One Does Not Simply Query a Stream!

Viktor Gamov, Confluent
@gamussa

Zurich Kafka Meetup,
Switzerland 2025

Robert Zych
@zychr

Had a great Q&A with John Roesler yesterday about IQ (ie Kafka streams interactive queries) v2 will it much easier to perform more complex queries. My question was basically when should use we use IQ vs something like @ApachePinot ?

7:32 AM · Jun 25, 2022

Jase
@jasonbelldata

It does.... Or a podcast. Or a blog.

8:47 PM · Jun 25, 2022

Viktor

GAMOV

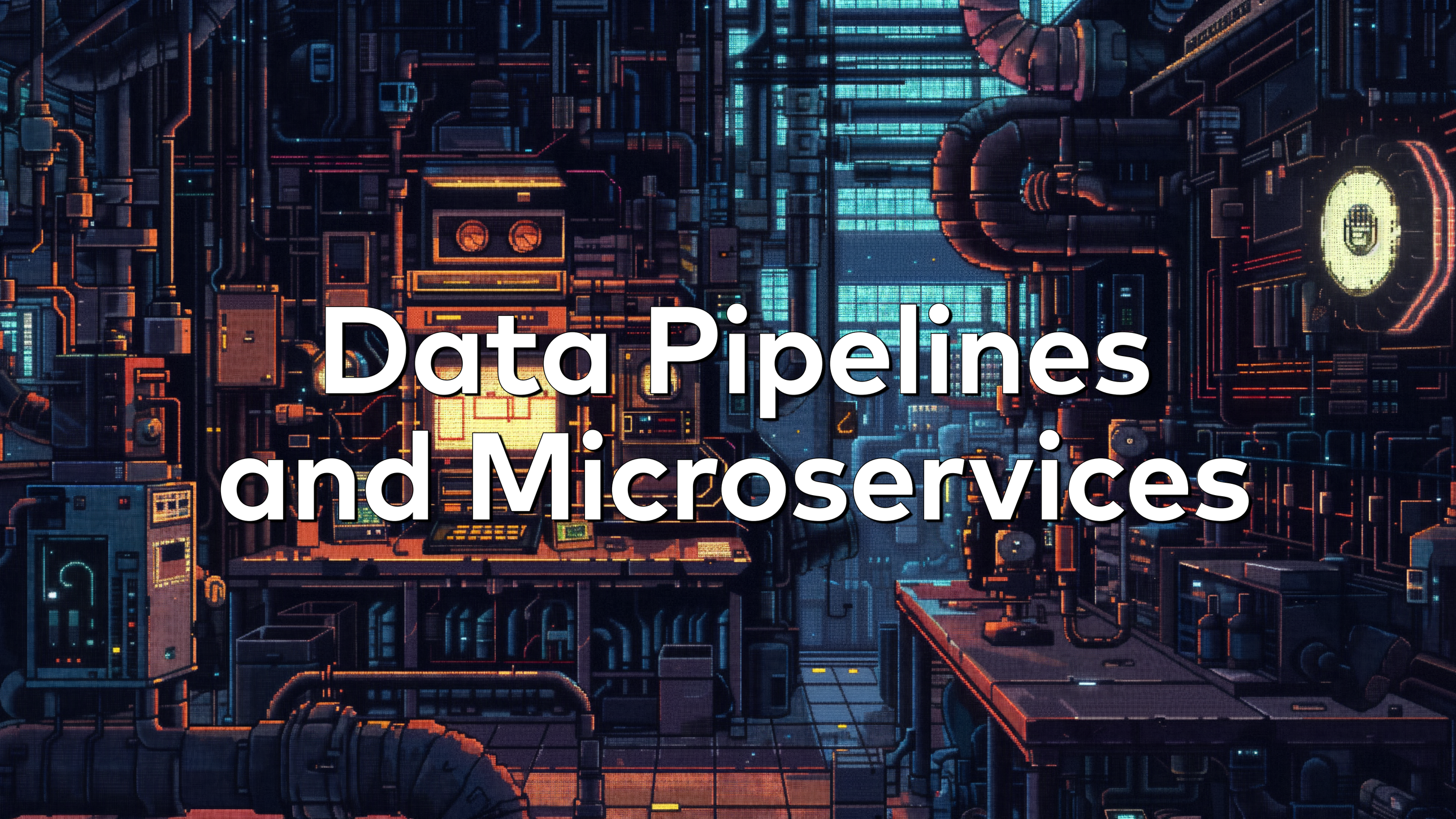
Principal Developer Advocate | Confluent

~~Twitter~~ X: @gamussa

Monolith

ETL and CDC

Mobile Era



Data Pipelines and Microservices

LOG

Robert Zych
@zychr

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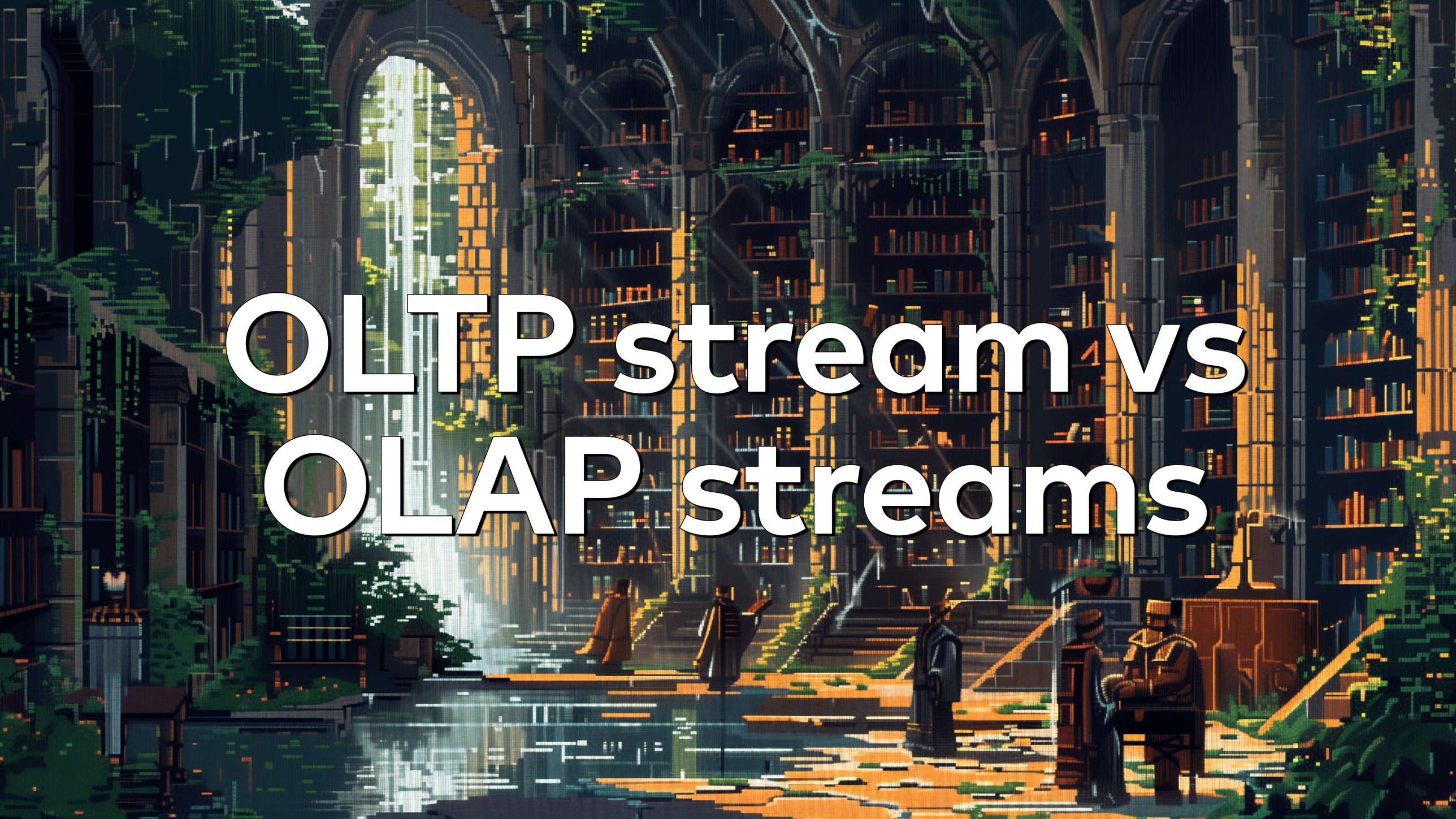
OLTP stream vs
OLAP streams

Skip Paywall

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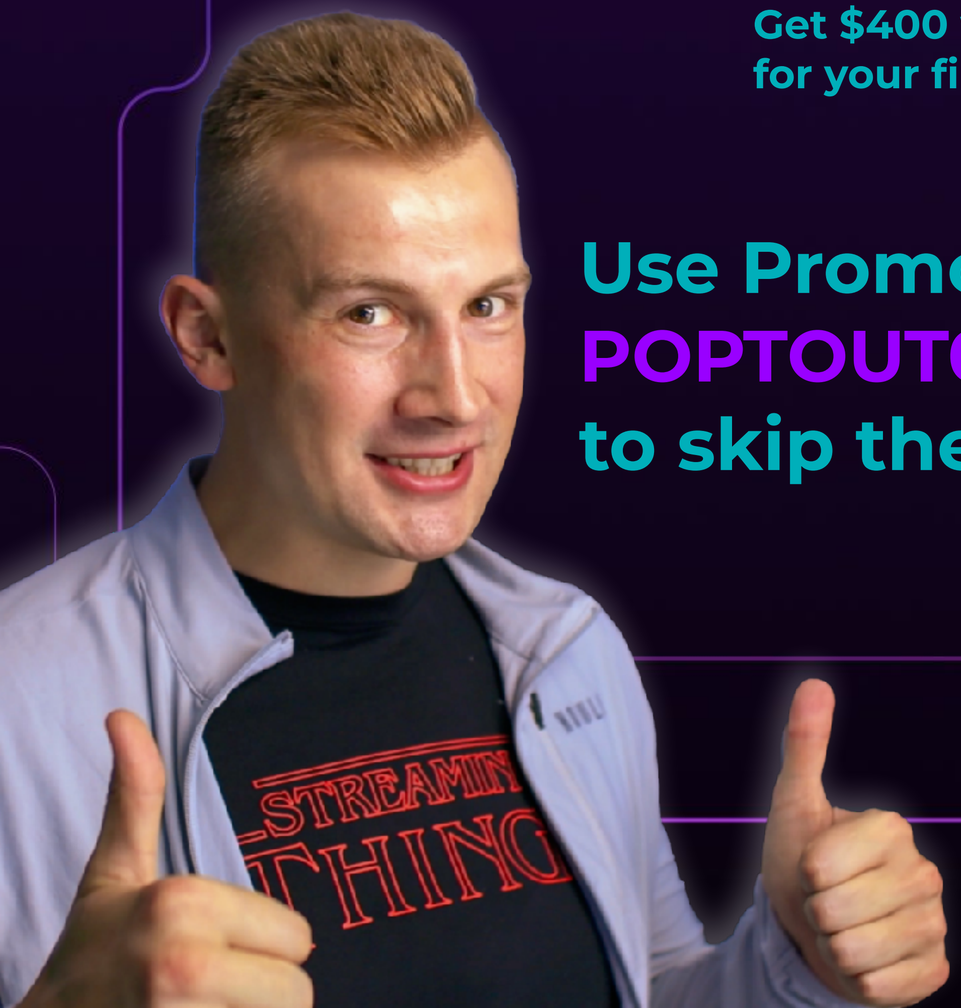
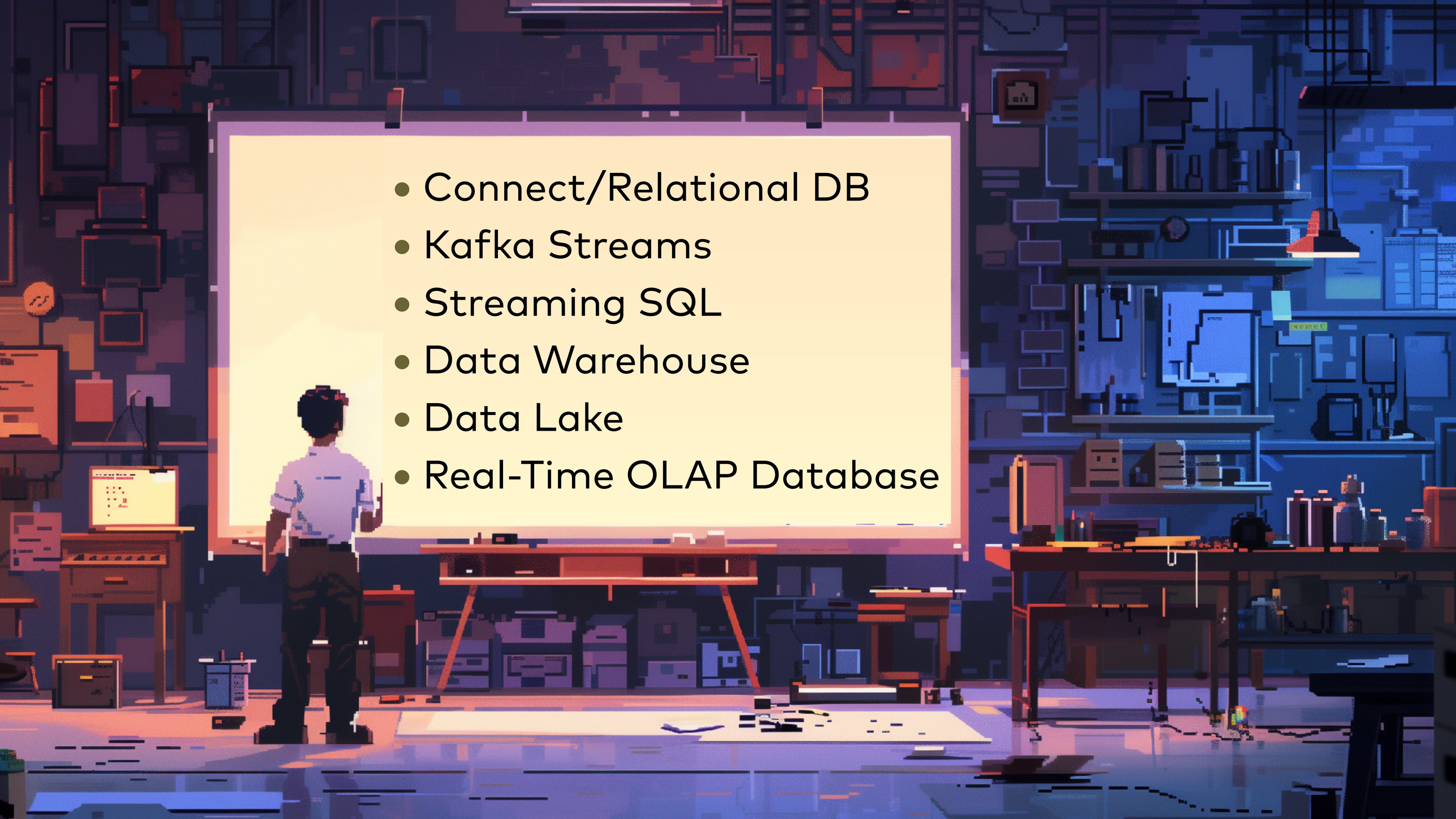
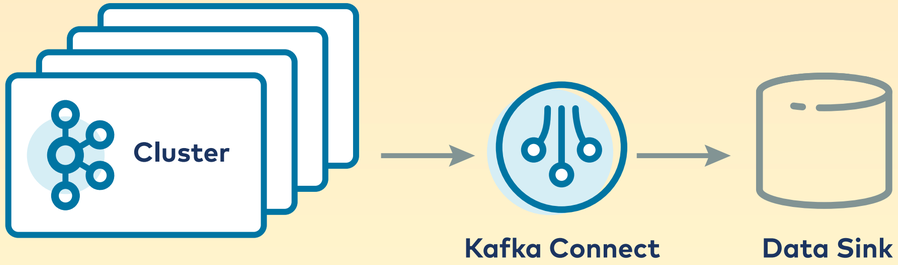


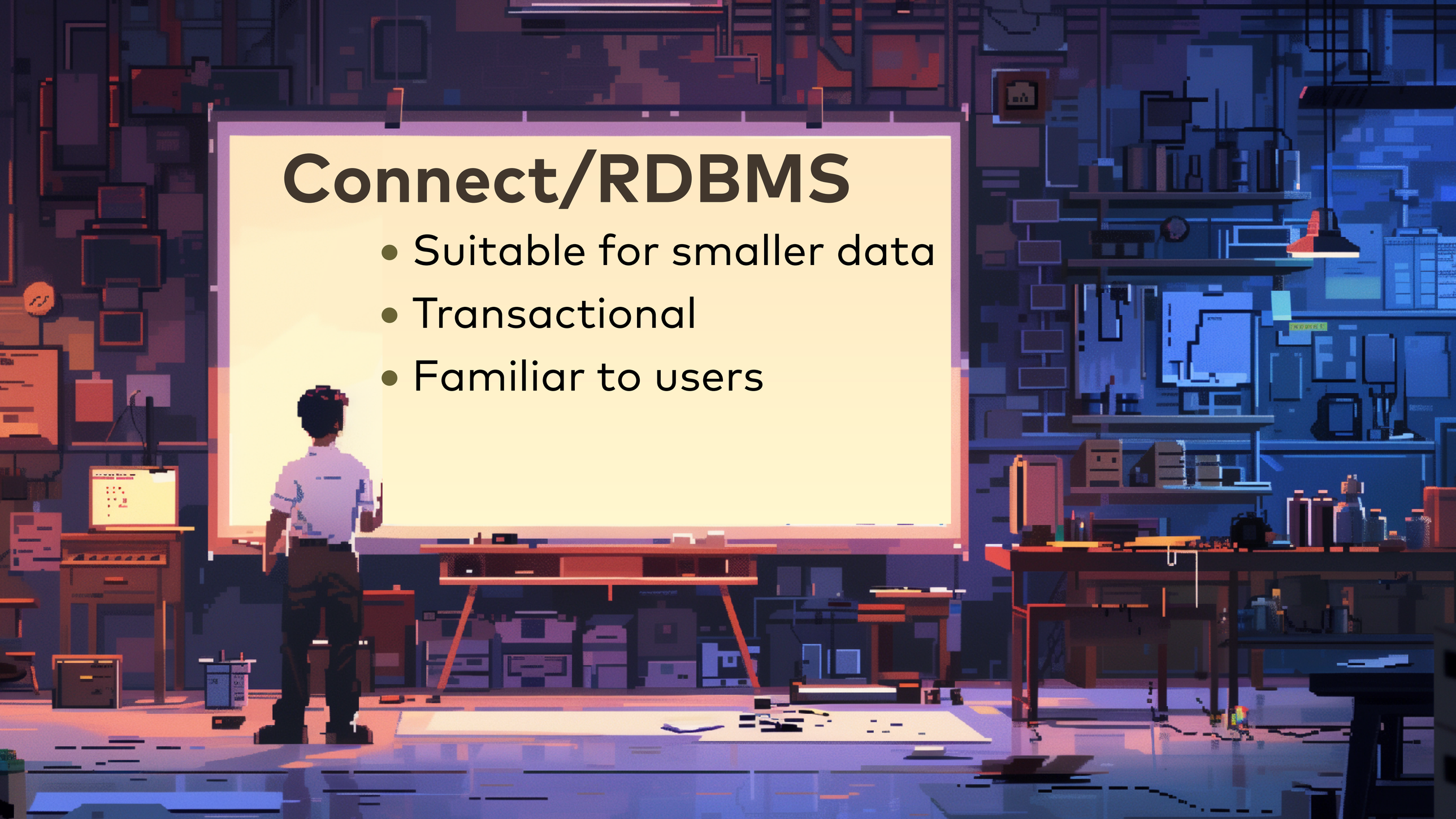
Use Promo Code - POPTOUT000MZG62 to skip the paywall!


Connect/Relational DB
Kafka Streams
Streaming SQL
Data Warehouse
Data Lake
Real-Time OLAP Database

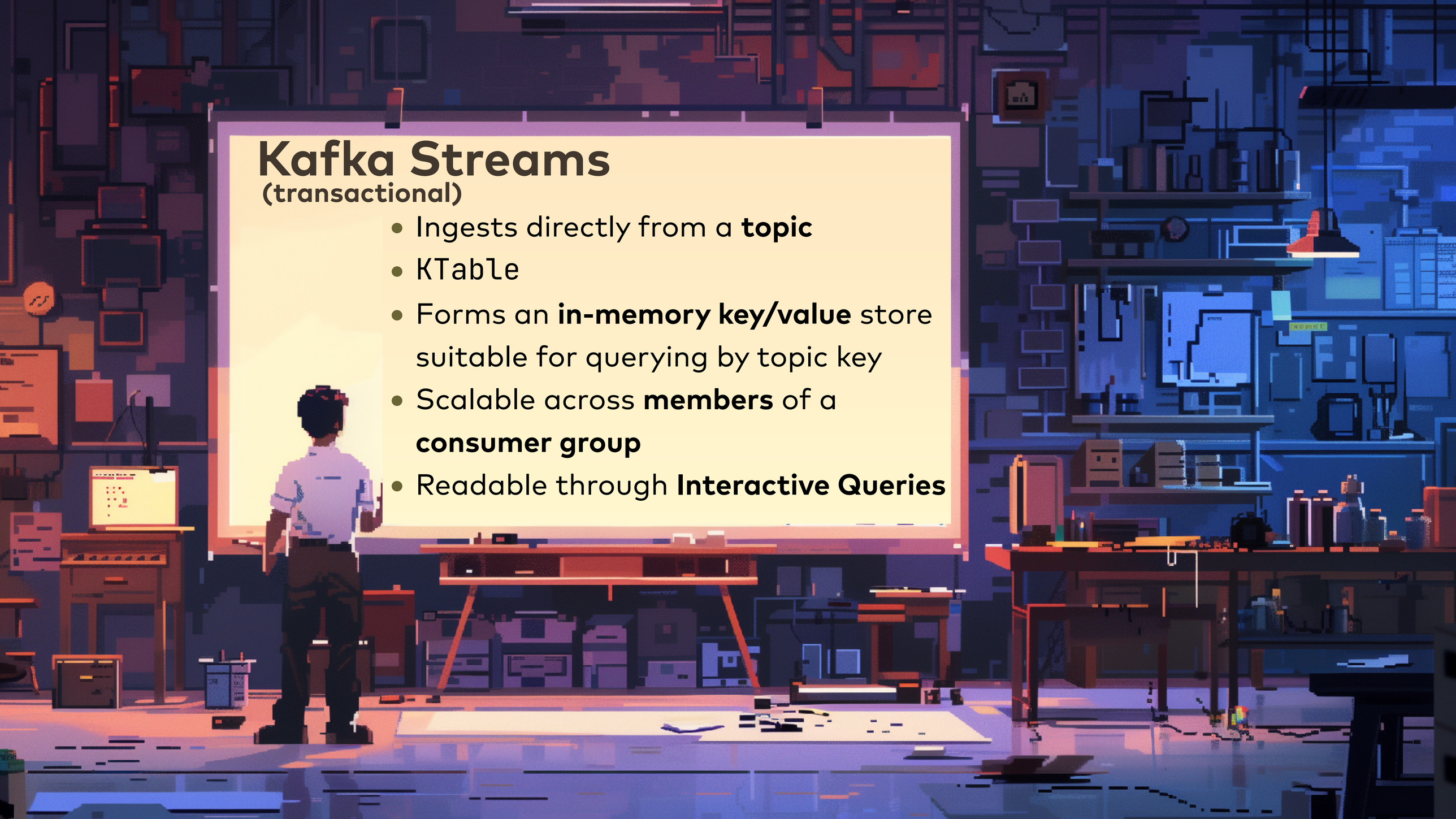
Kafka Connect

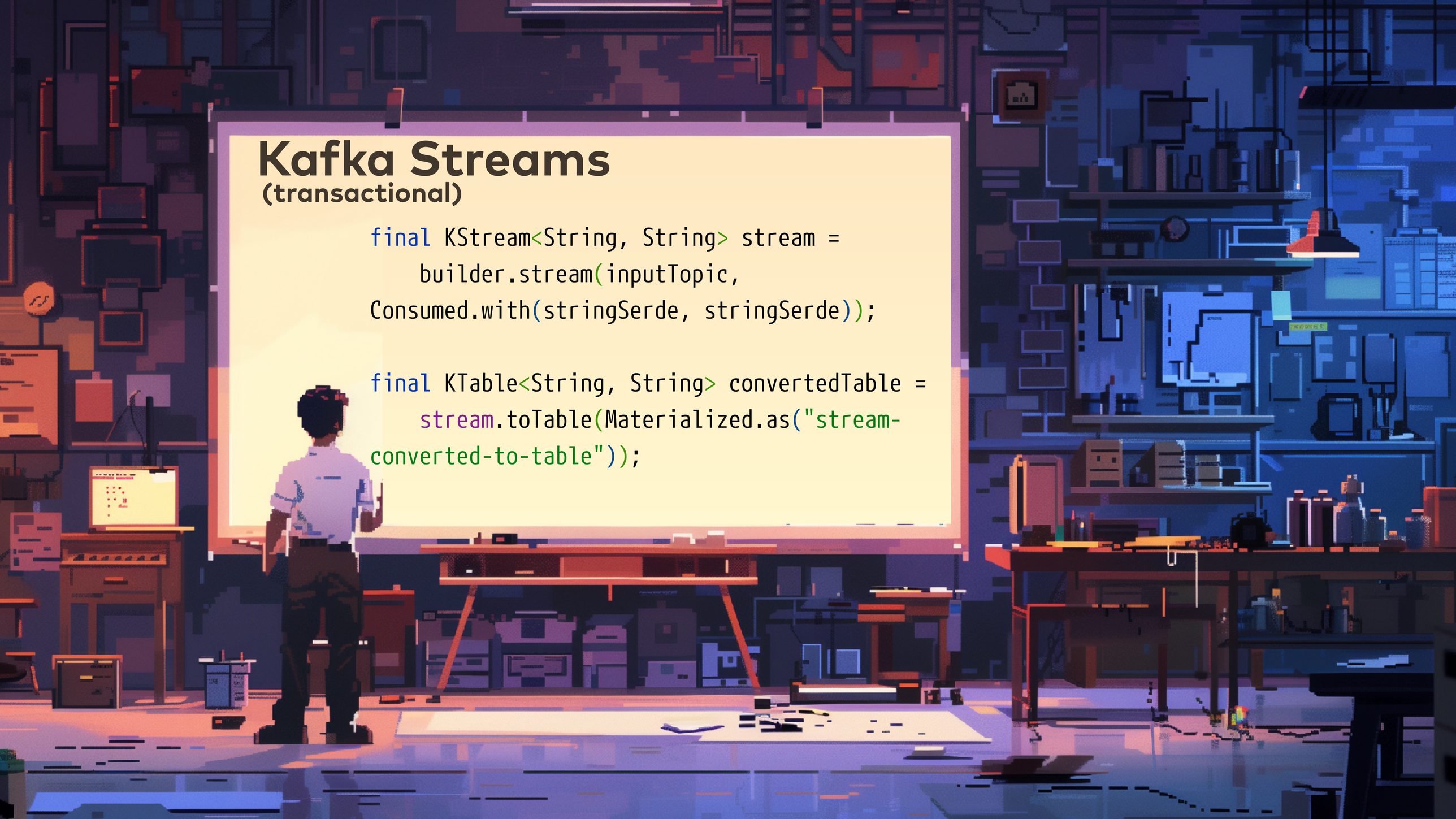
Connect/RDBMS




Connect/RDBMS
• Suitable for smaller data
• Transactional
• Familiar to users

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
(transactional)
final KStream<String, String> stream =
builder.stream(inputTopic,
Consumed.with(stringSerde, stringSerde));
final KTable<String, String> convertedTable =
stream.toTable(Materialized.as("stream-
converted-to-table"));

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

Kafka Streams
(analytical)

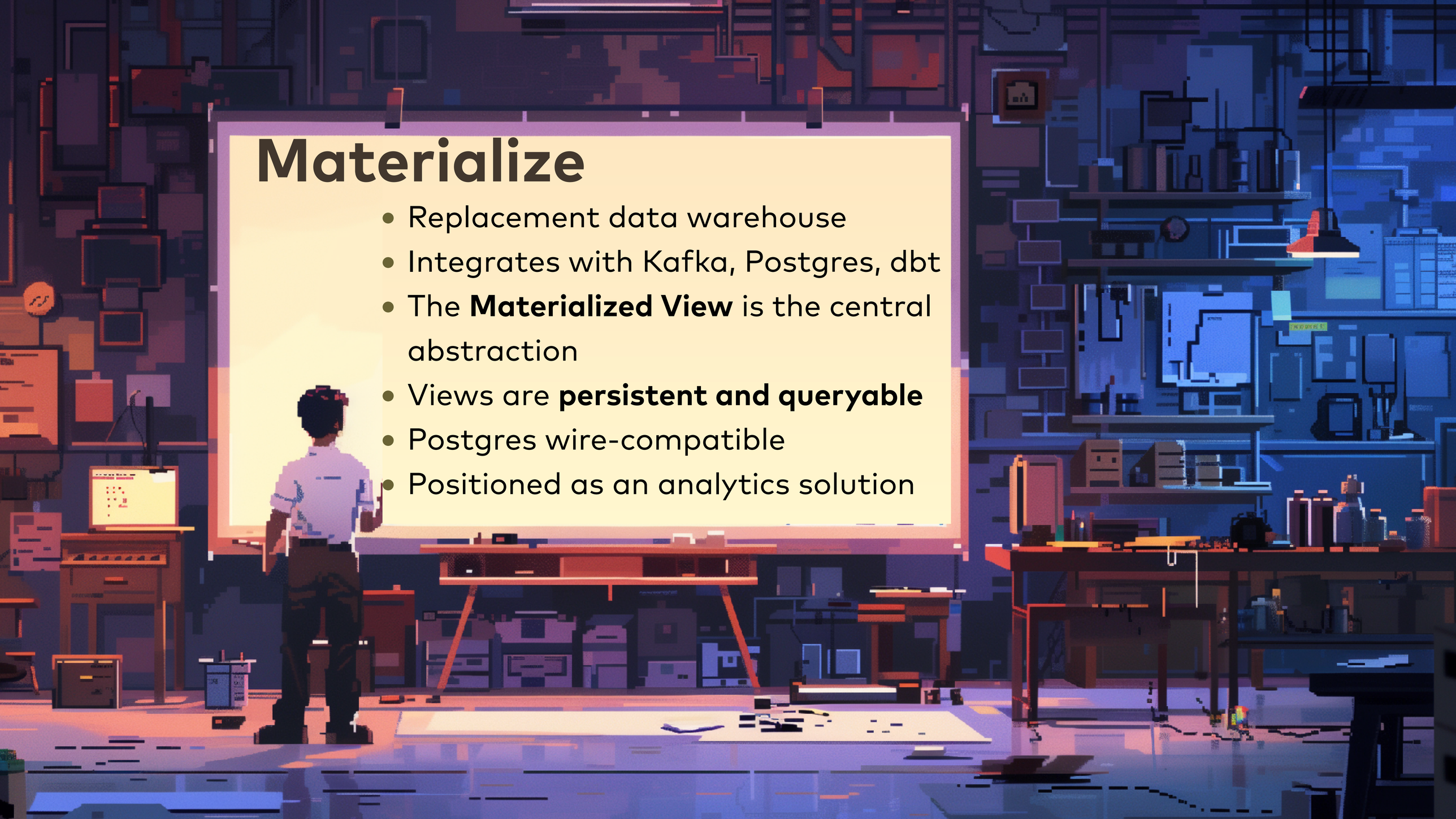
```
KTable<String, Long> wordCounts = textLines
    .flatMapValues(textLine ->

Arrays.asList(textLine.toLowerCase().split("\\W+")))
    .groupBy((key, word) -> word)
    .count(Materialized.<String, Long, KeyValueStore<Bytes,
byte[]>>as("counts-store"));

wordCounts.toStream().to("WordsWithCountsTopic",
                         Produced.with(Serdes.String(),
Serdes.Long()));
```

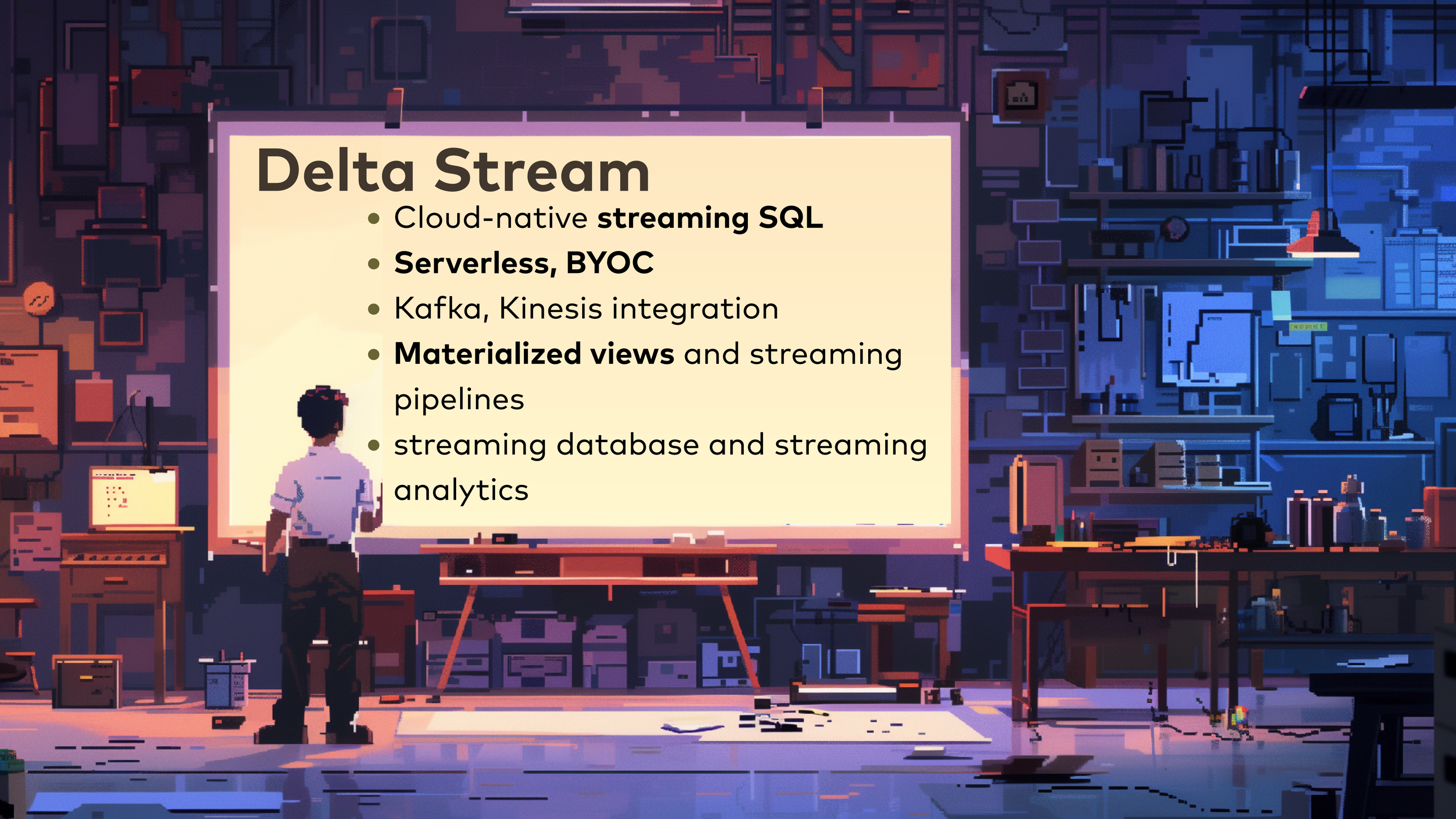
Streaming SQLs

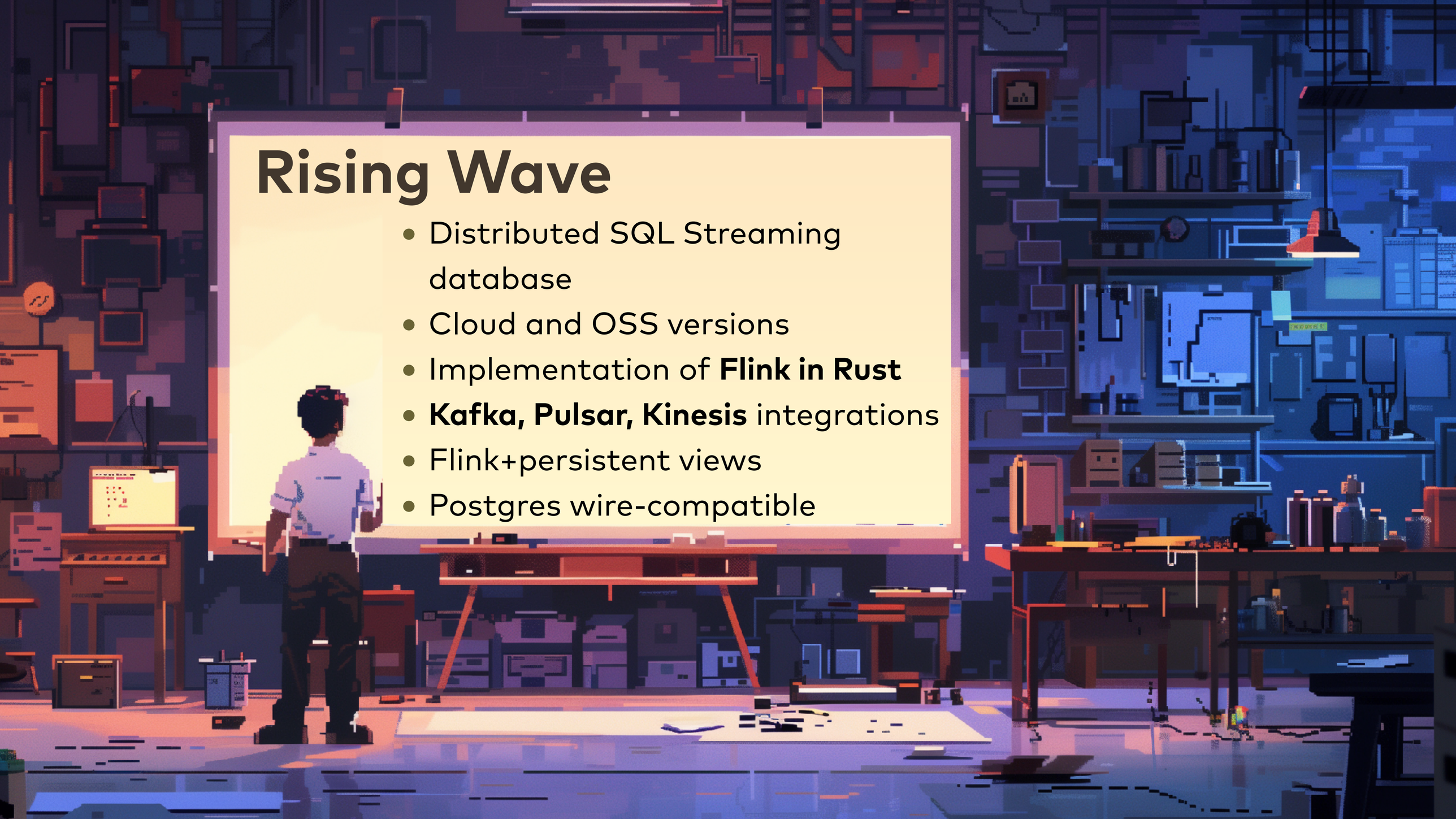
Streaming SQL
Materialize
DeltaStream
RisingWave
ksqlDB

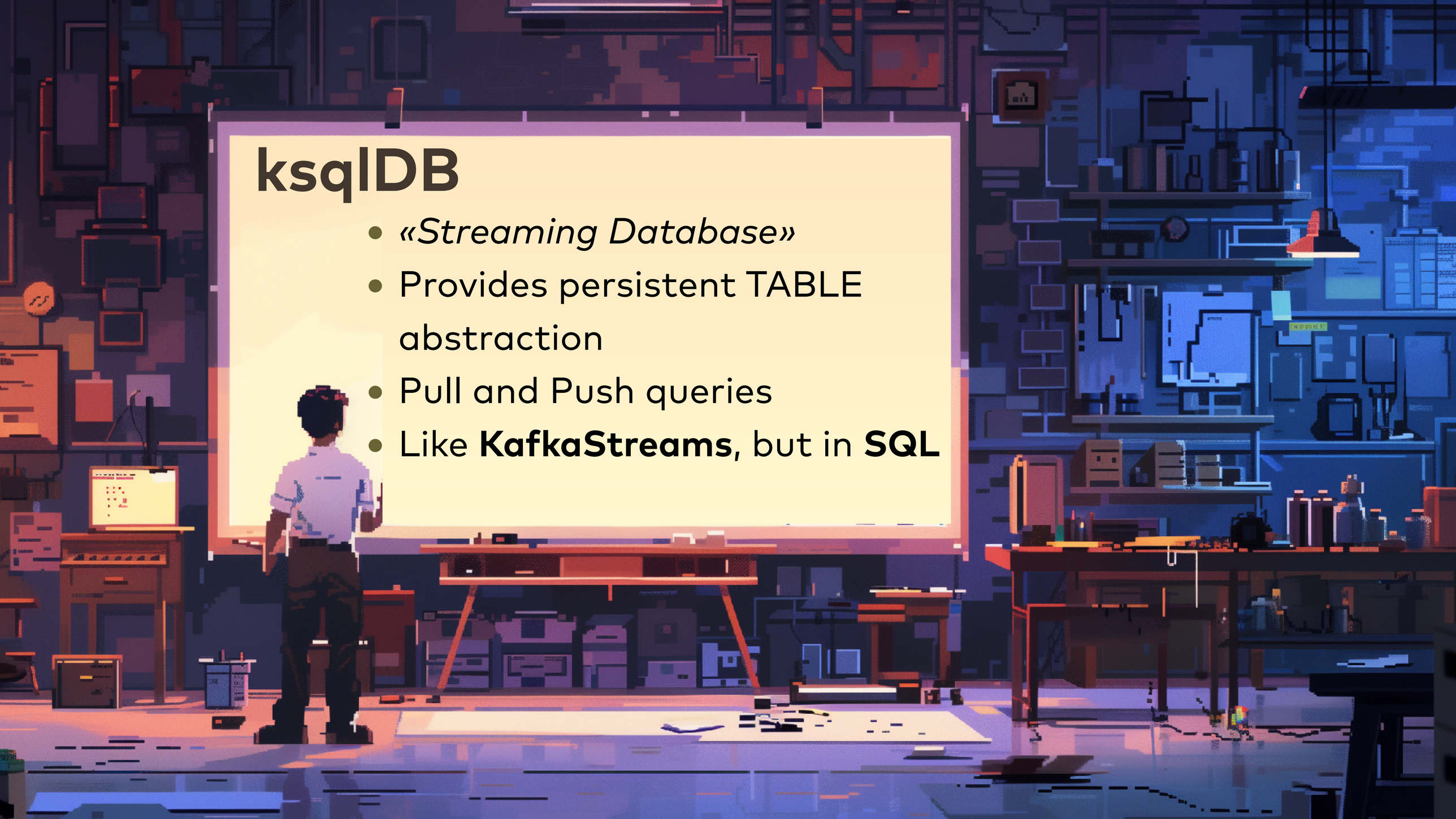


Materialize

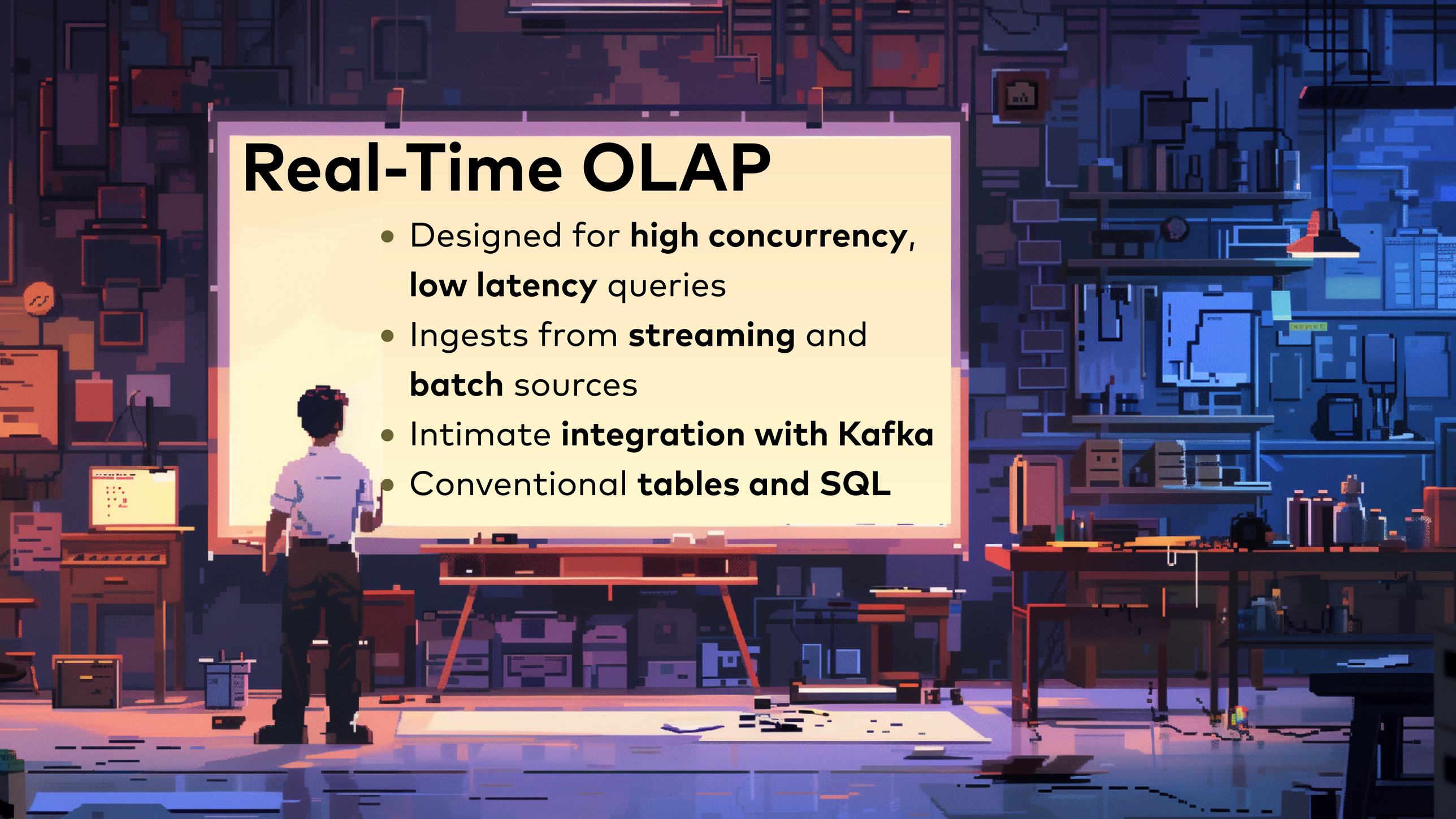
- Replacement data warehouse
- Integrates with Kafka, Postgres, dbt
- The **Materialized View** is the central abstraction
- Views are **persistent and queryable**
- Postgres wire-compatible
- Positioned as an analytics solution


Delta Stream
Cloud-native streaming SQL
Serverless, BYOC
Kafka, Kinesis integration
Materialized views and streaming pipelines
streaming database and streaming analytics


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

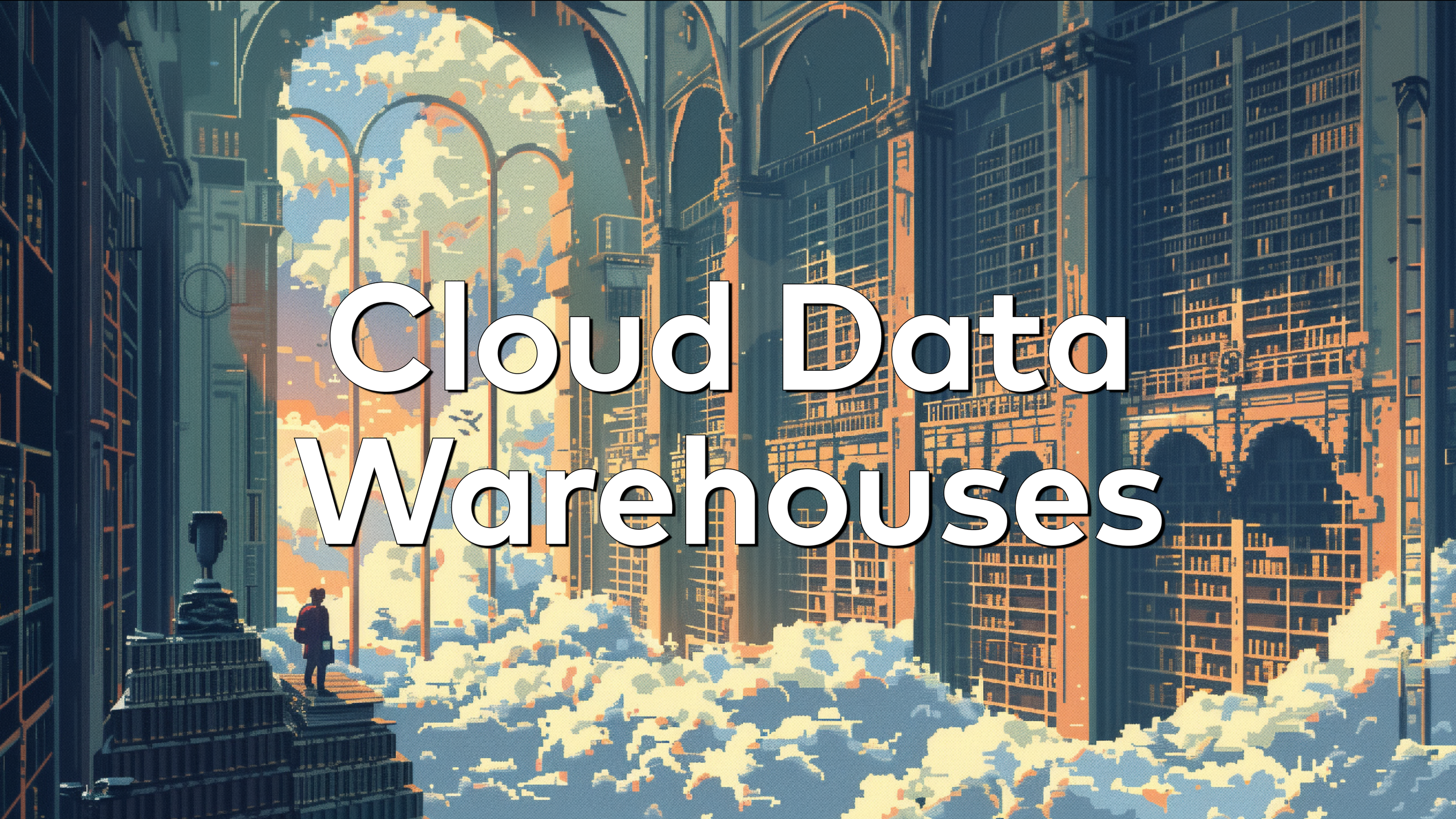

ksqlDB
«Streaming Database»
Provides persistent TABLE abstraction
Pull and Push queries
Like KafkaStreams, but in SQL

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

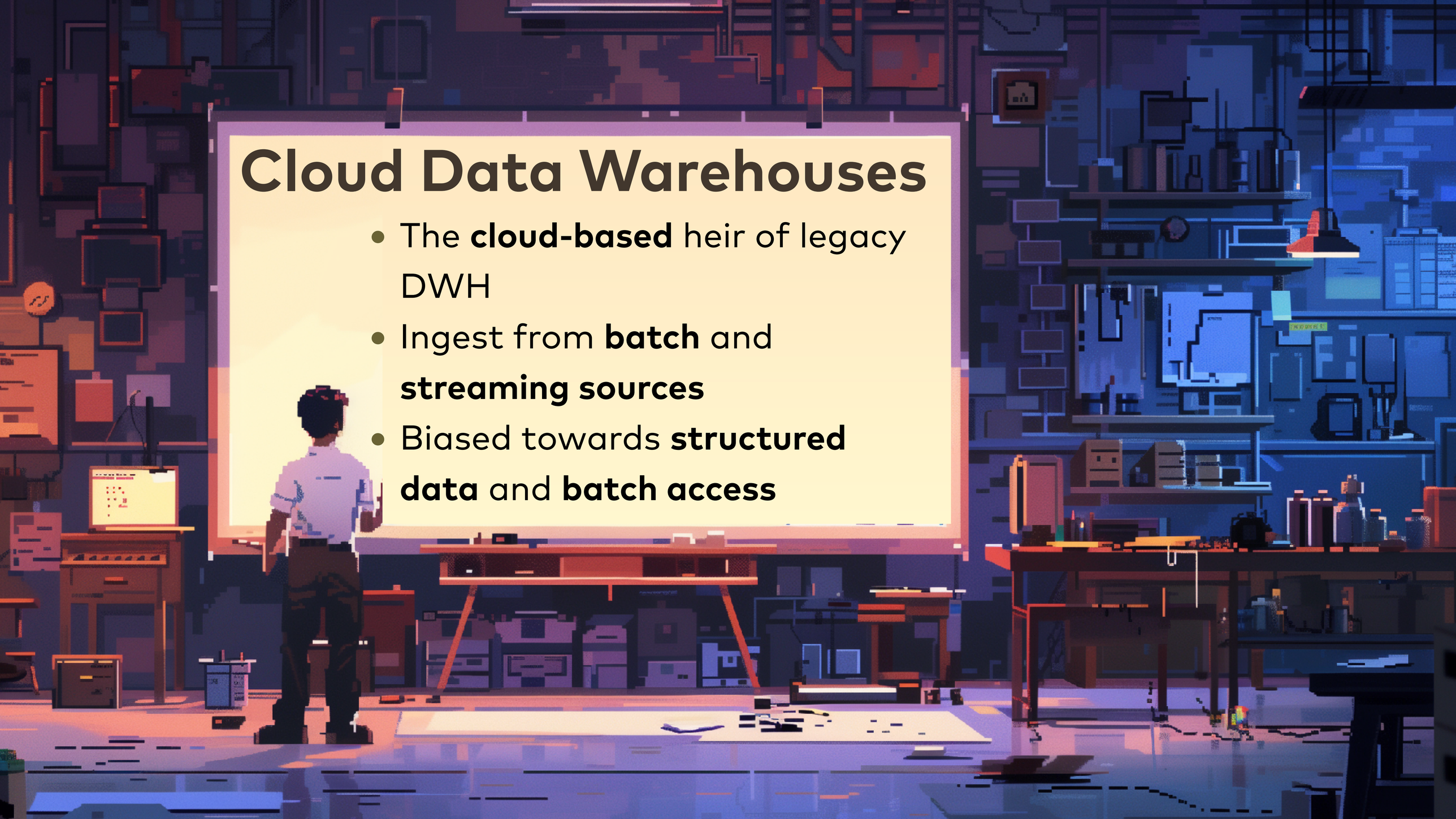
Real-Time OLAP

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



Cloud Data Warehouses

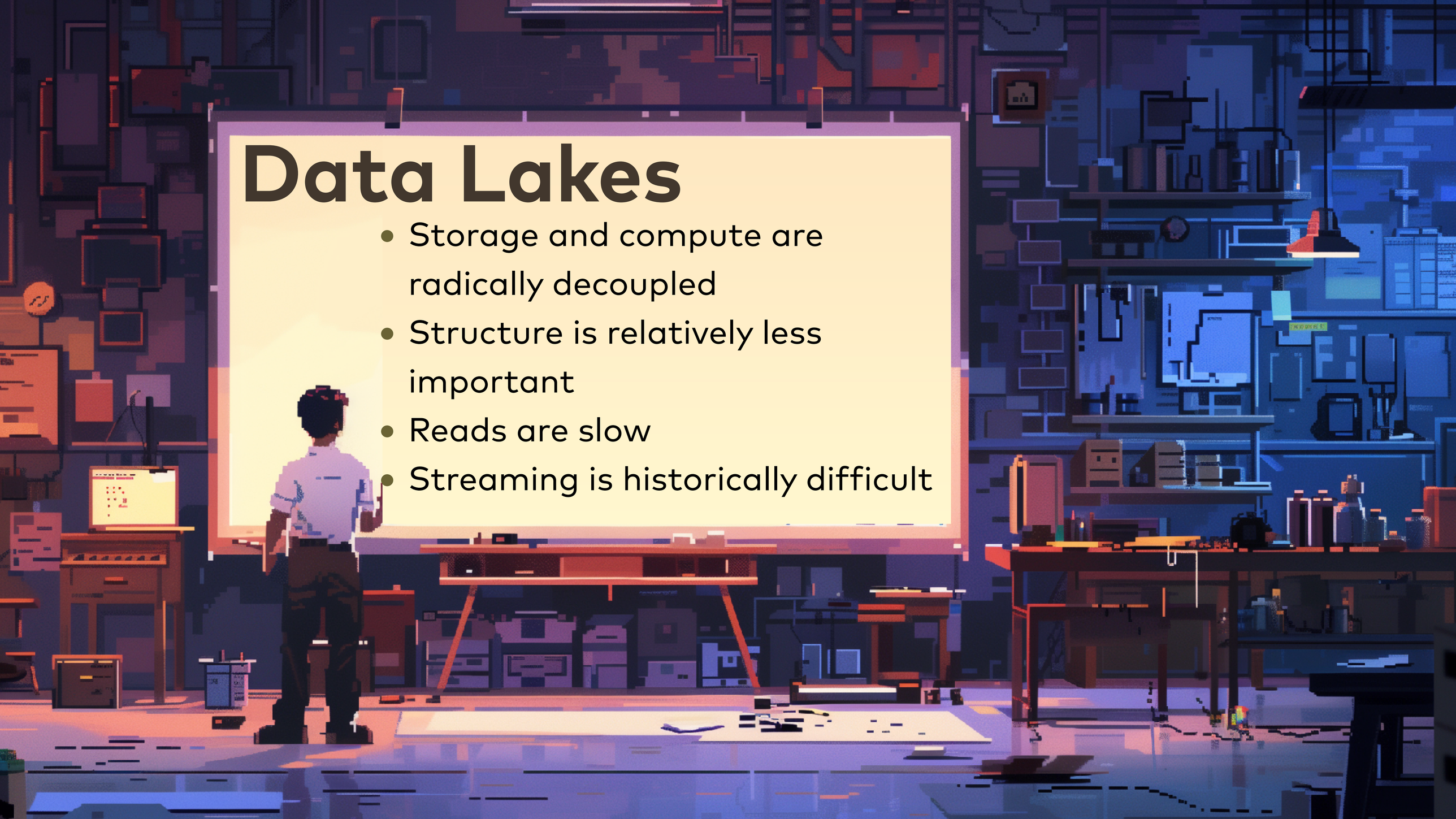
Cloud Data Warehouses


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

Data Lake

Data
Lake
Anything
else
We'll figure
this out

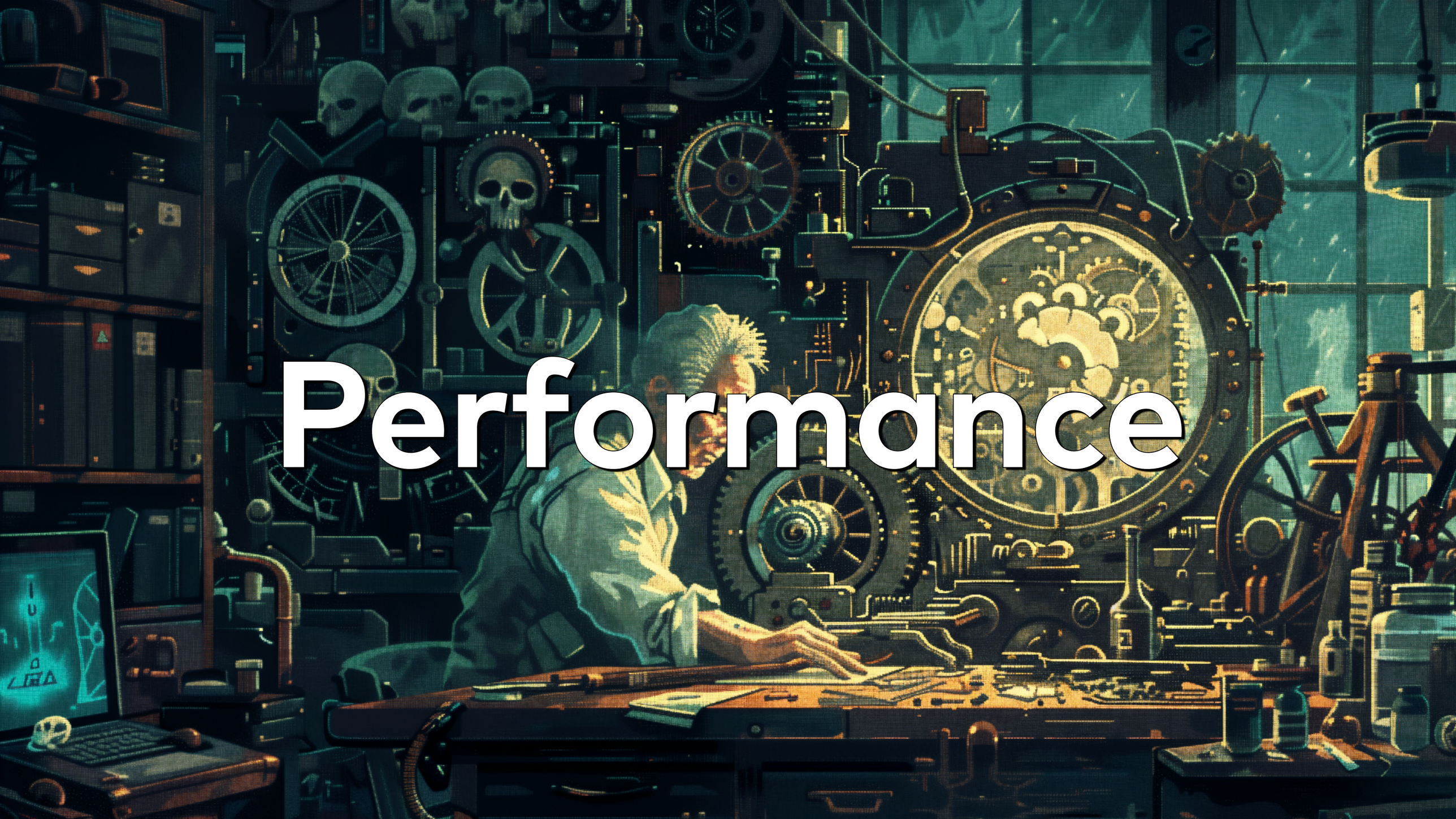
Data Lakes
Started as the HDFS cluster
Became S3
That didn't help...
ELT vs. ETL
Iceberg/Hudi/DeltaLake


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

No Solutions
only Trade Offs

Sometimes you go
with what you know

This is not bad!



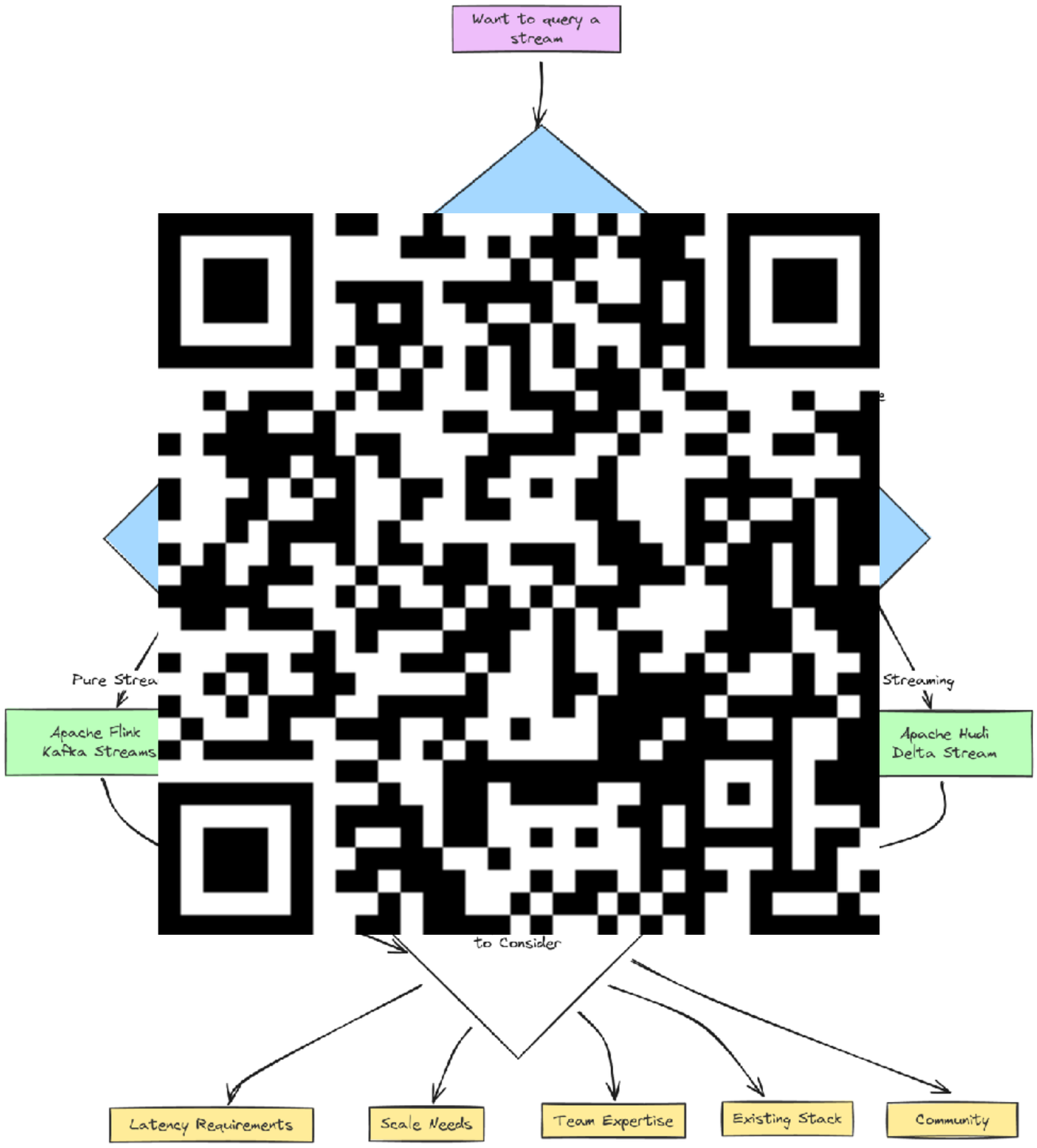
Performance

Community

Differentiated Application Code

Area of Exploration

Kafka


Want to query a stream
Pure Strea
Streaming
Apache Flink
Kafka Streams
Apache Hudi
Delta Stream
to Consider
Latency Requirements
Scale Needs
Team Expertise
Existing Stack
Community

Skip Paywall

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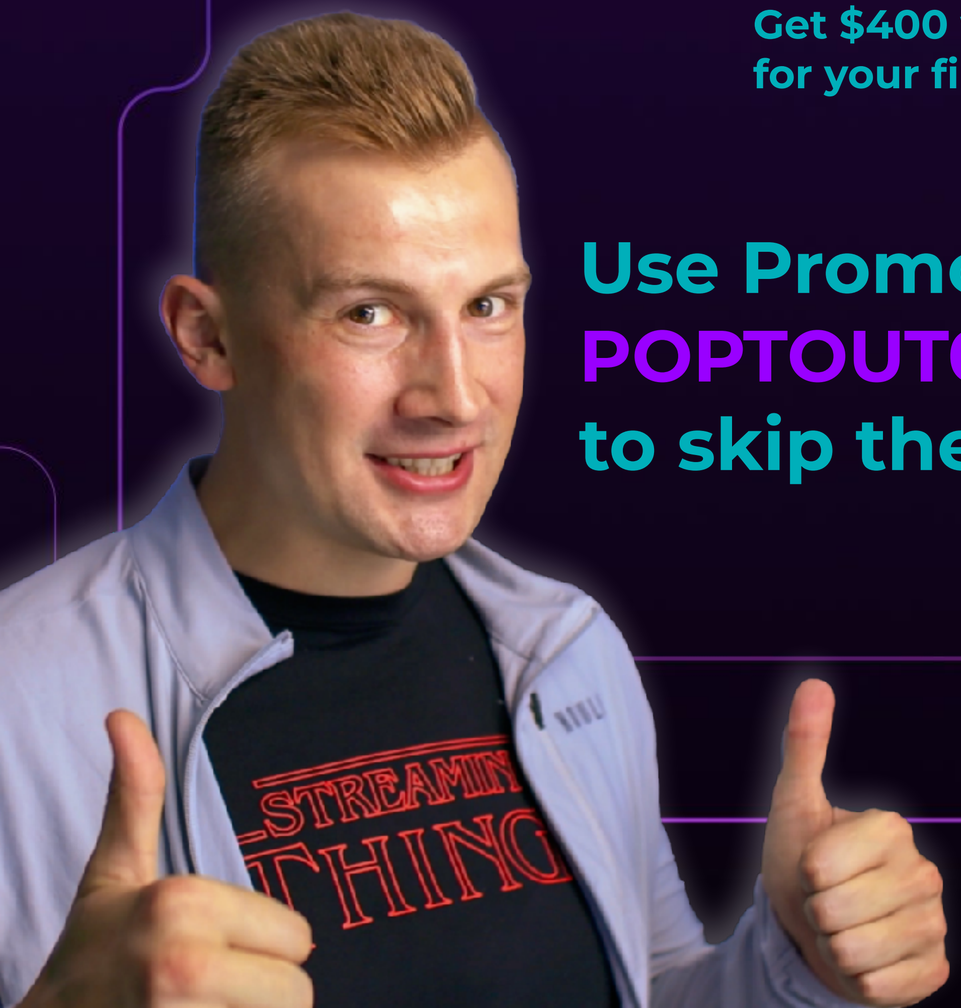

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