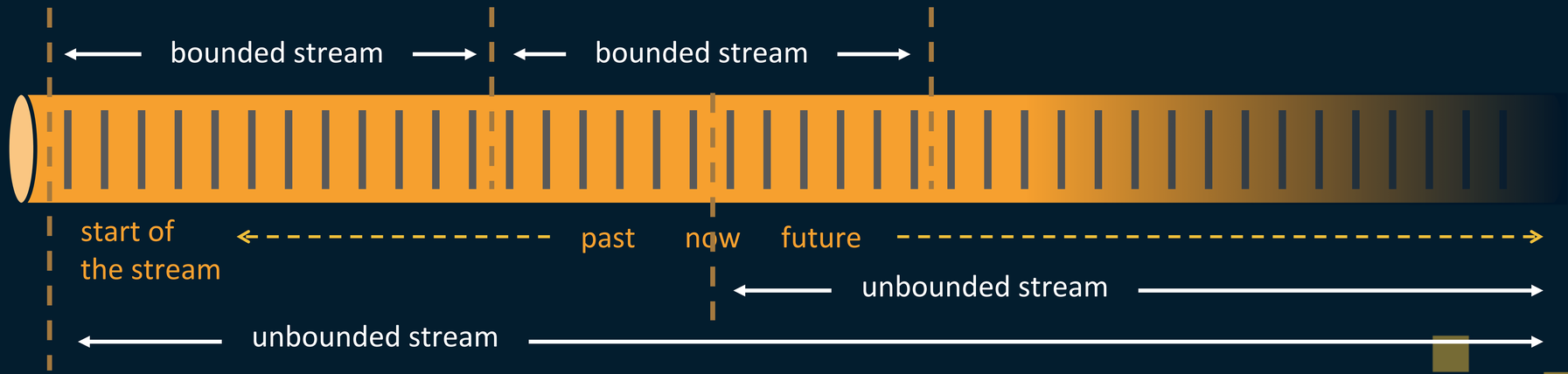
Stream Processing takes on Everything

Stephan Ewen

Flink Forward China 2018

Streams as a Paradigm



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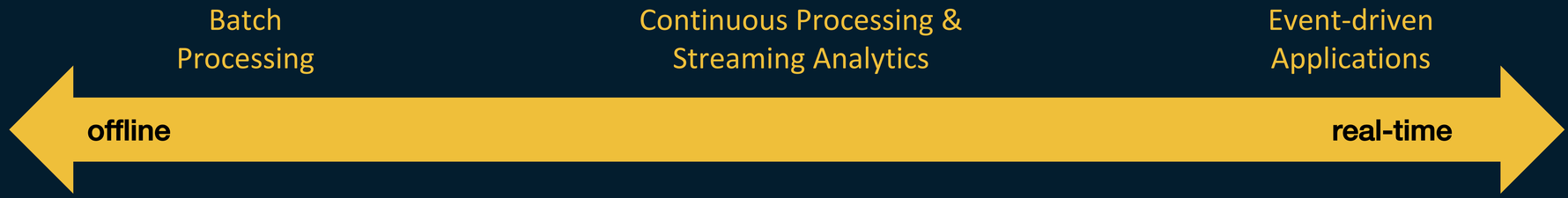
Stream Processing takes on Everything



Some new Streaming Features in Flink 1.7

```
SELECT
    o.time AS time,
    o.price * r.rate AS price
FROM
    Orders AS o,
    LATERAL TABLE (Rates(o.time)) AS r
WHERE r.crcy = o.crcy
```

Orders

time	price	crcy
10:15	2	EUR
10:30	1	USD
10:32	50	YEN
10:52	3	EUR
11:04	5	USD

Rates

time	crcy	rate
09:00	USD	102
09:00	EUR	114
09:00	YEN	1
10:45	EUR	116
11:00	USD	105

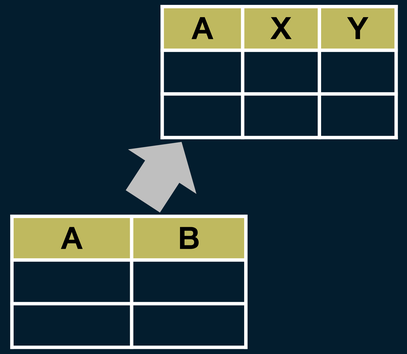
Result

time	price
10:15	228
10:30	102
10:32	50
10:52	348
11:04	525

Time-versioned Joins

```
SELECT *
FROM TaxiRides
MATCH_RECOGNIZE (
   PARTITION BY driverId
   ORDER BY rideTime
   MEASURES
       S.rideId as sRideId
   AFTER MATCH SKIP PAST LAST ROW
   PATTERN (S M{2,} E)
   DEFINE
       S AS S.isStart = true,
       M AS M.rideId <> S.rideId,
       E AS E.isStart = false
           AND E.rideId = S.rideId)
```

MATCH_RECOGNIZE



Schema Upgrades

S3 exactly-once

Applications and Services

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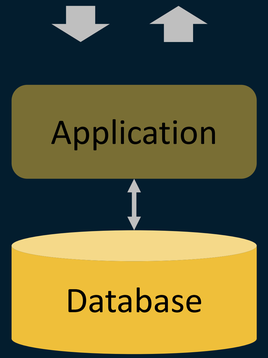
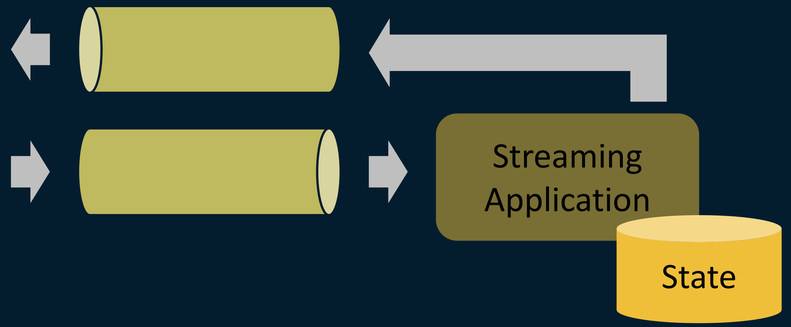
Request/Response Applications



Event-sourced / Streaming Applications



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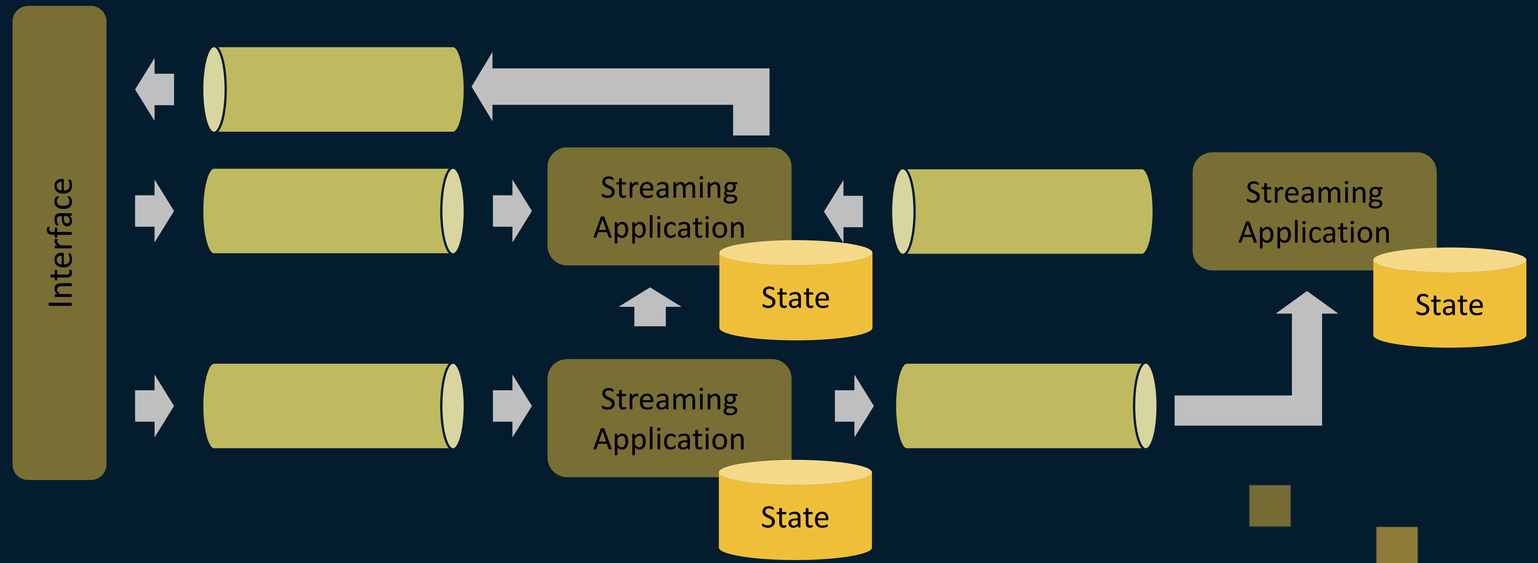
Streaming Applications

Event Sourcing

Command Query
Responsibility Segregation



What about Transactional Applications?

Example: Accounts and Transfers

A > 100?
A -= 50
B += 50

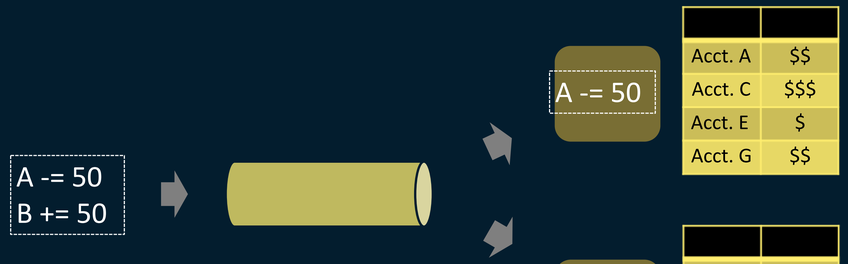
Acct. A	$$
Acct. C	$$$
Acct. E	$
Acct. G	$$

ACID

Atomicity **Consistency**

Isolation **Durability**

Streaming Transaction Processing



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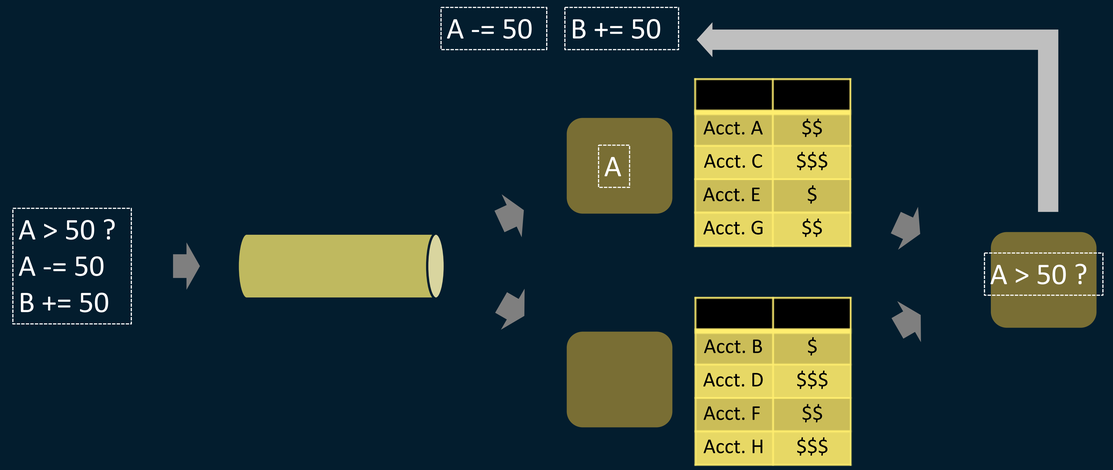
Streaming Transaction Processing



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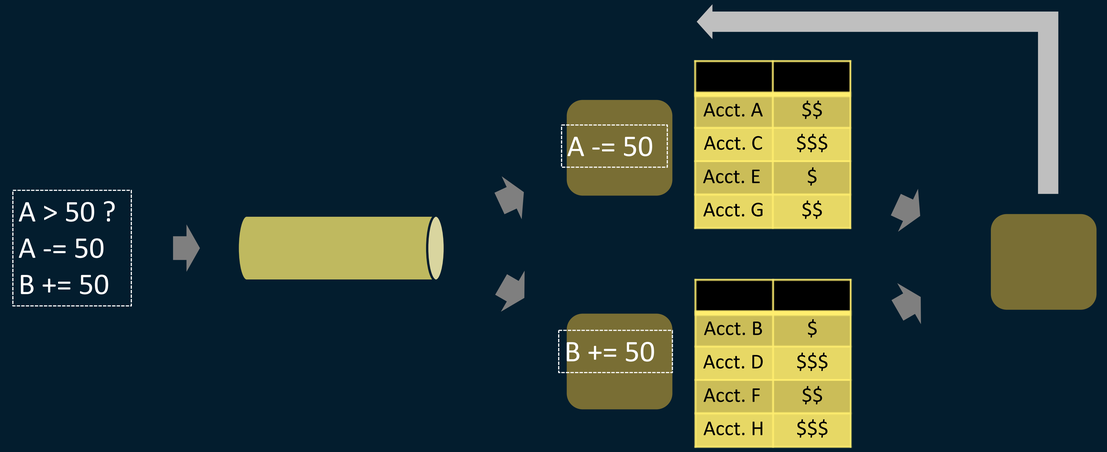
Streaming Transaction Processing



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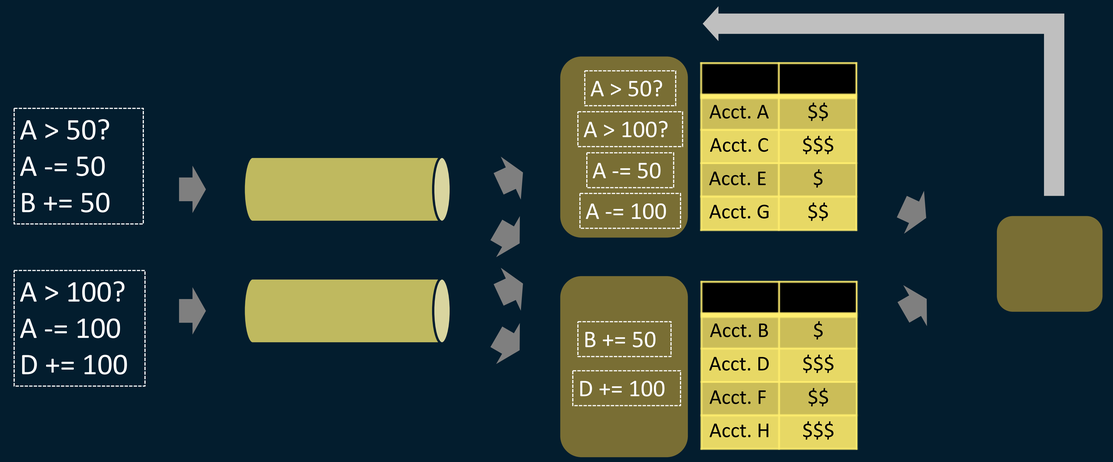
Streaming Transaction Processing



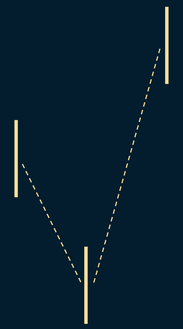
How to resolve this consistently?

Event-time to the rescue!

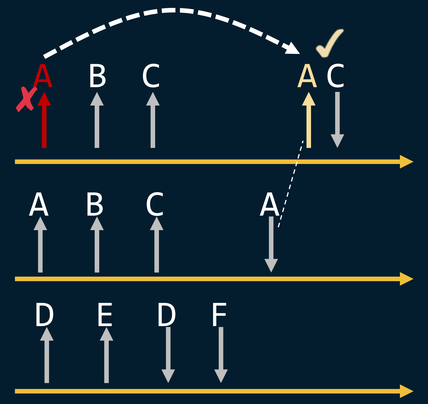
Serializable Isolation in Streaming Transactions

```
Txn: (A,B,C) -> C

Txn: (A,B,C) -> A

Txn: (D,E) -> (D,F)
```

transaction events



define ordering
for schedule



reorder events

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Serializable Isolation in Streaming Transactions

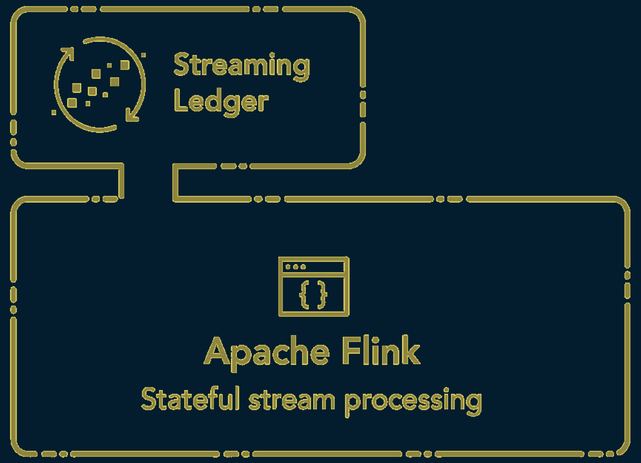
(0xf876ab78|0x0b7cc7a3)

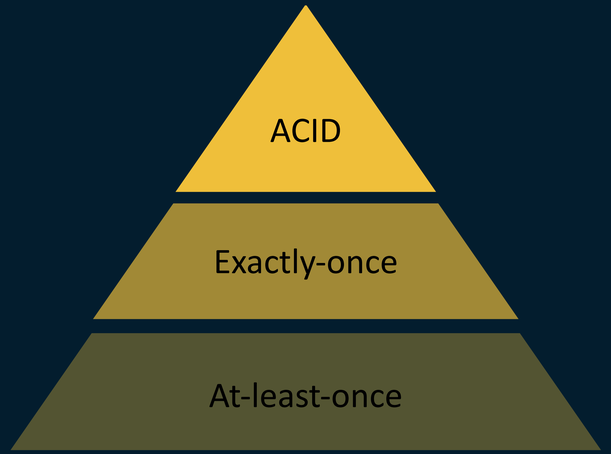
Logical Clocks
to define schedule

event re-ordering &
out-of-order processing

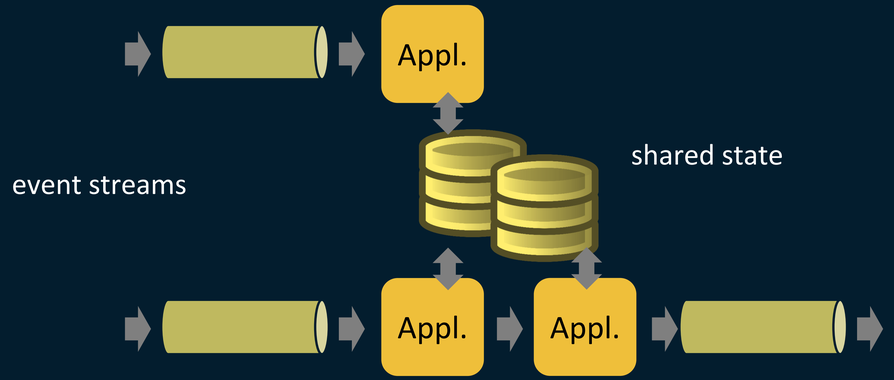
Iterative streaming
dataflows

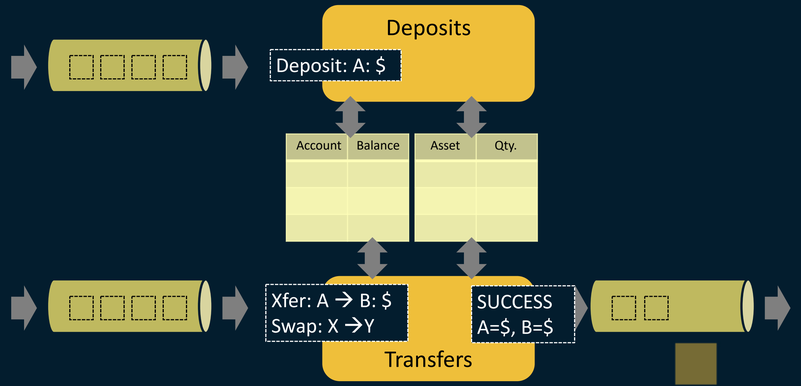
dA Streaming Ledger





Applications against Shared Consistent State

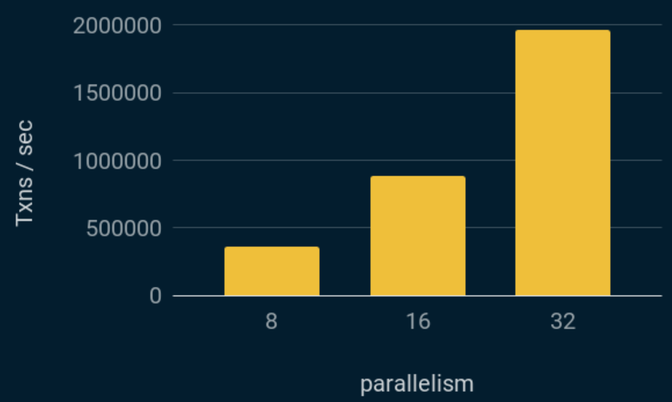




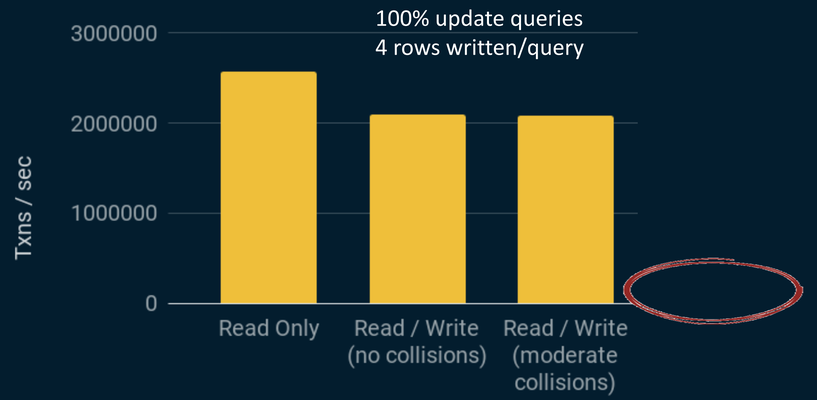
Performance

200 million rows
100% update queries
4 rows written/query

Scale Out



Hot Keys

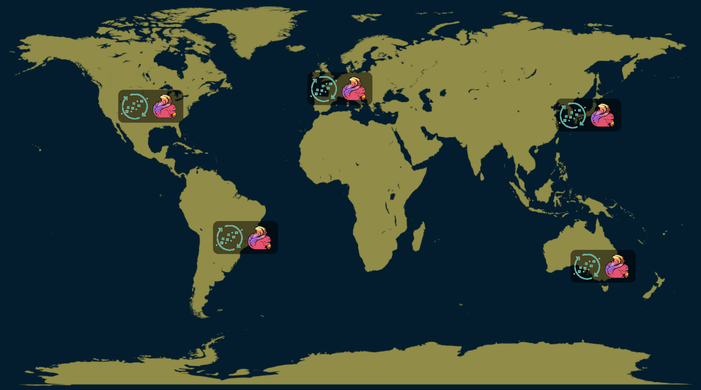


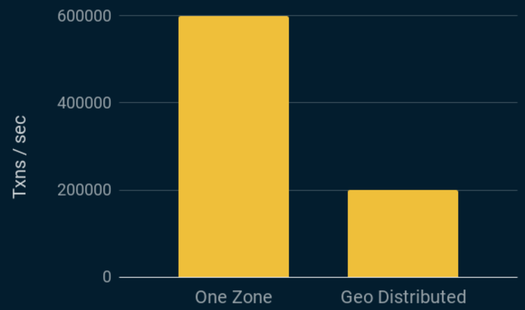
Extreme contention:

800,000 updates/sec on 1,000 keys

Slowdown, but stable

Performance in a Geo-distributed Setup





Apache Flink: The Powerful Foundation

This technology is possible, because Apache Flink offers such powerful building blocks

- Continuous processing
- Iterative flows
- Flexible state abstraction
- Asynchronous checkpoints
- Sophisticated event-time/watermarks

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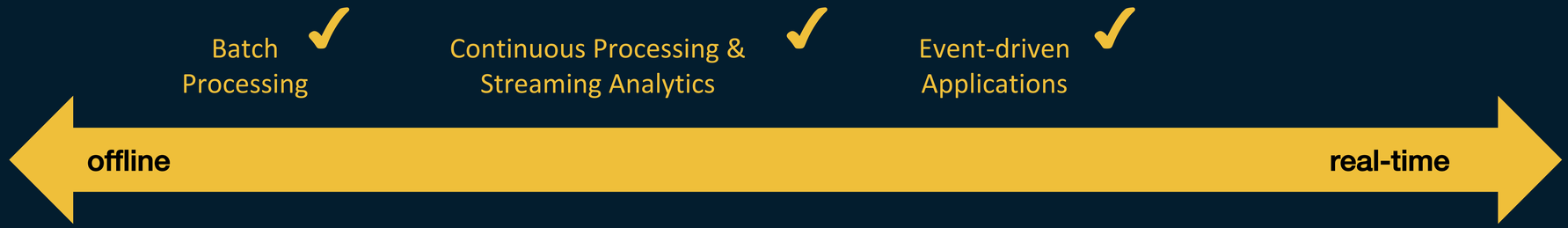

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Stream Processing takes on Everything

Batch Processing ✓

Continuous Processing & Streaming Analytics ✓

Event-driven Applications ✓

Transacional Processing ✓

…with the right framework ;-)


Apache Flink
THANKS

Flink Forward San Francisco 2019

https://sf-2019.flink-forward.org/register