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Literate Data Model

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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

PLURAL Components
UMEDPLURAL Components
PENDENTS Annotation
SUBTYPES LiterateModel , Subject , Class , Key , AttributeSection , Attribute , Constraint , Method , Parameter

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

warning This is a warning with emoji

name The name of the component
(CamelName value O_O)

Name *(QualifiedCamel value O_O)*

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

example "LDM" is the short form of "Literate Data Model".

DEFAULT name - how do you say name in english?
OCL x.name == y
STRAINTS the abbreviated name should be shorter than the actual name
OCL len(abbreviatedName) < len(name)
MESSAGE Why have an abbreviation longer than the name?
SEVERITY Warning

note Does this annotation find it's way to the Constraint? YES! It's fixed!

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

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

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

DEFAULT false

note 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

ent

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

(Boolean value O_O)

EFAULT false

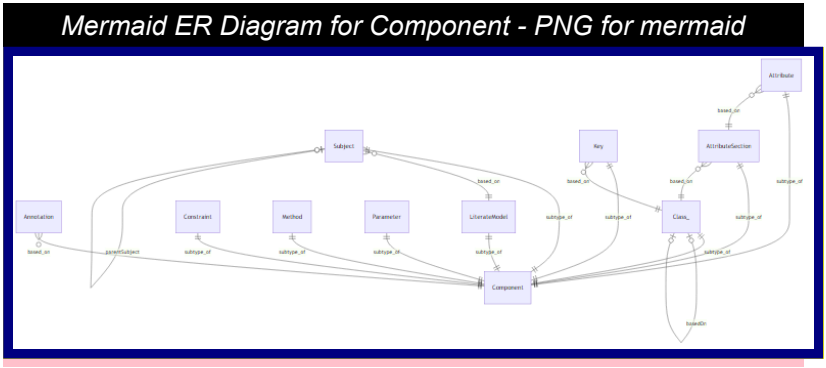
note This attribute is set to true for components that are automatically generated or added during the fleshing out, review, or rendering processes, such as implied attributes or suggested model elements. It helps distinguish embellishments from the core model elements defined in the original LDM source.

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!

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 - PNG for mermaid
Attribute
based_on
Subject
Key
AttributeSection
based_on
based_on
based_on
subtype_of
Annotation
Constraint
Method
Parameter
LiterateModel
subtype_of
subtype_of
Class_
subtype_of
based_on
parentSubject
subtype_of
subtype_of
subtype_of
subtype_of
Component
baseOn

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

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

LURAL AnnotationTypes
EDPLURAL AnnotationTypes
SEDON LiterateModel

oji an emoji
(Emoji value O_O)

me an emoji
(String value O_O)

de the Unicode for the emoji
(String value O_O)

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

ral the plural form of the label
(UpperCamel value O_O)

EFAULT based on label

se the intended reason for the annotation.
(OneLiner value O_O)

s created for AnnotationType

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

tionType verse attribute for Annotation.annotationType from which this was implied.
(Annotation value M_1)

VERSE Annotation.annotationType

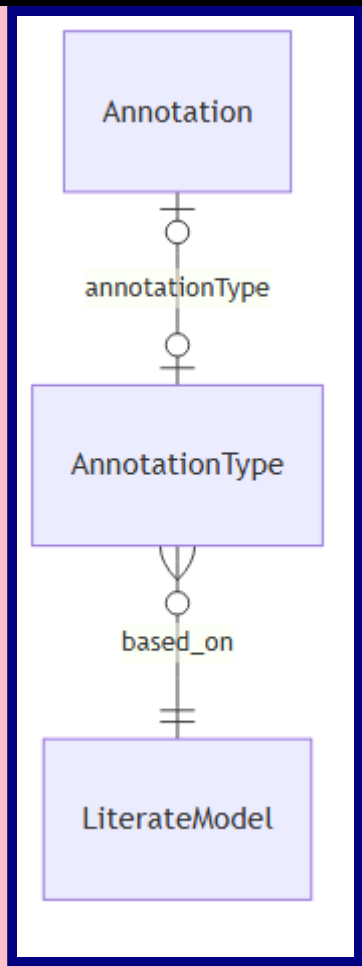
Mermaid ER Diagram for AnnotationType - Inert

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

Mermaid ER Diagram for AnnotationType - Live!

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

Mermaid ER Diagram for AnnotationType - PNG for mermaid



Annotation

A note or comment associated with a model element

LURAL Annotations

EDPLURAL Annotations

SEDON Component

ype *(Optional AnnotationType value O_O)*

note An Annotation is considered to *recognized* if the label is associated with an Annotation Type. otherwise it is *ad hoc* .

note Should be a Value Type

VERSE AnnotationType.inverseOfAnnotationType

bel A short label to indicate the purpose of the annotation _

(CamelName value O_O)

But any short label is valid.

EFAULT from annotationType

oji *(Optional Emoji value O_O)*

EFAULT from annotation type

ent The content or body of the annotation

(RichText value O_O)

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

(Boolean value O_O)

EFAULT false

note 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.

s created for Annotation

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

(Component value M_1)

Mermaid ER Diagram for Annotation - Inert

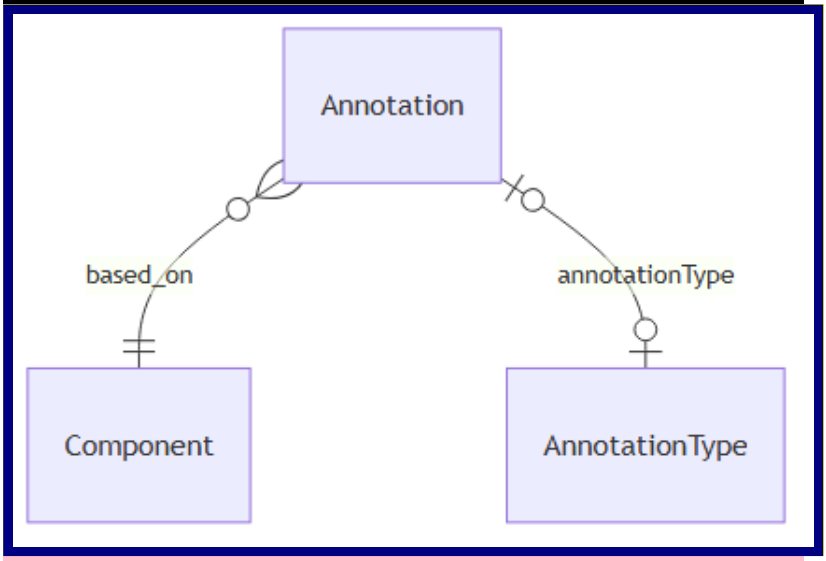
```
erDiagram
Annotation }o--|| Component : based_on
```

Annotation |o--o| AnnotationType : annotationType

Mermaid ER Diagram for Annotation - Live!

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

Mermaid ER Diagram for Annotation - PNG for mermaid



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The Model and its Subjects

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

LURAL LiterateModels
DENTS AnnotationType , Subject , SubjectArea
YPEOF Component

me (UpperCamel value O_O)
RRIDES Component.name

cts list of all classes in the model, as ordered in the definition of the model.
(List of Classes value O_O)
VERSE Class.inverseOfAllSubjects
VATION gathering s.allSubjects over s in subjectAreas
RAINTS Subject names must be unique across the model.

ses list of all classes in the model, as ordered in the definition of the model.
(List of Classes value O_O)
VERSE Class.inverseOfAllClasses
VATION gathering s.allClasses over s in allSubjects.
RAINTS Class names must be unique across the model.

pes (List of AnnotationTypes value O_O)

Language the recommended lanquage for expressing derivation, defaults, and constraints
(CodingLanguage value O_O)
EFAULT OCL

Languages (Optional List of CodingLanguages value O_O)

teLanguage the recommended lanquage for expressing derivation, defaults, and constraints
(TemplateLanguage value O_O)
EFAULT Handlebars

eLanguages (Optional List of TemplateLanguages value O_O)

ns A list of functions that require sophisticated AI-powered implementation *
(List of String value O_O)
VATION ['aiEnglishPlural()']

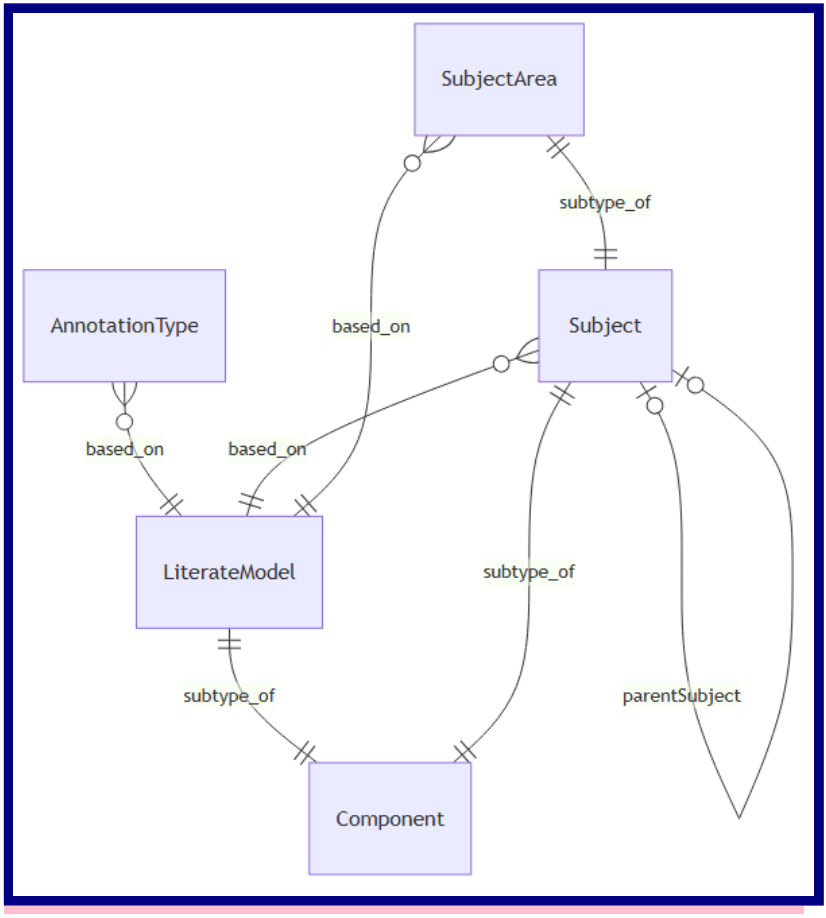
Mermaid ER Diagram for LiterateModel - Inert

```
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!

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 - 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.

PLURAL Subjects
BASEDON LiterateModel
BTYPEOF Component
UBTYPES SubjectArea

name ***(UpperCamel value O_O)***
VERRIDES Component.name

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

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

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

bjects 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.

INVERSE Subject.parentSubject

utes created for Subject

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

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

INVERSE Subject.parentSubject

Mermaid ER Diagram for Subject - Inert

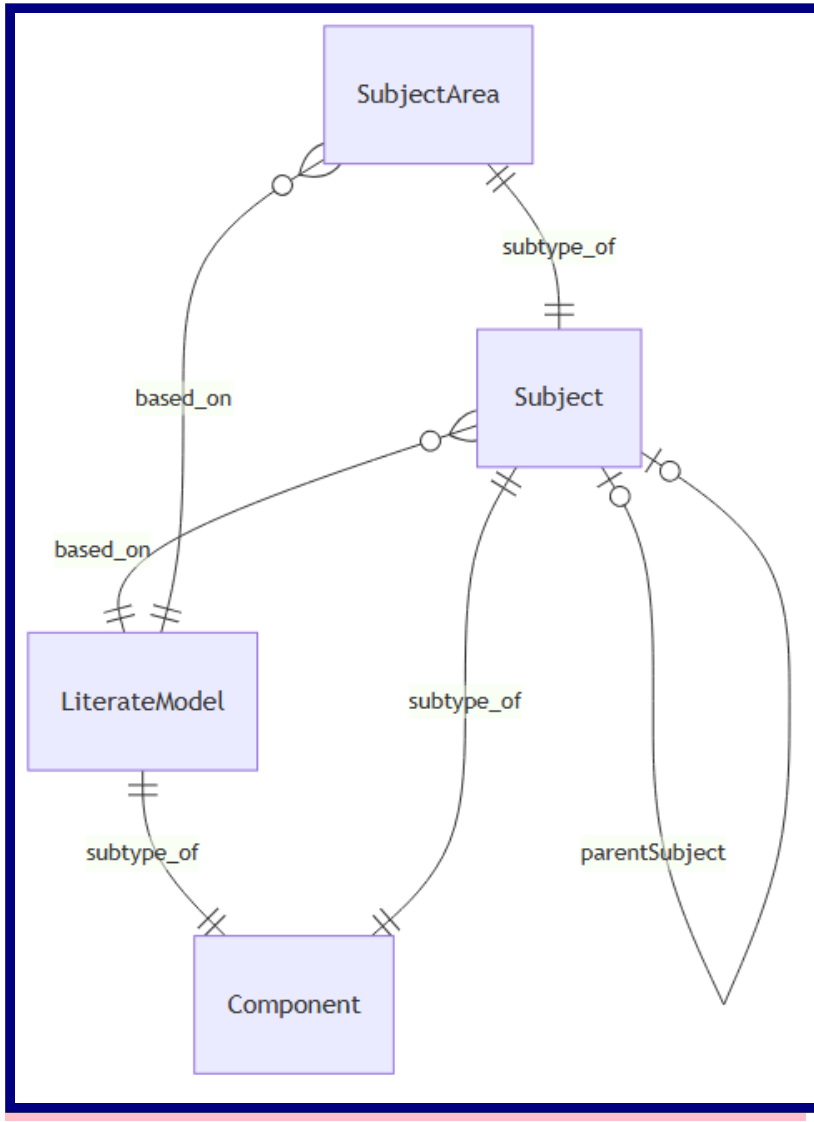
```
erDiagram
LiterateModel ||--|| Component : subtype_of
Subject ||--|| Component : subtype_of
Subject }o--|| LiterateModel : based_on
Subject |o--o| Subject : parentSubject
SubjectArea ||--|| Subject : subtype_of
SubjectArea }o--|| LiterateModel : based_on
```

Mermaid ER Diagram for Subject - Live!

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

The Model and its Subjects



SubjectArea

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

WHERE parentSubject is absent
LURAL SubjectAreas
SEDON LiterateModel
YPEOF Subject

s | created for SubjectArea

del | A link back to the LiterateModel on which this SubjectArea depends.

(LiterateModel value M_1)

Mermaid ER Diagram for SubjectArea - Inert

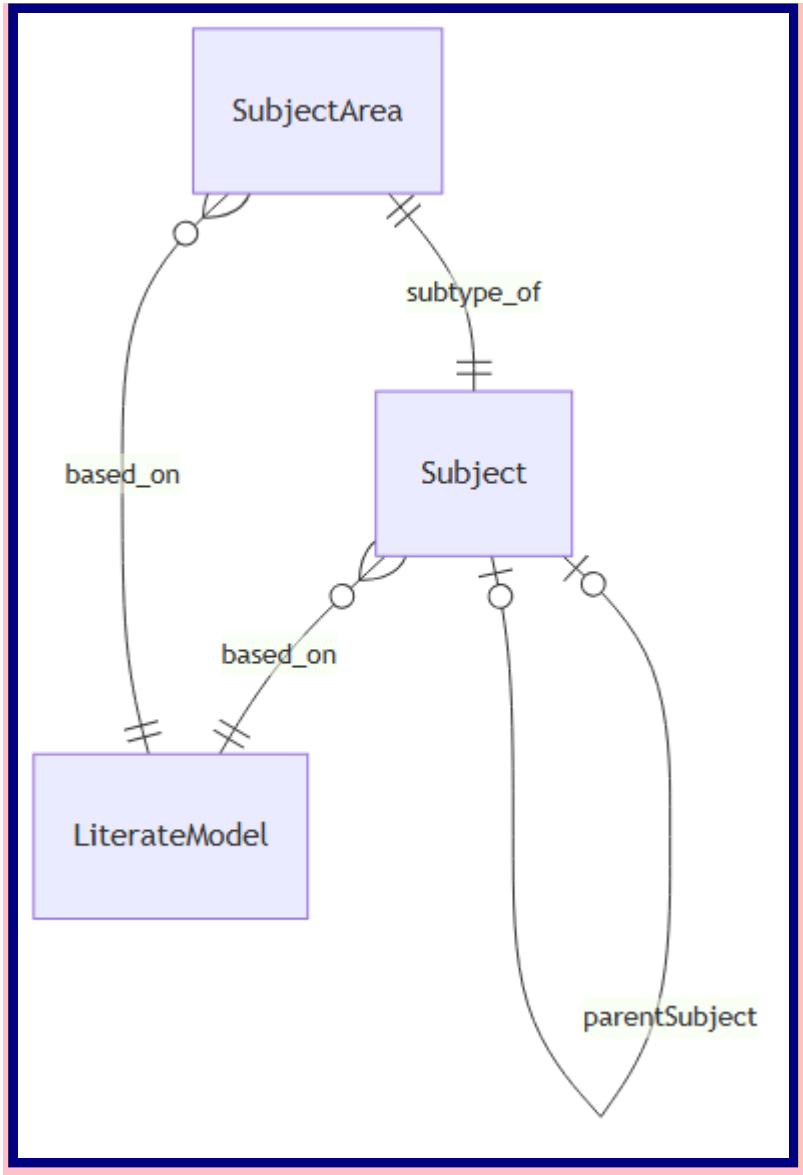
```
erDiagram
Subject }o--|| LiterateModel : based_on
Subject |o--o| Subject : parentSubject
SubjectArea ||--|| Subject : subtype_of
SubjectArea }o--|| LiterateModel : based_on
```

Mermaid ER Diagram for SubjectArea - Live!

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 - PNG for mermaid

The Model and its Subjects



Classes

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

PLURAL Classes
PENDENTS Subtyping , Key , AttributeSection , ClassConstraint
BTYPEOF Component
UBTYPES ReferenceType
STRAINTS Within each Class, attribute names must be unique.

lForm 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.

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

sedOn 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.

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

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

INVERSE Class.inverseOfSupertypes

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

example 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).
INVERSE Subtyping.inverseOfSubtypings

pes Any subtypes or specializations of this class based on it's subtypings.
(List of Classes value O_O)

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

VERSE Class.inverseOfSubtypes

tes The attributes or properties of the class, in the order in which they should be presented _
(List of Attributes value O_O)

VERSE Attribute.inverseOfAttributes

ns additional attributes or properties of the class, grouped for clarity and elaboration. _
(List of AttributeSections value O_O)

VERSE AttributeSection.inverseOfAttributeSections

nts Any constraints, rules, or validations specific to this class _
(List of Constraints value O_O)

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

ds Any behaviors or operations associated with this class _
(List of Methods value O_O)

VERSE Method.inverseOfMethods

s

nts the Classes which are basedOn this Class
(Optional Set of Classes value O_O)

VERSE Class.basedOn

eys
(Optional Set of UniqueKeys value O_O)

VERSE UniqueKey.basedOn

ects Inverse attribute for LiterateModel.allSubjects from which this was implied.
(LiterateModel value M_1)

VERSE LiterateModel.allSubjects

ses Inverse attribute for LiterateModel.allClasses from which this was implied.
(LiterateModel value M_1)

VERSE LiterateModel.allClasses

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

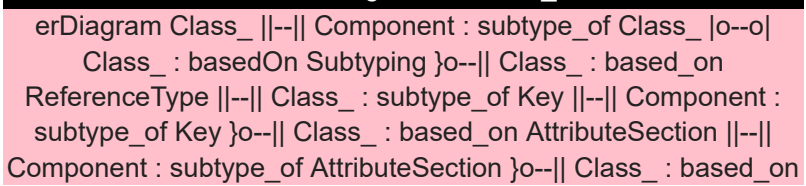
Classes

INVERSE	Subject.classes
sedOn	Inverse attribute for Class.basedOn from which this was implied. (*Class* value M_1)
INVERSE	Class.basedOn
ertypes	Inverse attribute for Class.supertypes from which this was implied. (*Class* value M_1)
INVERSE	Class.supertypes
types	Inverse attribute for Class.subtypes from which this was implied. (*Class* value M_1)
INVERSE	Class.subtypes
asses	Inverse attribute for Subtyping.classes from which this was implied. (*Subtyping* value M_1)
INVERSE	Subtyping.classes
eClass	Inverse attribute for SimpleDataTypeSubtpeOfDataType.coreClass from which this was implied. (*SimpleDataTypeSubtpeOfDataType* value M_1)
INVERSE	SimpleDataTypeSubtpeOfDataType.coreClass

Mermaid ER Diagram for Class_ - Inert

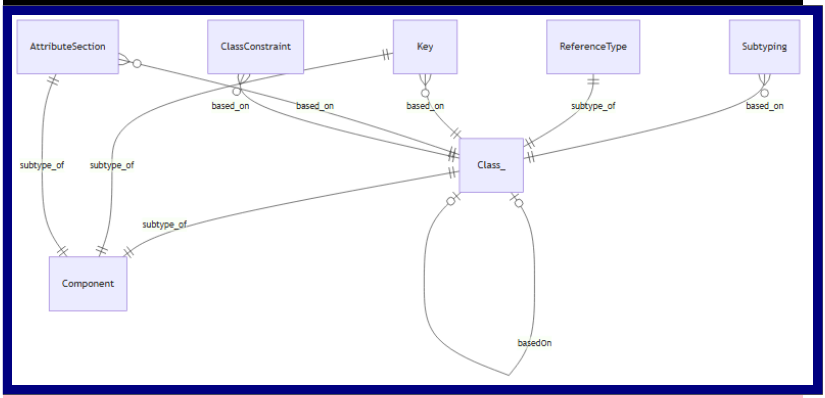
```
erDiagram
Class_ ||--|| Component : subtype_of
Class_ |o--o| Class_ : basedOn
Subtyping }o--|| Class_ : based_on
ReferenceType ||--|| Class_ : subtype_of
Key ||--|| Component : subtype_of
Key }o--|| Class_ : based_on
AttributeSection ||--|| Component : subtype_of
AttributeSection }o--|| Class_ :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

Mermaid ER Diagram for Class_ - Live!



ClassConstraint }o--|| Class_ : based_on

Mermaid ER Diagram for Class_ - PNG for mermaid



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

PLURAL Subtypings
UMEDPLURAL Subtypings
BASEDON Class

name ***(LowerCamel value O_O)***

lusive ***(Boolean value O_O)***

DEFAULT true

ustive ***(Boolean value O_O)***

DEFAULT true

asses ***(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.

note every class can have an unnamed subtyping.
INVERSE Class.inverseOfClasses

utes created for Subtyping

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

INVERSE Class.subtypings

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

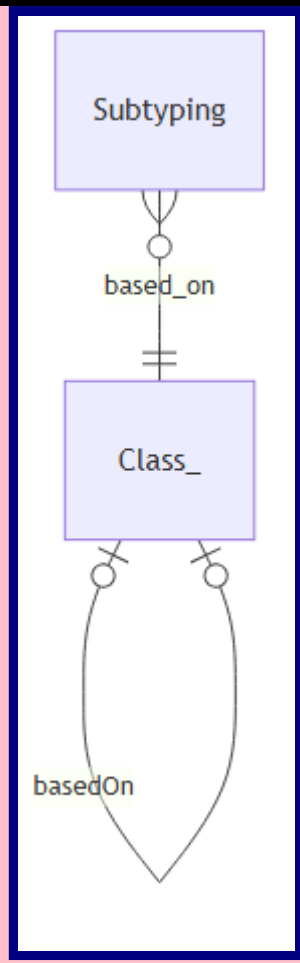
Mermaid ER Diagram for Subtyping - Inert

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

Mermaid ER Diagram for Subtyping - Live!

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

Mermaid ER Diagram for Subtyping - PNG for mermaid



Classes

ReferenceType

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

Plural ReferenceTypes

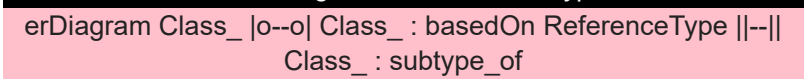
umedPlural ReferenceTypes

btypeOf Class

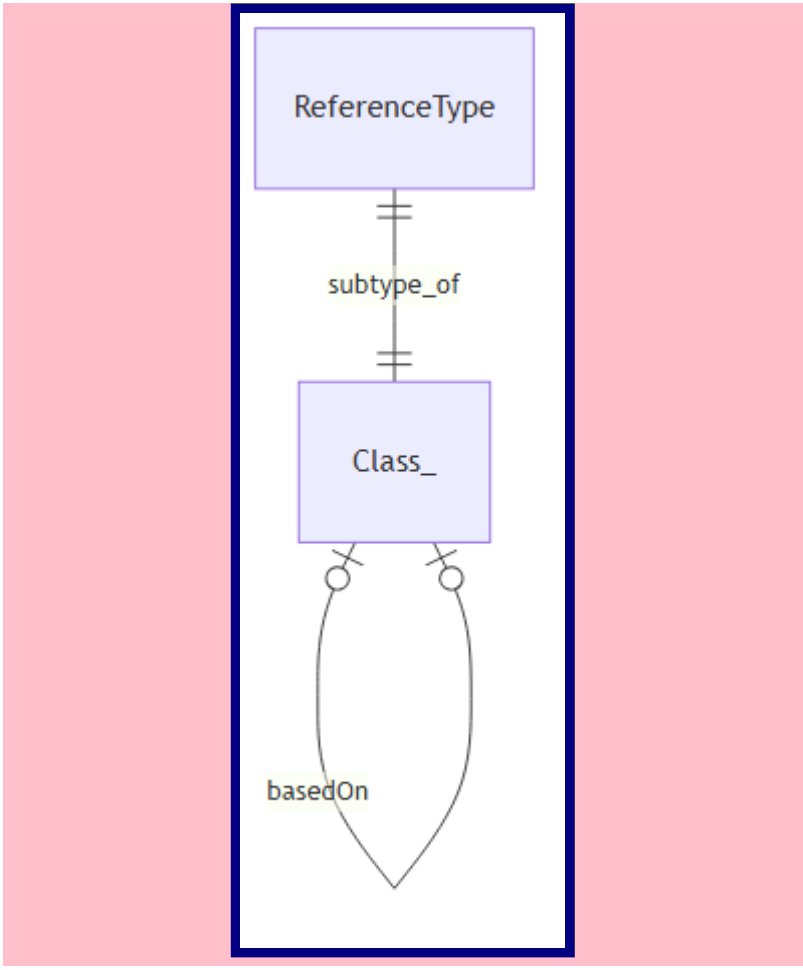
Mermaid ER Diagram for ReferenceType - Inert

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

Mermaid ER Diagram for ReferenceType - Live!



Mermaid ER Diagram for ReferenceType - PNG for mermaid



CodeType

A data type or enumeration used in the model

LURAL CodeTypes

EDPLURAL CodeTypes

DENTS CodeValue

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

(Boolean value O_O)

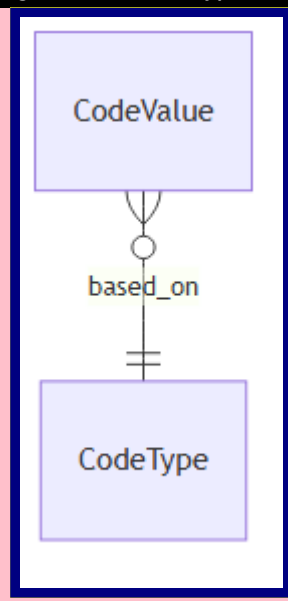
Mermaid ER Diagram for CodeType - Inert

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

Mermaid ER Diagram for CodeType - Live!

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

Mermaid ER Diagram for CodeType - PNG for mermaid



CodeValue

A possible value for an enumerated data class

PLURAL CodeValues

UMEDPLURAL CodeValues

BASEDON CodeType

code A short code or abbreviation for the value _

(String value O_O)

iption an explanation of what the code means

(RichText value O_O)

note 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:

utes created for CodeValue

eType A link back to the CodeType on which this CodeValue depends.

(CodeType value M_1)

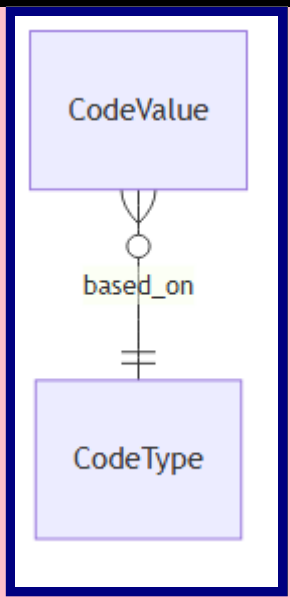
Mermaid ER Diagram for CodeValue - Inert

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

Mermaid ER Diagram for CodeValue - Live!

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

Mermaid ER Diagram for CodeValue - PNG for mermaid



Key

a list of attributes of a class

PLURAL	Keys
UMEDPLURAL	Keys
BASEDON	Class
BTYPEOF	Component
SUBTYPES	UniqueKey

ibutes	the attributes of the base Class. *(List of Attributes value O_O)*
INVERSE	Attribute.inverseOfKeyAttributes
STRAINTS	each attribute must be a direct or inherited of the base class.
STRAINTS	no repetitions allowed in keyAttributes **Issue** : introduce PureLists?
issue	need ascending descending to support index keys or ordering keys.
utes	created for Key
Class	A link back to the Class on which this Key depends. *(Class value M_1)*

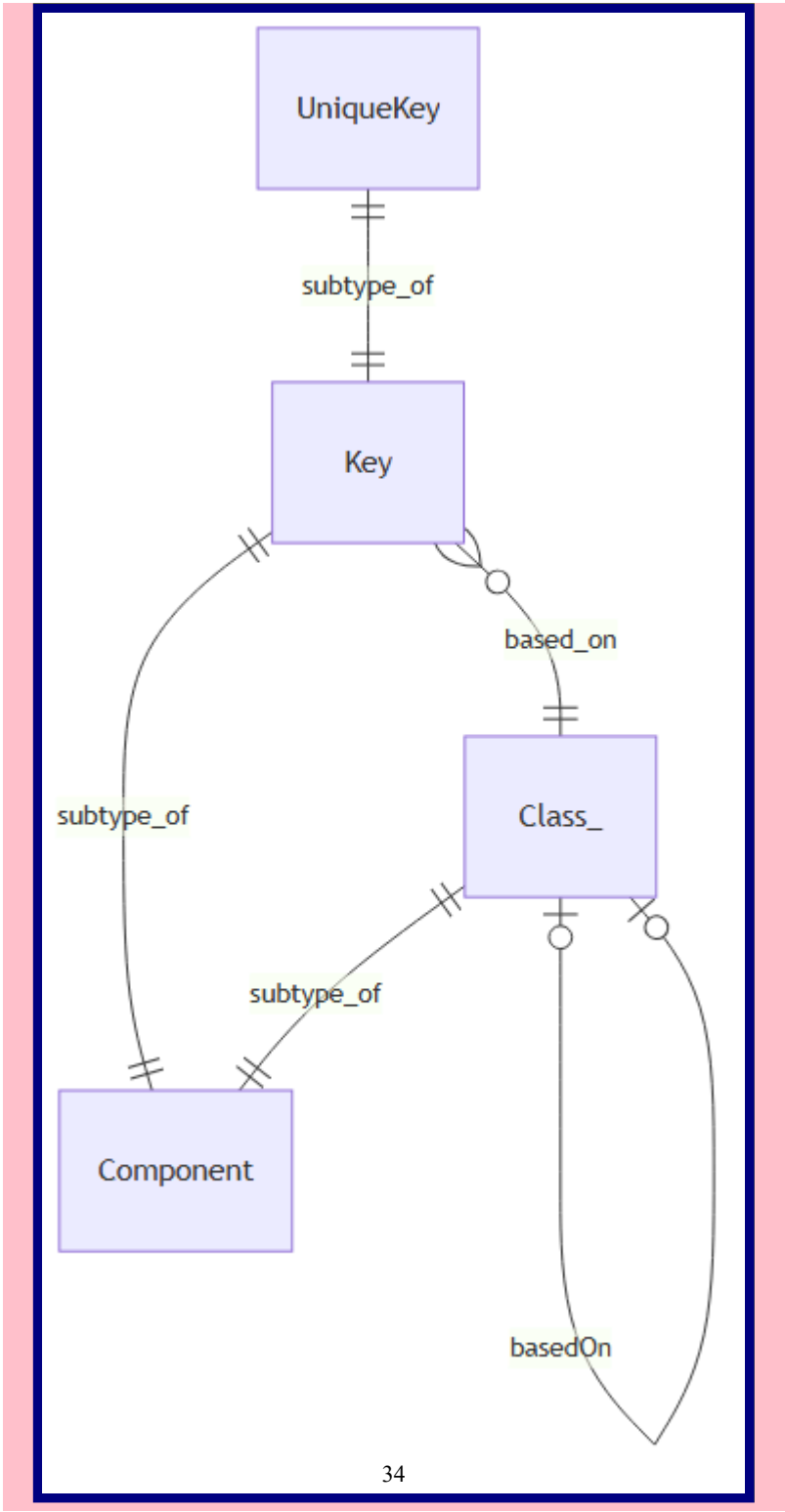
Mermaid ER Diagram for Key - Inert

```
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
basedOn

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

note order unimportant for Unique Keys.
PLURAL UniqueKeys
UMEDPLURAL UniqueKeys
BTYPEOF Key

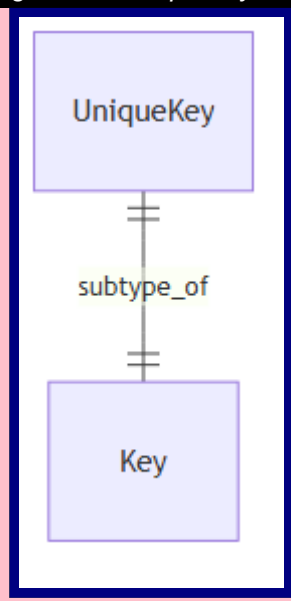
Mermaid ER Diagram for UniqueKey - Inert

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

Mermaid ER Diagram for UniqueKey - Live!

erDiagram UniqueKey ||--|| Key : subtype_of

Mermaid ER Diagram for UniqueKey - PNG for mermaid



BLANK

Attributes

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

LURAL AttributeSections
EDPLURAL AttributeSections
SEDON Class
DENTS Attribute
YPEOF Component

nal 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.

s created for AttributeSection

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

VERSE Class.attributeSections

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

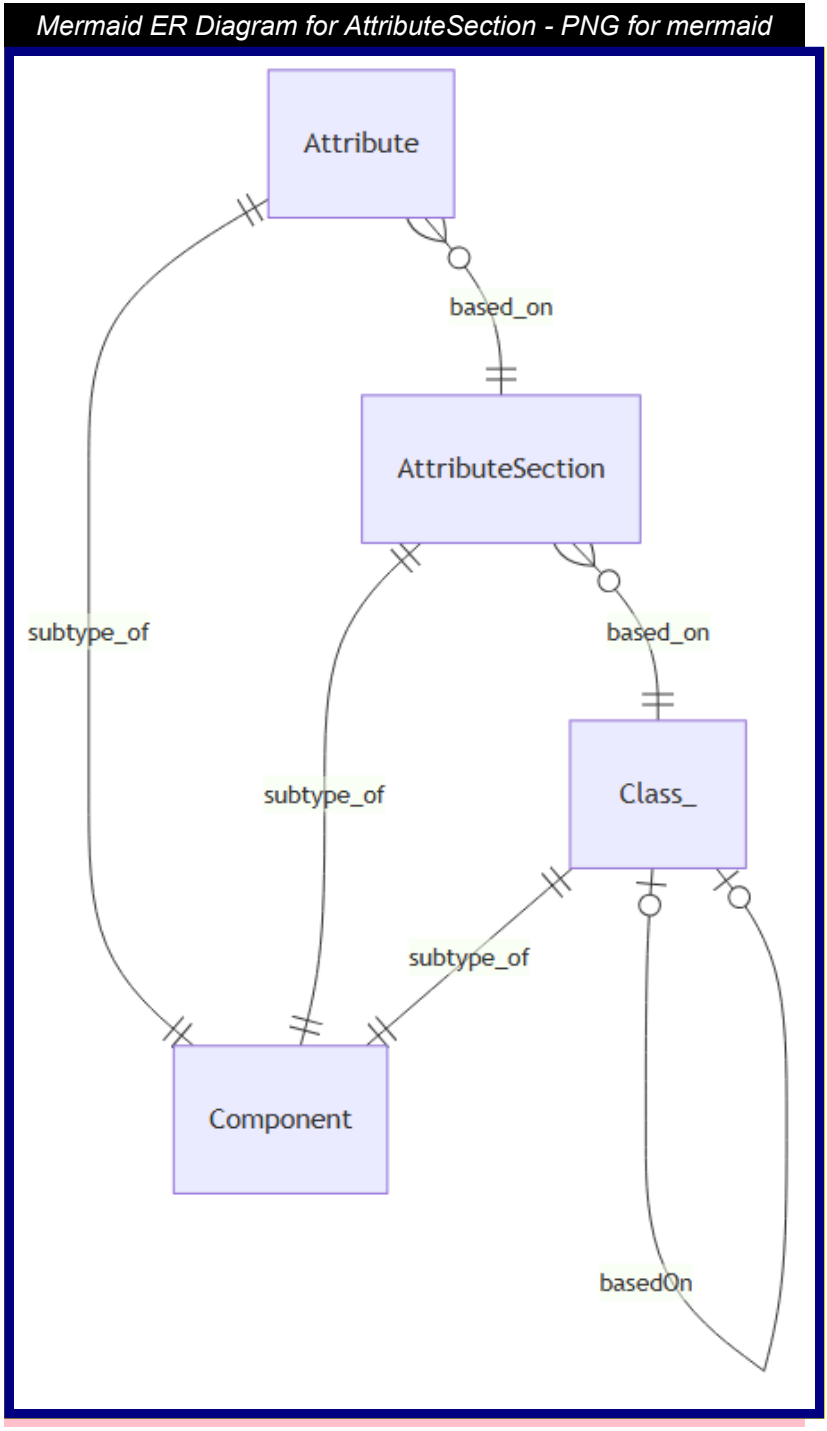
Mermaid ER Diagram for AttributeSection - Inert

```
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

Attributes


Mermaid ER Diagram for AttributeSection - PNG for mermaid
Attribute
based_on
AttributeSection
subtype_of
based_on
subtype_of
Class_
subtype_of
Component
basedOn

Attribute
A property or characteristic of a class

LURAL Attributes
SEDON AttributeSection
DENTS AttributeConstraint
YPEOF Component

me (LowerCamel value O_O)
RRIDES Component.name

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

But,

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

see the section below on Data Type Specifiers.

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

EFAULT *** False

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

EFAULT
*** 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.

note how this works with optionality

s
ble (Boolean value O_O)
VATION true if the data type is a class or a simple collection of members of a class.

ss the class which contains, or would contain the inverse attribute
(Optional Class value O_O)
VATION from the data type. Null unless arrribute is invertible.

ute (Optional Attribute value O_O)

Attributes

tional	(Optional Attribute value O_O)
efault	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)
note	even when an Attribute has a default derivation, there's no guarantee that every instance will have an assigned value. Example needed.
vation	For derived attributes, the rule or formula for calculating the value _ (Optional Derivation value O_O)
issue	on insert vs on access?
raints	Any validation rules specific to this attribute _ (List of Constraints value O_O)
note	from Class.constraints
king rrides utes	created for Attribute
ibutes	Inverse attribute for Class.attributes from which this was implied. (Class value M_1)
INVERSE	Class.attributes
Attributes	Inverse attribute for Key.keyAttributes from which this was implied. (Key value M_1)
INVERSE	Key.keyAttributes
Section	A link back to the AttributeSection on which this Attribute depends. (AttributeSection value M_1)

Mermaid ER Diagram for Attribute - Inert

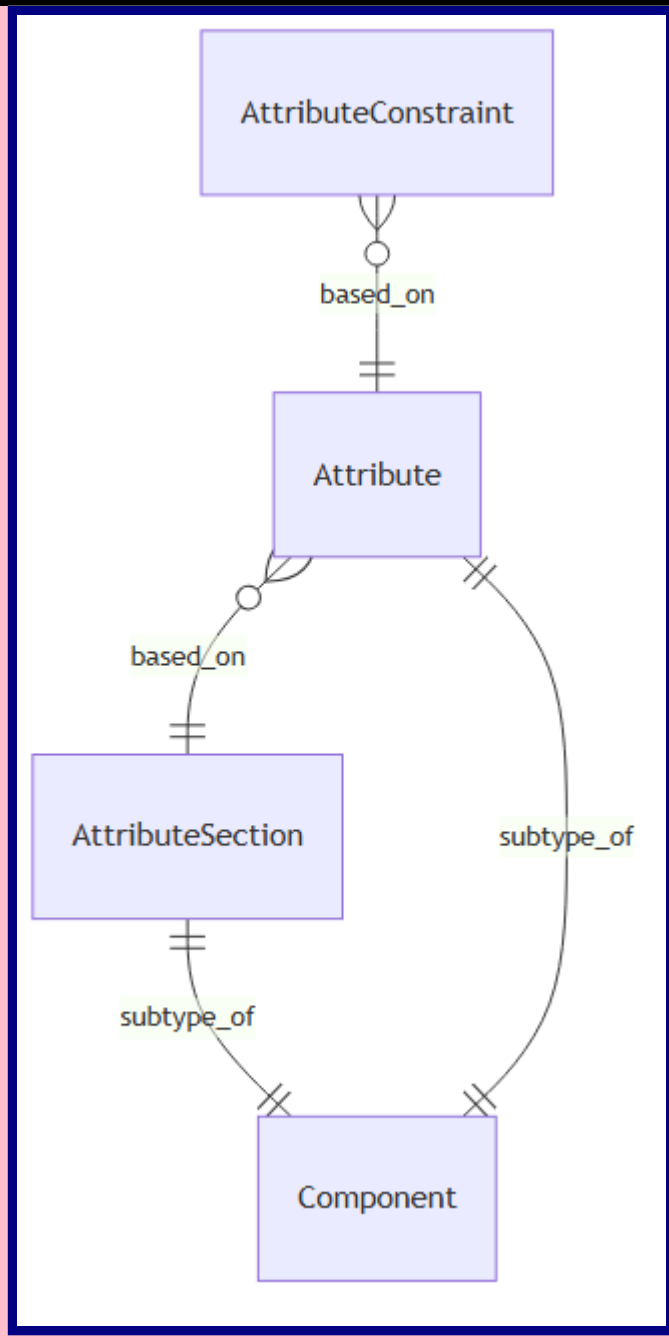
```
erDiagram
AttributeSection ||--|| Component : subtype_of
Attribute ||--|| Component : subtype_of
Attribute }o--|| AttributeSection : based_on
AttributeConstraint }o--|| Attribute : based_on
```

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



Attributes

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

PLURAL Derivations

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

ssion 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

PLURAL Constraints
BTYPEOF Component
SUBTYPES ClassConstraint , AttributeConstraint

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

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

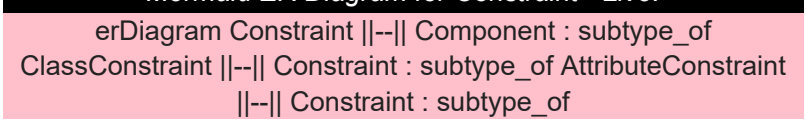
verity ***(Code value O_O)***

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

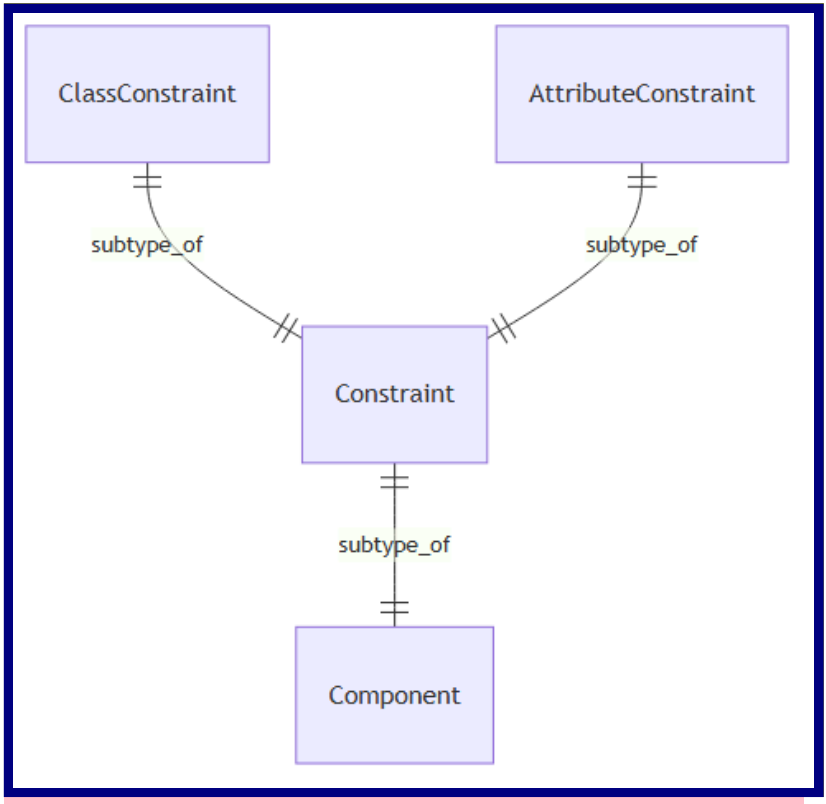
Mermaid ER Diagram for Constraint - Inert

```
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

LURAL ClassConstraints
EDPLURAL ClassConstraints
SEDON Class
YPEOF Constraint

S created for ClassConstraint

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

Mermaid ER Diagram for ClassConstraint - Inert

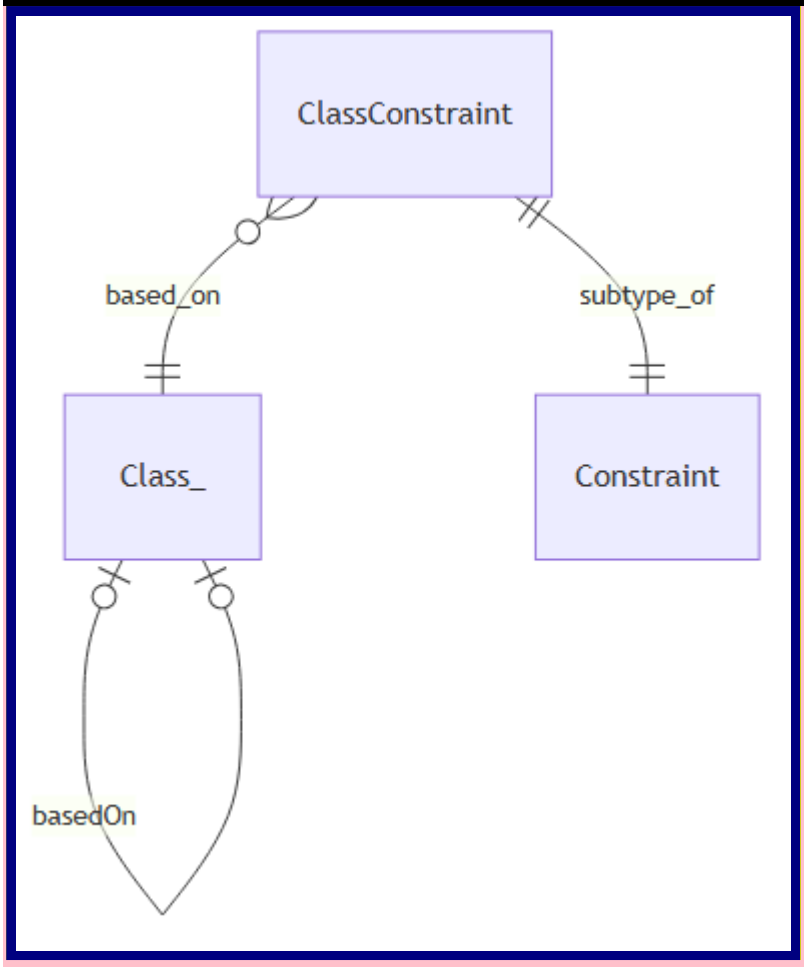
```
erDiagram
Class_ |o--o| Class_ : basedOn
ClassConstraint ||--|| Constraint : subtype_of
ClassConstraint }o--|| Class_ : based_on
```

Attributes

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

Plural	AttributeConstraints
umedPlural	AttributeConstraints
BasedOn	Attribute
btypeOf	Constraint

utes	created for AttributeConstraint

ute

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

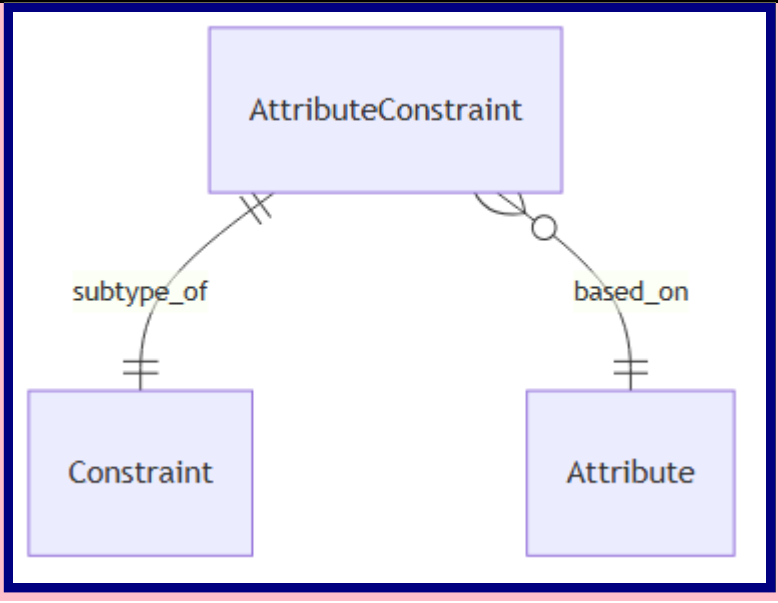
Mermaid ER Diagram for AttributeConstraint - Inert

```
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

LURAL Methods

YPEOF Component

ers The input parameters of the method _

(List of Parameters value O_O)

VERSE Parameter.inverseOfParameters

ype The data type of the value returned by the method _

(DataType value O_O)

s created for Method

ds Inverse attribute for Class.methods from which this was implied.

(Class value M_1)

VERSE Class.methods

Mermaid ER Diagram for Method - Inert

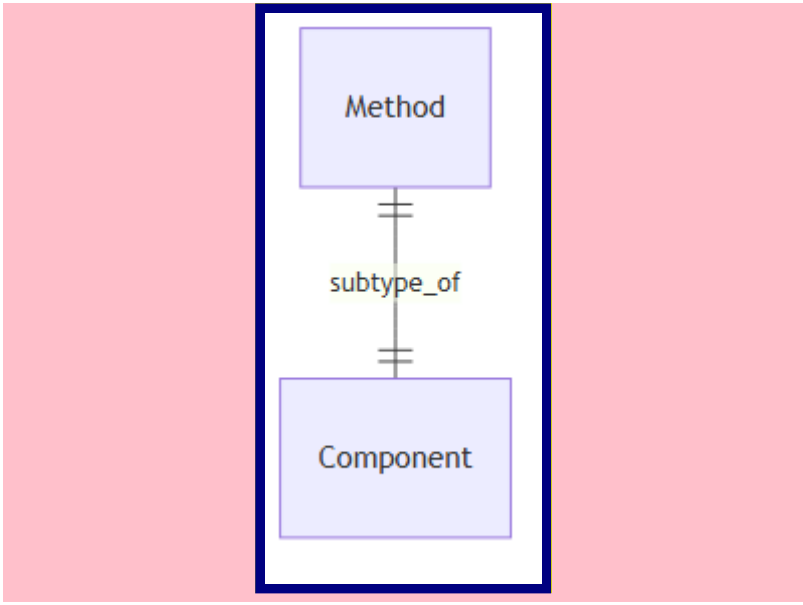
```
erDiagram
Method ||--|| Component : subtype_of
```

Mermaid ER Diagram for Method - Live!

erDiagram Method ||--|| Component : subtype_of

Mermaid ER Diagram for Method - PNG for mermaid

Methods



Parameter

An input to a method

LURAL Parameters

YPEOF Component

ype The data type of the parameter

(DataType value O_O)

lity The cardinality of the parameter. e.g., optional, required.

(Cardinality value O_O)

s created for Parameter

eters Inverse attribute for Method.parameters from which this was implied.

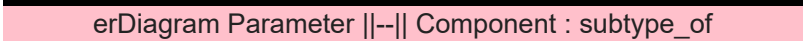
(Method value M_1)

VERSE Method.parameters

Mermaid ER Diagram for Parameter - Inert

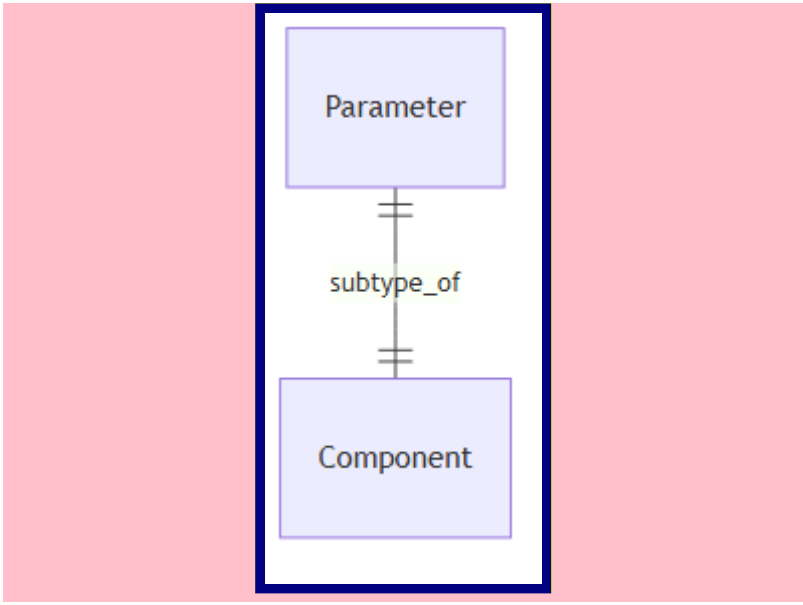
```
erDiagram
Parameter ||--|| Component : subtype_of
```

Mermaid ER Diagram for Parameter - Live!



Mermaid ER Diagram for Parameter - PNG for mermaid

Methods



BLANK

Trivial Data Types

Message

LURAL Messages
EDPLURAL Messages

Message is trivial; no diagram

CodeExpression

LURAL CodeExpressions
EDPLURAL CodeExpressions

ge the programming language
(Code value O_O)

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

ion *(String value O_O)*

CodeExpression is trivial; no diagram

DataType

LURAL DataTypes
EDPLURAL DataTypes

DataType is trivial; no diagram

SimpleDataTypeSubtpeOfDataType

LURAL SimpleDataTypeSubtpeOfDataTypes
EDPLURAL SimpleDataTypeSubtpeOfDataTypes

ss *(Class value O_O)*

VERSE Class.inverseOfCoreClass

SimpleDataTypeSubtpeOfDataType is trivial; no diagram

ComplexDataType

LURAL ComplexDataTypes
EDPLURAL ComplexDataTypes

on *(AggregatingOperator value O_O)*

es *(List of DataTypes value O_O)*

ComplexDataType is trivial; no diagram

AggregatingOperator

PLURAL AggregatingOperators

UMEDPLURAL AggregatingOperators

name *(Code value O_O)*

```
SetOf
ListOf
Mapping
```

arity *(Integer value O_O)*

elling *(Template value O_O)*

AggregatingOperator is trivial; no diagram

BLANK

Trivial Low level Data Types

insert Camel Case.md

Emoji

LURAL Emojis
EDPLURAL Emojis

Emoji is trivial; no diagram

String

LURAL Strings
EDPLURAL Strings

String is trivial; no diagram

CamelName

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

LURAL CamelNames
EDPLURAL CamelNames
YPEOF String
TYPES UpperCamel , LowerCamel

ng *(String value O_O)*

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

gNote

- *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

ample _ "Customer", "ProductCategory", "PaymentMethod"
WHERE content begins with an upper case letter.
LURAL UpperCamels
EDPLURAL UpperCamels
YPEOF CamelName

UpperCamel is trivial; no diagram

LowerCamel
a CamelName that begins with a lower case letter

example "firstName", "orderTotal", "shippingAddress"

WHERE content begins with a lower case letter.
PLURAL LowerCamels
UMEDPLURAL LowerCamels
BTYPEOF CamelName

LowerCamel is trivial; no diagram

QualifiedCamel
an expression consisting of Camel Names separated by periods

PLURAL QualifiedCamels
UMEDPLURAL QualifiedCamels
BTYPEOF String
STRAINTS

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.

PLURAL RichTexts
UMEDPLURAL RichTexts
BTYPEOF String
UBTYPES OneLiner

value the string content
(String value O_O)

ormat 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.

LURAL OneLiners
EDPLURAL OneLiners
YPEOF RichText

lue the string content

(String value O_O)

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

OneLiner is trivial; no diagram

PrimitiveType

A basic, built-in data type

LURAL PrimitiveTypes
EDPLURAL PrimitiveTypes
TYPES String , Integer , Decimal , Boolean , Date , Time , DateTime

PrimitiveType is trivial; no diagram

String

LURAL Strings
EDPLURAL Strings
YPEOF PrimitiveType
TYPES CamelName , QualifiedCamel , RichText

String is trivial; no diagram

Integer

LURAL Integers
EDPLURAL Integers
YPEOF PrimitiveType

Integer is trivial; no diagram

Decimal

LURAL Decimals
EDPLURAL Decimals
YPEOF PrimitiveType

Decimal is trivial; no diagram

Boolean

PLURAL Booleans
UMEDPLURAL Booleans
BTYPEOF PrimitiveType

Boolean is trivial; no diagram

Date

PLURAL Dates
UMEDPLURAL Dates
BTYPEOF PrimitiveType

Date is trivial; no diagram

Time

PLURAL Times
UMEDPLURAL Times
BTYPEOF PrimitiveType

Time is trivial; no diagram

DateTime

PLURAL DateTimes
UMEDPLURAL DateTimes
BTYPEOF PrimitiveType

DateTime is trivial; no diagram

CodingLanguage

PLURAL CodingLanguages
UMEDPLURAL CodingLanguages

CodingLanguage is trivial; no diagram

Cardinality

PLURAL Cardinalitys
UMEDPLURAL Cardinalitys

Cardinality is trivial; no diagram

TemplateLanguage

LURAL TemplateLanguages
EDPLURAL TemplateLanguages

TemplateLanguage is trivial; no diagram

Template

LURAL Templates
EDPLURAL Templates

Template is trivial; no diagram

Code

LURAL Codes
EDPLURAL 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

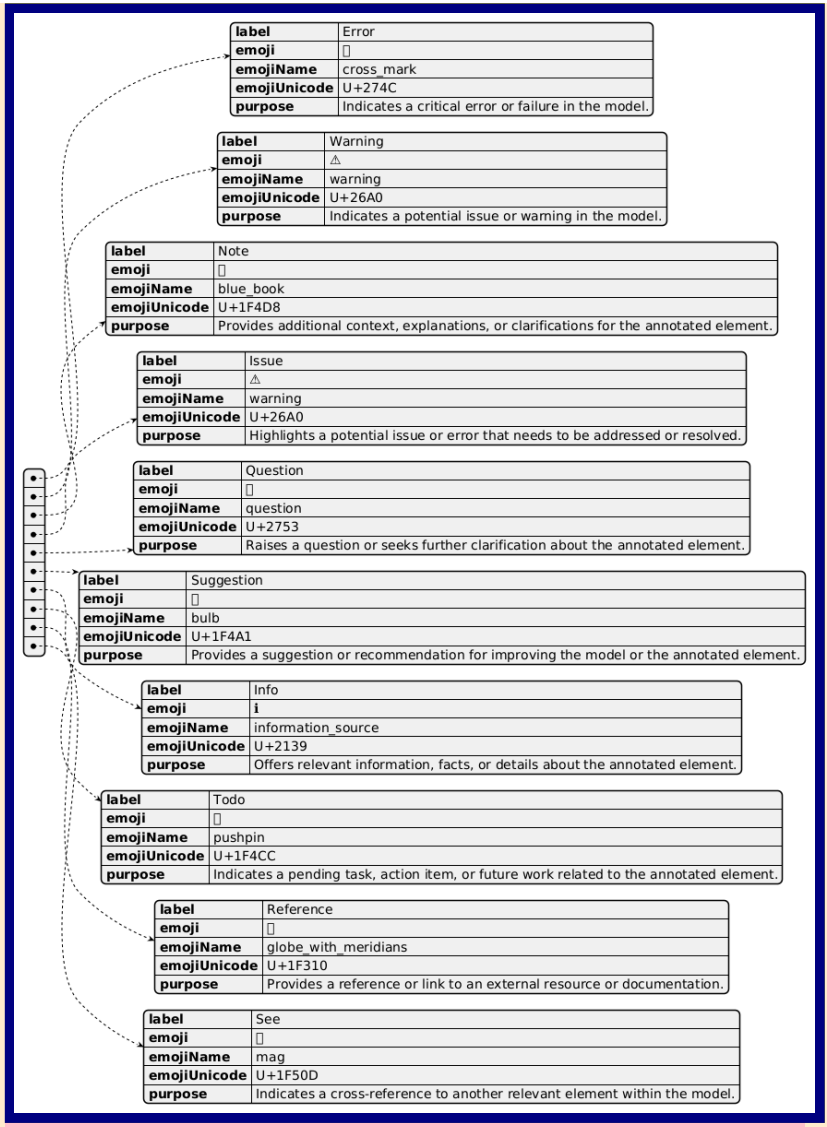
```
@startjson

[
{
"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,ℹ,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

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