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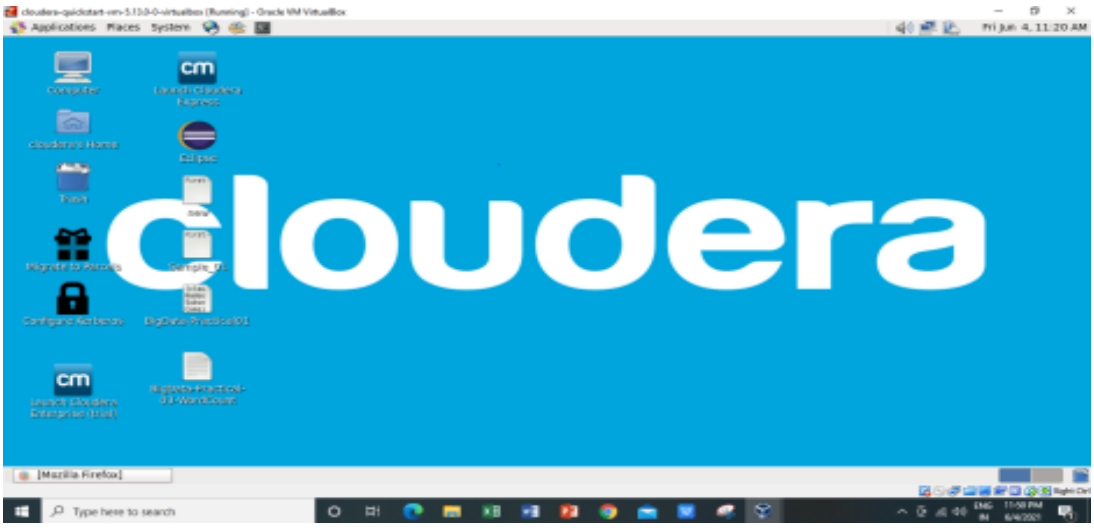
Steps for Word Count in Cloudera: (Without Combiner)

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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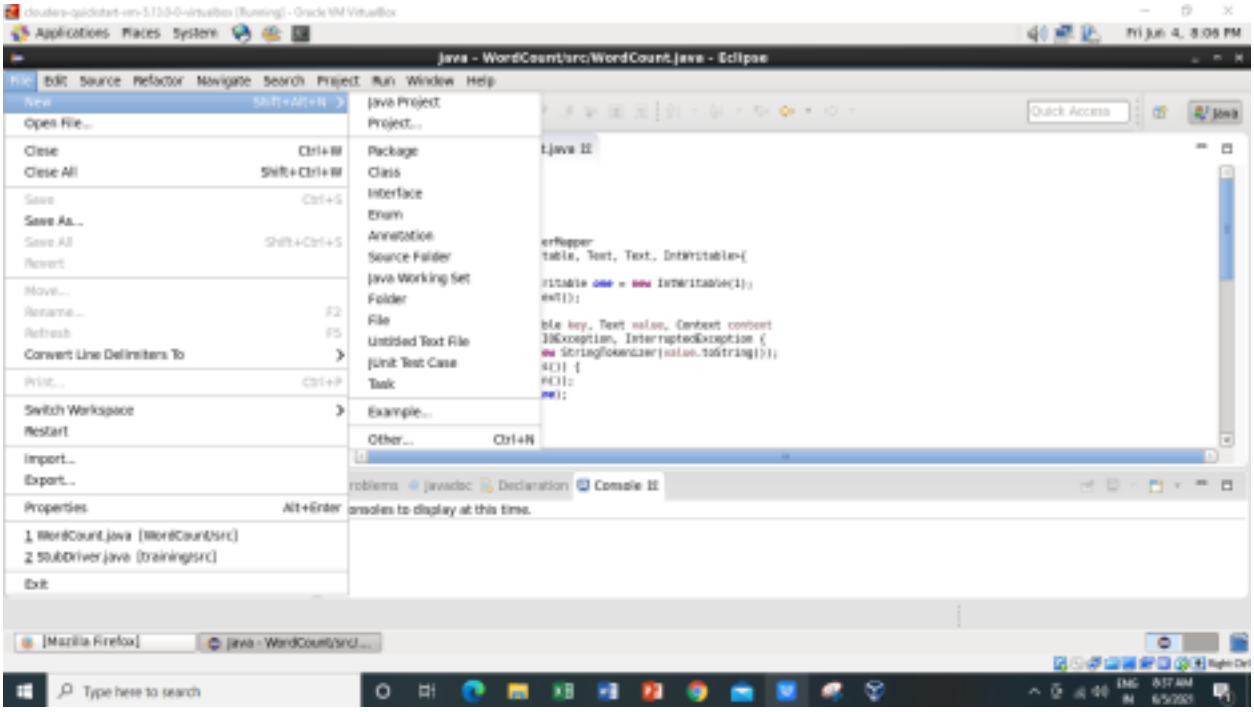
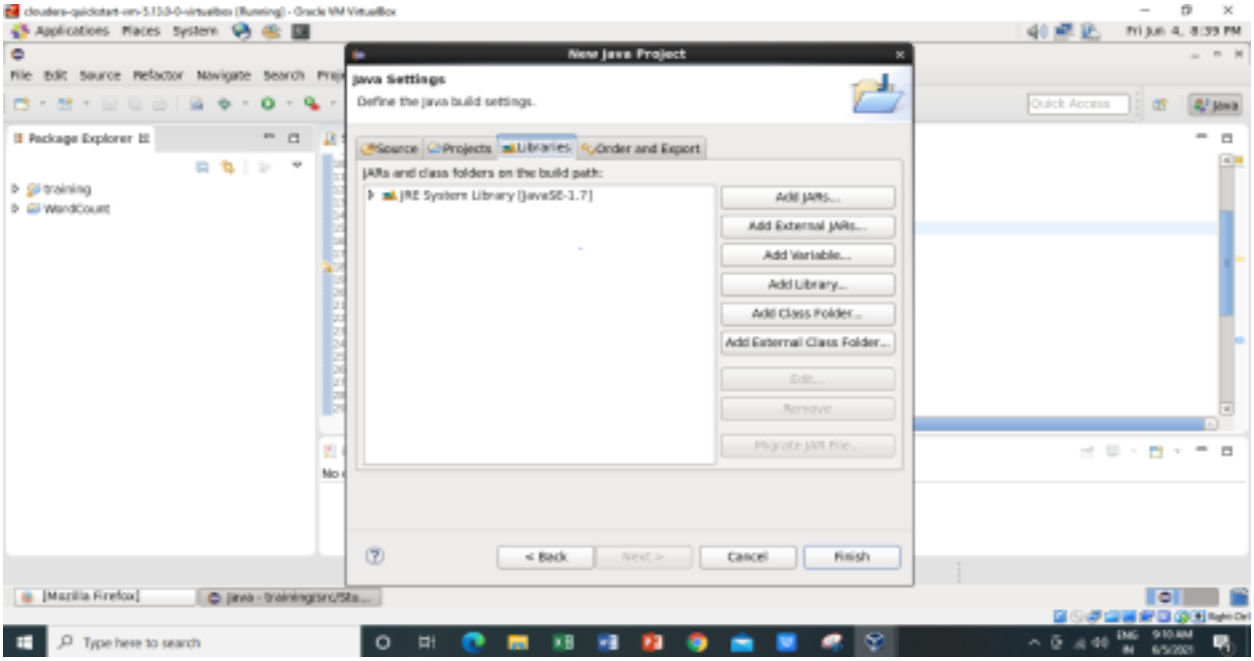


4)Adding the Hadoop libraries to the project Click on Libraries -> Add External JARs Click on File System -> usr -> lib -> hadoop Select all the libraries (JAR Files) -> click OK Click on Add External jars, -> client -> select all jar files -> ok -> Finish



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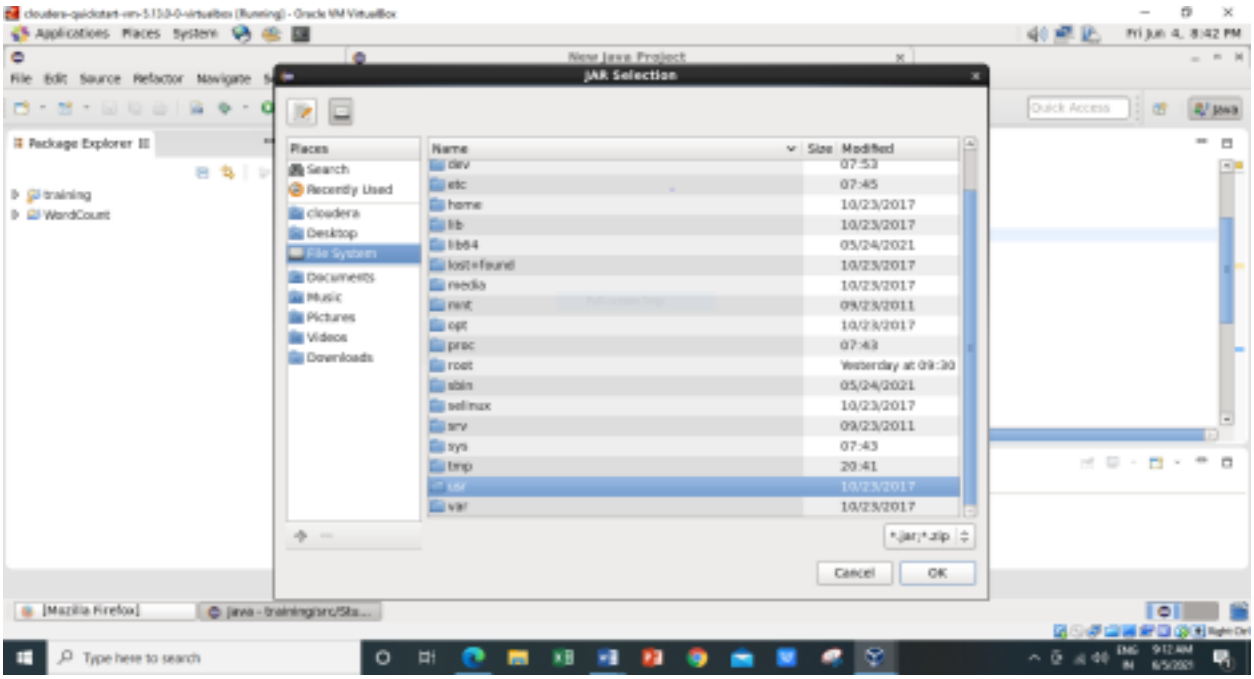

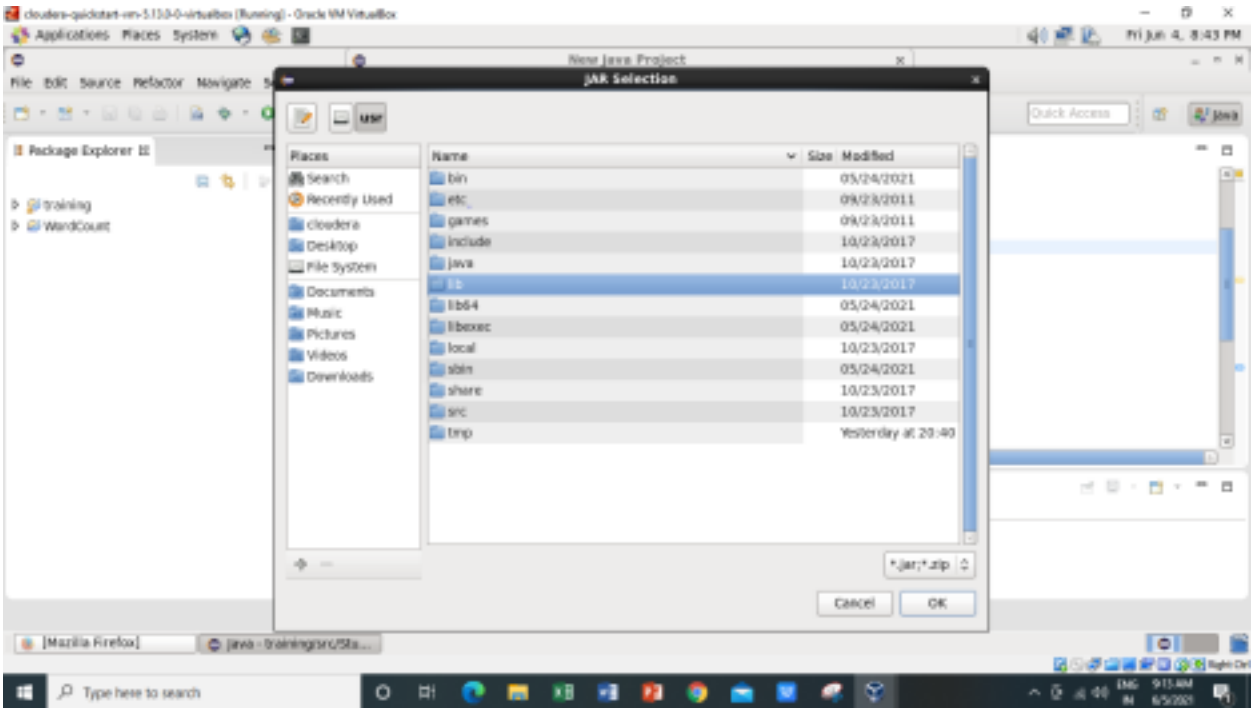

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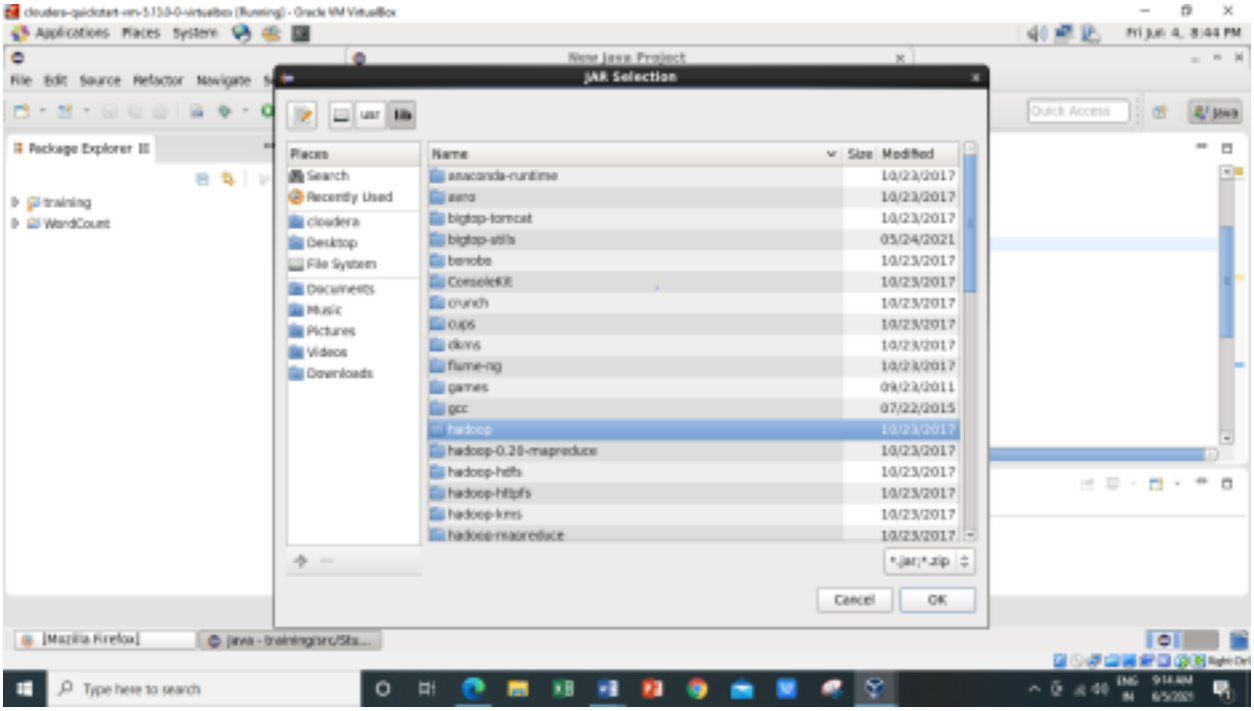

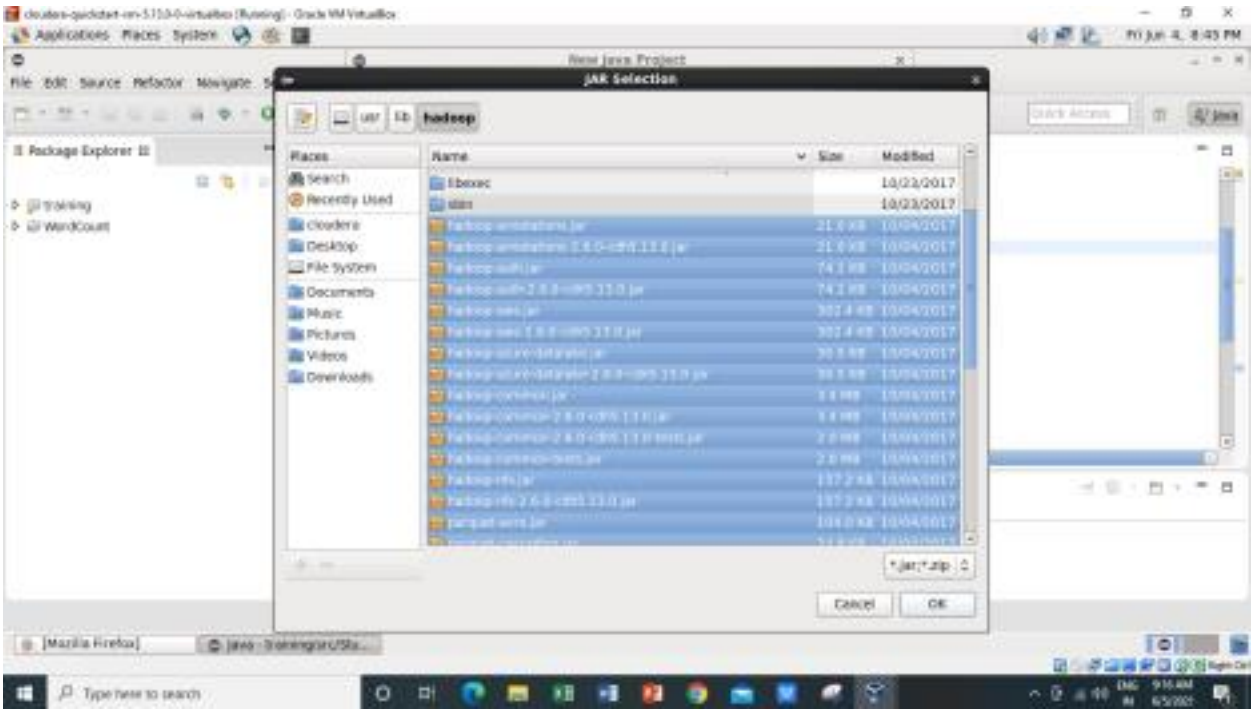

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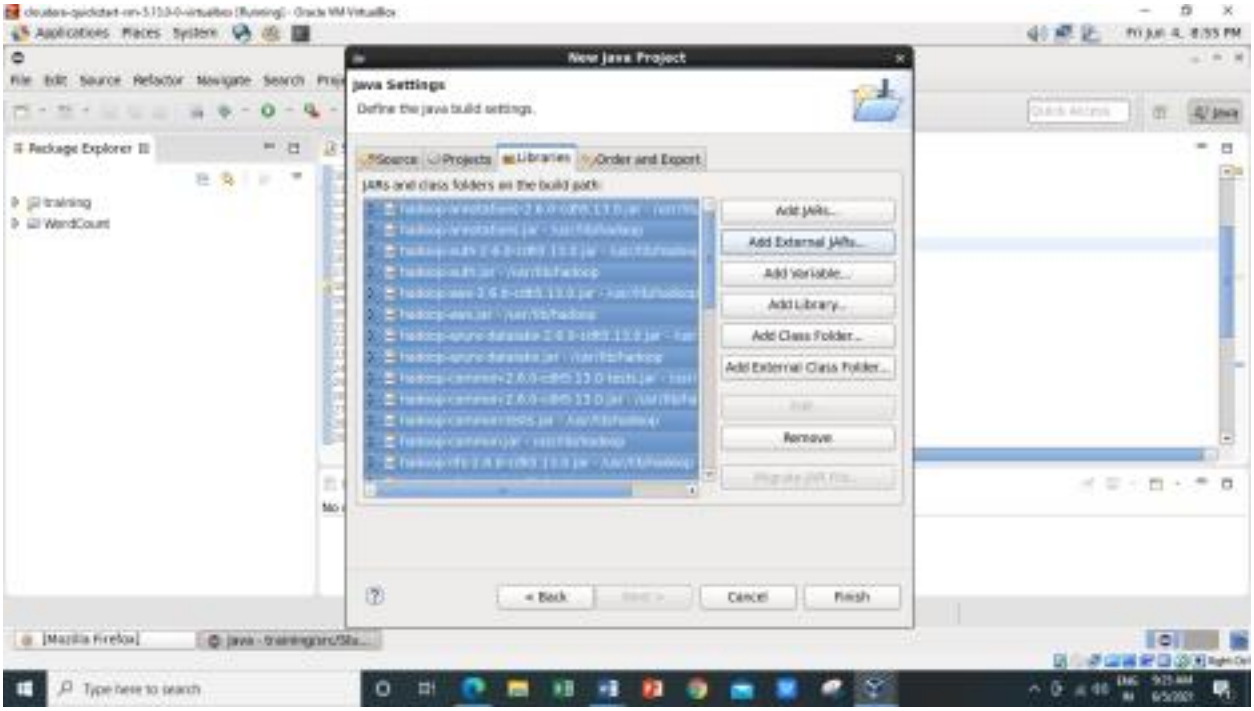

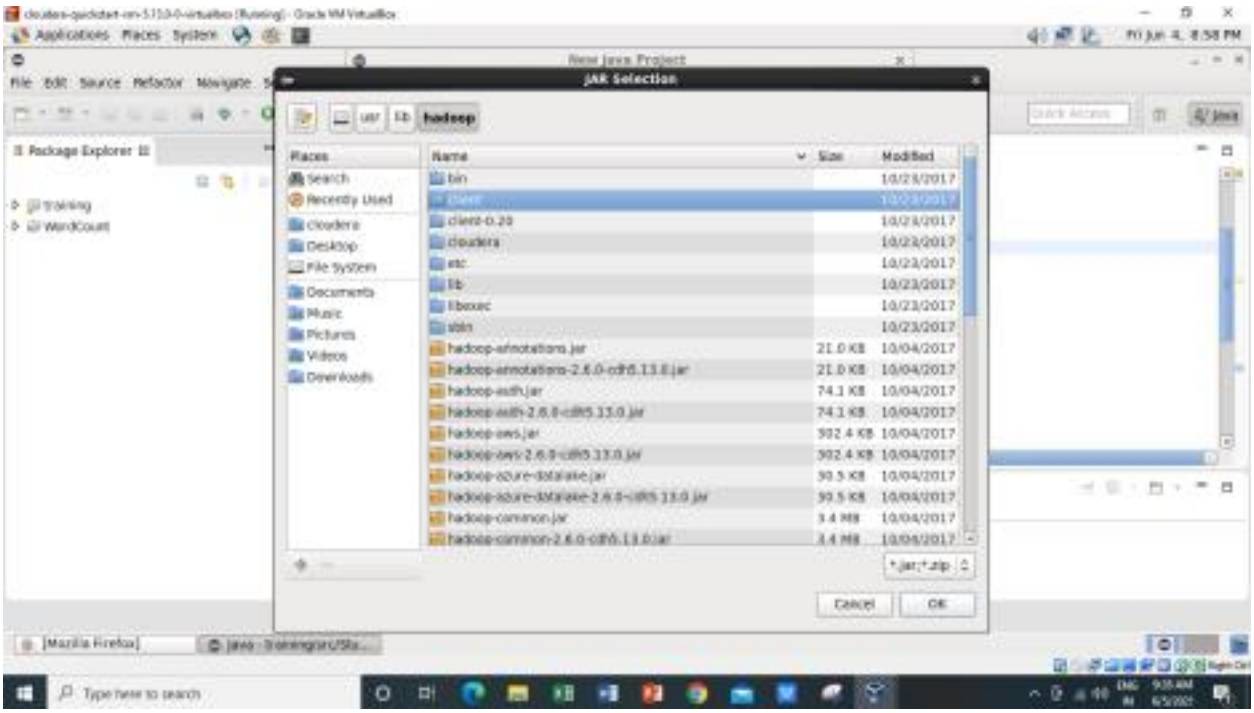

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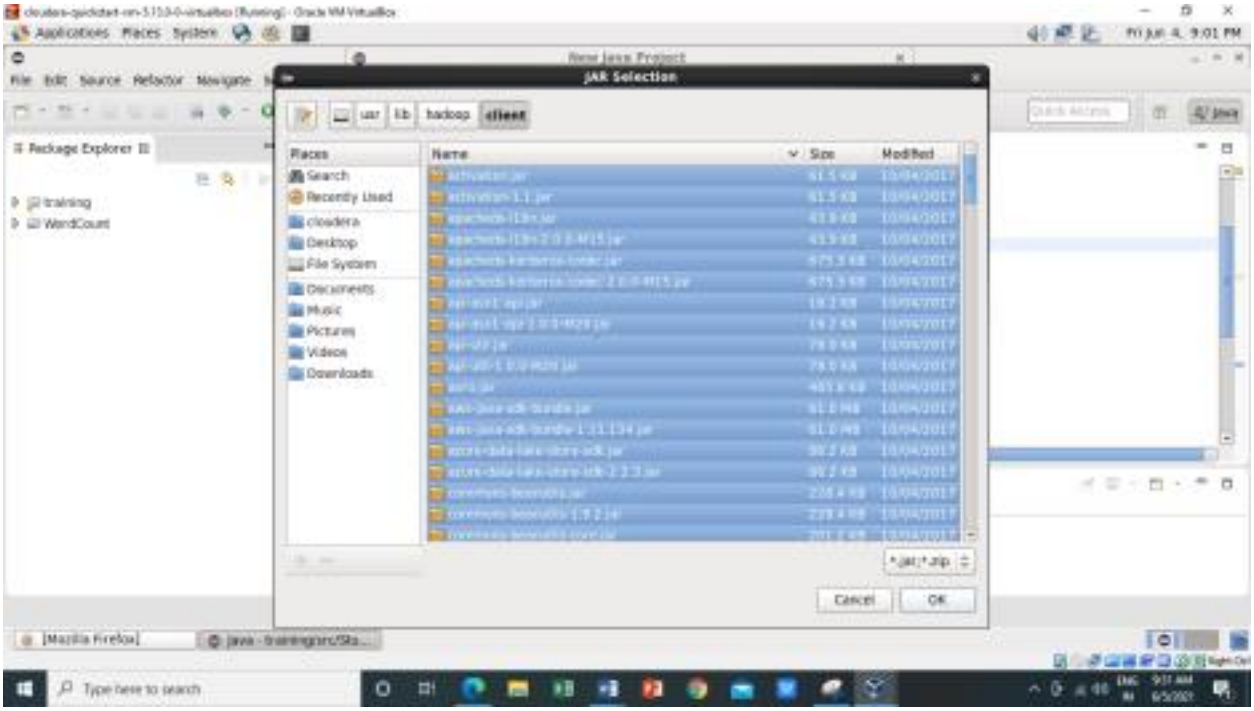

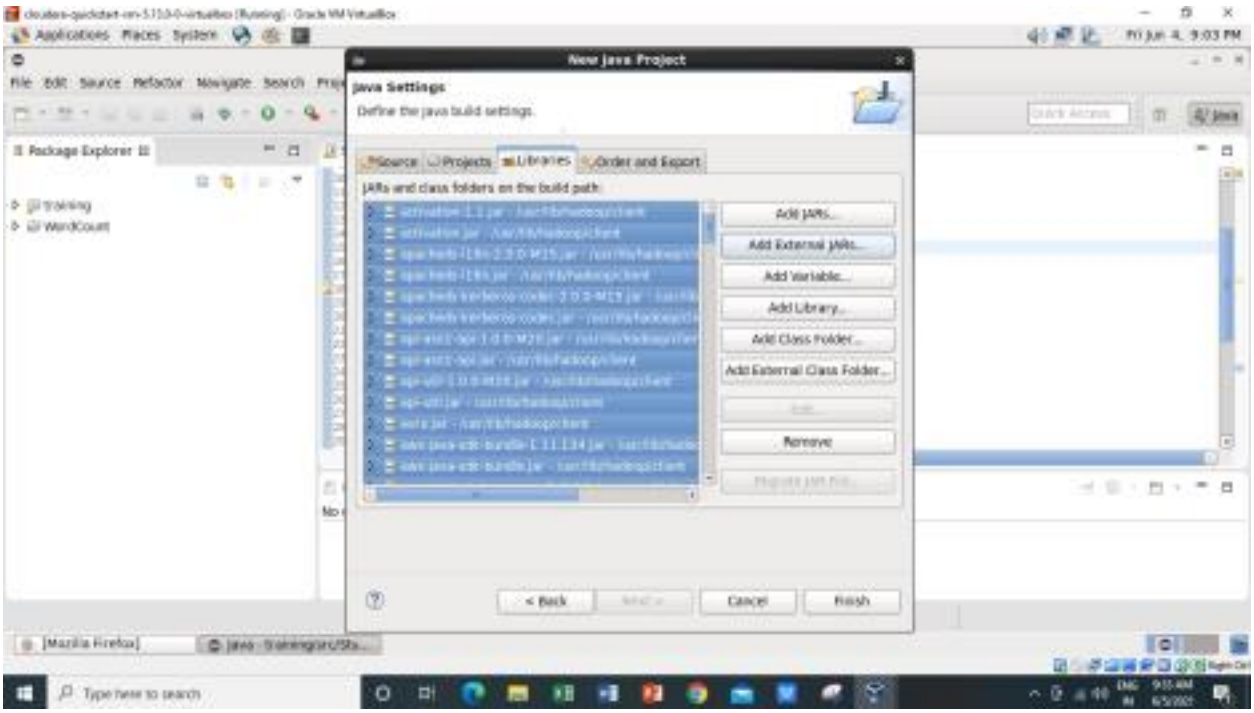

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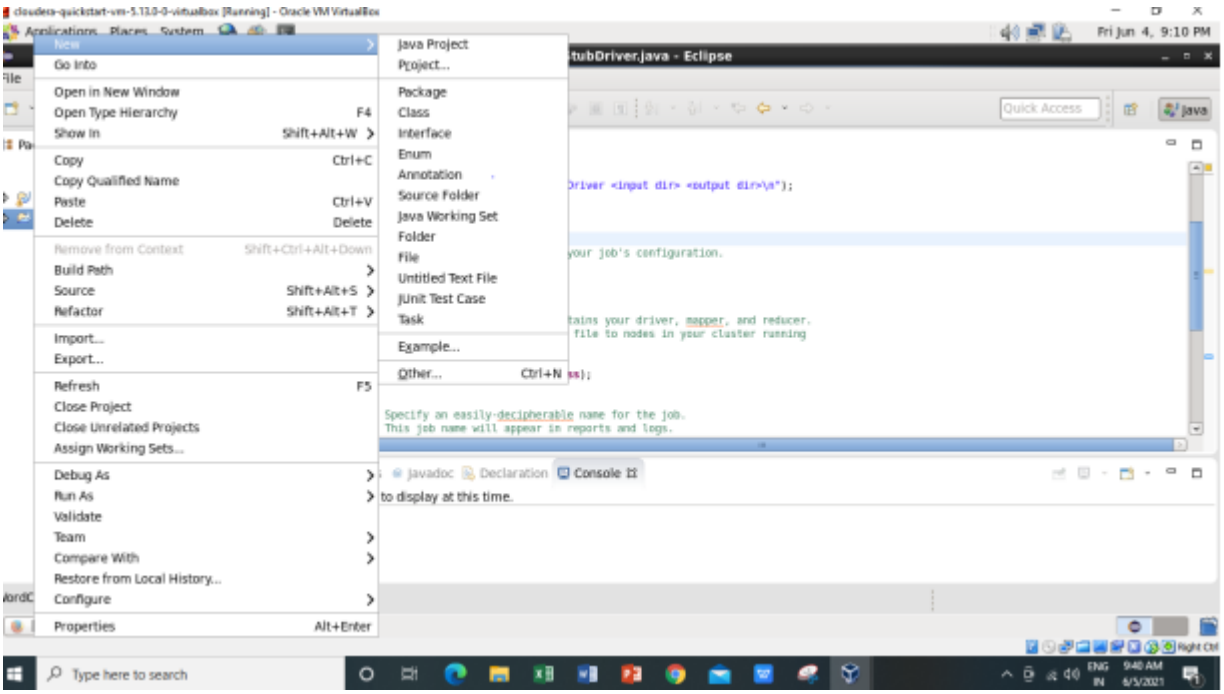
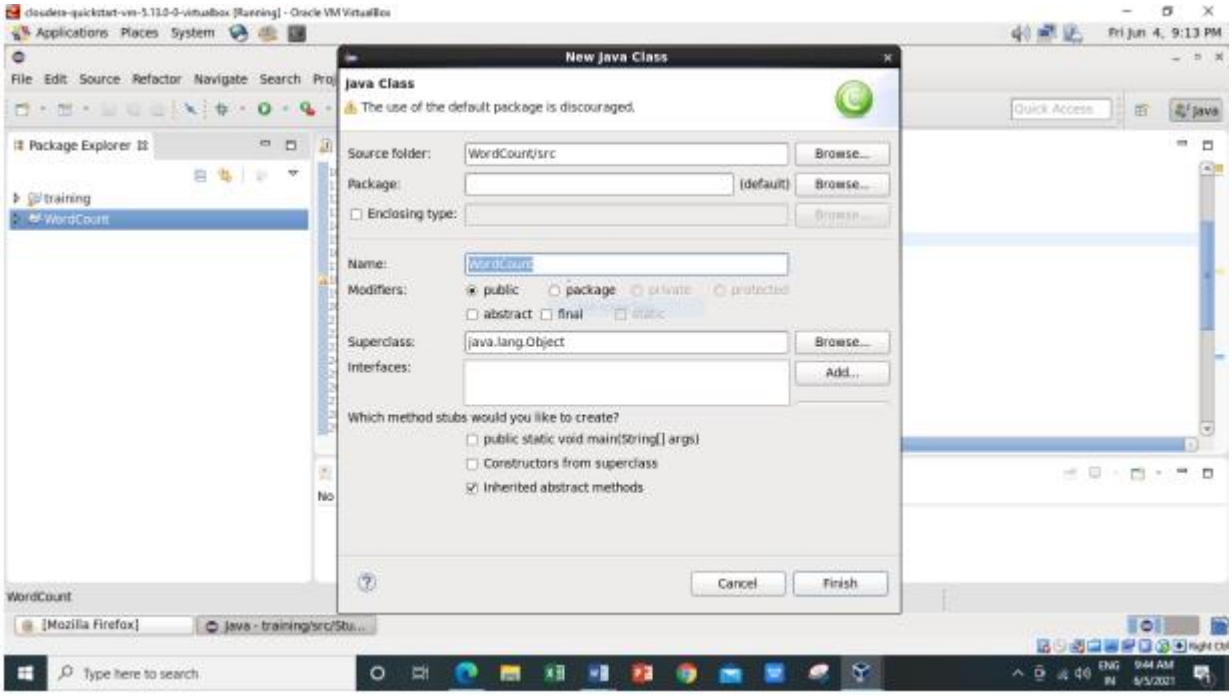
5) Right Click on the name of Project “WordCount” -> New -> class Don’t write anything for package Write Name Textbox write “WordCount” -> Finish Then WordCount.java window will pop up





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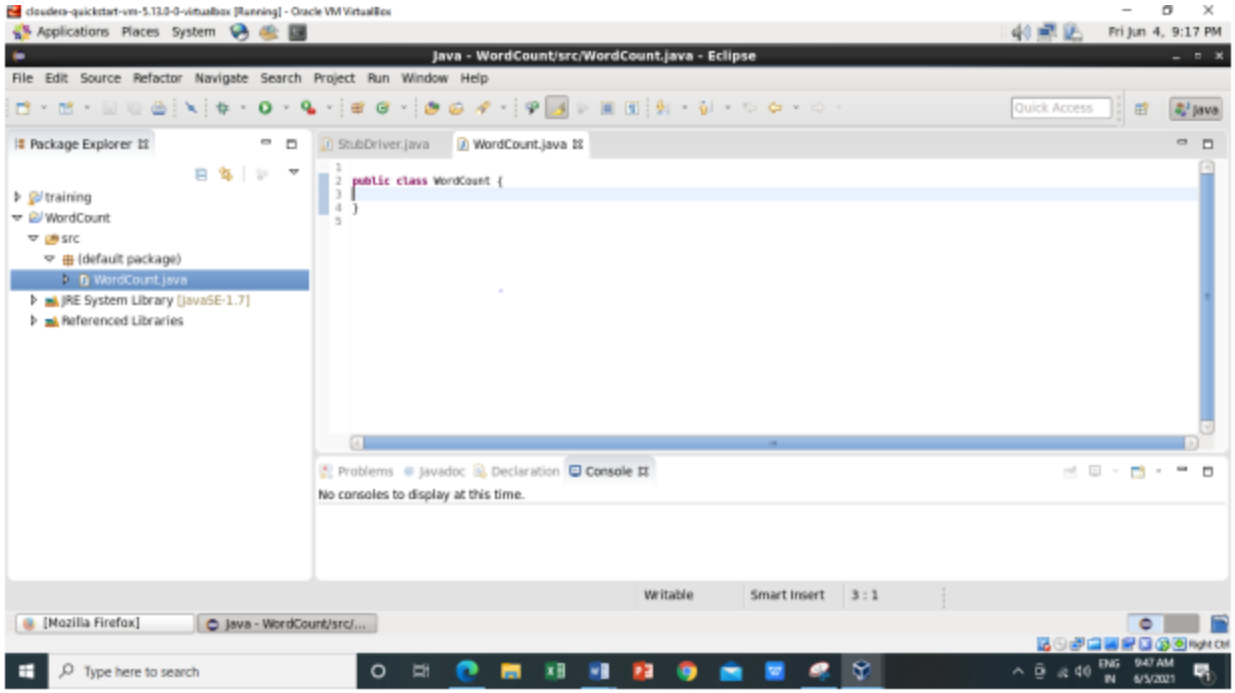

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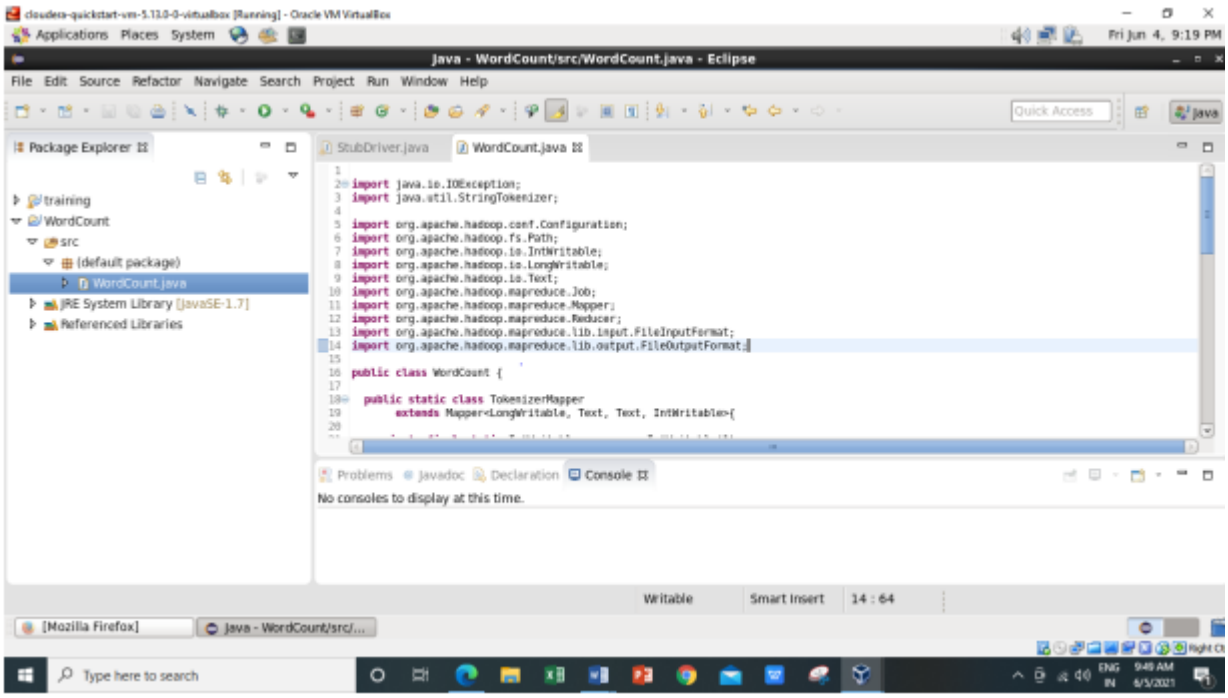

6) Right Click on the project name WordCount -> Export -> Java -> JAR File -> Next -> for select the export destination for JAR file: browse -> Name : WordCount.jar -> save in folder -> cloudera -> Finish -> OK

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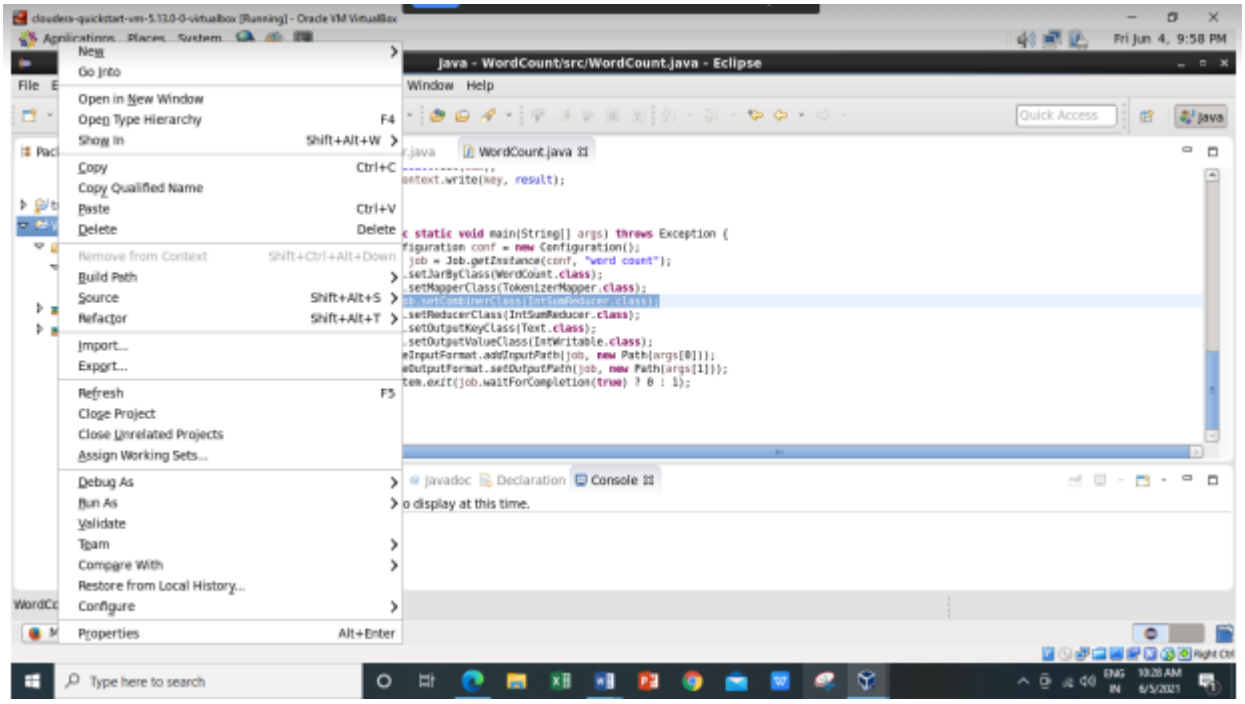

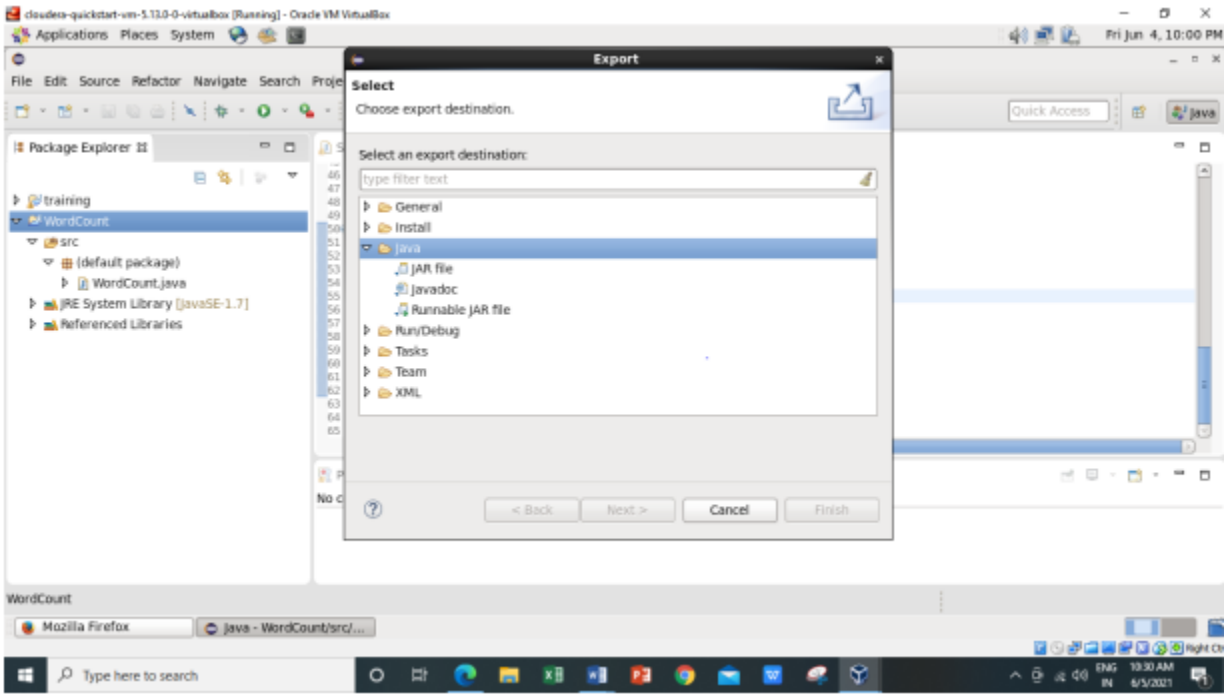

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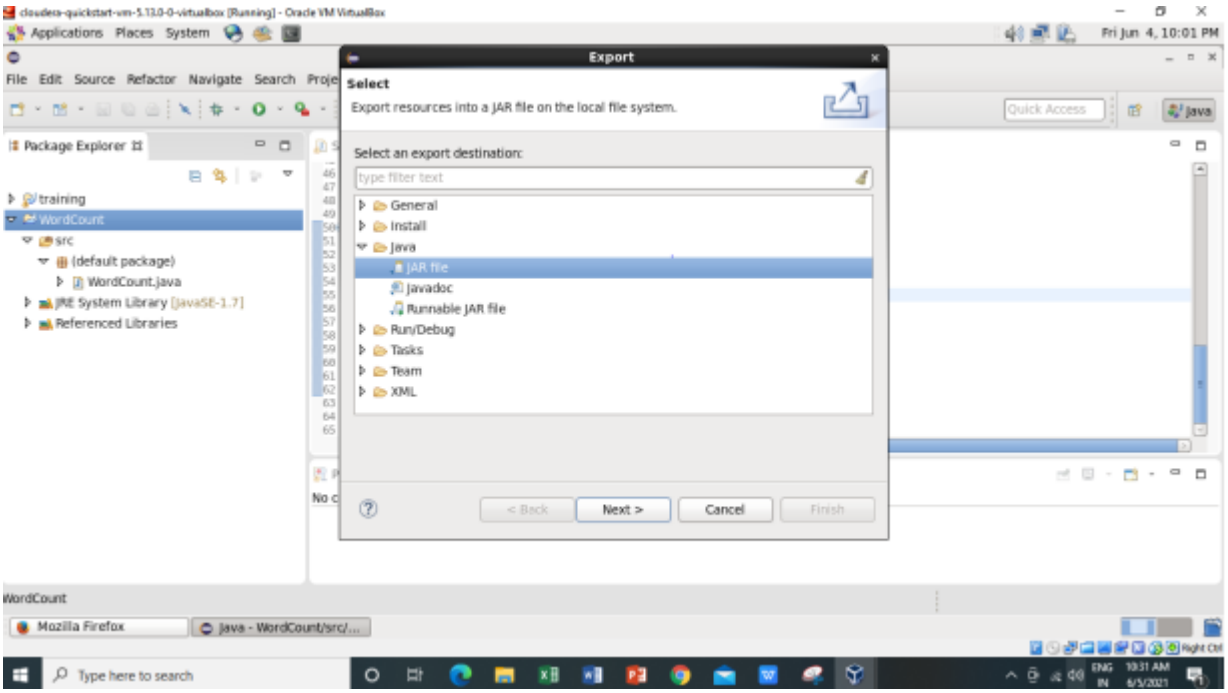

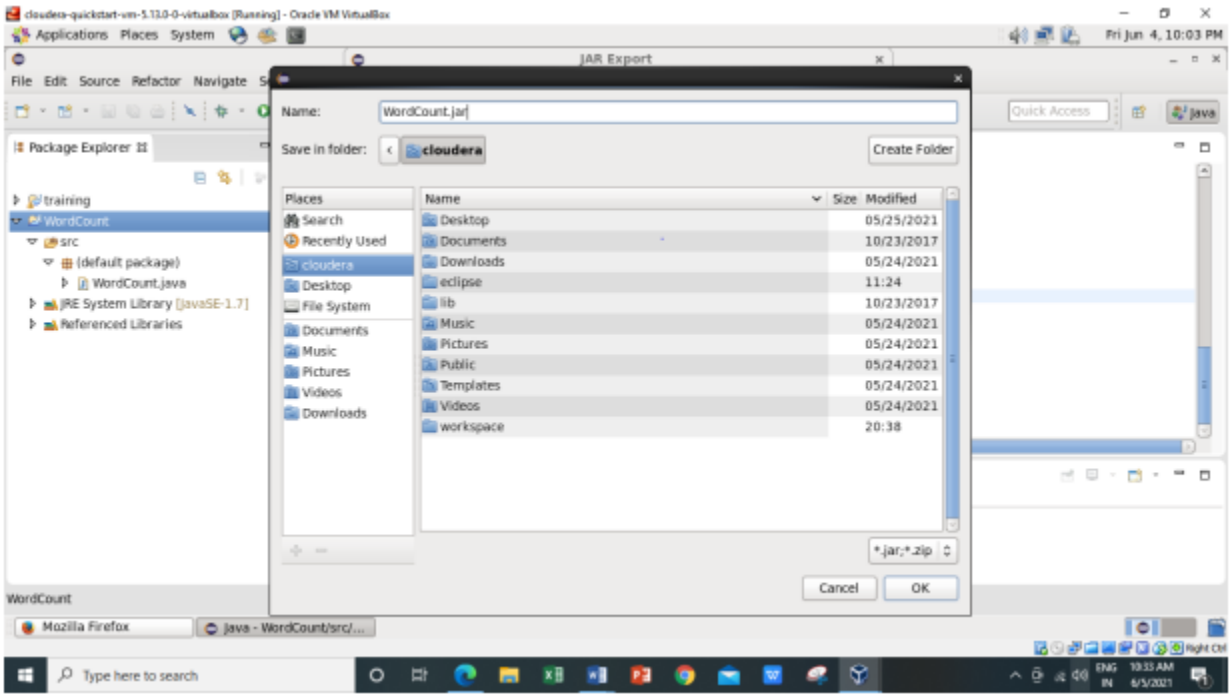

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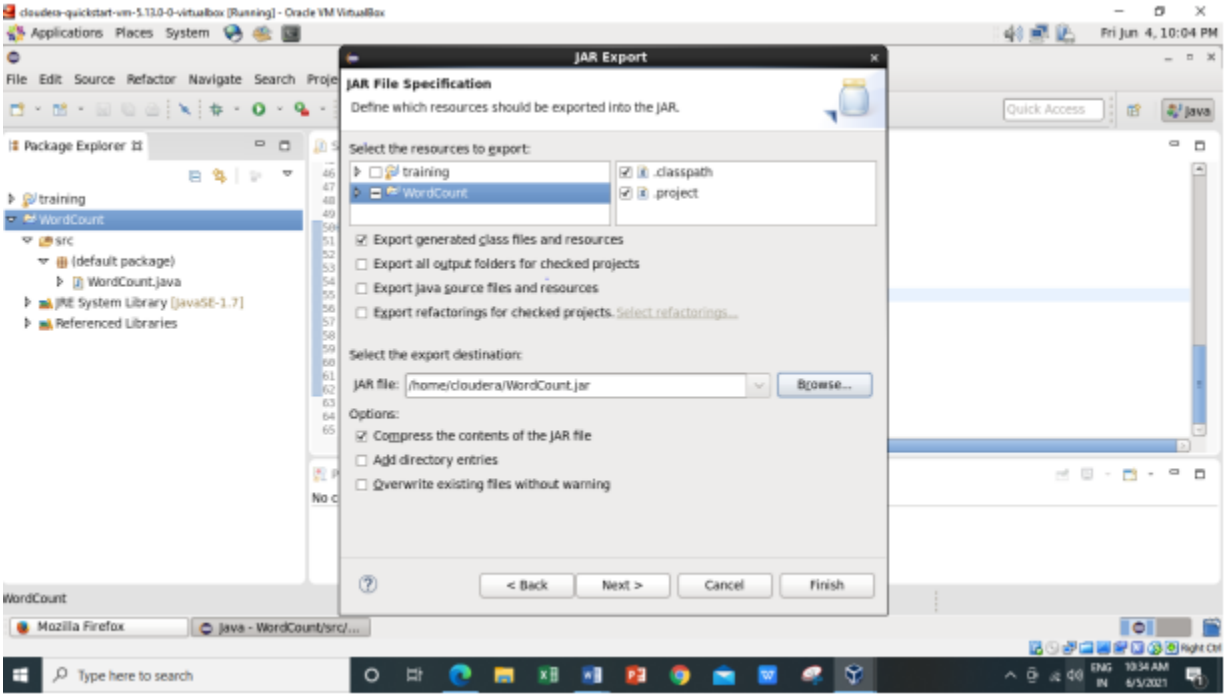
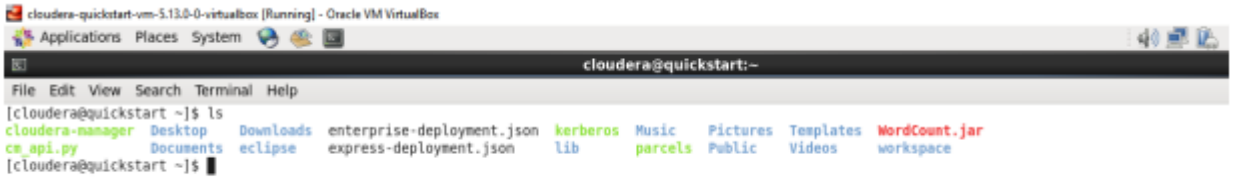


7) Verify jar file from terminal by using Open terminal & type " ls " There it will show WordCount.jar

Check current working directory ->pwd

```
[cloudera@quickstart ~]$ pwd
/home/cloudera
[cloudera@quickstart ~]$
```



8) We need to create an input file in local file system

Creating an input file named as "abc".

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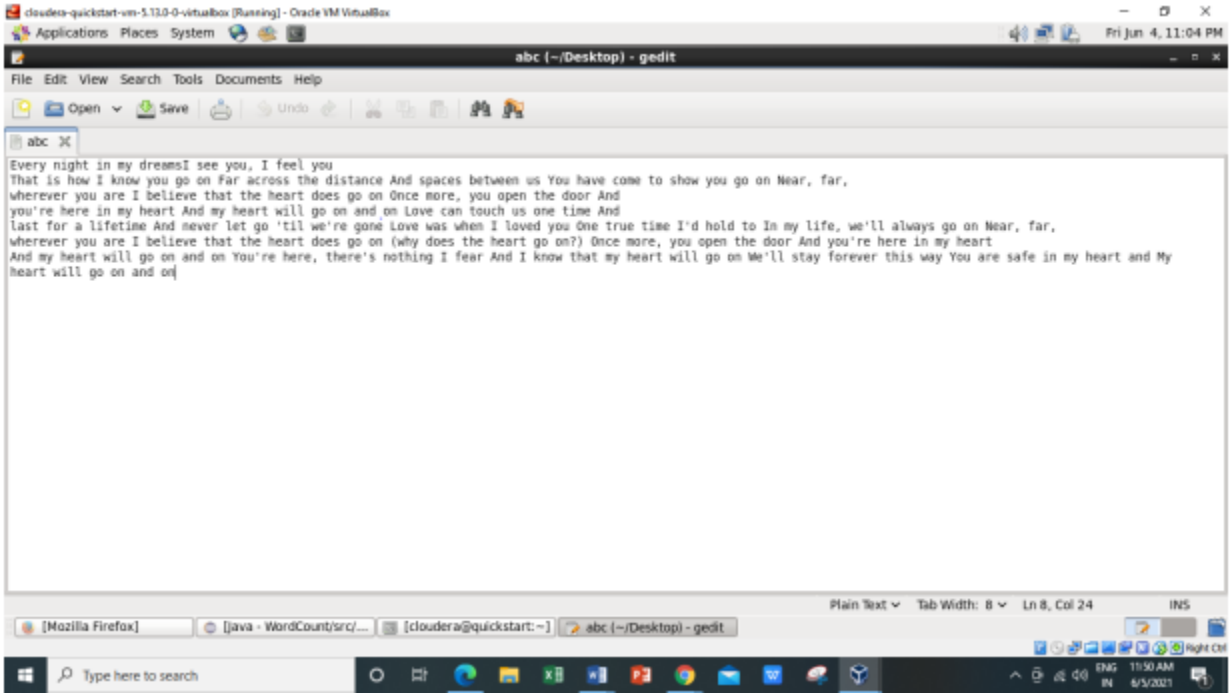

Here listing all the directory present in hdfs using hdfs dfs -ls / command

```
[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
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:58 /forcopy
drwxr-xr-x   - hbase    supergroup          0 2021-06-04 07:57 /hbase
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:20 /newdir
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:36 /rjc
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:55 /solr
drwxrwxrwt   - hdfs     supergroup          0 2021-05-24 10:39 /tmp
drwxr-xr-x   - hdfs     supergroup          0 2017-10-23 09:17 /user
drwxr-xr-x   - hdfs     supergroup          0 2017-10-23 09:17 /var
[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
-rw-r--r--   1 cloudera supergroup         27 2021-05-24 12:04 /Sample_01
drwxrwxrwx   - hdfs     supergroup          0 2017-10-23 09:15 /benchmarks
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:58 /forcopy
drwxr-xr-x   - hbase    supergroup          0 2021-06-04 07:57 /hbase
drwxr-xr-x   - cloudera supergroup          0 2021-06-04 23:34 /inputdir
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:20 /newdir
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:36 /rjc
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:55 /solr
drwxrwxrwt   - hdfs     supergroup          0 2021-05-24 10:39 /tmp
drwxr-xr-x   - hdfs     supergroup          0 2017-10-23 09:17 /user
drwxr-xr-x   - hdfs     supergroup          0 2017-10-23 09:17 /var
[cloudera@quickstart ~]$
```

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

```
[cloudera@quickstart ~]$ hdfs dfs -cat /inputdir/abc
Every night in my dreamsI see you, I feel you
That is how I know you go on Far across the distance And spaces between us You have come to show you go on Near, far,
wherever you are I believe that the heart does go on Once more, you open the door And
you're here in my heart And my heart will go on and on Love can touch us one time And
last for a lifetime And never let go 'til we're gone Love was when I loved you One true time I'd hold to In my life, we'll always go on Near, far,
wherever you are I believe that the heart does go on (why does the heart go on?) Once more, you open the door And you're here in my heart
And my heart will go on and on You're here, there's nothing I fear And I know that my heart will go on We'll stay forever this way You are safe in my heart and My
heart will go on and on
[cloudera@quickstart ~]$
```

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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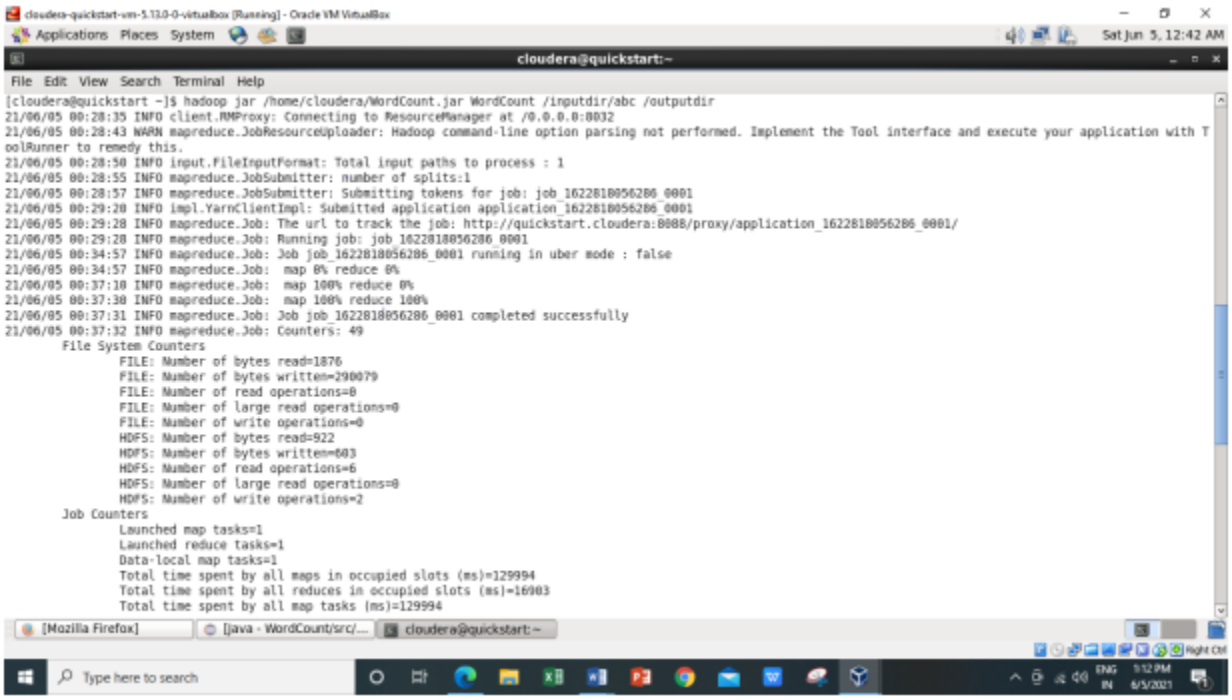
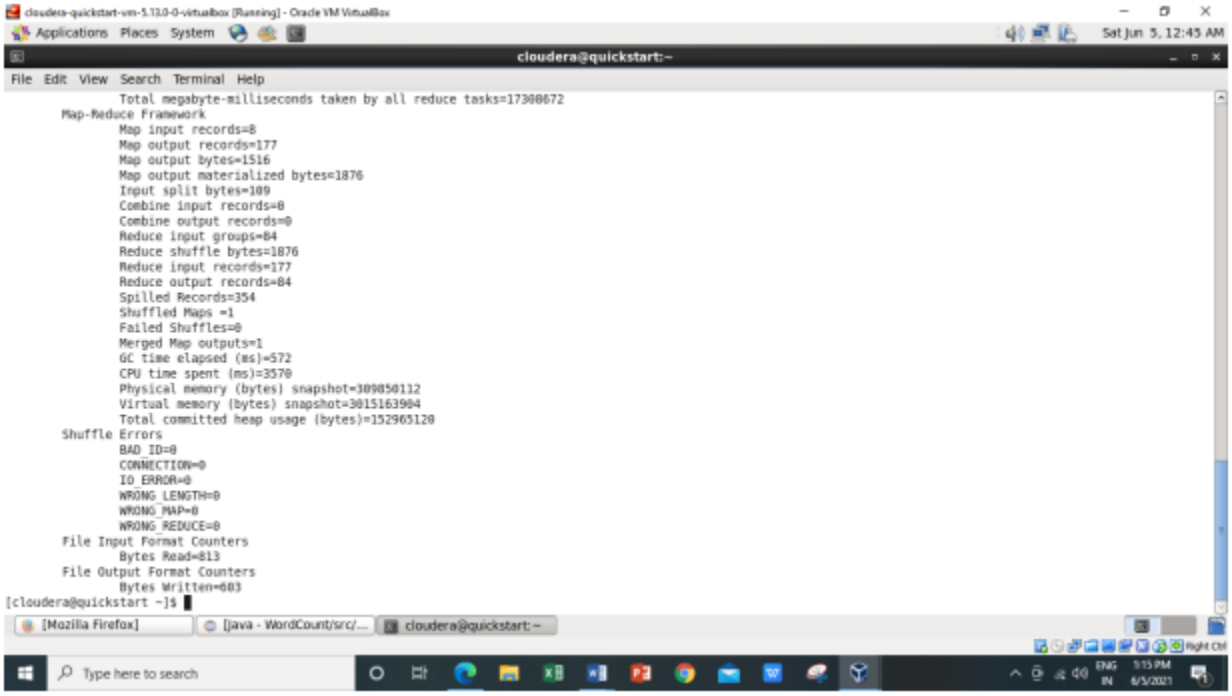


Map-Reduce Framework



As we can see in the above output,

Combine input records=0

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Combine output records=0

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 /

```
                Bytes Written=603
[cloudera@quickstart ~]$ hdfs dfs -ls /
Found 12 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
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:58 /forcopy
drwxr-xr-x   - hbase    supergroup          0 2021-06-04 07:57 /hbase
drwxr-xr-x   - cloudera supergroup          0 2021-06-05 00:06 /inputdir
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:20 /newdir
drwxr-xr-x   - cloudera supergroup          0 2021-06-05 00:37 /outputdir
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:36 /rjc
drwxr-xr-x   - cloudera supergroup          0 2021-05-24 13:55 /solr
drwxrwxrwt   - hdfs     supergroup          0 2021-05-24 10:39 /tmp
drwxr-xr-x   - hdfs     supergroup          0 2017-10-23 09:17 /user
drwxr-xr-x   - hdfs     supergroup          0 2017-10-23 09:17 /var
[cloudera@quickstart ~]$
```

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

```
[cloudera@quickstart ~]$ hdfs dfs -ls /outputdir
Found 2 items
-rw-r--r--   1 cloudera supergroup          0 2021-06-05 00:37 /outputdir/_SUCCESS
-rw-r--r--   1 cloudera supergroup        603 2021-06-05 00:37 /outputdir/part-r-00000
[cloudera@quickstart ~]$
```

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    1
(why    1
And     8
Every   1
Far     1
I       7
I'd     1
In      1
Love    2
My      1
Near,   2
Once    2
One     1
That    1
We'll   1
You     2
You're  1
a       1
across  1
always  1
and     4
are     3
believe 2
between 1
can     1
come    1
distance        1
does    3
door    2
dreamsI 1
```

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```
more,   2
my      8
never   1
night   1
nothing 1
on      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
true    1
us      2
was     1
way     1
we'll   1
we're   1
when    1
wherever        2
will    4
you     8
you're  2
you,    1
[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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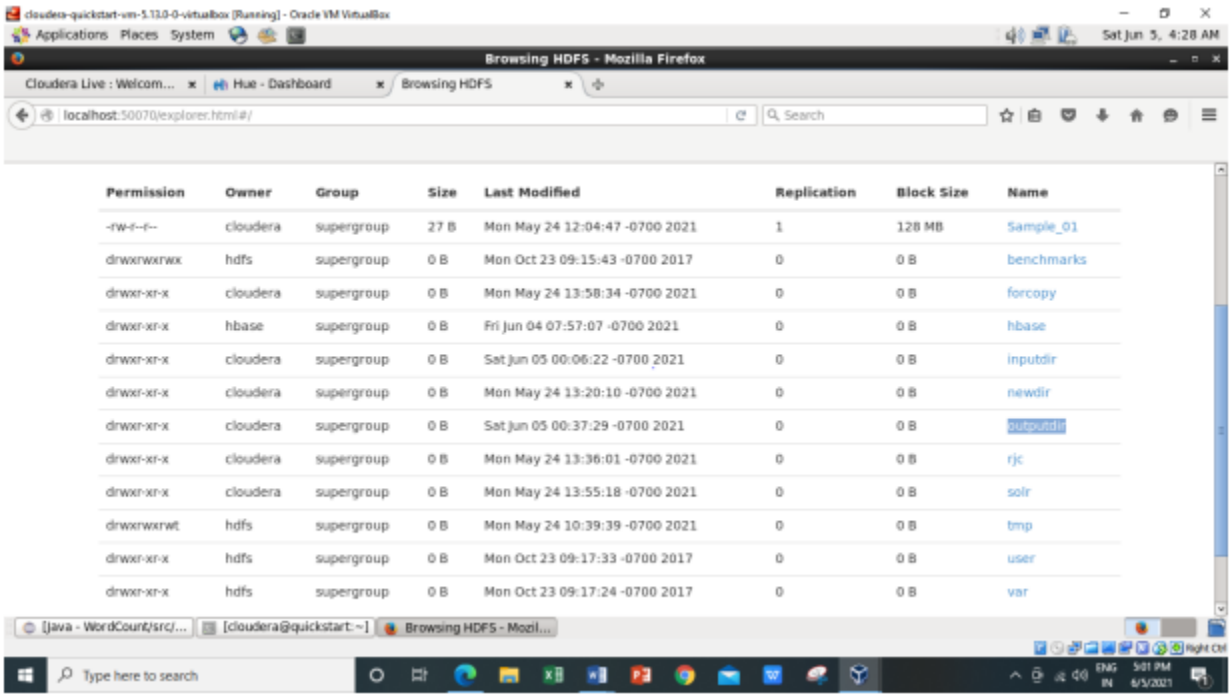

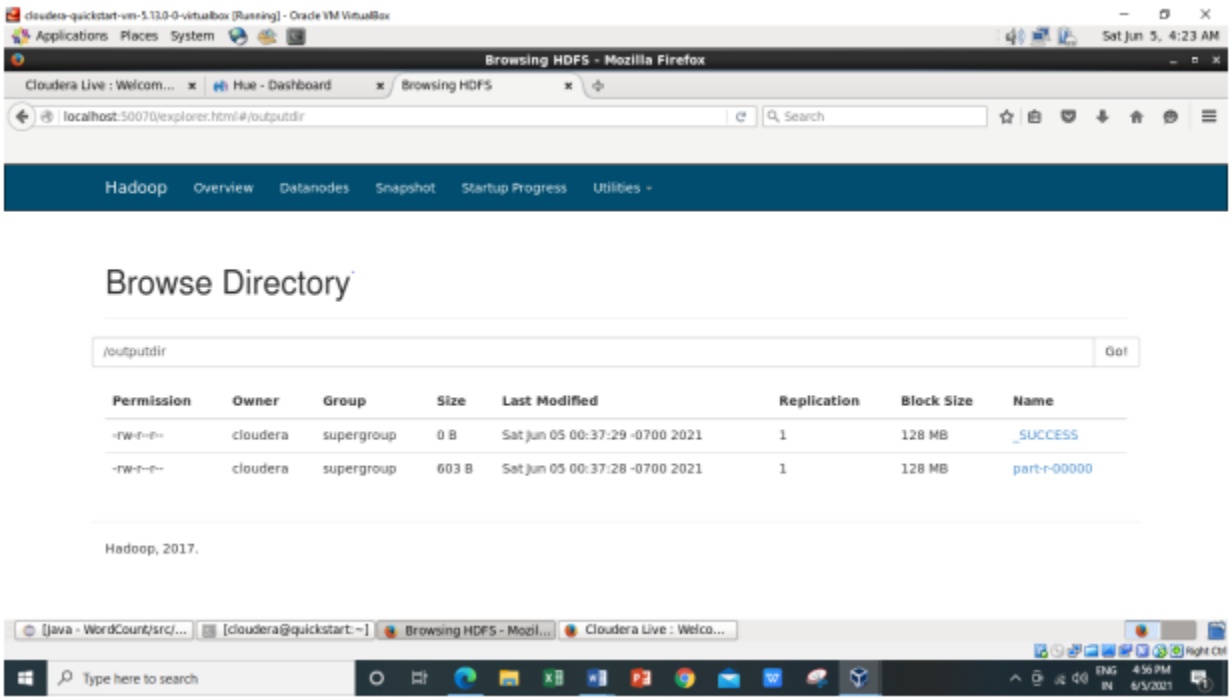

Now downloading the **part-r-00000** file.

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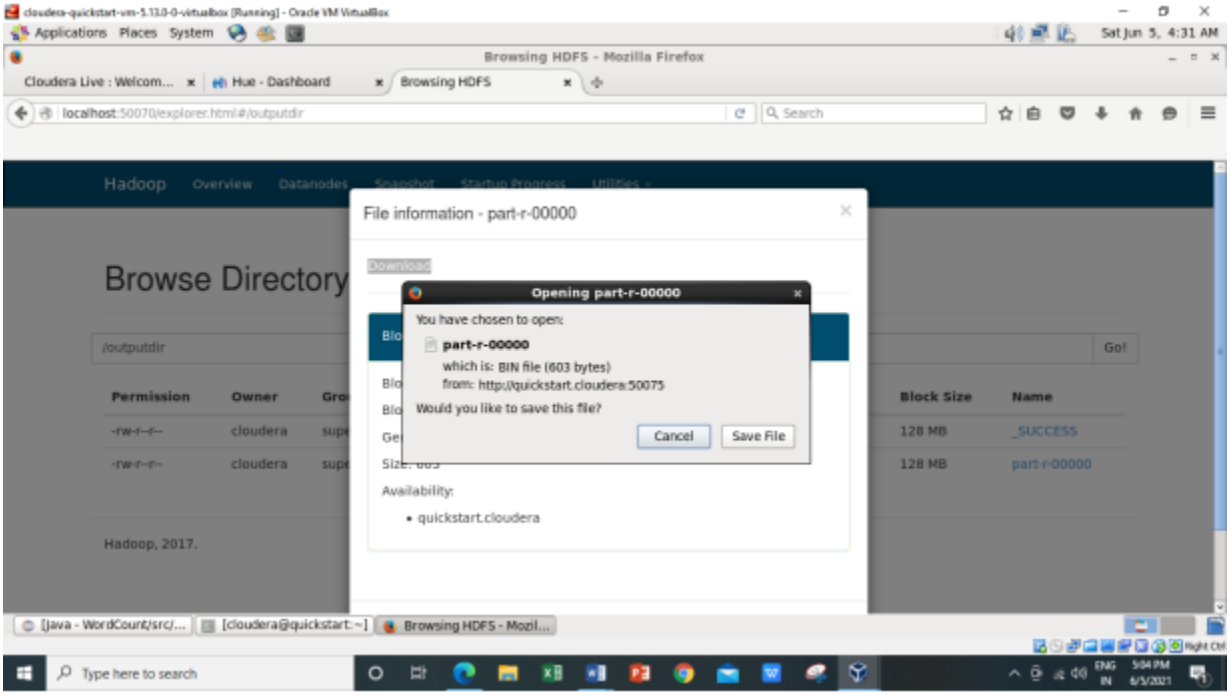
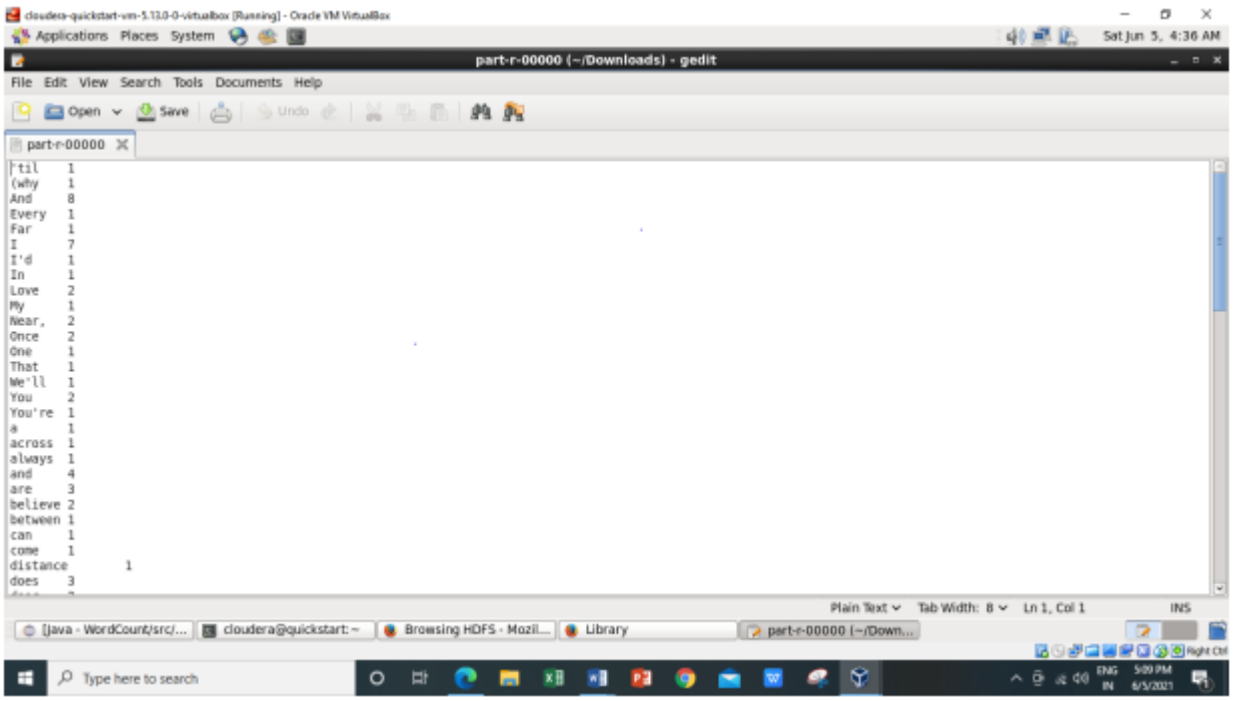


Inside the **part-r-00000** file it will have the same output as we are getting after executing using command **hadoop jar /home/cloudera/WordCount.jar WordCount /inputdir/abc /op1**



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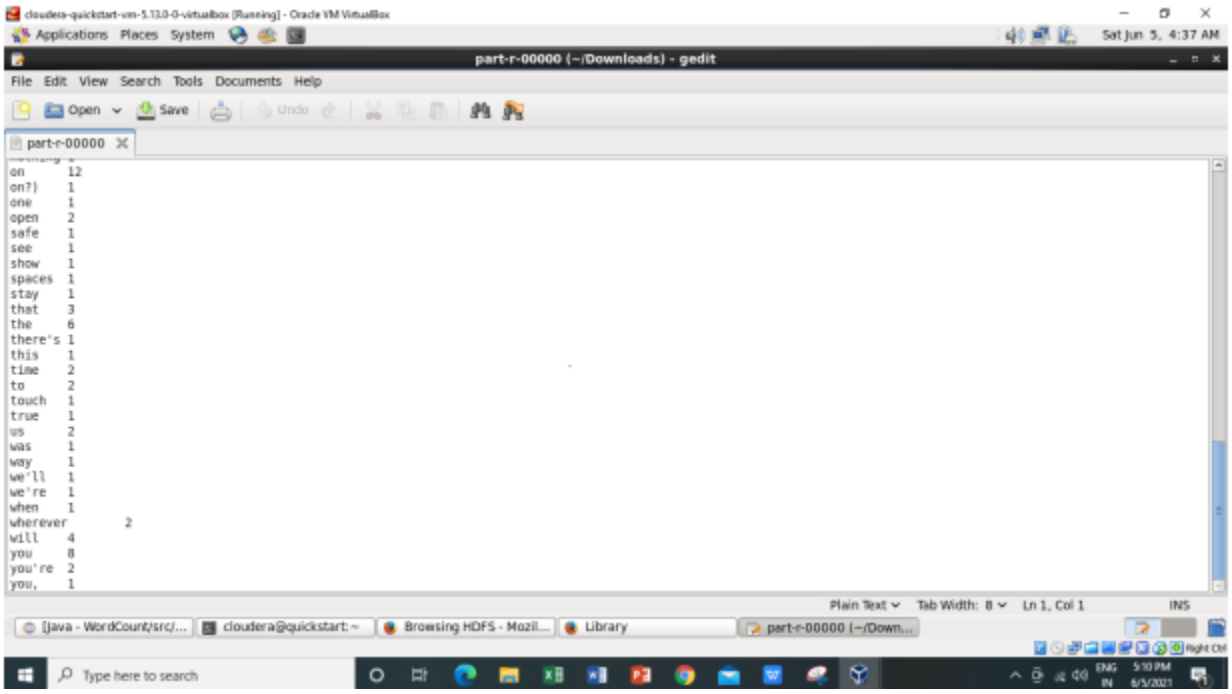

For every execution of this program we need to delete the output directory or give a new name to the output directory every time.

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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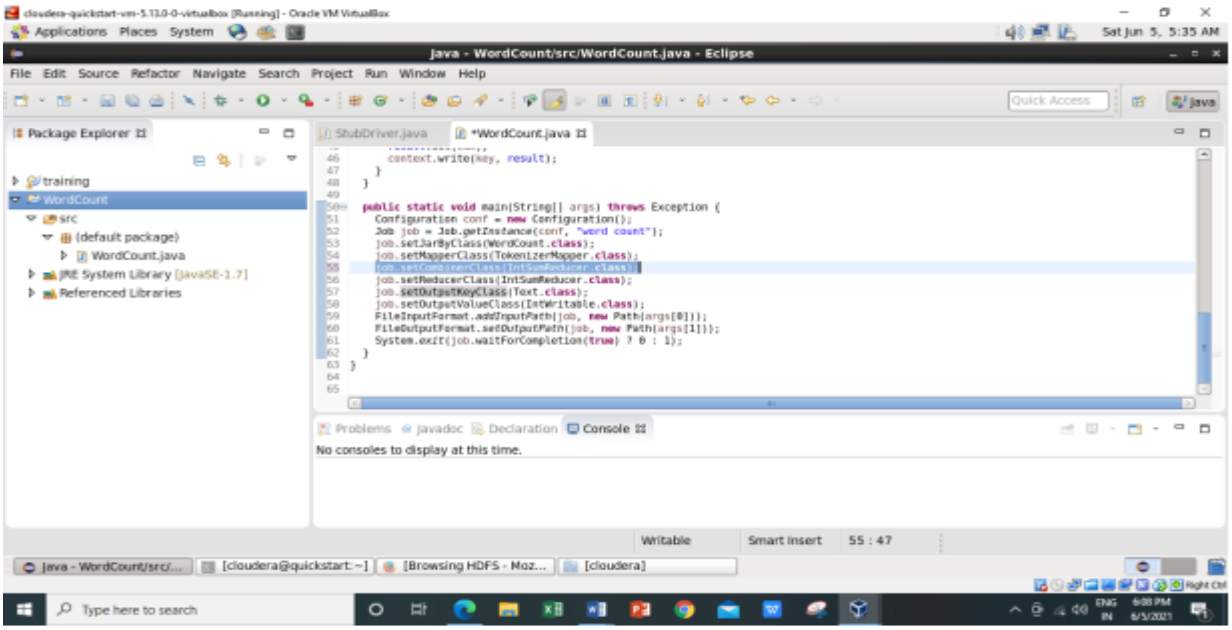
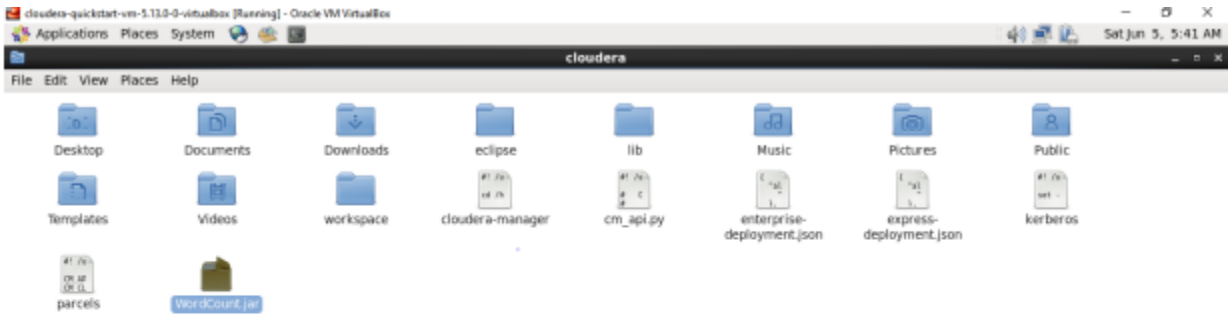
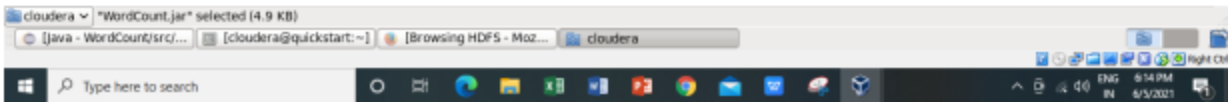


2)And will delete the WordCount.jar file in which all jar files are present from **/home/cloudera.**





We have successfully deleted the WordCount.jar file.

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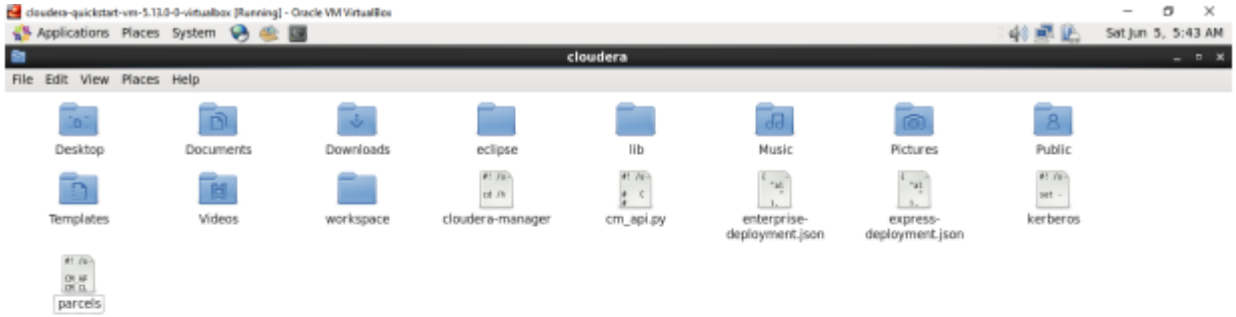
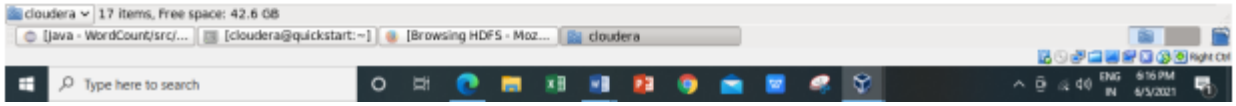
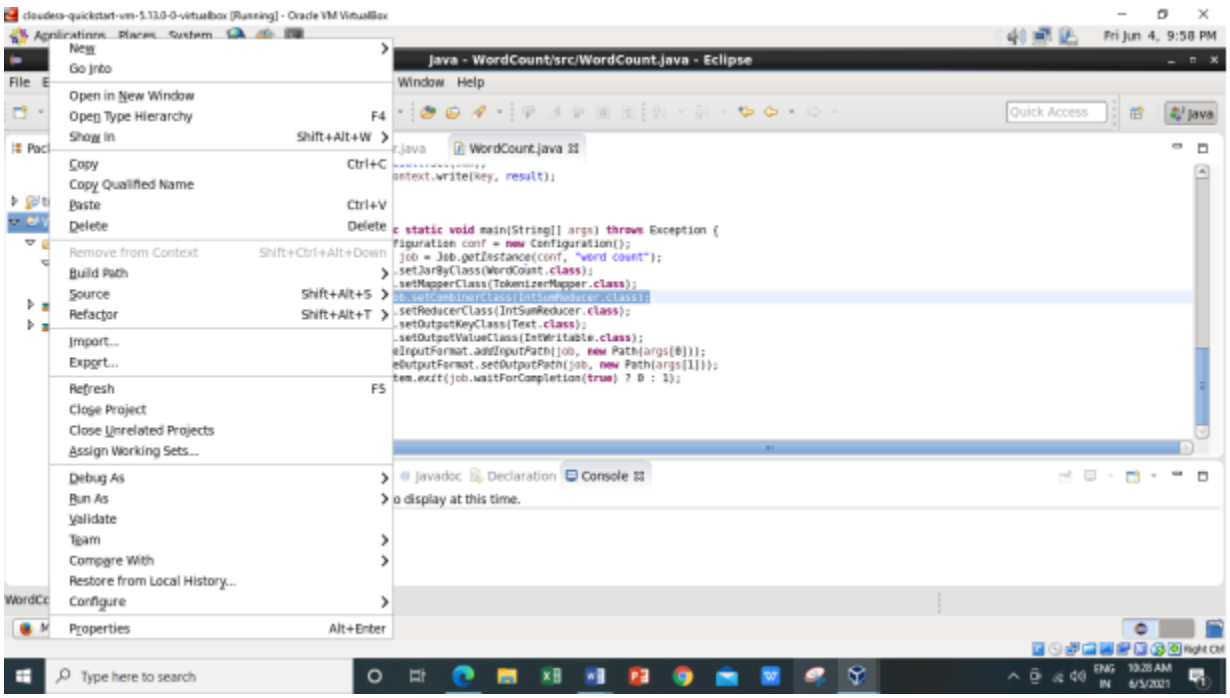




3) Now exporting the jar files Right Click on the project name WordCount -> Export -> Java ->JAR File -> Next -> for select the export destination for JAR file: browse -> Name : WordCount.jar -> save in folder -> cloudera -> Finish -> OK



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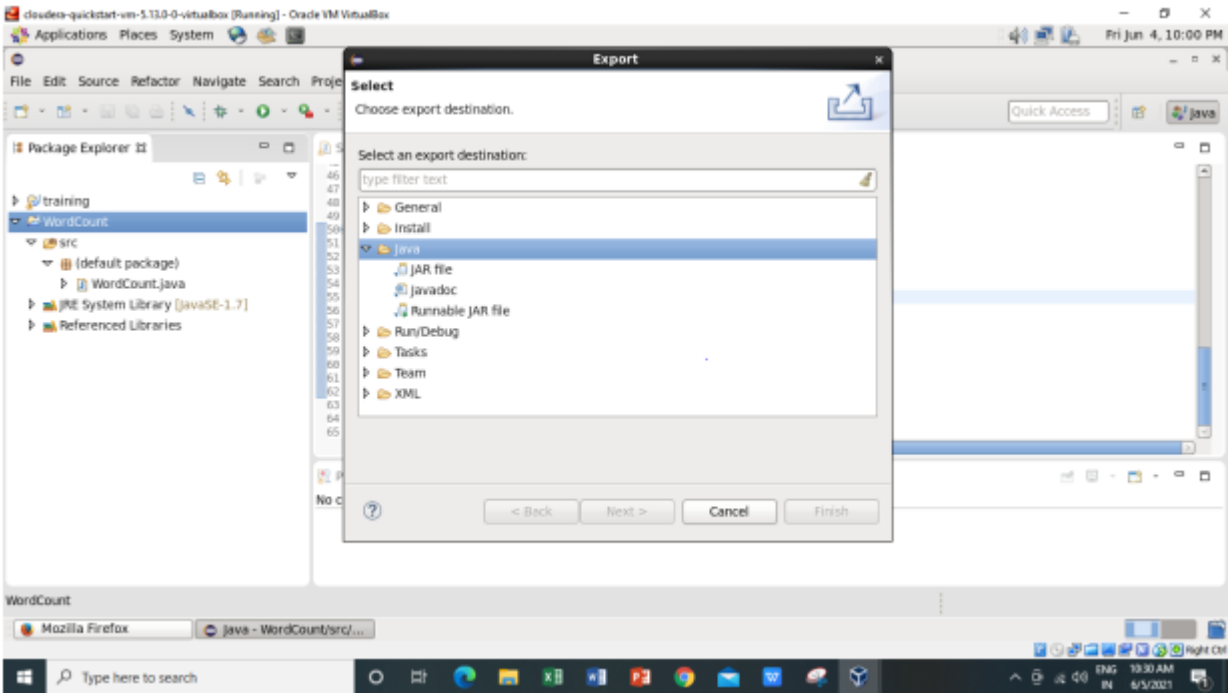

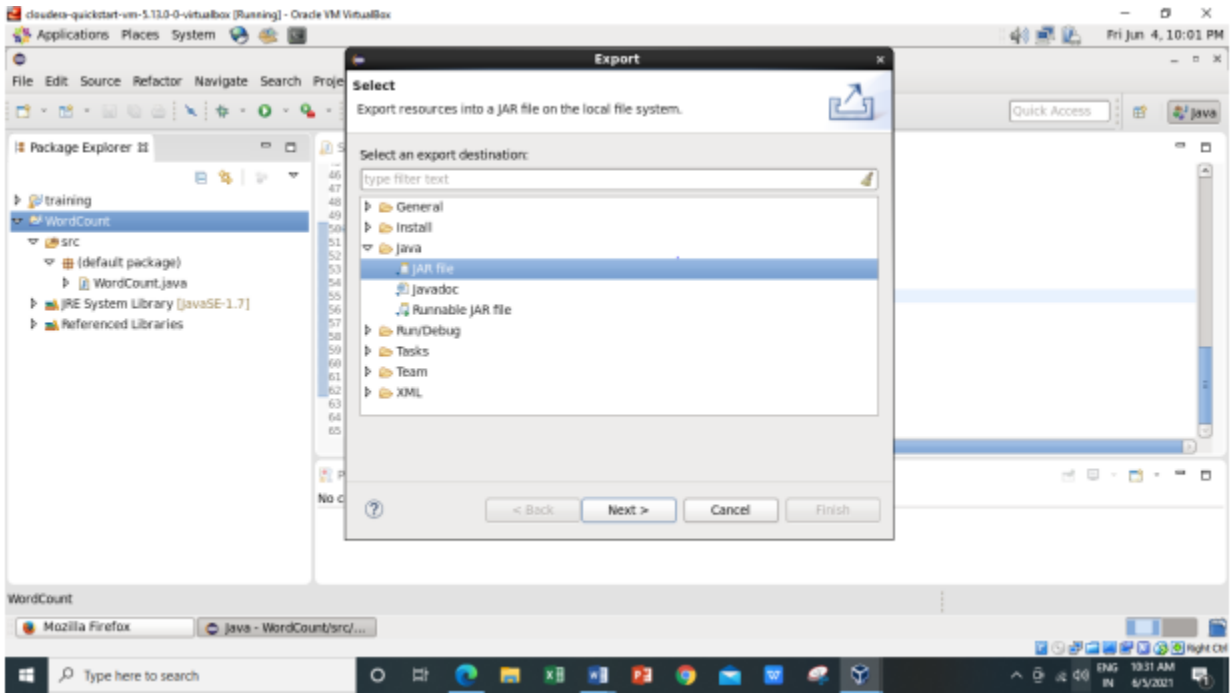

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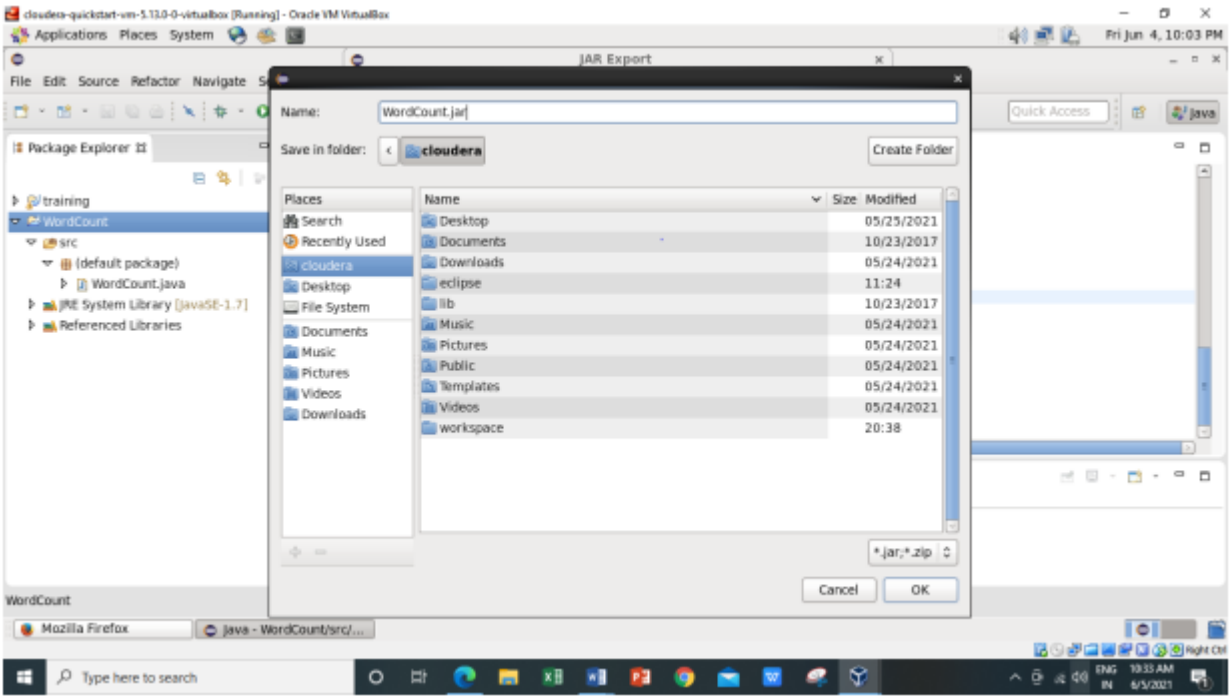

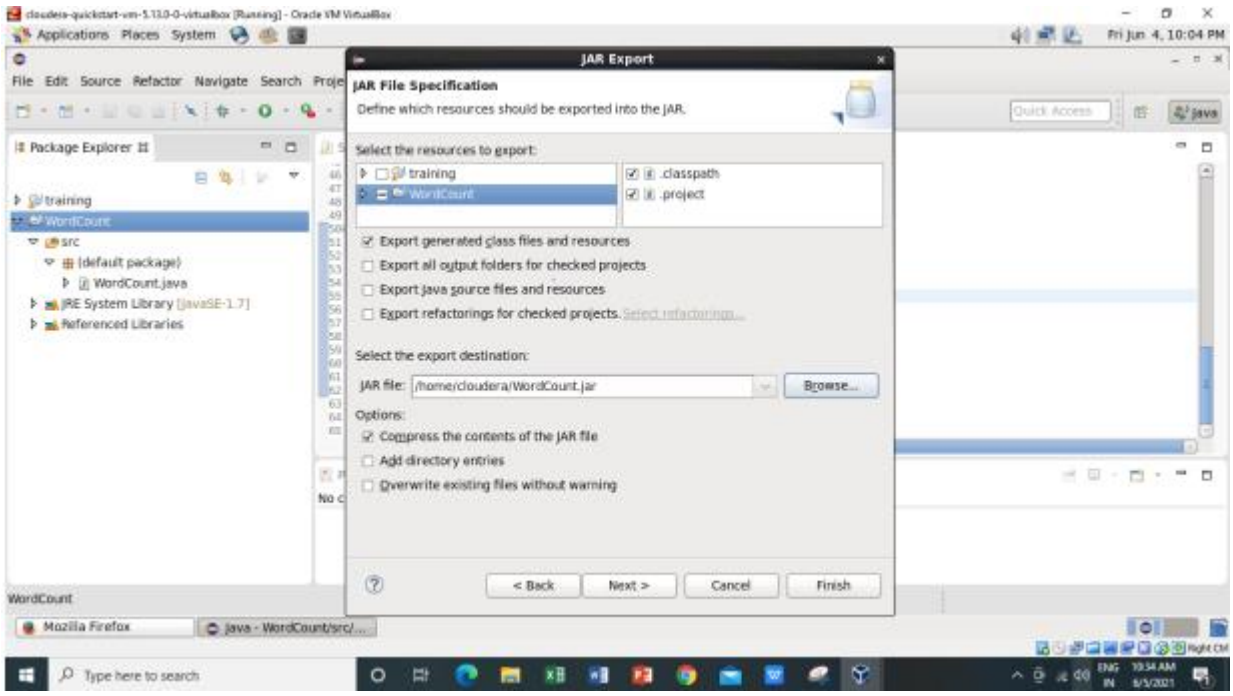

4)Now checking the WordCount.jar file is created or not using –ls command

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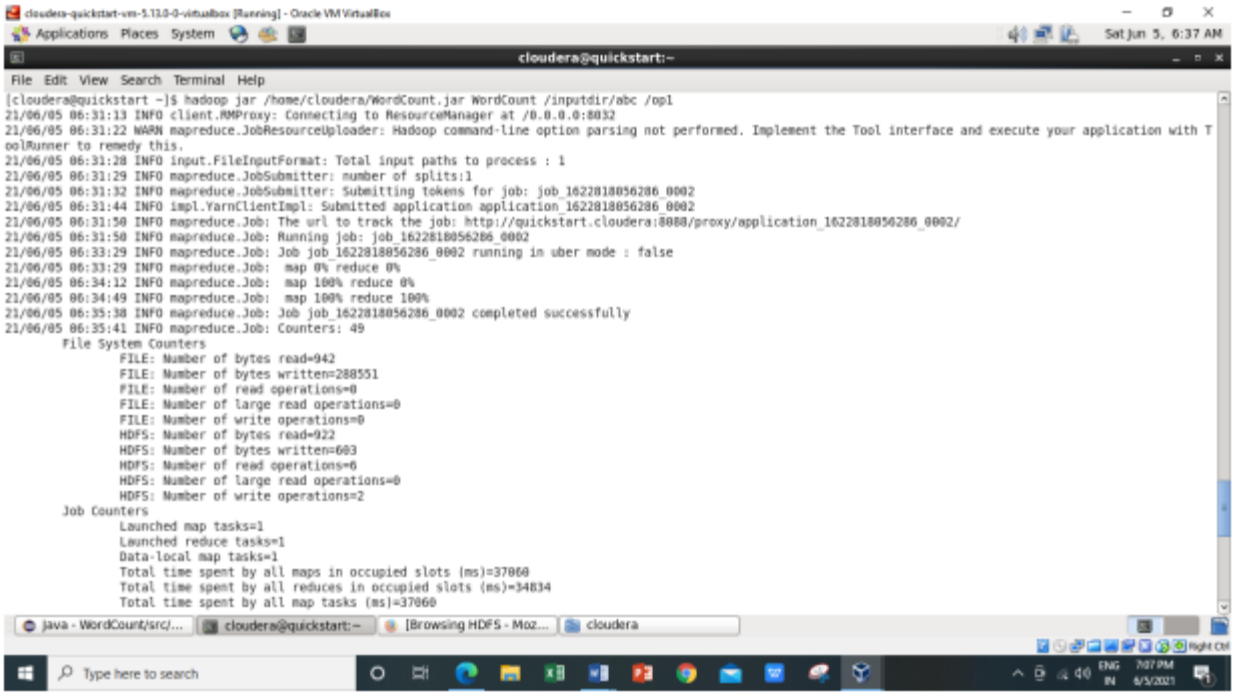
```
[cloudera@quickstart ~]$ ls
cloudera-manager  Desktop    Downloads  enterprise-deployment.json  kerberos  Music    Pictures  Templates  WordCount.jar
cm_api.py         Documents  eclipse    express-deployment.json     lib       parcels  Public    Videos     workspace
[cloudera@quickstart ~]$
```

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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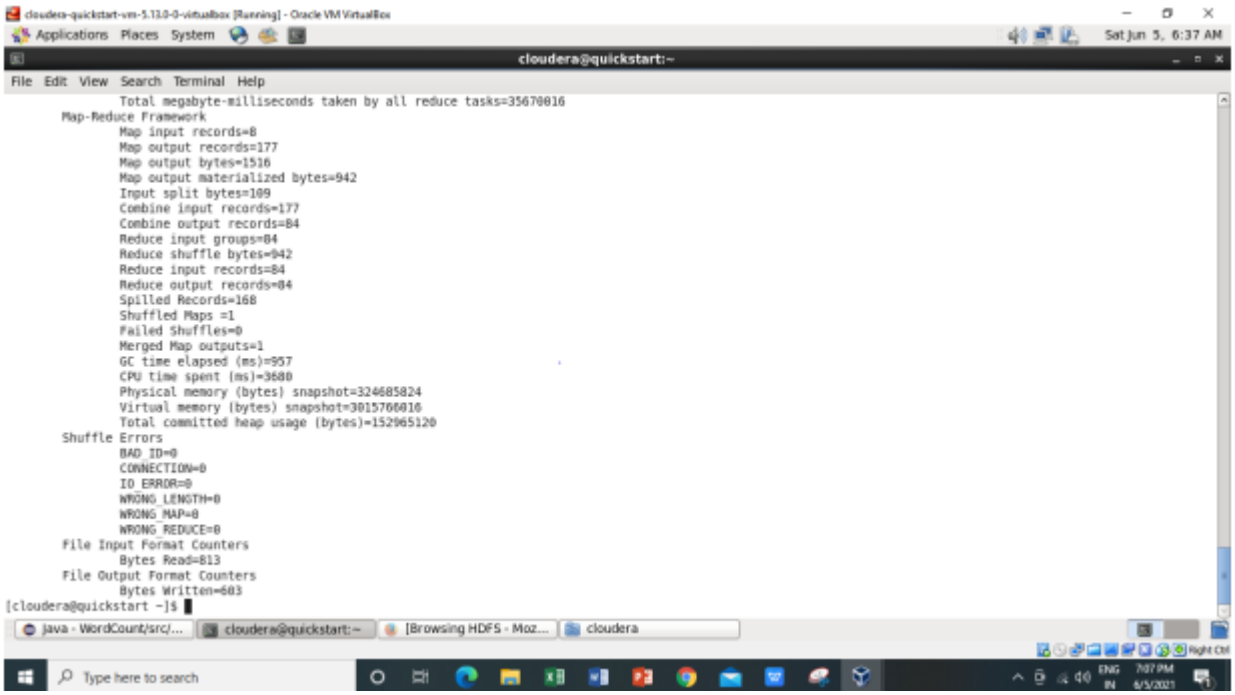

- As we can see from above image the the combiner input and output records coming out as,

  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.

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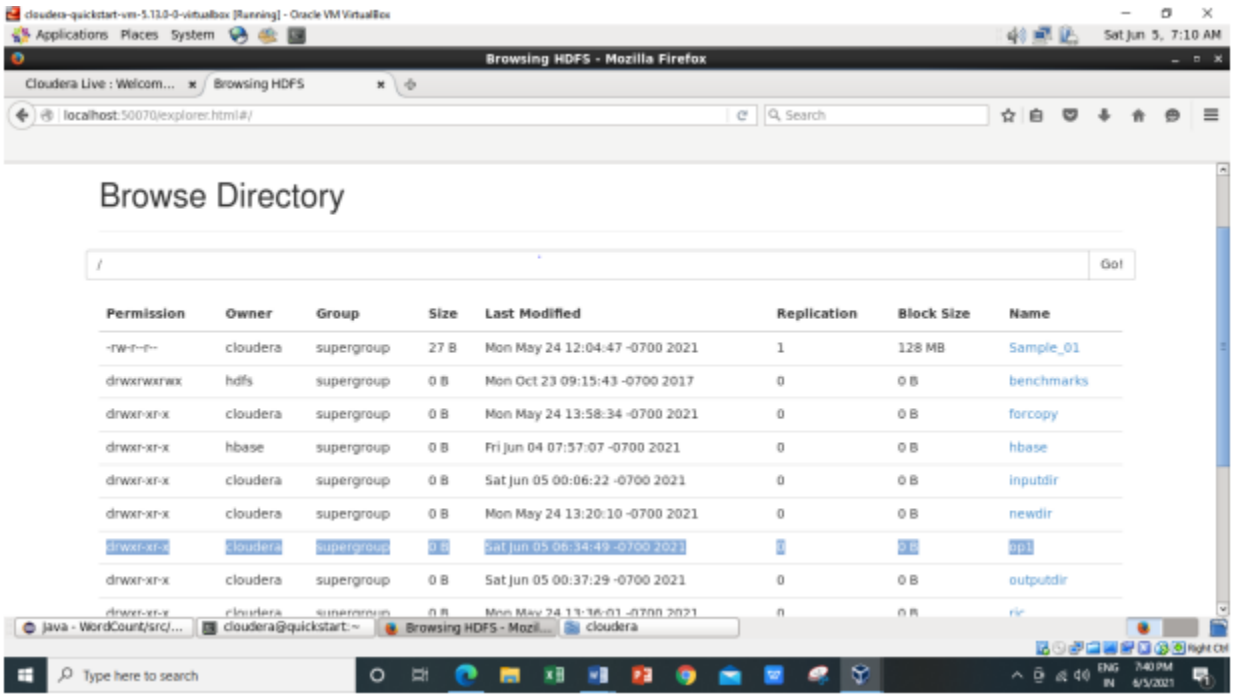
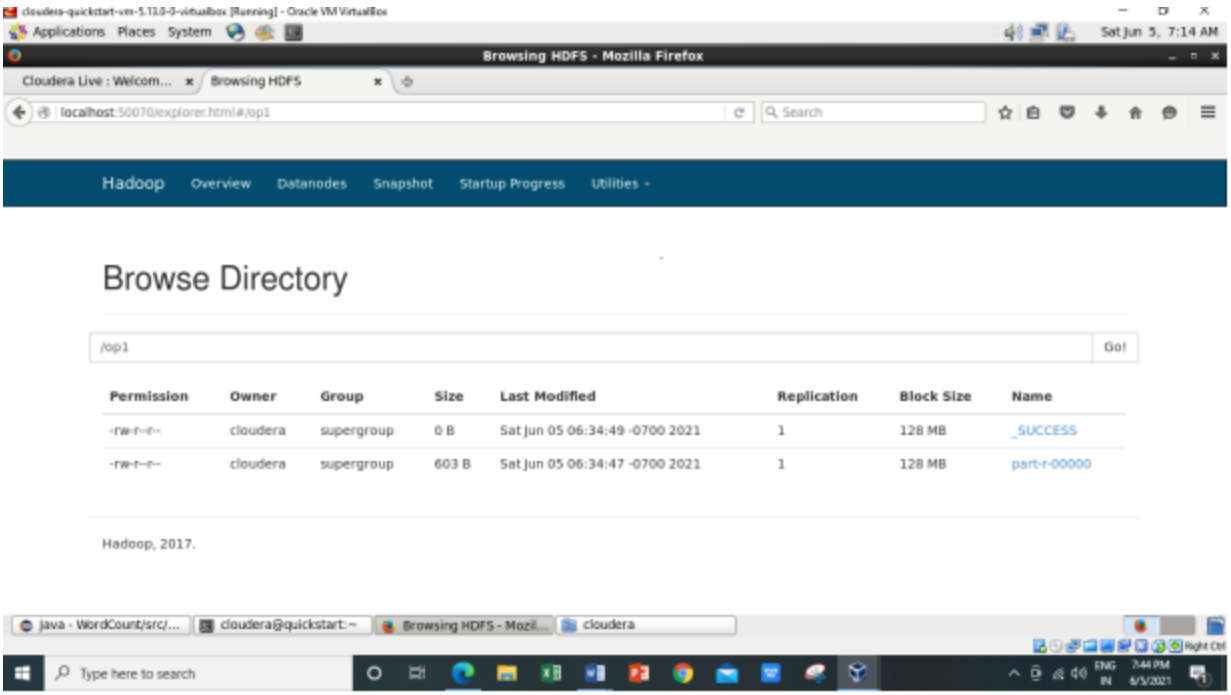
6) The same file can also be accessed using a browser.

Browse the Directory by

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





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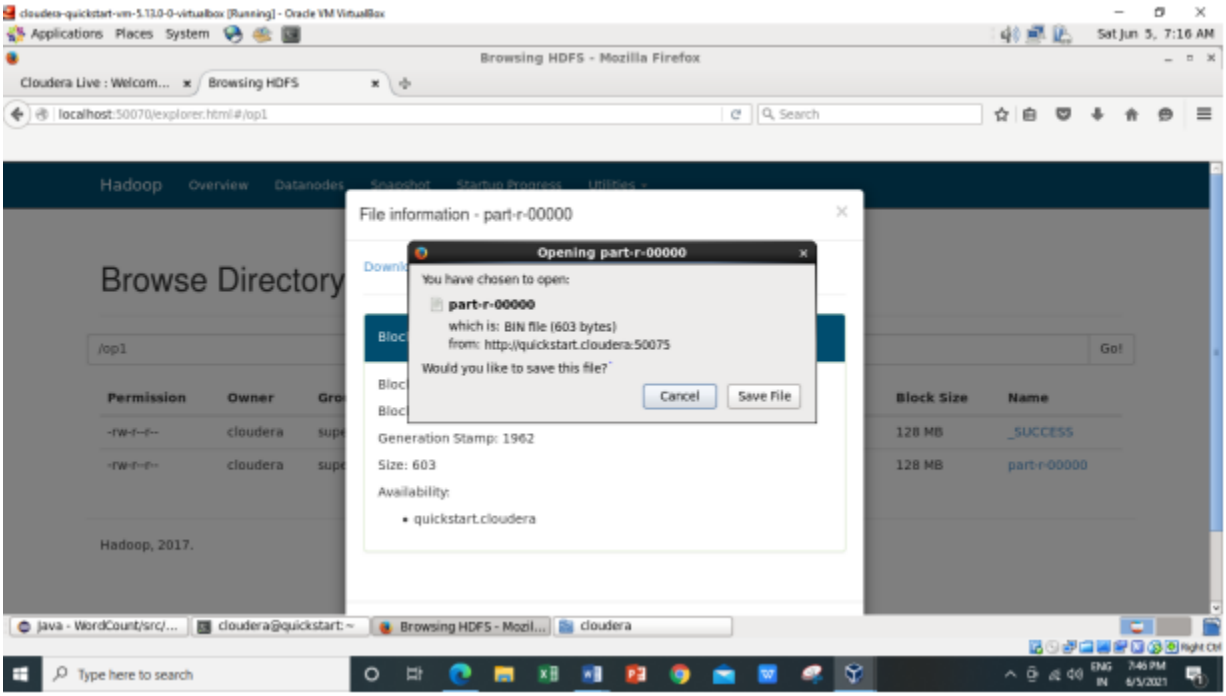
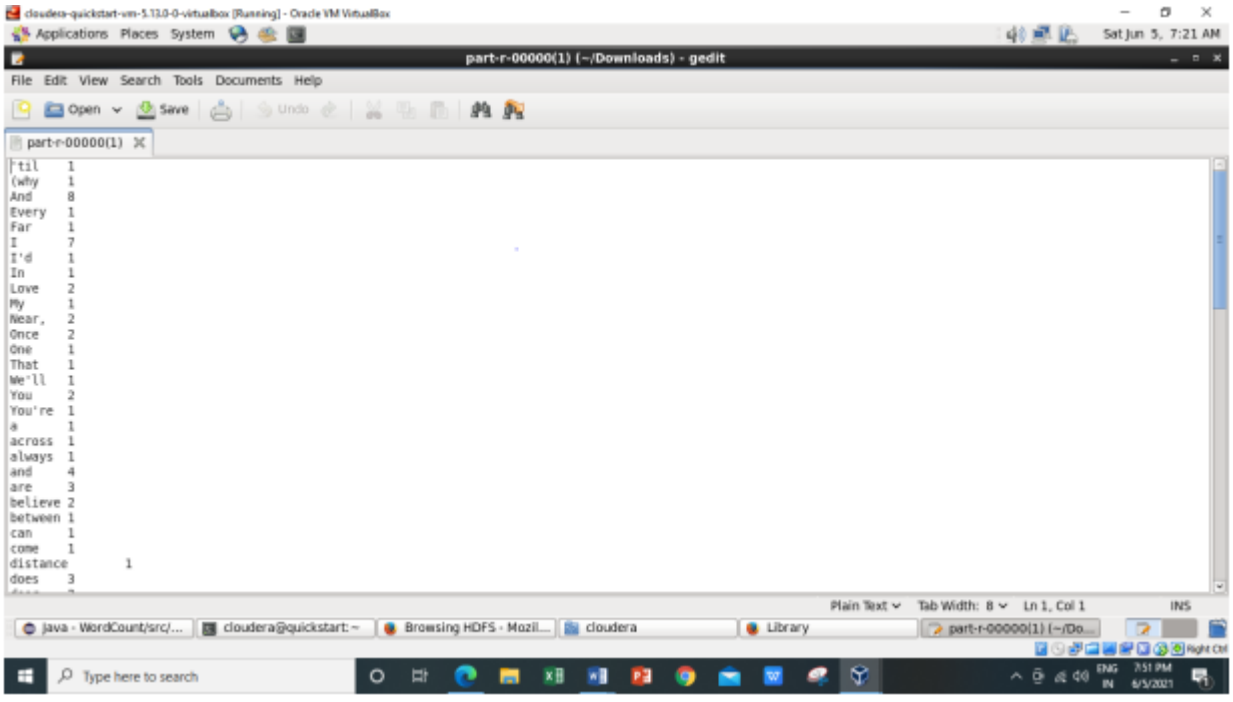
Now downloading the **part-r-00000** file.



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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