Hive Optimization

File Formats and Compression

Record Columnar File (RCFile): Design Goals

[Facebook] 2011 - RCFile: A Fast and Space-efficient Data Placement Structure in MapReduce-based Warehouse Systems

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row2	4	5	6
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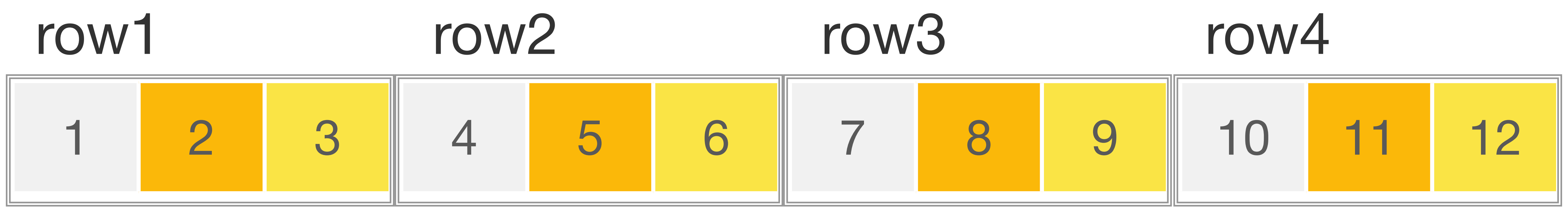
Row-oriented layout



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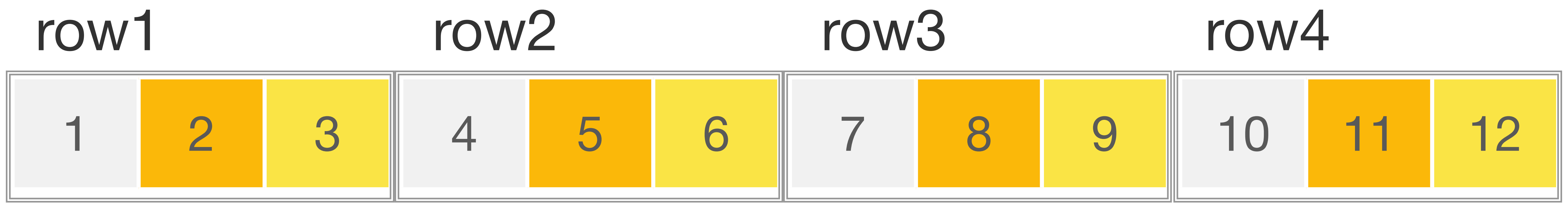

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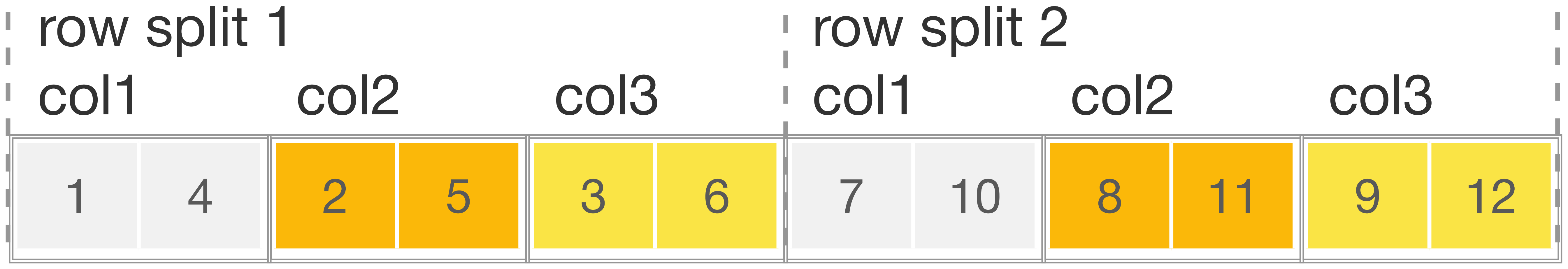
Column-oriented layout (RCFile)



row split 1						row split 2					
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date	user	order
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2017-05-19 17:59	Jane	200
2017-05-19 18:02	Alex	50
2017-05-20 10:27	Emeli	350

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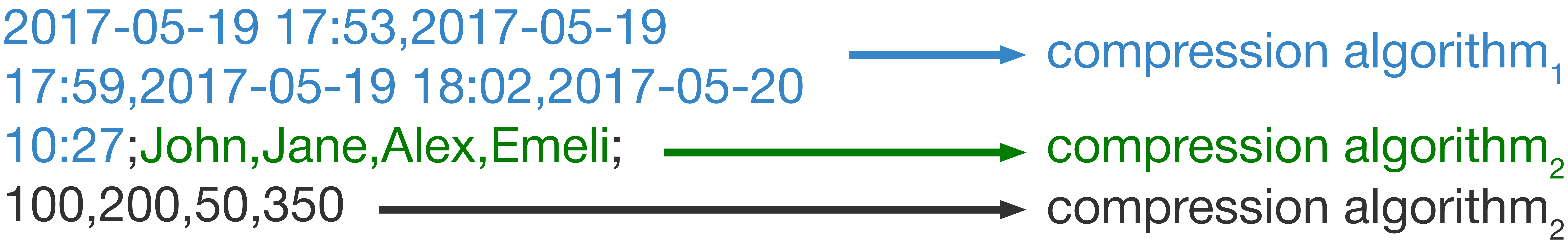
2017-05-19 17:53,2017-05-19 17:59,2017-05-19 18:02,2017-05-20 10:27;John,Jane,Alex,Emeli; 100,200,50,350



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compression algorithm$_1$

compression algorithm$_2$

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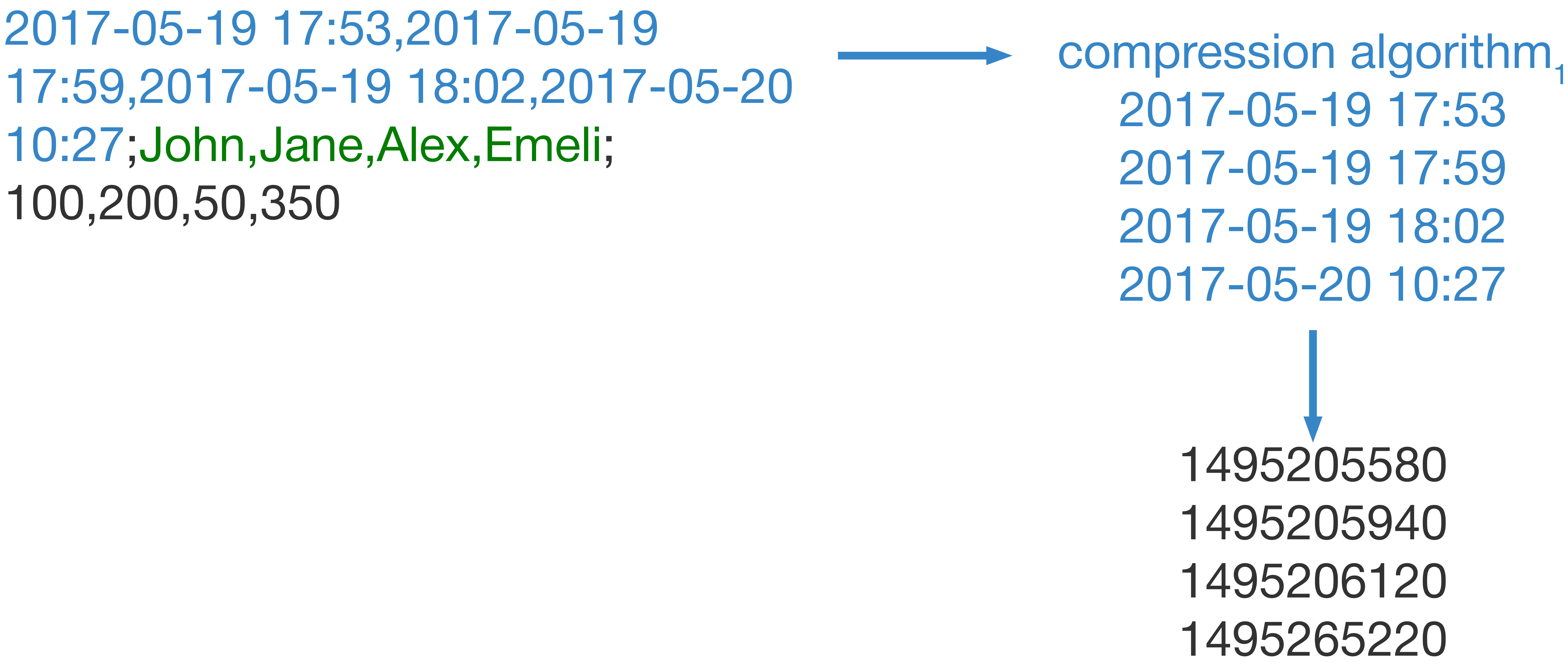

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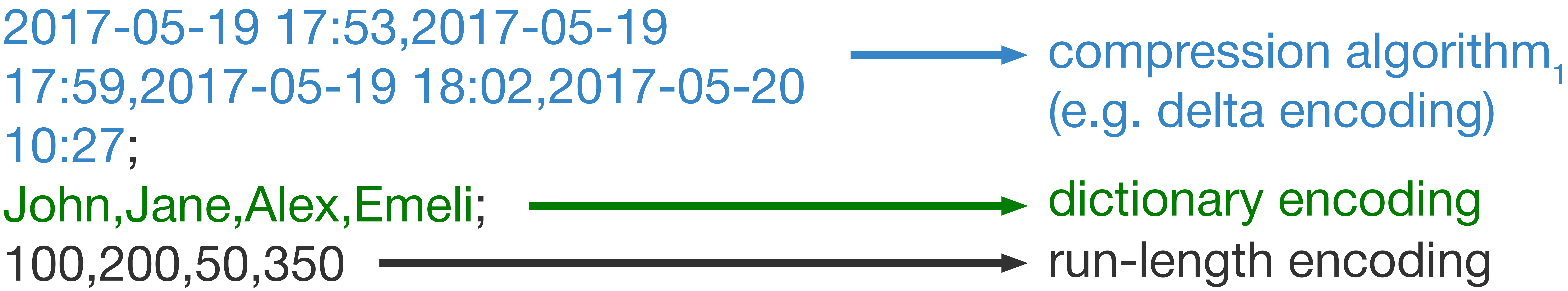
δ-encoding

1495205580
+360
+180
+59100



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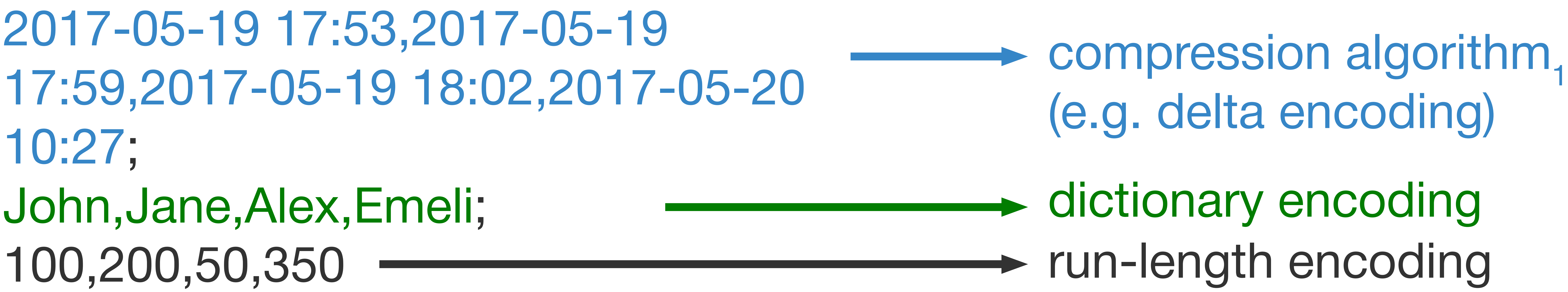
compression algorithm$_1$ (e.g. delta encoding)

dictionary encoding

run-length encoding



2017-05-19 17:53,2017-05-19 17:59,2017-05-19 18:02,2017-05-20 10:27; → compression algorithm[1] (e.g. delta encoding)

John,Jane,Alex,Emeli; → dictionary encoding

100,200,50,350 → run-length encoding

see: https://cwiki.apache.org/confluence/display/Hive/RCFile
see: https://en.wikipedia.org/wiki/Dictionary_coder
see: https://en.wikipedia.org/wiki/Run-length_encoding

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facebook + HORTONWORKS

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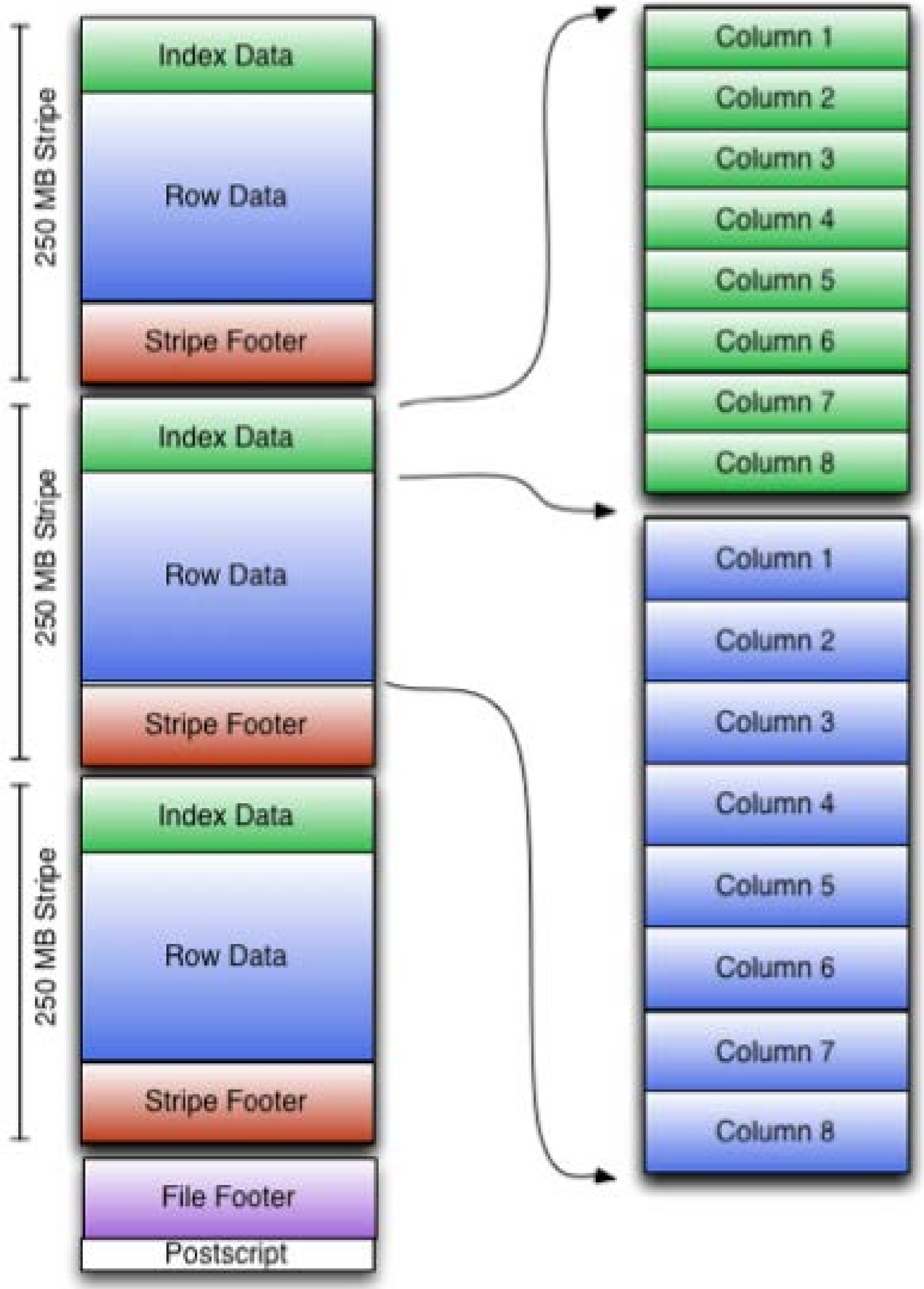
facebook + HORTONWORKS

✓ Parquet (especially for nested structures) Parquet

twitter + cloudera

ORC

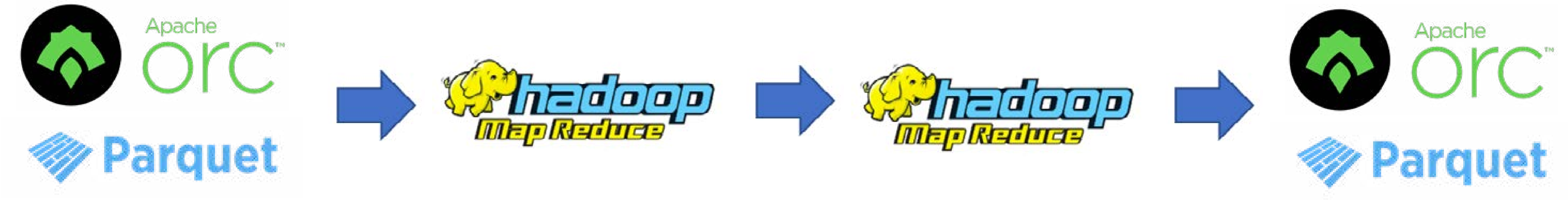


see: https://cwiki.apache.org/confluence/display/Hive/LanguageManual+ORC

ORC

Key	Default	Notes
orc.compress	ZLIB	high level compression (one of NONE, ZLIB, SNAPPY)
orc.compress.size	262,144	number of bytes in each compression chunk
orc.stripe.size	67,108,864	number of bytes in each stripe

```
CREATE TABLE my_orc_table (
    …
)
STORED AS orc
    TBLPROPERTIES ("orc.compress"="NONE")
…;
```


Apache orc™
Parquet
hadoop Map Reduce
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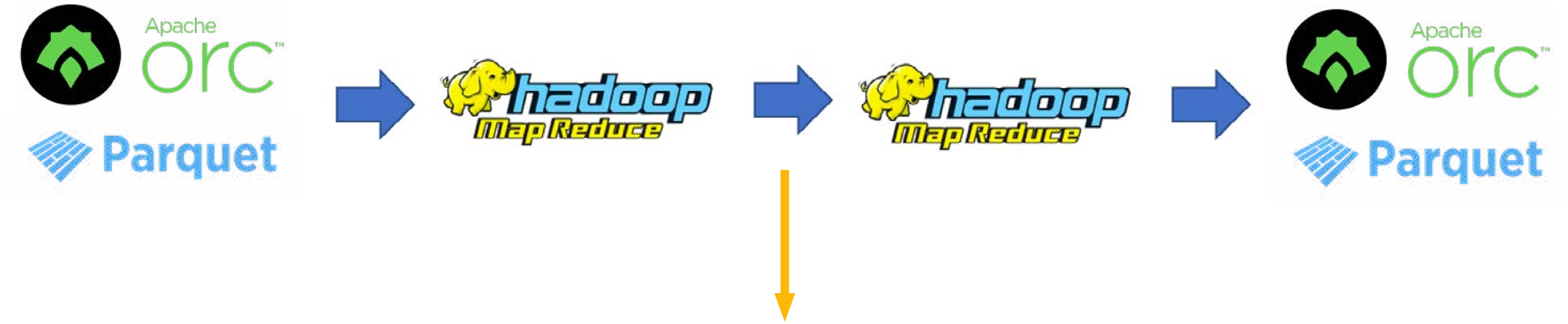

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SET hive.exec.compress.intermediate=true;
SET mapreduce.map.output.compress=true;
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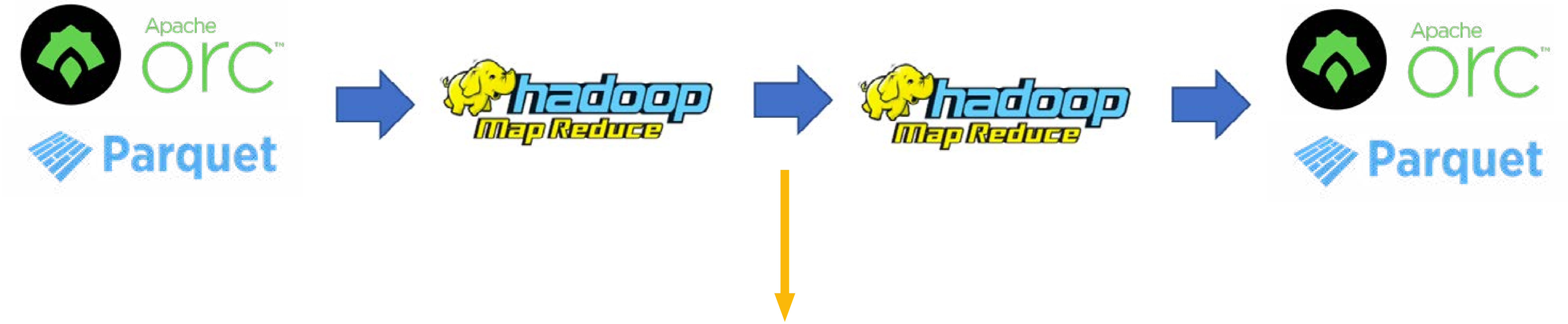

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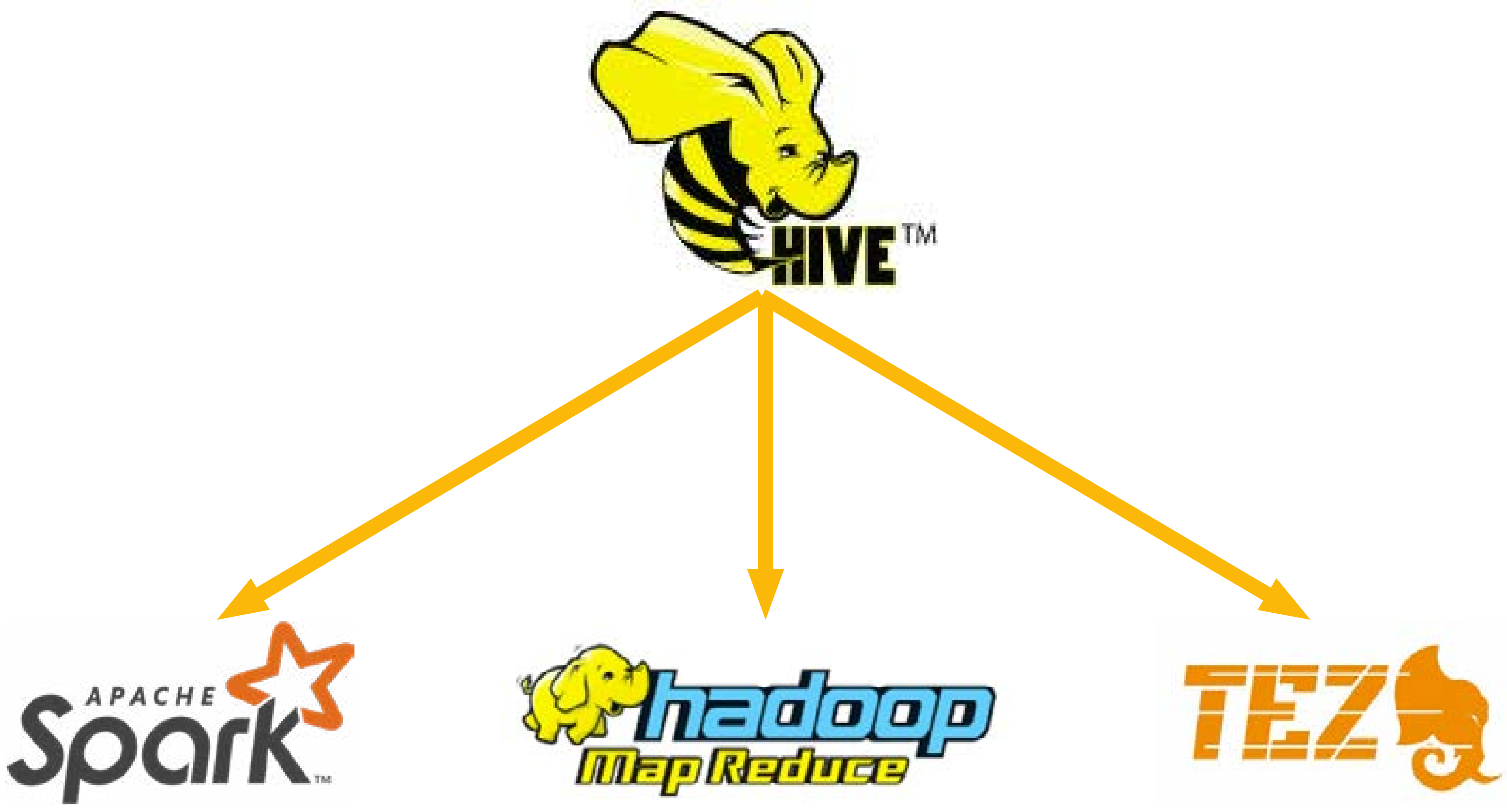

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`nice article: Scaling the Facebook data warehouse to 300 PB`