

Large Scale Data Management

Project Assignment 1, February 2024

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Part 1

For the 1st part I used the “DonQuixote.txt” file from this website <https://www.gutenberg.org/files/996/996-0.txt> which describes a middle-aged gentleman from the region of La Mancha in central Spain. Obsessed with the chivalrous ideals touted in books he has read, he decides to take up his lance and sword to defend the helpless and destroy the wicked. Below you can see the output of the Map-reduce execution for this book.

```
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hadoop jar /hadoop-map-reduce-examples-1.0-SNAPSHOT-jar-with-dependencies.jar
2024-02-05 20:10:40,828 INFO client.RMProxy: Connecting to ResourceManager at resourcemanager/172.18.0.3:8032
2024-02-05 20:10:41,416 INFO client.AHSProxy: Connecting to Application History server at historyserver/172.18.0.6:18200
2024-02-05 20:10:42,416 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
2024-02-05 20:10:42,577 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-jarn/staging/root/.staging/job_1707163372436_0001
2024-02-05 20:10:43,238 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-05 20:10:44,170 INFO input.FileInputFormat: Total input files to process : 1
2024-02-05 20:10:44,387 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-05 20:10:44,513 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-05 20:10:44,568 INFO mapreduce.JobSubmitter: number of splits:1
2024-02-05 20:10:45,890 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-05 20:10:45,284 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1707163372436_0001
2024-02-05 20:10:45,286 INFO mapreduce.JobSubmitter: Executing with tokens: []
2024-02-05 20:10:45,883 INFO conf.Configuration: resource-types.xml not found
2024-02-05 20:10:45,885 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2024-02-05 20:10:47,328 INFO impl.YarnClientImpl: Submitted application application_1707163372436_0001
2024-02-05 20:10:47,513 INFO mapreduce.Job: The url to track the job: http://resourcemanager:8080/proxy/application_1707163372436_0001/
2024-02-05 20:10:47,517 INFO mapreduce.Job: Running job: job_1707163372436_0001
2024-02-05 20:11:17,895 INFO mapreduce.Job: Job job_1707163372436_0001 running in uber mode : false
2024-02-05 20:11:17,183 INFO mapreduce.Job: map 0% reduce 0%
2024-02-05 20:11:25,405 INFO mapreduce.Job: map 100% reduce 0%
2024-02-05 20:11:49,896 INFO mapreduce.Job: map 100% reduce 100%
2024-02-05 20:11:52,861 INFO mapreduce.Job: Job job_1707163372436_0001 completed successfully
2024-02-05 20:11:52,479 INFO mapreduce.Job: Counters: 54
  File System Counters
    FILE: Number of bytes read=155400
    FILE: Number of bytes written=749095
    FILE: Number of read operations=0
    FILE: Number of large read operations=0
    FILE: Number of write operations=0
    HDFS: Number of bytes read=2391665
    HDFS: Number of bytes written=368154
    HDFS: Number of read operations=0
    HDFS: Number of large read operations=0
    HDFS: Number of write operations=2
    HDFS: Number of bytes read erasure-coded=0
  Job Counters
    Launched map tasks=1
    Launched reduce tasks=1
    Rack-local map tasks=1
    Total time spent by all maps in occupied slots (ms)=59100
    Total time spent by all reduces in occupied slots (ms)=88776
    Total time spent by all map tasks (ms)=14775
    Total time spent by all reduce tasks (ms)=11897
    Total vcore-milliseconds taken by all map tasks=14775
    Total vcore-milliseconds taken by all reduce tasks=11897
    Total megabyte-milliseconds taken by all map tasks=60518400
    Total megabyte-milliseconds taken by all reduce tasks=90906624
  Map-Reduce Framework
    Map input records=43279
    Map output records=437895
    Map output bytes=4095276
    Map output materialized bytes=155392
    Input split bytes=116
    Combine input records=437895
    Combine output records=33434
    Reduce input groups=33434
    Reduce shuffle bytes=155392
    Reduce input records=33434
    Reduce output records=33434
    Spilled Records=60868
    Shuffled Maps=1
    Failed Shuffles=0
```

```

2024-02-05 20:11:52,861 INFO mapreduce.Job: Job job_1707163372436_0001 completed successfully
2024-02-05 20:11:52,479 INFO mapreduce.Job: Counters: 54
File System Counters
  FILE: Number of bytes read=155400
  FILE: Number of bytes written=769095
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=2391665
  HDFS: Number of bytes written=368154
  HDFS: Number of read operations=8
  HDFS: Number of large read operations=0
  HDFS: Number of write operations=2
  HDFS: Number of bytes read erasure-coded=0
Job Counters
  Launched map tasks=1
  Launched reduce tasks=1
  Rack-local map tasks=1
  Total time spent by all maps in occupied slots (ms)=59100
  Total time spent by all reduces in occupied slots (ms)=88776
  Total time spent by all map tasks (ms)=14775
  Total time spent by all reduce tasks (ms)=11897
  Total vcore-milliseconds taken by all map tasks=14775
  Total vcore-milliseconds taken by all reduce tasks=11897
  Total megabyte-milliseconds taken by all map tasks=40518400
  Total megabyte-milliseconds taken by all reduce tasks=98986624
Map-Reduce Framework
  Map input records=43279
  Map output records=437095
  Map output bytes=4095276
  Map output materialized bytes=155392
  Input split bytes=116
  Combine input records=437095
  Combine output records=33434
  Reduce input groups=33434
  Reduce shuffle bytes=155392
  Reduce input records=33434
  Reduce output records=33434
  Spilled Records=66868
  Shuffled Maps=1
  Failed Shuffles=0
  Merged Map outputs=1
  GC time elapsed (ms)=269
  CPU time spent (ms)=0
  Physical memory (bytes) snapshot=10374656
  Virtual memory (bytes) snapshot=476078080
  Total committed heap usage (bytes)=415760384
  Peak Map Physical memory (bytes)=9044448
  Peak Map Virtual memory (bytes)=238039040
  Peak Reduce Physical memory (bytes)=9318208
  Peak Reduce Virtual memory (bytes)=238039040
Shuffle Errors
  BAD_ID=0
  CONNECTION=0
  IO_ERROR=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REDUCE=0
File Input Format Counters
  Bytes Read=2391549
File Output Format Counters
  Bytes Written=368154
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$

```

```

vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hdfs dfs -text /user/hdfs/output/part-r-000000 | head -100
2024-02-05 20:17:33,416 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-05 20:17:33,742 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
6886
#996| 1
$5,000| 1
&c.,'| 1
(s1| 1
(104K| 1
(105K| 1
(106K| 1
(108K| 1
(109K| 2
(10K| 1
(111K| 2
(112K| 1
(115K| 1
(118K| 1
(119K| 2
(11K| 1
(120K| 2
(122K| 1
(123K| 1
(124K| 1
(125K| 2
(126K| 3
(127K| 2
(129K| 5
(12K| 1
(130K| 1
(131K| 6
(132K| 1
(133K| 1
(134K| 1
(135K| 1
(137K| 3
(138K| 2
(139K| 2
(13K| 5
(140K| 2
(141K| 4
(142K| 3
(143K| 3
(144K| 1
(145K| 2
(147K| 2
(148K| 2
(149K| 1
(14K| 1
(150K| 2
(151K| 4
(152K| 2
(154K| 2
(155K| 2
(156K| 2
(157K| 1
(158K| 1
(159K| 3
(15K| 3
(160K| 1
(163K| 1
(164K| 1
(168K| 1

```

```
(142K) 3
(143K) 3
(144K) 1
(145K) 2
(147K) 2
(148K) 2
(149K) 1
(14K) 1
(150K) 2
(151K) 4
(152K) 2
(154K) 2
(155K) 2
(156K) 2
(157K) 1
(158K) 1
(159K) 3
(16K) 3
(168K) 1
(163K) 1
(164K) 1
(168K) 1
(169K) 1
(16K) 1
(170K) 1
(171K) 1
(172K) 2
(173K) 1
(177K) 1
(178K) 1
(17K) 2
(180K) 1
(181K) 3
(188K) 1
(18K) 6
(19K) 2
(204K) 1
(20K) 3
(21K) 1
(22K) 3
(232K) 1
(23K) 2
(243K) 1
(249K) 1
(24K) 2
(250K) 1
(251K) 1
(256K) 1
(261K) 2
(264K) 2
(268K) 1
(270K) 1
(271K) 1
(272K) 1
(273K) 1
(275K) 1
(279K) 1
(27K) 2
(280K) 1
(281K) 1
(283K) 1
vagrant@vagrant:/vagrant/hadoop-mapreduce-examples$
```

Also we can see that our docker containers are healthy during this process:

```
vagrant@vagrant:~$ docker ps
CONTAINER ID   IMAGE                                NAMES                        COMMAND                        CREATED        STATUS        PORTS
e91299d949ec   bde2020/hadoop-historyserver:2.0.0-hadoop3.2.1-java8  historyserver               "/entrypoint.sh /run_"      3 minutes ago  Up 3 minutes (healthy)   8188/tcp
d82e4441648e1   bde2020/hadoop-nodemanager:2.0.0-hadoop3.2.1-java8    nodemanager                 "/entrypoint.sh /run_"      3 minutes ago  Up 3 minutes (healthy)   8042/tcp
057bc3546060   bde2020/hadoop-datanode:2.0.0-hadoop3.2.1-java8       datanode                    "/entrypoint.sh /run_"      3 minutes ago  Up 3 minutes (healthy)   0.0.0.0:9864->9864/tcp, :::9864->9864/tcp
5b5aa7216dcb   bde2020/hadoop-resourcemanager:2.0.0-hadoop3.2.1-java8  resourcemanager             "/entrypoint.sh /run_"      3 minutes ago  Up 3 minutes (healthy)   0.0.0.0:8088->8088/tcp, :::8088->8088/tcp
58f640318293   bde2020/hadoop-namenode:2.0.0-hadoop3.2.1-java8       namenode                    "/entrypoint.sh /run_"      3 minutes ago  Up 3 minutes (healthy)   0.0.0.0:9000->9000/tcp, :::9000->9000/tcp
vagrant@vagrant:~$ cd "/vagrant/hadoop-mapreduce-examples/"
vagrant@vagrant:/vagrant/hadoop-mapreduce-examples$ mvn clean install
```

Part 2

In this part we are going to perform again the Map-Reduce execution but in this case to detect the most “danceable” song, along with its “danceability” and the average dance- ability of all songs for the same country and month pair from a .csv file which contains songs and its details from Spotify. As we can see from below the Map_reduce performed well and this is the result :

```
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hdfs dfs -rm -r /user/hdfs/output
Deleted /user/hdfs/output
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker cp /vagrant/hadoop-mapreduce-examples/target/hadoop-map-reduce-examples-1.0-SNAPSHOT-jar-with-dependencies.jar namenode:/
Successfully copied 24.4MB to namenode:/
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hadoop jar /hadoop-map-reduce-examples-1.0-SNAPSHOT-jar-with-dependencies.jar
2024-02-15 12:14:02,741 INFO client.RMProxy: Connecting to ResourceManager at resourcemanager:172.18.0.5:8082
2024-02-15 12:14:02,771 INFO client.AHSProxy: Connecting to Application History server at historyserver:172.18.0.3:10200
2024-02-15 12:14:03,422 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
2024-02-15 12:14:03,519 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/root/.staging/job_1707995172575_0002
2024-02-15 12:14:04,026 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-15 12:14:04,964 INFO input.FileInputFormat: Total input files to process : 1
2024-02-15 12:14:05,132 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-15 12:14:05,332 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-15 12:14:05,788 INFO mapreduce.JobSubmitter: number of splits:1
2024-02-15 12:14:06,344 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
2024-02-15 12:14:06,883 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1707995172575_0002
2024-02-15 12:14:06,888 INFO mapreduce.JobSubmitter: Executing with tokens: []
2024-02-15 12:14:07,540 INFO conf.Configuration: resource-types.xml not found
2024-02-15 12:14:07,542 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2024-02-15 12:14:08,018 INFO impl.YarnClientImpl: Submitted application application_1707995172575_0002
2024-02-15 12:14:08,168 INFO mapreduce.Job: The url to track the job: https://resourcemanager:8086/proxy/application_1707995172575_0002/
2024-02-15 12:14:08,168 INFO mapreduce.Job: Running job: job_1707995172575_0002
2024-02-15 12:14:30,216 INFO mapreduce.Job: Job job_1707995172575_0002 running in uber mode : false
2024-02-15 12:14:30,222 INFO mapreduce.Job: map 0% reduce 0%
2024-02-15 12:14:53,783 INFO mapreduce.Job: map 4% reduce 0%
2024-02-15 12:14:59,984 INFO mapreduce.Job: map 7% reduce 0%
2024-02-15 12:15:06,029 INFO mapreduce.Job: map 10% reduce 0%
2024-02-15 12:15:12,112 INFO mapreduce.Job: map 13% reduce 0%
2024-02-15 12:15:18,214 INFO mapreduce.Job: map 16% reduce 0%
2024-02-15 12:15:24,337 INFO mapreduce.Job: map 19% reduce 0%
2024-02-15 12:15:30,465 INFO mapreduce.Job: map 22% reduce 0%
2024-02-15 12:15:36,567 INFO mapreduce.Job: map 25% reduce 0%
2024-02-15 12:15:42,651 INFO mapreduce.Job: map 28% reduce 0%
2024-02-15 12:15:48,715 INFO mapreduce.Job: map 31% reduce 0%
2024-02-15 12:15:54,807 INFO mapreduce.Job: map 33% reduce 0%
2024-02-15 12:16:00,924 INFO mapreduce.Job: map 36% reduce 0%
2024-02-15 12:16:07,001 INFO mapreduce.Job: map 39% reduce 0%
2024-02-15 12:16:13,137 INFO mapreduce.Job: map 42% reduce 0%
2024-02-15 12:16:19,247 INFO mapreduce.Job: map 45% reduce 0%
2024-02-15 12:16:25,325 INFO mapreduce.Job: map 48% reduce 0%
2024-02-15 12:16:30,407 INFO mapreduce.Job: map 51% reduce 0%
2024-02-15 12:16:36,586 INFO mapreduce.Job: map 54% reduce 0%
2024-02-15 12:16:42,719 INFO mapreduce.Job: map 57% reduce 0%
2024-02-15 12:16:48,799 INFO mapreduce.Job: map 60% reduce 0%
2024-02-15 12:16:54,852 INFO mapreduce.Job: map 63% reduce 0%
2024-02-15 12:17:00,924 INFO mapreduce.Job: map 66% reduce 0%
2024-02-15 12:17:06,946 INFO mapreduce.Job: map 100% reduce 0%
2024-02-15 12:17:21,287 INFO mapreduce.Job: map 100% reduce 100%
2024-02-15 12:17:22,395 INFO mapreduce.Job: Job job_1707995172575_0002 completed successfully
2024-02-15 12:17:22,846 INFO mapreduce.Job: Counters: 54
File System Counters
  FILE: Number of bytes read=601450
  FILE: Number of bytes written=1660783
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=85676844
  HDFS: Number of bytes written=24140
  HDFS: Number of read operations=8
  HDFS: Number of large read operations=0
  HDFS: Number of write operations=2
  HDFS: Number of bytes read erasure-coded=0
Job Counters
  Launched map tasks=1
  Launched reduce tasks=1
  Rack-local map tasks=1
  Total time spent by all maps in occupied slots (ms)=608396
  Total time spent by all reduces in occupied slots (ms)=97984
  Total time spent by all map tasks (ms)=152099
  Total time spent by all reduce tasks (ms)=12248
  Total vcore-milliseconds taken by all map tasks=152099
  Total vcore-milliseconds taken by all reduce tasks=12248
  Total megabyte-milliseconds taken by all map tasks=62297584
  Total megabyte-milliseconds taken by all reduce tasks=108335616
Map-Reduce Framework
  Map input records=368798
  Map output records=368797
  Map output bytes=7927722
  Map output materialized bytes=601442
  Input split bytes=133
  Combine input records=0
  Combine output records=0
  Reduce input groups=292
  Reduce shuffle bytes=601442
  Reduce input records=368797
  Reduce output records=292
  Spilled Records=721594
  Shuffled Maps =1
  Failed Shuffles=0
  Merged Map outputs=1
  GC time elapsed (ms)=455
  CPU time spent (ms)=0
  Physical memory (bytes) snapshot=17575936
  Virtual memory (bytes) snapshot=476123136
  Total committed heap usage (bytes)=521631424
  Peak Map Physical memory (bytes)=9318400
  Peak Map Virtual memory (bytes)=238059520
  Peak Reduce Physical memory (bytes)=9322496
  Peak Reduce Virtual memory (bytes)=238063616
Shuffle Errors
  BAD_ID=0
  CONNECTION=0
  IO_ERROR=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REDUCE=0
File Input Format Counters
  Bytes Read=85676711
File Output Format Counters
  Bytes Written=24140
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hdfs dfs -text /user/hdfs/output/part-r-00000 | head -100
^Z
[2]- Stopped
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hdfs dfs -text /user/hdfs/output/part-r-00000 | head -100
2024-02-15 12:23:12,368 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
**: 2023-10 Most Danceable Song: 0.911, Average Danceability: 0.6691623931623933
**: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6573851444291627
**: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.6324294774193693
**: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6735483333333336
**AE: 2023-10 Most Danceable Song: 0.927, Average Danceability: 0.6569886201991468
**AE: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6587654746529696
**AE: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.6303412903225838
**AE: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6546158333333336
**AR: 2023-10 Most Danceable Song: 0.911, Average Danceability: 0.7493899999999989
**AR: 2023-11 Most Danceable Song: 0.925, Average Danceability: 0.7503364423717518
```

```
Job Counters
  Launched map tasks=1
  Launched reduce tasks=1
  Rack-local map tasks=1
  Total time spent by all maps in occupied slots (ms)=608396
  Total time spent by all reduces in occupied slots (ms)=97984
  Total time spent by all map tasks (ms)=152099
  Total time spent by all reduce tasks (ms)=12248
  Total vcore-milliseconds taken by all map tasks=152099
  Total vcore-milliseconds taken by all reduce tasks=12248
  Total megabyte-milliseconds taken by all map tasks=62297584
  Total megabyte-milliseconds taken by all reduce tasks=108335616
Map-Reduce Framework
  Map input records=368798
  Map output records=368797
  Map output bytes=7927722
  Map output materialized bytes=601442
  Input split bytes=133
  Combine input records=0
  Combine output records=0
  Reduce input groups=292
  Reduce shuffle bytes=601442
  Reduce input records=368797
  Reduce output records=292
  Spilled Records=721594
  Shuffled Maps =1
  Failed Shuffles=0
  Merged Map outputs=1
  GC time elapsed (ms)=455
  CPU time spent (ms)=0
  Physical memory (bytes) snapshot=17575936
  Virtual memory (bytes) snapshot=476123136
  Total committed heap usage (bytes)=521631424
  Peak Map Physical memory (bytes)=9318400
  Peak Map Virtual memory (bytes)=238059520
  Peak Reduce Physical memory (bytes)=9322496
  Peak Reduce Virtual memory (bytes)=238063616
Shuffle Errors
  BAD_ID=0
  CONNECTION=0
  IO_ERROR=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REDUCE=0
File Input Format Counters
  Bytes Read=85676711
File Output Format Counters
  Bytes Written=24140
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hdfs dfs -text /user/hdfs/output/part-r-00000 | head -100
^Z
[2]- Stopped
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hdfs dfs -text /user/hdfs/output/part-r-00000 | head -100
2024-02-15 12:23:12,368 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localhostTrusted = false, remoteHostTrusted = false
**: 2023-10 Most Danceable Song: 0.911, Average Danceability: 0.6691623931623933
**: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6573851444291627
**: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.6324294774193693
**: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6735483333333336
**AE: 2023-10 Most Danceable Song: 0.927, Average Danceability: 0.6569886201991468
**AE: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6587654746529696
**AE: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.6303412903225838
**AE: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6546158333333336
**AR: 2023-10 Most Danceable Song: 0.911, Average Danceability: 0.7493899999999989
**AR: 2023-11 Most Danceable Song: 0.925, Average Danceability: 0.7503364423717518
```



```
vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$ docker exec namenode hdfs dfs -text /user/hdfs/output/part-r-00000 | head -100
2024-02-15 12:23:12,368 INFO SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
**: 2023-10 Most Danceable Song: 0.911, Average Danceability: 0.6892744531223995
**: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6573851444291627
**: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.6324296774193593
**: 2023-01 Most Danceable Song: 0.943, Average Danceability: 0.6753453333333356
**AE*: 2023-10 Most Danceable Song: 0.927, Average Danceability: 0.656988281921468
**AE*: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6587654745529596
**AE*: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.6383147983225838
**AE*: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6544583333333348
**AR*: 2023-10 Most Danceable Song: 0.911, Average Danceability: 0.7493599999999989
**AR*: 2023-11 Most Danceable Song: 0.925, Average Danceability: 0.7583364423717518
**AR*: 2023-12 Most Danceable Song: 0.911, Average Danceability: 0.7404174193545386
**AR*: 2024-01 Most Danceable Song: 0.911, Average Danceability: 0.7287983333333343
**AT*: 2023-10 Most Danceable Song: 0.916, Average Danceability: 0.6875661458924598
**AT*: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6582398671896369
**AT*: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.6913154638789786
**AT*: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6695814666666675
**AU*: 2023-10 Most Danceable Song: 0.916, Average Danceability: 0.6419845584845575
**AU*: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6377232282262159
**AU*: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.6154946387896586
**AU*: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6518380808080814
**BE*: 2023-10 Most Danceable Song: 0.931, Average Danceability: 0.6511897289586293
**BE*: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.633245813777725
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**BG*: 2023-10 Most Danceable Song: 0.927, Average Danceability: 0.7117891737891742
**BG*: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.7849573598965382
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**BG*: 2024-01 Most Danceable Song: 0.968, Average Danceability: 0.7189380808080802
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**BO*: 2023-11 Most Danceable Song: 0.92, Average Danceability: 0.7266721285289855
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**BO*: 2024-01 Most Danceable Song: 0.92, Average Danceability: 0.7197883333333334
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**BR*: 2023-11 Most Danceable Song: 0.947, Average Danceability: 0.6799674527545334
**BR*: 2023-12 Most Danceable Song: 0.947, Average Danceability: 0.6638141935483892
**BR*: 2024-01 Most Danceable Song: 0.947, Average Danceability: 0.6648283333333347
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**BY*: 2023-11 Most Danceable Song: 0.955, Average Danceability: 0.69228789898973
**BY*: 2023-12 Most Danceable Song: 0.945, Average Danceability: 0.6822148387896755
**BY*: 2024-01 Most Danceable Song: 0.988, Average Danceability: 0.6825749999999978
**CA*: 2023-10 Most Danceable Song: 0.927, Average Danceability: 0.644811596113361
**CA*: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.621569348131871
**CA*: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.5933858864516158
**CA*: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6588516666666688
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**CH*: 2023-11 Most Danceable Song: 0.943, Average Danceability: 0.6499176628282861
**CH*: 2023-12 Most Danceable Song: 0.943, Average Danceability: 0.5879193548387129
**CH*: 2024-01 Most Danceable Song: 0.943, Average Danceability: 0.6468766666666683
**CL*: 2023-10 Most Danceable Song: 0.92, Average Danceability: 0.76534374579129
**CL*: 2023-11 Most Danceable Song: 0.925, Average Danceability: 0.7732880808080804
**CL*: 2023-12 Most Danceable Song: 0.925, Average Danceability: 0.768486451612985
**CL*: 2024-01 Most Danceable Song: 0.925, Average Danceability: 0.7753866666666677
**CO*: 2023-10 Most Danceable Song: 0.92, Average Danceability: 0.7638184445156785
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**CO*: 2024-01 Most Danceable Song: 0.92, Average Danceability: 0.7708514666666782
**CR*: 2023-10 Most Danceable Song: 0.92, Average Danceability: 0.7376427358427369
**CR*: 2023-11 Most Danceable Song: 0.92, Average Danceability: 0.7356262491672289
**CR*: 2023-12 Most Danceable Song: 0.92, Average Danceability: 0.727638789677413
**CR*: 2024-01 Most Danceable Song: 0.92, Average Danceability: 0.7236983333333337
**CZ*: 2023-10 Most Danceable Song: 0.929, Average Danceability: 0.7098471428571422
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**BY*: 2024-01 Most Danceable Song: 0.988, Average Danceability: 0.6825749999999978
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**DO*: 2023-11 Most Danceable Song: 0.949, Average Danceability: 0.76227692819148919
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**EG*: 2023-11 Most Danceable Song: 0.958, Average Danceability: 0.6986431158453376
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vagrant@vagrant:~/vagrant/hadoop-mapreduce-examples$
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