What you need to do for project 2 (windows):

1. Install
    - Jdk
    - Sbt
    - Apache spark
    - hadoop.dll
    - winutils.exe
    - Install vc redist x64

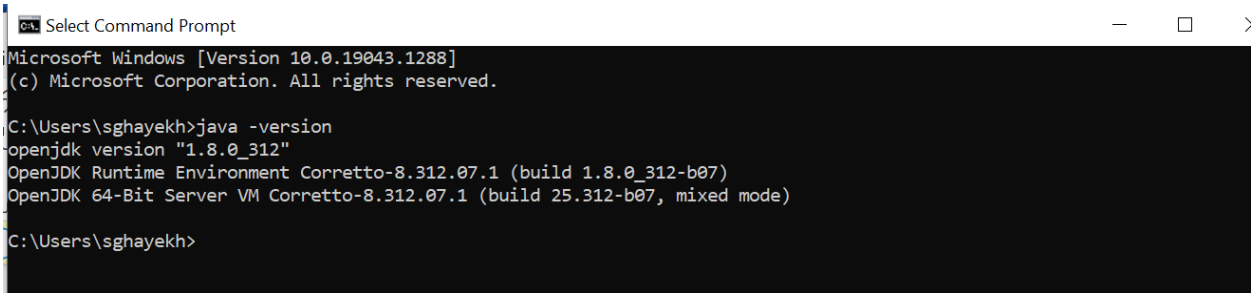
2. Setup
3. Edit Scala files
4. Create a jar file
5. Test your code.

Apache spark 2.4.7

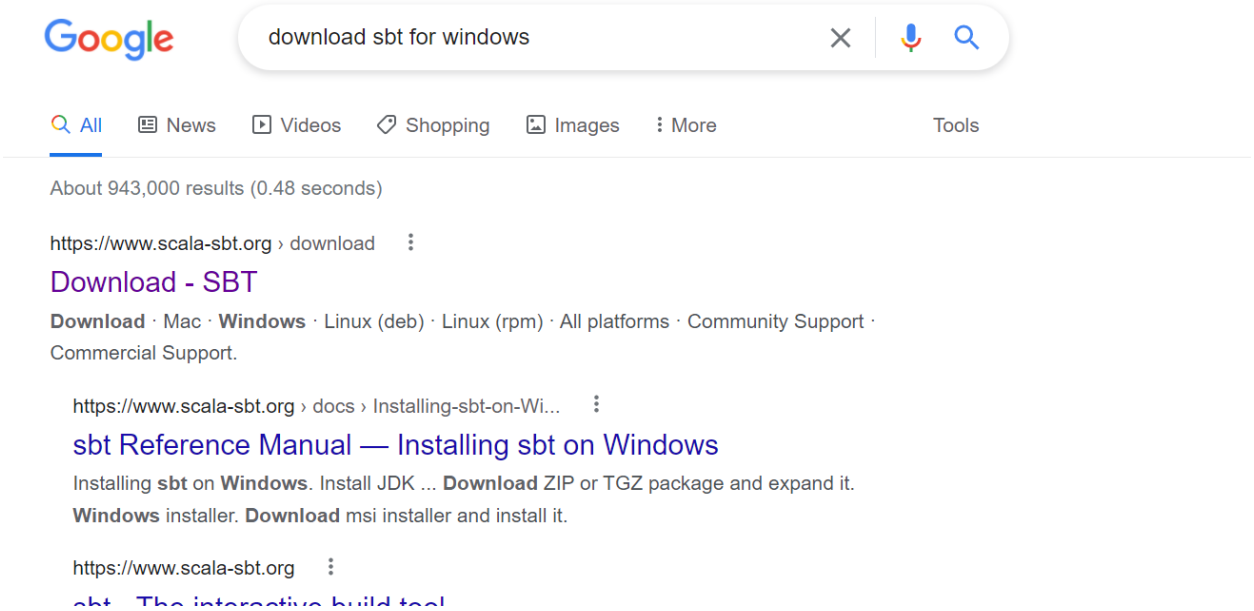
Java 8

Install

JDK 8:


Select Command Prompt
Microsoft Windows [Version 10.0.19043.1288]
(c) Microsoft Corporation. All rights reserved.
C:\Users\sghayekh>java -version
openjdk version "1.8.0_312"
OpenJDK Runtime Environment Corretto-8.312.07.1 (build 1.8.0_312-b07)
OpenJDK 64-Bit Server VM Corretto-8.312.07.1 (build 25.312-b07, mixed mode)
C:\Users\sghayekh>

Install SBT:


Google
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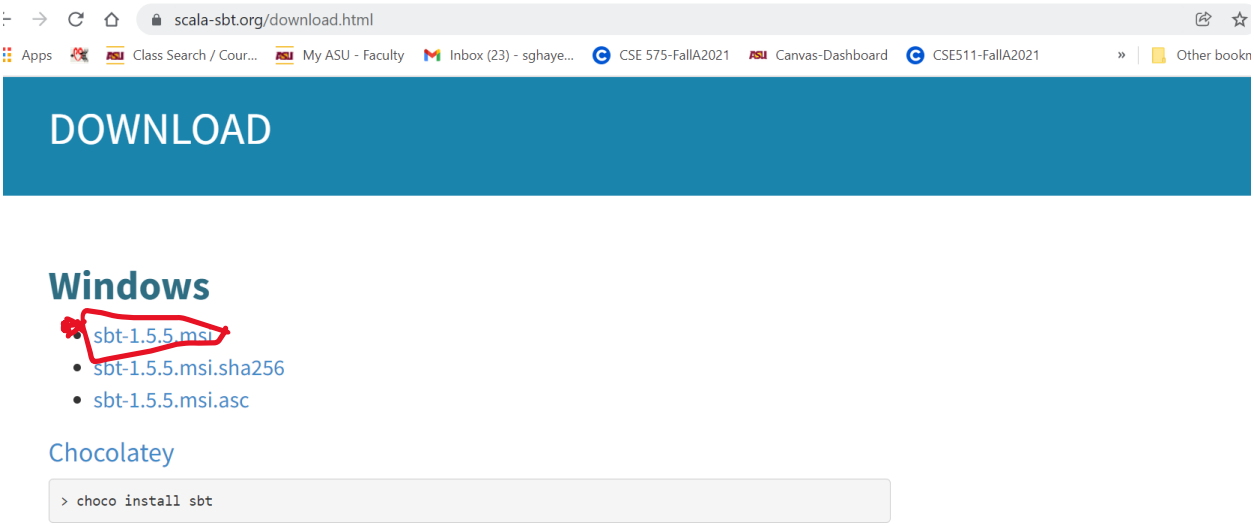
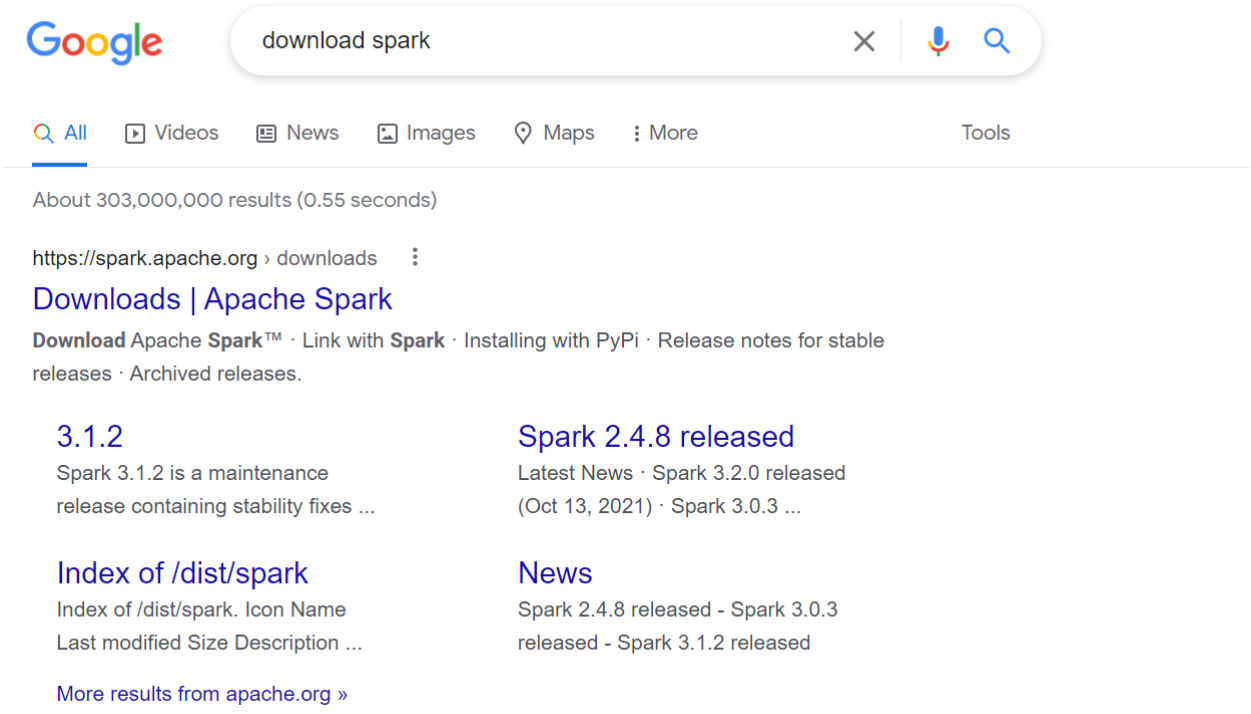
News
Videos
Shopping
Images
More
Tools
About 943,000 results (0.48 seconds)
https://www.scala-sbt.org › download
Download - SBT
Download · Mac · Windows · Linux (deb) · Linux (rpm) · All platforms · Community Support · Commercial Support.
https://www.scala-sbt.org › docs › Installing-sbt-on-Wi...
sbt Reference Manual — Installing sbt on Windows
Installing sbt on Windows. Install JDK ... Download ZIP or TGZ package and expand it. Windows installer. Download msi installer and install it.
https://www.scala-sbt.org


scala-sbt.org/download.html
Apps
Class Search / Cour...
My ASU - Faculty
Inbox (23) - sghaye...
CSE 575-FallA2021
Canvas-Dashboard
CSE511-FallA2021
Other bookm
DOWNLOAD
Windows
sbt-1.5.5.msi
sbt-1.5.5.msi.sha256
sbt-1.5.5.msi.asc
Chocolatey
> choco install sbt

Done!

Then install Apache spark:



Index of /dist/spark/spark-2.4.7

Name	Last modified	Size	Description
Parent Directory		-	
SparkR_2.4.7.tar.gz	2020-09-08 07:13	310K	
SparkR_2.4.7.tar.gz.asc	2020-09-08 07:13	819	
SparkR_2.4.7.tar.gz.sha512	2020-09-08 07:13	207	
pyspark-2.4.7.tar.gz	2020-09-08 07:13	208M	
pyspark-2.4.7.tar.gz.asc	2020-09-08 07:13	819	
pyspark-2.4.7.tar.gz.sha512	2020-09-08 07:13	210	
spark-2.4.7-bin-hadoop2.6.tgz	2020-09-08 07:13	221M	
spark-2.4.7-bin-hadoop2.6.tgz.asc	2020-09-08 07:13	819	
spark-2.4.7-bin-hadoop2.6.tgz.sha512	2020-09-08 07:13	268	
spark-2.4.7-bin-hadoop2.7.tgz	2020-09-08 07:13	223M	
spark-2.4.7-bin-hadoop2.7.tgz.asc	2020-09-08 07:13	819	
spark-2.4.7-bin-hadoop2.7.tgz.sha512	2020-09-08 07:13	268	
spark-2.4.7-bin-without-hadoop-scala-2.12.tgz	2020-09-08 07:13	140M	
spark-2.4.7-bin-without-hadoop-scala-2.12.tgz.asc	2020-09-08 07:13	819	

1. Download
2. Unzip
3. and copy-paste the files and folders:
    - in drive C → spark-local→spark.
    - Create another folder in drive C→spark-local→hadoop→bin

From the following repository:

https://github.com/steveloughran/winutils/tree/master/hadoop-2.7.1/bin

Open: hadoop.dll

- Download and paste it in Hadoop→ bin
- It also needs to be paste in another folder: Root drive (C) → windows

Also

Open: winutils.exe

- Download and paste it in Hadoop→ bin

Need to Install vc redist x64

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May 12, 2021 — Download **Microsoft Visual C++ 2010** Service Pack 1 **Redistributable Package** MFC Security Update from Official Microsoft Download Center.

https://www.microsoft.com › Download › confirmation

Download Microsoft Visual C++ 2010 Service Pack 1 ...

... vulnerability in MFC applications that are built with Visual Studio 2010 and ship the **Microsoft Visual C++ 2010** Service Pack 1 **Redistributable Package**.

Microsoft Visual C++ 2010 Service Pack 1 Redistributable Package MFC Security Update

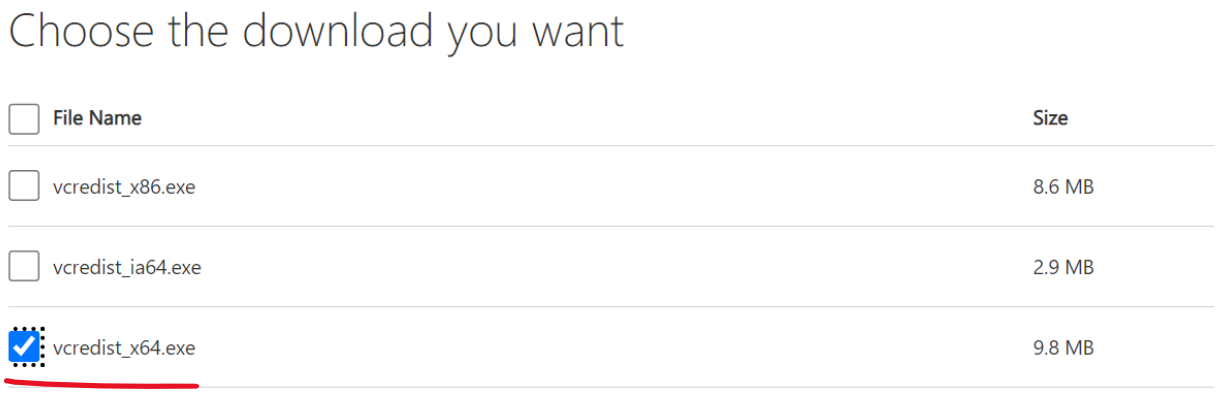
Important! Selecting a language below will dynamically change the complete page content to that language.

Select Language: English Download

A security issue has been identified leading to a vulnerability in MFC applications that are built with Visual Studio 2010 and ship the Microsoft Visual C++ 2010 Service Pack 1 Redistributable Package.

Details

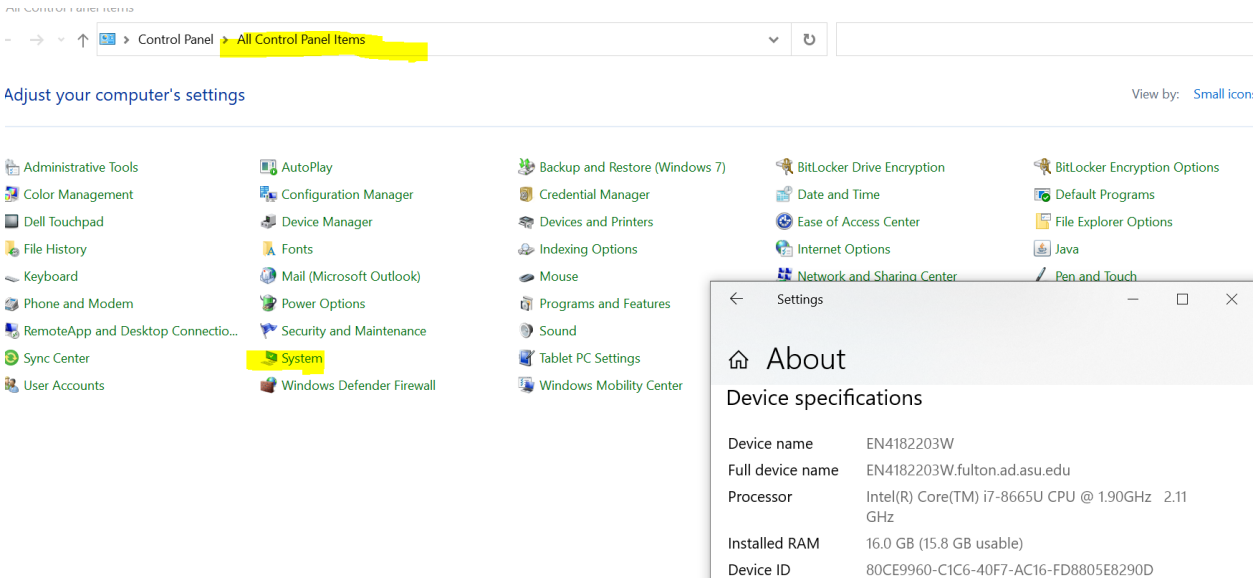
System Requirements



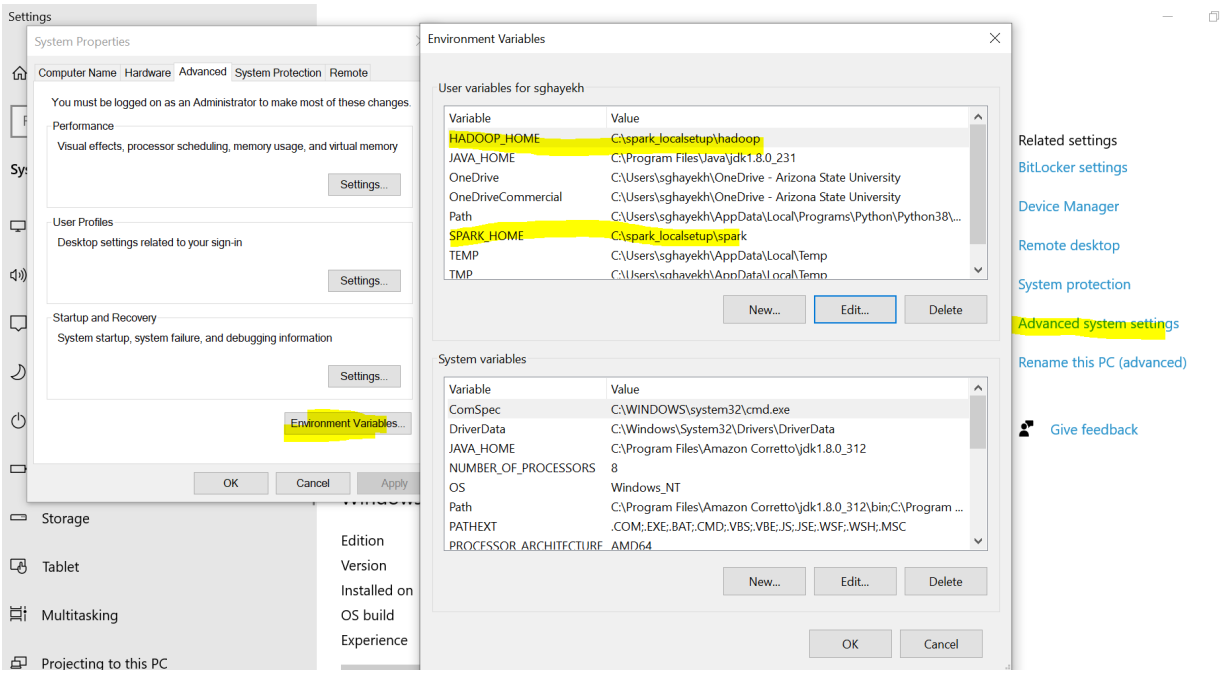
Done!.

Setup

The go to the following path to change the environment variables and path:



Open advance system setting→environment variables→Create two folders HADOOP_HOME and SPARK_HOME with their address in drive C.

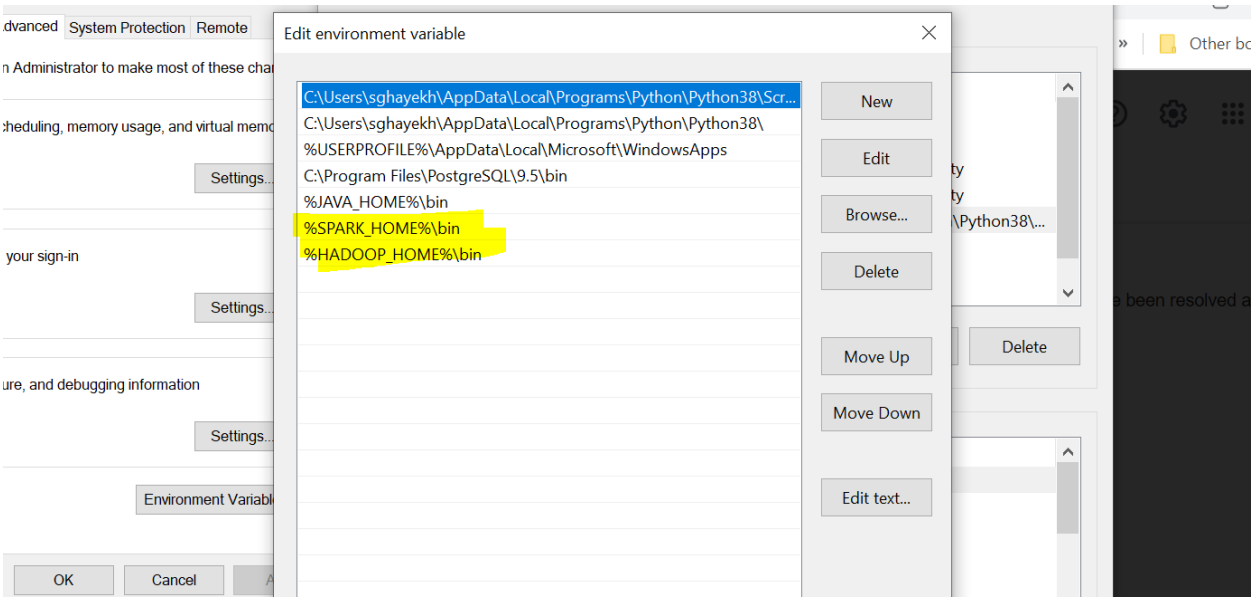


Go to path:

Create two new lines; to access to their bin folder

%SPARK_HOME%\bin

%HADOOP_HOME%\bin



RESTART YOUR COMPUTER>

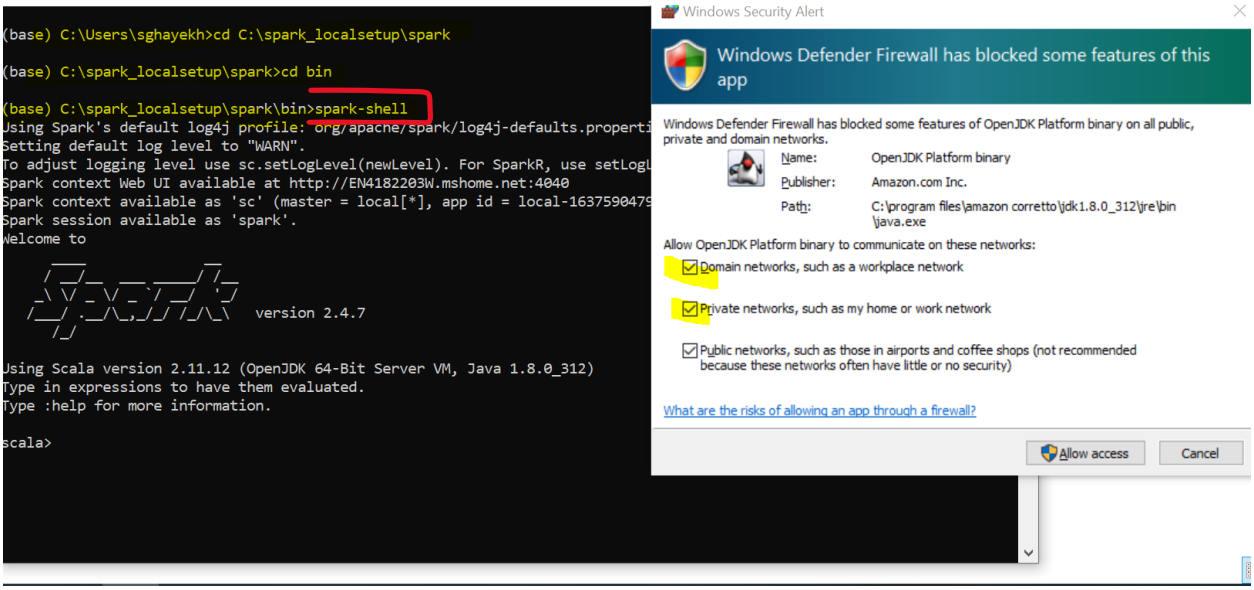
After restarting:

1- Checking JAVA:
   Open command line to see Java is working or not:

```
C:\Users\sghayekh>java
Usage: java [-options] class [args...]
           (to execute a class)
   or  java [-options] -jar jarfile [args...]
           (to execute a jar file)
where options include:
    -d32          use a 32-bit data model if available
    -d64          use a 64-bit data model if available
    -server       to select the "server" VM
                  The default VM is server.

    -cp <class search path of directories and zip/jar files>
    -classpath <class search path of directories and zip/jar files>
                  A ; separated list of directories, JAR archives,
                  and ZIP archives to search for class files.
    -D<name>=<value>
                  set a system property
    -verbose:[class|gc|jni]
                  enable verbose output
    -version      print product version and exit
    -version:<value>
                  Warning: this feature is deprecated and will be removed
                  in a future release.
                  require the specified version to run
    -showversion  print product version and continue
```

2-Checking SPARK:

Spark-shell



Done!

Hot Zone analysis:

Edit Scala files

Download the template from coursera:

https://www.coursera.org/learn/cse511/programming/FJqxG/project-2-hotspot-analysis-autograder-2-0

Project 2: Hot Spot Analysis

Requirement

In this project, you are required to do spatial hot spot analysis. In particular, you need to complete two different hot spot analysis tasks.

1. Hot zone analysis

This task will need to perform a range join operation on a rectangle datasets and a point dataset. For each rectangle, the number of points located within the rectangle will be obtained. The hotter rectangle means that it includes more points. So this task is to calculate the hotness of all the rectangles.

Download the required templates below.

CSE511-Project-Hotspot-Analysis-20200804T194129Z-001

ZIP File

Download file

2. Hot cell analysis

Description

This task will focus on applying spatial statistics to spatio-temporal big data in order to identify statistically significant spatial hot spots using Apache Spark. The topic of this task is from ACM SIGSPATIAL GISCUP 2016.

Extract it→then open

C:\yourpath\CSE511-Project-Hotspot-Analysis-20200804T194129Z-001\CSE511-Project-Hotspot-Analysis\src\main\scala\cse512

A- Hot zone analysis:

Input is set of rectangles and set of points=> aim finding the hotness zone/cell base on number of points in each rectangle.

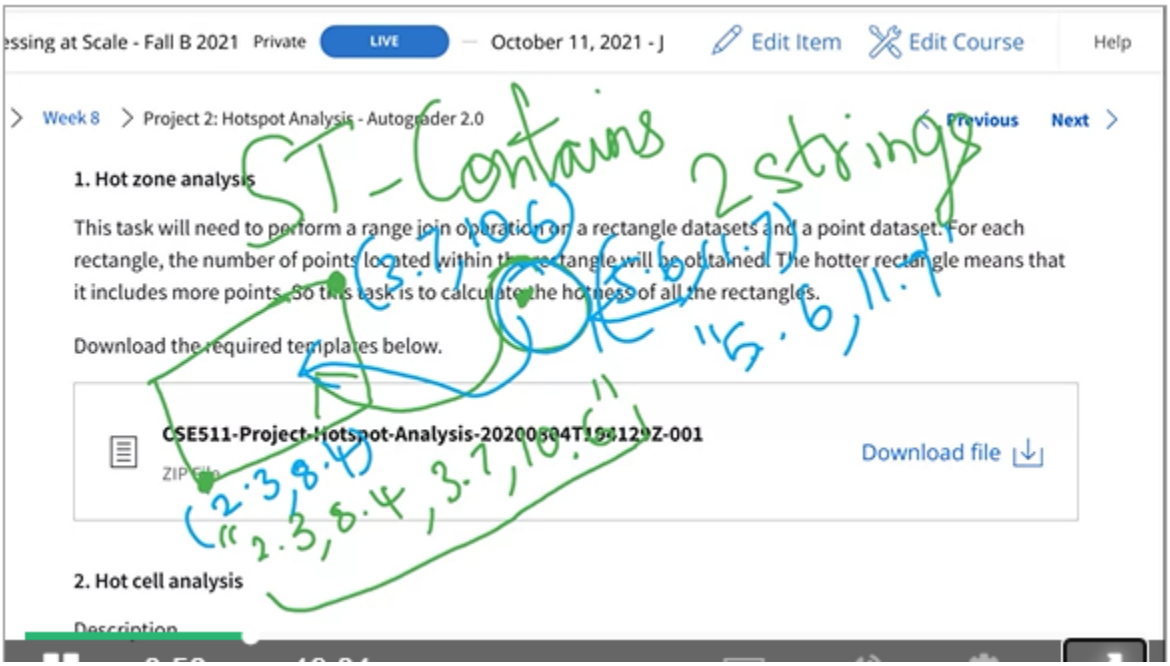
Function ***ST-Contains***

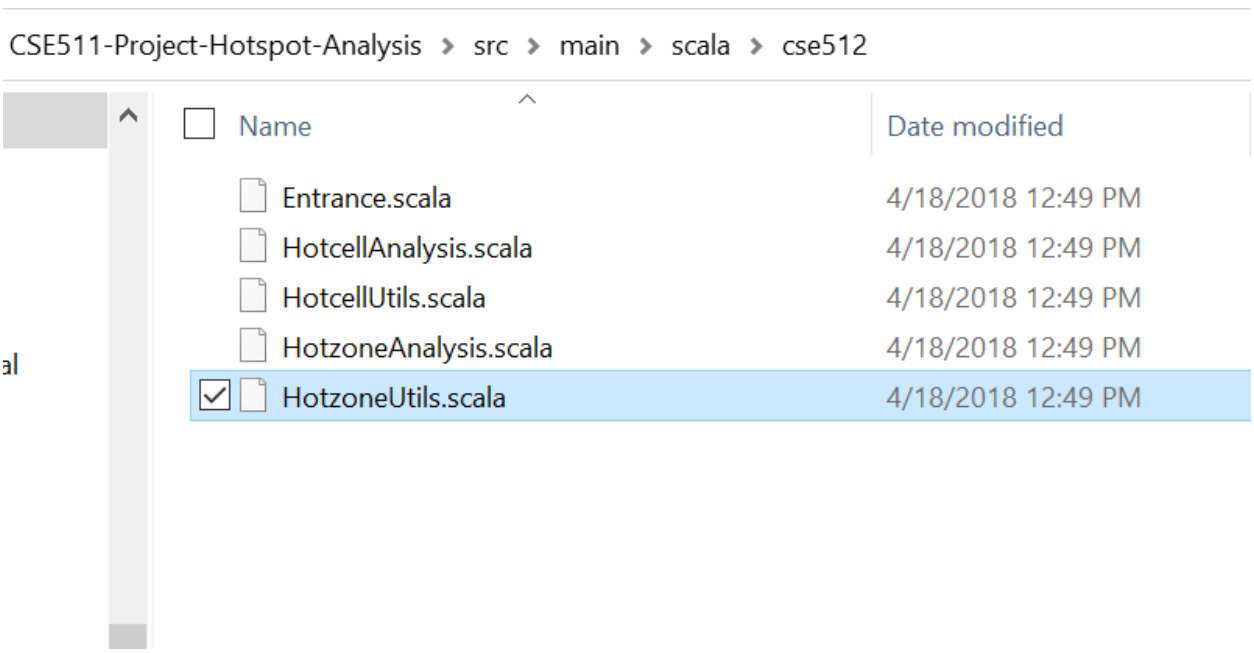
Input 2 strings

1) Corner (opposite) points of rectangle

2) point

Whether point is in rectangle or not?

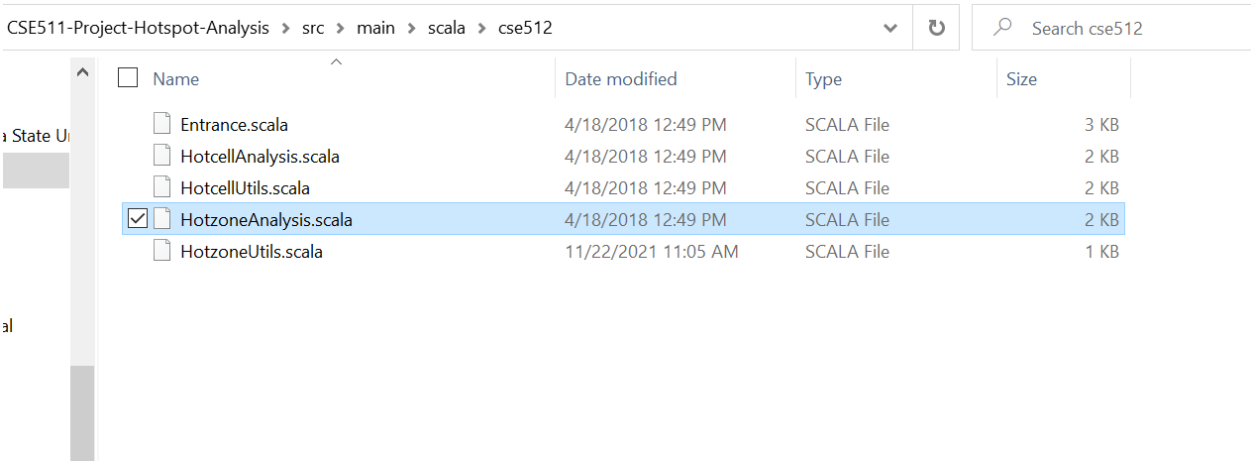




Need to modify this Scala file to write the function ***ST-Contains***.

```scala
package cse512

object HotzoneUtils {

  def ST_Contains(queryRectangle: String, pointString: String ): Boolean = {
    // YOU NEED TO CHANGE THIS PART
    return true // YOU NEED TO CHANGE THIS PART
  }

  // YOU NEED TO CHANGE THIS PART

}
```

Then open:



```
  // Parse point data formats
  spark.udf.register("trim",(string : String)=>(string.replace("(",
  "").replace(")", "")))
  pointDf = spark.sql("select trim(_c5) as _c5 from point")
  pointDf.createOrReplaceTempView("point")

  // Load rectangle data
  val rectangleDf =
  spark.read.format("com.databricks.spark.csv").option("delimiter","\t").option("h
  der","false").load(rectanglePath);
  rectangleDf.createOrReplaceTempView("rectangle")

  // Join two datasets
  spark.udf.register("ST_Contains",(queryRectangle:String,
  pointString:String)=>(HotzoneUtils.ST_Contains(queryRectangle, pointString)))
  val joinDf = spark.sql("select rectangle._c0 as rectangle, point._c5 as point
  from rectangle,point where ST_Contains(rectangle._c0,point._c5)")
  joinDf.createOrReplaceTempView("joinResult")

  // YOU NEED TO CHANGE THIS PART

  return joinDf // YOU NEED TO CHANGE THIS PART
}
```

Need to add .coalesce(1) to the last query And This function merges all the partitions into a single partition and returns the output.

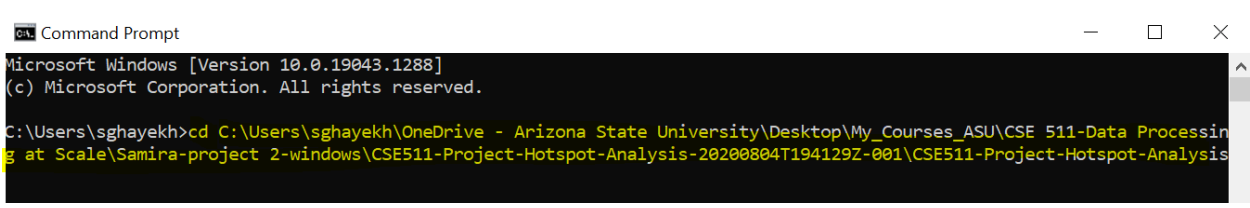
Create a jar file

Now once you wrote the functions in Scala, you need to ***create the jar file*** and then test it.

Go to the main root of template:

Open the command line: Go to the direction:

Cd C:\YOURPATH\CSE511-Project-Hotspot-Analysis-20200804T194129Z-001\CSE511-Project-Hotspot-Analysis



Write : ***Sbt assembly***

```
..zip
C:\Users\sghayekh\OneDrive - Arizona State University\Desktop\My_Courses_ASU\CSE 511-Data Processing at Scale\Samira-pro
ject 2-windows\CSE511-Project-Hotspot-Analysis-20200804T194129Z-001\CSE511-Project-Hotspot-Analysis>sbt assembly
```

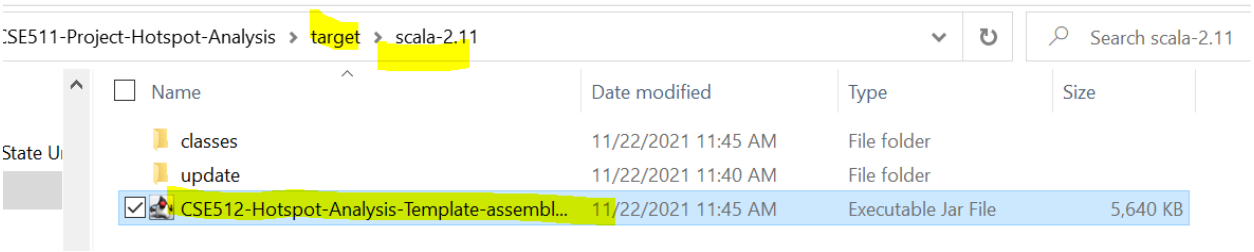
Takes some time to create a jar file.

```
[info] loading project definition from C:\Users\sghayekh\OneDrive - Arizona State University\D
 at Scale\Samira-project 2-windows\CSE511-Project-Hotspot-Analysis-20200804T194129Z-001\CSE511
[info] loading settings for project root from build.sbt ...
[info] set current project to CSE512-Hotspot-Analysis-Template (in build file:/C:/Users/sghaye
y/Desktop/My_Courses_ASU/CSE%20511-Data%20Processing%20at%20Scale/Samira-project%202-windows/C
9Z-001/CSE511-Project-Hotspot-Analysis/)
[info] Compiling 5 Scala sources to C:\Users\sghayekh\OneDrive - Arizona State University\Desk
 Scale\Samira-project 2-windows\CSE511-Project-Hotspot-Analysis-20200804T194129Z-001\CSE511-Pr
ses ...
[warn] there was one deprecation warning; re-run with -deprecation for details
[warn] one warning found
[info] Including: scala-library-2.11.11.jar
[info] ScalaTest
[info] Run completed in 47 milliseconds.
[info] Total number of tests run: 0
[info] Suites: completed 0, aborted 0
[info] Tests: succeeded 0, failed 0, canceled 0, ignored 0, pending 0
[info] No tests were executed.
[info] Checking every *.class/*.jar file's SHA-1.
[info] Merging files...
[warn] Merging 'META-INF\MANIFEST.MF' with strategy 'discard'
[warn] Strategy 'discard' was applied to a file
[info] SHA-1: f7d1f34c9ea16dfa54fe10fbf07f39f15d15a639
[success] Total time: 13 s, completed Nov 22, 2021 11:45:21 AM
```

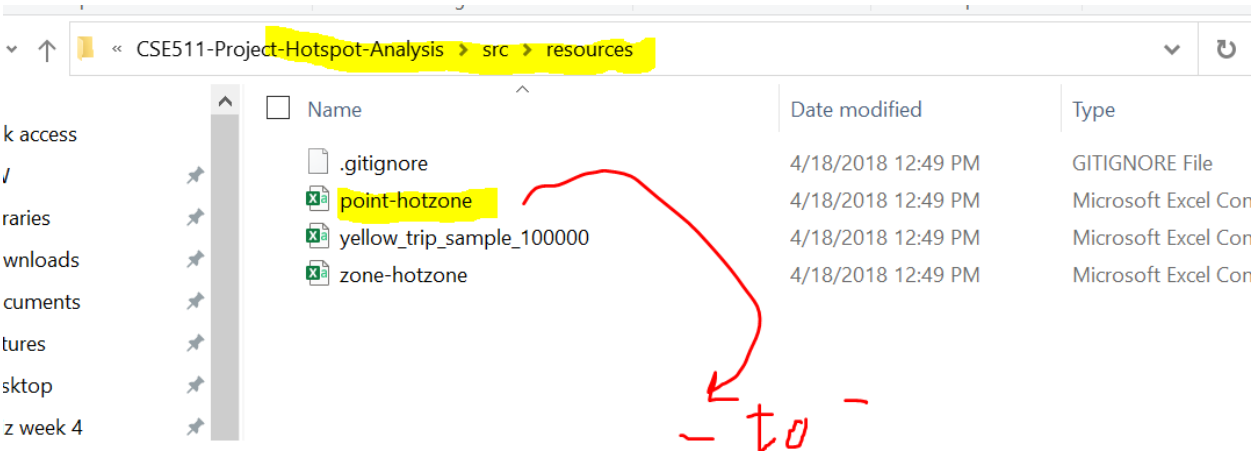
See the jar file in

ject-Hotspot-Analysis-20200804T194129Z-001 › CSE511-Project-Hotspot-Analysis Search CSE511

Name	Date modified	Type	Size
project	11/22/2021 11:40 AM	File folder	
src	11/22/2021 10:34 AM	File folder	
target	11/22/2021 11:40 AM	File folder	
testcase	11/22/2021 10:34 AM	File folder	
.gitignore	4/18/2018 12:49 PM	GITIGNORE File	1 KB
build.sbt	4/18/2018 12:49 PM	SBT File	1 KB
README.md	8/4/2020 11:30 AM	MD File	7 KB



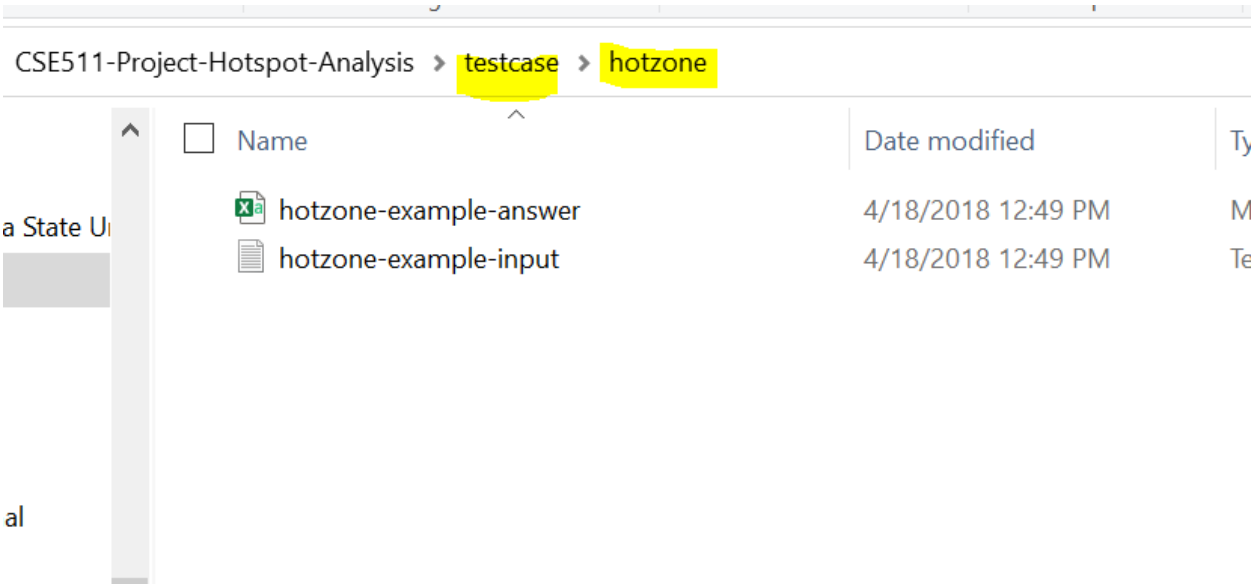
Now change this part in resource:



Test your code

After creating a jar file need to test it.

Now test your Jar file with input test cases:



Make sure you have a right slash (/):

Forward slash set used for (Linux). ***Windows*** use ***back slash***.

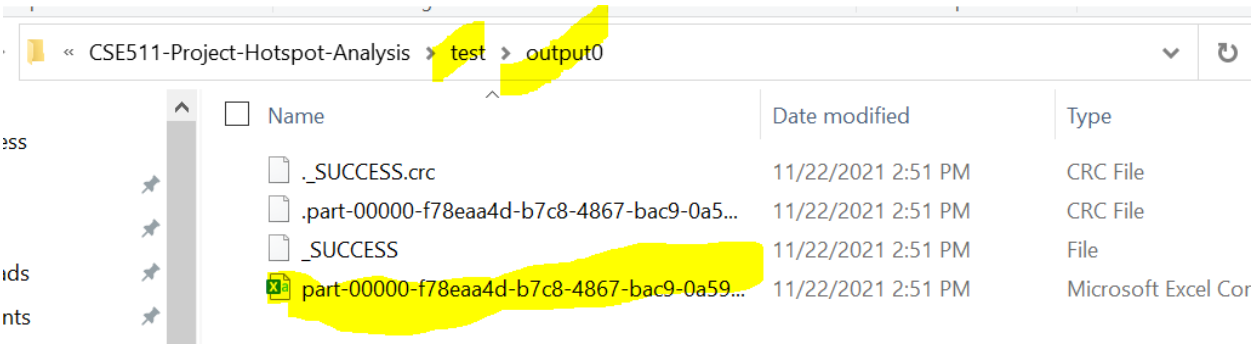
//windows

test\output hotzoneanalysis src\resources\point-hotzone.csv src\resources\zone-hotzone.csv

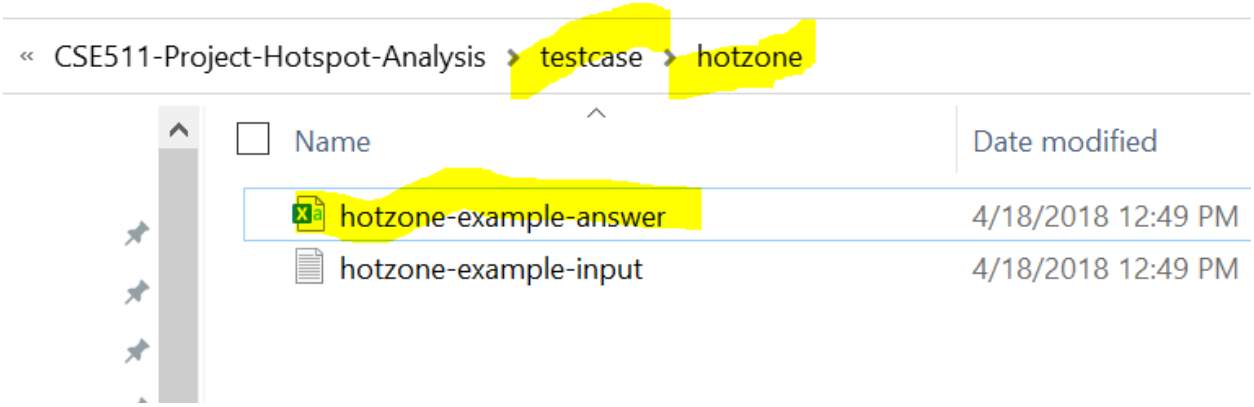
Need to write this part as well:

C:\Users\sghayekh\OneDrive - Arizona State University\Desktop\My_Courses_ASU\CSE 511-Data Processing at Scale\Samira-project 2-windows\CSE511-Project-Hotspot-Analysis-20200804T194129Z-001\CSE511-Project-Hotspot-Analysis>spark-submit target\scala-2.11\CSE512-Hotspot-Analysis-Template-assembly-0.1.0.jar test\output hotzoneanalysis src\resources\point-hotzone.csv src\resources\zone-hotzone.csv

If everything were correct you will see the output in the following path:



Its content must be the same as output (hot zone-example-answer) as we have in template:



Done!

Hot Cell analysis:

1. After applying changes in "**HotcellAnalysis.scala** and **HotcellUtils.scala**"
2. Then make a Jar file.

```
C:\Users\sghayekh\OneDrive - Arizona State University\Desktop\My_Courses_ASU\CSE 511-Data Processing at Scale\Samira-
ject 2-windows\CSE511-Project-Hotspot-Analysis-20200804T194129Z-001\CSE511-Project-Hotspot-Analysis>Sbt assembly
[info] welcome to sbt 1.3.13 (Amazon.com Inc. Java 1.8.0_312)
[info] loading settings for project cse511-project-hotspot-analysis-build from plugins.sbt ...
```

Jar file created.

Before testing, We also need to download the point data from Coursera and paste it in the following path before test the jar file.

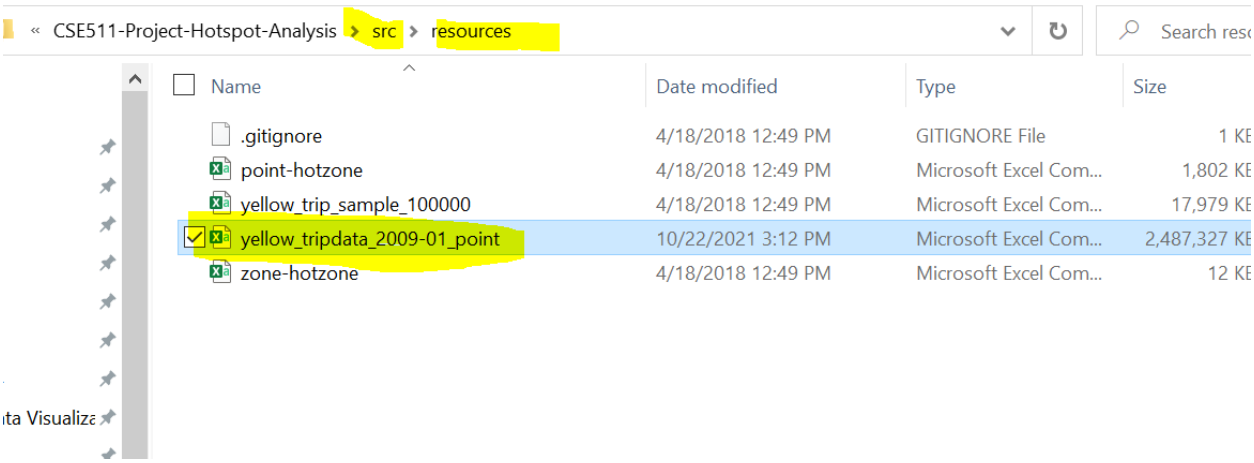
nput data format

The main function/entrace is "cse512.Entrance" scala file.

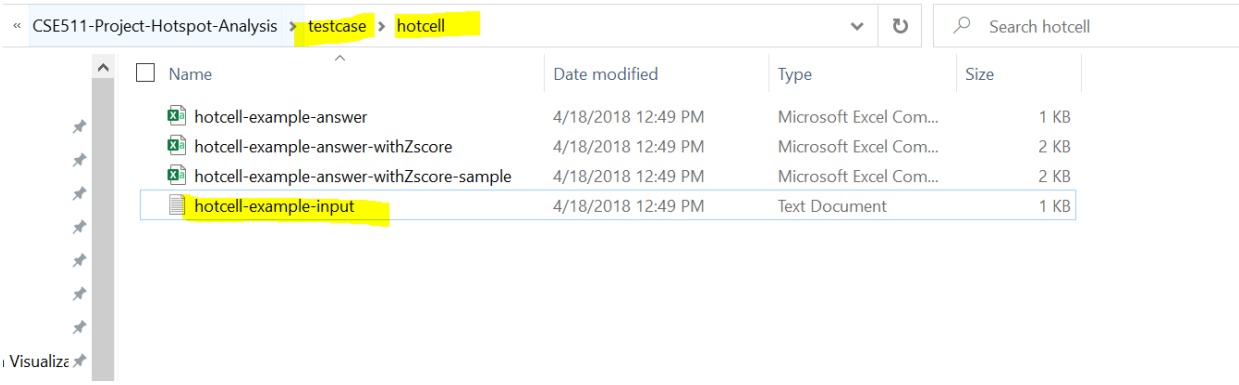
1. Point data: the input point dataset is the pickup point of New York Taxi trip datasets. But the coding template already parsed it for you. Find the data in the .zip file below.

2. Zone data (only for hot zone analysis): at "src/resources/zone-hotzone" of the template

Hot zone analysis



Then test the test cases from the following path:



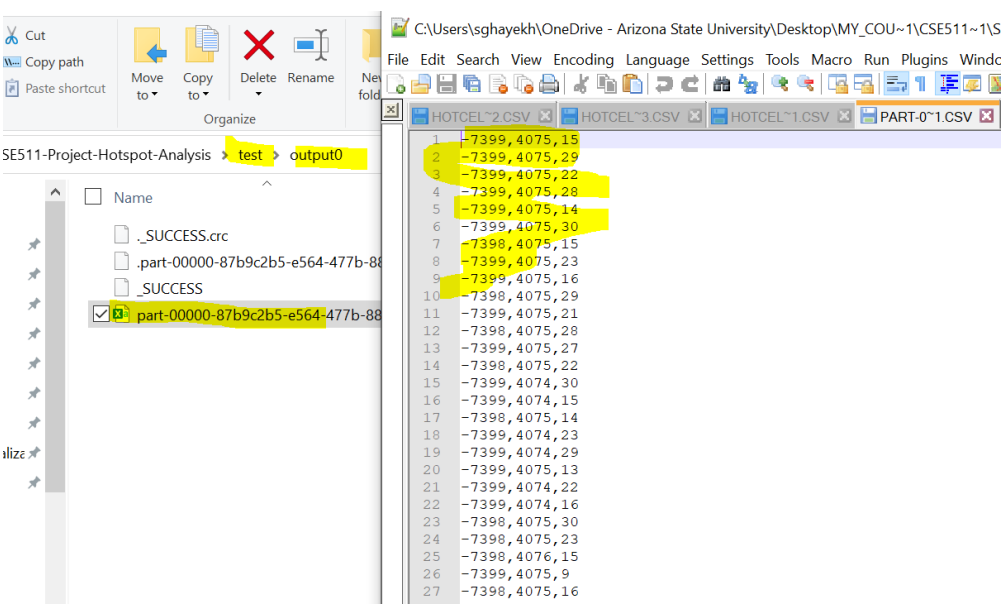
//windows

test\output hotcellanalysis src\resources\yellow_tripdata_2009-01_point.csv

Need to write the following commands:

```
C:\Users\sghayekh\OneDrive - Arizona State University\Desktop\My_Courses_ASU\CSE 511-Data Processing at Scale\Samira-project 2-windows\CSE511-Project-Hotspot-Analysis-20200804T194129Z-001\CSE511-Project-Hotspot-Analysis>spark-submit target\scala-2.11\CSE512-Hotspot-Analysis-Template-assembly-0.1.0.jar test\output hotcellanalysis src\resources\yellow_tripdata_2009-01_point.csv
```

Here is the output in test folder



Done!

And my jar file passed the auto grader successfully.