bash-5.0# hadoop jar /usr/program/hadoop/share/hadoop/mapreduce/hadoop-mapreduce-examples-3.2.3.jar pi -libjars ${libjars} 2 10

SLF4J: Class path contains multiple SLF4J bindings.

SLF4J: Found binding in [jar:file:/usr/program/hadoop/share/hadoop/common/lib/slf4j-log4j12-1.7.25.jar!/org/slf4j/impl/StaticLoggerBinder.class]

SLF4J: Found binding in [jar:file:/usr/program/tez/lib/slf4j-log4j12-1.7.10.jar!/org/slf4j/impl/StaticLoggerBinder.class]

SLF4J: Found binding in [jar:file:/usr/program/hive/lib/log4j-slf4j-impl-2.10.0.jar!/org/slf4j/impl/StaticLoggerBinder.class]

SLF4J: See http://www.slf4j.org/codes.html#multiple\_bindings for an explanation.

SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]

2023-10-03 03:32:55,454 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable

Number of Maps = 2

Samples per Map = 10

Wrote input for Map #0

Wrote input for Map #1

Starting Job

2023-10-03 03:32:57,279 INFO client.RMProxy: Connecting to ResourceManager at master/172.28.1.1:8032

2023-10-03 03:32:57,794 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/root/.staging/job\_1696303706397\_0001

2023-10-03 03:33:02,511 INFO input.FileInputFormat: Total input files to process : 2

2023-10-03 03:33:03,012 INFO mapreduce.JobSubmitter: number of splits:2

2023-10-03 03:33:03,292 INFO mapreduce.JobSubmitter: Submitting tokens for job: job\_1696303706397\_0001

2023-10-03 03:33:03,294 INFO mapreduce.JobSubmitter: Executing with tokens: []

2023-10-03 03:33:03,616 INFO conf.Configuration: resource-types.xml not found

2023-10-03 03:33:03,617 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.

2023-10-03 03:33:03,634 WARN mapred.YARNRunner: Configuration yarn.app.mapreduce.am.resource.memory-mb=512Mi is overriding the yarn.app.mapreduce.am.resource.mb=1536 configuration

2023-10-03 03:33:04,241 INFO impl.YarnClientImpl: Submitted application application\_1696303706397\_0001

2023-10-03 03:33:04,314 INFO mapreduce.Job: The url to track the job: http://master:8088/proxy/application\_1696303706397\_0001/

2023-10-03 03:33:04,315 INFO mapreduce.Job: Running job: job\_1696303706397\_0001

2023-10-03 03:33:14,580 INFO mapreduce.Job: Job job\_1696303706397\_0001 running in uber mode : false

2023-10-03 03:33:14,582 INFO mapreduce.Job: map 0% reduce 0%

2023-10-03 03:33:23,738 INFO mapreduce.Job: map 50% reduce 0%

2023-10-03 03:33:26,770 INFO mapreduce.Job: map 100% reduce 0%

2023-10-03 03:33:29,793 INFO mapreduce.Job: map 100% reduce 100%

2023-10-03 03:33:30,814 INFO mapreduce.Job: Job job\_1696303706397\_0001 completed successfully

2023-10-03 03:33:30,974 INFO mapreduce.Job: Counters: 54

File System Counters

FILE: Number of bytes read=50

FILE: Number of bytes written=738258

FILE: Number of read operations=0

FILE: Number of large read operations=0

FILE: Number of write operations=0

HDFS: Number of bytes read=522

HDFS: Number of bytes written=215

HDFS: Number of read operations=13

HDFS: Number of large read operations=0

HDFS: Number of write operations=3

HDFS: Number of bytes read erasure-coded=0

Job Counters

Launched map tasks=2

Launched reduce tasks=1

Data-local map tasks=2

Total time spent by all maps in occupied slots (ms)=26096

Total time spent by all reduces in occupied slots (ms)=15204

Total time spent by all map tasks (ms)=13048

Total time spent by all reduce tasks (ms)=3801

Total vcore-milliseconds taken by all map tasks=13048

Total vcore-milliseconds taken by all reduce tasks=3801

Total megabyte-milliseconds taken by all map tasks=13361152

Total megabyte-milliseconds taken by all reduce tasks=7784448

Map-Reduce Framework

Map input records=2

Map output records=4

Map output bytes=36

Map output materialized bytes=56

Input split bytes=286

Combine input records=0

Combine output records=0

Reduce input groups=2

Reduce shuffle bytes=56

Reduce input records=4

Reduce output records=0

Spilled Records=8

Shuffled Maps =2

Failed Shuffles=0

Merged Map outputs=2

GC time elapsed (ms)=314

CPU time spent (ms)=2300

Physical memory (bytes) snapshot=751931392

Virtual memory (bytes) snapshot=7061086208

Total committed heap usage (bytes)=703070208

Peak Map Physical memory (bytes)=285458432

Peak Map Virtual memory (bytes)=2355015680

Peak Reduce Physical memory (bytes)=182243328

Peak Reduce Virtual memory (bytes)=2355376128

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=236

File Output Format Counters

Bytes Written=97

Job Finished in 33.922 seconds

Estimated value of Pi is 3.80000000000000000000

the result of this MapReduce Pi estimation job demonstrates the fundamental concepts of parallel processing, distributed computing, and resource management in the context of Hadoop's MapReduce framework. It also highlights the tradeoff between the accuracy of results and the computational resources required.