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Graduate and Extended Studies

FA19: CMPE-297 Sec 01 - Special Topics

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Apache Hadoop: Setting up a Single Node Cluster.

1. Installation on Ubuntu

a. Install JAVA open JDK

- sudha@sudha:~\$ java -version
openjdk version "1.8.0_212"
OpenJDK Runtime Environment (build 1.8.0_212-8u212-b03-
Oubuntu1.18.04.1-b03)
OpenJDK 64-Bit Server VM (build 25.212-b03, mixed mode)

b. Add a dedicated Hadoop user

- sudo addgroup hadoop
- sudo adduser --ingroup hadoop hduser

c. Create and setup SSH certificates for password less login

- sudha@sudha:~\$ which ssh
/usr/bin/ssh
- su hduser
- cat \$HOME/.ssh/id_rsa.pub >> \$HOME/.ssh/authorized_key

d. Install Hadoop

- Wget hadoop package from the apache library (latest hadoop-3.2.0.tar.gz)
- tar xvzf hadoop-3.2.0.tar.gz
- sudo mkdir -p /usr/local/hadoop
- sudo adduser hduser sudo
- sudo chown -R hduser:hadoop /usr/local/hadoop
hduser@sudha:~/hadoop-3.2.0\$ ls
bin etc include lib libexec LICENSE.txt NOTICE.txt README.txt sbin share
- sudo mv * /usr/local/hadoop
- Set path for environment variables for JAVA and Hadoop in .bashrc

```
#HADOOP VARIABLES START
export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-amd64
export HADOOP_INSTALL=/usr/local/hadoop
export PATH=$PATH:$HADOOP_INSTALL/bin
export PATH=$PATH:$HADOOP_INSTALL/sbin
export HADOOP_MAPRED_HOME=$HADOOP_INSTALL
```

```
export HADOOP_COMMON_HOME=$HADOOP_INSTALL
export HADOOP_HDFS_HOME=$HADOOP_INSTALL
export YARN_HOME=$HADOOP_INSTALL
export
HADOOP_COMMON_LIB_NATIVE_DIR=$HADOOP_INSTALL/lib/native
export HADOOP_OPTS="-Djava.library.path=$HADOOP_INSTALL/lib"
export PDSH_RCMD_TYPE=ssh
#HADOOP VARIABLES END
```

- Update core-site.xml file with following contents

```
<configuration>
  <property>
    <name>hadoop.tmp.dir</name>
    <value>/app/hadoop/tmp</value>
    <description>A base for other temporary directories.</description>
  </property>
  <property>
    <name>fs.default.name</name>
    <value>hdfs://localhost:54310</value>
    <description>The name of the default file system. A URI whose
    scheme and authority determine the FileSystem implementation. The
    uri's scheme determines the config property (fs.SCHEME.impl) naming
    the FileSystem implementation class. The uri's authority is used to
    determine the host, port, etc. for a filesystem.</description>
  </property>
</configuration>
```

- Update mapred-site.xml file with following contents

```
<configuration>
  <property>
    <name>mapred.job.tracker</name>
    <value>localhost:54311</value>
    <description>The host and port that the MapReduce job tracker runs
    at. If "local", then jobs are run in-process as a single map
    and reduce task.
  </description>
  </property>
</configuration>
```

- Create namenode and datanode specific directories

```
hduser@sudha:~$ sudo mkdir -p
/usr/local/hadoop_store/hdfs/namenode
hduser@sudha:~$ sudo mkdir -p /usr/local/hadoop_store/hdfs/datanode
hduser@sudha:~$ sudo chown -R hduser:hadoop
/usr/local/hadoop_store
```
- Update hdfs-site.xml file with following contents

```
<configuration>
<property>
<name>dfs.replication</name>
<value>1</value>
<description>Default block replication.
The actual number of replications can be specified when the file is
created.
The default is used if replication is not specified in create time.
</description>
</property>
<property>
<name>dfs.namenode.name.dir</name>
<value>file:/usr/local/hadoop_store/hdfs/namenode</value>
</property>
<property>
<name>dfs.datanode.data.dir</name>
<value>file:/usr/local/hadoop_store/hdfs/datanode</value>
</property>
</configuration>
```
- Format hadoop namenode for initial usage

```
hduser@sudha:~$ hadoop namenode -format
```
- Start Hadoop daemons – dfs and yarn

```
hduser@sudha:~$ /usr/local/hadoop/sbin/start-dfs.sh
hduser@sudha:~$ /usr/local/hadoop/sbin/start-yarn.sh
```
- Verify the started processes

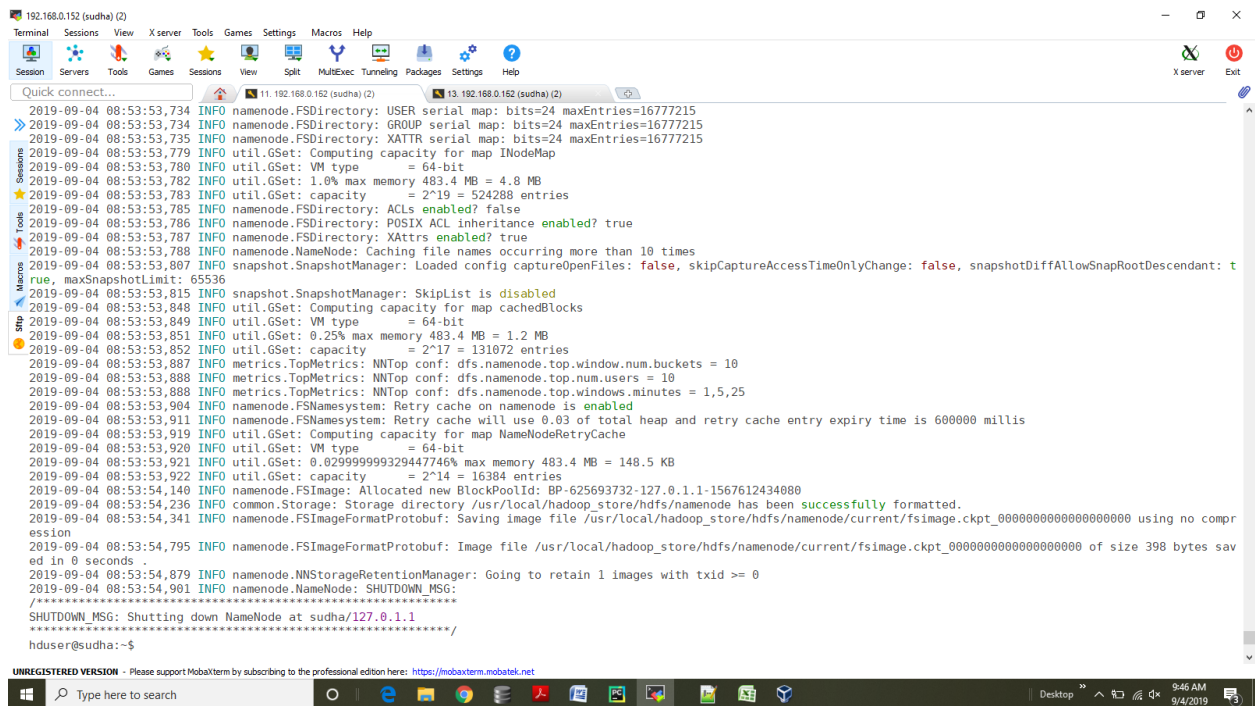
```
hduser@sudha:/usr/local/hadoop/sbin$ jps
5680 NodeManager
```

4688 DataNode
5525 ResourceManager
4902 SecondaryNameNode
6039 Jps
4536 NameNode

- Check URL - <http://localhost:9870/dfshealth.html#tab-overview>

2. Screenshots

a. Format Hadoop namenode for initial usage



```
2019-09-04 08:53:53,734 INFO namenode.FSDirectory: USER serial map: bits=24 maxEntries=16777215
2019-09-04 08:53:53,734 INFO namenode.FSDirectory: GROUP serial map: bits=24 maxEntries=16777215
2019-09-04 08:53:53,735 INFO namenode.FSDirectory: XATTR serial map: bits=24 maxEntries=16777215
2019-09-04 08:53:53,779 INFO util.GSet: Computing capacity for map INodeMap
2019-09-04 08:53:53,780 INFO util.GSet: VM type = 64-bit
2019-09-04 08:53:53,782 INFO util.GSet: 1.0% max memory 483.4 MB = 4.8 MB
2019-09-04 08:53:53,783 INFO util.GSet: capacity = 2^19 = 524288 entries
2019-09-04 08:53:53,785 INFO namenode.FSDirectory: ACLs enabled? false
2019-09-04 08:53:53,786 INFO namenode.FSDirectory: POSIX ACL inheritance enabled? true
2019-09-04 08:53:53,787 INFO namenode.FSDirectory: XAttrs enabled? true
2019-09-04 08:53:53,788 INFO namenode.NameNode: Caching file names occurring more than 10 times
2019-09-04 08:53:53,807 INFO snapshot.SnapshotManager: Loaded config captureOpenFiles: false, skipCaptureAccessTimeOnlyChange: false, snapshotDiffAllowSnapRootDescendant: true, maxSnapshotLimit: 65536
2019-09-04 08:53:53,815 INFO snapshot.SnapshotManager: SkipList is disabled
2019-09-04 08:53:53,848 INFO util.GSet: Computing capacity for map cachedBlocks
2019-09-04 08:53:53,849 INFO util.GSet: VM type = 64-bit
2019-09-04 08:53:53,851 INFO util.GSet: 0.25% max memory 483.4 MB = 1.2 MB
2019-09-04 08:53:53,852 INFO util.GSet: capacity = 2^17 = 131072 entries
2019-09-04 08:53:53,887 INFO metrics.TopMetrics: NNTop conf: dfs.namenode.top.window.num.buckets = 10
2019-09-04 08:53:53,888 INFO metrics.TopMetrics: NNTop conf: dfs.namenode.top.num.users = 10
2019-09-04 08:53:53,888 INFO metrics.TopMetrics: NNTop conf: dfs.namenode.top.windows.minutes = 1,5,25
2019-09-04 08:53:53,904 INFO namenode.FSNamesystem: Retry cache on namenode is enabled
2019-09-04 08:53:53,911 INFO namenode.FSNamesystem: Retry cache will use 0.03 of total heap and retry cache entry expiry time is 600000 millis
2019-09-04 08:53:53,919 INFO util.GSet: Computing capacity for map NameNodeRetryCache
2019-09-04 08:53:53,920 INFO util.GSet: VM type = 64-bit
2019-09-04 08:53:53,921 INFO util.GSet: 0.029999999329447746% max memory 483.4 MB = 148.5 KB
2019-09-04 08:53:53,922 INFO util.GSet: capacity = 2^14 = 16384 entries
2019-09-04 08:53:54,140 INFO namenode.FSImage: Allocated new BlockPoolId: BP-625693732-127.0.1.1-1567612434080
2019-09-04 08:53:54,236 INFO common.Storage: Storage directory /usr/local/hadoop_store/hdfs/namenode has been successfully formatted.
2019-09-04 08:53:54,341 INFO namenode.FSImageFormatProtobuf: Saving image file /usr/local/hadoop_store/hdfs/namenode/current/fsimage.ckpt_000000000000000000 using no compression
2019-09-04 08:53:54,795 INFO namenode.FSImageFormatProtobuf: Image file /usr/local/hadoop_store/hdfs/namenode/current/fsimage.ckpt_000000000000000000 of size 398 bytes saved in 0 seconds.
2019-09-04 08:53:54,879 INFO namenode.NNStorageRetentionManager: Going to retain 1 images with txid >= 0
2019-09-04 08:53:54,901 INFO namenode.NameNode: SHUTDOWN_MSG:
/*****
SHUTDOWN_MSG: Shutting down NameNode at sudha/127.0.1.1
*****/
hduser@sudha:~$
```

b. Starting Hadoop using dfs and yarn

```

hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$ sudo su hduser
hduser@sudha: /usr/local/hadoop/sbin$ start-dfs.sh
Starting namenodes on [localhost]
Starting datanodes
Starting secondary namenodes [sudha]
2019-09-04 09:22:14,358 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@sudha: /usr/local/hadoop/sbin$ http://localhost:50070/
bash: http://localhost:50070/: No such file or directory
hduser@sudha: /usr/local/hadoop/sbin$ sudo netstat -plten | grep java
tcp        0  0  127.0.0.1:54310      0.0.0.0:*           LISTEN      1001      74892      8452/java
tcp        0  0  0.0.0.0:*             0.0.0.0:*           LISTEN      1001      75162      8605/java
tcp        0  0  0.0.0.0:*             0.0.0.0:*           LISTEN      1001      74819      8605/java
tcp        0  0  0.0.0.0:*             0.0.0.0:*           LISTEN      1001      75175      8605/java
tcp        0  0  0.0.0.0:*             0.0.0.0:*           LISTEN      1001      76033      8823/java
tcp        0  0  0.0.0.0:*             0.0.0.0:*           LISTEN      1001      74310      8452/java
tcp        0  0  0.0.0.0:*             0.0.0.0:*           LISTEN      1001      74861      8605/java
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$
hduser@sudha: /usr/local/hadoop/sbin$ start-yarn.sh
Starting resourcemanager
Starting nodemanagers
hduser@sudha: /usr/local/hadoop/sbin$ jps
9123 ResourceManager
9283 NodeManager
8452 NameNode
9461 Jps
8823 SecondaryNameNode
8605 DataNode
hduser@sudha: /usr/local/hadoop/sbin$

```

c. Ubuntu local machine IP

```

hduser@sudha: /usr/local/hadoop/sbin$ ifconfig
enp8s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.152 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::f52b:48f0:7c09:498d prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:e2:37:98 txqueuelen 1000 (Ethernet)
    RX packets 51610 bytes 23258956 (23.2 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 59981 bytes 7952196 (7.9 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 13408 bytes 5048595 (5.0 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 13408 bytes 5048595 (5.0 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

hduser@sudha: /usr/local/hadoop/sbin$

```

d. Hadoop cluster overview

The screenshot shows the Hadoop NameNode Overview page for the cluster 'localhost:54310' (active). The page includes a navigation bar with tabs for Overview, Datanodes, Datanode Volume Failures, Snapshot, Startup Progress, and Utilities. The Overview tab is selected.

Overview 'localhost:54310' (active)

Started:	Wed Sep 04 09:21:48 -0700 2019
Version:	3.2.0, re97acb3bd8f3befd27418996fa544b50bf2e17bf
Compiled:	Mon Jan 07 22:08:00 -0800 2019 by sunlig from branch-3.2.0
Cluster ID:	CID-d9d6e0b5-1906-410a-84d8-4cb5e2b15520
Block Pool ID:	BP-625693732-127.0.1.1-1567612434080

Summary

Security is off.
 Safemode is off.
 1 files and directories, 0 blocks (0 replicated blocks, 0 erasure coded block groups) = 1 total filesystem object(s).
 Heap Memory used 26.13 MB of 44.14 MB Heap Memory. Max Heap Memory is 483.38 MB.
 Non Heap Memory used 54.78 MB of 55.94 MB Committed Non Heap Memory. Max Non Heap Memory is <unbounded>.

Configured Capacity:	29.4 GB
Configured Remote Capacity:	0 B
DFS Used:	28 KB (0%)
Non DFS Used:	11.57 GB
DFS Remaining:	16.31 GB (55.49%)
Block Pool Used:	28 KB (0%)
DataNodes usages% (Min/Median/Max/stdDev):	0.00% / 0.00% / 0.00% / 0.00%

e. Hadoop cluster summary showing a live node

The screenshot shows the Hadoop NameNode Summary page for the cluster 'localhost:54310' (active). The page includes a navigation bar with tabs for Overview, Datanodes, Datanode Volume Failures, Snapshot, Startup Progress, and Utilities. The Summary tab is selected.

Summary

Security is off.
 Safemode is off.
 1 files and directories, 0 blocks (0 replicated blocks, 0 erasure coded block groups) = 1 total filesystem object(s).
 Heap Memory used 26.13 MB of 44.14 MB Heap Memory. Max Heap Memory is 483.38 MB.
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Configured Capacity:	29.4 GB
Configured Remote Capacity:	0 B
DFS Used:	28 KB (0%)
Non DFS Used:	11.57 GB
DFS Remaining:	16.31 GB (55.49%)
Block Pool Used:	28 KB (0%)
DataNodes usages% (Min/Median/Max/stdDev):	0.00% / 0.00% / 0.00% / 0.00%
Live Nodes	1 (Decommissioned: 0, In Maintenance: 0)
Dead Nodes	0 (Decommissioned: 0, In Maintenance: 0)
Decommissioning Nodes	0
Entering Maintenance Nodes	0
Total Datanode Volume Failures	0 (0 B)
Number of Under-Replicated Blocks	0
Number of Blocks Pending Deletion	0
Block Deletion Start Time	Wed Sep 04 09:21:48 -0700 2019
Last Checkpoint Time	Wed Sep 04 09:23:19 -0700 2019
Enabled Erasure Coding Policies	RS-6-3-1024k

f. NameNode status

Namenode information

192.168.0.152:9870/dfshealth.html#tab-overview

Number of Under-Replicated Blocks	0
Number of Blocks Pending Deletion	0
Block Deletion Start Time	Wed Sep 04 09:21:48 -0700 2019
Last Checkpoint Time	Wed Sep 04 09:23:19 -0700 2019
Enabled Erasure Coding Policies	RS-6-3-1024k

NameNode Journal Status

Current transaction ID: 6

Journal Manager State

FileJournalManager(root=/usr/local/hadoop_store/hdfs/namenode) EditLogOutputStream(/usr/local/hadoop_store/hdfs/namenode/current/edits_inprogress_00000000000000000006)

NameNode Storage

Storage Directory	Type	State
/usr/local/hadoop_store/hdfs/namenode	IMAGE_AND_EDITS	Active

DFS Storage Types

Storage Type	Configured Capacity	Capacity Used	Capacity Remaining	Block Pool Used	Nodes In Service
DISK	29.4 GB	29 KB (0%)	16.31 GB (55.49%)	29 KB	1

Hadoop, 2019.

g. Information of the Datanode

Namenode information

192.168.0.152:9870/dfshealth.html#tab-datanode

Hadoop Overview Datanodes Datanode Volume Failures Snapshot Startup Progress Utilities

Datanode Information

✔ In service
 ❌ Down
 ⚠ Decommissioned
 ⚠ Decommissioned & dead
 ⚠ In Maintenance & dead

Datanode usage histogram

In operation

Show 25 entries

Search:

Node	Http Address	Last contact	Last Block Report	Capacity	Blocks	Block pool used	Version
✔ sudha-9866 (127.0.0.1:9866)	http://sudha:9864	0s	20m	29.4 GB	0	32 KB (0%)	3.2.0

Showing 1 to 1 of 1 entries

Previous 1 Next

Entering Maintenance

DataNode on sudha:9866

Cluster ID:	CID-d9d6e0b5-1986-410a-84d8-4cb5e2b15520
Version:	3.2.0, re97acb3bd8f3befd27418996fa5d4b50bf2e17bf

Block Pools

Namenode Address	Block Pool ID	Actor State	Last Heartbeat	Last Block Report	Last Block Report Size (Max Size)
localhost:54310	BP-625693732-127.0.1.1-1567612434080	RUNNING	1s	29 minutes	0 B (64 MB)

Volume Information

Directory	StorageType	Capacity Used	Capacity Left	Capacity Reserved	Reserved Space for Replicas	Blocks
/usr/local/hadoop_store/hdfs/datanode	DISK	32 KB	16.31 GB	0 B	0 B	0

Hadoop, 2019.

h. Hadoop cluster startup progress

Startup Progress

Elapsed Time: 9 sec, Percent Complete: 100%

Phase	Completion	Elapsed Time
Loading fsimage /usr/local/hadoop_store/hdfs/namenode/current/fsimage_000000000000000002 398 B	100%	1 sec
erasure coding policies (0/0)	100%	
inodes (1/1)	100%	
delegation tokens (0/0)	100%	
cache pools (0/0)	100%	
Loading edits	100%	0 sec
/usr/local/hadoop_store/hdfs/namenode/current/edits_000000000000000003-000000000000000003 1 MB (1/1)	100%	
Saving checkpoint	100%	0 sec
Safe mode	100%	0 sec
awaiting reported blocks (0/0)	100%	

Hadoop, 2019.

i. Logs directory

Directory: /logs/

File	Size	Timestamp
SecurityAuth-hduser.audit	0 bytes	Sep 4, 2019 8:33:47 AM
fairscheduler-statedump.log	0 bytes	Sep 4, 2019 8:33:47 AM
hadoop-hduser-datanode-sudha.log	63026 bytes	Sep 4, 2019 9:22:11 AM
hadoop-hduser-datanode-sudha.out	693 bytes	Sep 4, 2019 9:21:40 AM
hadoop-hduser-datanode-sudha.out.1	693 bytes	Sep 4, 2019 8:59:12 AM
hadoop-hduser-namenode-sudha.log	73426 bytes	Sep 4, 2019 9:23:19 AM
hadoop-hduser-namenode-sudha.out	6149 bytes	Sep 4, 2019 9:25:29 AM
hadoop-hduser-namenode-sudha.out.1	693 bytes	Sep 4, 2019 8:59:08 AM
hadoop-hduser-nodemanager-sudha.log	69727 bytes	Sep 4, 2019 9:34:33 AM
hadoop-hduser-nodemanager-sudha.out	2202 bytes	Sep 4, 2019 9:24:45 AM
hadoop-hduser-nodemanager-sudha.out.1	2202 bytes	Sep 4, 2019 9:05:36 AM
hadoop-hduser-resourcemanager-sudha.log	83763 bytes	Sep 4, 2019 9:34:33 AM
hadoop-hduser-resourcemanager-sudha.out	2218 bytes	Sep 4, 2019 9:24:49 AM
hadoop-hduser-resourcemanager-sudha.out.1	2218 bytes	Sep 4, 2019 9:05:38 AM
hadoop-hduser-secondarynamenode-sudha.log	62652 bytes	Sep 4, 2019 9:23:19 AM
hadoop-hduser-secondarynamenode-sudha.out	693 bytes	Sep 4, 2019 9:21:54 AM
hadoop-hduser-secondarynamenode-sudha.out.1	693 bytes	Sep 4, 2019 8:59:27 AM
userlogs/	4096 bytes	Sep 4, 2019 9:05:22 AM

j. Details of the Hadoop cluster

hadoop

About the Cluster

Cluster Metrics

Apps Submitted	Apps Pending	Apps Running	Apps Completed	Containers Running	Memory Used	Memory Total	Memory Reserved	VCores Used	VCores Total	VCores Reserved
0	0	0	0	0	0 B	8 GB	0 B	0	8	0

Cluster Nodes Metrics

Active Nodes	Decommissioning Nodes	Decommissioned Nodes	Lost Nodes	Unhealthy Nodes	Rebooted Nodes	Shutdown Nodes
1	0	0	0	0	0	0

Scheduler Metrics

Scheduler Type	Scheduling Resource Type	Minimum Allocation	Maximum Allocation	Maximum Cluster Application Priority
Capacity Scheduler	[memory-mb (unit=Mi), vcores]	<memory:1024, vCores:1>	<memory:8192, vCores:4>	0

Cluster overview

Cluster ID:	1567614290509
ResourceManager state:	STARTED
ResourceManager HA state:	active
ResourceManager HA zookeeper connection state:	Could not find leader elector. Verify both HA and automatic failover are enabled.
ResourceManager RMStateStore:	org.apache.hadoop.yarn.server.resourcemanager.recovery.NullRMStateStore
ResourceManager started on:	Wed Sep 04 09:24:50 -0700 2019
ResourceManager version:	3.2.0 from e97acb3bd8f3befd27418996fa5d4b50bf2e17bf by sunlig source checksum 57175c5bfbccdd68aa564d2ab23424 on 2019-01-08T06:33Z
Hadoop version:	3.2.0 from e97acb3bd8f3befd27418996fa5d4b50bf2e17bf by sunlig source checksum d3f0795ed0d9dc378e2c785d3668f39 on 2019-01-08T06:08Z

k. Information of the nodes of the cluster

The screenshot displays the Hadoop cluster management interface in a web browser. The browser tabs include 'Directory: /logs/', 'DataNode Information', and 'Nodes of the cluster'. The address bar shows 'Not secure | sudha:8088/cluster/nodes'. The page title is 'Nodes of the cluster' and it is logged in as 'dr.who'.

On the left, there is a sidebar with a 'Cluster' section containing links for 'About', 'Nodes', 'Node Labels', and 'Applications'. Below these are status indicators for 'NEW', 'NEW_SAVING', 'SUBMITTED', 'ACCEPTED', 'RUNNING', 'FINISHED', 'FAILED', and 'KILLED'. A 'Scheduler' link is also present. A 'Tools' section is at the bottom of the sidebar.

The main content area shows various metrics and a table of nodes:

- Cluster Metrics:** A table with columns: Apps Submitted (0), Apps Pending (0), Apps Running (0), Apps Completed (0), Containers Running (0 B), Memory Used (8 GB), Memory Total (0 B), Memory Reserved (0), VCoers Used (8), VCoers Total (0), and VCoers Reserved (0).
- Cluster Nodes Metrics:** A table with columns: Active Nodes (1), Decommissioning Nodes (0), Decommissioned Nodes (0), Lost Nodes (0), Unhealthy Nodes (0), Rebooted Nodes (0), and Shutdown Nodes (0).
- Scheduler Metrics:** A table with columns: Scheduler Type (Capacity Scheduler), Scheduling Resource Type ([memory-mb (unit-M), vcores]), Minimum Allocation (<memory:1024, vCores:1>), Maximum Allocation (<memory:8192, vCores:4>), and Maximum Cluster Application Priority (0).
- Node Table:** A table with columns: Node Labels, Rack, Node State, Node Address, Node HTTP Address, Last health-update, Health-report, Containers, Allocation Tags, Mem Used, Mem Avail, VCoers Used, VCoers Avail, and Version. One node is listed: /default-rack, RUNNING, sudha.42551, sudha.8042, Wed Sep 04 09:56:31 -0700 2019, 0, 0 B, 8 GB, 0, 8, 3.2.0.

At the bottom of the node table, it says 'Showing 1 to 1 of 1 entries' with navigation links: First, Previous, 1, Next, Last.

The Windows taskbar at the bottom shows the search bar, task view button, and several open applications. The system clock indicates 9:58 AM on 9/4/2019.