Apache Sentry (incubating) and Hadoop Authorization

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Hadoop Security

Different from traditional systems

1. All data in one place: HDFS/S3. No silos
2. Various compute engines. Some server side and some client side. No single process serving requests.
3. There might be sensitive information in the ingested data.

Aspects of security

- Authentication
  - Is user "Bob" really "Bob"?
- **Authorization**
  - Is user "Bob" allowed to do this operation?
  - Is user "Bob" allowed to see this data?
- Encryption
  - Restrict access by default.
- Audit and governance
  - Intrusion detection
  - Compliance requirements
- Data lineage

Existing authorization solutions

- Each compute framework has a dedicated authorization story.
  - Hive
  - HBase
  - HDFS
  - Sqoop
  - Spark
- They have overlapping underlying data
  - Hive databases, tables are accessible by HDFS/MR/Spark users.
- Duplicate policies => error prone and hard to get started and even harder to maintain

Sentry

- A secure service
- Provides unified policy management
- RBAC (Role based)
- Highly available
- Pluggable privilege model

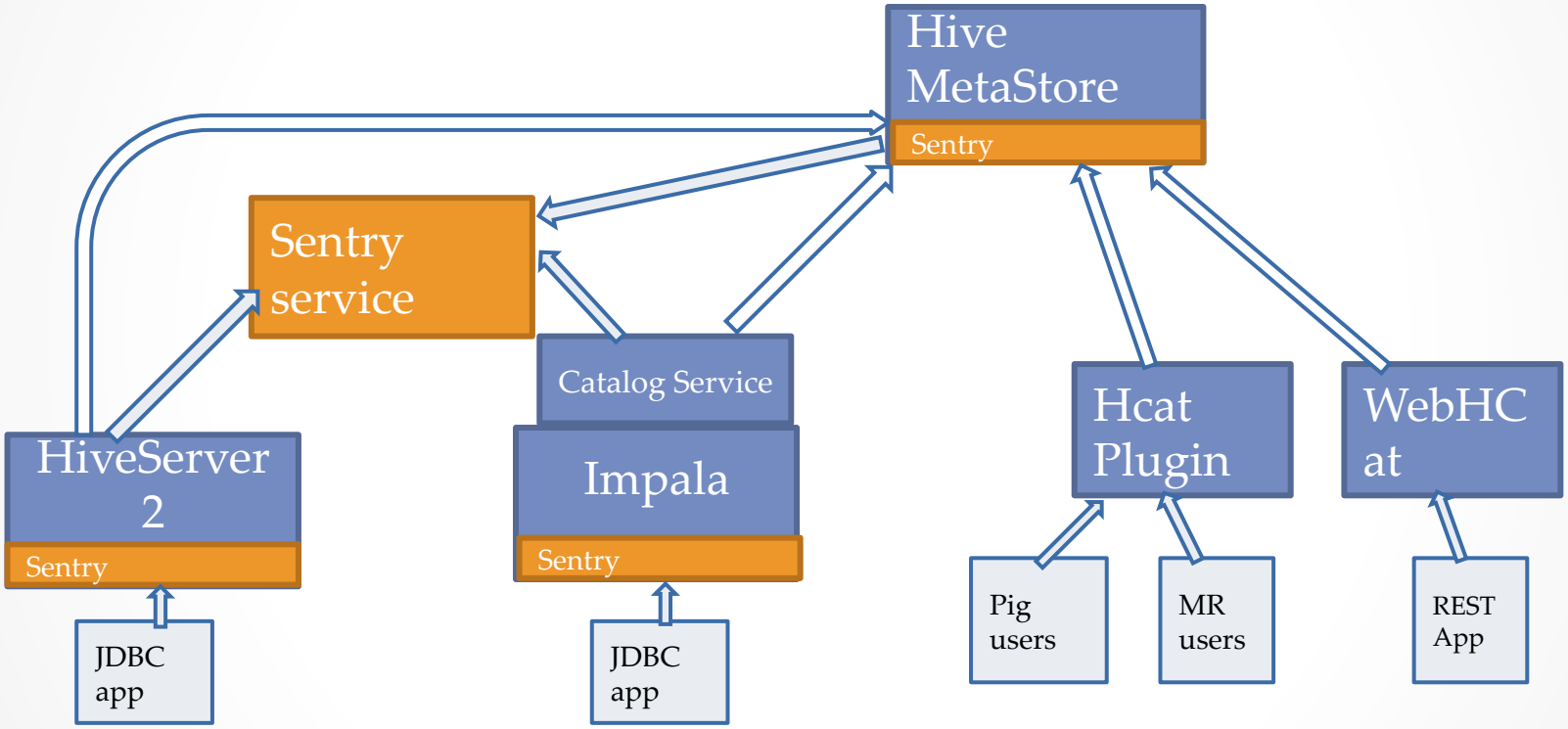
Sentry Service

- Kerberos protected thrift server
- Gets user:group mapping from HadoopGroupMapping
- Supports many backend DBs

Plugins

- HS2
- HMS
- Impala
- Solr
- Sqoop
- HDFS

Sentry plugins

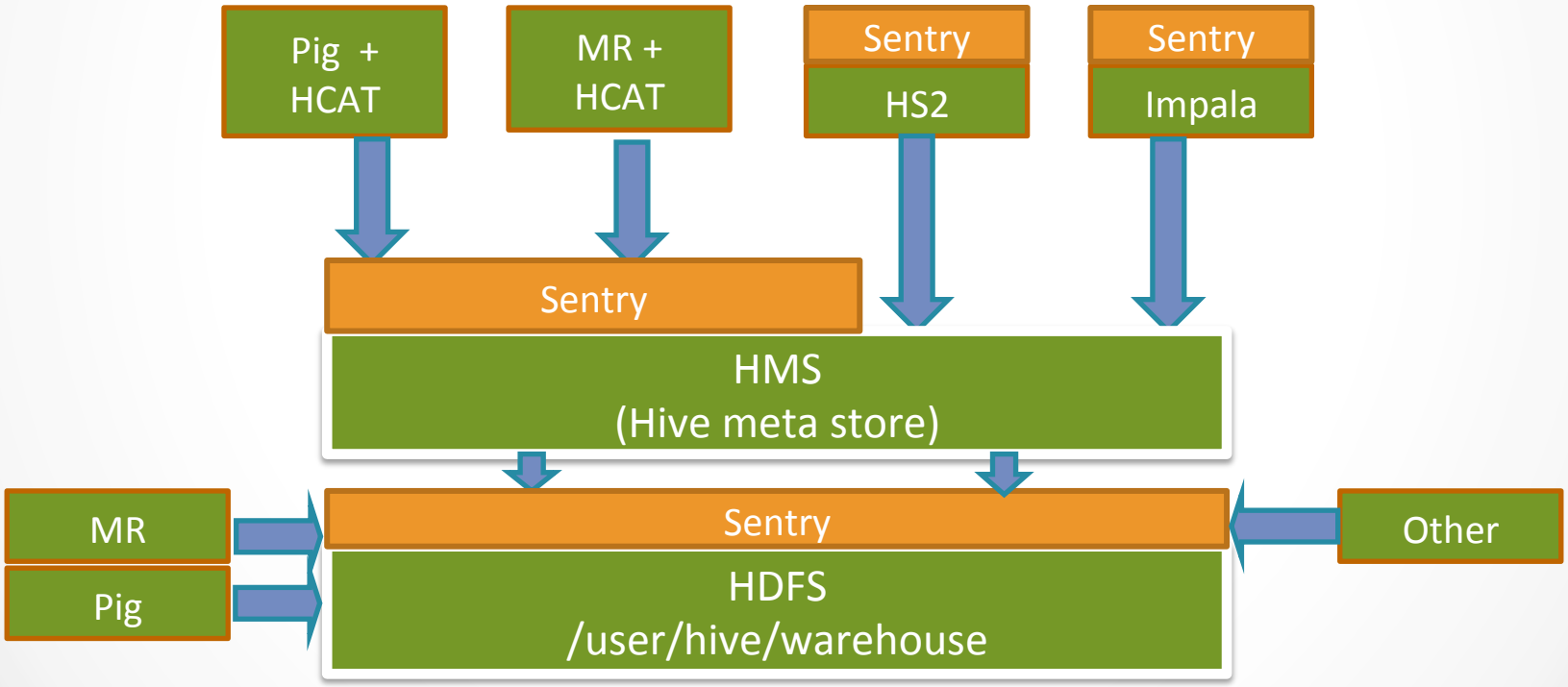


HDFS sync

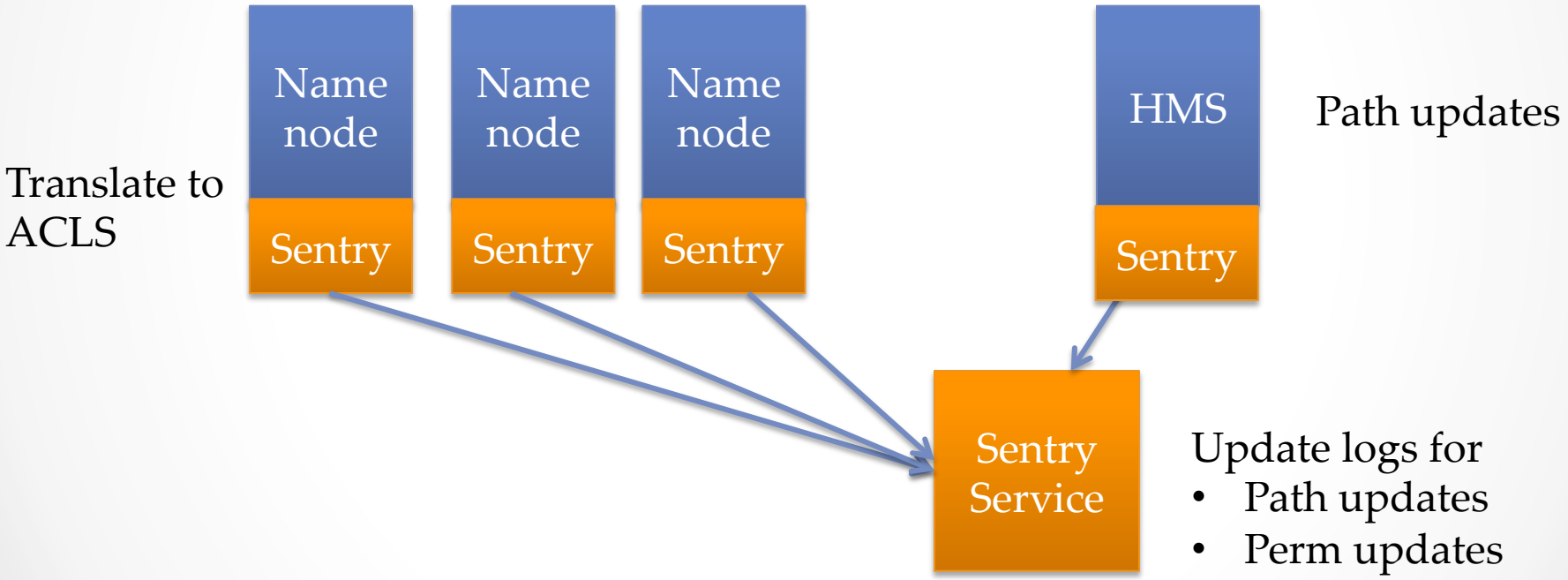
Single source of truth:

- User “Bob” has INSERT privileges on db1.tb1
- ACLs for “Bob” => WRITE_EXECUTE on /user/warehouse/db1.db/tb1
- Multiple compute frameworks can rely on same policies

Sentry plugin in Namenode



HDFS plugin architecture



RBAC

Example:

- Role = Read_customer_data
- Groups (from LDAP)
  - Financial services – senior analysts
  - Product – senior analysts

- An organization-wide abstract. Regardless of how many domains, servers, and forests you might have, the RBAC system rides on top of all of it.
- Job-related. Roles represent job tasks
- A separation of duties. Whoever controls the underlying permissions shouldn't control role membership, and vice-versa.

Reference:

- Why groups are'nt sufficient
- Economic analysis of RBAC

Generic model

- DB model:
  - Database
  - Table
  - View
  - Column
- Generic:
  - Resource type 1, resource value 1
  - Resource type 2, resource value 2 and so on

Import / Export of policies

- **Import:**

sentry -command config-tool -I <*filepath*> -o

- **Export:**

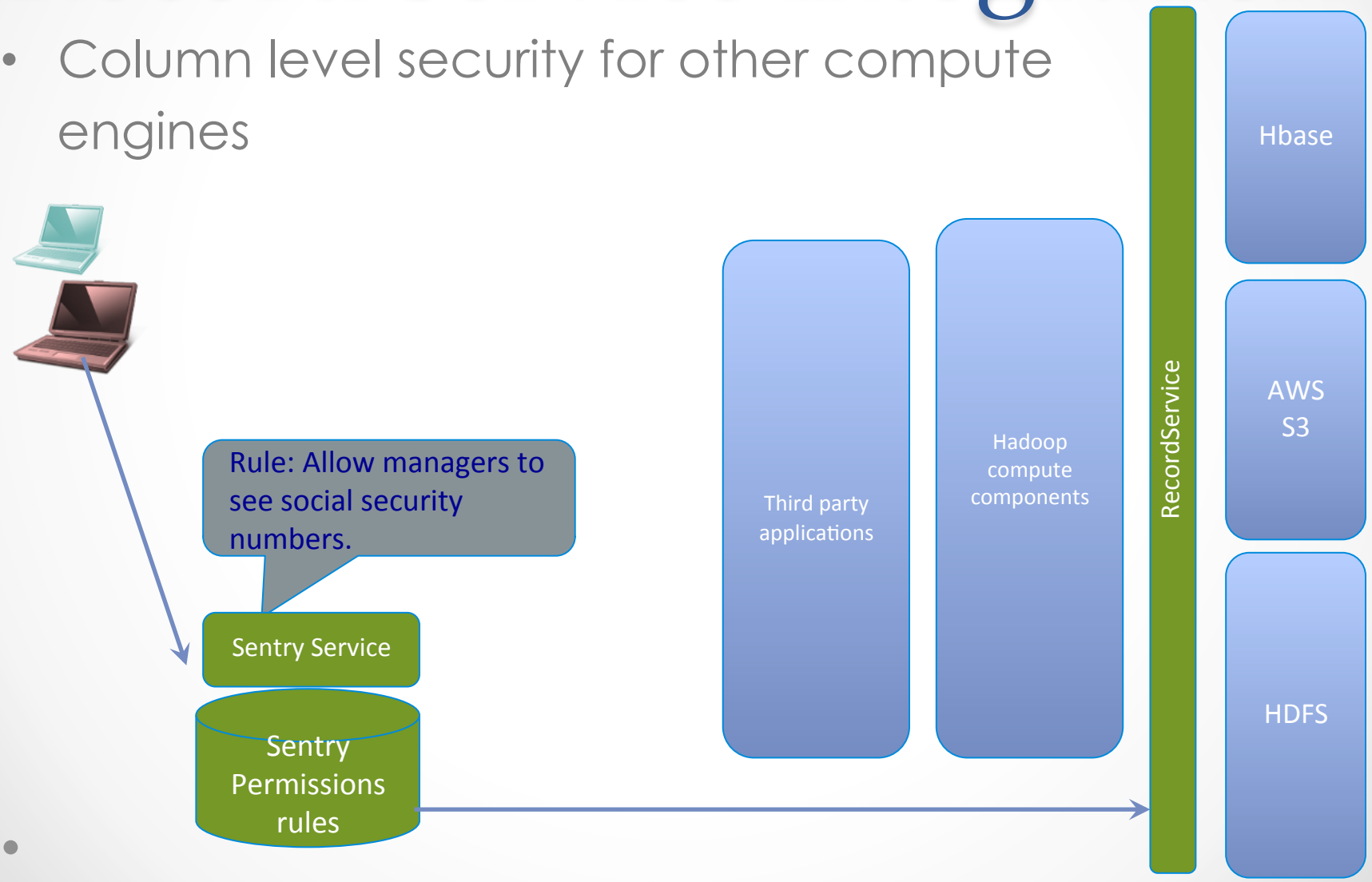
sentry -command config-tool -E <*filepath*>

Other features

- Column level access control:
  - Views were being used to enforce column level privileges.
  - Read_restricted_customer_data role = SELECT (id, zip_code) on table customer.
- Sentry HA
  - Uses curator framework

Record service integration

- Column level security for other compute engines



Apache community

Inclusive community which strives to achieve excellence through collaboration

- 5 releases
- 25 PPMC from diverse organizations
- 32 committers
- 21 contributors
- Diverse community: Female lead engineers

Roadmap

Some of them among many:

- Command line
- HDFS sync + HMS HA + Sentry HA
- Hive Auth V2
- HBase
- Kafka
- Gearing for graduation

Contributions welcome! ☺

- https://cwiki.apache.org/confluence/display/SENTRY/How+to+Contribute
- Wiki: https://cwiki.apache.org/confluence/display/SENTRY/Home
- Website: http://sentry.incubator.apache.org/
- Mailing list: dev-subscribe@sentry.incubator.apache.org

Thank you!!!

Questions??