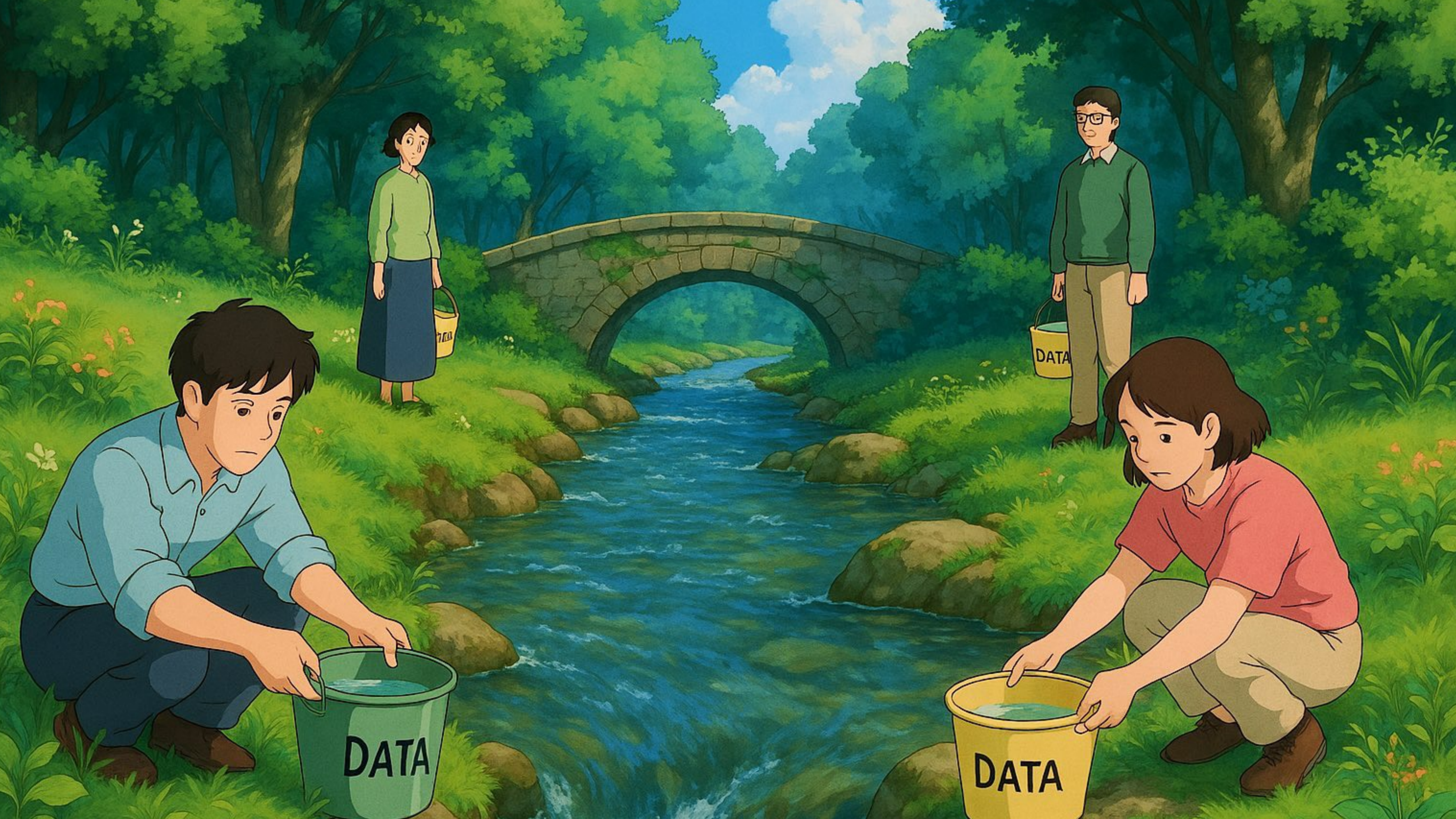


One Does Not Simply Query a Stream!

Viktor Gamov, Confluent
@gamussa



Athens Apache Kafka® Meetup
November 5th, 2025

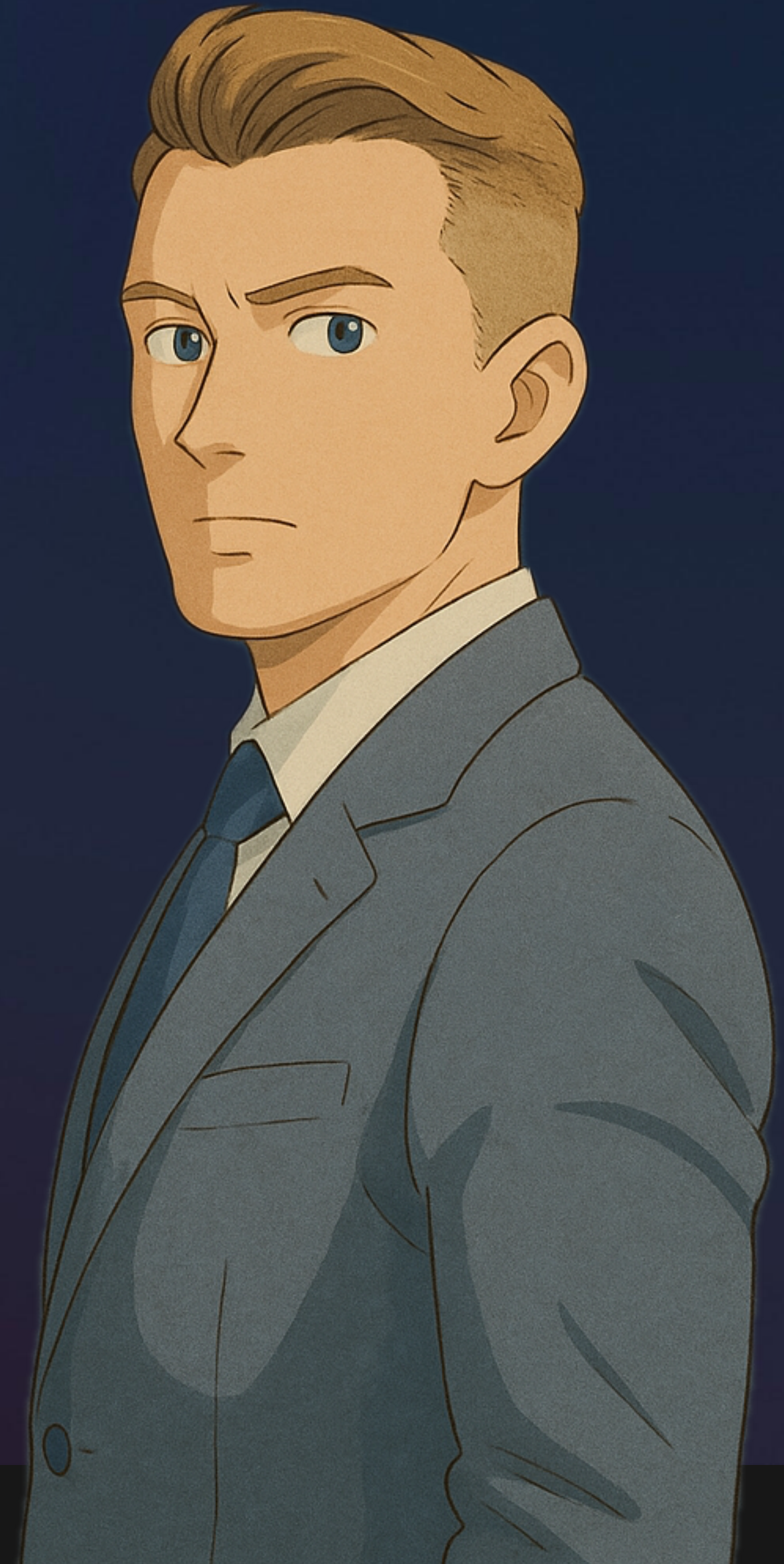


Viktor

GAMOV

Principal Developer Advocate | Confluent
Kafka in Action, Co-author

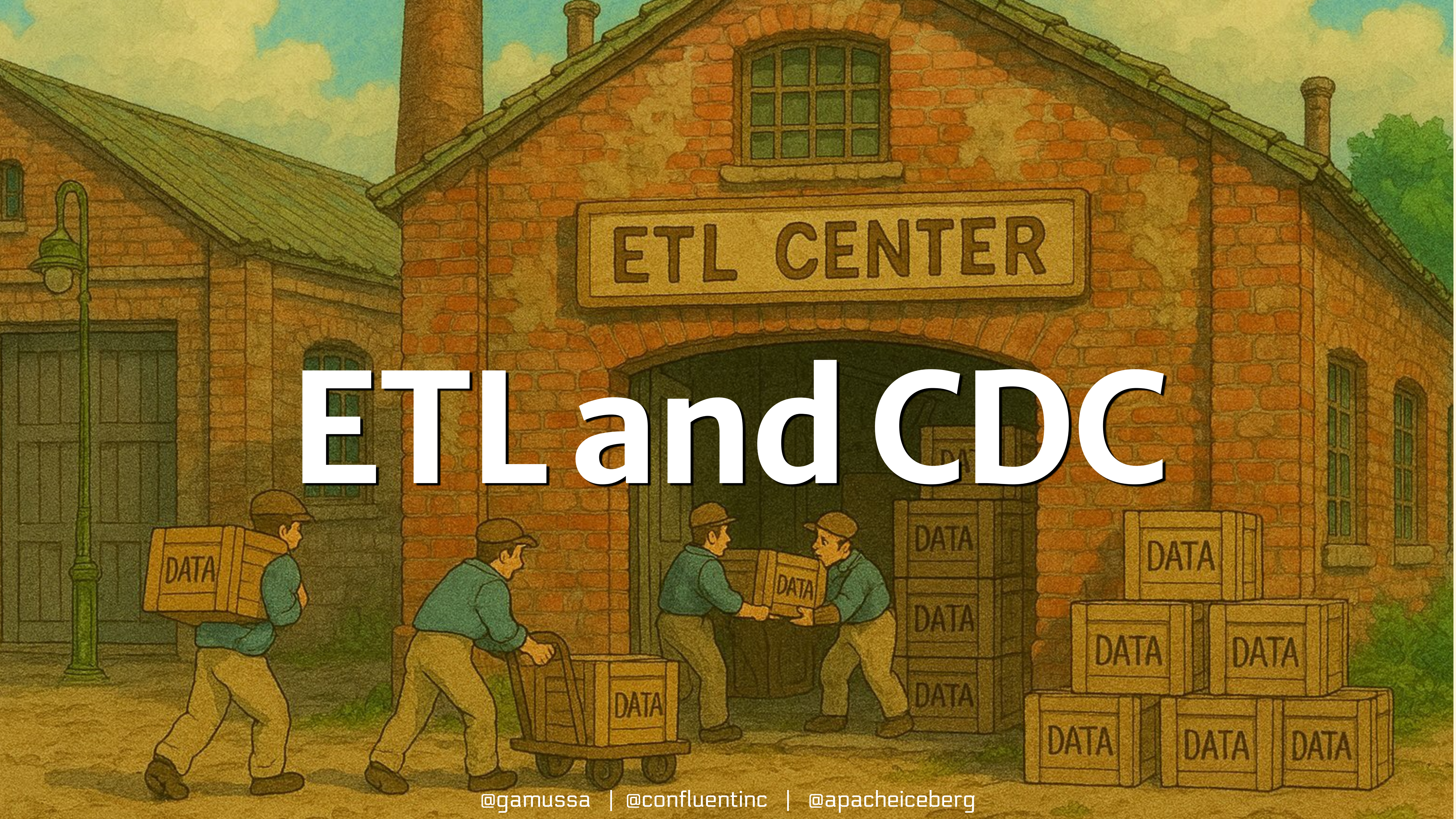
X and Bluesky: @gamussa

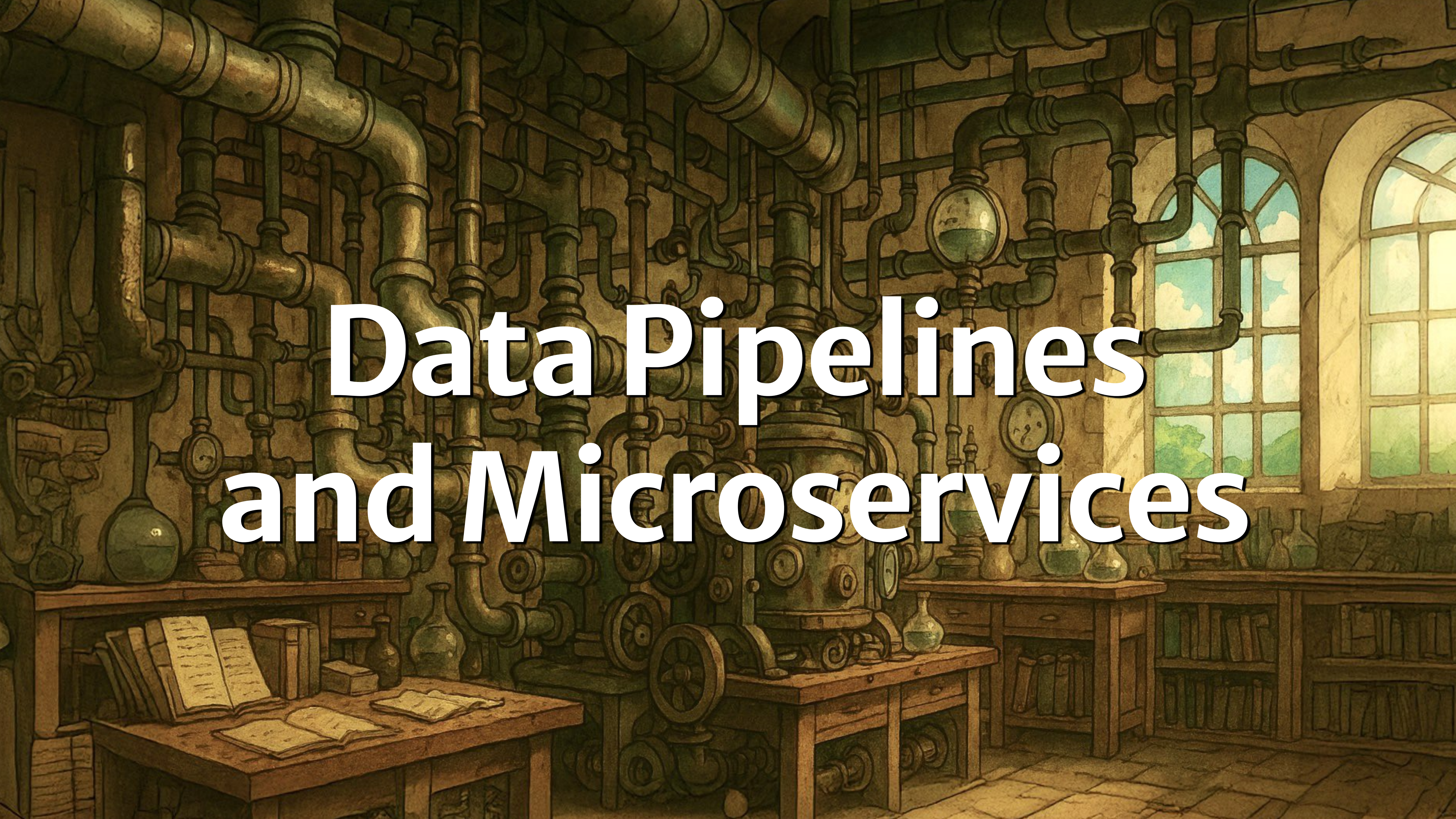


Monolith



ETL and CDC



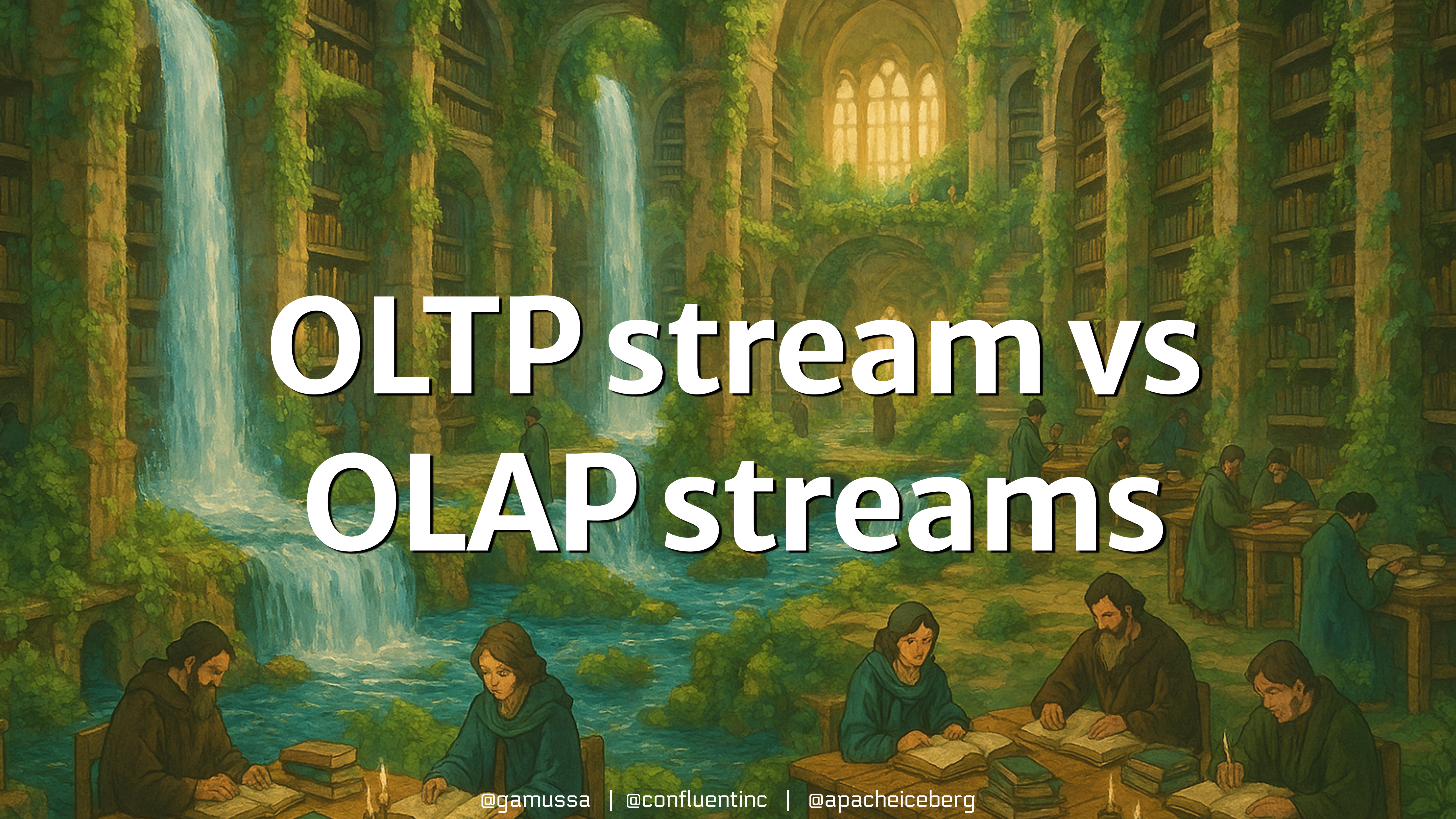


Data Pipelines and Microservices

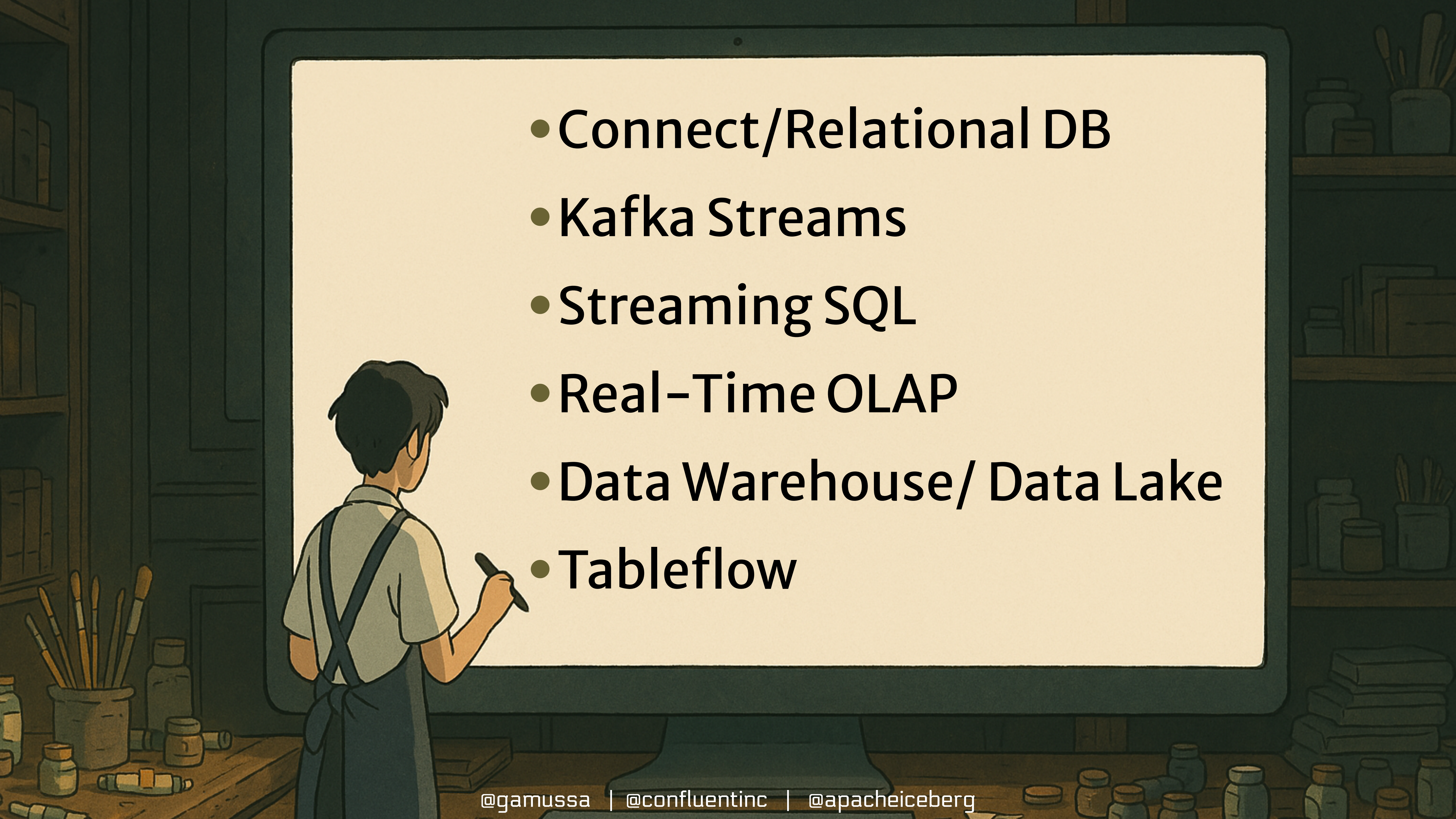


LOG

APPEND-ONLY
NO EXIT

The background of the slide is a rich, detailed illustration of a medieval library or monastery. Two large, cascading waterfalls flow through the space, surrounded by lush greenery and ivy-covered stone walls. Tall, arched bookshelves filled with books line the walls. In the foreground and middle ground, several scholars in medieval attire are seated at wooden desks, focused on reading or writing. The scene is lit with warm, golden light, creating a scholarly and serene atmosphere.

OLTP stream vs OLAP streams

- 
- An illustration of a person with dark hair, wearing a light-colored shirt and a dark apron, standing in a workshop. They are holding a marker and pointing at a large screen that displays a list of data technologies. The workshop is filled with various tools, jars, and books on shelves in the background.
- Connect/Relational DB
 - Kafka Streams
 - Streaming SQL
 - Real-Time OLAP
 - Data Warehouse/ Data Lake
 - Tableflow

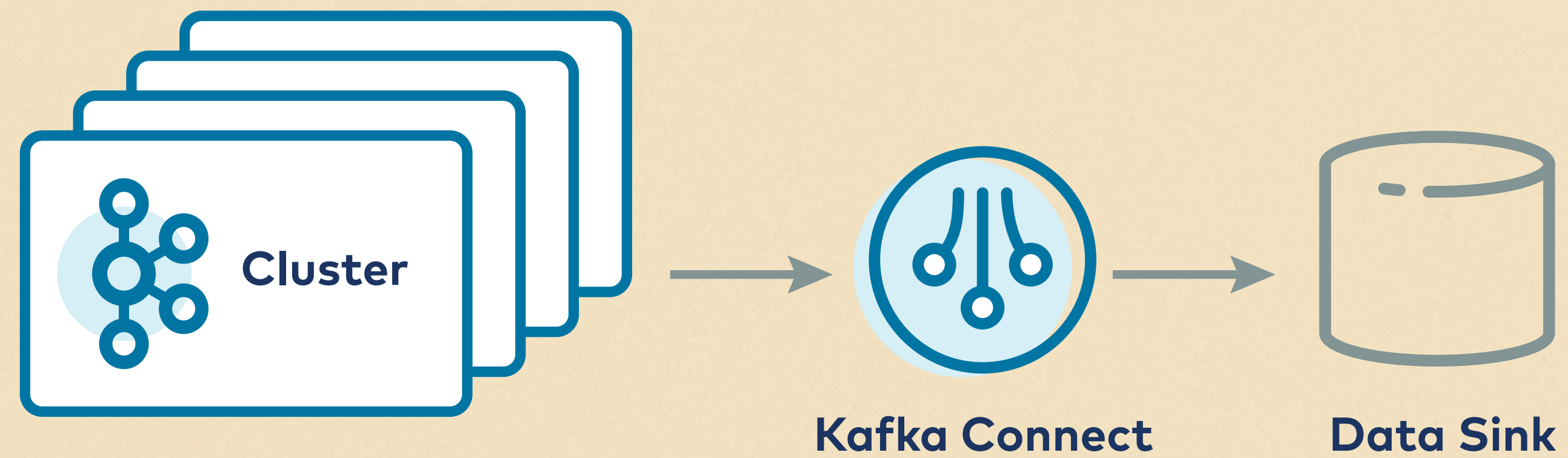
Kafka Connect



Connect/RDBMS

- Suitable for smaller data
- Transactional
- Familiar to users

Connect/RDBMS







Kafka Streams

Kafka Streams

(transactional)

- Ingests directly from a **topic**
- KTable
- Forms an **in-memory key/value** store suitable for querying by topic key
- Scalable across **members of a consumer group**
- Readable through **Interactive Queries**

Kafka Streams

(analytical)

- Full-featured **Java stream processing API**
- Arbitrary streaming computation
- Can emit new streams (not this talk)
- `KTables` **queryable by key**
- Every read pattern requires its own topology
- **Interactive Queries** again





Streaming SQLs

Streaming Database

- SQL for Queries
- Streaming Source is 1st class citizen
- Persistence / Storage

Streaming SQL

- ~~k~~sqlDB
- RisingWave
- Materialize
- TimePlus

A man with a beard and goggles, wearing a dark jacket, is sitting at a desk. He is looking at a small brown squirrel that is sitting inside a wire cage. The cage is on a desk next to some papers and a glass bottle. The background is a dimly lit room with a window and a bookshelf.

But Viktor, Flink
has SQL



What is Apache Flink® SQL?



ksqlDB

- «*Streaming Database*»
- Provides persistent TABLE abstraction
- Pull and Push queries
- Like **Kafka Streams**, but in **SQL**

Materialize

- Replacement data warehouse
- Integrates with Kafka, Postgres, dbt
- The **Materialized View** is the central abstraction
- Views are **persistent and queryable**
- Postgres wire-compatible
- Positioned as an analytics solution

Rising Wave

- Distributed SQL Streaming database
- Cloud and OSS versions
- Implementation of **Flink in Rust**
- **Kafka, Pulsar, Kinesis** integrations
- Flink+persistent views
- Postgres wire-compatible

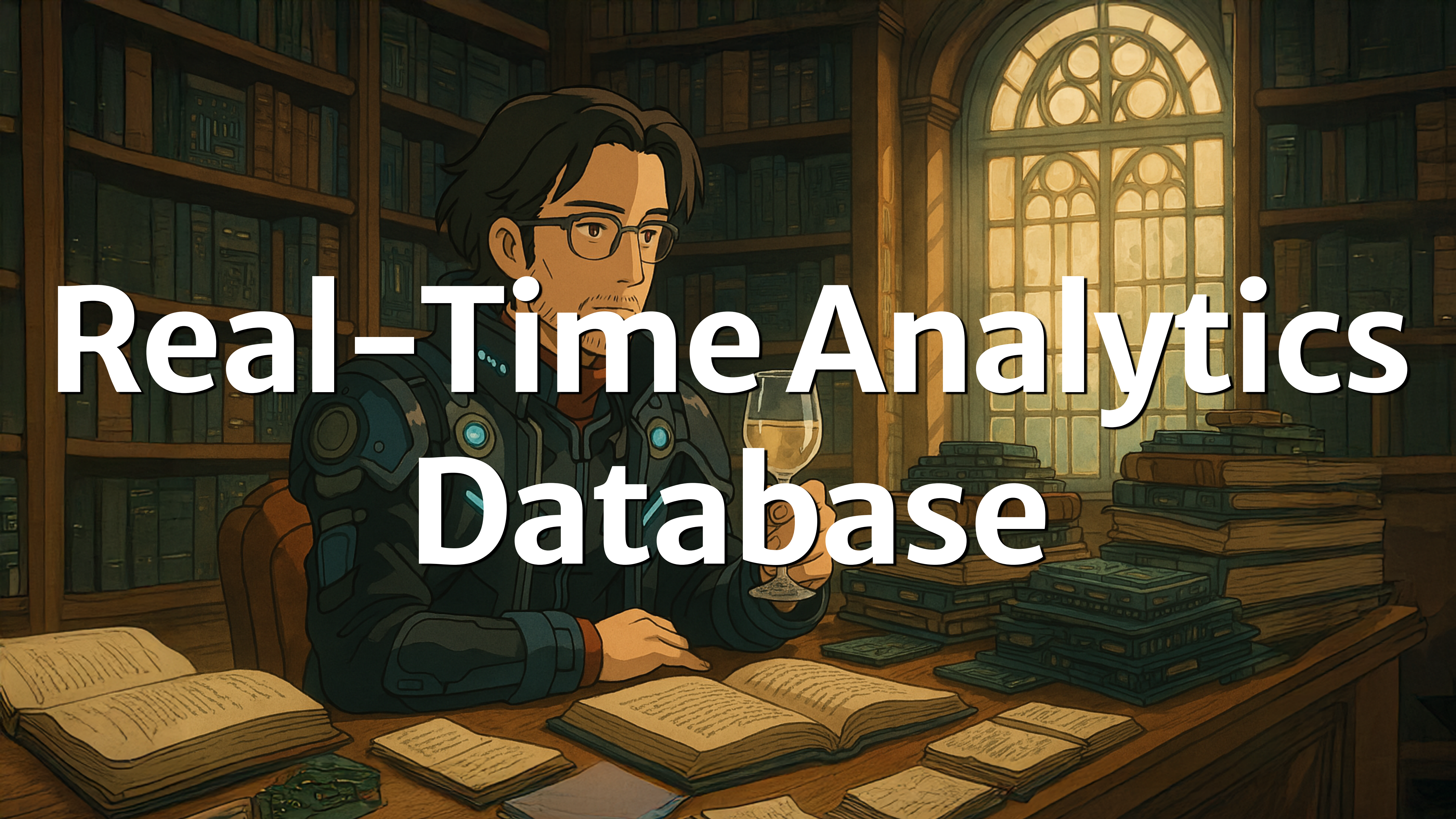


```
SELECT  
product_id.  
Av6irating)  
FROM reviews  
GROUP BY
```

```
SELECT  
room revting  
GROUP BY .....  
product_id
```

```
SELECT  
FROM orders  
WHERE status =  
'shipped'
```

```
SELECT ★  
FROM orders  
WHERE status =  
'shipped'
```

Real-Time Analytics Database

Real-Time OLAP

- Designed for **high concurrency, low latency queries**
- Ingests from **streaming and batch sources**
- Intimate integration with **Kafka**
- **Conventional tables and SQL**

Real-Time OLAP

- Analytics shaped like **real-time data**
- Analytics when **users are decision makers**



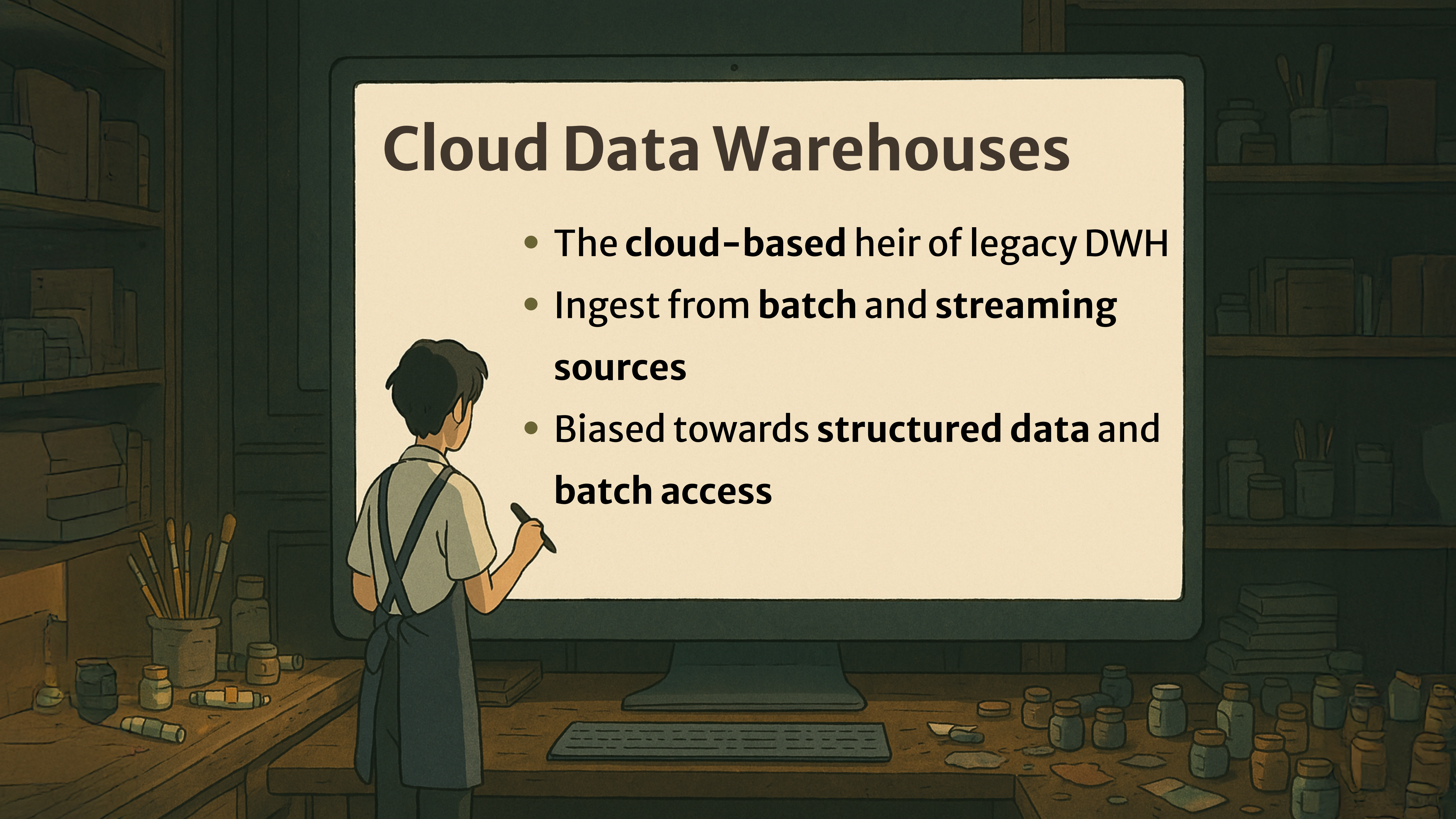
Cloud Data Warehouses

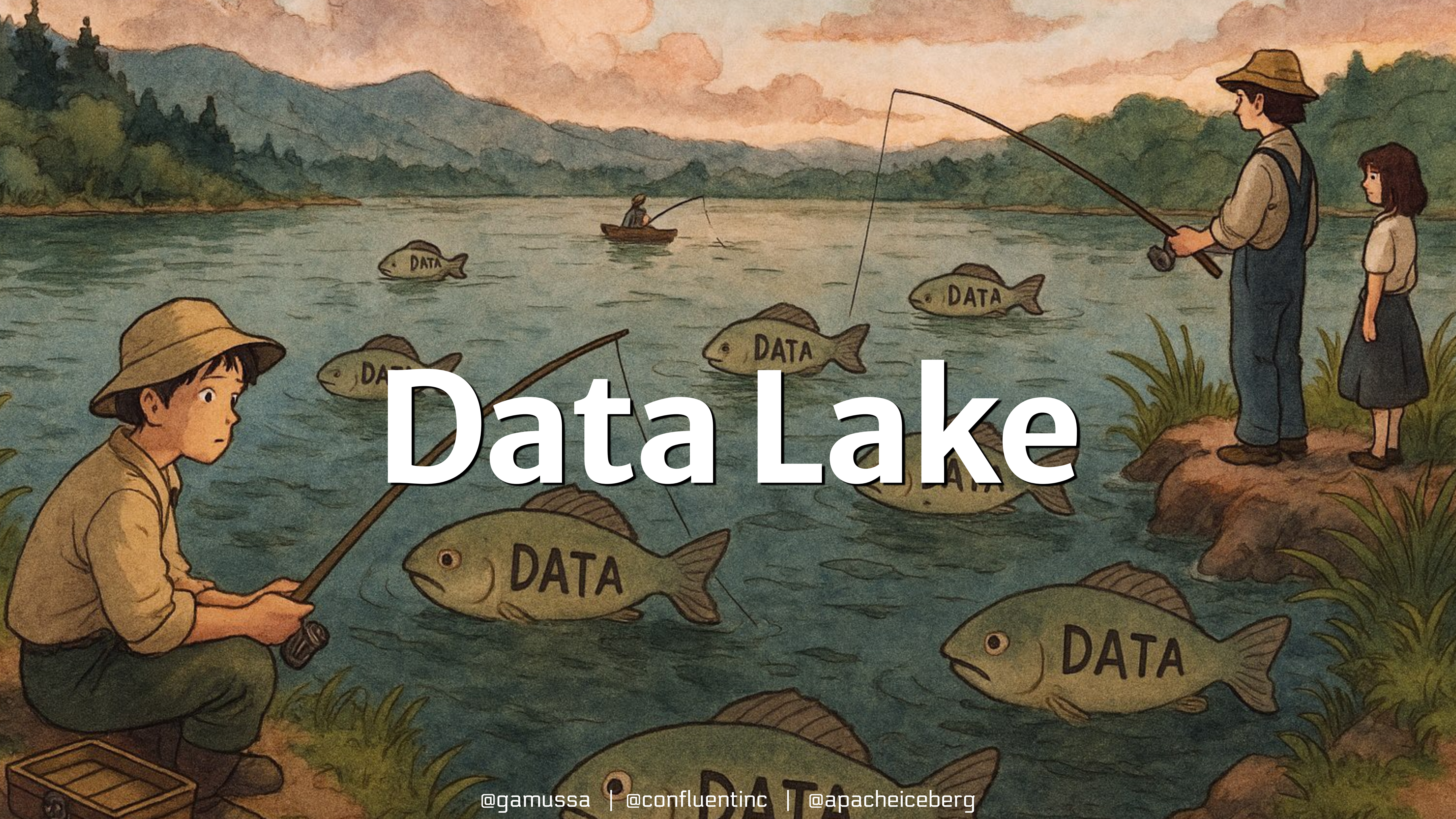
Cloud Data Warehouses



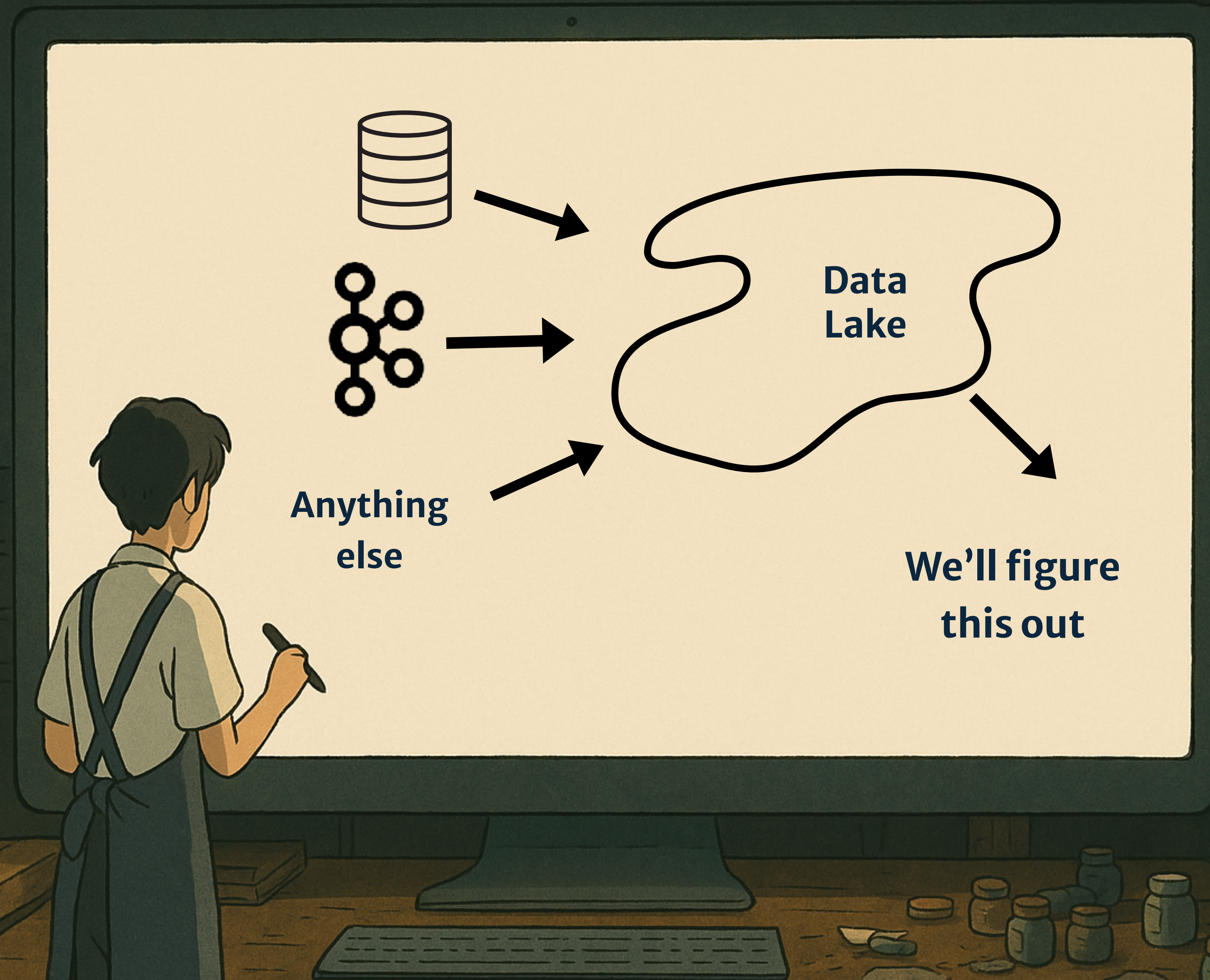
Cloud Data Warehouses

- The **cloud-based heir** of legacy DWH
- Ingest from **batch and streaming sources**
- Biased towards **structured data and batch access**



A watercolor illustration of a serene lake scene at sunset. In the foreground, a young boy in a tan shirt and hat sits on the grassy bank, holding a fishing rod. To his right, a man in a hat and overalls stands on a rock, also fishing, with a young girl in a white shirt and dark skirt standing beside him. Several fish are visible in the water, each with the word 'DATA' written on its side. In the background, a small boat with another person is on the water, and distant mountains are visible under a cloudy, orange-hued sky.

Data Lake



Data Lakes

- Storage and compute are radically decoupled
- Structure is relatively less important
- Reads are slow
- Streaming is historically difficult

Data Lakes

- Started as the HDFS cluster
- Became S3
- That didn't help...
- ELT vs. ETL
- Iceberg/Hudi/DeltaLake

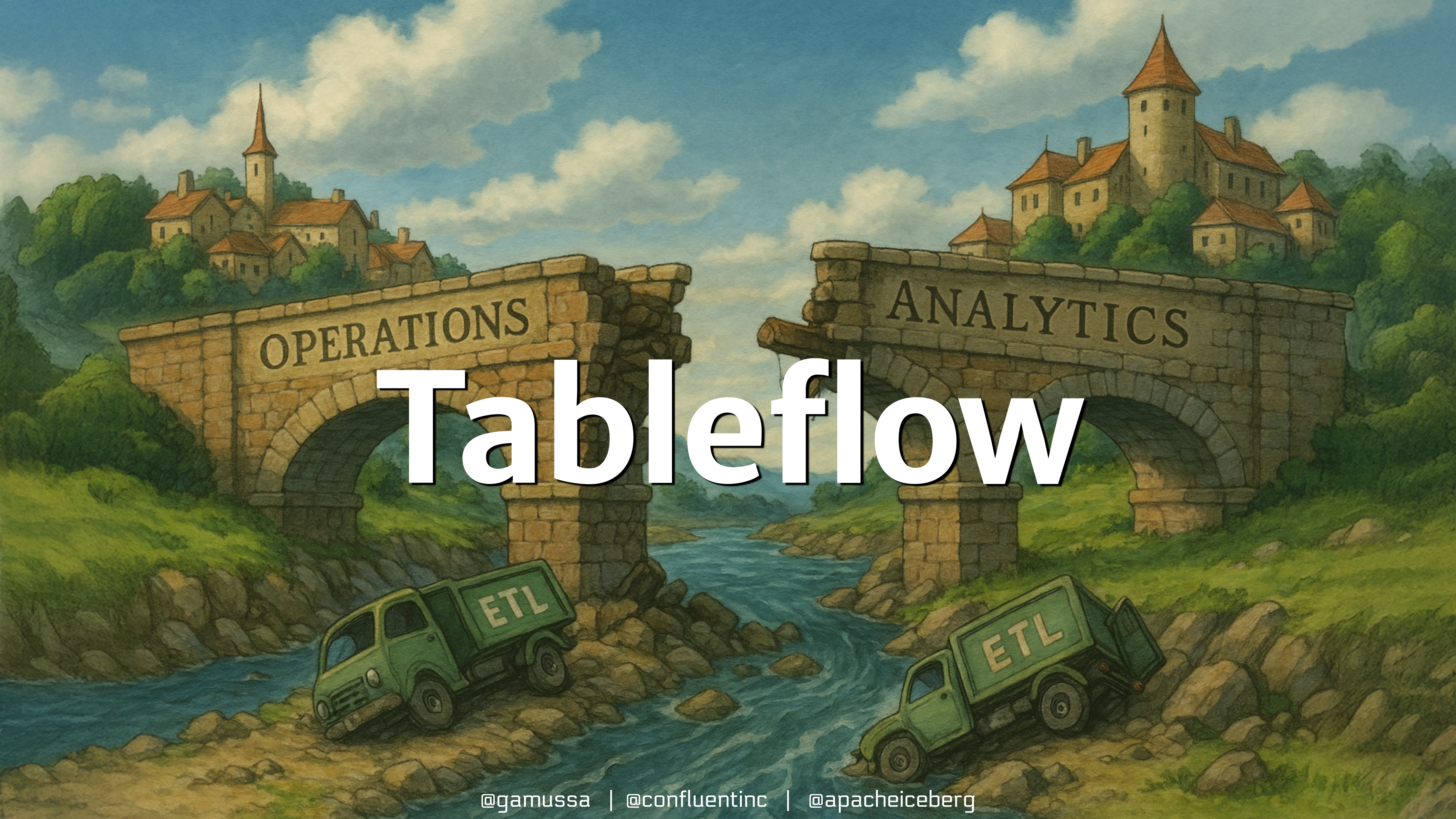
An illustration of a large blue iceberg floating in a body of water. The iceberg has a white, snow-covered peak. The background shows a sunset or sunrise sky with orange and yellow clouds, and dark green hills in the distance. The word 'Iceberg' is written in large white letters across the center of the iceberg. Below the word, there are three circular icons: a clock for 'TIME-TRAVEL', a network diagram for 'SCHEMA', and a table grid for 'TABLE'.

Iceberg

TIME-TRAVEL

SCHEMA

TABLE



Tableflow

Kafka



TABLE



user@host ~/streaming-github-events

```
SELECT * FROM github.default.event_stream LIMIT 5;
```

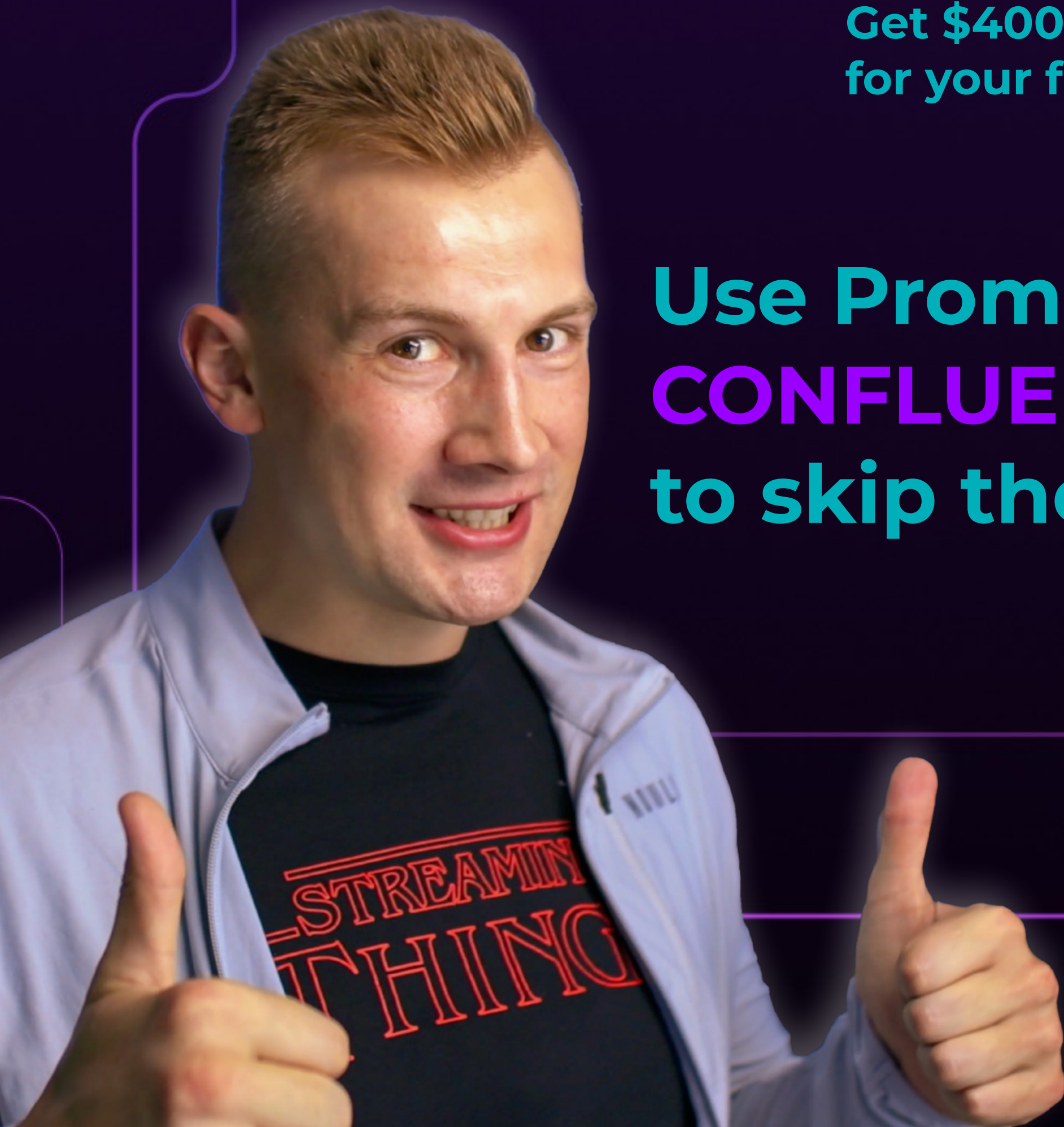
repository_name	eventtype	creationstamp
apache/pinot	WatchEvent	2024-04-24 15:31:54
open-telemetry/opentelemetry-		2024-04-24 15:31:54
python-contrib	python-contrib	
cornerstone.js/cornerstone	WatchEvent	2024-04-24 15:31:54
aws-gates/ec2-instance-connect-cli		2024-04-24 15:31:54
rancher/rancher	WatchEvent	2024-04-24 15:31:54

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CONFLUENTDEV1
to skip the paywall!





No Solutions only Trade Offs



Sometimes you go
with what you know

A cartoon illustration of a man with a beard and a grey cap, smiling as he reads a children's book. He is sitting in a wooden armchair in a room filled with bookshelves. The book he is holding shows a bright sun, a rabbit, and two children playing. The text "This is not bad!" is overlaid in large white letters. The scene is warmly lit, with sunlight coming from a window on the right. There are stacks of books on a table in front of him and on the floor to the left.

This is not bad!



Performance



Community

Differentiated Application Code

Area of
Exploration

Kafka



This is not bad!