

Hadoop Installation Guide and HDFS Hands On - H1

Every step is to be executed on the home directory. Use `cd` to move to home directory.

The commands in the guide use `USER` as the notation for your username. If you have executed AO correctly, then this should be your SRN in lowercase. This is important since the auto-evaluation depends on it. Verify your username by running `whoami` on the terminal.

Change any `/home/USER/` to `/home/<your SRN>/`

This manual includes steps that you will be doing in the classroom. It assumes that you have completed the downloads and installation steps 1-2 from your home which was emailed earlier. If you have not completed these steps, then click [here](#) to do so.

Execute the following commands to move to the home directory and updating the package list and the system. This guide assumes that you are working with Ubuntu or a Debian based distribution.

```
cd
sudo apt update -y
sudo apt upgrade -y
```

Step number continues from the H1_HOME manual.

Step 3 - Format HDFS NameNode

Before starting Hadoop for the first time, the namenode must be formatted. Use the following command.

```
hdfs namenode -format
```

A SHUTDOWN message will signify the end of the formatting process.

If you have reached this stage, it signifies that you have successfully installed hadoop.

Take a screenshot of the terminal output indicating the shutdown message and name it 3a.png.

```
2022-08-03 20:32:32,445 INFO namenode.FSImage: Allocated new BlockPoolId: BP-1111707238-127.0.1.1-1659538952404
2022-08-03 20:32:32,446 INFO common.Storage: Will remove files: [/home/han/dfsdata/namenode/current/fsimage_000000000000000008.md5, /home/han/dfsdata/namenode/current/fsimage_00000000000000000010, /home/han/dfsdata/namenode/current/edits_000000000000000003-000000000000000004, /home/han/dfsdata/namenode/current/fsimage_000000000000000008, /home/han/dfsdata/namenode/current/seen_txid, /home/han/dfsdata/namenode/current/edits_000000000000000007-000000000000000008, /home/han/dfsdata/namenode/current/edits_000000000000000001-000000000000000002, /home/han/dfsdata/namenode/current/VERSION, /home/han/dfsdata/namenode/current/edit_s_000000000000000005-000000000000000006, /home/han/dfsdata/namenode/current/edits_inprogress_000000000000000011, /home/han/dfsdata/namenode/current/fsimage_000000000000000010.md5, /home/han/dfsdata/namenode/current/edits_000000000000000009-000000000000000010]
2022-08-03 20:32:32,507 INFO common.Storage: Storage directory /home/han/dfsdata/namenode has been successfully formatted.
2022-08-03 20:32:32,735 INFO namenode.FSImageFormatProtobuf: Saving image file /home/han/dfsdata/namenode/current/fsimage.ckpt_000000000000000000 using no compression
2022-08-03 20:32:33,696 INFO namenode.FSImageFormatProtobuf: Image file /home/han/dfsdata/namenode/current/fsimage.ckpt_000000000000000000 of size 398 bytes saved in 0 seconds .
2022-08-03 20:32:33,724 INFO namenode.NNStorageRetentionManager: Going to retain 1 images with txid >= 0
2022-08-03 20:32:33,815 INFO namenode.FSNamesystem: Stopping services started for active state
2022-08-03 20:32:33,815 INFO namenode.FSNamesystem: Stopping services started for standby state
2022-08-03 20:32:33,832 INFO namenode.FSImage: FSImageSaver clean checkpoint: txid=0 when meet shutdown.
2022-08-03 20:32:33,835 INFO namenode.NameNode: SHUTDOWN_MSG:
/*****
SHUTDOWN_MSG: Shutting down NameNode at sachin/127.0.1.1
*****/
```

Step 4 - Starting Hadoop

Navigate to the hadoop folder and execute the following commands. `start-all.sh` is a shell script that is used to start all the processes that hadoop requires.

```
cd
cd hadoop-3.3.3/sbin/
./start-all.sh
```

Type `jps` to find all the Java Processes started by the shell script. You should see a total of 6 processes, including the `jps` process. Note that the order of the items and the process IDs will be different.

```
2994 DataNode
3219 SecondaryNameNode
3927 Jps
3431 ResourceManager
2856 NameNode
3566 NodeManager
```

Take a screenshot of the terminal output and name it 4a.png.

```
han@sachin:~/hadoop-3.3.3/sbin$ ./start-all.sh
WARNING: Attempting to start all Apache Hadoop daemons as han in 10 seconds.
WARNING: This is not a recommended production deployment configuration.
WARNING: Use CTRL-C to abort.
Starting namenodes on [localhost]
Starting datanodes
Starting secondary namenodes [sachin]
Starting resourcemanager
Starting nodemanagers
han@sachin:~/hadoop-3.3.3/sbin$ jps
5652 NodeManager
4116 NameNode
6070 Jps
5496 ResourceManager
4395 DataNode
5183 SecondaryNameNode
han@sachin:~/hadoop-3.3.3/sbin$
```

Step 5 - Accessing Hadoop from the Browser

You can access Hadoop on `localhost` on the following ports

- NameNode - <http://localhost:9870>
- DataNode - <http://localhost:9864>
- YARN Manager - <http://localhost:8088>

Step 6 - Hadoop Examples

We will be using the Wordcount example to demonstrate the usage of Hadoop. Create a text file named `input.txt` with any content you want. Next, we will put this to the HDFS folder `/example` with the following command.

```
hdfs dfs -mkdir /example
hdfs dfs -put input.txt /example
```

Run the following command for the wordcount example.

```
hadoop jar $HADOOP_HOME/share/hadoop/mapreduce/hadoop-mapreduce-examples-3.3.3.jar wordcount /example/input.txt /example/output
```

You can check the output with the following command.

```
hdfs dfs -cat /example/output/part-r-00000
```

Take a screenshot of the terminal output and name it `6a.png`.

```
han@sachin:~/Desktop$ hdfs dfs -cat /example/output/part-r-00000
a          1
big        1
can        1
data       1
hadoop     2
hdfs       2
hello.     1
is         2
map        1
reduce     1
run        1
this       1
tool       1
we         1
with       1
han@sachin:~/Desktop$
```

Step 7 - Running Custom WordCount

Now, we will run a sample HDFS command to calculate the frequency of a particular word in a text file using our own mapper and reducer files.

Firstly, clone the GitHub repository.

```
git clone https://github.com/Cloud-Computing-Big-Data/UE20CS322-H1.git
```

This repo contains a sample mapper, reducer and a dataset file named tech.txt. Run the following commands to setup HDFS directories and copy the dataset file to the HDFS.

```
cd UE20CS322-H1/
hdfs dfs -mkdir /handson
hdfs dfs -put tech.txt /handson
chmod +x *.py
```

Next, run the following command to run the wordcount program.

```
hadoop jar /home/USER/hadoop-3.3.3/share/hadoop/tools/lib/hadoop-streaming-3.3.3.jar \
  -mapper "$PWD/mapper.py" \
  -reducer "$PWD/reducer.py 'perseus'" \
  -input /handson/tech.txt \
  -output /handson/output-tech
```

To check the output, execute the following command.

```
hdfs dfs -cat /handson/output-tech/part-00000
```

Take a screenshot of the terminal output and name it 7a.png.

```
han@sachin:~/Desktop/BD22/UE20CS322-H1$ hdfs dfs -cat /handson/output-tech/part-00000
54
```

Step 8 - Auto-evaluation

Auto-evaluation is allowed only once. So make sure you have the following checklist ticked before proceeding.

- ☐ JPS has 6 processes(including the JPS process)
- ☐ Step 6 - Running WordCount - Output is correct

For RR campus students, run the following command

```
python3 eval-rr.pyc
```

For EC campus students, run the following command

```
python3 eval-ec.pyc
```

You can see your score in the terminal output after the program finishes.

To stop all processes when you are done with your work, execute the following command.

```
cd
cd hadoop-3.3.3/sbin/
./stop-all.sh
```

Step 9 - Final Assessment

Make a word document with all the screenshots from HOME and in-person sessions.

Your file should be named with the format PES1UG20CS999.pdf with your SRN.

Submission link for RR Campus: [here](#)

Submission link for EC Campus: [here](#)