

Shared-Memory Output:

```
Length: unspecified [application/octet-stream]
Saving to: 'gensort-linux-1.5.tar.gz'

[      <=>      ] 226,665      184KB/s   in 1.2s

2016-03-30 03:23:02 (184 KB/s) - 'gensort-linux-1.5.tar.gz' saved [226665]

ubuntu@ip-172-31-30-204:~$ tar -xvf gensort-linux-1.5.tar.gz
gzip-2.0.txt
32/
32/valsort
32/gensort
64/
64/valsort
64/gensort
ubuntu@ip-172-31-30-204:~$ ls
32 64 gensort-linux-1.5.tar.gz gzip-2.0.txt
ubuntu@ip-172-31-30-204:~$ cd 64
ubuntu@ip-172-31-30-204:~/64$ ls
gensort  valsort
ubuntu@ip-172-31-30-204:~/64$ ./gensort -a 107374182 dataset10gb.txt
ubuntu@ip-172-31-30-204:~/64$ ls
dataset10gb.txt  gensort  valsort
ubuntu@ip-172-31-30-204:~/64$ ls
dataset10gb.txt  ESort.java  gensort  valsort
ubuntu@ip-172-31-30-204:~/64$ javac ESort.java
```

```
usr/bin/schemagen (schemagen) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-oracle/bin/serialver to provide /
usr/bin/serialver (serialver) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-oracle/bin/wsgen to provide /usr/
bin/wsgen (wsgen) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-oracle/bin/wsimport to provide /u
sr/bin/wsimport (wsimport) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-oracle/bin/xjc to provide /usr/bi
n/xjc (xjc) in auto mode
Oracle JDK 8 installed
update-alternatives: using /usr/lib/jvm/java-8-oracle/jre/lib/amd64/libnpjp2.so
to provide /usr/lib/mozilla/plugins/libjavaplugin.so (mozilla-javaplugin.so) in
auto mode
Oracle JRE 8 browser plugin installed
Setting up gsfon (1:8.11+urwcyr1.0.7~pre44-4.2ubuntu1) ...
Setting up x11-common (1:7.7+1ubuntu8.1) ...
* Setting up X socket directories... [ OK ]
Processing triggers for ureadahead (0.100.0-16) ...
Setting up xfonts-encodings (1:1.0.4-1ubuntu1) ...
Setting up xfonts-utils (1:7.7+1) ...
Setting up gsfon (0.22) ...
Processing triggers for libc-bin (2.19-0ubuntu6.6) ...
ubuntu@ip-172-31-30-204:~/64$ java -version
java version "1.8.0_77"
Java(TM) SE Runtime Environment (build 1.8.0_77-b03)
Java HotSpot(TM) 64-Bit Server VM (build 25.77-b03, mixed mode)
ubuntu@ip-172-31-30-204:~/64$ javac ESort.java
ubuntu@ip-172-31-30-204:~/64$ java ESort
Time taken: 397317
ubuntu@ip-172-31-30-204:~/64$ |
```

```
ubuntu@ip-172-31-30-204: ~/64$  
update-alternatives: using /usr/lib/jvm/java-8-oracle/bin/wsimport to provide /u  
sr/bin/wsimport (wsimport) in auto mode  
update-alternatives: using /usr/lib/jvm/java-8-oracle/bin/xjc to provide /usr/bi  
n/xjc (xjc) in auto mode  
Oracle JDK 8 installed  
update-alternatives: using /usr/lib/jvm/java-8-oracle/jre/lib/amd64/libnpjp2.so  
to provide /usr/lib/mozilla/plugins/libjavaplugin.so (mozilla-javaplugin.so) in  
auto mode  
Oracle JRE 8 browser plugin installed  
Setting up gsfonts (1:8.11+urwcyri1.0.7-pre44-4.2ubuntu1) ...  
Setting up x11-common (1:7.7+1ubuntu8.1) ...  
 * Setting up X socket directories... [ OK ]  
Processing triggers for ureadahead (0.100.0-16) ...  
Setting up xfonts-encodings (1:1.0.4-1ubuntu1) ...  
Setting up xfonts-utils (1:7.7+1) ...  
Setting up gsfonts-x11 (0.22) ...  
Processing triggers for libc-bin (2.19-0ubuntu6.6) ...  
ubuntu@ip-172-31-30-204:~/64$ java -version  
java version "1.8_0_77"  
Java(TM) SE Runtime Environment (build 1.8.0_77-b03)  
Java HotSpot(TM) 64-Bit Server VM (build 25.77-b03, mixed mode)  
ubuntu@ip-172-31-30-204:~/64$ javac ESort.java  
ubuntu@ip-172-31-30-204:~/64$ java ESort  
Time taken: 397317  
ubuntu@ip-172-31-30-204:~/64$ ls  
dataset10gb.txt temp-file-12.txt temp-file-26.txt temp-file-3.txt temp-file-53.txt temp-file-67.txt temp-file-80.txt temp-file-94.txt  
ESort.class temp-file-13.txt temp-file-27.txt temp-file-40.txt temp-file-54.txt temp-file-68.txt temp-file-81.txt temp-file-95.txt  
ESort.java temp-file-14.txt temp-file-28.txt temp-file-41.txt temp-file-55.txt temp-file-69.txt temp-file-82.txt temp-file-96.txt  
gensort temp-file-15.txt temp-file-29.txt temp-file-42.txt temp-file-56.txt temp-file-70.txt temp-file-83.txt temp-file-97.txt  
temp-file-0.txt temp-file-16.txt temp-file-2.txt temp-file-43.txt temp-file-57.txt temp-file-71.txt temp-file-84.txt temp-file-98.txt  
temp-file-100.txt temp-file-17.txt temp-file-30.txt temp-file-44.txt temp-file-58.txt temp-file-72.txt temp-file-85.txt temp-file-99.txt  
temp-file-101.txt temp-file-18.txt temp-file-31.txt temp-file-45.txt temp-file-59.txt temp-file-73.txt temp-file-86.txt temp-file-9.txt  
temp-file-102.txt temp-file-19.txt temp-file-32.txt temp-file-46.txt temp-file-5.txt temp-file-74.txt temp-file-87.txt valsort  
temp-file-103.txt temp-file-1.txt temp-file-33.txt temp-file-47.txt temp-file-60.txt temp-file-75.txt temp-file-88.txt  
temp-file-104.txt temp-file-20.txt temp-file-34.txt temp-file-48.txt temp-file-61.txt temp-file-76.txt temp-file-89.txt  
temp-file-105.txt temp-file-21.txt temp-file-35.txt temp-file-49.txt temp-file-62.txt temp-file-77.txt temp-file-90.txt  
temp-file-106.txt temp-file-22.txt temp-file-36.txt temp-file-4.txt temp-file-63.txt temp-file-78.txt temp-file-91.txt  
temp-file-107.txt temp-file-23.txt temp-file-37.txt temp-file-50.txt temp-file-64.txt temp-file-79.txt temp-file-92.txt  
temp-file-108.txt temp-file-24.txt temp-file-38.txt temp-file-51.txt temp-file-65.txt temp-file-80.txt temp-file-93.txt  
temp-file-11.txt temp-file-25.txt temp-file-39.txt temp-file-52.txt temp-file-66.txt temp-file-7.txt  
ubuntu@ip-172-31-30-204:~/64$
```

```

ubuntu@ip-172-31-10-204: ~ - /
|zG^9{ - 0000000000000000000000000000809EE
|<FJ, X' 00000000000000000000000000051799
"qYvY1HH 00000000000000000000000000057C1A
"|Y>:##% 00000000000000000000000000002B28D
kIoI_&] 0000000000000000000000000000A1ZAD
$D7zn, no 000000000000000000000000000098539
%6$'ELc% 00000000000000000000000000009C9D9
%w, w0>0o 0000000000000000000000000000354D0
%-_m\* 0000000000000000000000000000ACFDD
_.lQL kv 00000000000000000000000000008B8A5
'75wJfSc 0000000000000000000000000000AC3CD
(I[GI58 000000000000000000000000000095BE0
(yB,_% = 0000000000000000000000000000EDA08
)A),YXX[ 00000000000000000000000000007DDE
|]WBH' d 00000000000000000000000000004AC35
*LN]fSkf 0000000000000000000000000000B2A3
*xPc#CC 00000000000000000000000000002B18D
+k&A, y5d 00000000000000000000000000007776
, &3* j8 N 00000000000000000000000000003AF45
-, |ocf.} 00000000000000000000000000000F2EBB
-Y' |qbZ 0000000000000000000000000000103FC
-hL>Y^S: 0000000000000000000000000000076C8
. j |M#z = 00000000000000000000000000009CAE8
/Oz dFM G 0000000000000000000000000000A0F63
/ftLK3g| 0000000000000000000000000000E4FD7
0jY|d9v{ 00000000000000000000000000000B15A
3HLE&IT? 0000000000000000000000000000D6DFD
4srK(4-m 0000000000000000000000000000EB1FC
5RAmqf+7 000000000000000000000000000078E1B
63= #v\*q 0000000000000000000000000000CE828
6< hJUV 00000000000000000000000000009E39F
6b\N;|F/ 00000000000000000000000000000A0E15
6wt5ksn; 000000000000000000000000000006042B
8;Ms|p#H 00000000000000000000000000000D5FB0
8eB?|Q2| 00000000000000000000000000000185E8
8v sP3;| 00000000000000000000000000000078C8
9!M#Ar'n 0000000000000000000000000000021B2E
|J00s' bE 00000000000000000000000000000878E0
|z0M#&@ 000000000000000000000000000009C589
= z|gruy 000000000000000000000000000005B82E
555DDDD1111CCCC9999BBB0000BBBCCCCFFFC CCC44443333
2222222266660003333FF FFFF555500000000888EEEEEEEE
2222EEEE000099990000222333388886666FF F9999AAAA7777
555511118888FF F88884444EEEE22244444446666888AAAA
11115555DDDD11112222DDDDFF F77775555888B11119999AAAA
4444888B999999922211114444222222333388884444EEEE
5555AAAA999922220000DDDD1111FF FDDDD11118888AAAAEEEE
44443333888B8888222200009999444433335555FF F1111
AAAAFF F7777AAAA888B8881111DDDD888B4444AAAAEEEEAAAA
AAAA333388889999EEEEAAAA666622222222AAAA333366662222
EEEEEEEE8888FF FFFEEE5555222266667777FF F33337777AAAA
88881111DDDDEEEE44444444DDDD11118888DDDD4444AAAA1111
8888EEEEAAAA7777BBB00000000FF F8888000022255559999
1111CCCCEEEEDDDD7777EEEE1111AAAA33336666DDDD77773333
77770000CCCC9999CCCC88887777444444449999DDDD55552222
EEEE1111AAAAAAA66663333FF FFFF4444444499997777CCCC
00005555CCCC9999DDDD7777666633339999AAAA888B44449999
1111AAAA66664444DDDD444455557777777755558888DDDD888B
AAAAFF F7777888B7777999999966661111AAAAFF FCCCC2222
AAAA7777DDDD55554444DDDD6666888BEEEE1111FF F66664444
2222555599990000CCCCAAAA7777BBB11116666FF FBBB885555
8888EEEE44441111000088883333EEEE55555555888BEEEE5555
11110000FF F88885555333300001111111100009999FF F9999
3333444433336666BBB0000EEEE8888AAAAAAA888B88BCCCC
00002222000088882222DDDD777733332222999922224444AAAA
CCCC22223333AAAA999999988881111FF F222111166667777
666699995555777766666666EEEE9999FF FAAAAAAAEEEEAAAA
5555DDDD77774444CCCC5555888B6666777722229999888B5555
888B3333FF FCCCC2222FF FFFEEEE11119999888B222200004444
777755558888555555554444888B2221111EEEE1111888B9999
CCCCDDDD111144440000AAAA888BDDDD33335555444466660000
9999EEEEEEFF F11116666CCCC222288889999999AAAA77772222
5555111177770000DDDD222233334444222222224444FF F4444
33333333FF F000044440000AAAAFF FFAAAFF F777799991111
2222333355552222777755551111AAAA888B99992222FF F9999
9999888B88889999AAAAEEEEAAAAFF F11115555888899999999
66664444AAAA222244440000FF F5555EEEE6666CCCC00003333
2222888811117777111133339999222777700003333AAAA1111
444411110000EEEE666600006666EEEE5555EEEE8887777EEEE
5555EEEEEEEEAAAAEEEDDD6666777777773333333300003333
Type :quit<Enter> to exit Vim

```

Hadoop 1 Node Output:

Browse Directory

/user/biya/Input						Go!
Permission	Owner	Group	Size	Replication	Block Size	Name
-rw-r--r--	root	supergroup	10 GB	3	128 MB	dataset10gb.txt
-rw-r--r--	root	supergroup	953.67 MB	3	128 MB	dataset1gb.txt

Hadoop, 2014.

```
a-Lenovo-Ideapad-100-15IBD: ~
at org.apache.hadoop.mapreduce.JobSubmitter.writeNewSplits(JobSubmitter.java:493)
at org.apache.hadoop.mapreduce.JobSubmitter.writeSplits(JobSubmitter.java:510)
at org.apache.hadoop.mapreduce.JobSubmitter.submitJobInternal(JobSubmitter.java:394)
at org.apache.hadoop.mapreduce.Job$10.run(Job.java:1285)
at org.apache.hadoop.mapreduce.Job$10.run(Job.java:1282)
at java.security.AccessController.doPrivileged(Native Method)
at javax.security.auth.Subject.doAs(Subject.java:415)
at org.apache.hadoop.security.UserGroupInformation.doAs(UserGroupInformation.java:1548)
at org.apache.hadoop.mapreduce.Job.submit(Job.java:1282)
at org.apache.hadoop.mapreduce.Job.waitForCompletion(Job.java:1303)
at HadoopSort.main(HadoopSort.java:63)
at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:57)
at sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:43)
at java.lang.reflect.Method.invoke(Method.java:606)
at org.apache.hadoop.util.RunJar.main(RunJar.java:212)
root@ip-172-31-17-83 ephemeral-hdfs]$ bin/hadoop jar /root/HadoopSort.jar HadoopSort /user/biya/Input/dataset10gb.txt /user/biya/Output/output.t
xt -D mapreduce.job.reduces=4
OpenJDK 64-Bit Server VM warning: You have loaded library /root/ephemeral-hdfs/lib/native/libhadoop.so.1.0.0 which might have disabled stack gua
rd. The VM will try to fix the stack guard now.
It's highly recommended that you fix the library with 'execstack -c <libfile>', or link it with '-z noexecstack'.
2016-03-30 07:11:31,776 WARN [main] util.NativeCodeLoader (NativeCodeLoader.java:<clinit>(62)) - Unable to load native-hadoop library for your
platform... using builtin-java classes where applicable
Time taken: 1320
2016-03-30 07:11:31,906 INFO [main] client.RMProxy (RMProxy.java:createRMProxy(92)) - Connecting to ResourceManager at ec2-54-172-54-83.compute
-1.amazonaws.com/172.31.17.83:8032
2016-03-30 07:11:32,228 WARN [main] mapreduce.JobSubmitter (JobSubmitter.java:copyAndConfigureFiles(150)) - Hadoop command-line option parsing
not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
2016-03-30 07:11:32,438 INFO [main] input.FileInputFormat (FileInputFormat.java:listStatus(280)) - Total input paths to process : 1
2016-03-30 07:11:32,533 INFO [main] mapreduce.JobSubmitter (JobSubmitter.java:submitJobInternal(396)) - number of splits:80
2016-03-30 07:11:32,820 INFO [main] mapreduce.JobSubmitter (JobSubmitter.java:printTokens(479)) - Submitting tokens for job: job_1459289648775_
0009
2016-03-30 07:11:33,011 INFO [main] impl.YarnClientImpl (YarnClientImpl.java:submitApplication(204)) - Submitted application application_145928
9648775_0009
2016-03-30 07:11:33,052 INFO [main] mapreduce.Job (Job.java:submit(1289)) - The url to track the job: http://ec2-54-172-54-83.compute-1.amazona
ws.com:8088/proxy/application_1459289648775_0009/
2016-03-30 07:11:33,053 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1334)) - Running job: job_1459289648775_0009
2016-03-30 07:11:41,285 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1355)) - Job job_1459289648775_0009 running in uber mode : false
2016-03-30 07:11:41,287 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 0% reduce 0%
2016-03-30 07:11:52,409 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 1% reduce 0%
```



```
2016-03-30 07:23:25,300 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 70% reduce 0%
2016-03-30 07:23:35,363 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 71% reduce 0%
2016-03-30 07:23:47,420 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 72% reduce 0%
2016-03-30 07:23:49,430 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 73% reduce 0%
2016-03-30 07:24:01,489 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 74% reduce 0%
2016-03-30 07:24:12,543 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 75% reduce 0%
2016-03-30 07:24:25,606 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 76% reduce 0%
2016-03-30 07:24:37,665 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 77% reduce 0%
2016-03-30 07:24:50,729 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 78% reduce 0%
2016-03-30 07:24:51,734 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 79% reduce 0%
2016-03-30 07:25:02,790 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 80% reduce 0%
2016-03-30 07:25:14,849 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 81% reduce 0%
2016-03-30 07:25:26,922 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 82% reduce 0%
2016-03-30 07:25:39,993 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 83% reduce 0%
2016-03-30 07:25:40,997 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 84% reduce 0%
2016-03-30 07:25:55,067 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 85% reduce 0%
2016-03-30 07:26:05,124 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 86% reduce 0%
2016-03-30 07:26:17,181 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 87% reduce 0%
2016-03-30 07:26:20,195 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 88% reduce 0%
2016-03-30 07:26:31,249 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 89% reduce 0%
2016-03-30 07:26:42,301 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 90% reduce 0%
2016-03-30 07:26:55,368 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 91% reduce 0%
2016-03-30 07:27:07,426 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 92% reduce 0%
2016-03-30 07:27:09,435 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 93% reduce 0%
2016-03-30 07:27:21,492 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 94% reduce 0%
2016-03-30 07:27:35,561 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 95% reduce 0%
2016-03-30 07:27:45,612 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 96% reduce 0%
2016-03-30 07:27:57,669 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 97% reduce 0%
2016-03-30 07:27:59,680 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 98% reduce 0%
2016-03-30 07:28:12,739 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 99% reduce 0%
2016-03-30 07:28:22,788 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 0%
2016-03-30 07:28:35,852 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 1%
2016-03-30 07:28:41,880 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 2%
2016-03-30 07:28:44,893 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 3%
2016-03-30 07:28:50,919 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 4%
2016-03-30 07:28:56,944 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 5%
2016-03-30 07:29:02,970 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 6%
2016-03-30 07:29:08,996 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 7%
2016-03-30 07:29:15,022 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 8%
2016-03-30 07:29:24,061 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 9%
```

```
biya@biya-Lenovo-ideapad-100-15IBD: ~
2016-03-30 07:37:09,140 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 83%
2016-03-30 07:37:18,177 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 84%
2016-03-30 07:37:24,204 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 85%
2016-03-30 07:37:33,243 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 86%
2016-03-30 07:37:39,269 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 87%
2016-03-30 07:37:48,312 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 88%
2016-03-30 07:37:57,351 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 89%
2016-03-30 07:38:07,403 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 90%
2016-03-30 07:38:16,444 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 91%
2016-03-30 07:38:22,471 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 92%
2016-03-30 07:38:31,511 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 93%
2016-03-30 07:38:40,552 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 94%
2016-03-30 07:38:46,579 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 95%
2016-03-30 07:38:55,618 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 96%
2016-03-30 07:39:01,646 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 97%
2016-03-30 07:39:10,684 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 98%
2016-03-30 07:39:22,741 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 99%
2016-03-30 07:39:28,771 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 100%
2016-03-30 07:39:33,798 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1373)) - Job job_1459289648775_0009 completed successfully
2016-03-30 07:39:33,942 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1380)) - Counters: 49

File System Counters
  FILE: Number of bytes read=32582696868
  FILE: Number of bytes written=43628027271
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=10742607464
  HDFS: Number of bytes written=10737418200
  HDFS: Number of read operations=243
  HDFS: Number of large read operations=0
  HDFS: Number of write operations=2

Job Counters
  Launched map tasks=80
  Launched reduce tasks=1
  Data-local map tasks=80
  Total time spent by all maps in occupied slots (ms)=880670
  Total time spent by all reduces in occupied slots (ms)=665824
  Total time spent by all map tasks (ms)=880670
  Total time spent by all reduce tasks (ms)=665824
  Total vcore-seconds taken by all map tasks=880670
  Total vcore-seconds taken by all reduce tasks=665824
```


Hadoop 16 Node Output:

Browse Directory

/user/Input

Go!

Permission	Owner	Group	Size	Replication	Block Size	Name
-rw-r--r--	root	supergroup	100 GB	3	128 MB	dataset100gb.txt

Hadoop, 2014.

```
biya@biya-Lenovo-ideapad-100-15IBD: ~
2016-03-29 08:37:57,725 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 71%
2016-03-29 08:40:35,102 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 72%
2016-03-29 08:43:16,509 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 73%
2016-03-29 08:45:56,888 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 74%
2016-03-29 08:48:39,297 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 75%
2016-03-29 08:51:24,224 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 76%
2016-03-29 08:53:58,592 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 77%
2016-03-29 08:56:42,141 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 78%
2016-03-29 08:59:18,526 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 79%
2016-03-29 09:02:01,359 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 80%
2016-03-29 09:04:44,735 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 81%
2016-03-29 09:07:21,096 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 82%
2016-03-29 09:10:04,480 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 83%
2016-03-29 09:12:41,846 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 84%
2016-03-29 09:15:25,226 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 85%
2016-03-29 09:18:08,625 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 86%
2016-03-29 09:20:42,991 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 87%
2016-03-29 09:23:25,370 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 88%
2016-03-29 09:26:05,754 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 89%
2016-03-29 09:28:48,128 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 90%
2016-03-29 09:31:25,490 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 91%
2016-03-29 09:34:08,872 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 92%
2016-03-29 09:36:52,261 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 93%
2016-03-29 09:39:26,991 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 94%
2016-03-29 09:42:12,369 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 95%
2016-03-29 09:44:48,735 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 96%
2016-03-29 09:47:32,281 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 97%
2016-03-29 09:50:16,660 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 98%
2016-03-29 09:52:49,003 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 99%
2016-03-29 09:55:35,379 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1362)) - map 100% reduce 100%
2016-03-29 09:56:58,581 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1373)) - Job job_1459223158961_0002 completed successfully
2016-03-29 09:56:58,727 INFO [main] mapreduce.Job (Job.java:monitorAndPrintJob(1380)) - Counters: 51
File System Counters
FILE: Number of bytes read=435074830668
FILE: Number of bytes written=545527286845
FILE: Number of read operations=0
FILE: Number of large read operations=0
FILE: Number of write operations=0
HDFS: Number of bytes read=107426661264
HDFS: Number of bytes written=107374182000
HDFS: Number of read operations=2403
```



```
biya@biya-Lenovo-ideapad-100-15IBD: ~  
Total time spent by all maps in occupied slots (ms)=22791463  
Total time spent by all reduces in occupied slots (ms)=11343086  
Total time spent by all map tasks (ms)=22791463  
Total time spent by all reduce tasks (ms)=11343086  
Total vcore-seconds taken by all map tasks=22791463  
Total vcore-seconds taken by all reduce tasks=11343086  
Total megabyte-seconds taken by all map tasks=23338458112  
Total megabyte-seconds taken by all reduce tasks=11615320064  
  
Map-Reduce Framework  
Map input records=1073741820  
Map output records=1073741820  
Map output bytes=107374182000  
Map output materialized bytes=109521670440  
Input split bytes=116000  
Combine input records=0  
Combine output records=0  
Reduce input groups=1073741820  
Reduce shuffle bytes=109521670440  
Reduce input records=1073741820  
Reduce output records=1073741820  
Spilled Records=5339181190  
Shuffled Maps =800  
Failed Shuffles=0  
Merged Map outputs=800  
GC time elapsed (ms)=335450  
CPU time spent (ms)=14109560  
Physical memory (bytes) snapshot=223532949504  
Virtual memory (bytes) snapshot=790330523648  
Total committed heap usage (bytes)=165326880768  
  
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=107426545264  
File Output Format Counters  
Bytes Written=107374182000  
root@ip-172-31-20-241 ephemeral-hdfs$ ^[[2-
```

```
biya@biya-Lenovo-ideapad-100-15IBD: ~  
-rw-r--r-- 1 root root 3.2K Mar 29 06:41 HadoopSort.jar  
-rw-r--r-- 1 root root 2.4K Mar 29 06:31 HadoopSort.java  
drwxr-xr-x 3 root root 4.0K Mar 29 03:43 mapreduce  
-rw-r--r-- 1 root root 100G Mar 29 12:41 part-r-00000  
drwxr-xr-x 10 67974 users 4.0K Mar 29 03:43 persistent-hdfs  
drwxrwxr-x 9 2000 2000 4.0K Sep 27 2013 scala  
drwxr-xr-x 13 hadoop ec2-user 4.0K Mar 29 03:46 spark  
drwxr-xr-x 15 root root 4.0K Mar 29 03:46 spark-ec2  
drwxr-xr-x 21 rstudio games 4.0K Mar 29 03:48 tachyon  
root@ip-172-31-20-241 ~# head part-r-00000  
14+ABv 000000000000000000000000017F7E829 EEE33334444111122228888333344446666333222DDDDDEEEE  
01uue 0000000000000000000000000001228D4 77778888000022224444DDDDDDDEEEE00000000CCCC7777DDDD  
%1$SU( 0000000000000000000000000002E6C821C 2222333377774444555511119999CCCC4444EEEEFFFF11115555  
&5X|X 000000000000000000000000000399BC288 5555CCCCBBB899999999DDDD111100001111EEEE7777DDDD9999  
'ic$So 00000000000000000000000000031F06B7D EEEEBBBBAAAA8888DDDDDD777722224444111166664444AAAA  
*0GIo 0000000000000000000000000003B5E85A1 1111AAAA9999CCCCBBB8111199991111333399991111AAAA6666  
, (GhT_ 0000000000000000000000000002D0172DC 1111CCCC1111DDDDCCCCEEEE9999CCCC8888CCCCFF55555555  
0*VYm3 0000000000000000000000000002D61578 DDDD7777AAAAEEEEEEEE6666AAAA2222CCCC5555555522229999  
2C>)8d 0000000000000000000000000002G79E66 444400001111CCCC6666BBB8555577776666CCCC2222AAAA8888  
8tu30; 0000000000000000000000000003FC4ABD1 77772222DDDD77772222AAAA33336666EEEE88880000FFFF6666  
root@ip-172-31-20-241 ~# tail part-r-00000  
~0y(Gy" 0000000000000000000000000003F802989 2222666644440000EEEE111199998888222299997777CCCCEEEE  
~4!kA7X 0000000000000000000000000001F1A1E26 EEEE777711117777BBB81111EEEE88884444DDDDDDDEEEE8888  
~81x|l@ 0000000000000000000000000001F05932F 11119999BBB844447777000011114444CCCCAAAA6666DDDD0000  
~8CZtB 00000000000000000000000000008CB2293 88883333BBB8111166669999888855558888888822228888CCCC  
~G_)m^ 0000000000000000000000000003F9B2AB5 7777AAAA22221111FFFF5555BBB82222BBB80000AAAA0000DDDD2222  
~Tz i)l 0000000000000000000000000003ED87AFD DDDDDFFFBBB8CCCCFF555544446666AAAA111133333333AAAACCCC  
~UeTRs 0000000000000000000000000003E299FE5 DDD0000CCCC22227777DDDD5555888800000000222222222222  
~+I&P 00000000000000000000000000074BD6F4 8888000055550000DDDD22227777AAAA000033332222AAAA0000  
~hb&5X* 0000000000000000000000000003C0E06B 7777BBB8BBB89999EEEEAAAAAA0000CCCCDDDD444488884444  
root@ip-172-31-20-241 ~# cd 64  
root@ip-172-31-20-241 64# ls  
dataset100gb.txt gensort valsort  
root@ip-172-31-20-241 64# ./valsort /root/part-r-00000  
Records: 1073741820  
Checksum: 1ffff69e4a447ce7  
Duplicate keys: 0  
SUCCESS - all records are in order  
root@ip-172-31-20-241 64#  
root@ip-172-31-20-241 64#
```

Browse Directory

Go!

Permission	Owner	Group	Size	Replication	Block Size	Name
-rw-r--r--	root	supergroup	0 B	3	128 MB	_SUCCESS
-rw-r--r--	root	supergroup	100 GB	3	128 MB	part-r-00000

Spark 1 Node Output :

Browse Directory

/user/biya/Input Go!

Permission	Owner	Group	Size	Replication	Block Size	Name
-rw-r--r--	root	supergroup	10 GB	3	128 MB	dataset10gb.txt
-rw-r--r--	root	supergroup	953.67 MB	3	128 MB	dataset1gb.txt

Hadoop, 2014.

```
root@ip-172-31-17-83 64]$ ./valsort /root/part-r-00000
Records: 107374182
Checksum: 33349ec704ab841
Duplicate keys: 0
SUCCESS - all records are in order
root@ip-172-31-17-83 64]$ cd ..
root@ip-172-31-17-83 ~]$ head part-r-00000
"O!uve          000000000000000000000000001228D4    777788800000222444DDDDDDDEEEEE0000000CCCC7777DDDD
PMd32=         0000000000000000000000000003440CC1    FFFFEeee6666CCCCBBBB999933335555DDDDDDDD777788886666
^3C0],         000000000000000000000000000158C5C5    5555AAAA9999EEEE888822229999CCCCDDDD6666555544442222
!&S3/]        00000000000000000000000000002145D78    8888BBBBDDDD1111CCCC55556666BBBB1111EEEEDDDD22229999
!,=#,9        000000000000000000000000000001907E33    33332222FFFFBBBB0000FFFFAAAA666655553333DDDD3333CCCC
!0f[ITd       00000000000000000000000000003CAAB48    9999FFFF555533337777CCCC4444BBBB7777EEEEEBBBDDDD4444
!f6Suy2       00000000000000000000000000003ABFD84    EEEE555555556666AAAA5555BBBBDDDD0000111166660000DDDD
"X=xLlWW      00000000000000000000000000006652BCF    888888887777111144444444111144446666BBBBEEEE33330000
#%N!Pq.       000000000000000000000000000003B36FB9    1111000033334444111166666666AAAAAAAA00001111CCCCEEEE
#'acl'~       0000000000000000000000000000002EDC5C8    8888AAAA11114444FFFF77773333EEEE44440000FFFF99999999
root@ip-172-31-17-83 ~]$ tail part-r-00000
~~~v/0&Qnm     00000000000000000000000000004709701    CCCC88883333FFFF00000000000099991111FFFF777744446666
~~~y@_[16=    0000000000000000000000000000006607BF1    3333CCCC4444AAAA7777999933338888BBBB7777DDDDDDDD6666
~~~yK0l:gEf    000000000000000000000000000002048B4F    CCCC11114444888822226666BBBB888855557777EEEEBBBB0000
~~~yK^H.i\l    000000000000000000000000000000463D004    44440000FFFF3333999944447777DDDDFFFFAAAA11118888DDDD
~~~yl;C'XE     0000000000000000000000000000005B0D211    2222EEEE3333000022221111CCCCFFFF555577774444BBBB6666
~~~zbA_Tt      0000000000000000000000000000007F9F4F    BBBBCCCC666655559999FFFF8888AAAA11116666AAABBB0000
~~~zeo^FEg     0000000000000000000000000000001E06130    4444CCCCBBBB99992222888855558888CCCCFFFF000011111111
~~~}GxjWHI     00000000000000000000000000000000A1345    777711118888AAAAAAA22221111BBBB00002222BBBBCCCC2222
~~~}P;]g0g     00000000000000000000000000000040DA3E4    4444FFFF444466663333EEEE88888888DDDEEEEE44442222DDDD
~~~}ku|K<p     0000000000000000000000000000005EA0AA    0000666655551111BBBB88889999AAAA55550000333355557777
root@ip-172-31-17-83 ~]$ ^C
root@ip-172-31-17-83 ~]$ ^C
```

Spark 16 Node Output:

EC2 Management Console - Mozilla Firefox

https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:sort=instancetype

AWS Services Edit Vickyben N. Virginia Support

EC2 Dashboard Events Tags Reports Limits

INSTANCES

- Instances
- Spot Requests
- Reserved Instances
- Scheduled Instances
- Commands
- Dedicated Hosts

IMAGES

- AMIs
- Bundle Tasks

ELASTIC BLOCK STORE

- Volumes
- Snapshots

NETWORK & SECURITY

- Security Groups
- Elastic IPs
- Placement Groups

Launch Instance Connect Actions

Filter by tags and attributes or search by keyword

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS
Spark_cluste...	i-0093079b	c3.large	us-east-1c	running	2/2 checks ...	None	ec2-54-164-126-6.com
Spark_cluste...	i-0793079c	c3.large	us-east-1c	running	2/2 checks ...	None	ec2-54-173-202-231.c
Master	i-08215f8b	t2.micro	us-east-1a	stopped		None	
spark-slave4...	i-1ea18a9d	t2.micro	us-east-1a	stopped		None	
Spark_cluste...	i-1f930784	c3.large	us-east-1c	running	2/2 checks ...	None	ec2-52-91-158-61.com
	i-313c44b2	t2.micro	us-east-1a	running	2/2 checks ...	None	ec2-54-209-26-54.com
Spark_cluste...	i-439c08d8	c3.large	us-east-1c	running	2/2 checks ...	None	ec2-54-173-206-248.c
Spark_cluste...	i-449c08df	c3.large	us-east-1c	running	2/2 checks ...	None	ec2-52-90-208-55.com
Spark_cluste...	i-459c08de	c3.large	us-east-1c	running	2/2 checks ...	None	ec2-54-172-25-125.c
Spark_cluste...	i-4a9307d1	c3.large	us-east-1c	running	2/2 checks ...	None	ec2-54-173-206-229.c
Spark_cluste...	i-4b9307d0	c3.large	us-east-1c	running	2/2 checks ...	None	ec2-54-173-123-97.c

Select an instance above

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```
biya@biya-Lenovo-ideapad-100-15IBD: ~
root@ip-172-31-17-83 ~]# ls
32 ephemeral-hdfs      gpl-2.0.txt           jdk-8u73-linux-x64.rpm  persistent-hdfs         sort-0.0.1-SNAPSHOT.jar  spark      tachyon
64 gensort-linux-1.5.tar.gz  hadoop-native         mapreduce               scala                   SortSpark.jar           spark-ec2
root@ip-172-31-17-83 ~]# cd 64
root@ip-172-31-17-83 64]# ls
dataset1gb.txt gensort valsort
root@ip-172-31-17-83 64]# cd spark
-bash: cd: spark: No such file or directory
root@ip-172-31-17-83 64]# cd ..
root@ip-172-31-17-83 ~]# cd spark
root@ip-172-31-17-83 spark]# ls
bin  CHANGES.txt  conf  data  ec2  examples  lib  LICENSE  licenses  logs  NOTICE  python  R  RELEASE  sbin
root@ip-172-31-17-83 spark]# cd bin
root@ip-172-31-17-83 bin]# ls
beeline      pyspark      run-example2.cmd  spark-class.cmd  spark-shell      spark-submit
beeline.cmd  pyspark2.cmd  run-example.cmd   sparkR            spark-shell2.cmd  spark-submit2.cmd
load-spark-env.cmd  pyspark.cmd   spark-class       sparkR2.cmd      spark-shell.cmd   spark-submit.cmd
load-spark-env.sh  run-example   spark-class2.cmd  sparkR.cmd       spark-sql
root@ip-172-31-17-83 bin]# cd ..
root@ip-172-31-17-83 spark]# cd ..
root@ip-172-31-17-83 ~]# ls
32 ephemeral-hdfs      gpl-2.0.txt           jdk-8u73-linux-x64.rpm  persistent-hdfs         sort-0.0.1-SNAPSHOT.jar  spark      tachyon
64 gensort-linux-1.5.tar.gz  hadoop-native         mapreduce               scala                   SortSpark.jar           spark-ec2
root@ip-172-31-17-83 ~]# spark/bin/spark-submit --master spark://ec2-54-172-54-83.compute-1.amazonaws.com --class sort.SortSpark file:///root/sort-0.0.1-SNAPSHOT.jar spark://ec2-54-172-54-83.compute-1.amazonaws.com hdfs://ec2-54-172-54-83.compute-1.amazonaws.com:50070/user/Input/dataset1gb.txtclear
```

```

root@ip-172-31-20-241 ~# $ head part-r-00000
14+ABv 0000000000000000000000000017F7E829 EEEF33334444111122288883334444666333222DDDDDEEEE
"0!uVe 000000000000000000000000001228D4 7777888800002224444DDDDDDDEEEE00000000CCCC7777DDDD
%!$u(C 0000000000000000000000000002E6C821C 2222333377774444555511119999CCCC4444EEEEFFFF11115555
&5r(X 00000000000000000000000000399B2C88 5555CCCCBBB888899999999DDDD111100001111EEEE7777DDDD9999
*%k$0 00000000000000000000000000031F06B7D EEEEBBBBAAAA8888DDDDDDDD77772224444111166664444AAAD
'0G!Io 000000000000000000000000003B5E85A1 1111AAAA9999CCCCBBB111199991111333399991111AAAA6666
,(GhT_ 000000000000000000000000000206172DC 1111CCCC1111DDDDCCCCEEEE9999CCCC8888CCCCFFFF55555555
0*vVm3 000000000000000000000000000206157C8 DDDDD7777AAAAEEEEEEEE6666AAAA2222CCCC5555555522229999
2C>J8d 00000000000000000000000000026C79E66 444400001111CCCC6666BBB88555577776666CCCC2222AAAA88BB
8Tu30; 0000000000000000000000000003FC4BD1 7777222DDDD7777222AAAA33336666EEEE88880000FFFF6666

root@ip-172-31-20-241 ~# $ tail part-r-00000
~~~~~0y(Gy" 0000000000000000000000000003F8029B9 2222666644440000EEEE111199998888222299997777CCCCEEEE
~~~~~kA7x 0000000000000000000000000001F1AE26 EEE777711117777BBB1111EEEE88884444DDDDDDDEEEEEBBB
~~~~~BI!i@ 0000000000000000000000000000F05932F 1119999BBB4444777700001114444CCCCAAA6666DDDD0000
~~~~~I'5>F 000000000000000000000000000008CB2293 88883333BBB1111666699998888555888888822228888CCCC
~~~~~8Cztb 0000000000000000000000000003F9B2AB5 7777AAAA22221111FFFF5555BBB62222BBB80000AAAAADDD2222
~~~~~(G-)n^ 00000000000000000000000000013397F73 DDDDF7FB8BCCCCFF44446666AAAA1111333333333333AAAA
~~~~~Tz iJL 0000000000000000000000000003ED87AFD CFFF2222777788880000AAAA666666677771111AAAAACCCAAAA
~~~~~UEtrJ$ 0000000000000000000000000003E299F5 DDD00000CCCC22227777DDDD55558888000000002222222222
~~~~~+1&cP 000000000000000000000000000074BDF64 8888000055550000DDDD22227777AAAA000033332222AAAAADDD
~~~~~hb&5X* 00000000000000000000000000032C0E0B 7777BBB888889999EEEEAAAAAAA0000CCCCDDDD44448BBB4444

root@ip-172-31-20-241 ~# $ cd 64
root@ip-172-31-20-241 64$ ls
dataset100gb.txt gensort valsort
root@ip-172-31-20-241 64$ ./valsort /root/part-r-00000
Records: 1073741820
Checksum: 1ffff69e4a47ce7
Duplicate keys: 0
SUCCESS - all records are in order
root@ip-172-31-20-241 64$
root@ip-172-31-20-241 64$ |

```