CLOUDERA

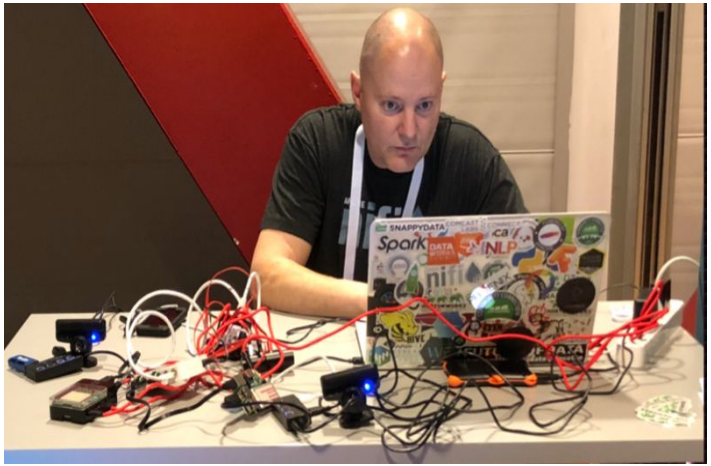
Using Apache NiFi, Apache Kafka, RisingWave, and Apache Iceberg with Stock Data and LLM

Karin Wolok
Developer Relations, Dev Marketing, and Community Programming @ Project Elevate

Tim Spann
Principal Developer Advocate, Cloudera

29-February-2024

Tim Spann



Twitter: @**PaasDev** // Blog: **datainmotion.dev**
Principal Developer Advocate.
Princeton Future of Data Meetup.
ex-Pivotal, ex-Hortonworks, ex-StreamNative, ex-PwC, ex-HPE
https://medium.com/@tspann
https://github.com/tspannhw

Future of Data – NYC + NJ + Philly + Virtual

https://www.meetup.com/futureofdata-princeton/
https://www.meetup.com/futureofdata-newyork/

From Big Data to AI to Streaming to Containers to Cloud to Analytics to Cloud Storage to Fast Data to Machine Learning to Microservices to ...

ICEBERG

@PaasDev

FLaNK Stack Weekly by Tim Spann

https://bit.ly/32dAJft

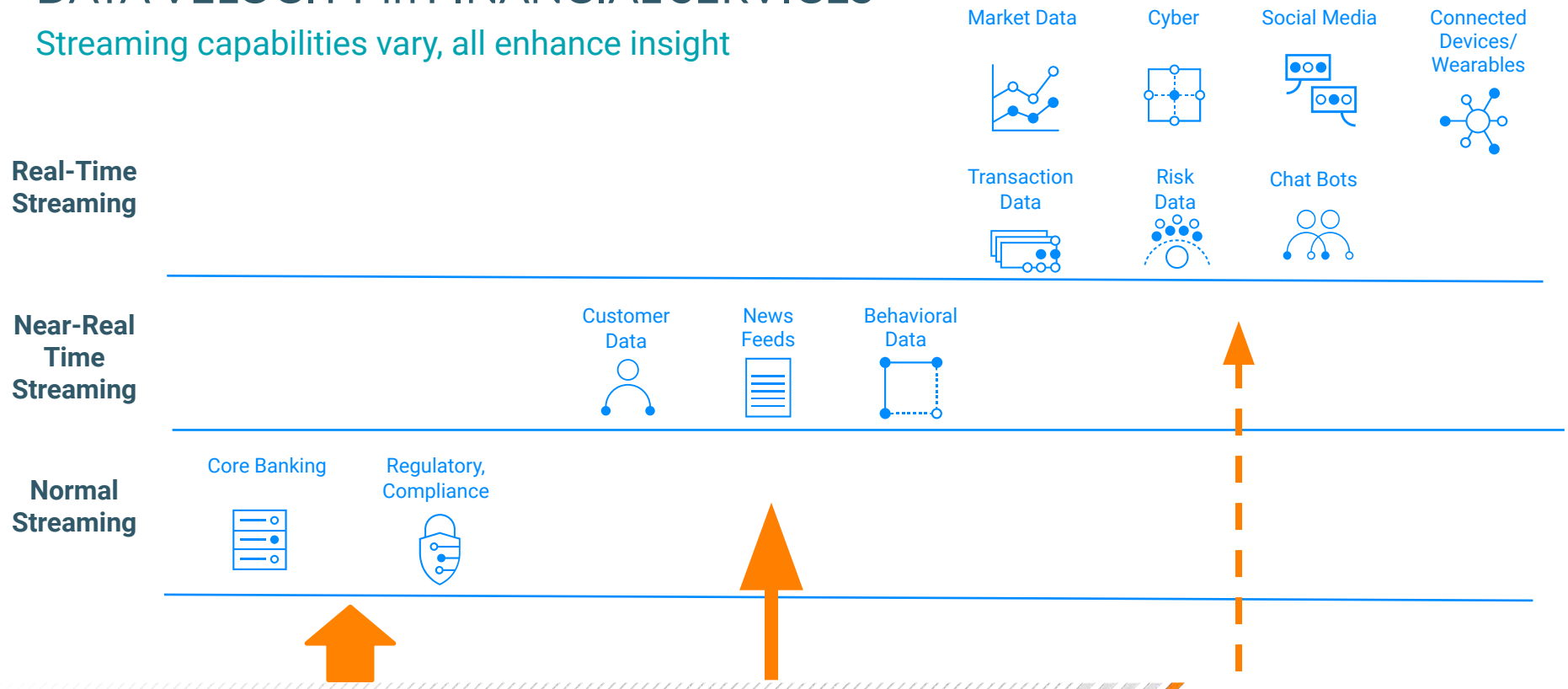
https://www.meetup.com/futureofdata-princeton/

This week in Apache NiFi, Apache Flink, Apache Kafka, ML, AI, Apache Spark, Apache Iceberg, Python, Java, LLM, GenAI, Vector DB and Open Source friends.

OVERVIEW

DATA VELOCITY in FINANCIAL SERVICES

Streaming capabilities vary, all enhance insight



NIFI MEETS AI

Unstructured file types

Structured Sources

GURU

Other enterprise data

Data in Motion With Cloudera

Capture, process & distribute any data, anywhere

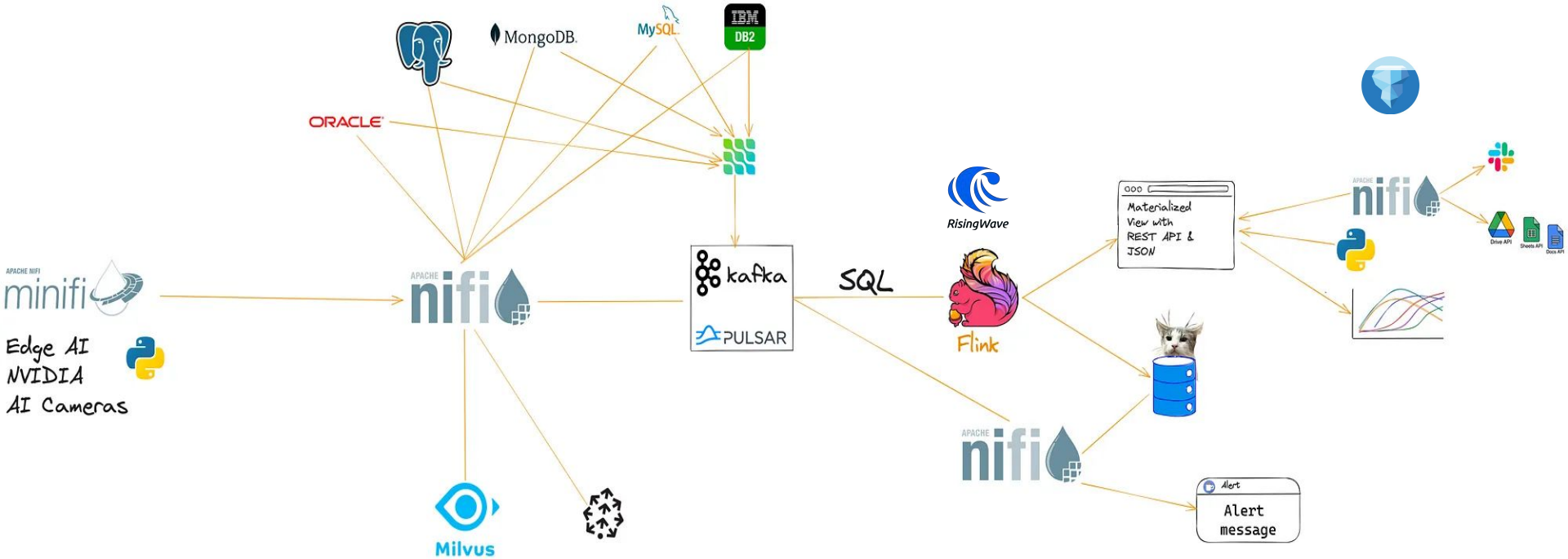
AI Model Vector DB

Applications/API's

Streams

Materialized Views

Open Data Lakehouse


MongoDB.
MySQL
IBM
DB2
ORACLE
APACHE NIFI
minifi
Edge AI
NVIDIA
AI Cameras
APACHE
nifi
kafka
PULSAR
SQL
RisingWave
Flink
Materialized
View with
REST API &
JSON
APACHE
nifi
APACHE
nifi
Milvus
Alert
Alert
message

[FLaNK for Halifax Canada Transit — NiFi, Kafka, Flink, SQL, GTFS-RT | by Tim Spann | Cloudera | Dec, 2023 | Medium]

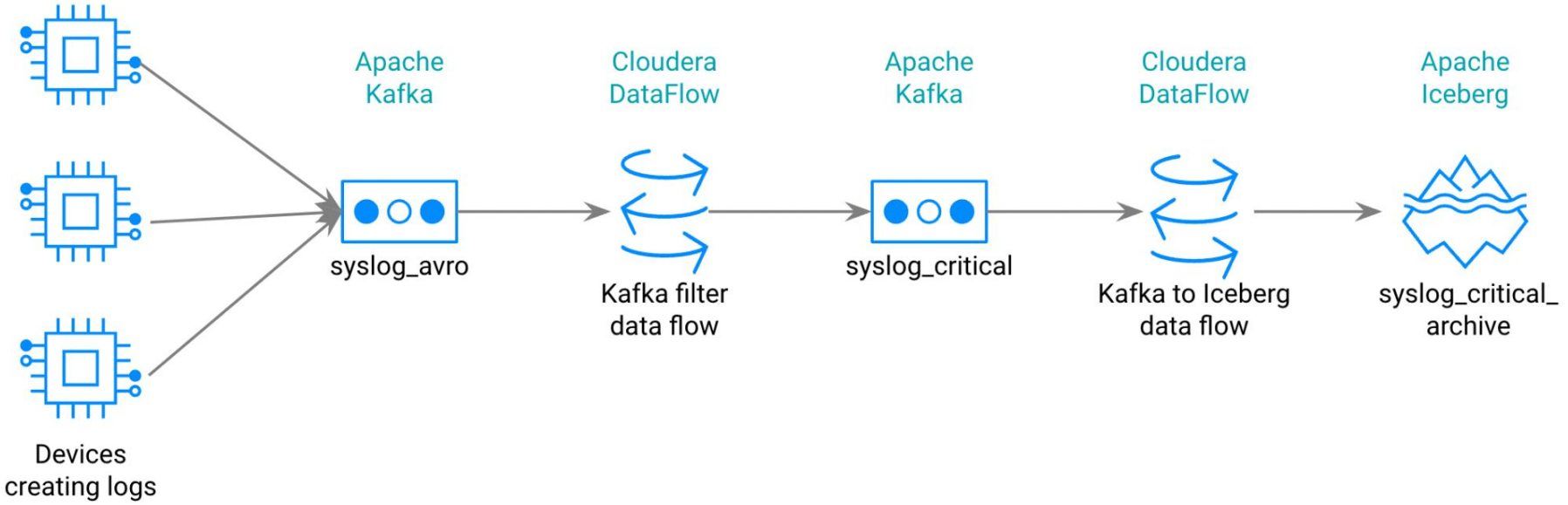
[Never Get Lost in the Stream. NiFi-Kafka-Flink for getting to work… | by Tim Spann | Cloudera | Dec, 2023 | Medium]

[Iteration 1: Building a System to Consume All the Real-Time Transit Data in the World At Once | by Tim Spann | Cloudera | Medium]

[Watching Airport Traffic in Real-Time | by Tim Spann | Cloudera | Medium]

APACHE ICEBERG

ICEBERG



ReadyFlow Gallery

Iceberg

Added

Kafka to Iceberg

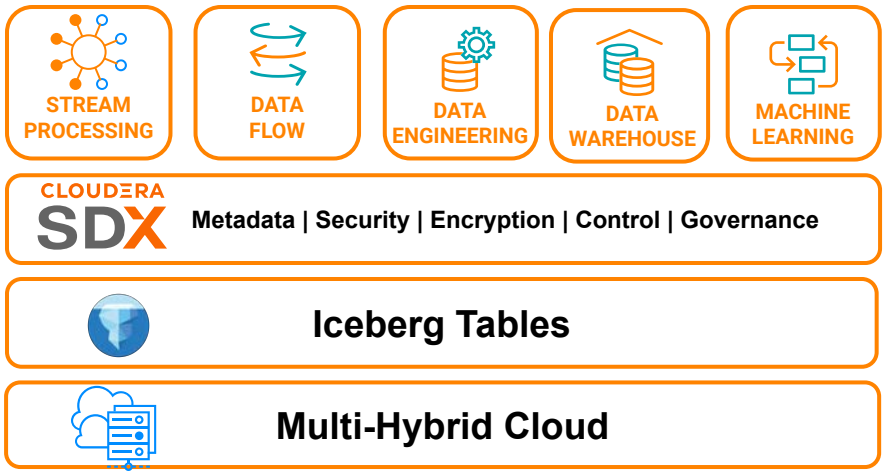
Version 1

Consumes JSON, CSV or Avro events from Kafka and writes them as Parquet files to a destination Iceberg table.

View Added Flow Definition

Create New Draft

Cloudera's Open Data Lakehouse



- Multi-function analytics for Streaming, Data Engineering, Data Warehouse and AI/ML with integrated data services
- Common security and governance policies and data lineage with SDX integration
- Common dataset with all CDP analytics engines without data duplication and movement
- Deployment freedom with Multi-Hybrid Cloud

Compute Engine Interoperability & SDX Integration

- **Snapshot isolation** ensures **consistent** data access and processing with various compute engines including **Hive**, **Spark**, **Impala** and **Nifi**
- **Security & Governance** support (e.g. FGAC) through **Ranger** integration
- Data **lineage** support through **Atlas** integration

DATAFLOW APACHE NIFI

Apache NiFi - developed 17 years ago by the NSA

2006
NiagaraFiles (NiFi) was first incepted
at the National Security Agency (NSA)

APACHE INCUBATOR

November 2014
NiFi is donated to the Apache Software Foundation (ASF) through NSA's Technology Transfer Program and enters ASF's incubator.

APACHE nifi

July 2015
NiFi reaches ASF top-level project status

Apache NiFi in a few numbers

A very active project with a dynamic community & comparison with ACEU 2019

2800+ members on the Slack channel (535+ - 4 years ago)
475+ contributors on Github across the repositories (260+ - 4 years ago)
65 committers in the Apache NiFi community (45 - 4 years ago)
Apache NiFi 1.25.0 is the latest release, NiFi 2.0.0-M2 is in alpha.
14M+ docker pulls of the Apache NiFi image (1M+ - 4 years ago)

PROVENANCE

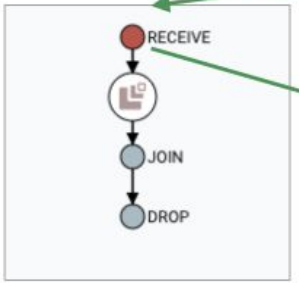
Displaying 13 of 104
Oldest event available: 11/15/2016 13:34:50 EST

Showing the most recent events.

ConsumeKafka | by component name

Date/Time	Type	FlowFile Uuid	Size	Component Name	Component Type
11/15/2016 13:35:03.8...	RECEIVE	379fc4f6-60e0-4151-9743-28...	44 bytes	ConsumeKafka	ConsumeKafka
11/15/2016 13:35:02.7...	RECEIVE	78f8c38b-89fc-4d00-a8d8-51...	44 bytes	ConsumeKafka	ConsumeKafka
11/15/2016 13:35:01.6...	RECEIVE	2bcd5124-bb78-489f-ad8a-7...	44 bytes	ConsumeKafka	ConsumeKafka

- Tracks data at each point as it flows through the system
- Records, indexes, and makes events available for display
- Handles fan-in/fan-out, i.e. merging and splitting data
- View attributes and content at given points in time



Provenance Event

DETAILS | ATTRIBUTES | CONTENT

Attribute Values

filename
328717796819631
No value previously set

kafka.offset
44815
No value previously set

kafka.partition
6
No value previously set

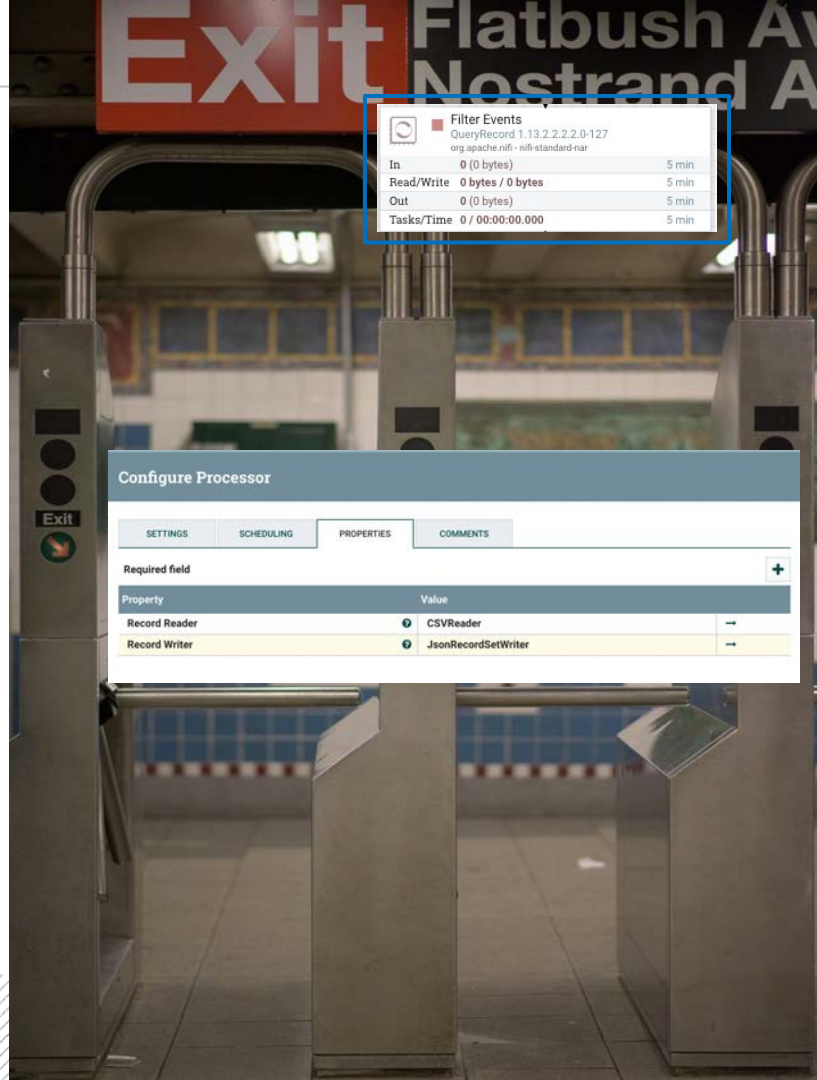
kafka.topic
nifi-testing
No value previously set

path
./
No value previously set

uuid

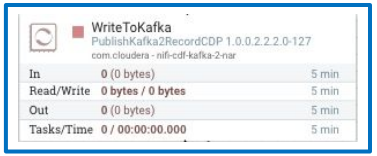
RECORD-ORIENTED DATA WITH NIFI

- **Record Readers** - Avro, CSV, Grok, IPFIX, JSAN1, JSON, Parquet, Scripted, Syslog5424, Syslog, WindowsEvent, XML
- **Record Writers** - Avro, CSV, FreeFromText, Json, Parquet, Scripted, XML
- Record Reader and Writer support referencing a schema registry for retrieving schemas when necessary.
- Enable processors that accept any data format without having to worry about the parsing and serialization logic.
- Allows us to keep FlowFiles larger, each consisting of multiple records, which results in far better performance.

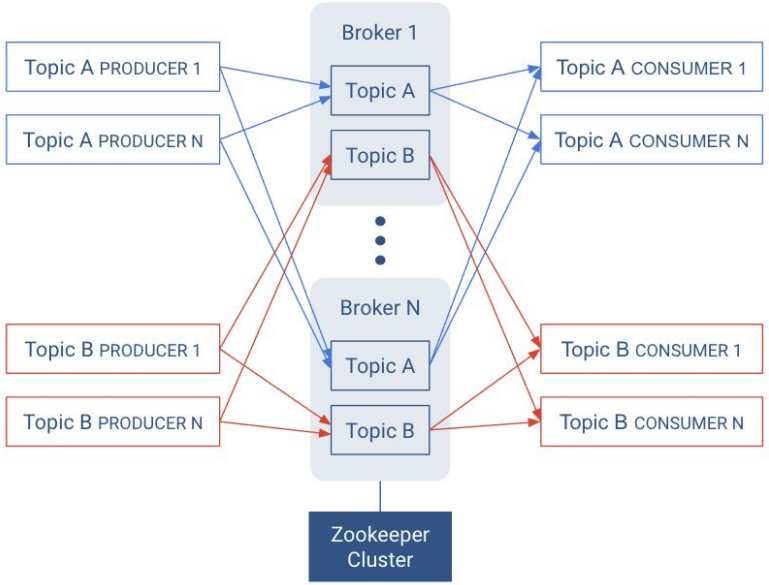


APACHE KAFKA

STREAMS MESSAGING WITH KAFKA



- Highly reliable distributed messaging system.
- Decouple applications, enables many-to-many patterns.
- Publish-Subscribe semantics.
- Horizontal scalability.
- Efficient implementation to operate at speed with big data volumes.
- Organized by topic to support several use cases.



DEMO

https://medium.com/@tspann/cdc-not-cat-data-capture-e43713879c03


APACHE NIFI
STREAMING DATA
APACHE
ICEBERG


APACHE
ICEBEG
APACHE


Apache NiFi


Apache ICEBERG
Apache Iceberg


nifi


ICEBERG


STREAMING
APACHE KAFKA
APACHE NIFI
ACEPERGG


Apache Iceberg
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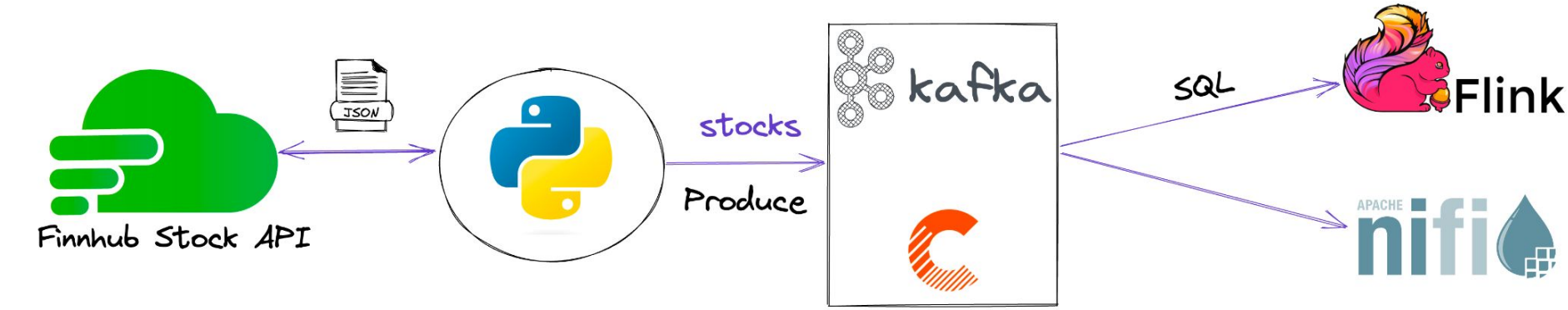
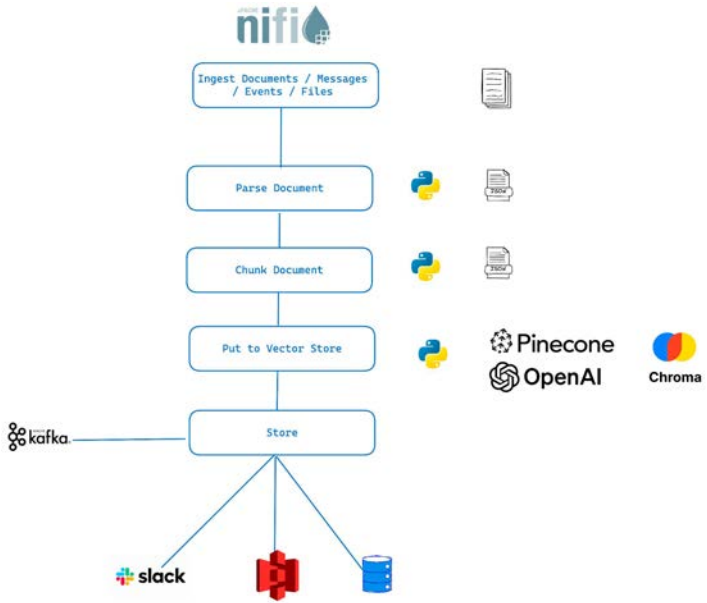
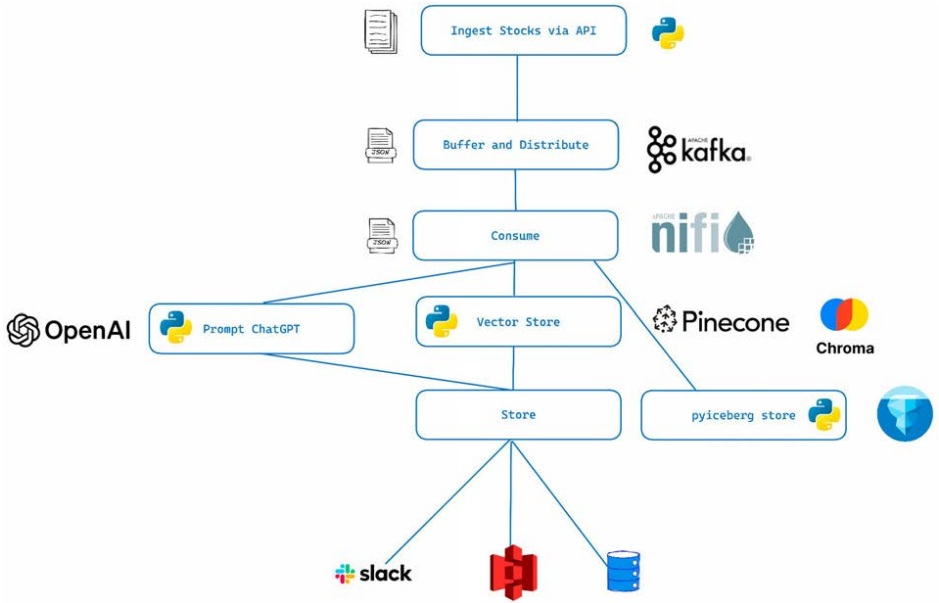
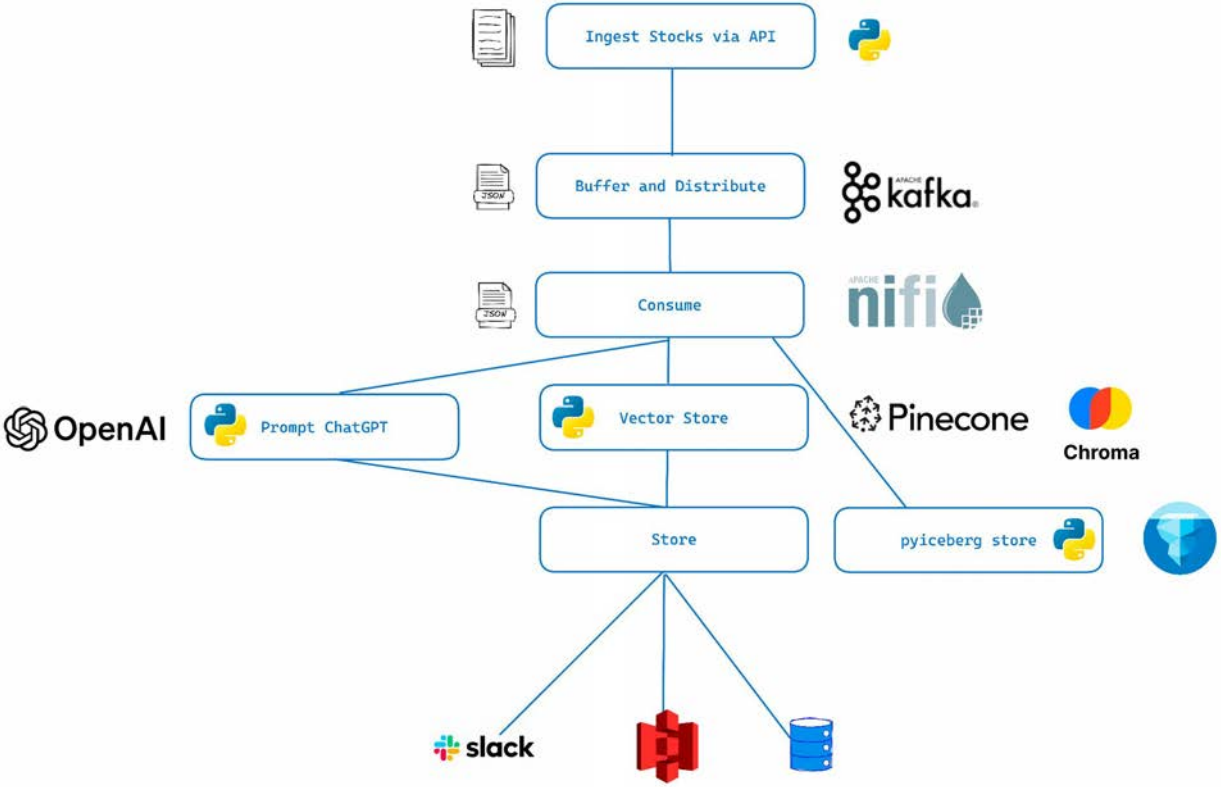
APACHE
NIFI


Finnhub Stock API
JSON
stocks
Produce
kafka
SQL
Flink
APACHE
nifi


nifi
Ingest Documents / Messages / Events / Files
Parse Document
Chunk Document
Put to Vector Store
Store
Pinecone
OpenAI
Chroma
kafka
slack


Ingest Stocks via API
Buffer and Distribute
Consume
kafka
nifi
OpenAI
Prompt ChatGPT
Vector Store
Pinecone
Chroma
Store
pyiceberg store
slack



https://github.com/tspannhw/PaK-Stocks
https://github.com/tspannhw/FLaNK-Py-Stocks
https://medium.com/cloudera-inc/let-nifi-worry-about-those-stocks-for-you-57d5f16b5e6b


THE FUTURE OF GEN AI IS
STREAMING WITH NIFI

THANK YOU


GEN AI NEEDS STREAMING