# Iceberg 101

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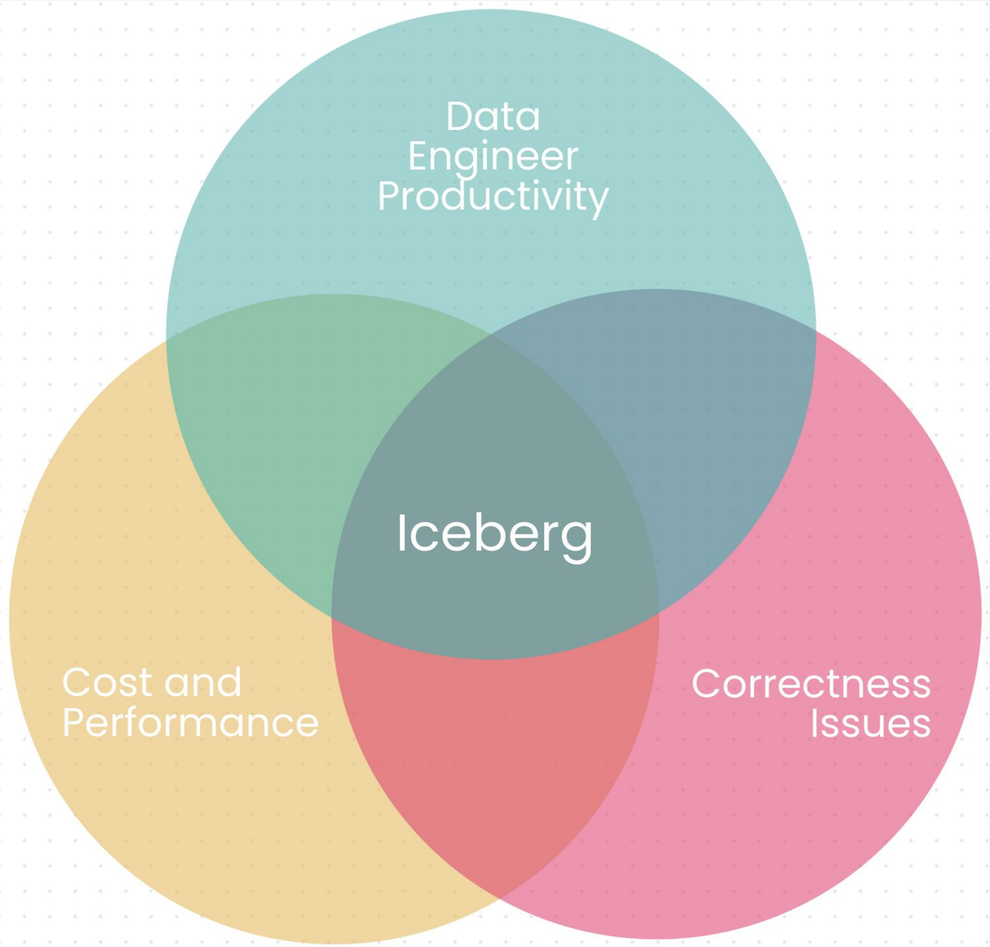
May 2023

Scan for an Iceberg cheat sheet for Spark or Trino

# Netflix problems



Iceberg is an open standard for tables with SQL behavior

# The importance of an open standard

# Commercial investment

snowflake

Google Big Query

aws

Starburst

dremio

CLOUDERA

# Why does SQL behavior matter?

WHAT IF WE APPLIED
DATABASE FUNDAMENTALS
imgflip.com

# Schema evolution

- Instantaneous – no rewrites
- Safe – no undead columns 🧟
- Saves days of headache

# Hidden partitioning

- No silent correctness bugs
- No conversion mistakes
- Fast queries without needing an expert or DBA

FIX MY QUERY THAT'S TAKING FOREVER
I TOLD YOU TO ADD PARTITION PREDICATES
I SHOULDN'T HAVE TO KNOW THE TABLE'S FILE LAYOUT TO QUERY IT
SPARK HAS ALWAYS BEEN THIS WAY, GET USED TO IT
FIX THE DATABASE NOT THE ANALYST
imgflip.com

# Iceberg should be invisible

## Avoid unpleasant surprises

- No zombie columns
- Performance should not be mysterious

## Don’t steal attention

- No rewriting to drop a column
- Don’t make people filter twice
- Fix problems without migration

# What are the advantages of using Iceberg?

# Expressive SQL

Declarative, row-level commands

- MERGE, UPDATE, and DELETE
- Let engines optimize plans
  - Dynamic partition pruning
  - Storage-partitioned joins

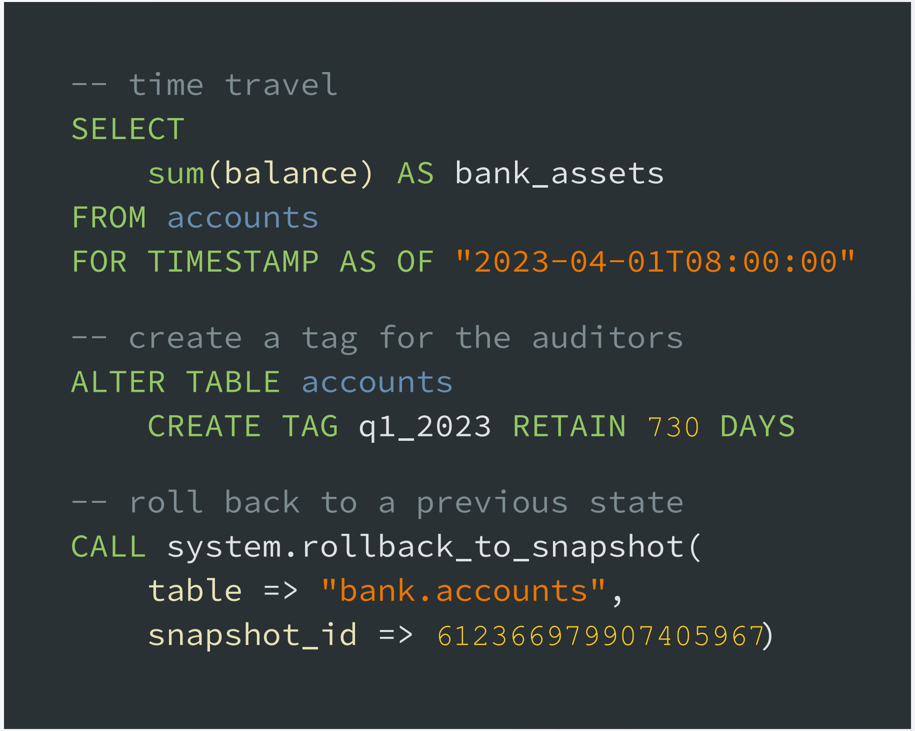
```sql
-- squash multiple updates
WITH updates AS (
    SELECT
        account_id,
        sum(amount) AS amount
    FROM transactions
    GROUP BY account_id
)
-- update or insert
MERGE INTO accounts a USING updates u
ON a.account_id = u.account_id
WHEN MATCHED THEN UPDATE
    SET a.balance = a.balance + u.amount
WHEN NOT MATCHED THEN INSERT *
```

# Time travel and rollback

Every change is a snapshot

- History for debugging
- Rollback to known healthy states
- Incremental consumption

Tag snapshots for longer retention



```
-- time travel
SELECT
    sum(balance) AS bank_assets
FROM accounts
FOR TIMESTAMP AS OF "2023-04-01T08:00:00"

-- create a tag for the auditors
ALTER TABLE accounts
    CREATE TAG q1_2023 RETAIN 730 DAYS

-- roll back to a previous state
CALL system.rollback_to_snapshot(
    table => "bank.accounts",
    snapshot_id => 612366979907405967)
```

# Better engineering patterns

## Branching

- Test and validate in context
  - How do you test a MERGE?
- Integrate audits into workflows

## Transactions

- Only format supporting single-table
- Multi-table support coming soon

```
-- start a branch
ALTER TABLE accounts
    CREATE BRANCH test_new_transform
    RETAIN 14 DAYS

-- validate before publishing
SELECT
    count(1) AS bad_rows
FROM accounts
FOR VERSION AS OF test_new_transform
WHERE account_id IS NULL
```

# Declarative data engineering

Declare the ideal state

- Partitioning
- Clustering
- Tuning

… and let the infrastructure get there itself

Unlocks **automatic optimization**

```
-- schema & layout
CREATE TABLE accounts (
    account_id bigint,
    balance decimal(12, 2))
PARTITIONED BY (
    bucket(4, account_id))

-- distribution & clustering
ALTER TABLE accounts
WRITE DISTRIBUTED BY PARTITION
      LOCALLY ORDERED BY account_id

-- tune tables, not jobs
ALTER TABLE accounts SET TBLPROPERTIES (
    "write.parquet.dict-size-bytes"="...")
```

# And more . . .

## Performance

- Automatic pruning
- Column-level filtering
- Indexed metadata – fast query plans

## Portable

- PyIceberg CLI and Python SDK
- No JVM or Spark-specific features

## Flexible update strategies

- Eager – rewrite to optimize reads (*copy-on-write*)
- Lazy – defer work to read time (*merge-on-read*)
- Background – optimize with services

## Layout evolution

```
stack.pop()
```

# What does Iceberg unlock?

# Cloud–native data architecture

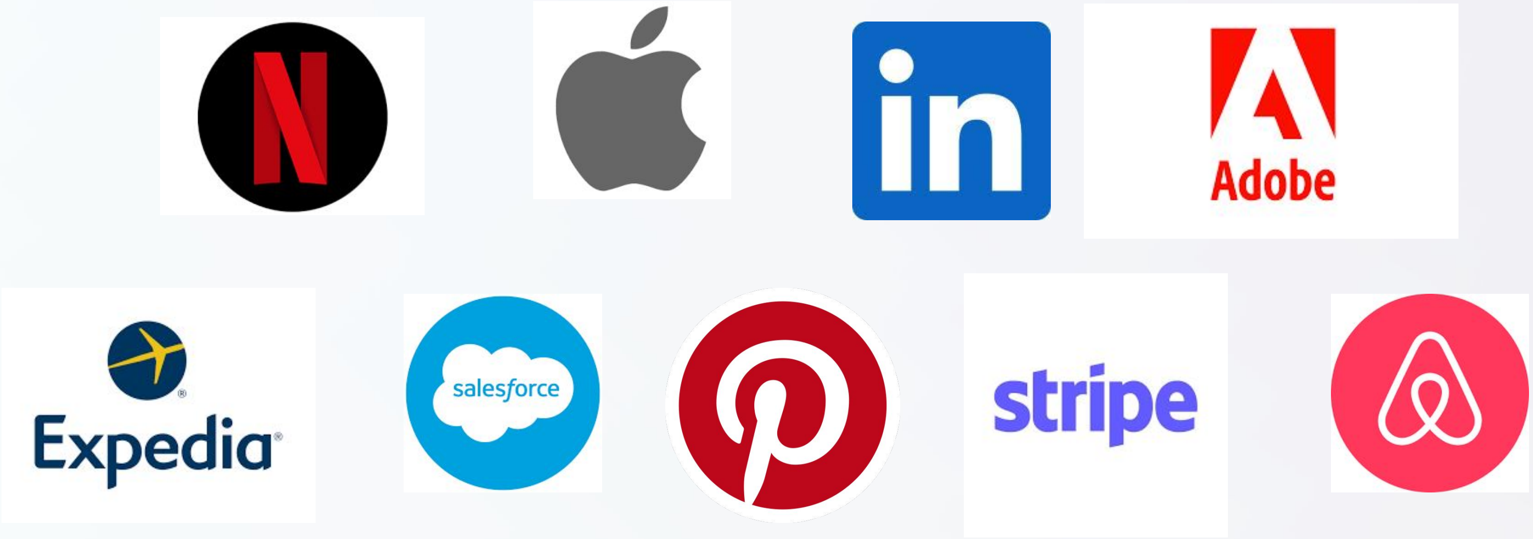
## Flexible compute

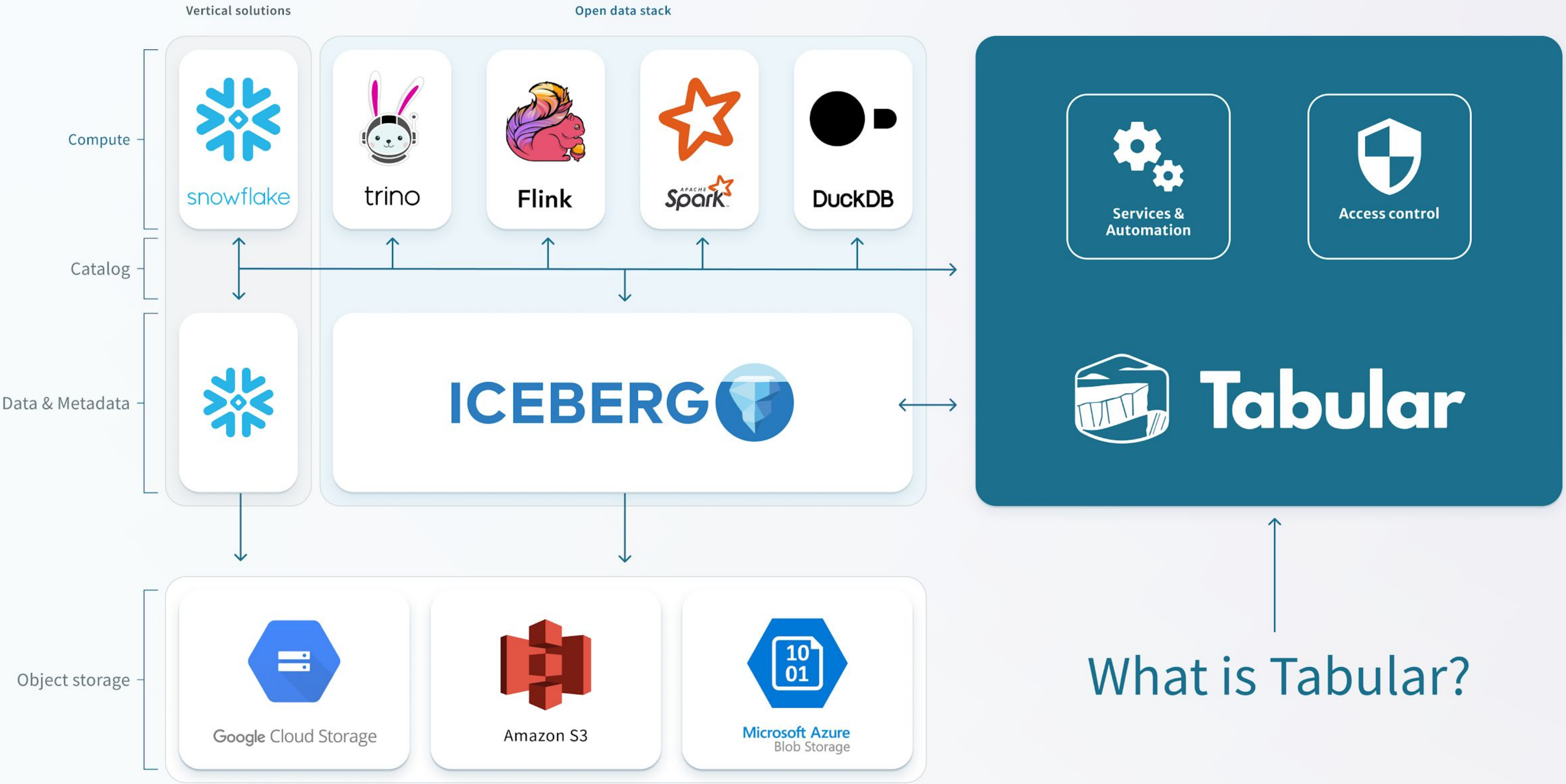
- Center of gravity – don’t move data
- Unify batch, streaming, and ad-hoc
- Any language or framework

## SQL warehouse behavior

- Make people productive
- Strong guarantees
- Maintain data in place

# Companies using and contributing to Iceberg





Vertical solutions

Open data stack

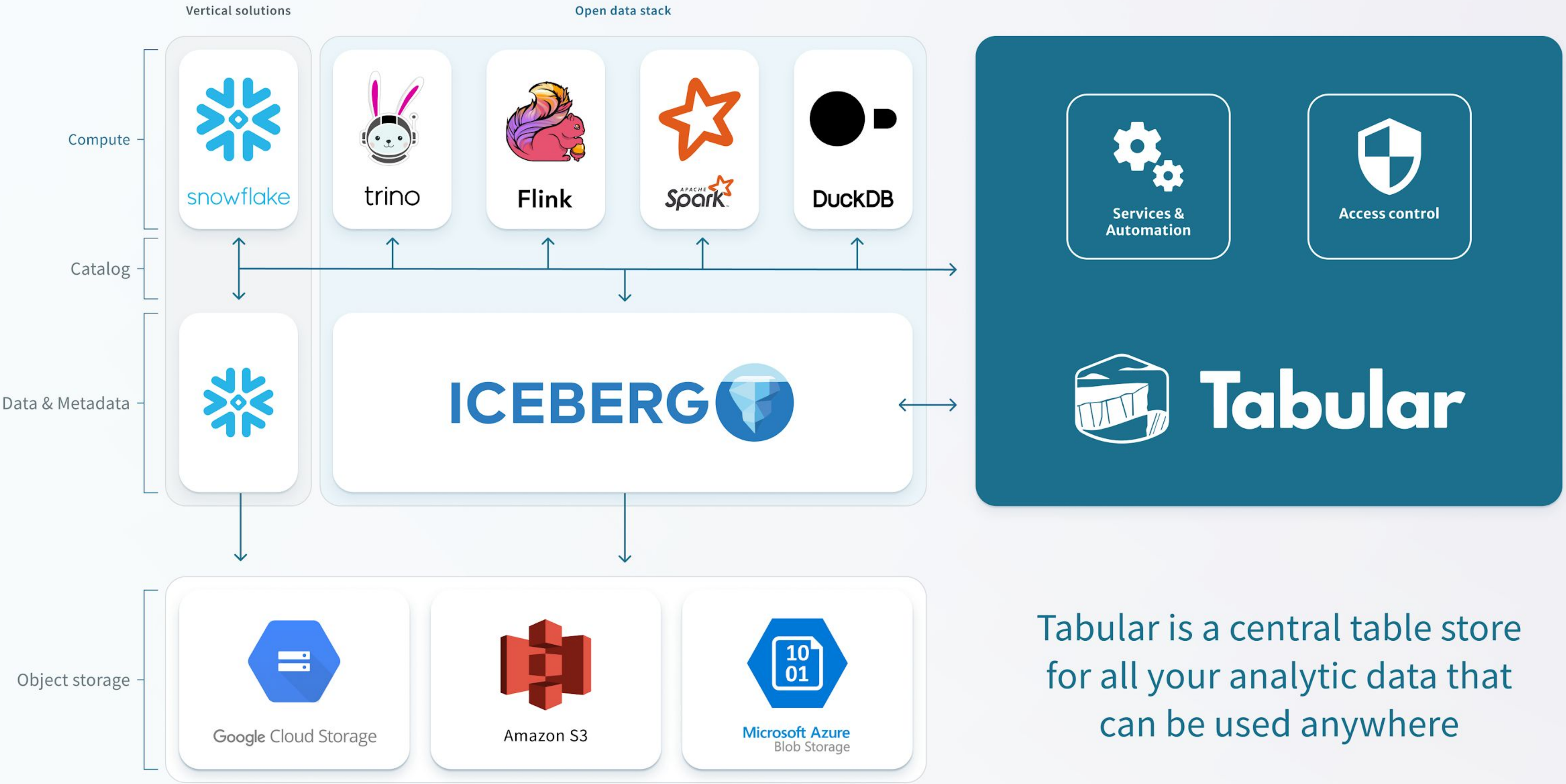
Compute

Catalog

Data & Metadata

Object storage

# What is Tabular?



Tabular is a central table store for all your analytic data that can be used anywhere

# Questions?

Thanks for attending!

app.tabular.io/signup