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Literate Data Model

Preliminaries
the basic structure of the model

In Literate Data Modeling, the main components of interest are typically Classes, Attributes, Models, and Subjects. However, to streamline the model and promote reusability, we introduce a supertype called Component. By defining common attributes and behaviors in the Component class, we can inherit them in the subclasses, ensuring consistency and reducing duplication throughout the model.

We present the Component class first because it is a best practice in modeling to introduce supertypes before their subtypes. This approach allows readers to understand the general concepts and shared properties before delving into the specifics of each specialized component.

Component
An element or building block of the literate data model

Components
RALComponents
Annotation
LiterateModel , Subject , Class , Key , AttributeSection , Attribute , Constraint , Method , Parameter

the name of the component, not in camel case
(String value O_O)

This is a warning with emoji

The name of the component
(CamelName value O_O)

(QualifiedCamel value O_O)

a short form of the component's name, used for cross references and improved readability.
(CamelName value O_O)

"LDM" is the short form of "Literate Data Model".
name - how do you say name in english?
x.name == y
the abbreviated name should be shorter than the actual name
len(abbreviatedName) < len(name)
Why have an abbreviation longer than the name?
Warning
Does this annotation find it's way to the Constraint? YES! It's fixed!

A brief, one-line definition or description of the component, suitable for use in a descriptive table of contents. _
(OneLiner value O_O)

A more detailed explanation or discussion of the component _
(RichText value O_O)

Indicates whether this component is an embellishment added during post-parsing processing _
(Boolean value O_O)

false
This attribute is set to true for components that are automatically generated or added during the fleshing out, review, or rendering processes, such as implied attributes or suggested model elements. It helps distinguish embellishments from the core model elements defined in the original LDM source.

mechanical attributes
Indicates whether this component is an embellishment added during post-parsing processing _ *(Boolean value O_O)*

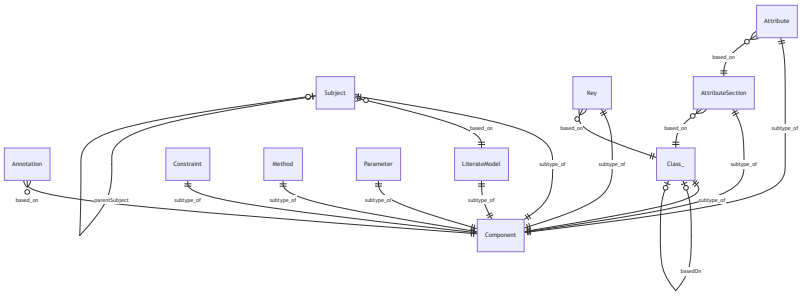
false

This attribute is set to true for components that are automatically generated or added during the fleshing out, review, or rendering processes, such as implied attributes or suggested model elements. It helps distinguish embellishments from the core model elements defined in the original LDM source.

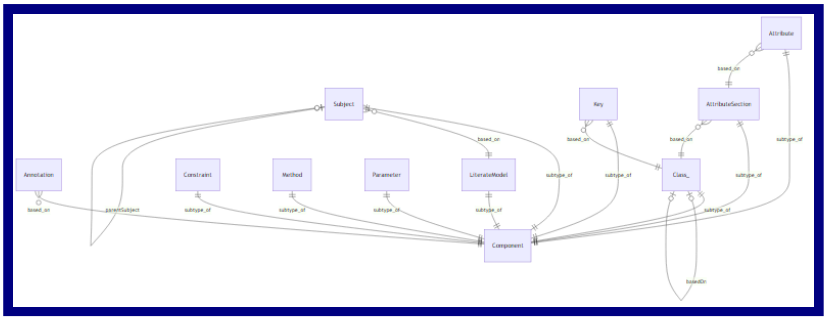
Mermaid ER Diagram for Component - Inert

```
erDiagram
Annotation }o--|| Component : based_on
LiterateModel ||--|| Component : subtype_of
Subject ||--|| Component : subtype_of
Subject }o--|| LiterateModel : based_on
Subject |o--o| Subject : parentSubject
Class_ ||--|| Component : subtype_of
Class_ |o--o| Class_ : basedOn
Key ||--|| Component : subtype_of
Key }o--|| Class_ : based_on
AttributeSection ||--|| Component : subtype_of
AttributeSection }o--|| Class_ : based_on
Attribute ||--|| Component : subtype_of
Attribute }o--|| AttributeSection : based_on
Constraint ||--|| Component : subtype_of
Method ||--|| Component : subtype_of
Parameter ||--|| Component : subtype_of
```

Mermaid ER Diagram for Component - Live!



Mermaid ER Diagram for Component - PNG for mermaid


Attribute
based_on
Subject
Key
AttributeSection
based_on
based_on
based_on
subtype_of
Annotation
Constraint
Method
Parameter
LiteralModel
subtype_of
subtype_of
Class_
subtype_of
based_on
parentSubject
subtype_of
subtype_of
subtype_of
subtype_of
subtype_of
Component
basedOn

AnnotationType
a kind of note, or aside, used to call attention to additional information about some Component.

Each LDM declares a set of Annotation Types, with defined labels, emojis, and clearly documented purposes. These are *recognized* or *registered* Annotation Types.

AnnotationTypes

AnnotationTypes

LiterateModel

an emoji

(Emoji value O_O)

an emoji

(String value O_O)

the Unicode for the emoji

(String value O_O)

A short label to indicate the purpose of the annotation _

(LowerCamel value O_O)

the plural form of the label

(UpperCamel value O_O)

based on label

the intended reason for the annotation.

(OneLiner value O_O)

created for AnnotationType

A link back to the LiterateModel on which this AnnotationType depends.

(LiterateModel value M_1)

reverse attribute for Annotation.annotationType from which this was implied.

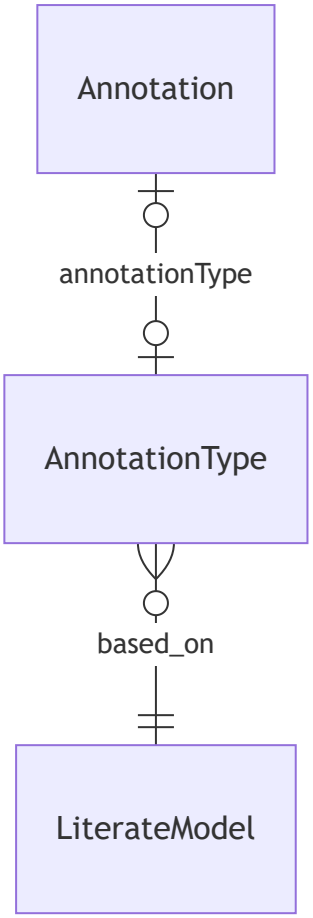
(Annotation value M_1)

Annotation.annotationType

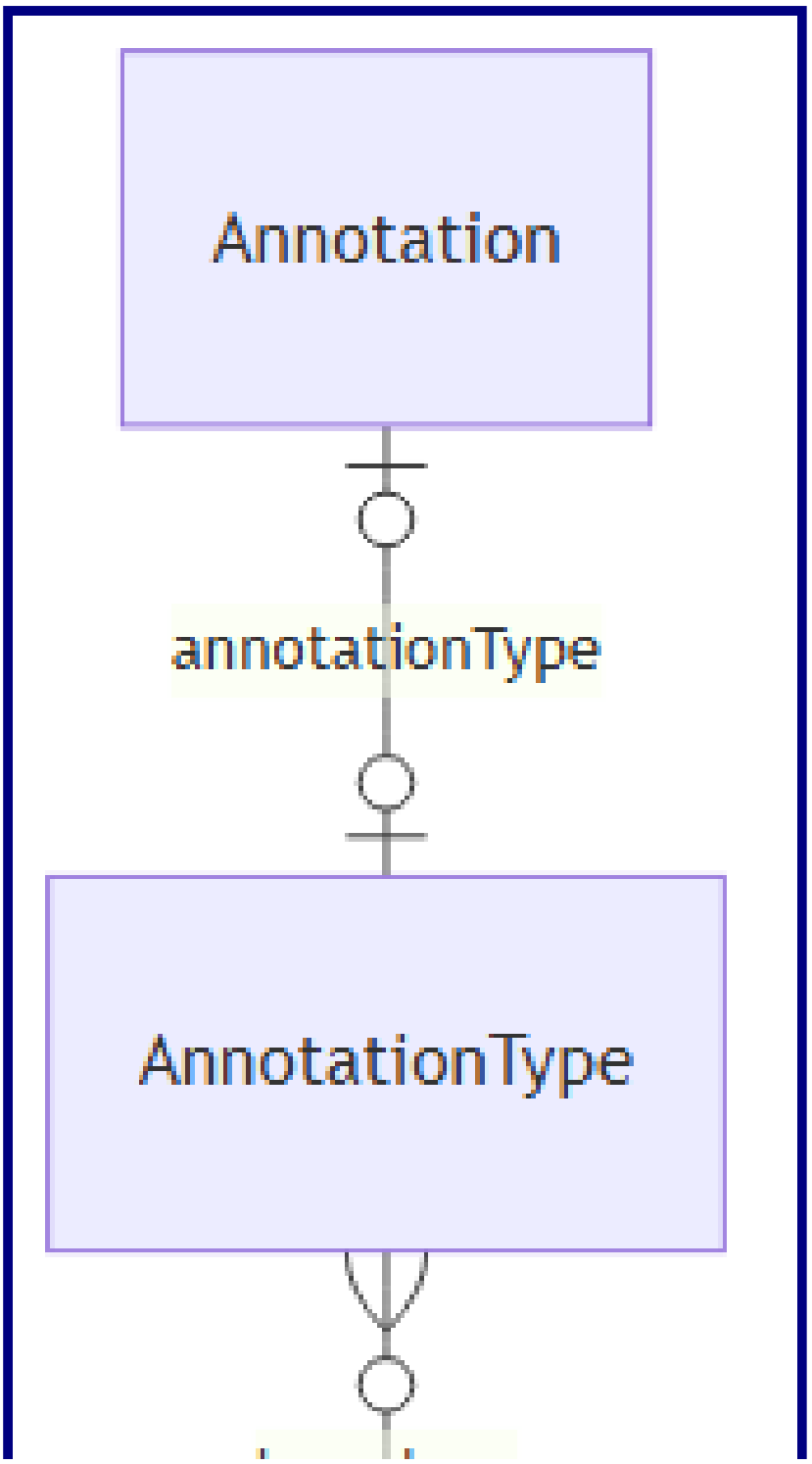
Mermaid ER Diagram for AnnotationType - Inert

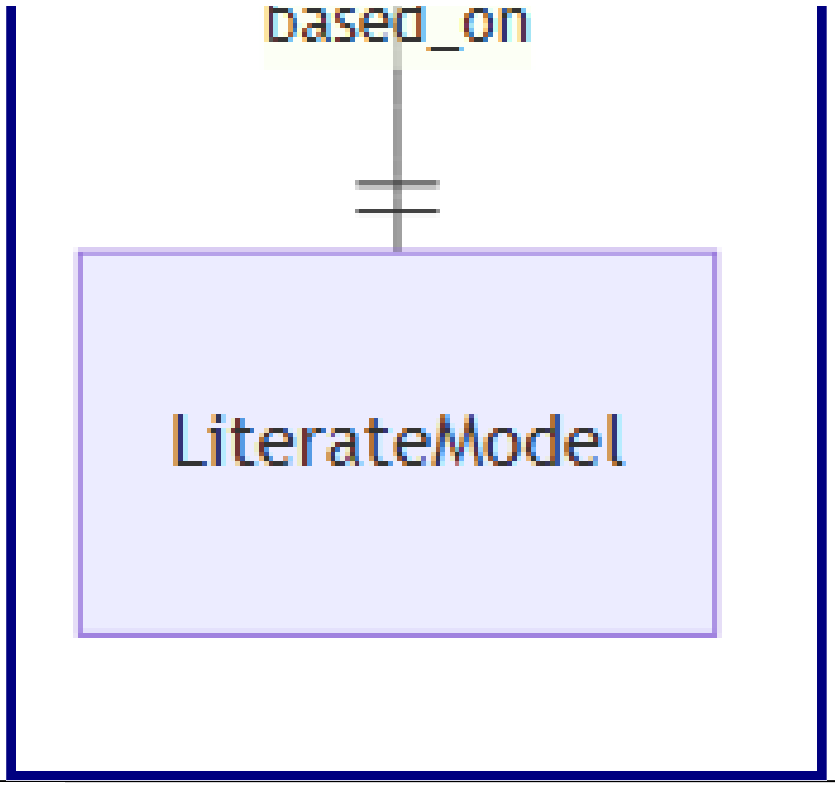
```
erDiagram
AnnotationType }o--|| LiterateModel : based_on
Annotation |o--o| AnnotationType : annotationType
```

Mermaid ER Diagram for AnnotationType - Live!



Mermaid ER Diagram for AnnotationType - PNG for mermaid


Annotation
annotationType
AnnotationType



Annotation
A note or comment associated with a model element

Annotations
Annotations
Component

(Optional AnnotationType value O_O)

An Annotation is considered to *recognized* if the label is associated with an Annotation Type. otherwise it is *ad hoc* .
Should be a Value Type
AnnotationType.inverseOfAnnotationType

A short label to indicate the purpose of the annotation _
(CamelName value O_O)

But any short label is valid.

from annotationType

(Optional Emoji value O_O)

from annotation type

The content or body of the annotation

(RichText value O_O)

Indicates whether this annotation is an embellishment added during post-parsing processing _

(Boolean value O_O)

false

This attribute is set to true for annotations that are automatically generated or added during the fleshing out, review, or rendering processes, such as suggestions, issues, or diagnostic messages. It helps distinguish embellishment annotations from the annotations defined in the original LDM source.

created for Annotation

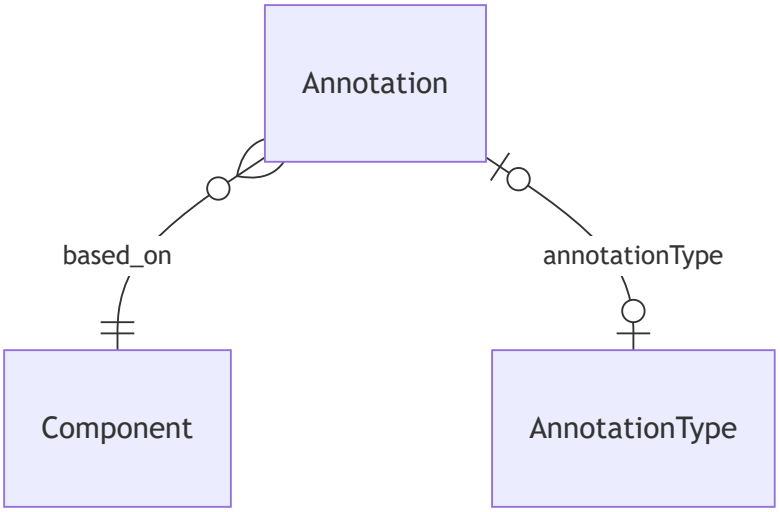
A link back to the Component on which this Annotation depends.

(Component value M_1)

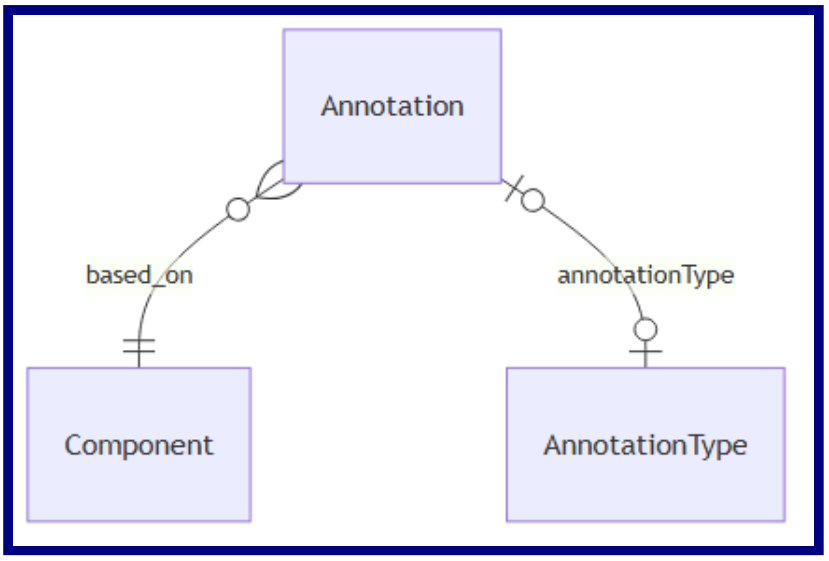
Mermaid ER Diagram for Annotation - Inert

```
erDiagram
Annotation }o--|| Component : based_on
Annotation |o--o| AnnotationType : annotationType
```

Mermaid ER Diagram for Annotation - Live!



Mermaid ER Diagram for Annotation - PNG for mermaid



The Model and its Subjects

LiterateModel

A representation of a domain's entities, attributes, and relationships, along with explanatory text and examples

LiterateModels

AnnotationType , Subject , SubjectArea

Component

(UpperCamel value O_O)

Component.name

list of all classes in the model, as ordered in the definition of the model.

(List of Classes value O_O)

Class.inverseOfAllSubjects

gathering s.allSubjects over s in subjectAreas

Subject names must be unique across the model.

list of all classes in the model, as ordered in the definition of the model.

(List of Classes value O_O)

Class.inverseOfAllClasses

gathering s.allClasses over s in allSubjects.

Class names must be unique across the model.

(List of AnnotationTypes value O_O)

tge recommended lanquage for expressing derivation, defaults, and constraints

(CodingLanguage value O_O)

OCL

ges *(Optional List of CodingLanguages value O_O)*

tage recommended lanquage for expressing derivation, defaults, and constraints

(TemplateLanguage value O_O)

Handlebars

uages *(Optional List of TemplateLanguages value O_O)*

A list of functions that require sophisticated AI-powered implementation *

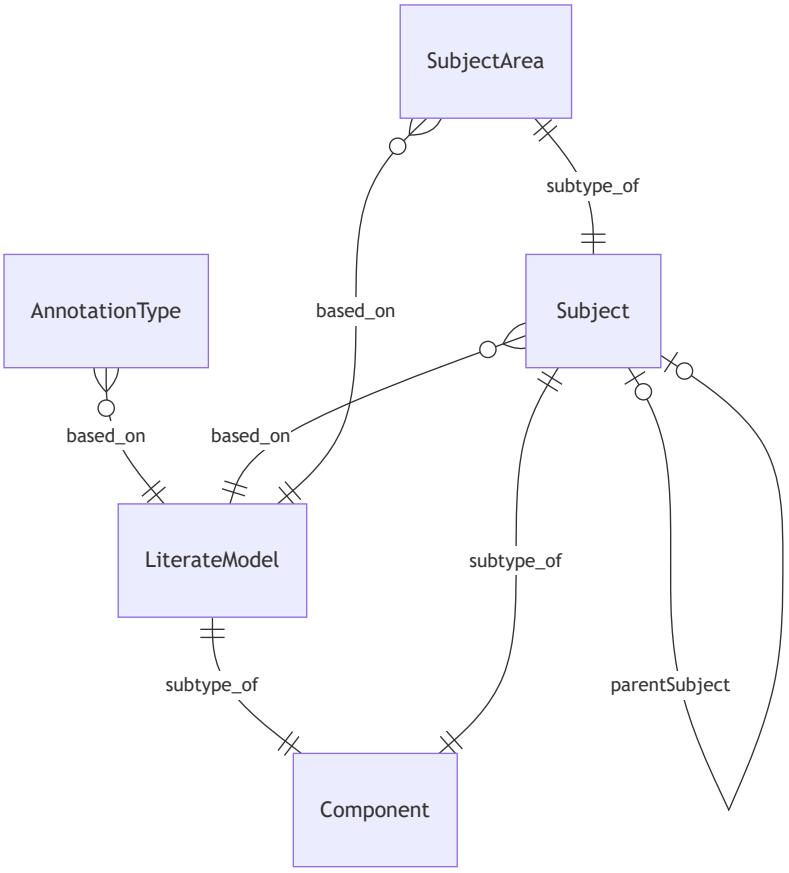
(List of String value O_O)

['aiEnglishPlural()']

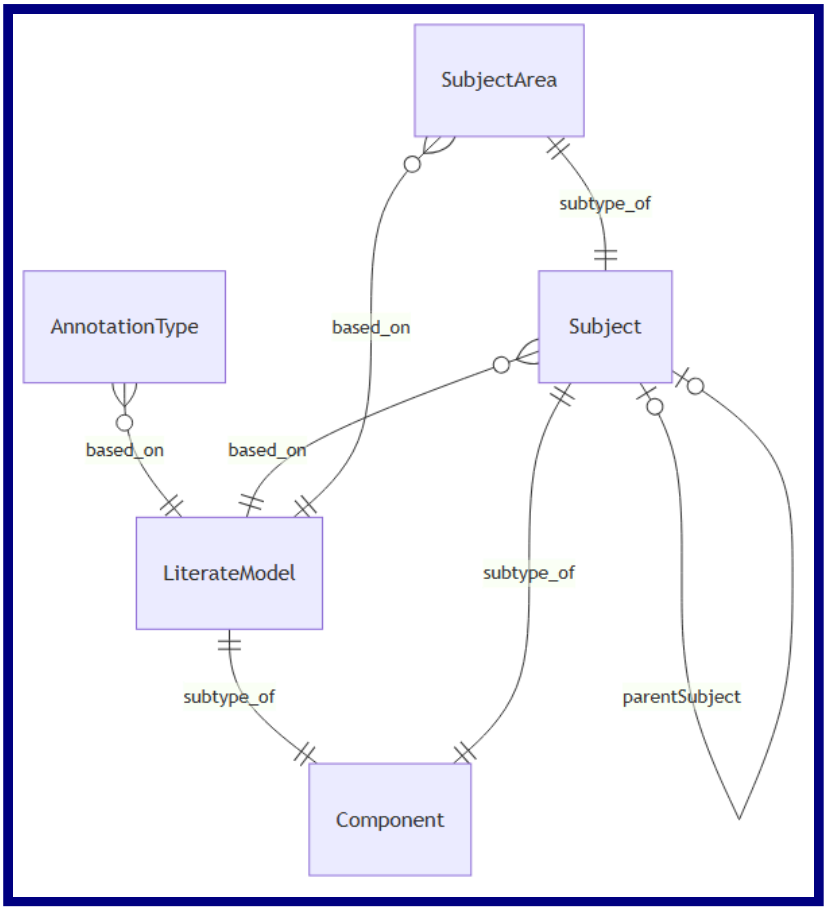
Mermaid ER Diagram for LiterateModel - Inert

```
erDiagram
AnnotationType }o--|| LiterateModel : based_on
LiterateModel ||--|| Component : subtype_of
Subject ||--|| Component : subtype_of
Subject }o--|| LiterateModel : based_on
Subject |o--o| Subject : parentSubject
SubjectArea ||--|| Subject : subtype_of
SubjectArea }o--|| LiterateModel : based_on
```

Mermaid ER Diagram for LiterateModel - Live!



Mermaid ER Diagram for LiterateModel - PNG for mermaid


SubjectArea
subtype_of
AnnotationType
based_on
Subject
based_on
based_on
LiterateModel
subtype_of
subtype_of
parentSubject
Component

Subject
A specific topic or theme within the model

Subjects are the chapters an sections of the model.

- A subject need not contain any Classes if it's just expository.

Subjects
LiterateModel
Component
SubjectArea

(UpperCamel value O_O)

Component.name

The parent subject, if any, under which this subject is nested _
(Optional Subject value O_O)

Subject.inverseOfParentSubject

The major classes related to this subject, in the order in which they should be presented _
(List of Classes value O_O)

define chapter, section, subsection as levels?
Class.inverseOfClasses

Any child subjects nested under this subject, in the order in which they should be presented _
(List of Subjects value O_O)

DSL : the Classes within a Subject are always displayed before the childSubjects.

Subject.parentSubject

created for Subject

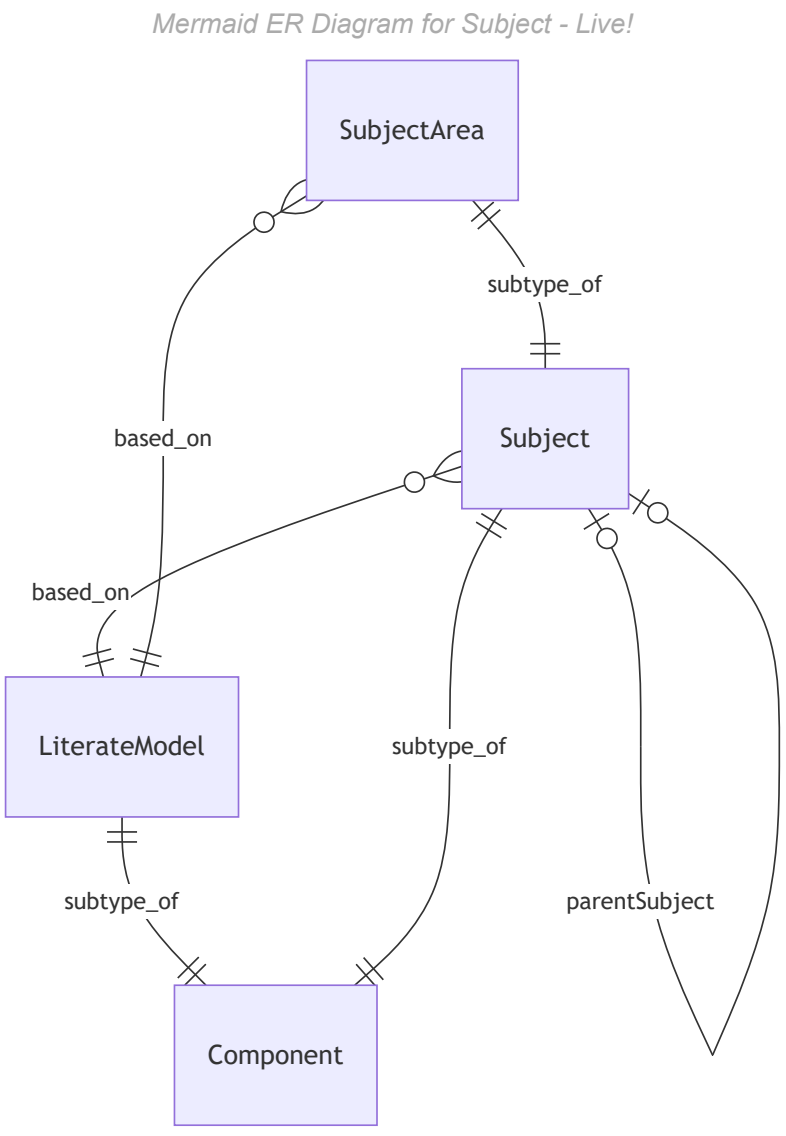
A link back to the LiterateModel on which this Subject depends.
(LiterateModel value M_1)

Inverse attribute for Subject.parentSubject from which this was implied.
(Subject value M_1)

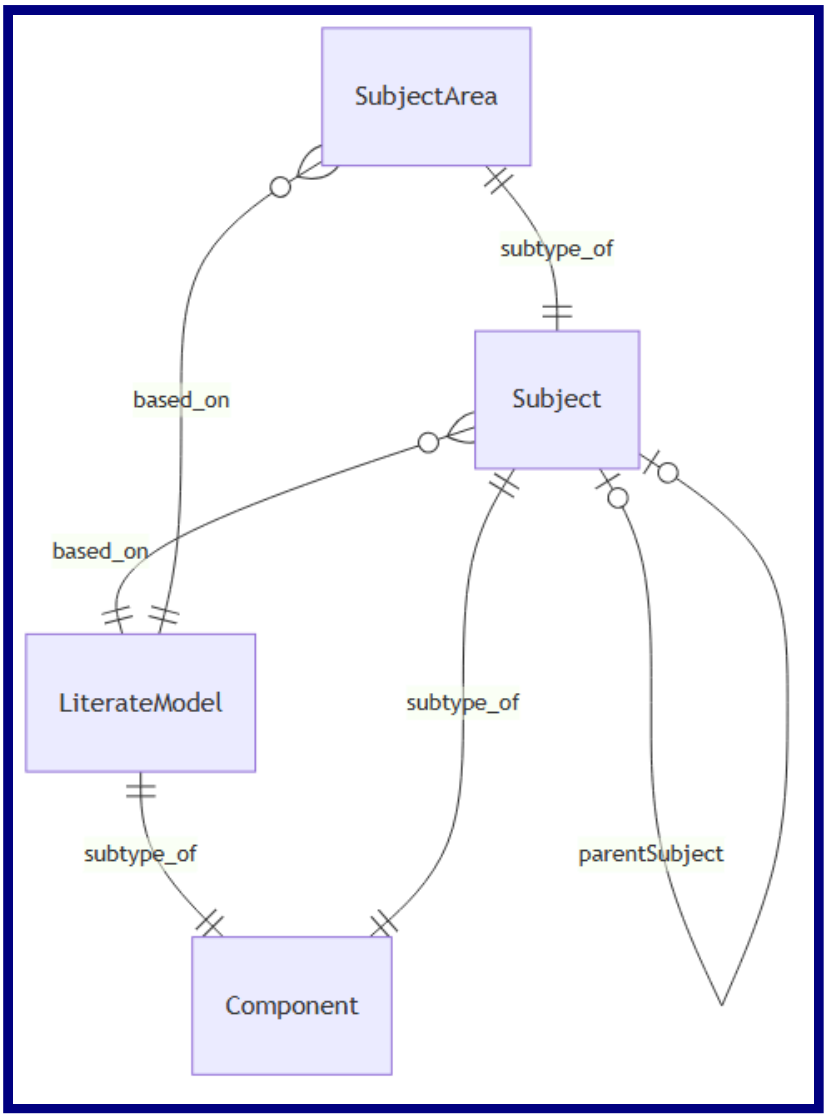
Subject.parentSubject

Mermaid ER Diagram for Subject - Inert

erDiagram
LiterateModel ||--|| Component : subtype_of
Subject ||--|| Component : subtype_of
Subject }o--|| LiterateModel : based_on
Subject |o--o| Subject : parentSubject
SubjectArea ||--|| Subject : subtype_of
SubjectArea }o--|| LiterateModel : based_on



Mermaid ER Diagram for Subject - PNG for mermaid



SubjectArea
A main topic or area of focus within the model, containing related subjects and classes

parentSubject is absent
SubjectAreas
LiterateModel
Subject

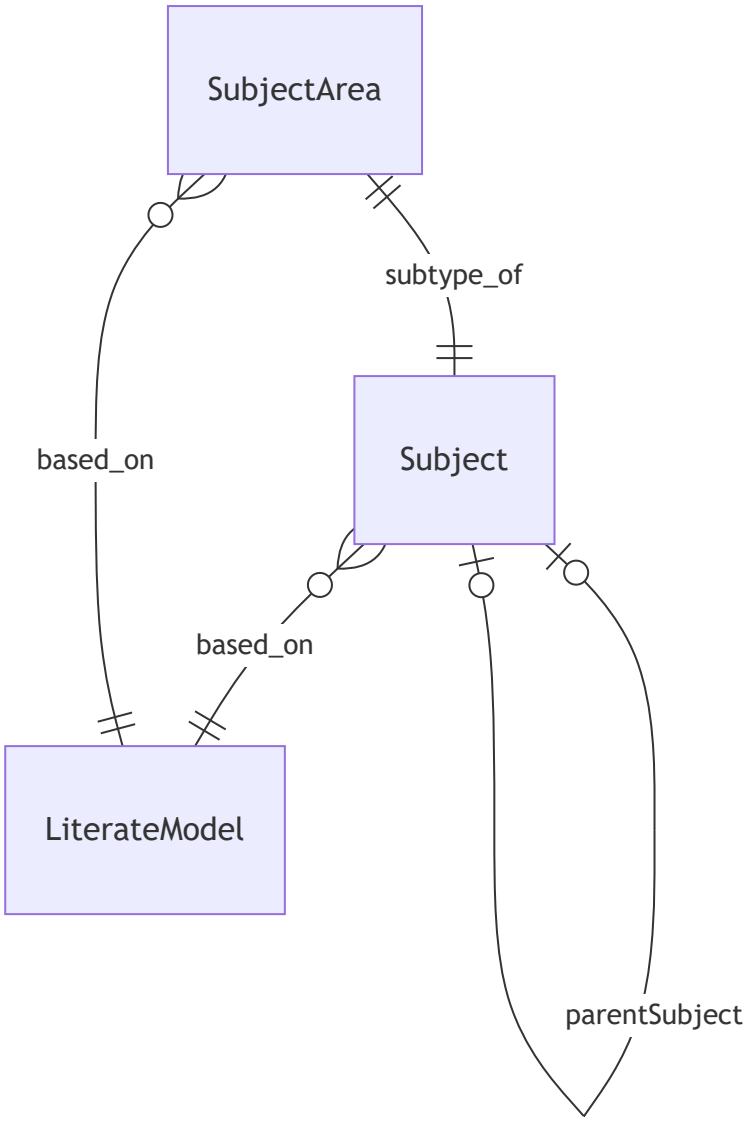
created for SubjectArea

A link back to the LiterateModel on which this SubjectArea depends.
(LiterateModel value M_1)

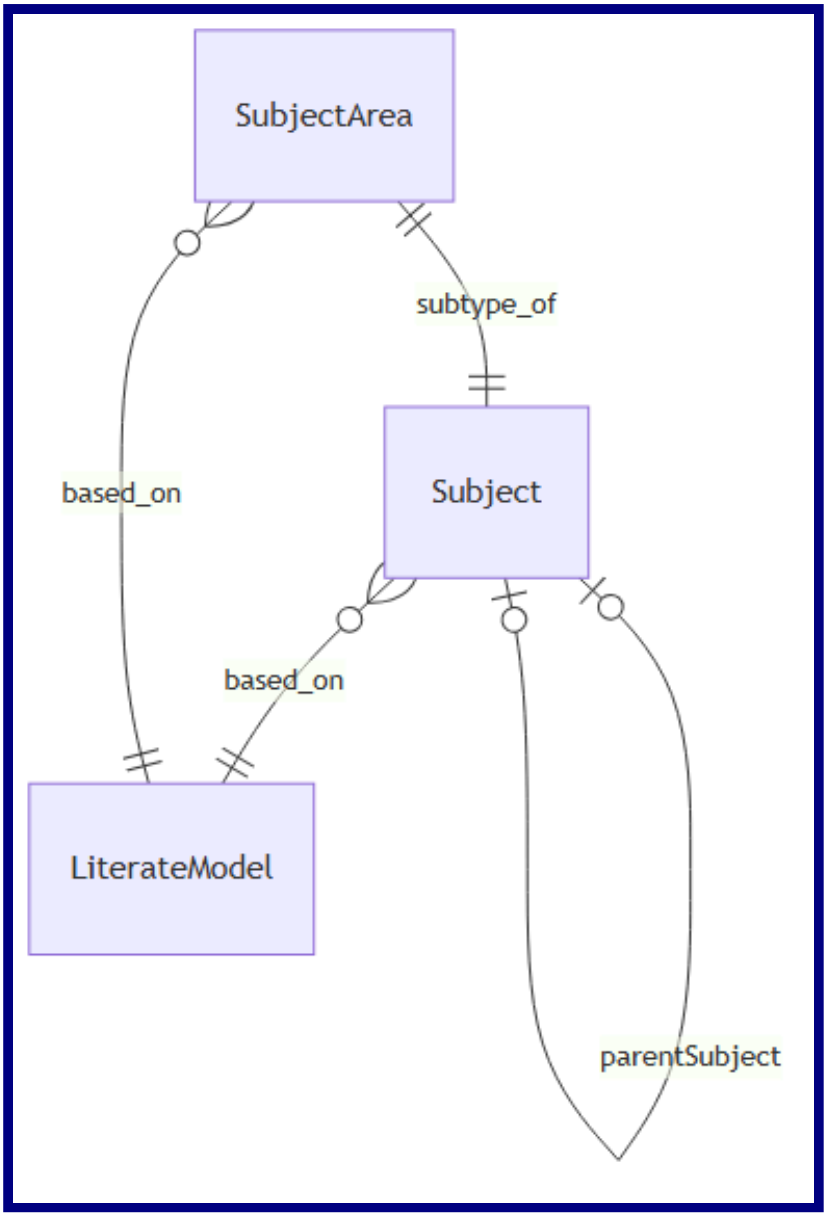
Mermaid ER Diagram for SubjectArea - Inert

```
erDiagram
Subject }o--|| LiterateModel : based_on
Subject |o--o| Subject : parentSubject
SubjectArea ||--|| Subject : subtype_of
SubjectArea }o--|| LiterateModel : based_on
```

Mermaid ER Diagram for SubjectArea - Live!



Mermaid ER Diagram for SubjectArea - PNG for mermaid


SubjectArea
subtype_of
based_on
Subject
based_on
LiterateModel
parentSubject

Classes

Class
A key entity or object type in the model, often corresponding to a real-world concept

Classes
Subtyping , Key , AttributeSection , ClassConstraint
Component
ReferenceType
Within each Class, attribute names must be unique.

the normal English plural form of the name of the Class
(UpperCamel value O_O)

Might be Books for the Book class or other regular plurals.

- But also might be People for Person.

When inputting a model, you will rarely need to specify the plural form. The input program will just look it up.
the regular plural, formed by adding "s" or "es".

the Class or Classes on which this class is dependent
(Set of Class value O_O)

This is solely based on **Existence Dependency** . A true dependent entity cannot logically exist without the related parent entity. For instance, an Order Item cannot exist without an Order. If removing the parent entity logically implies removing the dependent entity, then it is a dependent entity.

that basedOn and dependentOf are being used synonymousle in this metamodel.
Class.inverseOfBasedOn

The parent class or classes from which this class inherits attributes
(List of Classes value O_O)

Class.inverseOfSupertypes

the criteria, or dimensions, by which the class can be divided into subtypes
(List of Subtypings value O_O)

in a library model, the `Book` class could have subtypings based on genre (e.g., Fiction, Non-fiction), format (e.g., Hardcover, Paperback), or subject (e.g., Science, History).
Subtyping.inverseOfSubtypings

Any subtypes or specializations of this class based on it’s subtypings.

(List of Classes value O_O)

For instance, using the `Book` example, the subtypes could include `FictionBook` , `Non-fictionBook` , `HardcoverBook` , `PaperbackBook` , `ScienceBook` , and `HistoryBook` .

Class.inverseOfSubtypes

The attributes or properties of the class, in the order in which they should be presented _

(List of Attributes value O_O)

Attribute.inverseOfAttributes

additional attributes or properties of the class, grouped for clarity and elaboration. _

(List of AttributeSections value O_O)

AttributeSection.inverseOfAttributeSections

Any constraints, rules, or validations specific to this class _

(List of Constraints value O_O)

Constraints may be expressed on either the Class or the Attribute. Always?

Any behaviors or operations associated with this class _

(List of Methods value O_O)

Method.inverseOfMethods

the Classes which are basedOn this Class

(Optional Set of Classes value O_O)

Class.basedOn

(Optional Set of UniqueKeys value O_O)

UniqueKey.basedOn

Inverse attribute for LiterateModel.allSubjects from which this was implied.

(LiterateModel value M_1)

LiterateModel.allSubjects

Inverse attribute for LiterateModel.allClasses from which this was implied.

(LiterateModel value M_1)

LiterateModel.allClasses

Inverse attribute for Subject.classes from which this was implied.

(Subject value M_1)

Subject.classes

Inverse attribute for Class.basedOn from which this was implied.
(Class value M_1)

Class.basedOn

Inverse attribute for Class.supertypes from which this was implied.
(Class value M_1)

Class.supertypes

Inverse attribute for Class.subtypes from which this was implied.
(Class value M_1)

Class.subtypes

Inverse attribute for Subtyping.classes from which this was implied.
(Subtyping value M_1)

Subtyping.classes

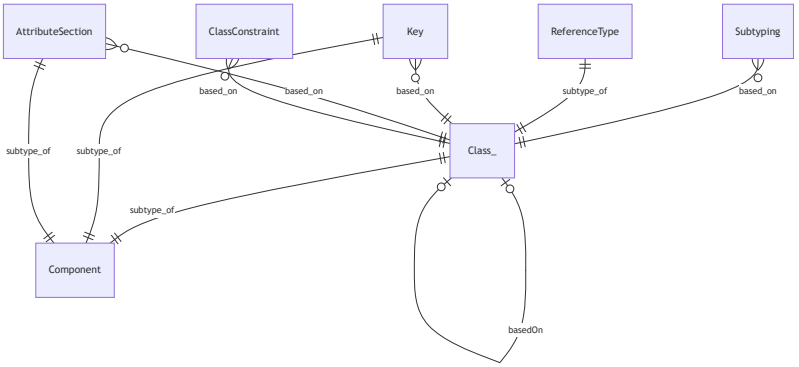
Inverse attribute for SimpleDataTypeSubtpeOfDataType.coreClass from which this was implied.
(SimpleDataTypeSubtpeOfDataType value M_1)

SimpleDataTypeSubtpeOfDataType.coreClass

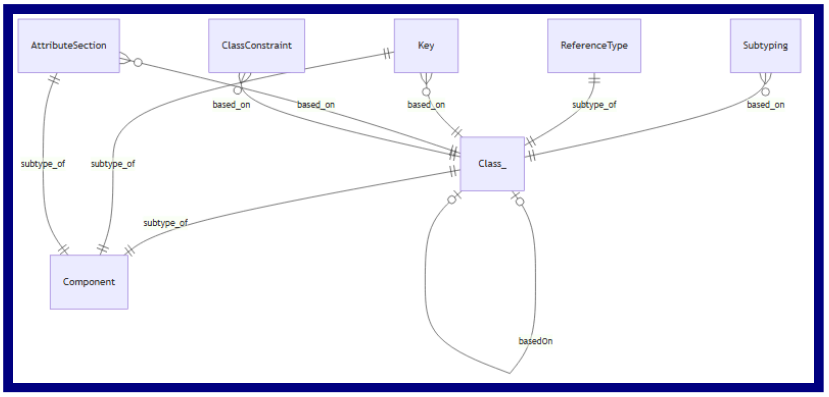
Mermaid ER Diagram for Class_ - Inert

```
erDiagram
Class_ ||--|| Component : subtype_of
Class_ |o--o| Class_ : basedOn
Subtyping }o--|| Class_ : based_on
ReferenceType ||--|| Class_ : subtype_of
Key ||--|| Component : subtype_of
Key }o--|| Class_ : based_on
AttributeSection ||--|| Component : subtype_of
AttributeSection }o--|| Class_ : based_on
ClassConstraint }o--|| Class_ : based_on
```

Mermaid ER Diagram for Class_ - Live!



Mermaid ER Diagram for Class_ - PNG for mermaid



Subtyping
a way in which subtypes of a Class may be classified

Subtypings
RALSubtypings
Class

(LowerCamel value O_O)

(Boolean value O_O)

true

(Boolean value O_O)

true

(List of Classes value O_O)

DSL : Shown in the DSL as

- Subbtypes: byBrand - Brand1, Brand2,... (non exclusive, exhaustive)
- on the super class. And as
- Subtype of: SuperClass byBrand
- on the subclass.

every class can have an unnamed subtyping.
Class.inverseOfClasses

created for Subtyping

Inverse attribute for Class.subtypings from which this was implied.
(Class value M_1)

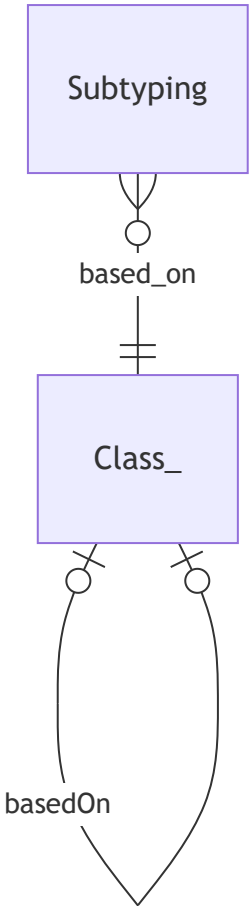
Class.subtypings

A link back to the Class on which this Subtyping depends.
(Class value M_1)

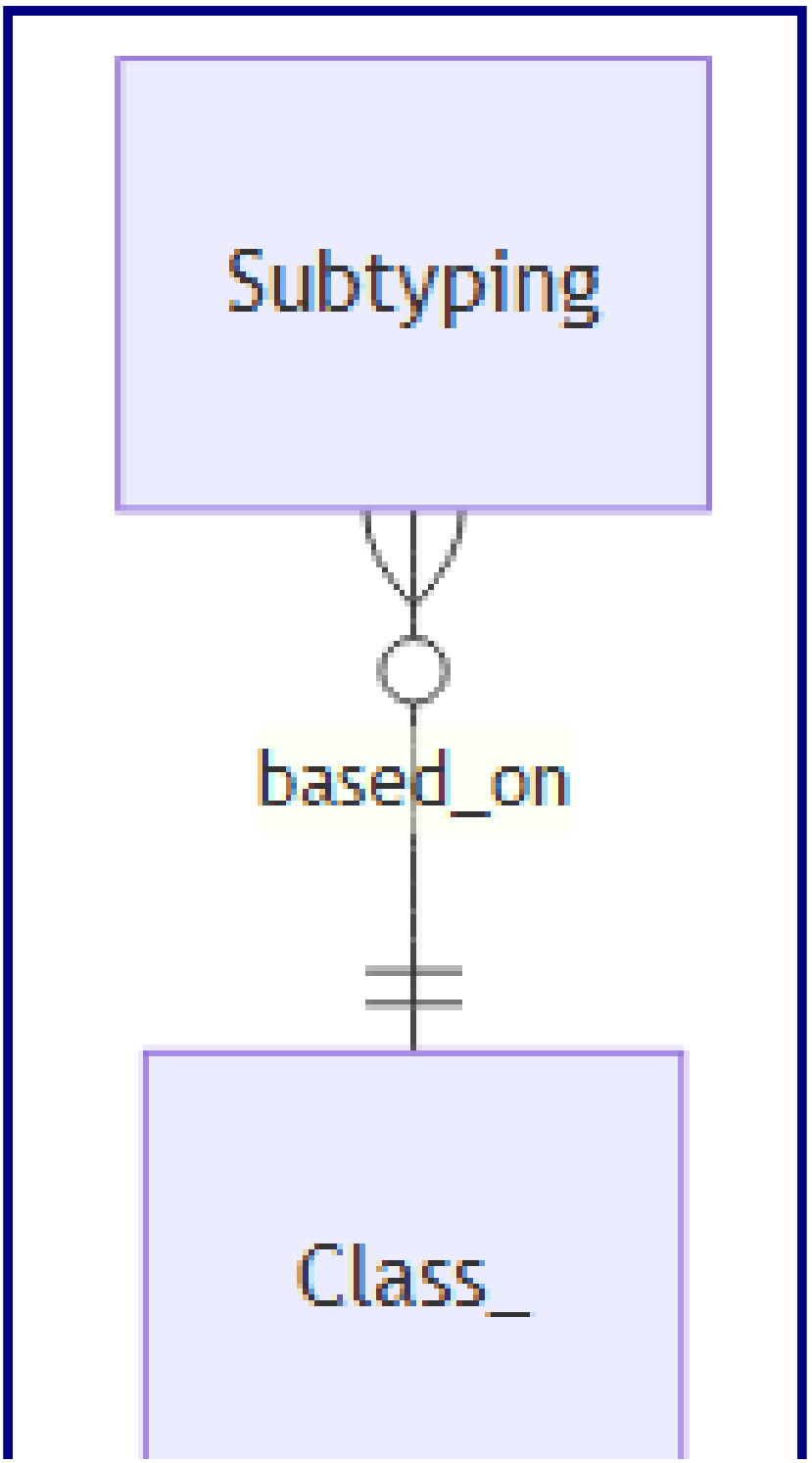
Mermaid ER Diagram for Subtyping - Inert

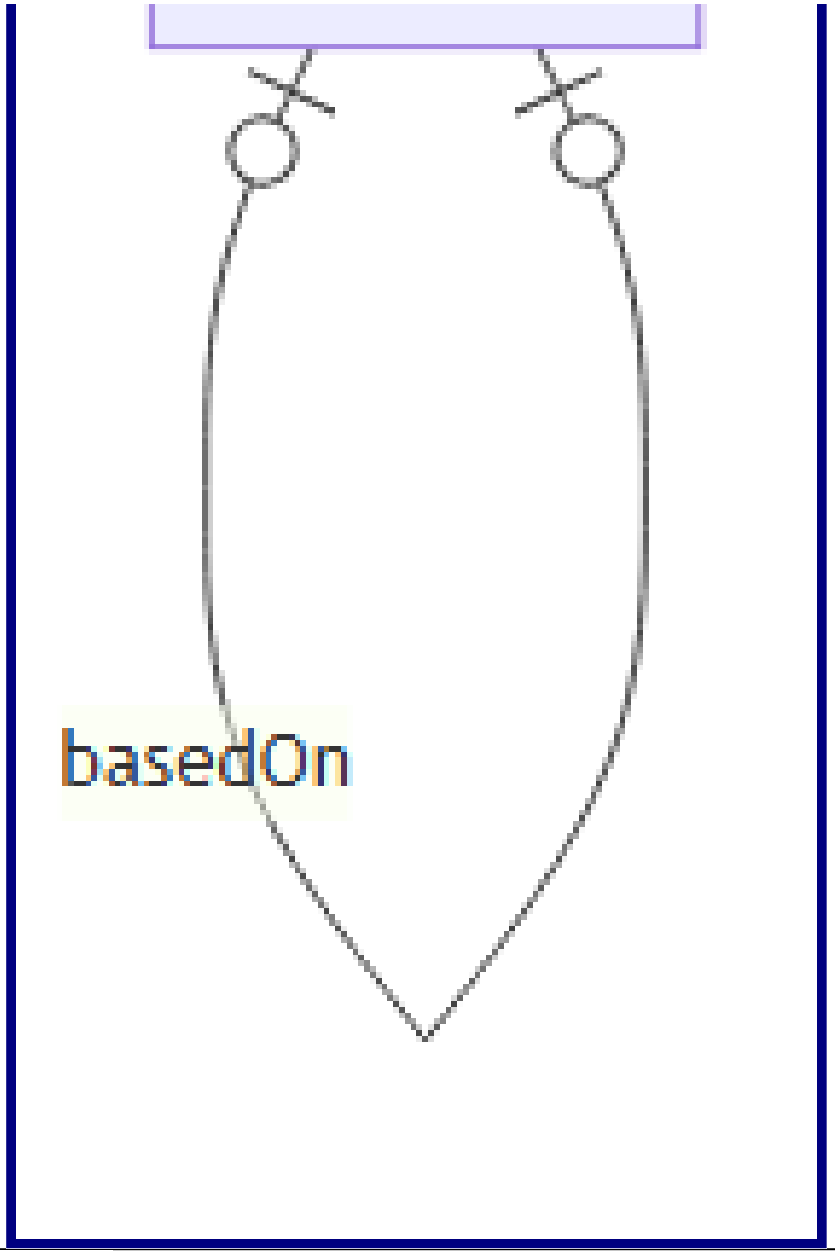
```
erDiagram
Class_ |o--o| Class_ : basedOn
Subtyping }o--|| Class_ : based_on
```

Mermaid ER Diagram for Subtyping - Live!



Mermaid ER Diagram for Subtyping - PNG for mermaid


Subtyping
based_on
Class_



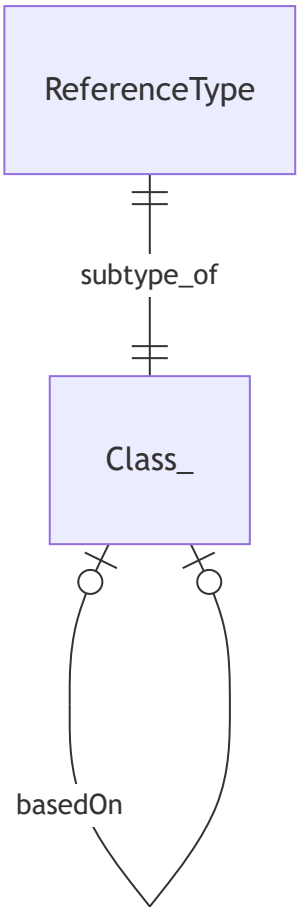
ReferenceType
A class that is presumed to be used as a reference, rather than a value

ReferenceTypes
RAL ReferenceTypes
Class

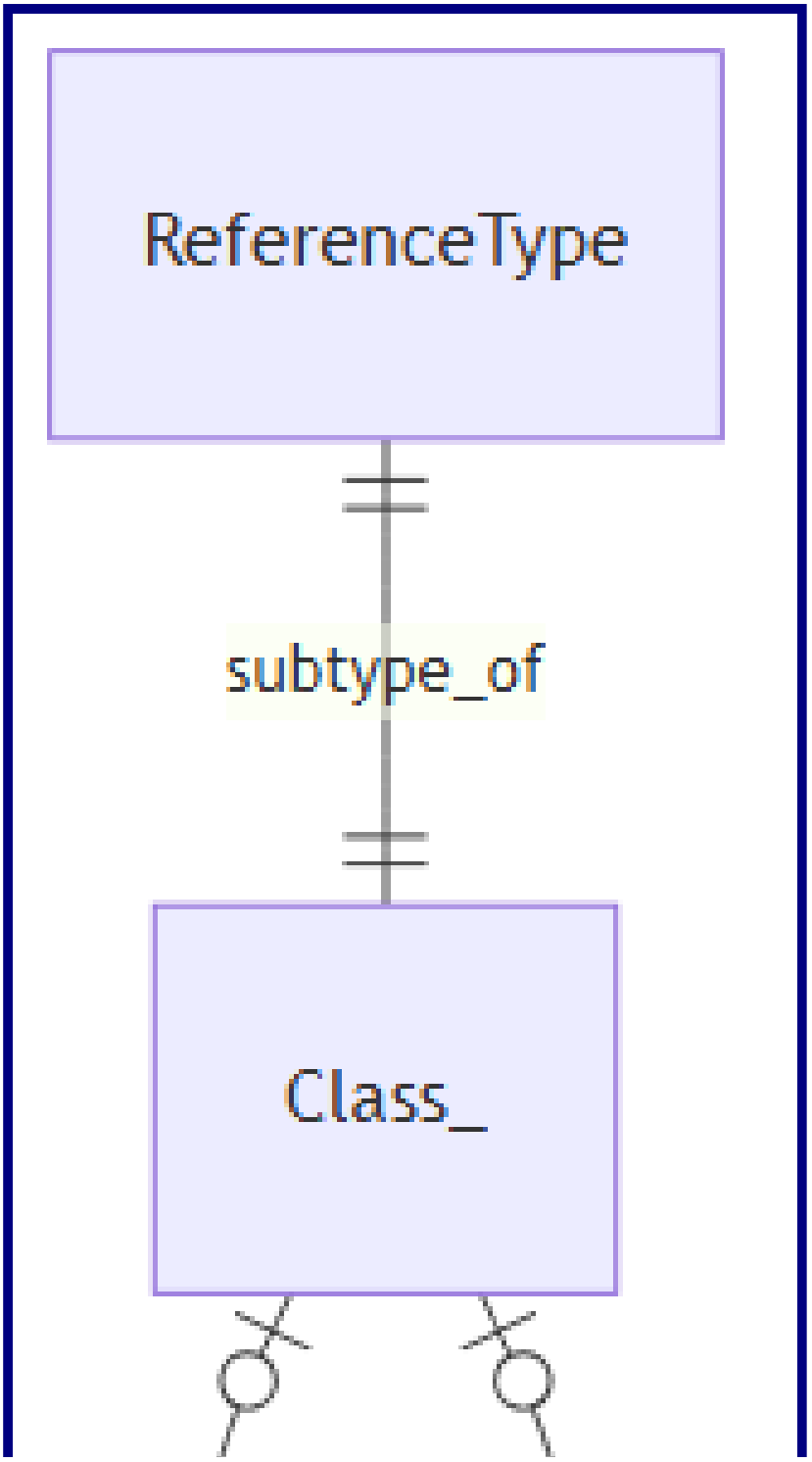
Mermaid ER Diagram for ReferenceType - Inert

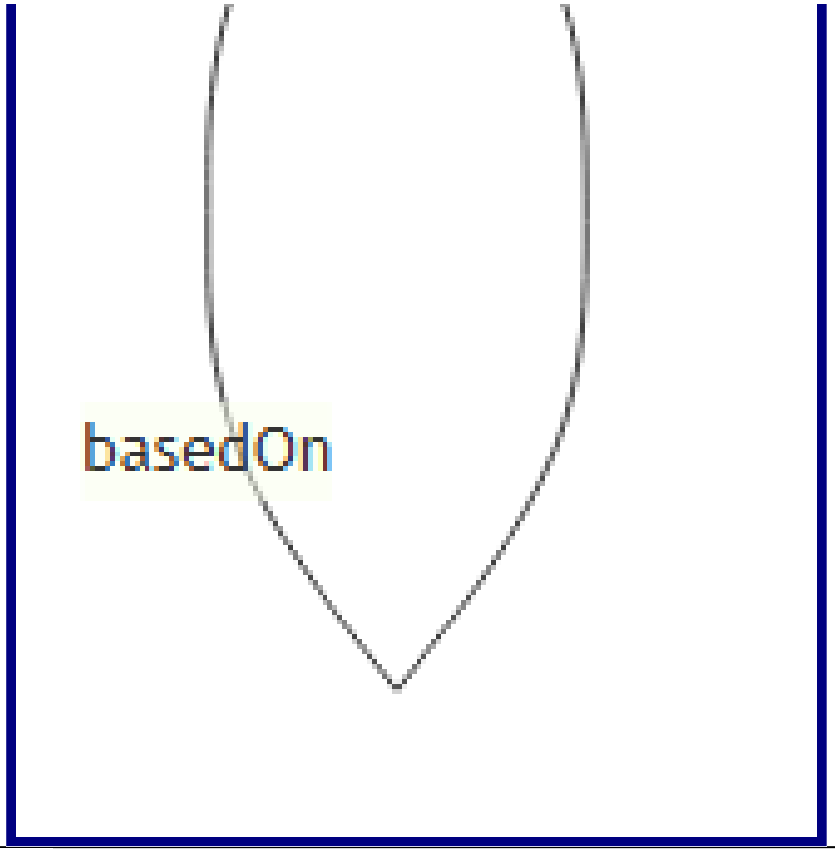
```
erDiagram
Class_ |o--o| Class_ : basedOn
ReferenceType ||--|| Class_ : subtype_of
```

Mermaid ER Diagram for ReferenceType - Live!



Mermaid ER Diagram for ReferenceType - PNG for mermaid


ReferenceType
subtype_of
Class_



CodeType
A data type or enumeration used in the model

CodeTypes
CodeTypes
CodeValue

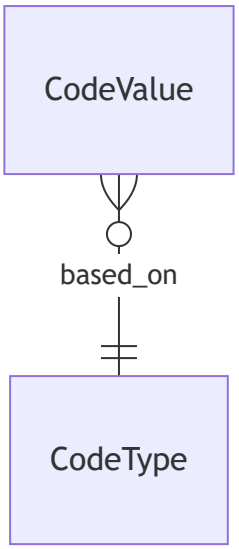
the code type was implied by use in an attribute and is only used for that attribute

(Boolean value O_O)

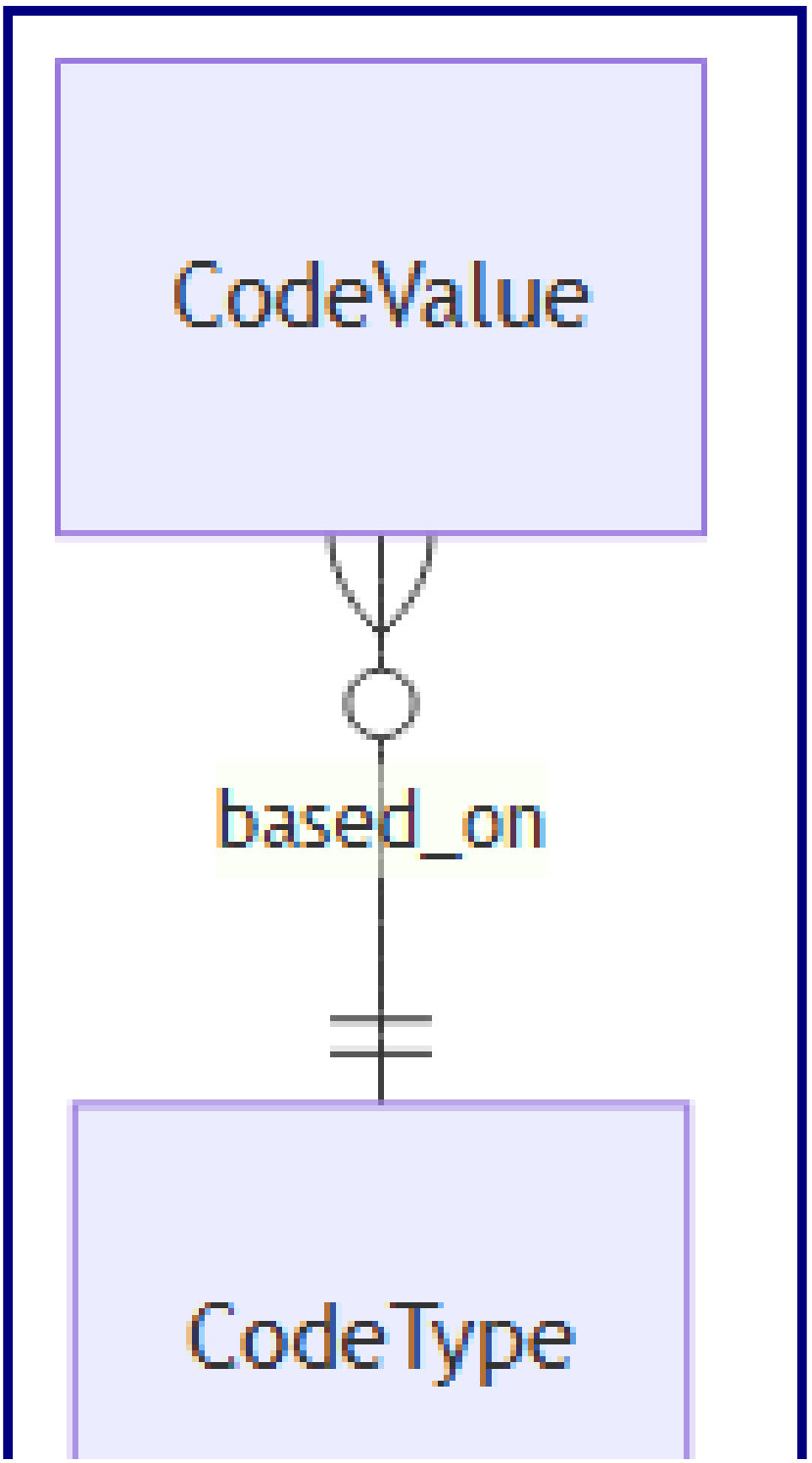
Mermaid ER Diagram for CodeType - Inert

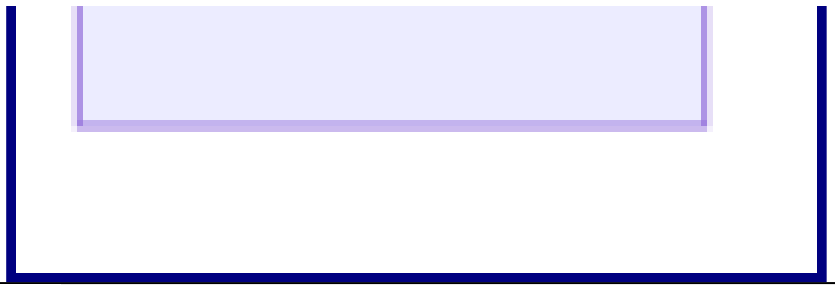
```
erDiagram
CodeValue }o--|| CodeType : based_on
```

Mermaid ER Diagram for CodeType - Live!



Mermaid ER Diagram for CodeType - PNG for mermaid


CodeValue
based_on
CodeType



CodeValue
A possible value for an enumerated data class

CodeValues
CodeValues
CodeType

A short code or abbreviation for the value _
(String value O_O)

an explanation of what the code means
(RichText value O_O)

Often, a CodeType will be assigned to just one attribute in the model. In such cases, there's no need to declare a new Code Type and invent a name for it. Instead:

created for CodeValue

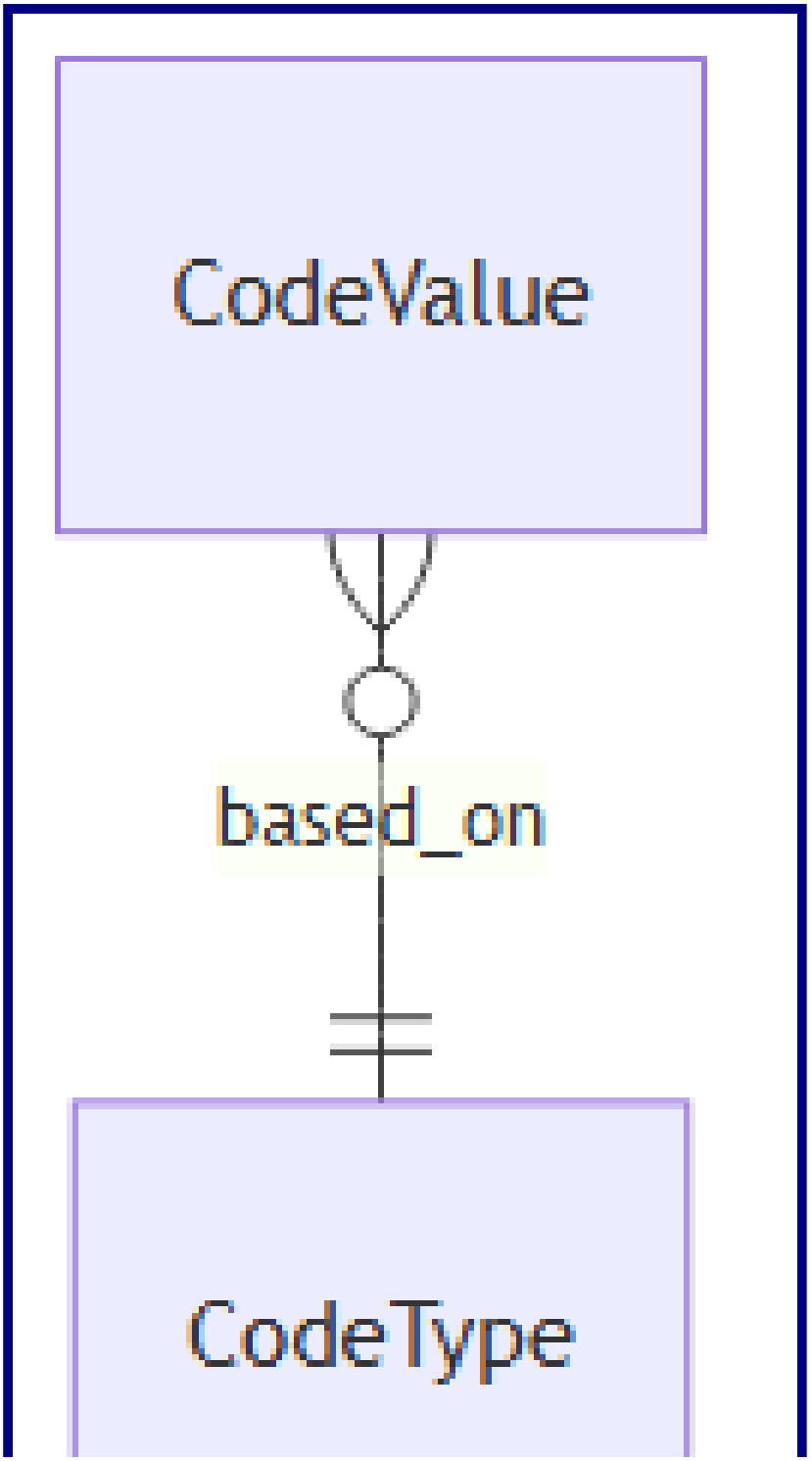
A link back to the CodeType on which this CodeValue depends.
(CodeType value M_1)

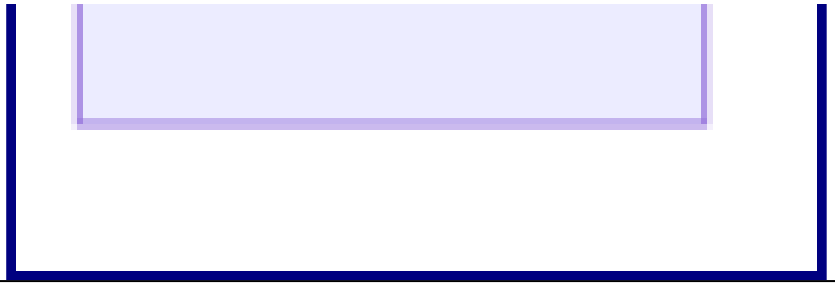
Mermaid ER Diagram for CodeValue - Inert

```
erDiagram
CodeValue }o--|| CodeType : based_on
```

Mermaid ER Diagram for CodeValue - Live!

Mermaid ER Diagram for CodeValue - PNG for mermaid


CodeValue
based_on
CodeType



Key
a list of attributes of a class

Keys
RALKeys
Class
Component
UniqueKey

the attributes of the base Class.
(List of Attributes value O_O)

Attribute.inverseOfKeyAttributes
each attribute must be a direct or inherited of the base class.
no repetitions allowed in keyAttributes

👍 **Issue** : introduce PureLists?

need ascending descending to support index keys or ordering keys.

created for Key

A link back to the Class on which this Key depends.
(Class value M_1)

Mermaid ER Diagram for Key - Inert

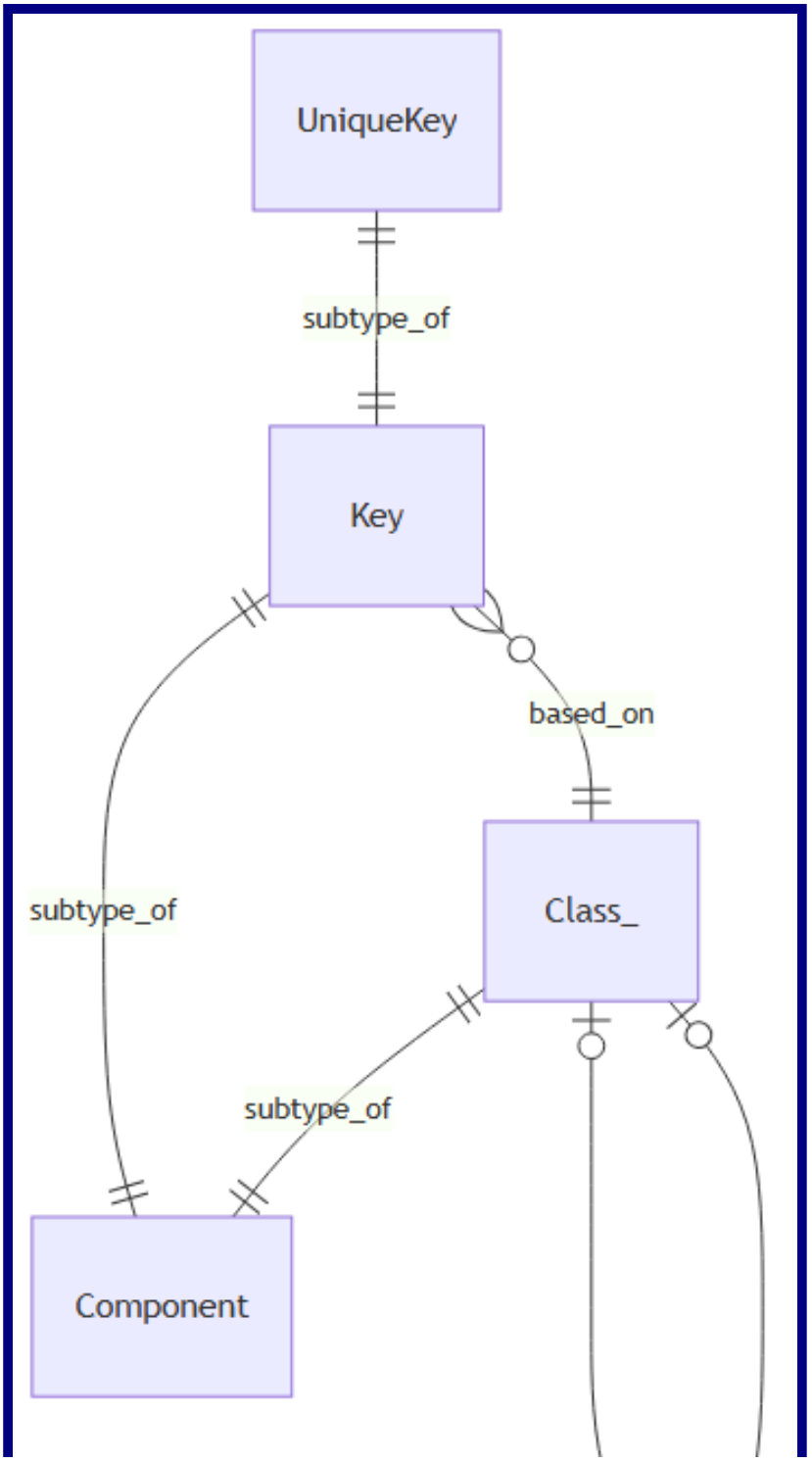
```
erDiagram
Class_ ||--|| Component : subtype_of
Class_ |o--o| Class_ : basedOn
Key ||--|| Component : subtype_of
Key }o--|| Class_ : based_on
UniqueKey ||--|| Key : subtype_of
```

Mermaid ER Diagram for Key - Live!

erDiagram Class_ ||--|| Component : subtype_of Class_ |o--o| Class_ : basedOn Key ||--|| Component : subtype_of Key }o--||

Class_ : based_on UniqueKey ||--|| Key : subtype_of

Mermaid ER Diagram for Key - PNG for mermaid


UniqueKey
subtype_of
Key
based_on
subtype_of
Class_
subtype_of
Component

UniqueKey
a list of attributes on which instances of the base class may be keyed.

order unimportant for Unique Keys.
UniqueKeys
UniqueKeys
RAL
Key

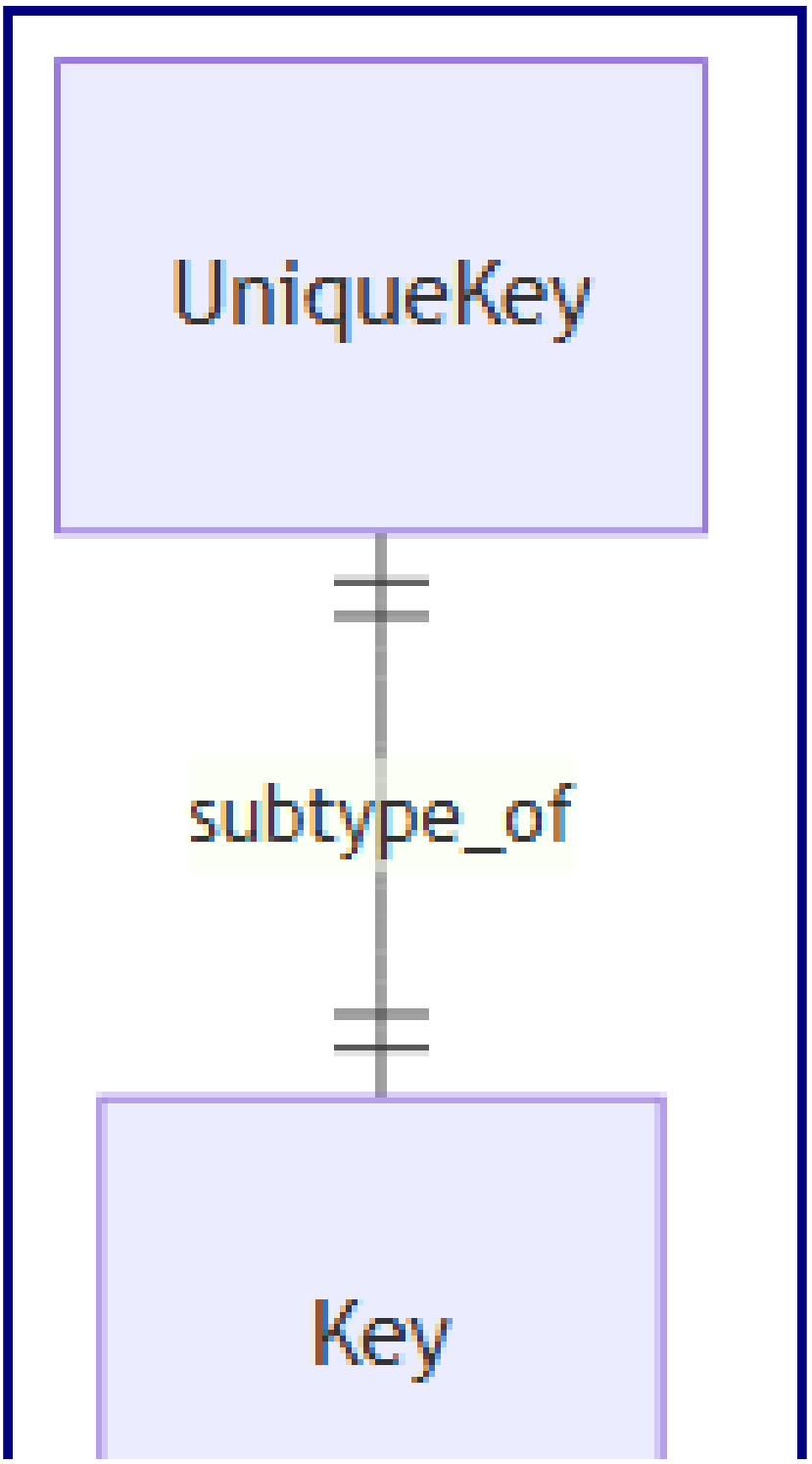
Mermaid ER Diagram for UniqueKey - Inert

```
erDiagram
UniqueKey ||--|| Key : subtype_of
```

Mermaid ER Diagram for UniqueKey - Live!

erDiagram UniqueKey ||--|| Key : subtype_of

Mermaid ER Diagram for UniqueKey - PNG for mermaid


UniqueKey
subtype_of
Key

Attributes

AttributeSection
a group of attributes for a class that merit a shared explanation.

AttributeSections
RALAttributeSections
Class
Attribute
Component

whether the attributes in this section, taken together, are optional.
(Boolean value O_O)

If the Attribute Section is required,then each Attribute within the sectional is optional ot required, depending on how it is marked.

-
- But if the Arrribute Section is optional each attribute in the section is only required if any attribute in the section is ptresent.

created for AttributeSection

bwverse attribute for Class.attributeSections from which this was implied.
(Class value M_1)

Class.attributeSections

A link back to the Class on which this AttributeSection depends.
(Class value M_1)

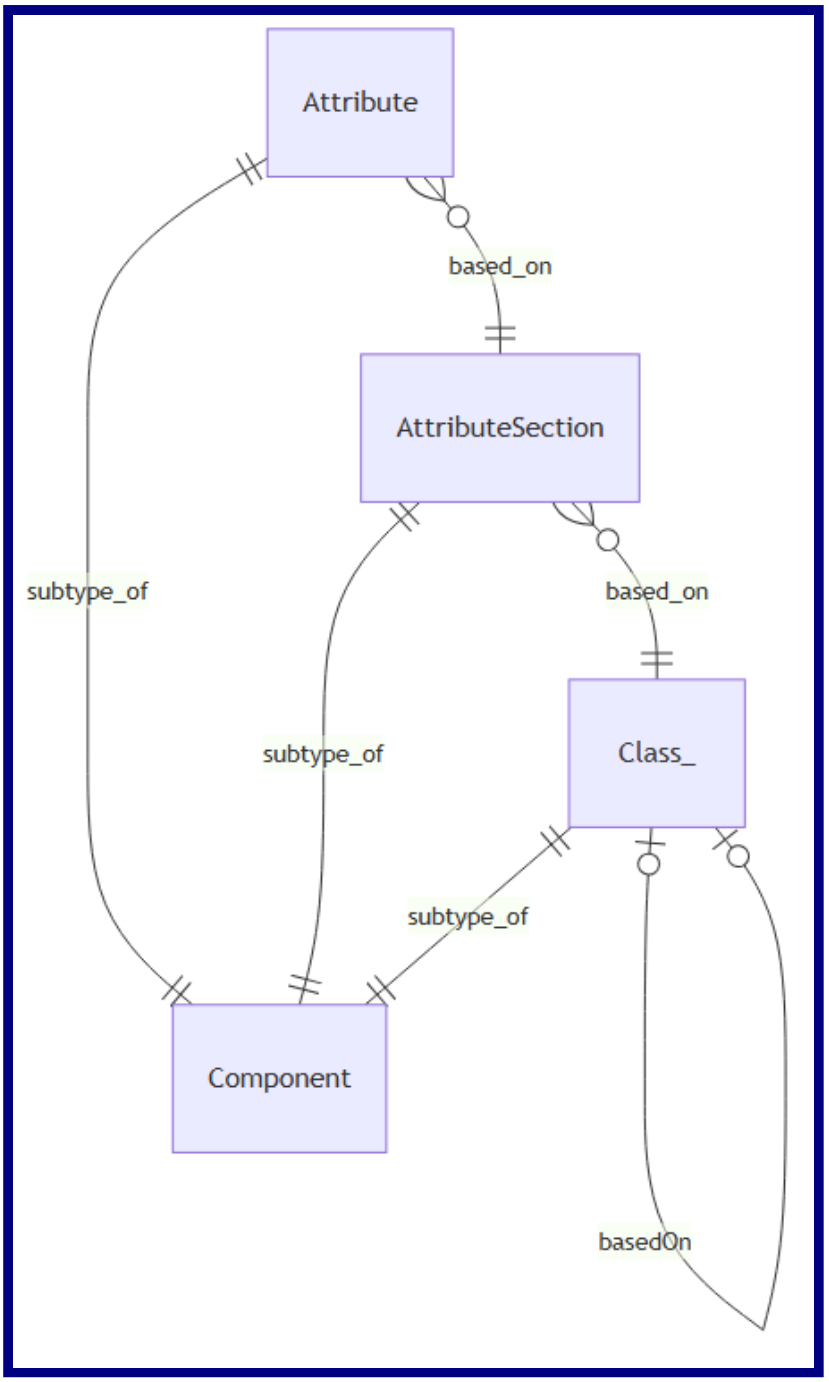
Mermaid ER Diagram for AttributeSection - Inert

```
erDiagram
Class_ ||--|| Component : subtype_of
Class_ |o--o| Class_ : basedOn
AttributeSection ||--|| Component : subtype_of
AttributeSection }o--|| Class_ : based_on
Attribute ||--|| Component : subtype_of
Attribute }o--|| AttributeSection : based_on
```

Mermaid ER Diagram for AttributeSection - Live!

erDiagram Class_ ||--|| Component : subtype_of Class_ |o--o| Class_ : basedOn AttributeSection ||--|| Component : subtype_of AttributeSection }o--|| Class_ : based_on Attribute ||--|| Component : subtype_of Attribute }o--|| AttributeSection : based_on

Mermaid ER Diagram for AttributeSection - PNG for mermaid



Attribute
A property or characteristic of a class

Attributes
AttributeSection
AttributeConstraint
Component

(LowerCamel value O_O)

Component.name

The kind of object to which the attribute refers. _
(DataType value O_O)

But,

-
  - List of Editions
-
  - Set of Edition
-
  - ... and more complicated cases.

the section below on Data Type Specifiers.

Indicates whether the attribute must have a value for every instance of the class _
(Boolean value O_O)

*** False

The cardinality of the relationship represented by the attribute _
(Cardinality value O_O)

*** For a singular attribute, the default cardinality is N:1. If the attribute is 1:1, it must be stated explicitly. For a collective attribute, the default is 1:N. If the attribute is N:M, it must be stated explicitly.

how this works with optionality

(Boolean value O_O)

true if the data type is a class or a simple collection of members of a class.

the class which contains, or would contain the inverse attribute
(Optional Class value O_O)

from the data type. Null unless arrribute is invertible.

(Optional Attribute value O_O)

(Optional Attribute value O_O)

The rule or formula for calculating the value, if no value is supplied Now running to a second line with the parenthentical on yet a third line
(Optional Derivation value O_O)

even when an Attribute has a default derivation, there's no guarantee that every instance will have an assigned value. Example needed.

For derived attributes, the rule or formula for calculating the value _
(Optional Derivation value O_O)

on insert vs on access?

Any validation rules specific to this attribute _
(List of Constraints value O_O)

from Class.constraints

created for Attribute

Inverse attribute for Class.attributes from which this was implied.
(Class value M_1)

Class.attributes

Inverse attribute for Key.keyAttributes from which this was implied.
(Key value M_1)

Key.keyAttributes

A link back to the AttributeSection on which this Attribute depends.
(AttributeSection value M_1)

Mermaid ER Diagram for Attribute - Inert

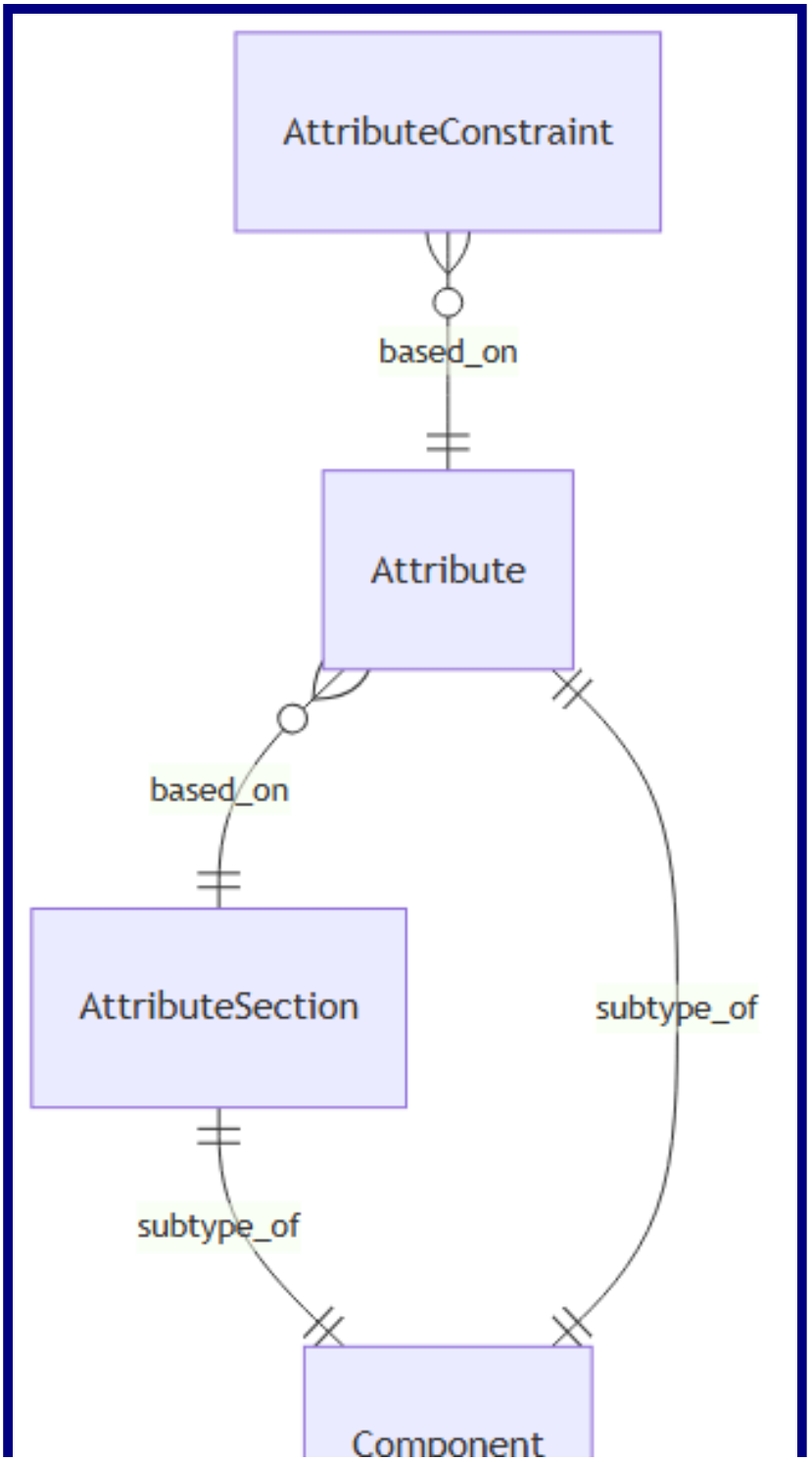
erDiagram

AttributeSection ||--|| Component : subtype_of
Attribute ||--|| Component : subtype_of
Attribute }o--|| AttributeSection : based_on
AttributeConstraint }o--|| Attribute : based_on

Mermaid ER Diagram for Attribute - Live!

erDiagram AttributeSection ||--|| Component : subtype_of Attribute ||--|| Component : subtype_of Attribute }o--|| AttributeSection : based_on AttributeConstraint }o--|| Attribute : based_on

Mermaid ER Diagram for Attribute - PNG for mermaid


AttributeConstraint
based_on
Attribute
based_on
AttributeSection
subtype_of
subtype_of
Component

Derivation
A rule or formula for deriving the value of an attribute

Derivations

An English language statement of the derivation rule _
(RichText value O_O)

The formal expression of the derivation in a programming language _
(CodeExpression value O_O)

Constraint
A rule, condition, or validation that must be satisfied by the model

Constraints
Component
ClassConstraint , AttributeConstraint

An English language statement of the constraint _
(RichText value O_O)

The formal expression of the constraint in a programming language, for example: OCL or Python. _
(CodeExpression value O_O)

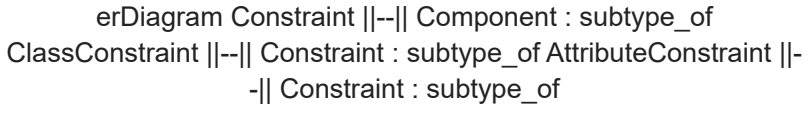
(Code value O_O)

```
Warning, nothing fatal; just a caution
Error, serious. Fix now
```

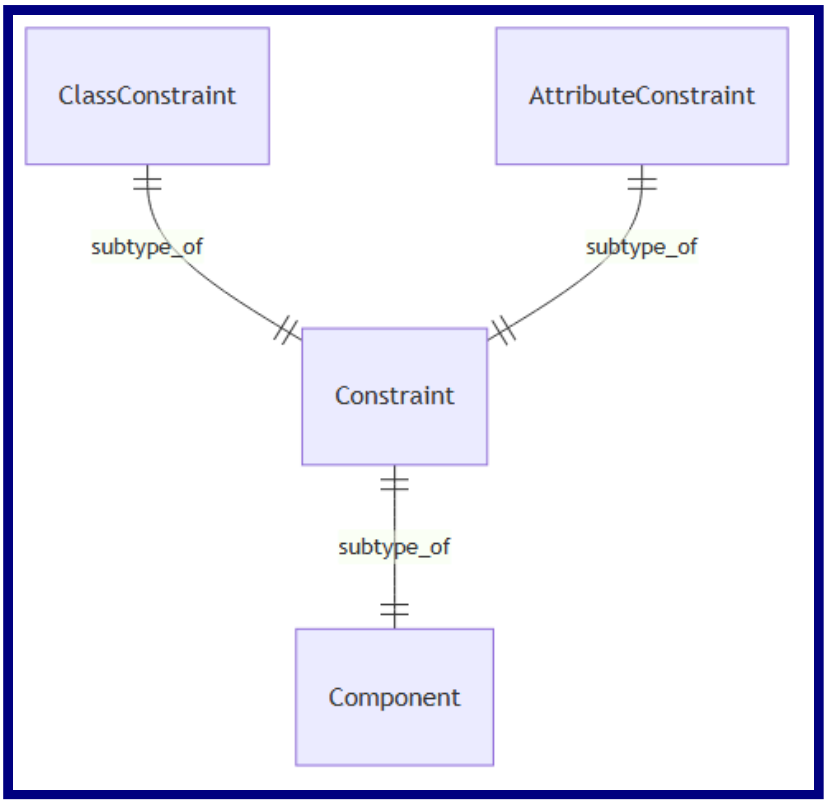
Mermaid ER Diagram for Constraint - Inert

```
erDiagram
Constraint ||--|| Component : subtype_of
ClassConstraint ||--|| Constraint : subtype_of
AttributeConstraint ||--|| Constraint : subtype_of
```

Mermaid ER Diagram for Constraint - Live!



Mermaid ER Diagram for Constraint - PNG for mermaid



ClassConstraint

ClassConstraints
RALClassConstraints
Class
Constraint

created for ClassConstraint

A link back to the Class on which this ClassConstraint depends. ***(Class value M_1)***

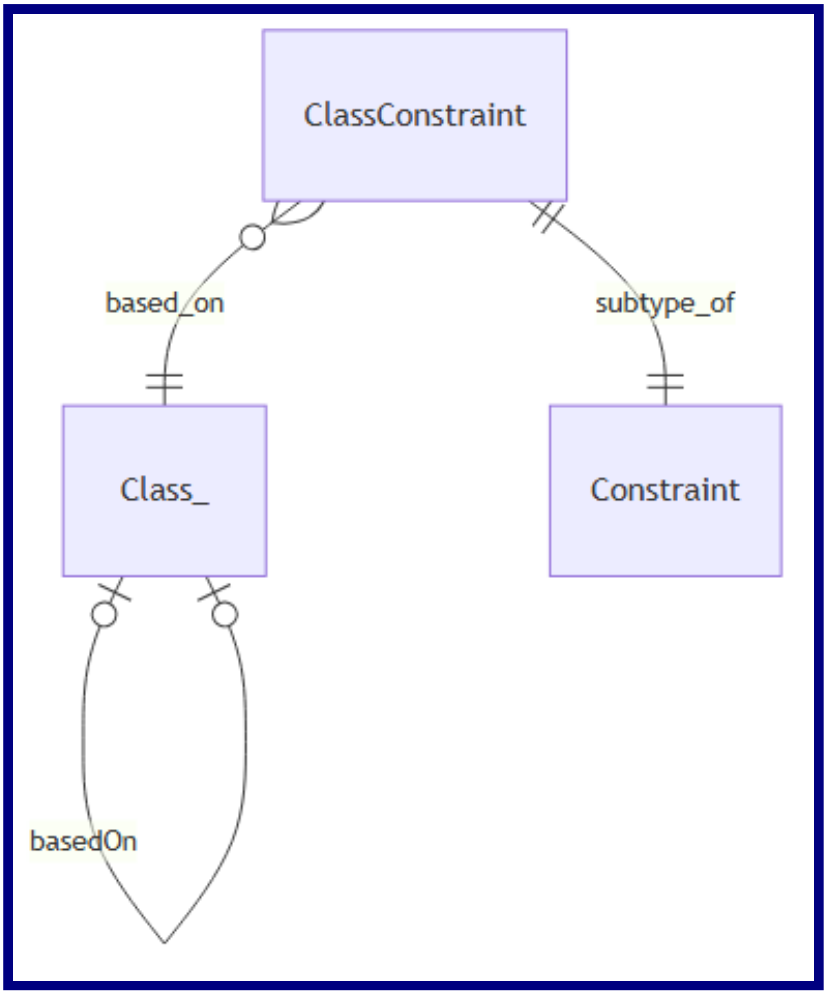
Mermaid ER Diagram for ClassConstraint - Inert

```
erDiagram
Class_ |o--o| Class_ : basedOn
ClassConstraint ||--|| Constraint : subtype_of
ClassConstraint }o--|| Class_ : based_on
```

Mermaid ER Diagram for ClassConstraint - Live!

erDiagram Class_ |o--o| Class_ : basedOn ClassConstraint ||--|| Constraint : subtype_of ClassConstraint }o--|| Class_ : based_on

Mermaid ER Diagram for ClassConstraint - PNG for mermaid



AttributeConstraint

AttributeConstraints

AttributeConstraints

Attribute

Constraint

created for AttributeConstraint

A link back to the Attribute on which this AttributeConstraint depends. ***(Attribute value M_1)***

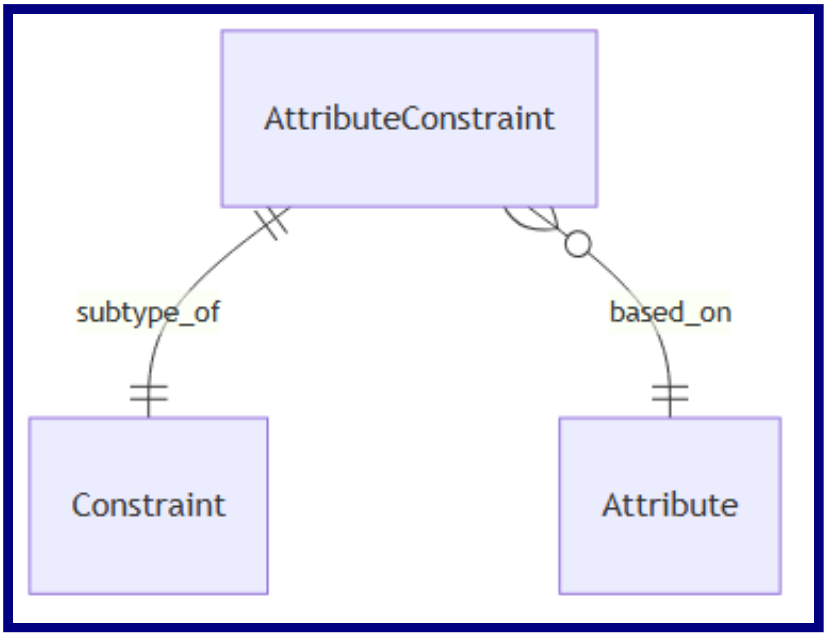
Mermaid ER Diagram for AttributeConstraint - Inert

erDiagram
AttributeConstraint ||--|| Constraint : subtype_of
AttributeConstraint }o--|| Attribute : based_on

Mermaid ER Diagram for AttributeConstraint - Live!

erDiagram AttributeConstraint ||--|| Constraint : subtype_of
AttributeConstraint }o--|| Attribute : based_on

Mermaid ER Diagram for AttributeConstraint - PNG for mermaid



Methods

Method
A behavior or operation associated with a class

Methods
Component

The input parameters of the method _
(List of Parameters value O_O)

Parameter.inverseOfParameters

The data type of the value returned by the method _
(DataType value O_O)

created for Method

Inverse attribute for Class.methods from which this was implied.
(Class value M_1)

Class.methods

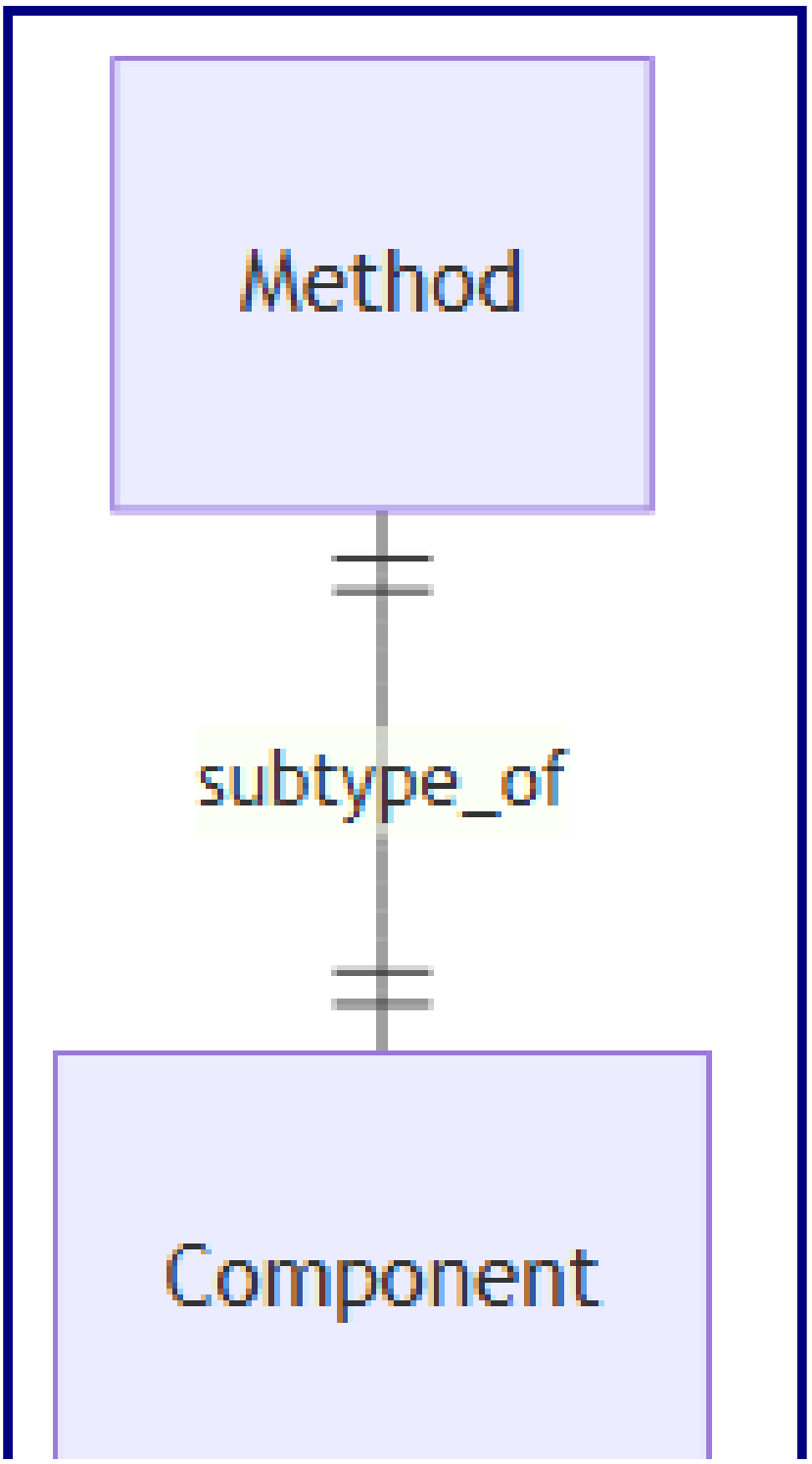
Mermaid ER Diagram for Method - Inert

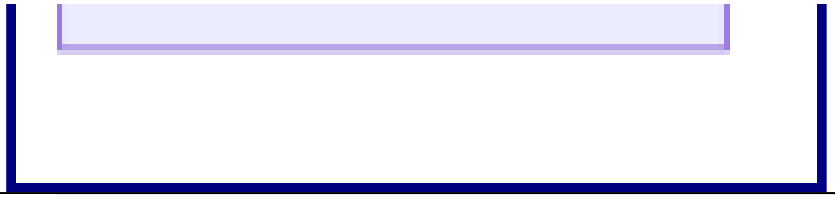
```
erDiagram
Method ||--|| Component : subtype_of
```

Mermaid ER Diagram for Method - Live!

erDiagram Method ||--|| Component : subtype_of

Mermaid ER Diagram for Method - PNG for mermaid


Method
subtype_of
Component



Parameter
An input to a method

Parameters
Component

The data type of the parameter
(DataType value O_O)

The cardinality of the parameter. e.g., optional, required.
(Cardinality value O_O)

created for Parameter

Inverse attribute for Method.parameters from which this was implied.
(Method value M_1)

Method.parameters

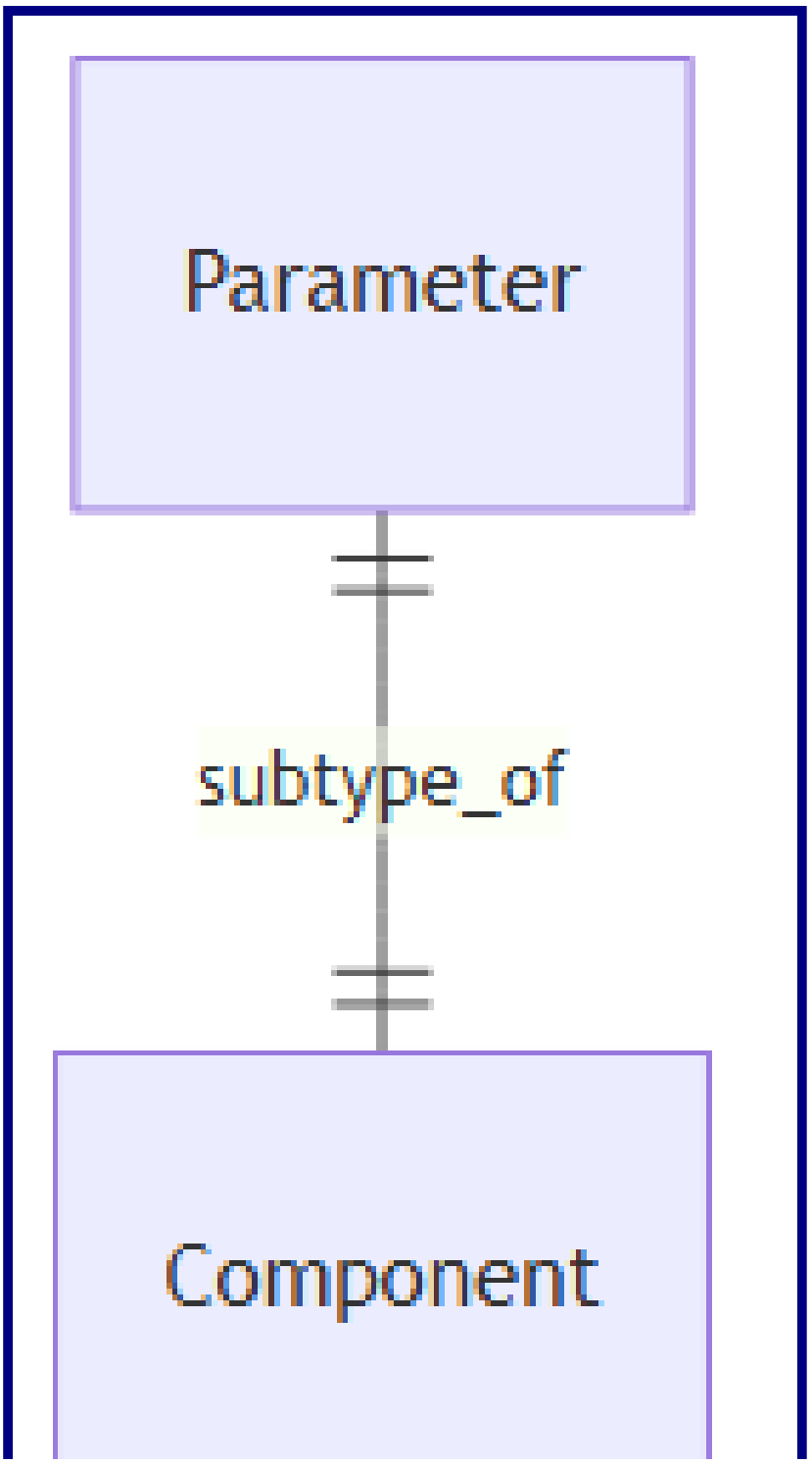
Mermaid ER Diagram for Parameter - Inert

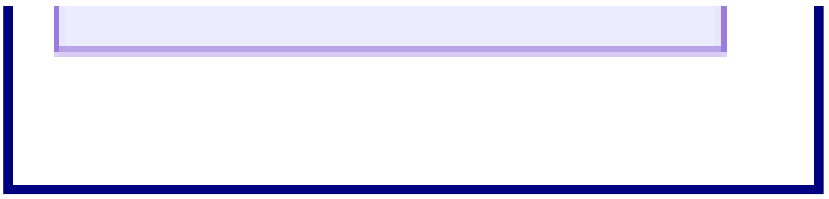
```
erDiagram
Parameter ||--|| Component : subtype_of
```

Mermaid ER Diagram for Parameter - Live!

erDiagram Parameter ||--|| Component : subtype_of

Mermaid ER Diagram for Parameter - PNG for mermaid


Parameter
subtype_of
Component



Trivial Data Types

Message

Messages
RALMessages

Message is trivial; no diagram

CodeExpression

CodeExpressions
RALCodeExpressions

the programming language

(Code value O_O)

```
OCL, Object Constraint Language
Java, Java
```

(String value O_O)

CodeExpression is trivial; no diagram

DataType

DataTypes
RALDataTypes

DataType is trivial; no diagram

SimpleDataTypeSubtpeOfDataType

SimpleDataTypeSubtpeOfDataTypes
RALSimpleDataTypeSubtpeOfDataTypes

(Class value O_O)

Class.inverseOfCoreClass

SimpleDataTypeSubtpeOfDataType is trivial; no diagram

ComplexDataType

ComplexDataTypes
RALComplexDataTypes

(AggregatingOperator value O_O)

(List of DataTypes value O_O)

ComplexDataType is trivial; no diagram

AggregatingOperator

AggregatingOperators

RALAggregatingOperators

(Code value O_O)

SetOf
ListOf
Mapping

(Integer value O_O)

(Template value O_O)

AggregatingOperator is trivial; no diagram

Trivial Low level Data Types

insert Camel Case.md

Emoji

Emojis
RALEmojis

Emoji is trivial; no diagram

String

Strings
RALStrings

String is trivial; no diagram

CamelName

A short string without punctuation or spaces, suitable for names, labels, or identifiers and presented in camel case.

CamelNames
RALCamelNames
String
UpperCamel , LowerCamel

(String value O_O)

Must follow the camel case naming convention and not be empty.
"firstName", "orderDate", "customerID"

- *CamelName* is presented here, just after its first usage by another class (Component), to provide context and understanding before it is used further in the model.

CamelName is trivial; no diagram

UpperCamel a CamelName that begins with a capital letter

_ "Customer", "ProductCategory", "PaymentMethod"
content begins with an upper case letter.
UpperCamels
RALUpperCamels
CamelName

UpperCamel is trivial; no diagram

LowerCamel
a CamelName that begins with a lower case letter

"firstName", "orderTotal", "shippingAddress"
content begins with a lower case letter.
LowerCamels
LowerCamels
CamelName

LowerCamel is trivial; no diagram

QualifiedCamel
an expression consisting of Camel Names separated by periods

QualifiedCamels
QualifiedCamels
String

content consists of CamelNames, separated by periods. Each of the camel names must be Upper Camel except, possibly, the first.

QualifiedCamel is trivial; no diagram

RichText
A string with markup for block level formatting.

RichTexts
RichTexts
String
OneLiner

the string content
(String value O_O)

the rich text coding language used
(Code value O_O)

HTML
MarkDown

RichText is trivial; no diagram

OneLiner

String with markup for line level formatting.

OneLiners
RALOneLiners
RichText

the string content
(String value O_O)

RichText.value
must not containa line break or new line character
A line can't span two lines

OneLiner is trivial; no diagram

PrimitiveType
A basic, built-in data type

PrimitiveTypes
RALPrimitiveTypes
String , Integer , Decimal , Boolean , Date , Time , DateTime

PrimitiveType is trivial; no diagram

String

Strings
RALStrings
PrimitiveType
CamelName , QualifiedCamel , RichText

String is trivial; no diagram

Integer

Integers
RALIntegers
PrimitiveType

Integer is trivial; no diagram

Decimal

Decimals
RALDecimals
PrimitiveType

Decimal is trivial; no diagram

Boolean

Booleans

RALBooleans

PrimitiveType

Boolean is trivial; no diagram

Date

Dates

RALDates

PrimitiveType

Date is trivial; no diagram

Time

Times

RALTimes

PrimitiveType

Time is trivial; no diagram

DateTime

DateTimes

RALDateTimes

PrimitiveType

DateTime is trivial; no diagram

CodingLanguage

CodingLanguages

RALCodingLanguages

CodingLanguage is trivial; no diagram

Cardinality

Cardinalitys

RALCardinalitys

Cardinality is trivial; no diagram

TemplateLanguage

TemplateLanguages

RAL TemplateLanguages

TemplateLanguage is trivial; no diagram

Template

Templates
RAL Templates

Template is trivial; no diagram

Code

Codes
RAL Codes

Code is trivial; no diagram

Annotation Types Used

These are the recognized Annotation Types for the LDM model.

And this is how you register the AnnotationTyped for a model. By including this sort of array in the DSL document for the model.

PlantUML Diagram - Inert

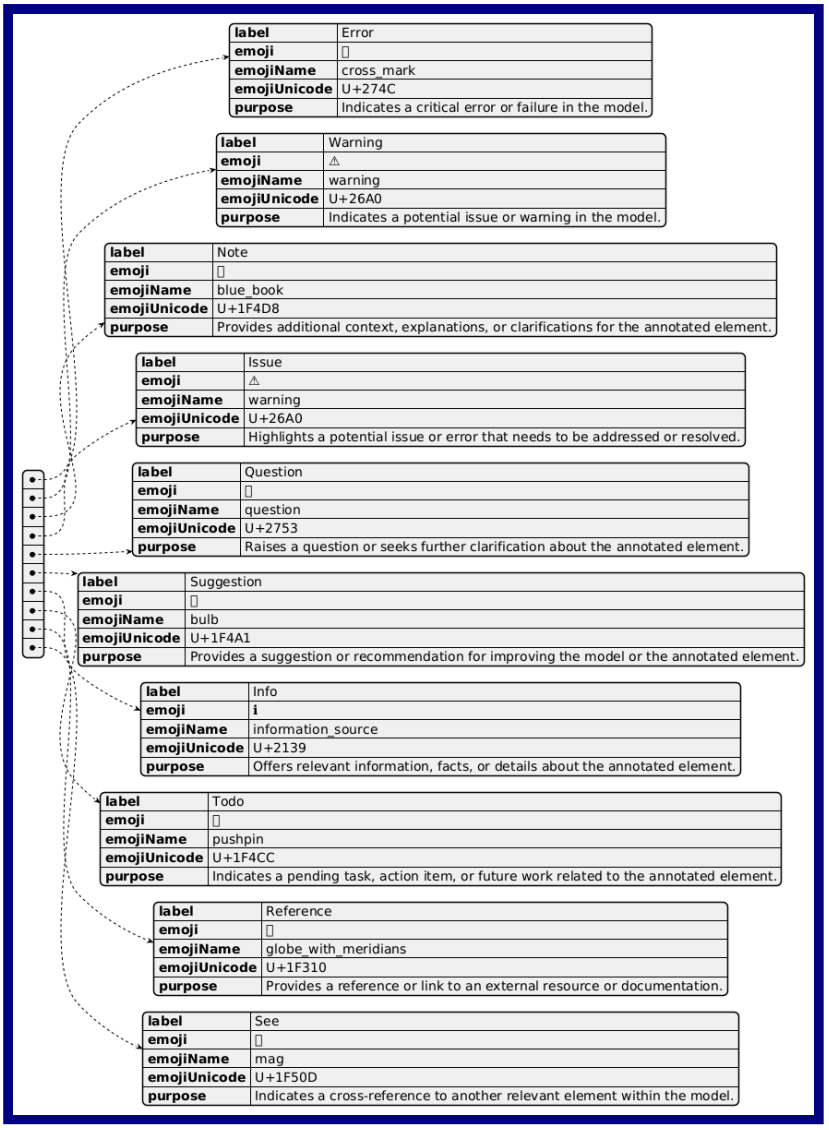
```
@startjson

[
{
"label": "Error",
"emoji": "❌",
"emojiName": "cross_mark",
"emojiUnicode": "U+274C",
"purpose": "Indicates a critical error or failure in
the model."
},
{
"label": "Warning",
"emoji": "⚠️",
"emojiName": "warning",
"emojiUnicode": "U+26A0",
"purpose": "Indicates a potential issue or warning
in the model."
},
{
"label": "Note",
"emoji": "📘",
"emojiName": "blue_book",
"emojiUnicode": "U+1F4D8",
"purpose": "Provides additional context,
explanations, or clarifications for the annotated
element."
},
{
"label": "Issue",
"emoji": "⚠️",
"emojiName": "warning",
"emojiUnicode": "U+26A0",
```

"purpose": "Highlights a potential issue or error that needs to be addressed or resolved."
},
{
"label": "Question",
"emoji": "❓",
"emojiName": "question",
"emojiUnicode": "U+2753",
"purpose": "Raises a question or seeks further clarification about the annotated element."
},
{
"label": "Suggestion",
"emoji": "💡",
"emojiName": "bulb",
"emojiUnicode": "U+1F4A1",
"purpose": "Provides a suggestion or recommendation for improving the model or the annotated element."
},
{
"label": "Info",
"emoji": "ℹ️",
"emojiName": "information_source",
"emojiUnicode": "U+2139",
"purpose": "Offers relevant information, facts, or details about the annotated element."
},
{
"label": "Todo",
"emoji": "📌",
"emojiName": "pushpin",
"emojiUnicode": "U+1F4CC",
"purpose": "Indicates a pending task, action item, or future work related to the annotated element."
},
{
"label": "Reference",
"emoji": "🌐",
"emojiName": "globe_with_meridians",
"emojiUnicode": "U+1F310",

"purpose": "Provides a reference or link to an external resource or documentation."
},
{
"label": "See",
"emoji": "🔍",
"emojiName": "mag",
"emojiUnicode": "U+1F50D",
"purpose": "Indicates a cross-reference to another relevant element within the model."
}
]
@endjson

PlantUML Diagram - PNG for puml


label Error
emoji
emojiName cross_mark
emojiUnicode U+274C
purpose Indicates a critical error or failure in the model.
label Warning
emoji ⚠
emojiName warning
emojiUnicode U+26A0
purpose Indicates a potential issue or warning in the model.
label Note
emoji
emojiName blue_book
emojiUnicode U+1F4D8
purpose Provides additional context, explanations, or clarifications for the annotated element.
label Issue
emoji ⚠
emojiName warning
emojiUnicode U+26A0
purpose Highlights a potential issue or error that needs to be addressed or resolved.
label Question
emoji
emojiName question
emojiUnicode U+2753
purpose Raises a question or seeks further clarification about the annotated element.
label Suggestion
emoji
emojiName bulb
emojiUnicode U+1F4A1
purpose Provides a suggestion or recommendation for improving the model or the annotated element.
label Info
emoji i
emojiName information_source
emojiUnicode U+2139
purpose Offers relevant information, facts, or details about the annotated element.
label Todo
emoji
emojiName pushpin
emojiUnicode U+1F4CC
purpose Indicates a pending task, action item, or future work related to the annotated element.
label Reference
emoji
emojiName globe_with_meridians
emojiUnicode U+1F310
purpose Provides a reference or link to an external resource or documentation.
label See
emoji
emojiName mag
emojiUnicode U+1F50D
purpose Indicates a cross-reference to another relevant element within the model.

Annotation types as CSV

```
label,emoji,emojiName,emojiUnicode,purpose
Error,❌,cross mark,U+274C,Indicates a critical error or failure in the model.
Warning,⚠️,warning,U+26A0,Indicates a potential issue or warning in the model.
Note,📘,blue book,U+1F4D8,"Provides additional context, explanations, or clarifications for the annotated element."
Issue,⚠️,warning,U+26A0,Highlights a potential issue or error that needs to be addressed or resolved.
Question,❓,question,U+2753,Raises a question or seeks further clarification about the annotated element.
Suggestion,💡,bulb,U+1F4A1,Provides a suggestion or recommendation for improving the model or the annotated element.
Info,ℹ️,information_source,U+2139,"Offers relevant information, facts, or details about the annotated element."
Todo,📌,pushpin,U+1F4CC,"Indicates a pending task, action item, or future work related to the annotated element."
Reference,🌐,globe with meridians,U+1F310,Provides a reference or link to an external resource or documentation.
See,🔍,mag,U+1F50D,Indicates a cross-reference to another relevant element within the model.
```

	label	emoji	emojiName	emojiUnicode	purpose
0	Error	❌	cross_mark	U+274C	Indicates a critical error or failure in the model.
1	Warning	⚠️	warning	U+26A0	Indicates a potential issue or warning in the model.
2	Note	📘	blue_book	U+1F4D8	Provides additional context, explanations, or clarifications for the annotated element.
3	Issue	⚠️	warning	U+26A0	Highlights a potential issue or error that needs to be addressed or resolved.
4	Question	❓	question	U+2753	Raises a question or seeks further clarification about the annotated element.
5	Suggestion	💡	bulb	U+1F4A1	Provides a suggestion or recommendation for improving the model or the annotated element.
6	Info	ℹ️	information_source	U+2139	Offers relevant information, facts, or details about the annotated element.
7	Todo	📌	pushpin	U+1F4CC	Indicates a pending task, action item, or future work related to the annotated element.
8	Reference	🌐	globe_with_meridians	U+1F310	Provides a reference or link to an external resource or documentation.
9	See	🔍	mag	U+1F50D	Indicates a cross-reference to another relevant element within the model.

Appendices

various sidebars to include Insert More Sidebars.md Insert Overrides.md insert LDM Intro.md Insert OCL.md Insert Camel Case.md

== content to add