AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

ANT307

What's new with Amazon Athena

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Amazon Web Services

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CEO, Co-founder
Tabular Technologies, Inc.

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Agenda

What's New?

- Data operations
- Scale and performance
- Cost visibility and management
- User experience

What's Next?...

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Amazon Athena

SERVERLESS INTERACTIVE QUERY SERVICE

Query instantly



No cluster setup

Point to S3 and start analyzing

Cost-effective



Pay only for data scanned

Save 30–90% on per-query costs through compression and partitioning

Easy



No servers to manage

Access data in AWS and other data stores

Open & Standard



Use ANSI SQL for querying

Supports Parquet, ORC, Avro and other standard data formats

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Data operations

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Common DataOps Needs

Timeliness – fresh data is available promptly

Evolution – data fields and types are free to evolve

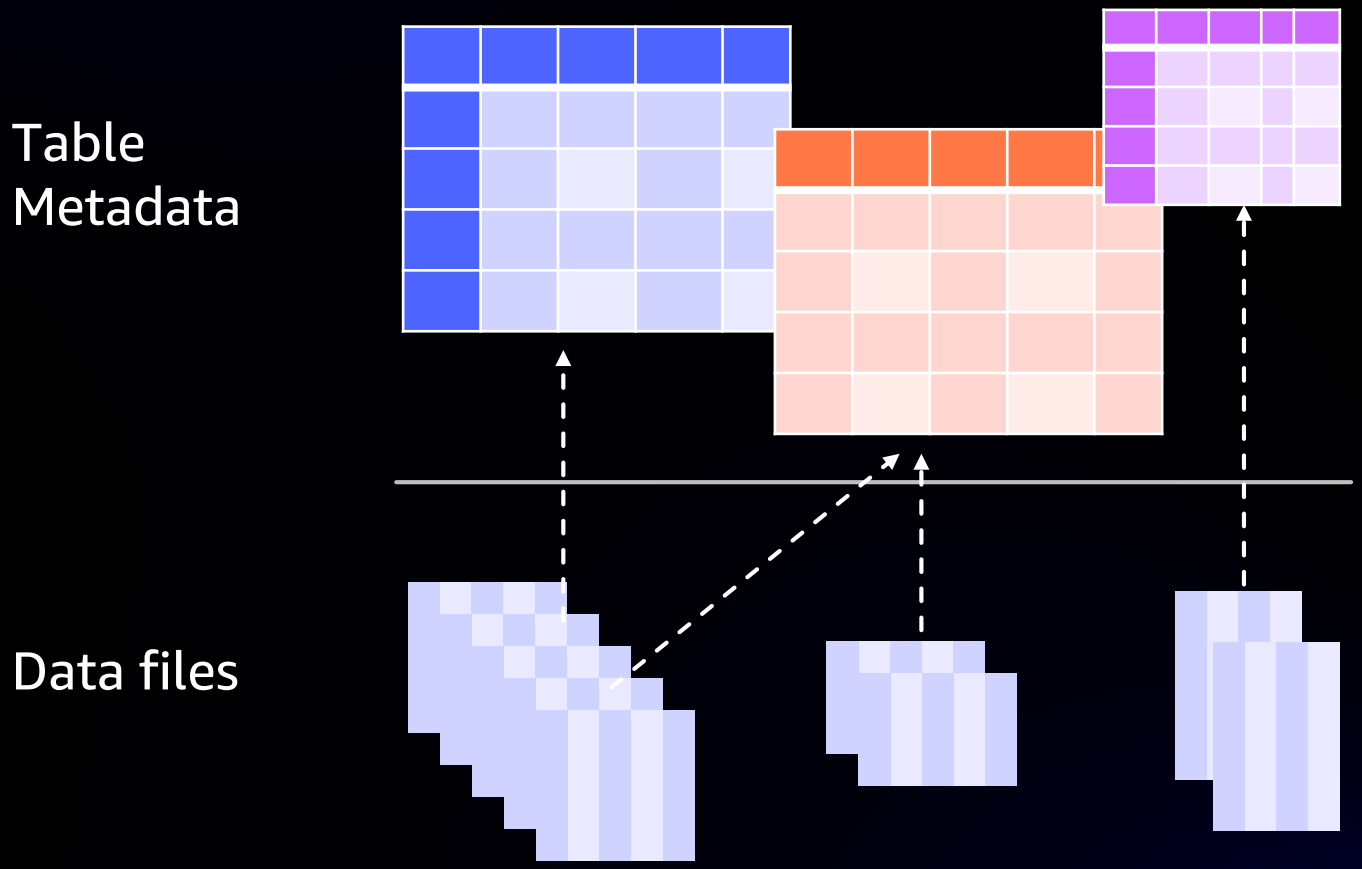
Reliability – queries are resilient to updates and deletes

Security – confidentiality is balanced against access

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Table-based solutions

Data lake table formats

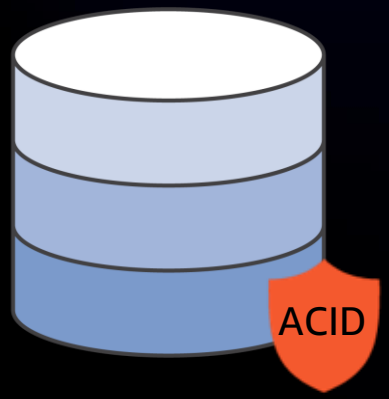


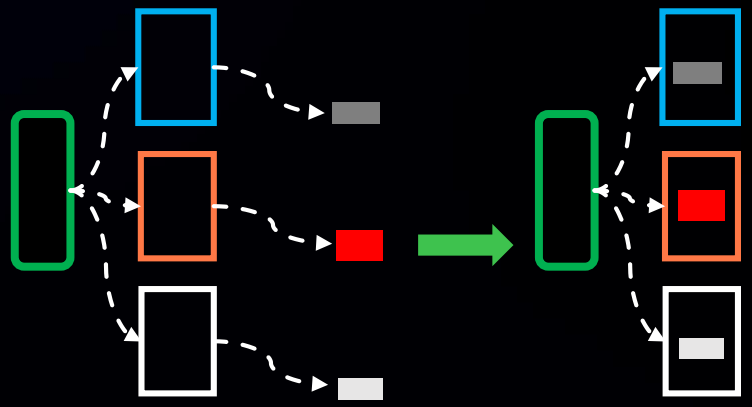
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Lake Formation Governed Tables

ANT318: DATA LAKES: EASILY BUILD, SECURE, AND SHARE DATA WITH AWS LAKE FORMATION

Launched Today







ACID transactions

Consistent across tasks
Insert, update, delete
Converge batch & real-time

Reliable

Storage optimization

Auto-compact small files
Push-down filters
Reduce data scan

Performant

Time travel

Data history
Reproduce experiments
Audit changed data

Versioned

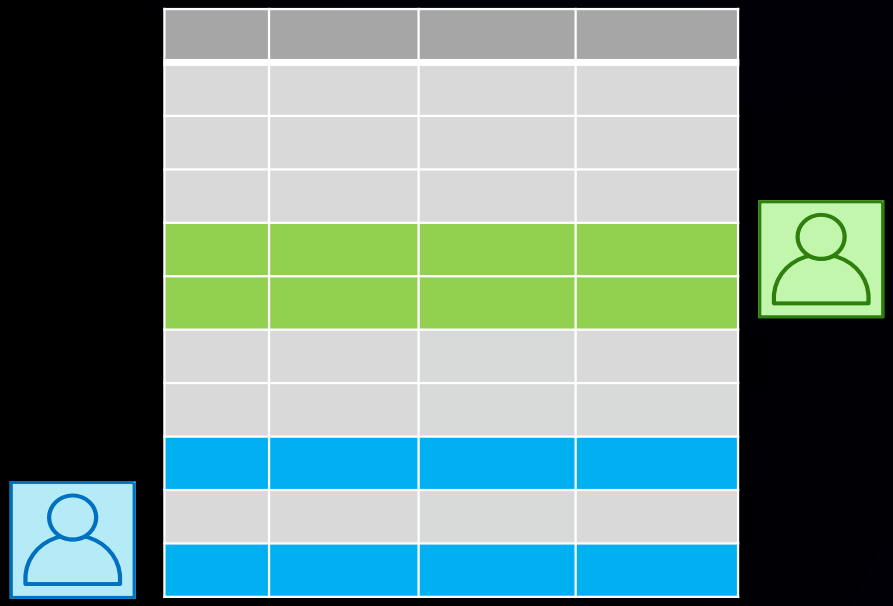
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Lake Formation Fine-grained security

ANT318: DATA LAKES: EASILY BUILD, SECURE, AND SHARE DATA WITH AWS LAKE FORMATION

Launched Today



Table, column, row and cell-level security policies

Row filter expressions are
"WHERE" clause in "PartiQL"

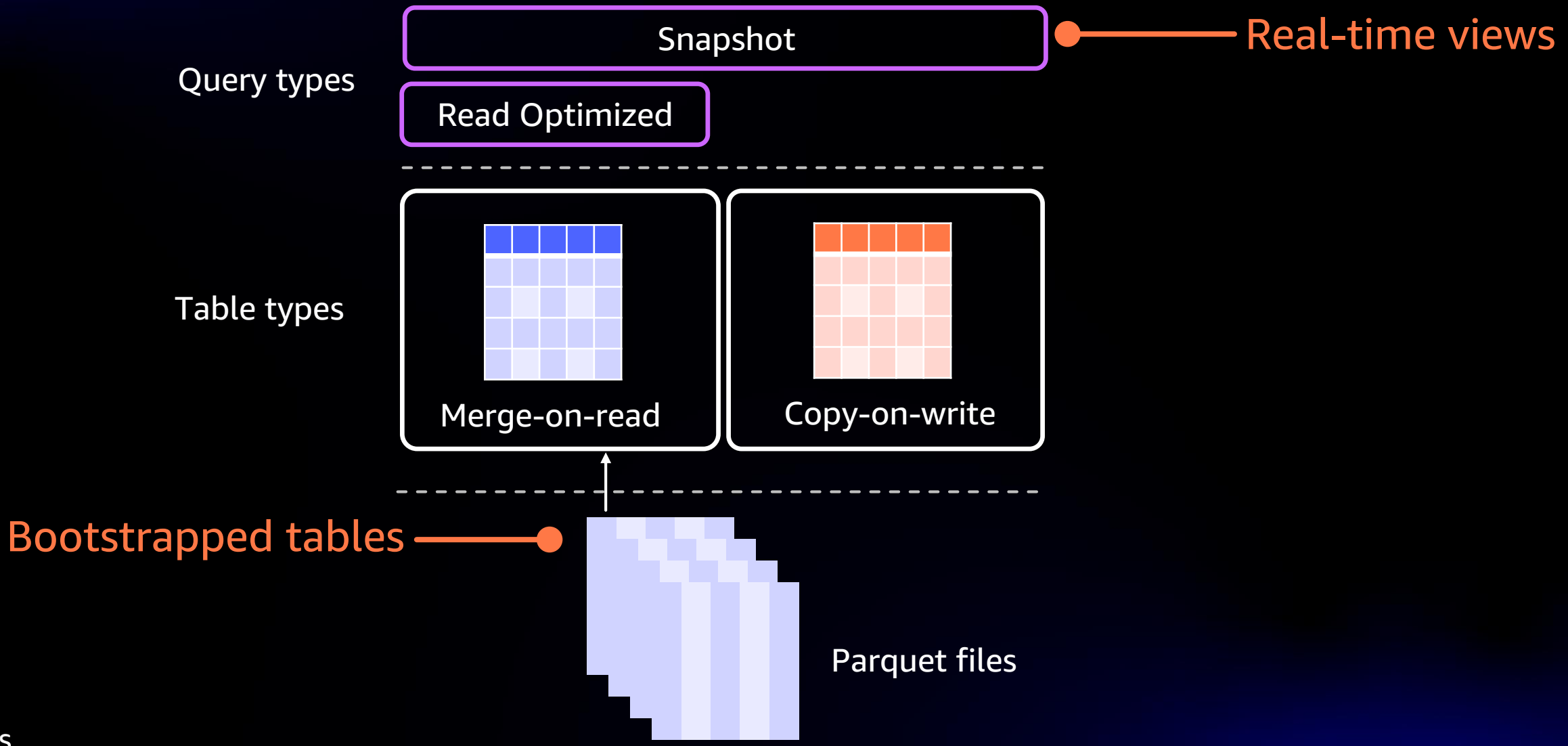
Governed and non-governed table support

Easy-to-audit permissions and access

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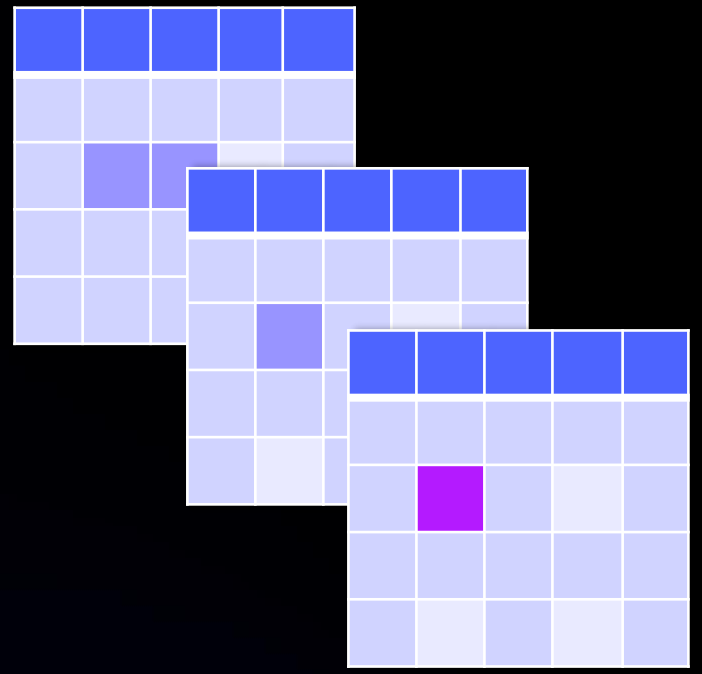
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Hudi: Improved compatibility



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Announcing: Apache *Iceberg Integration (Preview)*



Open specification table format for huge analytic datasets

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Apache Iceberg table features

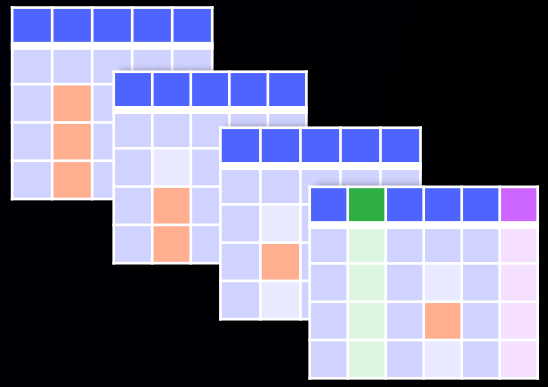


Table Snapshots

Schema Evolution

"hidden partitioning"

Metadata layer

Data layer

Partition Evolution

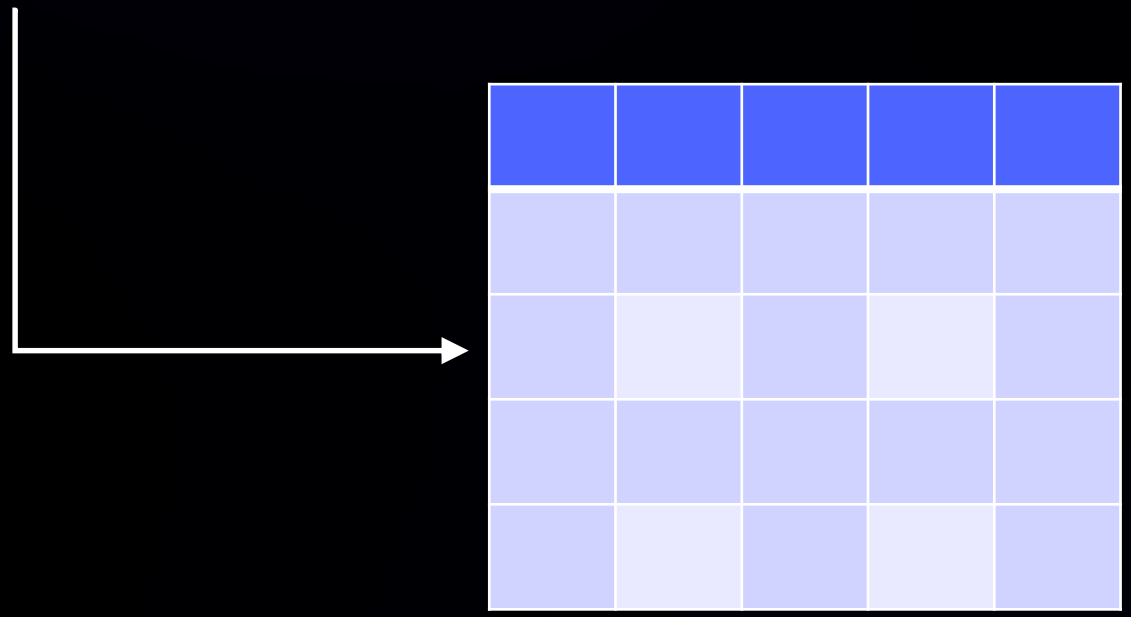
Multiple file formats
(Parquet, ORC, Avro)

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ACID Transactions: row-level *Write, Delete, Update*

INSERT INTO *tablename* VALUES (v1, v2,...)...

UPDATE *tablename* SET xx=yy[,...] [WHERE *predicate*]

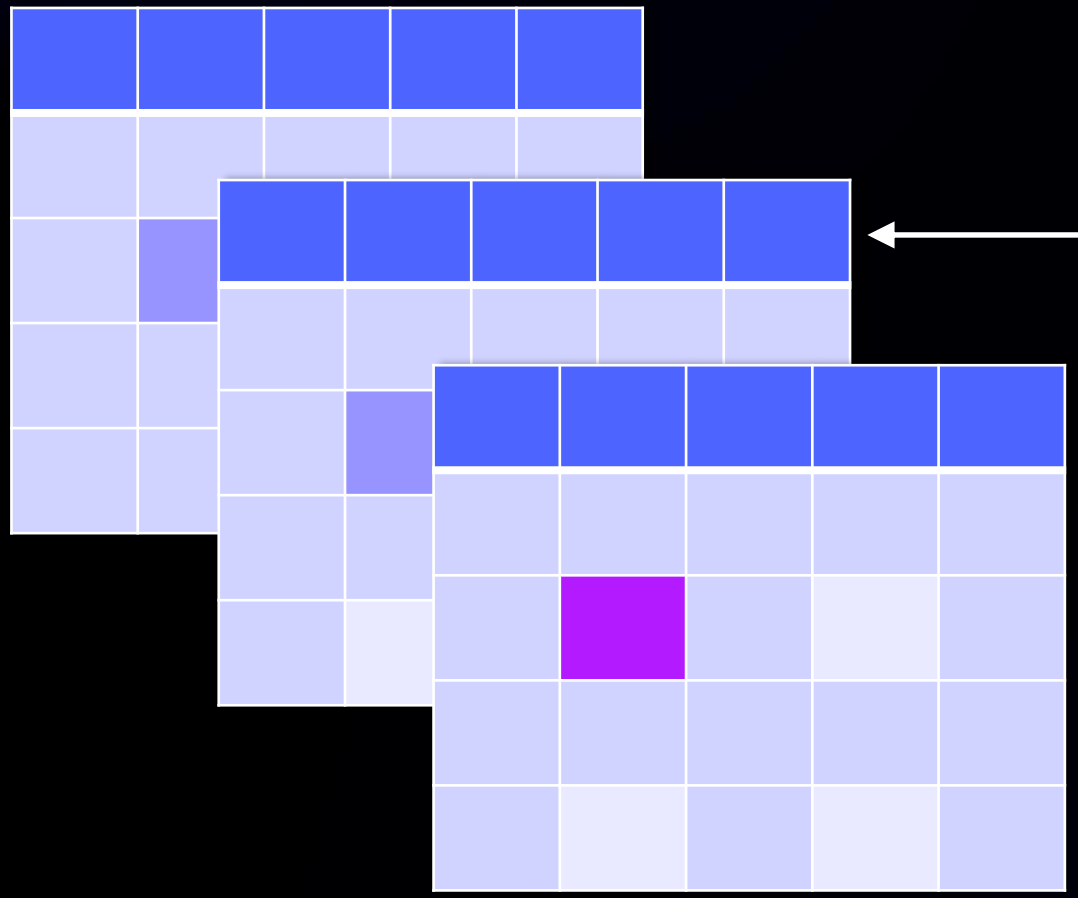


DELETE FROM *tablename* [WHERE *predicate*]

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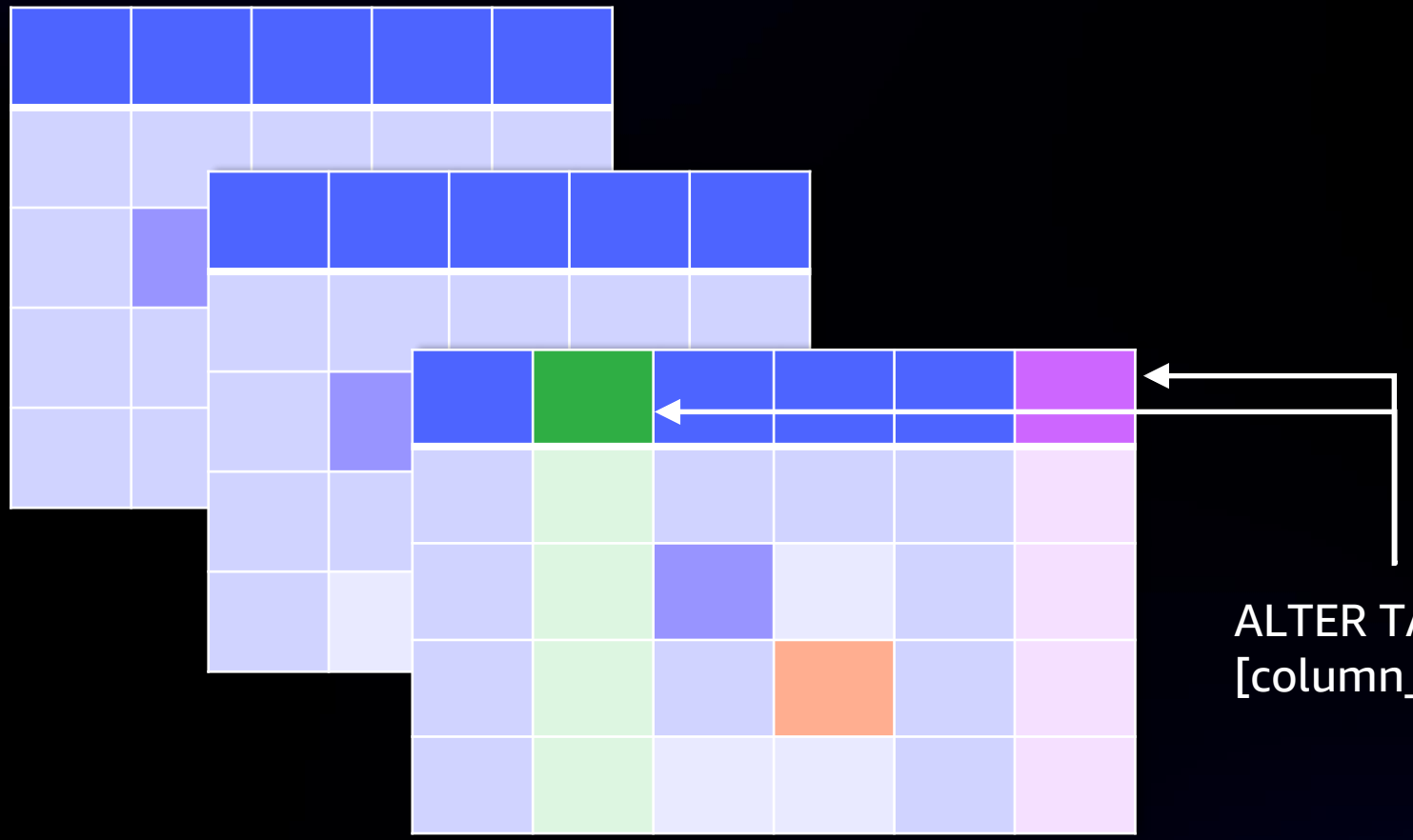
ACID Transactions: *version and time travel* queries



SELECT * FROM *database.table*
FOR [SYSTEM_TIME | SYSTEM_VERSION]
AS OF *[timestamp | version]*

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ACID Transactions: *schema evolution* queries



ALTER TABLE *tablename* ADD COLUMNS
[column_name data_type [,...])

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Why Iceberg?

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In 5 years, what engine will handle . . . data warehousing and stream processing and ML?

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How much would you bet on that?



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What about . . .
one engine for data warehousing,
one for stream processing,
and another for ML?

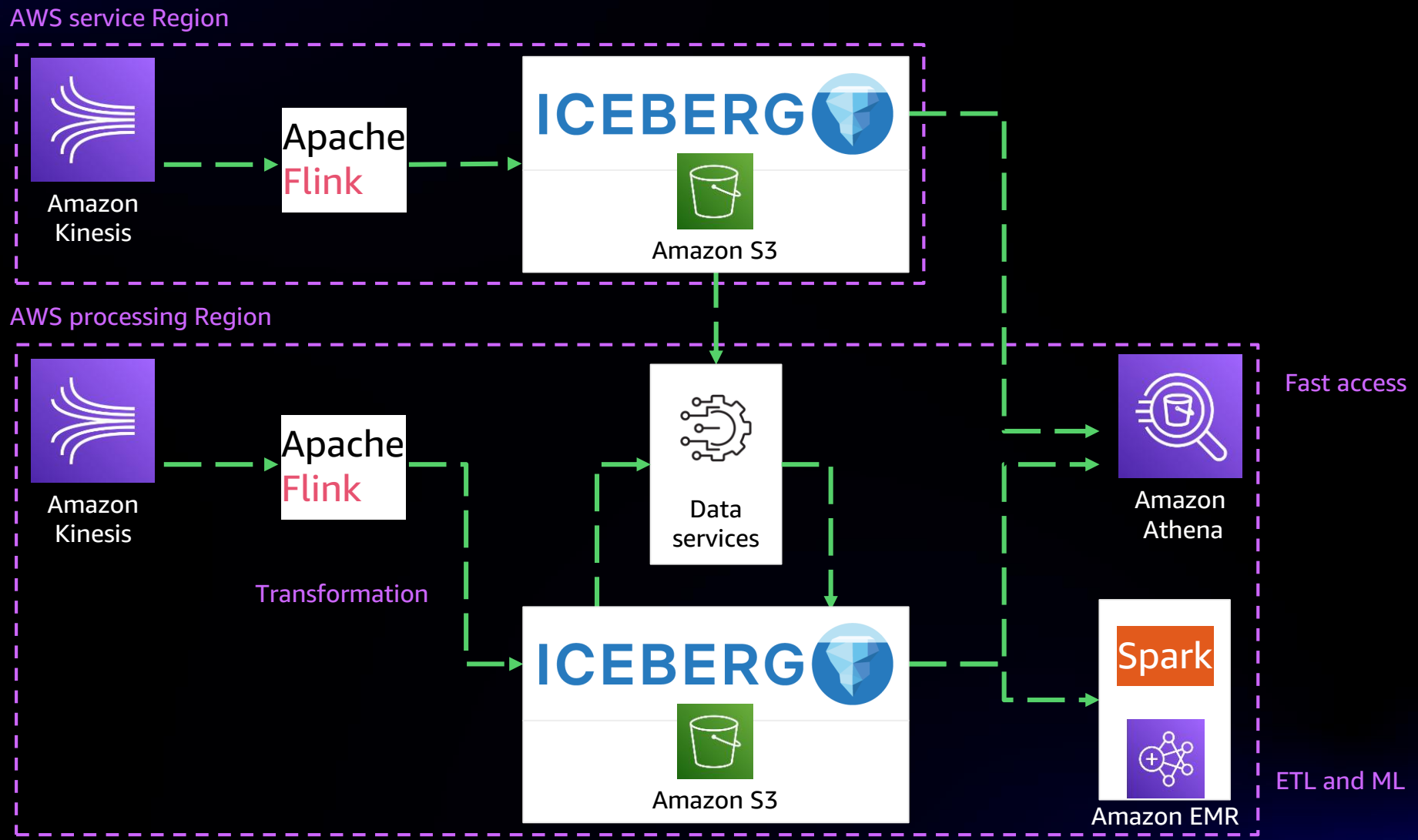
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Much better odds, right?



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Iceberg architecture



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Companies writing about Iceberg

Netflix

"Iceberg is widely adopted in Netflix as a data warehouse table format that addresses many of the usability and performance problems with Hive tables."

Adobe

"A design point we deeply appreciated with Iceberg was that it's simply a Java library that could easily be embedded inside of our current applications."

LinkedIn

"Gobblin now supports the ORC file format and Iceberg metadata catalog to provide our data customers with high-query performance."

Expedia

"Iceberg has excellent, inbuilt support for schema evolution that provides guarantees against committing breaking changes to your table."

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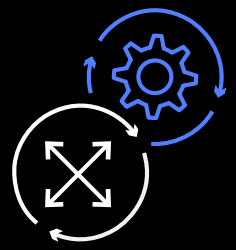
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What makes Iceberg different?



Open data architecture

- Documented standard
- Collaborative community



Designed for productivity

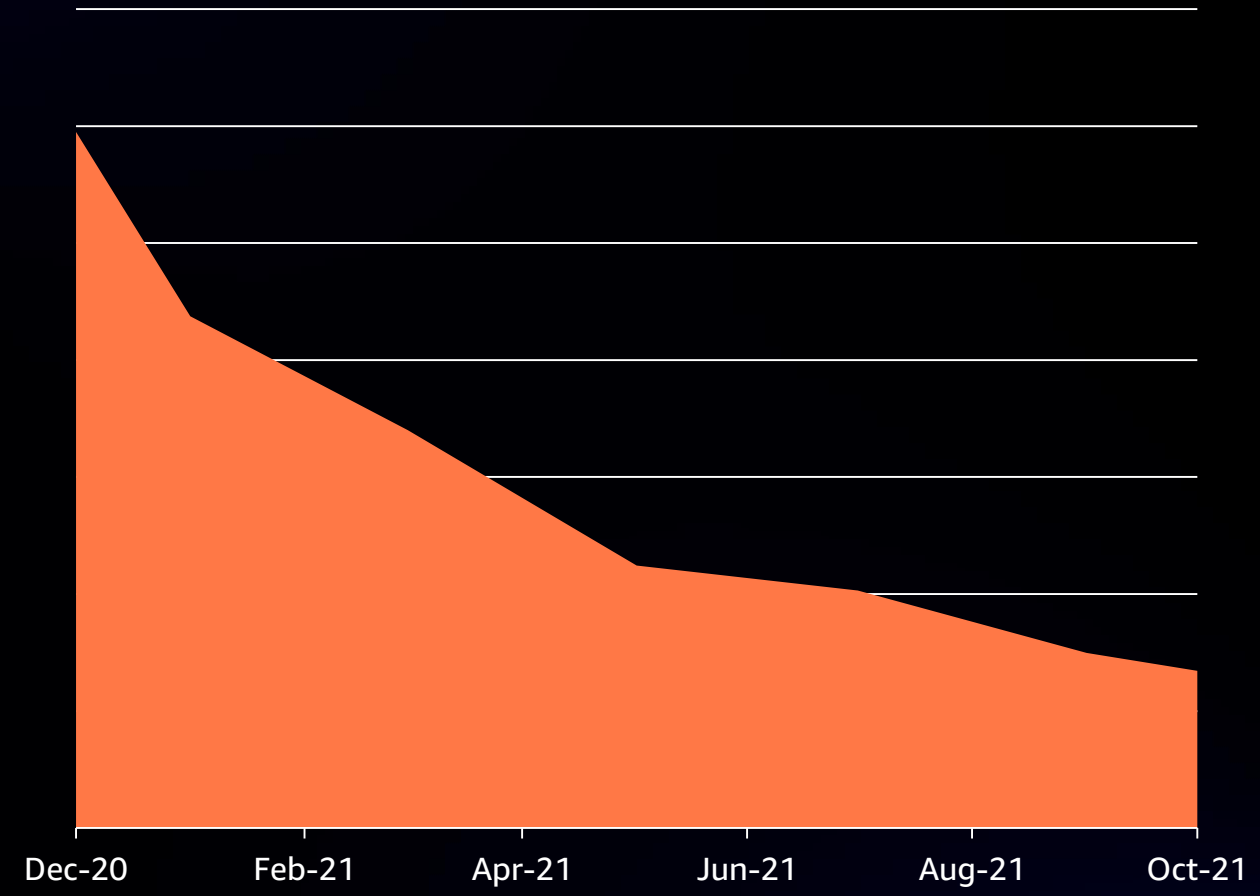
- Saves human time, not just machine time
- Reliable transactions (ACID)
- Cloud-native performance

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Scale and performance

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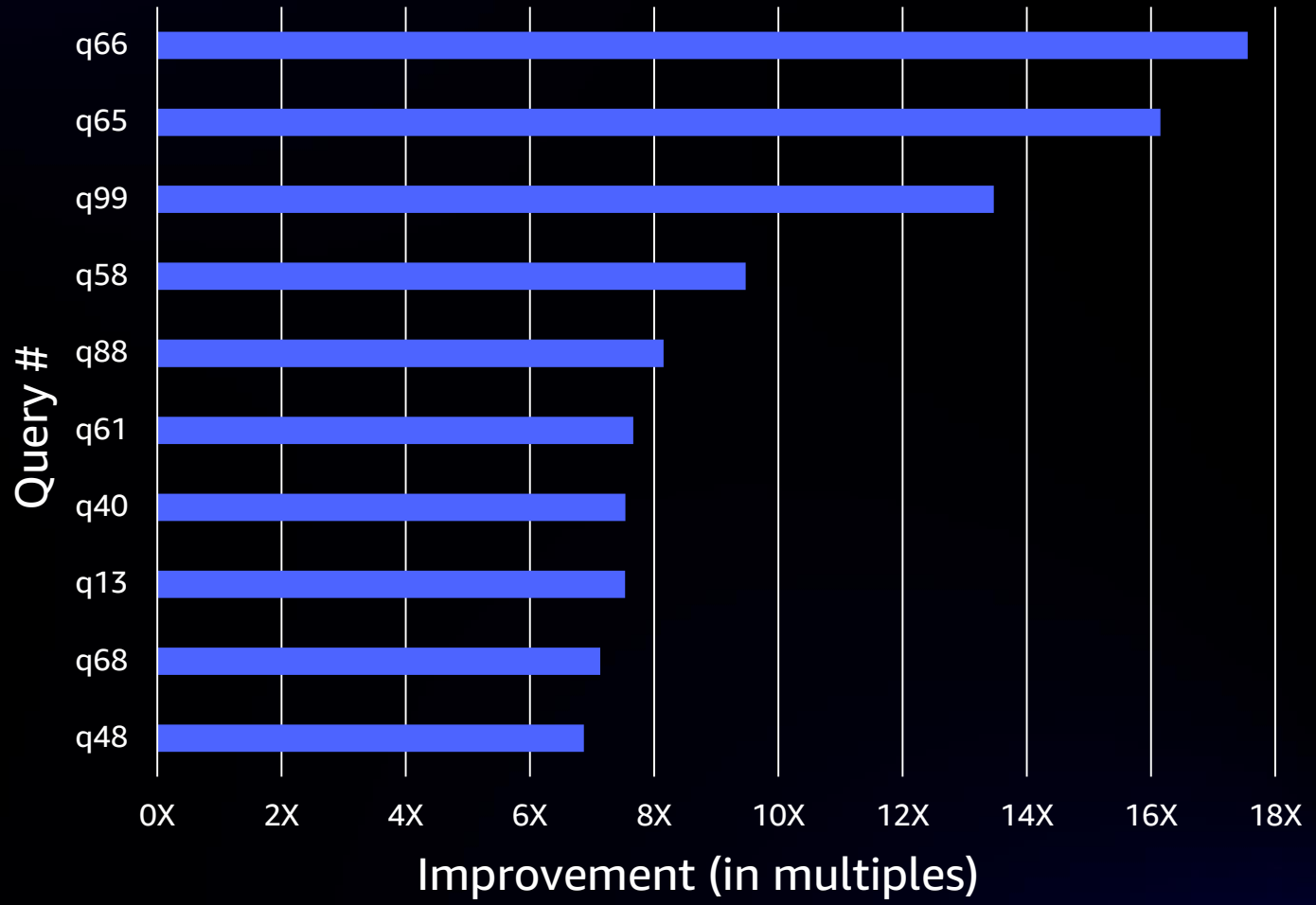
3x faster performance at the same price



TPC-DS benchmark

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Top 10 improved TPC-DS queries



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Improvement highlights

JOINs – JOIN ordering and algorithms choice; dynamic filtering/pruning

Nested structures – nested field pruning without flattening

Subqueries – correlated subqueries with equality and inequality

Functions – aggregate WINDOW(), grouping() and map-returning

S3 data reads – 2-3x faster result downloads for API and drivers

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Highly partitioned data performance

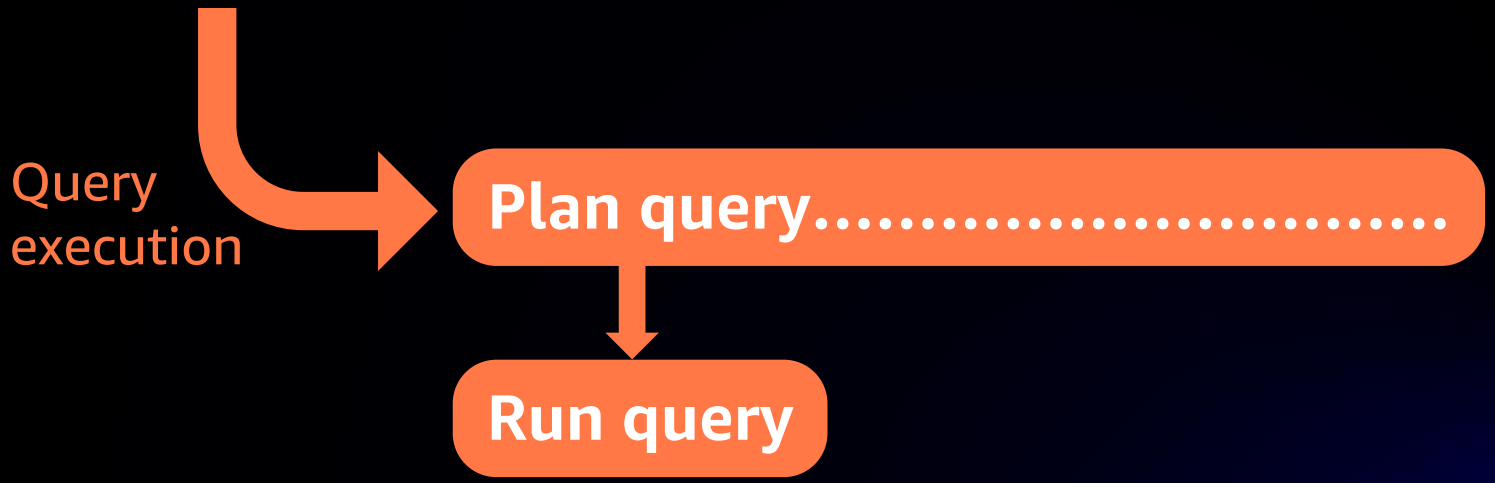
DATA

20 regions **10** years **365** days **24** hours

```
.../region=US-east-1/year=2021/month=7/day=1/hour=10/...
.../region=US-west-1/year=2021/month=7/day=1/hour=11/...
```

METADATA

20 x 10 x 365 x 24 = 1.75M partitions



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Athena now supports AWS Glue Partition Indexes



Reduces metadata transfer



Improves query performance



Supports multiple engines: Athena, Amazon EMR, Amazon Redshift Spectrum, AWS Glue ETL jobs



Powered by AWS Glue Data Catalog

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Cost & Visibility

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Control costs with compression

EXPANDED COMPRESSION ALGORITHMS



(Zstandard)

Balanced compression with speed

bzip2

Splittable text compression

gzip

Text compression with broad compatibility

Additional codecs supported: DEFLATE, LZ4, LZO, SNAPPY, ZLIB

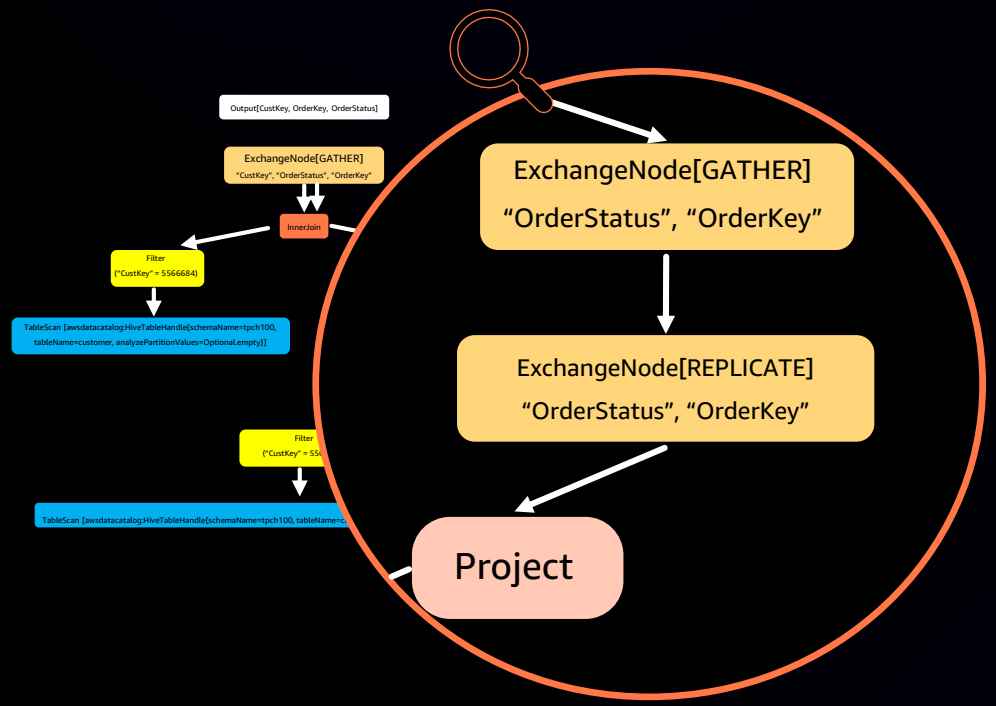
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Assess query costs & timing

QUERY PLAN

EXPLAIN [(option [, ...])] statement



EXPLAIN ANALYZE [(option [, ...])] statement

Fragment 1

CPU: 24.60ms, Input: 10 rows (1.48kB); per task: std.dev.: 0.00, Output: 10

Output layout: [date, time, location, bytes, requestip, method, host, uri, st

- Limit[10] => [[date, time, location, bytes, requestip, method, host, uri, st

CPU: 1.00ms (0.03%), Output: 10 rows (1.48kB)

Input avg.: 10.00 rows, Input std.dev.: 0.00%

- LocalExchange[SINGLE] () => [[date, time, location, bytes, requestip,

CPU: 0.00ns (0.00%), Output: 10 rows (1.48kB)

Input avg.: 0.63 rows, Input std.dev.: 387.30%

- RemoteSource[2] => [[date, time, location, bytes, requestip, method,

CPU: 1.00ms (0.03%), Output: 10 rows (1.48kB)

Input avg.: 0.63 rows, Input std.dev.: 387.30%

Query plan details in JSON, text, or visual format

Query execution details in JSON or text

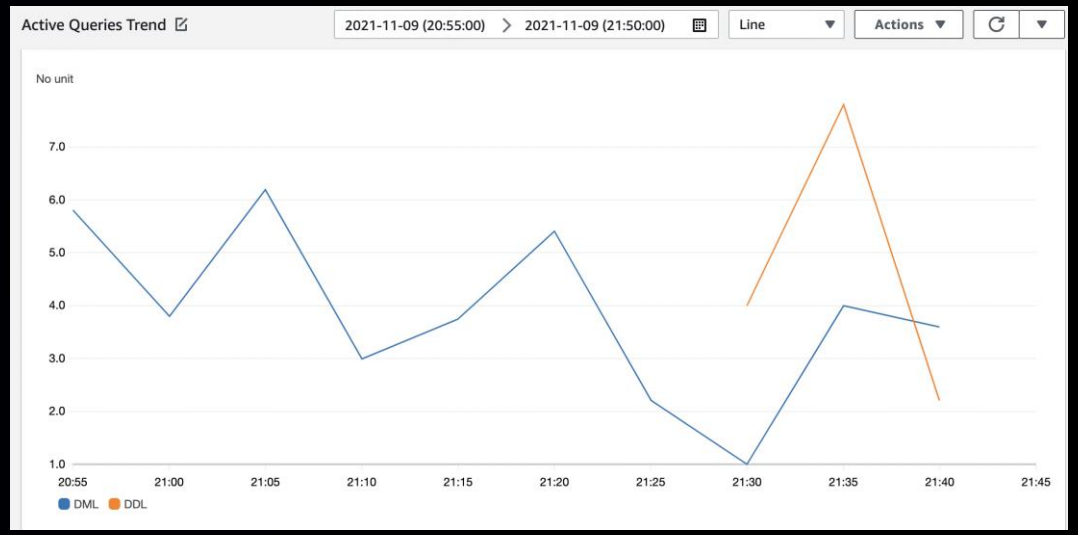
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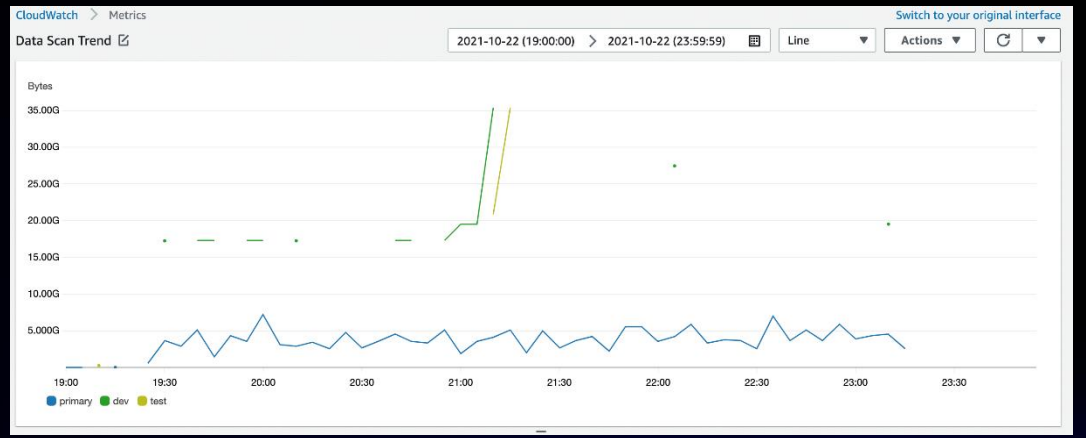
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Amazon CloudWatch usage metrics

ActiveQueryCount

Dimension	Description
Service	The name of the AWS service: Athena
Type	The type of entity: Resource
Resource	The type of resource: ActiveQueryCount
Class	The class of resource: DML or DDL





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User experience

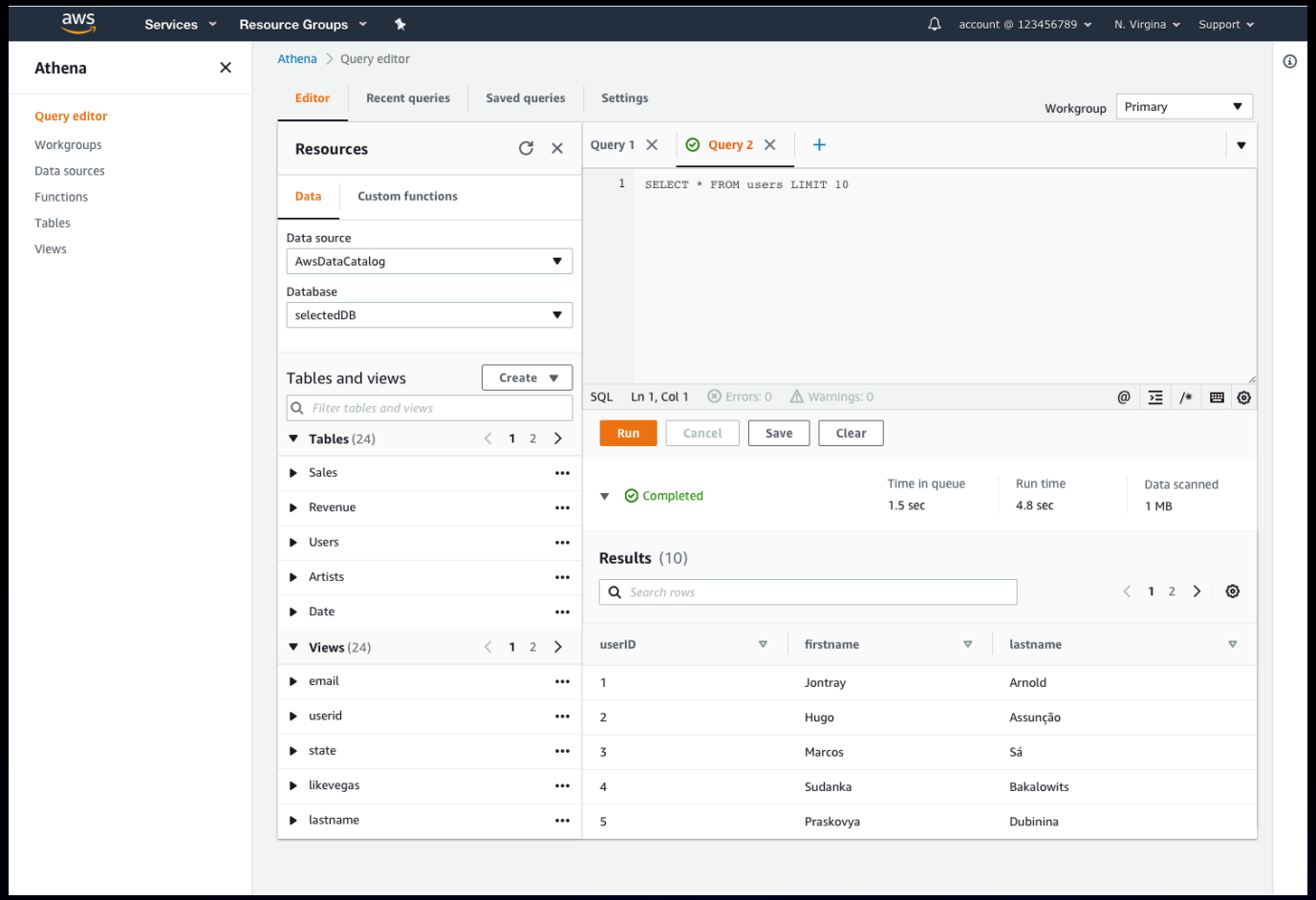
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Console upgrade

Refreshed UI framework

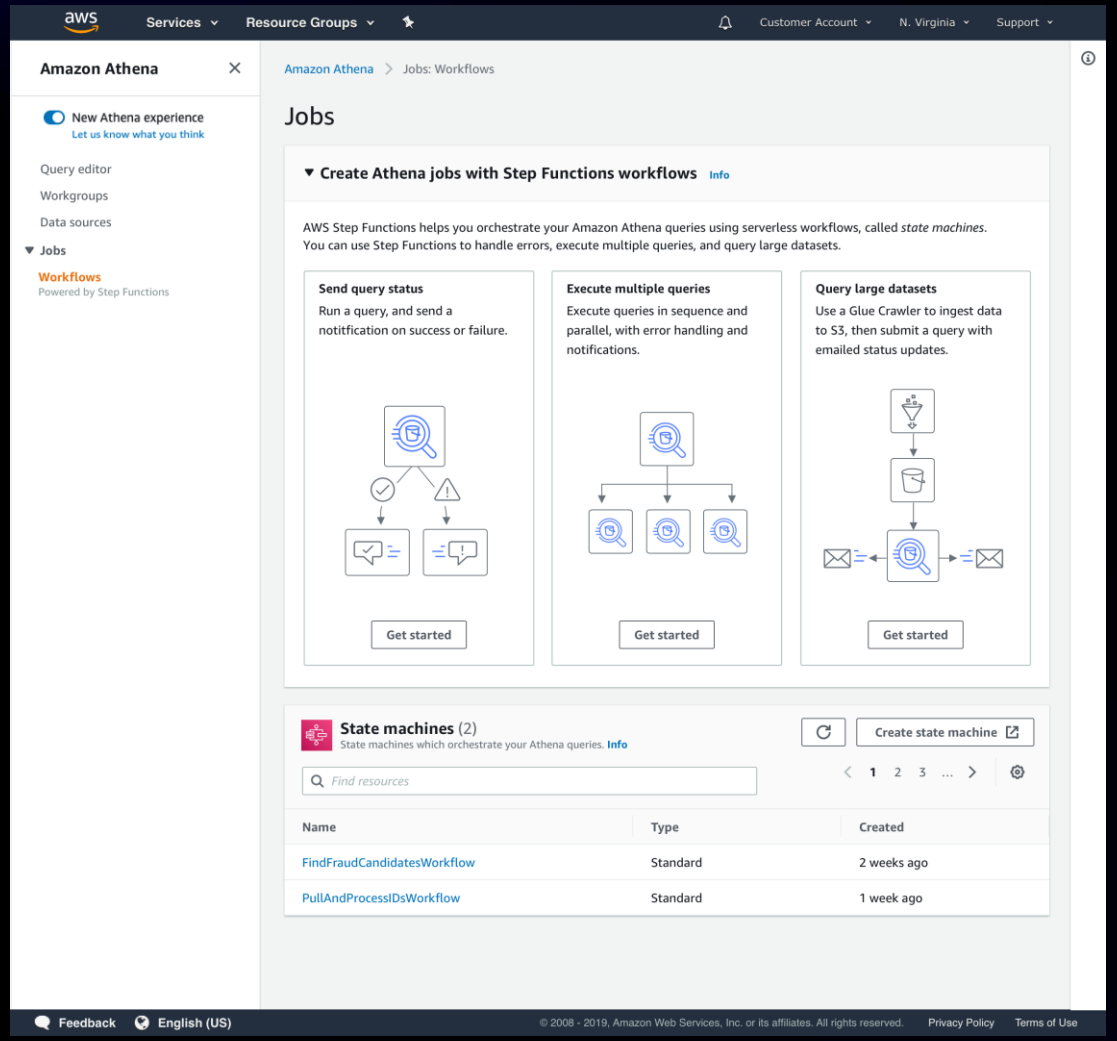
Improved workflows

Preferences & personalization



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Introducing: Step Functions integration



Embedded console experience

Use case templates

State machine access

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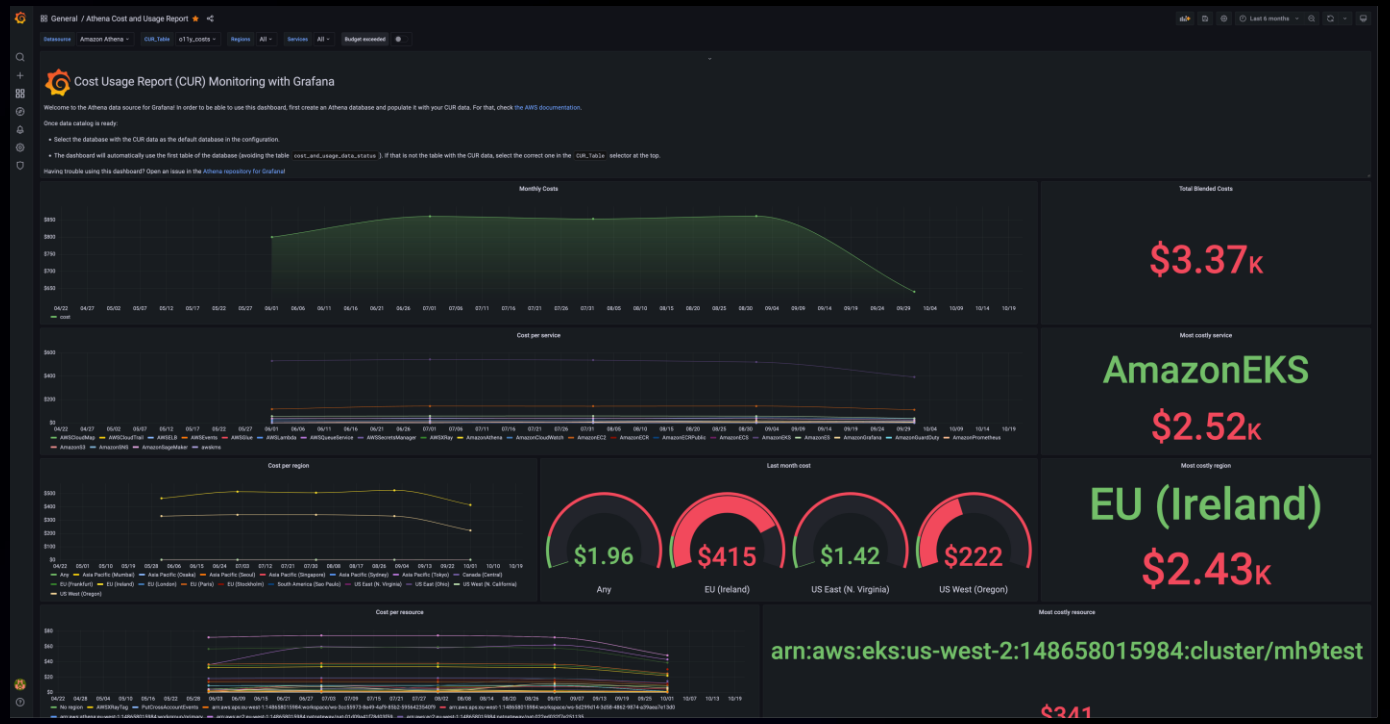
Introducing: Athena Grafana Plug-in

Simple configuration setup

Built-in sample dashboard

SQL query input interface

Visualize Athena results



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What’s Next?

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Future Investment highlights

In 2022 we will be investing in

- Development tools: debug, optimization, extensions
- Data engineering: simpler data source configuration
- Data science: ML Model training & notebook integration
- Administration: Workload management control
- ...and even more *performance* and *scale*!

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Thank you!

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