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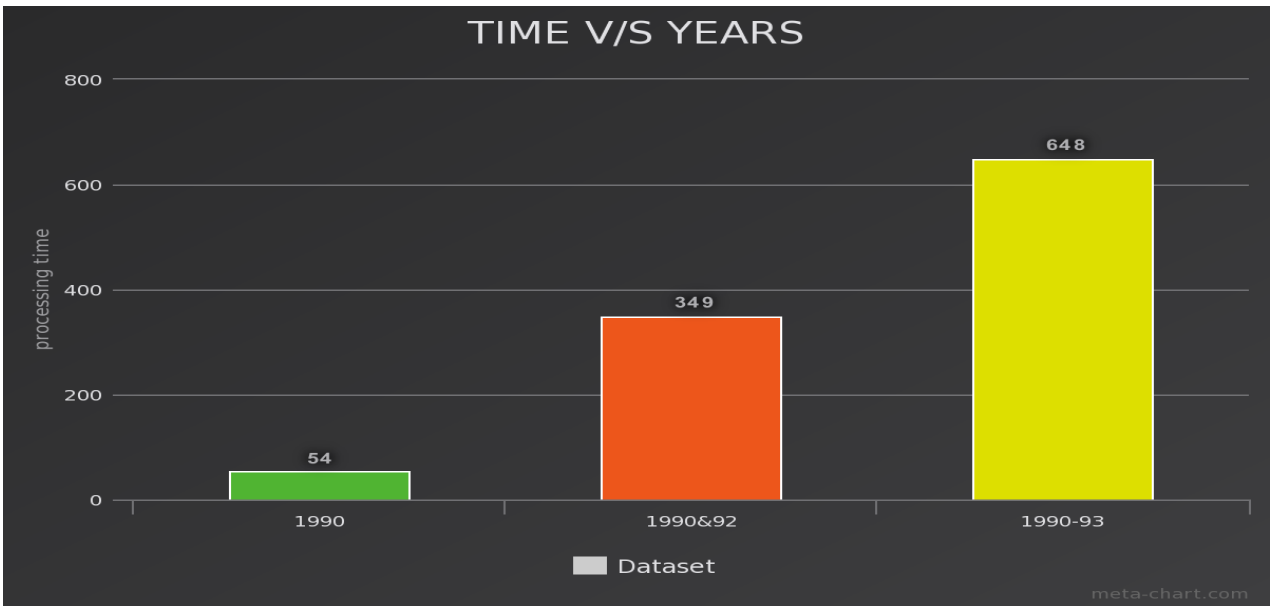
ITMD 521
Week 03

Below is a chart explaining of the amount of time required (in seconds) to run each dataset using the awk script, java, and MapReduce (with MaxTemperature and MaxTempetarureWithCombiner) with a graph combined with some screen shots to explain the process in detail and compare the time taken by each dataset.

Chart:

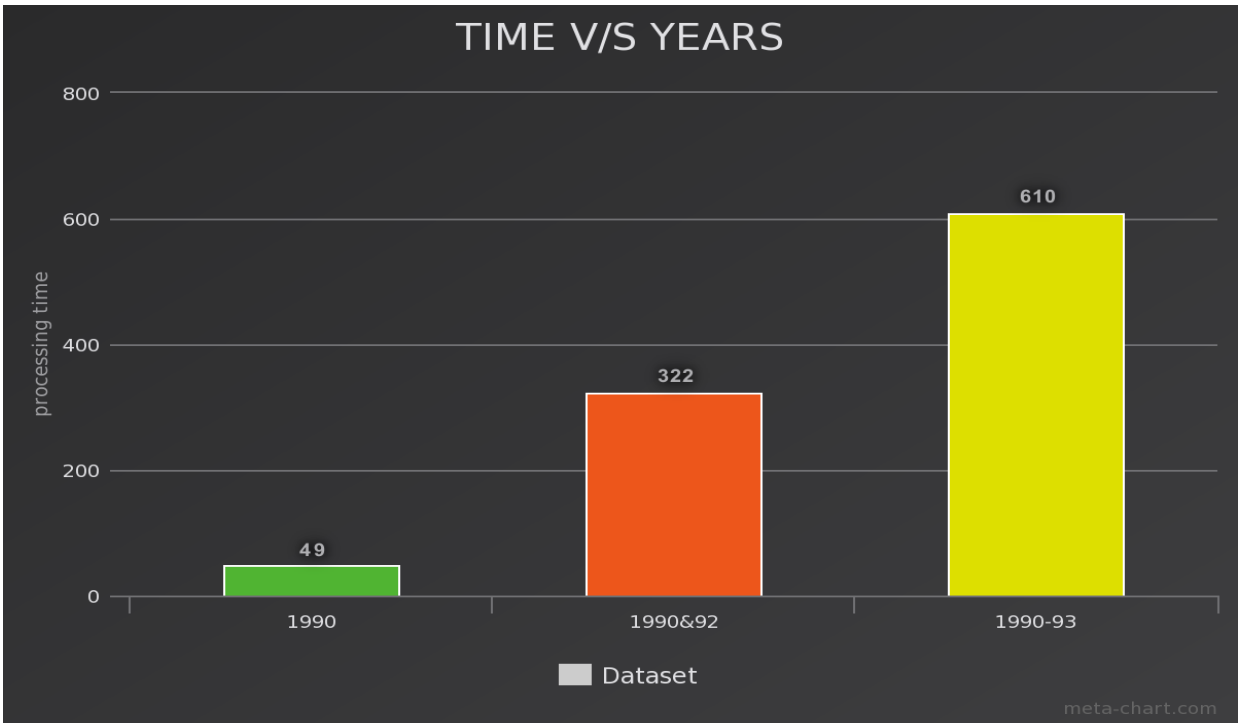
Datasets	awk	java	MapReduce	
			MaxTemperature	MaxTemperatureWithCombiner
1990	13.62	57	54	49
1990& 1992	99.28	382	349	322
1990-1993	192.40	708	648	610

Graph:
MaxTemperature:



The above graph shows the time taken by each dataset to execute using the MaxTemperature class.

Graph:
MaxTemperatureWithCombiner



The above graph shows the time taken by each dataset to execute using the MaxTemperatureWithCombiner class.

Analysis:

As you can see in the above chart, the least time taken to execute the job was by the awk script on the datasets. But, as we observe, after awk script the next minimum time taken was by the MapReduce as compared to Java.

Advantages of using MapReduce over SQL:

MapReduce is one of the efficient programming model to process a large set of data. It works on a key-value pair and can be written in any language. It can be tested on a local cluster or a distributed cluster. The job of the map is to collect the raw data as input and process it in key-value pairs and pass it as an input to the reducer. Generally, the input data will be in the HDFS file system. The reducer will then combine the key-value pair to produce the final results. As the name indicates the reduce job is always performed after the map job.

The Mapper breaks down the large dataset into several small files and distributes it to various data nodes. The data nodes will then process the data and gives the highest temperature per file back to the mapper. The mapper passes the same information to reducer and the reducer will then give you the highest temperature each year. The real preferred standpoint of MapReduce is that it is easy to scale data processing over various computing node as compared to the java which runs on a signal file at a time to give us the result.

MapReduce is also known as the Batch query processor. It can run adhoc query against the whole dataset and get the results in a reasonable time.

But, there are some scenarios where MR will not be a best choice to choose:

1. When querying small dataset, it will always be preferred to run the job on a single cluster than on a distributed cluster.
2. When you need fast response, MR is not the best choice as its not know to gets the results faster than the SQL.
3. Implementing MR to every job can be costlier, only big companies can afford the resources.
4. Works best on large datasets as compared to small datasets.

Observation:

1. Time taken by Java(SQL) and MapReduce did not differ much since the MapReduce was working on a single cluster.

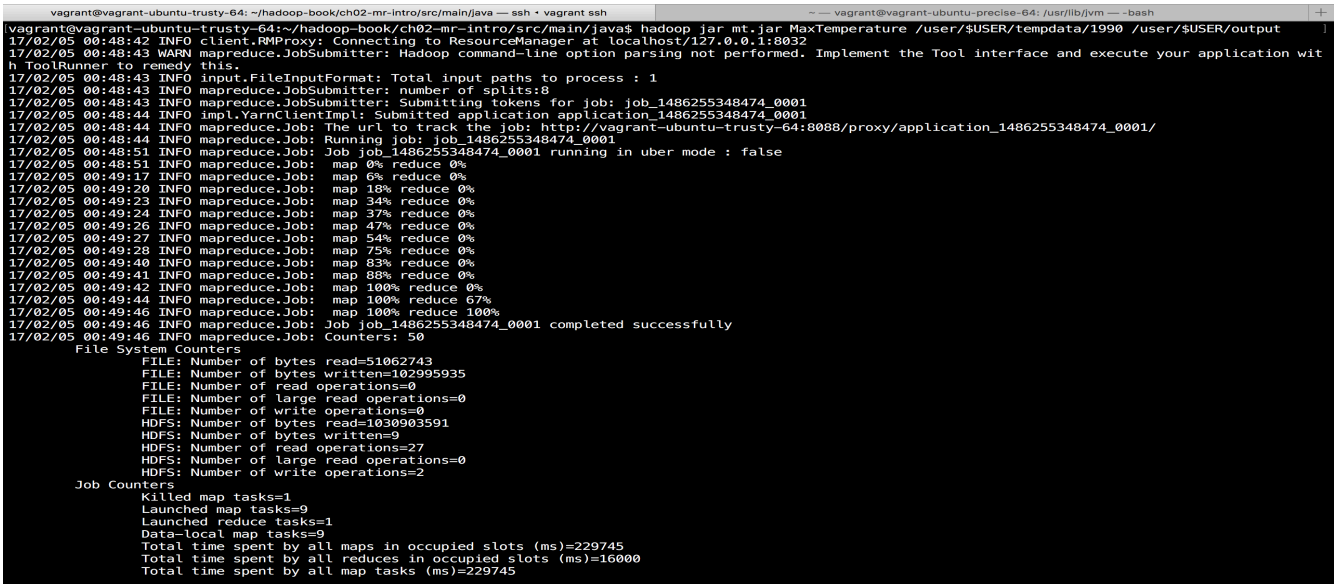
2. If we would create more cluster to run the MapReduce job the results would be much faster than now.

3. The awk script was the fastest because it was executed on the compressed files as compared to Java and MR which were run on the uncompressed dataset.

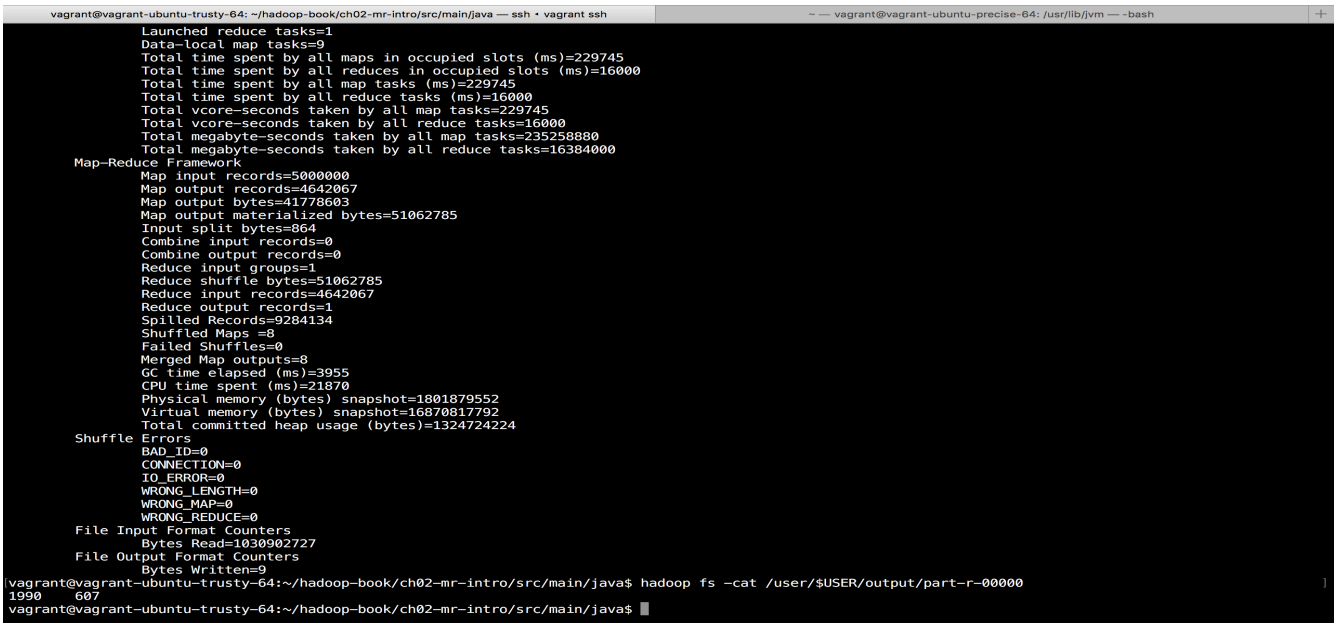
4. The execution time taken by MaxTemperatureWithCombiner was noticeably less than MaxTemperature because when we use the combiner class, the data sent as input to the reducer is first collected by the combiner to sort the data and then send it to the reducer so that time taken by the reducer is less than the time taken without using the combiner class.

Screen Shots:

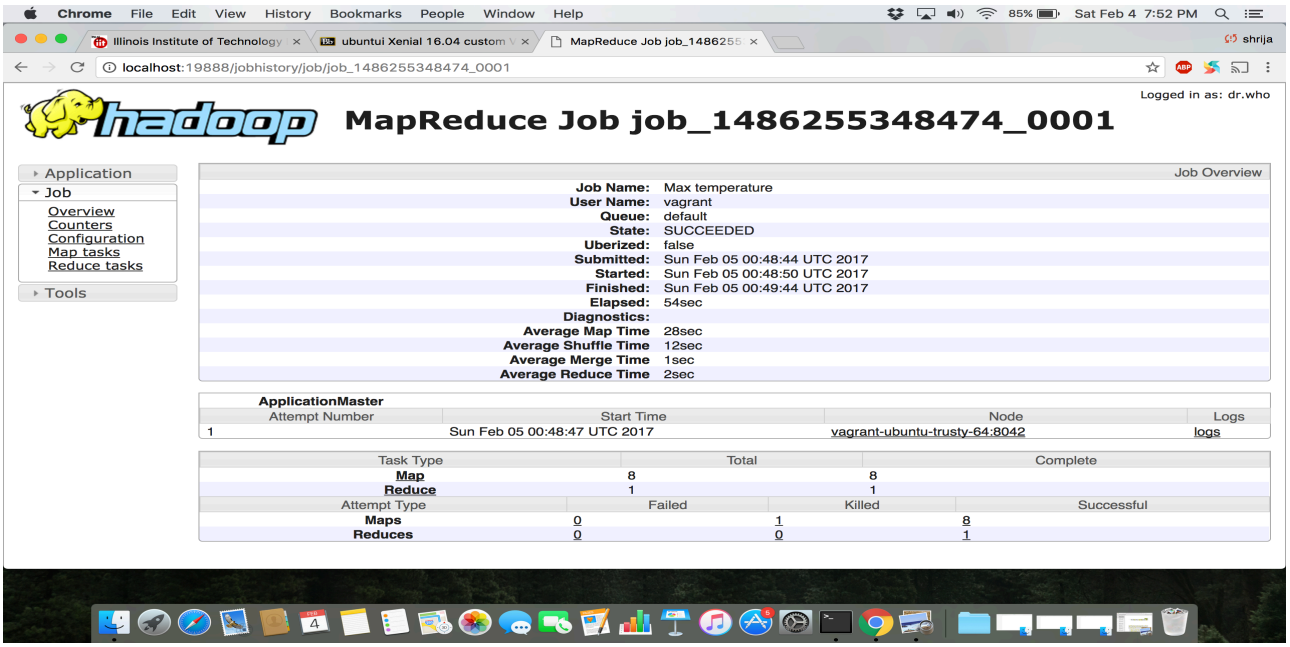
Using MaxTemperature
1990 Dataset



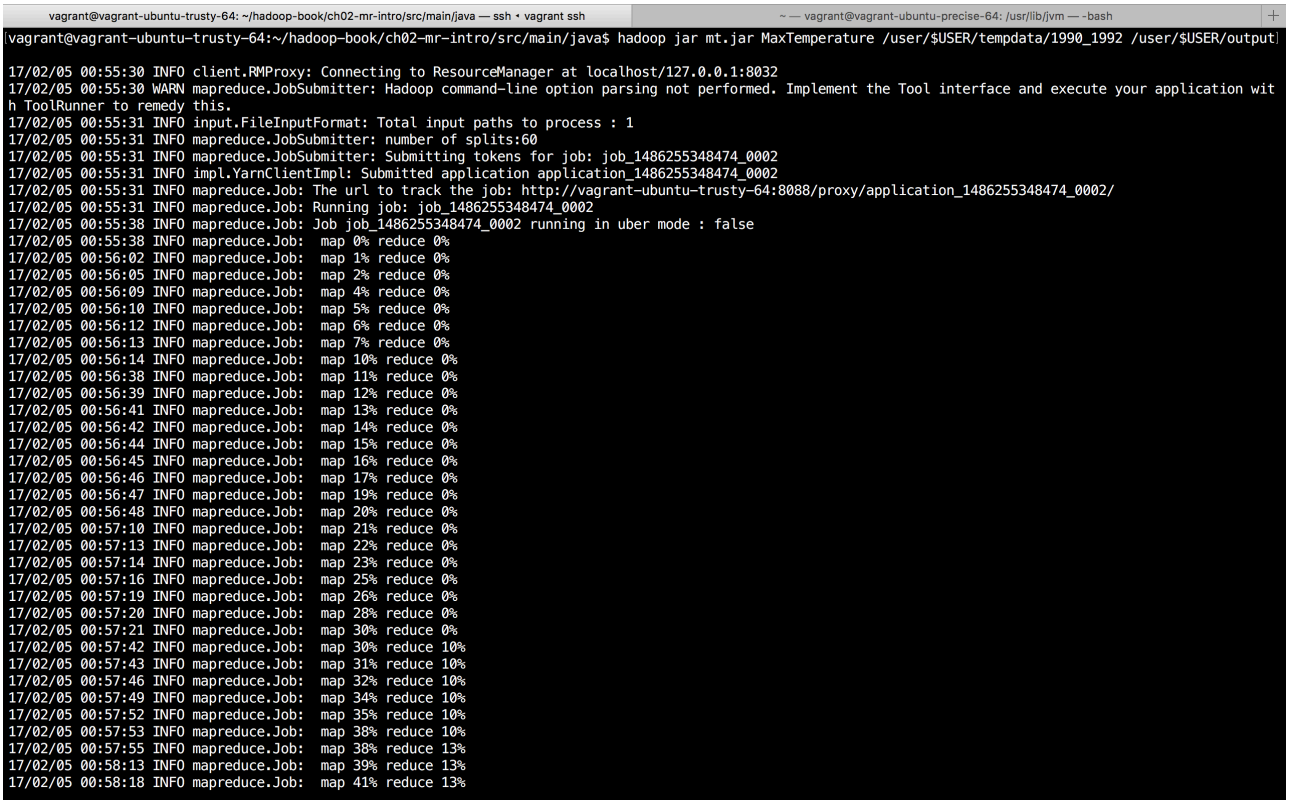
```
vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh • vagrant ssh
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop jar mt.jar MaxTemperature /user/$USER/tempdata/1990 /user/$USER/output
17/02/05 00:48:42 INFO client.RMProxy: Connecting to ResourceManager at localhost/127.0.0.1:8032
17/02/05 00:48:43 WARN mapreduce.JobSubmitter: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application wit
h ToolRunner to remedy this.
17/02/05 00:48:43 INFO input.FileInputFormat: Total input paths to process : 1
17/02/05 00:48:43 INFO mapreduce.JobSubmitter: number of splits:8
17/02/05 00:48:43 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1486255348474_0001
17/02/05 00:48:44 INFO impl.YarnClientImpl: Submitted application application_1486255348474_0001
17/02/05 00:48:44 INFO mapreduce.Job: The url to track the job: http://vagrant-ubuntu-trusty-64:8088/proxy/application_1486255348474_0001/
17/02/05 00:48:44 INFO mapreduce.Job: Running job: job_1486255348474_0001
17/02/05 00:48:51 INFO mapreduce.Job: Job job_1486255348474_0001 running in uber mode : false
17/02/05 00:48:51 INFO mapreduce.Job:  map 0% reduce 0%
17/02/05 00:49:17 INFO mapreduce.Job:  map 6% reduce 0%
17/02/05 00:49:20 INFO mapreduce.Job:  map 18% reduce 0%
17/02/05 00:49:23 INFO mapreduce.Job:  map 34% reduce 0%
17/02/05 00:49:24 INFO mapreduce.Job:  map 37% reduce 0%
17/02/05 00:49:26 INFO mapreduce.Job:  map 47% reduce 0%
17/02/05 00:49:27 INFO mapreduce.Job:  map 54% reduce 0%
17/02/05 00:49:28 INFO mapreduce.Job:  map 75% reduce 0%
17/02/05 00:49:40 INFO mapreduce.Job:  map 83% reduce 0%
17/02/05 00:49:41 INFO mapreduce.Job:  map 88% reduce 0%
17/02/05 00:49:42 INFO mapreduce.Job:  map 100% reduce 0%
17/02/05 00:49:44 INFO mapreduce.Job:  map 100% reduce 67%
17/02/05 00:49:46 INFO mapreduce.Job:  map 100% reduce 100%
17/02/05 00:49:46 INFO mapreduce.Job: Job job_1486255348474_0001 completed successfully
17/02/05 00:49:46 INFO mapreduce.Job: Counters: 50
        File System Counters
                FILE: Number of bytes read=51062743
                FILE: Number of bytes written=102995935
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=1030903591
                HDFS: Number of bytes written=9
                HDFS: Number of read operations=27
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
        Job Counters
                Killed map tasks=1
                Launched map tasks=9
                Launched reduce tasks=1
                Data-local map tasks=9
                Total time spent by all maps in occupied slots (ms)=229745
                Total time spent by all reduces in occupied slots (ms)=16000
                Total time spent by all map tasks (ms)=229745
```



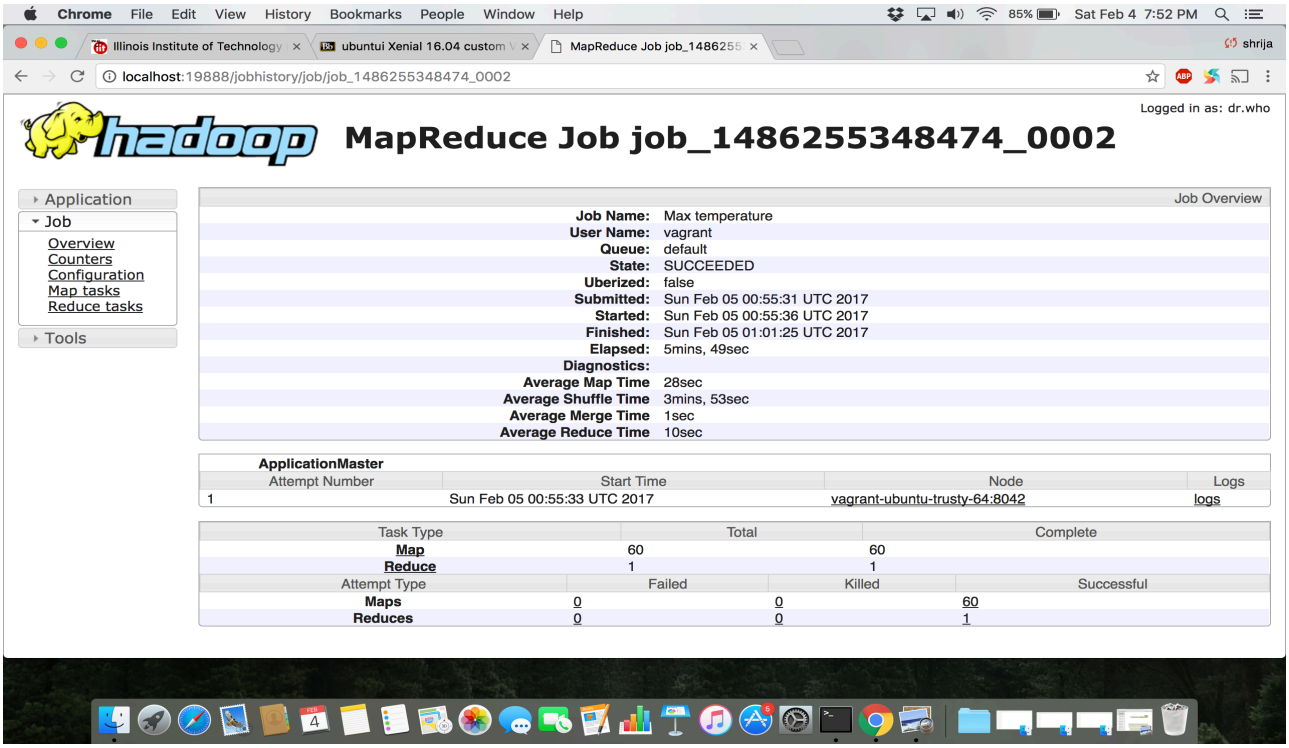
```
vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh • vagrant ssh
                Launched reduce tasks=1
                Data-local map tasks=9
                Total time spent by all maps in occupied slots (ms)=229745
                Total time spent by all reduces in occupied slots (ms)=16000
                Total time spent by all map tasks (ms)=229745
                Total time spent by all reduce tasks (ms)=16000
                Total vcore-seconds taken by all map tasks=229745
                Total vcore-seconds taken by all reduce tasks=16000
                Total megabyte-seconds taken by all map tasks=235258880
                Total megabyte-seconds taken by all reduce tasks=16384000
        Map-Reduce Framework
                Map input records=5000000
                Map output records=4642067
                Map output bytes=41778603
                Map output materialized bytes=51062785
                Input split bytes=864
                Combine input records=0
                Combine output records=0
                Reduce input groups=1
                Reduce shuffle bytes=51062785
                Reduce input records=4642067
                Reduce output records=1
                Spilled Records=9284134
                Shuffled Maps =8
                Failed Shuffles=0
                Merged Map outputs=8
                GC time elapsed (ms)=3955
                CPU time spent (ms)=21870
                Physical memory (bytes) snapshot=1801879552
                Virtual memory (bytes) snapshot=16870817792
                Total committed heap usage (bytes)=1324724224
        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=1030902727
        File Output Format Counters
                Bytes Written=9
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop fs -cat /user/$USER/output/part-r-00000
1990    607
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$
```



1990 and 1992 Dataset



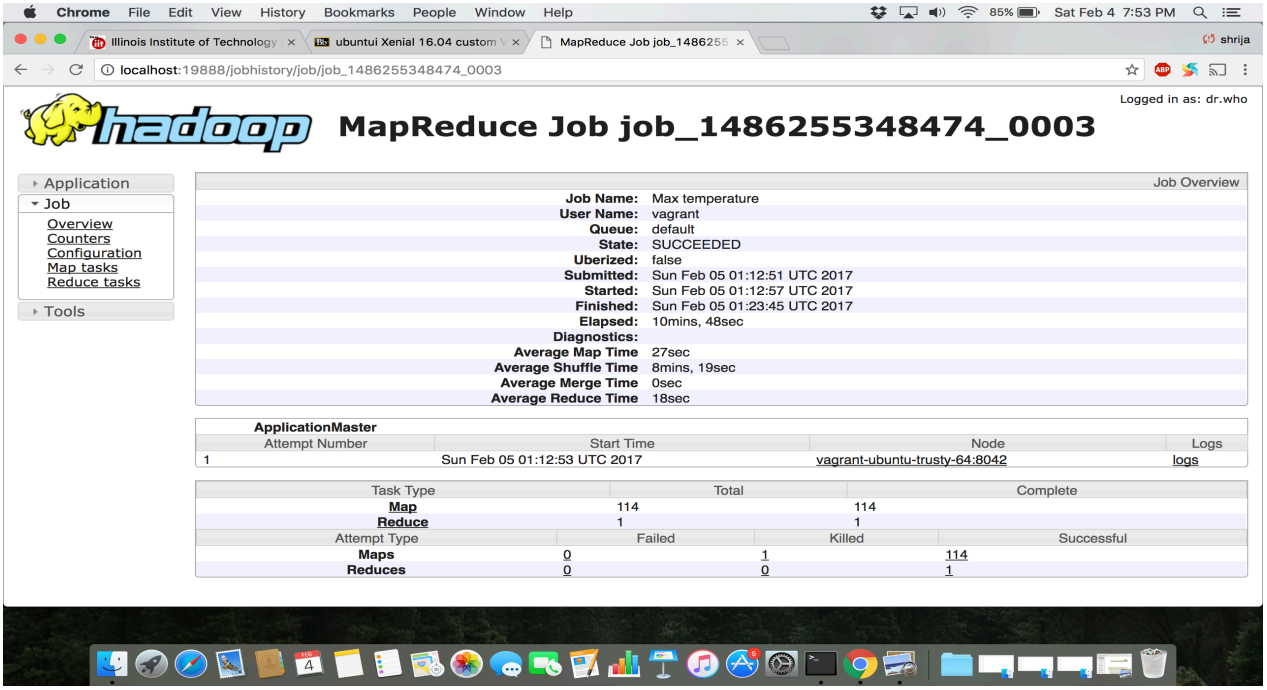
```
vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh ‹ vagrant ssh
~ — vagrant@vagrant-ubuntu-precise-64: /usr/lib/jvm — -bash

                Data-local map tasks=60
                Total time spent by all maps in occupied slots (ms)=1687213
                Total time spent by all reduces in occupied slots (ms)=245547
                Total time spent by all map tasks (ms)=1687213
                Total time spent by all reduce tasks (ms)=245547
                Total vcore-seconds taken by all map tasks=1687213
                Total vcore-seconds taken by all reduce tasks=245547
                Total megabyte-seconds taken by all map tasks=1727706112
                Total megabyte-seconds taken by all reduce tasks=251440128
        Map-Reduce Framework
                Map input records=35000000
                Map output records=30592765
                Map output bytes=275334885
                Map output materialized bytes=336520775
                Input split bytes=6780
                Combine input records=0
                Combine output records=0
                Reduce input groups=2
                Reduce shuffle bytes=336520775
                Reduce input records=30592765
                Reduce output records=2
                Spilled Records=61185530
                Shuffled Maps =60
                Failed Shuffles=0
                Merged Map outputs=60
                GC time elapsed (ms)=28485
                CPU time spent (ms)=155850
                Physical memory (bytes) snapshot=12472471552
                Virtual memory (bytes) snapshot=114304675840
                Total committed heap usage (bytes)=9409646592
        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=7993010283
        File Output Format Counters
                Bytes Written=18
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop fs -cat /user/$USER/output/part-r-00000
1990    607
1992    605
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$
```



1990 to 1993 Dataset

```
vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh • vagrant ssh    ~ — vagrant@vagrant-ubuntu-precise-64: /usr/lib/jvm — -bash
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop jar mt.jar MaxTemperature /user/$USER/tempdata/1990_1991_1992_1993 /user/$USER/output
17/02/05 01:12:50 INFO client.RMProxy: Connecting to ResourceManager at localhost/127.0.0.1:8032
17/02/05 01:12:50 WARN mapreduce.JobSubmitter: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
17/02/05 01:12:50 INFO input.FileInputFormat: Total input paths to process : 1
17/02/05 01:12:51 INFO mapreduce.JobSubmitter: number of splits:114
17/02/05 01:12:51 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1486255348474_0003
17/02/05 01:12:51 INFO impl.YarnClientImpl: Submitted application application_1486255348474_0003
17/02/05 01:12:51 INFO mapreduce.Job: The url to track the job: http://vagrant-ubuntu-trusty-64:8088/proxy/application_1486255348474_0003/
17/02/05 01:12:51 INFO mapreduce.Job: Running job: job_1486255348474_0003
17/02/05 01:12:58 INFO mapreduce.Job: Job job_1486255348474_0003 running in uber mode : false
17/02/05 01:12:58 INFO mapreduce.Job:  map 0% reduce 0%
17/02/05 01:13:25 INFO mapreduce.Job:  map 1% reduce 0%
17/02/05 01:13:29 INFO mapreduce.Job:  map 3% reduce 0%
17/02/05 01:13:32 INFO mapreduce.Job:  map 4% reduce 0%
17/02/05 01:13:33 INFO mapreduce.Job:  map 5% reduce 0%
17/02/05 01:13:53 INFO mapreduce.Job:  map 6% reduce 0%
17/02/05 01:14:00 INFO mapreduce.Job:  map 7% reduce 0%
17/02/05 01:14:01 INFO mapreduce.Job:  map 8% reduce 0%
17/02/05 01:14:04 INFO mapreduce.Job:  map 9% reduce 0%
17/02/05 01:14:06 INFO mapreduce.Job:  map 11% reduce 0%
17/02/05 01:14:29 INFO mapreduce.Job:  map 12% reduce 0%
17/02/05 01:14:31 INFO mapreduce.Job:  map 13% reduce 0%
17/02/05 01:14:34 INFO mapreduce.Job:  map 14% reduce 0%
17/02/05 01:14:35 INFO mapreduce.Job:  map 15% reduce 0%
17/02/05 01:14:37 INFO mapreduce.Job:  map 16% reduce 0%
17/02/05 01:15:00 INFO mapreduce.Job:  map 17% reduce 0%
17/02/05 01:15:01 INFO mapreduce.Job:  map 18% reduce 0%
17/02/05 01:15:04 INFO mapreduce.Job:  map 19% reduce 0%
17/02/05 01:15:07 INFO mapreduce.Job:  map 20% reduce 0%
17/02/05 01:15:08 INFO mapreduce.Job:  map 21% reduce 0%
17/02/05 01:15:28 INFO mapreduce.Job:  map 21% reduce 7%
17/02/05 01:15:31 INFO mapreduce.Job:  map 22% reduce 7%
17/02/05 01:15:35 INFO mapreduce.Job:  map 23% reduce 7%
17/02/05 01:15:38 INFO mapreduce.Job:  map 24% reduce 7%
17/02/05 01:15:41 INFO mapreduce.Job:  map 25% reduce 8%
17/02/05 01:15:54 INFO mapreduce.Job:  map 26% reduce 8%
17/02/05 01:16:03 INFO mapreduce.Job:  map 27% reduce 9%
17/02/05 01:16:06 INFO mapreduce.Job:  map 28% reduce 9%
17/02/05 01:16:09 INFO mapreduce.Job:  map 29% reduce 9%
17/02/05 01:16:11 INFO mapreduce.Job:  map 30% reduce 9%
17/02/05 01:16:12 INFO mapreduce.Job:  map 30% reduce 10%
17/02/05 01:16:26 INFO mapreduce.Job:  map 31% reduce 10%
17/02/05 01:16:32 INFO mapreduce.Job:  map 32% reduce 10%
```

```
vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh • vagrant ssh    ~ — vagrant@vagrant-ubuntu-precise-64: /usr/lib/jvm — -bash
                Total time spent by all reduces in occupied slots (ms)=519011
                Total time spent by all map tasks (ms)=3085349
                Total time spent by all reduce tasks (ms)=519011
                Total vcore-seconds taken by all map tasks=3085349
                Total vcore-seconds taken by all reduce tasks=519011
                Total megabyte-seconds taken by all map tasks=3159397376
                Total megabyte-seconds taken by all reduce tasks=531467264
        Map-Reduce Framework
                Map input records=65000000
                Map output records=55358499
                Map output bytes=498226491
                Map output materialized bytes=608944173
                Input split bytes=14022
                Combine input records=0
                Combine output records=0
                Reduce input groups=4
                Reduce shuffle bytes=608944173
                Reduce input records=55358499
                Reduce output records=4
                Spilled Records=110716998
                Shuffled Maps =114
                Failed Shuffles=0
                Merged Map outputs=114
                GC time elapsed (ms)=51181
                CPU time spent (ms)=287170
                Physical memory (bytes) snapshot=23587983360
                Virtual memory (bytes) snapshot=215471804416
                Total committed heap usage (bytes)=17690132480
        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=15257831563
        File Output Format Counters
                Bytes Written=36
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop fs -cat /user/$USER/output/part-r-00000
1990    607
1991    607
1992    605
1993    567
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$
```

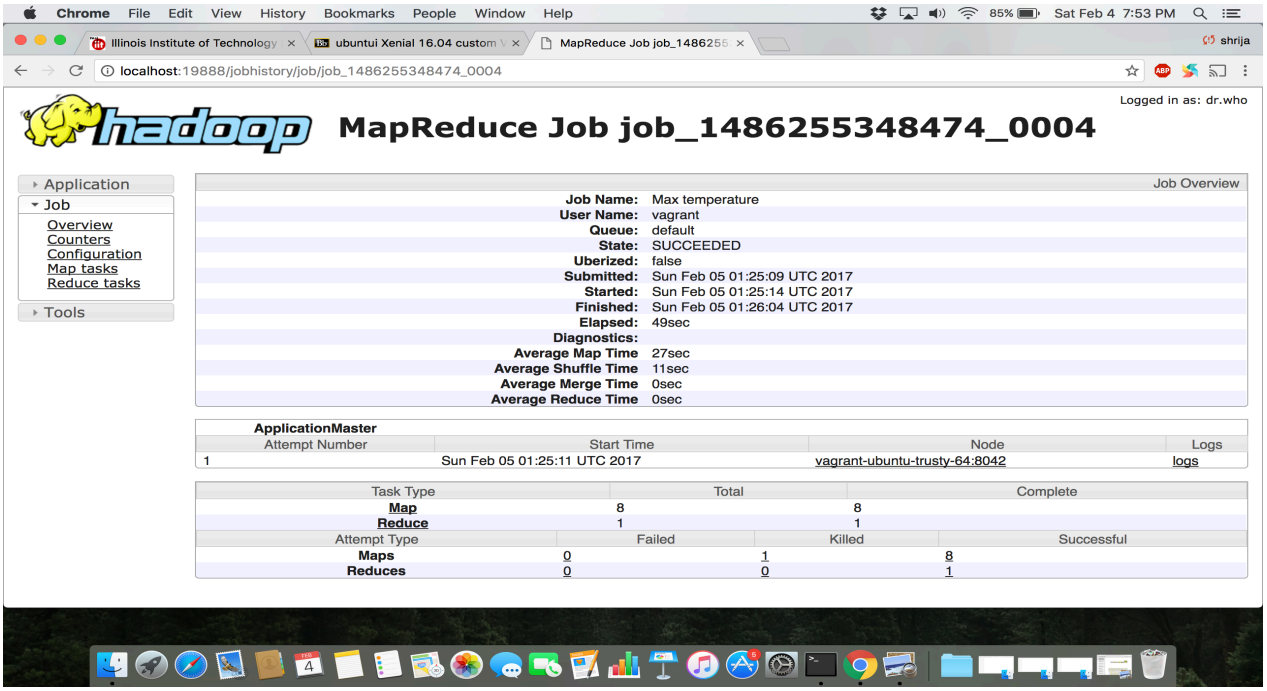


Using MaxTemperatureWithCombiner:

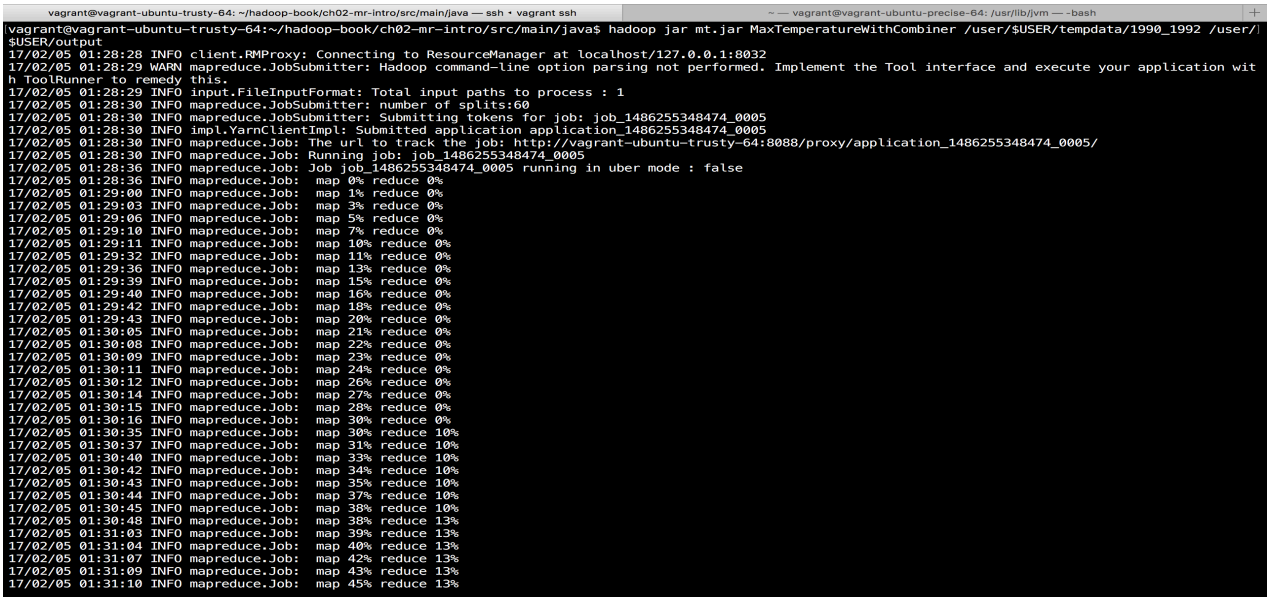
1990 Dataset

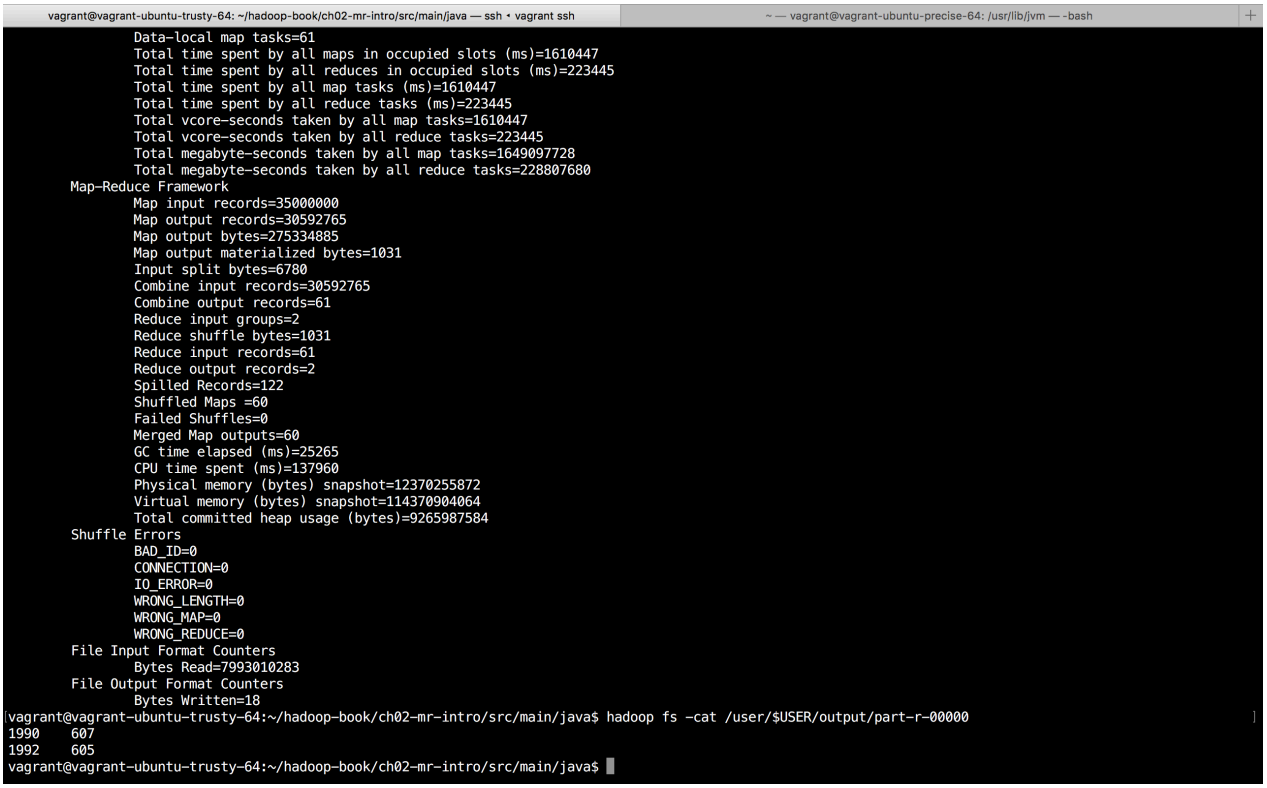
```
vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh • vagrant ssh
~ — vagrant@vagrant-ubuntu-precise-64: /usr/lib/jvm — -bash
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop jar mt.jar MaxTemperatureWithCombiner /user/$USER/tempdata/1990 /user/$USER/output
17/02/05 01:25:08 INFO client.RMProxy: Connecting to ResourceManager at localhost/127.0.0.1:8032
17/02/05 01:25:08 WARN mapreduce.JobSubmitter: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
17/02/05 01:25:09 INFO input.FileInputFormat: Total input paths to process : 1
17/02/05 01:25:09 INFO mapreduce.JobSubmitter: number of splits:8
17/02/05 01:25:09 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1486255348474_0004
17/02/05 01:25:09 INFO impl.YarnClientImpl: Submitted application application_1486255348474_0004
17/02/05 01:25:09 INFO mapreduce.Job: The url to track the job: http://vagrant-ubuntu-trusty-64:8088/proxy/application_1486255348474_0004/
17/02/05 01:25:09 INFO mapreduce.Job: Running job: job_1486255348474_0004
17/02/05 01:25:16 INFO mapreduce.Job: Job job_1486255348474_0004 running in uber mode : false
17/02/05 01:25:16 INFO mapreduce.Job:  map 0% reduce 0%
17/02/05 01:25:39 INFO mapreduce.Job:  map 4% reduce 0%
17/02/05 01:25:40 INFO mapreduce.Job:  map 6% reduce 0%
17/02/05 01:25:42 INFO mapreduce.Job:  map 8% reduce 0%
17/02/05 01:25:43 INFO mapreduce.Job:  map 19% reduce 0%
17/02/05 01:25:45 INFO mapreduce.Job:  map 22% reduce 0%
17/02/05 01:25:47 INFO mapreduce.Job:  map 38% reduce 0%
17/02/05 01:25:50 INFO mapreduce.Job:  map 58% reduce 0%
17/02/05 01:25:51 INFO mapreduce.Job:  map 71% reduce 0%
17/02/05 01:25:52 INFO mapreduce.Job:  map 75% reduce 0%
17/02/05 01:26:03 INFO mapreduce.Job:  map 88% reduce 0%
17/02/05 01:26:04 INFO mapreduce.Job:  map 100% reduce 0%
17/02/05 01:26:05 INFO mapreduce.Job:  map 100% reduce 100%
17/02/05 01:26:06 INFO mapreduce.Job: Job job_1486255348474_0004 completed successfully
17/02/05 01:26:06 INFO mapreduce.Job: Counters: 50
        File System Counters
                FILE: Number of bytes read=94
                FILE: Number of bytes written=872023
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=1030903591
                HDFS: Number of bytes written=9
                HDFS: Number of read operations=27
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
        Job Counters
                Killed map tasks=1
                Launched map tasks=9
                Launched reduce tasks=1
                Data-local map tasks=9
                Total time spent by all maps in occupied slots (ms)=223016
                Total time spent by all reduces in occupied slots (ms)=12291
```

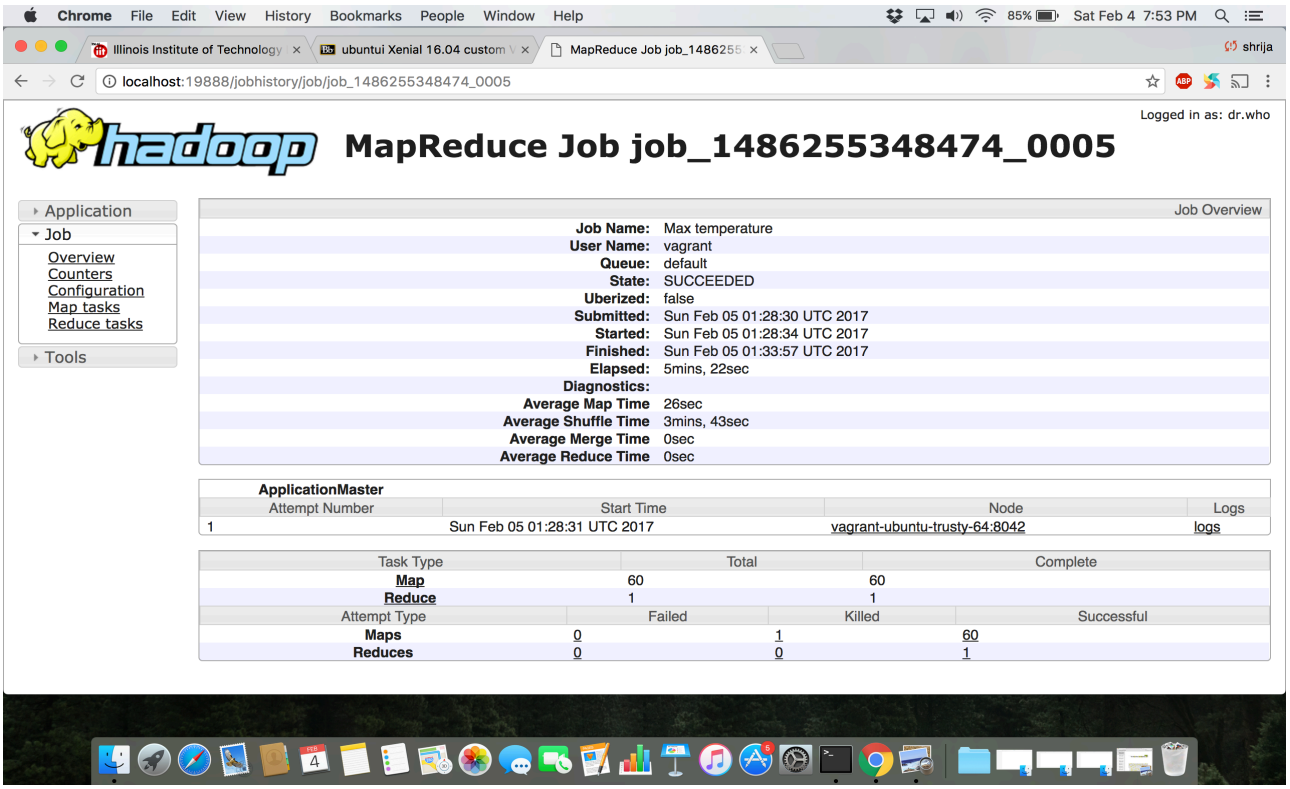
```
vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh ‹ vagrant ssh
~ — vagrant@vagrant-ubuntu-precise-64: /usr/lib/jvm — -bash

                Launched reduce tasks=1
                Data-local map tasks=9
                Total time spent by all maps in occupied slots (ms)=223016
                Total time spent by all reduces in occupied slots (ms)=12291
                Total time spent by all map tasks (ms)=223016
                Total time spent by all reduce tasks (ms)=12291
                Total vcore-seconds taken by all map tasks=223016
                Total vcore-seconds taken by all reduce tasks=12291
                Total megabyte-seconds taken by all map tasks=228368384
                Total megabyte-seconds taken by all reduce tasks=12585984
        Map-Reduce Framework
                Map input records=5000000
                Map output records=4642067
                Map output bytes=41778603
                Map output materialized bytes=136
                Input split bytes=864
                Combine input records=4642067
                Combine output records=8
                Reduce input groups=1
                Reduce shuffle bytes=136
                Reduce input records=8
                Reduce output records=1
                Spilled Records=16
                Shuffled Maps =8
                Failed Shuffles=0
                Merged Map outputs=8
                GC time elapsed (ms)=3451
                CPU time spent (ms)=19380
                Physical memory (bytes) snapshot=1738575872
                Virtual memory (bytes) snapshot=16883130368
                Total committed heap usage (bytes)=1277722624
        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=1030902727
        File Output Format Counters
                Bytes Written=9
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop fs -cat /user/$USER/output/part-r-00000
1990    607
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$
```



1990 and 1992 Dataset

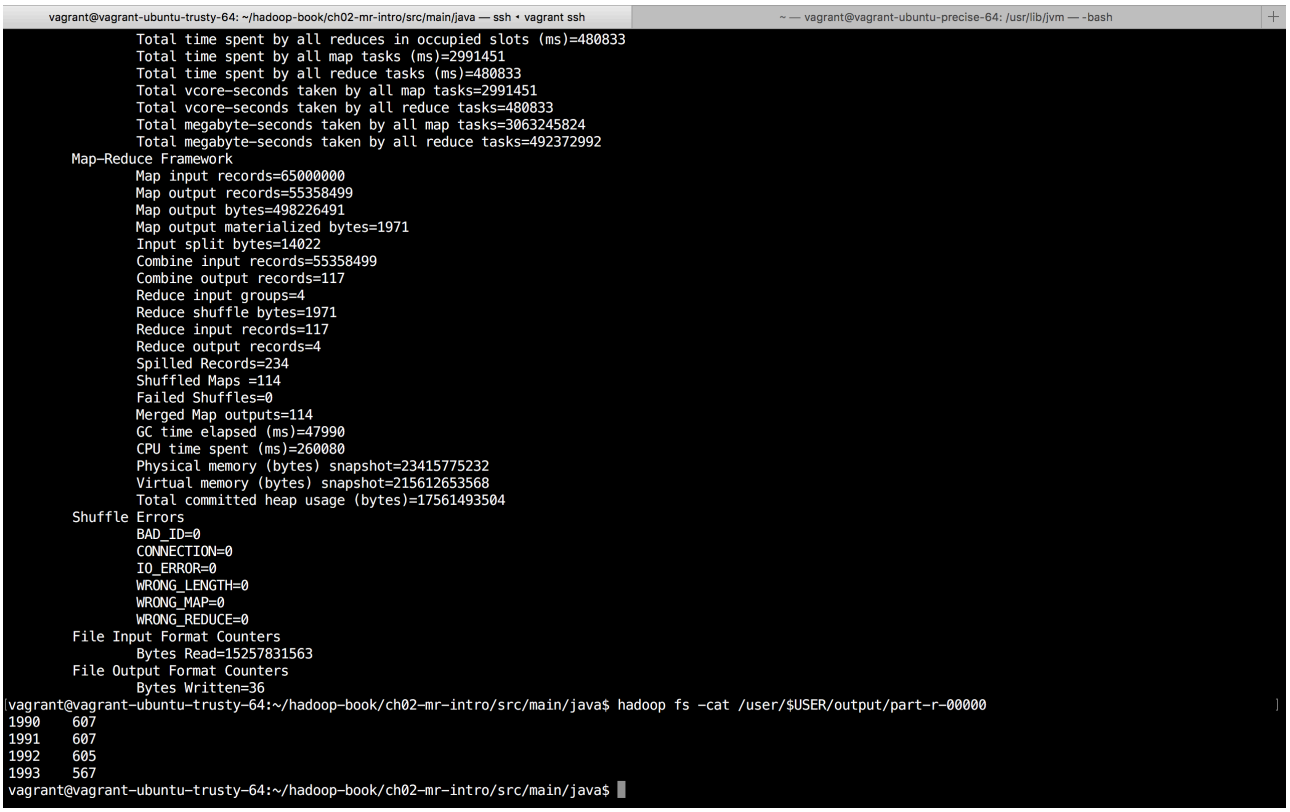


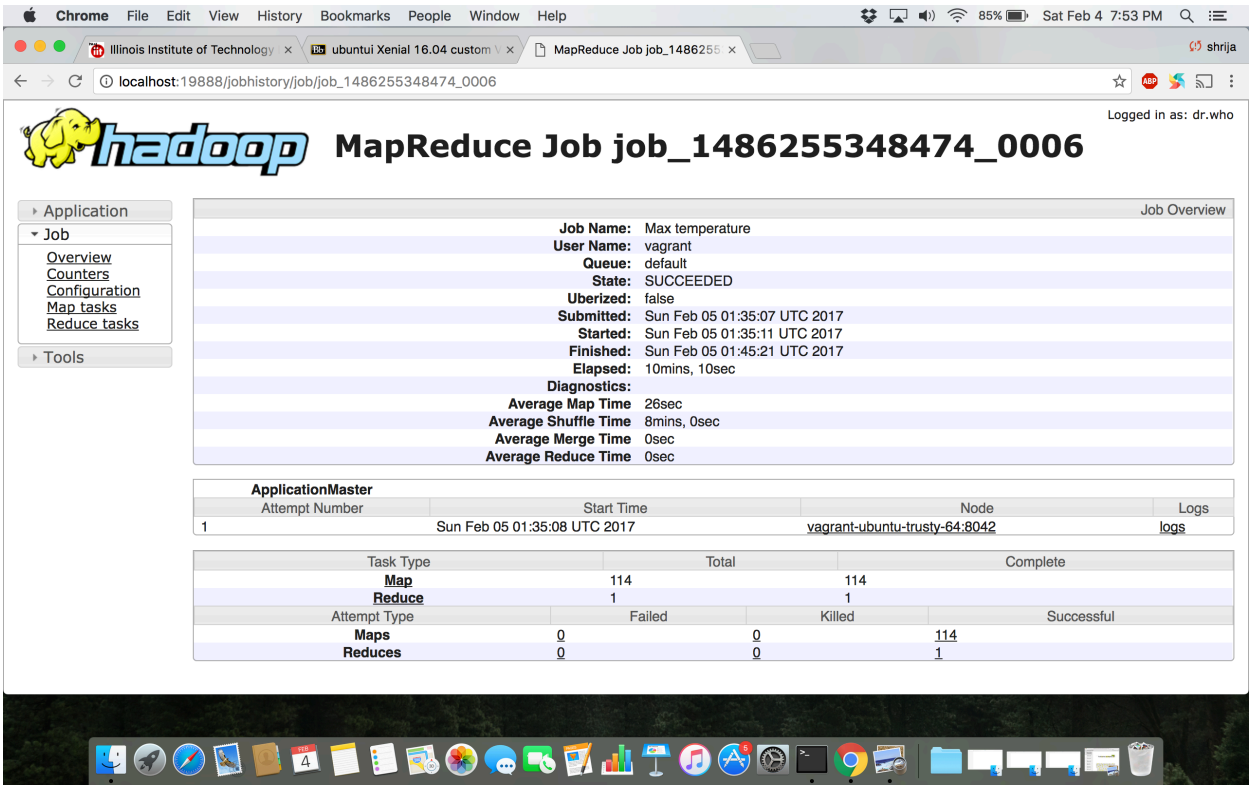




1990 to 1993 Dataset

```
vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh • vagrant ssh
~ — vagrant@vagrant-ubuntu-precise-64: /usr/lib/jvm — -bash
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop jar mt.jar MaxTemperatureWithCombiner /user/$USER/tempdata/1990_1991_1992_1
993 /user/$USER/output
17/02/05 01:35:05 INFO client.RMProxy: Connecting to ResourceManager at localhost/127.0.0.1:8032
17/02/05 01:35:06 WARN mapreduce.JobSubmitter: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application wit
h ToolRunner to remedy this.
17/02/05 01:35:06 INFO input.FileInputFormat: Total input paths to process : 1
17/02/05 01:35:06 INFO mapreduce.JobSubmitter: number of splits:114
17/02/05 01:35:06 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1486255348474_0006
17/02/05 01:35:07 INFO impl.YarnClientImpl: Submitted application application_1486255348474_0006
17/02/05 01:35:07 INFO mapreduce.Job: The url to track the job: http://vagrant-ubuntu-trusty-64:8088/proxy/application_1486255348474_0006/
17/02/05 01:35:07 INFO mapreduce.Job: Running job: job_1486255348474_0006
17/02/05 01:35:13 INFO mapreduce.Job: Job job_1486255348474_0006 running in uber mode : false
17/02/05 01:35:13 INFO mapreduce.Job:  map 0% reduce 0%
17/02/05 01:35:40 INFO mapreduce.Job:  map 1% reduce 0%
17/02/05 01:35:43 INFO mapreduce.Job:  map 2% reduce 0%
17/02/05 01:35:44 INFO mapreduce.Job:  map 3% reduce 0%
17/02/05 01:35:47 INFO mapreduce.Job:  map 4% reduce 0%
17/02/05 01:35:48 INFO mapreduce.Job:  map 5% reduce 0%
17/02/05 01:36:10 INFO mapreduce.Job:  map 6% reduce 0%
17/02/05 01:36:13 INFO mapreduce.Job:  map 7% reduce 0%
17/02/05 01:36:16 INFO mapreduce.Job:  map 8% reduce 0%
17/02/05 01:36:18 INFO mapreduce.Job:  map 9% reduce 0%
17/02/05 01:36:19 INFO mapreduce.Job:  map 10% reduce 0%
17/02/05 01:36:20 INFO mapreduce.Job:  map 11% reduce 0%
17/02/05 01:36:44 INFO mapreduce.Job:  map 12% reduce 0%
17/02/05 01:36:47 INFO mapreduce.Job:  map 13% reduce 0%
17/02/05 01:36:48 INFO mapreduce.Job:  map 14% reduce 0%
17/02/05 01:36:49 INFO mapreduce.Job:  map 15% reduce 0%
17/02/05 01:36:51 INFO mapreduce.Job:  map 16% reduce 0%
17/02/05 01:37:14 INFO mapreduce.Job:  map 17% reduce 0%
17/02/05 01:37:17 INFO mapreduce.Job:  map 18% reduce 0%
17/02/05 01:37:18 INFO mapreduce.Job:  map 19% reduce 0%
17/02/05 01:37:20 INFO mapreduce.Job:  map 20% reduce 0%
17/02/05 01:37:22 INFO mapreduce.Job:  map 21% reduce 0%
17/02/05 01:37:44 INFO mapreduce.Job:  map 21% reduce 7%
17/02/05 01:37:46 INFO mapreduce.Job:  map 22% reduce 7%
17/02/05 01:37:48 INFO mapreduce.Job:  map 23% reduce 7%
17/02/05 01:37:50 INFO mapreduce.Job:  map 24% reduce 7%
17/02/05 01:37:52 INFO mapreduce.Job:  map 25% reduce 7%
17/02/05 01:37:53 INFO mapreduce.Job:  map 25% reduce 8%
17/02/05 01:38:08 INFO mapreduce.Job:  map 26% reduce 8%
17/02/05 01:38:13 INFO mapreduce.Job:  map 27% reduce 8%
17/02/05 01:38:14 INFO mapreduce.Job:  map 27% reduce 9%
17/02/05 01:38:16 INFO mapreduce.Job:  map 28% reduce 9%
17/02/05 01:38:19 INFO mapreduce.Job:  map 29% reduce 9%
```


vagrant@vagrant-ubuntu-trusty-64: ~/hadoop-book/ch02-mr-intro/src/main/java — ssh • vagrant ssh
~ — vagrant@vagrant-ubuntu-precise-64: /usr/lib/jvm — -bash
Total time spent by all reduces in occupied slots (ms)=480833
Total time spent by all map tasks (ms)=2991451
Total time spent by all reduce tasks (ms)=480833
Total vcore-seconds taken by all map tasks=2991451
Total vcore-seconds taken by all reduce tasks=480833
Total megabyte-seconds taken by all map tasks=3063245824
Total megabyte-seconds taken by all reduce tasks=492372992
Map-Reduce Framework
Map input records=65000000
Map output records=55358499
Map output bytes=498226491
Map output materialized bytes=1971
Input split bytes=14022
Combine input records=55358499
Combine output records=117
Reduce input groups=4
Reduce shuffle bytes=1971
Reduce input records=117
Reduce output records=4
Spilled Records=234
Shuffled Maps =114
Failed Shuffles=0
Merged Map outputs=114
GC time elapsed (ms)=47990
CPU time spent (ms)=260080
Physical memory (bytes) snapshot=23415775232
Virtual memory (bytes) snapshot=21561653568
Total committed heap usage (bytes)=17561493504
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=15257831563
File Output Format Counters
Bytes Written=36
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$ hadoop fs -cat /user/$USER/output/part-r-00000
1990 607
1991 607
1992 605
1993 567
vagrant@vagrant-ubuntu-trusty-64:~/hadoop-book/ch02-mr-intro/src/main/java$


Chrome File Edit View History Bookmarks People Window Help
85% Sat Feb 4 7:53 PM
Illinois Institute of Technology
ubuntu Xenial 16.04 custom
MapReduce Job job_1486255
shrija
localhost:19888/jobhistory/job/job_1486255348474_0006
Logged in as: dr.who
MapReduce Job job_1486255348474_0006
Application
Job
Overview
Counters
Configuration
Map tasks
Reduce tasks
Tools
Job Overview
Job Name: Max temperature
User Name: vagrant
Queue: default
State: SUCCEEDED
Uberized: false
Submitted: Sun Feb 05 01:35:07 UTC 2017
Started: Sun Feb 05 01:35:11 UTC 2017
Finished: Sun Feb 05 01:45:21 UTC 2017
Elapsed: 10mins, 10sec
Diagnostics:
Average Map Time 26sec
Average Shuffle Time 8mins, 0sec
Average Merge Time 0sec
Average Reduce Time 0sec
ApplicationMaster
Attempt Number
Start Time
Node
Logs
1
Sun Feb 05 01:35:08 UTC 2017
vagrant-ubuntu-trusty-64:8042
logs
Task Type
Total
Complete
Map
114
114
Reduce
1
1
Attempt Type
Failed
Killed
Successful
Maps
0
0
114
Reduces
0
0
1