Running Trino at Exabyte-Scale Data Warehouse

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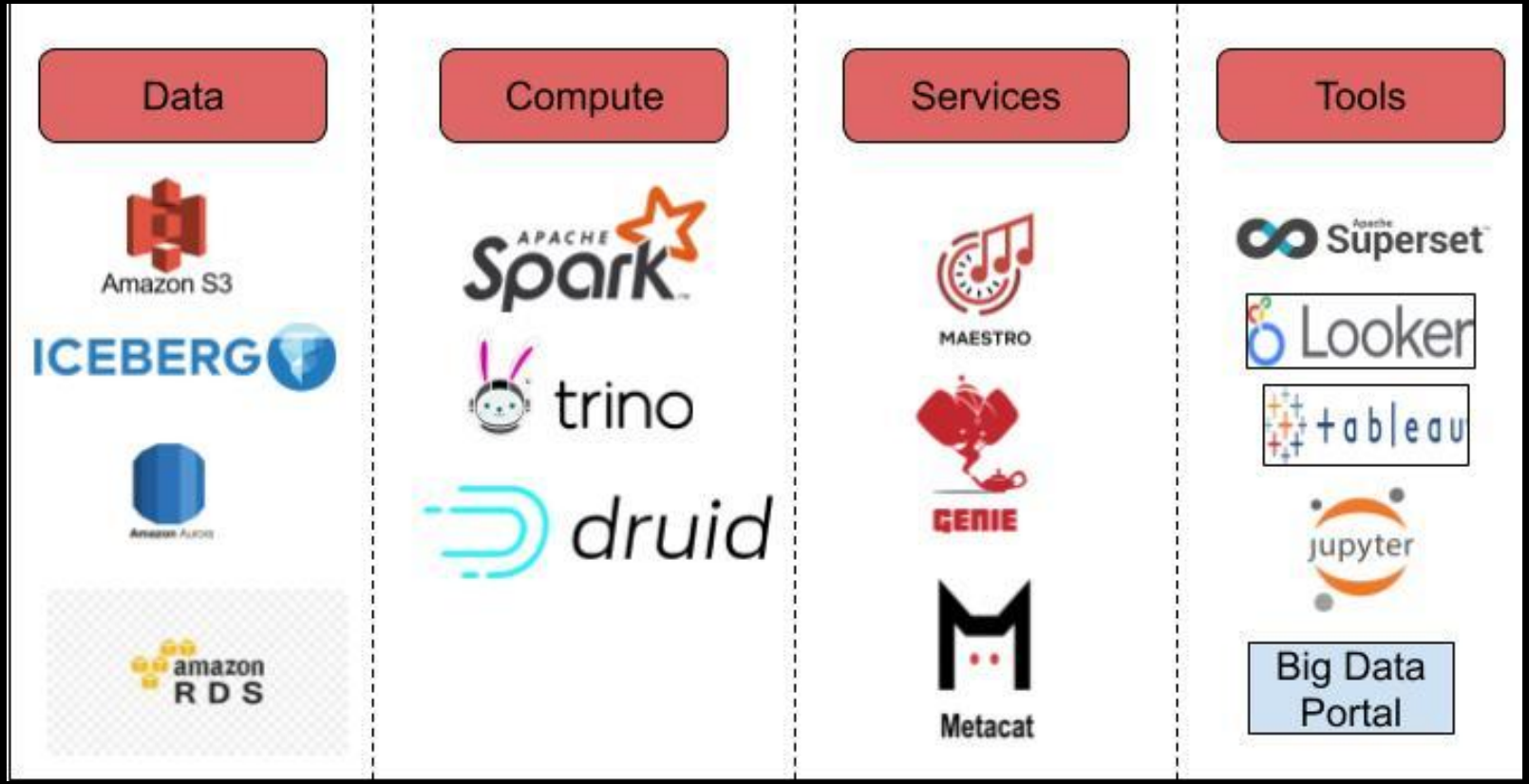
Trino Summit - 2024

Agenda

- Data Platform Architecture
- Iceberg @ Netflix
- Trino Architecture
- Internal Trino Features
- Trino-Iceberg connector
- Future

Data Platform Architecture (Analytics)



Iceberg @ Netflix

1+EB
Total Warehouse Size

3m+
Iceberg Tables

99.5%+
Iceberg adoption

36PB
Largest Iceberg Table

10+PB
Data Ingested per day

9+PB
Data Deleted per day

2PB
Data replicated per day

600
Peak commits per second

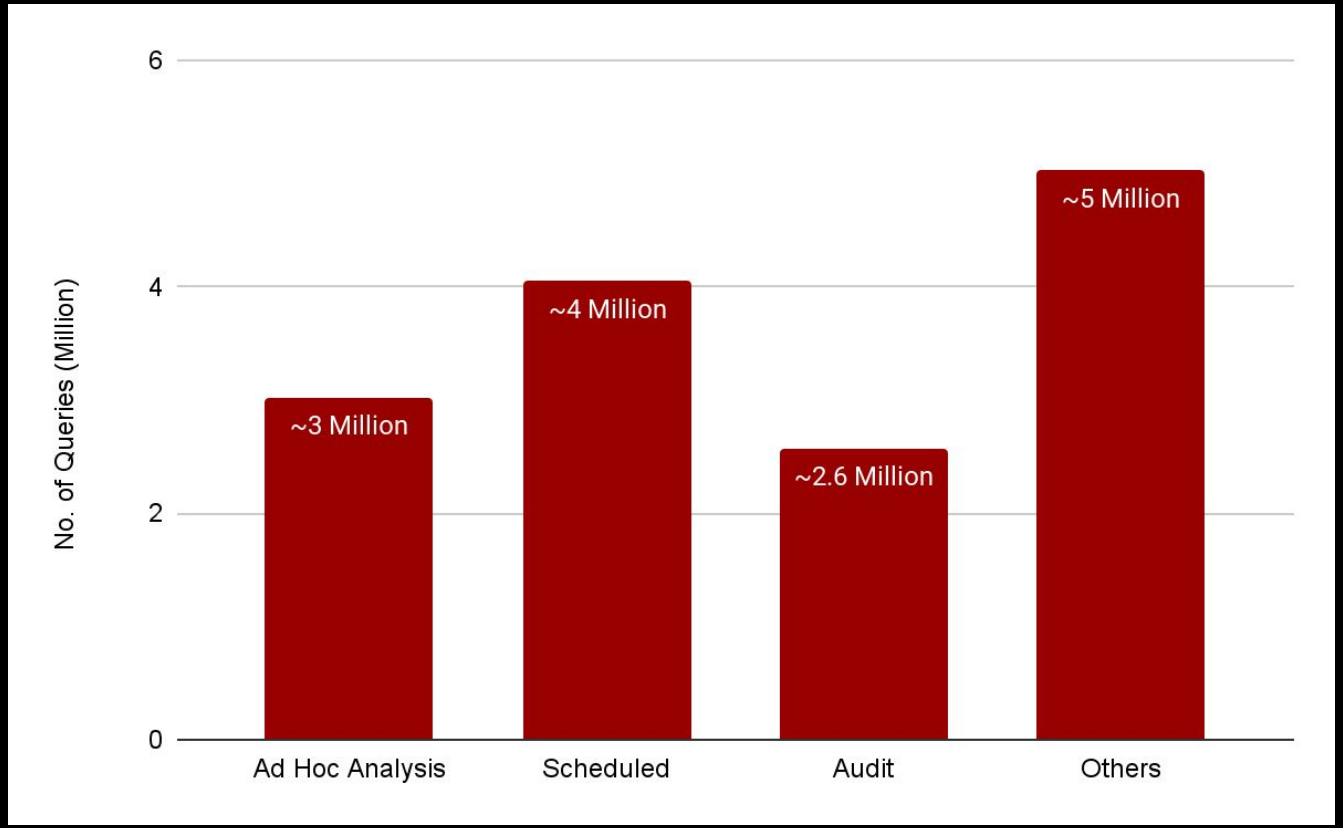
12K
Peak table loads per second

Trino @ Netflix

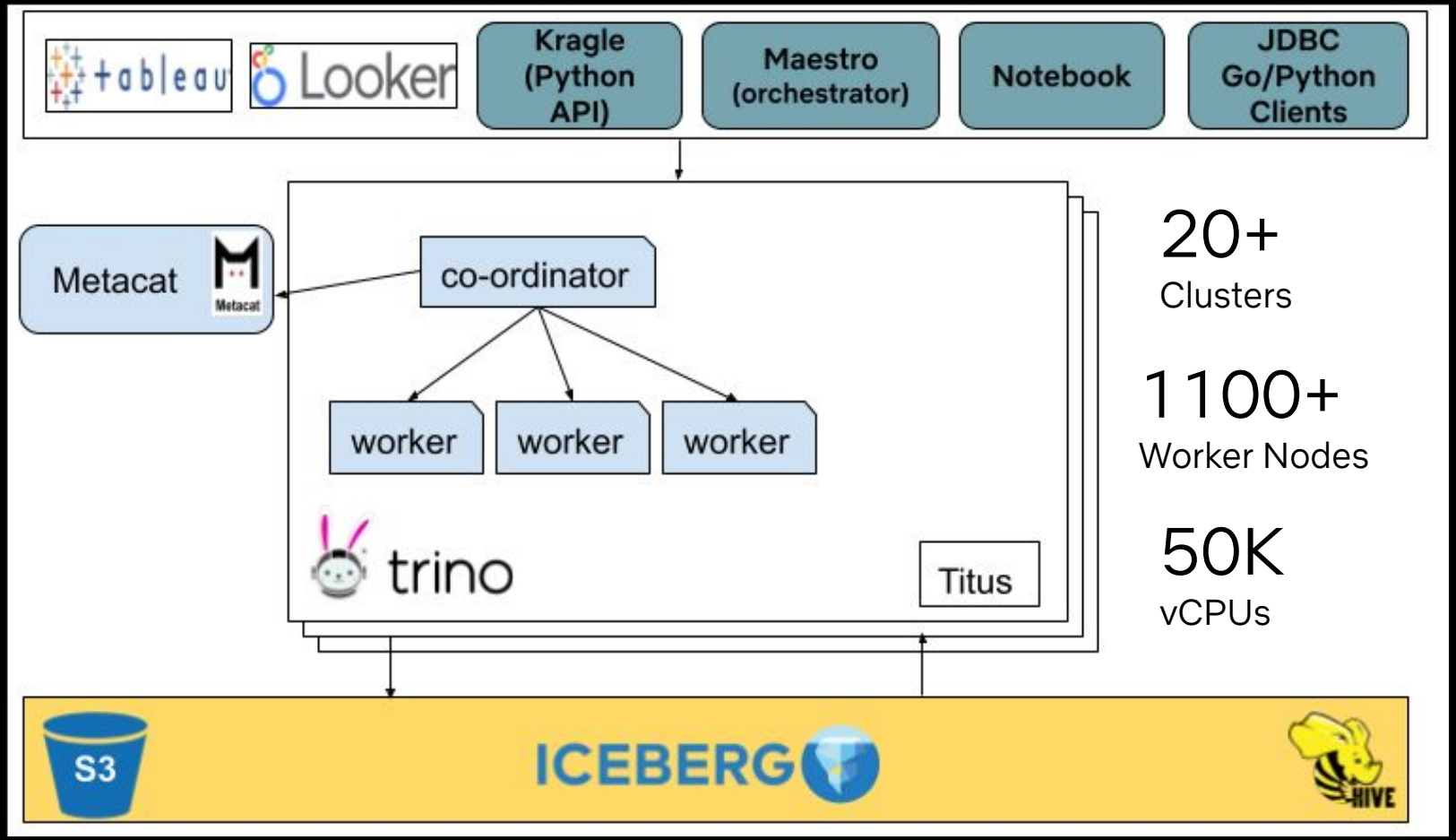
~500K
Queries/Day

~15 Million
Queries
[November, 2024]

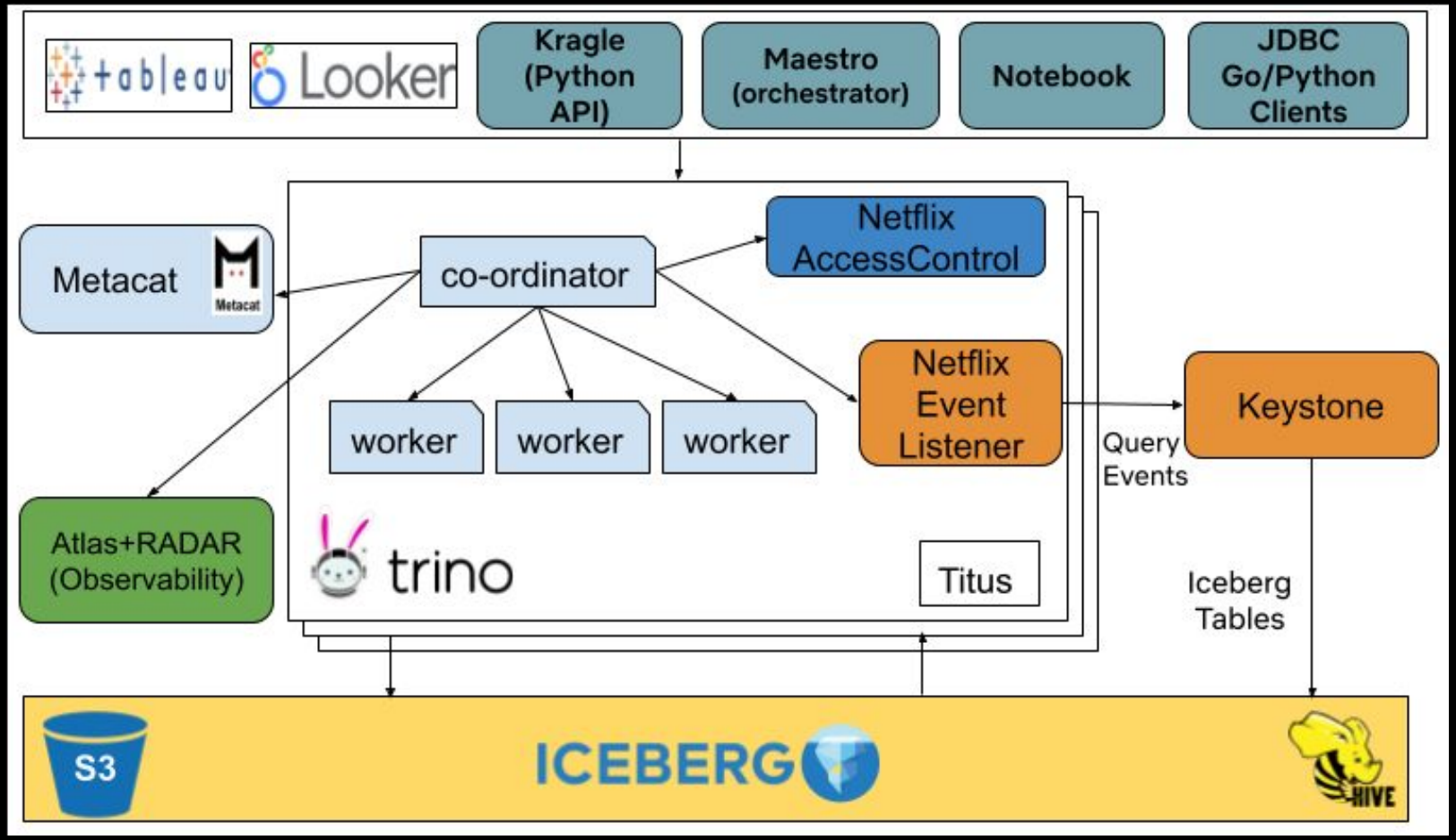
2500+
Unique Users



Trino Architecture



Trino Architecture



Trino General Internal Features

- NetflixAccessControl, Metacat Connector, Netflix Event Listener plugin
- Lineage Logging
- Rich Netflix Internal UDFs - common input/output types on all supported query engines
- Aggregation pushdown for Druid connector
- Experimental:
  - HDFS based caching solution
  - Autoscaler

Trino-Iceberg Connector Features

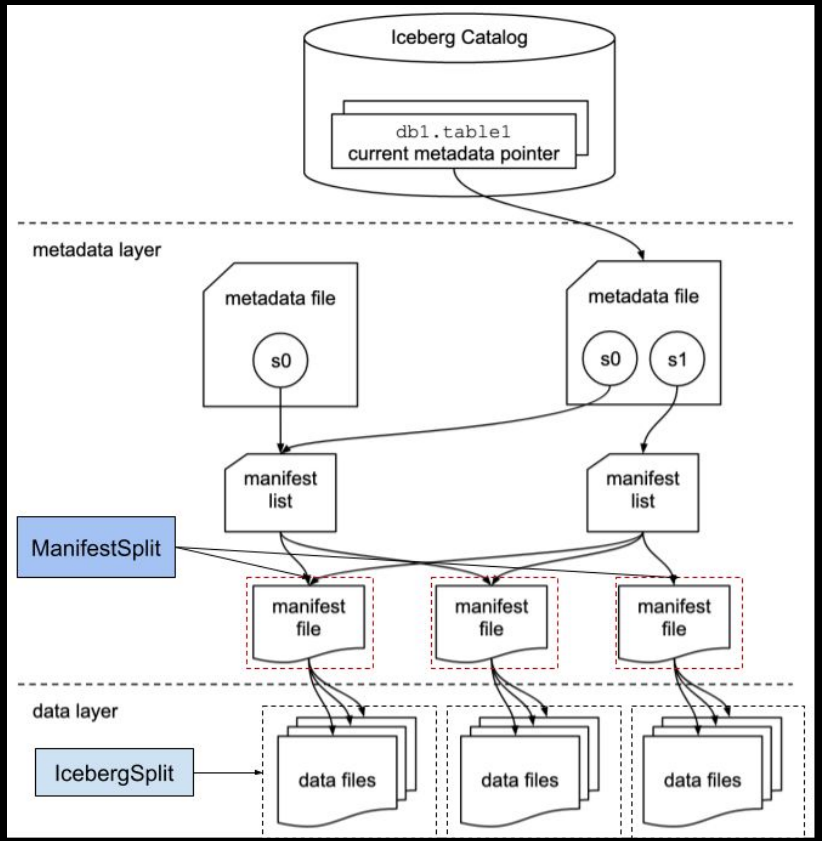
- Materialized View feature - Contributed to OSS
- ‘@’ keyword support for selecting a specific snapshot/timestamp
- Additional metadata tables - $entries, $irc_metadata
- Distributed Metadata Table Scan
- Incremental Read

Distributed Metadata Table Scan

- Metadata Tables are considered as SystemTable:
  - ALL NODES (i.e, nodes table)
  - ALL_COORDINATORS (i.e, queries table)
  - SINGLE_COORDINATOR (Iceberg Metadata Tables)
- Tables with more than 100 million files

Distributed Metadata Table Scan

- $files table:
  - Each ManifestFile as a Split
- $partitions table:
  - View on top of $files table - Group files on partition key
- 2-1000x perf improvement



Incremental Read

SELECT tables with READ options (i.e, start/end snapshot-id, start/end timestamp)

```
SELECT <columns>
FROM <table>
WITH (
  "start-snapshot-id"='1234',
  "end-snapshot-id"='5678'
);
```

```
SELECT <columns>
FROM <table>
WITH (
  "start-timestamp"='12345678',
  "end-timestamp"='987654321'
);
```

Future Work

- Trino Nightly Build - Stay as close as possible to Open Source
- Integration with Iceberg Rest Catalog (IRC)
- Trino Gateway
- Trino Caching
- ETL - Project Tardigrade

Open Source Projects

- ➔ Maestro: https://github.com/Netflix/maestro
- ➔ Genie: https://netflix.github.io/genie/
- ➔ Atlas DB: https://github.com/Netflix/atlas
- ➔ Metacat: https://github.com/Netflix/metacat

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Thank You

Q&A...