Roll No: 31

Practical 3: WORD COUNT

Steps for Word Count in Cloudera: (Without Combiner)

1) Open virtual box and then start cloudera quickstart.

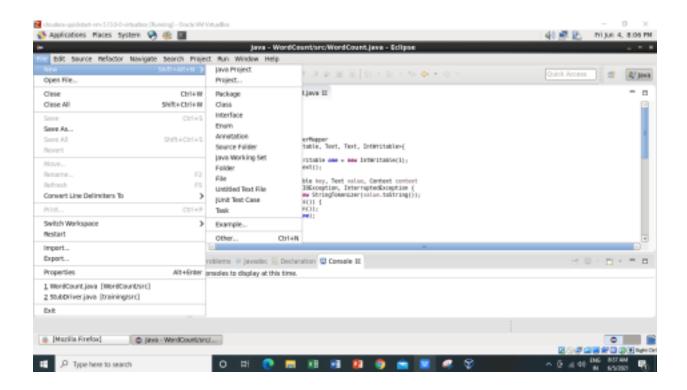


2) Open Eclipse present on the cloudera desktop.

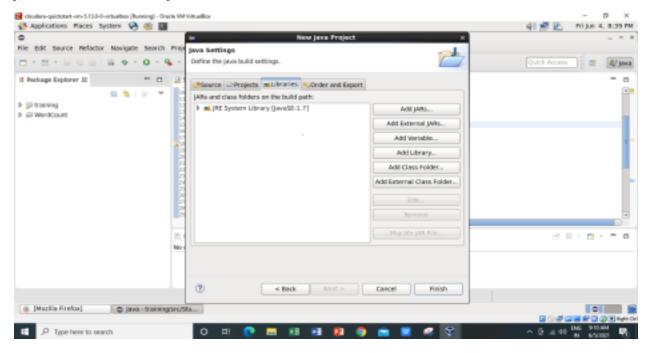


3) Create a new Java project clicking: File -> New -> Project -> Java Project -> Next ("WordCount" is the project name).

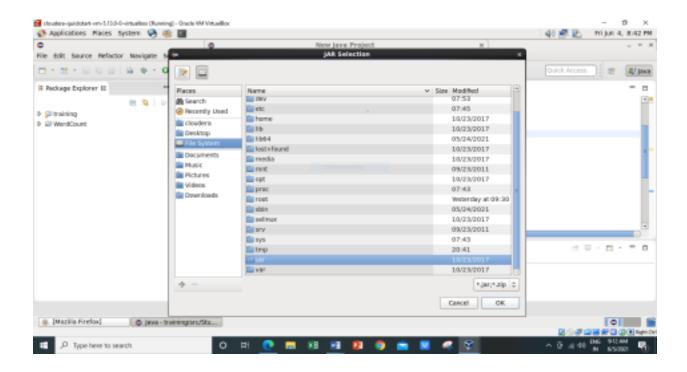
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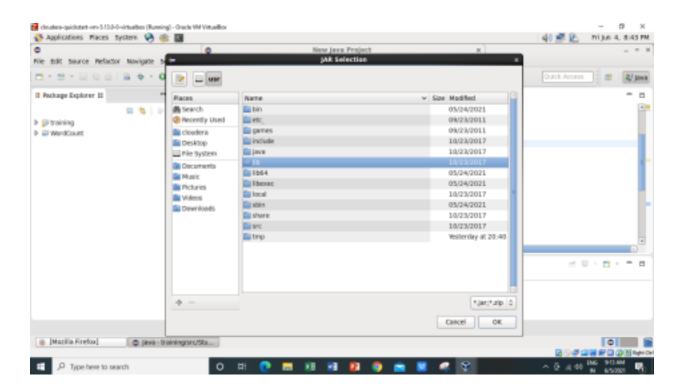


4)Adding the Hadoop libraries to the project Click on Libraries -> Add External JARs Click on File System -> usr -> lib -> hadoop Select all the libraries (JAR Files) -> click OK Click on Add External jars, -> client -> select all jar files -> ok -> Finish

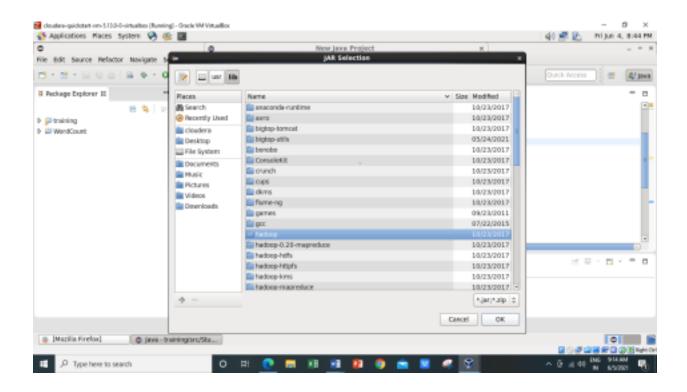


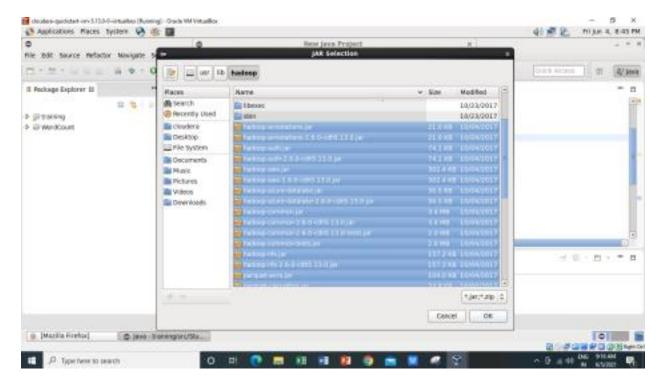
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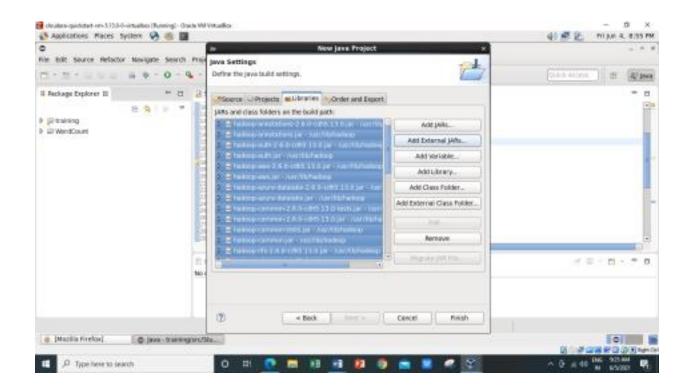


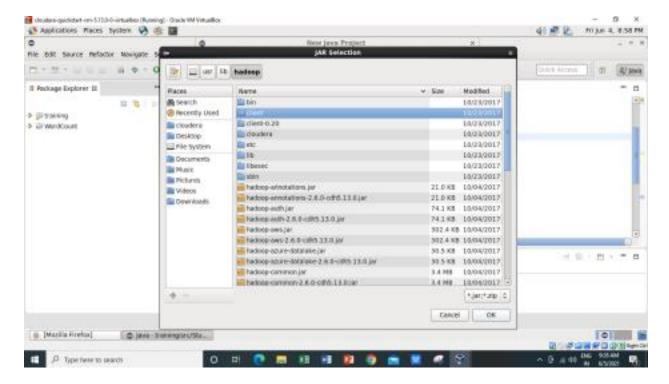
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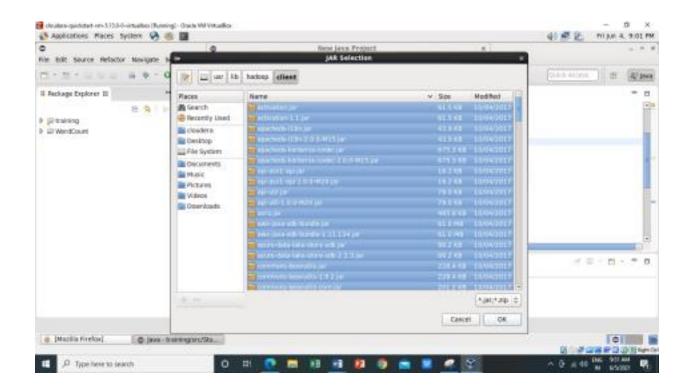


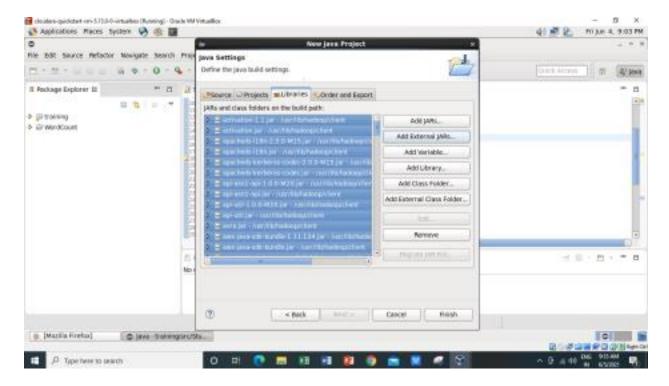
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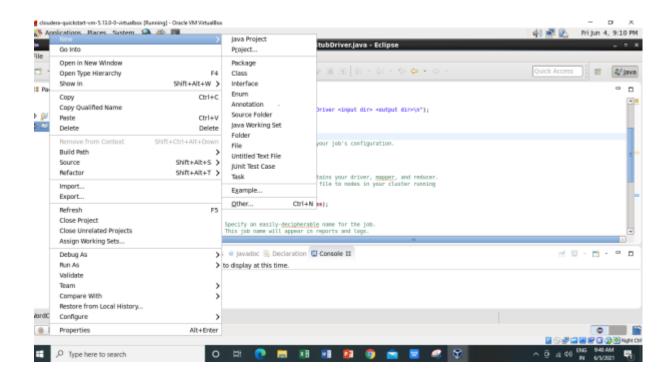
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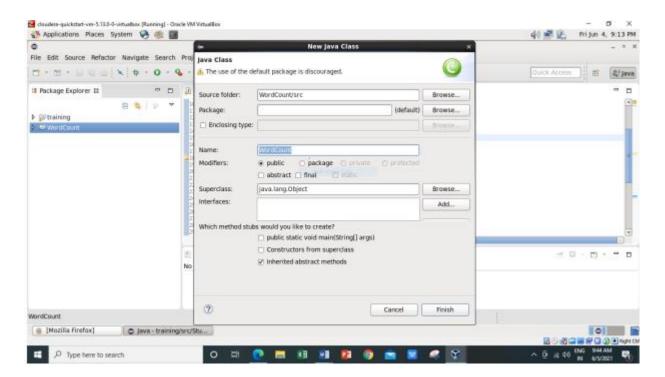




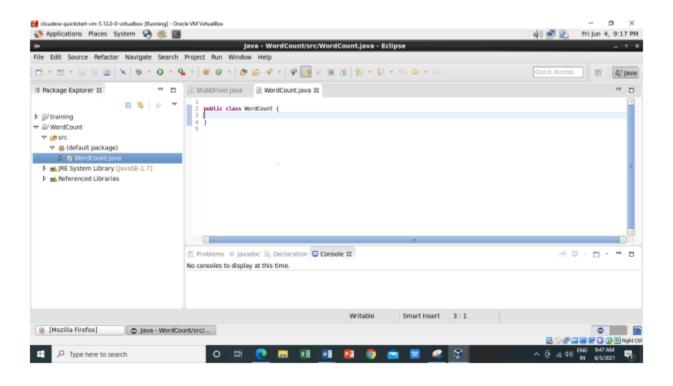
5) Right Click on the name of Project "WordCount" -> New -> class Don't write anything for package Write Name Textbox write "WordCount" -> Finish Then WordCount.java window will pop up

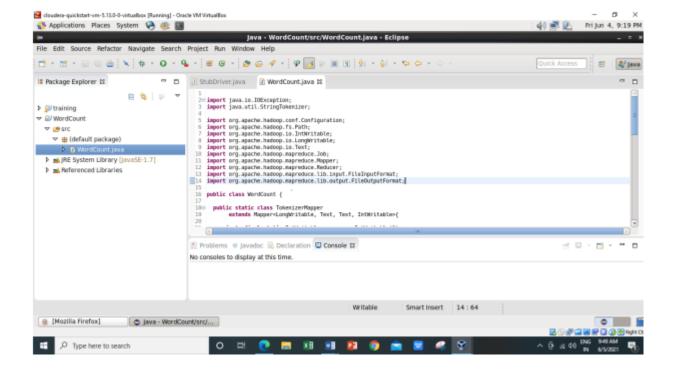
Name: Muhammed Rehan Shaikh Roll No: 31





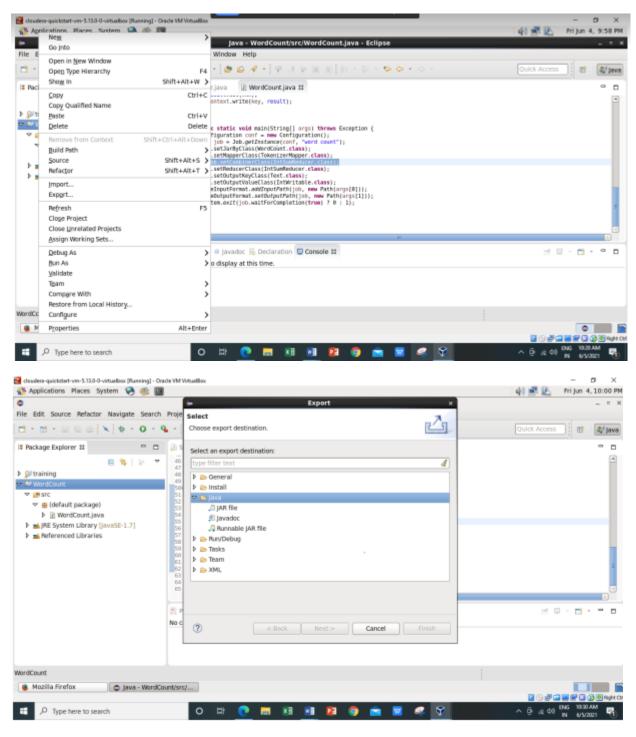
Name: Muhammed Rehan Shaikh Roll No: 31



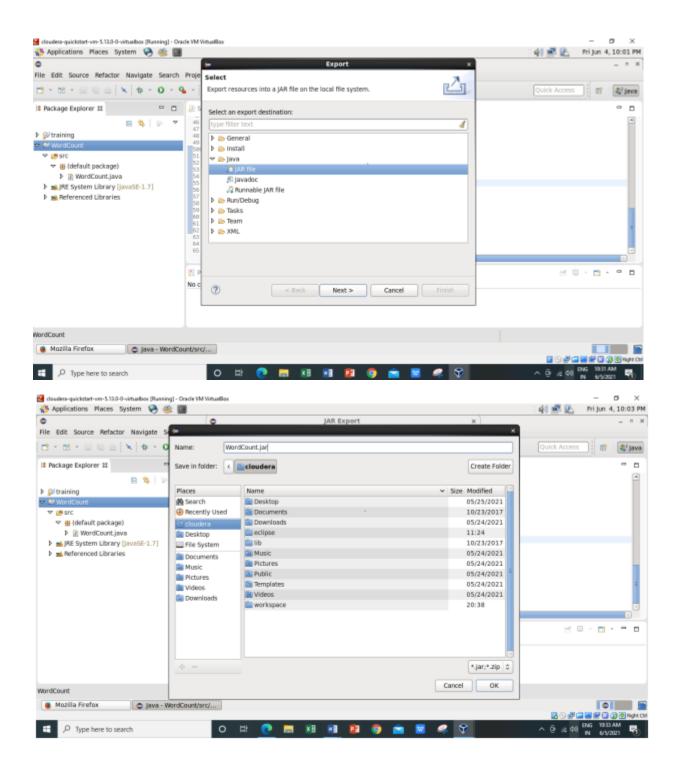


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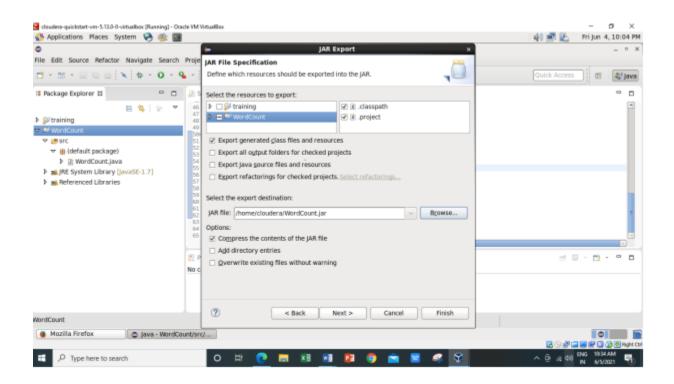
6) Right Click on the project name WordCount -> Export -> Java -> JAR File -> Next -> for select the export destination for JAR file: browse -> Name : WordCount.jar -> save in folder -> cloudera -> Finish -> OK



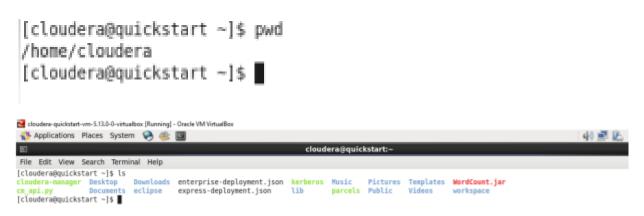
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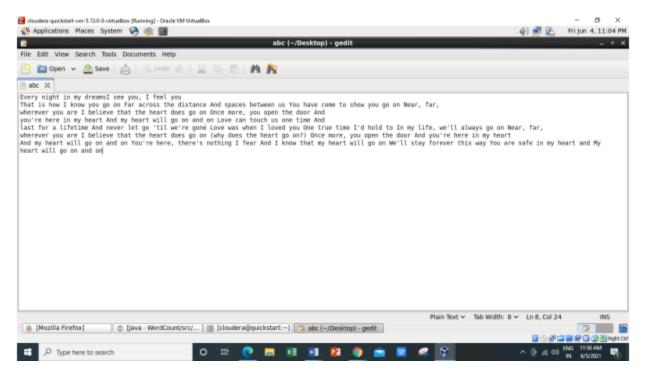


7) Verify jar file from terminal by using Open terminal & type "ls" There it will show WordCount.jar Check current working directory ->pwd



8) We need to create an input file in local file system Creating an input file named as "abc".

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Here listing all the directory present in hdfs using hdfs dfs -ls / command

```
[cloudera@quickstart ~]$ hdfs dfs -ls /
Found 10 items
-rw-r--r-- 1 cloudera supergroup
                                           27 2021-05-24 12:04 /Sample 01
drwxrwxrwx
            - hdfs
                        supergroup
                                            0 2017-10-23 09:15 /benchmarks
            - cloudera supergroup
drwxr-xr-x
                                            0 2021-05-24 13:58 /forcopy
                                           0 2021-06-04 07:57 /hbase
drwxr-xr-x
            - hbase
                        supergroup
                                         · 0 2021-05-24 13:20 /newdir
drwxr-xr-x
            - cloudera supergroup
drwxr-xr-x

    cloudera supergroup

                                           0 2021-05-24 13:36 /rjc
            - cloudera supergroup
                                           0 2021-05-24 13:55 /solr
drwxr-xr-x
            - hdfs
                                           0 2021-05-24 10:39 /tmp
drwxrwxrwt
                       supergroup
            - hdfs
- hdfs
                                           0 2017-10-23 09:17 /user
drwxr-xr-x
                        supergroup
                                           0 2017-10-23 09:17 /var
drwxr-xr-x
                        supergroup
[cloudera@quickstart ~]$
```

9) Now we have to move this input file to hdfs. For this we create a direcory on hdfs using command hdfs dfs -mkdir /inputnew.

```
[cloudera@quickstart ~]$ hdfs dfs -mkdir /inputdir
[cloudera@quickstart ~]$ ■ ·
```

Then we can verify whether this directory is created or not using ls command hdfs dfs -ls /

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```
[cloudera@quickstart ~]$ hdfs dfs -ls /
Found 11 items
                1 cloudera supergroup
                                                     27 2021-05-24 12:04 /Sample_01
 - FW - F - - F - -
                  hdfs supergroup
cloudera supergroup
                                                      0 2017-10-23 09:15 /benchmarks
0 2021-05-24 13:58 /forcopy
drwxrwxrwx
drwxr-xr-x
                                                       0 2021-06-04 07:57 /hbase
0 2021-06-04 23:34 /inputdir

    hbase supergroup
    cloudera supergroup

drwxr-xr-x
drwxr-xr-x
               - cloudera supergroup
                                                       0 2021-05-24 13:20 /newdir
drwxr-xr-x
               - cloudera supergroup
                                                       0 2021-05-24 13:36 /ric
                                              0 2021-05-24 13:55 /solr
0 2021-05-24 10:39 /tmp
0 2017-10-23 09:17 /user
               - cloudera supergroup
drwxr-xr-x
dryxryxryt

    hdfs supergroup

                - hdfs
drwxr-xr-x
                              supergroup
drwxr-xr-x - hdfs sug
[cloudera@quickstart ~]$ ■
                               supergroup
                                                      0 2017-10-23 09:17 /var
```

Move the input file to this directory created in hdfs by using either put command or copyFromLocal command.

```
[cloudera@quickstart ~]$ hdfs dfs -put /home/cloudera/Desktop/abc /inputdir/ [cloudera@quickstart ~]$ ■
```

Now checking whether the "abc" present in /inputdir directory of hdfs or not using hdfs dfs -ls /inputdir command

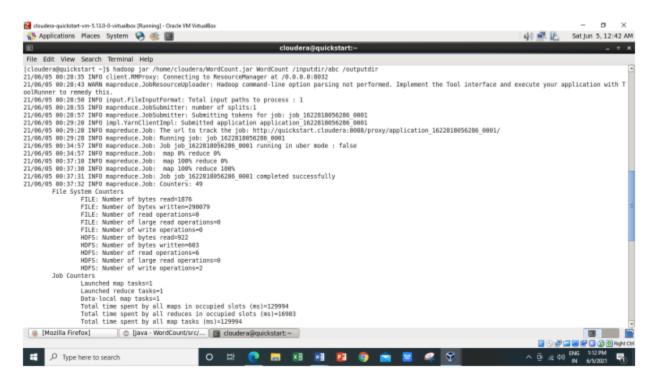
```
[cloudera@quickstart ~]$ hdfs dfs -ls /inputdir
Found 1 items
-rw-r--r-- 1 cloudera supergroup 813 2021-06-05 00:06 /inputdir/abc
[cloudera@quickstart ~]$ ■
```

As we can see "abc" file is present in /inputdir directory of hdfs. Now we will see the content of this file using hdfs dfs –cat /inputdir/abc command

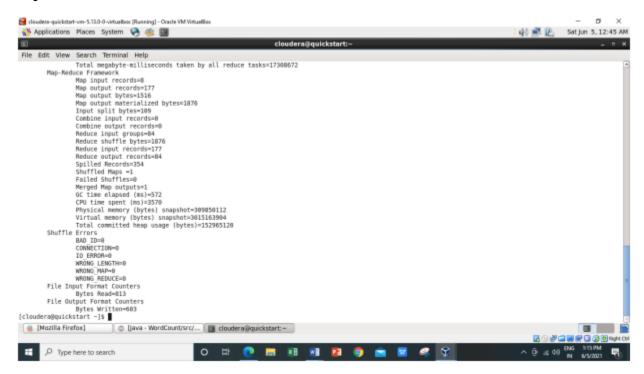
10) Running Mapreduce Program on Hadoop, syntax is hadoop jar jarFileName.jar ClassName /InputFileAddress /outputdir

i.e. hadoop jar /home/cloudera/WordCount.jar WordCount /inputdir/abc /outputdir

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Map-Reduce Framework



As we can see in the above output,

Combine input records=0

Combine output records=0

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We are getting this because we have commented the Combiner line in main function.

And Reduce shuffle bytes coming as,

Reduce shuffle bytes=1876

So when we are not using combiner 1876 bytes acting as an input for the reducer.

11) Then we can verify the content of outputdir directory and in that part-r file has the actual output by using the command Hdfs dfs -cat /outputdir/part-r-00000 This will give us final output. The same file can also be accessed using a browser. For every execution of this program we need to delete the output directory or give a new name to the output directory every time.

1st we are checking whether the outputdir directory is created in hdfs or not using command

hdfs dfs -ls /

```
[cloudera@quickstart ~]$ hdfs dfs -ls /
Found 12 items
-rw-r--r-- 1 cloudera supergroup
drwxrwxrwx - hdfs supergroup
drwxr-xr-x - cloudera supergroup
drwxr-xr-x - hdfs supergroup
drwxr-xr-x - hdfs supergroup
drwxr-xr-x - hdfs supergroup
drwxr-xr-x - hdfs supergroup
[cloudera@quickstart ~]$
```

Now let's check what we have inside this **outputdir** directory using command as **hdfs dfs -ls**

/outputdir

Now we want to read the content of the part-r-00000 file which present inside the outputdir using command hdfs dfs -cat /outputdir/part-r-00000

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```
[cloudera@quickstart ~]$ hdfs dfs -cat /outputdir/part-r-00000
'til
(why
       1
And
       8
Every
       1
       1
Far
       7
Ι
I'd
       1
       1
In
Love
       2
       1
Му
Near,
       2
       2
Once
       1
0ne
That
       1
We'll 1
You
       2
You're 1
       1
across 1
always 1
and
are
       3
believe 2
between 1
can
     1
come 1
distance
              1
does 3
door
    2
dreamsI 1
```

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```
more,
        8
my
never
        1
night
        1
nothing 1
        12
on?)
        1
one
        1
open
        2
safe
        1
see
        1
show
        1
spaces 1
stay
        1
that
        3
the
        6
there's 1
this
        1
time
        2
to
        2
touch
        1
        1
true
us
        2
was
        1
        1
way
we'll
        1
we're
        1
when
        1
wherever
                2
will
you
        8
you're 2
you,
[cloudera@quickstart ~]$
```

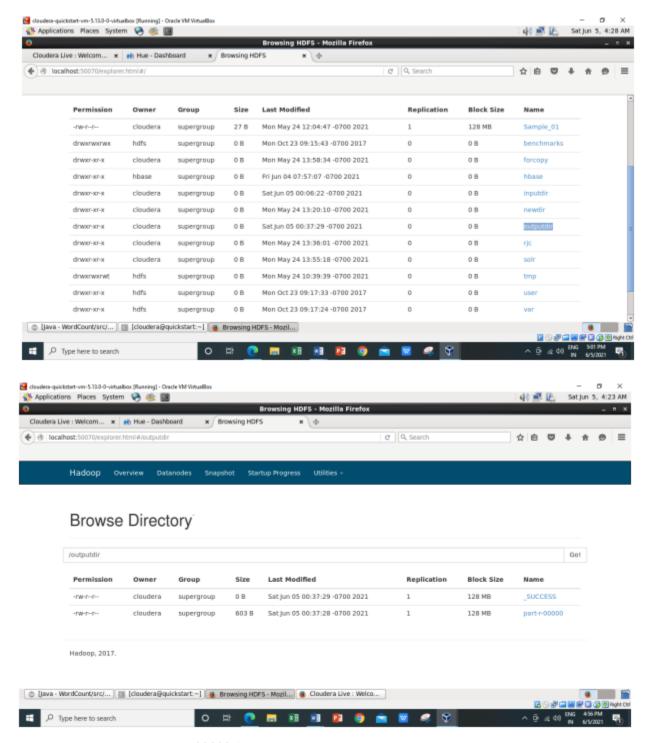
It will give the count of number of times each word has occurred as output.

12) The same file can also be accessed using a browser.

Browse the Directory by

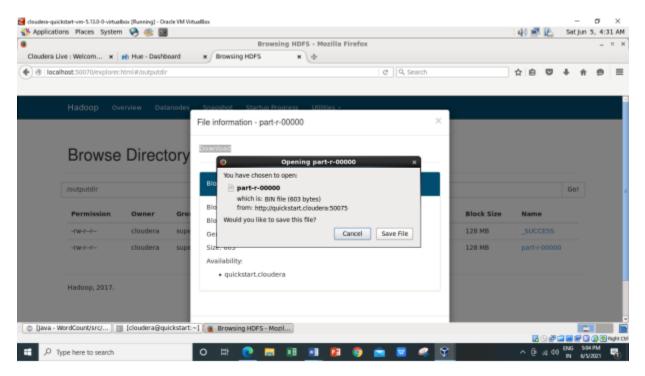
Hadoop->HDFS Namenode->Ultilities ->Browse the file system

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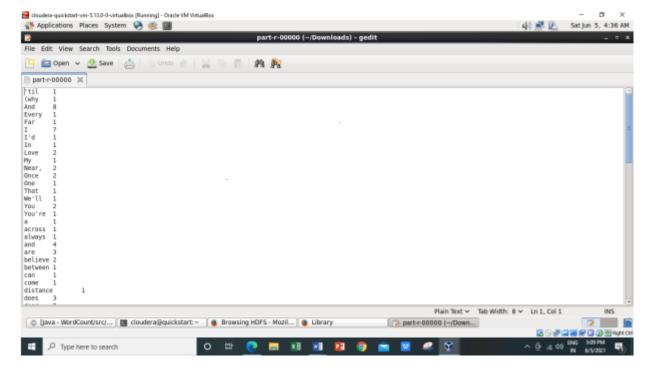


Now downloading the part-r-00000 file.

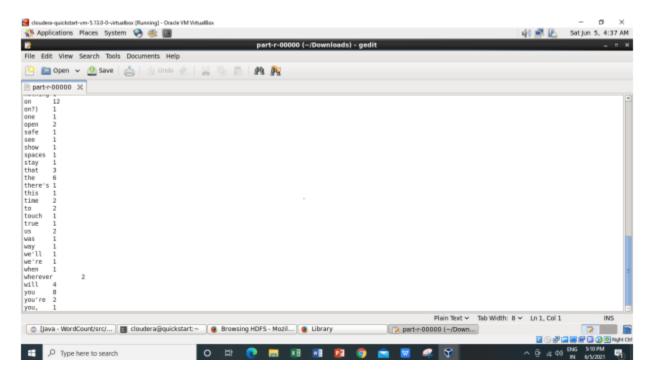
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Inside the **part-r-00000** file it will have the same output as we are getting after executing using command **hadoop jar /home/cloudera/WordCount.jar WordCount /inputdir/abc /op1**



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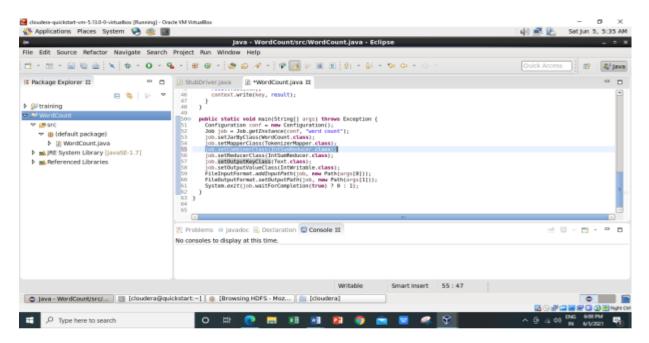


For every execution of this program we need to delete the output directory or give a new name to the output directory every time.

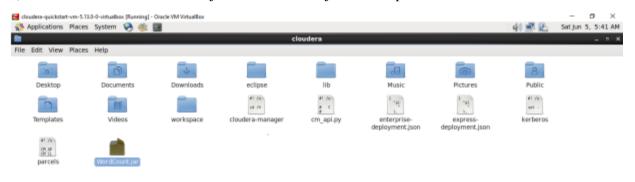
Implementation of WordCount problem using Hadoop MapReduce (With Combiner) in Eclipse:

1) We will perform the same steps as we have done above for WordCount (without using combiner) in that we just uncommenting the combiner line in main function.

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2) And will delete the WordCount.jar file in which all jar files are present from /home/cloudera.





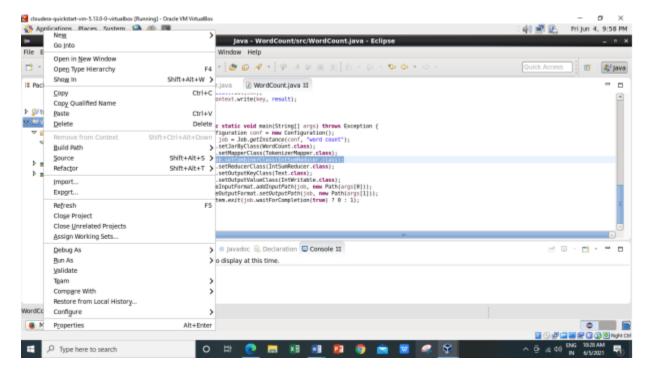
We have successfully deleted the WordCount.jar file.

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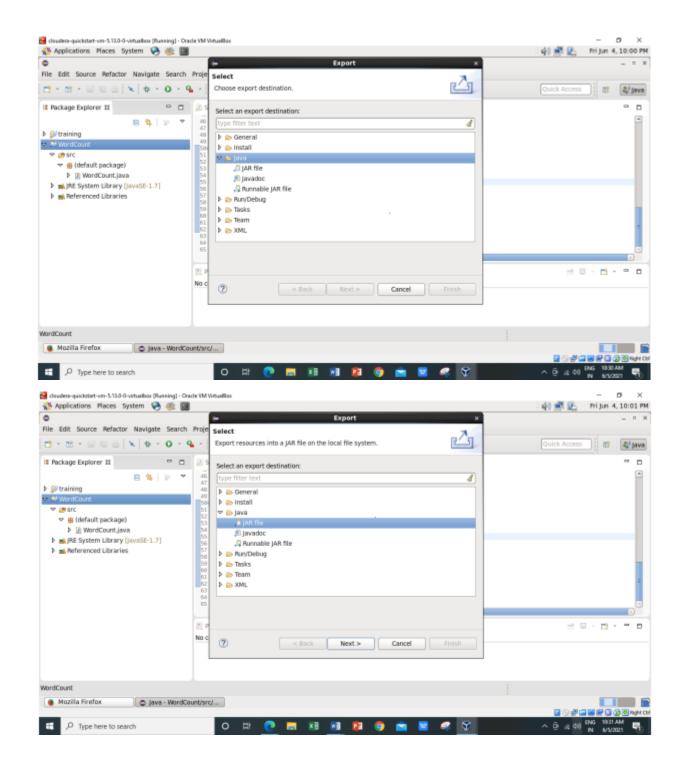




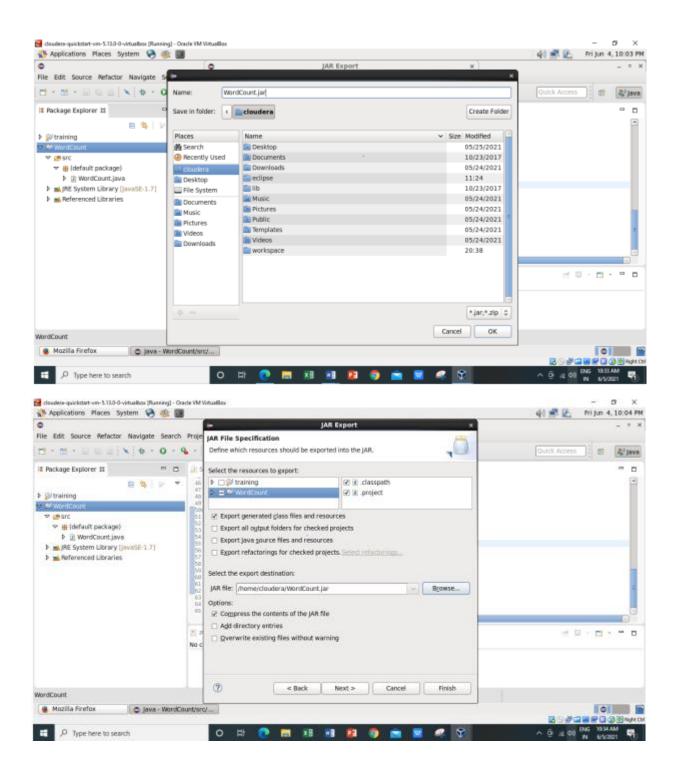
3) Now exporting the jar files Right Click on the project name WordCount -> Export -> Java -> JAR File -> Next -> for select the export destination for JAR file: browse -> Name : WordCount.jar -> save in folder -> cloudera -> Finish -> OK



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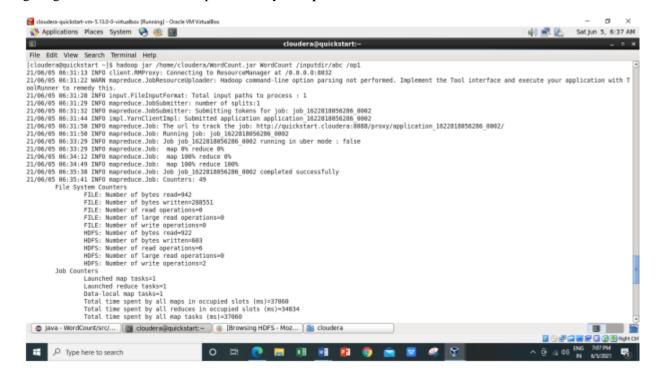
4) Now checking the WordCount.jar file is created or not using -ls command

```
[cloudera@quickstart -]$ ls
cloudera-manager Desktop Downloads enterprise-deployment.json kerberos Music Pictures Templates WordCount.jar
cm_api.py Documents eclipse express-deployment.json lib parcels Public Videos workspace
[cloudera@quickstart -]$ |
```

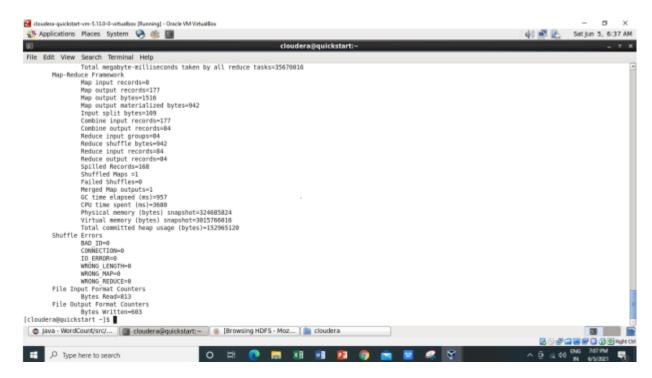
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5) Running Mapreduce Program on Hadoop, syntax is hadoop jar jarFileName.jar ClassName /InputFileAddress /outputdir

i.e. hadoop jar /home/cloudera/WordCount.jar WordCount /inputdir/abc /op1
here I am using the same input file 'abc' which I have created earlier for WordCount
example (Without Combiner). For every execution of this program we need to delete the
output directory or give a new name to the output directory every time. So here I am
giving the new name to the output directory as 'op1'.



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As we can see from above image the the combiner input and output records coming out as,

Combine input records=177

Combine output records=84

Earlier it was coming out as "zero" while executing WordCount (without combiner).

Combine input records=0

Combine output records=0

• And also here we are getting the Reduce Shuffle bytes as,

Reduce shuffle bytes=942

Earlier while executing WordCount (without combiner) it is coming out as,

Reduce shuffle bytes=1876

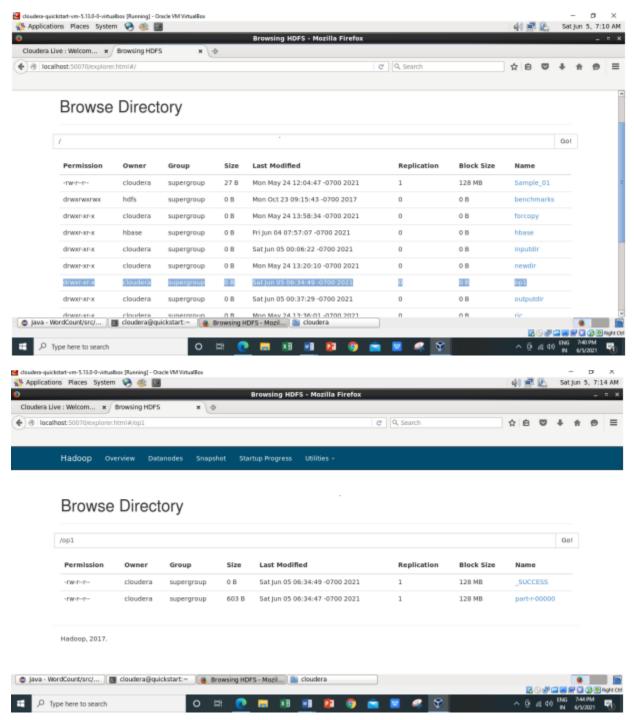
- So Combiner is used to save the Network Bandwidth. So for saving the Network bandwidth we make use of combiner. So instead of sending every word over the network what we do is we incorporate the logic of the reducer at the combiner side so that the less amount of information can be transmitted over the network.
- So when we are not using combiner 1876 bytes acting as an input for the reducer. And when we are making use of the combiner so 942 bytes acting as input for the reducer.

6) The same file can also be accessed using a browser.

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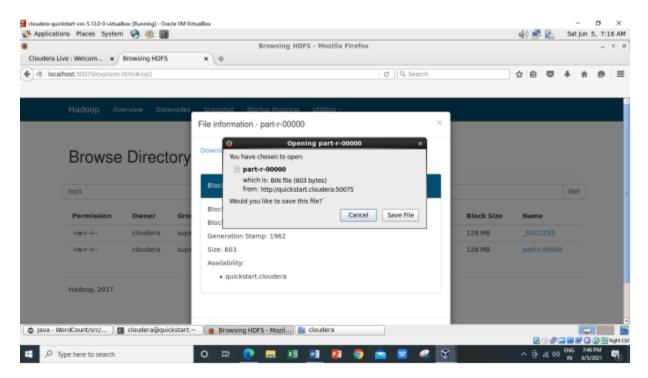
Browse the Directory by

Hadoop->HDFS Namenode->Ultilities ->Browse the file system

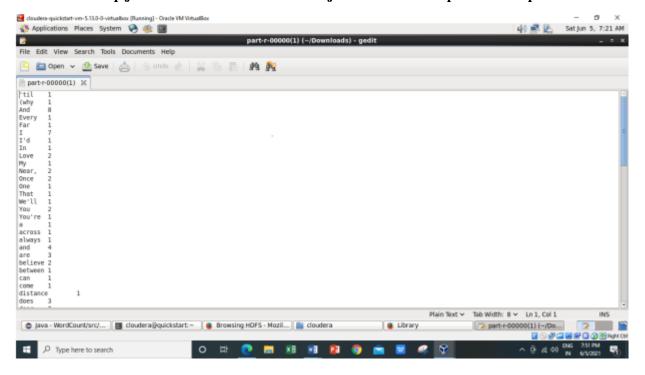


Now downloading the part-r-00000 file.

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Inside the **part-r-00000** file it will have the same output as we are getting after executing using command **hadoop jar /home/cloudera/WordCount.jar WordCount /inputdir/abc /op1**



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