Hive - Installation

All Hadoop sub-projects such as Hive, Pig, and HBase support Linux operating system. Therefore, you need to install any Linux flavored OS. The following simple steps are executed for Hive installation:

Step 1: Verifying JAVA Installation

Java must be installed on your system before installing Hive. Let us verify java installation using the following command:

```
$ java –version
```

If Java is already installed on your system, you get to see the following response:

```
java version "1.7.0_71"
Java(TM) SE Runtime Environment (build 1.7.0_71-b13)
Java HotSpot(TM) Client VM (build 25.0-b02, mixed mode)
```

If java is not installed in your system, then follow the steps given below for installing java.

Installing Java

Step I:

Download java (JDK <latest version> - X64.tar.gz) by visiting the following link http://www.oracle.com/technetwork/java/javase/downloads/jdk7-downloads-1880260.html.

Then jdk-7u71-linux-x64.tar.gz will be downloaded onto your system.

Step II:

Generally you will find the downloaded java file in the Downloads folder. Verify it and extract the jdk-7u71-linux-x64.gz file using the following commands.

```
$ cd Downloads/
$ ls
jdk-7u71-linux-x64.gz
$ tar zxf jdk-7u71-linux-x64.gz
$ ls
jdk1.7.0_71 jdk-7u71-linux-x64.gz
```

Step III:

To make java available to all the users, you have to move it to the location "/usr/local/". Open root, and type the following commands.

```
$ su
password:
# mv jdk1.7.0_71 /usr/local/
# exit
```

Step IV:

For setting up PATH and JAVA_HOME variables, add the following commands to ~/.bashrc file.

```
export JAVA_HOME=/usr/local/jdk1.7.0_71
export PATH=$PATH:$JAVA_HOME/bin
```

Now apply all the changes into the current running system.

```
$ source ~/.bashrc
```

Step V:

Use the following commands to configure java alternatives:

```
# alternatives --install /usr/bin/java/java/usr/local/java/bin/java 2

# alternatives --install /usr/bin/javac/javac/usr/local/java/bin/javac 2

# alternatives --install /usr/bin/jar/jar/usr/local/java/bin/jar 2
# alternatives --set java/usr/local/java/bin/java

# alternatives --set javac/usr/local/java/bin/javac

# alternatives --set jar/usr/local/java/bin/jar
```

Now verify the installation using the command java -version from the terminal as explained above.

Step 2: Verifying Hadoop Installation

Hadoop must be installed on your system before installing Hive. Let us verify the Hadoop installation using the following command:

```
$ hadoop version
```

If Hadoop is already installed on your system, then you will get the following response:

```
Hadoop 2.4.1 Subversion https://svn.apache.org/repos/asf/hadoop/common -r 152
Compiled by hortonmu on 2013-10-07T06:28Z
Compiled with protoc 2.5.0
From source with checksum 79e53ce7994d1628b240f09af91e1af4
```

If Hadoop is not installed on your system, then proceed with the following steps:

Downloading Hadoop

Download and extract Hadoop 2.4.1 from Apache Software Foundation using the following commands.

```
$ su
password:
# cd /usr/local
# wget http://apache.claz.org/hadoop/common/hadoop-2.4.1/
hadoop-2.4.1.tar.gz
# tar xzf hadoop-2.4.1.tar.gz
# mv hadoop-2.4.1/* to hadoop/
# exit
```

Installing Hadoop in Pseudo Distributed Mode

The following steps are used to install Hadoop 2.4.1 in pseudo distributed mode.

Step I: Setting up Hadoop

You can set Hadoop environment variables by appending the following commands to **~/.bashrc** file.

```
export HADOOP_HOME=/usr/local/hadoop
export HADOOP_MAPRED_HOME=$HADOOP_HOME
export HADOOP_COMMON_HOME=$HADOOP_HOME
export HADOOP_HDFS_HOME=$HADOOP_HOME
export YARN_HOME=$HADOOP_HOME
export HADOOP_COMMON_LIB_NATIVE_DIR=$HADOOP_HOME/lib/native export
PATH=$PATH:$HADOOP_HOME/sbin:$HADOOP_HOME/bin
```

Now apply all the changes into the current running system.

```
$ source ~/.bashrc
```

Step II: Hadoop Configuration

You can find all the Hadoop configuration files in the location "$HADOOP_HOME/etc/hadoop". You need to make suitable changes in those configuration files according to your Hadoop infrastructure.

```
$ cd $HADOOP_HOME/etc/hadoop
```

In order to develop Hadoop programs using java, you have to reset the java environment variables in **hadoop-env.sh** file by replacing **JAVA_HOME** value with the location of java in your system.

```
export JAVA_HOME=/usr/local/jdk1.7.0_71
```

Given below are the list of files that you have to edit to configure Hadoop.

core-site.xml

The **core-site.xml** file contains information such as the port number used for Hadoop instance, memory allocated for the file system, memory limit for storing the data, and the size of Read/Write buffers.

Open the core-site.xml and add the following properties in between the <configuration> and </configuration> tags.

```
<configuration>

   <property>
      <name>fs.default.name</name>
      <value>hdfs://localhost:9000</value>
   </property>

</configuration>
```

hdfs-site.xml

The **hdfs-site.xml** file contains information such as the value of replication data, the namenode path, and the datanode path of your local file systems. It means the place where you want to store the Hadoop infra.

Let us assume the following data.

```
dfs.replication (data replication value) = 1

(In the following path /hadoop/ is the user name.
hadoopinfra/hdfs/namenode is the directory created by hdfs file system.)

namenode path = //home/hadoop/hadoopinfra/hdfs/namenode

(hadoopinfra/hdfs/datanode is the directory created by hdfs file system.)
datanode path = //home/hadoop/hadoopinfra/hdfs/datanode
```

Open this file and add the following properties in between the <configuration>, </configuration> tags in this file.

```
<configuration>

   <property>
      <name>dfs.replication</name>
      <value>1</value>
   </property>
   <property>
      <name>dfs.name.dir</name>
      <value>file:///home/hadoop/hadoopinfra/hdfs/namenode </value>
   </property>
   <property>
      <name>dfs.data.dir</name>
      <value>file:///home/hadoop/hadoopinfra/hdfs/datanode </value >
   </property>

</configuration>
```

Note: In the above file, all the property values are user-defined and you can make changes according to your Hadoop infrastructure.

yarn-site.xml

This file is used to configure yarn into Hadoop. Open the yarn-site.xml file and add the following properties in between the <configuration>, </configuration> tags in this file.

```
<configuration>


   <property>
      <name>yarn.nodemanager.aux-services</name>
      <value>mapreduce_shuffle</value>
   </property>

</configuration>
```

mapred-site.xml

This file is used to specify which MapReduce framework we are using. By default, Hadoop contains a template of yarn-site.xml. First of all, you need to copy the file from mapred-site,xml.template to mapred-site.xml file using the following command.

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

Open **mapred-site.xml** file and add the following properties in between the <configuration>, </configuration> tags in this file.

```
<configuration>
```

```
   <property>
      <name>mapreduce.framework.name</name>
      <value>yarn</value>
   </property>

</configuration>
```

Verifying Hadoop Installation

The following steps are used to verify the Hadoop installation.

Step I: Name Node Setup

Set up the namenode using the command “hdfs namenode -format” as follows.

```
$ cd ~
$ hdfs namenode -format
```

The expected result is as follows.

```
10/24/14 21:30:55 INFO namenode.NameNode: STARTUP_MSG:
/************************************************************
STARTUP_MSG: Starting NameNode
STARTUP_MSG: host = localhost/192.168.1.11
STARTUP_MSG: args = [-format]
STARTUP_MSG: version = 2.4.1
...
...
10/24/14 21:30:56 INFO common.Storage: Storage directory
/home/hadoop/hadoopinfra/hdfs/namenode has been successfully formatted.
10/24/14 21:30:56 INFO namenode.NNStorageRetentionManager: Going to
retain 1 images with txid >= 0
10/24/14 21:30:56 INFO util.ExitUtil: Exiting with status 0
10/24/14 21:30:56 INFO namenode.NameNode: SHUTDOWN_MSG:
/************************************************************
SHUTDOWN_MSG: Shutting down NameNode at localhost/192.168.1.11
 ************************************************************/
```

Step II: Verifying Hadoop dfs

The following command is used to start dfs. Executing this command will start your Hadoop file system.

```
$ start-dfs.sh
```

The expected output is as follows:

```
10/24/14 21:37:56
Starting namenodes on [localhost]
localhost: starting namenode, logging to /home/hadoop/hadoop-2.4.1/logs/hadoo
localhost: starting datanode, logging to /home/hadoop/hadoop-2.4.1/logs/hadoo
Starting secondary namenodes [0.0.0.0]
```

Step III: Verifying Yarn Script

The following command is used to start the yarn script. Executing this command will start your yarn daemons.

```
$ start-yarn.sh
```

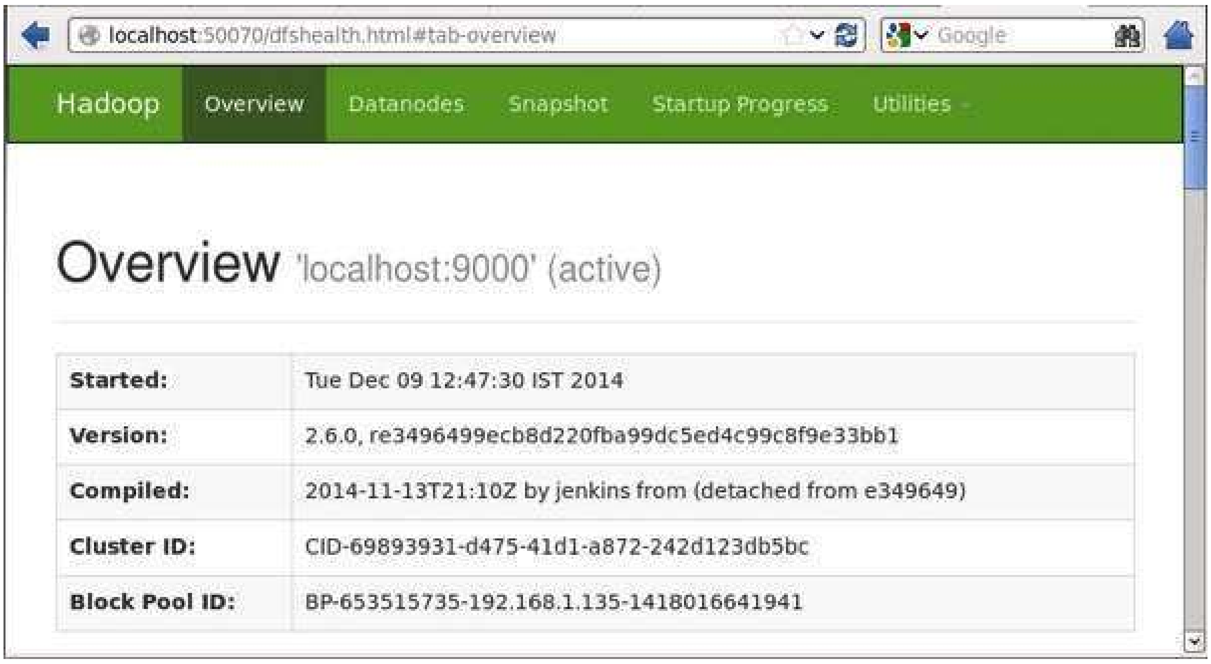
The expected output is as follows:

```
starting yarn daemons
starting resourcemanager, logging to /home/hadoop/hadoop-2.4.1/logs/yarn-hado
localhost: starting nodemanager, logging to /home/hadoop/hadoop-2.4.1/logs/ya
```

Step IV: Accessing Hadoop on Browser

The default port number to access Hadoop is 50070. Use the following url to get Hadoop services on your browser.

```
http://localhost:50070/
```



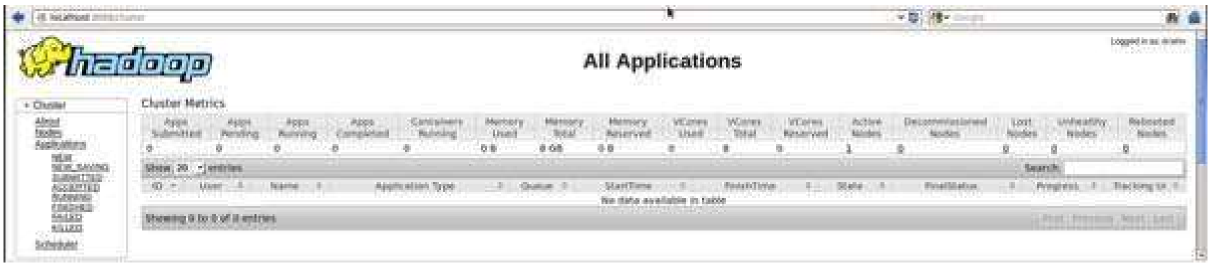
Overview 'localhost:9000' (active)

Started:	Tue Dec 09 12:47:30 IST 2014
Version:	2.6.0, re3496499ecb8d220fba99dc5ed4c99c8f9e33bb1
Compiled:	2014-11-13T21:10Z by jenkins from (detached from e349649)
Cluster ID:	CID-69893931-d475-41d1-a872-242d123db5bc
Block Pool ID:	BP-653515735-192.168.1.135-1418016641941

Step V: Verify all applications for cluster

The default port number to access all applications of cluster is 8088. Use the following url to visit this service.

```
http://localhost:8088/
```



All Applications

Cluster Metrics

Apps Submitted	Apps Pending	Apps Running	Apps Completed	Containers Running	Memory Used	Memory Total	Memory Reserved	VCores Used	VCores Total	VCores Reserved	Active Nodes	Decommissioned Nodes	Lost Nodes	Unhealthy Nodes	Rebooted Nodes
0	0	0	0	0	0 B	8 GB	0 B	0	8	0	1	0	0	0	0

ID	User	Name	Application Type	Queue	StartTime	FinishTime	State	FinalStatus	Progress	Tracking UI
No data available in table										

Showing 0 to 0 of 0 entries

Step 3: Downloading Hive

We use hive-0.14.0 in this tutorial. You can download it by visiting the following link http://apache.petsads.us/hive/hive-0.14.0/. Let us assume it gets downloaded onto the /Downloads directory. Here, we download Hive archive named "apache-hive-0.14.0-bin.tar.gz" for this tutorial. The following command is used to verify the download:

```
$ cd Downloads
$ ls
```

On successful download, you get to see the following response:

```
apache-hive-0.14.0-bin.tar.gz
```

Step 4: Installing Hive

The following steps are required for installing Hive on your system. Let us assume the Hive archive is downloaded onto the /Downloads directory.

Extracting and verifying Hive Archive

The following command is used to verify the download and extract the hive archive:

```
$ tar zxvf apache-hive-0.14.0-bin.tar.gz
$ ls
```

On successful download, you get to see the following response:

```
apache-hive-0.14.0-bin apache-hive-0.14.0-bin.tar.gz
```

Copying files to /usr/local/hive directory

We need to copy the files from the super user “su -”. The following commands are used to copy the files from the extracted directory to the /usr/local/hive” directory.

```
$ su -
passwd:

# cd /home/user/Download
# mv apache-hive-0.14.0-bin /usr/local/hive
# exit
```

Setting up environment for Hive

You can set up the Hive environment by appending the following lines to **~/.bashrc** file:

```
export HIVE_HOME=/usr/local/hive
export PATH=$PATH:$HIVE_HOME/bin
export CLASSPATH=$CLASSPATH:/usr/local/Hadoop/lib/*:.
export CLASSPATH=$CLASSPATH:/usr/local/hive/lib/*:.
```

The following command is used to execute ~/.bashrc file.

```
$ source ~/.bashrc
```

Step 5: Configuring Hive

To configure Hive with Hadoop, you need to edit the **hive-env.sh** file, which is placed in the **$HIVE_HOME/conf** directory. The following commands redirect to Hive **config** folder and copy the template file:

```
$ cd $HIVE_HOME/conf
$ cp hive-env.sh.template hive-env.sh
```

Edit the **hive-env.sh** file by appending the following line:

```
export HADOOP_HOME=/usr/local/hadoop
```

Hive installation is completed successfully. Now you require an external database server to configure Metastore. We use Apache Derby database.

Step 6: Downloading and Installing Apache Derby

Follow the steps given below to download and install Apache Derby:

Downloading Apache Derby

The following command is used to download Apache Derby. It takes some time to download.

```
$ cd ~
$ wget http://archive.apache.org/dist/db/derby/db-derby-10.4.2.0/db-derby-10.
```

The following command is used to verify the download:

```
$ ls
```

On successful download, you get to see the following response:

```
db-derby-10.4.2.0-bin.tar.gz
```

Extracting and verifying Derby archive

The following commands are used for extracting and verifying the Derby archive:

```
$ tar zxvf db-derby-10.4.2.0-bin.tar.gz
$ ls
```

On successful download, you get to see the following response:

```
db-derby-10.4.2.0-bin db-derby-10.4.2.0-bin.tar.gz
```

Copying files to /usr/local/derby directory

We need to copy from the super user “su -”. The following commands are used to copy the files from the extracted directory to the /usr/local/derby directory:

```
$ su -
passwd:
# cd /home/user
# mv db-derby-10.4.2.0-bin /usr/local/derby
# exit
```

Setting up environment for Derby

You can set up the Derby environment by appending the following lines to **~/.bashrc** file:

```
export DERBY_HOME=/usr/local/derby
export PATH=$PATH:$DERBY_HOME/bin
Apache Hive
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export CLASSPATH=$CLASSPATH:$DERBY_HOME/lib/derby.jar:$DERBY_HOME/lib/derbytc
```

The following command is used to execute **~/.bashrc** file:

```
$ source ~/.bashrc
```

Create a directory to store Metastore

Create a directory named data in $DERBY_HOME directory to store Metastore data.

```
$ mkdir $DERBY_HOME/data
```

Derby installation and environmental setup is now complete.

Step 7: Configuring Metastore of Hive

Configuring Metastore means specifying to Hive where the database is stored. You can do this by editing the hive-site.xml file, which is in the $HIVE_HOME/conf directory. First of all, copy the template file using the following command:

```
$ cd $HIVE_HOME/conf
$ cp hive-default.xml.template hive-site.xml
```

Edit **hive-site.xml** and append the following lines between the <configuration> and </configuration> tags:

```
<property>
   <name>javax.jdo.option.ConnectionURL</name>
   <value>jdbc:derby://localhost:1527/metastore_db;create=true </value>
   <description>JDBC connect string for a JDBC metastore </description>
</property>
```

Create a file named jpox.properties and add the following lines into it:

```
javax.jdo.PersistenceManagerFactoryClass =

org.jpox.PersistenceManagerFactoryImpl
org.jpox.autoCreateSchema = false
org.jpox.validateTables = false
org.jpox.validateColumns = false
org.jpox.validateConstraints = false
org.jpox.storeManagerType = rdbms
org.jpox.autoCreateSchema = true
org.jpox.autoStartMechanismMode = checked
org.jpox.transactionIsolation = read_committed
javax.jdo.option.DetachAllOnCommit = true
javax.jdo.option.NontransactionalRead = true
javax.jdo.option.ConnectionDriverName = org.apache.derby.jdbc.ClientDriver
javax.jdo.option.ConnectionURL = jdbc:derby://hadoop1:1527/metastore_db;creat
javax.jdo.option.ConnectionUserName = APP
javax.jdo.option.ConnectionPassword = mine
```

Step 8: Verifying Hive Installation

Before running Hive, you need to create the **/tmp** folder and a separate Hive folder in HDFS. Here, we use the **/user/hive/warehouse** folder. You need to set write permission for these newly created folders as shown below:

```
chmod g+w
```

Now set them in HDFS before verifying Hive. Use the following commands:

```
$ $HADOOP_HOME/bin/hadoop fs -mkdir /tmp
$ $HADOOP_HOME/bin/hadoop fs -mkdir /user/hive/warehouse
$ $HADOOP_HOME/bin/hadoop fs -chmod g+w /tmp
$ $HADOOP_HOME/bin/hadoop fs -chmod g+w /user/hive/warehouse
```

The following commands are used to verify Hive installation:

```
$ cd $HIVE_HOME
$ bin/hive
```

On successful installation of Hive, you get to see the following response:

```
Logging initialized using configuration in jar:file:/home/hadoop/hive-0.9.0/l
Hive history file=/tmp/hadoop/hive_job_log_hadoop_201312121621_1494929084.txt
………………….
hive>
```

The following sample command is executed to display all the tables:

```
hive> show tables;
OK
Time taken: 2.798 seconds
hive>
```