Hadoop

Installation:

1. Download and install JDK

https://www.oracle.com/in/java/technologies/downloads/#jdk19-windows

2. Extracting the hadoop 3.3.0 tar file-

https://archive.apache.org/dist/hadoop/common/hadoop-3.2.1/hadoop-3.2.1.tar.gz

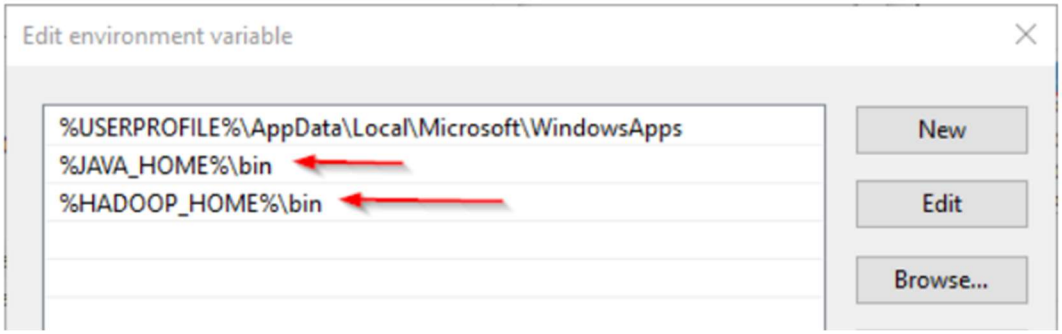
3. Adding hadoop winutils files to bin. (check same version)

https://github.com/kontext-tech/winutils/tree/master/hadoop-3.2.1/bin

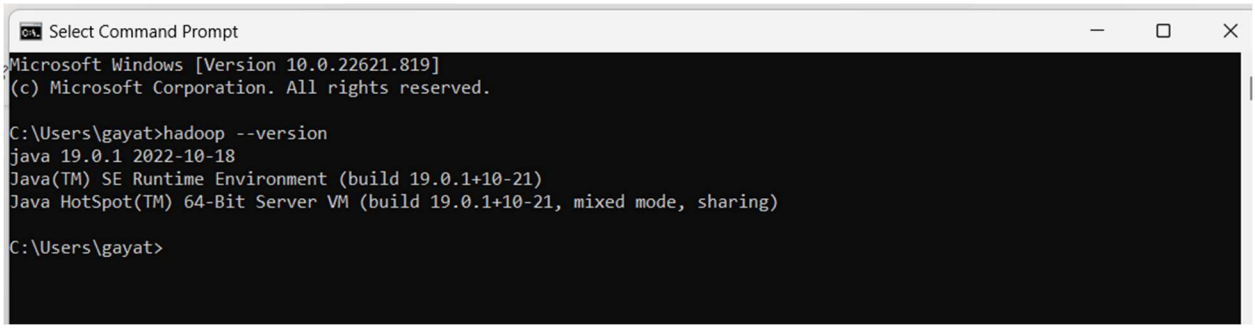
4. Adding the hadoop files and jdk files to a right directory.(copy paste jdk files from Program files)

5. Add **Hadoop and jdk path** to Environment VARIABLES.

6. Also, in Path- add the paths as below:



7. Open CMD and check Hadoop version.



8. Startup commands for running the nodes from Hadoop-3.2.1/sbin> are:

.\start-dfs.cmd

.\start-yarn.cmd

If you face any error, follow the below steps further.

9. Configuring Hadoop cluster

There are four files we should alter to configure Hadoop cluster:

1. %HADOOP_HOME%\etc\hadoop\hdfs-site.xml
2. %HADOOP_HOME%\etc\hadoop\core-site.xml
3. %HADOOP_HOME%\etc\hadoop\mapred-site.xml
4. %HADOOP_HOME%\etc\hadoop\yarn-site.xml

9.1. HDFS site configuration

Hadoop is built using a master-slave paradigm. Before altering the HDFS configuration file, we should create a directory to store all master node (name node) data and another one to store data (data node). In this example, we created the following directories:

- E:\hadoop-env\hadoop-3.2.1\data\dfs\namenode
- E:\hadoop-env\hadoop-3.2.1\data\dfs\datanode

Now, open “hdfs-site.xml” file located in “%HADOOP_HOME%\etc\hadoop” directory, and add the following properties within the <configuration></configuration> element:

```
<property><name>dfs.replication</name><value>1</value></property><property><name>dfs.namenode.name.dir</name><value>file:///E:/hadoop-env/hadoop-3.2.1/data/dfs/namenode</value></property><property><name>dfs.datanode.data.dir</name><value>file:///E:/hadoop-env/hadoop-3.2.1/data/dfs/datanode</value></property>
```

9.2. Core site configuration

Now, configure the name node URL by adding the following XML code into the

<configuration></configuration> element within “core-site.xml”:

```
<property><name>fs.default.name</name><value>hdfs://localhost:9820</value></property>
```

9.3. Map Reduce site configuration

Now, add the following XML code into the <configuration></configuration> element within

“mapred-site.xml”:

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

9.4. Yarn site configuration

Now, add the following XML code into the <configuration></configuration> element within

“yarn-site.xml”:

```
<property><name>yarn.nodemanager.aux-services</name><value>mapreduce_shuffle</value><description>Yarn Node Manager Aux Service</description></property>
```

10. Formatting Name node

After the configuration, we’ll format the name node using the following command:

```
hdfs namenode -format
```

If you face any error, this issue will be solved within the next release. For now, you can fix it

temporarily using the following steps:

1. Download hadoop-hdfs-3.2.1.jar file from the following link.

2. Rename the file name hadoop-hdfs-3.2.1.jar to hadoop-hdfs-3.2.1.bak in folder %HADOOP_HOME%\share\hadoop\hdfs

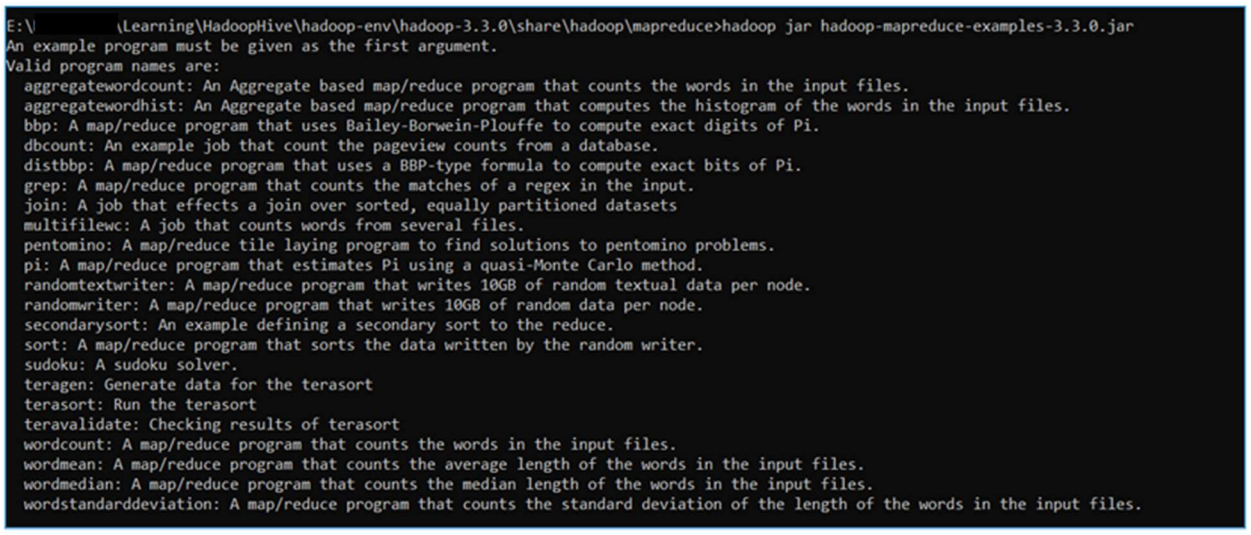
3. Copy the downloaded hadoop-hdfs-3.2.1.jar to folder %HADOOP_HOME%\share\hadoop\hdfs

11. Start the Hadoop services now from Hadoop for running the nodes from - Hadoop-3.2.1/sbin>

.\start-dfs.cmd
.\start-yarn.cmd

Running a prebuilt example of a Map Reduce program

1. Navigate to mapreduce directory on hadoop. \hadoop-3.3.0\share\hadoop\mapreduce> **hadoop jar hadoop-mapreduce-examples-3.3.0.jar**



2. Executing word count program of map reduce.
3. Have a text file containing the words in multiple lines.

Deer Rabbit Fox Dog
Dog Rabbit Deer
Deer Deer Fox Dog
Rabbit Fox Rabbit
Deer Rabbit Fox

4. Start the hadoop clusters- nodes and yarn managers from hadoop/sbin directory.

.\start-dfs.cmd
.\start-yarn.cmd

5. To move the input file to hdfs root, Run the command from mapreduce directory-

\hadoop-3.3.0\share\hadoop\mapreduce> **hadoop dfs -put E:/RapidData/Learning/HadoopHive/hadoop-env/hadoop-3.3.0/examples/words.txt /**

6. Check and display from hdfs-

\hadoop-3.3.0\share\hadoop\mapreduce> **hadoop dfs -cat /words.txt**

```
E:\      :a\Learning\HadoopHive\hadoop-env\hadoop-3.3.0\share\hadoop\mapreduce>hadoop dfs -cat /words.txt
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.
Deer Rabbit Fox Dog
Dog Rabbit Deer
Deer Deer Fox Dog
Rabbit Fox Rabbit
Deer Rabit Fox
```

7. Run the mapreduce program.

\hadoop-3.3.0\share\hadoop\mapreduce> **hadoop jar hadoop-mapreduce-examples-3.3.0.jar wordcount /words.txt /FirstExampleOut**

```
. . . . . \Learning\HadoopHive\hadoop-env\hadoop-3.3.0\share\hadoop\mapreduce>hadoop jar hadoop-mapreduce-examples-3.3.0.jar wordcount /words.txt /FirstExampleOut
2022-12-09 15:58:18,405 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2022-12-09 15:58:18,928 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/gayat/.staging/job_1670581651650_0002
2022-12-09 15:58:19,674 INFO input.FileInputFormat: Total input files to process : 1
2022-12-09 15:58:19,755 INFO mapreduce.JobSubmitter: number of splits:1
2022-12-09 15:58:20,328 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1670581651650_0002
2022-12-09 15:58:20,328 INFO mapreduce.JobSubmitter: Executing with tokens: []
2022-12-09 15:58:20,469 INFO conf.Configuration: resource-types.xml not found
2022-12-09 15:58:20,469 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2022-12-09 15:58:20,893 INFO impl.YarnClientImpl: Submitted application application_1670581651650_0002
2022-12-09 15:58:20,928 INFO mapreduce.Job: The url to track the job: http://RDLAP0014:8088/proxy/application_1670581651650_0002/
2022-12-09 15:58:20,929 INFO mapreduce.Job: Running job: job_1670581651650_0002
2022-12-09 15:58:29,073 INFO mapreduce.Job: Job job_1670581651650_0002 running in uber mode : false
2022-12-09 15:58:29,077 INFO mapreduce.Job:  map 0% reduce 0%
2022-12-09 15:58:34,169 INFO mapreduce.Job:  map 100% reduce 0%
2022-12-09 15:58:38,093 INFO mapreduce.Job:  map 100% reduce 100%
2022-12-09 15:58:39,113 INFO mapreduce.Job: Job job_1670581651650_0002 completed successfully
2022-12-09 15:58:39,180 INFO mapreduce.Job: Counters: 54
       File System Counters
              FILE: Number of bytes read=62
              FILE: Number of bytes written=530625
              FILE: Number of read operations=0
              FILE: Number of large read operations=0
              FILE: Number of write operations=0
              HDFS: Number of bytes read=186
              HDFS: Number of bytes written=36
              HDFS: Number of read operations=8
              HDFS: Number of large read operations=0
              HDFS: Number of write operations=2
              HDFS: Number of bytes read erasure-coded=0
       Job Counters
              Launched map tasks=1
              Launched reduce tasks=1
              Data-local map tasks=1
              Total time spent by all maps in occupied slots (ms)=2787
              Total time spent by all reduces in occupied slots (ms)=2468
              Total time spent by all map tasks (ms)=2787
              Total time spent by all reduce tasks (ms)=2468
              Total vcore-milliseconds taken by all map tasks=2787
              Total vcore-milliseconds taken by all reduce tasks=2468
              Total megabyte-milliseconds taken by all map tasks=2853888
              Total megabyte-milliseconds taken by all reduce tasks=2527232
       Map-Reduce Framework
              Map input records=5
              Map output records=17
              Map output bytes=155
              Map output materialized bytes=62
              Input split bytes=96
```

8. Check if the output file is available.

\hadoop-3.3.0\share\hadoop\mapreduce> **hadoop dfs -ls /FirstExampleOut**

9. Display the output from the file.

\hadoop-3.3.0\share\hadoop\mapreduce> **hadoop dfs -cat /FirstExampleOut/part-r-00000**

```
E:\        \Learning\HadoopHive\hadoop-env\hadoop-3.3.0\share\hadoop\mapreduce>hadoop dfs -cat /FirstExampleOut/part-r-00000
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.
Deer    5
Dog     3
Fox     4
Rabbit  4
Rabit   1
```

Thus, the count of each occurences of the words in the file are done.