Maharishi University of Management

CS522 – Big Data

Dr. Premchand Nair

Tutorial

Set Up a Single Node Cluster

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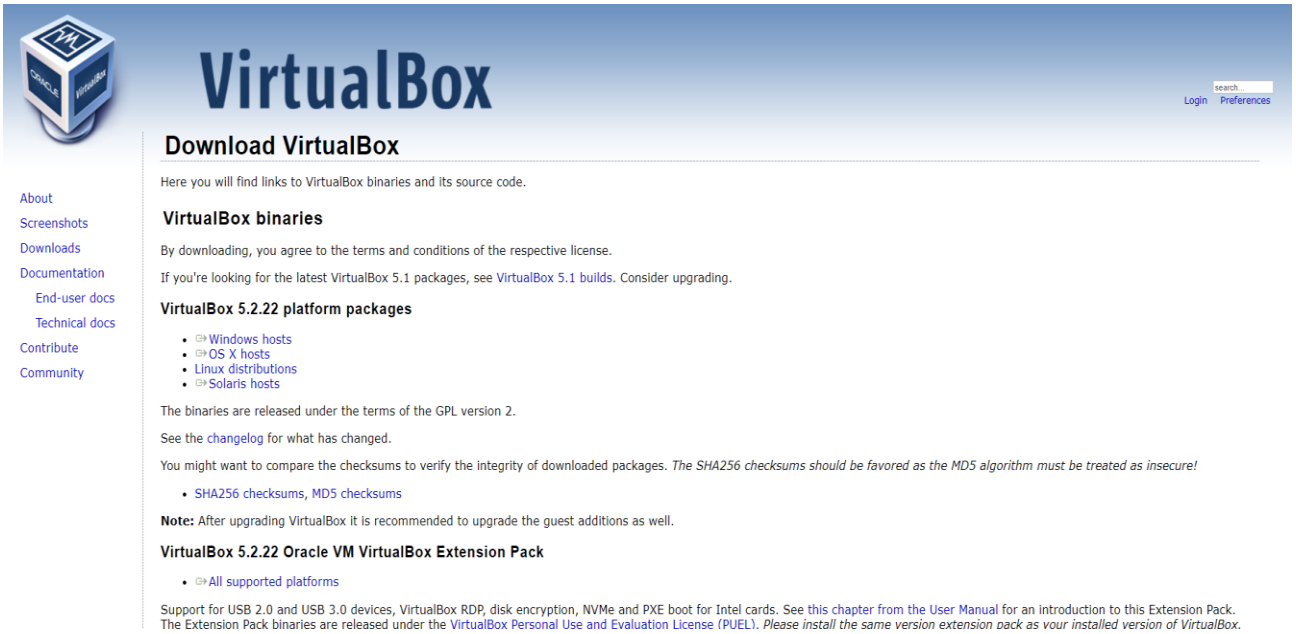
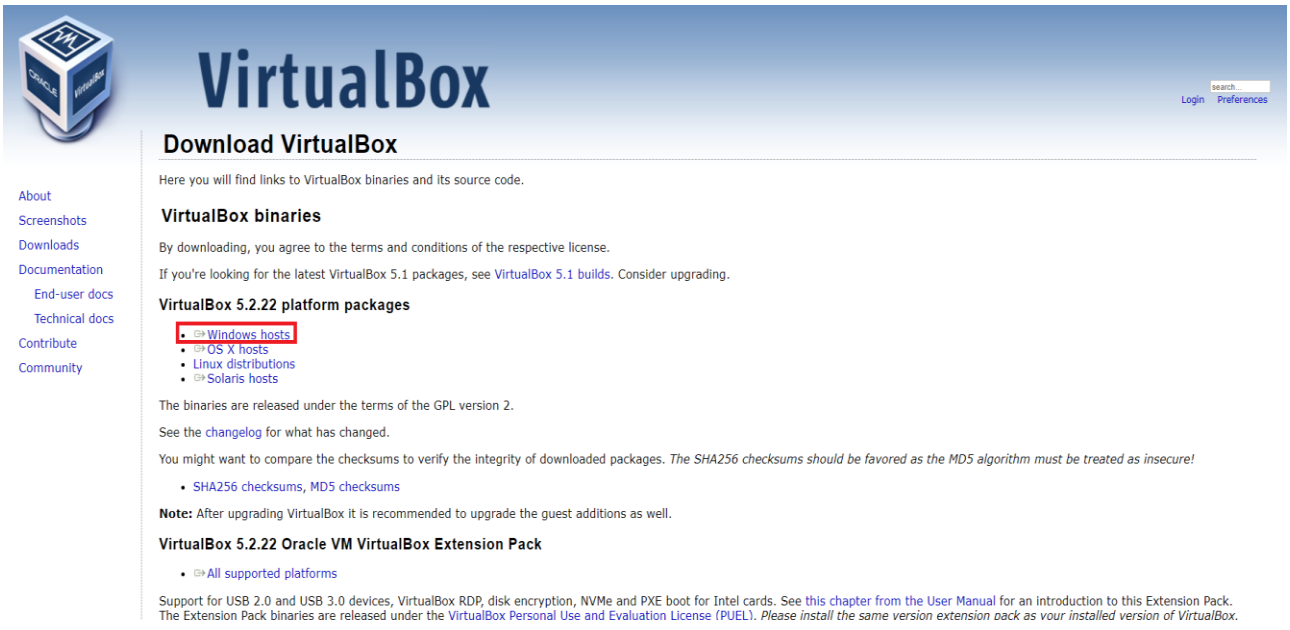
This document describes the steps how to set up and configure a single-node Hadoop installation and optionally an eclipse development environment to create and test your programs on Microsoft Windows.

I. Install Oracle Virtual Box

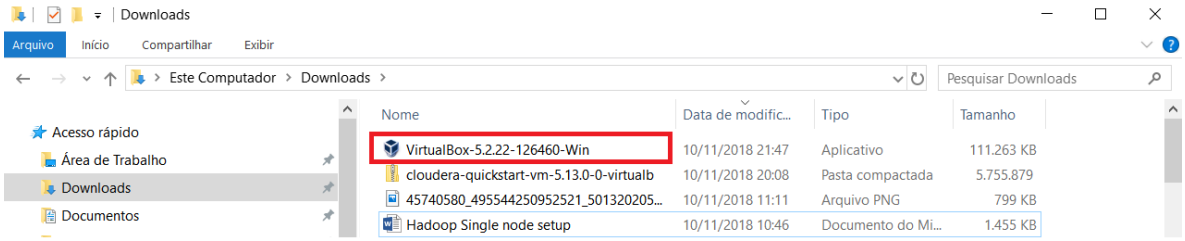
Go to the virtual box website to download the installer: https://www.virtualbox.org/wiki/Downloads



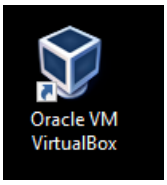
- Select the option: "Windows Hosts" to download setup file for Windows.



After download, double click on setup file to perform the VirtualBox installation



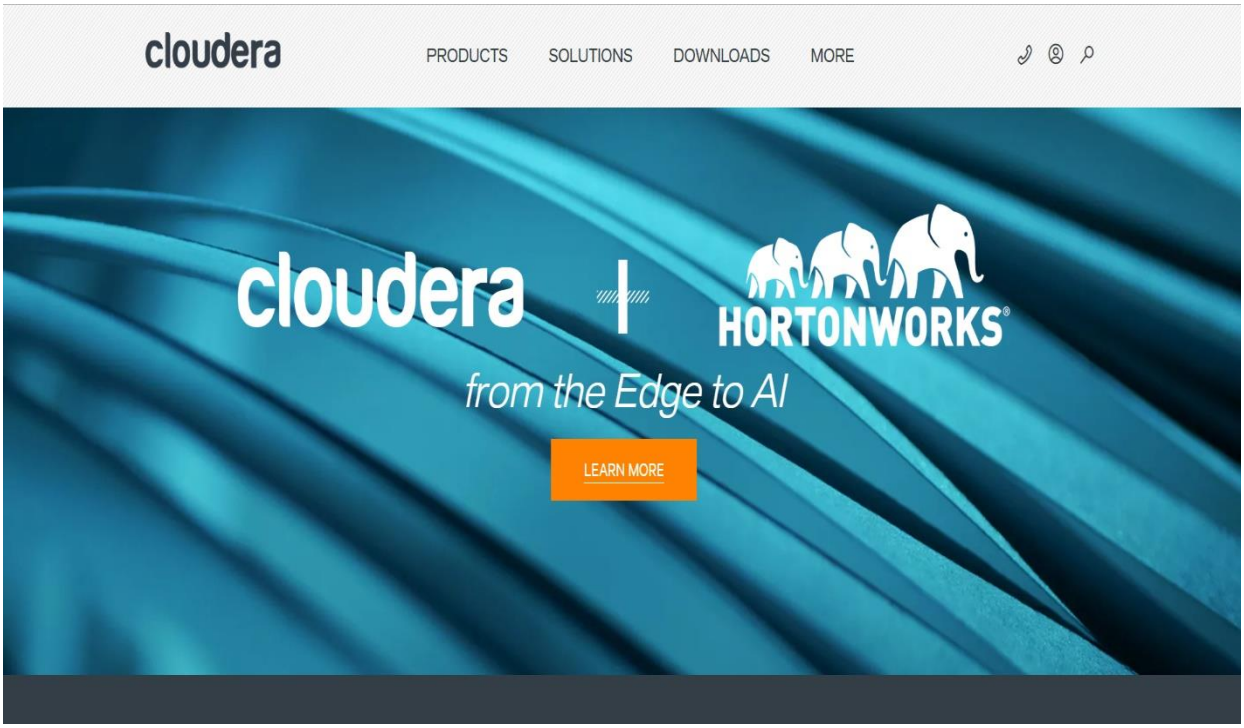
After finished installation, you will able to run the program.



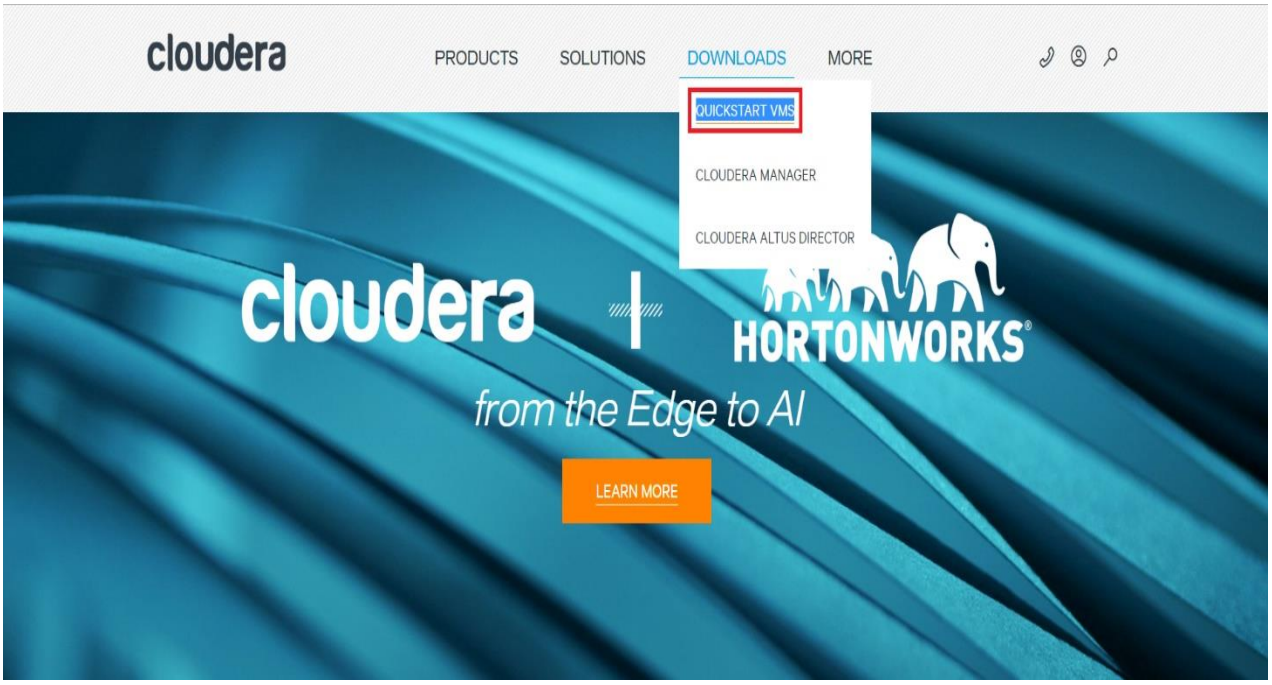
II. Download & Install Cloudera

a. Get Cloudera

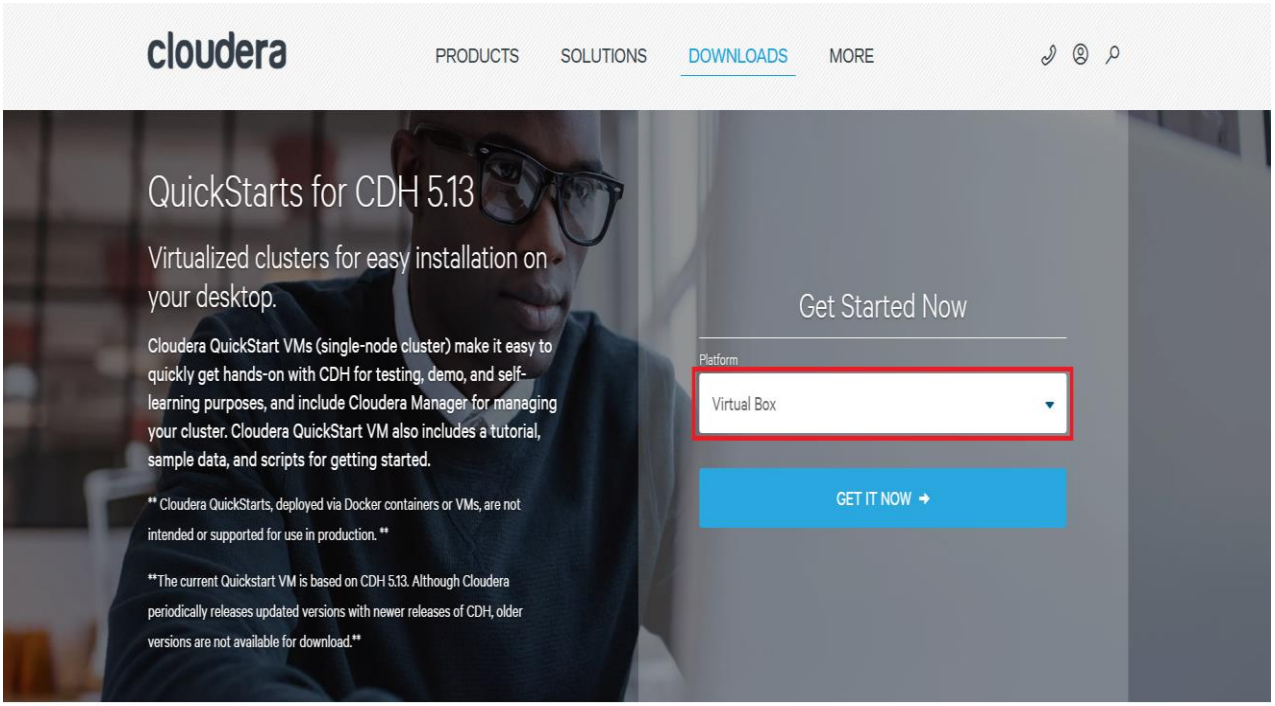
Go to the Cloudera website to download the installer: https://www.cloudera.com/



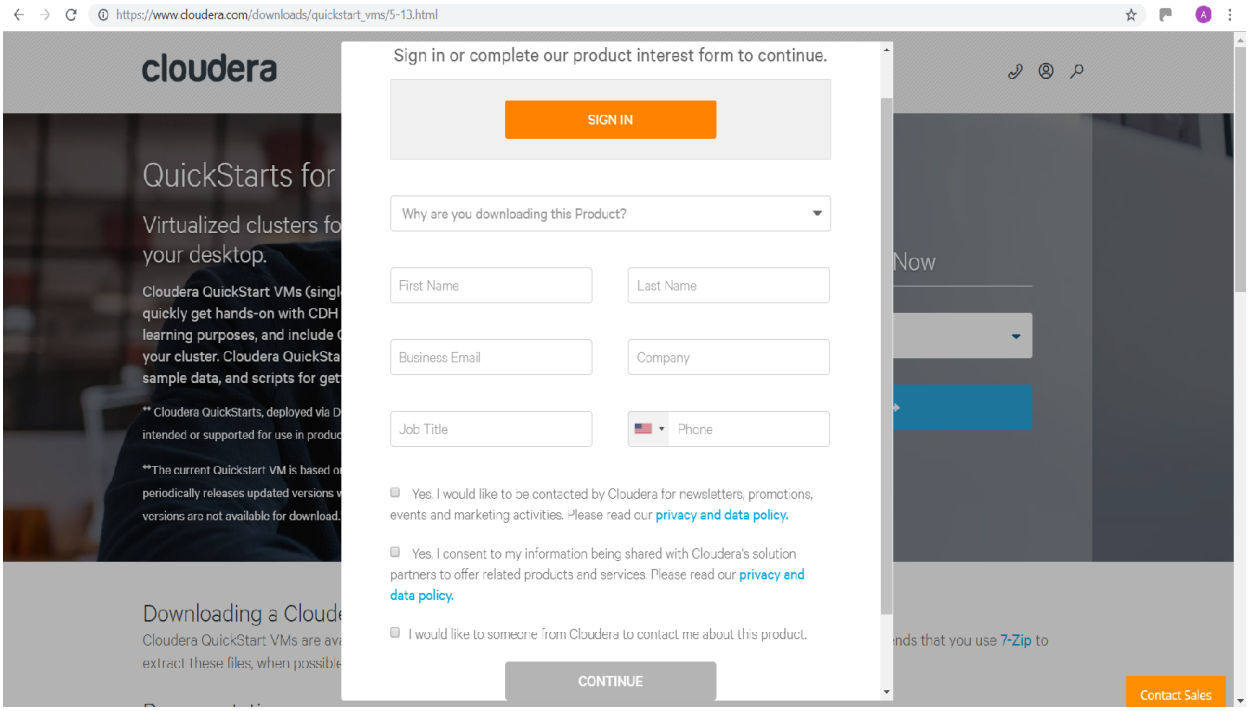
- Click in the option: “Downloads” and then, the option: “QUICKSTARTVMS”.



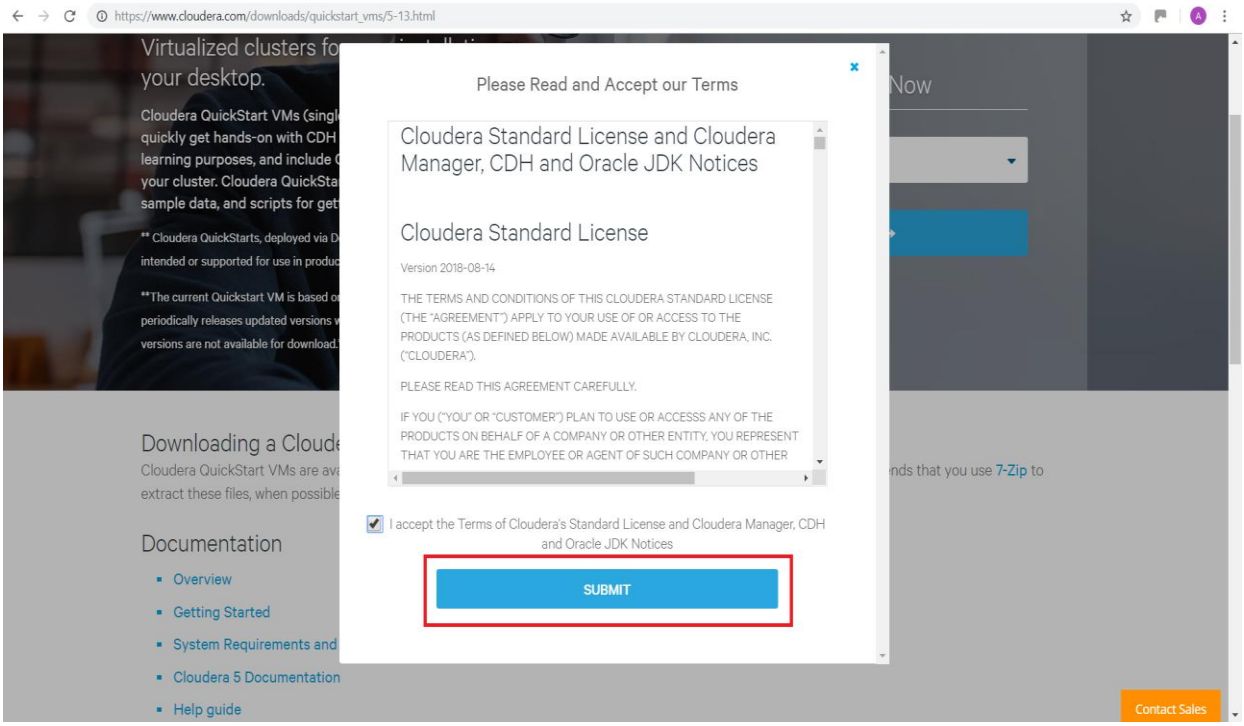
- After, it is necessary to select the option: “Virtual box” in the field: Platform and click in the bottom: “Get it now”.



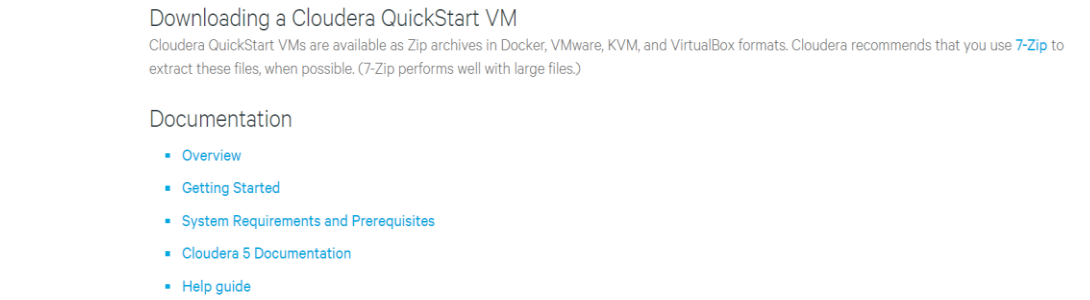
- To be able to start the Download, you will need to Sign In, you will need an account to download Cloudera, if you don't have an account yet, you need to fill all the fields and click in “Continue”.

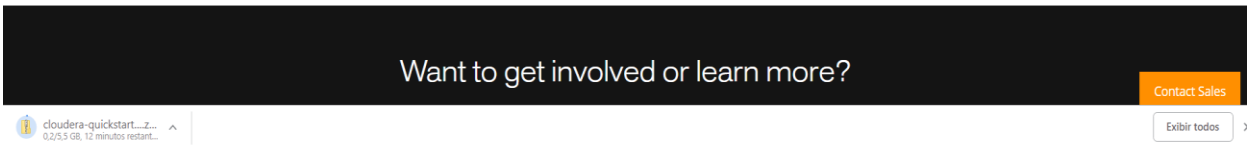


- After, you will need to accept the Terms, clicking in the bottom: “Submit”.



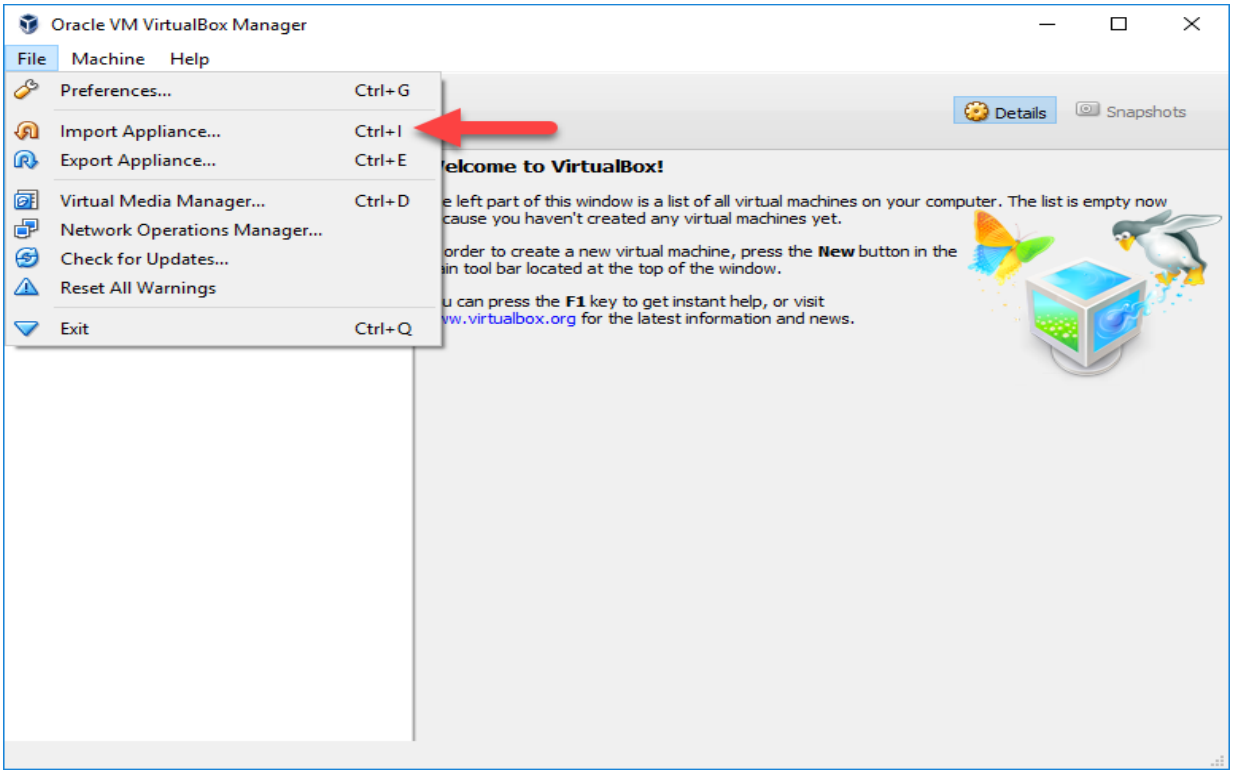
- Download will start, you will get the zip file after finished



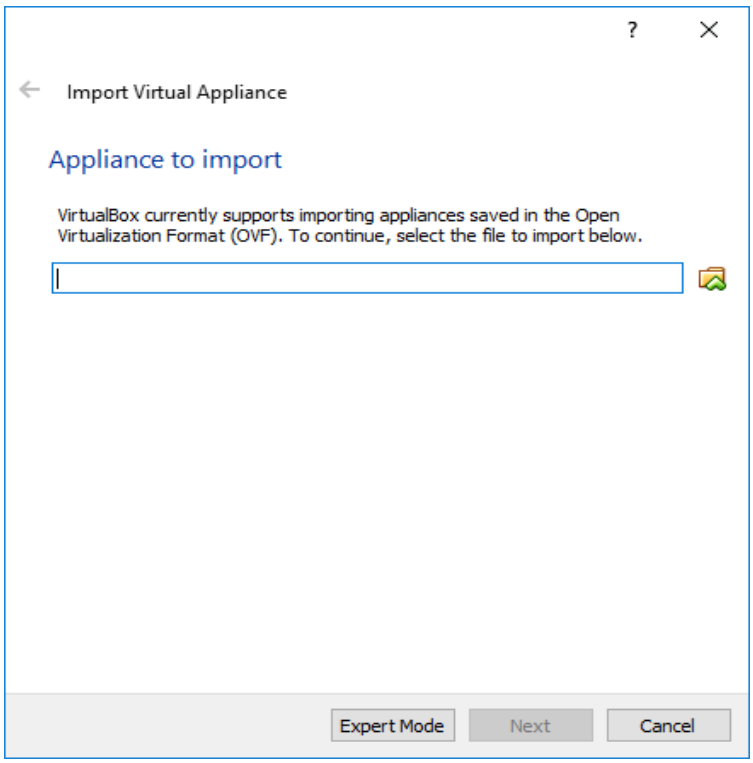


b. Install Cloudera

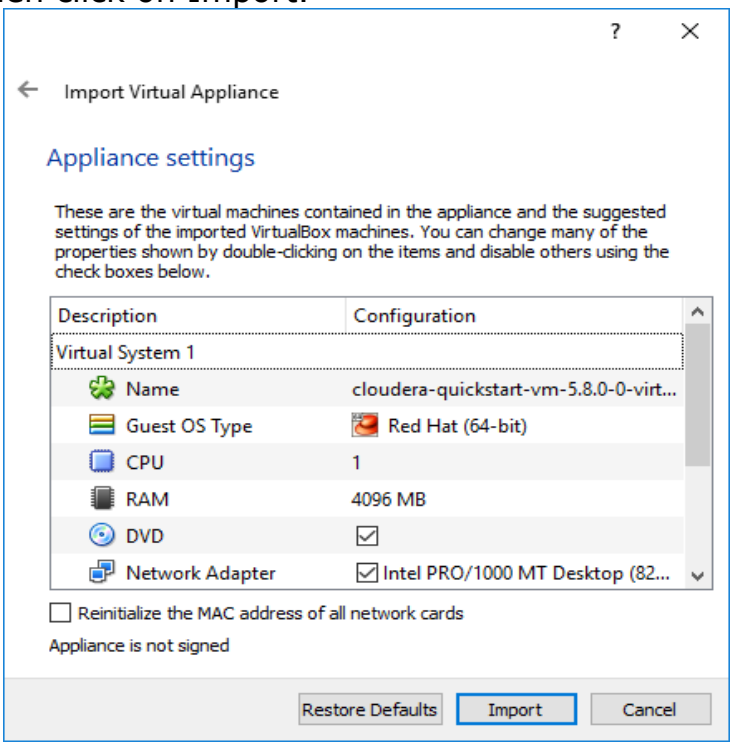
After you extract and unzip the file, you can import it to VirtualBox. Run VirtualBox, then click on "Import Appliance".



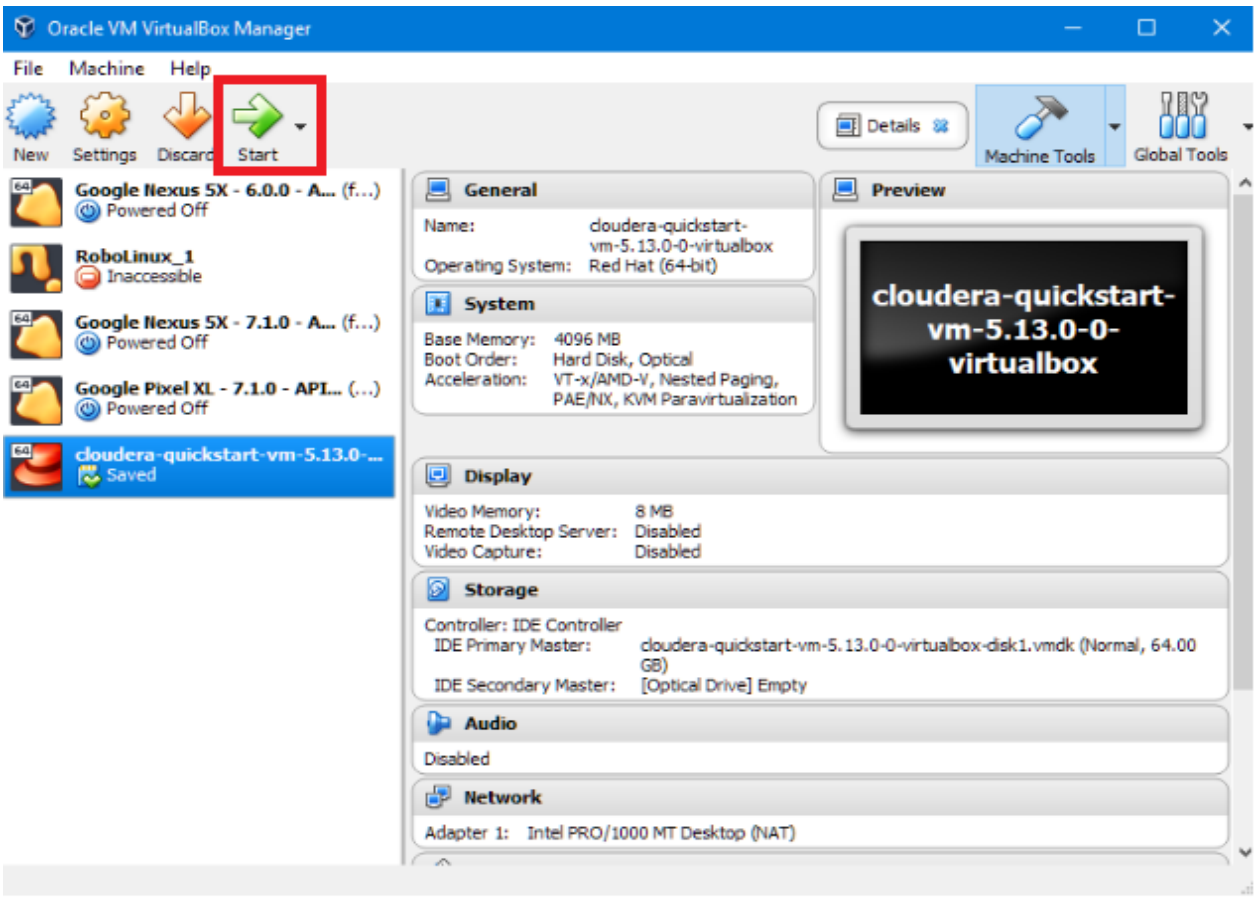
- Select your VirtualBox image file location, after that, click in the bottom: “Next”.



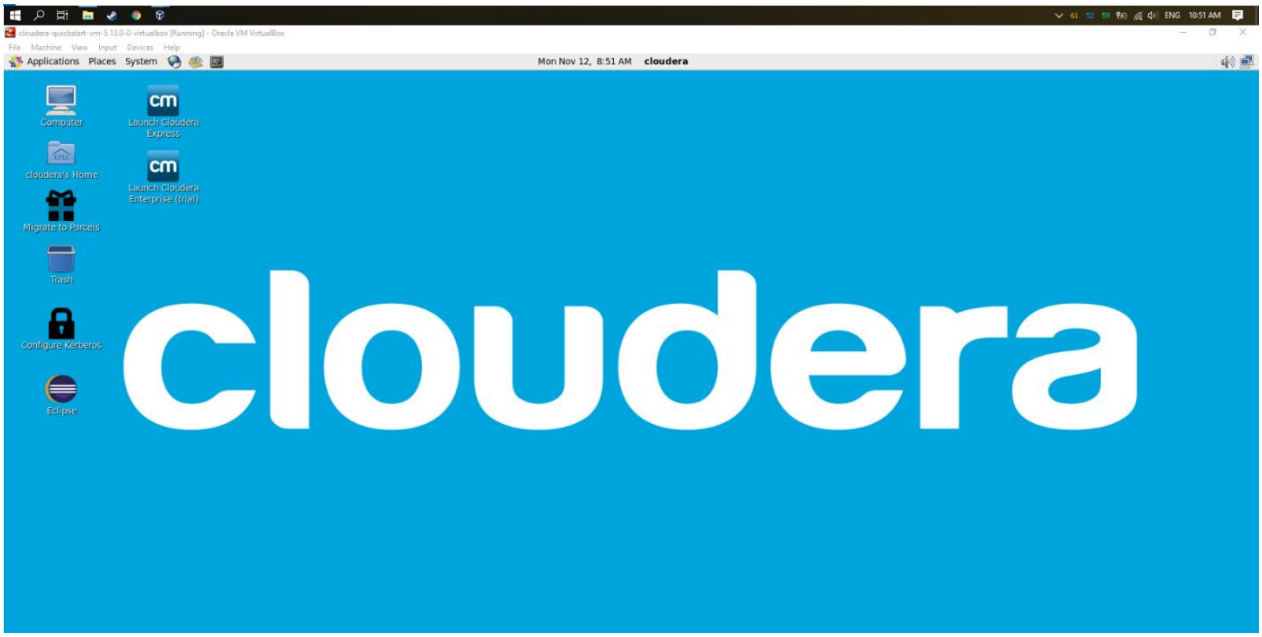
- Configure your setting. Minimum RAM requirement for this VM is 4GB. Then click on Import.



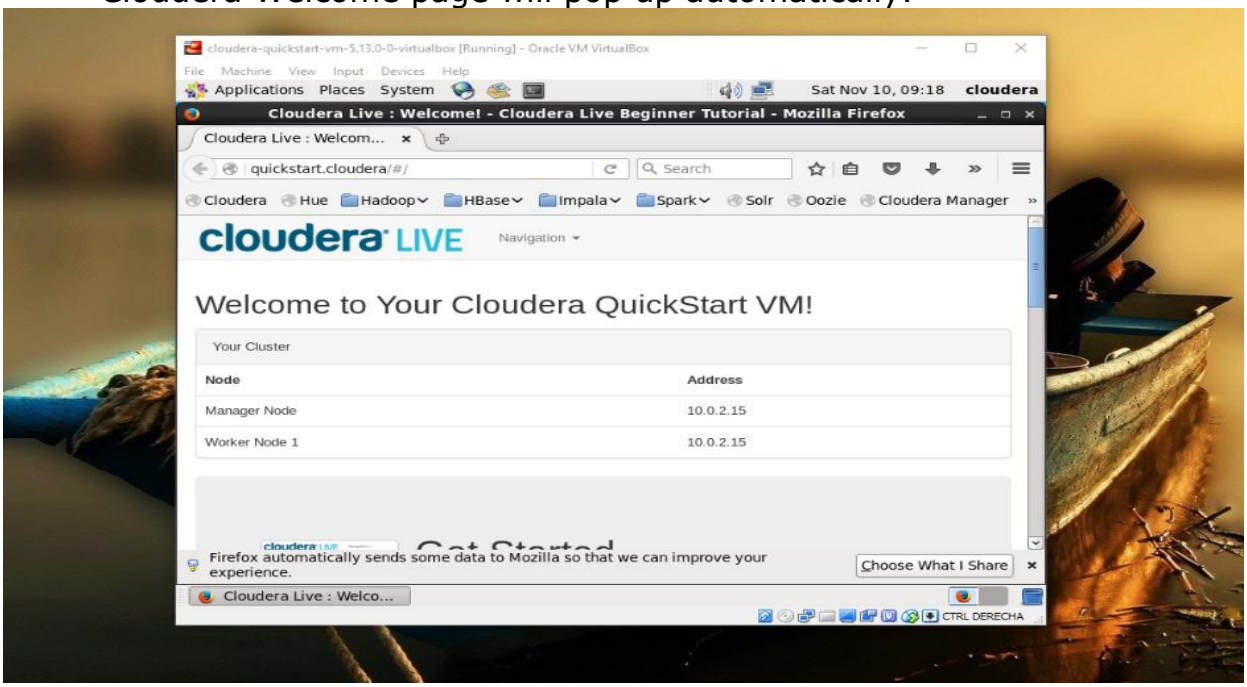
- After finished import, you will able to see your Virtual Machine. Click Start to start the VM.



- The Cloudera screen will be showed.



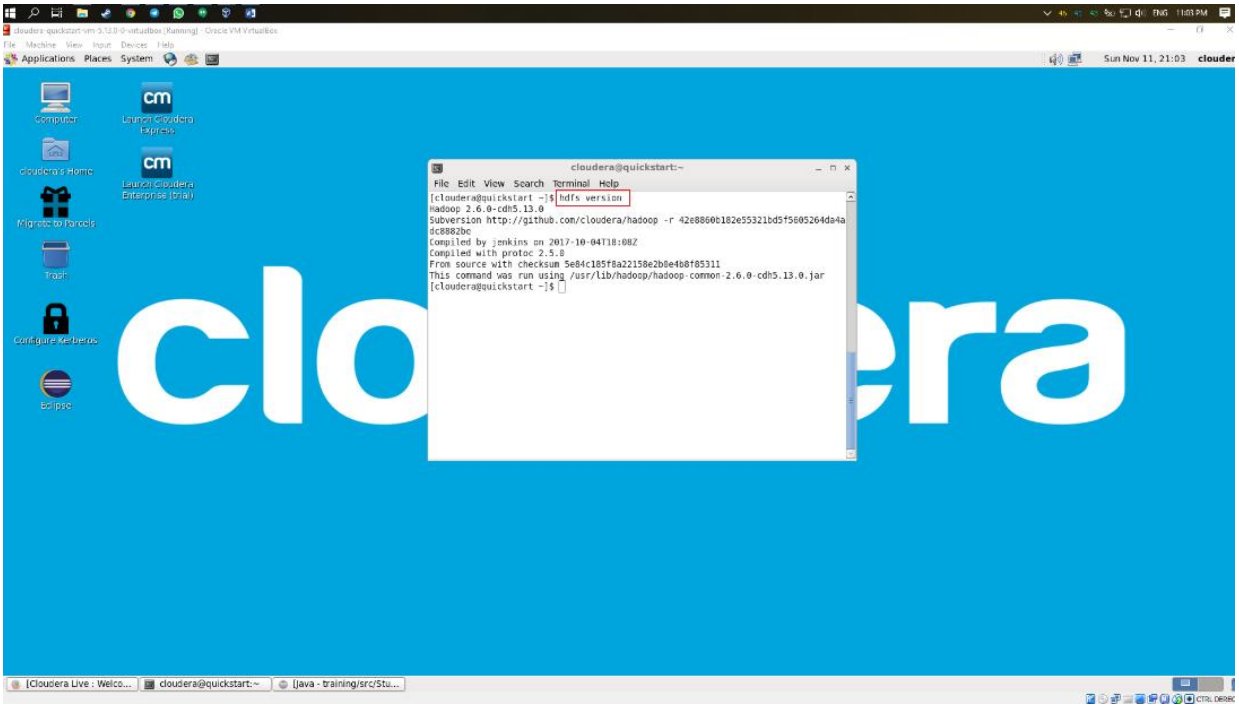
- Cloudera Welcome page will pop up automatically.



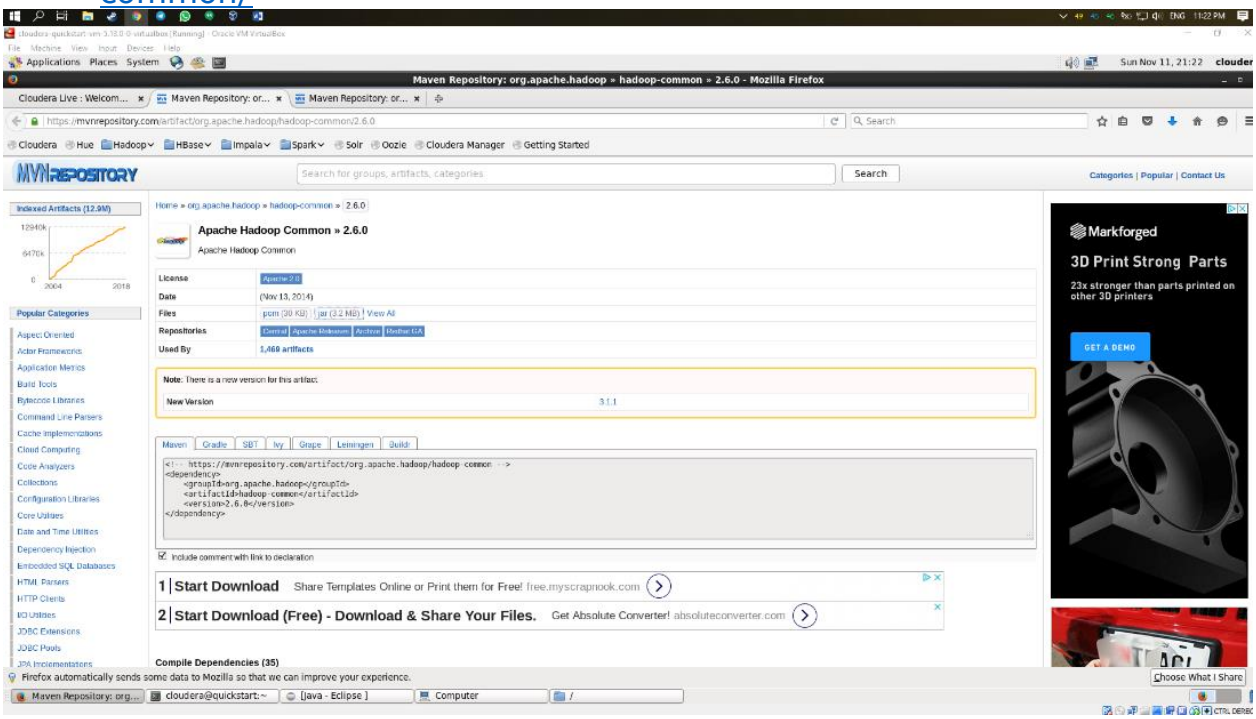
III. Get WordCount (Test run)

To start to work with WordCount, you will need to import Hadoop libraries to run WordCount.

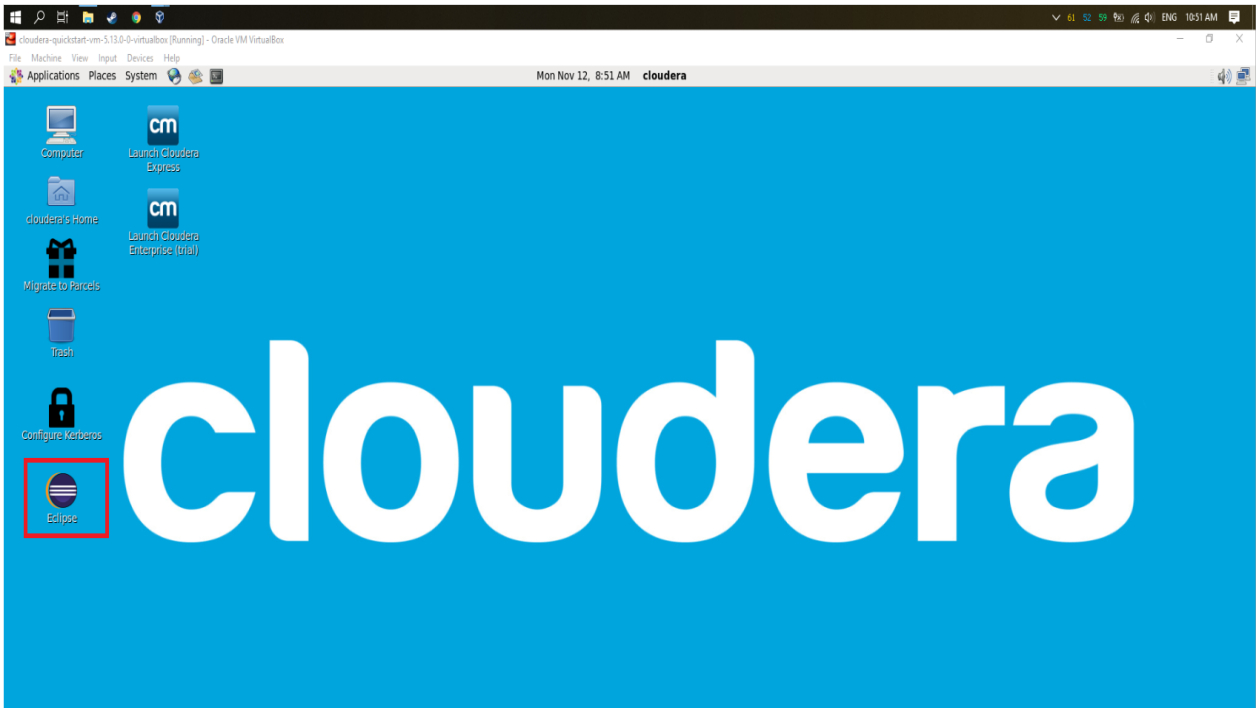
- You need to check your Hadoop version. Go to Terminal -> run command and type: "hdfs version".



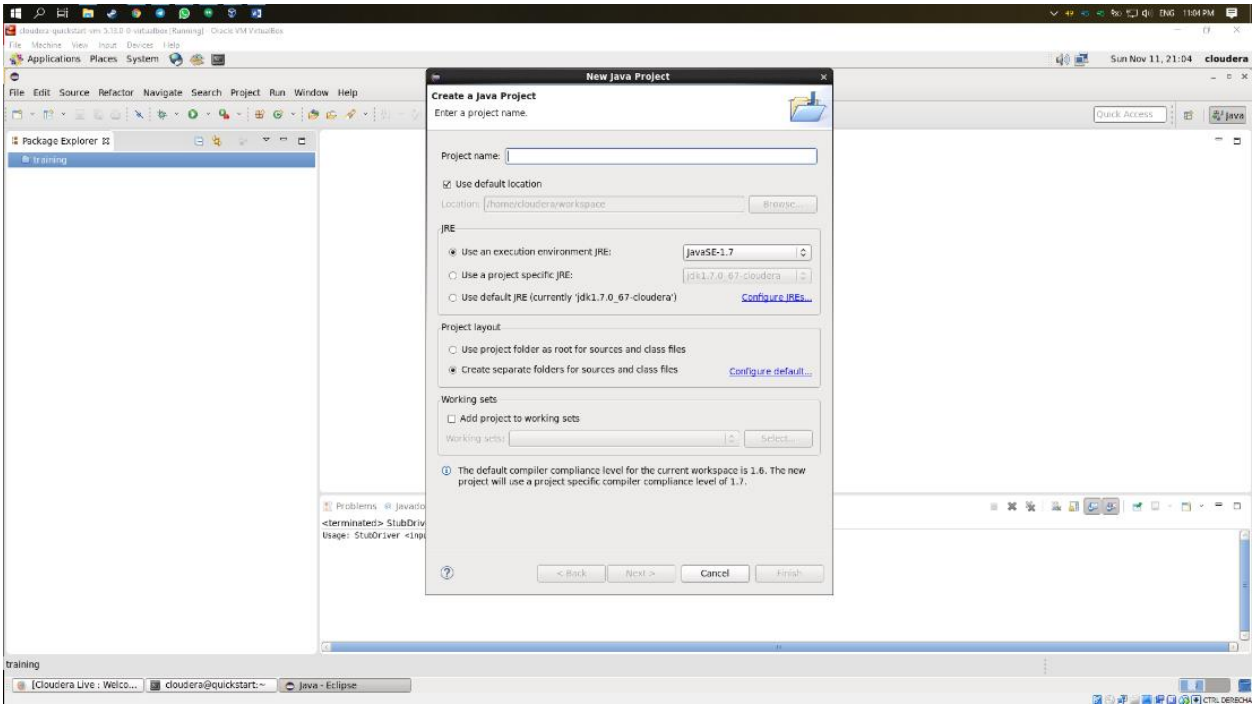
- Hadoop version is 2.6.0, so we will need to download libraries exactly as this version. It is necessary to do the download of Hadoop library from this website: http://mvnrepository.com/artifact/org.apache.hadoop/hadoop-common/



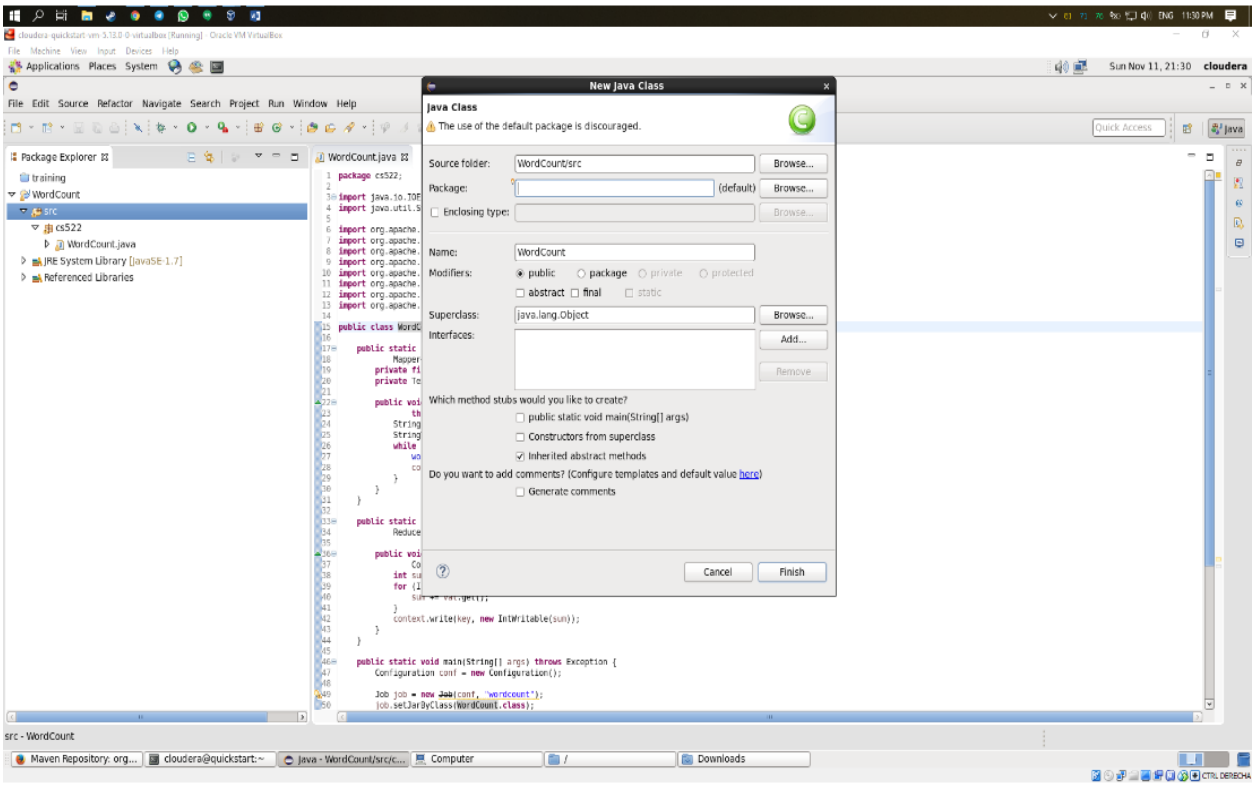
- You need to download the file and you will need it to import to Eclipse later. Eclipse is available on your VM machine.



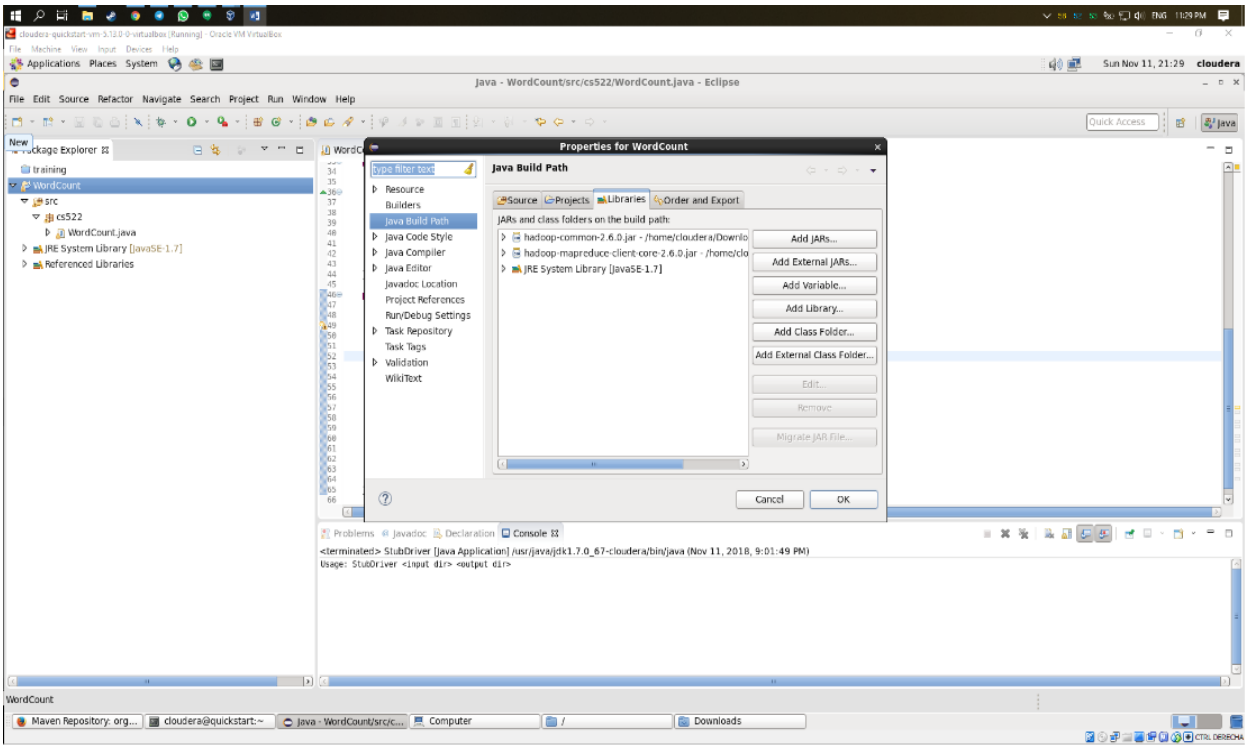
- Run the Eclipse IDE and then create Java Project



- Setup project name and JRE



- You must to add all all required libraries



a) Running WordCount

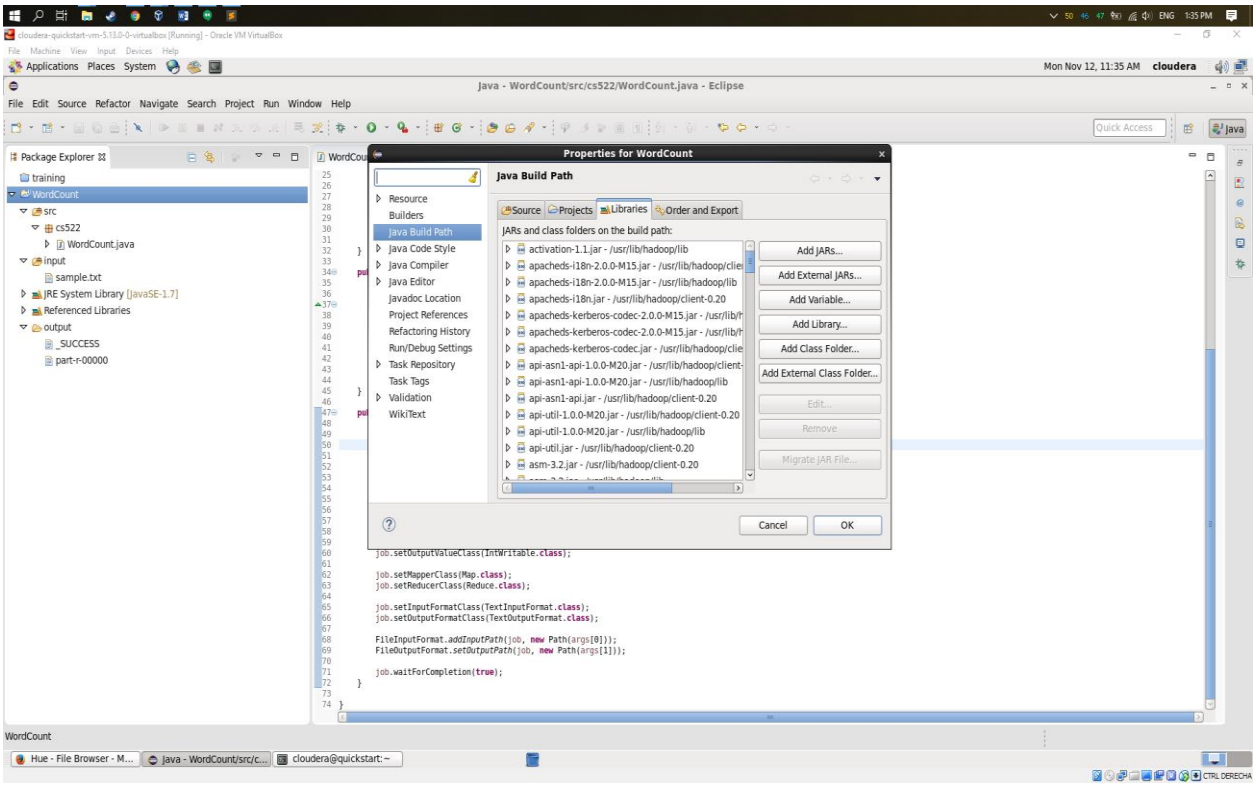
We will show the execution of the algorithm WordCount, that count the words from an input source and return a count of each word.

- Algorithm(WordCount):

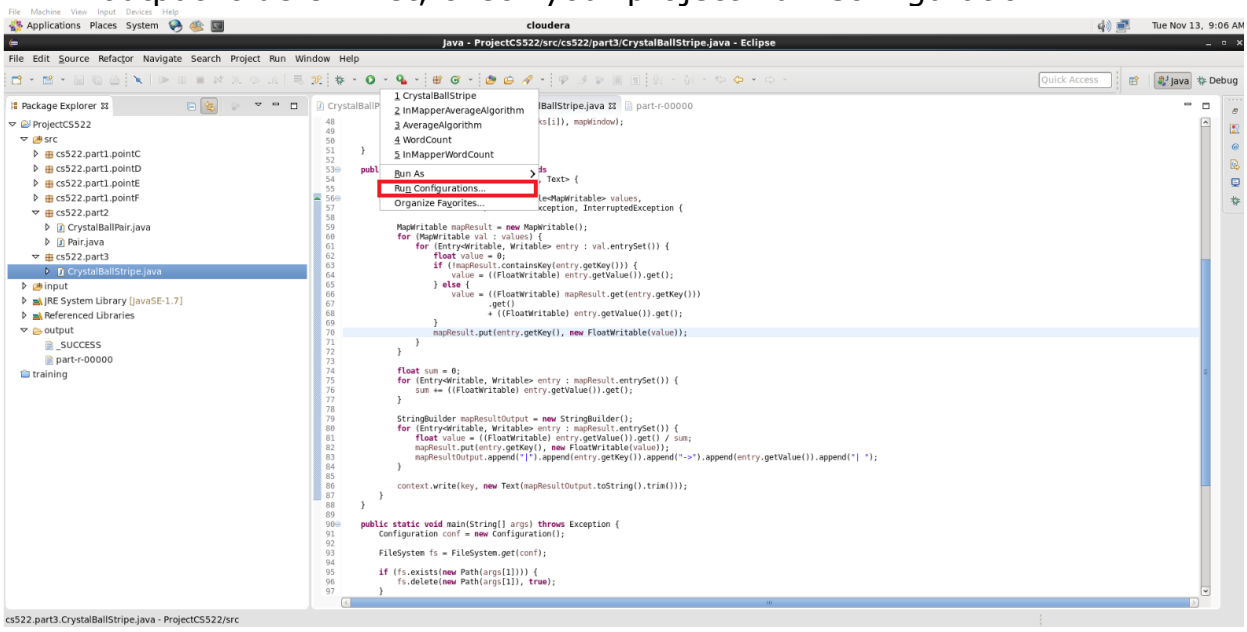
```
package cs522.pointC;

import java.io.IOException;
import java.util.StringTokenizer;

import org.apache.hadoop.fs.FileSystem;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.input.TextInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;
import org.apache.hadoop.mapreduce.lib.output.TextOutputFormat;

public class WordCount {

      public static class Map extends
                  Mapper<LongWritable, Text, Text, IntWritable> {
            private final static IntWritable one = new IntWritable(1);
```

```
		private Text word = new Text();

		public void map(LongWritable key, Text value, Context context)
				throws IOException, InterruptedException {
			String line = value.toString();
			StringTokenizer tokenizer = new StringTokenizer(line);
			while (tokenizer.hasMoreTokens()) {
				word.set(tokenizer.nextToken());
				context.write(word, one);
			}
		}
	}
public static class Reduce extends
			Reducer<Text, IntWritable, Text, IntWritable> {

		public void reduce(Text key, Iterable<IntWritable> values,
				Context context) throws IOException,
InterruptedException {
			int sum = 0;
			for (IntWritable val : values) {
				sum += val.get();
			}
			context.write(key, new IntWritable(sum));
		}
	}

	public static void main(String[] args) throws Exception {
		Configuration conf = new Configuration();

		FileSystem fs = FileSystem.get(conf);

		if(fs.exists(new Path(args[1]))){
		   fs.delete(new Path(args[1]),true);
		}

		Job = new Job(conf, "wordcount");
		job.setJarByClass(WordCount.class);

		job.setOutputKeyClass(Text.class);
		job.setOutputValueClass(IntWritable.class);

		job.setMapperClass(Map.class);
		job.setReducerClass(Reduce.class);

		job.setInputFormatClass(TextInputFormat.class);
		job.setOutputFormatClass(TextOutputFormat.class);

		FileInputFormat.addInputPath(job, new Path(args[0]));
		FileOutputFormat.setOutputPath(job, new Path(args[1]));

		job.waitForCompletion(true);
	}

}
```

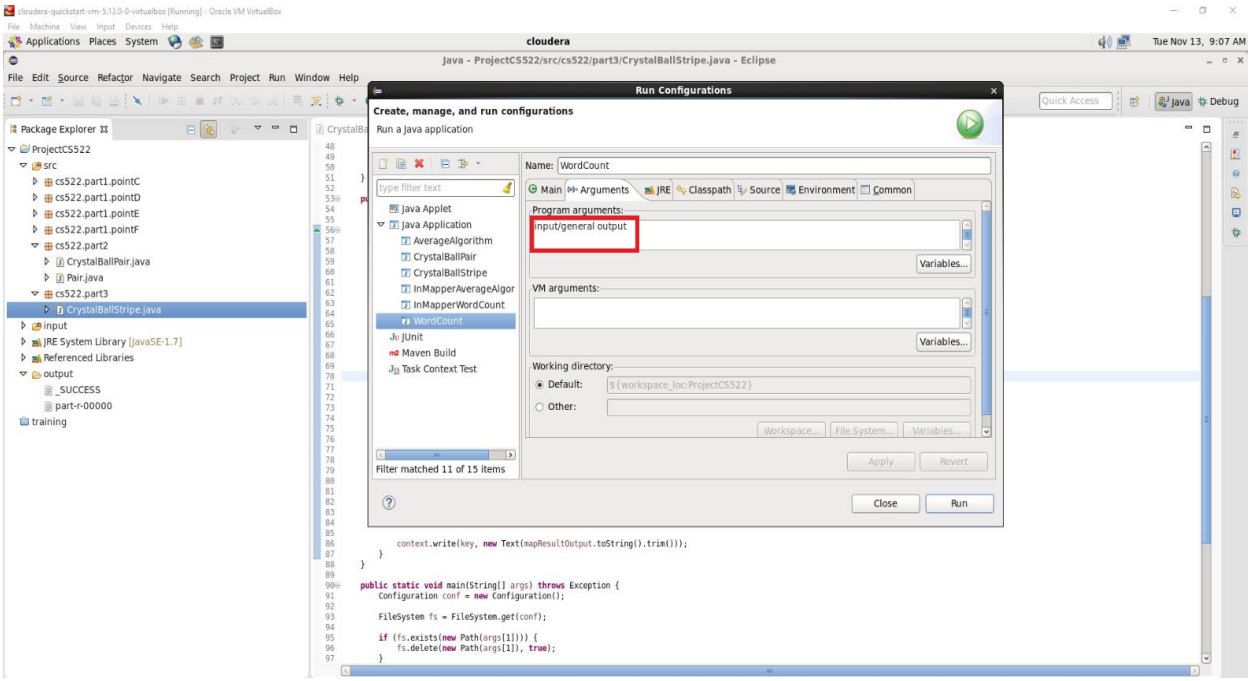
- We need to Add all required libraries as below
  File system/usr/lib/hadoop/client-0.20
  File system/usr/lib/hadoop
  File system/usr/lib/hadoop/lib



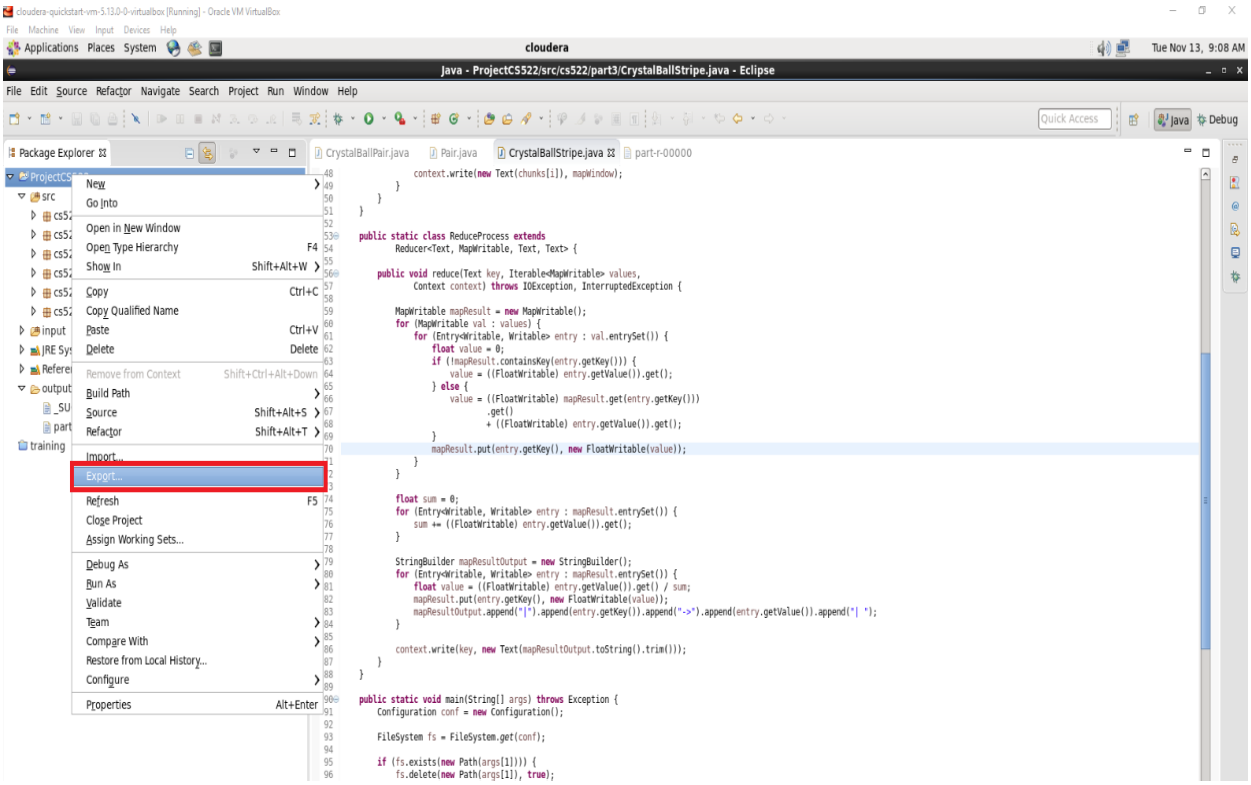
- To run the class "WordCount" you will need to setup the input and output folders. First, check your project Run Configuration:



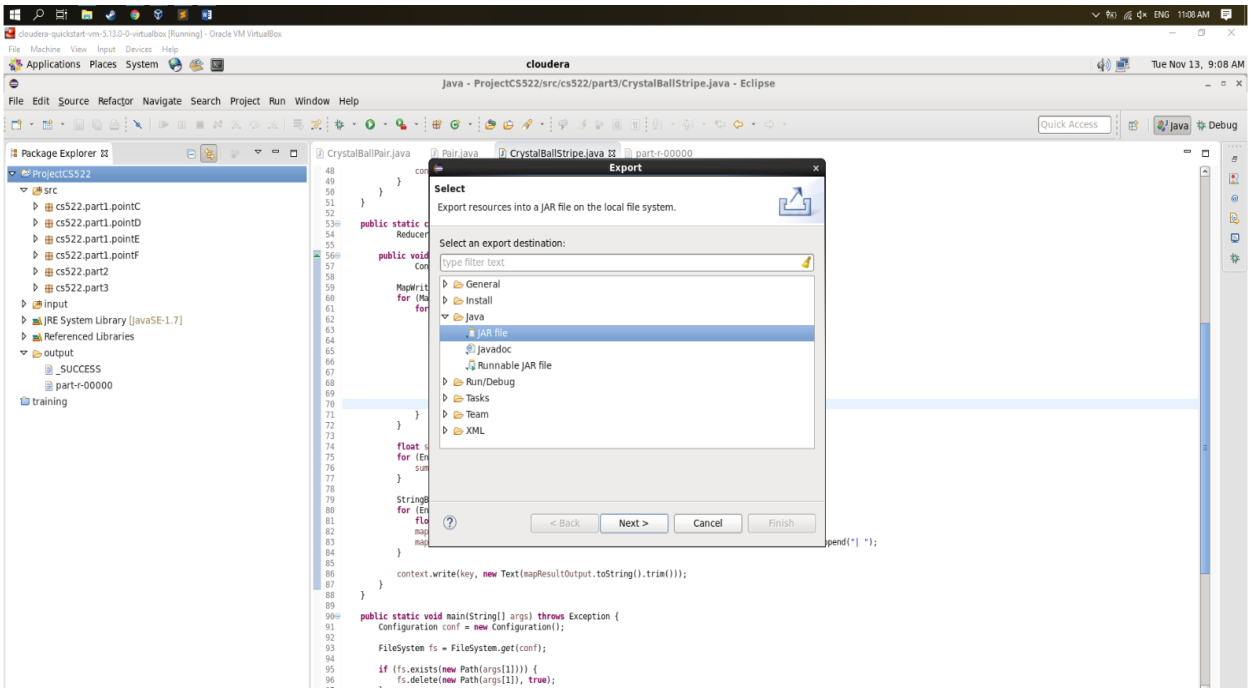
- You will need to configure the name/location to input and output folders.



- In Eclipse, right click on your class file -> Choose Export

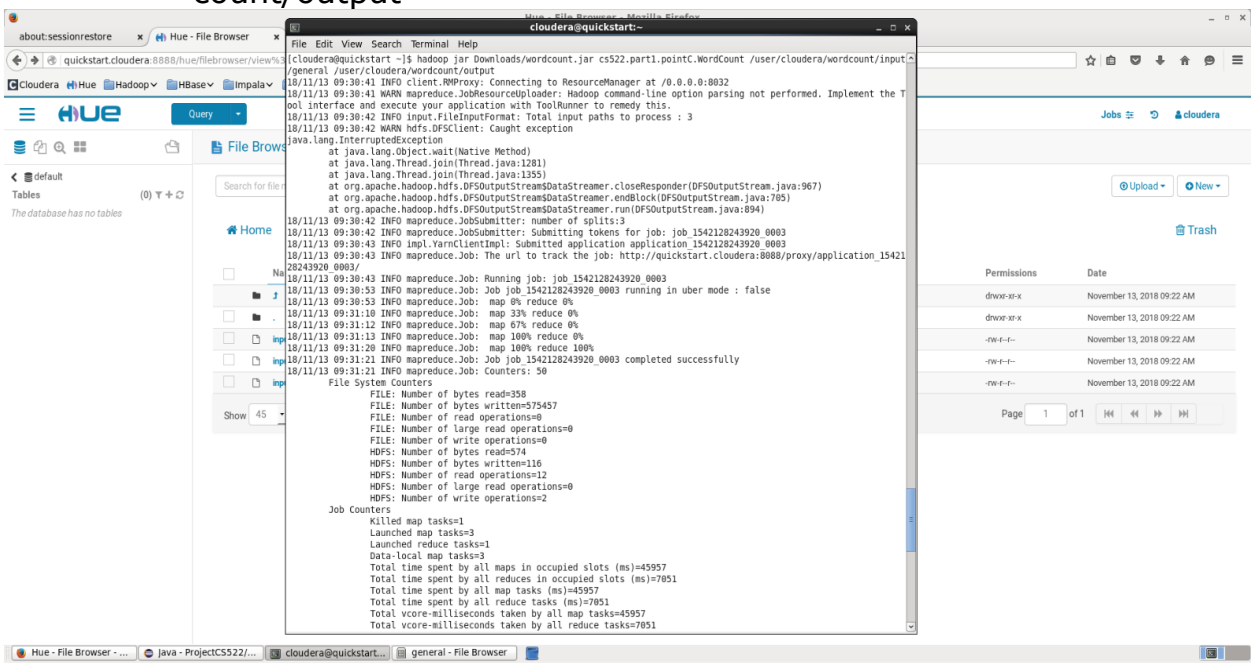


- Select the option: "Java" -> JAR file

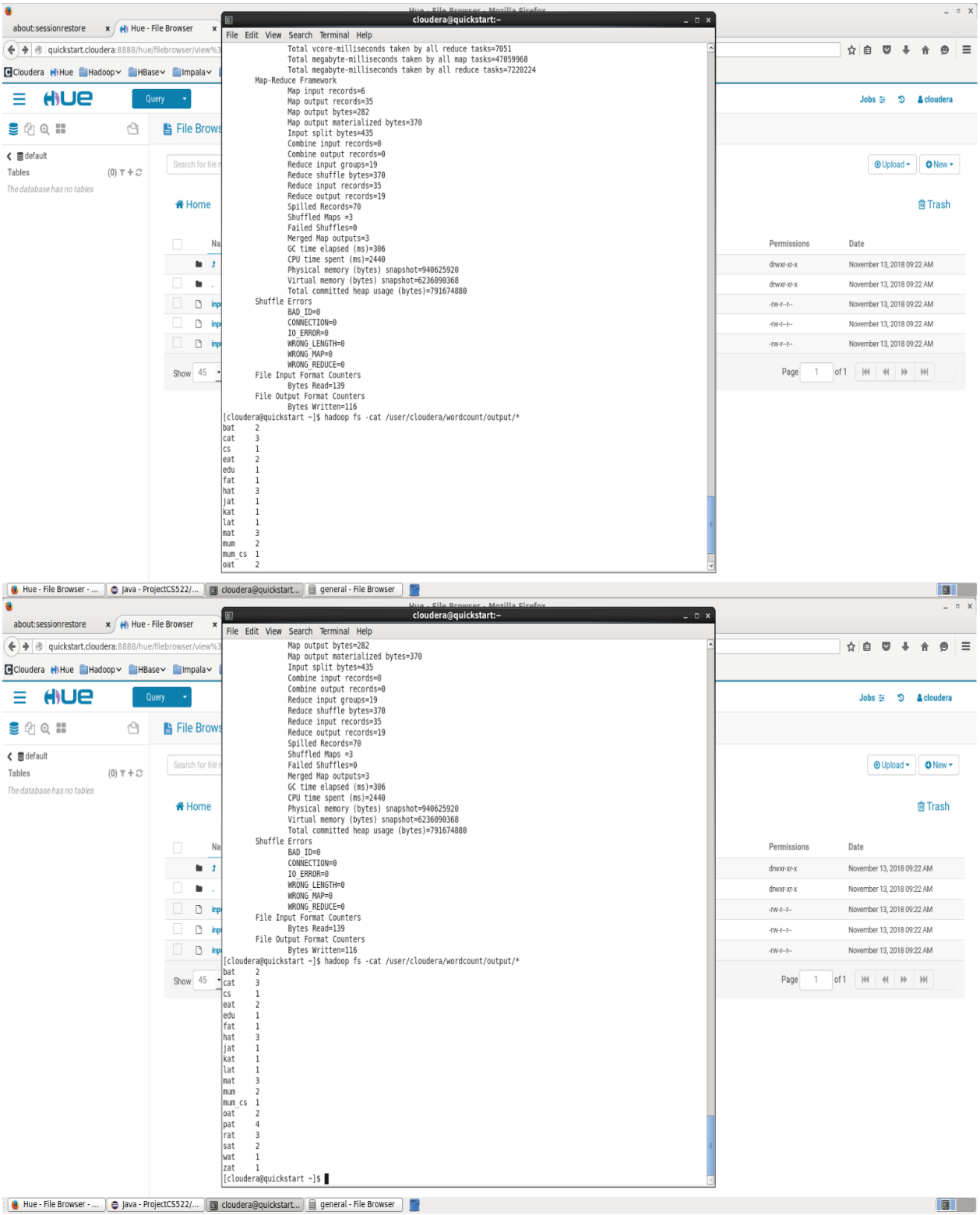


- To run the WordCount application from JAR file, passing the paths to the input and output directories.

  - Run command: $ hadoop jar Downloads/wordcount.jar cs522.part1.pointC.WordCount /user/cloudera/wordcount/input/general/user/cloudera/wordcount/output



- You can see the output results:



- You also can check the output file on the web browser