Hadoop: Setting up Hadoop 2.7.3 (single node) on AWS EC2 Ubuntu AMI

Saturday, February 11, 2017 2:05 PM

(** Changed from https://sagarruchandani.wordpress.com/2015/08/01/hadoop-setting-up-hadoop-2-6-0-single-node-on-aws-ec2-ubuntu-ami/)

This kind of highlighted commands (or strings) in the following note would be changed in your case.

PART 1: Creating an EC2 Instance on AWS

(Some of the following steps may not be essential, but I did not check all possible cases!)

1. From services, select "EC2".

2. Set the region.

3. To create a new Instance, click on "Launch Instance".

4. To choose an Amazon Machine Image (AMI), Select "Ubuntu Server 14.04 LTS (HVM)".

5. To choose an Instance type, select "t2.medium".

6. Click "Next: Configure Instance Details".

7. From IAM role drop down box, select "admin". Select "Prevention against accidental termination" check box. Then hit "Next: Add Storage ".

8. If you don't have admin role. Go to Dashboard and click IAM. Create a new role. Under AWS service role select Amazon EC2. It will show different policy templates. Choose "administrator access" and save.

9. Click "Next: Tag Instance" again in Storage device settings. (default settings)

10. Select "Create a new security group" checkbox. > Security Group name -> "open ports".

11. (May not be needed!) To enable ping, select "All ICMP" in the Create a new rule drop-down and click on "Add Rule." Do the same to enable HTTP (port 80 & 8000) accesses, then click "Continue."

12. (May not be needed!) To allow Hadoop to communicate and expose various web interfaces, we need to open a number of ports: 22, 9000, 9001, 50070, 50030, 50075, 50060. Again click on "Add Rule" and enable these ports. Optionally you can enable all traffic. But be careful and don't share your PEM key or aws credentials with anyone or on websites like Github.

13. Review: Click "Launch" and click "Close" to close the wizard.

14. Now to access your EC2 Instances, click on "instances" on your left pane.

15. Select the instance check box and hit "Launce Instance" (It will take a while to start the virtual instance. Go ahead once its shows it is "running").

16. Now click on "connect" for how to SSH in your instance.

PART 2: Installing Apache Hadoop

1. Login to new EC2 instance using ssh

```
# ssh -i aws-key.pem ubuntu@172.31.58.109
```

2. Install base packages (java 8)

```
# sudo apt-get install python-software-properties

# sudo add-apt-repository ppa:webupd8team/java

# sudo apt-get update

# sudo apt-get install oracle-java8-installer
```

Note: If you have any other version of Java, it is fine as long as you keep the directory paths proper in the below steps.

3. Check the java version

```
# java –version
```

4. Download latest stable Hadoop using `wget` from Apache mirrors (the following link may be invalid).

```
# wget http://www-us.apache.org/dist/hadoop/common/hadoop-2.7.3/hadoop-2.7.3.tar.gz

# tar xzf hadoop-2.7.3.tar.gz
```

5. (Optional) Create a directory where the hadoop will store its data. We will set this directory path in hdfs-site.

```
# mkdir hadoopdata
```

6. Add the Hadoop related environment variables in your bash file.

```
# vim ~/.bashrc
```

Copy and paste these environment variables.

```
export HADOOP_HOME=/home/ubuntu/hadoop-2.7.3

export HADOOP_COMMON_LIB_NATIVE_DIR=$HADOOP_HOME/lib/native

export HADOOP_OPTS="-Djava.library.path=$HADOOP_HOME/lib"

export JAVA_HOME=/usr/lib/jvm/java-8-oracle

PATH=$PATH:$JAVA_HOME/bin:$HADOOP_HOME/bin:$HADOOP_HOME/sbin
```

Save and exit and use this command to refresh the bash settings.

```
# source ~/.bashrc
```

7. Setting hadoop environment for password less ssh access. Password less SSH Configuration is a mandatory installation requirement. However it is more useful in distributed environment.

```
# ssh-keygen -t rsa -P ''

# cat $HOME/.ssh/id_rsa.pub >> $HOME/.ssh/authorized_keys
```

-> Modify the config file

```
# sudo vim /etc/ssh/sshd_config
```

-> Find the following line and edit accordingly. You can use ctrl+W and type PasswordAuthentication to quickly find the wanted line.

```
PasswordAuthentication yes
```

-> Save the config file. Then restart the ssh service for the update to take action.

```
# sudo service ssh restart
```

-> check password less ssh access to localhost

```
# ssh localhost
```

-> exit from inner localhost shell

```
# exit
```

8. Set the hadoop config files. We need to set the below files in order for hadoop to function properly.

- core-site.xml
- hadoop-env.sh
- yarn-site.xml
- hdfs-site.xml
- mapred-site.xml

-> go to directory where all the config files are present (cd /home/ubuntu/hadoop-2.7.3/etc/hadoop)

- Copy and paste the below configurations in **core-site.xml**

-> Add the following text between the configuration tabs.

```
<property>

<name>hadoop.tmp.dir</name>

<value>/home/ubuntu/hadooptmp/hadoop-${user.name}</value>

<description>A base for other temporary directories.</description>

</property>

<property>

<name>fs.defaultFS</name>

<value>hdfs://localhost:9000</value>

</property>
```

- Copy and paste the below configurations in **hadoop-env.sh**

-> get the java home directory using:

```
# readlink -f `which java`
```

Example output: /usr/lib/jvm/java-8-oracle/jre/bin/java (NOTE THE JAVA_HOME PATH. JUST GIVE THE BASE DIRECTORY PATH)

-> Need to set JAVA_HOME in hadoop-env.sh

```
export JAVA_HOME=/usr/lib/jvm/java-8-oracle
```

- Copy and paste the below configurations in **mapred-site.xml**

-> copy mapred-site.xml from mapred-site.xml.template

```
# cp mapred-site.xml.template mapred-site.xml

# vim mapred-site.xml
```

-> Add the following text between the configuration tabs.

```
<property>

<name>mapred.job.tracker</name>

<value>localhost:9001</value>

</property>
```

- Copy and paste the below configurations in **yarn-site.xml**

-> Add the following text between the configuration tabs.

```
<property>

<name>yarn.nodemanager.aux-services</name>

<value>mapreduce_shuffle</value>

</property>
```

- Copy and paste the below configurations in **hdfs-site.xml**

-> Add the following text between the configuration tabs.

```
<property>

<name>dfs.replication</name>

<value>1</value>

</property>

<property><name>dfs.name.dir</name>

<value>file:/home/ubuntu/hadoopdata/hdfs/namenode</value>

</property>

<property>

<name>dfs.data.dir</name>

<value>file:/home/ubuntu/hadoopdata/hdfs/datanode</value>
```

```
</property>
```

9. Formatting the HDFS file system via NameNode (after installing hadoop, for the first time we have to format the HDFS file system to make it work)

```
# hdfs namenode -format
```

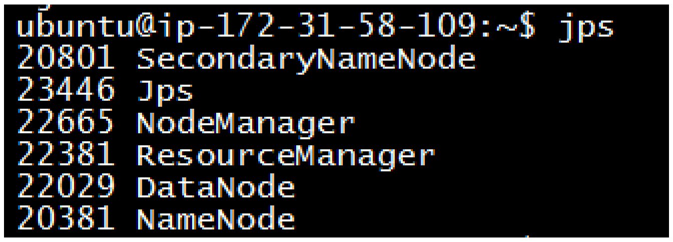
10. Issue the following commands to start hadoop

```
# start-dfs.sh

# start-yarn.sh
```

11. Check for hadoop processes /daemons running on hadoop with Java Virtual Machine Process Status Tool.

```
# jps
```

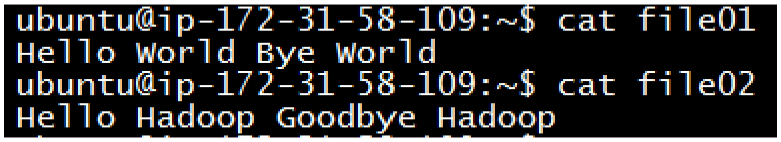


```
ubuntu@ip-172-31-58-109:~$ jps
20801 SecondaryNameNode
23446 Jps
22665 NodeManager
22381 ResourceManager
22029 DataNode
20381 NameNode
```

PART 3: Running a Sample Word Count Program

The MapReduce examples which comes along with hadoop package are located in hadoop-[VERSION]/share/hadoop/mapreduce. You can run those jars to see whether hadoop single node cluster is set up properly.

1. Create two test files, i.e., file01, and file02: (the following screenshot shows the content of the two files)



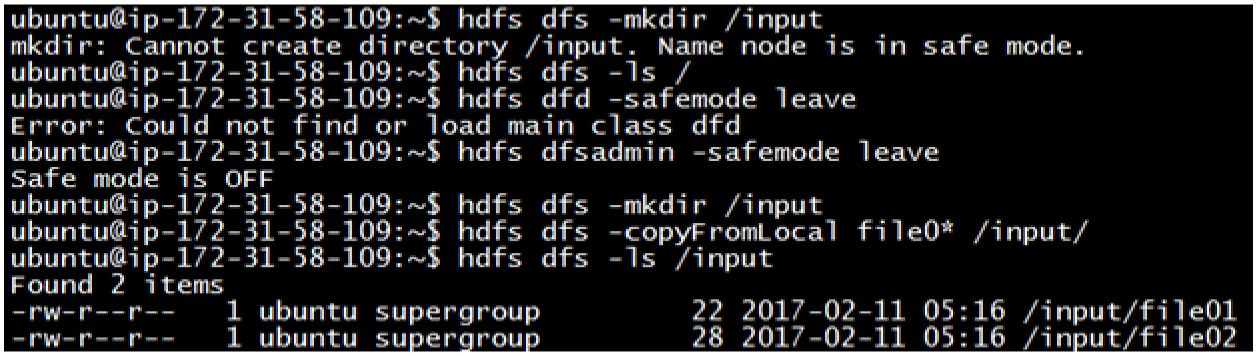
```
ubuntu@ip-172-31-58-109:~$ cat file01
Hello World Bye World
ubuntu@ip-172-31-58-109:~$ cat file02
Hello Hadoop Goodbye Hadoop
```

2. Now create a directory in Hadoop's Distributed File System using:

```
# hdfs dfs -ls /

# hdfs dfs -mkdir /input
```

You may need to leave the safe mode before you create the folder.



```
ubuntu@ip-172-31-58-109:~$ hdfs dfs -mkdir /input
mkdir: Cannot create directory /input. Name node is in safe mode.
ubuntu@ip-172-31-58-109:~$ hdfs dfs -ls /
ubuntu@ip-172-31-58-109:~$ hdfs dfd -safemode leave
Error: Could not find or load main class dfd
ubuntu@ip-172-31-58-109:~$ hdfs dfsadmin -safemode leave
Safe mode is OFF
ubuntu@ip-172-31-58-109:~$ hdfs dfs -mkdir /input
ubuntu@ip-172-31-58-109:~$ hdfs dfs -copyFromLocal file0* /input/
ubuntu@ip-172-31-58-109:~$ hdfs dfs -ls /input
Found 2 items
-rw-r--r--   1 ubuntu supergroup         22 2017-02-11 05:16 /input/file01
-rw-r--r--   1 ubuntu supergroup         28 2017-02-11 05:16 /input/file02
```

Go to the folder where files are copied and from that folder run the command

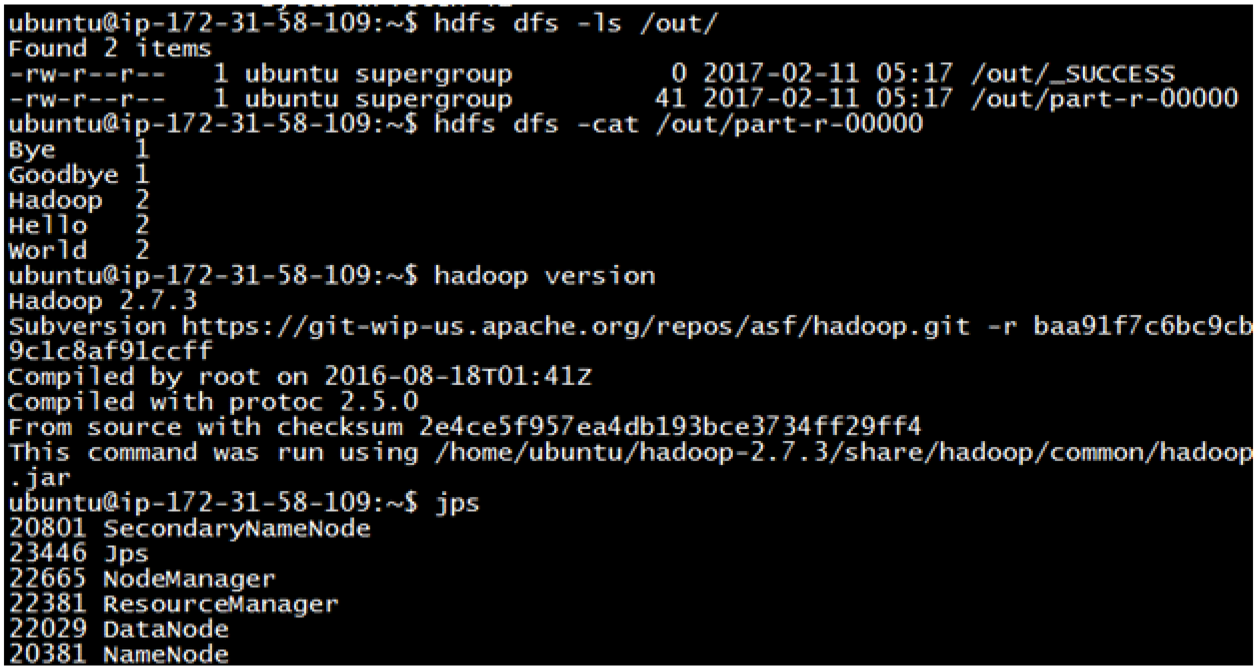
```
# hdfs dfs -copyFromLocal file0* /input
```

3. Run the hadoopmapreduce-examples-2.7.3.jar as follows: (**Note that the output folder should be a new path!**)

```
# hadoop jar
/home/ubuntu/hadoop-2.7.3/share/hadoop/mapreduce/hadoopmapreduce-
examples-2.7.3.jar wordcount /input /out
```

4. To see the results file,

```
# hdfs dfs -cat /out/part-r-00000
```



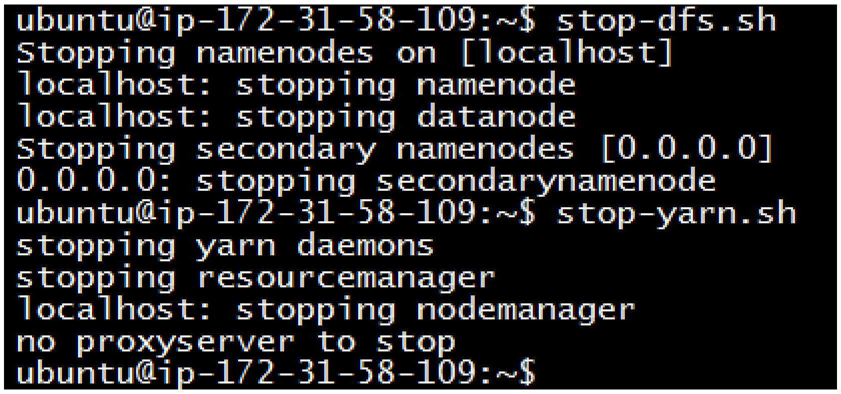
```
ubuntu@ip-172-31-58-109:~$ hdfs dfs -ls /out/
Found 2 items
-rw-r--r--   1 ubuntu supergroup          0 2017-02-11 05:17 /out/_SUCCESS
-rw-r--r--   1 ubuntu supergroup         41 2017-02-11 05:17 /out/part-r-00000
ubuntu@ip-172-31-58-109:~$ hdfs dfs -cat /out/part-r-00000
Bye     1
Goodbye 1
Hadoop  2
Hello   2
World   2
ubuntu@ip-172-31-58-109:~$ hadoop version
Hadoop 2.7.3
Subversion https://git-wip-us.apache.org/repos/asf/hadoop.git -r baa91f7c6bc9cb
9c1c8af91ccff
Compiled by root on 2016-08-18T01:41Z
Compiled with protoc 2.5.0
From source with checksum 2e4ce5f957ea4db193bce3734ff29ff4
This command was run using /home/ubuntu/hadoop-2.7.3/share/hadoop/common/hadoop
.jar
ubuntu@ip-172-31-58-109:~$ jps
20801 SecondaryNameNode
23446 Jps
22665 NodeManager
22381 ResourceManager
22029 DataNode
20381 NameNode
```

<u>**TURN OFF Hadoop**</u>

Stop individual services by following commands:

```
# stop-dfs.sh
```

```
# stop-yarn.sh
```



```
ubuntu@ip-172-31-58-109:~$ stop-dfs.sh
Stopping namenodes on [localhost]
localhost: stopping namenode
localhost: stopping datanode
Stopping secondary namenodes [0.0.0.0]
0.0.0.0: stopping secondarynamenode
ubuntu@ip-172-31-58-109:~$ stop-yarn.sh
stopping yarn daemons
stopping resourcemanager
localhost: stopping nodemanager
no proxyserver to stop
ubuntu@ip-172-31-58-109:~$
```

!!! Additional Problems:

When you try to start the Hadoop services “start-dfs.sh”, you would see the following warnings:

WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable

After a continuous research as suggested by Kotil got resolved the issue.

```
hduser@ubuntu:~$ cd /usr/local/hadoop

hduser@ubuntu:/usr/local/hadoop$ ls

bin  include  libexec      logs        README.txt  share
etc  lib      LICENSE.txt  NOTICE.txt  sbin

hduser@ubuntu:/usr/local/hadoop$ cd lib

hduser@ubuntu:/usr/local/hadoop/lib$ ls
native

hduser@ubuntu:/usr/local/hadoop/lib$ cd native/

hduser@ubuntu:/usr/local/hadoop/lib/native$ ls

libhadoop.a       libhadoop.so        libhadooputils.a  libhdfs.so
libhadooppipes.a  libhadoop.so.1.0.0  libhdfs.a         libhdfs.so.0.0.0

hduser@ubuntu:/usr/local/hadoop/lib/native$ sudo mv * ../
```

Cheers!

Summarized by Harry CUI on 24-Feb-2017.