Guide to

Kastalia KMS Labyrinth(s)

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Frohe Spaziergang und ewige Blumenkraft !

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About This File

This file was created for the benefit of all aieducators, teachers, students, developers and parents wanting to use Kastalia Knowledge Management System (KMS) creation of their own knowledge graphs, archives of more complex curricular and/or meta-curricular structures.

Brief Introduction to Kastalia KMS

Kastalia Knowledge Management System, or simply "Kastalia KMS", is a system for collaborative web-publishing, data-management and archivation of structured information in a form of a so-called "knowledge graph".

The knowledge graph (KG) is composed of things - also called "knowledge units" or "knots" - and relations between things - also called "bounds".

Diverse combinations of "knots" and "bounds" can be obtained by executing different kinds of "templates", ultimately providing "views" which end up in the browser of a human user.

To the one who understands it and masters it, Kastalia KMS is a **strongly generative system** providing theoretically infinite flexibility in both content structuration as well as interface design.

1.1 Graphs

"*In discrete mathematics, and more specifically in graph theory, in graph theory, a graph is a structure amounting to a set of objects in which some pairs of the objects are in some sense "related". The objects correspond to mathematical abstractions called vertices (also called nodes or points) and each of the related pairs of vertices is called an edge (also called link or line).*" [1]

1.2 Knowledge graphs

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[1] https://en.wikipedia.org/wiki/Graph_(discrete_mathematics)

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Concepts

2.1 Knots

Knots - or "KNOwledge uniTS" are fundamental building blocks of any Kastalia system. In terms of graph theory, knots are vertices, in terms of chemistry, knots are atoms, in terms of Hesse's Glasperlenspiel, knots are the Glasperlen.

Immanuel Kant would have most probably label them as "Ding an sich".

The fundamental role of "knots" within the Kastalia system is made explicit by a following principle:

Everything in Kastalia which is not a "bound" or an entry in the "Zeitgeist" log is a knot, a property of the knot or an attribute of a knot.

Thus, no matter whether we speak about a category, text, recording, illustration, user profile, curriculum, exercise, template or anything else, all these entities are fundamentally "knots".

2.1.1 Properties of knots

Every knot is endowed with a finite, well-defined set of properties. In original version of Kastalia, these properties are

ID	Unique numeric identifier
NAME	Name / title of the knot
CONTENT	Content of the knot
ATTRIBUTES	An arbitrary set of additional data

2.1.2 Attributes of knots

Every knot can have an arbitrary number of additional attributes associated to them. It is these attributes which give the knot its unique "taste" and "behaviour". Following table lists some of the most important attributes.

public	1	if set to true value, knot can be accessed by unlogged user
template	list	default template by means of which knot is displayed
lang	de	language of the knot
img_url	/picture.png	URL of associated image
ogg_url	/picture.ogg	URL of associated audio file

As You will progress through the Kastalia Labyrinth, You will encounter dozens and hundreds of other attributes whose explanation will appear at the place the most suitable.

2.2 Bounds

A healthy knot is not isolated. Rather, it is related to other knots by means of "bounds" [2]

<div align="center">Bounds are relations.</div>

In terms of graph theory, bounds are "edges" which interconnect the vertices (i.e. knots).

2.2.1 Predicate

Bounds are predicated. This means: **there are different types of bounds**. Following table lists some of most prominent predicates, and specifies whether they are symmetric (S) or asymmetric (A)[3].

is_parent	A	relation between super-ordinated category and sub-ordinated concept
is_uttered_as	A	relation between text and audio recording
illustrates	A	relation between picture and the text it illustrates
translates	S	relation between two translations of the same content
contains	A	relation between container knot and the entity contained

As You will proceed with lecture of this manual and execute Your first interactions within the Labyrinth, the exact meaning of diverse predicates and their function will become more clear.

2.2.2 Participants

Bounds are ternary relations having a form:

<div align="center">KNOT$_1$ PREDICATE KNOT$_2$</div>

Every bound puts into relation two knots $KNOT_1$ and $KNOT_2$ which can be understood as "participants" within the bound. Since majority of bounds used within Kastalia are "asymmetric", it gives sense to specify which participant is the first member of the relation and which is the second.

Sometimes we also refer to first members of relations as "sources" and to the other ones as "targets". The metaphor of "dendrites" for incoming relations and "axones" for outgoing is also used. In more linguistic terms, it is often meaningful to speak about the **subject and object** of the predicate. For example, the presence of the bound like

<div align="center">WORDS is_parent NOUNS</div>

which refers to knowledge that knot with name "WORDS" is a super-ordinated category of the knot with name "NOUNS" can be simply read as a sentence whereby "WORDS" is the subject of the sentence and "NOUNS" is the object of the sentence.

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[2]Actually, knotless ontologies where knots themselves are just special cases of bounds are possible and potentially even desirable. Within the context of Kastalia v1, however, such considerations would bring us too far.

[3]In a symmetric relation R, xRy is equal to yRx. In case of asymmetric R, xRy is different from yRx.

2.2.3 Rank

Every bound has also a certain "rank" associated to it. This rank - sometimes also interpreted as "strength", "weight" or "priority" - is a numeric value which may be used as a sorting, ordering or separating criterium.

Whether the rank plays a role and if yes, which one and how, depends on the predicate.

Default value is 1 [4].

2.3 Views

What You will encounter in the Labyrinth consists of interplay of WHAT You chose to see and HOW You chose to see it.

2.3.1 Ding für Dich

Ultimately, what the conscious seer S sees and with what he interacts, is given by combination of

- WHAT: the object O of interest

- HOW: the means M by means of which (sic!) S looks upon O

In Kastalia, the WHAT object of interest O is the knot K. As already indicated, one may consider K to be the noumenal "Ding an sich".

The HOW component is provided by the template.

2.3.2 Templates

Templates are knots which specify how knots can be displayed.

2.3.3 The Formula

https://KASTALIA_URL/KNOT/TEMPLATE

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[4]Rank is encoded as floating point number. This allows one to always define a rank higher than some other rank R_1 and lower than some other rank R_2. This is of particular use when one builds a presentation where one wants to stick a new folio F_{new} between already existing folios F_1 and F_2.

How to use KMS to learn something.

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Learner

How to build Your own Curricula and how to help Your students to progress.

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Teacher

How to deploy Your own Kastalia KMS instance.

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System Operator