MAP REDUCE IN WEATHER DATASET

TERMINAL:

hadoop@vinoth-ubuntu:~\$ hadoop version

Hadoop 3.3.6

Source code repository https://github.com/apache/hadoop.git -r

1be78238728da9266a4f88195058f08fd012bf9c

Compiled by ubuntu on 2023-06-18T08:22Z

Compiled on platform linux-x86 64

Compiled with protoc 3.7.1

From source with checksum 5652179ad55f76cb287d9c633bb53bbd

This command was run using

/home/hadoop/share/hadoop/common/hadoop-common-3.3.6.jar

hadoop@vinoth-ubuntu:~\$ export HADOOP_CLASSPATH=\$(hadoop classpath)

hadoop@vinoth-ubuntu:~\$ echo \$HADOOP CLASSPATH

/home/hadoop/hadoop/etc/hadoop:/home/hadoop/hadoop/share/hadoop/common/lib/*:/home/hadoop/hadoop/share/hadoop/common/*:/home/hadoop/hadoop/share/hadoop/hadoop/share/hadoop/hadoop/share/hadoop/hadoop/share/hadoop/hadoop/share/hadoop/hadoop/share/hadoop/hadoop/share/hadoop/share/hadoop/yarn:/home/hadoop/share/hadoop/yarn/lib/*:/home/hadoop/share/hadoop/share/hadoop/yarn/*

hadoop@vinoth-ubuntu:~\\$ hadoop fs -mkdir /WeatherTutorial

hadoop@vinoth-ubuntu:~\\$ hadoop fs -mkdir /WeatherTutorial/Input

hadoop@vinoth-ubuntu:~\$ hadoop fs -put

'/home/hadoop/Documents/WeatherExpt/input_data/weatherinput.txt' /WeatherTutorial/Input

hadoop@vinoth-ubuntu:~\$ cd home /hadoop/Documents/WeatherExpt bash: cd: too many arguments

hadoop@vinoth-ubuntu:~\$ cd home/hadoop/Documents/WeatherExpt

bash: cd: home/hadoop/Documents/WeatherExpt: No such file or directory

hadoop@vinoth-ubuntu:~\$ cd home/hadoop/Documents/WeatherExpt/

bash: cd: home/hadoop/Documents/WeatherExpt/: No such file or directory

hadoop@vinoth-ubuntu:~\$ cd /home/hadoop/Documents/WeatherExpt

hadoop@vinoth-ubuntu:~/Documents/WeatherExpt\$ javac -classpath \$HADOOP CLASSPATH -d

'/home/hadoop/Documents/WeatherExpt/tutorial_classes'

'/home/hadoop/Documents/WeatherExpt/weather program.java'

/home/hadoop/Documents/WeatherExpt/weather program.java:18: error: class MyMaxMin is public, should be declared in a file named MyMaxMin.java public class MyMaxMin {

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Note: /home/hadoop/Documents/WeatherExpt/weather program.java uses or overrides a deprecated API.

Note: Recompile with -Xlint:deprecation for details.

1 error

hadoop@vinoth-ubuntu:~/Documents/WeatherExpt\$ javac -classpath

\$HADOOP CLASSPATH -d

'/home/hadoop/Documents/WeatherExpt/tutorial_classes'

'/home/hadoop/Documents/WeatherExpt/WeatherProg.java'

/home/hadoop/Documents/WeatherExpt/WeatherProg.java:121: error: cannot find symbol

job.setJarByClass(MyMaxMin.class); //Assigning the driver class name

symbol: class MyMaxMin location: class WeatherProg

Note: /home/hadoop/Documents/WeatherExpt/WeatherProg.java uses or overrides a deprecated API.

Note: Recompile with -Xlint:deprecation for details.

1 error

hadoop@vinoth-ubuntu:~/Documents/WeatherExpt\$ javac -classpath

\$HADOOP CLASSPATH -d

'/home/hadoop/Documents/WeatherExpt/tutorial classes'

'/home/hadoop/Documents/WeatherExpt/MyMaxMin.java'

Note: /home/hadoop/Documents/WeatherExpt/MyMaxMin.java uses or overrides a deprecated API.

Note: Recompile with -Xlint:deprecation for details.

hadoop@vinoth-ubuntu:~/Documents/WeatherExpt\$ javac -classpath

\$HADOOP_CLASSPATH -d

'/home/hadoop/Documents/WeatherExpt/tutorial classes'

'/home/hadoop/Documents/WeatherExpt/MyMaxMin.java' -Xlint:unchecked

Note: /home/hadoop/Documents/WeatherExpt/MyMaxMin.java uses or overrides a deprecated API.

Note: Recompile with -Xlint:deprecation for details.

hadoop@vinoth-ubuntu:~/Documents/WeatherExpt\$ javac -classpath

\$HADOOP_CLASSPATH -d

'/home/hadoop/Documents/WeatherExpt/tutorial_classes'

'/home/hadoop/Documents/WeatherExpt/MyMaxMin.java'-Xlint:unchecked javac: invalid flag:

/home/hadoop/Documents/WeatherExpt/MyMaxMin.java-Xlint:unchecked

Usage: javac <options> <source files>

use -help for a list of possible options

hadoop@vinoth-ubuntu:~/Documents/WeatherExpt\$ javac -classpath

\$HADOOP CLASSPATH -d

'/home/hadoop/Documents/WeatherExpt/tutorial_classes'

'/home/hadoop/Documents/WeatherExpt/MyMaxMin.java' -Xlint:unchecked

```
Note: /home/hadoop/Documents/WeatherExpt/MyMaxMin.java uses or overrides a
deprecated API.
Note: Recompile with -Xlint:deprecation for details.
hadoop@vinoth-ubuntu:~/Documents/WeatherExpt$ jar -cvf secondTutorial.jar -C
tutorial classes/.
added manifest
adding: MyMaxMin$MaxTemperatureReducer.class(in = 1283) (out=
533)(deflated 58%)
adding: MyMaxMin$MaxTemperatureMapper.class(in = 2029) (out= 885)(deflated
56%)
adding: MyMaxMin.class(in = 1836) (out= 928)(deflated 49%)
hadoop@vinoth-ubuntu:~/Documents/WeatherExpt$ hadoop jar
'/home/hadoop/Documents/WeatherExpt/secondTutorial.jar' MyMinMax
/WeatherTutorial/Input WeatherTutorial/Output
Exception in thread "main" java.lang.ClassNotFoundException: MyMinMax
      at java.net.URLClassLoader.findClass(URLClassLoader.java:387)
      at java.lang.ClassLoader.loadClass(ClassLoader.java:418)
      at java.lang.ClassLoader.loadClass(ClassLoader.java:351)
      at java.lang.Class.forName0(Native Method)
      at java.lang.Class.forName(Class.java:348)
      at org.apache.hadoop.util.RunJar.run(RunJar.java:321)
      at org.apache.hadoop.util.RunJar.main(RunJar.java:241)
hadoop@vinoth-ubuntu:~/Documents/WeatherExpt$ hadoop jar
'/home/hadoop/Documents/WeatherExpt/secondTutorial.jar' MyMaxMin
/WeatherTutorial/Input WeatherTutorial/Output
2024-09-12 20:17:43,202 INFO impl.MetricsConfig: Loaded properties from
hadoop-metrics2.properties
2024-09-12 20:17:43,387 INFO impl.MetricsSystemImpl: Scheduled Metric
snapshot period at 10 second(s).
2024-09-12 20:17:43,387 INFO impl.MetricsSystemImpl: JobTracker metrics
system started
2024-09-12 20:17:43,459 WARN mapreduce. JobResource Uploader: Hadoop
command-line option parsing not performed. Implement the Tool interface and
execute your application with ToolRunner to remedy this.
2024-09-12 20:17:43,654 INFO input. FileInputFormat: Total input files to process
: 1
2024-09-12 20:17:43,694 INFO mapreduce.JobSubmitter: number of splits:1
2024-09-12 20:17:43,803 INFO mapreduce. JobSubmitter: Submitting tokens for
job: job local1070794341 0001
2024-09-12 20:17:43,803 INFO mapreduce. JobSubmitter: Executing with tokens:
2024-09-12 20:17:44,001 INFO mapreduce. Job: The url to track the job:
http://localhost:8080/
```

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2024-09-12 20:17:44,002 INFO mapreduce. Job: Running job:
job local1070794341 0001
2024-09-12 20:17:44,008 INFO mapred.LocalJobRunner: OutputCommitter set in
config null
2024-09-12 20:17:44,039 INFO output.PathOutputCommitterFactory: No output
committer factory defined, defaulting to FileOutputCommitterFactory
2024-09-12 20:17:44,041 INFO output.FileOutputCommitter: File Output
Committer Algorithm version is 2
2024-09-12 20:17:44,041 INFO output.FileOutputCommitter:
FileOutputCommitter skip cleanup temporary folders under output directory:false,
ignore cleanup failures: false
2024-09-12 20:17:44,042 INFO mapred.LocalJobRunner: OutputCommitter is
org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
2024-09-12 20:17:44,125 INFO mapred.LocalJobRunner: Waiting for map tasks
2024-09-12 20:17:44,126 INFO mapred.LocalJobRunner: Starting task:
attempt local1070794341 0001 m 000000 0
2024-09-12 20:17:44,167 INFO output.PathOutputCommitterFactory: No output
committer factory defined, defaulting to FileOutputCommitterFactory
2024-09-12 20:17:44,167 INFO output.FileOutputCommitter: File Output
Committer Algorithm version is 2
2024-09-12 20:17:44,167 INFO output.FileOutputCommitter:
FileOutputCommitter skip cleanup temporary folders under output directory:false,
ignore cleanup failures: false
2024-09-12 20:17:44,225 INFO mapred. Task: Using
ResourceCalculatorProcessTree:[]
2024-09-12 20:17:44,231 INFO mapred.MapTask: Processing split:
hdfs://localhost:9000/WeatherTutorial/Input/weatherinput.txt:0+79205
2024-09-12 20:17:44,626 INFO mapred.MapTask: (EQUATOR) 0 kvi
26214396(104857584)
2024-09-12 20:17:44,627 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
2024-09-12 20:17:44,627 INFO mapred.MapTask: soft limit at 83886080
2024-09-12 20:17:44,627 INFO mapred.MapTask: bufstart = 0; bufvoid =
104857600
2024-09-12 20:17:44,627 INFO mapred.MapTask: kvstart = 26214396; length =
6553600
2024-09-12 20:17:44,640 INFO mapred.MapTask: Map output collector class =
org.apache.hadoop.mapred.MapTask$MapOutputBuffer
2024-09-12 20:17:44,891 INFO mapred.LocalJobRunner:
2024-09-12 20:17:44,895 INFO mapred.MapTask: Starting flush of map output
2024-09-12 20:17:44,895 INFO mapred.MapTask: Spilling map output
2024-09-12 20:17:44,895 INFO mapred.MapTask: bufstart = 0; bufend = 8489;
bufvoid = 104857600
2024-09-12 20:17:44,895 INFO mapred.MapTask: kvstart =
26214396(104857584); kvend = 26212940(104851760); length = 1457/6553600
```

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2024-09-12 20:17:44,931 INFO mapred.MapTask: Finished spill 0
2024-09-12 20:17:45.012 INFO mapred. Task:
Task:attempt local1070794341 0001 m 000000 0 is done. And is in the process
of committing
2024-09-12 20:17:45,017 INFO mapreduce. Job: Job job local1070794341 0001
running in uber mode: false
2024-09-12 20:17:45,019 INFO mapreduce. Job: map 0% reduce 0%
2024-09-12 20:17:45,023 INFO mapred.LocalJobRunner: map
2024-09-12 20:17:45,025 INFO mapred. Task: Task
'attempt local1070794341 0001 m 000000 0' done.
2024-09-12 20:17:45.069 INFO mapred. Task: Final Counters for
attempt local1070794341 0001 m 000000 0: Counters: 23
      File System Counters
      FILE: Number of bytes read=3314
      FILE: Number of bytes written=654149
      FILE: Number of read operations=0
      FILE: Number of large read operations=0
      FILE: Number of write operations=0
      HDFS: Number of bytes read=79205
      HDFS: Number of bytes written=0
      HDFS: Number of read operations=5
      HDFS: Number of large read operations=0
      HDFS: Number of write operations=2
      HDFS: Number of bytes read erasure-coded=0
      Map-Reduce Framework
      Map input records=365
      Map output records=365
      Map output bytes=8489
      Map output materialized bytes=9225
      Input split bytes=125
      Combine input records=0
      Spilled Records=365
      Failed Shuffles=0
      Merged Map outputs=0
      GC time elapsed (ms)=17
      Total committed heap usage (bytes)=379060224
      File Input Format Counters
      Bytes Read=79205
2024-09-12 20:17:45,074 INFO mapred.LocalJobRunner: Finishing task:
attempt local1070794341 0001 m 000000 0
2024-09-12 20:17:45,076 INFO mapred.LocalJobRunner: map task executor
complete.
2024-09-12 20:17:45,097 INFO mapred.LocalJobRunner: Waiting for reduce tasks
```

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2024-09-12 20:17:45,100 INFO mapred.LocalJobRunner: Starting task:
attempt local1070794341 0001 r 000000 0
2024-09-12 20:17:45,147 INFO output.PathOutputCommitterFactory: No output
committer factory defined, defaulting to FileOutputCommitterFactory
2024-09-12 20:17:45,147 INFO output.FileOutputCommitter: File Output
Committer Algorithm version is 2
2024-09-12 20:17:45,147 INFO output.FileOutputCommitter:
FileOutputCommitter skip cleanup temporary folders under output directory:false,
ignore cleanup failures: false
2024-09-12 20:17:45,149 INFO mapred.Task: Using
ResourceCalculatorProcessTree:[]
2024-09-12 20:17:45,158 INFO mapred.ReduceTask: Using
ShuffleConsumerPlugin:
org.apache.hadoop.mapreduce.task.reduce.Shuffle@38c3cf46
2024-09-12 20:17:45,171 WARN impl.MetricsSystemImpl: JobTracker metrics
system already initialized!
2024-09-12 20:17:45,239 INFO reduce.MergeManagerImpl: MergerManager:
memoryLimit=1265788544, maxSingleShuffleLimit=316447136,
mergeThreshold=835420480, ioSortFactor=10,
memToMemMergeOutputsThreshold=10
2024-09-12 20:17:45,253 INFO reduce. Event Fetcher:
attempt local1070794341 0001 r 000000 0 Thread started: EventFetcher for
fetching Map Completion Events
2024-09-12 20:17:45,343 INFO reduce.LocalFetcher: localfetcher#1 about to
shuffle output of map attempt local1070794341 0001 m 000000 0 decomp:
9221 len: 9225 to MEMORY
2024-09-12 20:17:45,347 INFO reduce.InMemoryMapOutput: Read 9221 bytes
from map-output for attempt local1070794341 0001 m 000000 0
2024-09-12 20:17:45,350 INFO reduce. MergeManagerImpl: closeInMemoryFile
-> map-output of size: 9221, inMemoryMapOutputs.size() -> 1, commitMemory ->
0. usedMemory ->9221
2024-09-12 20:17:45,360 INFO reduce. EventFetcher: EventFetcher is interrupted...
Returning
2024-09-12 20:17:45,361 INFO mapred.LocalJobRunner: 1 / 1 copied.
2024-09-12 20:17:45,361 INFO reduce. MergeManagerImpl: finalMerge called
with 1 in-memory map-outputs and 0 on-disk map-outputs
2024-09-12 20:17:45,396 INFO mapred.Merger: Merging 1 sorted segments
2024-09-12 20:17:45,396 INFO mapred. Merger: Down to the last merge-pass, with
1 segments left of total size: 9201 bytes
2024-09-12 20:17:45,409 INFO reduce. MergeManagerImpl: Merged 1 segments,
```

2024-09-12 20:17:45,409 INFO reduce. MergeManagerImpl: Merging 1 files, 9225

9221 bytes to disk to satisfy reduce memory limit

bytes from disk

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2024-09-12 20:17:45,410 INFO reduce. MergeManagerImpl: Merging 0 segments,
0 bytes from memory into reduce
2024-09-12 20:17:45,410 INFO mapred.Merger: Merging 1 sorted segments
2024-09-12 20:17:45,413 INFO mapred. Merger: Down to the last merge-pass, with
1 segments left of total size: 9201 bytes
2024-09-12 20:17:45,421 INFO mapred.LocalJobRunner: 1 / 1 copied.
2024-09-12 20:17:45,504 INFO Configuration.deprecation: mapred.skip.on is
deprecated. Instead, use mapreduce.job.skiprecords
2024-09-12 20:17:45,596 INFO mapred.Task:
Task:attempt local1070794341 0001 r 000000 0 is done. And is in the process
of committing
2024-09-12 20:17:45,600 INFO mapred.LocalJobRunner: 1 / 1 copied.
2024-09-12 20:17:45,600 INFO mapred. Task: Task
attempt local1070794341 0001 r 000000 0 is allowed to commit now
2024-09-12 20:17:45,649 INFO output. FileOutputCommitter: Saved output of task
'attempt local1070794341 0001 r 000000 0' to
hdfs://localhost:9000/user/hadoop/WeatherTutorial/Output
2024-09-12 20:17:45,652 INFO mapred.LocalJobRunner: reduce > reduce
2024-09-12 20:17:45,652 INFO mapred.Task: Task
'attempt local1070794341 0001 r 000000 0' done.
2024-09-12 20:17:45,654 INFO mapred. Task: Final Counters for
attempt local1070794341 0001 r 000000 0: Counters: 30
      File System Counters
      FILE: Number of bytes read=21796
      FILE: Number of bytes written=663374
      FILE: Number of read operations=0
      FILE: Number of large read operations=0
      FILE: Number of write operations=0
      HDFS: Number of bytes read=79205
      HDFS: Number of bytes written=8489
      HDFS: Number of read operations=10
      HDFS: Number of large read operations=0
      HDFS: Number of write operations=4
      HDFS: Number of bytes read erasure-coded=0
      Map-Reduce Framework
      Combine input records=0
      Combine output records=0
      Reduce input groups=365
      Reduce shuffle bytes=9225
      Reduce input records=365
      Reduce output records=365
      Spilled Records=365
      Shuffled Maps =1
```

Failed Shuffles=0

Merged Map outputs=1

GC time elapsed (ms)=0

Total committed heap usage (bytes)=379060224

Shuffle Errors

BAD ID=0

CONNECTION=0

IO ERROR=0

WRONG LENGTH=0

WRONG MAP=0

WRONG REDUCE=0

File Output Format Counters

Bytes Written=8489

2024-09-12 20:17:45,654 INFO mapred.LocalJobRunner: Finishing task:

attempt_local1070794341_0001_r_000000_0

2024-09-12 20:17:45,655 INFO mapred.LocalJobRunner: reduce task executor complete.

2024-09-12 20:17:46,028 INFO mapreduce.Job: map 100% reduce 100%

2024-09-12 20:17:46,029 INFO mapreduce.Job: Job job_local1070794341_0001 completed successfully

2024-09-12 20:17:46,037 INFO mapreduce. Job: Counters: 36

File System Counters

FILE: Number of bytes read=25110

FILE: Number of bytes written=1317523

FILE: Number of read operations=0

FILE: Number of large read operations=0

FILE: Number of write operations=0

HDFS: Number of bytes read=158410

HDFS: Number of bytes written=8489

HDFS: Number of read operations=15

HDFS: Number of large read operations=0

HDFS: Number of write operations=6

HDFS: Number of bytes read erasure-coded=0

Map-Reduce Framework

Map input records=365

Map output records=365

Map output bytes=8489

Map output materialized bytes=9225

Input split bytes=125

Combine input records=0

Combine output records=0

Reduce input groups=365

Reduce shuffle bytes=9225

Reduce input records=365

Reduce output records=365

Spilled Records=730

Shuffled Maps =1

Failed Shuffles=0

Merged Map outputs=1

GC time elapsed (ms)=17

Total committed heap usage (bytes)=758120448

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=79205

File Output Format Counters

Bytes Written=8489

hadoop@vinoth-ubuntu:~/Documents/WeatherExpt\$ hadoop dfs -cat

WeatherTutorial/Output/*

WARNING: Use of this script to execute dfs is deprecated.

WARNING: Attempting to execute replacement "hdfs dfs" instead.

Cold Day 20150101 -21.8 Cold Day 20150102 -24.9 -28.2Cold Day 20150103 -28.9 Cold Day 20150104 Cold Day 20150105 -29.3-26.3Cold Day 20150106 Cold Day 20150107 -28.7-24.1 Cold Day 20150108 Cold Day 20150109 -20.3Cold Day 20150110 -25.8Cold Day 20150111 -28.2Cold Day 20150112 -29.1-29.9 Cold Day 20150113 -29.0 Cold Day 20150114 -24.2Cold Day 20150115 Cold Day 20150116 -24.6

Cold Day 20150117 -23.2

Cold Day 20150118 -23.0

Cold Day 20150118 -25.0 Cold Day 20150119 -30.4

Cold Day 20150120 -24.7

Cold Day 20150121 -24.1

Cold Day 20150122 -27.5

G 11D 00150100	20.2
Cold Day 20150123	-29.3
Cold Day 20150124	-30.3
Cold Day 20150125	-30.0
Cold Day 20150126	-30.7
Cold Day 20150127	-26.9
Cold Day 20150128	-36.2
Cold Day 20150129	-35.0
Cold Day 20150129	-24.2
	-24.2
Cold Day 20150131	
Cold Day 20150201	-22.1
Cold Day 20150202	-19.0
Cold Day 20150203	-31.1
Cold Day 20150204	-38.2
Cold Day 20150205	-37.0
Cold Day 20150206	-29.7
Cold Day 20150207	-27.9
Cold Day 20150208	-35.4
Cold Day 20150209	-36.8
Cold Day 20150210	-34.5
Cold Day 20150211	-34.1
Cold Day 20150212	-32.5
Cold Day 20150212	-34.0
Cold Day 20150214	-34.6
	-34.0
Cold Day 20150215	
Cold Day 20150216	-25.7
Cold Day 20150217	-22.1
Cold Day 20150218	-18.5
Cold Day 20150219	-19.2
Cold Day 20150220	-23.2
Cold Day 20150221	-19.3
Cold Day 20150222	-19.0
Cold Day 20150223	-20.0
Cold Day 20150224	-18.1
Cold Day 20150225	-15.6
Cold Day 20150226	-6.5
Cold Day 20150227	-16.3
Cold Day 20150228	-26.5
Cold Day 20150225 Cold Day 20150301	-28.5
Cold Day 20150301	-23.6
	-16.4
Cold Day 20150303	
Cold Day 20150304	-25.4
Cold Day 20150305	-26.9
Cold Day 20150306	-27.6
Cold Day 20150307	-25.0

Cold Day 20150308	-29.6
Cold Day 20150309	-31.5
	-36.5
Cold Day 20150310	
Cold Day 20150311	-38.6
Cold Day 20150312	-39.3
Cold Day 20150313	-39.3
Cold Day 20150314	-38.0
Cold Day 20150315	-32.7
Cold Day 20150316	-33.1
Cold Day 20150317	-23.7
Cold Day 20150318	-23.9
Cold Day 20150319	-24.2
Cold Day 20150320	-24.3
Cold Day 20150321	-20.2
Cold Day 20150322	-23.0
Cold Day 20150323	-27.0
Cold Day 20150324	-33.0
Cold Day 20150325	-27.4
Cold Day 20150326	-26.5
Cold Day 20150327	-25.0
Cold Day 20150328	-26.3
Cold Day 20150329	-25.0
	-23.3
Cold Day 20150330	
Cold Day 20150331	-19.3
Cold Day 20150401	-23.7
Cold Day 20150402	-26.1
Cold Day 20150403	-21.6
Cold Day 20150404	-23.7
Cold Day 20150405	-24.2
Cold Day 20150406	-20.1
Cold Day 20150407	-18.4
Cold Day 20150408	-16.4
Cold Day 20150409	-17.6
Cold Day 20150410	-20.0
	-20.0
Cold Day 20150411	
Cold Day 20150412	-23.1
Cold Day 20150413	-27.7
Cold Day 20150414	-26.1
Cold Day 20150415	-27.4
Cold Day 20150416	-24.2
Cold Day 20150417	-28.1
Cold Day 20150418	-25.0
Cold Day 20150419	-15.6
Cold Day 20150420	-11.8

Cold Day 20150421 Cold Day 20150422 Cold Day 20150423 Cold Day 20150424 Cold Day 20150425 Cold Day 20150426 Cold Day 20150427 Cold Day 20150428 Cold Day 20150429 Cold Day 20150429 Cold Day 20150501 Cold Day 20150501 Cold Day 20150502 Cold Day 20150503 Cold Day 20150505 Cold Day 20150505 Cold Day 20150506 Cold Day 20150507 Cold Day 20150507 Cold Day 20150508 Cold Day 20150509 Cold Day 20150510 Cold Day 20150511 Cold Day 20150511 Cold Day 20150513 Cold Day 20150515 Cold Day 20150516 Cold Day 20150516 Cold Day 20150517	-13.8 -8.4 -8.8 -12.4 -9.0 -8.6 -9.4 -9.5 -9.4 -13.7 -16.1 -8.6 -9.6 -13.0 -12.3 -10.8 -9.6 -4.7 -6.1 -2.1 -3.8 -4.6 -6.7 -5.1 -2.9 -0.3
	-13.0
	-12.3
	-10.8
	-9.6
	-4.7
	-6.1
	-2.1
	-3.8
	-4.6
Cold Day 20150515	- 5.1
	-2.9
Cold Day 20150517	
Cold Day 20150518	0.7
Cold Day 20150519	-1.4
Cold Day 20150520	-2.6
Cold Day 20150521	0.0
Cold Day 20150522	0.2
Cold Day 20150523	-0.4
Cold Day 20150524	-0.5
Cold Day 20150525	-0.3
Cold Day 20150526	-1.8
Cold Day 20150527	-2.4
Cold Day 20150528	-2.1
Cold Day 20150529	0.2
Cold Day 20150530	-2.3
Cold Day 20150531	-3.8
Cold Day 20150601	-4.0 2.4
Cold Day 20150602	-2.4
Cold Day 20150603	-3.2

Cold Day 20150604 Cold Day 20150605 Cold Day 20150606	-3.7 -3.3 -1.0
Cold Day 20150607 Cold Day 20150608	-1.7 1.0
Cold Day 20150609	0.6
Cold Day 20150610 Cold Day 20150611	-1.5 -2.9
Cold Day 20150612	-2.4
Cold Day 20150613	3.3
Cold Day 20150614 Cold Day 20150615	3.3 0.8
Cold Day 20150616	1.4
Cold Day 20150617	1.0
Cold Day 20150618	0.6
Cold Day 20150619	0.6
Cold Day 20150620 Cold Day 20150621	7.7 7.1
Cold Day 20150622	0.1
Cold Day 20150623	1.3
Cold Day 20150624	1.3
Cold Day 20150625 Cold Day 20150626	1.6 2.6
Cold Day 20150627	1.4
Cold Day 20150628	1.9
Cold Day 20150629	6.5
Cold Day 20150630	6.7
Cold Day 20150701 Cold Day 20150702	4.7 3.7
Cold Day 20150702 Cold Day 20150703	1.3
Cold Day 20150704	3.9
Cold Day 20150705	8.5
Cold Day 20150706	8.1
Cold Day 20150707 Cold Day 20150708	0.8 0.3
Cold Day 20150709	0.3
Cold Day 20150710	0.4
Cold Day 20150711	0.4
Cold Day 20150712	0.6 0.9
Cold Day 20150713 Cold Day 20150714	2.6
Cold Day 20150715	1.1
Cold Day 20150716	2.2
Cold Day 20150717	1.4

Cold Day 20150718	1.4
•	
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Cold Day 20150723	0.0
Cold Day 20150724	-0.1
Cold Day 20150725	1.0
Cold Day 20150726	0.9
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Cold Day 20150809	4.2
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Cold Day 20150812	0.4
Cold Day 20150813	3.1
Cold Day 20150814	4.3
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Cold Day 20150816	0.6
Cold Day 20150817	0.5
Cold Day 20150818	0.4
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Cold Day 20150821	0.8
Cold Day 20150822	1.4
Cold Day 20150823	0.6
Cold Day 20150824	0.6
Cold Day 20150825	1.3
Cold Day 20150826	2.4
Cold Day 20150827	1.9
Cold Day 20150828	0.5
Cold Day 20150829	0.0
Cold Day 20150830	-0.2
Cold Day 20150831	-0.1
2014 Day 20130031	0.1

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Cold Day 20150901	1.4
Cold Day 20150902	2.6
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Cold Day 20150905	-0.3
Cold Day 20150906	2.7
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Cold Day 20150917	-3.0
Cold Day 20150918	-3.2
Cold Day 20150919	-3.4
Cold Day 20150920	-3.6
Cold Day 20150921	-4.9
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Cold Day 20150925	-1.5
Cold Day 20150926	-2.1
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Cold Day 20150929	-3.0
Cold Day 20150930	-4.4
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Cold Day 20151004	-4.6
Cold Day 20151005	-2.9
Cold Day 20151006	-4.1
	-4.1 -4.6
Cold Day 20151007	
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Cold Day 20151010	-4.6
Cold Day 20151011	-3.7
Cold Day 20151012	-5.0
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Cold Day 20151118	-29.8
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Cold Day 20151123	-26.8
Cold Day 20151124	-16.9
Cold Day 20151125	-14.9
Cold Day 20151126	-19.8
Cold Day 20151127	-24.1
2014 24 2015 1121	∠ 1,1

Cold Day 20151128	-17.9
Cold Day 20151129	-18.8
Cold Day 20151130	-25.7
Cold Day 20151201	-25.5
Cold Day 20151202	-25.6
Cold Day 20151202 Cold Day 20151203	-27.4
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Cold Day 20151206	-28.9
Cold Day 20151207	-28.4
Cold Day 20151208	-28.3
Cold Day 20151209	-28.3
Cold Day 20151210	-27.2
Cold Day 20151211	-29.2
Cold Day 20151212	-26.0
Cold Day 20151213	-22.3
Cold Day 20151214	-23.2
Cold Day 20151215	-20.8
Cold Day 20151216	-19.4
Cold Day 20151217	-22.9
Cold Day 20151218	-25.7
Cold Day 20151219	-22.3
Cold Day 20151220	-22.5
Cold Day 20151221	-27.5
Cold Day 20151222	-30.0
Cold Day 20151223	-30.3
Cold Day 20151224	-30.8
Cold Day 20151225	-37.5
Cold Day 20151226	-29.6
Cold Day 20151227	-26.0
	-20.0 -27.1
Cold Day 20151228	-33.0
Cold Day 20151229	
Cold Day 20151230	-25.7
Cold Day 20151231	-22.7
Hot Day 201507209999	9. U



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