DATA+AI SUMMIT BY databricks

ATTRIBUTE BASED ACCESS CONTROL

Building a scalable access management framework

Kristen Wilder, Zeashan Pappa

Meet our presenters

Zeashan Pappa

- 23+ years of experience as an engineer and architect
- 6 years of experience building with Databricks
- 10 years of experience building scalable platforms and companies
- Product manager working on catalog, governance, security products

Kristen Wilder

- Product manager at Databricks focused on discovery and governance experiences
- 4+ years of experience across product management and FE engineering
- 3 years specializing on improving Governance and Data Access Management

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Agenda

1. ABAC Overview
2. Fundamentals
3. Story & Demo
4. Anatomy of a rule
5. Use Cases
6. Q/A

ABAC Overview

Attribute Based Access Control

ABAC allows access control to be conditional based on broader properties of the user, resource, and the request.

- Builds on top of and coexists with the current UC security model, including all privileges
- Use row level filters and column level masking for fine grained access control
- Governs data, AI, & filesystems

High Leverage Governance with ABAC

Govern Data & AI at scale

Rules

Express rules and enforce policy

Attributes

Tags & attributes on data, objects, and principals

Lakehouse Data

Data/AI/file assets in your data lake, Volumes, Models, Tables, Views, structured and unstructured data.

Federated Data

Data from legacy DBMS sources and other platforms

ABAC Vision

Govern the data intelligence platform

Rules

Express rules and enforce policy on all objects in the Data Intelligence Platform

Attributes

Tags & attributes on data, objects, and principals

Lakehouse Data

Data/AI/file assets in your data lake, Volumes, Models, Tables, Views Structured and unstructured data.

Federated Data

Data from legacy DBMS sources and other platforms

Databricks Platform

Accounts, workspaces, workflows, pipelines, dashboards, notebooks, etc

Concepts and Fundamentals

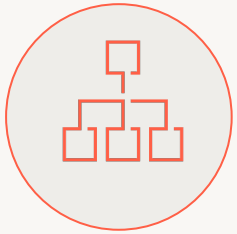
Concepts

Attributes

Attributes describe data and other objects

Rules

Rules determine access control

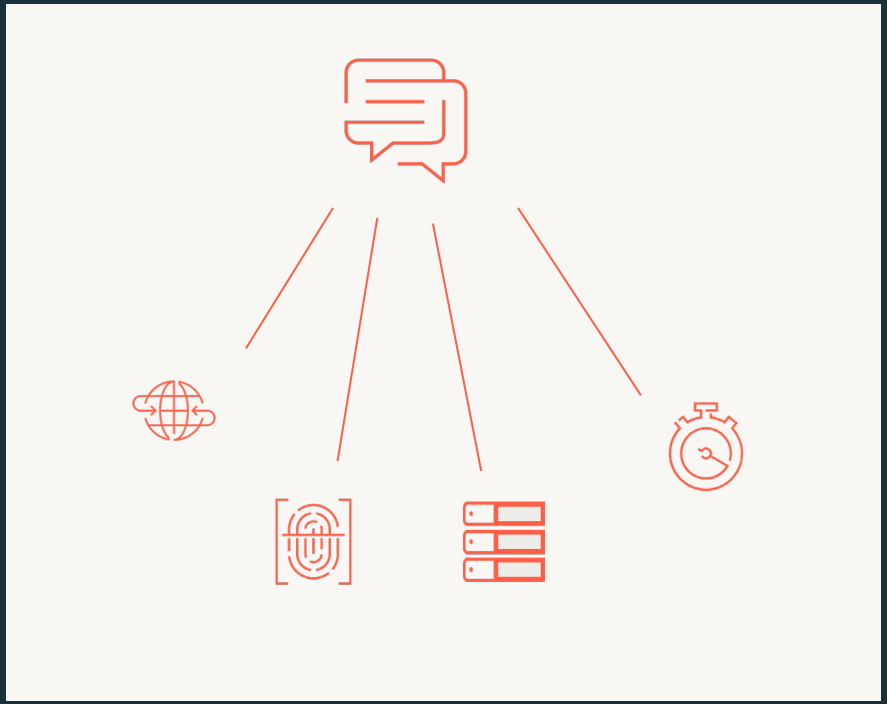


Inheritance

Rules and tags are inherited and accumulate to express policy

More on Attributes

Attributes can be used to inform rules

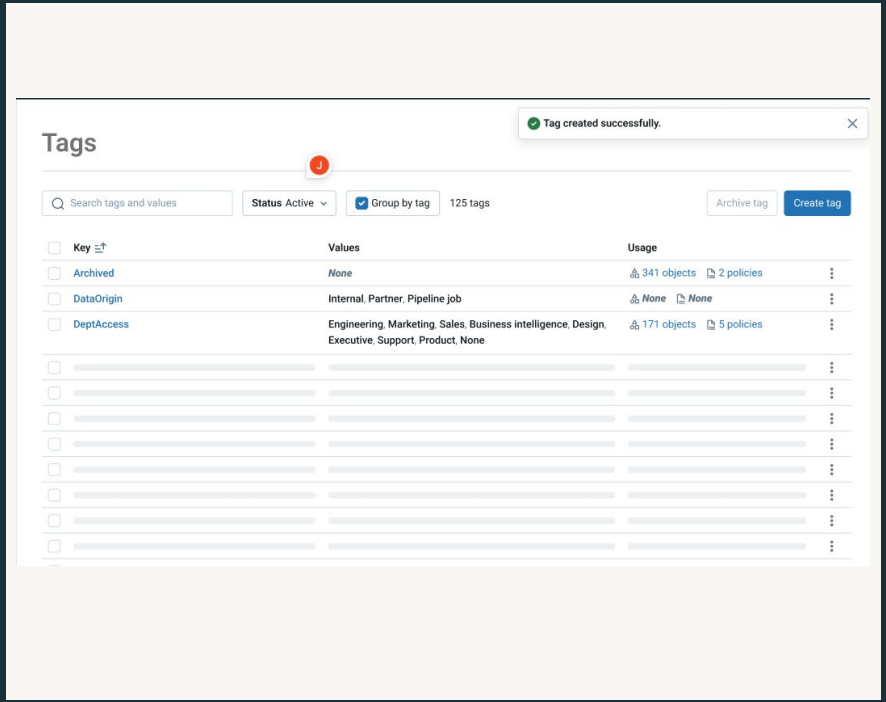


Attributes are derived from the context of the object where policy is evaluated

- Location
  - Workspace, IP, etc
- Identity
  - User, group, etc
- Tag
  - User or system assigned
- Time
  - Current datetime of the request

What are Tags?

Introducing governed tags



- Tags are scoped at the account level
- Highly flexible attribute type
- Can be leveraged to classify any Databricks object
- Can be used to establish your company's business taxonomy
- Used for access management via ABAC, resource usage, data retention, processing pipelines, billing, and discovery.

How are Tags used?

Tags can be used for governance, discovery, attribution

Governance

Data steward wants to classify sensitive data and ensure their organization is GDPR compliant.

Assigns a pii tag to relevant columns

Credit_card	Ssn	Zip_code
pii: ccn	pii: ssn	pii: zip
123-12334	123456789	92660

Discovery

Data engineer wants to find all tables related to the marketing domain

Assigns a tag, “domain: marketing”

Transactions_table
domain:marketing

fiscal_2025
domain:marketing

Attribution

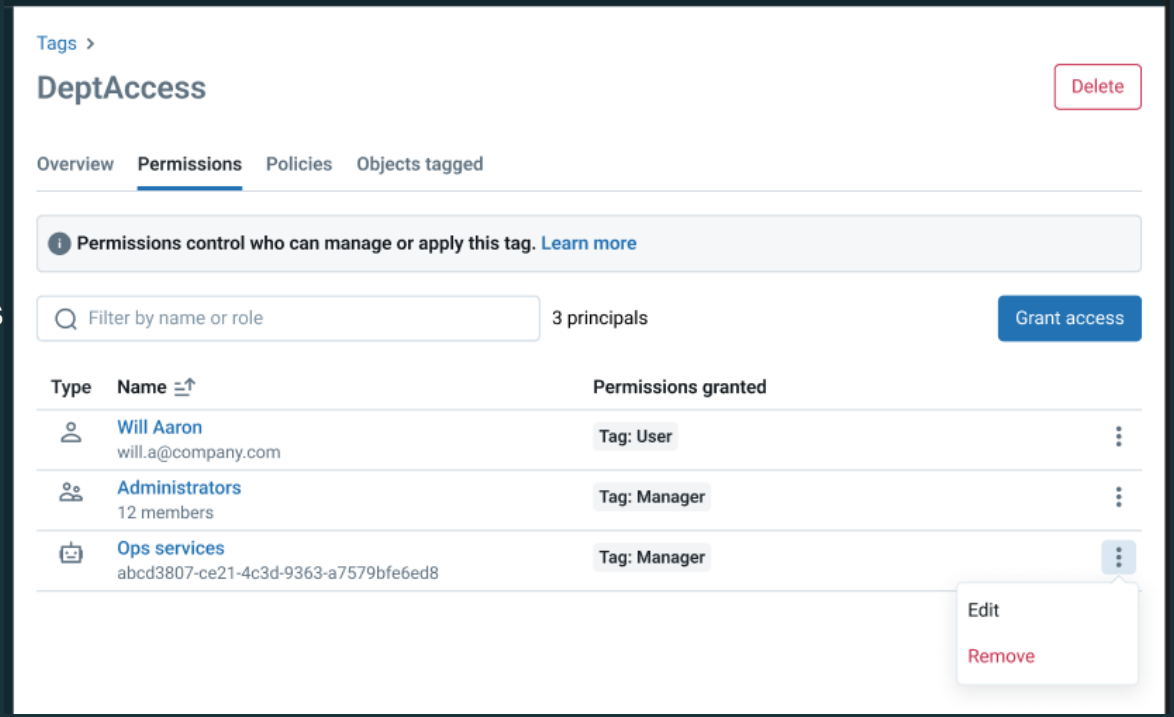
Admin wants to track usage and estimate costs.

Assigns a tag, costcenter: finance to the finance related assets

How are Tags governed?

Tags provide input to rules, and must be governed.

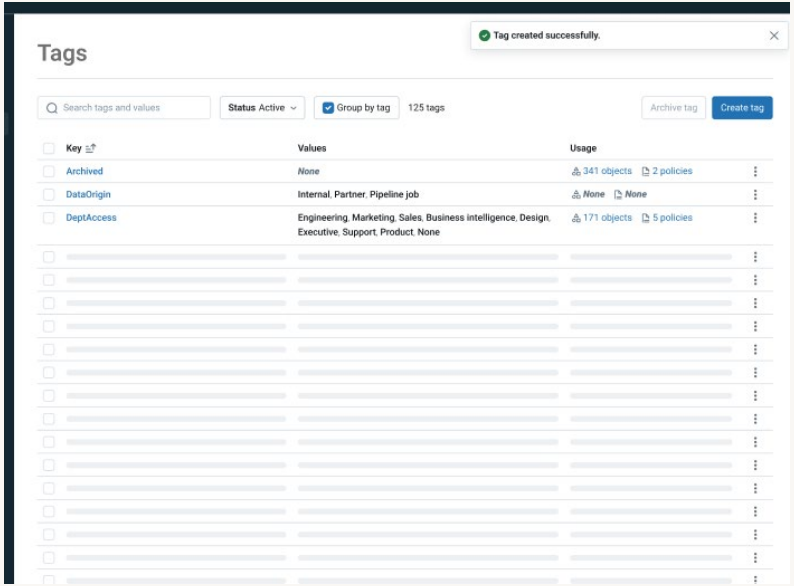
- Restrict which users can **create, update, delete tags**
- Control which users can **assign and unassign** tags
- Leverage flexible permission sets
  - Manage tags set
  - Manage tag assignments set



How can you interact with Tags?

Users can view a centralized Tags list

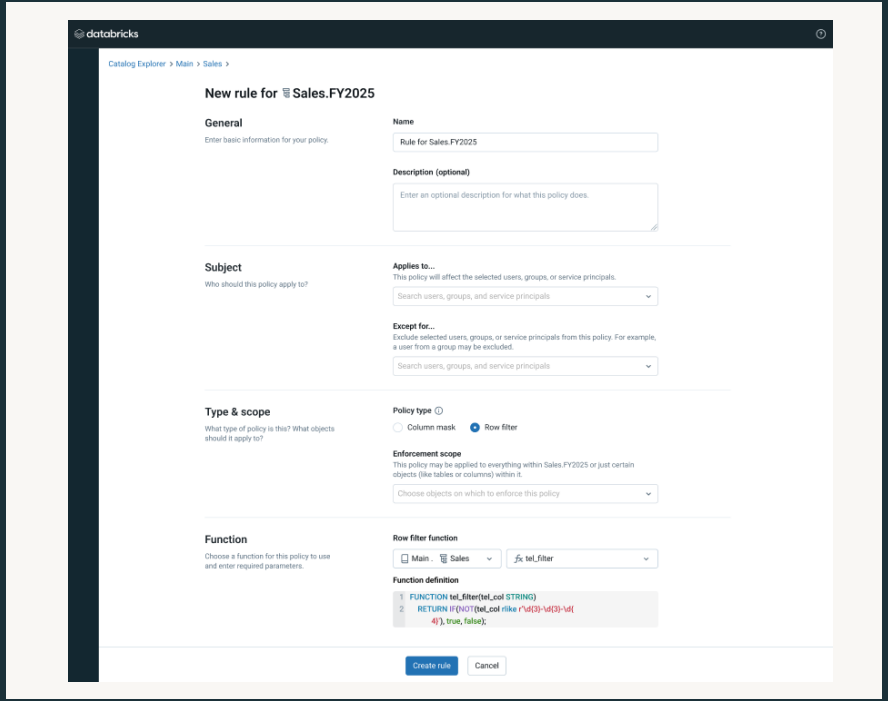
- Tags
  - Via REST API
  - Via UI
- Tag assignments
  - Via SQL
  - Via REST API
  - Via UI
- REST based integration support for 3rd party tag sources



What are Rules?

Rules use tags and other attributes to decide access.

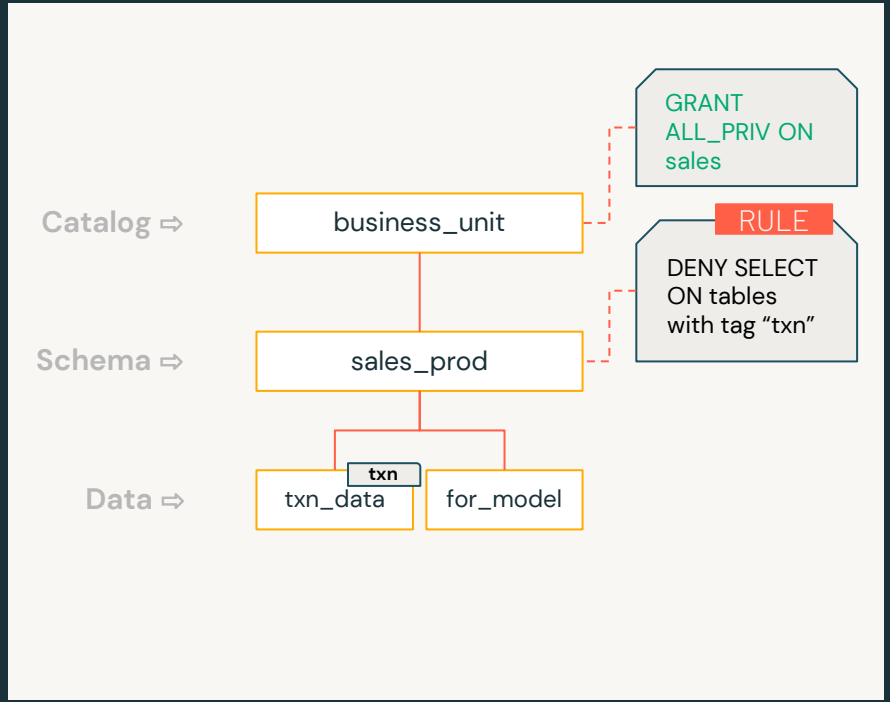
- Applied on **tables, schemas, catalogs**
- Target **users, groups or roles**
- **Inherited** from parent container
- Have conditions that use **tags and attributes**
- 4 Rule Types
  - RLS / CLM / GRANT / DENY



Inheritance

Rules and Tags use inheritance to co-exist, simplify and add flexibility

- Rules inherit down the object hierarchy and co-exist with existing object grants.
- Hierarchy order is respected for Tags
- Denies are always respected.
- Tags from catalogs and schemas can be used in policies that apply directly to objects
  - Policies on catalogs/schemas can also use object tags.



Meet our characters

Every ~~organization~~ story has its “characters”

Sarita

Data engineer responsible for building a forecast model

Wants to discover the right data, and access only what she needs in order to build her model

Malik

Data producer responsible for producing transaction data in Sarita’s organization

Wants access control on his data, but doesn’t want to re-implement it when access needs or rules change.

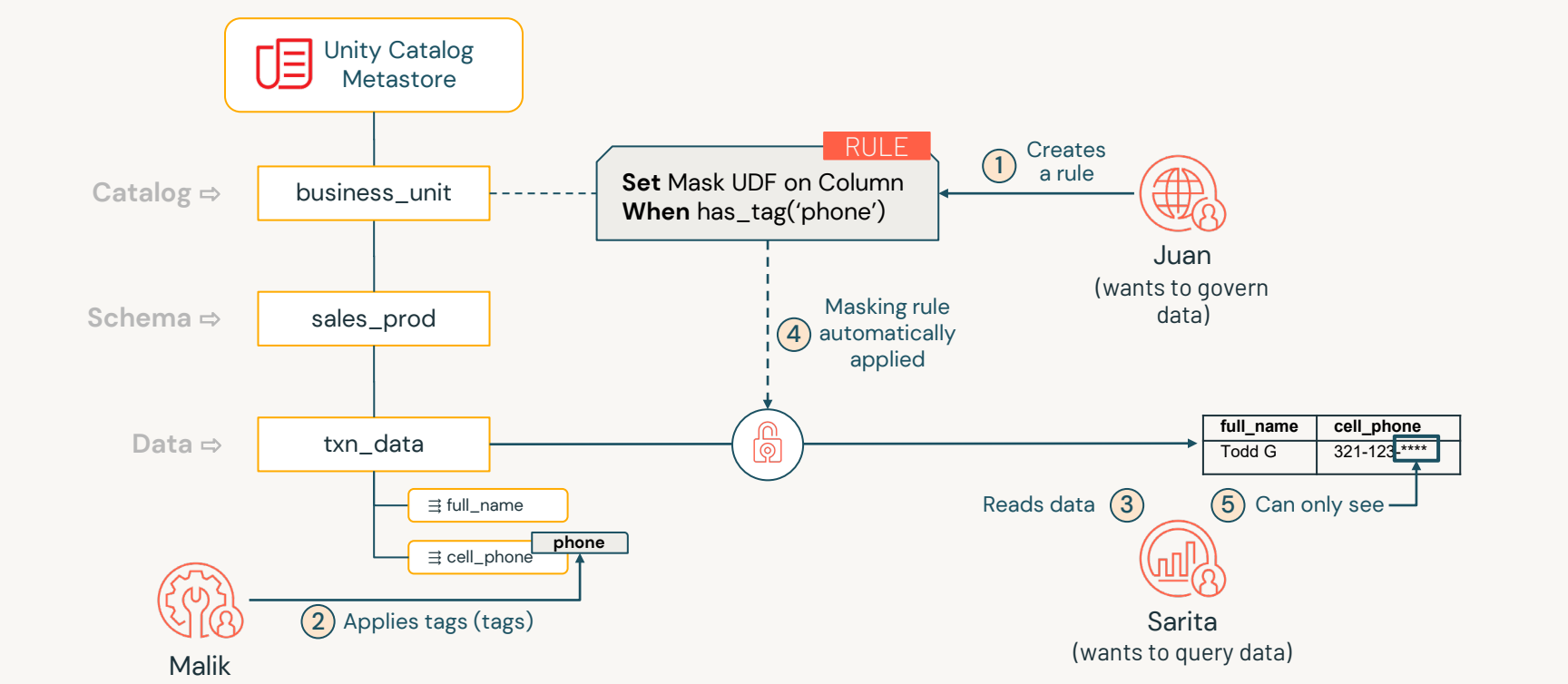
Juan

Data steward responsible for governing sales data within Sarita’s organization

Wants to meet compliance standards across all data sets and enforce proper data access automatically

The plot thickens

ABAC in action



Demo

Anatomy of a Rule

Anatomy of a rule

"Follow" along please

```
SET RULE filter_by_state
ON CATALOG sales_prod
ROW FILTER state_lookup_filter
TO all_analysts EXCEPT analyst_managers
FOR TABLES
WHEN COLUMNS col_has_tag_value('pii','state')
```

- Applies a filter based on a lookup table to ensure that analysts can only see data for their assigned states

More about rules – Name

All good things have good names.

```
SET RULE filter_by_state
ON CATALOG sales_prod
ROW FILTER state_lookup_filter
TO all_analysts EXCEPT analyst_managers
FOR TABLES
WHEN COLUMNS col_has_tag_value('pii','state')
```

- Names are unique within the assigned resource
- Names are how you select the rule for updates and deletes

More about rules – Resource

Where your rule is applied in the hierarchy

```
SET RULE filter_by_state
ON CATALOG sales_prod
ROW FILTER state_lookup_filter
TO all_analysts EXCEPT analyst_managers
FOR TABLES
WHEN COLUMNS col_has_tag_value('pii','state')
```

- Rule is enforced on all objects at or “below” where it is applied

More about rules – Type

Rule types have different syntax and behavior

```
SET RULE filter_by_state
ON CATALOG sales_prod
ROW FILTER state_lookup_filter
TO all_analysts EXCEPT analyst_managers
FOR TABLES
WHEN COLUMNS col_has_tag_value('pii','state')
```

- Row Filter / Column Mask / Grant / Deny
- Applied when conditions are met

More about rules – Targets & Filters

Who does it apply to, and for what object type

```
SET RULE filter_by_state
ON CATALOG sales_prod
ROW FILTER state_lookup_filter
TO all_analysts EXCEPT analyst_managers
FOR TABLES
WHEN COLUMNS col_has_tag_value('pii','state')
```

- Principals targeted or excluded
- Object types targeted

More about rules – Conditions

WHEN does the rule apply?

```
SET RULE filter_by_state
ON CATALOG sales_prod
ROW FILTER state_lookup_filter
TO all_analysts EXCEPT analyst_managers
FOR TABLES
WHEN COLUMNS col_has_tag_value('pii','state')
```

- Condition is applied to the object being accessed.
- Evaluates true/false
- Can use attributes from parent objects, user, and request

Use cases

Time-bound data access

Enforce policy that automatically expires

Sarita is a data engineer who needs access to transaction tables for a 3 month project

Juan, the data steward, creates an ABAC policy with a time bound expiration of 3 months

```
SET RULE grant_expire_3mo
 ON SCHEMA sales
GRANT SELECT
 TO `data_engineering`
 ON TABLES WHEN
 current_date() < '2024-09-13'
```

Region based data access

Geo-fence your data

Sarita, the data engineer, is based out of America and wants to access a dataset stored in Europe.

Malik, the data producer, wants to ensure that engineers can access data for their use cases

Juan the data steward, wants to make sure that GDPR constraints are not violated and creates a row filter to ensure that Sarita can only see data for America.

Region based data access

Geo-fence your data

Lookup Table

region	group_name
emea	EMEA_USERS
amer	AMER_USERS
apj	APJ_USERS

UDF

```
CREATE FUNCTION gdpr_fxn(region STRING)

RETURN
     region IN (SELECT DISTINCT region from
     sales.region_mapping WHERE
     is_account_group_member(group_name))
```

Rule

```
SET RULE
 gdpr_filter
 ON  SCHEMA house.sales
 ROW_FILTER gdpr_fxn
 TO data_engineering
 FOR TABLES
 WHEN COLUMNS
   (col_has_tag('region'))
```


Distributed ownership

Broad policy coexists with functional access

Malik, the data producer wants to provide analysts access to all sales transactions.

```
SET RULE analyst_sales_select
 ON CATALOG business_unit
GRANT SELECT
 TO `analysts`
 FOR TABLES
WHEN TABLE has_tag('txn')
```

Julie, the CDO, wants to make sure that all PII information is masked for back office users.

```
SET RULE analyst_sales_mask
 ON CATALOG business_unit
COLUMN MASK mask_pii
 TO `analysts`
FOR TABLES
 WHEN has_tag('txn')
 WHEN COLUMNS col_has_tag('pii')
```

Restrict default privileges

Limit what a user can do by default

Carlton, the platform admin, wants to make sure that users do not have the ability to give other users access to data assets that they create.

```
SET RULE restrict_manage_tables
ON CATALOG business_unit
DENY MANAGE_ACCESS
TO ALL EXCEPT `admins`
FOR TABLES
```

Exclusive access to data

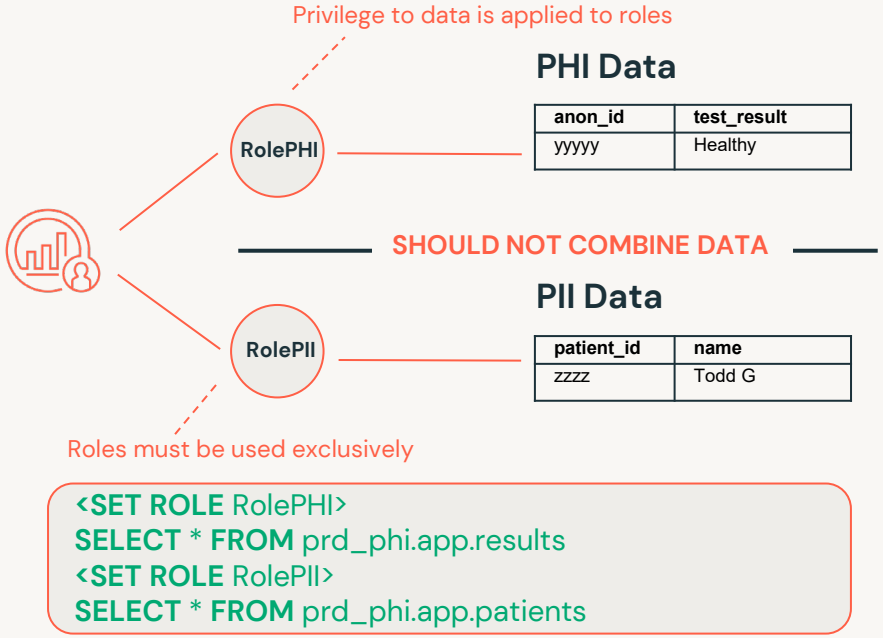
Coming soon!

<Set Role> - can be combined with ABAC or used by itself

Malik, the data producer wants to ensure that PHI cannot be combined with PII data to limit the risk of re-identification.

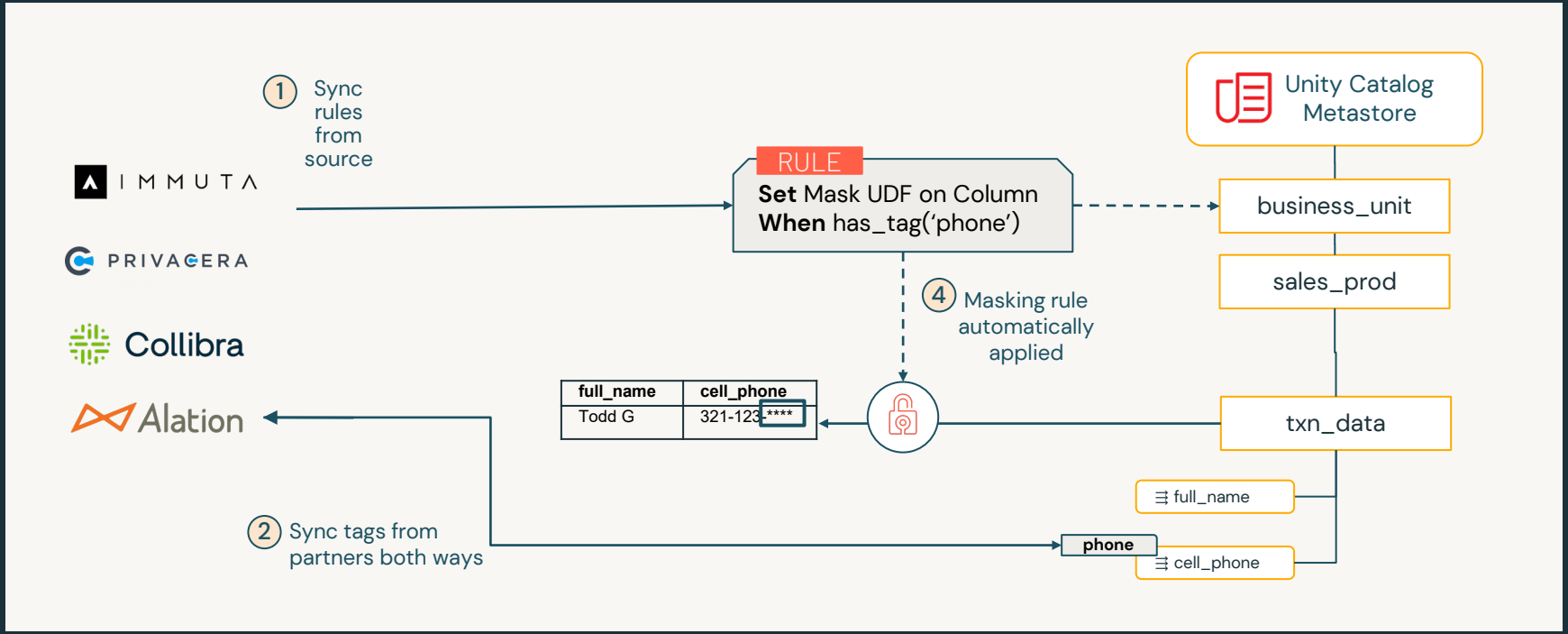
Data is stored separately but analysts have access to both PHI and PII information for different projects.

Analysts should not query or combine data together.



ABAC improves UC Integrations

Express policy via our launch partners, secure it with Unity Catalog



Q/A

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