

Big data: architectures and data analytics

Spark - Exercises

Exercise #30

- Log filtering
 - Input: a simplified log of a web server (i.e., a textual file)
 - Each line of the file is associated with a URL request
 - Output: the lines containing the word "google"
 - Store the output in an HDFS folder

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Exercise #30 - Example

- Input file

```
66.249.69.97 -- [24/Sep/2014:22:25:44 +0000] "GET http://www.google.com/bot.html"
66.249.69.97 -- [24/Sep/2014:22:26:44 +0000] "GET http://www.google.com/how.html"
66.249.69.97 -- [24/Sep/2014:22:28:44 +0000] "GET http://dbdmg.polito.it/course.html"
71.19.157.179 -- [24/Sep/2014:22:30:12 +0000] "GET http://www.google.com/faq.html"
66.249.69.97 -- [24/Sep/2014:31:28:44 +0000] "GET http://dbdmg.polito.it/thesis.html"
```

- Output

```
66.249.69.97 -- [24/Sep/2014:22:25:44 +0000] "GET http://www.google.com/bot.html"
66.249.69.97 -- [24/Sep/2014:22:26:44 +0000] "GET http://www.google.com/how.html"
71.19.157.179 -- [24/Sep/2014:22:30:12 +0000] "GET http://www.google.com/faq.html"
```

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Exercise #31

- Log analysis
 - Input: log of a web server (i.e., a textual file)
 - Each line of the file is associated with a URL request
 - Output: the list of distinct IP addresses associated with the connections to a google page (i.e., connections to URLs containing the term "www.google.com")
 - Store the output in an HDFS folder

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Exercise #31 - Example

■ Input file

```
66.249.69.97 -- [24/Sep/2014:22:25:44 +0000] "GET http://www.google.com/bot.html"
66.249.69.97 -- [24/Sep/2014:22:26:44 +0000] "GET http://www.google.com/how.html"
66.249.69.97 -- [24/Sep/2014:22:28:44 +0000] "GET http://dbdmg.polito.it/course.html"
71.19.157.179 -- [24/Sep/2014:22:30:12 +0000] "GET http://www.google.com/faq.html"
66.249.69.95 -- [24/Sep/2014:31:28:44 +0000] "GET http://dbdmg.polito.it/thesis.html"
66.249.69.97 -- [24/Sep/2014:56:26:44 +0000] "GET http://www.google.com/how.html"
56.249.69.97 -- [24/Sep/2014:56:26:44 +0000] "GET http://www.google.com/how.html"
```

■ Output

```
66.249.69.97
71.19.157.179
56.249.69.97
```

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Exercise #32

- Maximum value
 - Input: a collection of (structured) textual csv files containing the daily value of PM10 for a set of sensors
 - Each line of the files has the following format
sensorId,date,PM10 value ($\mu\text{g}/\text{m}^3$)\n
 - Output: report the maximum value of PM10
 - Print the result on the standard output

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Exercise #32 - Example

- Input file

```
s1,2016-01-01,20.5
s2,2016-01-01,30.1
s1,2016-01-02,60.2
s2,2016-01-02,20.4
s1,2016-01-03,55.5
s2,2016-01-03,52.5
```

- Output 60.2

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Exercise #33

- Top-k maximum values
 - Input: a collection of (structured) textual csv files containing the daily value of PM₁₀ for a set of sensors
 - Each line of the files has the following format
 sensorId,date,PM₁₀ value (μg/m³)\n
 - Output: report the top-3 maximum values of PM₁₀
 - Print the result on the standard output

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Exercise #33 - Example

- Input file

```
s1,2016-01-01,20.5
s2,2016-01-01,30.1
s1,2016-01-02,60.2
s2,2016-01-02,20.4
s1,2016-01-03,55.5
s2,2016-01-03,52.5
```

- Output

```
60.2
55.5
52.5
```

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Exercise #34

- Readings associated with the maximum value
 - Input: a collection of (structured) textual csv files containing the daily value of PM10 for a set of sensors
 - Each line of the files has the following format
 sensorId,date,PM10 value ($\mu\text{g}/\text{m}^3$)\n
 - Output: the line(s) associated with the maximum value of PM10
 - Store the result in an HDFS folder

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Exercise #34 - Example

- Input file

```
s1,2016-01-01,20.5
s2,2016-01-01,30.1
s1,2016-01-02,60.2
s2,2016-01-02,20.4
s1,2016-01-03,60.2
s2,2016-01-03,52.5
```

- Output

```
s1,2016-01-02,60.2
s1,2016-01-03,60.2
```

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Exercise #35

- Dates associated with the maximum value
 - Input: a collection of (structured) textual csv files containing the daily value of PM10 for a set of sensors
 - Each line of the files has the following format
sensorId,date,PM10 value ($\mu\text{g}/\text{m}^3$)\n
 - Output: the date(s) associated with the maximum value of PM10
 - Store the result in an HDFS folder

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Exercise #35 - Example

- Input file

```
s1,2016-01-01,20.5
s2,2016-01-01,30.1
s1,2016-01-02,60.2
s2,2016-01-02,20.4
s1,2016-01-03,60.2
s2,2016-01-03,52.5
```

- Output

```
2016-01-02
2016-01-03
```

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Exercise #36

- Average value
 - Input: a collection of (structured) textual csv files containing the daily value of PM₁₀ for a set of sensors
 - Each line of the files has the following format
 sensorId,date,PM₁₀ value (µg/m³)\n
 - Output: compute the average PM₁₀ value
 - Print the result on the standard output

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Exercise #36 - Example

- Input file

```
s1,2016-01-01,20.5
s2,2016-01-01,30.1
s1,2016-01-02,60.2
s2,2016-01-02,20.4
s1,2016-01-03,55.5
s2,2016-01-03,52.5
```

- Output 39.86

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