

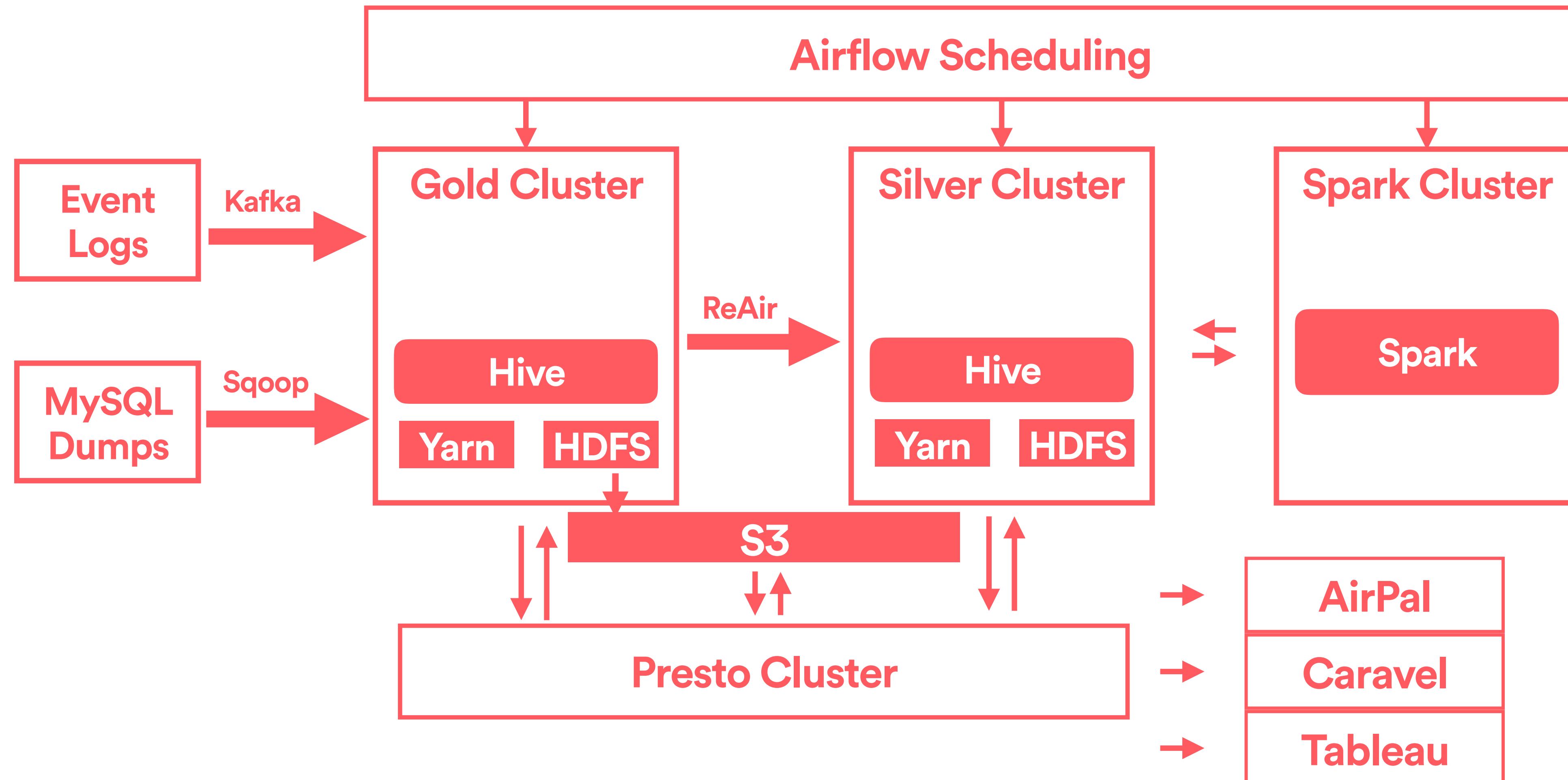
LIYIN TANG & JINGWEI LU

AirStream

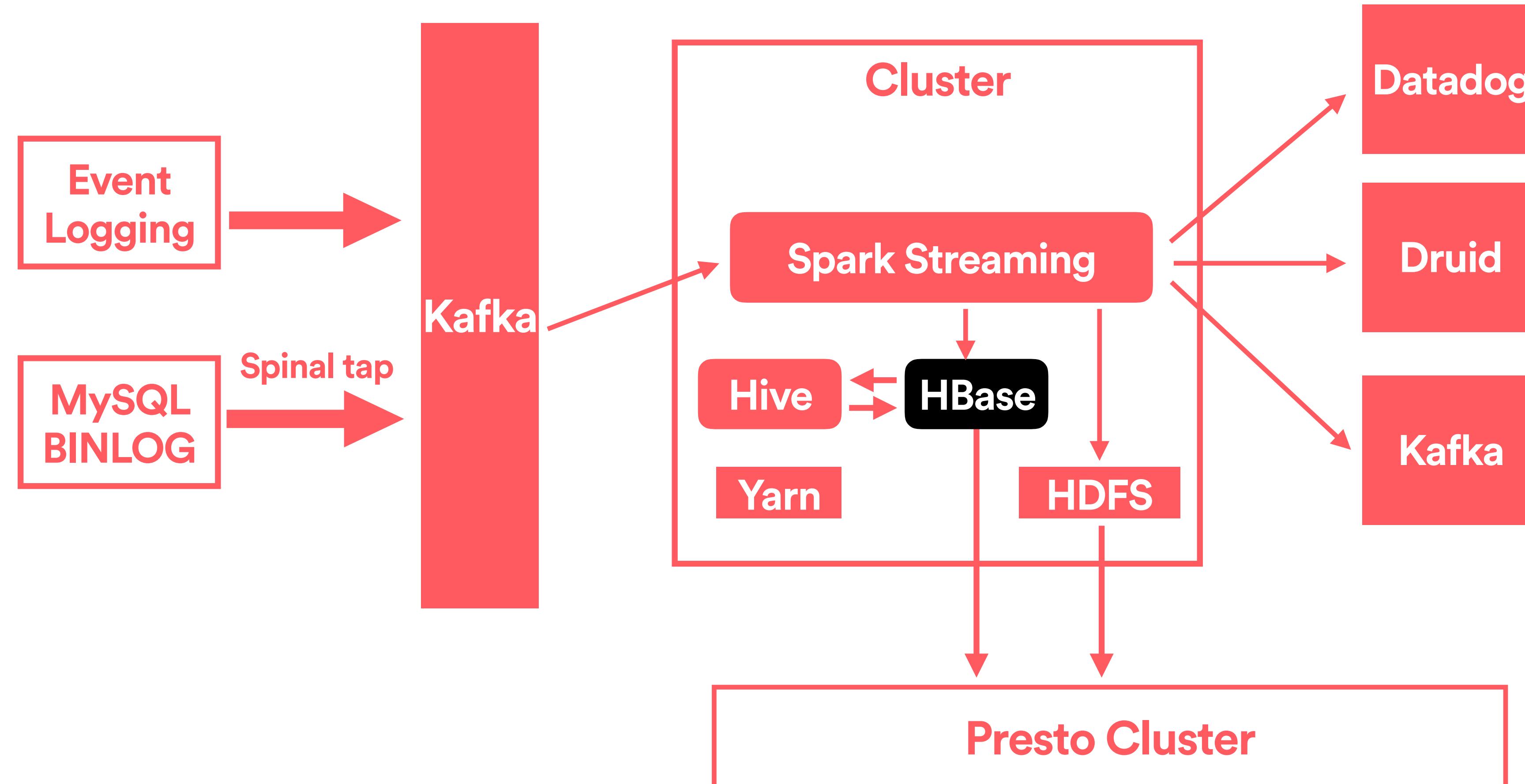


Data Infrastructure at Airbnb

Batch Infrastructure

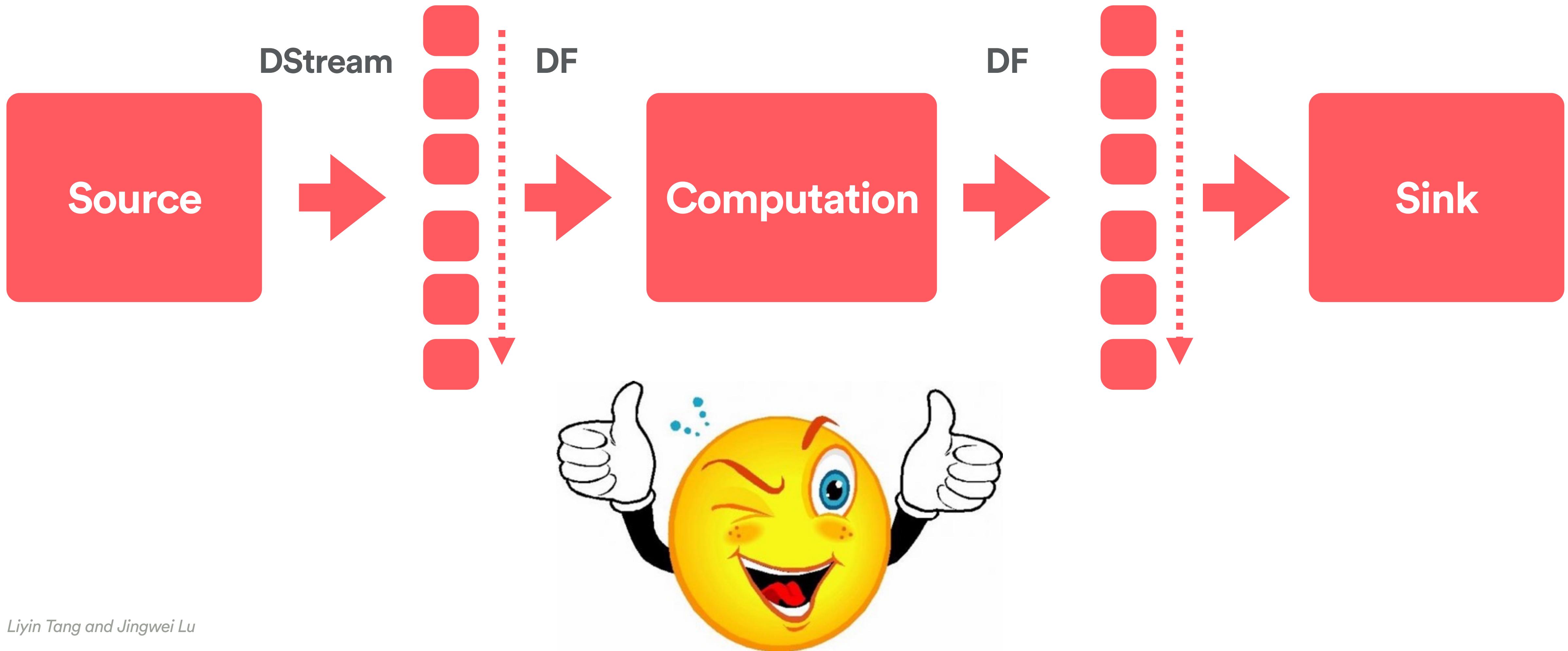


Streaming at Airbnb

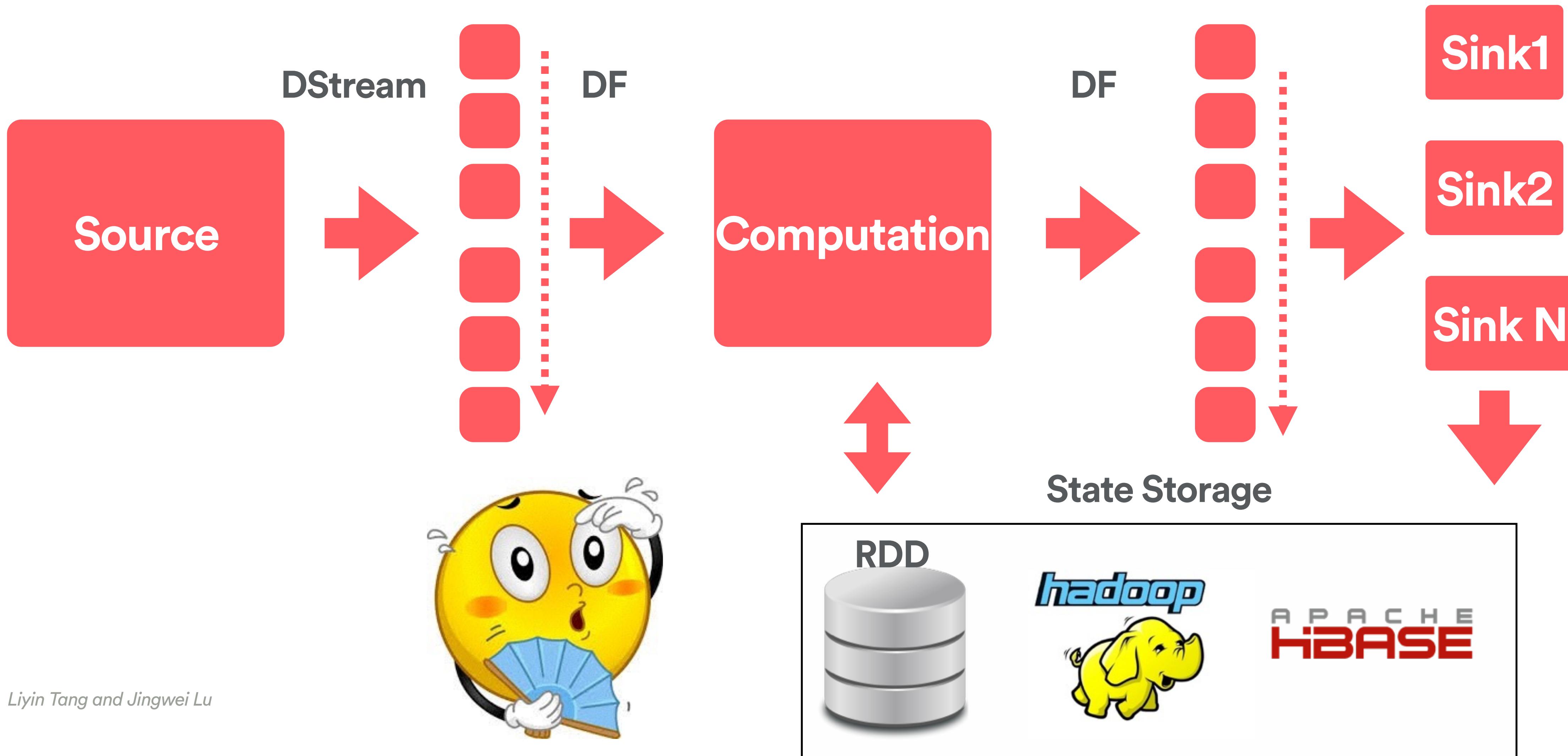


Growing Pain

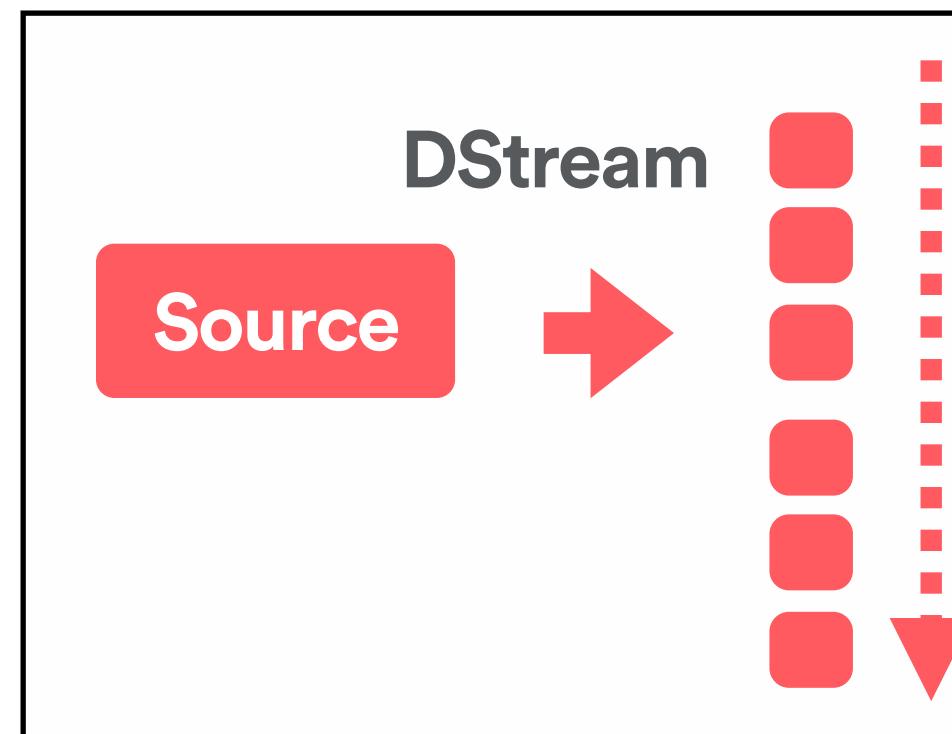
Stateless



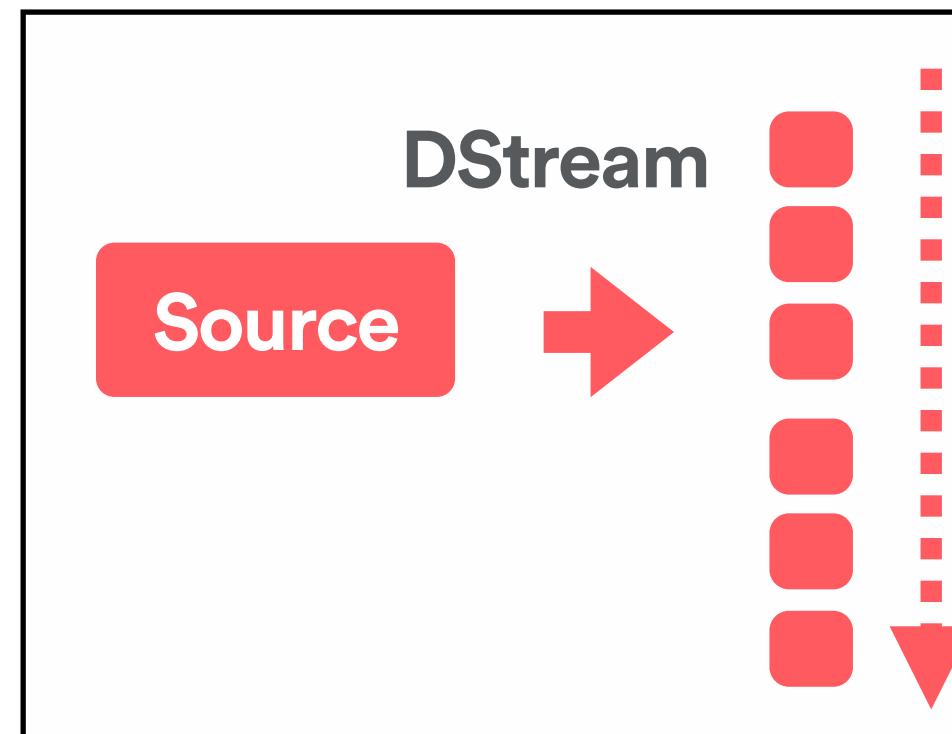
Stateful



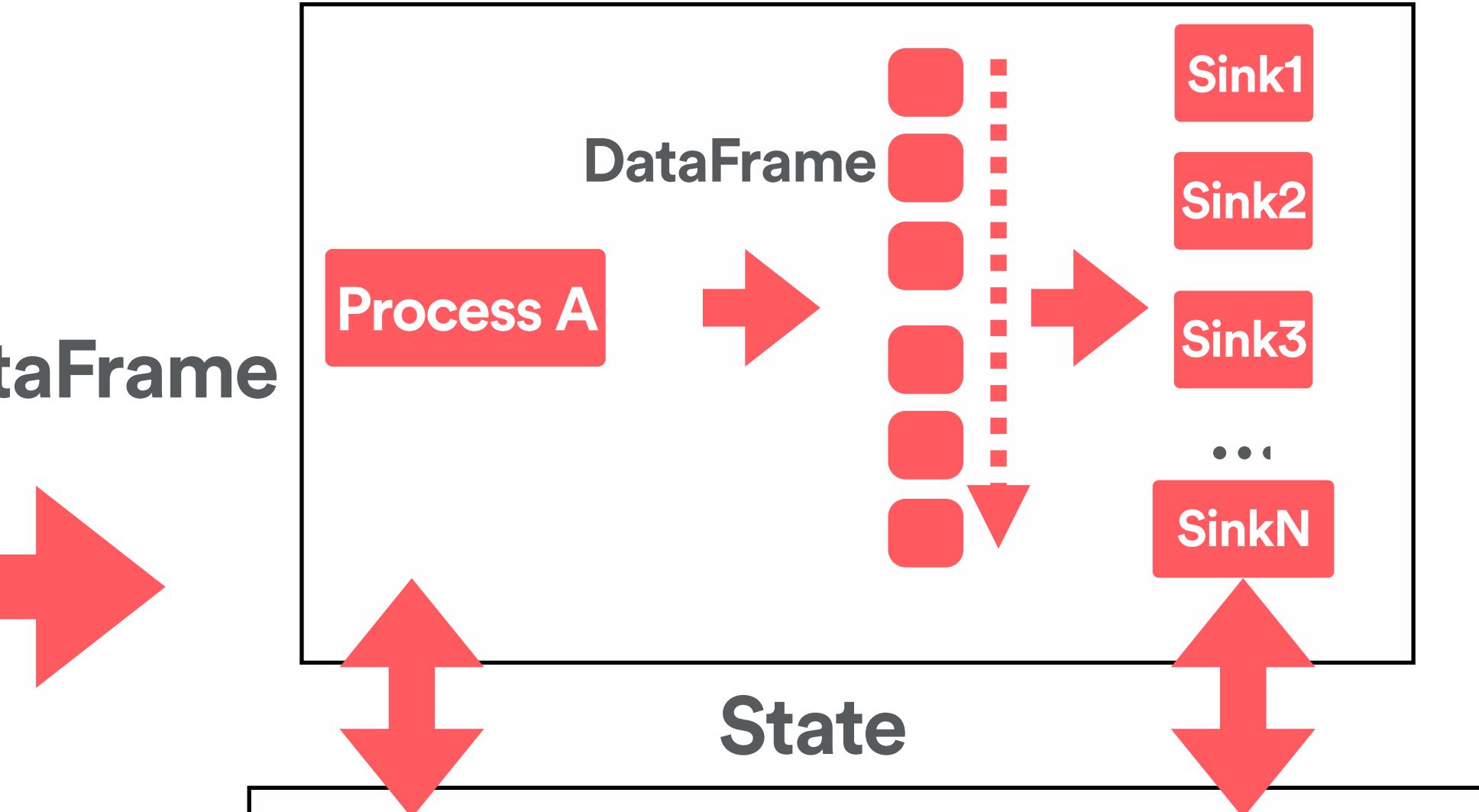
Multiple Streams



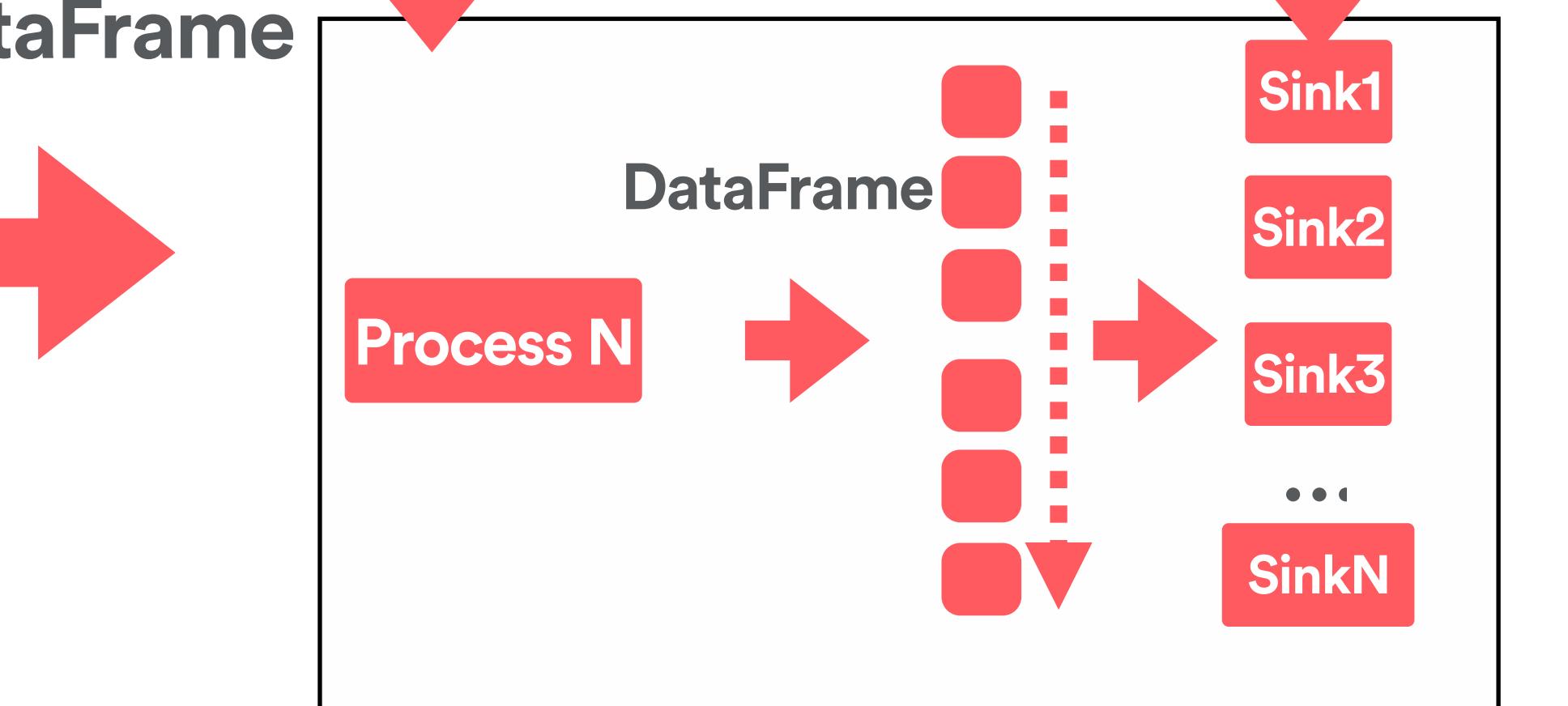
Align by Time



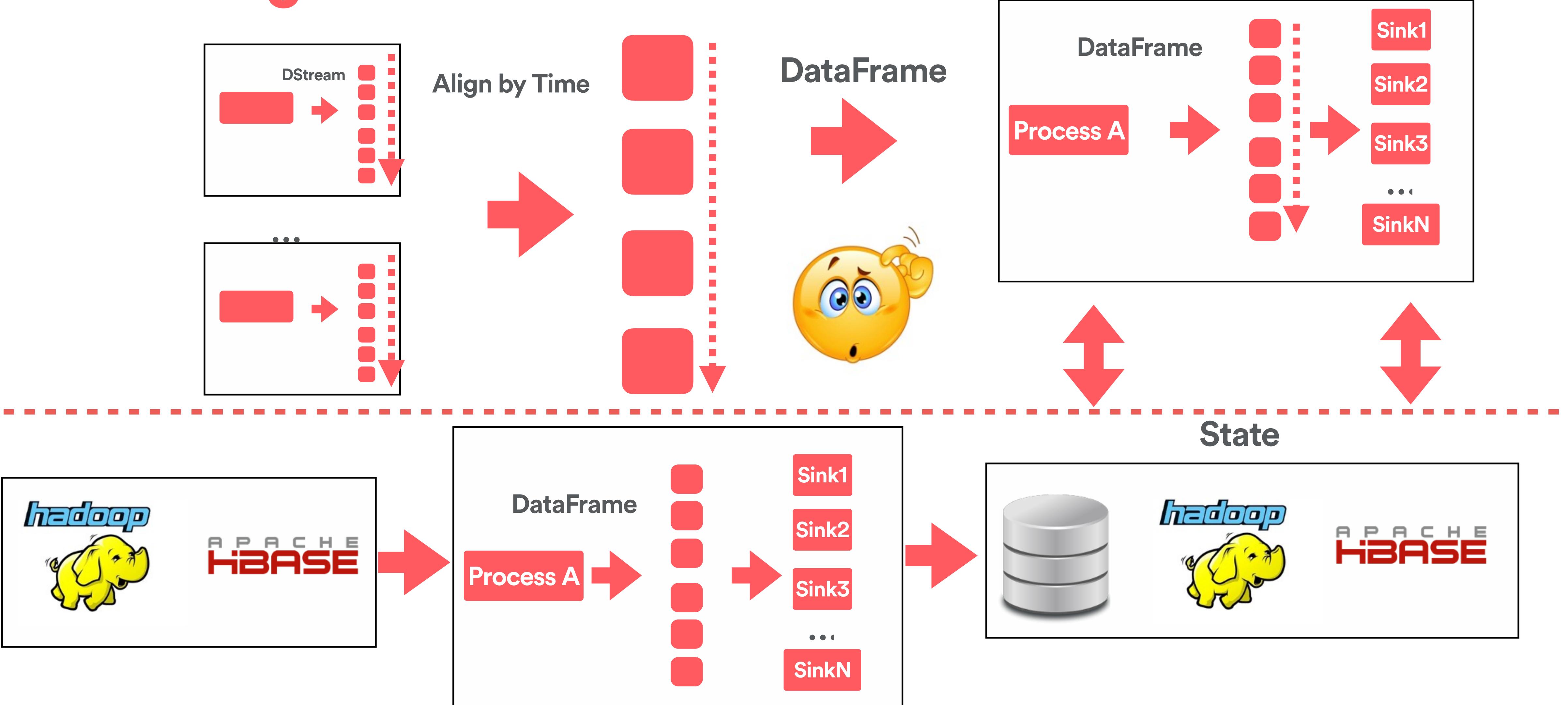
DataFrame



DataFrame



Streaming + Batch

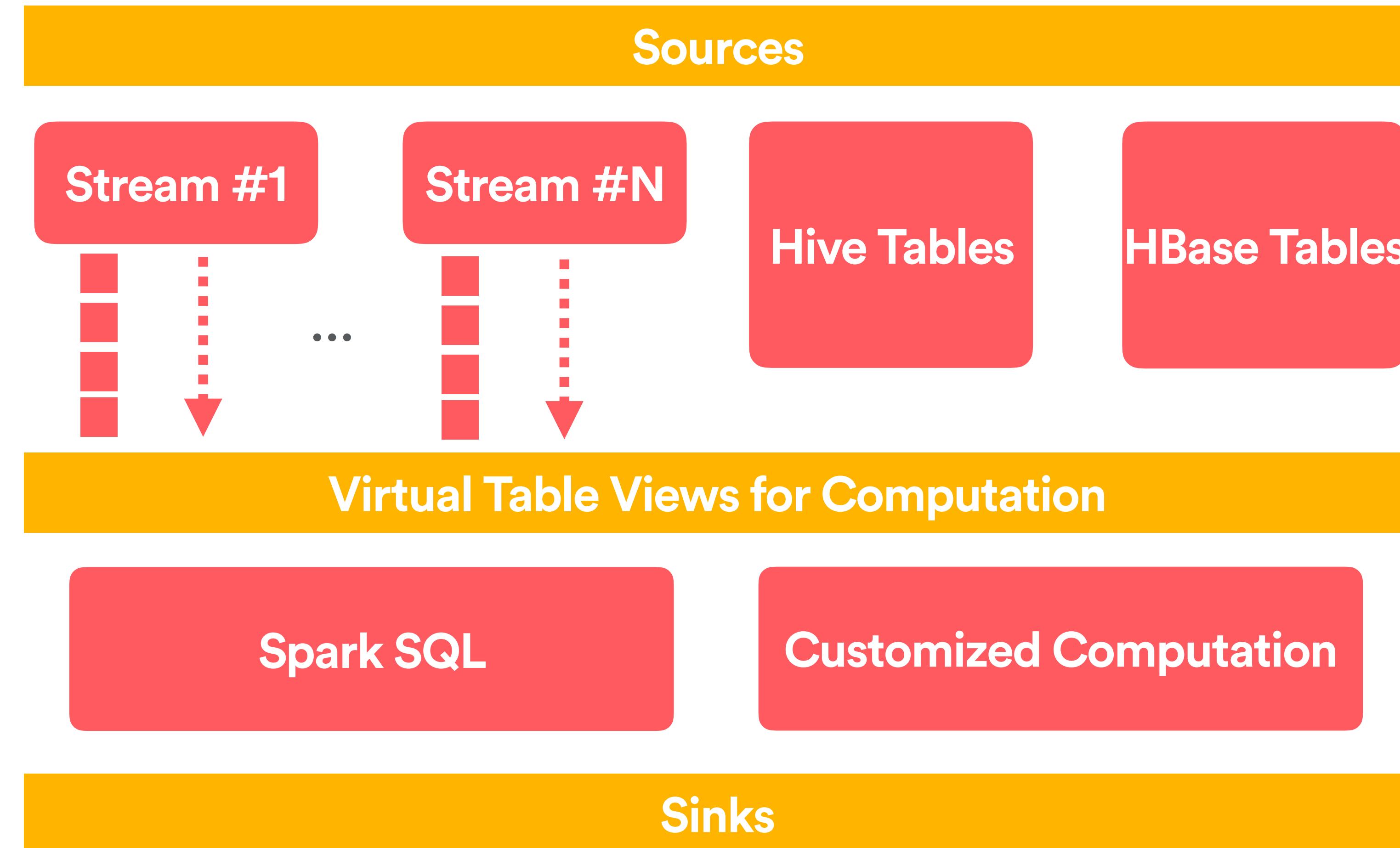
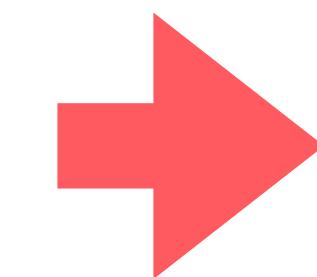


Simplify and Unify

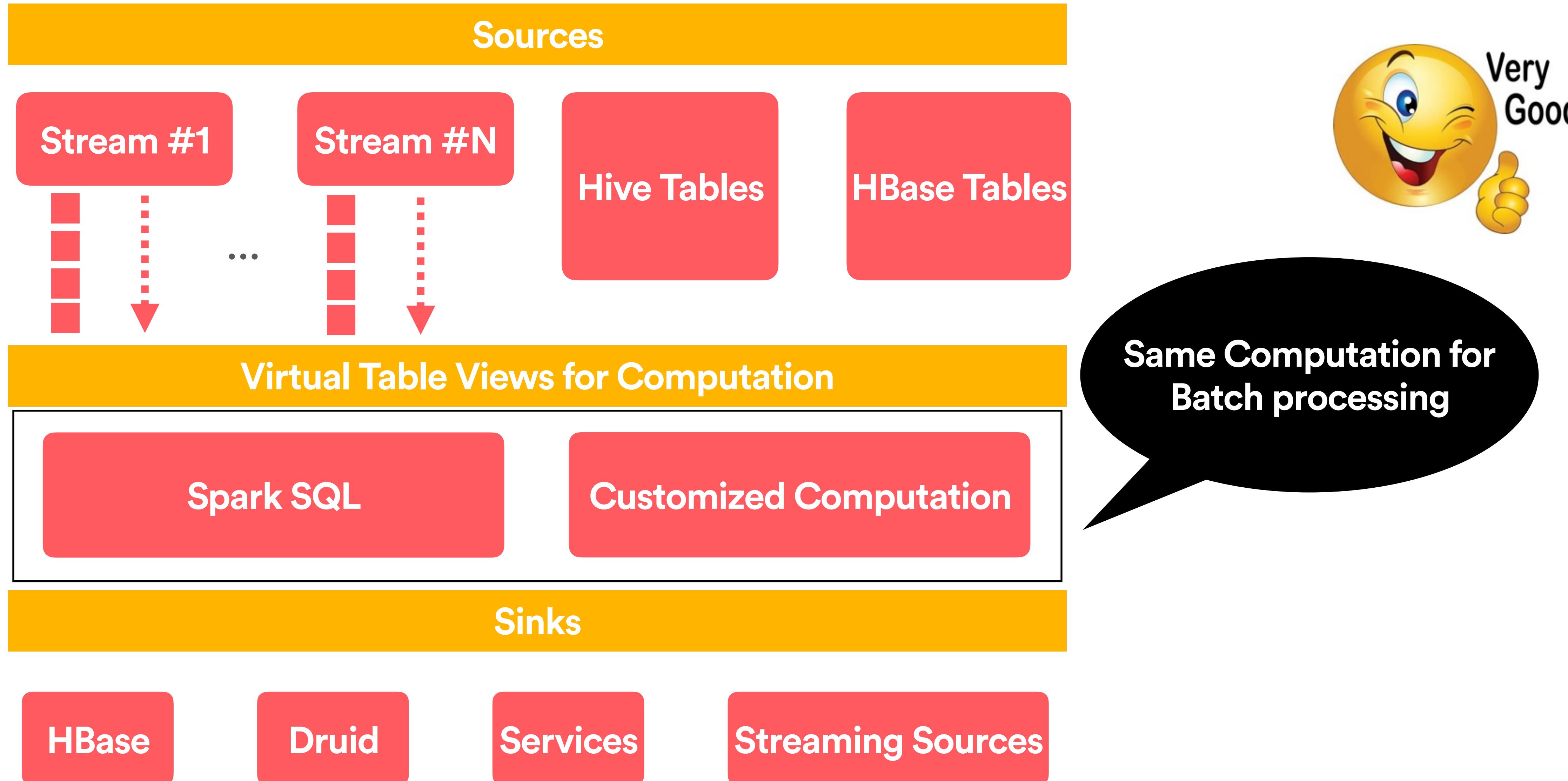
AirStream Architecture



Simple Config



AirStream Architecture



Stateful

State Store

- Merge changes
- Provide fast lookup
- Fast persistent storage across streaming and batch jobs

Why HBase

Reliable and Scalable

Rich Integration with Hadoop EcoSystem

Rich Functionalities

Easy Management

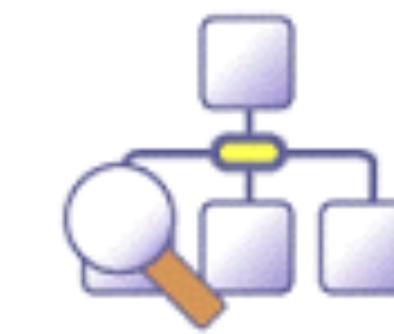
Strong Community

HBase State Store

Operators in Airstream



Full Table Scan



Key/Prefix Lookup



Update



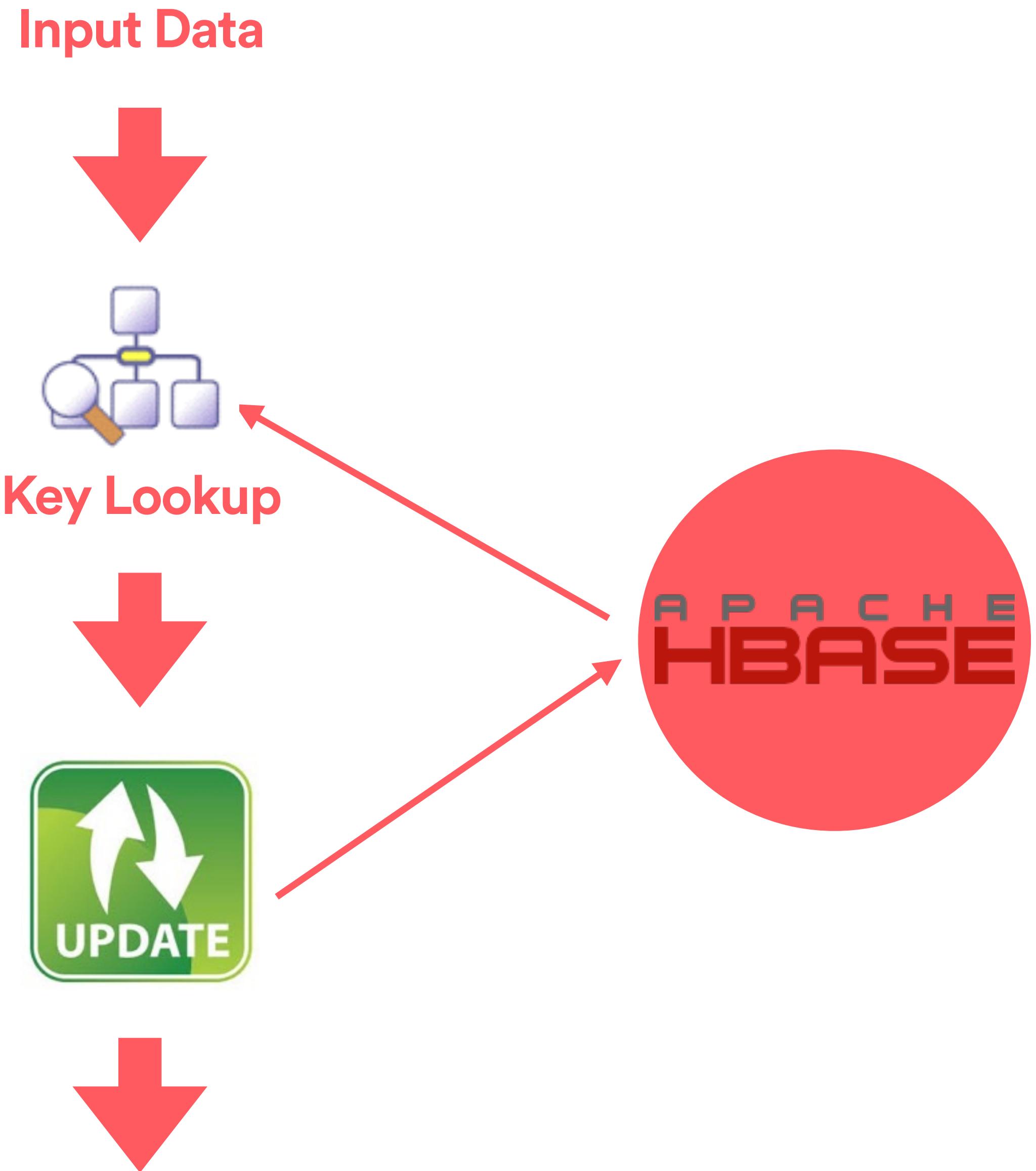
Bulk Upload



Simple Aggregation

Computation DAG

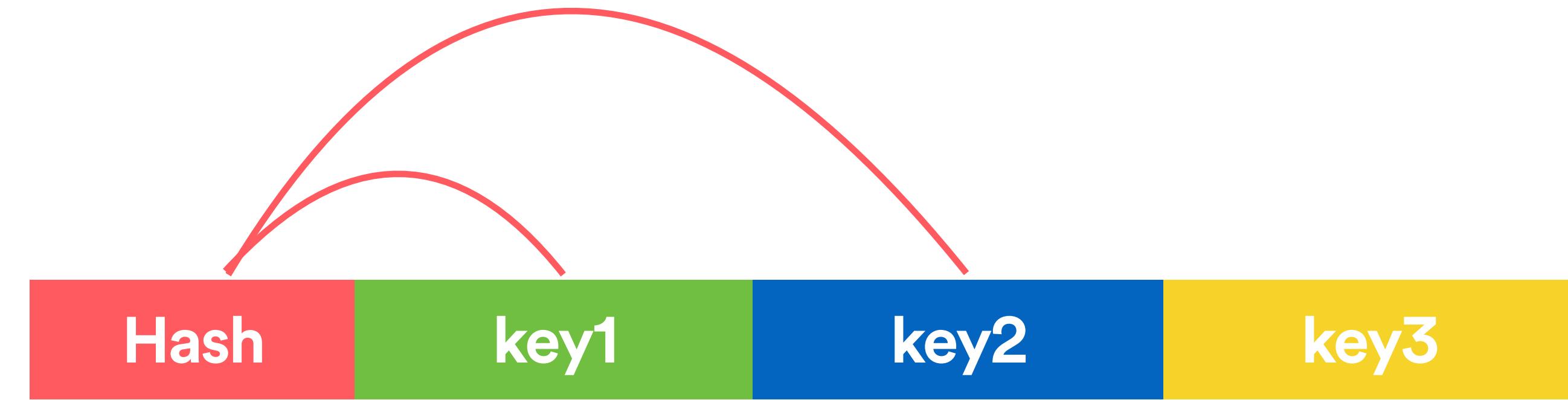
Left Outer Join Result



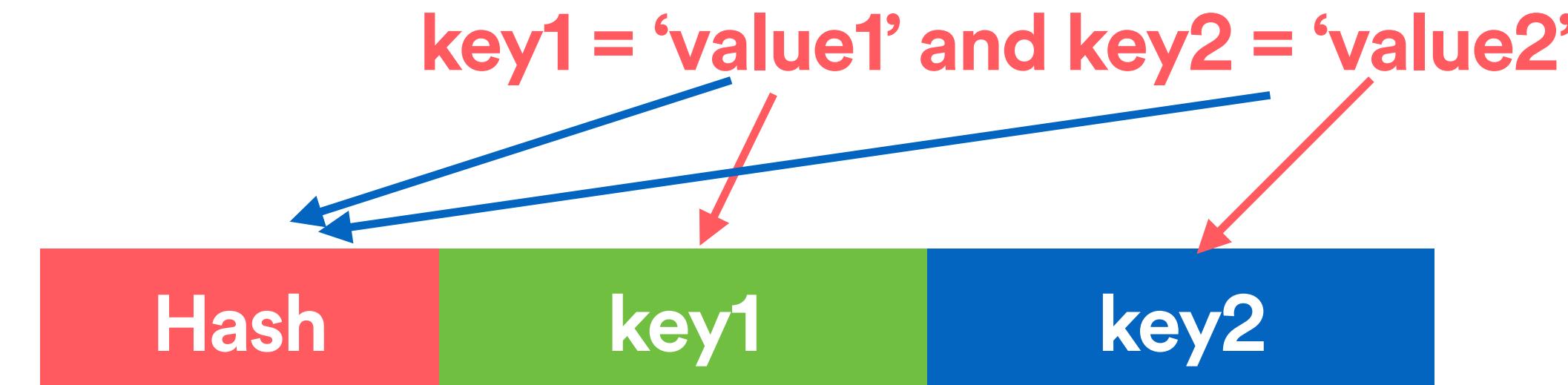
Key Space Design

- Hash partition key space for load balance
- Composite key for $K \rightarrow V$
- Support full key lookup
- Prefix lookup supported for all keys used in hash function

Hash based on key prefix



Lookup based on key prefix

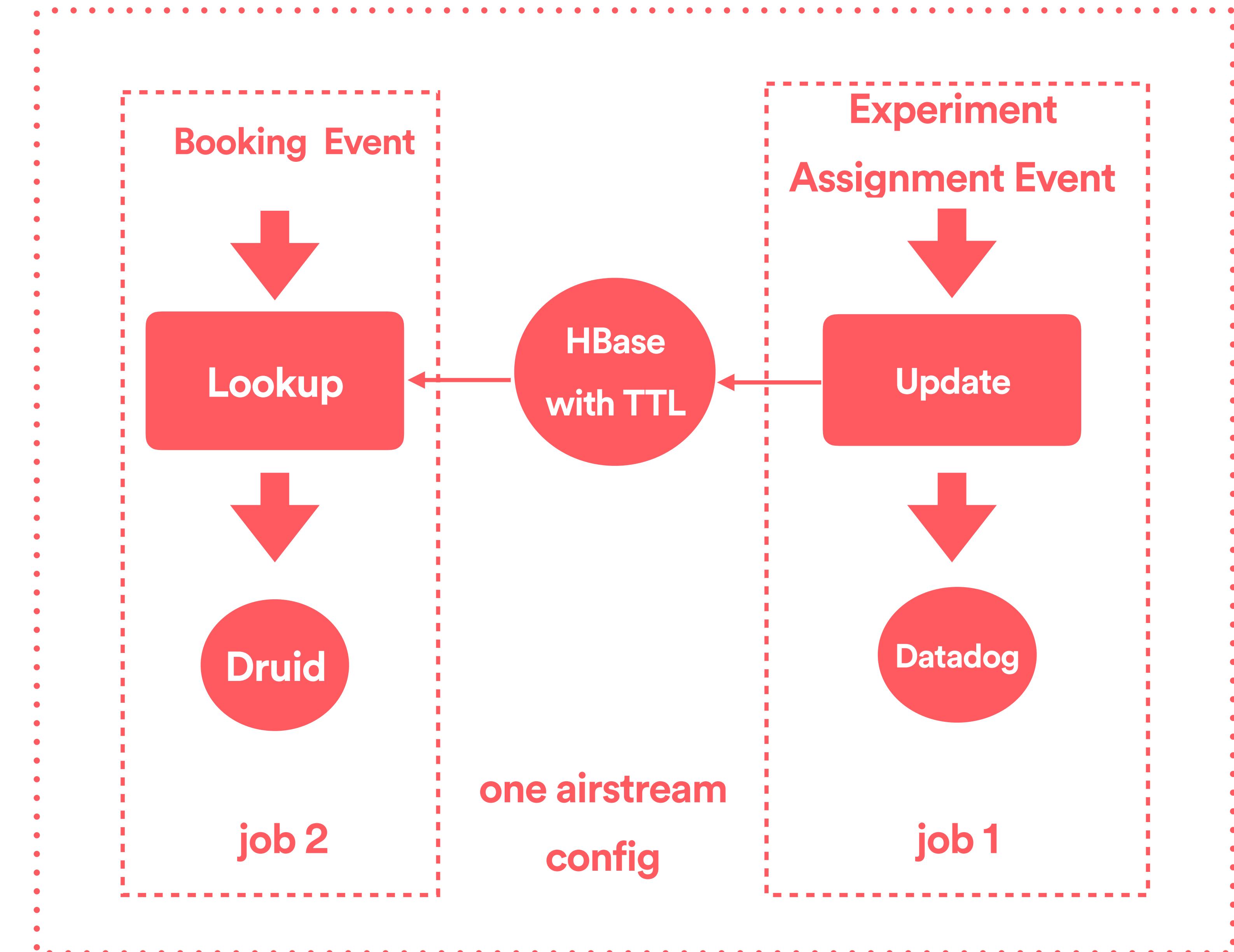


Write Performance

- Partition based on key before write
- Use bulk upload for large volume update

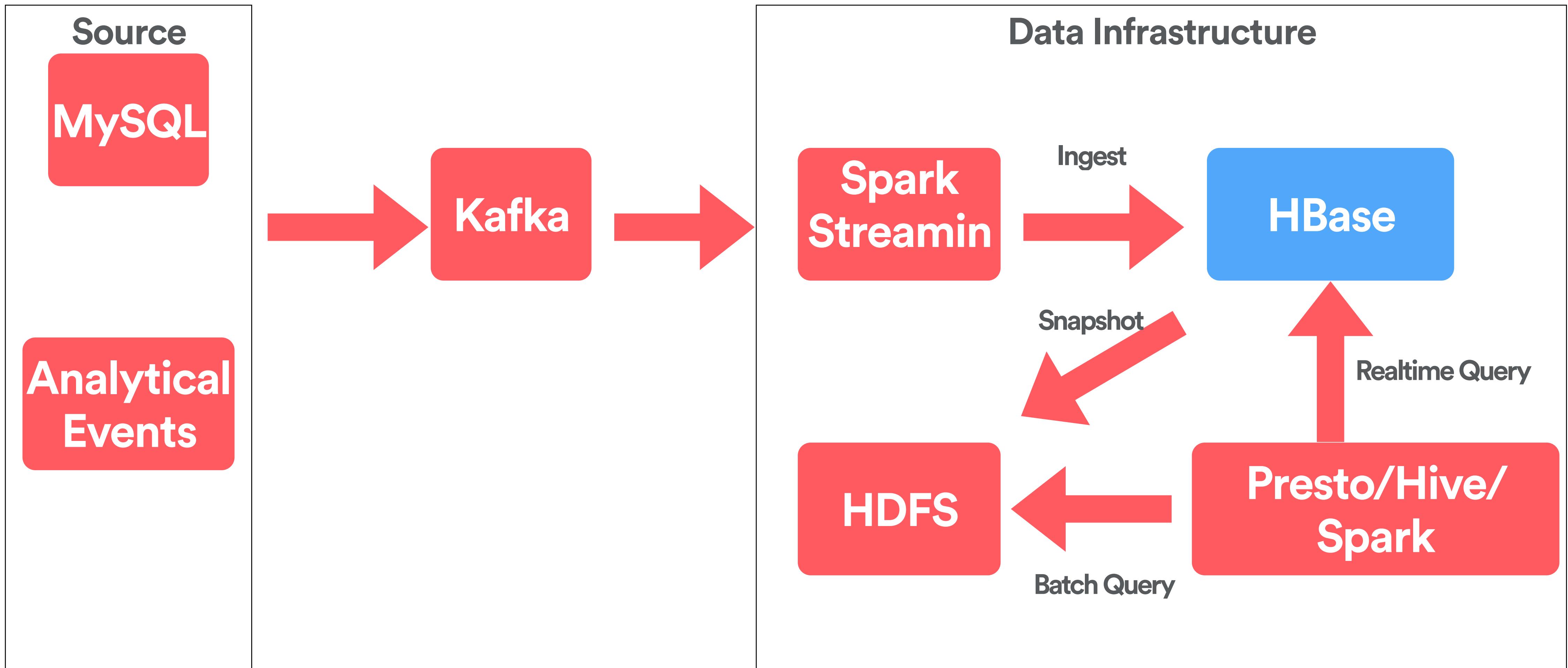
Case Study

Experiment realtime feedback

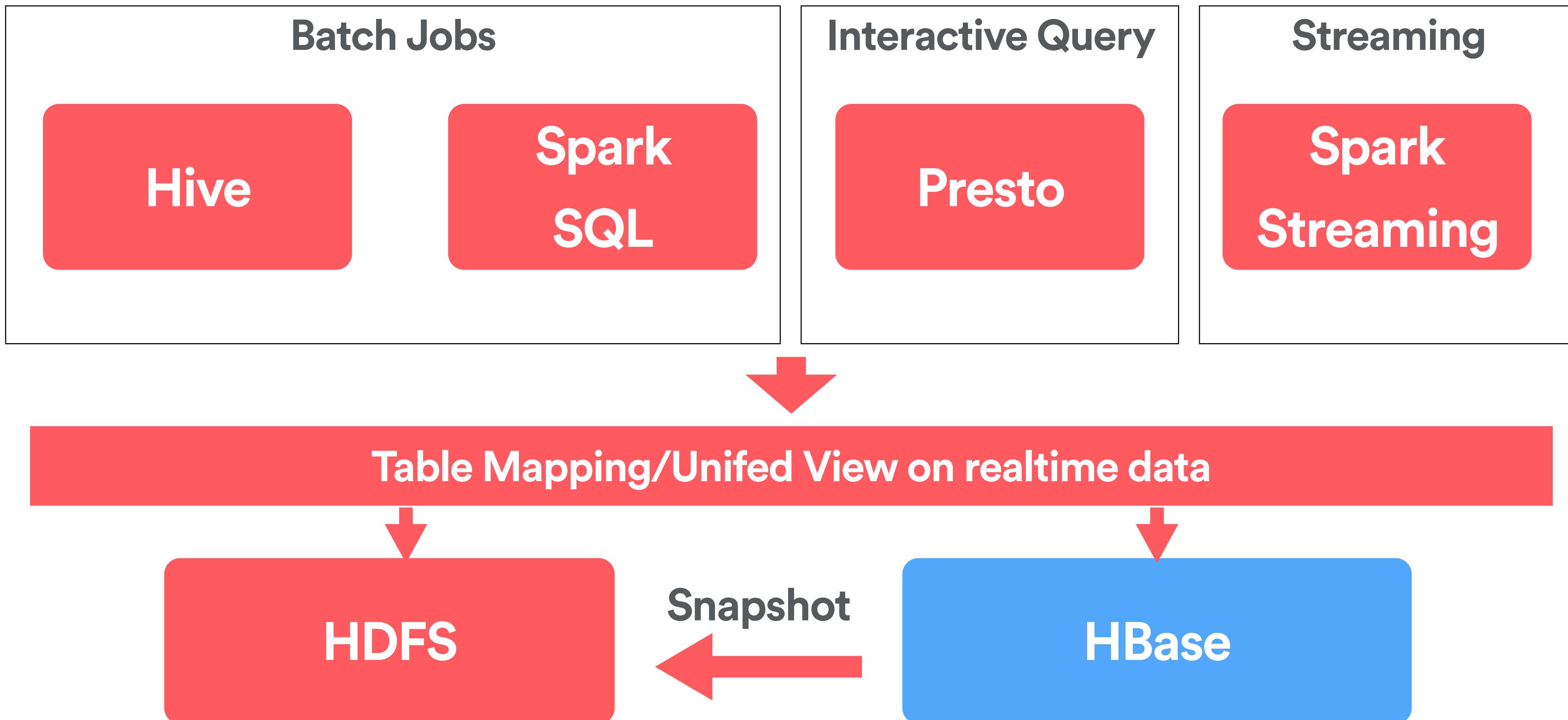


Realtime Data Ingestion

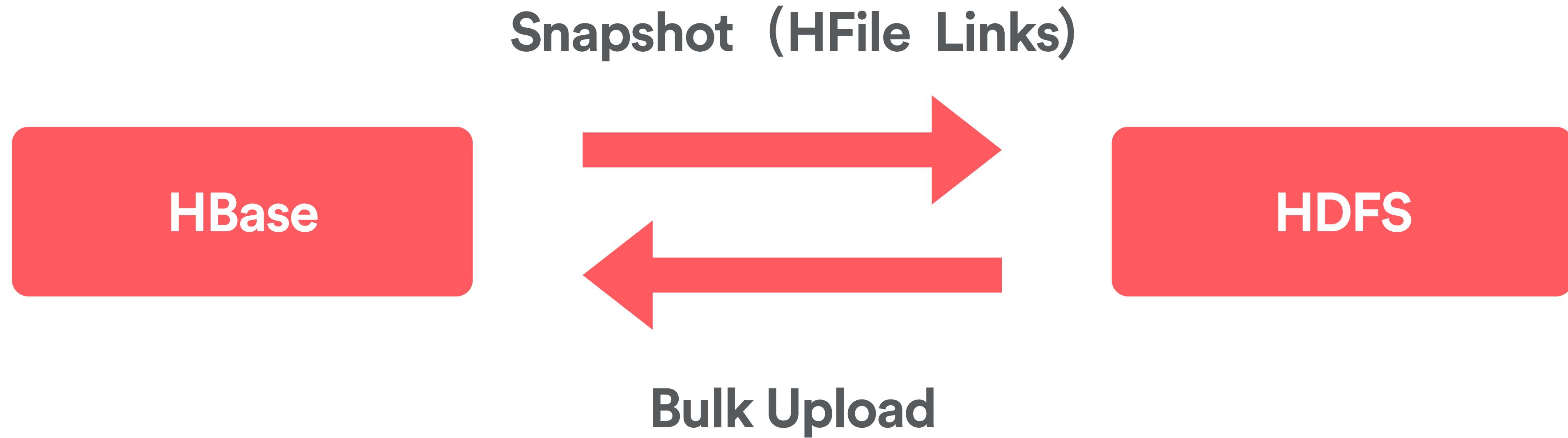
Realtime Ingestion on HBase



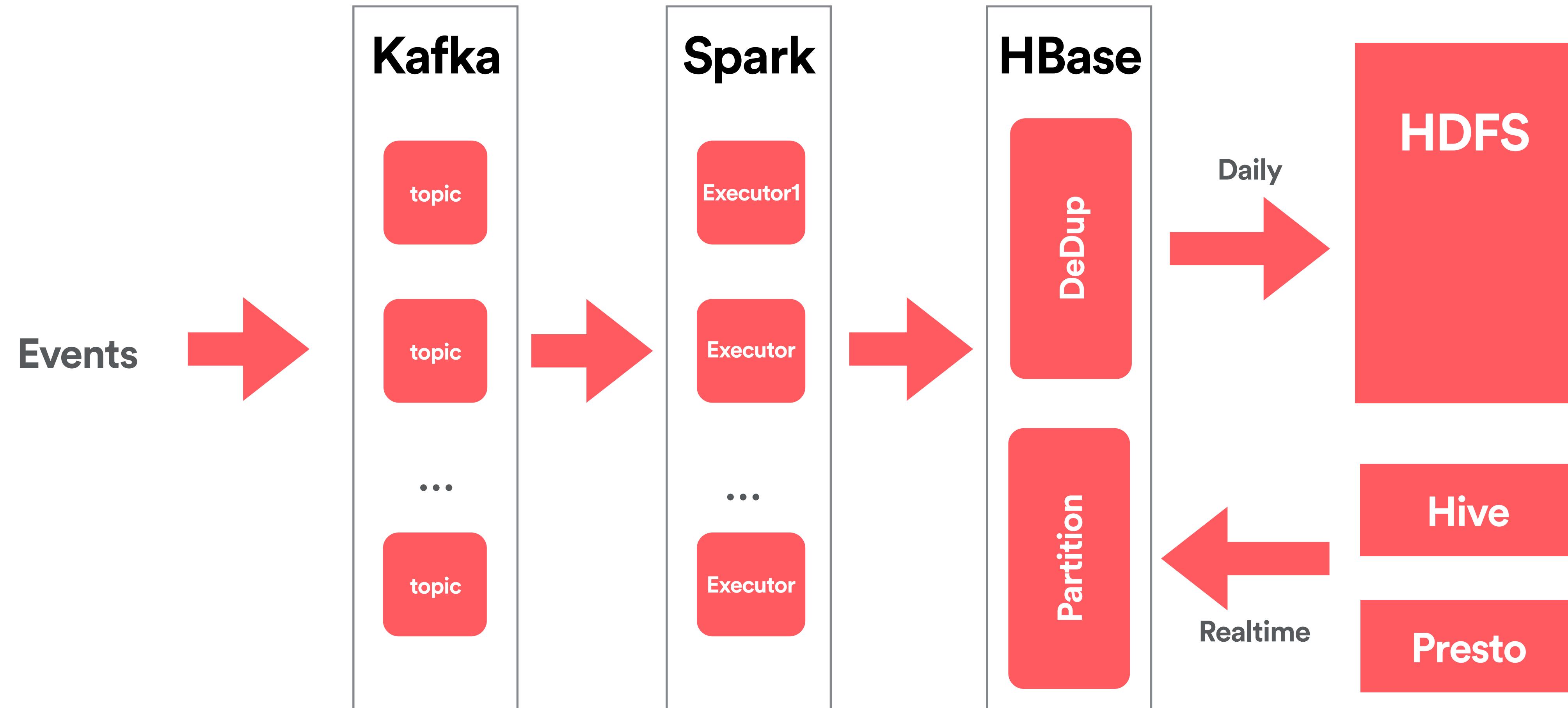
Access Data in HBase



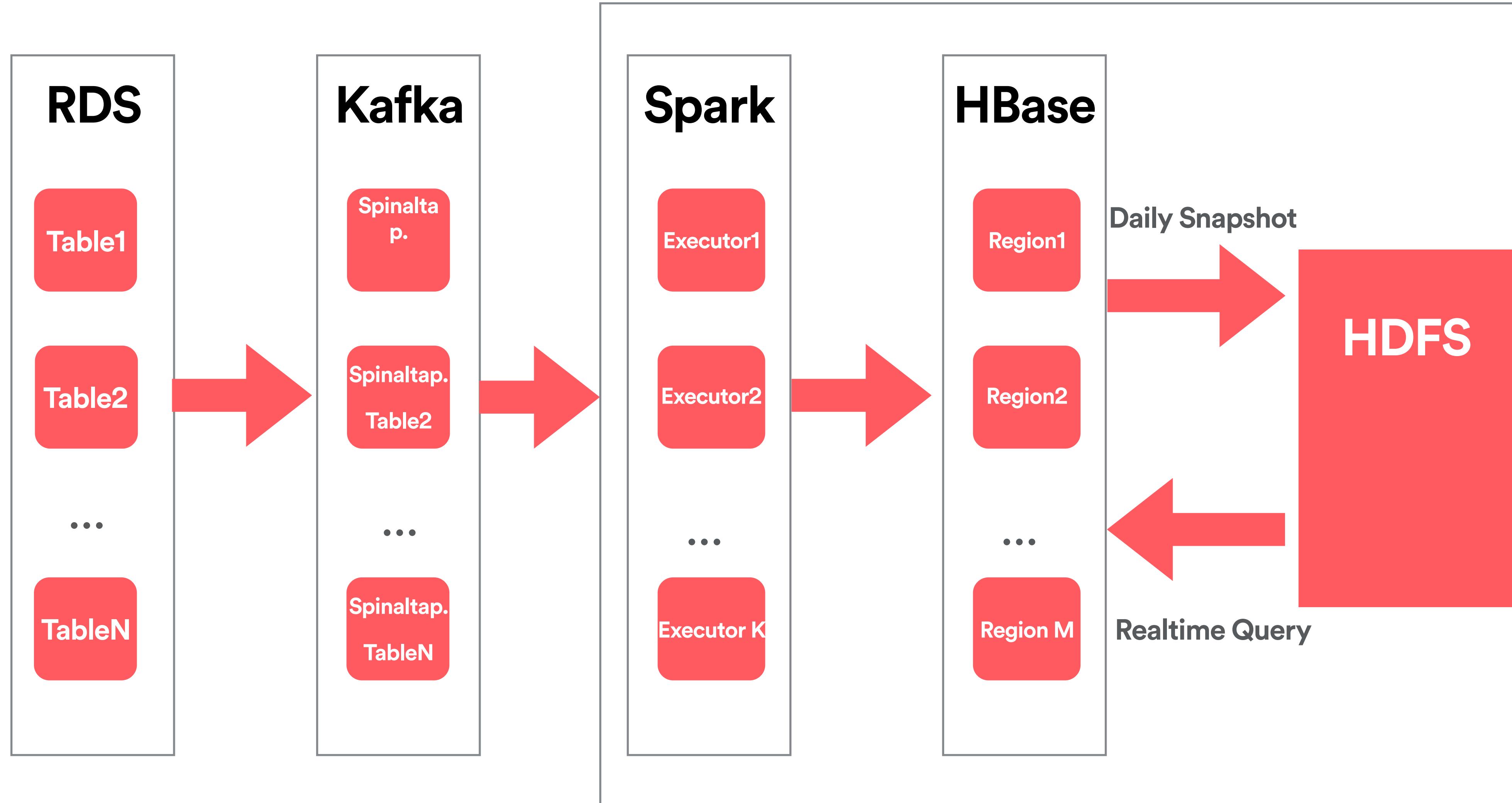
Snapshot & Reseed



Case Study 1: Events Ingestion



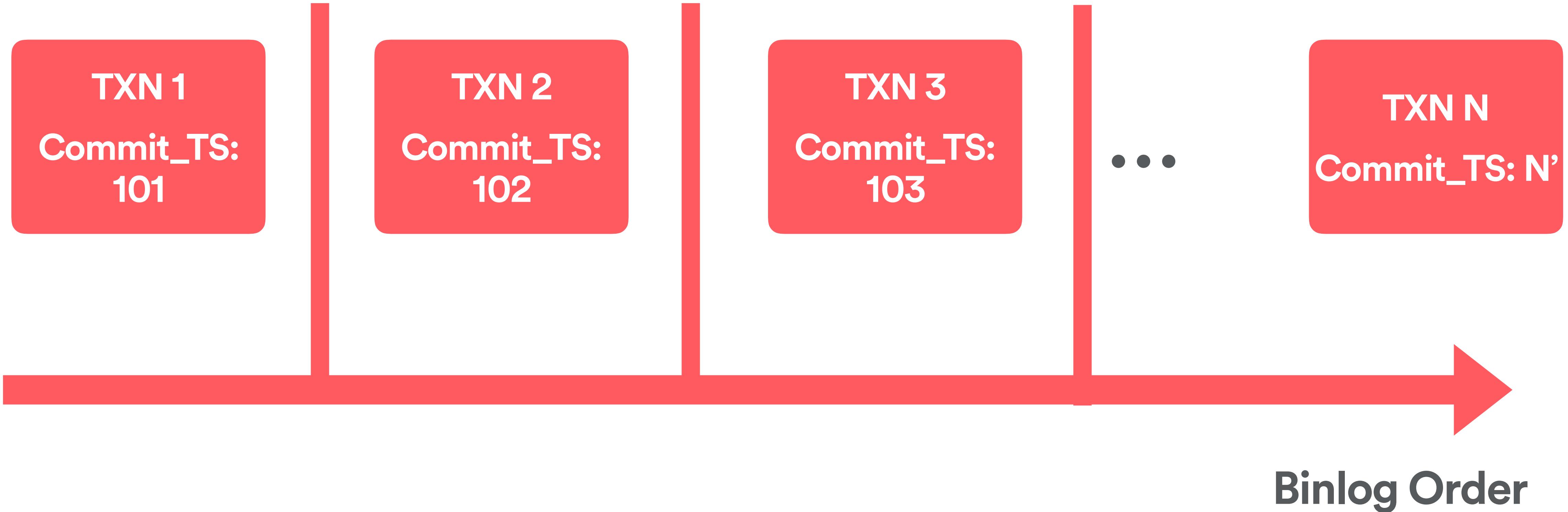
Case Study 2: Streaming DB Export



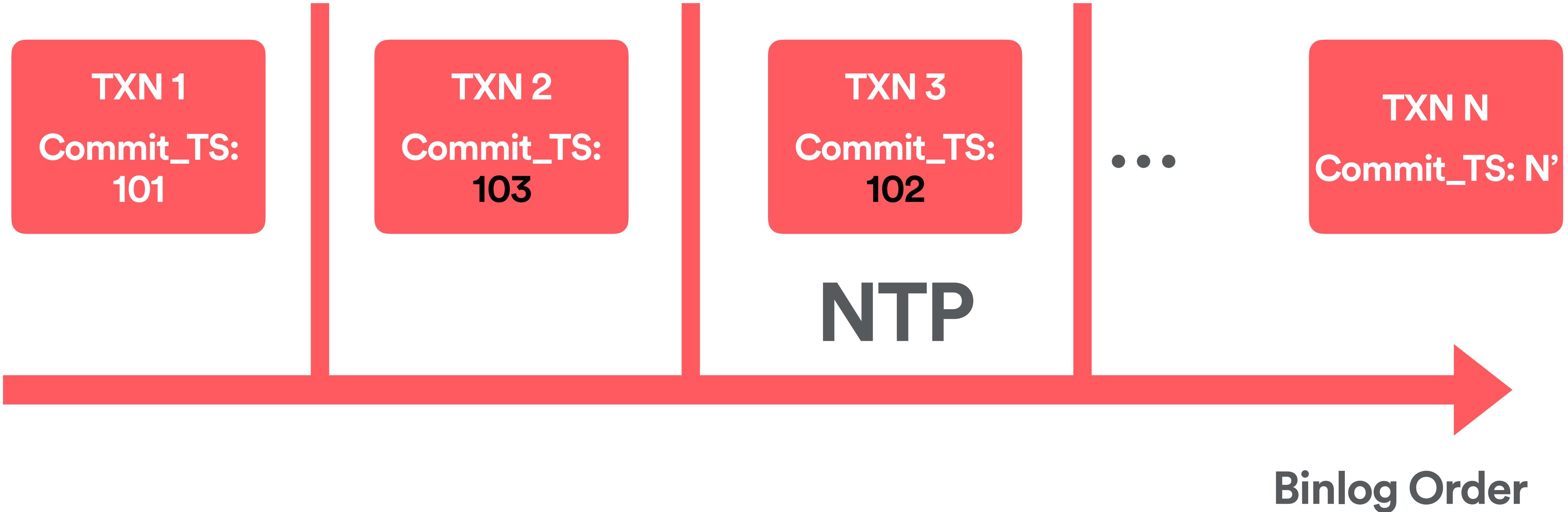
Case Study: Streaming DB Export

Rows	CF: Columns	Version	Value
<ShardKey><DB_TABLE_#1><PK_a=A>	id	Fri May 19 00:33:19 2016	101
<ShardKey><DB_TABLE_#1><PK_a=A>	city	Fri May 19 00:33:19 2016	San Francisco
<ShardKey><DB_TABLE_#1><PK_a=A>	city	Fri May 10 00:34:19 2016	New York
<ShardKey><DB_TABLE_#2><PK_a=A>	id	Fri May 19 00:33:19 2016	1

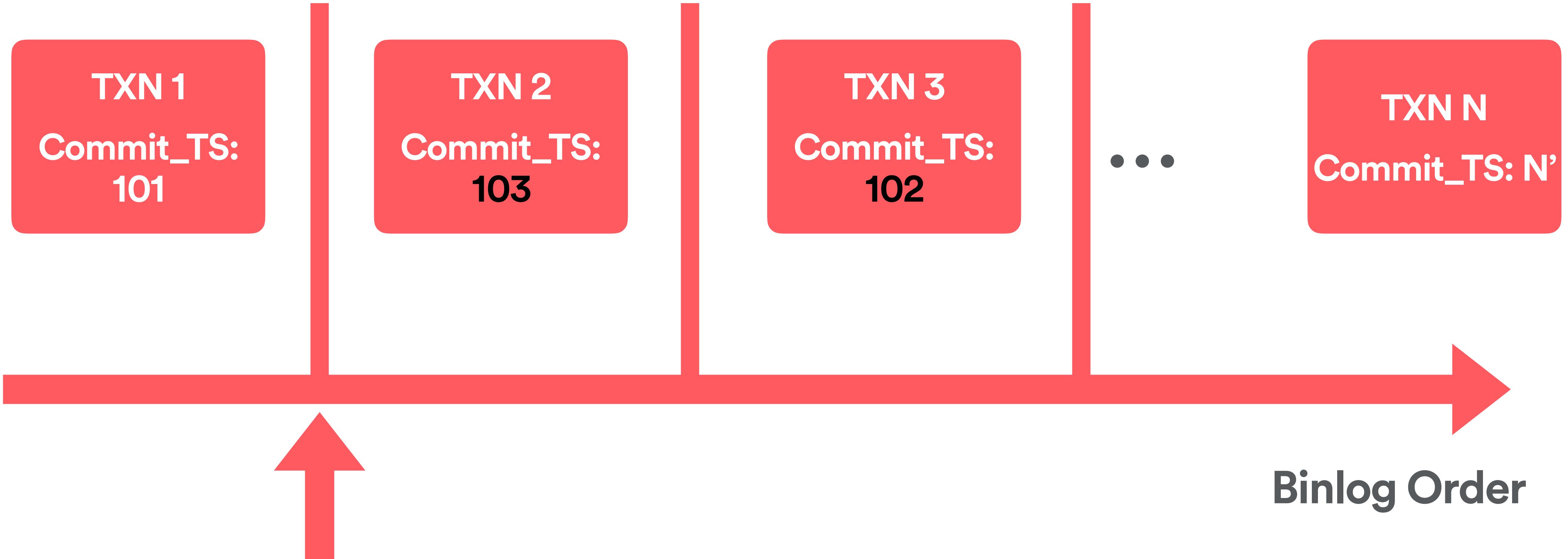
Case Study: Streaming DB Export



Case Study: Streaming DB Export



Case Study: Streaming DB Export



Point-in-Time Restore on TS 102

Case Study: Streaming DB Export

Rows	CF: Columns	Version	Value
<ShardKey><DB_TABLE_#1><PK_a=A>	id	bin100	101
<ShardKey><DB_TABLE_#1><PK_a=A>	city	bin101	San Francisco
<ShardKey><DB_TABLE_#1><PK_a=A>	city	bin102	New York
<ShardKey><DB_TABLE_#2><PK_a=A>	id	bin100	1

Case Study: Streaming DB Export

Rows	Version (Logical Offset)	Value
<ShardKey><DB_TABLE_#1><2016-05-23 23><100>	100	mysql-bin.00000:100
<ShardKey><DB_TABLE_#1><2016-05-23 23><101>	101	mysql-bin.00000:101
<ShardKey><DB_TABLE_#1><2016-05-23 23><103>	103	mysql-bin.00000:103
<ShardKey><DB_TABLE_#1><2016-05-24 00><102>	102	mysql-bin.00000:102

Case Study: Streaming DB Export

Rows	Version (Logical Offset)	Value
<ShardKey><DB_TABLE_#1><2016-05-23 23><100>	100	mysql-bin.00000:100
<ShardKey><DB_TABLE_#1><2016-05-23 23><101>	101	mysql-bin.00000:101
<ShardKey><DB_TABLE_#1><2016-05-23 23><103>	103	mysql-bin.00000:103
<ShardKey><DB_TABLE_#1><2016-05-24 00><102>	102	mysql-bin.00000:102

Operation

Job Management: Scaling up

Config

Driver

...

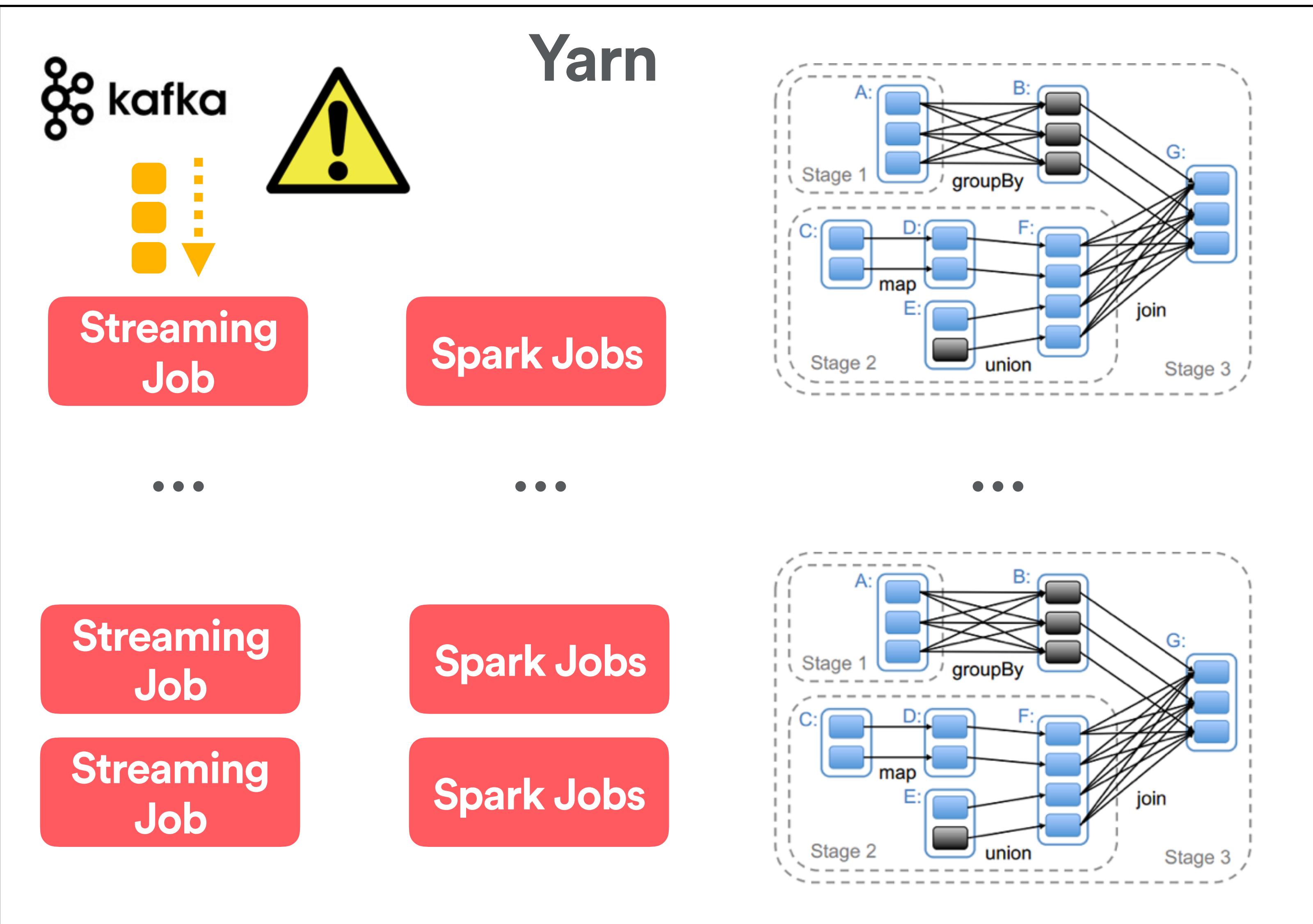
Config

Driver

Config

Driver

Liyin Tang & Jingwei Lu



Job Management: Scaling up

Config

Driver

Streaming
Job



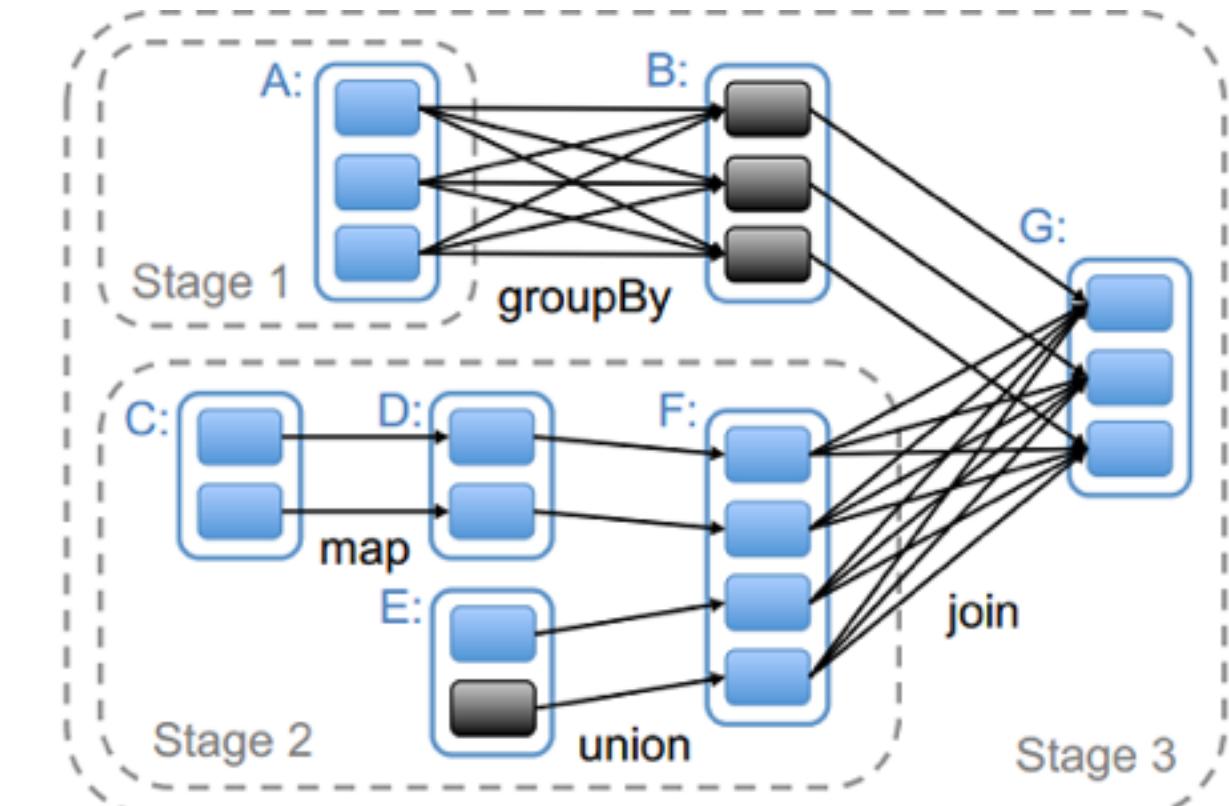
Yarn

Concurrent
Spark Job 1

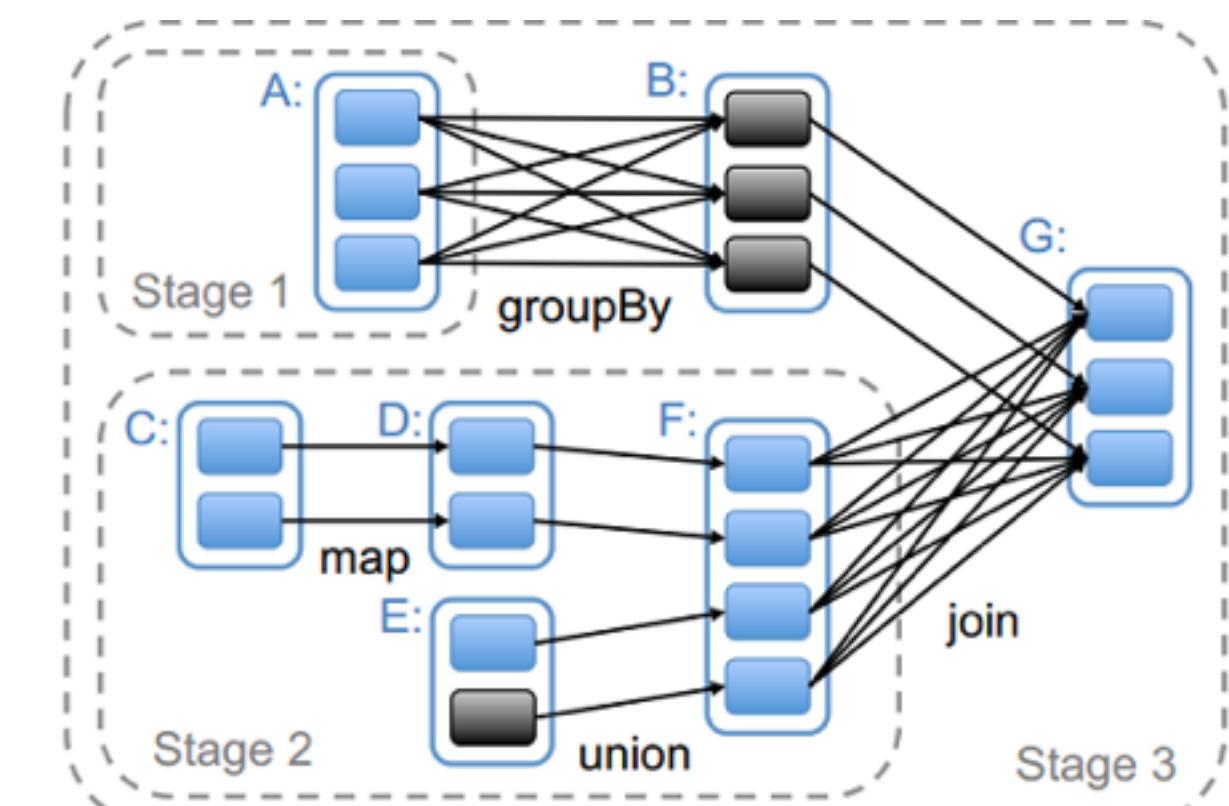
Spark Job2

Spark Job N

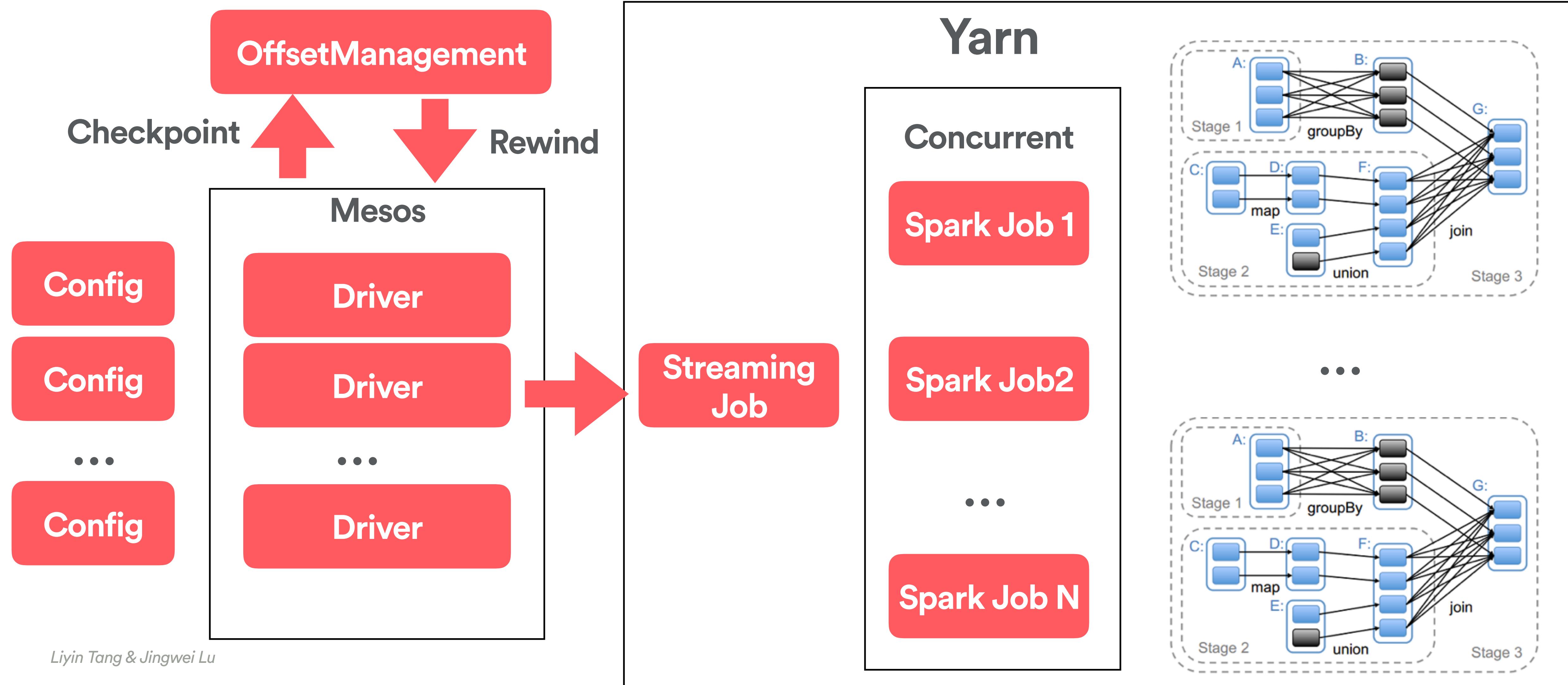
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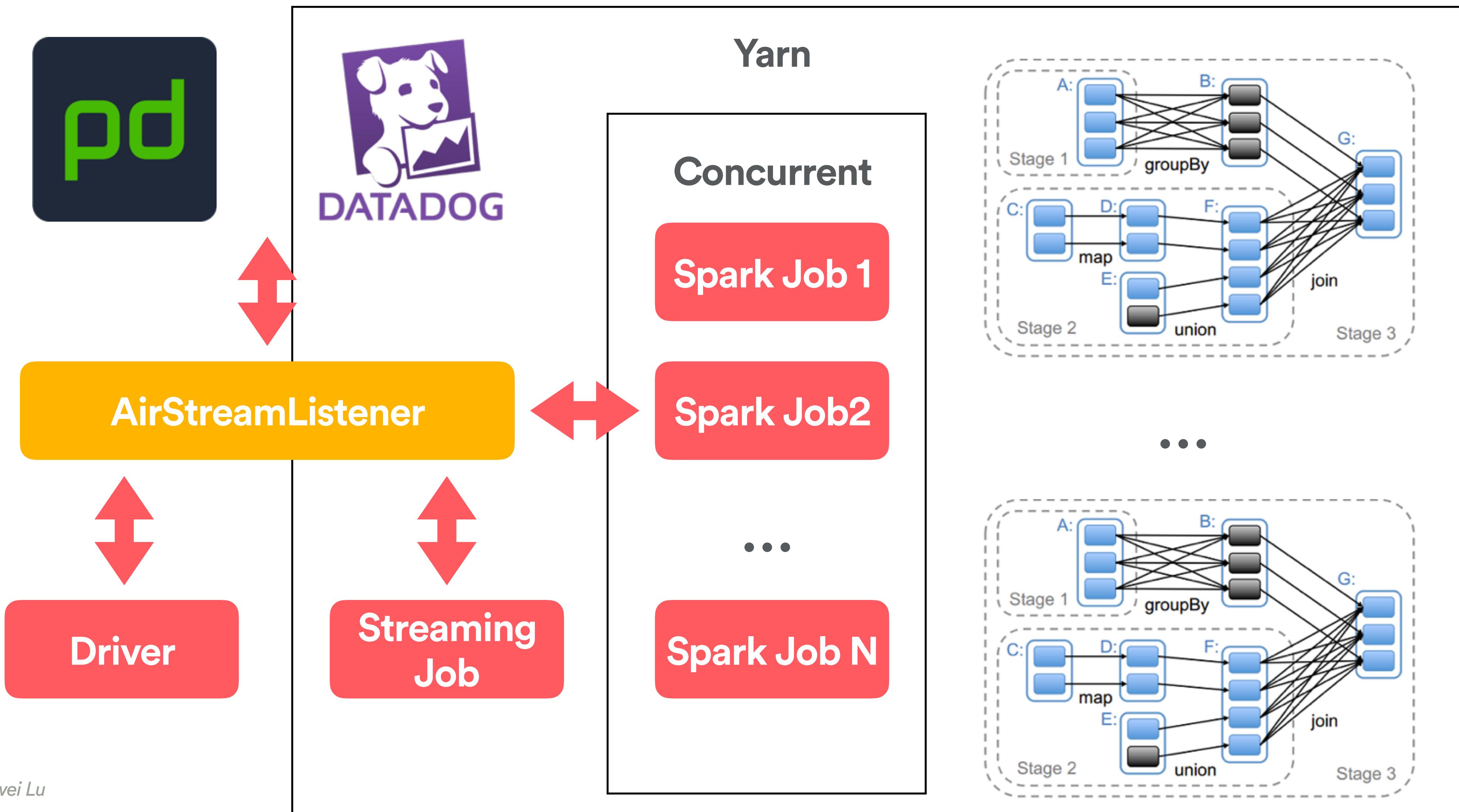
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Job Management: Fault Tolerant



Job Management: Monitoring & Alerting



Summary

Simplify and Unify Stream Batch Pipeline

Rich Stateful Computation

Rich Integration with Hadoop EcoSystem

Easy Operation



airbnb