Universidad
de La Laguna

ESCUELA TÉCNICA SUPERIOR
INGENIERÍA INFORMÁTICA

Hadoop - MapReduce
Restaurants close to Tenerife's beaches

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Goal

We want to know the closest restaurants of each beach of Tenerife in order to:

- Inform and recommend to the tourist that visit the island where they can take a meal.
- Give new gastronomic options to the Tenerife population.
- Promote new restaurants.

Solution

- We use **Hadoop-MapReduce** to solve this approach.
- The input files of beaches and restaurants come from **OpenData Canarias**, specifically from **SPET, Turismo de Tenerife S.A.** Dataset.
- It's possible to change the distance value (in km) for the search.

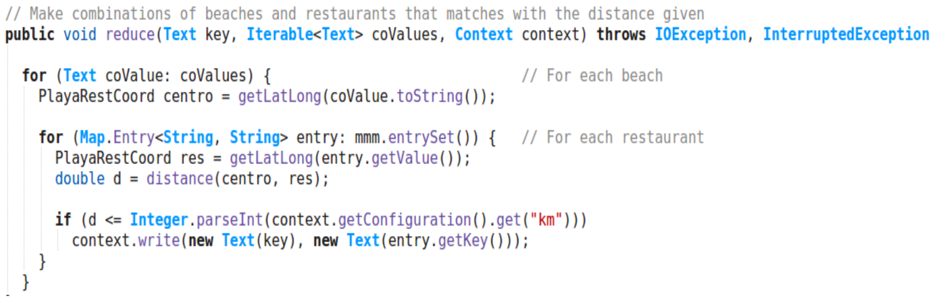
Mapper

```java
// Mapper
public static class PlayaRestMapper extends Mapper<Object, Text, Text, Text> {

  private static final String SEPARATOR = ",";

  public void map(Object key, Text value, Context context) throws IOException, InterruptedException {

    final String[] values = value.toString().split(SEPARATOR);

    final String playa = values[0].trim();     // Beach's name
    final String lat = values[2].trim();       // Latitude
    final String lon = values[3].trim();       // Longitude
    final String coord = lat + "," + lon;      // Coordinates

    context.write(new Text(playa), new Text(coord));
  }
}
```

Combiner I

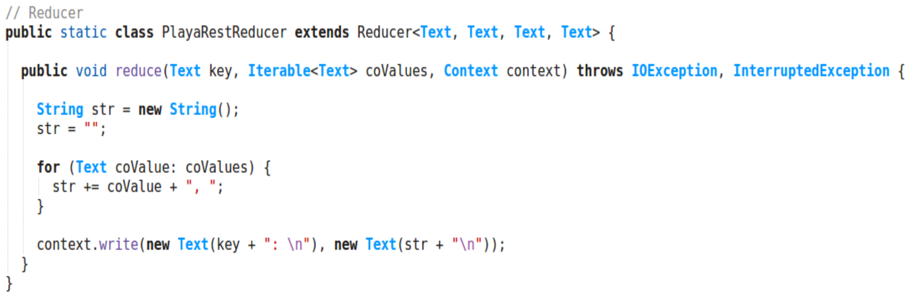
```
// Combiner
public static class PlayaRestCombiner extends Reducer<Text, Text, Text, Text> {

  // Hash that stores restaurants' coordinates
  Map<String, String> m = new HashMap<String, String> ();



BufferedReader reader = new BufferedReader(new FileReader("restauracion.csv"));

while ((strRead=reader.readLine() ) != null) {
  String splitarray[] = strRead.split(SEPARATOR);

  final String res = splitarray[0].trim();    // Restaurant's name
  final String lat = splitarray[2].trim();    // Latitude
  final String lon = splitarray[3].trim();    // Longitude
  final String coord = lat + "," + lon;       // Coordinates

  m.put(res, coord);
}
```

Combiner II



```java
// Make combinations of beaches and restaurants that matches with the distance given
public void reduce(Text key, Iterable<Text> coValues, Context context) throws IOException, InterruptedException

  for (Text coValue: coValues) {                              // For each beach
    PlayaRestCoord centro = getLatLong(coValue.toString());

    for (Map.Entry<String, String> entry: mmm.entrySet()) {   // For each restaurant
      PlayaRestCoord res = getLatLong(entry.getValue());
      double d = distance(centro, res);

      if (d <= Integer.parseInt(context.getConfiguration().get("km")))
        context.write(new Text(key), new Text(entry.getKey()));
    }
  }
```

Reducer



```
// Reducer
public static class PlayaRestReducer extends Reducer<Text, Text, Text, Text> {

  public void reduce(Text key, Iterable<Text> coValues, Context context) throws IOException, InterruptedException {

    String str = new String();
    str = "";

    for (Text coValue: coValues) {
      str += coValue + ", ";
    }

    context.write(new Text(key + ": \n"), new Text(str + "\n"));
  }
}
```

Running the example

bin/hadoop jar <.jar> <ClassName> <input dir> <output dir> **-files** <file.csv> **-D** <distance>

bin/hadoop jar pr.jar PlayaRest /user/hduser/input /user/hduser/output -**files** /opt/hadoop/jj/restauracion.csv -**D** 5

Problems

- Scope of classes' attributes (e.g: between Mappers).
- Need of customization of the context for each problem.
- Constraint of key-value data.

Bibliography

- "Latest stable documentation."
  https://hadoop.apache.org/docs/stable/.
- "Multiple input files."
  http://goo.gl/As5yoW.
- "Passing parameters to Mappers and Reducers."
  http://goo.gl/MDn7V8.
- "Basic MapReduce."
  http://www.adictosaltrabajo.com/tutoriales/mapreduce-basic/.

End

Thank you