CS 455 – Spring 2019

RUNNING THE WORD COUNT EXAMPLE

Before starting, make sure that you have HDFS and Yarn running, using sbin/start-dfs.sh and sbin/start-yarn.sh

- Download text copies of at least 3 books from Project Gutenberg: (http://www.gutenberg.org/)

```
st-vrain> la
total 1284
-rw------- 1 class  84358 Mar 26 23:47 Much_Ado_About_Nothing.txt
-rw------- 1 class 792920 Mar 26 23:48 Tale_Of_Two_Cities.txt
-rw------- 1 class 421884 Mar 26 23:49 Tom_Sawyer.txt
```

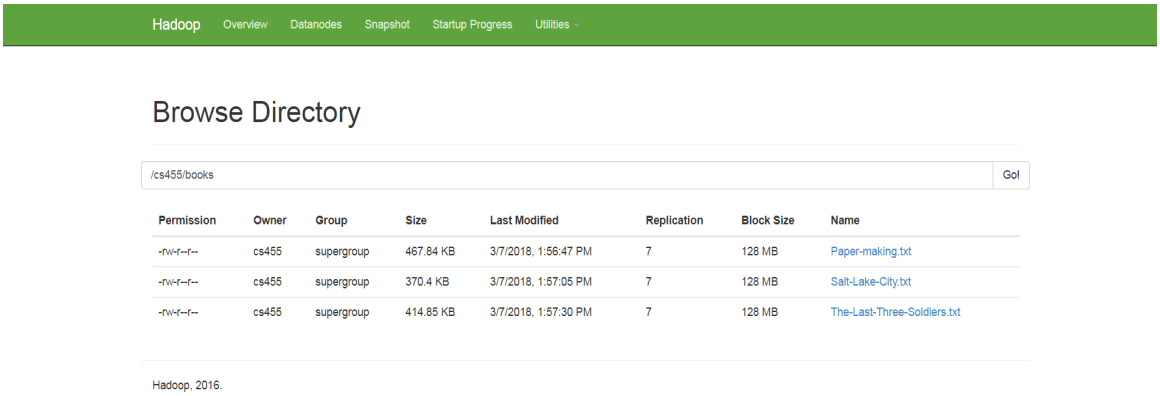
- Create a directory in your local space on HDFS to store these books:

```
st-vrain> $HADOOP_HOME/bin/hdfs dfs -mkdir /cs455
st-vrain> $HADOOP_HOME/bin/hdfs dfs -mkdir /cs455/books
st-vrain> $HADOOP_HOME/bin/hdfs dfs -ls /cs455/
Found 1 items
drwxr-xr-x   - cs455 supergroup          0 2018-03-08 23:51 /cs455/books
```

- Move the books from NFS into HDFS:

```
st-vrain> $HADOOP_HOME/bin/hdfs dfs -put *.txt /cs455/books
st-vrain> $HADOOP_HOME/bin/hdfs dfs -ls /cs455/books
Found 3 items
-rw-r--r--   3 cs455 supergroup      84358 2018-03-08 23:55
/cs455/books/Much_Ado_About_Nothing.txt
-rw-r--r--   3 cs455 supergroup     792920 2018-03-08 23:55
/cs455/books/Tale_Of_Two_Cities.txt
-rw-r--r--   3 cs455 supergroup     421884 2018-03-08 23:55
/cs455/books/Tom_Sawyer.txt
```

- You can also check that the books are there via the HDFS web portal:



- Download the source code of the word count example from CS 455 course web site. (link: http://www.cs.colostate.edu/~cs455/cs455-wordcount-sp19.tar.gz)

```
wget http://www.cs.colostate.edu/~cs455/cs455-wordcount-sp19.tar.gz
```

- Extract the tarball.

```
tar –xzvf cs455-wordcount-sp19.tar.gz
```

- This includes an build.gradle file. This is used to compile source and package it into a jar. After compiling, it will create the jar file inside the `./build` directory. You can use this build.gradle file as it is for HW3-PC. Type 'gradle build' to compile the source and create the jar file.

```
st-vrain> gradle build
BUILD SUCCESSFUL in 9s
2 actionable tasks: 2 executed
```

- Run the jar in yarn:

```
st-vrain> $HADOOP_HOME/bin/hadoop jar build/libs/cs455-wordcount-
sp19.jar cs455.hadoop.wordcount.WordCountJob /cs455/books
/cs455/wordcount-out
2017-03-08 00:36:53,833 INFO  [main] client.RMProxy
(RMProxy.java:createRMProxy(98)) - Connecting to ResourceManager
at st-vrain/129.82.47.128:46783
2017-03-08 00:36:54,325 WARN  [main] mapreduce.JobSubmitter
(JobSubmitter.java:copyAndConfigureFiles(153)) - Hadoop command-
line option parsing not performed. Implement the Tool interface
and execute your application with ToolRunner to remedy this.
2017-03-08 00:36:54,606 INFO  [main] input.FileInputFormat
(FileInputFormat.java:listStatus(281)) - Total input paths to
process : 3
2017-03-08 00:36:54,696 INFO  [main] mapreduce.JobSubmitter
(JobSubmitter.java:submitJobInternal(494)) - number of splits:3
2017-03-08 00:36:54,909 INFO  [main] mapreduce.JobSubmitter
```

```
(JobSubmitter.java:printTokens(583)) - Submitting tokens for job:
job_1427438142863_0001
2017-03-08 00:36:55,231 INFO  [main] impl.YarnClientImpl
(YarnClientImpl.java:submitApplication(251)) - Submitted
application application_1427438142863_0001
2017-03-08 00:36:55,270 INFO  [main] mapreduce.Job
(Job.java:submit(1300)) - The url to track the job: http://st-
vrain:8088/proxy/application_1427438142863_0001/
2017-03-08 00:36:55,271 INFO  [main] mapreduce.Job
(Job.java:monitorAndPrintJob(1345)) - Running job:
job_1427438142863_0001
2017-03-08 00:37:01,455 INFO  [main] mapreduce.Job
(Job.java:monitorAndPrintJob(1366)) - Job job_1427438142863_0001
running in uber mode : false
2017-03-08 00:37:01,456 INFO  [main] mapreduce.Job
(Job.java:monitorAndPrintJob(1373)) -  map 0% reduce 0%
2017-03-08 00:37:07,530 INFO  [main] mapreduce.Job
(Job.java:monitorAndPrintJob(1373)) -  map 100% reduce 0%
2017-03-08 00:37:16,599 INFO  [main] mapreduce.Job
(Job.java:monitorAndPrintJob(1373)) -  map 100% reduce 100%
2017-03-08 00:37:17,631 INFO  [main] mapreduce.Job
(Job.java:monitorAndPrintJob(1384)) - Job job_1427438142863_0001
completed successfully
2017-03-08 00:37:17,773 INFO  [main] mapreduce.Job
(Job.java:monitorAndPrintJob(1391)) - Counters: 49
     File System Counters
          FILE: Number of bytes read=549269
          FILE: Number of bytes written=1522267
          FILE: Number of read operations=0
          FILE: Number of large read operations=0
          FILE: Number of write operations=0
          HDFS: Number of bytes read=1299517
          HDFS: Number of bytes written=314863
          HDFS: Number of read operations=12
          HDFS: Number of large read operations=0
          HDFS: Number of write operations=2
     Job Counters
          Launched map tasks=3
          Launched reduce tasks=1
          Data-local map tasks=3
          Total time spent by all maps in occupied slots
(ms)=10788
          Total time spent by all reduces in occupied slots
(ms)=6841
          Total time spent by all map tasks (ms)=10788
          Total time spent by all reduce tasks (ms)=6841
          Total vcore-seconds taken by all map tasks=10788
          Total vcore-seconds taken by all reduce tasks=6841
          Total megabyte-seconds taken by all map tasks=11046912
          Total megabyte-seconds taken by all reduce
```

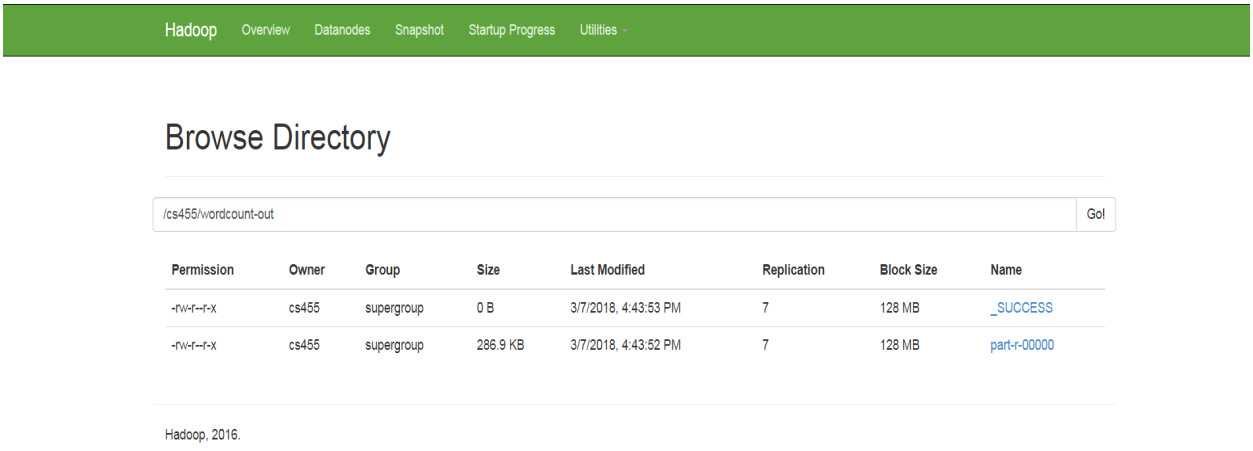
```
tasks=7005184
      Map-Reduce Framework


            Map input records=27088
            Map output records=226606
            Map output bytes=2171352
            Map output materialized bytes=549281
            Input split bytes=355
            Combine input records=226606
            Combine output records=38119
            Reduce input groups=29082
            Reduce shuffle bytes=549281
            Reduce input records=38119
            Reduce output records=29082
            Spilled Records=76238
            Shuffled Maps =3
            Failed Shuffles=0
            Merged Map outputs=3
            GC time elapsed (ms)=128
            CPU time spent (ms)=8450
            Physical memory (bytes) snapshot=956612608
            Virtual memory (bytes) snapshot=3741761536
            Total committed heap usage (bytes)=805306368
      Shuffle Errors
            BAD_ID=0
            CONNECTION=0
            IO_ERROR=0
            WRONG_LENGTH=0
            WRONG_MAP=0
            WRONG_REDUCE=0
      File Input Format Counters
            Bytes Read=1299162
      File Output Format Counters
Bytes Written=314863
```

- Check output in HDFS:

```
st-vrain> $HADOOP_HOME/bin/hdfs dfs -ls /cs455/wordcount-out
Found 2 items
-rw-r--r--   3 cs455 supergroup          0 2018-03-07 16:43
/cs455/wordcount-out/_SUCCESS
-rw-r--r--   3 cs455 supergroup     314863 2018-03-07 16:43
/cs455/wordcount-out/part-r-00000
```

Check the output in the web portal. Click on part-r-00000 file and it will be downloaded.



- **NOTE:** if you run this repeatedly, you will need to either modify your output folder name, or delete it between runs
- Check the following link for the complete set of HDFS commands. [http://hadoop.apache.org/docs/current/hadoop-project-dist/hadoop-hdfs/HDFSCommands.html]