



Управляем Shuffle & Sort с помощью Partitioner и Comparator

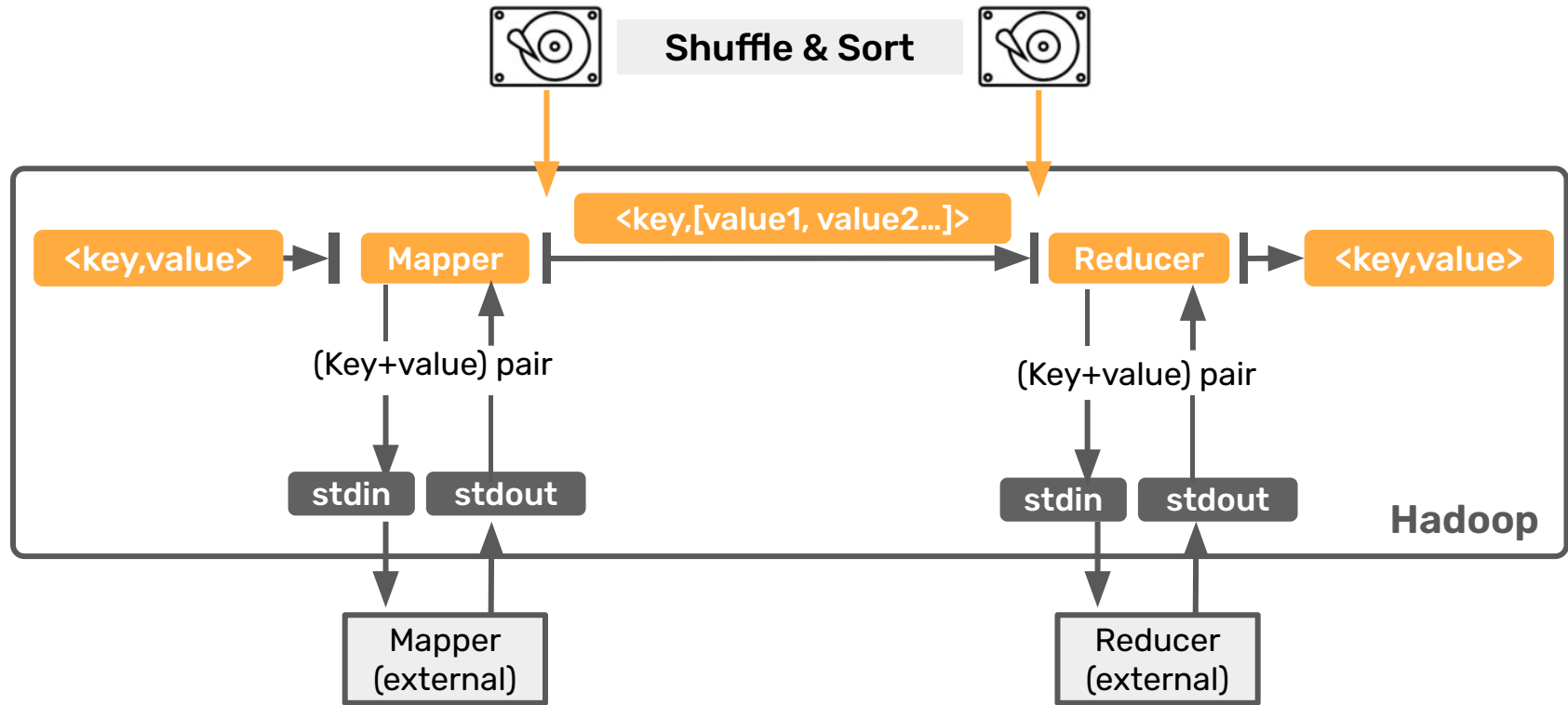
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CEO at BigData Team, <https://bigdatateam.org>

<https://www.facebook.com/bigdatateam>



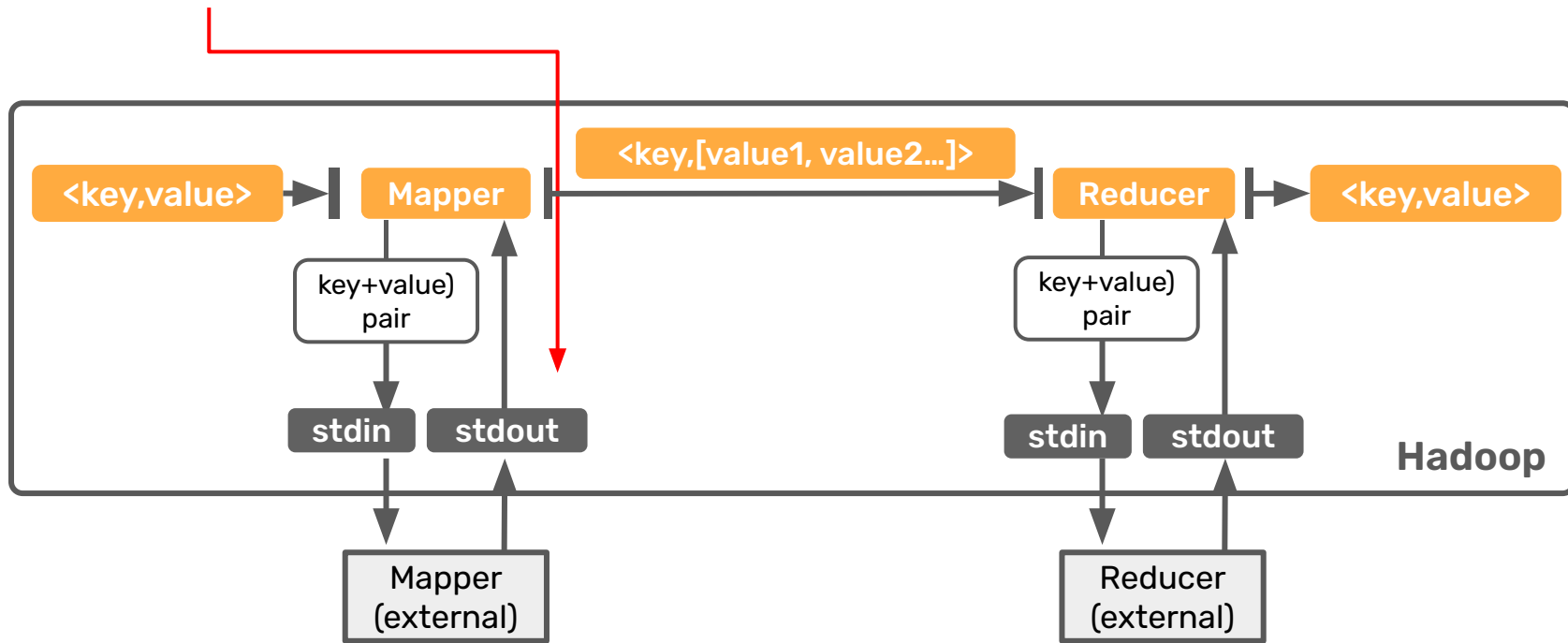
Φαζα Shuffle & Sort





Определение ключа

-D stream.num.map.output.key.fields=1





Поведение по умолчанию

year	name	surname	height
1990	Vasya	Pupkin	192
1990	Alexey	Pupkin	190
1988	Ivan	Ivanov	175
1988	Alexey	Dral	181
1985	Ivan	Pupkin	180
1988	Alexey	Ivanov	180
1985	Vaysa	Ivanov	195



key



value



Поведение по умолчанию

part-00000

1985	Vaysa	Ivanov	195
1985	Ivan	Pupkin	180
1990	Alexey	Pupkin	190
1990	Vasya	Pupkin	192

part-00001

1988	Alexey	Ivanov	180
1988	Alexey	Dral	181
1988	Ivan	Ivanov	175

key

value

```
yarn jar $HADOOP_STREAMING_JAR \  
  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



Поведение по умолчанию

part-00000

1988	Alexey	Ivanov	180
1988	Alexey	Dral	181
1988	Ivan	Ivanov	175

part-00001

1985	Ivan	Pupkin	180
1985	Vaysa	Ivanov	195
1990	Alexey	Pupkin	190
1990	Vasya	Pupkin	192

key

value

```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



Comparator (порядок)





```
yarn jar $HADOOP_STREAMING_JAR \  
  -D stream.num.map.output.key.fields=2 \  
  -D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
  
  -mapper cat \  
  -reducer cat \  
  -numReduceTasks 2 \  
  -input /data/user_profiles \  
  -output shuffle_and_sort_experiment
```




```
yarn jar $HADOOP_STREAMING_JAR \  
  -D stream.num.map.output.key.fields=2 \  
  -D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
  -D mapreduce.partition.keycomparator.options="-k1,1nr -k2,2" \  
  -mapper cat \  
  -reducer cat \  
  -numReduceTasks 2 \  
  -input /data/user_profiles \  
  -output shuffle_and_sort_experiment
```



Кастомный Comparator

part-00000

1988	Alexey	Ivanov	180
1988	Alexey	Dral	181
1988	Ivan	Ivanov	175

part-00001

1990	Alexey	Pupkin	190
1990	Vasya	Pupkin	192
1985	Ivan	Pupkin	180
1985	Vaysa	Ivanov	195

key

value

```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
... "-k1,1nr -k2,2" \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



```
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  -D stream.num.map.output.key.fields=2 \  
  -D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
  -D mapreduce.partition.keycomparator.options="-k1,1nr -k2,2" \  
  -mapper cat \  
  -reducer cat \  
  -numReduceTasks 2 \  
  -input /data/user_profiles \  
  -output shuffle_and_sort_experiment
```



```
yarn jar $HADOOP_STREAMING_JAR \  
  -D stream.num.map.output.key.fields=2 \  
  -D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
  -D mapreduce.partition.keycomparator.options="-k1,1nr -k2,2" \  
  -mapper cat \  
  -reducer cat \  
  -numReduceTasks 2 \  
  -input /data/user_profiles \  
  -output shuffle_and_sort_experiment
```



```
yarn jar $HADOOP_STREAMING_JAR \  
  -D stream.num.map.output.key.fields=2 \  
  -D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
  -D mapreduce.partition.keycomparator.options="-k1,1nr -k2,2" \  
  -mapper cat \  
  -reducer cat \  
  -numReduceTasks 2 \  
  -input /data/user_profiles \  
  -output shuffle_and_sort_experiment
```



```
yarn jar $HADOOP_STREAMING_JAR \  
  -D stream.num.map.output.key.fields=2 \  
  -D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
  -D mapreduce.partition.keycomparator.options="-k1,1nr -k2,2" \  
  -mapper cat \  
  -reducer cat \  
  -numReduceTasks 2 \  
  -input /data/user_profiles \  
  -output shuffle_and_sort_experiment
```



```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
-D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
-D mapreduce.partition.keycomparator.options="-k1,1nr -k2,2" \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



Кастомный Comparator с ошибкой

part-00000

1990	Alexey	Pupkin	190
1990	Vasya	Pupkin	192
1985	Vaysa	Ivanov	195
1985	Ivan	Pupkin	180

part-00001

1988	Alexey	Ivanov	180
1988	Alexey	Dral	181
1988	Ivan	Ivanov	175

key

value

```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
... "-k1,1nr -k2,2" \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```




**BIGDATA
TEAM**

Shuffle & Sort: Partitioner





```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
-D mapreduce.partition.keypartitioner.options=-k2.1,2.1 \  
-partitioner org.apache.hadoop.mapred.lib.KeyFieldBasedPartitioner \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
-D mapreduce.partition.keypartitioner.options=-k2.1,2.1 \  
-partitioner org.apache.hadoop.mapred.lib.KeyFieldBasedPartitioner \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
-D mapreduce.partition.keypartitioner.options=-k2.1,2.1 \  
-partitioner org.apache.hadoop.mapred.lib.KeyFieldBasedPartitioner \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



Кастомный Partitioner

part-00000			
1985	Vaysa	Ivanov	195
1990	Vasya	Pupkin	192
part-00001			
1985	Ivan	Pupkin	180
1988	Alexey	Ivanov	180
1988	Alexey	Dral	181
1988	Ivan	Ivanov	175
1990	Alexey	Pupkin	190

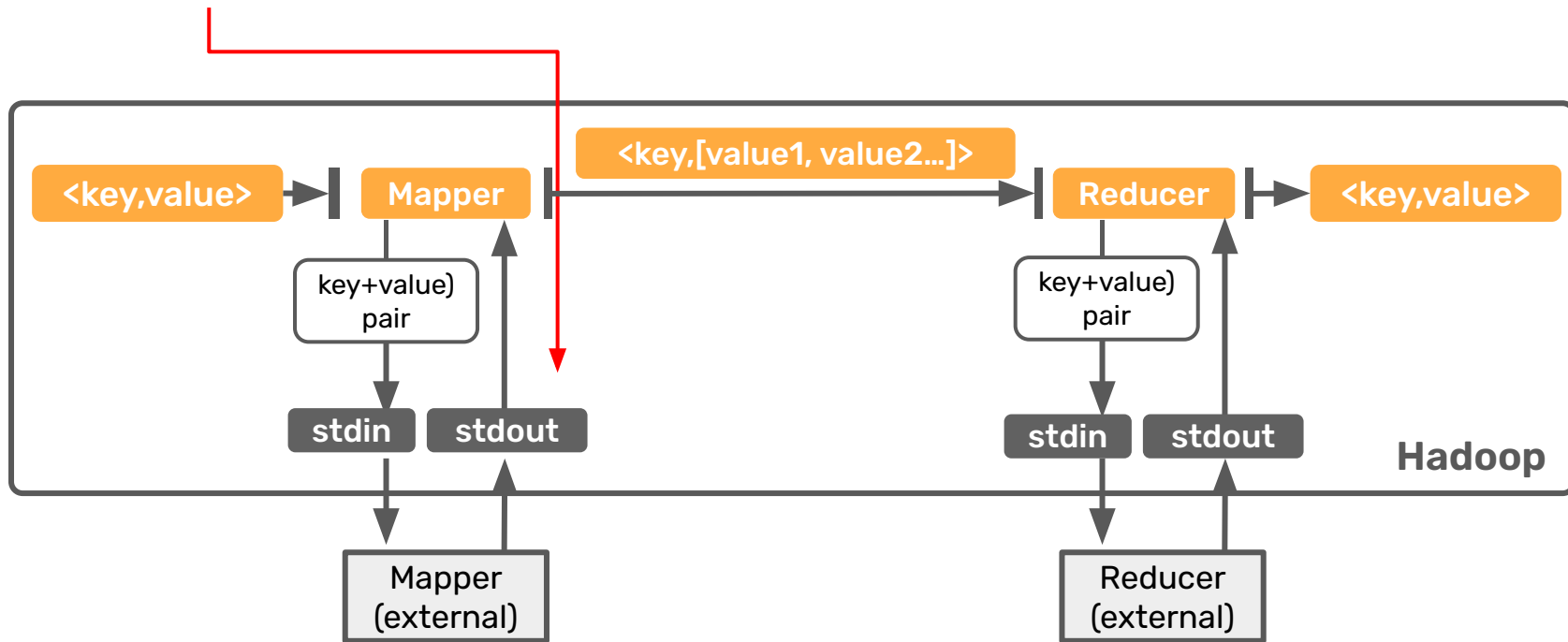
key

value

```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
... -k2.1,2.1 \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



-D `stream.map.output.field.separator=.`





Плохие практики

part-00000

1985,Ivan [redacted] Pupkin,180
1985,Vaysa [redacted] Ivanov,195
1990,Alexey [redacted] Pupkin,190
1990,Vasya [redacted] Pupkin,192

part-00001

1988,Alexey [redacted] Ivanov,180
1988,Alexey [redacted] Dral,181
1988,Ivan [redacted] Ivanov,175

```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.map.output.field.separator=, \  
-D stream.num.map.output.key.fields=2 \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```

key

value



```
yarn jar $HADOOP_STREAMING_JAR \  
-D stream.num.map.output.key.fields=2 \  
-D stream.num.reduce.output.key.fields=2 \  
-D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
-D mapreduce.partition.keycomparator.options="-k1,1nr -k2,2" \  
-D mapreduce.partition.keypartitioner.options=-k2.1,2.1 \  
-partitioner org.apache.hadoop.mapred.lib.KeyFieldBasedPartitioner \  
-mapper cat \  
-combiner cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```




```
yarn jar $HADOOP_STREAMING_JAR \  
-D mapreduce.map.output.key.field.separator=. \  
-D  
mapreduce.job.output.key.comparator.class=org.apache.hadoop.mapreduce.lib.partition.KeyFieldBasedComparator \  
-D mapreduce.partition.keycomparator.options="-k1,1nr -k2,2" \  
-D mapreduce.partition.keypartitioner.options=-k2.1,2.1 \  
-partitioner org.apache.hadoop.mapred.lib.KeyFieldBasedPartitioner \  
-mapper cat \  
-reducer cat \  
-numReduceTasks 2 \  
-input /data/user_profiles \  
-output shuffle_and_sort_experiment
```



Добавляем ip-адрес

ip	name	surname	height
255.1.1.1	Vasya	Pupkin	192
255.2.1.1	Alexey	Pupkin	190
24.2.1.1	Ivan	Ivanov	175
24.1.1.1	Alexey	Dral	181
23.2.1.1	Ivan	Pupkin	180
12.3.1.1	Alexey	Ivanov	180
12.1.1.1	Vaysa	Ivanov	195

key

value



С указанием внутреннего разделителя

part-00000			
255.2.1.1	Alexey	Pupkin	190
24.2.1.1	Ivan	Ivanov	175
23.2.1.1	Ivan	Pupkin	180
part-00001			
255.1.1.1	Vasya	Pupkin	192
24.1.1.1	Alexey	Dral	181
12.1.1.1	Vaysa	Ivanov	195
12.3.1.1	Alexey	Ivanov	180

key

value

- ▶ `mapreduce.map.output.key.field.separator=.`
- ▶ `Comparator: "-k1,1nr -k2,2"`
- ▶ `Partitioner: -k2.1,2.1`



Без указанием внутреннего разделителя

part-00000			
255.2.1.1	Alexey	Pupkin	190
255.1.1.1	Vasya	Pupkin	192
24.2.1.1	Ivan	Ivanov	175
24.1.1.1	Alexey	Dral	181
23.2.1.1	Ivan	Pupkin	180
12.3.1.1	Alexey	Ivanov	180
12.1.1.1	Vaysa	Ivanov	195
part-00001			
(пусто)			

key

value



~~mapreduce.map.output.key.field:
separator=.~~



Comparator: "-k1,1nr -k2,2"



Partitioner: -k2.1,2.1



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Резюме



Теперь вы:

- ▶ Освоили магию сложный ключей



Теперь вы:

- ▶ Освоили магию сложный ключей
- ▶ Умеее использовать часть ключа в Partitioner'е



Теперь вы:

- ▶ Освоили магию сложный ключей
- ▶ Умеее использовать часть ключа в Partitioner'е
- ▶ И в Comparator'е



Теперь вы:

- ▶ Освоили магию сложный ключей
- ▶ Умеее использовать часть ключа в Partitioner'е
- ▶ И в Comparator'е
- ▶ Знаете и можете объяснить какие флаги можно и нельзя сочетать



Уточненная модель MapReduce

