Cloudera

Exam CCA-470

Cloudera Certified Administrator for Apache Hadoop CDH4 Upgrade Exam

Version: 6.0

[Total Questions: 86]

Question No : 1

You configure Hadoop cluster with both MapReduce frameworks, MapReduce v1 (MRv1) and MapReduce v2 (MRv2/YARN). Which two MapReduce (computational) daemons do you need to configure to run on your master nodes?

A. JobTracker
B. ResourceManager
C. ApplicationMaster
D. JournalNode
E. NodeManager

Answer: B,C

Explanation: MapReduce has undergone a complete overhaul in hadoop-0.23 and we now have, what we call, MapReduce 2.0 (MRv2) or YARN.

The fundamental idea of MRv2 is to split up the two major functionalities of the JobTracker, resource management and job scheduling/monitoring, into separate daemons. The idea is to have a global ResourceManager (RM) and per-application ApplicationMaster (AM). An application is either a single job in the classical sense of Map-Reduce jobs or a DAG of jobs.

The ResourceManager and per-node slave, the NodeManager (NM), form the data-computation framework. The ResourceManager is the ultimate authority that arbitrates resources among all the applications in the system.

The per-application ApplicationMaster is, in effect, a framework specific library and is tasked with negotiating resources from the ResourceManager and working with the NodeManager(s) to execute and monitor the tasks.

Note:
* MRV2 maintains API compatibility with previous stable release (hadoop-0.20.205). This means that all Map-Reduce jobs should still run unchanged on top of MRv2 with just a recompile.

Reference: Apache Hadoop NextGen MapReduce (YARN)

Question No : 2

Choose three reasons why should you run the HDFS balancer periodically?

A. To improve data locality for MapReduce tasks.
B. To ensure that there is consistent disk utilization across the DataNodes.
C. To ensure that there is capacity in HDFS tor additional data.
D. To ensure that all blocks in the cluster are 128MB in size.
E. To help HDFS deliver consistent performance under heavy loads.

Answer: A,B,E

Explanation: The balancer is a tool that balances disk space usage on an HDFS cluster when some datanodes become full or when new empty nodes join the cluster. The tool is deployed as an application program that can be run by the cluster administrator on a live HDFS cluster while applications adding and deleting files.

DESCRIPTION

The threshold parameter is a fraction in the range of (0%, 100%) with a default value of 10%. The threshold sets a target for whether the cluster is balanced. A cluster is balanced if for each datanode, the utilization of the node (ratio of used space at the node to total capacity of the node) differs from the utilization of the (ratio of used space in the cluster to total capacity of the cluster) by no more than the threshold value. The smaller the threshold, the more balanced a cluster will become. It takes more time to run the balancer for small threshold values. Also for a very small threshold the cluster may not be able to reach the balanced state when applications write and delete files concurrently.

The tool moves blocks from highly utilized datanodes to poorly utilized datanodes iteratively. In each iteration a datanode moves or receives no more than the lesser of 10G bytes or the threshold fraction of its capacity. Each iteration runs no more than 20 minutes. At the end of each iteration, the balancer obtains updated datanodes information from the namenode.

Reference: org.apache.hadoop.hdfs.server.balancer, Class Balancer

Question No : 3

Assuming a large properly configured multi-rack Hadoop cluster, which scenario should not result in loss of HDFS data assuming the default replication factor settings?

A. Ten percent of DataNodes simultaneously fail.

B. All DataNodes simultaneously fail.

C. An entire rack fails.

D. Multiple racks simultaneously fail.

E. Seventy percent of DataNodes simultaneously fail.

Answer: A

Reference: http://stackoverflow.com/questions/12399197/in-a-large-properly-configured-multi-rack-hadoop-cluster-which-scenarios-will-b

Question No : 4

What happens if a Mapper on one node goes into an infinite loop while running a MapReduce job?

A. After a period of time, the JobTracker will restart the TaskTracker on the node on which the map task is running

B. The Mapper will run indefinitely; the TaskTracker must be restarted to kill it

C. The job will immediately fail.

D. After a period of time, the TaskTracker will kill the Map Task.

Answer: D

Explanation: * The TaskTracker nodes are monitored. If they do not submit heartbeat signals often enough, they are deemed to have failed and the work is scheduled on a different TaskTracker.

* A TaskTracker will notify the JobTracker when a task fails. The JobTracker decides what to do then: it may resubmit the job elsewhere, it may mark that specific record as something to avoid, and it may may even blacklist the TaskTracker as unreliable.

Question No : 5

You have a cluster running with the FIFO scheduler enabled. You submit a large job A to the cluster which you expect to run for one hour. Then, you submit job B to the cluster,

which you expect to run a couple of minutes only. Let's assume both jobs are running at the same priority.

How does the FIFO scheduler execute the jobs? (Choose 3)

A. The order of execution of tasks within a job may vary.
B. When a job is submitted, all tasks belonging to that job are scheduled.
C. Given jobs A and B submitted in that order, all tasks from job A will be scheduled before all tasks from job B.
D. Since job B needs only a few tasks, if might finish before job A completes.

Answer: A,B,C
Reference: http://seriss.com/rush-current/rush/rush-priority.html#FIFO%20Scheduling (see fifo scheduling)

Question No : 6

For each job, the Hadoop framework generates task log files. Where are Hadoop's task log files stored?

A. Cached on the local disk of the slave node running the task, then purged immediately upon task completion.
B. Cached on the local disk of the slave node running the task, then copied into HDFS.
C. In HDFS, in the directory of the user who generates the job.
D. On the local disk of the slave node running the task.

Answer: C
Explanation: Job Statistics
These logs are created by the jobtracker. The jobtracker runtime statistics from jobs to thesefiles. Those statistics include task attempts, time spent shuffling, input splits given to task attempts, start times of tasks attempts and other information.

The statistics files are named:

<hostname>_<epoch-of-jobtracker-start>_<job-id>_<job-name>
where <hostname> is the hostname of the machine creating these logs, <epoch-of-jobtracker-start> is the number of milliseconds that had elapsed since Unix Epoch when the jobtracker daemon was started, <job-id> is the job ID, and <job-name> is the name of the job.

For example:

ec2-72-44-61-184.compute-
1.amazonaws.com_1250641772616_job_200908190029_0002_hadoop_test-mini-mr
These logs are not rotated.You can clear these logs periodically without affecting Hadoop.
However, consider archiving the logs if they are of interest in the job development process.
Make sure you do not move or delete a file that is being written to by a running job.

Individual statistics logs are created for each job that is submitted to the cluster. The size of
each log file varies. Jobs with more tasks produce larger files.

Reference: Apache Hadoop Log Files: Where to find them in CDH, and what info they
contain

Question No : 7

Which three processes does HDFS High Availability (HA) enable on your cluster?

A. Automatically 'fail over' between NameNodes if one goes down
B. Write data to two clusterssimultaneously
C. Shut one NameNode down for maintenance without halting the cluster
D. Manually 'fail over' between NameNodes
E. Configure unlimited hot standby NameNode.

Answer: A,C,D

Explanation: The HDFS High Availability feature addresses the above problems by
providing the option of running two redundant NameNodes in the same cluster in an
Active/Passive configuration with a hot standby. This allows a fast failover to a new
NameNode in the case that a machine crashes, or a graceful administrator-initiated failover
for the purpose of planned maintenance.

Question No : 8

You has a cluster running with the Fail Scheduler enabled. There are currently no jobs running on the cluster you submit a job A, so that only job A is running on the cluster. A while later, you submit job B. Now job A and Job B are running on the cluster al the same time. How will the Fair' Scheduler handle these two Jobs?

A. When job A gets submitted, it consumes all the task slot

B. When job A gets submitted, it doesn't consume all the task slot

C. When job B gets submitted, Job A has to finish first, before job it can get scheduled.

D. When job B gets submitted, it will get assigned tasks, while job A continues to run with fewer tasks.

Answer: D

Explanation: Fair scheduling is a method of assigning resources to jobs such that all jobs get, on average, an equal share of resources over time. When there is a single job running, that job uses the entire cluster. When other jobs are submitted, tasks slots that free up are assigned to the new jobs, so that each job gets roughly the same amount of CPU time. Unlike the default Hadoop scheduler, which forms a queue of jobs, this lets short jobs finish in reasonable time while not starving long jobs. It is also a reasonable way to share a cluster between a number of users. Finally, fair sharing can also work with job priorities - the priorities are used as weights to determine the fraction of total compute time that each job should get.

Reference: Hadoop, Fair Scheduler Guide

Question No : 9

You've configured your cluster with HDFS Federation. One NameNode manages the /data namesapace and another Name/Node manages the /reports namespace. How do you configure a client machine to access both the /data and the /reports directories on the cluster?

A. Configure the client to mount the /data namespace. As long as a single namespace is mounted and the client participates in the cluster, HDFS grants access to all files in the cluster to that client.

B. Configure the client to mount both namespaces by specifying the appropriate properties in the core-site.xml

C. You cannot configure a client to access both directories in the current implementation of HDFS Federation.

D. You don't need to configure any parameters on the client machine. Access is controlled

by the NameNodes managing the namespace.

Answer: C

Explanation: HDFS Federation

In order to scale the name service horizontally, federation uses multiple independent namenodes/namespaces. The namenodes are federated, that is, the namenodes are independent and don't require coordination with each other. The datanodes are used as common storage for blocks by all the namenodes. Each datanode registers with all the namenodes in the cluster. Datanodes send periodic heartbeats and block reports and handles commands from the namenodes.

Note: HDFS Federation improves the existing HDFS architecture through a clear separation of namespace and storage, enabling generic block storage layer. It enables support for multiple namespaces in the cluster to improve scalability and isolation. Federation also opens up the architecture, expanding the applicability of HDFS cluster to new implementations and use cases.

Reference: Hortonworks, An Introduction to HDFS Federation

Question No : 10

You have a cluster running with the Fair in Scheduler enabled. There are currently no jobs running on the cluster, and you submit a job A, so that only job A is running on the cluster. A while later, you submit job B, Now job A and job B are running on the cluster at the same time.

Which of the following describes how the Fair Scheduler operates? (Choose 2)

A. When job B gets submitted, it will get assigned tasks, while job A continues to run with fewer tasks.
B. When job A gets submitted, it doesn't consume all the task slots.
C. When job A gets submitted, it consumes all the task slots.
D. When job B gets submitted, job A has to finish first, before job B can get scheduled.

Answer: C,D
Reference: http://hadoop.apache.org/common/docs/r0.20.2/fair_scheduler.html
(introduction, first paragraph)

Question No : 11

What determines the number of Reduces that run a given MapReduce job on a cluster running MapReduce v1 (MRv1)?

A. It is set by the Hadoop framework and is based on the number of InputSplits of the job.
B. It is set by the developer.
C. It is set by the JobTracker based on the amount of intermediate data.
D. It is set and fixed by the cluster administrator in mapred-site.xml. The number set always run for any submitted job.

Answer: B

Explanation: Number of Reduces

The right number of reduces seems to be 0.95 or 1.75 * (nodes * mapred.tasktracker.tasks.maximum). At 0.95 all of the reduces can launch immediately and start transfering map outputs as the maps finish. At 1.75 the faster nodes will finish their first round of reduces and launch a second round of reduces doing a much better job of load balancing.

Currently the number of reduces is limited to roughly 1000 by the buffer size for the output files (io.buffer.size * 2 * numReduces << heapSize). This will be fixed at some point, but until it is it provides a pretty firm upper bound.

The number of reduces also controls the number of output files in the output directory, but usually that is not important because the next map/reduce step will split them into even smaller splits for the maps.

The number of reduce tasks can also be increased in the same way as the map tasks, via JobConf's conf.setNumReduceTasks(int num).

Reference: org.apache.hadoop.mapred

Class JobConf

Question No : 12

Identify which two daemons typically run each slave node in a Hadoop cluster running MapReduce v1 (MRv1)

A. NodeManager
B. TaskTracker
C. DataNode
D. NameNode
E. Secondary NameNode
F. JobTracker

Answer: B,C

Explanation: A TaskTracker is a slave node daemon in the cluster that accepts tasks (Map, Reduce and Shuffle operations) from a JobTracker.

The following two daemons run on each Slave nodes:
* DataNode – Stores actual HDFS data blocks.
* TaskTracker - Responsible for instantiating and monitoring individual Map and Reduce tasks.

Reference: 24 Interview Questions & Answers for Hadoop MapReduce developers, How many Daemon processes run on a Hadoop system?

Question No : 13

What two processes must you do if you are running a Hadoop cluster with a single NameNode and six DataNodes, and you want to change a configuration parameter so that it affects all six DataNodes.

A. You must restart the NameNode daemon to apply the changes to the cluster
B. You must restart all six DataNode daemons to apply the changes to the cluster.
C. You don't need to restart any daemon, as they will pick up changes automatically.
D. You must modify the configuration files on each of the six DataNode machines.
E. You must modify the configuration files on only one of the DataNode machine
F. You must modify the configuration files on the NameNode only. DataNodes read their configuration from the master nodes.

Answer: A,F

Explanation: Note:Typically one machine in the cluster is designated as
the NameNode and another machine the as JobTracker, exclusively. These are