EGERIA AND OPEN LINEAGE

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# Egeria’s webinar program

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Today’s Agenda

- What is lineage?
- Lineage Architecture
  - Lineage Capture
  - Lineage Stewardship
  - Lineage Preservation and Use
- Demo
What is Lineage?
What if the data you are using reveals unexpected results?

Incorrect Values?
Inconsistent Values?
Missing Values?
What is lineage?

- Lineage shows how data flows from its origins to its various destinations. This includes details of the processing along the way. It is used to understand:
  - whether the data used in reports and analytics models has come from the correct sources and has passed through the correct processing (known as *traceability of data*).
  - what would be the impact on downstream processing and consumers if something was changed (known as *impact analysis*).
  - whether the operational processes that implement the data flows are executing correctly (known as *governance by expectation*).
Examples of processes

File → read → Spark Job → write → Kafka Topic

lookup → Hive Table

API

call → Microservice

update → ETL

load → DataStore

distribute → Replication

Replication

https://egeria-project.org
The lineage graph emerges …

Lineage capture involves contributions from many technologies.

Each technology contributes what they know to open metadata and Egeria stitches it together.

Consistency in naming and use of open metadata types increases the effectiveness of the stitching process.

The stitching process is a mixture of automated matching and human stewardship.
The abstract lineage graph
Lineage Architecture
Capture, Stewardship, Preservation and Use
Lineage Capture
Capturing two types of lineage

- **Design Lineage**
  - Shows the paths of data flow through data sources and processes

- **Operational Lineage**
  - Shows when processes ran, how much data they processed, what they discovered about the content

*traceability of data*, *impact analysis*, *governance by expectation*
Static and Dynamic Capture

- The **static** aspect involves cataloguing all of the *resources* that are deployed into your digital landscape. This defines the data sources and processing engines and how they link together. Ideally this cataloguing is done as these resources are deployed, which may then be augmented with *automated cataloguing* of resources and *metadata discovery*. It is also possible that tools may catalogue resources under the guidance of their users and this metadata is *shared with the open metadata ecosystem*.

- The **dynamic** aspect captures information about the activity that happens day-to-day, such as the running of processes, and its effects. This could include details of the volumes of data discovered and/or processed along with any analysis of its contents.
Comparison of lineage capture for different technologies
The OpenLineage Standard

- Provides a standard payload and API URL for dynamic lineage capture

(https://openlineage.io/)
OpenLineage events

Run Facets

nominalTime: {NominalTimeRunFacet}
  _producer : <URL of producer code>
  _schemaURL : <URL of schema>
  nominalStartTime : <date-time>
  nominalEndTime : <date-time>

parent: {ParentRunFacet}
  _producer : <URL of producer code>
  _schemaURL : <URL of schema>
  run :
    runId : <guid>
  job :
    namespace : <string>
    name : <string>

EventType:
- "START"
- "COMPLETE"
- "ABORT"
- "FAIL"
- "OTHER"

eventTime: <date-time>

run: {Run}
  runId : <guid>
  facets:
    additionalProperties: {baseName, CustomFacetContent}

job: {Job}
  namespace : <string>
  name : <string>
  facets:
    additionalProperties: {baseName, CustomFacetContent}

inputs:
  namespace : <string>
  name : <string>
  facets:
    additionalProperties: {baseName, CustomFacetContent}

outputs:
  namespace : <string>
  name : <string>
  facets:
    additionalProperties: {baseName, CustomFacetContent}

producer : <URL of producer code>
/schemaURL : <URL of RunEvent spec>
Example process and its events

```
eventType="START", eventTime=<date-time>, runId=1, job="Onboard Data File", inputDataSource="Landing Area"

eventType="START", eventTime=<date-time>, runId=2, parentRunId=1, job="Run Quality Analysis", inputDataSource="Landing Area"

eventType="OTHER", eventTime=<date-time>, runId=2, parentRunId=1, job="Run Quality Analysis", dataQualityMetrics={...}

eventType="COMPLETE", eventTime=<date-time>, runId=2, parentRunId=1, job="Run Quality Analysis", inputDataSource="Landing Area"

eventType="START", eventTime=<date-time>, runId=3, parentRunId=1, job="Categorise Data File", inputDataSource="Landing Area"

eventType="COMPLETE", eventTime=<date-time>, runId=3, parentRunId=1, job="Categorise Data File", inputDataSource="Landing Area"

eventType="START", eventTime=<date-time>, runId=4, parentRunId=1, job="Move Data File", inputDataSource="Landing Area", outputDataSource="Data Lake Folder"

eventType="COMPLETE", eventTime=<date-time>, runId=4, parentRunId=1, job="Move Data File", inputDataSource="Landing Area", outputDataSource="Data Lake Folder"

eventType="COMPLETE", eventTime=<date-time>, runId=1, job="Onboard Data File", inputDataSource="Landing Area", outputDataSource="Data Lake Folder"
```
OpenLineage runtimes

- Marquez ([https://marquezproject.github.io/marquez/](https://marquezproject.github.io/marquez/)) is the reference implementation
OpenLineage runtimes – the proxy backend
OpenLineage runtimes – direct integration with Egeria
Egeria’s OpenLineage support
OpenLineage Log Store

- Auditing
- Analysis
Egeria’s OpenLineage support – more detail
Lineage Stewardship
Stitching

- **Data passing relationships** add the links to show which process called another and the style of the invocation.
  - *DataFlow* - Shows that data is passed between the two processes - typically by the processing engine that hosts them.
  - *ControlFlow* - Shows that control is passed between the two processes - typically by the processing engine that hosts them.
  - *ProcessCall* - Shows that one process makes an explicit call to another.

- **LineageMapping relationships** associates two elements from different assets that are equivalent.
Lineage Preservation and Use
Lineage capture, preservation and use
Building a lineage warehouse

1. Metadata arrives on the cohort topic.
2. Asset Lineage looks at lineage metadata, completes lineage context for assets and sends it for preservation.
3. Open Lineage Server stores lineage elements building up the lineage graph.
4. Background jobs run to optimize the querying and detect changes.
5. Apps or tools query lineage information for consolidated business views and further use.
Exercise 1

Capturing lineage manually

In this exercise, Peter and Erin will start with minimal use-case and execute steps to create lineage manually. They are looking at simple high-level transformation activity implemented using CoCoETL, an in-house developed ETL tool that uses Python scripting language. Files from previous clinical trials are stored on server location accessible by the tool. `ConvertFileToCSV` is script that reads file coming out of legacy system of records and transforms it to csv file structure.

![Diagram of file conversion process]

Figure 2: Simple asset lineage

For use-cases like this one, Data Engine Access Service (OMAS) API seems perfect match. It enables external data platforms, tools or engines to interact with Egeria and share metadata needed to construct lineage graph.

Check if assets are present in the catalog

At first, Erin wants to be sure upfront that the assets are not present in the catalog. She uses Egeria UI Asset Catalog search option but first she needs to log in.

**Important:** When running this lab using kubernetes deployment, make sure that you **expose the Egeria UI** running in the container to your local network and access it via localhost.

To access Egeria UI go to [http://localhost:8443/](http://localhost:8443/)

username: erinoverview
password: secret

Egeria Open Metadata
Find the right data with governance

![Login page for Egeria Open Metadata]

https://egeria-project.org
Horizontal lineage view
Vertical lineage view
Vertical lineage view example
Open forum

Questions?
THANK YOU!

https://odpi.github.io/egeria-docs/features/lineage-management/overview/
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