

# FI Data Lineage Model

Walter Hjelm [walter.hjelm@synechron.com](mailto:walter.hjelm@synechron.com)

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## Fixed Income - Data Lineage Model Documentation

This data lineage model is designed to track the flow of data across systems, applications, and business processes in a financial services trading firm. The model includes nodes and relationships that cover data governance, regulations and compliance, data quality, and data security.

### Core model concepts

#### Nodes

- **Application**: Represents systems or applications that are part of the data flow.
- **BusinessAttribute**: Represents attributes of a BusinessTerm (e.g., Customer ID, Customer Name, Email).
- **BusinessKeyActivity**: Represents a sub-step of a BusinessProcess.
- **BusinessProcess**: Represents activities or sets of activities that accomplish a specific organizational goal.
- **BusinessTerm**: Represents an entity or object that a BusinessProcess operates on (e.g., Customer).
- **ComplianceOfficer**: Represents an individual responsible for ensuring regulatory compliance and overseeing the firm's adherence to data governance policies.
- **CompliancePolicy**: Represents the firm's internal compliance policies and guidelines.
- **DataAsset**: Represents a data asset, such as a table, file, or database.
- **DataClassification**: Represents a logical grouping of types DataElements (e.g. email address, phone number, country code).
- **DataConfidentiality**: Represents data security classification levels (e.g., Confidential, Restricted, Public).
- **DataElement**: Represents the implementation of a BusinessAttribute in a DataSet (e.g., a field in a table).

- **DataQualityIssue**: Represents identified data quality problems or violations.
- **DataQualityMetric**: Represents quantifiable measures of data quality, such as completeness, accuracy, or timeliness.
- **DataQualityRule**: Represents rules that define data quality expectations and requirements.
- **DataSet**: Represents a logical aggregation of DataElements for common use.
- **LineOfBusiness**: Represents an organizational unit of the business.
- **ProcessSteward**: Represents the process equivalent of the data steward.
- **Regulation**: Represents specific regulatory requirements applicable to the financial services industry (e.g., GDPR, MiFID II, Dodd-Frank).
- **SystemOfRecord**: Represents the authoritative data source for a given data element or piece of information.
- **TradeLifecycle**: Represents the different stages that a trade goes through, from placement to settlement.
- **Transformation**: Represents a data transformation process or job. Represents a data transformation process or job.

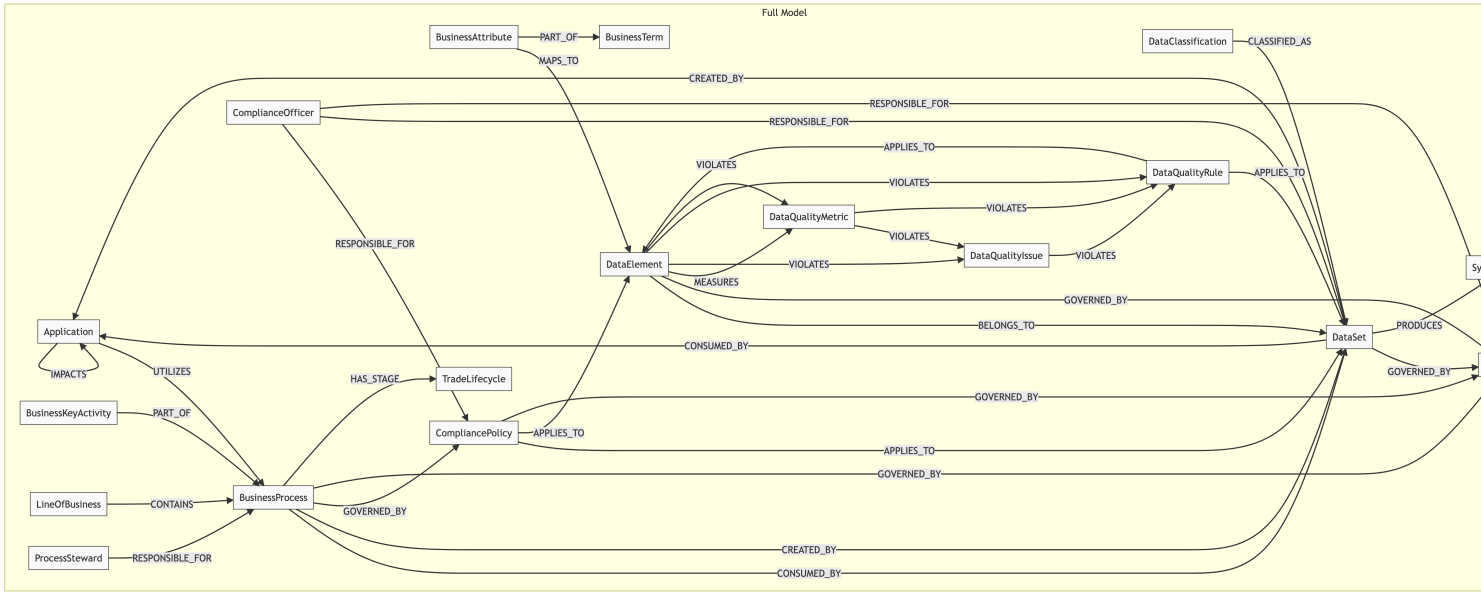
## Relationships

- **APPLIES\_TO**: Connects a DataQualityRule to a DataElement or DataSet that it applies to.
- **CLASSIFIED\_AS**: Connects a DataSet to a DataConfidentiality, indicating its security classification level.
- **CONSUMED\_BY**: Connects a DataSet (source data) to an Application or BusinessProcess that consumes the data without creating or transforming it.
- **CREATED\_BY**: Connects a DataSet (output data) to an Application or BusinessProcess that creates or transforms the data.
- **GOVERNED\_BY**: Connects a DataElement, DataSet, or CompliancePolicy to a Regulation, indicating which regulatory requirements apply.
- **IMPACTS**: Connects Applications to show the downstream impact of changes.
- **MAPS\_TO**: Connects a BusinessAttribute to a DataElement.
- **MEASURES**: Connects a DataQualityMetric to a DataElement or DataSet that it measures.
- **PART\_OF**: Connects a BusinessAttribute to its corresponding BusinessTerm.
- **PRODUCES**: Connects a SystemOfRecord to a DataSet that it produces as output.
- **RESPONSIBLE\_FOR**: Connects a ProcessSteward, ComplianceOfficer, or DataSteward to a BusinessProcess, Regulation, CompliancePolicy, or DataAsset, indicating their responsibility for ensuring compliance, data governance, or process oversight.
- **UTILIZES**: Connects a BusinessProcess to an Application that is used to accomplish the process.
- **VIOLATES**: Connects a DataQualityIssue to a DataElement, DataSet, DataQualityRule, or DataQualityMetric that it violates.

## Model Diagrams

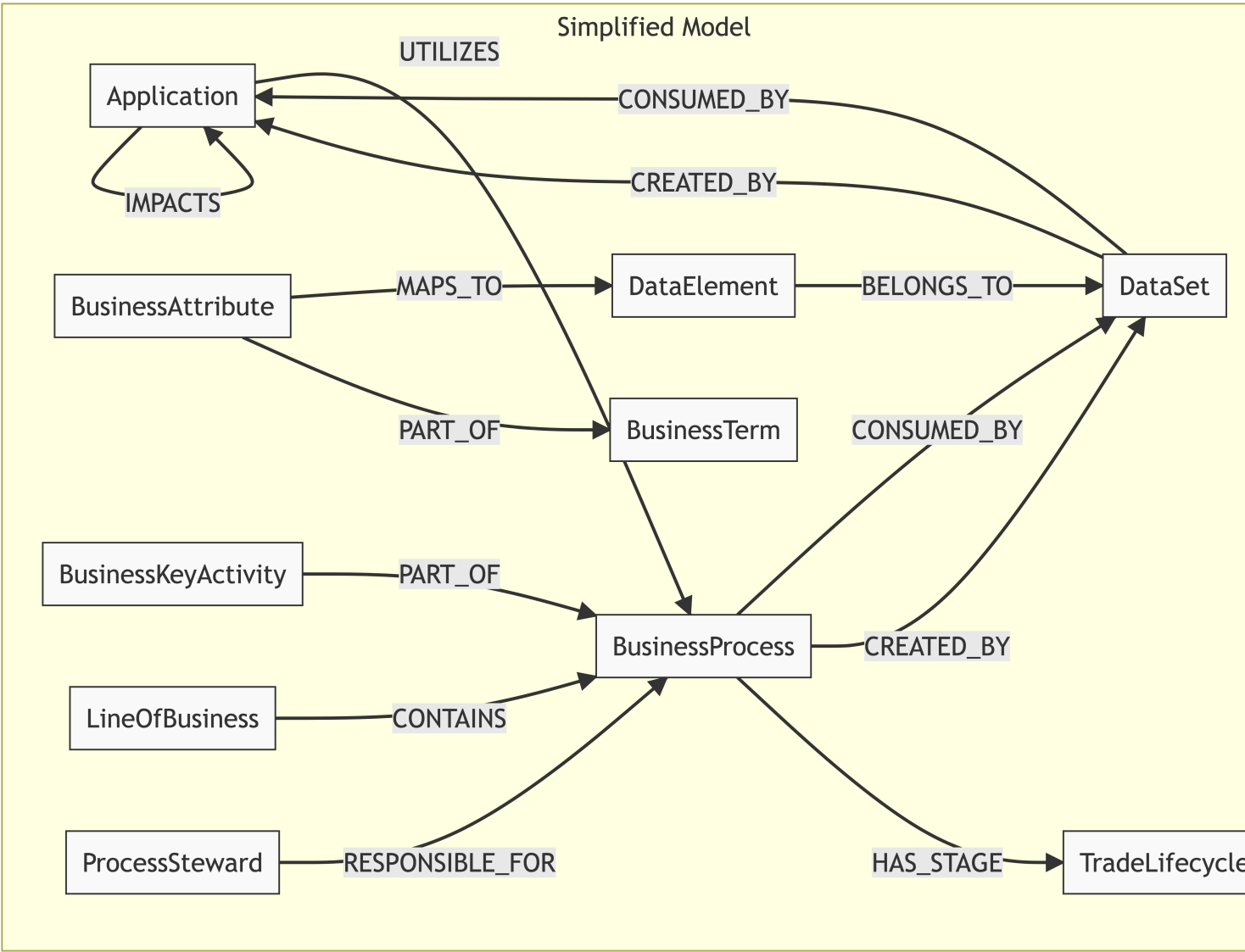
### Full model diagram

The model that we have created is of a higher fidelity than the data that we currently have access to, but to get a sense of the scope of the model, we present a graph that contains the full model for contextualization.



**Simplified model diagram**

Here is the simplified version of the model that will be used as the version 1, Minimal Viable Product, of the model.



end

## Node Definitions

//

### ### Application

Represents a system or application that is used to process data.

#### #### \*\*Properties\*\*

- id
- name

#### #### \*\*Relationships\*\*

```
```{mermaid}
%%| label: fig-application-relationships
%%| fig-width: 7
%%| fig-cap: |
%%|   Application Relationships
graph LR

subgraph "Application Relationships"
    A[Application]:::entity
    BP[BusinessProcess]:::entity
    DS[DataSet]:::entity

    A --IMPACTS--> A
    BP --UTILIZES--> A
    DS --CONSUMED_BY--> A
    DS --CREATED_BY--> A
end

classDef entity fill:#f9f9f9,stroke:#333,stroke-width:1px;
classDef relation fill:#EFEFEF,stroke:#666,stroke-width:1px;
```

- **CONSUMED\_BY** - Connects a [DataAsset](#) (source data) to an [Application](#) or [BusinessProcess](#)
- **IMPACTS** - Connects an [Application](#) to other related assets, such as other [Application](#), [DataAsset](#) or [DataElement](#)
- **UTILIZES** - Connects a [BusinessProcess](#) to an [Application](#)

### Example

```

1
2 (app:Application {
3     id: 'app1',
4     name: 'NAPA'
5 })
6
////////////////////////////////////

```

## BusinessAttribute

Represents a property or characteristic of a BusinessTerm.

### Properties

- id
- name
- description

### Relationships

- [HAS\\_ATTRIBUTE](#) - Connects a [BusinessTerm](#) node to a [BusinessAttribute](#)
- [MAPS\\_TO](#) - Connects a [BusinessAttribute](#) node to a [DataElement](#) node

### Example

```

1
2 (ba:BusinessAttribute {
3     id: : 'ba1',
4     name: 'Customer ID',
5     description: 'Unique      id:  for a customer'
6 })
7
////////////////////////////////////

```

## BusinessProcess

Represents a business process or set of activities that accomplish a specific organizational goal.



## Properties

- id
- name
- description

## Relationships

- [CONSUMED\\_BY](#) - Connects a [DataAsset](#) (source data) to an [Application](#) or [BusinessProcess](#)
- [INVOLVES](#) - Connects a [BusinessProcess](#) node to a [DataAsset](#) node or a [Transformation](#) node
- [MANAGES\\_PROCESS](#) - Connects a [ProcessSteward](#) node to a [BusinessProcess](#) node
- [UTILIZES](#) - Connects a [BusinessProcess](#) to an [Application](#)

## Example

```
1  
2 (bp:BusinessProcess {  
3     id: 'bp1',  
4     name: 'Customer Onboarding',  
5     description: 'Process for onboarding new customers'  
6 })  
7
```

////////////////////////////////////

## BusinessTerm

Represents an entity or object that a BusinessProcess operates on.

## Properties

- id
- name
- description

## Relationships

- [HAS\\_ATTRIBUTE](#) - Connects a [BusinessTerm](#) node to a [BusinessAttribute](#)

## Example

```

1
2 (bt:BusinessTerm {
3     id: : 'bt1',
4     name: 'Customer',
5     description: 'A customer entity in the organization'
6 })
7

```

////////////////////////////////////

## ComplianceOfficer

Represents an individual responsible for ensuring regulatory compliance and overseeing the firm's adherence to data governance policies.

### Properties

- id
- name
- title

### Relationships

- [RESPONSIBLE\\_FOR](#) - Connects a [ComplianceOfficer](#) to a [Regulation](#), [CompliancePolicy](#), or [DataAsset](#)

### Example

```

1
2 (co:ComplianceOfficer {
3     id: : 'co1',
4     name: 'John Doe',
5     title: 'Chief Compliance Officer'
6 })
7

```

////////////////////////////////////

## CompliancePolicy

Represents the firm's internal compliance policies and guidelines.

## Properties

- id
- name
- description

## Relationships

- [GOVERNED\\_BY](#) - Connects a [DataSet](#) or [DataElement](#) to a [Regulation](#) or [CompliancePolicy](#)
- [RESPONSIBLE\\_FOR](#) - Connects a [ComplianceOfficer](#) to a [Regulation](#), [CompliancePolicy](#), or [DataSet](#)

## Example

```
1
2 (cp:CompliancePolicy {
3     id: : 'cp1',
4     name: 'Data Retention Policy',
5     description: 'Policy for data retention and disposal'
6 })
7
```

////////////////////////////////////

## DataSet

Represents a data asset, such as a table, file, or database. A type of asset that represents details of organizational data in two layers. One layer is independent of any particular technology for non-technical stakeholder communication. The other one is taking the implementation system for technical stakeholder communication into account.

## Properties

- id
- name
- description
- type

## Relationships

- [ACCOUNTABLE\\_FOR](#) - Connects a [SystemOfRecord](#) node to a [DataAsset](#) node
- [APPLIES](#) - Connects a [DataQualityRule](#) to a [DataAsset](#) or [DataElement](#)
- [CLASSIFIED\\_AS](#) - Connects a [DataAsset](#) or [DataElement](#) to a [DataClassification](#)
- [CONSUMED\\_BY](#) - Connects a [DataAsset](#) (source data) to an [Application](#) or [BusinessProcess](#)
- [CONTAINS](#) - Connects a [DataAsset](#) node to a [DataElement](#) node.
- [DERIVED\\_FROM](#) - Connects a [DataAsset](#) (representing the view) to another [DataAsset](#) (representing the source data)
- [GOVERNED\\_BY](#) - Connects a [DataAsset](#) or [DataElement](#) to a [Regulation](#) or [CompliancePolicy](#)
- [MEASURES](#) - Connects a [DataQualityMetric](#) to a [DataAsset](#) or [DataElement](#)
- – [RESPONSIBLE\\_FOR](#) - Connects a [DataSteward](#) node to a [DataAsset](#) node
- [RESPONSIBLE\\_FOR](#) - Connects a [ComplianceOfficer](#) to a [Regulation](#), [CompliancePolicy](#), or [DataAsset](#)
- [VIOLATES](#) - Connects a [DataQualityIssue](#) to a [DataQualityRule](#), [DataQualityMetric](#), [DataAsset](#), or [DataElement](#)

## Example

```
1
2 (d:DataAsset {
3   identifier: 'table1',
4   name: 'Table 1',
5   description: 'Sales data',
6   type: 'table'
7 })
```

////////////////////////////////////

## DataClassification

Represents data security classification levels (e.g., Confidential, Restricted, Public).

## Properties

- id
- name
- description

## Relationships

- [CLASSIFIED\\_AS](#) - Connects a [DataAsset](#) or [DataElement](#) to a [DataClassification](#)

## Example

```
1
2 (dc:DataClassification {
3     id: : 'dc1',
4     name: 'Confidential',
5     description: 'Highly sensitive data requiring strict access control'
6 })
7
```

////////////////////////////////////

## DataElement

Represents a field (column) within a data asset.

## Properties

- id
- name
- description
- dataType

## Relationships

- [APPLIES](#) - Connects a [DataQualityRule](#) to a [DataAsset](#) or [DataElement](#)
- [CLASSIFIED\\_AS](#) - Connects a [DataAsset](#) or [DataElement](#) to a [DataClassification](#)
- [CONTAINS](#) - Connects a [DataAsset](#) node to a [DataElement](#) node.
- [GENERATED\\_BY](#) - Connects a [DataElement](#) node to a [Transformation](#) node
- [GOVERNED\\_BY](#) - Connects a [DataAsset](#) or [DataElement](#) to a [Regulation](#) or [Compliance-Policy](#)
- [IMPACTS](#) - Connects an [Application](#) to other related assets, such as other [Application](#), [DataAsset](#) or [DataElement](#)

- [MAPS\\_TO](#) - Connects a [BusinessAttribute](#) node to a [DataElement](#) node
- [MEASURES](#) - Connects a [DataQualityMetric](#) to a [DataAsset](#) or [DataElement](#)
- [TRANSFORMS\\_TO](#) - Connects a [DataElement](#) node to another [DataElement](#) node
- [VIOLATES](#) - Connects a [DataQualityIssue](#) to a [DataQualityRule](#), [DataQualityMetric](#), [DataAsset](#), or [DataElement](#)

## Example

```

1
2 (de:DataElement {
3     identifier: 'column1',
4     name: 'CustomerID',
5     description: 'Unique customer identifier',
6     dataType: 'integer'
7 })

```

////////////////////////////////////

## DataQualityIssue

Represents identified data quality problems or violations.

### Properties

- id
- description
- severity

### Relationships

- [VIOLATES](#) - Connects a [DataQualityIssue](#) to a [DataQualityRule](#), [DataQualityMetric](#), [DataAsset](#), or [DataElement](#)

## Example

```

1
2 (dqi:DataQualityIssue {
3     id: : 'dqi1',
4     description: 'Missing customer email',
5     severity: 'Medium'
6 })

```

////////////////////////////////////

## DataQualityMetric

Represents quantifiable measures of data quality, such as completeness, accuracy, or timeliness.

### Properties

- id
- name
- description

### Relationships

- [MEASURES](#) - Connects a [DataQualityMetric](#) to a [DataAsset](#) or [DataElement](#)
- [VIOLATES](#) - Connects a [DataQualityIssue](#) to a [DataQualityRule](#), [DataQualityMetric](#), [DataAsset](#), or [DataElement](#)

### Example

```
1
2 (dqm:DataQualityMetric {
3     id: : 'dqm1',
4     name: 'Accuracy',
5     description: 'Measure of data accuracy'
6 })
7
```

////////////////////////////////////

## DataQualityRule

Represents rules that define data quality expectations and requirements.

### Properties

- id
- name
- description

### Relationships

- [APPLIES](#) - Connects a [DataQualityRule](#) to a [DataAsset](#) or [DataElement](#)
- [VIOLATES](#) - Connects a [DataQualityIssue](#) to a [DataQualityRule](#), [DataQualityMetric](#), [DataAsset](#), or [DataElement](#)

## Example

```
1
2 (dqr:DataQualityRule {
3     id: : 'dqr1',
4     name: 'Completeness Rule',
5     description: 'Rule to ensure data completeness'
6 })
7
```

////////////////////////////////////

## DataSet

A collection of related sets of data assets that are data elements or composed of data elements.

### Properties

- id
- name
- description

### Relationships

- [ACCOUNTABLE\\_FOR](#) - Connects a [SystemOfRecord](#) node to a [DataAsset](#) node
- [AGGREGATES](#) - Connects a [DataSet](#) node to a [DataElement](#)
- [APPLIES](#) - Connects a [DataQualityRule](#) to a [DataAsset](#) or [DataElement](#)
- [IMPACTS](#) - Connects an [Application](#) to other related assets, such as other [Application](#), [DataAsset](#) or [DataElement](#)
- [INVOLVES](#) - Connects a [BusinessProcess](#) node to a [DataAsset](#) node or a [Transformation](#) node

## Example

```
1
2 (ds:DataSet {
3     id: : 'ds1',
4     name: 'CustomerDataSet',
5     description: 'A dataset containing customer information'
6 })
7
```

////////////////////////////////////



## DataSteward

Represents a person responsible for managing data assets and ensuring data quality and governance.

### Properties

- id
- name
- email

### Relationships

- [RESPONSIBLE\\_FOR](#) - Connects a [DataSteward](#) node to a [DataAsset](#) node

### Example

```
1  
2 (s:DataSteward {  
3   id: 'steward1',  
4   name: 'Alice',  
5   email: 'alice@example.com'  
6 })
```

////////////////////////////////////

## ProcessSteward

Represents a person responsible for managing and ensuring the quality and governance of a business process.

### Properties

- id
- name
- email

### Relationships

- [ACCOUNTABLE\\_FOR](#) - [ProcessSteward](#) node to a [SystemOfRecord](#) node
- [MANAGES\\_PROCESS](#) - Connects a [ProcessSteward](#) node to a [BusinessProcess](#) node

## Example

```
1
2 (ps:ProcessSteward {
3     id: : 'psteward1',
4     name: 'Bob',
5     email: 'bob@example.com'
6 })
7
```

////////////////////////////////////

## Regulation

Represents specific regulatory requirements applicable to the financial services industry (e.g., GDPR, MiFID II, Dodd-Frank).

## Properties

- id
- name
- description

## Relationships

- [GOVERNED\\_BY](#) - Connects a [DataAsset](#) or [DataElement](#) to a [Regulation](#) or [CompliancePolicy](#)
- [RESPONSIBLE\\_FOR](#) - Connects a [ComplianceOfficer](#) to a [Regulation](#), [CompliancePolicy](#), or [DataAsset](#)

## Example

```
1
2 (r:Regulation {
3     id: : 'r1',
4     name: 'GDPR',
5     description: 'General Data Protection Regulation'
6 })
7
```

////////////////////////////////////

## SystemOfRecord

Represents the authoritative data source for a given data element or piece of information.

### Properties

- id
- name
- description

### Relationships

- [ACCOUNTABLE\\_FOR](#) - Connects a [SystemOfRecord](#) node to a [DataAsset](#) node

### Example

```
1  
2 (sor:SystemOfRecord {  
3   id: 'sor1',  
4   name: 'Customer Master Data',  
5   description: 'Authoritative source for customer information'  
6 })  
7
```

////////////////////////////////////

## Transformation

Represents a data transformation process or job.

### Properties

- id
- name
- description
- type

### Relationships

- [GENERATED\\_BY](#) - Connects a [DataElement](#) node to a [Transformation](#) node
- [INVOLVES](#) - Connects a [BusinessProcess](#) node to a [DataAsset](#) node or a [Transformation](#) node

## Example

```
1  
2 (t:Transformation {  
3   identifier: 'job1',  
4   name: 'Data Cleansing Job',  
5   description: 'Cleans and prepares data for analysis',  
6   type: 'ETL'  
7 })
```

## Relationships

////////////////////////////////////

### ACCOUNTABLE\_FOR:

Connects a [ProcessSteward](#) node to a [SystemOfRecord](#) node, indicating that the person is accountable for the authoritative data source.

## Example

```
1  
2 (ps: [ProcessSteward] (#processsteward))-[:ACCOUNTABLE_FOR]->(sor: SystemOfRecord)  
3
```

////////////////////////////////////

### AGGREGATES:

Connects a [DataSet](#) node to a [DataElement](#) or node, representing the aggregation of [DataElements](#) for common use.

## Example

```
1  
2 (ds: DataSet)-[:AGGREGATES]->(de: DataElement)  
3
```

////////////////////////////////////

## APPLIES

Connects a [DataQualityRule](#) to a [DataAsset](#) or [DataElement](#), indicating that the rule applies to the specific data.

### Example

```
1  
2 (dqr:DataQualityRule)-[:APPLIES]->(d:DataAsset)  
3
```

////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

## AUTHORITATIVE\_SOURCE

Connects a [SystemOfRecord](#) node to a [DataAsset](#) node, indicating that the data asset is the authoritative source for specific data elements.

### Example

```
1  
2 (sor:SystemOfRecord)-[:AUTHORITATIVE_SOURCE]->(d:DataAsset)  
3
```

////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

## CLASSIFIED\_AS

Connects a [DataAsset](#) or [DataElement](#) to a [DataClassification](#), indicating the security classification level of the specific data.

### Example

```
1  
2 (d:DataAsset)-[:CLASSIFIED_AS]->(dc:DataClassification)  
3
```

////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

## CONSUMED\_BY

Connects a [DataAsset](#) (source data) to an [Application](#) or [BusinessProcess](#) that consumes the data without creating or transforming it.

## Example

```
1
2 (d:DataAsset {type: 'Table'})-[:CONSUMED_BY]->(a:Application)
3 or
4
5 ##### **Example**
6
7 ``` cypher
8
9 (d:DataAsset {type: 'Table'})-[:CONSUMED_BY]->(bp:BusinessProcess)
10
11 //////////////////////////////////////
```

## CONTAINS

Connects a [DataAsset](#) node to a [DataElement](#) node.

## Example

```
1
2 (d:DataAsset)-[:CONTAINS]->(de:DataElement)
3
4
5 //////////////////////////////////////
```

## DERIVED\_FROM

Connects a [DataAsset](#) (representing the view) to another [DataAsset](#) (representing the source data), indicating that the view is derived from the source data.

## Example

```
1
2 (v:DataAsset {type: 'View'})-[:DERIVED_FROM]->(d:DataAsset {type: 'Table'})
3
4
5 //////////////////////////////////////
```

## GENERATED\_BY

Connects a [DataElement](#) node to a [Transformation](#) node, indicating that the field was generated by a particular transformation process.

### Example

```
1  
2 (de:DataElement)-[:GENERATED_BY]->(t:Transformation)  
3
```

////////////////////////////////////

## GOVERNED\_BY

Connects a [DataAsset](#) or [DataElement](#) to a [Regulation](#) or [CompliancePolicy](#), indicating that the data is subject to specific regulatory requirements or policies.

### Example

```
1  
2 (d:DataAsset)-[:GOVERNED_BY]->(r:Regulation)  
3
```

////////////////////////////////////

## HAS\_ATTRIBUTE

Connects a [BusinessTerm](#) node to a [BusinessAttribute](#) node.

### Example

```
1  
2 (bt:BusinessTerm)-[:HAS_ATTRIBUTE]->(ba:BusinessAttribute)  
3
```

////////////////////////////////////

## IMPACTS

Connects an [Application](#) to other related assets, such as other [Application](#), [DataAsset](#) or [DataElement](#), to represent the influence or effect the [Application](#) has on these assets, particularly when changes occur within the [Application](#) .

## Example

```
1
2 (a:Application)-[:IMPACTS]->(d:DataAsset {type: 'Table'})
3 or
4
5 ##### **Example**
6
7 ``` cypher
8
9 (a:Application)-[:IMPACTS]->(de:DataElement)
10 or
11
12 ##### **Example**
13
14 ``` cypher
15
16 (a1:Application)-[:IMPACTS]->(a2:Application)
17
18 //////////////////////////////////////
```

## INVOLVES

Connects a [BusinessProcess](#) node to a [DataAsset](#) node or a [Transformation](#) node, indicating that the process involves the use or modification of the data asset or transformation.

## Example

```
1
2 (bp:BusinessProcess)-[:INVOLVES]->(d:DataAsset)
3
4 ##### **Example**
5
6 ``` cypher
7
8 (bp:BusinessProcess)-[:INVOLVES]->(t:Transformation)
9
10 //////////////////////////////////////
```



### MANAGES\_PROCESS

Connects a [ProcessSteward](#) node to a [BusinessProcess](#) node, indicating that the person is responsible for managing the business process.

#### Example

```
1
2 (ps:ProcessSteward)-[:MANAGES_PROCESS]->(bp:BusinessProcess)
3
////////////////////////////////////
```

### MAPS\_TO

Connects a [BusinessAttribute](#) node to a [DataElement](#) node.

#### Example

```
1
2 (ba:BusinessAttribute)-[:MAPS_TO]->(de:DataElement)
3
////////////////////////////////////
```

### MEASURES

Connects a [DataQualityMetric](#) to a [DataAsset](#) or [DataElement](#), indicating that the metric is used to measure the quality of the specific data.

#### Example

```
1
2 (dqm:DataQualityMetric)-[:MEASURES]->(d:DataAsset)
3
////////////////////////////////////
```

### RESPONSIBLE\_FOR

Connects a [ComplianceOfficer](#) to a [Regulation](#), [CompliancePolicy](#), or [DataAsset](#), indicating their responsibility for ensuring compliance.

### Example

```
1  
2 (co:ComplianceOfficer)-[:RESPONSIBLE_FOR]->(r:Regulation)  
3
```

////////////////////////////////////

### TRANSFORMS\_TO

Connects a [DataElement](#) node to another [DataElement](#) node, representing the transformation from one field to another in a data transformation process.

### Example

```
1  
2 (de1:DataElement)-[:TRANSFORMS_TO {transformationId: 'job1'}]->(de2:DataElement)  
3
```

////////////////////////////////////

### UTILIZES

Connects a [BusinessProcess](#) to an [Application](#) that is used to accomplish the process.

### Example

```
1  
2 (bp:BusinessProcess)-[:UTILIZES]->(a:Application)
```

////////////////////////////////////

### VIOLATES

Connects a [DataQualityIssue](#) to a [DataQualityRule](#), [DataQualityMetric](#), [DataAsset](#), or [DataElement](#), indicating that the issue represents a violation of the rule or metric or is related to the specific data.

### Example

```
1  
2 (dqi:DataQualityIssue)-[:VIOLATES]->(dqr:DataQualityRule)
```

////////////////////////////////////