Big Data Management and Analytics
Assignment 6

Assignment 6-1

(a) Implement the word count example using PySpark

General ‚pattern' of a (Py)Spark program:

```
from pyspark import SparkConf, SparkContext
```

Configuration of a Spark application

```
sparkConf = SparkConf()
              .setAppName("MyProgram")
              .setMaster("local")


sc = SparkContext(conf=sparkConf)
```

Master URL to connect to
local: run locally with one thread
local[4]: run locally with 4 cores

Represents connection to a Spark cluster.
Can be used to create RDDs, accumulators and broadcast variables to that cluster.

Note: once a SparkConf object is passed to Spark, it is cloned and can no longer be modified by the user!

Assignment 6-1

(a) Implement the word count example using PySpark

General ‚pattern' of a (Py)Spark program:

```
somevar = sc.parallelize(someData)
```

Creates from a provided iterable or collection an RDD.

→ Dataset is cut into a certain number of partitions automatically
→ # of partitions can be set manually by second parameter (someData, numberOfPartitions)

Assignment 6-1

(a) Implement the word count example using PySpark

General ‚pattern' of a (Py)Spark program:

```
smth_mapped = somevar.map(f)

smth_reduced = smth_mapped.reduceByKey(
                    lambda var1, var2 : var1 op var2)

smth_collected = smth_reduced.collect()
```

Assignment 6-1

(a) Implement the word count example using PySpark

```
from pyspark import SparkConf, SparkContext
```

```
sparkConf = (SparkConf()
             .setAppName("WordCount")
             .setMaster("local"))
sc = SparkContext(conf=sparkConf)
```

```
words = sc.parallelize(["scala","java","hadoop","spark","akka"])
```

```
#assign key to each word
wordsMapped1 = words.map(lambda word: (word, 1))

#returns an RDD object
wordCount1 = wordsMapped1.reduceByKey(lambda c1, c2: c1 + c2)

print('Number of occurences per word: ', wordCount1.collect())
```

Assignment 6-2

(a) + (b) matrix-matrix multiplication using Spark

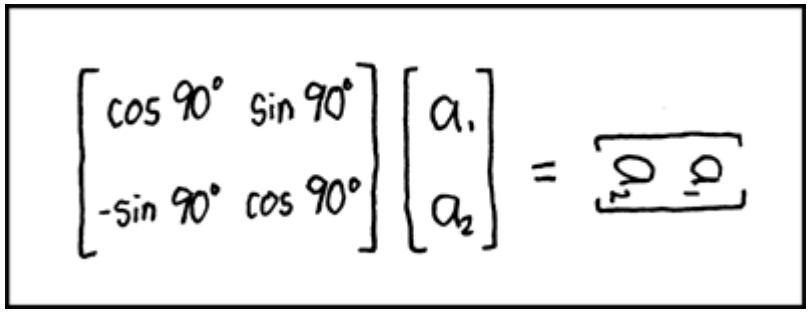
RECAP: Assignment 4-1:

Following steps are required for performing a matrix-matrix multiplication using MapReduce:

1. Map $(i, j, a_{ij}) \rightarrow (j, (A, i, a_{ij}))$ $(j, k, b_{jk}) \rightarrow (j, (B, k, b_{jk}))$
2. Join $\left(j, (A, i, a_{ij})\right) \bowtie \left(j, (B, k, b_{jk})\right) \rightarrow \; (j, [(A, i, a_{ij}), (B, k, b_{jk})])$
3. Map $(j, [(A, i, a_{ij}), (B, k, b_{jk})]) \rightarrow ((i, k), (a_{ij} b_{jk}))$
4. ReduceByKey $\left((i, k), [(a_{ij} b_{jk})]\right) \rightarrow ((i, k), \sum (a_{ij}, b_{jk}))$

Assignment 6-2

Now let's have a look at the code…



https://xkcd.com/184/

Running Spark on Windows

1. Run master node:
    * spark-class.cmd org.apache.spark.deploy.master.Master
    * spark-class.cmd is located in the bin directory

2. Check if Spark is up-and-running:
    * fire up your browser and type in: http://localhost:8080
    * you should see a Spark Master page
    * get the URL! (e.g. spark://10.153.51.36:7077)

3. Run worker node:
    * spark-class.cmd org.apache.spark.deploy.worker.Worker spark://10.153.51.36:7077

4. Run Python script:
    * spark-submit awesomescript.py