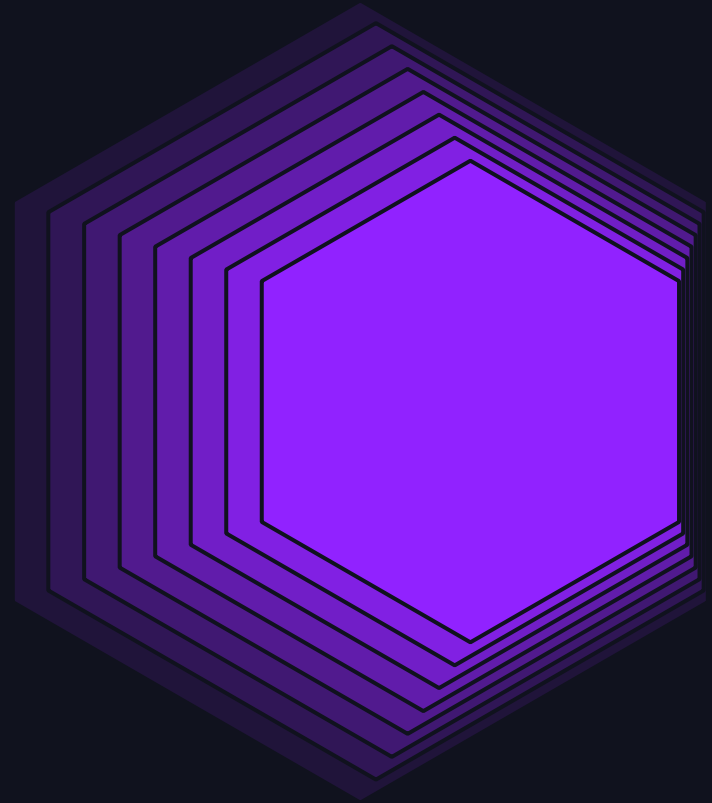


RISE OF THE MEDALLION MESH



Franco Patano, Databricks, Strategic Data & AI Advisor

Top concerns in data and AI modernization*

For leaders and practitioners across industries

- Data security, governance, and quality
- Performance, scalability, and total cost of ownership
- Skills and expertise gap
- Data integration and migration
- Provide diverse tooling to support variety of users on a single version of the truth for all use cases

whoami

- Background in ETL, Data Warehousing, BI, and Analytics
 - MSBI Stack (SQL Server, Reporting Services, Integrations Services, Analysis Services)
 - Informatica
 - Tableau
 - Cognos
 - Excel and VBA
- Grew up in Enterprises in Chicago Area
 - Career Education Corporation (Perdoceo Education Corporation)
 - Wintrust
 - JLL (Jones Lang Lasalle)
- Dreamed of joining a startup and changing the world
 - Joined Databricks in 2019 to change the world with Lakehouse!

- Likes
 - Time Travel fiction (and non-fiction)
 - Back to the future
 - Doctor Who
 - Bill and Ted
 - Predestination
 - Making Pizza from Scratch
 - EDM
 - Daft Punk, Alesso, Cazzette, DJ Caffeine
 - Rocky, The Princess Bride, and The Fifth Element are the most EPIC films of all time
- Dislikes
 - Data Warehouses
 - Ever since I first became an analyst, all I wanted to do was get rid of that pesky data warehouse



Franco Patano
Strategic Data and AI Advisor



10,000+
global customers

Inventor of the **lakehouse**
&
Pioneer of **generative AI**

\$1.5B+
in revenue



databricks

The data and AI company

\$4B
in investment

Gartner-recognized Leader
Database Management Systems
Data Science and Machine Learning Platforms

Creator of



DELTA LAKE

mlflowTM

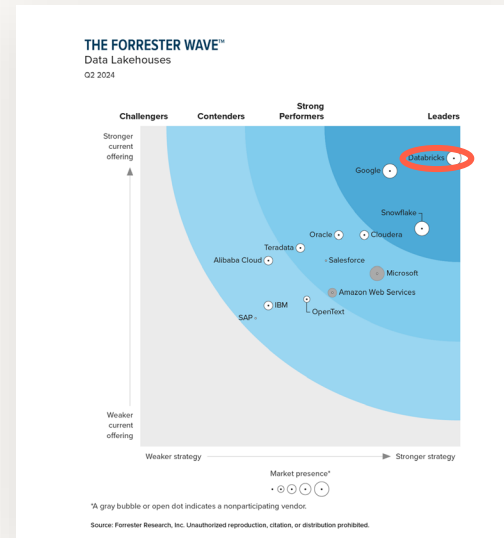
APACHE
SparkTM

DBRX



Recognized as a leader in the industry

Gartner MQ
Leader
Database
Management
Systems

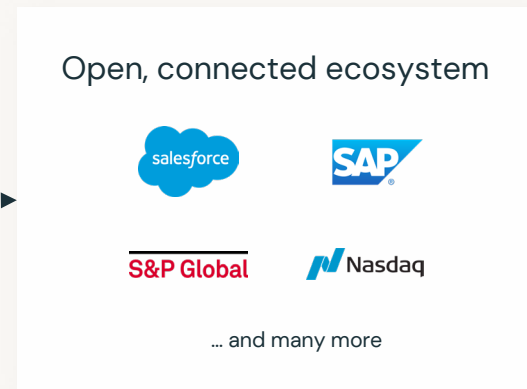
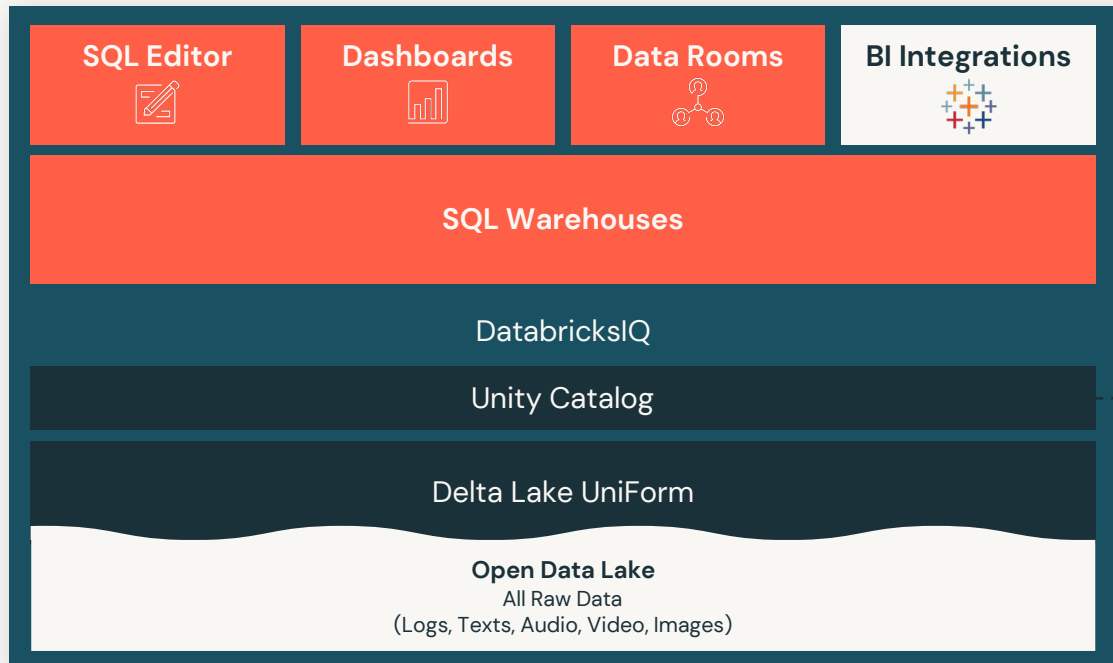


Forrester
Wave Leader
Data
Lakehouses



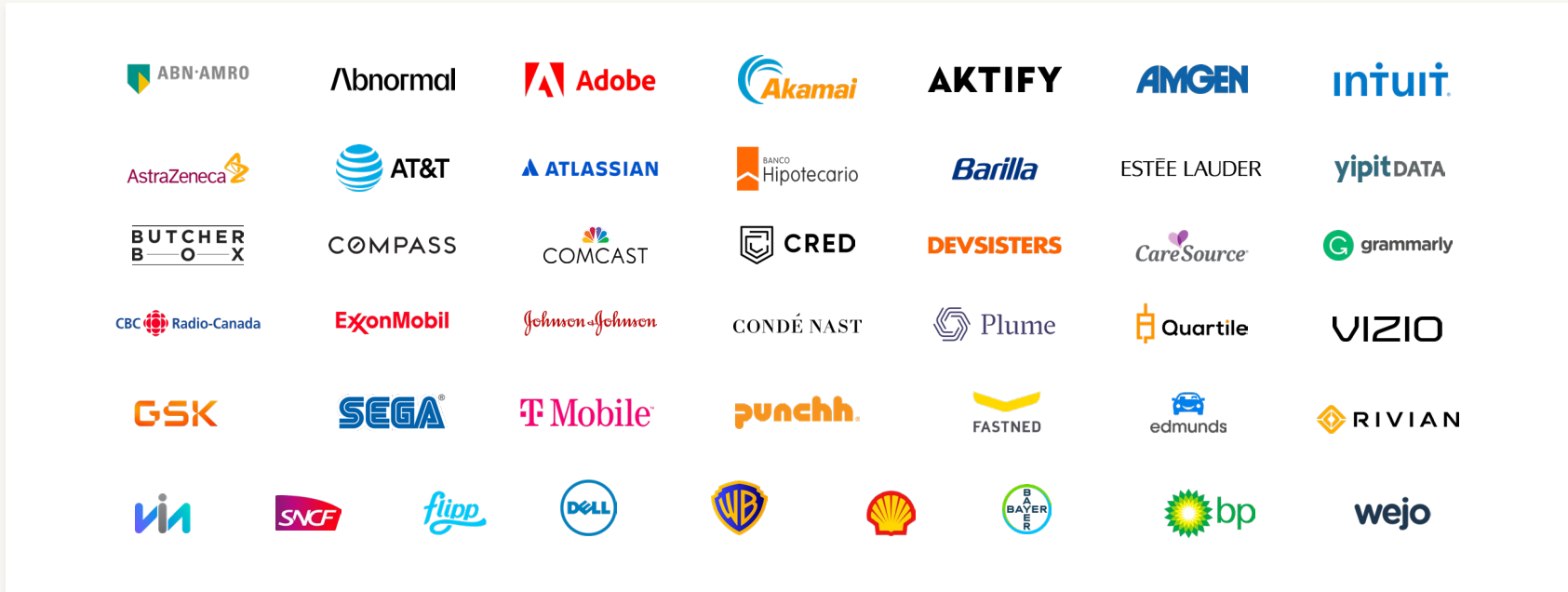
Databricks SQL

Intelligent data warehousing on the Data Intelligence Platform



Trusted by organizations of all sizes

4,600+ Databricks SQL customers across industries

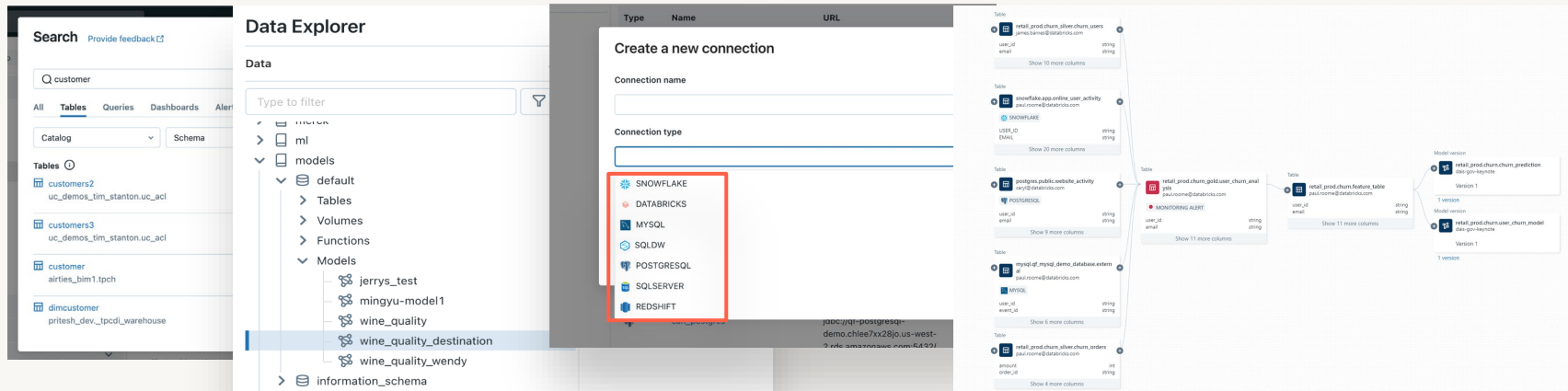


DATA SECURITY, GOVERNANCE, AND QUALITY



Governed and secured by Unity Catalog

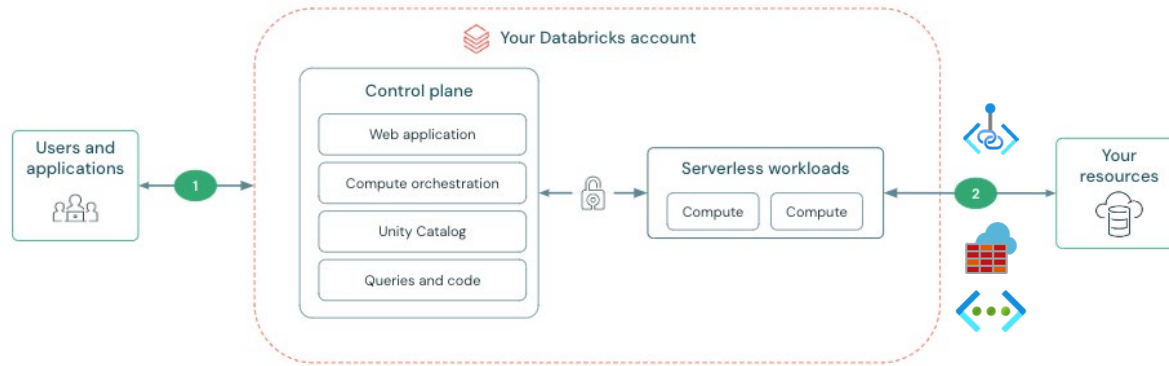
Governance for all your data and AI assets



Simplified **data discovery**, **governance**, **federation**, **lineage**, and **compliance** with enhanced **security** and **auditing** with Unity Catalog and Databricks SQL

Simple security with private connectivity

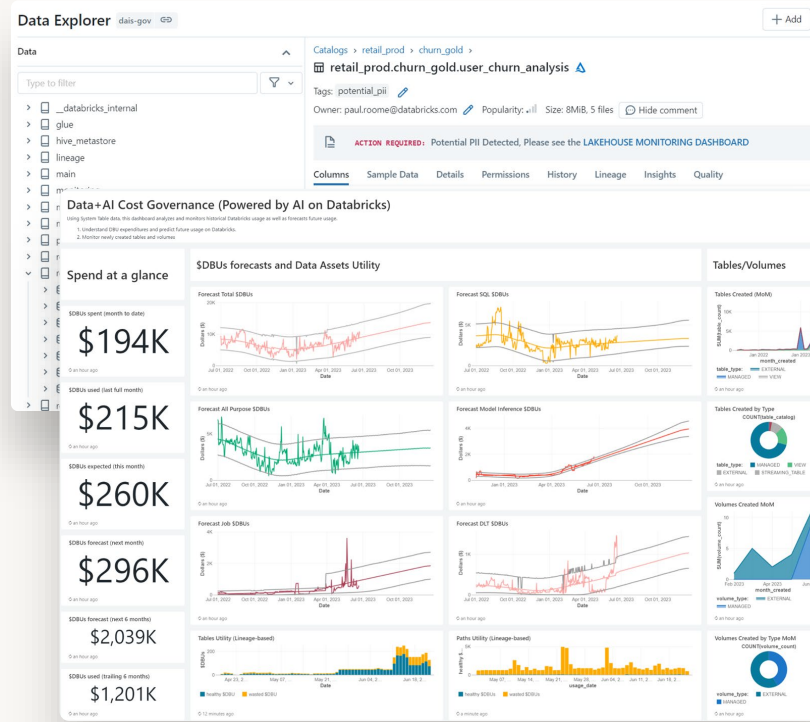
Private Link or firewall support for stable VNET IPs



- Reduce data exfiltration risk
- Improved performance by minimizing network latency
- Meet compliance requirements for sensitive workloads
- PrivateLink included with Serverless SQL Warehouse cost on Azure

Simple AI-powered monitoring and observability

- Receive **proactive alerts** for quality issues with data and ML models
- Access **real-time data lineage** down to the column level for efficient root cause analysis and impact assessment
- Utilize **auto-generated** dashboards to easily share data and ML quality reports with stakeholders
- Achieve complete data and AI **observability** with operational intelligence for billing, auditing, lineage, and more



Simple data monitoring

Lakehouse monitoring for reliable, insightful, and simple data-to-AI-BI pipelines



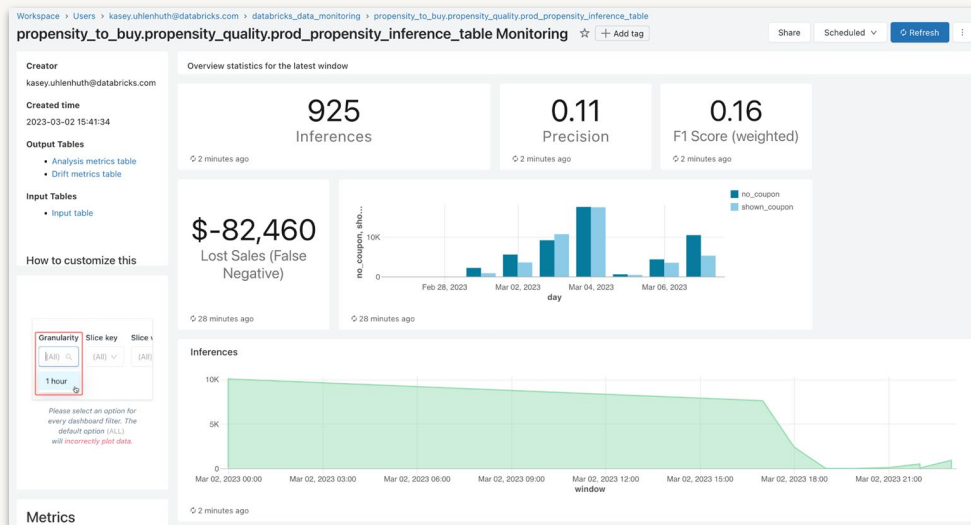
Simple: Log inference tables automatically, and generate metric tables and SQL dashboards.



Proactive: Automate alerts on table quality and custom metrics, and diagnose data or model issues.

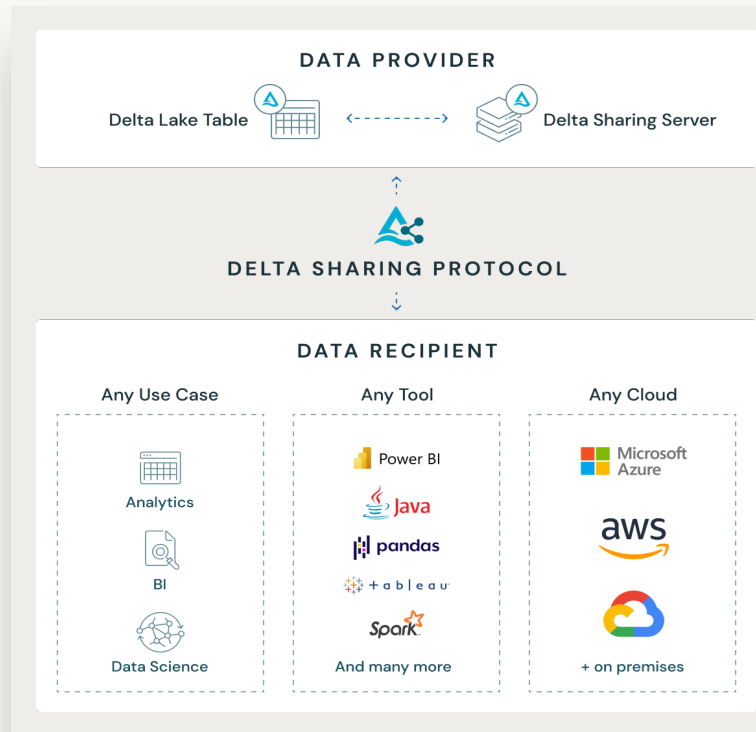


Integrated: Track end-to-end lineage in the Unity Catalog for training data, feature tables, models, and inference logs, for simpler governance.



Simple and open data sharing

- **Avoid vendor lock-in** with open-source Delta Sharing for seamless data sharing across clouds, regions, and platforms, without replication
- Share **more than just data**: notebooks, ML models, dashboards, applications
- Explore and monetize data products through an **open marketplace**
- Collaborate securely on sensitive data with **scalable data clean rooms**



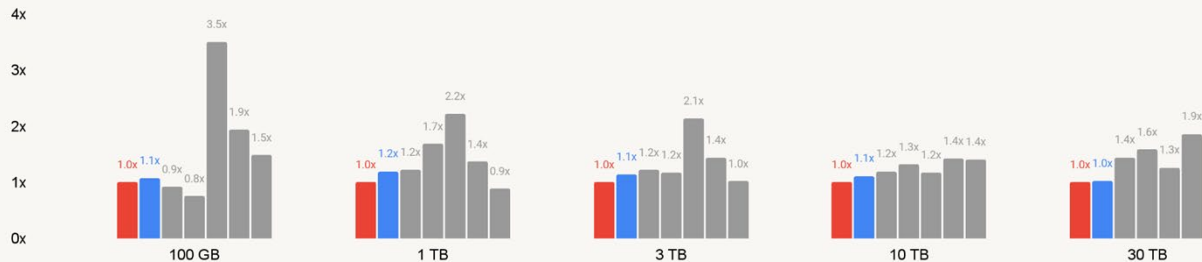
PERFORMANCE, SCALABILITY, AND TOTAL COST OF OWNERSHIP

World-class performance & TCO

Meets or beats the price/performance of major CDWs across scales!

P
E
R
F

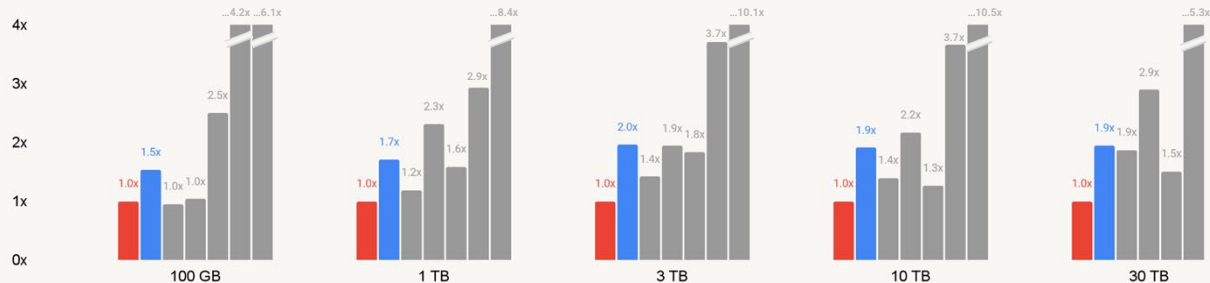
TPC-DS Elapsed Time (Lower is Better)



- Databricks
- CDW 1
- CDW 2
- CDW 3
- CDW 4
- CDW 5
- CDW 6

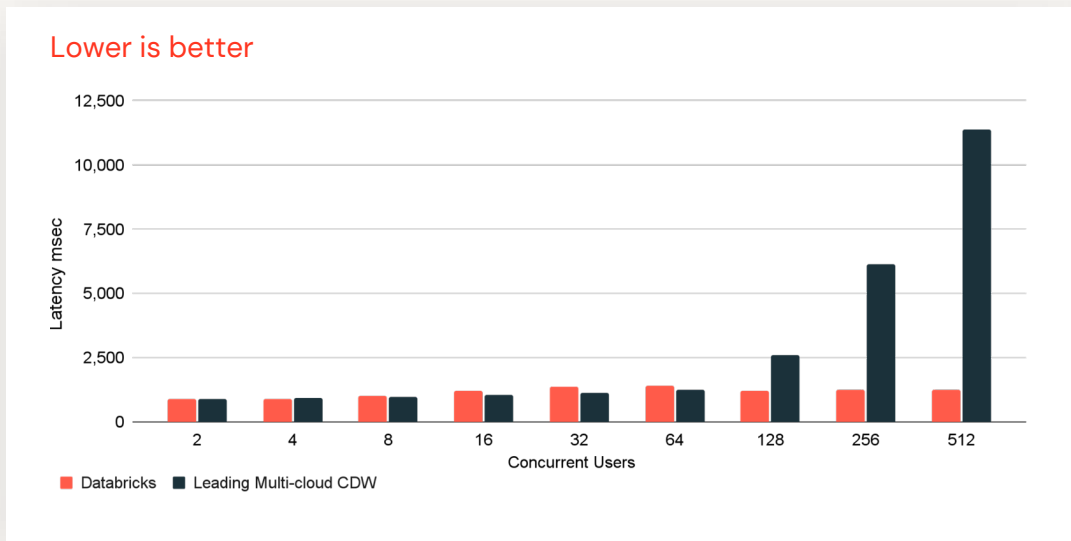
C
O
S
T

TPC-DS Total Cost (Lower is Better)



World-class performance for BI

High **concurrency** with low latency



Adevinta

“Our analysts rely on Databricks SQL to derive **business intelligence** . . . **we have 30% better performance** and have reduced costs by 20% on average.”

—Allard de Boer
Global Director of Analytics,
Adevinta

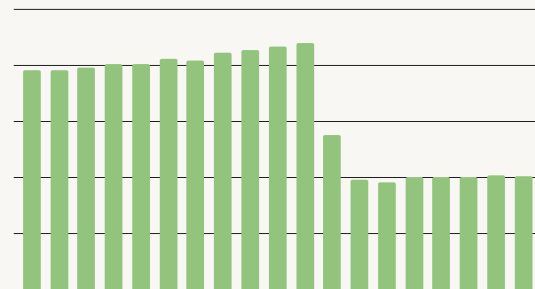
Simple performance with Predictive Optimization

AI-optimized Delta table layouts for best price-performance

Runs OPTIMIZE, VACUUM, ANALYZE, Liquid clustering

AI model prioritizes tables to maximize ROI

Out-of-box observability with system tables



Customer storage costs
(actual data from Preview customer)

“Databricks’ Predictive Optimizations intelligently optimized our Unity Catalog storage, which **saved us 50% in annual storage costs** while **speeding up our queries by >2x**. It learned to prioritize our largest and most-accessed tables. And, it did all of this **automatically**, saving our team valuable time.”

—Anker

SKILLS AND EXPERTISE GAP

Intelligent experiences with natural language

Powered by DatabricksIQ

Assistant

The Assistant can accelerate your work by diagnosing errors, suggesting code or queries, and answering questions. Mistakes are possible, so be sure to check facts and adjust your feedback. (Share info)

User

write a query to return the top 10 most expensive taxi cab fare amounts from main-nyctaxi.trips

Assistant

```
SQL
```

```
SELECT fare_amount  
FROM main-nyctaxi.trips  
ORDER BY fare_amount DESC  
LIMIT 10
```

This query returns the fare amount of trips and sorts them in a descending order, returning the top 10 most expensive trips.

#	fare_amount
1	275.00
2	260.00
3	188.00
4	182.00
5	175.00
6	165.00
7	165.00

Refreshed just now

SQL Editor

Data Science / Engineers

Canvas Data | Send feedback

New Dashboard 2023-12-07 10:19:38 | 10min | 9 - Shared 10 - Databricks | Refresh | Share | 1

Select a widget to configure

Lakeview Dashboards

Analysts

Fast AI | Smart AI

Quick actions

- Example questions
- Explain data set
- Surprise me

Project Genie

Coming Soon!

Business Users

Assistant in SQL Editor

Developers can create, explain and fix SQL code



Assistant in Query Editor

Assistant

The Assistant can accelerate your work by diagnosing errors, suggesting code or queries, and answering questions. Mistakes are possible, so be sure to check facts and [share your feedback](#). (More info)

User

write a query to return the top 10 most expensive taxi cab fair amounts from main.nyctaxi.trips

Assistant

```
sql

SELECT fare_amount
FROM main.nyctaxi.trips
ORDER BY fare_amount DESC
LIMIT 10
```

This query fetches the fare amount of trips and sorts them in a descending order, returning the top 10 most expensive trips.

Enter your message

New query

hive_metastore.default

```
1 SELECT fare_amount
2 FROM main.nyctaxi.trips
3 ORDER BY fare_amount DESC
4 LIMIT 10
```

Results

#	fare_amount
1	275.00
2	260.00
3	188.00
4	130.00
5	115.00
6	105.00
7	105.00

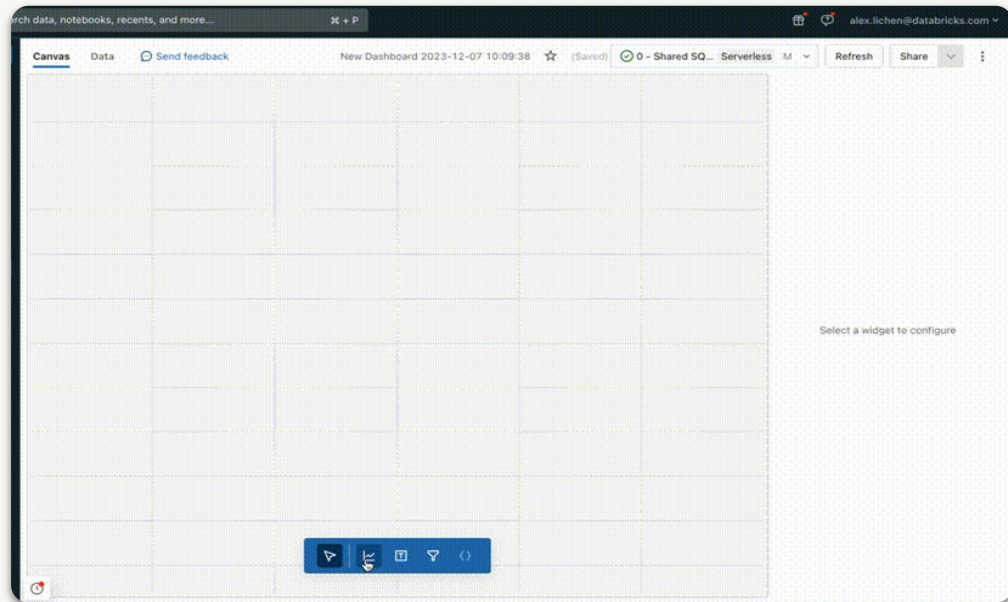
357 ms | 10 rows returned Refreshed just now

Assistant in Lakeview

Analysts can generate visualizations using natural language



Assistant
in Lakeview

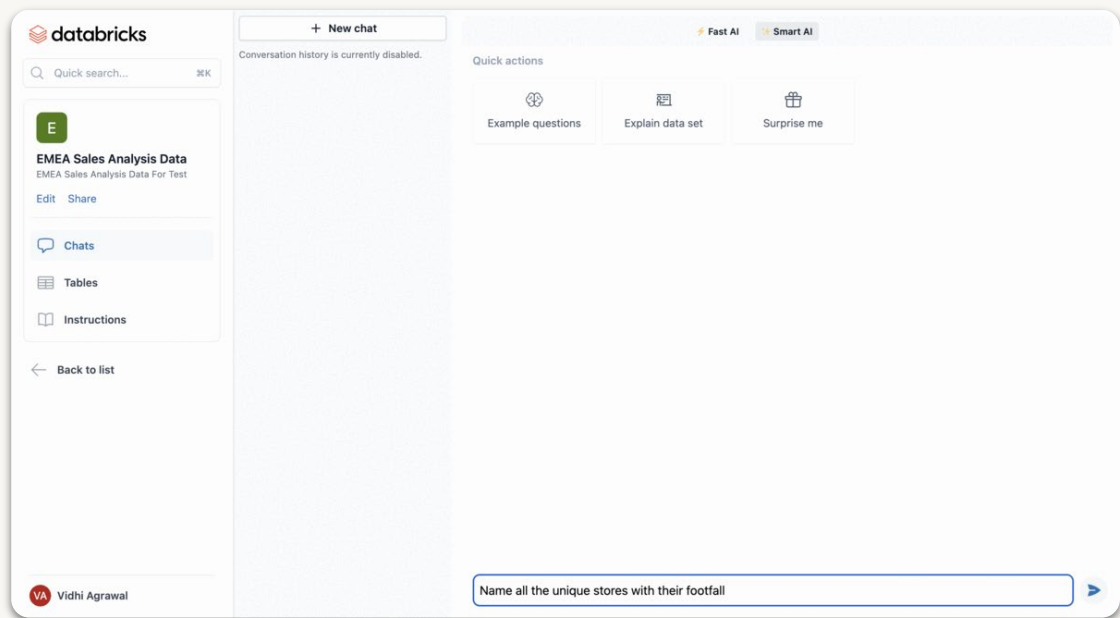


Project Genie (Coming Soon)

Business users can query and visualize data using natural language



Project Genie



DATA INTEGRATION AND MIGRATION

Simple migrations at your pace



Federate

with Lakehouse Federation

Lower the barrier to entry and get started fast
Unity can secure and govern the sources, and track the consumption



Materialized Views

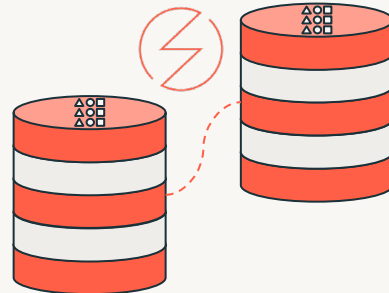
Query Federation



Materialize

with Materialized Views

When the users and business find value, lower the stress on federated data sources with Materialization in the cloud



Ingest

with Change Data Capture

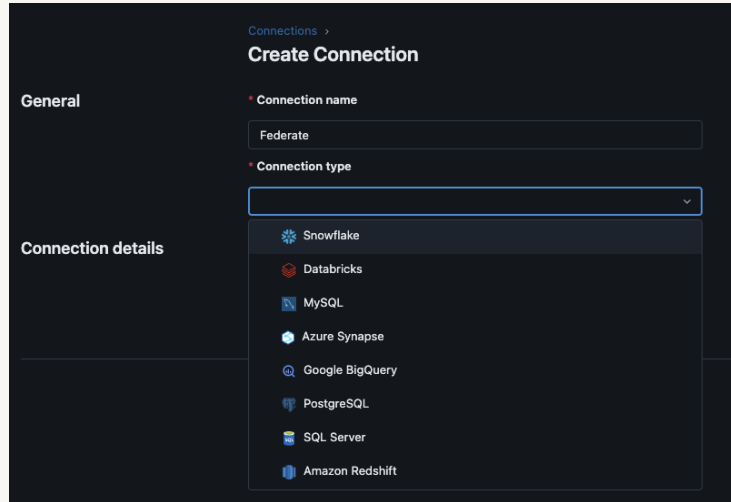
When the business and technical folks are aligned, lower the costs and migrate with low latency and high throughput incremental CDC

IN PRODUCTION TODAY

Announced at Summit

ALL OF THIS IS POWERED BY UNITY CATALOG

Simple data access with Federation



Discover, query, and govern **all** your data with **a unified view**, unified **engine** and **governance**—no matter where it lives

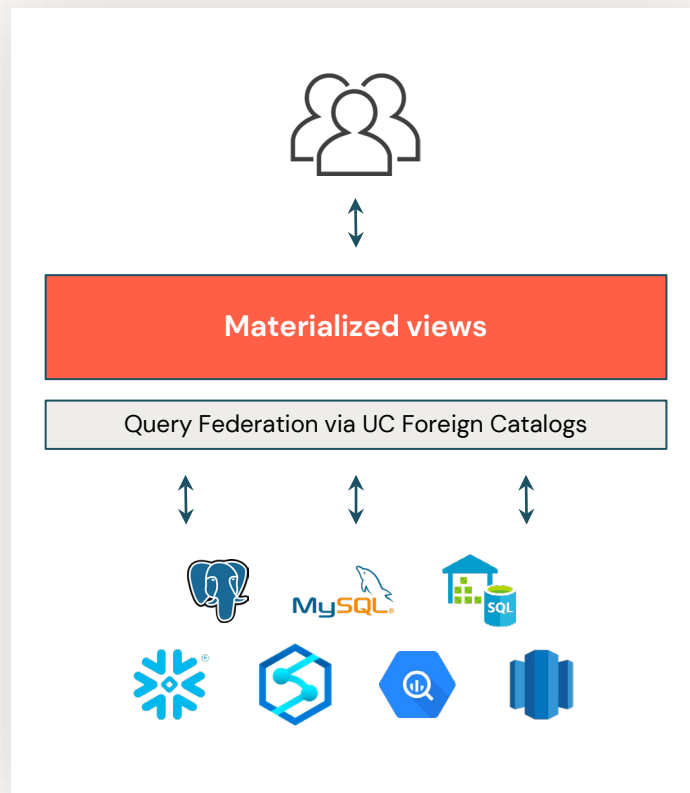


Simple and fast performance

Accelerating federated workloads

Federation ♥ Materialized views:

- Consistent latency & concurrency for data outside of the Lakehouse
- Accelerate cross-source joins and complicated transformation logic
- Offload access to underlying databases via materialized views to avoid high/concurrent loads on operational databases



Simple data ingestion

Built-in connectors for common database and SaaS sources

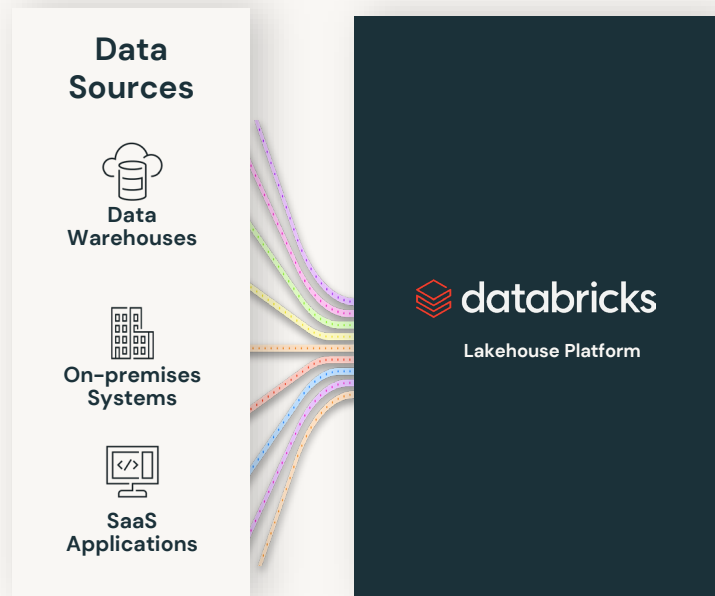
Quickly and reliably replicate data across on-prem, cloud databases, and data platforms into the Lakehouse

Fully integrated into the Lakehouse

Low-maintenance API or no-code UI

Utilizing Arcion's advanced CDC technology

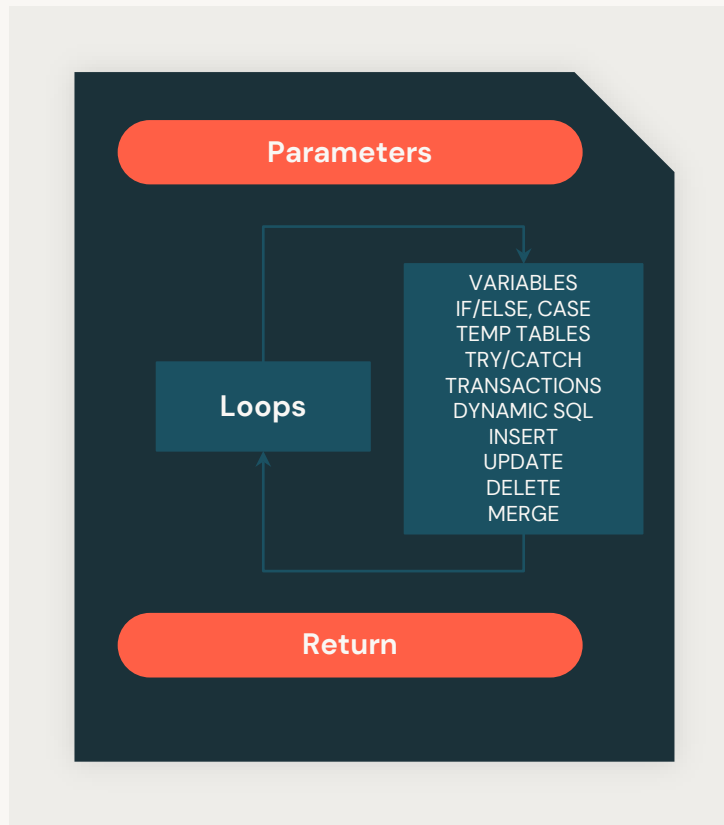
Private Preview in Q1



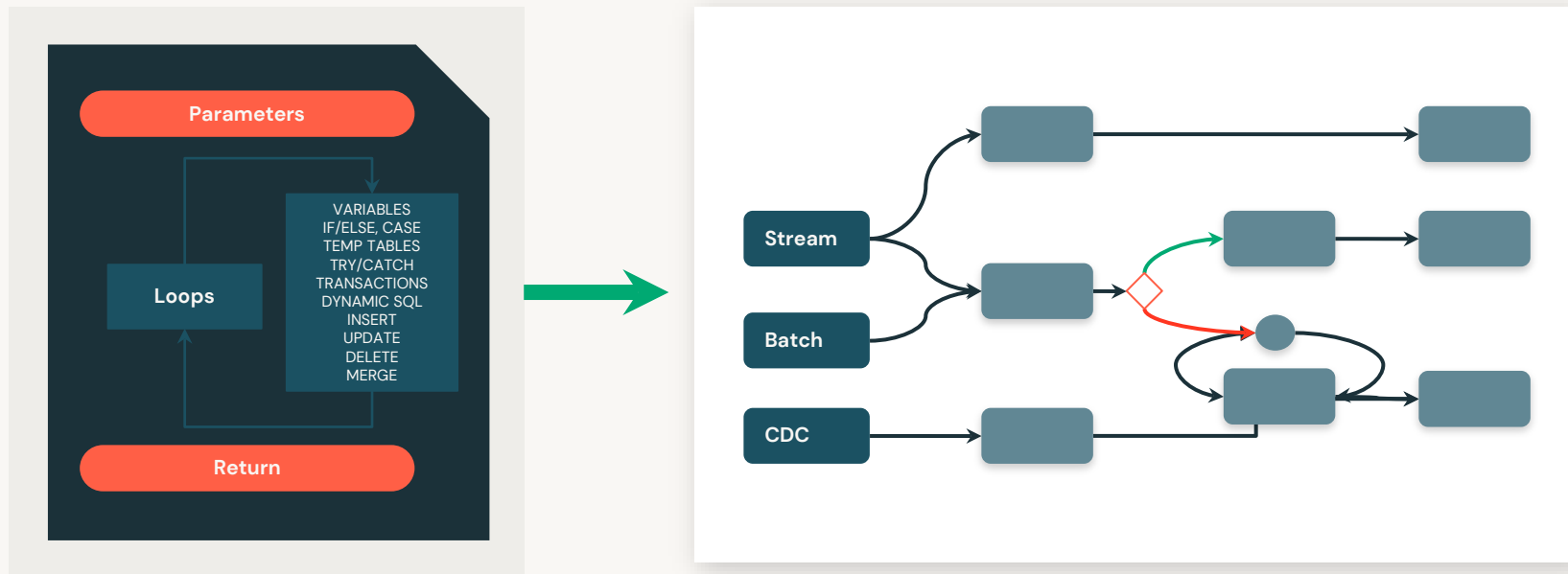
Warehousing technical debt

Stored procedures

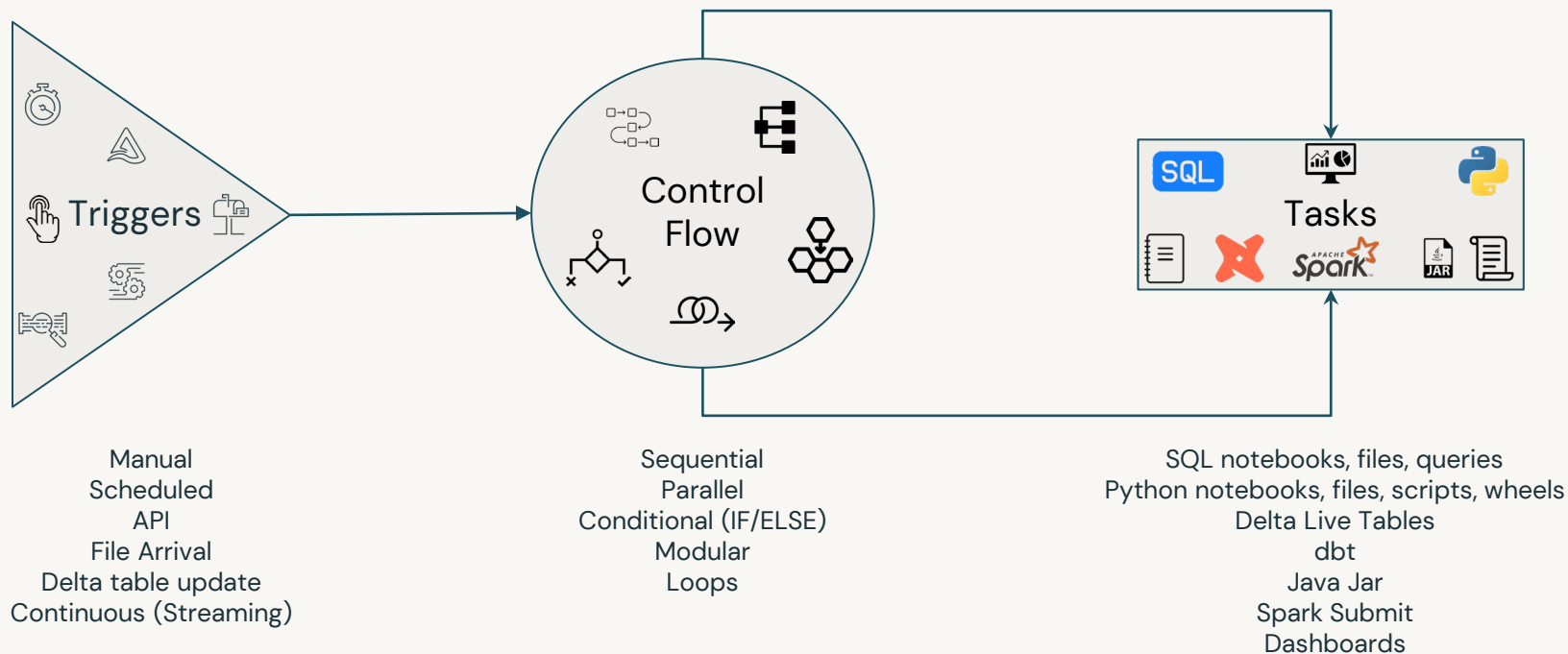
- **Why**
 - Performance & cost
 - Runs on warehouse, compared to external ETL tools
- **What**
 - Powerful SQL script that encapsulates complex and reusable database operations
- **Pain**
 - Difficult to debug
 - Costly in the cloud
 - Migration pain with vendor lock-in
 - Anti-Patterns in the cloud



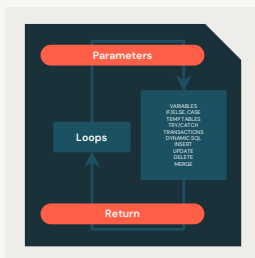
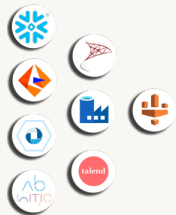
Refactor monolithic black box procedures to modularized Workflows



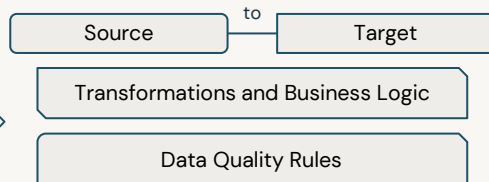
Simple authoring of Workflows



Simple Migrations with AI

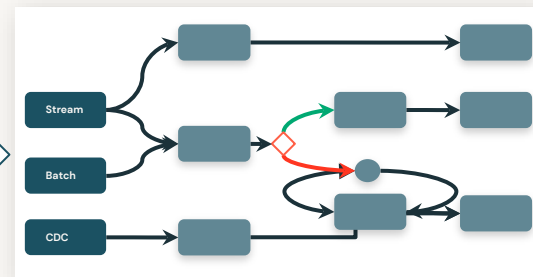


Use AI to extract Source to Target mappings and transformations and business logic from existing ETL + Warehouse



Map to a metadata driven framework

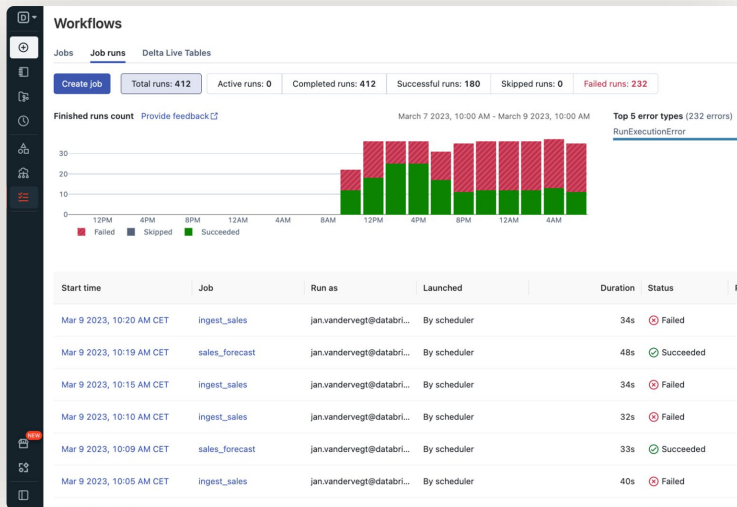
Use AI to generate workflow DAGs using Python support for Databricks Asset Bundles



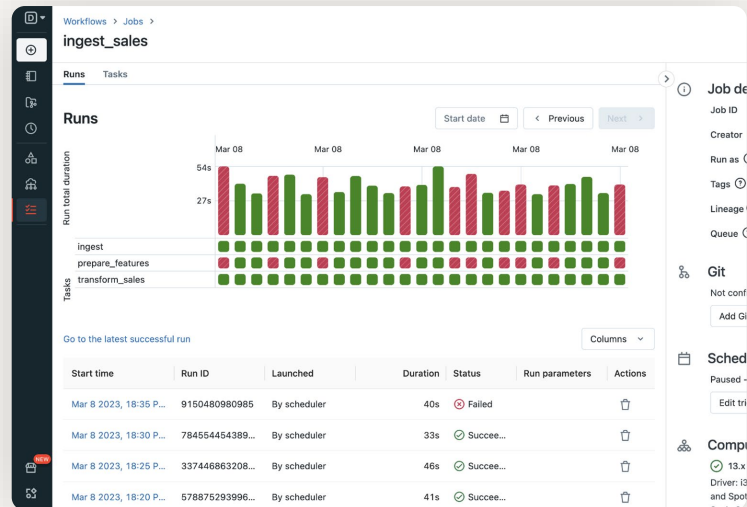
- Reduce risk of migration friction with LLM as judges to ensure transformation logic validity
- Accelerate time to value
- Backwards compatibility with Hive Federation, Delta Uniform or Delta Sharing to dependent systems
- Gain visibility with unified Governance and Orchestration
- Leverage existing Solutions Integrator frameworks



Simple real-time monitoring

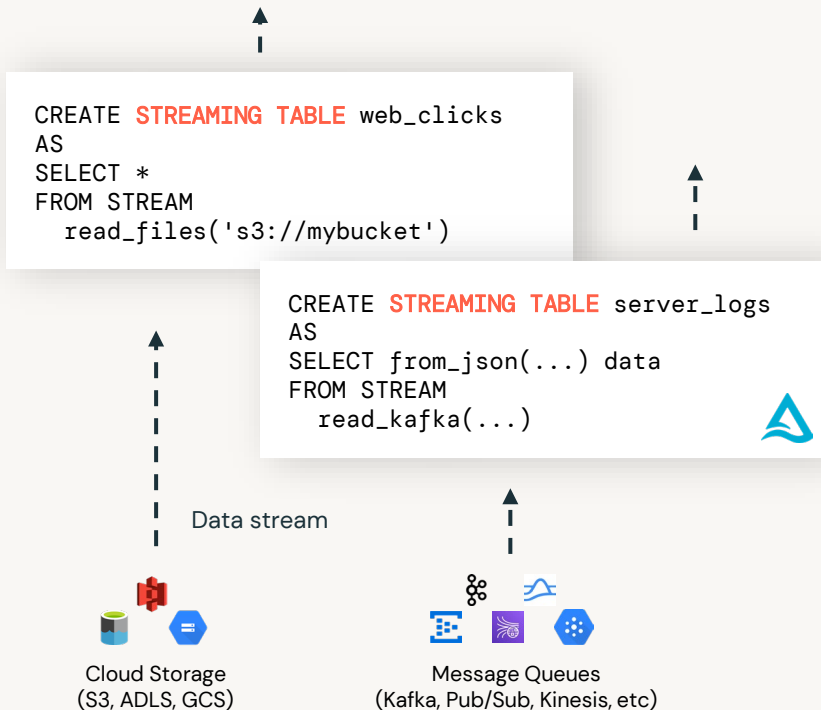


A simple and intuitive monitoring UI provides real-time metrics and detailed analytics for every workflow run



Drill down to understand which tasks are failing and why. Troubleshoot issues before your customers are impacted

Simple streaming with SQL



Benefits:

1. **Unlock real-time use cases.** Ability to support real-time analytics/BI, machine learning and operational use cases with streaming data.
2. **Better scalability.** More efficiently handle high volumes of data via incremental processing vs. large batches.
3. **Enable more practitioners.** Simple SQL syntax makes data streaming accessible to all data engineers and analysts.

Simple and fast BI with Materialized Views

```
CREATE MATERIALIZED VIEW customer_orders
AS
SELECT
  customers.name,
  sum(orders.amount),
  orders.orderdate
FROM orders
LEFT JOIN customers ON
  orders.custkey = customers.c_custkey
GROUP BY
  name,
  orderdate;
```



Results are pre-computed and incrementally refreshed

customers
(Table)



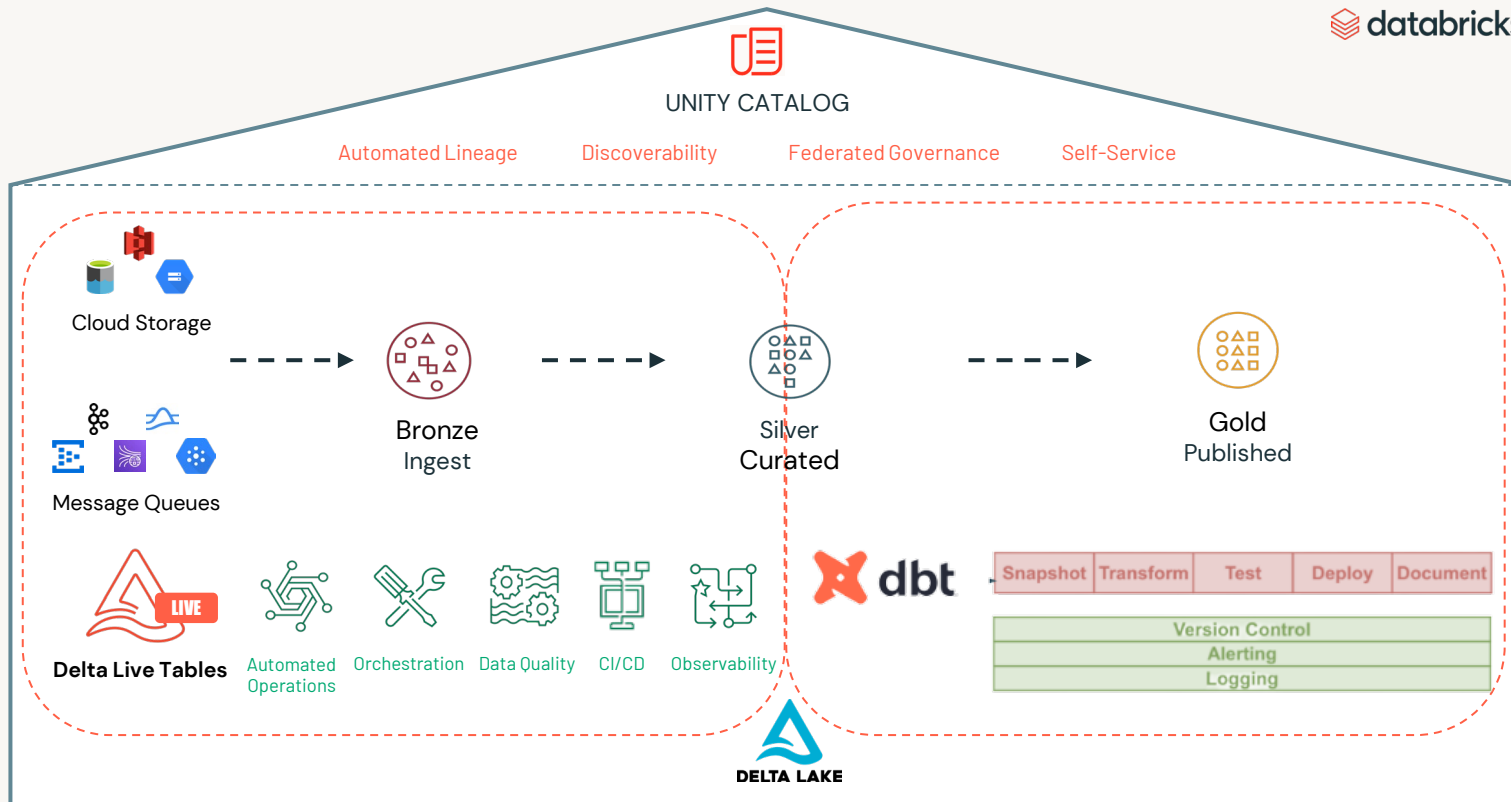
orders
(Table)



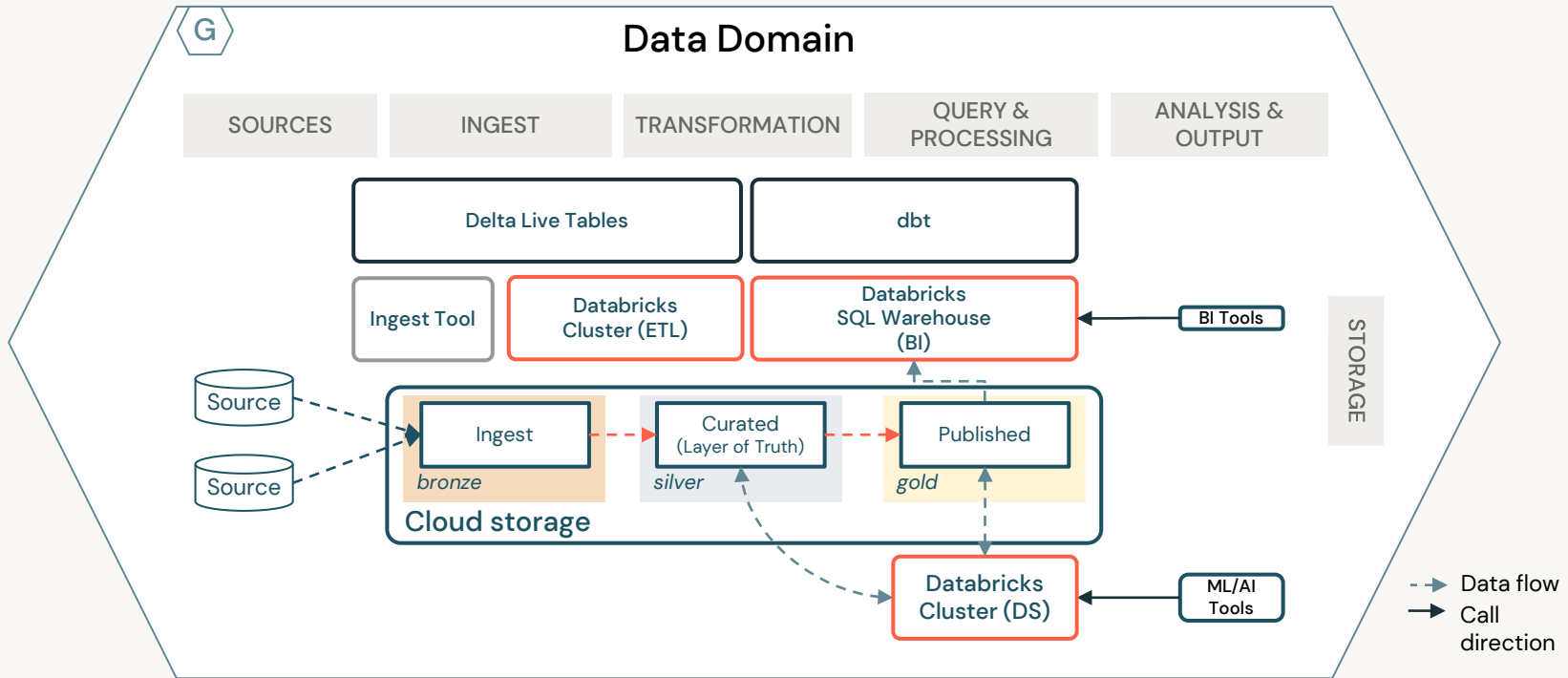
Benefits:

1. **Accelerate BI dashboards.** Much faster to query data that is pre-computed vs querying base tables.
2. **Reduce data processing costs.** MV results are refreshed incrementally avoiding the need to completely rebuild the view when new data arrives.
3. **Improve data access control.** More tightly govern what data can be seen by consumers by controlling access to base tables.

Ingest and Transform with Medallion Mesh



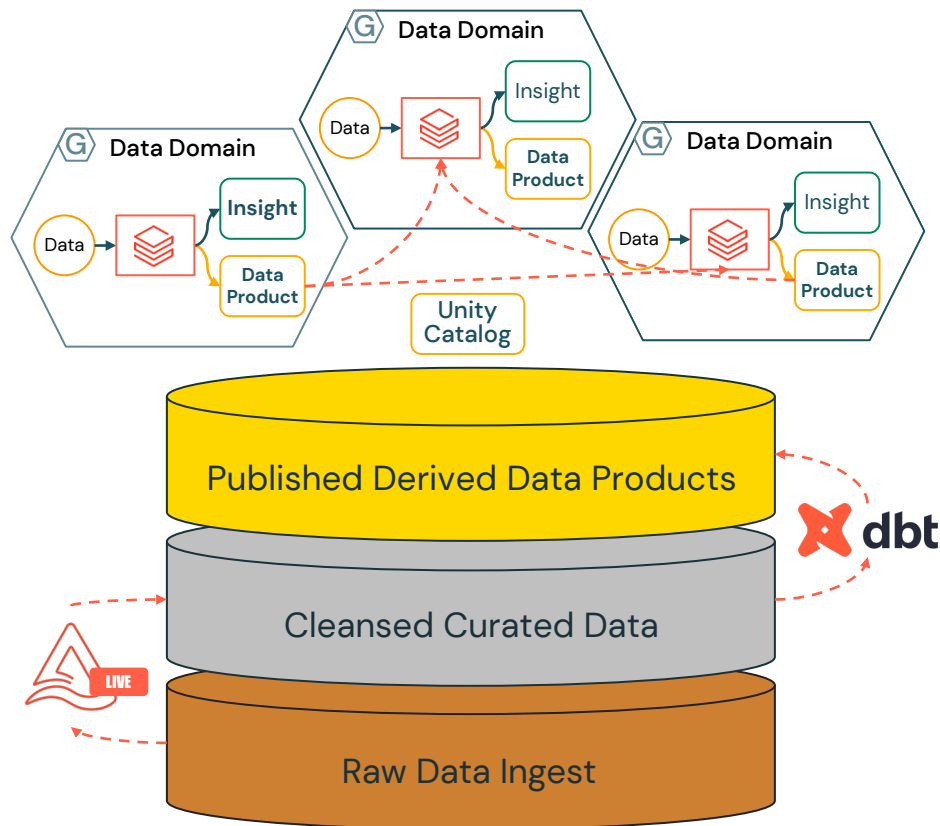
Minimal data domain blueprint



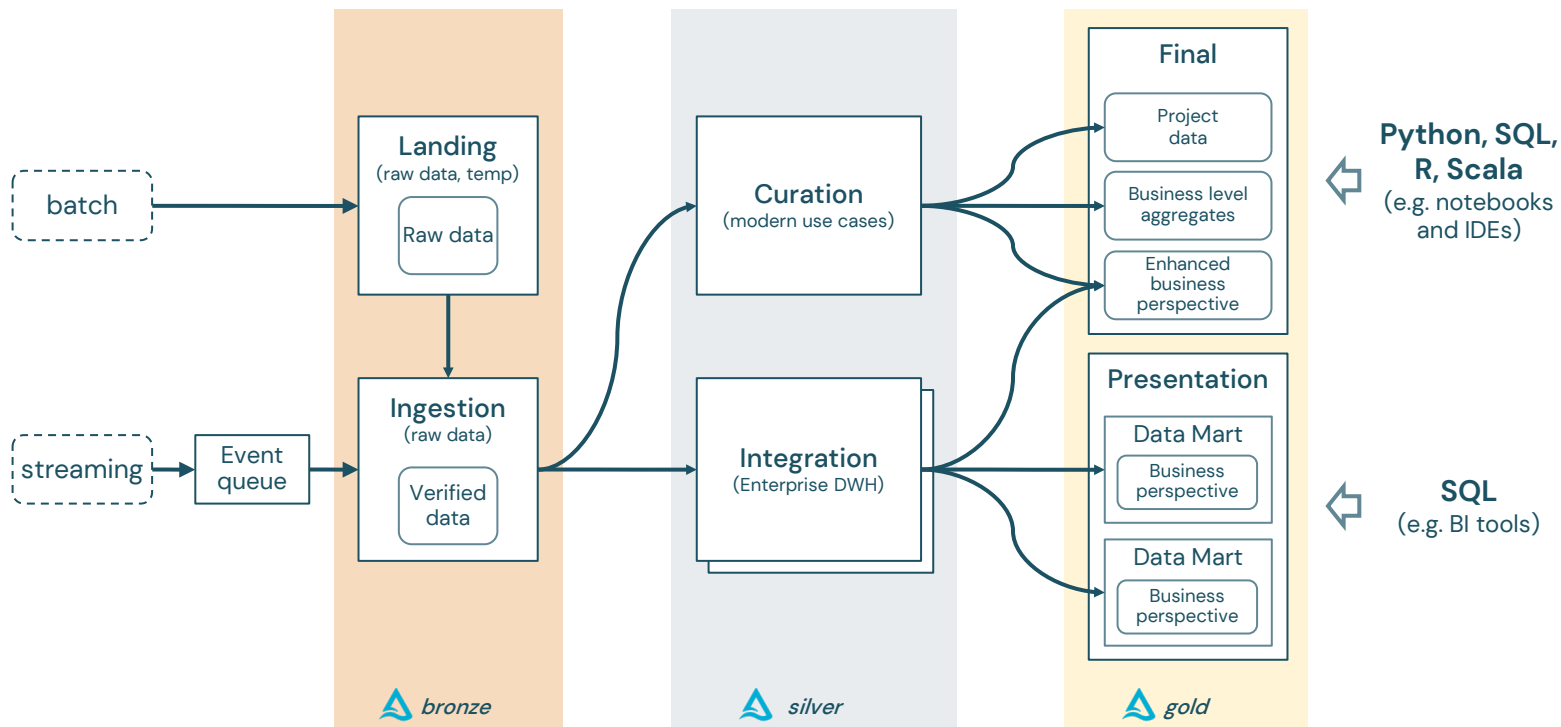
* <https://future.a16z.com/emerging-architectures-modern-data-infrastructure/>



Vertical view into the domains and layers

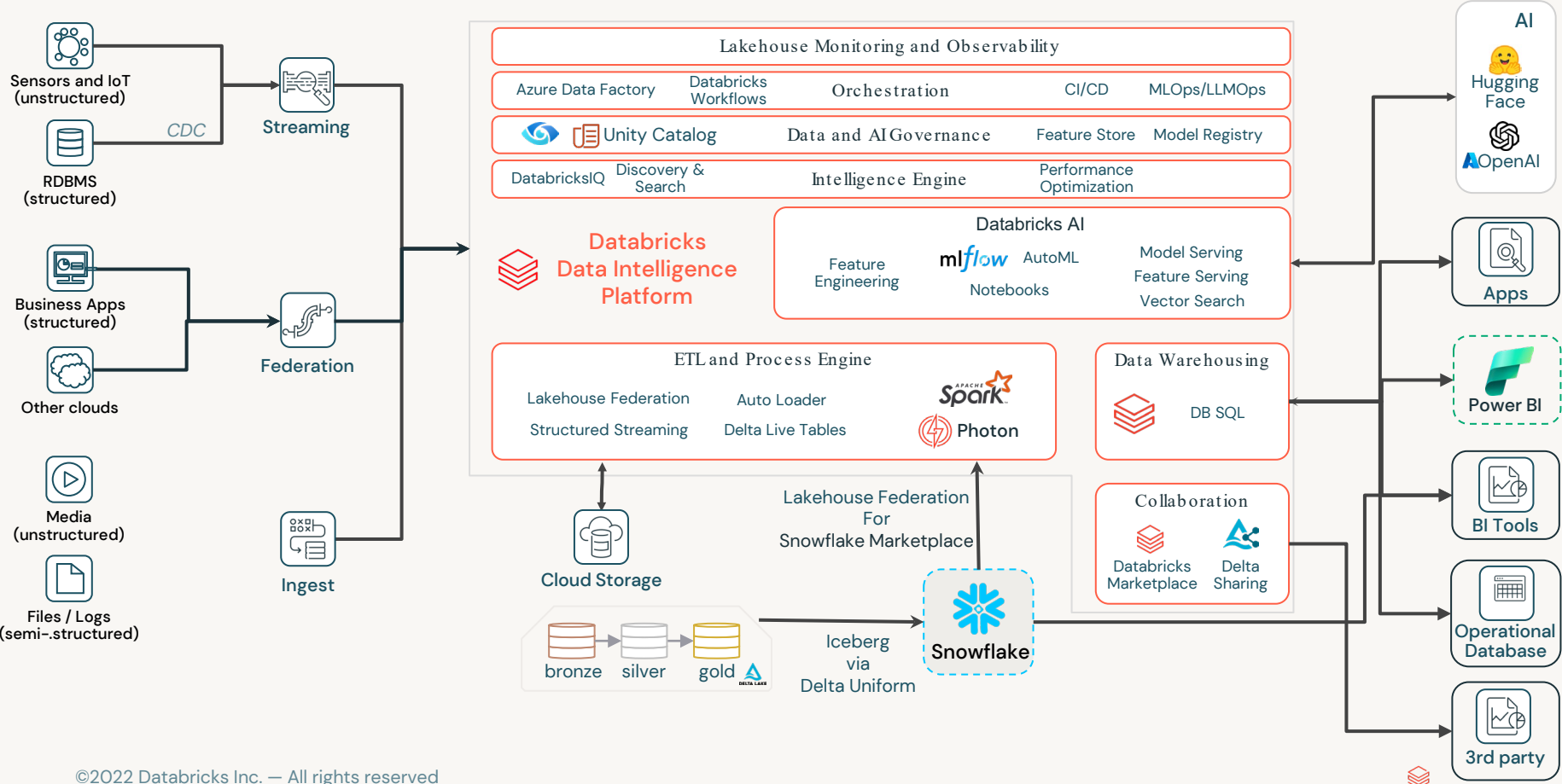


Unified data modeling in Medallion Mesh



UNIFIED PLATFORM FOR ALL USERS AND USE CASES

Medallion Mesh on Data Intelligence Platform



Simple data understanding

Real-time relational modelling visualization

Easily visualize **table-to-table** relationships leveraged by **BI tools** and **DatabricksIQ**

Modify and create PK/FK Constraints with UI

Visualize table to table relationships with a built-in Entity

Relationship Diagram (ERD)

Built on Unity Catalog

View PK, FK columns via the schema browser

Table	Columns	Types	Constraints
inventory.products.products	product_id	string NN	PK
inventory.products.products	product_name	string NN	CHECK
inventory.products.products	category	string	
inventory.products.products	description	string	
inventory.products.products	date_added	date	CHECK
inventory.products.products	manufacturer_id	string NN	FK
inventory.products.products	price	int NN	CHECK
inventory.products.products	weight	int	CHECK

Table	Columns	Types	Constraints
inventory.products.manufacturers	manufacturer_id	string NN	PK

Send feedback

Catalogs > lineage_roma > roma_shop > lineage_roma.roma_shop.payments

Owner: robert.martinez@databricks.com Popularity: Size: 0B, 0 files Last Updated: 3 weeks ago

Tags: Add tags

AI Suggested Comment Preview

The 'payments' table records transactional data related to payments made in the Roma Shop. It includes information about the payment method, order details, and the person making the payment. This data can be utilized for tracking individual customer purchases, analyzing payment trends, and monitoring transactional security.

Columns Sample Data Details Permissions History Lineage Insights Quality

Filter columns...

Column	Type	Comment	Tags
ID PK(1S)	string		
OrderID FK	int		
PersonID FK(2)	int		
LastName FK	string		

See ERD AI generate

Simple and unified visibility into data and AI

- **Discover and classify** structured and unstructured data, files, notebooks, ML models, and dashboards at one place
- Consolidate and query data from **other databases and data warehouses** using a **single point of access**, without moving or copying the data
- Build better **understanding of your data estate** with automated lineage, tags and auto-generated data insights
- Boost productivity by searching, understanding and gaining insights from your data and AI assets, using **natural language**

The image displays the Databricks Data Explorer interface. On the left, a sidebar shows a tree view of data assets under 'Data', including folders for 'ml' and 'models', and a 'default' folder containing 'Tables', 'Volumes', 'Functions', and 'Models'. A red box highlights the 'Tables' and 'Models' options. On the right, a 'Create a new connection' dialog is open, showing a list of connection types: SNOWFLAKE, DATABRICKS, MYSQL, SQLDW, POSTGRESQL, SQLSERVER, and REDSHIFT. A red box highlights this list. Below the dialog, a data lineage graph is visible, showing a flow of data from source tables to target tables. The source tables include 'snowflake.app.retention' (SNOWFLAKE), 'retention_prod.churn_silver.churn_order' (DATABRICKS), and 'retention_prod.churn_gold.churn_features' (DATABRICKS). The target table is 'retention_prod.churn.churn_prediction' (DATABRICKS). The graph shows the lineage of data from these sources into the prediction model.

Simple help from AI in your SQL

Write SQL to get insight from unstructured text data via LLMs

SQL AI ANALYZE SENTIMENT



```
> SELECT ai_analyze_sentiment('I am happy');
positive

> SELECT ai_analyze_sentiment('I am sad');
negative
```

AI SQL CLASSIFY



```
SELECT ai_classify("my password is leaked.", ARRAY("urgent", "not urgent"));
urgent
```

```
SELECT
  description,
  ai_classify(description, ARRAY("clothing", "shoes", "accessories", "furniture")) AS category
FROM
  products
```

SQL AI EXTRACT



```
> SELECT ai_extract(
  'John Doe lives in New York and works for Acme Corp.',
  array('person', 'location', 'organization')
);
{"person": "John Doe", "location": "New York", "organization": "Acme Corp."}

> SELECT ai_extract(
  'Send an email to jane.doe@example.com about the meeting at 10am.',
  array('email', 'time')
);
{"email": "jane.doe@example.com", "time": "10am"}
```

SQL AI FIX GRAMMAR



```
SELECT ai_fix_grammar('This sentence have some mistake');
"This sentence has some mistakes"

SELECT ai_fix_grammar('She dont know what to did. ');
'She doesn't know what to do.'
```

SQL AI MASK



```
SELECT ai_mask(
  'John Doe lives in New York. His email is john.doe@example.com.',
  array('person', 'email')
);
{"MASKED"} lives in New York. His email is [MASKED].

SELECT ai_mask(
  'Contact me at 555-1234 or visit us at 123 Main St.',
  array('phone', 'address')
);
'Contact me at [MASKED] or visit us at [MASKED]'
```

SQL AI SIMILARITY



```
SELECT ai_similarity('Apache Spark', 'Apache Spark');
1.0

SELECT
  company_name
FROM
  customers
ORDER BY ai_similarity(company_name, 'Databricks') DESC
LIMIT 1

Databricks Inc.
```

Simplify your SQL

Iterate faster with AI
Assistant does all the heavy
lifting

Cell in focus
Focus on a cell to turn it into a
SQL Editor
Focus back to notebook mode

Run Cells in parallel
Use Run Now to execute SQL
cells in parallel, no more waiting
for execution

The screenshot displays the Databricks SQL interface. At the top, there's a search bar and navigation icons. The main area is titled "SQL Queries for TPC-DI" and includes a "Run all" button and a "Serverless Starter Wa..." dropdown. A sidebar on the left lists various workspace components like "Workspace", "Catalog", "Workflows", "Compute", "SQL Editor", "Queries", "Dashboards", "Alerts", "Query History", "SQL Warehouses", "Genie Spaces", "Data Engineering", "Job Runs", "Data Ingestion", "Machine Learning", "Playground", "Experiments", "Features", "Models", "Serving", and "Marketplace". The central pane shows a "Catalog" view with a search filter and a list of columns including "firstname", "middleinitial", "gender", "tier", "dob", "addressline1", "addressline2", "postalcode", "city", "stateprov", "country", "phone1", "phone2", "phone3", "email1", "email2", "nationaltaxratedesc", "nationaltaxrate", "localtaxratedesc", "localtaxrate", "agencyid", and "creditrating". The main editor area contains two SQL cells. The first cell, titled "09:28 PM (6s)", contains a query that creates a table and performs a complex join and aggregation. The second cell, titled "09:20 PM (4s)", contains a query that selects specific columns from multiple tables. The interface also shows a "Group by all" section and a "See performance (2)" link.

Simplify your Data Science and ML

Provide a collaborative environment for Unified Machine Learning & Data Analytics

Multi-Language
Scala, SQL, Python, R:
All in one notebook

Visualizations
Built-in visualizations and
support for the most popular
visualization libraries
(e.g. matplotlib, ggplot)

Experiment Tracking
Built-in tracking of Data
Science and ML experiments,
with metrics, parameters,
artifacts, and more

The screenshot displays the 'Serving endpoints' page in Databricks. It features a sidebar with navigation options like Workspace, Recents, Catalog, Workflows, Compute, SQL, SQL Editor, Queries, Dashboards, Alerts, Query History, SQL Warehouses, and Genie Spaces. The main content area shows a 'Serving endpoints' section with a 'Create serving endpoint' button and a table of existing endpoints.

Name	State	Served entities	Tags	Task	Created by	Last modified
databricks-dbrx...	Ready	DBRX Instruct		Chat		6 months ago
databricks-meta...	Ready	Meta Llama 3 70B Inst		Chat		6 months ago
databricks-mixt...	Ready	Mixtral-8x7B Instruct		Chat		6 months ago
databricks-llam...	Ready	Llama 2 70B Chat		Chat		6 months ago
databricks-bge...	Ready	BGE Large (En)		Embeddings		6 months ago
databricks-mpt...	Ready	MPT 30B Instruct		Completions		6 months ago
databricks-mpt...	Ready	MPT 7B Instruct		Completions		6 months ago

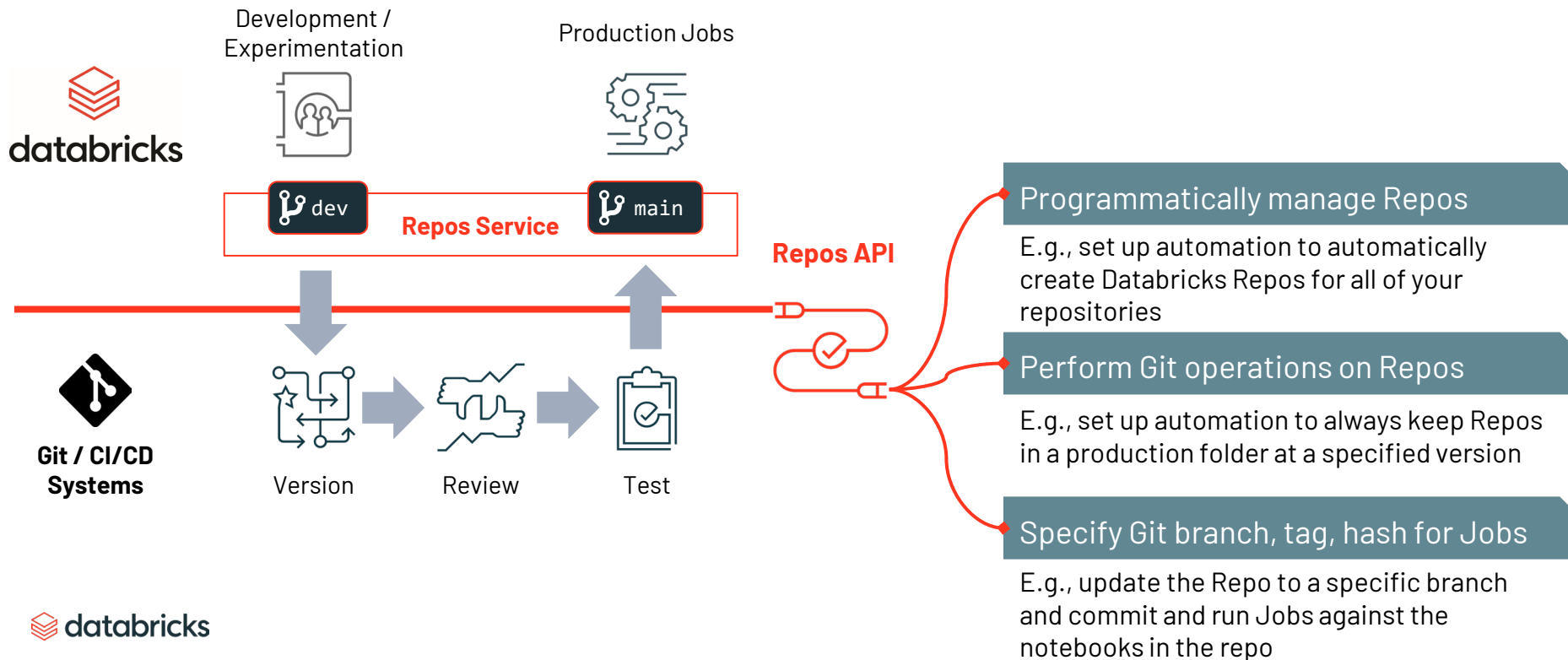
Reproducible
Auto-logged revision history
and Git integration for
version control

Collaborative
Realtime co-editing, with
sharing and permissions

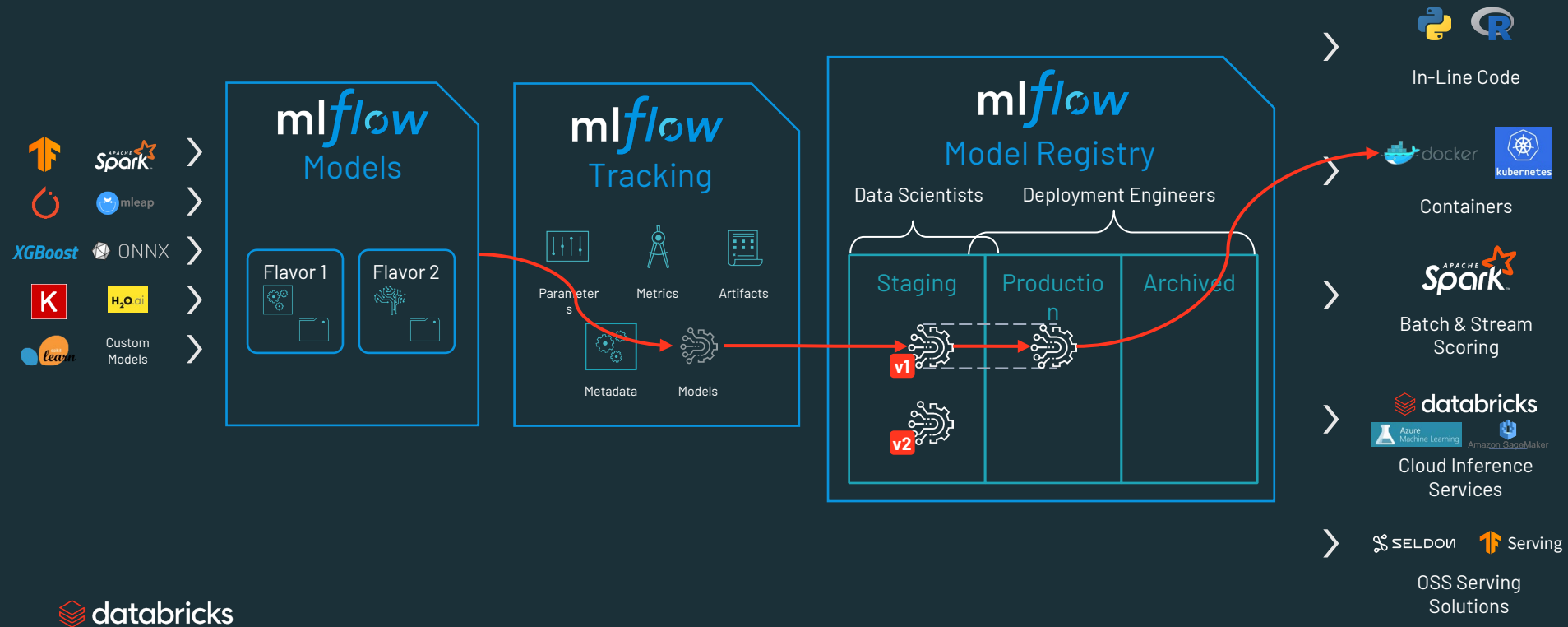
Enterprise Ready
Enterprise grade access
controls, identity pass-through,
and auditability

Simplify DEVOPS with Repos

Repos API to automate CI/CD



Simplify MLOPS with *mlflow*



Simple Prompt Engineering UI with mlflow™

Adjust text prompts for Gen AI models to elicit better responses

MLflow Prompt Engineering lets you compare and analyze many models and prompts, across many inputs.

The screenshot displays the MLflow LLM Evaluation e2e interface. At the top, it shows the experiment name 'LLM Evaluation e2e', a 'Provide Feedback' button, and the experiment ID '2147295487455025'. Below this is a 'Description Edit' section. The main area features a search bar with the query 'metrics.rmse < 1 and params.model = "tree"', along with filters for 'Time created', 'State: Active', 'Datasets', and 'Sort: Created'. A 'New run' button is visible in the top right. The interface is divided into two main sections: a 'Table' view on the left and a 'Preview' view on the right. The 'Table' view lists various runs with names like 'popular-her-608', 'amazing-lark-871', and 'intrigued-bass-609'. The 'Preview' view shows the output for the 'books' stock type, displaying the prompt: 'Get lost in a good book with our wide selection of titles available at our online store!'. The output is '1010 ms, 47 total tokens'.

RISE UP AND UNIFY WITH THE MEDALLION MESH

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