

# **Assignment 5**

## **1. What are the factors that are to be considered when deploying the Cassandra cluster?**

Broadly speaking, there are 4 things to consider when deploying a Cassandra cluster:

- Capacity Planning
- Hardware Selection
- Replication Options
- Node Tool Configuration Options

In capacity planning, it's better to estimate or determine 3-6 years in the future with regards to transaction growth, increase in number of concurrent transactions, throughput, and security requirements on the system. This estimation helps in better architecting the system for the present and for the future as well.

Based on the capacity planning needs, the next thing to determine the various configuration for CPU, Memory, Hard Disk, and Network speed, and data center location, fire-wall.

In terms of network requirements, since there is too much chatter goes on among nodes due to Gossip protocol – one node wants to know the state of the other node – it's important to have good bandwidth with some amount of redundancy.

In general, since Cassandra is P2P architecture based. It puts equal demand on all the nodes for all the resources. On average, at least 16g RAM is needed; however 32g is recommended to start with. With regards to CPU, since it is multithreaded system, having more processor—many core-- in the node would help deliver better CPU performance.

Having better decision on replication options, also helps in determining hard disk needs (RAID-0, RAID-1, and RAID-10 etc) and designing network topology of the deployment.

Having proper security requirement, helps in setting up a robust network with regards to porting, firewall, encryption, decryption, key storage. In addition, it also helps in determine how the system would allow user to authenticate and authorize.

## **2. How does more memory power help in tuning Cassandra? Does it help in the reads as well?**

Having maximum memory – which can be accessed by the OS—helps in improve reading performance. That way size of the MemTable can be made larger so that maximum read would happen from the MemTable as opposed to SSTable.

Have larger MemTable also helps in decrease the frequency of flushing. This would then result in less small SSTables and less frequency of compaction.

## **3. What is a node tool and where is it configured. What all can you accomplish with a node tool?**

Node tool helps you administer and maintain the Cassandra cluster. It does the following:

- Get the statistics about the cluster
- Find out the ranges each node maintains
- Move data from one node to other
- Decommission a node
- Add a node
- Repair a node having trouble

## **4. What are partitioners? How many major kinds of partitioners are there? Please compare the differences between various partitioning strategies?**

Partitioner provide algorithm how rows would be distributed on the nodes in a Cassandra cluster.

There are two types of Partitioner: Random Partitioner, and Byte Order Partitioner.

Random Partitioner helps in better distribution of rows across the cluster nodes. It does it by calculating MD5 hash of the row key and then calculate the mod of hash and number of nodes in cluster. The mod value is the node number where the record will be first stored, and then replicated on the other node based on the replication strategy.

The advantage of Random Partitioner is the even distribution of rows. The disadvantage is that this partitioner mechanism is not efficient for range queries.

The Byte Order Partitioner divides rows in a sorted order on different nodes. This kind of partitioner is good for range queries as cluster is aware what range is stored on a node. The drawback is that there is chance of creation of Hot Spot – which is say among total rows, say 80% of the rows are stored on single node. This hot-spot would decrease read and write performance.

## **5. What are snitches? What function do they perform in Cassandra? How do they affect Cassandra configuration?**

Snitches are used to determine host proximity. There are two kinds of Snitch: Simple and Property File Snitch.

For a single RAC cluster, Simple Snitch, which is default, is stuffiest. However, if you cluster is deployed on more than one data center, Property File snitch would be more appropriate.

In Simple Snitch, IP address octet is used to determine the host location. On the other hand, in Property File snitch, the DC and RAC is provided along with the nodes IP addresses in a property file.

**6. What are snapshots? What is a snapshot analogous to in RDBMS? Why are snapshots necessary?**

Snapshot are the backup of keyspace. Snapshot analogous in RDBMS is cold backup. Snapshot helps in restoring a node.

**7. Please explain briefly how you will tune Cassandra in terms of the following:**

➤ **Reads**

- To tune read performance, many things could be done.
  - If we are not changing any configuration, just having weak consistency (Any, One) provides better read performance.
  - Having larger MemTable also improve read performance.
  - Random Partitioning also deliver better read performance; however, if you need sorted rows then Byte Order partitioning would be appropriate. But it may create hot spots.

➤ **Writes**

- To tune write performance, many things could be done.
  - If we are not changing any configuration, just having weak consistency (One) provides better write performance.
  - Having larger MemTable also improve read performance.
  - Random Partitioning also deliver better write performance.
  - Replication Factor in the low range ( around 2-3)

## **8. Please explain the decommissioning process in Cassandra?**

The decommissioning is process of taking a node of the service from the cluster.

When you run decommission command, following thing happens in steps:

- The gossipier is shut down so that it doesn't receive more data.
- The messaging service is shut down.
- The SEDA stage manage is shut down.
- The node is set to decommission.