Apache Atlas: Governance for your data

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Agenda

- Introduction
- Apache Atlas
  - Overview
  - Data Provenance/Lineage
  - Classification
  - Metadata Catalog Search
  - Architecture
- Demo
- Roadmap
- Q & A

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Apache Atlas: Introduction

Provides metadata-driven core foundational governance services for Hadoop and enterprise data ecosystem

Data Lineage/Provenance

- Captures data lineage across components

Data Classification

- Supports classification of data assets using tags – PII, PHI, PCI, EXPIRES_ON, CLAIMS, LIFE_INSURANCE

Metadata Catalog Search

- Free text search on metadata
- Advanced search using DSL

Integrations

- OOB real-time metadata and lineage ingestion with Hive, Sqoop, Storm/Kafka
- APIs for custom metadata ingestion
- Apache Ranger integration for classification based security

Metadata Repository

- Flexible metamodel to capture technical, business, operational metadata
- Out-of-box models for Hive, Storm, Sqoop, HDFS, Kafka, HBase
- APIs to register custom models

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Background: DGI Community becomes Apache Atlas

Dec 2014
DGI group Kickoff

May 2015
Apache Atlas Incubation

Aug 2016
HDP 2.5/ Apache 0.7 Foundation Release

Apr 2017
HDP 2.6/ Apache 0.8 Release

- #Committers – 35
- Code contributors from
  - Hortonworks, IBM, Aetna, Merck, Target

Apache 0.8/HDP 2.6

- Simplified Search UI
- Simplified APIs
- Classification-based security for HDFS, Kafka, HBase
- Knox SSO
- Performance/scalability improvements

Apache 0.7.1/HDP 2.5.3

- High availability support
- LDAP Authentication/Authorization
- Classification based security for Hive
- UI Redesign

** DGI: Data Governance Initiative*

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Apache Atlas : Lineage

Lineage

- Where does this data originate from (source/provenance)?
- **Upstream path**: Path through all data assets and processes leading up to current data asset

Impact

- How is this data being used ?
- What other data assets (derivative/dependent) does this impact?
- **Downstream path**: Path through all data assets and processes leading out of current data asset

Used for forensics

- Impact analysis
- Auditing and Compliance

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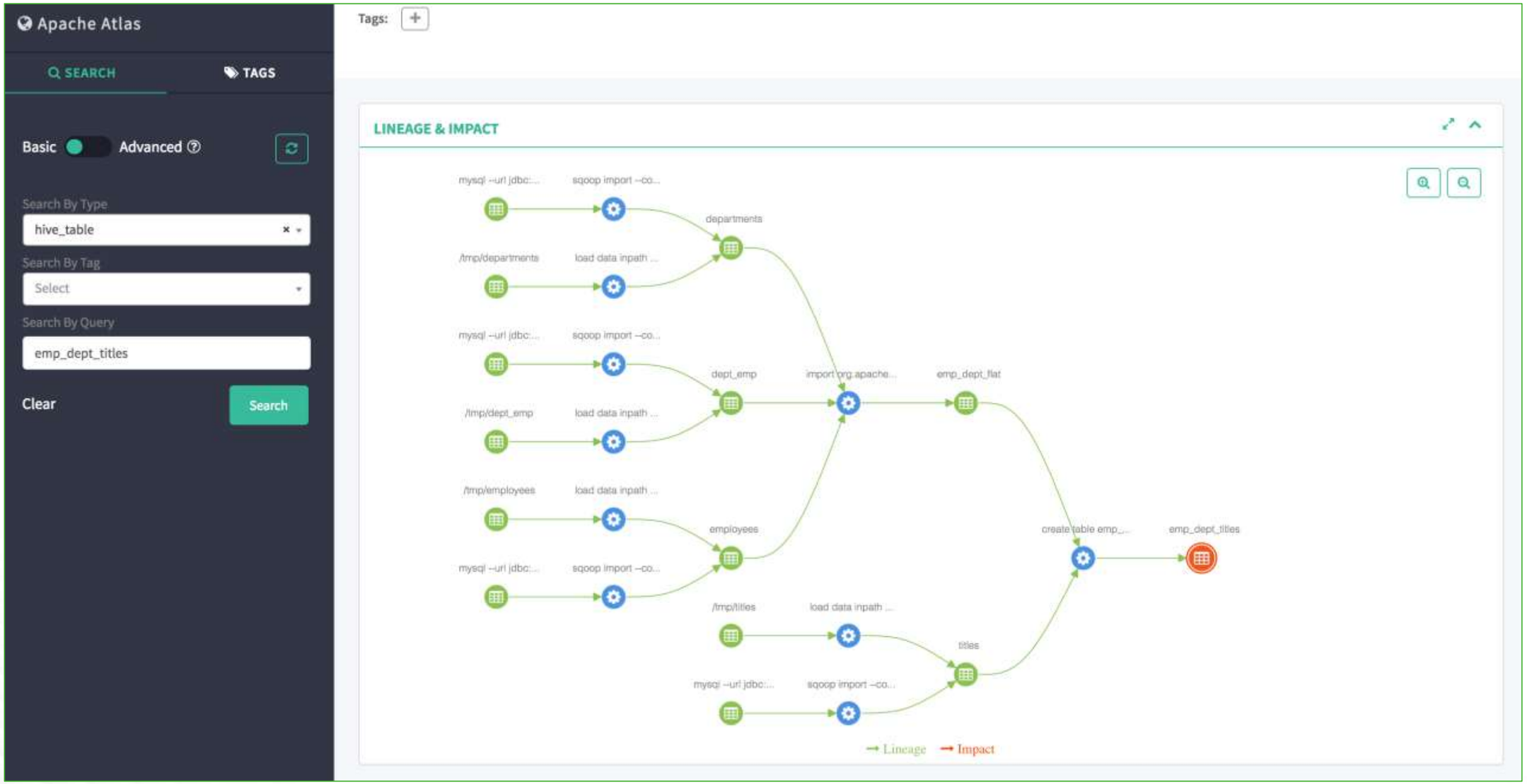
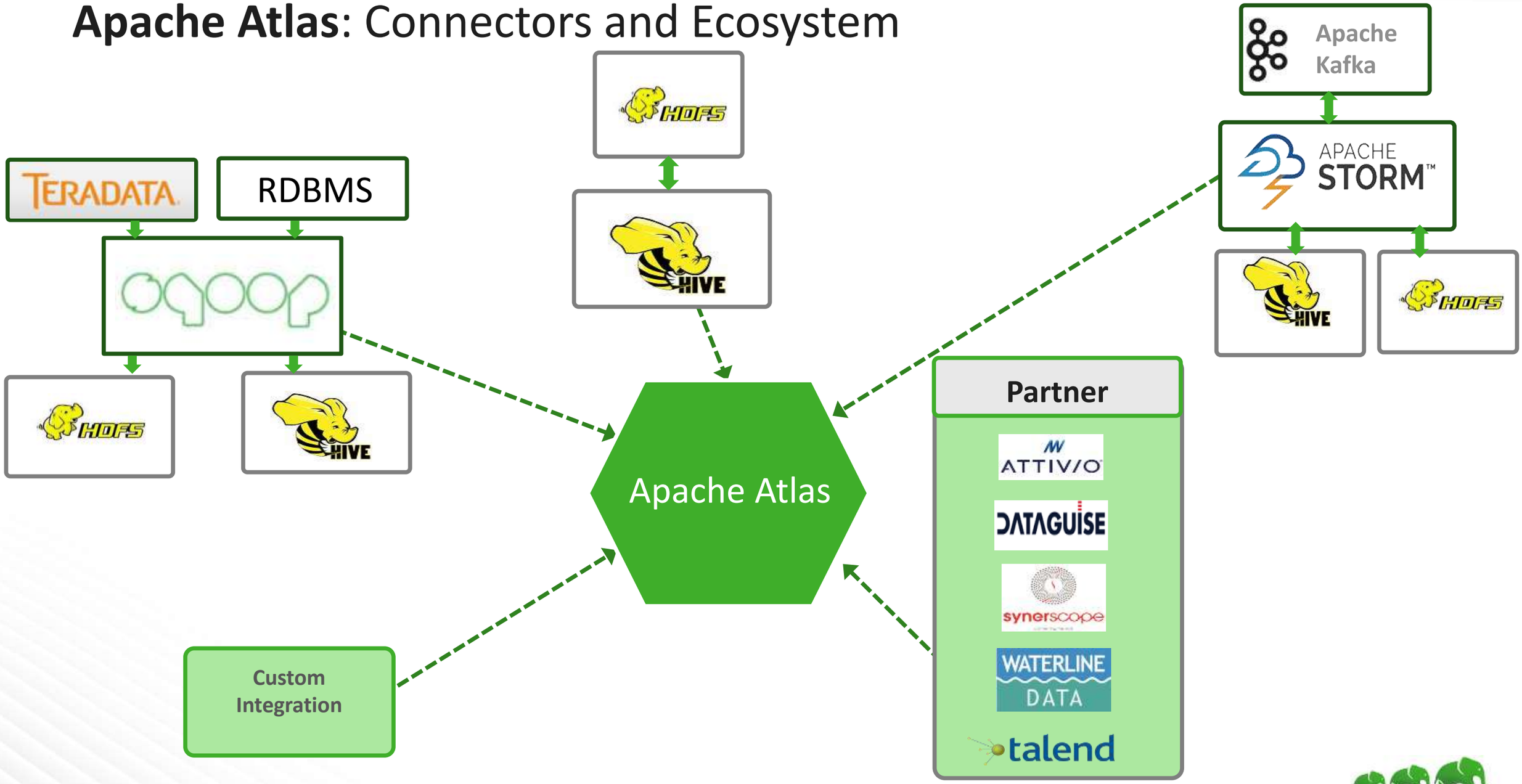
Apache Atlas: Lineage and Impact



Apache Atlas: Connectors and Ecosystem



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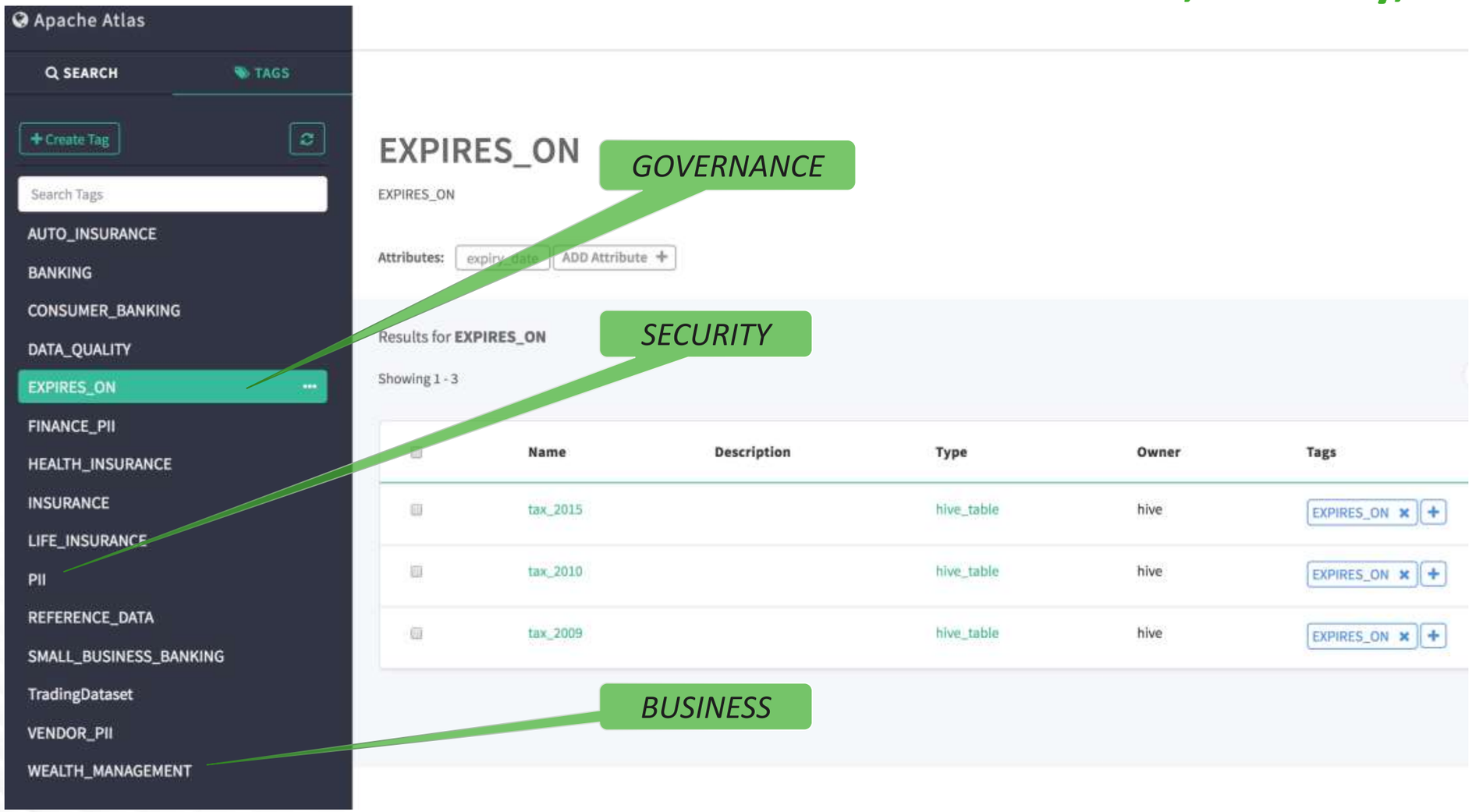
Apache Atlas: Classification

- Categorize and curate data assets for easier discovery
- Associate context with data assets – Governance, Security, Business, …



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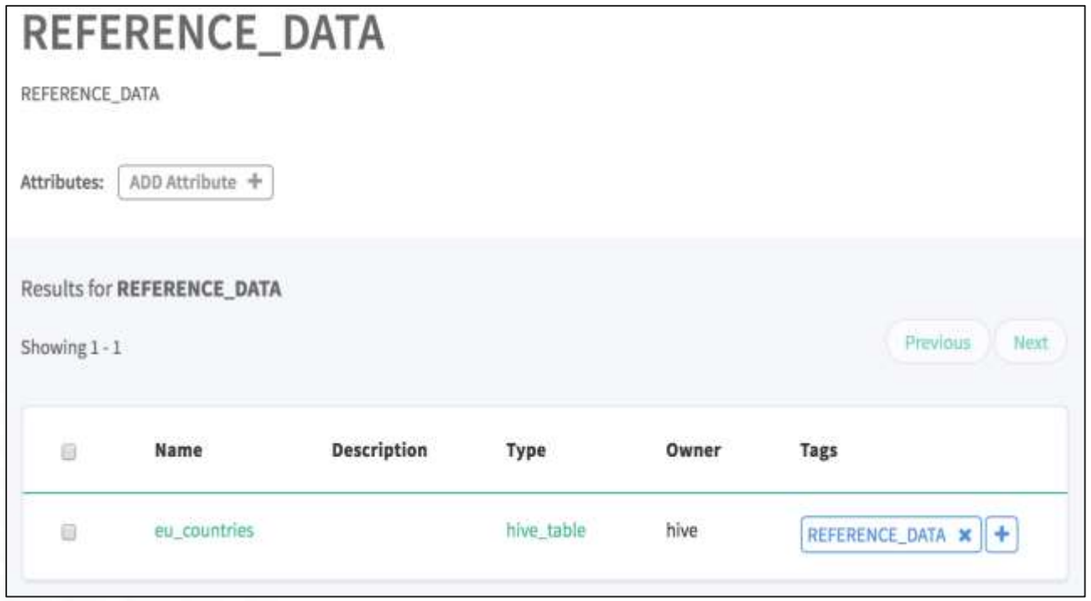
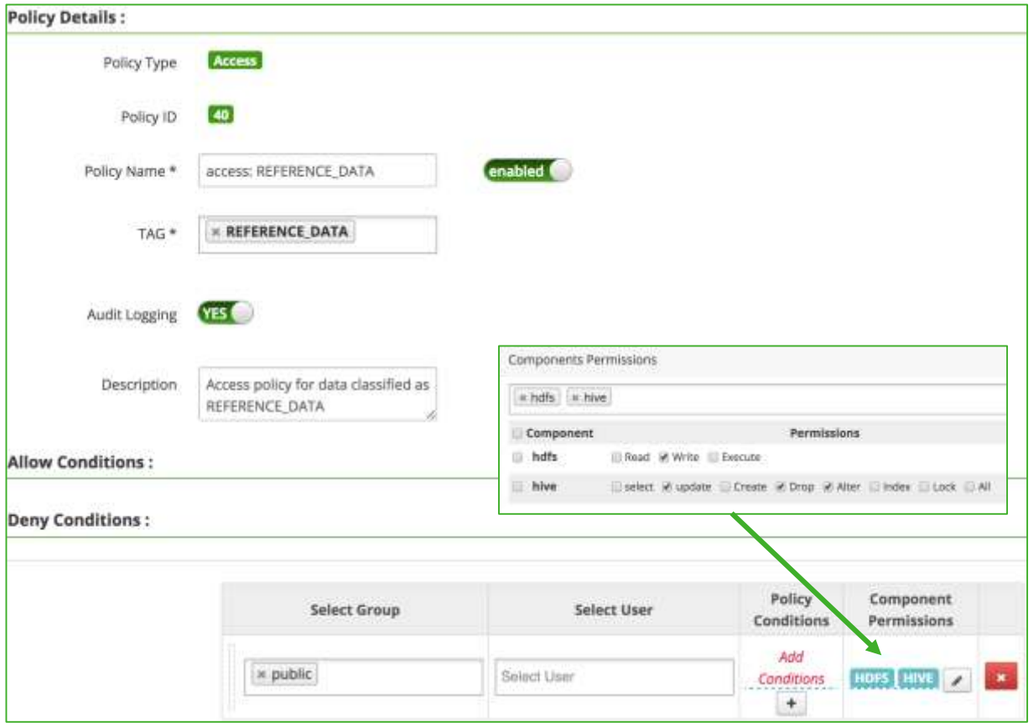
Apache Atlas Classification : usecase – REFERENCE_DATA

Security policy enforcement for denying updates on immutable data assets

- **REFERENCE_DATA** classification associated with immutable hive_table **eu_countries**
- Apache Ranger policies block updates on the table for all users except admins

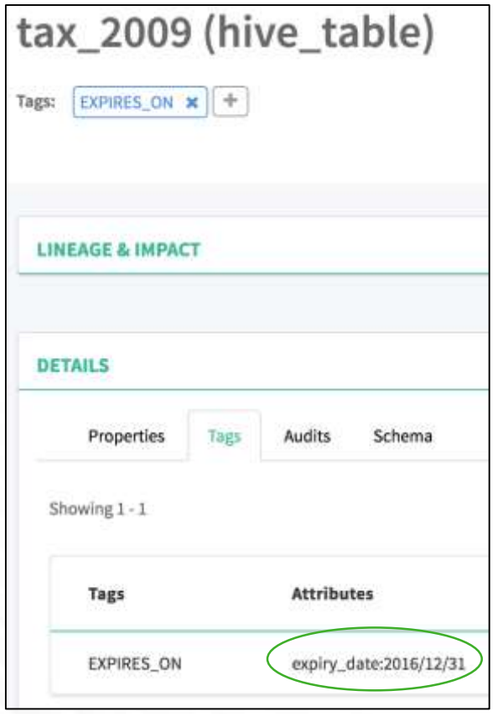


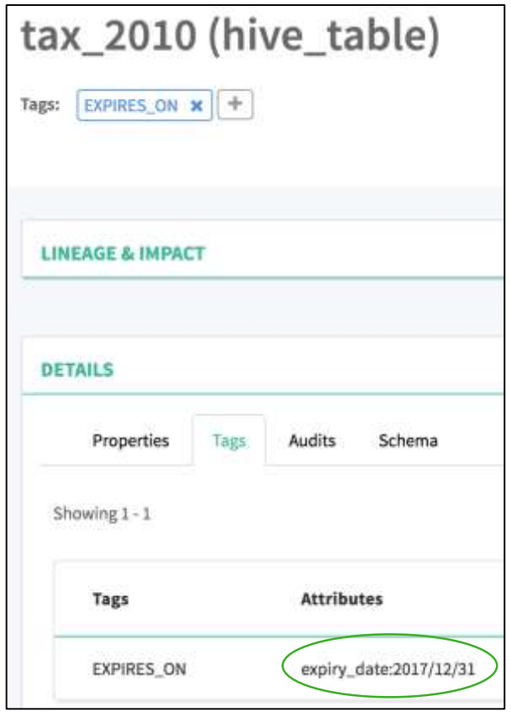


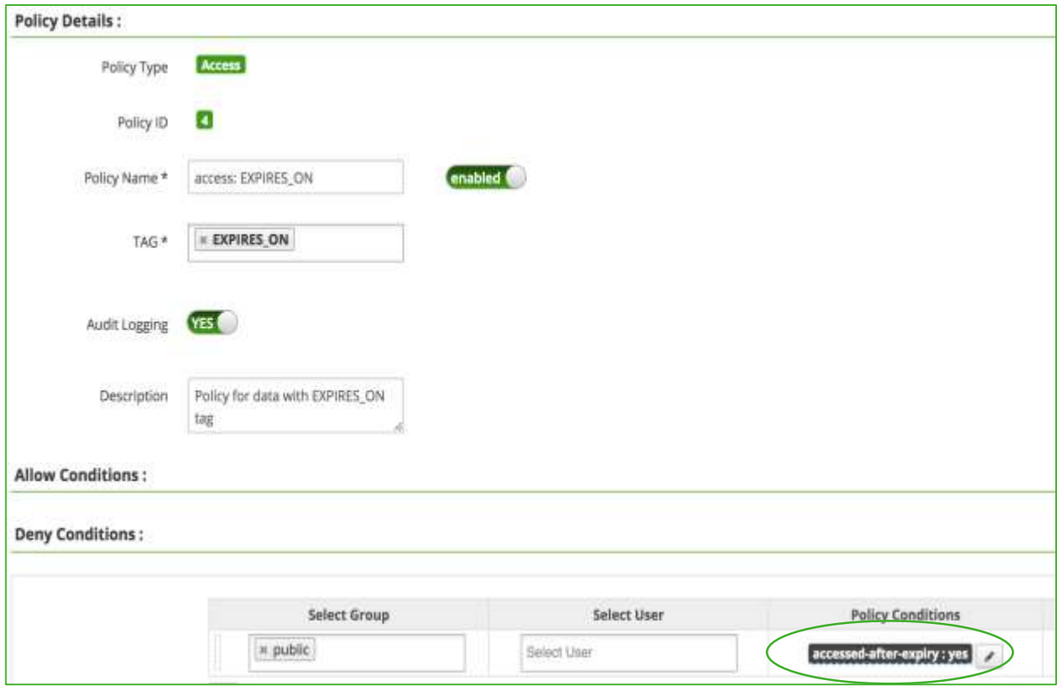
Apache Atlas Classification : usecase – access expiry

Data expiration

- **EXPIRES_ON** classification with attribute `expiry_date`
- tax_2009 table tagged with EXPIRES_ON(expiry_date=2016/12/31)
- tax_2010 table tagged with EXPIRES_ON(expiry_date=2017/12/31)
- Apache Ranger policies use the attribute to block access after expiry date



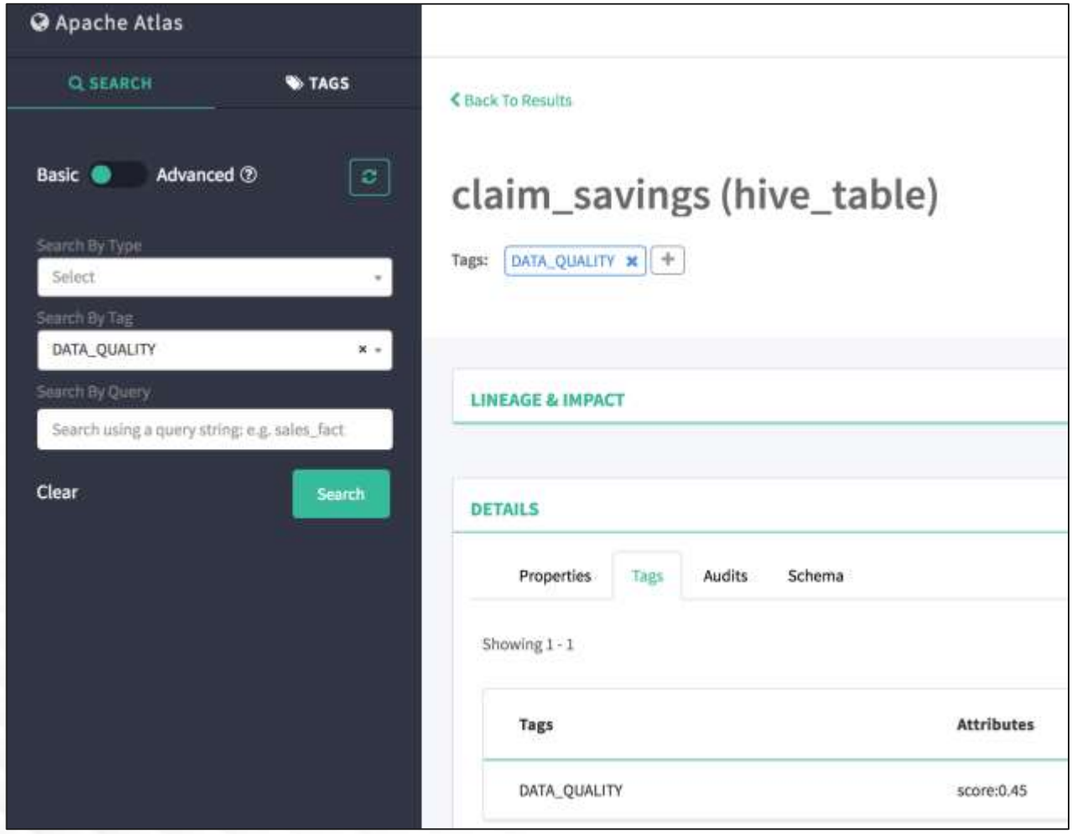


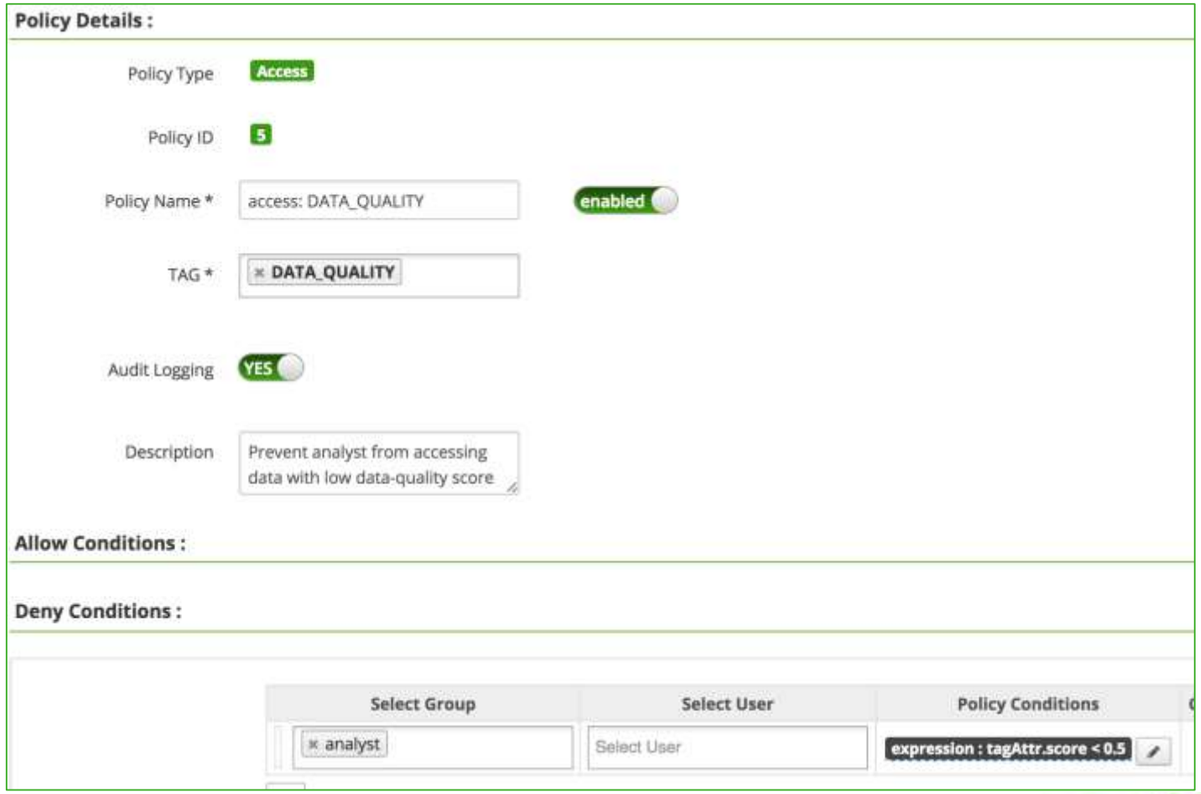


Apache Atlas Classification: usecase – attribute based authorization

Data quality

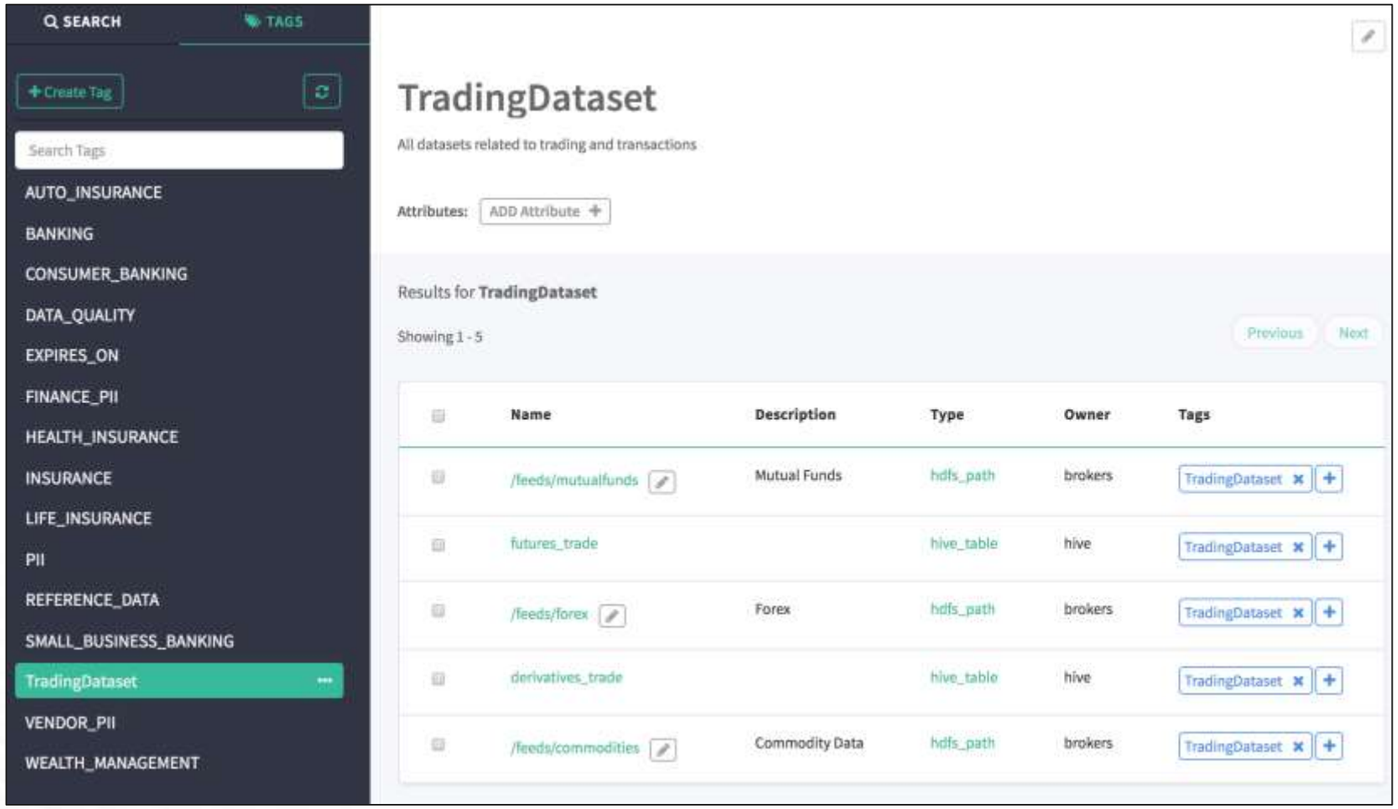
- Deny access to **analysts** group based on data quality threshold

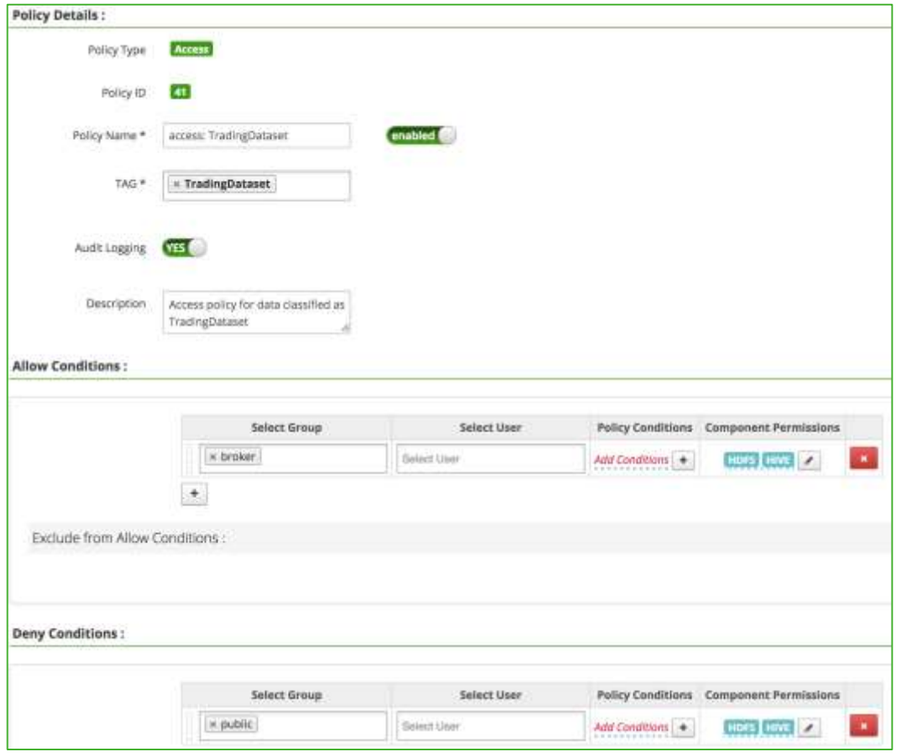




Apache Atlas Classification: usecase – cross component

Classification based security on cross-component data assets





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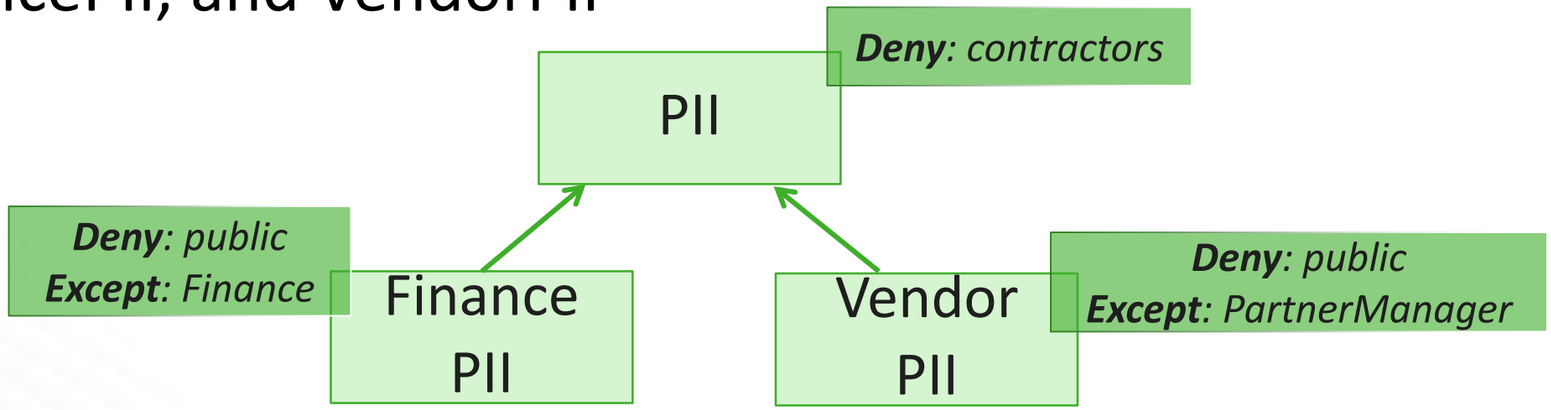
Apache Atlas Classification: usecase - hierarchy

Security policy enforcement based on classification hierarchy

- Data assets classified as **PII** will be denied for all contractors
- Data assets classified as **FinancePII** will be denied for anyone not in Finance group
- Data assets classified as **VendorPII** will be denied for anyone not in PartnerManager group
- ..hence contractors will be denied access to data assets classified as PII, FinancePII, and VendorPII



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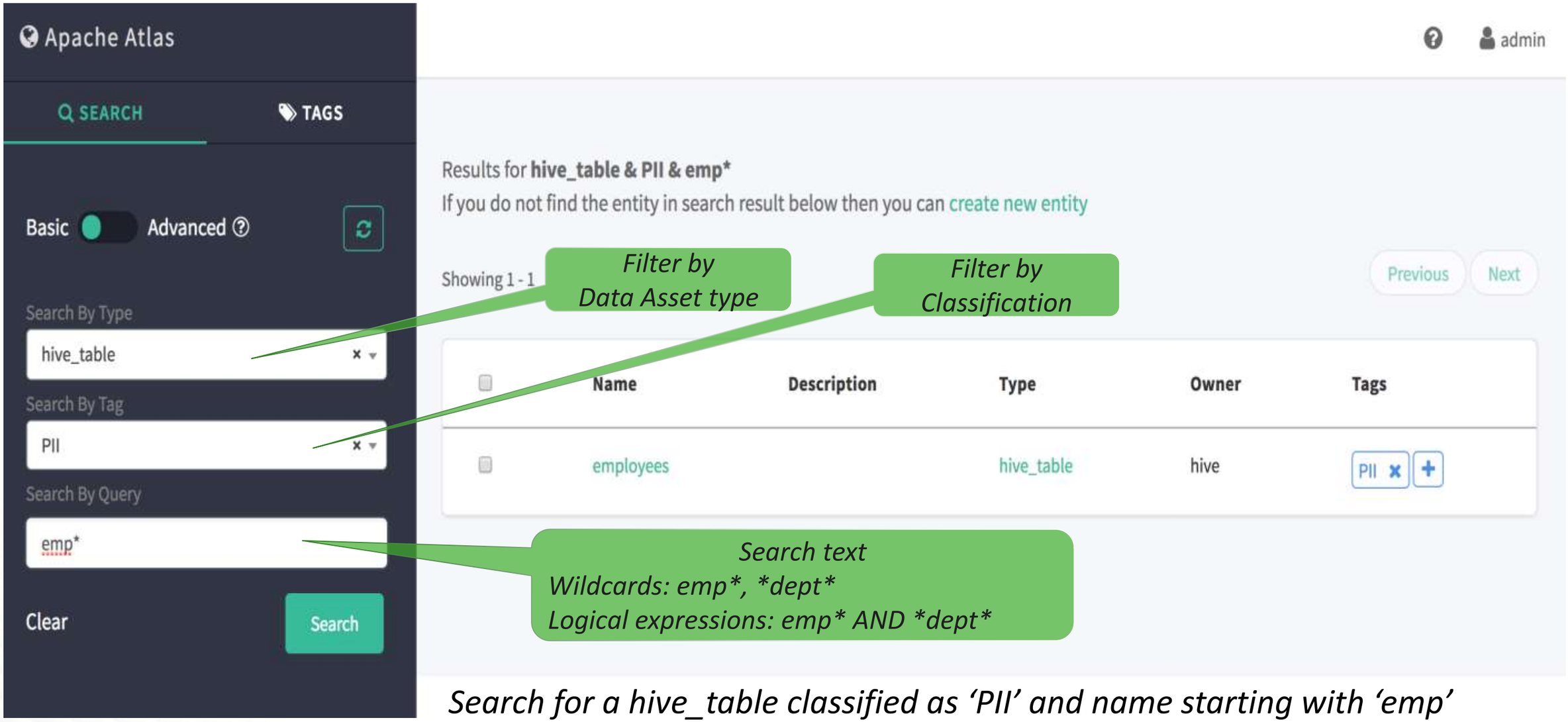
Metadata Catalog Search : Free Text



Search for a hive_table classified as 'PII' and name starting with 'emp'

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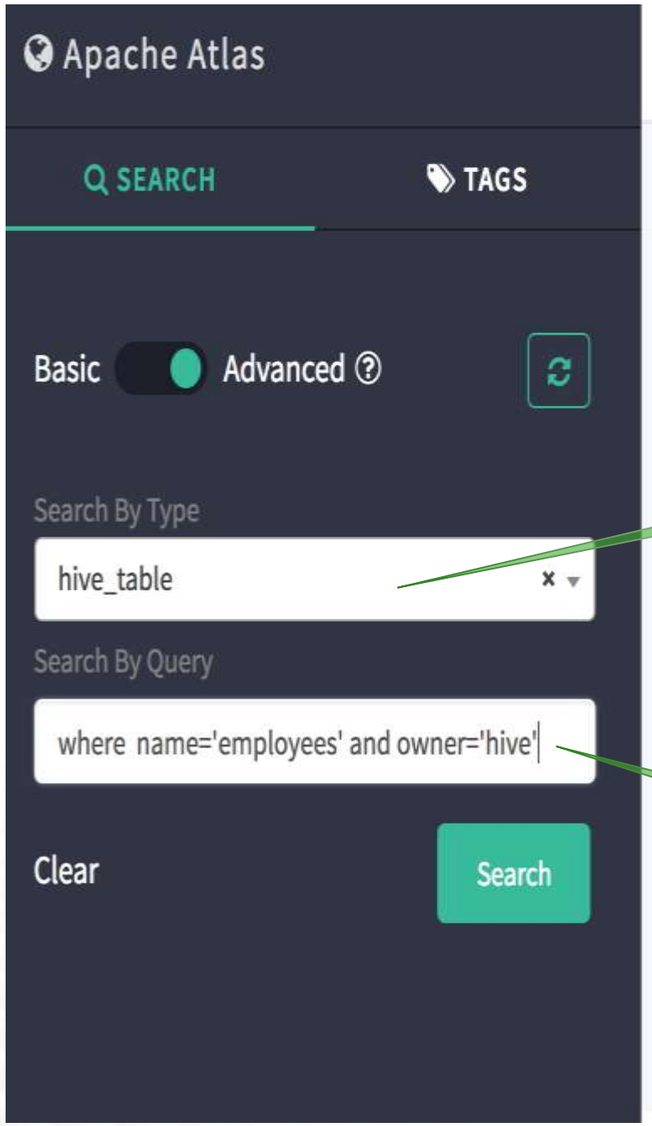
Metadata Catalog Search : Advanced



DSL search with SQL like syntax

Select columns from *impressions* table in *raw* database

hive_column where table.name='impressions' and table.db.name = 'raw'

admin

Results for **hive_table where name='employees' and owner='hive'**

If you do not find the entity in search result below then you can create new entity

Filter by Data asset type

Showing 1 - 1

Previous Next

Name	Description	Type	Owner	Tags
employees		hive_table	hive	PII

DSL query string

Search for a hive_table named 'employees' and owner 'hive'

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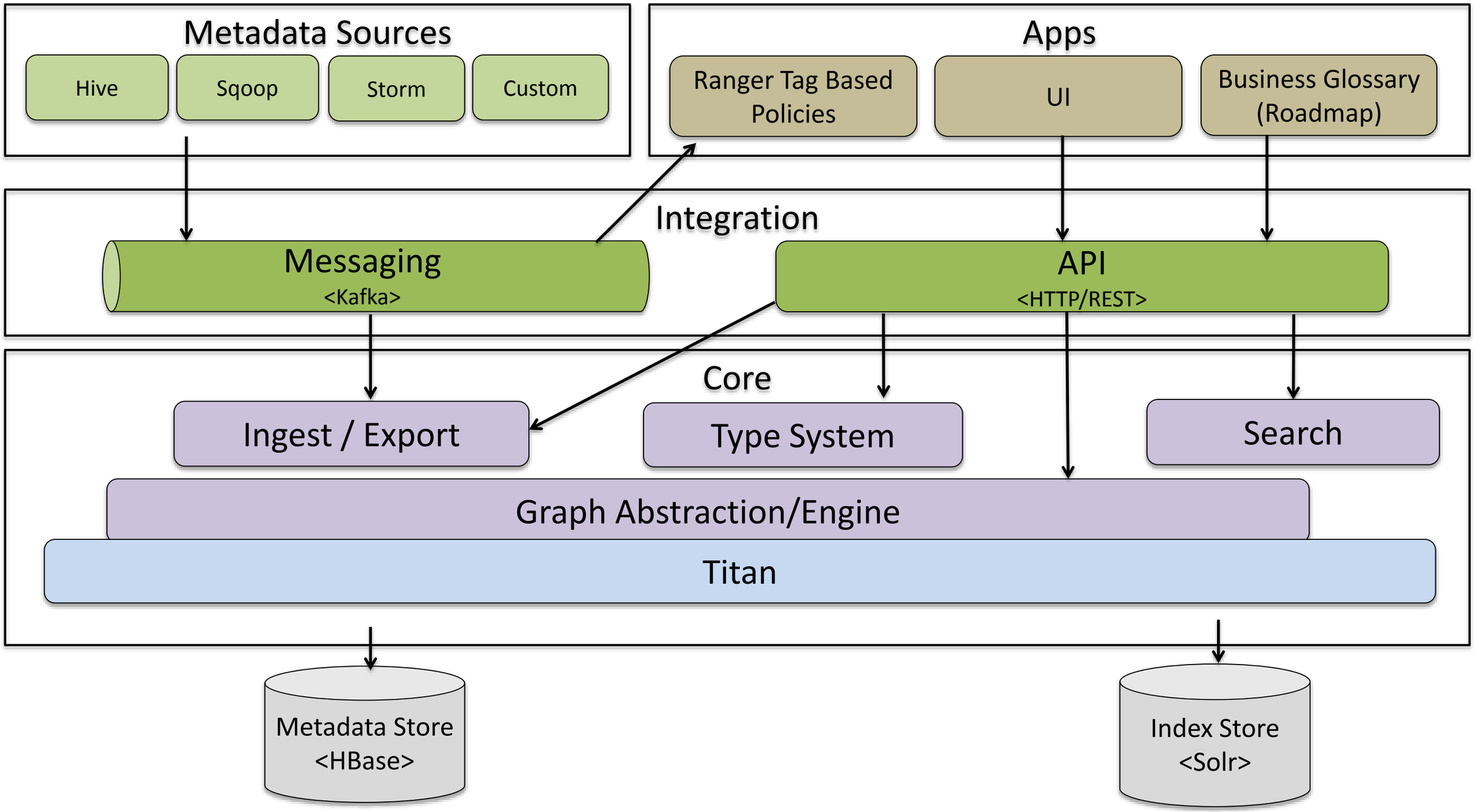
Apache Atlas: Architecture



Apache Atlas : Roadmap

Business Taxonomy/Glossary

- Vocabulary for business users
- Categorized and curated by data stewards
- Association with physical assets like database, tables for effective data classification
- Discover data assets more naturally with glossary terms

Connectors

- Spark, NiFi, HBase

Hive Column-Level Lineage

Search/Filtering on Lineage

Export/Import of Atlas lineage and metadata

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Questions

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References

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  - http://atlas.apache.org
  - http://hortonworks.com/apache/atlas
- Apache Atlas community
  - https://community.hortonworks.com/spaces/64/governance-lifecycle-track.html?topics=Atlas&type=question
- Apache Ranger
  - http://ranger.apache.org
  - http://hortonworks.com/apache/ranger
  - https://cwiki.apache.org/confluence/display/RANGER/Tag+Based+Policies