

ClickHouse for Financial Analytics

Engineering

Bloomberg

ClickHouse NYC Meetup
December 6, 2022

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Agenda

01

Context



02

ClickHouse



03

Our Model



04

Future



Context

HIGHLIGHTS

- 5B+ records x 100 columns
- Filter/Group/Aggregate
- Interactive slice-n-dice
- Complex aggregations



ClickHouse

STRENGTHS

- Rich **syntax**
- **Columnar** storage
- Cost-effective

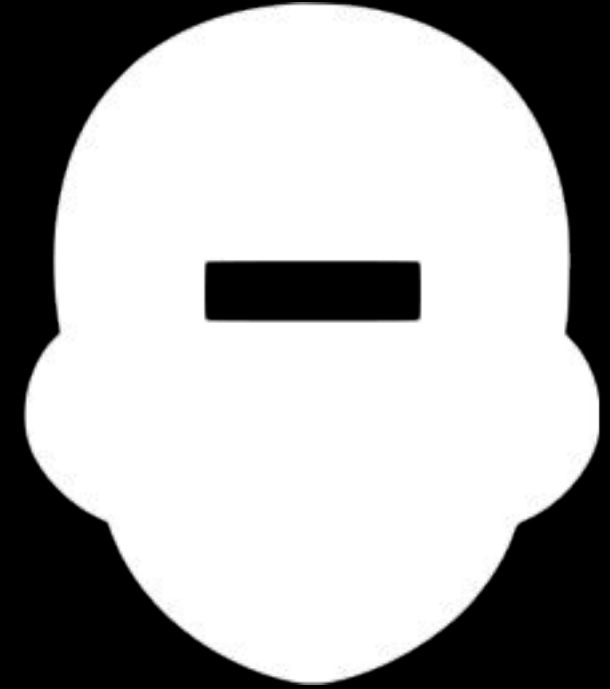


$$CPR_n = 1 - \left[\prod_{i=1}^n \left(1 - \frac{\sum_{j=1}^m SMM_{i,j} * SB_{i,j}}{\sum_{j=1}^m SB_{i,j}} \right) \right]^{\frac{12}{n}}$$

ClickHouse

TRADE-OFFS

- Single index
- No **transactions** (yet)
- No update/delete
- No **user-defined** aggregations



Our Model - Nodes

DEV

12 virtual (16 cores / 96 GB / 4 TB)

2 shards, 6 replicas

Ceph storage

PROD

8 physical (36 cores / 1 TB / 32 TB)

2 shards, 4 replicas

RAID 1E storage

Apache ZooKeeper | Grafana | Humio

Our Model - Consistency

01

New Table



02

Synchronize



03

Promote



04

Query



Our Model - Appending

MERGE-TREE HARD LINKS

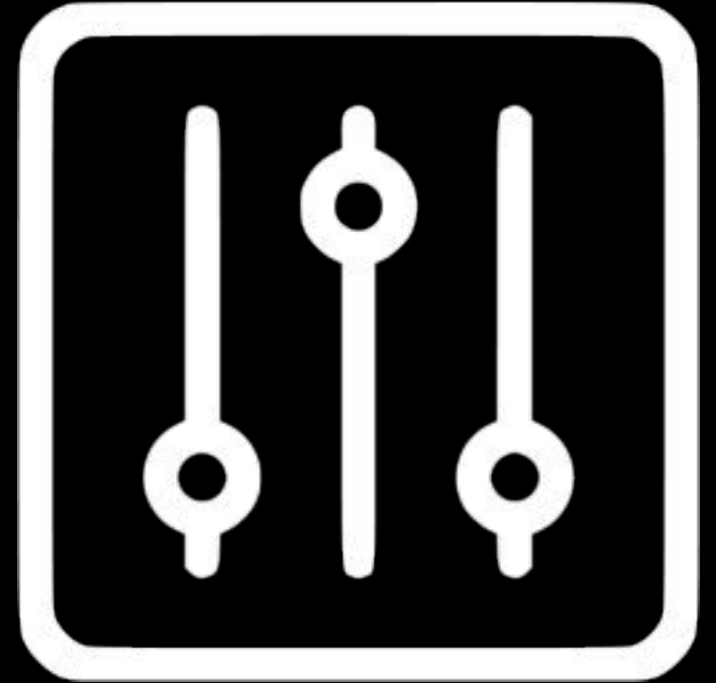
```
ALTER TABLE
  <db>.<dest>
ON CLUSTER
  <cluster>
ATTACH PARTITION
  tuple()
FROM
  <db>.<source>;
```



Our Model - Client

CONSISTENCY

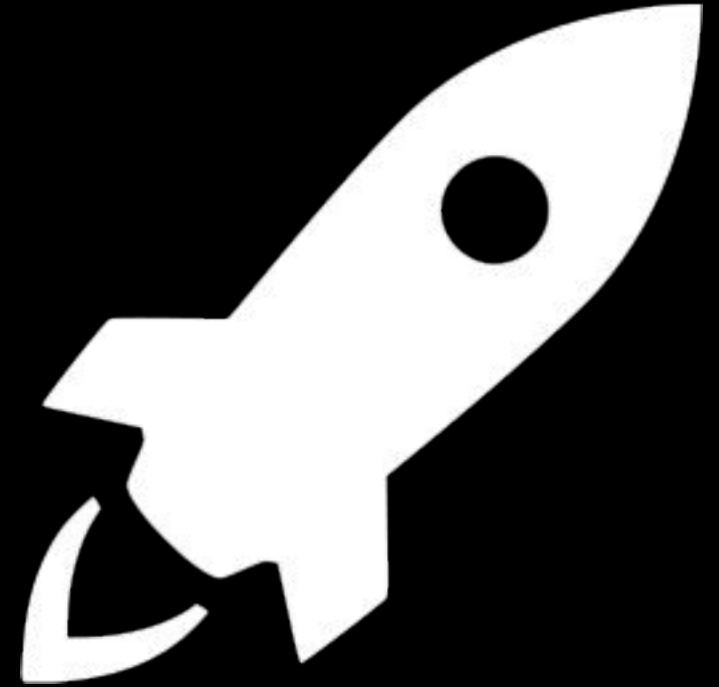
- No **stale** replicas
- Max. delay of **1s**
- Distributed DDL **Null** status
- Retry if table/database **doesn't exist**



Future

CLOUD

- Storage on **S3** or **block storage**
- Compute on **Kubernetes**
- Sync with **ClickHouse-Keeper**



Thank you!

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