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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.

Preliminaries

<b>Component</b>
An element or building block of the literate data model

<b>PLURAL</b>	Components
<b>SINGULAR</b>	Component
<b>DEPENDENTS</b>	<a href="#">Annotation</a>
<b>SUBTYPES</b>	<a href="#">LiterateModel</a> , <a href="#">Subject</a> , <a href="#">Class</a> , <a href="#">Key</a> , <a href="#">AttributeSection</a> , <a href="#">Attribute</a> , <a href="#">Constraint</a> , <a href="#">Method</a> , <a href="#">Parameter</a>

<b>Name</b>	the name of the component, not in camel case ( <a href="#">String</a> value O_O )
-------------	--

<b>warning</b>	This is a warning with emoji
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<b>name</b>	The name of the component ( <a href="#">CamelName</a> value O_O )
-------------	--

<b>Name</b>	( <a href="#">QualifiedCamel</a> value O_O )
-------------	--

<b>Name</b>	a short form of the component's name, used for cross references and improved readability. ( <a href="#">CamelName</a> value O_O )
-------------	--

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

<b>OneLiner</b>	A brief, one-line definition or description of the component, suitable for use in a descriptive table of contents. _ ( <a href="#">OneLiner</a> value O_O )
-----------------	--

<b>Description</b>	A more detailed explanation or discussion of the component _ ( <a href="#">RichText</a> value O_O )
--------------------	--

<b>Embellishment</b>	Indicates whether this component is an embellishment added during post-parsing processing _ ( <a href="#">Boolean</a> value O_O )
----------------------	--

<b>DEFAULT</b>	false
<b>note</b>	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.

ent	Indicates whether this component is an embellishment added during post-parsing processing _	( <u>Boolean</u> value 0_0 )
-----	---	------------------------------

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 _	( <u>Boolean</u> value 0_0 )
-----	---	------------------------------

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.



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**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.

**PLURAL** AnnotationTypes

**IMPLIES** AnnotationTypes

**BASED ON** [LiterateModel](#)

**emoji** an emoji  
( [Emoji](#) value O\_O )

**Name** an emoji  
( [String](#) value O\_O )

**unicode** the Unicode for the emoji  
( [String](#) value O\_O )

**label** A short label to indicate the purpose of the annotation \_  
( [LowerCamel](#) value O\_O )

**plural** the plural form of the label  
( [UpperCamel](#) value O\_O )

**DEFAULT** based on label

**purpose** the intended reason for the annotation.  
( [OneLiner](#) value O\_O )

**created by** created for AnnotationType

**Model** A link back to the LiterateModel on which this AnnotationType depends.  
( [LiterateModel](#) value M\_1 )

**AnnotationType** inverse attribute for Annotation.annotationType from which this was implied.  
( [Annotation](#) value M\_1 )

**INVERSE** [Annotation.annotationType](#)

**AnnotationTypes** inverse attribute for LiterateModel.annotationTypes from which this was implied.  
( [LiterateModel](#) value M\_1 )

**INVERSE** [LiterateModel.annotationTypes](#)

<b>Annotation</b>	
A note or comment associated with a model element	
<b>PLURAL</b>	Annotations
<b>EDPLURAL</b>	Annotations
<b>SEDON</b>	<a href="#">Component</a>
<b>pe</b>	( <i>Optional</i> <a href="#">AnnotationType</a> value O_O )
<b>note</b>	An Annotation is considered to <i>recognized</i> if the label is associated with an Annotation Type. otherwise it is <i>ad hoc</i> .
<b>note</b>	Should be a Value Type
<b>VERSE</b>	<a href="#">AnnotationType.inverseOfAnnotationType</a>
<b>bel</b>	A short label to indicate the purpose of the annotation _ ( <a href="#">CamelName</a> value O_O )
But any short label is valid.	
<b>DEFAULT</b>	from annotationType
<b>oji</b>	( <i>Optional</i> <a href="#">Emoji</a> value O_O )
<b>DEFAULT</b>	from annotation type
<b>ent</b>	The content or body of the annotation ( <a href="#">RichText</a> value O_O )
<b>ent</b>	Indicates whether this annotation is an embellishment added during post-parsing processing _ ( <a href="#">Boolean</a> value O_O )
<b>DEFAULT</b>	false
<b>note</b>	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.
<b>ent</b>	Indicates whether this annotation is an embellishment added during post-parsing processing _ ( <a href="#">Boolean</a> value O_O )
<b>DEFAULT</b>	false
<b>note</b>	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.

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utes  
onent

created for Annotation	
A link back to the Component on which this Annotation depends.	
	( <u>Component</u> value <i>M_1</i> )

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## The Model and its Subjects

	<b>LiterateModel</b> A representation of a domain's entities, attributes, and relationships, along with explanatory text and examples
PLURAL	LiterateModels
DEPENDENTS	<a href="#">AnnotationType</a> , <a href="#">Subject</a> , <a href="#">SubjectArea</a>
TYPEOF	<a href="#">Component</a>
name	( <a href="#">UpperCamel</a> value O_O )
PROVIDES	<a href="#">Component.name</a>
methods	list of all classes in the model, as ordered in the definition of the model. ( List of <a href="#">Classes</a> value O_O )
INVERSE	<a href="#">Class.inverseOfAllSubjects</a>
DESCRIPTION	gathering s.allSubjects over s in subjectAreas
CONSTRAINTS	Subject names must be unique across the model.
methods	list of all classes in the model, as ordered in the definition of the model. ( List of <a href="#">Classes</a> value O_O )
INVERSE	<a href="#">Class.inverseOfAllClasses</a>
DESCRIPTION	gathering s.allClasses over s in allSubjects.
CONSTRAINTS	Class names must be unique across the model.
methods	( List of <a href="#">AnnotationTypes</a> value O_O )
INVERSE	<a href="#">AnnotationType.inverseOfAnnotationTypes</a>
Language	the recommended language for expressing derivation, defaults, and constraints ( <a href="#">CodingLanguage</a> value O_O )
DEFAULT	Python
languages	( Optional List of <a href="#">CodingLanguages</a> value O_O )
TemplateLanguage	the recommended language for expressing derivation, defaults, and constraints ( <a href="#">TemplateLanguage</a> value O_O )
DEFAULT	Handlebars
TemplateLanguages	( Optional List of <a href="#">TemplateLanguages</a> value O_O )
functions	A list of functions that require sophisticated AI-powered implementation * ( List of <a href="#">String</a> value O_O )
DESCRIPTION	[ <a href="#">aiEnglishPlural()</a> ]

<b>Types</b>	( <i>List of <a href="#">AnnotationTypes</a> value 0_0</i> )
<b>INVERSE</b>	<a href="#">AnnotationType.inverseOfAnnotationTypes</a>
<b><a href="#">CodingLanguage</a></b>	the recommended language for expressing derivation, defaults, and constraints ( <i><a href="#">CodingLanguage</a> value 0_0</i> )
<b>DEFAULT</b>	Python
<b><a href="#">CodingLanguages</a></b>	( <i>Optional List of <a href="#">CodingLanguages</a> value 0_0</i> )
<b><a href="#">TemplateLanguage</a></b>	the recommended language for expressing derivation, defaults, and constraints ( <i><a href="#">TemplateLanguage</a> value 0_0</i> )
<b>DEFAULT</b>	Handlebars
<b><a href="#">TemplateLanguages</a></b>	( <i>Optional List of <a href="#">TemplateLanguages</a> value 0_0</i> )
<b><a href="#">Functions</a></b>	A list of functions that require sophisticated AI-powered implementation * ( <i>List of <a href="#">String</a> value 0_0</i> )
<b>DERIVATION</b>	<code>['aiEnglishPlural()']</code>

**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.

**LURAL** Subjects  
**SEDON** [LiterateModel](#)  
**YPOF** [Component](#)  
**YPES** [SubjectArea](#)

**me** ( [UpperCamel](#) value O\_O )  
**RIDES** [Component.name](#)

**ect** The parent subject, if any, under which this subject is nested \_  
( *Optional* [Subject](#) value O\_O )

**VERSE** [Subject.inverseOfParentSubject](#)

**es** 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?  
**VERSE** [Class.inverseOfClasses](#)

**cts** 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.

**VERSE** [Subject.parentSubject](#)

**s** created for Subject  
**del** A link back to the LiterateModel on which this Subject depends.  
( [LiterateModel](#) value M\_1 )

**Subject** Inverse attribute for Subject.parentSubject from which this was implied.  
( [Subject](#) value M\_1 )

**VERSE** [Subject.parentSubject](#)



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  
**PLURAL** SubjectAreas  
**BASEDON** [LiterateModel](#)  
**BTYPEOF** [Subject](#)

**utes** created for SubjectArea

**Model** A link back to the LiterateModel on which this SubjectArea depends.

( [LiterateModel](#) value *M\_1* )

**Classes**

## Classes

### Class

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

PLURAL	Classes
DEPENDENTS	<a href="#">Subtyping</a> , <a href="#">Key</a> , <a href="#">AttributeSection</a> , <a href="#">ClassConstraint</a>
BTYPOF	<a href="#">Component</a>
SUBTYPES	<a href="#">ReferenceType</a>
STRAINTS	Within each Class, attribute names must be unique.

**Form** 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".

**basedOn** 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 synonymously in this metamodel.

**INVERSE** [Class.inverseOfBasedOn](#)

**types** The parent class or classes from which this class inherits attributes

( [List of](#) [Classes](#) value O\_O )

**INVERSE** [Class.inverseOfSupertypes](#)

**typings** 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](#)

es	Any subtypes or specializations of this class based on it's subtypings. ( List of <u>Classes</u> value O_O )
ample	For instance, using the Book example, the subtypes could include FictionBook , Non-fictionBook , HardcoverBook , PaperbackBook , ScienceBook , and HistoryBook .
VERSE	<u>Class.inverseOfSubtypes</u>
es	The attributes or properties of the class, in the order in which they should be presented _ ( List of <u>Attributes</u> value O_O )
VERSE	<u>Attribute.inverseOfAttributes</u>
ns	additional attributes or properties of the class, grouped for clarity and elaboration. _ ( List of <u>AttributeSections</u> value O_O )
VERSE	<u>AttributeSection.inverseOfAttributeSections</u>
nts	Any constraints, rules, or validations specific to this class _ ( List of <u>Constraints</u> 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 <u>Methods</u> value O_O )
VERSE	<u>Method.inverseOfMethods</u>
nts	the Classes which are basedOn this Class ( Optional Set of <u>Classes</u> value O_O )
VERSE	<u>Class.basedOn</u>
ys	( Optional Set of <u>UniqueKeys</u> value O_O )
VERSE	<u>UniqueKey.basedOn</u>
s	
nts	the Classes which are basedOn this Class ( Optional Set of <u>Classes</u> value O_O )
VERSE	<u>Class.basedOn</u>
ys	( Optional Set of <u>UniqueKeys</u> value O_O )
VERSE	<u>UniqueKey.basedOn</u>
ects	Inverse attribute for LiterateModel.allSubjects from which this was implied. ( <u>LiterateModel</u> value M_1 )
VERSE	<u>LiterateModel.allSubjects</u>

## Classes

<b>Classes</b>	Inverse attribute for LiterateModel.allClasses from which this was implied. ( <a href="#">LiterateModel</a> value M_1 )
INVERSE	<a href="#">LiterateModel.allClasses</a>
<b>Classes</b>	Inverse attribute for Subject.classes from which this was implied. ( <a href="#">Subject</a> value M_1 )
INVERSE	<a href="#">Subject.classes</a>
<b>basedOn</b>	Inverse attribute for Class.basedOn from which this was implied. ( <a href="#">Class</a> value M_1 )
INVERSE	<a href="#">Class.basedOn</a>
<b>superTypes</b>	Inverse attribute for Class.superTypes from which this was implied. ( <a href="#">Class</a> value M_1 )
INVERSE	<a href="#">Class.superTypes</a>
<b>subTypes</b>	Inverse attribute for Class.subTypes from which this was implied. ( <a href="#">Class</a> value M_1 )
INVERSE	<a href="#">Class.subTypes</a>
<b>classes</b>	Inverse attribute for Subtyping.classes from which this was implied. ( <a href="#">Subtyping</a> value M_1 )
INVERSE	<a href="#">Subtyping.classes</a>
<b>inverseClass</b>	Inverse attribute for Attribute.inverseClass from which this was implied. ( <a href="#">Attribute</a> value M_1 )
INVERSE	<a href="#">Attribute.inverseClass</a>
<b>coreClass</b>	Inverse attribute for SimpleDataTypeSubtpeOfDataType.coreClass from which this was implied. ( <a href="#">SimpleDataTypeSubtpeOfDataType</a> value M_1 )
INVERSE	<a href="#">SimpleDataTypeSubtpeOfDataType.coreClass</a>

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

**SINGULAR** Subtypings  
**EDPLURAL**Subtypings  
**BASED ON** [Class](#)

**NAME** ( [LowerCamel](#) value O\_O )

**TYPE** ( [Boolean](#) value O\_O )

**DEFAULT** true

**TYPE** ( [Boolean](#) value O\_O )

**DEFAULT** true

**VALUES** ( List of [Classes](#) value O\_O )

**DSL** : Shown in the DSL as

- Subtypes: 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.  
[Class.inverseOfClasses](#)

**VERSE**

**DESCRIPTION** created for Subtyping

**DESCRIPTION** Inverse attribute for Class.subtypings from which this was implied.  
( [Class](#) value M\_1 )

**VERSE** [Class.subtypings](#)

**DESCRIPTION** A link back to the Class on which this Subtyping depends.  
( [Class](#) value M\_1 )

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

**SINGULAR** ReferenceTypes  
**EDPLURAL**ReferenceTypes  
**TYPE OF** [Class](#)

**CodeType**

A data type or enumeration used in the model

**PLURAL** CodeTypes

**IMPLIES** CodeTypes

**DEPENDENTS** [CodeValue](#)

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

( [Boolean](#) value O\_O )

**CodeValue**

A possible value for an enumerated data class

**PLURAL** CodeValues

**IMPLIES** CodeValues

**BASED ON** [CodeType](#)

**code** A short code or abbreviation for the value \_

( [String](#) value O\_O )

**Description** 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:

**Attributes** created for CodeValue

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

( [CodeType](#) value M\_1 )

**Key**  
a list of attributes of a class

**LURAL** Keys  
**DPLURAL** Keys  
**SED ON** [Class](#)  
**TYPE OF** [Component](#)  
**TYPES** [UniqueKey](#)

**es** the attributes of the base Class.  
( *List of [Attributes](#) value O\_O* )

**VERSE** [Attribute.inverseOfKeyAttributes](#)  
**RAINTS** each attribute must be a direct or inherited of the base class.  
**RAINTS** no repetitions allowed in keyAttributes

👉 **Issue** : introduce PureLists?

**issue** need ascending descending to support index keys or ordering keys.

**s** created for Key

**ss** A link back to the Class on which this Key depends.  
( *[Class](#) value M\_1* )

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

**note** [order unimportant for Unique Keys.](#)

**LURAL** UniqueKeys  
**DPLURAL** UniqueKeys  
**TYPE OF** [Key](#)



## Attributes

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

**PLURAL** AttributeSections  
**DEPENDS ON** [Class](#)  
**DEPENDS ON** [Attribute](#)  
**TYPE OF** [Component](#)

**optional** 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 section is optional or required, depending on how it is marked.

- But if the Attribute Section is optional each attribute in the section is only required if any attribute in the section is present.

**is created by** created for AttributeSection

**inverse attribute** inverse attribute for Class.attributeSections from which this was implied.  
( [Class](#) value **M\_1** )

**inverse** [Class.attributeSections](#)

**class** A link back to the Class on which this AttributeSection depends.  
( [Class](#) value **M\_1** )

# Attributes

**Attribute**  
A property or characteristic of a class

**PLURAL** Attributes  
**BASED ON** [AttributeSection](#)  
**DEPENDENTS** [AttributeConstraint](#)  
**BTYPED OF** [Component](#)

**name** ( [LowerCamel](#) value O\_O )

**OVERRIDES** [Component.name](#)

**DataType** 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.](#)

**Optional** Indicates whether the attribute must have a value for every instance of the class \_  
( [Boolean](#) value O\_O )

**DEFAULT** \*\*\* False

**Cardinality** The cardinality of the relationship represented by the attribute \_  
( [Cardinality](#) value O\_O )

**DEFAULT** \*\*\* 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](#)

**Invertible** ( [Boolean](#) value O\_O )

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

**Class** the class which contains, or would contain the inverse attribute  
( [Optional](#) [Class](#) value O\_O )

**INVERSE** [Class.inverseOfInverseClass](#)

**DERIVATION** from the data type. Null unless attribute is invertible.

**Attribute** ( [Optional](#) [Attribute](#) value O\_O )

VERSE [Attribute.inverseOfInverseAttribute](#)

nal ( [Optional Attribute value O\\_O](#) )

VERSE [Attribute.inverseOfInverselsOptional](#)

ult The rule or formula for calculating the value, if no value is supplied Now running to a second line with the parenthetical 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.

on For derived attributes, the rule or formula for calculating the value \_ ( [Optional Derivation value O\\_O](#) )

issue on insert vs on access?

nts Any validation rules specific to this attribute \_ ( [List of Constraints value O\\_O](#) )

note from Class.constraints

es the higher level attribute which this one overrides - for type or ... ( [Attribute value O\\_O](#) )

VERSE [Attribute.inverseOfOverrides](#)

nal Indicates whether the attribute must have a value for every instance of the class \_ ( [Boolean value O\\_O](#) )

DEFAULT \*\*\* False

ity The cardinality of the relationship represented by the attribute \_ ( [Cardinality value O\\_O](#) )

DEFAULT

\*\*\* 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](#) )

## Attributes

<b>INVERSE</b>	<a href="#">Class.inverseOfInverseClass</a>	
<b>DERIVATION</b>	from the data type. Null unless attribute is invertible.	
<b>Attribute</b>		( <i>Optional</i> <a href="#">Attribute</a> value 0_0 )
<b>INVERSE</b>	<a href="#">Attribute.inverseOfInverseAttribute</a>	
<b>Optional</b>		( <i>Optional</i> <a href="#">Attribute</a> value 0_0 )
<b>INVERSE</b>	<a href="#">Attribute.inverseOfInverselsOptional</a>	
<b>Default</b>	The rule or formula for calculating the value, if no value is supplied Now running to a second line with the parenthetical on yet a third line	( <i>Optional</i> <a href="#">Derivation</a> value 0_0 )
<b>note</b>	even when an Attribute has a default derivation, there's no guarantee that every instance will have an assigned value. Example needed.	
<b>Derivation</b>	For derived attributes, the rule or formula for calculating the value _	( <i>Optional</i> <a href="#">Derivation</a> value 0_0 )
<b>issue</b>	on insert vs on access?	
<b>Constraints</b>	Any validation rules specific to this attribute _	( <i>List of</i> <a href="#">Constraints</a> value 0_0 )
<b>note</b>	from Class.constraints	
<b>Overrides</b>	the higher level attribute which this one overrides - for type or ...	( <a href="#">Attribute</a> value 0_0 )
<b>INVERSE</b>	<a href="#">Attribute.inverseOfOverrides</a>	
<b>Attributes</b>	created for Attribute	
<b>Attributes</b>	Inverse attribute for Class.attributes from which this was implied.	( <a href="#">Class</a> value M_1 )
<b>INVERSE</b>	<a href="#">Class.attributes</a>	
<b>Attributes</b>	Inverse attribute for Key.keyAttributes from which this was implied.	( <a href="#">Key</a> value M_1 )
<b>INVERSE</b>	<a href="#">Key.keyAttributes</a>	
<b>Section</b>	A link back to the AttributeSection on which this Attribute depends.	( <a href="#">AttributeSection</a> value M_1 )
<b>inverseAttribute</b>	inverse attribute for Attribute.inverseAttribute from which this was implied.	( <a href="#">Attribute</a> value M_1 )

VERSE	<a href="#">Attribute.inverseAttribute</a>	
IsOptional	Inverse attribute for Attribute.inverselsOptional from which this was implied.	( <a href="#">Attribute</a> value M_1 )
VERSE	<a href="#">Attribute.inverselsOptional</a>	
Is	Inverse attribute for Attribute.overrides from which this was implied.	( <a href="#">Attribute</a> value M_1 )
VERSE	<a href="#">Attribute.overrides</a>	
	<b>Derivation</b>	
	A rule or formula for deriving the value of an attribute	
PLURAL	Derivations	
Definition	An English language statement of the derivation rule _	( <a href="#">RichText</a> value O_0 )
Formal	The formal expression of the derivation in a programming language _	( <a href="#">CodeExpression</a> value O_0 )
	<b>Constraint</b>	
	A rule, condition, or validation that must be satisfied by the model	
PLURAL	Constraints	
TYPEOF	<a href="#">Component</a>	
TYPES	<a href="#">ClassConstraint</a> , <a href="#">AttributeConstraint</a>	
Definition	An English language statement of the constraint _	( <a href="#">RichText</a> value O_0 )
Formal	The formal expression of the constraint in a programming language, for example: OCL or Python. _	( <a href="#">CodeExpression</a> value O_0 )
Property		( <a href="#">Code</a> value O_0 )
	<div>Warning, nothing fatal; just a caution</div> <div>Error, serious. Fix now</div>	
	<b>ClassConstraint</b>	
PLURAL	ClassConstraints	
ADPLURAL	ClassConstraints	
BASED ON	<a href="#">Class</a>	
TYPEOF	<a href="#">Constraint</a>	

Attributes

Attributes	created for ClassConstraint
Class	A link back to the Class on which this ClassConstraint depends. ( <u>Class</u> value M_1 )
	AttributeConstraint

PLURAL AttributeConstraints  
IMEDPLURAL AttributeConstraints  
BASEDON [Attribute](#)  
BTYPEOF [Constraint](#)

Attributes	created for AttributeConstraint
Attribute	A link back to the Attribute on which this AttributeConstraint depends. ( <u>Attribute</u> value M_1 )

BLANK



## Methods

	<b>Method</b>	
	A behavior or operation associated with a class	
LURAL	Methods	
TYPEOF	<a href="#">Component</a>	
ers	The input parameters of the method _	( <i>List of <a href="#">Parameters</a> value O_O</i> )
VERSE	<a href="#">Parameter.inverseOfParameters</a>	
pe	The data type of the value returned by the method _	( <i><a href="#">DataType</a> value O_O</i> )
s	created for Method	
ds	Inverse attribute for Class.methods from which this was implied.	( <i><a href="#">Class</a> value M_1</i> )
VERSE	<a href="#">Class.methods</a>	
	<b>Parameter</b>	
	An input to a method	
LURAL	Parameters	
TYPEOF	<a href="#">Component</a>	
pe	The data type of the parameter	( <i><a href="#">DataType</a> value O_O</i> )
ity	The cardinality of the parameter. e.g., optional, required.	( <i><a href="#">Cardinality</a> value O_O</i> )
s	created for Parameter	
ters	Inverse attribute for Method.parameters from which this was implied.	( <i><a href="#">Method</a> value M_1</i> )
VERSE	<a href="#">Method.parameters</a>	

## Trivial Data Types

Message

LURAL Messages  
DPLURAL Messages

CodeExpression

LURAL CodeExpressions  
DPLURAL CodeExpressions

ge

the programming language

( [Code](#) value O\_O )

OCIL, Object Constraint Language  
Java, Java  
Python, Python

on

( [String](#) value O\_O )

DataType

LURAL DataTypes  
DPLURAL DataTypes

SimpleDataTypeSubtpeOfDataType

LURAL SimpleDataTypeSubtpeOfDataTypes  
DPLURAL SimpleDataTypeSubtpeOfDataTypes

ss

( [Class](#) value O\_O )

VERSE [Class.inverseOfCoreClass](#)

ComplexDataType

LURAL ComplexDataTypes  
DPLURAL ComplexDataTypes

on

( [AggregatingOperator](#) value O\_O )

es

( List of [DataTypes](#) value O\_O )

AggregatingOperator

LURAL AggregatingOperators  
DPLURAL AggregatingOperators

me

( [Code](#) value O\_O )

Trivial Data Types

SetOf  
ListOf  
Mapping

arity

( Integer value O\_O )

elling

( Template value O\_O )

BLANK

## Trivial Low level Data Types

insert Camel Case.md

Emoji

LURAL    Emojis  
DPLURAL Emojis

String

LURAL    Strings  
DPLURAL Strings

CamelName

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

LURAL    CamelNames  
DPLURAL CamelNames  
TYPEOF    [String](#)  
TYPES    [UpperCamel](#), [LowerCamel](#)

ng    ( [String](#) value O\_O )

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

ngNote    

- *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.

UpperCamel

a CamelName that begins with a capital letter

ample    \_ "Customer", "ProductCategory", "PaymentMethod"

WHERE    content begins with an upper case letter.  
LURAL    UpperCamels  
DPLURAL UpperCamels  
TYPEOF    [CamelName](#)

LowerCamel

a CamelName that begins with a lower case letter

ample    "firstName", "orderTotal", "shippingAddress"

WHERE    content begins with a lower case letter.  
LURAL    LowerCamels  
DPLURAL LowerCamels



**BTYPEOF** [CamelName](#)

**QualifiedCamel**

an expression consisting of Camel Names separated by periods

**PLURAL** QualifiedCamels

**IMEDPLURAL** QualifiedCamels

**BTYPEOF** [String](#)

**STRAINTS**

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

**RichText**

A string with markup for block level formatting.

**PLURAL** RichTexts

**IMEDPLURAL** RichTexts

**BTYPEOF** [String](#)

**SUBTYPES** [OneLiner](#)

**value** the string content

( [String](#) value O\_O )

**format** the rich text coding language used

( [Code](#) value O\_O )

HTML  
MarkDown

**OneLiner**

String with markup for line level formatting.

**PLURAL** OneLiners

**IMEDPLURAL** OneLiners

**BTYPEOF** [RichText](#)

**value** the string content

( [String](#) value O\_O )

**VERRIDES** [RichText.value](#)

**STRAINTS** must not contain a line break or new line character

**MESSAGE** A line can't span two lines

**PrimitiveType**

A basic, built-in data type

**PLURAL** PrimitiveTypes

PrimitiveTypes

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

String

Strings

Strings

PrimitiveType

CamelName, QualifiedCamel, RichText

Integer

Integers

Integers

PrimitiveType

Decimal

Decimals

Decimals

PrimitiveType

Boolean

Booleans

Booleans

PrimitiveType

Date

Dates

Dates

PrimitiveType

Time

Times

Times

PrimitiveType

DateTime

DateTimes

DateTimes

PrimitiveType

CodingLanguage

CodingLanguages

CodingLanguages

Trivial Low level Data Types

**Cardinality**

PLURAL Cardinalitys  
IMEDPLURALCardinalitys

**TemplateLanguage**

PLURAL TemplateLanguages  
IMEDPLURALTemplateLanguages

**Template**

PLURAL Templates  
IMEDPLURALTemplates

**Code**

PLURAL Codes  
IMEDPLURALCodes

## 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*

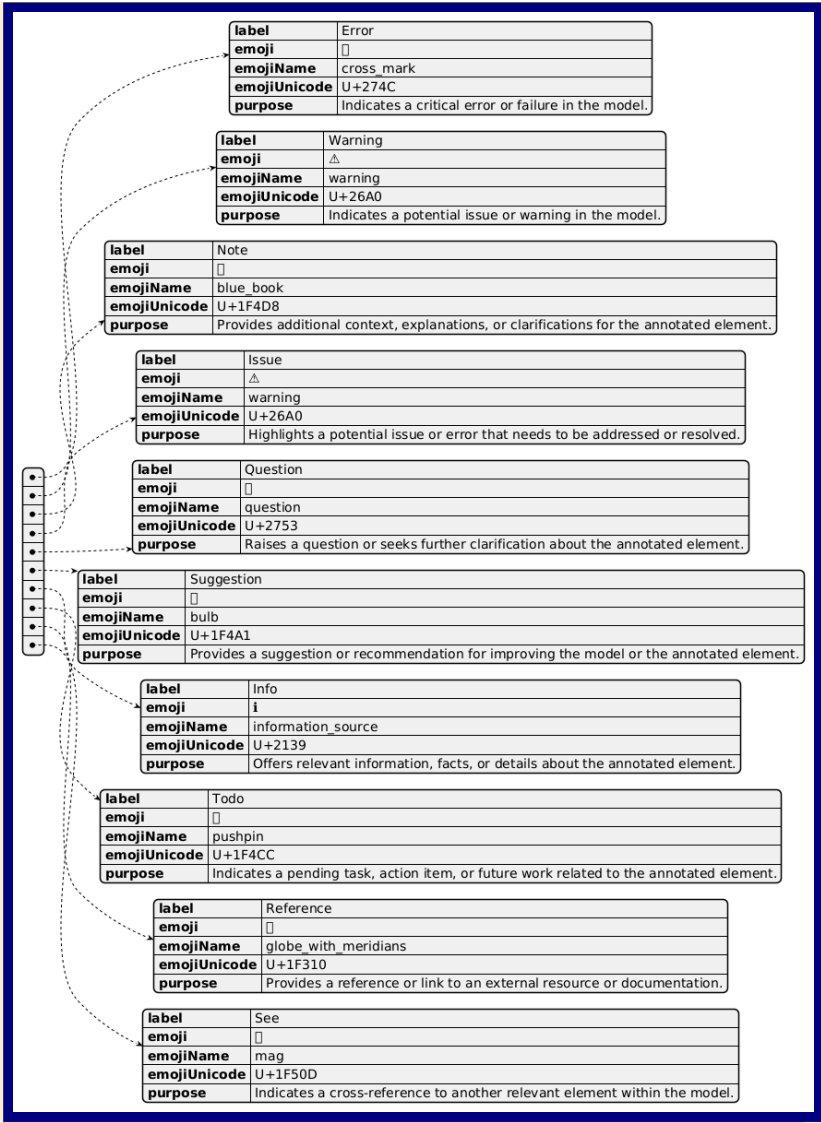
**@startjson**

```
[
{
  "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": "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."  
}  
]  
@endjson
```

*PlantUML Diagram - PNG for puml*



**Annotation types as CSV**



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,📖,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.					
47										
					Highlights a potential issue					

BLANK

## 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