-02-02 17:19:38,495 Server.java:156 - Starting listening for CQL clients on /192.168.43.152:9042 (unencrypted)...
INFO [main] 2019-02-02 17:19:38,595 ThriftServer.java:116 - Binding thrift service to /192.168.43.152:9160
INFO [Thread-2] 2019-02-02 17:19:38,601 ThriftServer.java:133 - Listening for thrift clients...
```

```
asif@asif-HP-Pavilion-15-Notebook-PC:/etc/cassandra$ cqlsh
Connection error: ('Unable to connect to any servers', {'127.0.0.1': error(111, "Tried connecting to [('127.0.0.1', 9042)]. Last error: Connection refused"))
asif@asif-HP-Pavilion-15-Notebook-PC:/etc/cassandra$ cqlsh 192.168.43.152
Connected to Test Cluster at 192.168.43.152:9042.
[cqlsh 5.0.1 | Cassandra 3.11.3 | CQL spec 3.4.4 | Native protocol v4]
Use HELP for help.
cqlsh> describe keyspaces

system_schema  system_auth  system  system_distributed  abhishek  system_traces
```