databricks

Databricks Unity Catalog

Unified governance for data and AI

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Presenters

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Data and AI governance drives business value

"Organizations are finally realizing the value of data as an asset that needs to be protected, managed and maintained to increase asset value"

—

IDC

"Organizations seeing the highest returns from AI have a framework for AI governance to cover every step of the model development process"

—

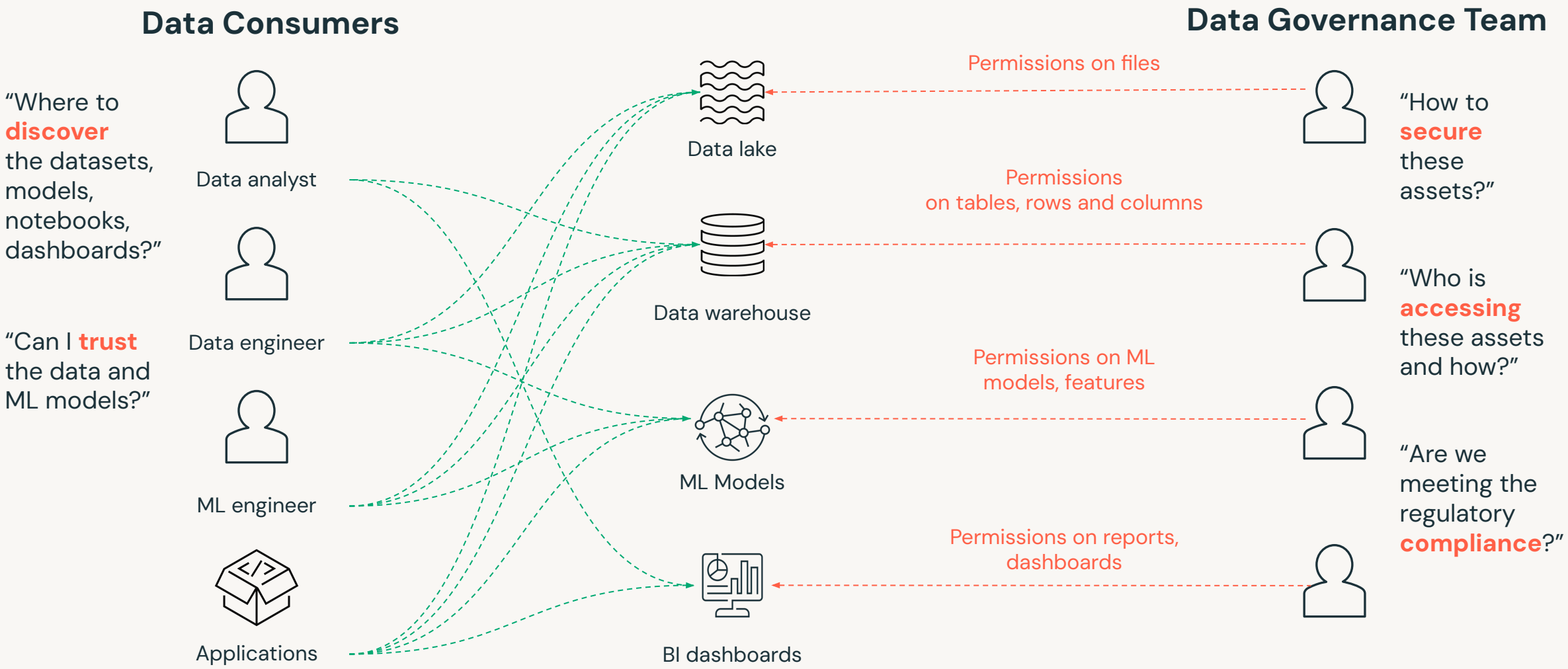
The State of AI in 2022, McKinsey & Co

"AI is now an enterprise essential, and as such, AI governance will join cybersecurity and compliance as a board-level topic"

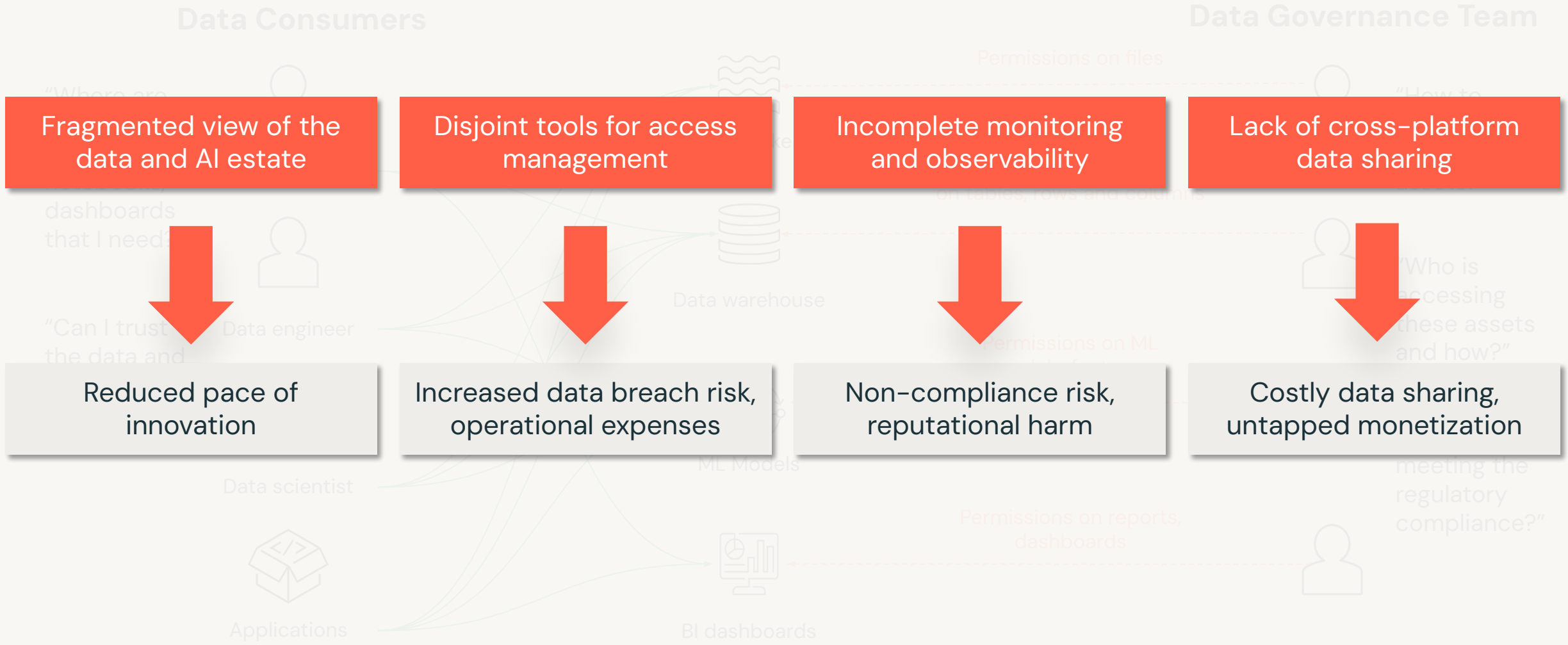
—

Forrester, 2023 AI Predictions report

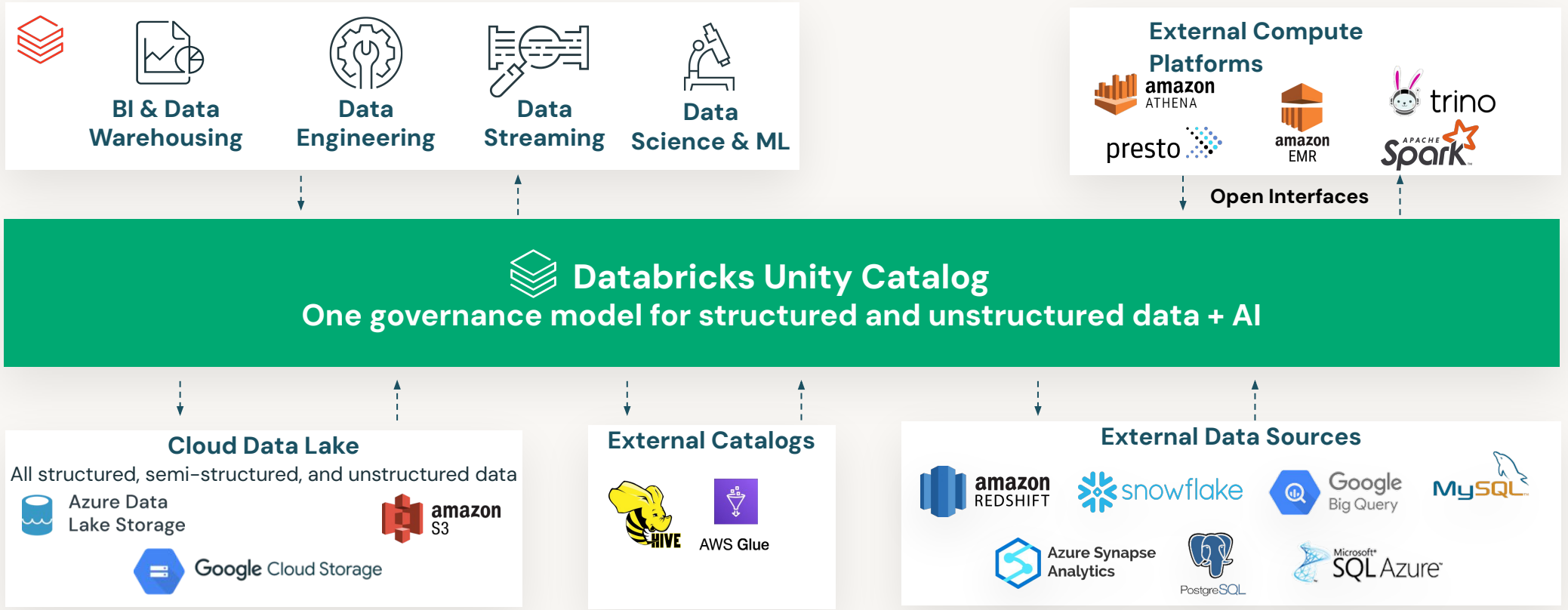
Today, data and AI governance is complex



Today, data and AI governance is complex



Databricks Lakehouse unifies data and AI governance



Databricks Unity Catalog

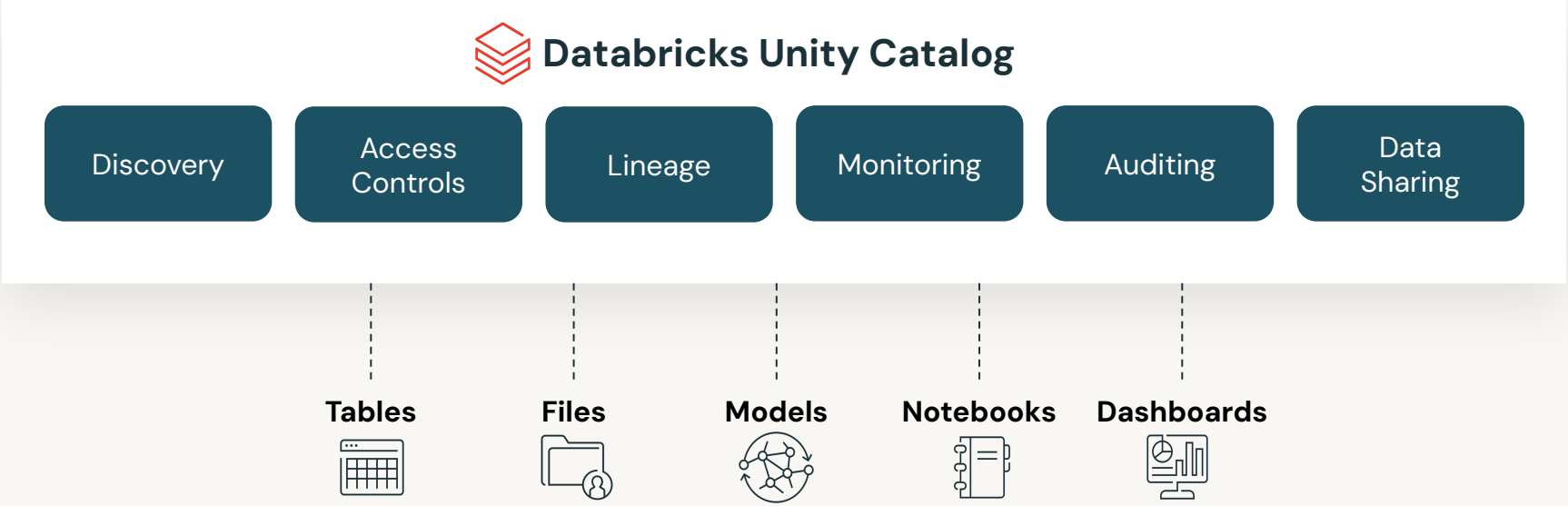
Unified governance for data and AI

Unified visibility into data and AI

Single permission model for data and AI

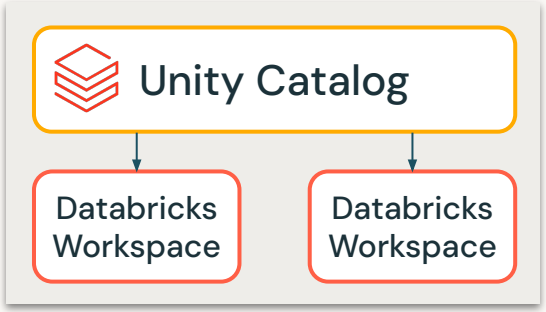
AI-powered monitoring and observability

Open data sharing



Unity Catalog – Key Capabilities

- Centralized metadata and user management
- Centralized access controls
- Data lineage
- Data access auditing
- Data search and discovery
- Secure data sharing with Delta Sharing



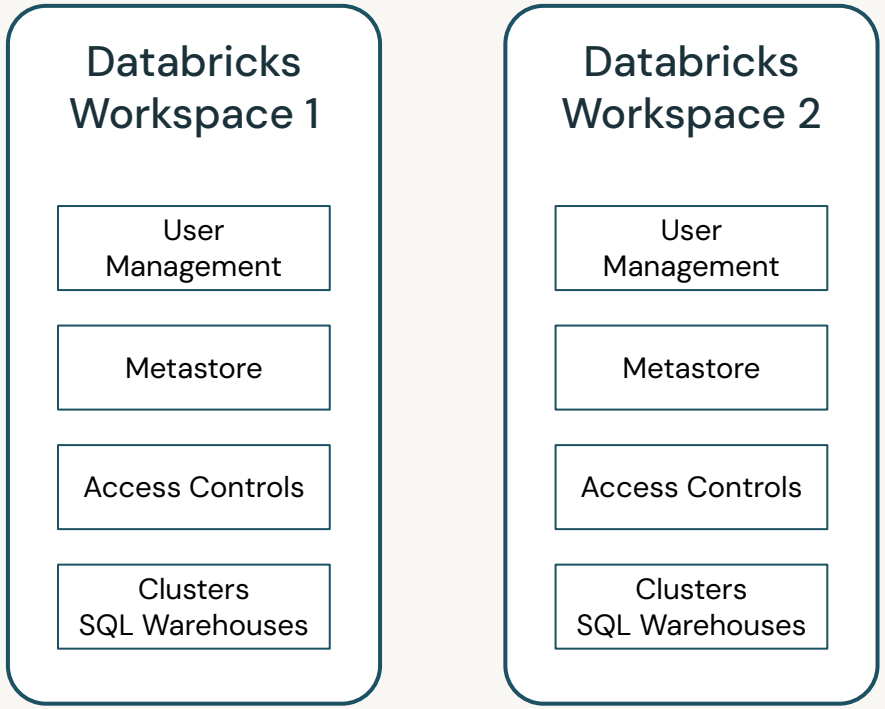

```
GRANT ... ON ... TO ...
REVOKE ... ON ... FROM ...
```

Catalogs, Databases (schemas), Tables, Views, Storage credentials, External locations

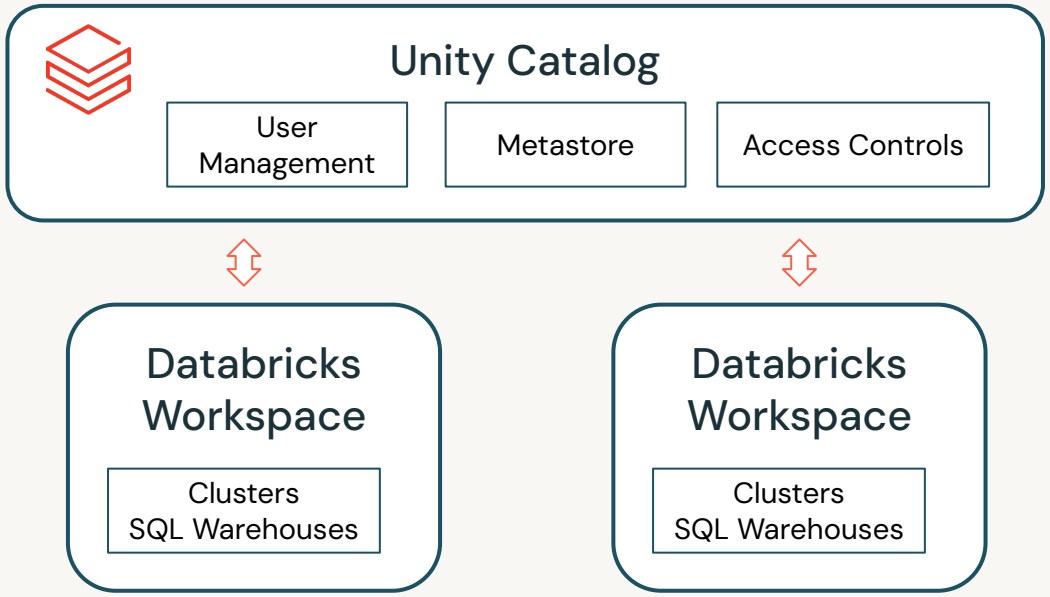
Centralized Metadata and User Management

Create a unified view of your data estate

Without Unity Catalog



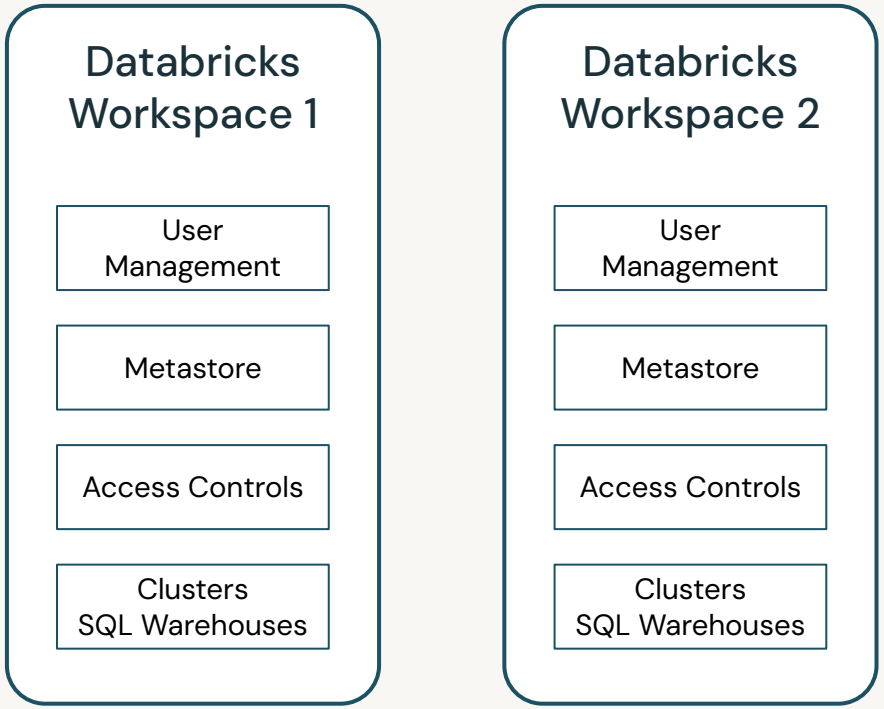
With Unity Catalog



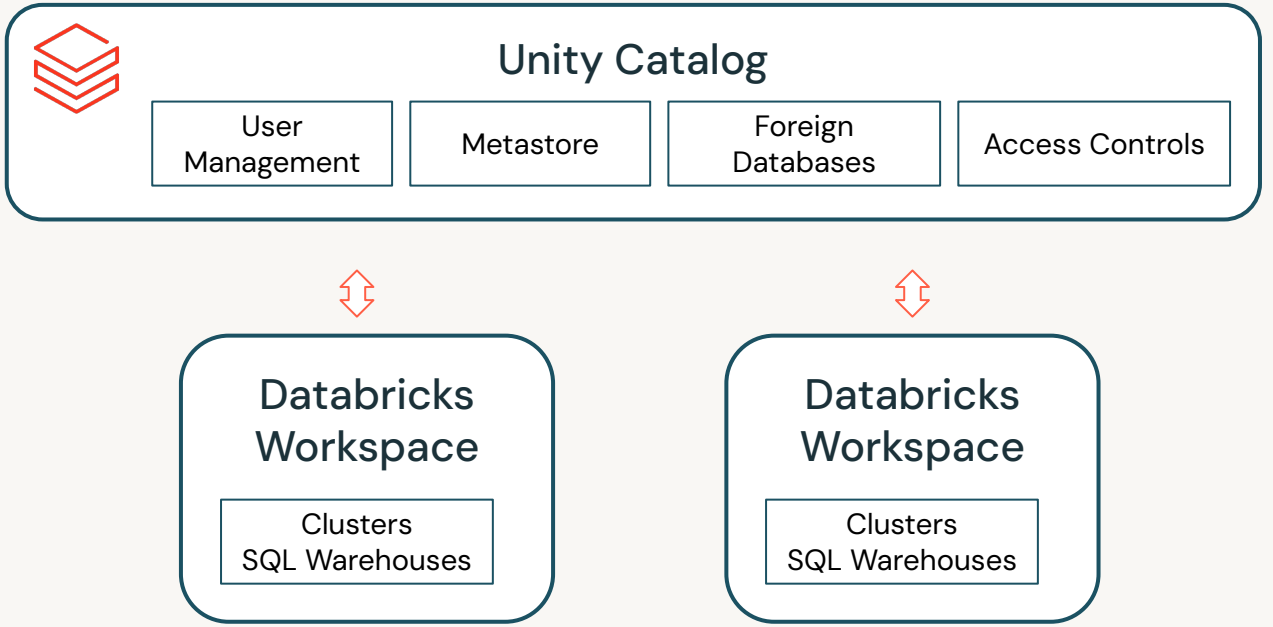
All your metadata, in one place

One metadata layer across file and database sources **superpowers** governance

Without Unity Catalog



With Unity Catalog



Fundamental Concepts

Working with file based data sources

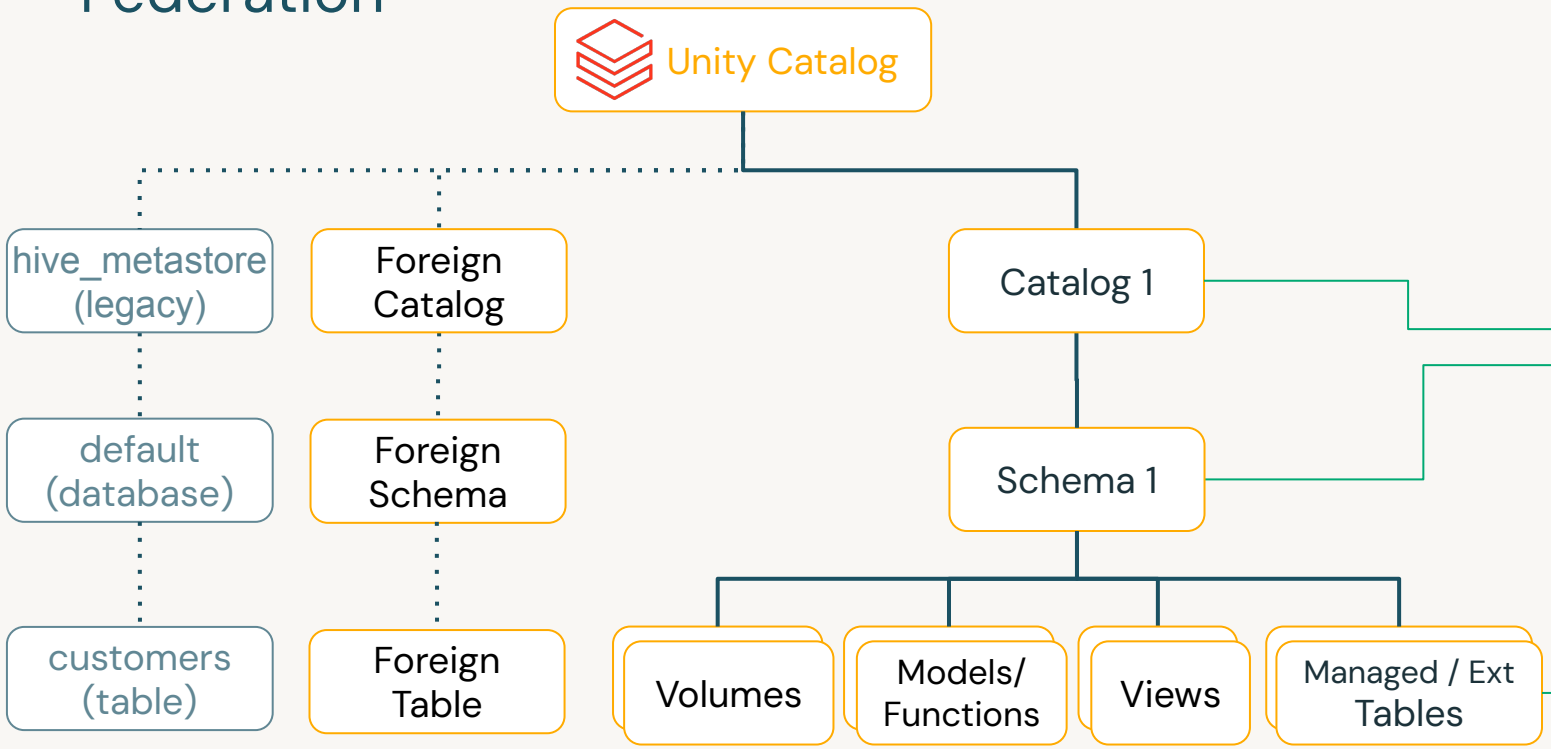
- Credentials
  - Cloud provider credential to connect to storage
- External Locations
  - Storage location used for external tables or arbitrary files
- Managed Data Sources
  - External Location that is used exclusively for tabular data
- Volumes
  - Arbitrary file container inside an external location

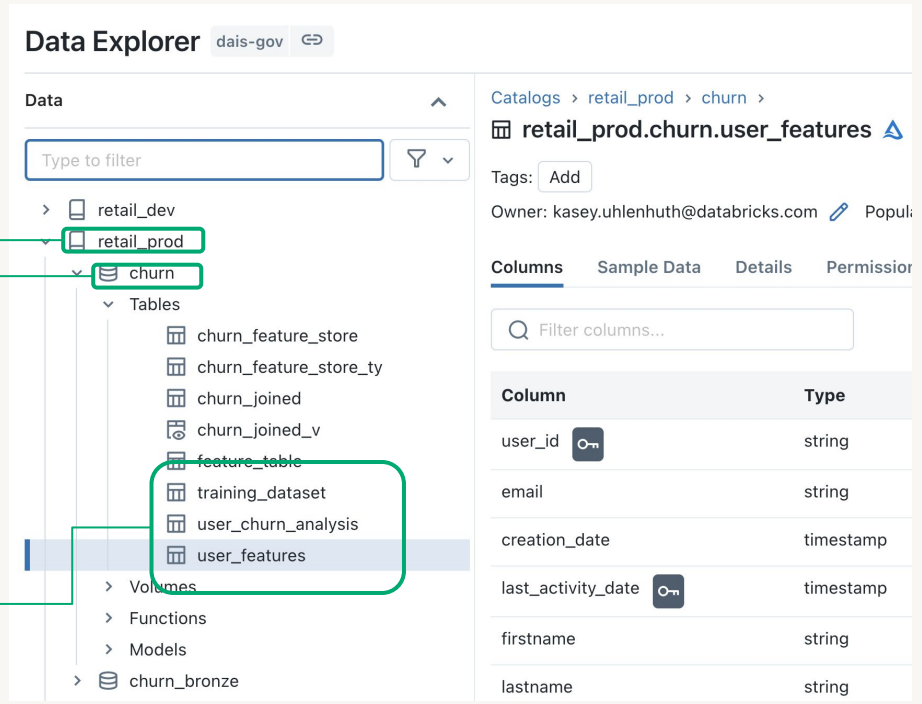
Working with databases

- Connections
  - Credential and connection information to connect to an external database
- Foreign Catalogs
  - A catalog that represents an external database in UC and can be queried alongside managed data sources and file sources

Governed namespace across file and database sources

Access legacy metastore and foreign databases powered by Lakehouse Federation






```
SELECT * FROM main.paul.red_wine;  -- <catalog>.<database>.<table>

SELECT * FROM hive_metastore.default.customers;

SELECT * FROM snowflake_warehouse.some_schema.some_table;
```

Centralized Access Controls

Centrally grant and manage access permissions across workloads

Using ANSI SQL DCL

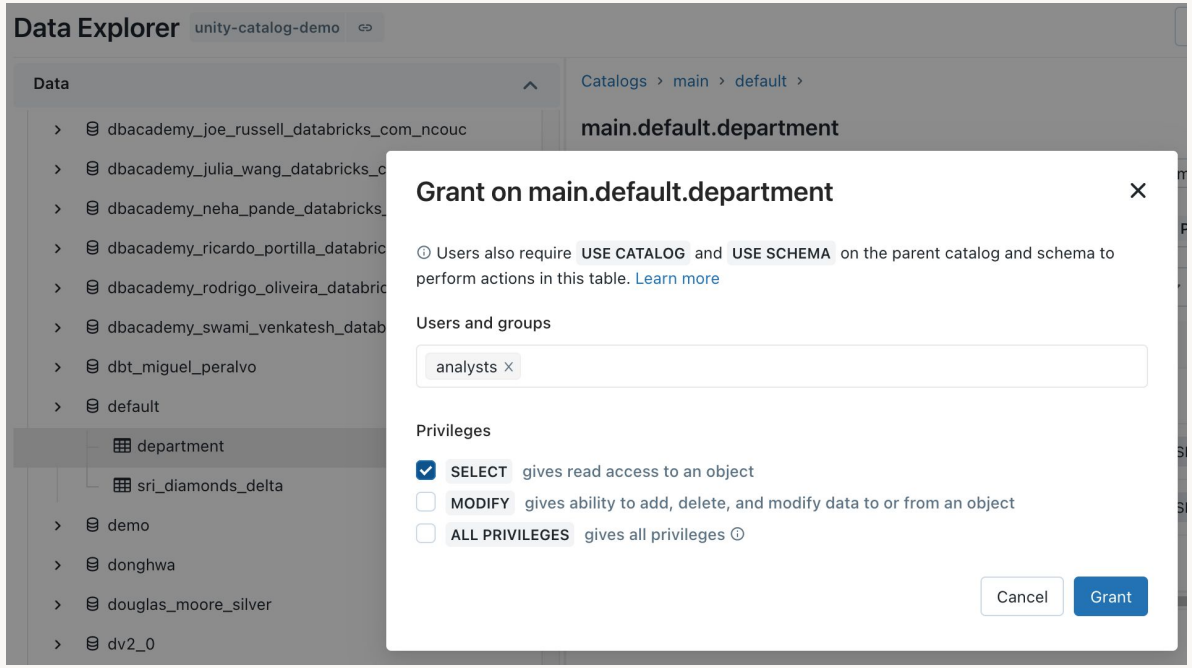
```
GRANT <privilege> ON <securable_type>
<securable_name> TO `<principal>`

GRANT SELECT ON iot.events TO engineers
```

Choose permission level

'Table'= collection of files in S3/ADLS

Sync groups from your identity provider

Using UI



Row Level Security and Column Level Masking

In Preview

Provide differential fine grained access to datasets

Only show specific rows

```
CREATE FUNCTION <name> ( <parameter_name >
<parameter_type> .. )
RETURN {filter clause whose output must be a boolean}
```

```
CREATE FUNCTION us_filter(region STRING)
RETURN IF(IS_MEMBER('admin'), true, region="US");

ALTER TABLE sales SET ROW FILTER us_filter ON region;
```

Test for group membership

Assign reusable filter to table

Specify filter predicates

Mask or redact sensitive columns

```
CREATE FUNCTION <name> (<parameter_name>,
<parameter_type>, [, <column>...])
RETURN {expression with the same type as the first
parameter}
```

```
CREATE FUNCTION ssn_mask(ssn STRING)
RETURN IF(IS_MEMBER('admin'), ssn, "****");

ALTER TABLE users ALTER COLUMN table_ssn SET MASK
ssn_mask;
```

Test for group membership

Assign reusable mask to column

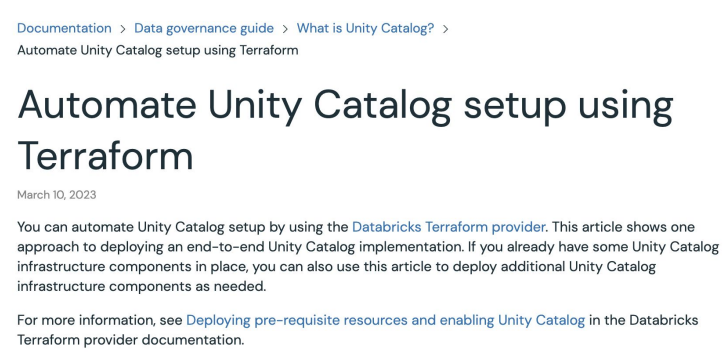
Specify mask or function to mask

High Leverage Governance with Terraform & APIs

Use data-sec-ops, policies as code patterns to scale your efforts

- Privileges for UC objects can be managed programmatically using our Terraform provider, especially for teams already using Terraform
- This will pair naturally with the management of the UC objects (Metastore, Catalog, Assignments etc.) themselves.

  (If not already using Terraform, maybe now is a good time!)


Documentation > Data governance guide > What is Unity Catalog? >
Automate Unity Catalog setup using Terraform

Automate Unity Catalog setup using Terraform

March 10, 2023

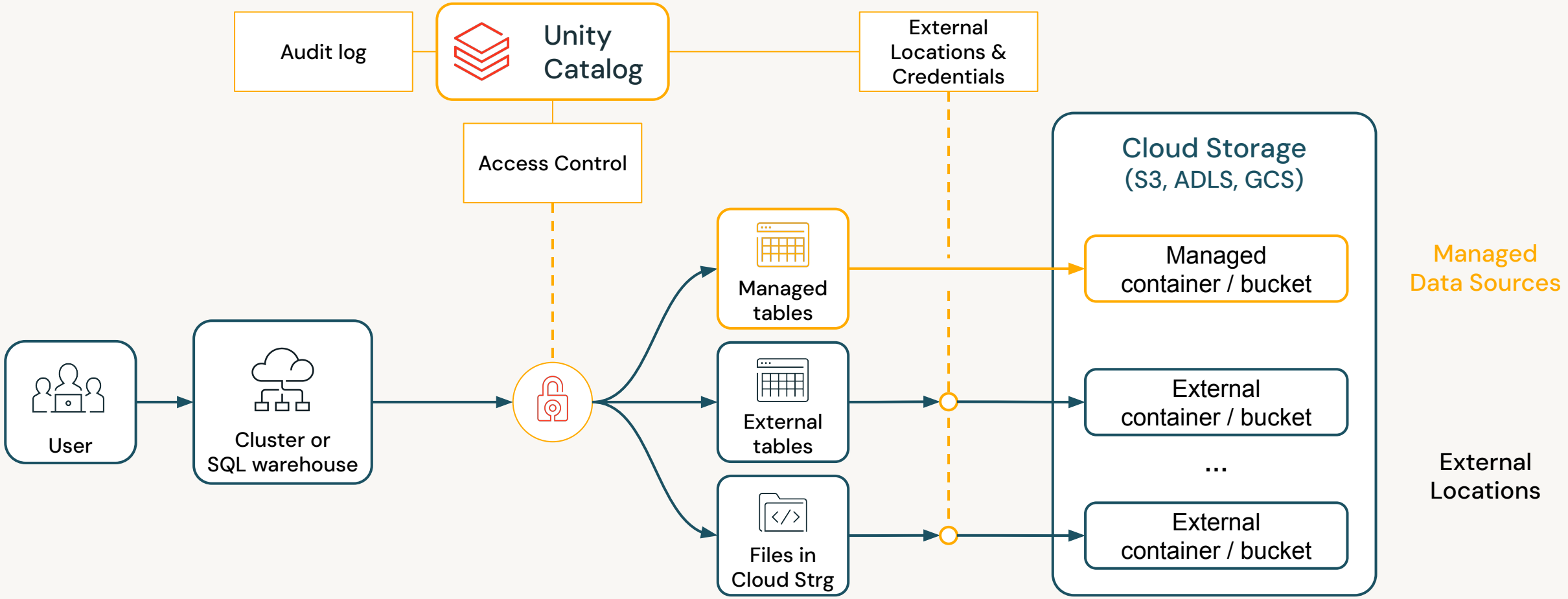
You can automate Unity Catalog setup by using the Databricks Terraform provider. This article shows one approach to deploying an end-to-end Unity Catalog implementation. If you already have some Unity Catalog infrastructure components in place, you can also use this article to deploy additional Unity Catalog infrastructure components as needed.

For more information, see Deploying pre-requisite resources and enabling Unity Catalog in the Databricks Terraform provider documentation.

```
resource "databricks_grants" "sandbox" {
  provider = databricks.workspace
  catalog = databricks_catalog.sandbox.name
  grant {
    principal = "Data Scientists"
    privileges = ["USAGE", "CREATE"]
  }
  grant {
    principal = "Data Engineers"
    privileges = ["USAGE"]
  }
}
```

Managed Data Sources & External Locations

Simplify data access management across clouds



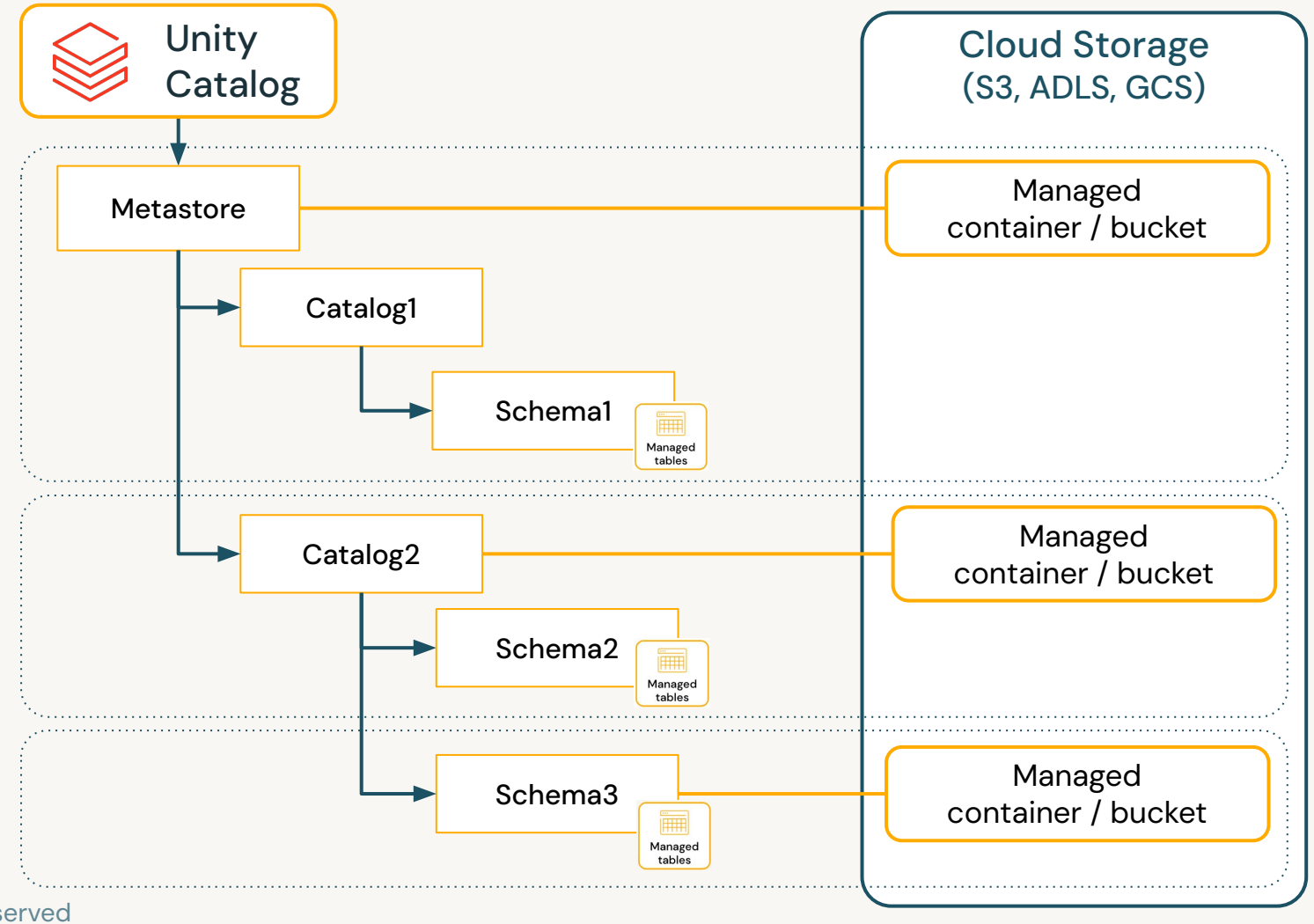
Default access to storage by catalog or schema

Use managed data sources for data isolation or cost allocation

1) Store at the **metastore**

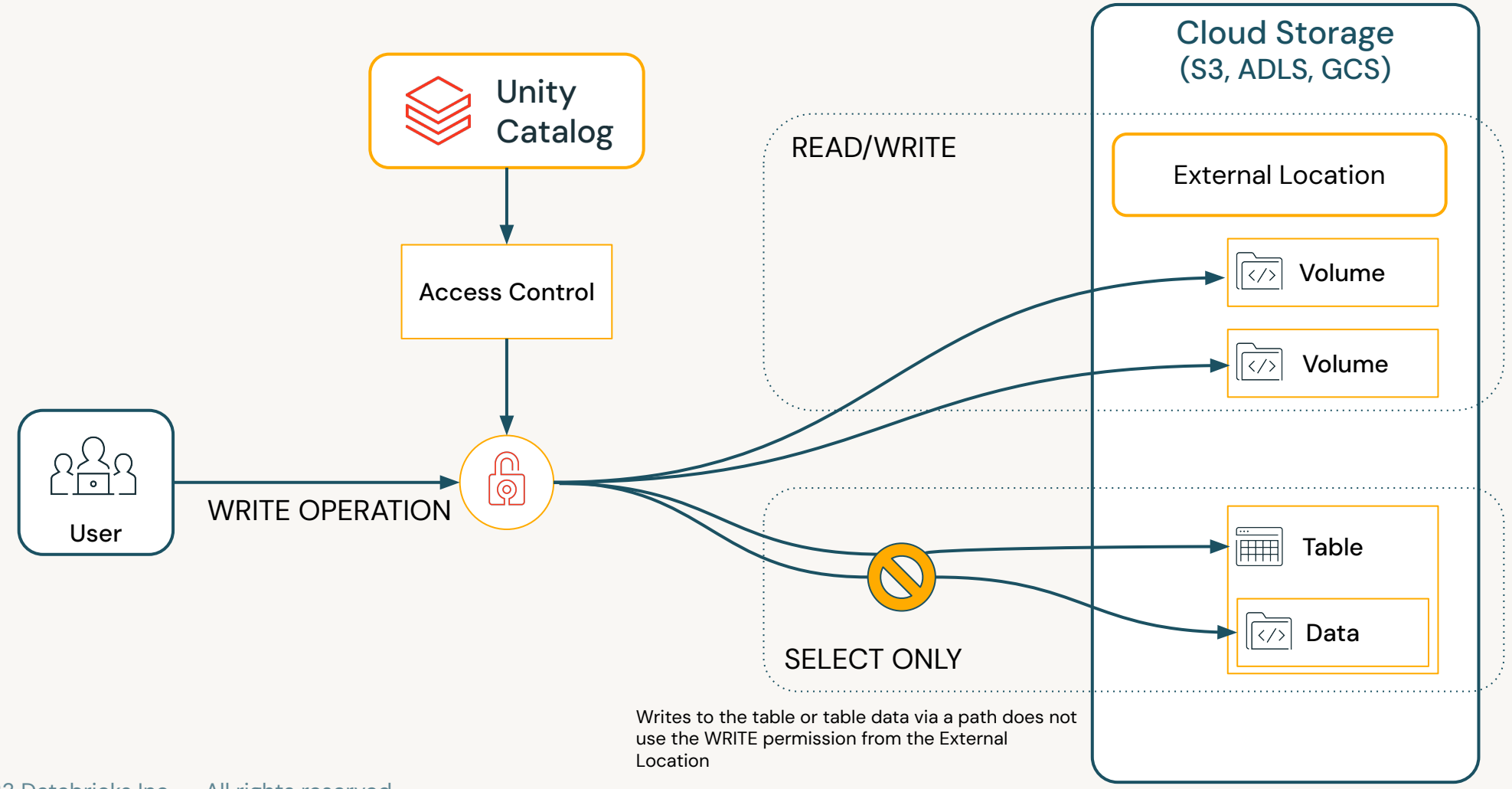
2) Store at the **catalog**

3) Store at the **schema**



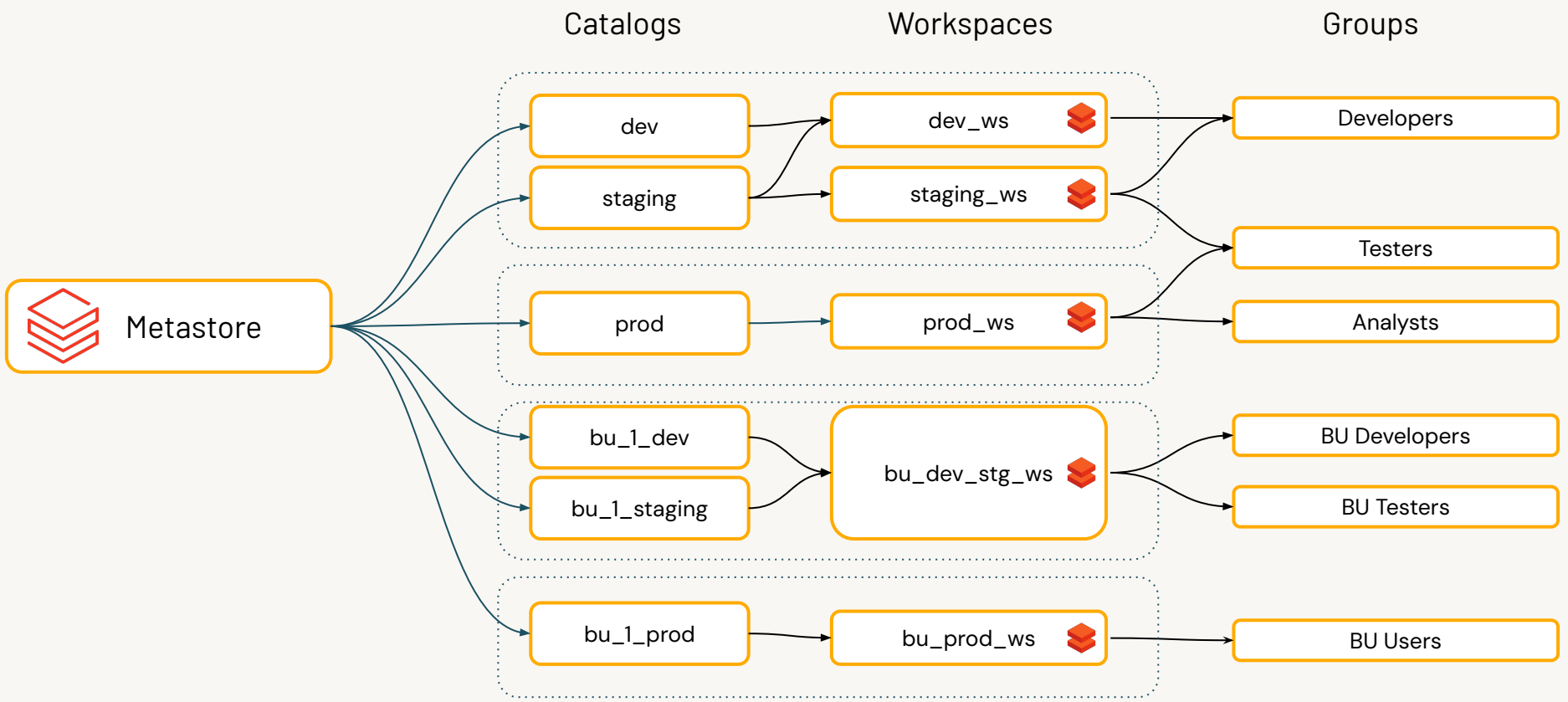
Govern filesystems and objects distinctly

Govern external tables and filesystem access separately



Access data from specified environments only

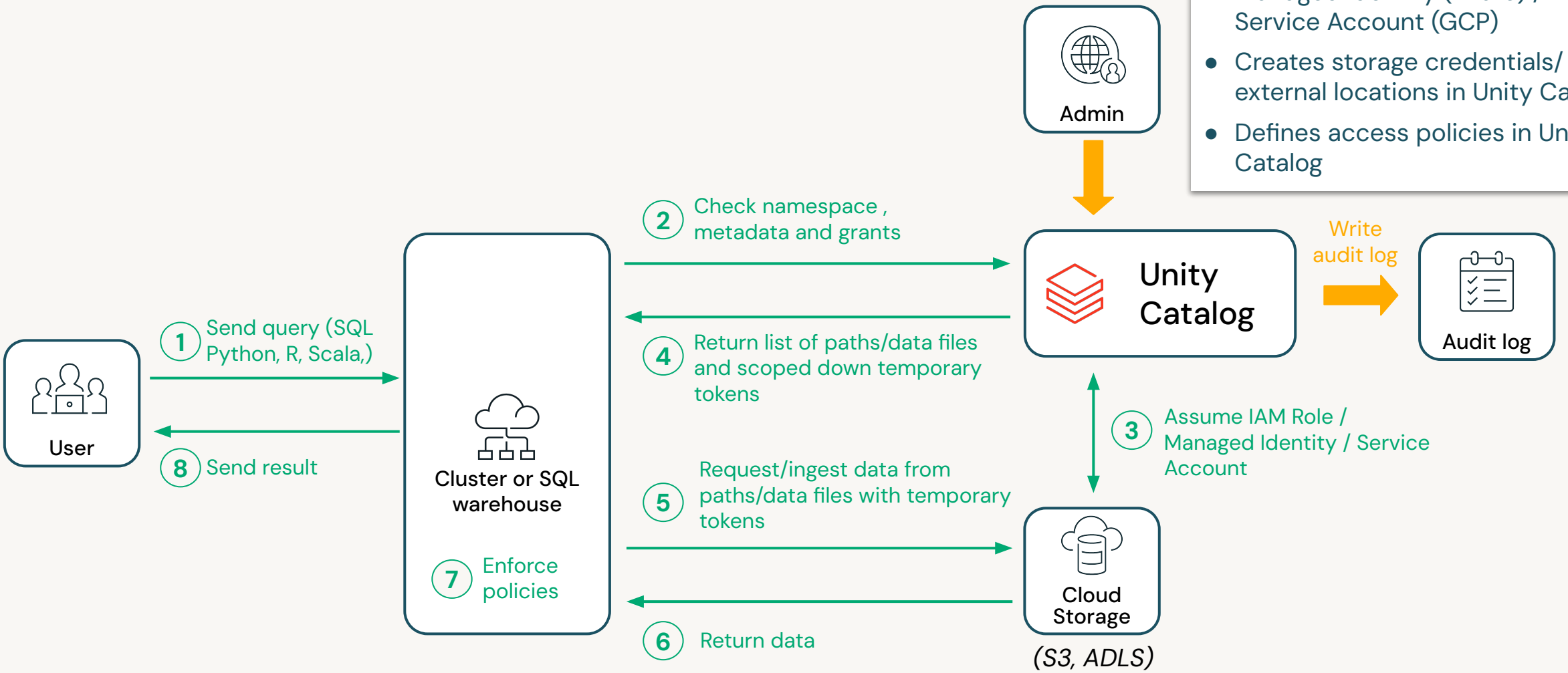
Restrict data access by environment or purpose



Access to data and availability of data can be isolated across workspaces and groups

Querying file based data sources with Unity

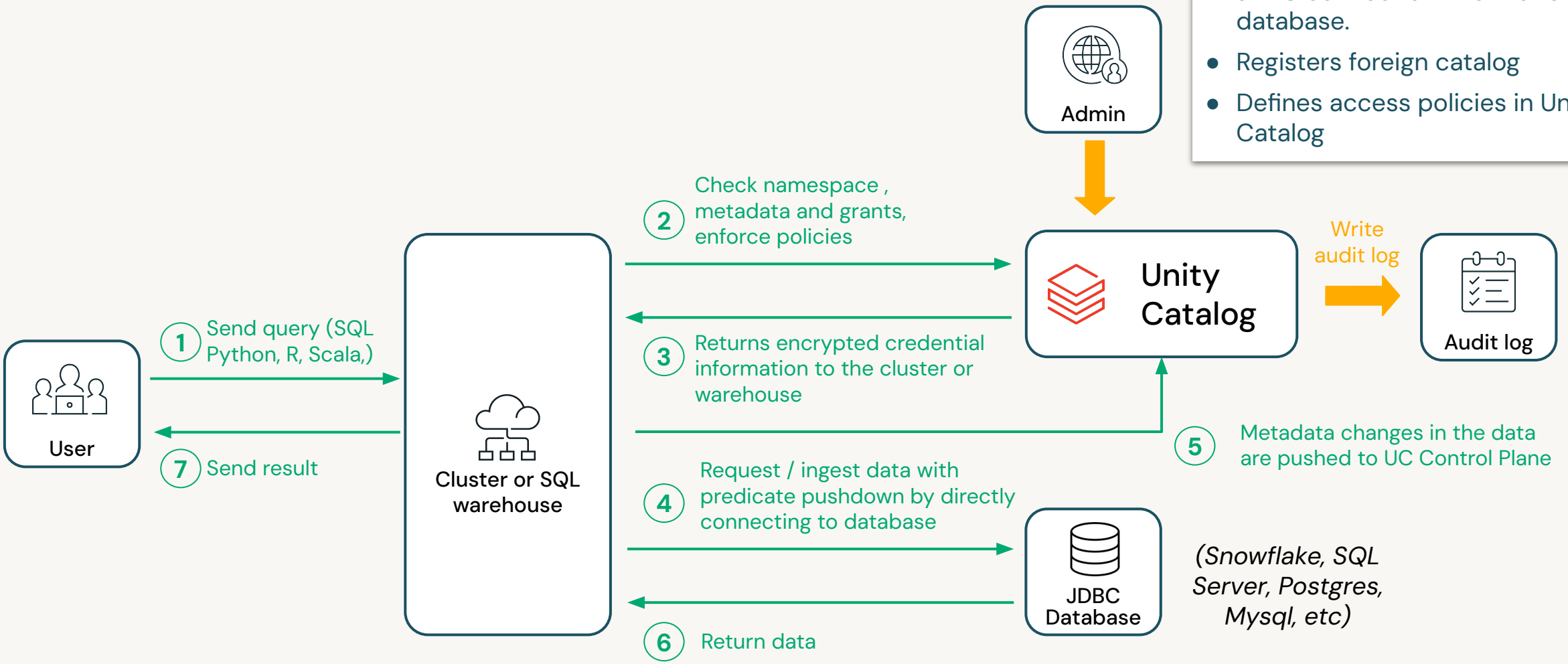
- Creates an IAM role (AWS)/ Managed Identity (Azure) / Service Account (GCP)
- Creates storage credentials/ external locations in Unity Catalog
- Defines access policies in Unity Catalog



Querying database sources with Unity

In Preview

- Defines Connection object with JDBC connection information to database.
- Registers foreign catalog
- Defines access policies in Unity Catalog



In Preview

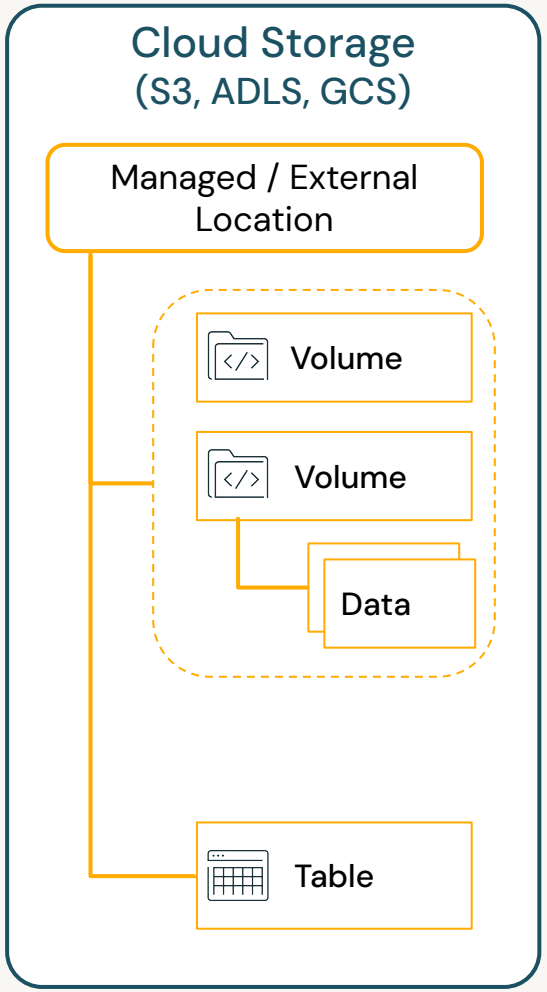
Volumes in Unity Catalog

Access, store, organize and process files with Unity Catalog governance

- Volumes can be accessed by POSIX commands

```
dbutils.fs.ls("s3://my_external_location/Volumes/volume123")

ls /Volumes/volume123
```

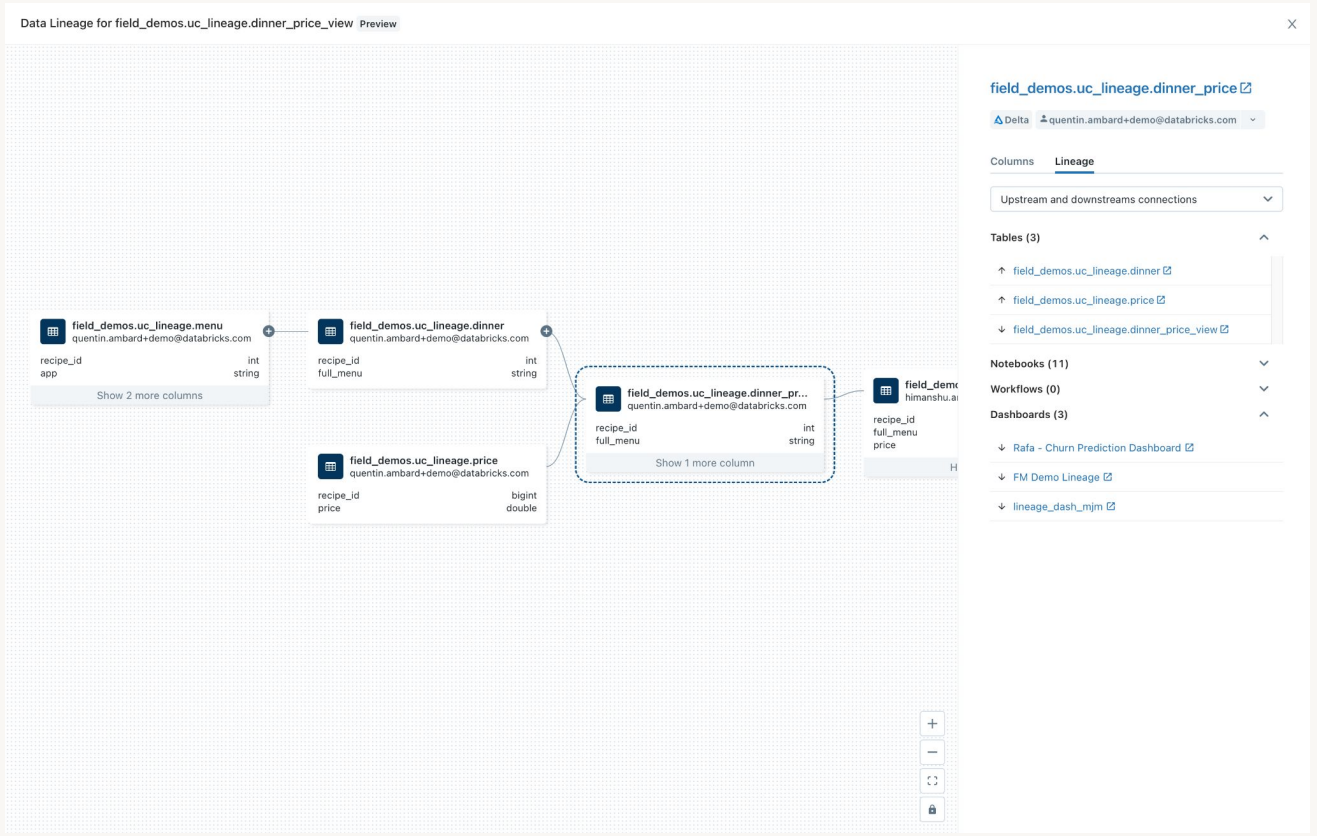
- Volumes are created under Managed or External Locations and show up in UC Lineage
- Volumes add governance over non-tabular data sets
  - Unstructured data, e.g., image, audio, video, or PDF files, used for ML
  - Semi-structured training, validation, test data sets, used in ML model training
  - Raw data files used for ad-hoc or early stage data exploration, or saved outputs
  - Library or config files used across workspaces
  - Operational data, e.g., logging or checkpointing output files
- Tables are registered in Managed / External Locations, not in Volumes



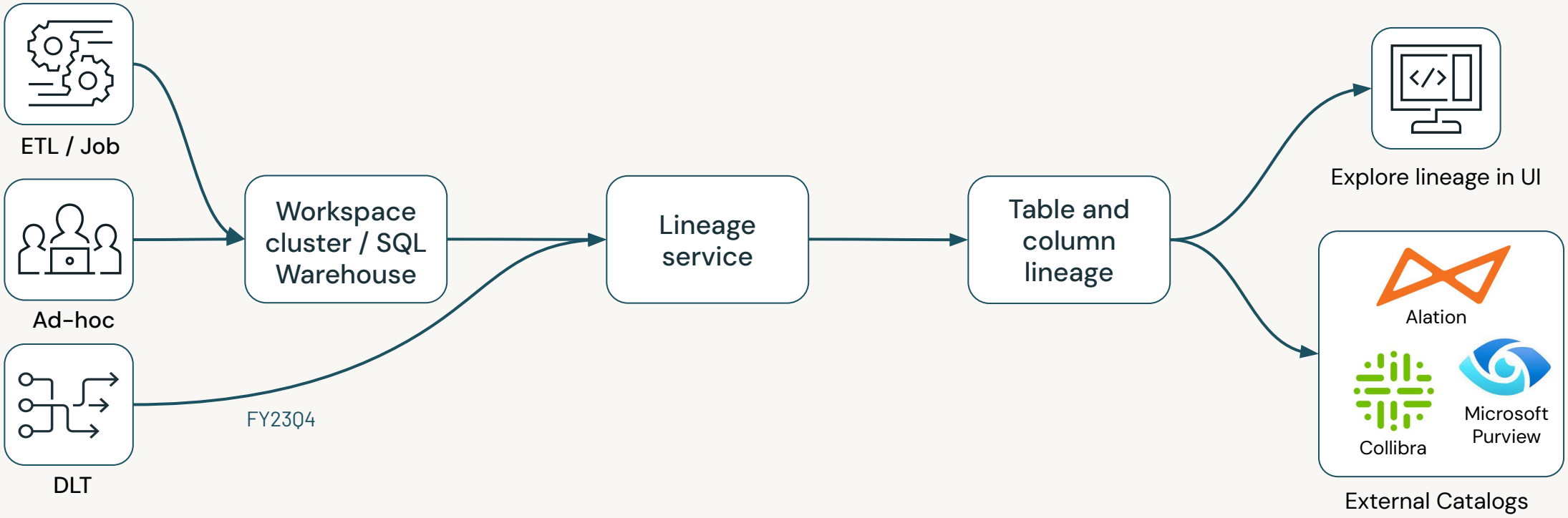
Automated lineage for all workloads

End-to-end visibility into how data flows and consumed in your organization

- Auto-capture runtime data lineage on a Databricks cluster or SQL warehouse
- Track lineage down to the table and column level
- Leverage common permission model from Unity Catalog
- Lineage across tables, dashboards, workflows, notebooks, feature tables, files, and DLT



Lineage flow – How it works

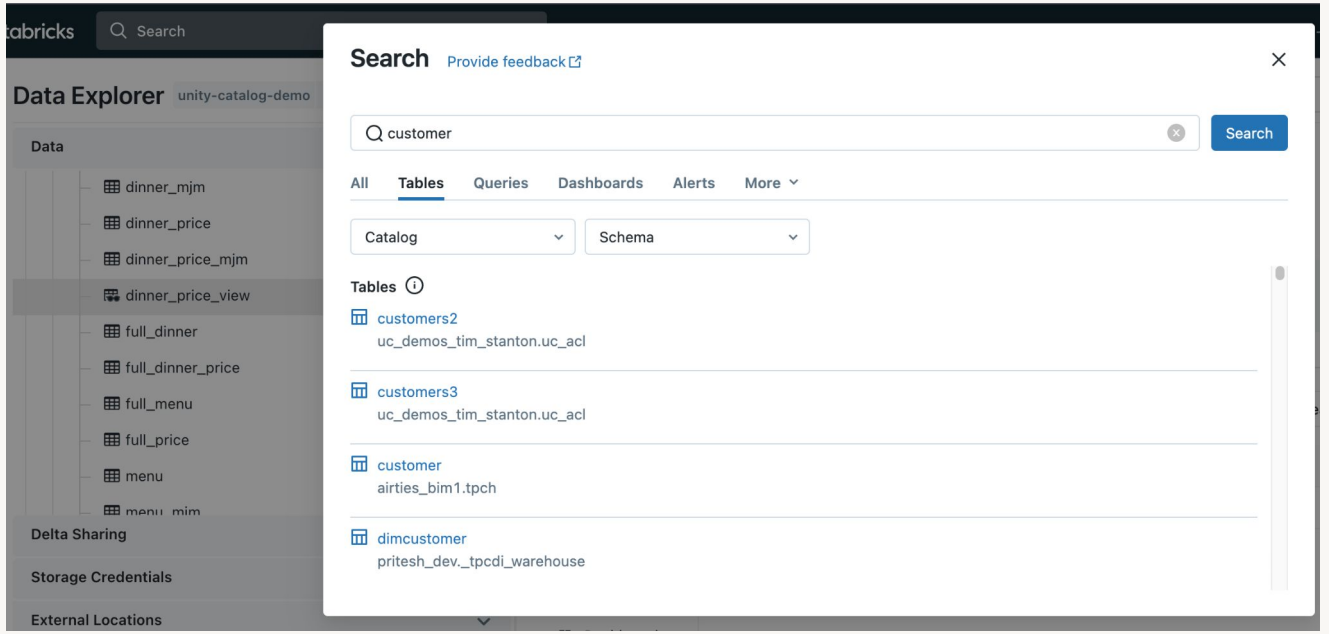


- Code (any language) is submitted to a cluster or SQL warehouse or DLT* executes data flow
- Lineage service analyzes logs emitted from the cluster, and pulls metadata from DLT
- Assembles column and table level lineage
- Presented to the end user graphically in Databricks
- Lineage can be exported via API and imported into other tool

Built-in search and discovery

Accelerate time to value with low latency data discovery

- UI to search for data assets stored in Unity Catalog
- Unified UI across DSML + DBSQL
- Leverage common permission model from Unity Catalog
- Apply semantic tags to data and search across tags



Discovery Tags

Semantic layer for your lakehouse

In Preview

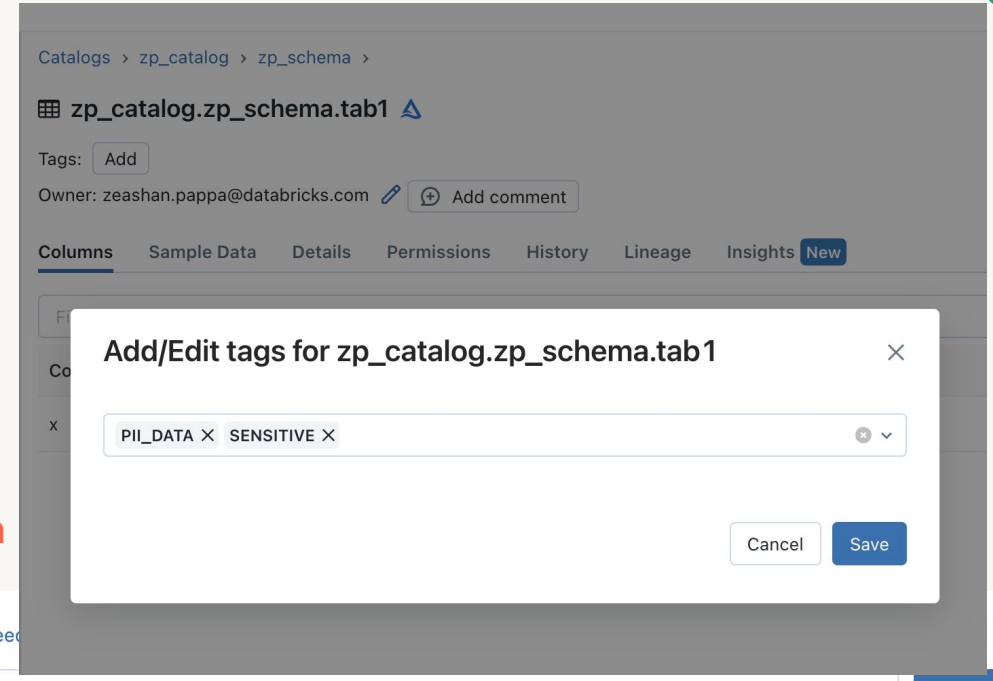
Problem

Searching for data assets in business terms or generally agreed upon taxonomies usually requires additional catalog tools.

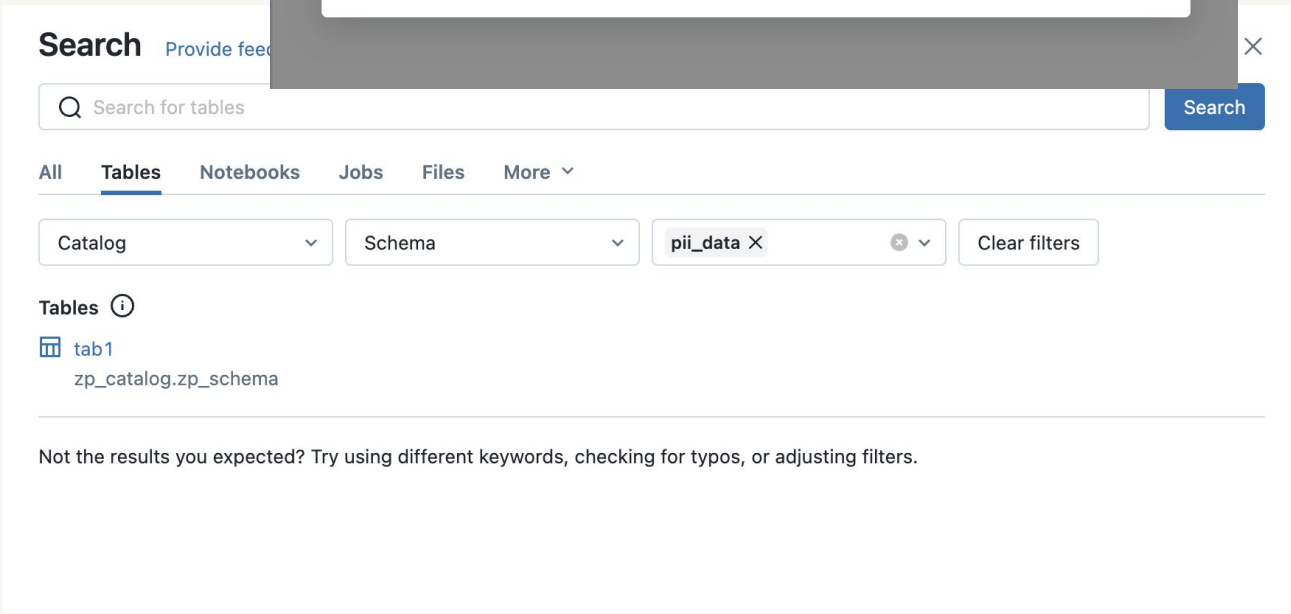
Solution

- Discovery Tags allow you to tag Column, Table, Schema, Catalog objects in UC
- **Integrated search mechanism in UC allows you to search for objects by tag.**

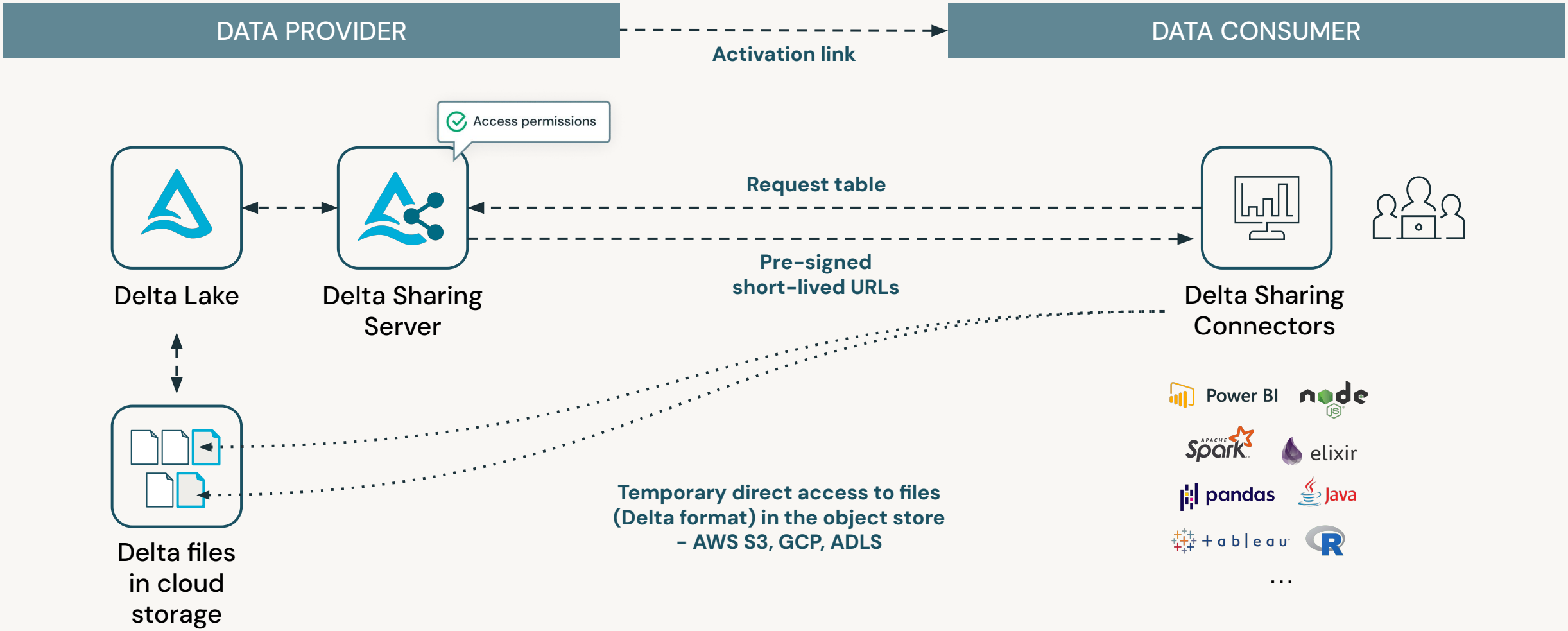
Tag your data



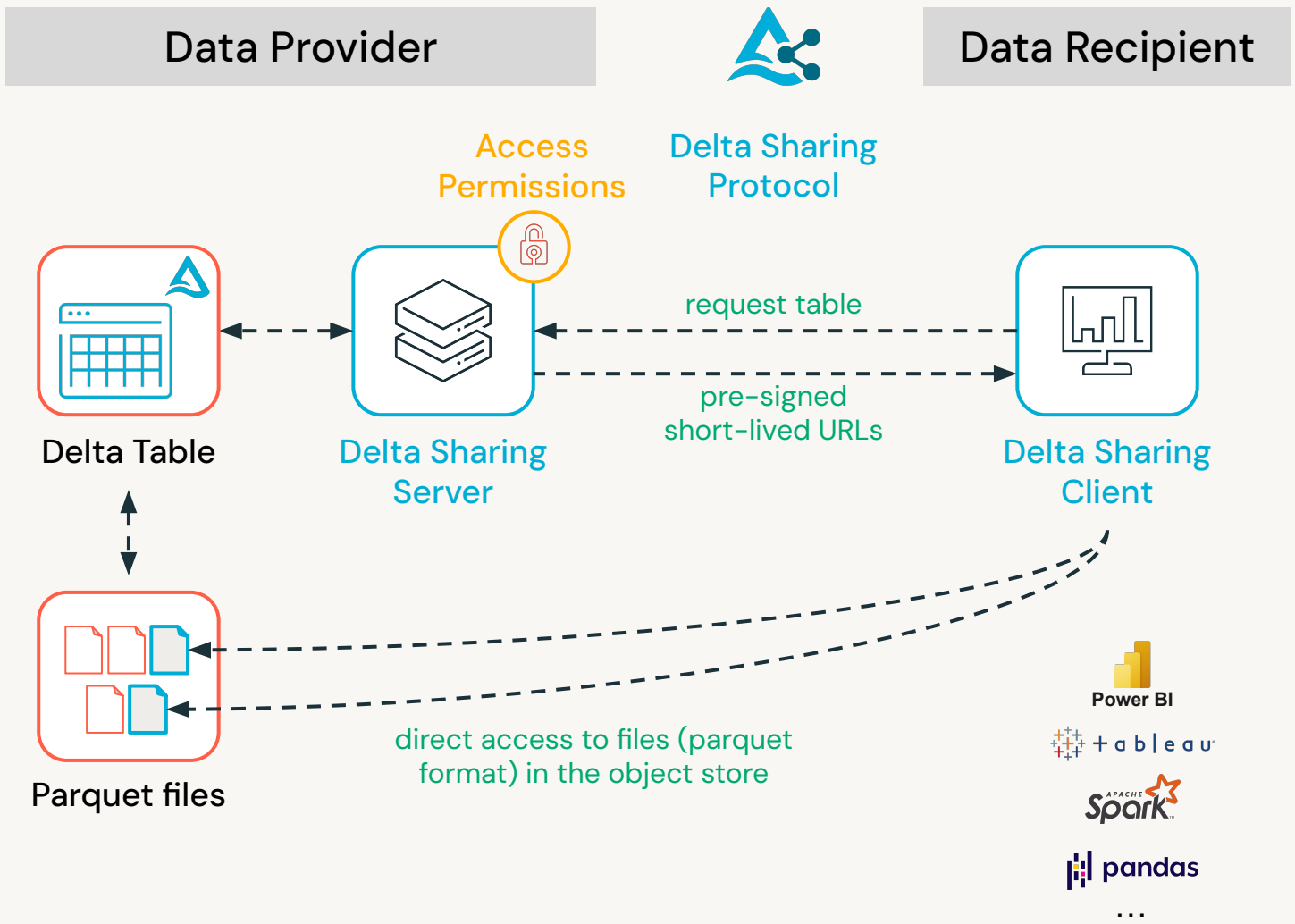
Search based on tags



Delta Sharing



Delta Sharing – Under the hood

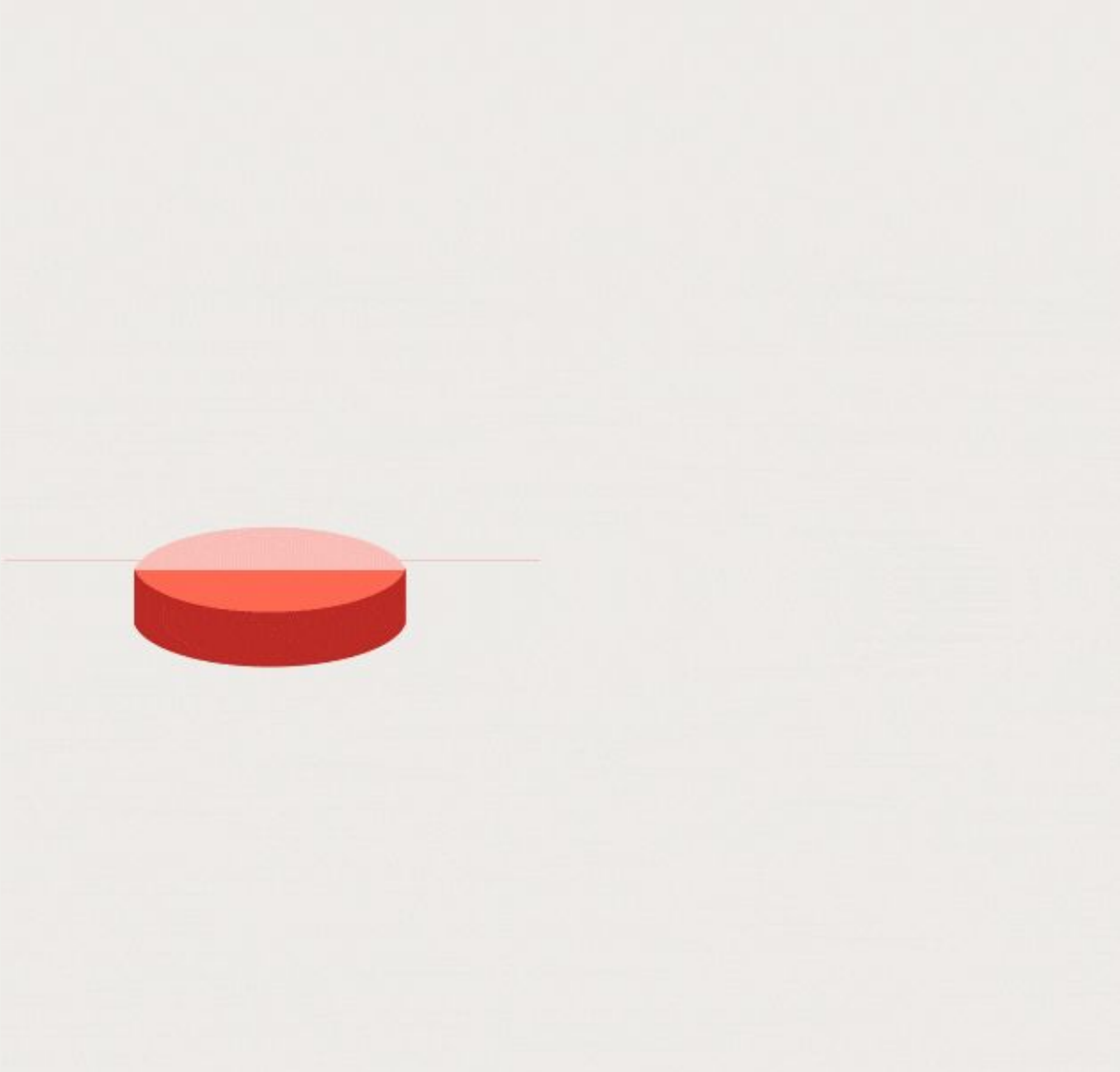


Delta Sharing Protocol:

- Client authenticates to Sharing Server
- Client requests a table (including filters)
- Server checks access permissions
- Server generates and returns pre-signed short-lived URLs
- Client uses URLs to directly read files from object storage

Notes:

- Sharing happens on Delta part files, supporting full tables, partitions, delta versions, ...
- Client is system independent, just needs to be able to read parquet files
- In Databricks Sharing Server and ACL checks are integrated with Unity Catalog



DEMO

Highlights From FY24 Tech Summit

Slides

Partner Academy

partner-academy.databricks.com

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  - All ILT
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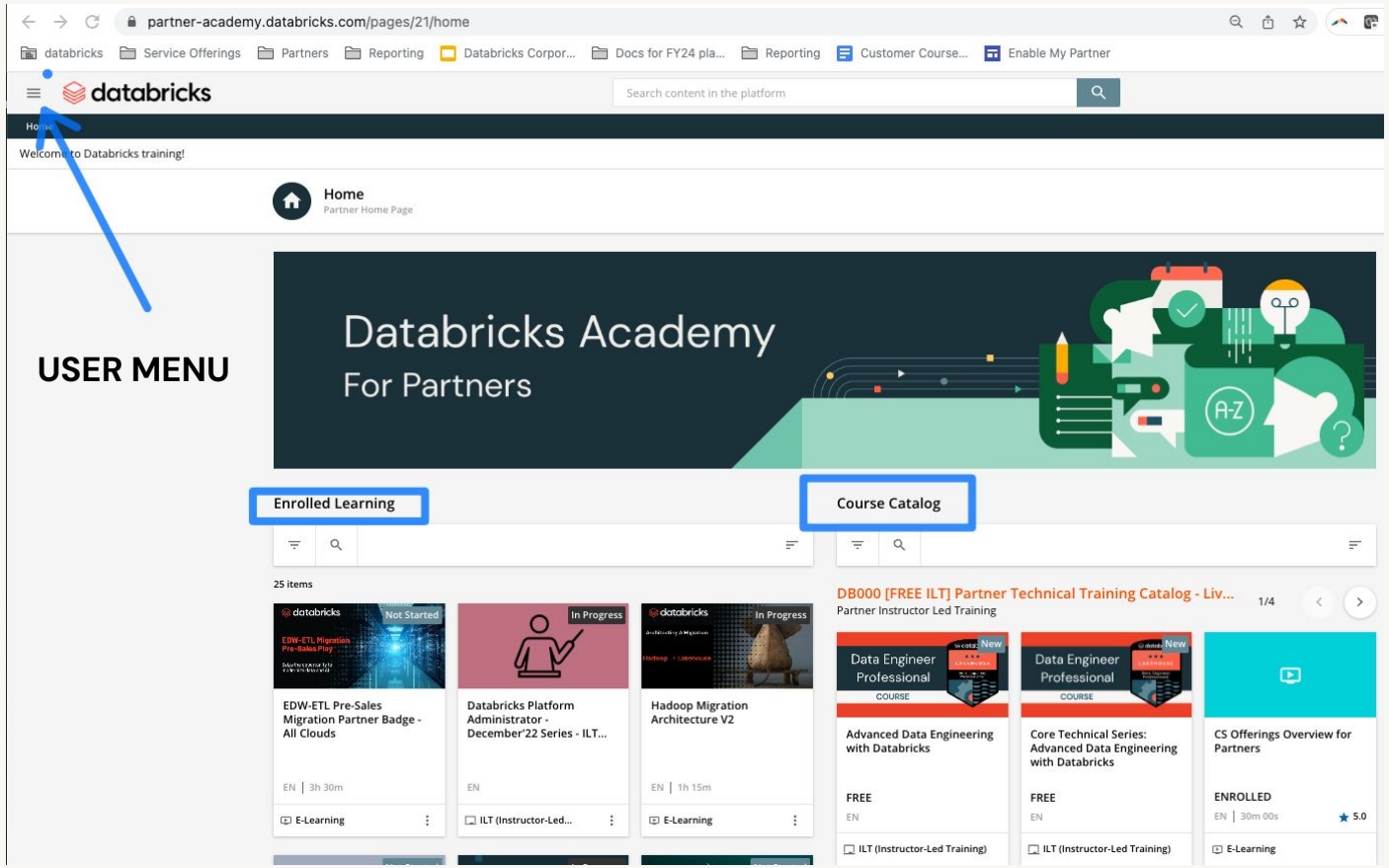
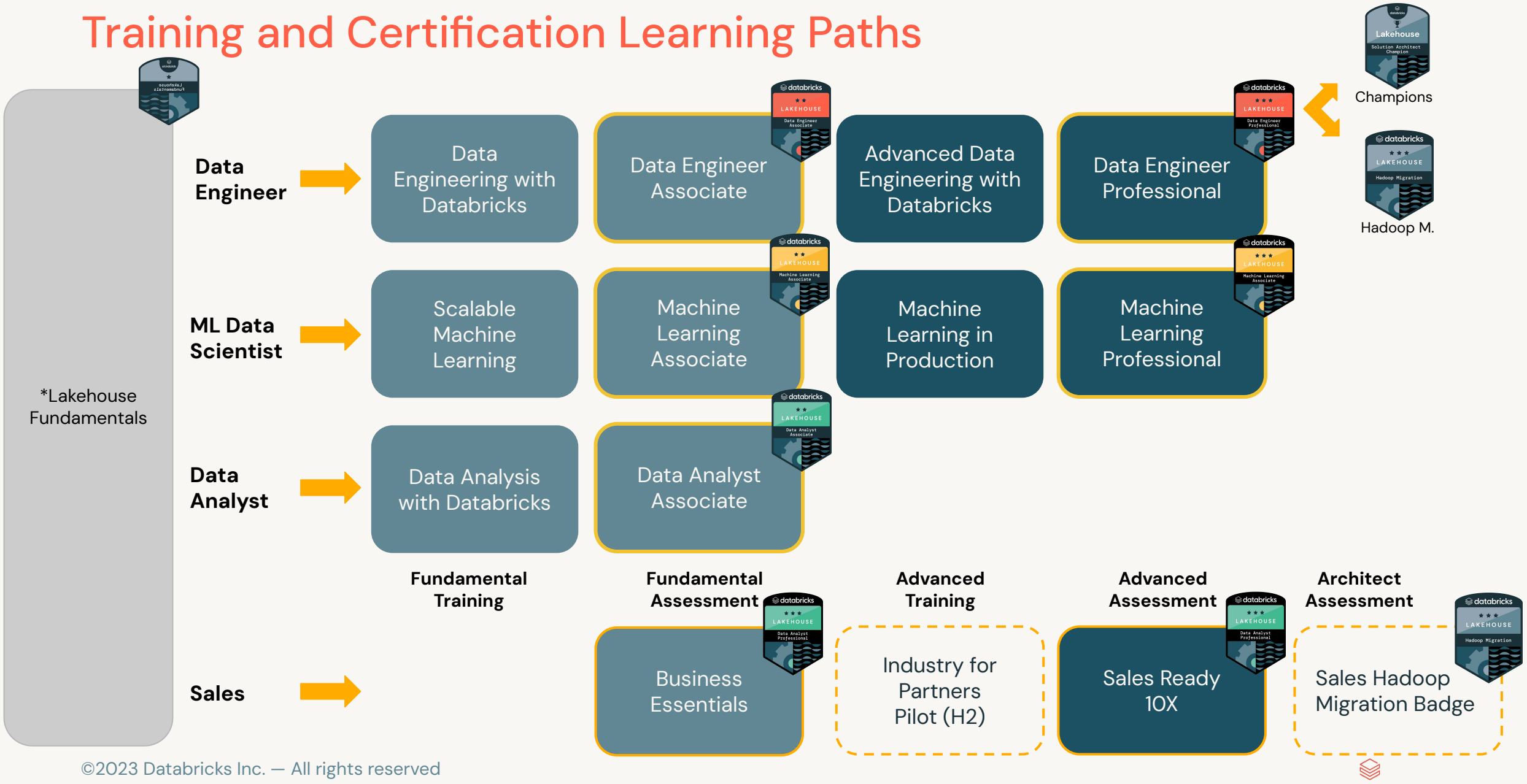


Partner Enablement 2023

Training and Certification Learning Paths



Databricks Alliance Team

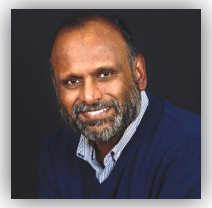
LEAD ALLIANCE PARTNERS:

Dave Thomas
GPS

Thomas Zipprich
Commercial

Alliance Team:

Emily Cole Alliance Manager & US Commercial Comms Leader



Mani Kandasamy
Alliance CTO

Dave Hurlbrink
Channel Sales Manager

Sue Wallrich
Alliance Marketing

Community of Practice:

Vamsi Vangala
USI, Commercial COP Leader & USI Comms Leader

Pradeep Penumarthy
USI, Commercial Pursuits Leader

Edgar Cuellar
USDC Commercial

Kalyani Kundhurthi
USI, Commercial Assets

Ashvic Godinho
GPS CoP Lead

Yogesh More
GPS Pursuits Lead

Ion Barbus
GPS Communications

Sunmin Lee
GPS Technical

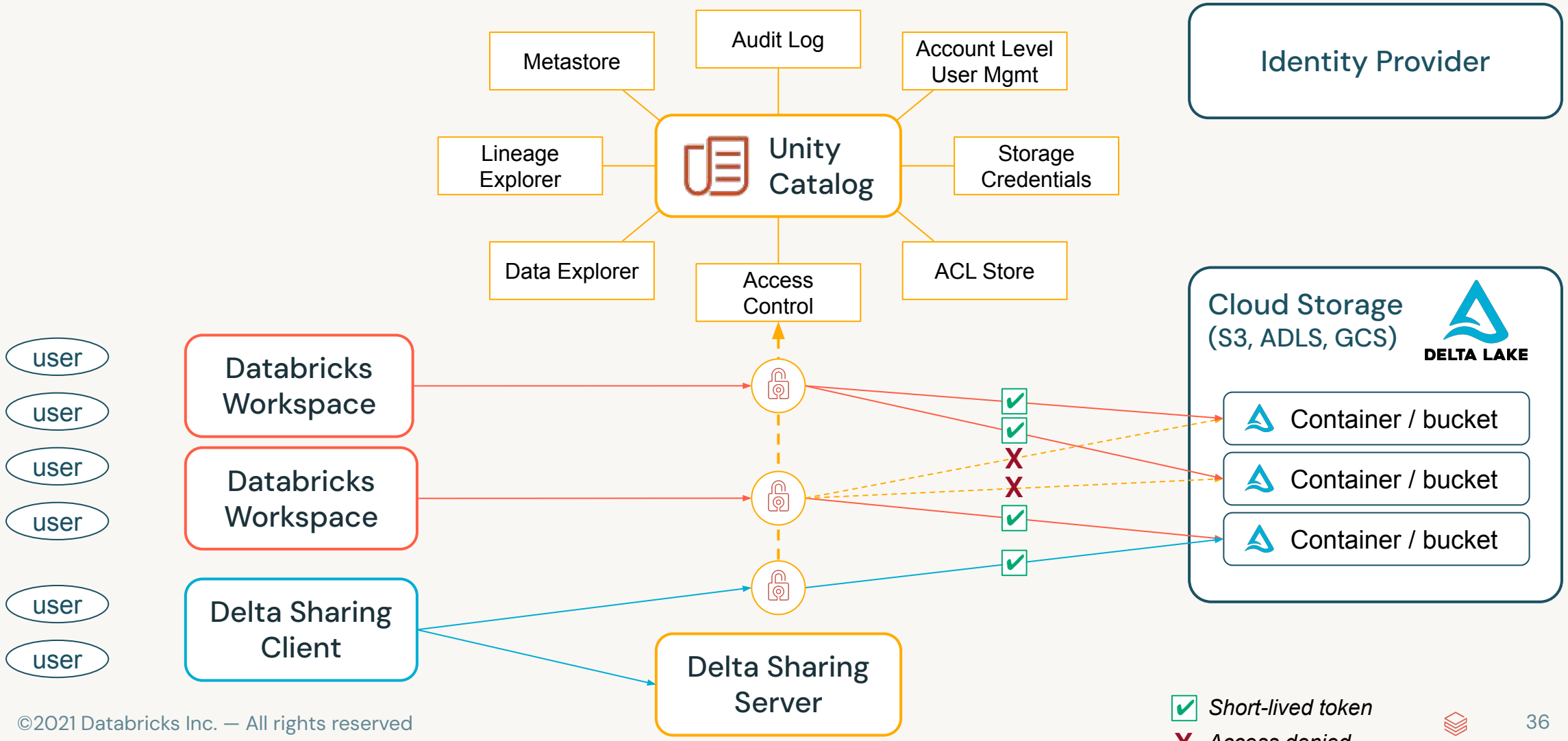
Ganesh Narayanan
GPS Training

Mark Lopez
GPS Assets

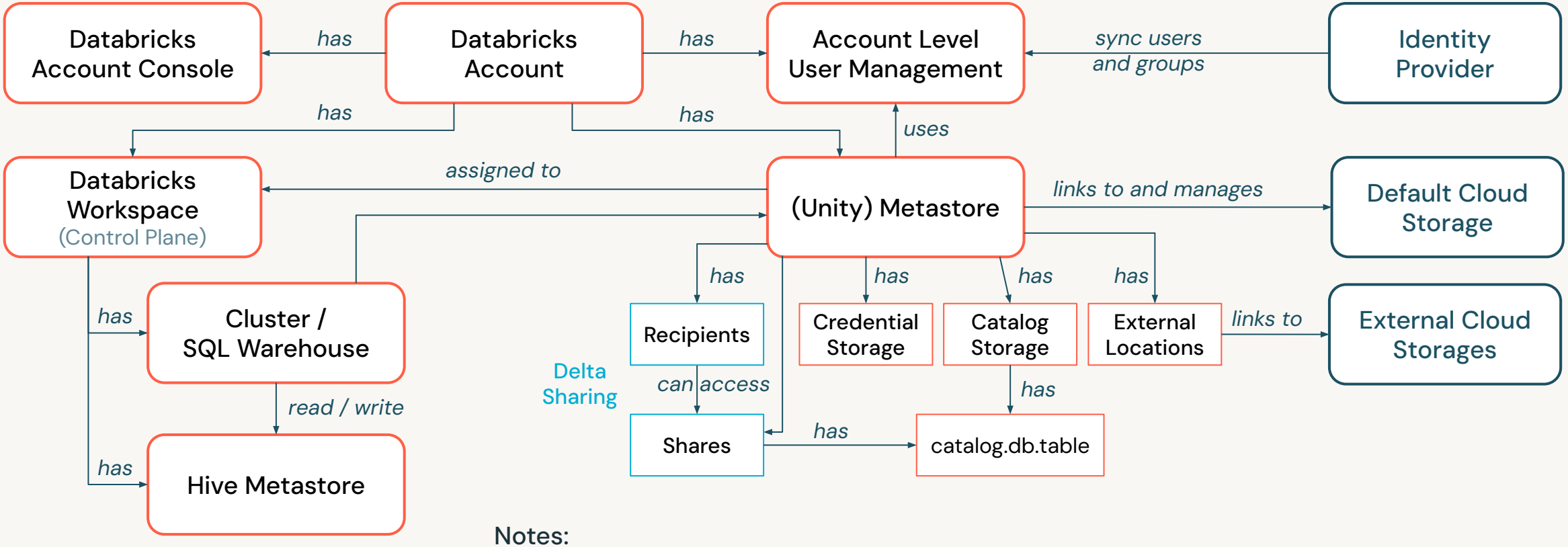
Appendix

Databricks Unity Catalog

Centralized Governance



Object relations with Unity Catalog (UC)

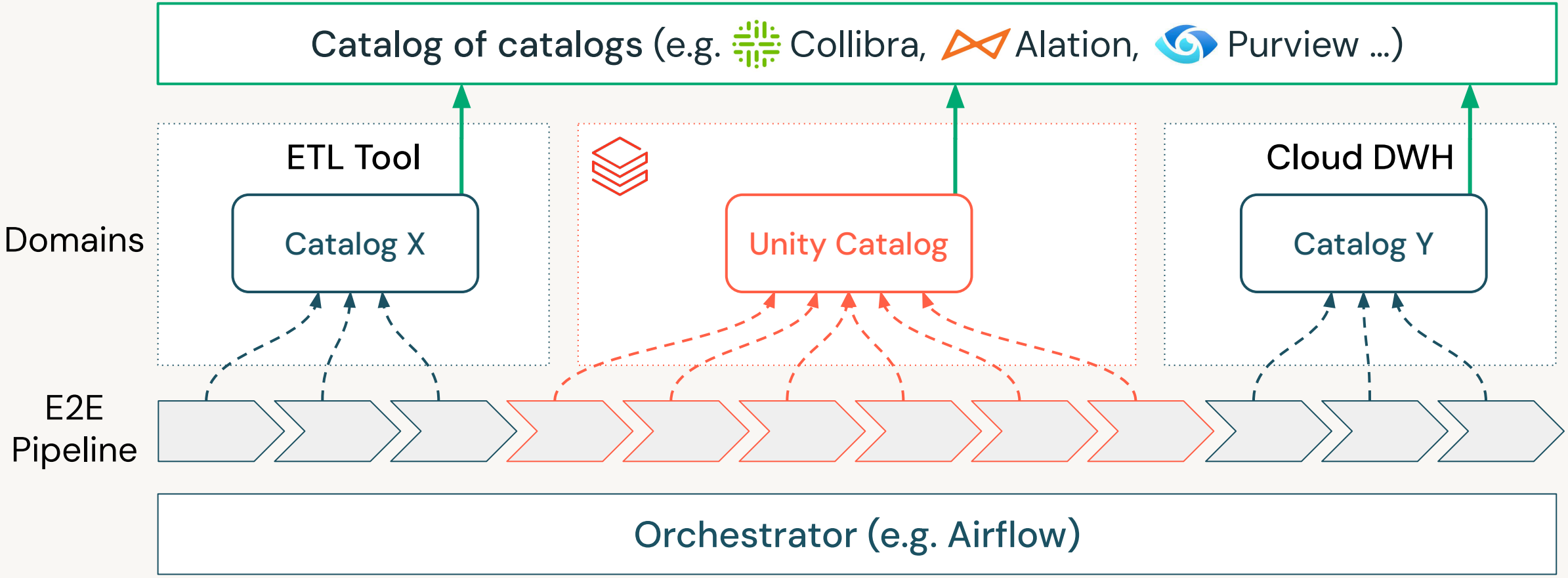


Notes:

- Using Unity Catalog is optional. Workspaces can still use a Hive Metastore only
- There can be more than one Unity Metastore (UC) per Databricks Account (e.g. for regional isolation or for isolation of lines of business)
- Every workspace can only attach to one UC Metastore, however one Unity Metastore can be assigned to several Workspaces

Unity Catalog and Catalog Partners

Better together



Lineage information flow:

- Pipeline step sending lineage to domain's catalog (e.g. UC)
- Domain's catalog to global catalog of catalogs

Unity Catalog and Governance Partners

Better together

Greatly improves the experience in Immuta and Privacera:

- No longer limits the languages that these products can work in
- No longer limits the APIs that your users can use
- Improves performance and robustness
- Adds a common enforcement layer