Flink SQL 1.9.0 技术内幕和最佳实践

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Kafka X Flink Meetup 深圳 - 2019年08月31日

个人介绍

- 伍 翀（云邪，Jark）
- Apache Flink Committer
- 阿里巴巴 Blink SQL 团队

云邪的博客

专注分享Flink、Spark
等大数据相关技术。
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http://wuchong.me

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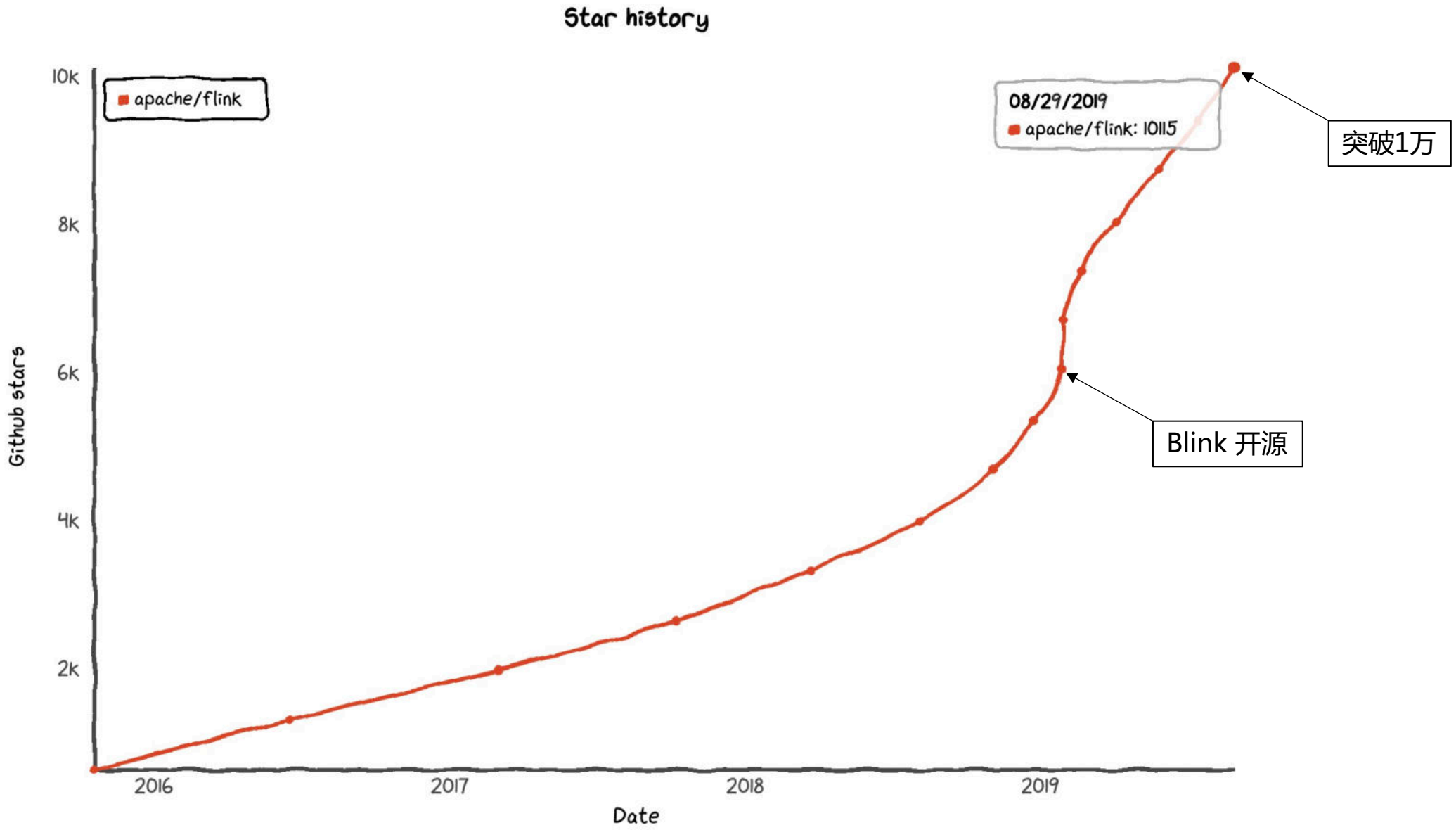
Flink 1.9.0 的里程碑意义

2019.01 Blink 开源并贡献给 Apache Flink

2019.08 Blink 合并入 Flink 后首次发版

Flink 1.9.0 的里程碑意义



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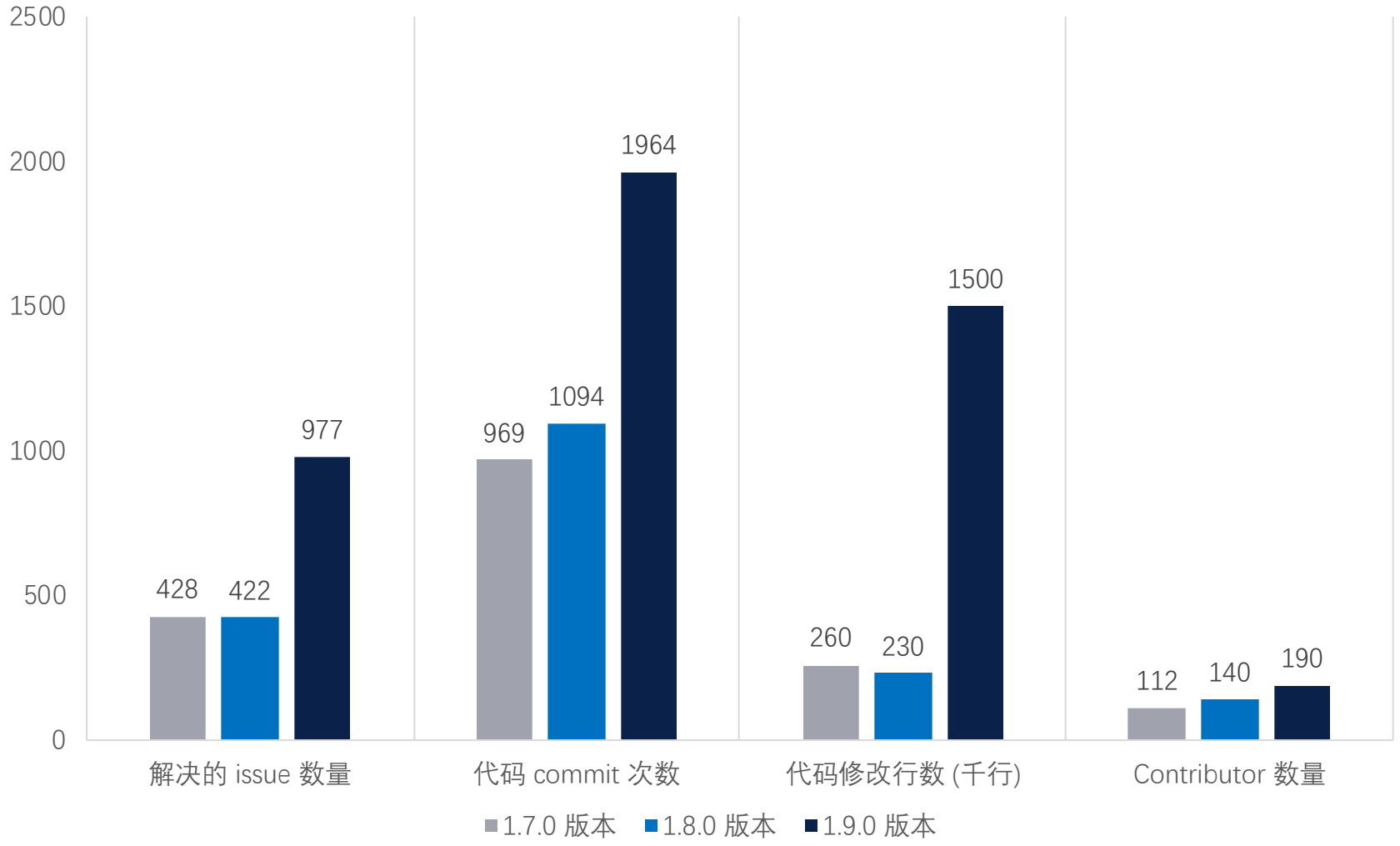
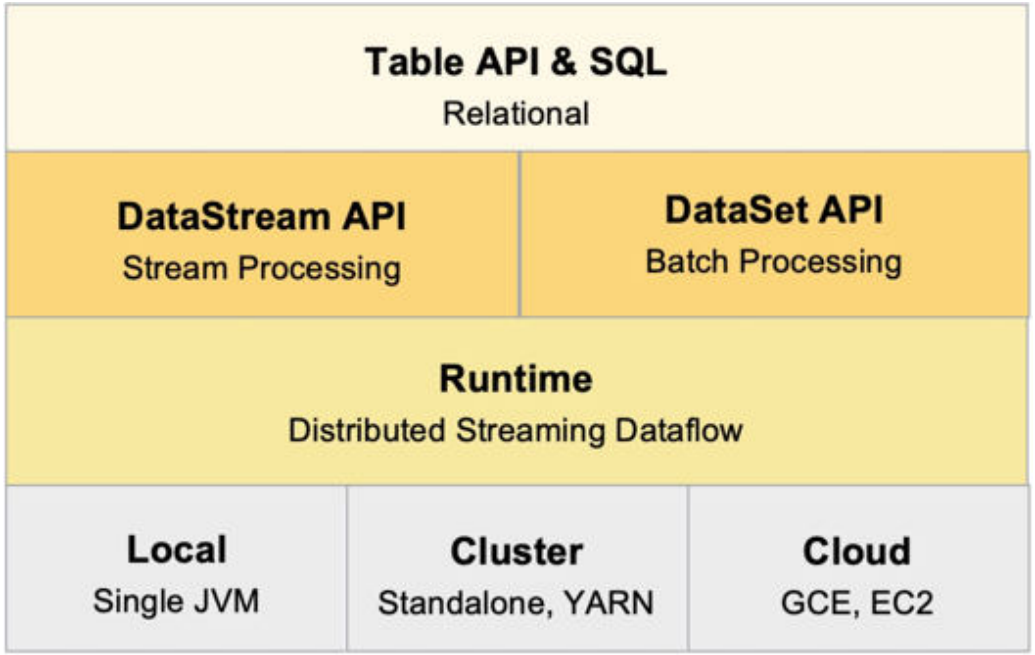


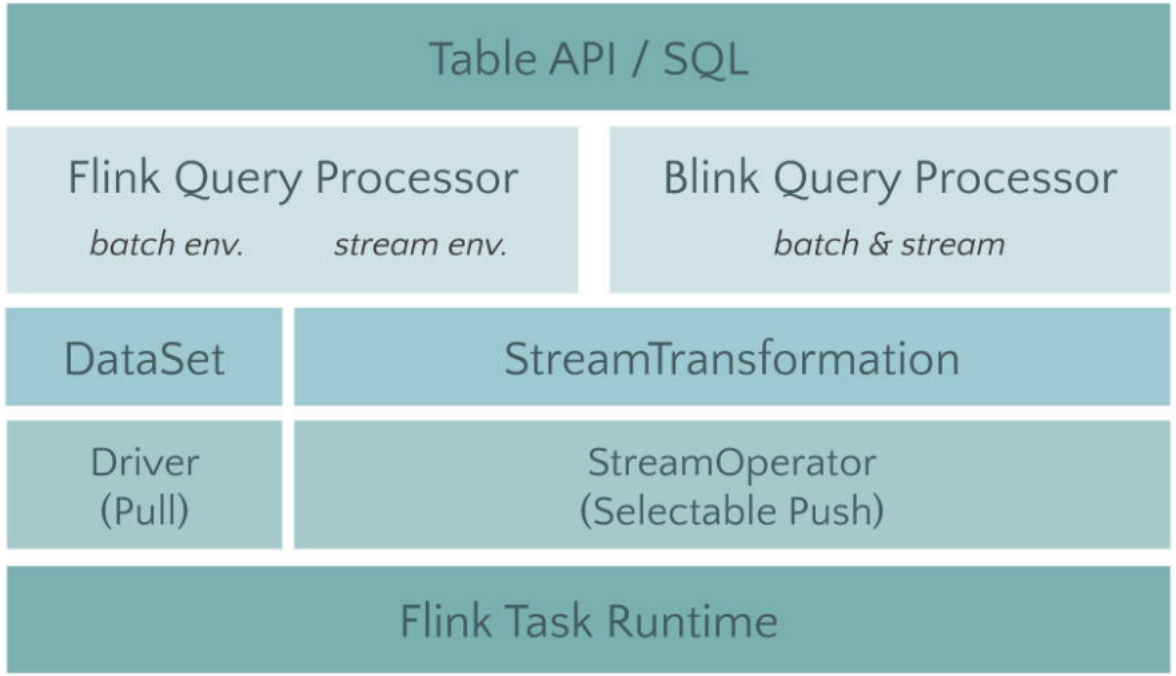
02

新架构和新功能

架构升级



Flink 1.8



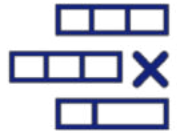
Flink 1.9

新功能一览

SQL DDL

重构类型系统

TopN



高效流式去重

维表关联

MiniBatch

多种解
热点手段

完整的
批处理支持

Python
Table API

Hive 集成

新功能一览

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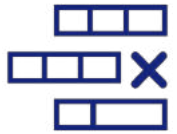

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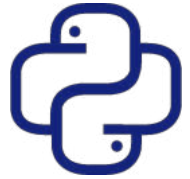

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03

如何使用 Blink Planner

如何使用 Blink Planner

```
<dependency>
  <groupId>org.apache.flink</groupId>
  <artifactId>flink-table-api-scala-bridge_2.11</artifactId>
  <version>1.9.0</version>
  <scope>provided</scope>
</dependency>

<dependency>
  <groupId>org.apache.flink</groupId>
  <artifactId>flink-table-planner-blink_2.11</artifactId>
  <version>1.9.0</version>
  <scope>provided</scope>
</dependency>
```

如果在IDE中运行，要删除 provided。
如果打包提交，要确保有 provided。

```
val settings = EnvironmentSettings.newInstance().useBlinkPlanner().inStreamingMode().build();
val env = StreamExecutionEnvironment.getExecutionEnvironment()
val tEnv = StreamTableEnvironment.create(bsEnv, bsSettings)
tEnv.sqlUpdate(…)
tEnv.execute()
```

04

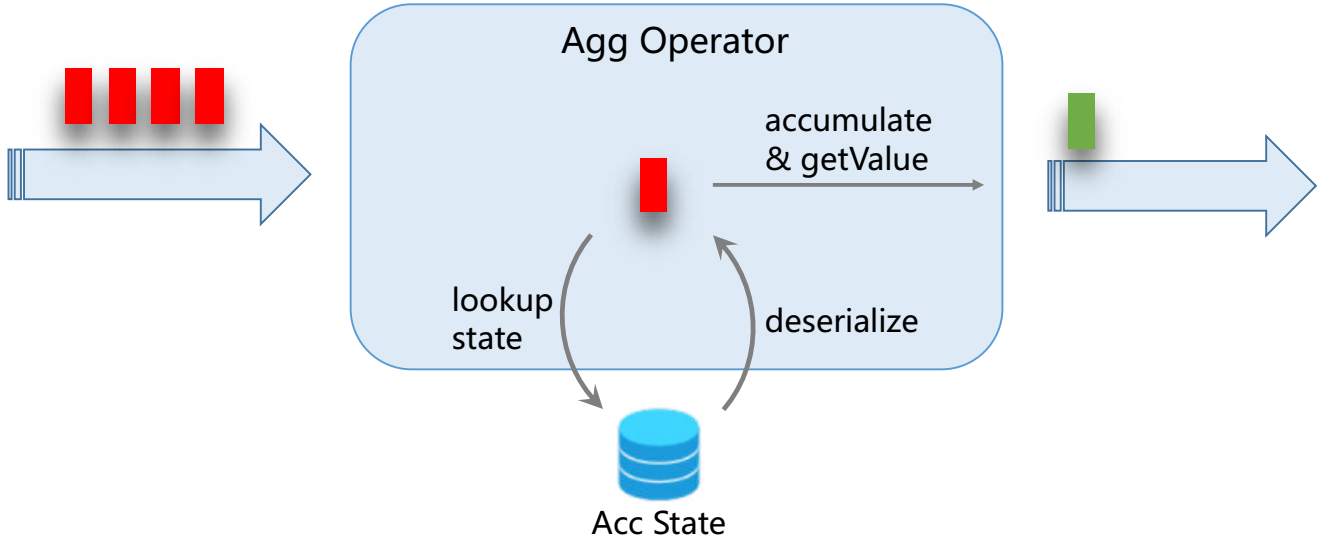
性能优化指南

举个栗子

统计每小时全网的访问量。

每条数据状态访问

```
SELECT
  DATE_FORMAT(ts, 'yyyy-MM-dd HH') hour,
  COUNT(*) AS pv
FROM user_log
GROUP BY DATE_FORMAT(ts, 'yyyy-MM-dd HH')
```

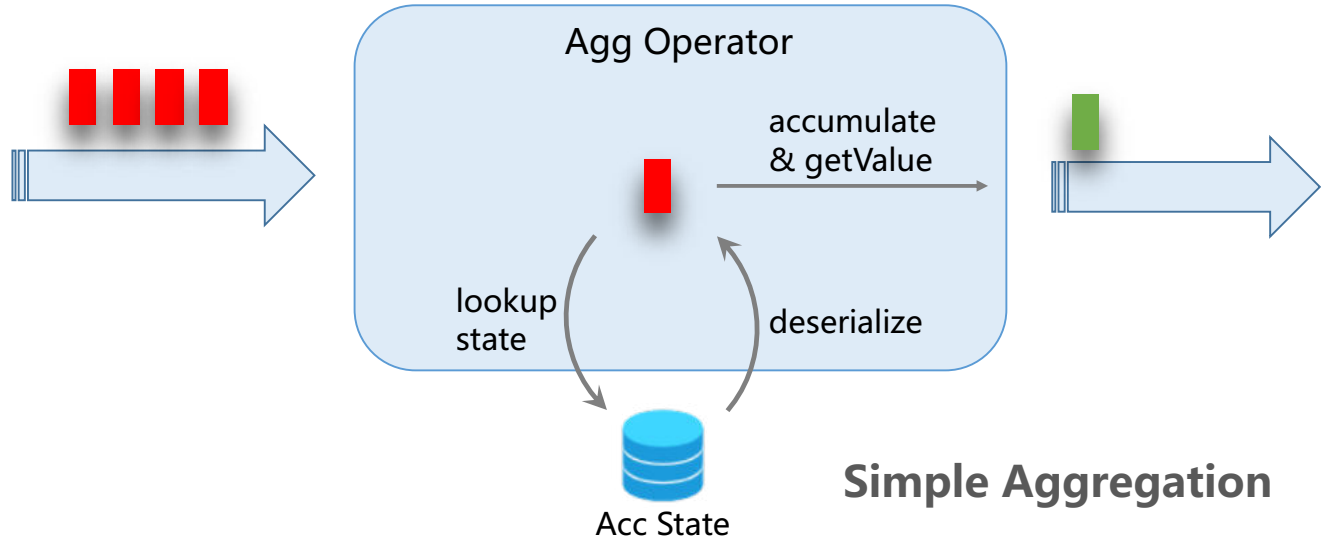


MiniBatch 优化

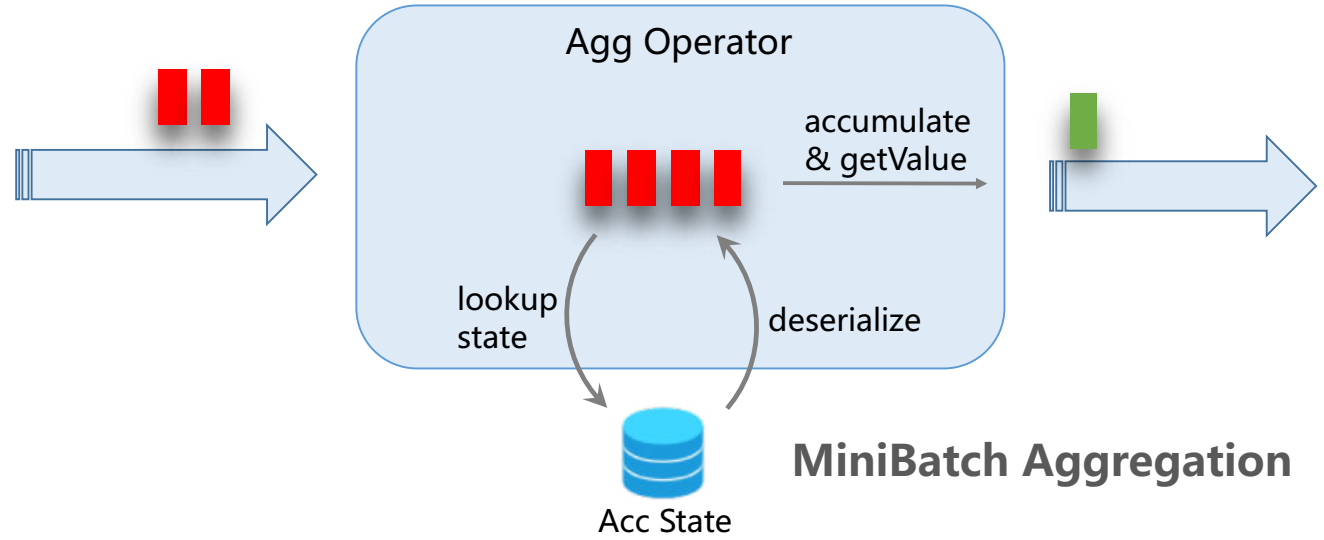
MiniBatch 的优势：

1. 提升吞吐
2. 减少 state 访问
3. 减少序列化/反序列化的开销
4. 减少输出，降低对下游压力

```
# 开启 mini-batch
table.exec.mini-batch.enabled=true
# mini-batch的时间间隔，即作业需要额外忍受的延迟
table.exec.mini-batch.allow-latency=5s
# 一个节点中允许最多缓存的数据
table.exec.mini-batch.size=5000
```

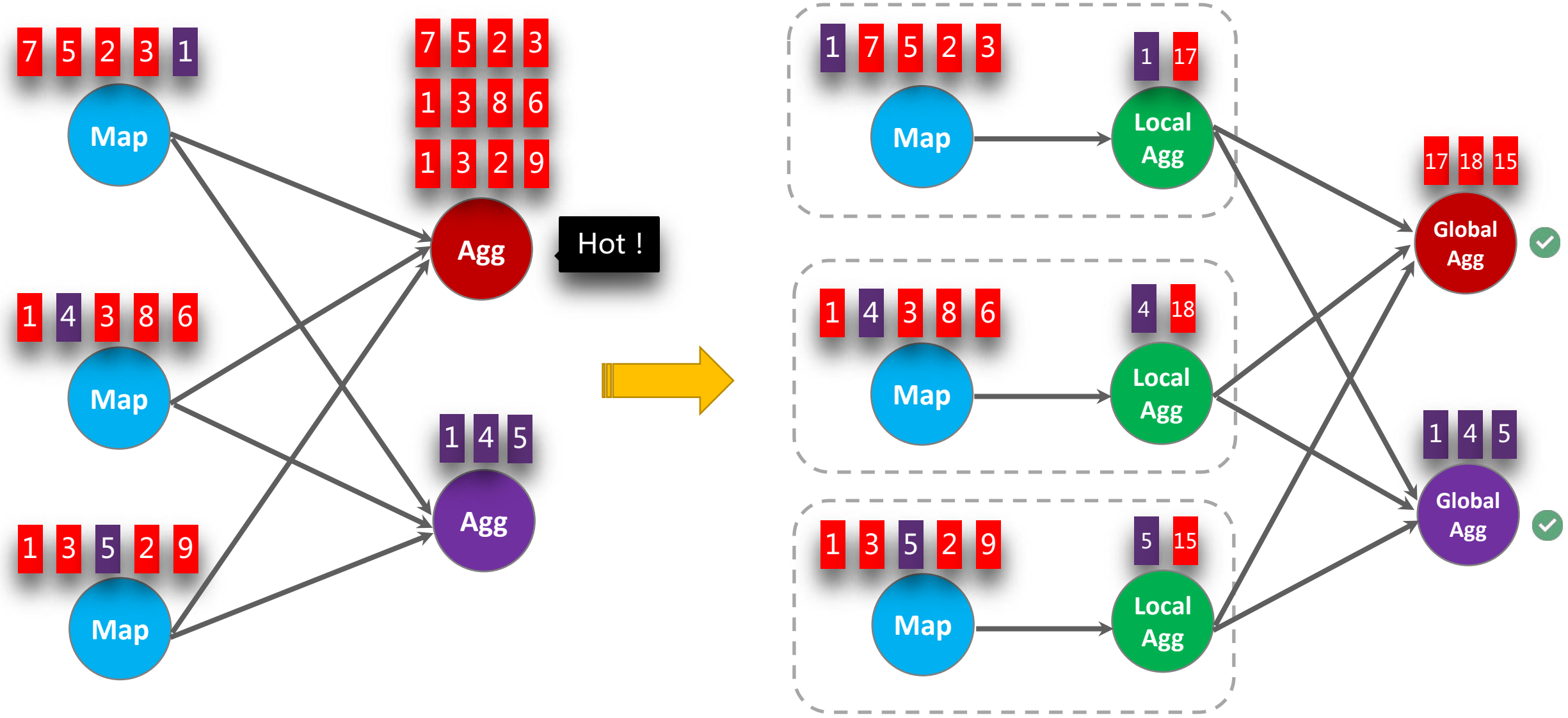


Simple Aggregation



MiniBatch Aggregation

Local-Global 优化



Local-Global 优化

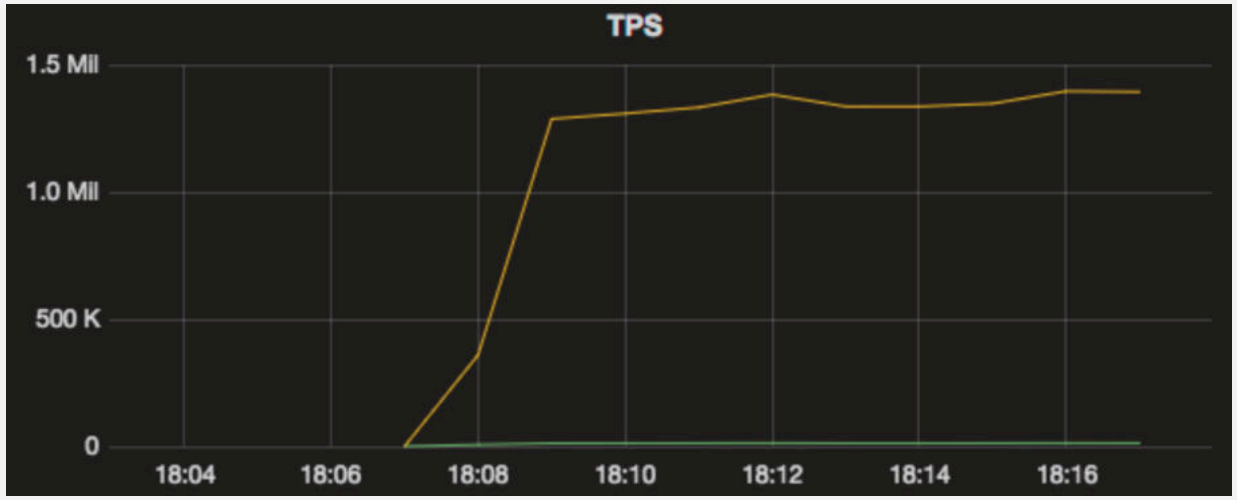
Local-Global 的优势：

1. 对于**普通聚合**，性能提升明显
2. 缓解数据倾斜
3. 减少网络传输

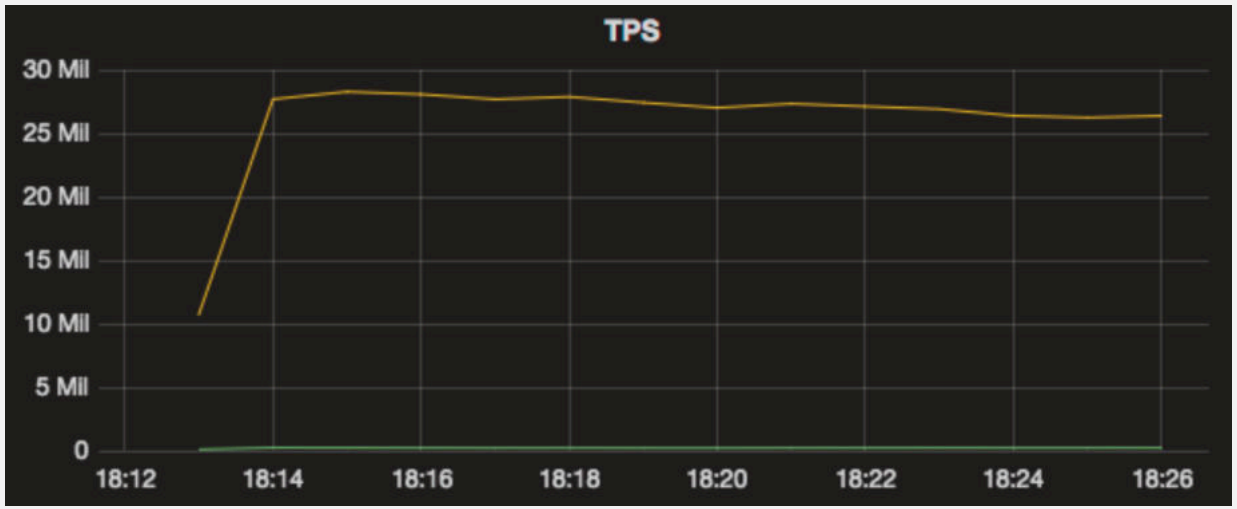
```
# 开启两阶段，即 local-global 优化
table.optimizer.agg-phase-strategy=TWO_PHASE

# 还需开启 mini-batch
table.exec.mini-batch.enabled=true
table.exec.mini-batch.allow-latency=5s
table.exec.mini-batch.size=5000
```

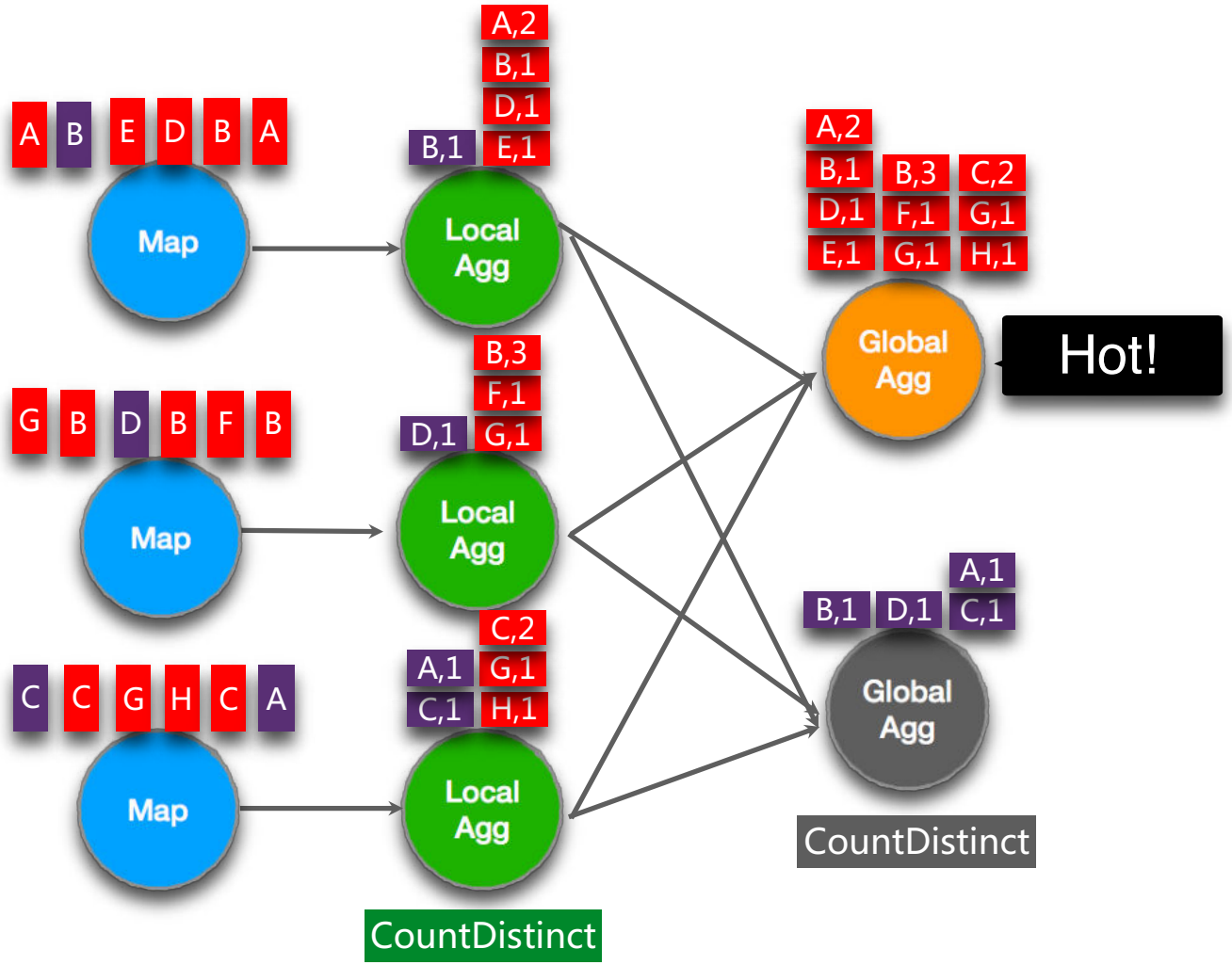
优化前



优化后



DISTINCT 数据倾斜问题



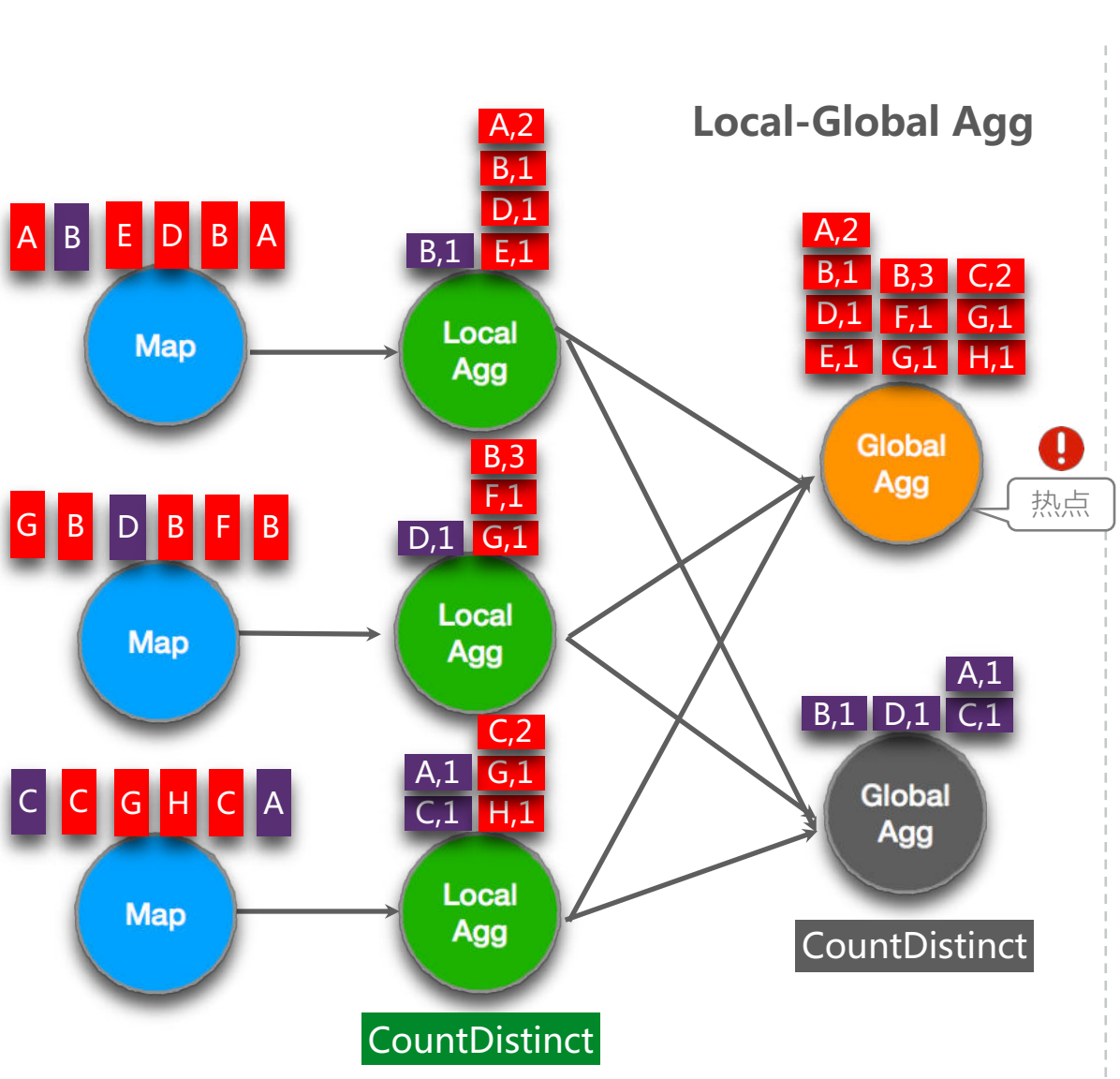
对于中间结果会存储明细的agg，

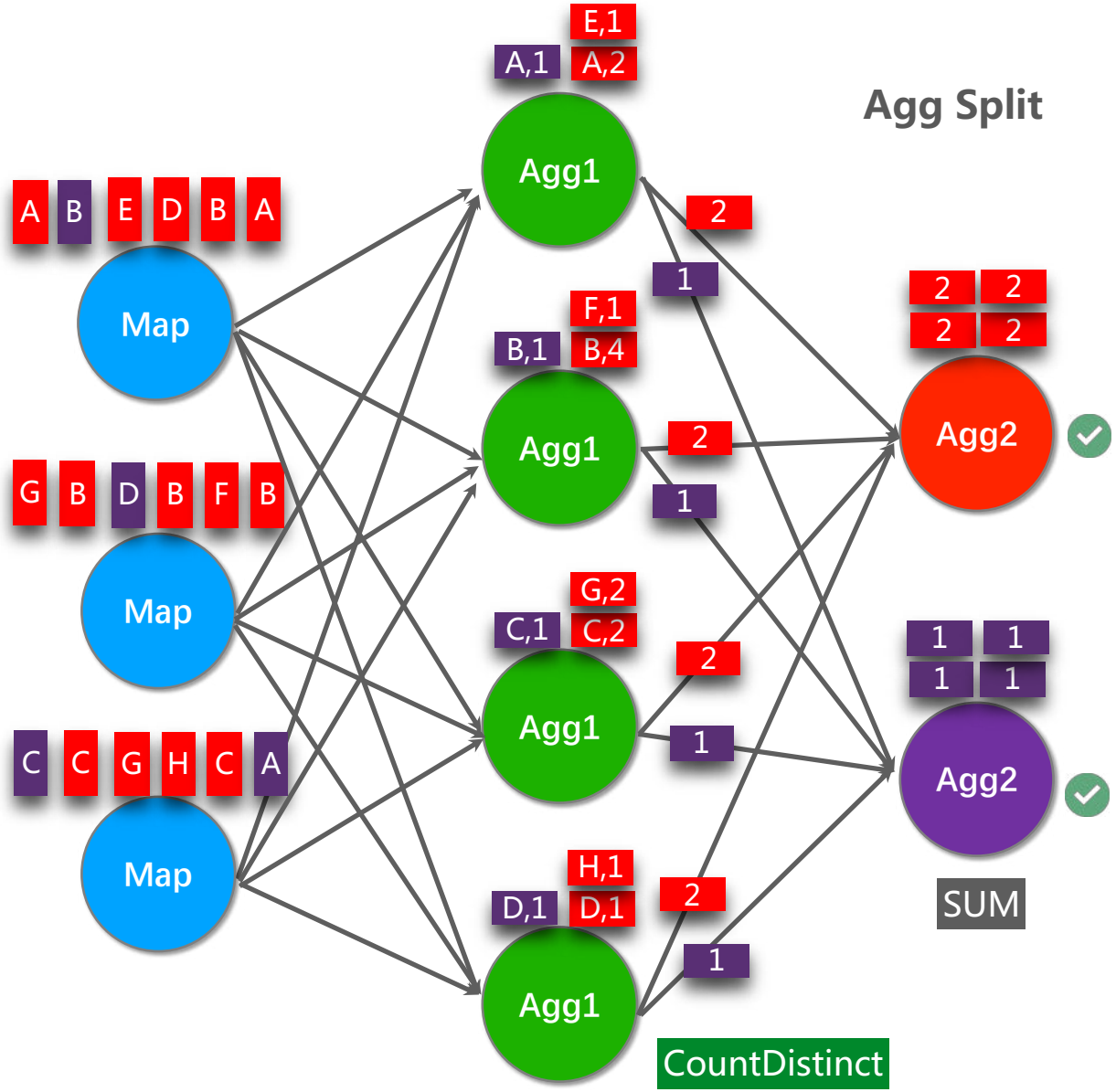
（例如 count distinct）

LocalGlobal无法有效解决热点问题

```
SELECT
  hour,
  COUNT(DISTINCT user) AS uv
FROM T
GROUP BY hour
```

COUNT DISTINCT 自动拆分





COUNT DISTINCT 自动拆分

1. 解决 COUNT DISTINCT 数据倾斜问题
2. 亦适用于多 DISTINCT 场景

```
COUNT(DISTINCT a)
SUM(DISTINCT b)
MAX(DISTINCT b)
```

```
# 开启 distinct agg 切分
table.optimizer.distinct-agg.split.enabled=true
```

```
SELECT
  hour,
  COUNT(DISTINCT user) AS uv
FROM T
GROUP BY hour
```

Simple Aggregation

```
SELECT hour, SUM(cnt) AS uv
FROM (
  SELECT hour, COUNT(DISTINCT user) AS cnt
  FROM T
  GROUP BY hour, MOD(HASH_CODE(user), 1024)
) GROUP BY hour
```

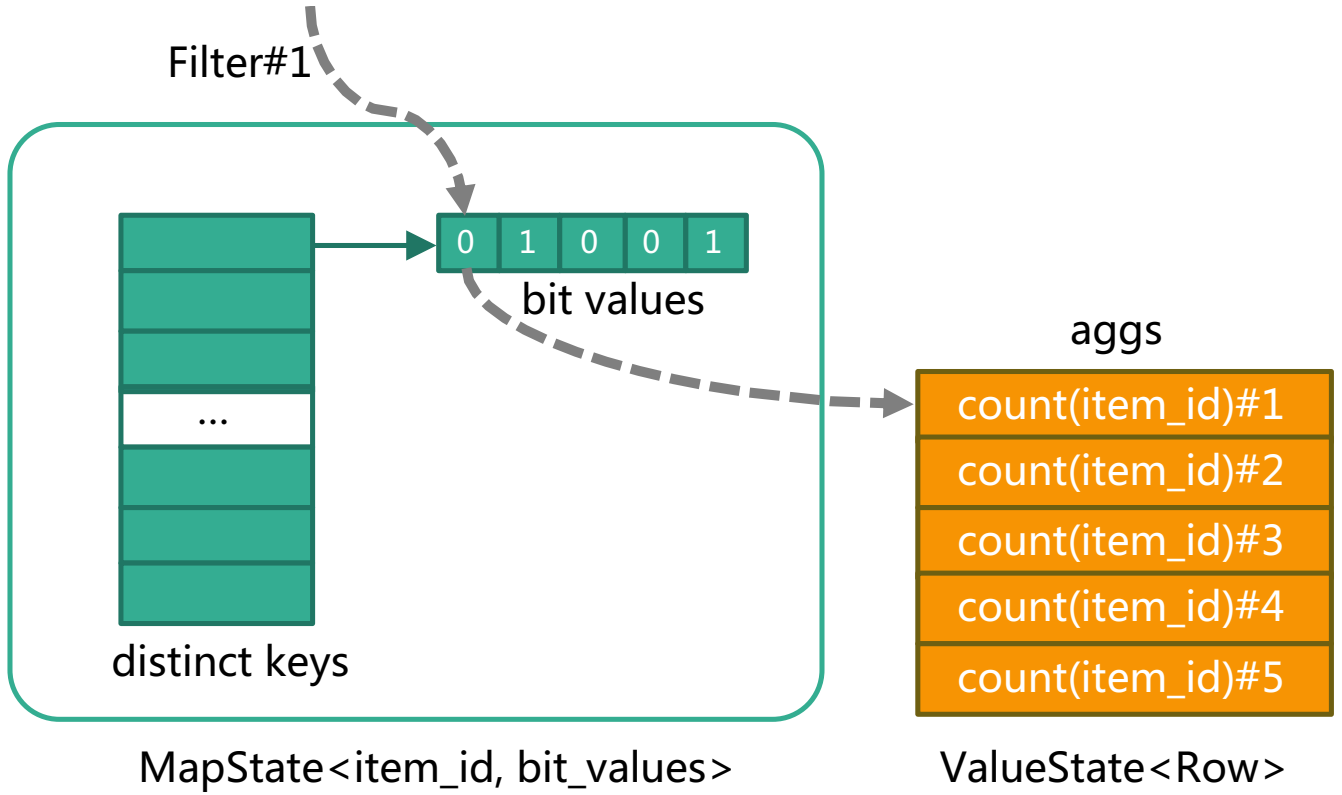
拆分后 Aggregation

大量 COUNT DISTINCT 场景的优化

```sql
SELECT
  date_time,
  shop_id,
  COUNT (DISTINCT item_id) AS item_col1,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('iphone')) AS item_col2,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('android')) AS item_col3,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('pc')) AS item_col4,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('wap')) AS item_col5,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('other')) AS item_col6,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('iphone', 'android')) AS item_col7,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('pc', 'other')) AS item_col8,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('iphone', 'android', 'wap')) AS item_col9,
  COUNT (DISTINCT item_id) FILTER (WHERE flag IN ('iphone', 'android', 'wap', 'pc', 'other')) AS item_col10,
  COUNT (DISTINCT visitor_id) AS visitor_col1,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('iphone')) AS visitor_col2,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('android')) AS visitor_col3,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('pc')) AS visitor_col4,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('wap')) AS visitor_col5,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('other')) AS visitor_col6,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('iphone', 'android')) AS visitor_col7,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('pc', 'other')) AS visitor_col8,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('iphone', 'android', 'wap')) AS visitor_col9,
  COUNT (DISTINCT visitor_id) FILTER (WHERE flag IN ('iphone', 'android', 'wap', 'pc', 'other')) AS visitor_col10
FROM logs
GROUP BY date_time, shop_id
```

大量 COUNT DISTINCT 场景的优化

```
SELECT
  key,
  count(distinct item_id) filter (…),
  count(distinct item_id) filter (…),
  count(distinct item_id) filter (…),
  count(distinct item_id) filter (…),
  count(distinct item_id) filter (…)
FROM T
GROUP BY key
```



节省了约1倍的 state size, 4倍的额外读写

实际测试性能提升1倍

05

Demo

FLINK FORWARD

Organized by 阿里云

Created by ververica

Flink Forward Asia

全球最大的 Apache Flink 官方会议

预计 2000+ 参会人员， 2019年11月28-30日 @北京国家会议中心

国内外一线厂商悉数参与

阿里巴巴、腾讯、字节跳动、intel、 DellEMC 、Uber、美团点评、Ververica ...

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欢迎关注，共同进步！

THANKS