
**Information technology — SGML
Applications — Topic Maps**

*Technologies de l'information — Applications SGML — Plans relatifs à des
sujets*

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 13250 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 34, *Document description and processing languages*.

Annex A forms a normative part of this International Standard. Annex B is for information only.

Introduction

This International Standard provides a standardized notation for interchangeably representing information about the structure of information resources used to define topics, and the relationships between topics. A set of one or more interrelated documents that employs the notation defined by this International Standard is called a *topic map*. In general, the structural information conveyed by topic maps includes:

- groupings of addressable information objects around topics ('occurrences'), and
- relationships between topics ('associations').

A topic map defines a multidimensional topic space — a space in which the locations are topics, and in which the distances between topics are measurable in terms of the number of intervening topics which must be visited in order to get from one topic to another, and the kinds of relationships that define the path from one topic to another, if any, through the intervening topics, if any.

NOTE 1 Two topics may be connected through an association, and they can also be connected by virtue of sharing an occurrence.

In addition, information objects can have properties, as well as values for those properties, assigned to them externally. These properties are called *facet types*.

NOTE 2 The word *facet* can mean one side of a many-sided, polished object, or one segment of a compound eye (e.g. an insect's). Its metaphorical use here captures the idea that a facet is a property of a set of information objects that can be used to create a view of them.

Several topic maps can provide topical structure information about the same information resources. The Topic Maps architecture is designed to facilitate merging topic maps without requiring the merged topic maps to be copied or modified. Because of their extrinsic character, topic maps can be thought of as *overlays* on, or extensions to, sets of information objects.

The base notation of Topic Maps is SGML; an interchangeable topic map always consists of at least one SGML document, and it may include and/or refer to other kinds information resources. A set of information resources that comprise a complete interchangeable topic map can be specified using the 'bounded object set (BOS)' facility defined by the HyTime architecture in ISO/IEC 10744:1997.

As the Extensible Markup Language (XML), a World Wide Web Consortium recommendation, is a subset of SGML, as explained in Annex K of SGML (1997), also known as WebSGML, XML can be also used as a base notation for Topic Maps.

The topic map notation is defined as an *SGML Architecture*, and this International Standard takes the form of an *architecture definition document* expressed in conformance with Normative Annex A.3 of ISO/IEC 10744:1997, the *SGML Architectural Form Definition Requirements* (AFDR). The formal definition of the topic map notation is expressed as a meta-DTD.

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Information technology — SGML Applications — Topic Maps

1 Scope

NOTE 1 This clause defines the scope of this International standard. It should not be confused with the concept of "scope" defined in 3.16, which only applies in the context of Topic Maps.

Topic maps enable multiple, concurrent views of sets of information objects. The structural nature of these views is unconstrained; they may reflect an object oriented approach, or they may be relational, hierarchical, ordered, unordered, or any combination of the foregoing. Moreover, an unlimited number of topic maps may be overlaid on a given set of information resources.

Topic maps can be used:

- To qualify the content and/or data contained in information objects as topics to enable navigational tools such as indexes, cross-references, citation systems, or glossaries.
- To link topics together in such a way as to enable navigation between them. This capability can be used for virtual document assembly, and for creating thesaurus-like interfaces to corpora, knowledge bases, etc.
- To filter an information set to create views adapted to specific users or purposes. For example, such filtering can aid in the management of multilingual documents, management of access modes depending on security criteria, delivery of partial views depending on user profiles and/or knowledge domains, etc.
- To structure unstructured information objects, or to facilitate the creation of topic-oriented user interfaces that provide the effect of merging unstructured information bases with structured ones. The overlay mechanism of topic maps can be considered as a kind of *external markup mechanism*, in the sense that an arbitrary structure is imposed on the information without altering its original form.

This International Standard does not require or disallow the use of any scheme for addressing information objects. Except for the requirement that topic map documents themselves be expressed using SGML (or WebSGML) and HyTime, using the syntax described herein, neither does it require or disallow the use of any notation used to express information.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 8879:1986, *Information processing — Text and office systems — Standard Generalized Markup Language (SGML)*, including Technical Corrigenda 1, 2, and 3.

ISO 10744:1997, *Information processing — Text and office systems — Hypermedia/Time-based Structuring Language (HyTime)*, including Amendment 1.

3 Definitions

For the purposes of this International Standard; the following definitions apply.

The definitions provided in ISO 8879:1986 (including TC1, TC2 and TC3) and ISO/IEC 10744:1997 (including Amendment 1) shall apply to this International Standard.

3.1 added themes

Topics added to the sets of themes comprising the scopes within which topics have their topic characteristics. Added themes can be specified in two ways:

- a) Within the topic map document whose scopes are affected, by means of the **added themes** (*addthems*) attribute of the document element. The specified themes are added to the scopes of all of the topic characteristics which are assigned to topics via the topic links and association links contained in the document.
- b) Inside or outside the topic map document whose scopes are affected, by means of elements conforming to the **themes to be added** (*addthms*) architectural form. The specified themes are added to the topic characteristics assigned to topics via:
 - entire topic map documents (specified via the *tmdocs* attribute),
 - topic links (that is, the name characteristics and occurrence characteristics assigned to topics via topic links) (specified via the *cassign* attribute),
 - association links (that is, the roles played in associations by topics, as assigned to topics via association links) (specified via the *cassign* attribute), or
 - any combination of the foregoing.

3.2 association

See 'topic association'.

3.3 association link

A hyperlink element conforming to the association link architectural form defined by this International Standard. See 5.3.

3.4 association role

One of the roles that topics play in a given topic association.

3.5 association type

- a) A subject which is a class of topic associations.
- b) One of the classes of topic associations of which a particular association link is an instance. The association types of which a given association link is an instance can be specified by its optional *types* attribute.

3.6 base name

- a) A subelement (*basename*) of a *topname* subelement of a topic link.

b) A name characteristic of a topic that is specified in the content of a *basename* element.

3.7 bounded object set (BOS)

A set of one or more documents and other information objects, all of which are known to the processing application and which are processed collectively. See ISO/IEC 10744:1997 for details; see also the definition of 'hub document'.

3.8 display name

a) A subelement (*dispname*) of a *topname* subelement of a topic link, containing the identifying information intended to be displayed by the application to represent the subject of the topic link.

b) A name characteristic of a topic that is specified in the content of a *dispname* element.

3.9 facet

a) The subset of information objects that share an externally-applied property.

b) The values given to a particular property externally applied to a set of information objects.

3.10 facet link

A hyperlink that applies values for a given property (as well as the property itself) to one or more information objects.

3.11 facet type

A property applied by one or more facet links to one or more objects.

3.12 facet value

A member of the set of all values of a particular facet type.

3.13 hub document

The HyTime document used to define the set of information resources (the *bounded object set* (BOS)) that comprise a HyTime hyperdocument. Applications may regard the HyTime document used as the entry point for a browsing session within a hyperdocument as the hub document. See ISO/IEC 10744:1997 for details. By definition, a topic map is a HyTime hyperdocument, and any topic map document can be regarded as a hub document.

3.14 occurrence role

The sense in which some set of occurrences is relevant to a topic. In the Topic Maps architecture, occurrence roles are specified as anchor roles (as defined in the HyTime architecture) of topic links.

3.15 public subject descriptor

A subject descriptor (see the definition of 'subject descriptor') which is used (or, especially, which is designed to be used) as a common referent of the *identity* attributes of many topic links in many topic maps. The subject described by the subject descriptor is thus easily recognized as the common binding point of all the topic links that reference it, so that they will be merged.

3.16 scope

NOTE 2 The definition of scope provided here should not be confused with 1, entitled 'Scope', which defines the scope of this International Standard.

The extent of the validity of a topic characteristic assignment (see the definition of ‘topic characteristic assignment’): the context in which a name or an occurrence is assigned to a given topic, and the context in which topics are related through associations. This International Standard does not require that scopes be specified explicitly. If the scope of a topic characteristic assignment is not explicitly specified via one or more *scope* attributes, the scope within which the topic characteristic applies to the topic includes all the topics in the entire topic map; this special scope is called ‘the unconstrained scope’. If a scope is specified, the specification consists of a set of topics, which, in the context of their role as members of such a set, are called ‘themes’. Each theme contributes to the extent of the scope that the themes collectively define; a given scope is the union of the subjects of the set of themes used to specify that scope.

NOTE 3 If it is desired to specify a scope which is the intersection (rather than the union) of two topics, this can be accomplished by creating a topic whose subject is that intersection, and then by using that topic as a theme.

3.17 sort name

- a) A subelement (*sortname*) of a *topname* subelement of a topic link, containing a string that is an alternative representation of a topic name that is intended to be used for alphabetic or other ordering.
- b) A name characteristic of a topic that is specified in the content of a *sortname* element.

3.18 subject

In the most generic sense, a ‘subject’ is any thing whatsoever, regardless of whether it exists or has any other specific characteristics, about which anything whatsoever may be asserted by any means whatsoever.

NOTE 4 The invisible heart of every topic link is the subject that its author had in mind when it was created. In some sense, a topic link reifies a subject. The *identity* attribute of a topic link is provided to allow the author of the topic link to indicate, as unambiguously as possible, the subject he had in mind as the organizing principle of the topic. See the definition of ‘subject descriptor’.

3.19 subject descriptor

Information which is intended to provide a positive, unambiguous indication of the identity of a subject, and which is the referent of an *identity* attribute of a topic link. (See also the definition of ‘public subject descriptor’.)

NOTE 5 There is no requirement that a subject descriptor be text, although it can be the text of a definition of the subject. It can also, for example, be a listing in a catalog of subjects, such as an acquisition number of an asset in a museum collection, a catalog number in a sales catalog, or a subject heading in a catalog of library subject headings. The distinction between a subject descriptor that happens to be a definition and an ordinary occurrence of a definition is that, in the case of the subject descriptor, the topic link's author has indicated (by referring to it by means of the value of the *identity* attribute) that it is to be regarded as the authoritative definition of the organizing principle of the topic link. In the other case, by characterizing a definition as a definitional occurrence, the author is merely acknowledging the existence of the definition and its possible relevance to the subject of the topic link.

NOTE 6 Subject descriptors may be offline resources.

3.20 theme

A member of the set of topics comprising a scope within which a topic characteristic assignment is valid. See also the definitions of ‘scope’ and ‘topic’.

3.21 topic

- a) An aggregate of topic characteristics, including zero or more names, occurrences, and roles played in associations with other topics, whose organizing principle is a single subject.
- b) A topic link element. See 5.2.

3.22 topic association

- a) A specific relationship among specific topics that is asserted by an association link element.
- b) An association link element. See 5.3.

3.23 topic characteristic

Any defining characteristic of a topic. There are three kinds of topic characteristics:

- a) names,
- b) occurrences, and
- c) roles played in relationships ('associations') with other topics.

For example, a name of a topic is a 'name characteristic' of that topic.

3.24 topic characteristic assignment

- a) The mechanism whereby a topic characteristic becomes a characteristic of a topic. For example, *topname* subelements of topic link elements are used to assign names to topics as topic characteristics, so, in topic map documents, they perform the function of assigning topic name characteristics.
- b) The fact that a particular topic characteristic is a characteristic of a particular topic.

3.25 topic link

A hyperlink element conforming to the topic link architectural form defined in 5.2 by this International Standard.

NOTE 7 In this International Standard, the foregoing definition is invoked by the phrase 'topic link', or, since the default SGML name of the topic link architectural form is 'topic', by the special typography used to distinguish SGML names (i.e., *topic*).

NOTE 8 See also the definition of 'topic'.

3.26 topic map

- a) A set of information resources regarded by a topic map application as a bounded object set whose hub document is a topic map document conforming to the SGML architecture defined by this International Standard.
- b) Any topic map document conforming to the SGML architecture defined by this International Standard, or the document element (*topicmap*) of such a document.

- c) The document element type (*topicmap*) of the topic map document architecture.

3.27 topic name

- a) A string of characters specified as a name of a topic; a name characteristic of a topic.
- b) A topic name (*topname*) element, as defined by this International Standard.
- c) Either a base name (*basename*), display name (*dispname*) or name to be used as sort key (*sortname*) element, as defined by this International Standard, and/or the information that such an element contains.
- d) A combination of the foregoing definitions.

3.28 topic occurrence

Information that is specified as relevant to a given subject.

NOTE 9 Topic occurrences may be offline resources.

3.29 topic type

- a) A subject which is a class of topics.
- b) One of the classes of topics of which a particular topic link is an instance. The topic types of which a given topic link is an instance can be specified via its optional *types* attribute.

3.30 unconstrained scope

The scope comprised of all of the topics in a topic map. When no applicable *scope* attributes are explicitly specified as governing a topic characteristic assignment, the scope within which the topic characteristic assignment is made is the unconstrained scope.

NOTE 10 In other words, the unconstrained scope is the default scope. Thus, for example, in a given topic map, if no *scope* attributes are explicitly specified for the name characteristics of any topics, any two topic links that have any of the same names will be merged, due to the effect of the topic naming constraint.

4 Notation

Topic Maps is an enabling document architecture whose definition (this International Standard) conforms to the Architectural Form Definition Requirements in Normative Annex A.3 of ISO/IEC 10744:1997, the *SGML Architectural Form Definition Requirements* (AFDR). The formal definition of the topic map notation is expressed as a meta-DTD. The specification of the Topic Maps architecture is accomplished by a combination of narrative text and formal definitions.

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NOTE 11 This document uses editorial conventions mandated by the ISO with which the reader should be familiar in order to understand the implications of certain words.

The text describing each construct emphasizes semantics, while the formal SGML definition provides the rigorous syntactic definitions underlying the text descriptions.

NOTE 12 For this reason, it is recommended that the reader refer to the SGML definitions while reading the textual descriptions. Although the SGML definition always follows the related text, the user may find it helpful to read the SGML first in some cases. The meta-DTD is found in "Annex A: Topic Maps Meta-DTD (Normative)".

When a construct is first introduced, it is described in the text. If the construct occurs in the formal SGML specification, both the formal SGML name and a full name in English are presented, as follows:

— The element form **full construct name** (*SGMLname*) ...

— The attribute **full construct name** (*SGMLname*) ...

The declarations include comments, called "conventional comments", that follow conventions established in the HyTime standard to specify syntactic and semantic constraints and other information that is known to an architecture engine such as a Topic Maps engine. The conventional comments do not extend SGML in any way. They are used in the architecture definitions only, as a notation for the documentation of the architecture. They need not be included in application DTDs and, if they are included, the SGML parser will treat them as it would any other comment.

4.1 RCS name, full name, description, and clause

Every form name is followed by comments giving the full name, a description of the form, and the number of the clause in this International Standard in which the form is defined.

Individual attributes have a full name and description comment.

4.2 Constraints

Comments labeled "Constraints" define additional semantic or syntactic constraints on the constructs they follow. Constraint comments that follow the name of a form define constraints on the use of that form in general. Constraint comments that follow a component of a declaration (for example, the default value prescription of an attribute declaration), define the specific constraints on that component.

4.3 Note

Note comments provide additional information not provided by the other comment types and are informational rather than constraining.

5 Topic Maps architecture

This clause defines the syntax of topic maps. The Topic Maps syntax makes use of the base, location address, and hyperlinking modules of the HyTime architecture as defined in clauses 6, 7 and 8 of ISO/IEC 10744:1997.

NOTE 13 The entire formal definition of the Topic Maps syntax, the Topic Maps meta-DTD, is found in normative Annex A of this International Standard.

When interchanged, topic maps are HyTime bounded object sets (BOSs). The hub document of such a BOS must contain a Topic Maps architectural support declaration (see Annex B for examples).

Only one of the hyperlink syntaxes defined by HyTime is used in the topic map syntax: **variable link** (*varlink*).

The HyTime architecture provides a comprehensive set of addressing mechanisms and a standard syntax for using them. In addition, it provides means whereby any addressing syntax can be declared and used. The topic map architecture preserves these features of HyTime. Thus, the Topic Maps architecture allows topic map authors to use any addressing scheme, including proprietary addressing mechanisms driven by expressions in any notations, provided each such notation is formally declared as a notation in the manner prescribed by the SGML and HyTime International Standards.

NOTE 14 For example, in an XML environment, location addressing can be accomplished using IETF Uniform Resource Locator (URL) notation.

5.1 Topic Map Architectural Form

The **topic map** (*topicmap*) element form is used as the document element of all documents that conform to the Topic Maps architecture defined by this International Standard.

The effect of specifying the **added themes** (*addthems*) attribute is to add the themes that it references to the scopes of all of the topic characteristic assignments made throughout the document of which the element is the root element.

NOTE 15 See the definition of 'added themes'.

NOTE 16 The *addthems* attribute can be used to acknowledge and document the fact that the document specifies only topic characteristic assignments that are within the scope defined by the set of themes that it specifies. It can be used to avoid specifying these common themes explicitly in every scope. After a topic map document is merged with other topic map documents, the contributions that it made to the resulting merged topic map can be distinguished from the contributions of all others by virtue of the fact that everything it contributed continues to appear within the scopes of the topics specified by the *addthems* attribute of its document element.

The *topicmap* element type is derived from the document element type of the HyTime architecture (*HyDoc*). All of the remaining attributes (*maxbos*, *boslevel* and *grovplan*) are inherited from *HyDoc*. The optional *maxbos* and *boslevel* attributes are used in hub documents in specifying the members of the HyTime bounded object set rooted at the document. The optional *grovplan* attribute is used in HyTime addressing. (See ISO/IEC 10744:1997.)

NOTE 17 As the use of the TMCFC parameter entity indicates, valid topic map documents may or may not have any topic links, association links or facet links in them. Some conforming applications may support only *facet* element types, while others may not support *facet* element types.

```
<!entity %
  TMCFC          -- Topic map context-free content --
  "topic|assoc|facet|bosspec|addthms|TMBrid"
>
<!element
  TMBrid          -- Topic map bridge element --
  - O
  ANY
>

<!element
  topicmap        -- Topic map document element --
                  -- Clause: 5.1 --
  - O
  (%TMCFC;)*
>
<!attlist
  topicmap
    HyTime        -- HyTime architectural form name --
    NAME
    HyDoc         -- HyTime document element. (This
                  -- attribute definition is redundant; it
                  -- appears here as an aid to
                  -- understanding.) --
    addthms       -- Added themes --
                  -- Themes to add to all scopes that govern
                  -- the assignments of topic names,
                  -- occurrences, and roles played in
                  -- associations in this topic map
                  -- document. --
    CDATA         -- Reference --
                  -- Reftype: topic+ --
    #IMPLIED      -- Default: No themes added via this
                  -- attribute. --
    -- bos --     -- HyTime bounded object set --
                  -- HyTime Clause: 6.5.1 --
    maxbos        -- Maximum bounded object set level --
                  -- Bounding level of HyTime bounded object
                  -- set when document is a hub or
                  -- subhub. --
    NUMBER        -- Constraint: Depth of nested entities to
                  -- include in BOS (0=no limit, 1=hub only)
                  --
    0
    boslevel      -- Bounded object set level --
                  -- Default BOS level used by data entities
                  -- declared in hub document. --
    NUMBER        -- Constraint: Depth of nested entities to
                  -- include in BOS (0=no limit, 1=this
                  -- entity only) --
    #IMPLIED      -- Default: No HyTime BOS --
    -- bosspecat -- -- BOS exception specification attributes
                  --
                  -- HyTime Clause: 6.5.3 --
    bosspec       -- Bounded object set exception
                  -- specification --
```

```

-- Adjustments to be made to the bounded
-- object set. --
IDREFS      -- Reference --
-- Reftype: bosspec+ --
-- Constraint: Must be internal reference
--
#IMPLIED    -- Default: No BOS exception specification
--
-- dgrvplan -- -- HyTime document grove plan --
-- HyTime Clause: 7.1.4.1 --
grovplan     -- Grove plan --
-- Grove plan for HyTime extended SGML
-- document grove --
CDATA       -- Reference --
-- Reftype: grovplan --
#IMPLIED    -- Default: HyTime default grove plan --
>

```

5.2 Topic link

5.2.1 Topic Link Architectural Form

The **topic link** (*topic*) element form is used to assign topic name characteristics and topic occurrence characteristics to a topic.

Every topic link is intended by its author to be organized around exactly one subject, regardless of whether that subject is explicitly defined anywhere. A topic link may declare zero or more names and zero or more pieces of information ('occurrences') that are relevant to its subject. Names, and the scopes within which the names are applicable to the subject, are declared by means of *topname* subelements. Occurrences are the anchors of the topic link; these, and the scopes within which the occurrences are applicable to the subject, are specified by means of *occurs* subelements.

The required **unique identifier** (*id*) attribute facilitates the addressing of topics by association links, by the *identity* attributes of other topic links, and, in their roles as themes in scopes, by *scope* and *addthems* attributes.

The optional **subject identity** (*identity*) attribute refers to one or more indications ('subject descriptors') of the identity of the subject (the organizing principle) of the topic link. All of the other topic characteristics specified by the topic link are regarded as elaborating, and in no way contradicting, the subject described by the subject descriptor(s), if any. There are no restrictions on the kinds of information that may be referenced by an *identity* attribute.

NOTE 18 The information referenced by an *identity* attribute may or may not take the form of a topic link in a topic map document, may or may not be text, may or may not be machine-interpretable, and may or may not be online.

Any two or more topic links that reference the same subject by means of their *identity* attributes are equivalent to a single topic link that has the union of the characteristics (the names, occurrences, and associations) of both topic links. The two or more topic links may be merged, and/or applications may process and/or render them as if they have been merged.

NOTE 19 The two or more topic links do not have to refer to the same subject descriptor in order to be merged under this rule. It is only necessary that the subject that is somehow indicated by the two *identity* attributes be one and the same subject. If two or more topics refer to exactly the same subject descriptor, the subject descriptor may be described as a

‘public subject descriptor’, and it becomes possible to automate the merging of all such topics by making the assumption that, if they all share the same subject descriptor, they all share the same subject identity.

Similarly, if the *identity* attribute references one or more topic links, topic map processing applications must regard the referencing topic link, and all the referenced topic links, as having one and the same subject, and therefore they may all be merged.

The optional **topic types** (*types*) attribute references one or more topic links. The subject of each such referenced topic link is a class of subject of which the subject of the referencing topic link is an instance. The class-instance relationship established between the subject of each referenced topic link and the subject of the referencing topic link could alternatively be established by a topic association link whose semantic is the relationship between a class and an instance of that class.

NOTE 20 In other words, the *types* attribute establishes a relationship between topics (a topic association), rather than being a means whereby the referencing topic becomes an occurrence of each of the referenced topics.

The topic relationships established by the *types* attribute are not superclass-subclass relationships. They are only class-instance relationships.

NOTE 21 Superclass-subclass relationships between topics can be asserted by topic association links that have been user-defined for that purpose.

The optional **scope** (*scope*) attribute references the themes that are added to the scopes within which all names and occurrences specified by the topic link are valid.

NOTE 22 The *scope* attribute of the topic link architectural form is designed to permit a reduction in syntactic redundancy by providing a means whereby the themes that are common to the scopes within which all the names and occurrences of a topic are valid can be specified once for all. There is no requirement that it be used, however, even if its use would reduce redundancy.

A valid topic link must have at least one of the following: a topic name, a topic occurrence, or a role played in an association with at least one other valid topic.

The *topic* element type is derived from the *varlink* element type of the HyTime architecture.

NOTE 23 However, because it is possible to have a topic link without any *occurs* elements inside it, while (at the time of publication of this International Standard) the HyTime architecture requires that *varlink* elements always contain at least one *anchspec*, it is necessary that the value of the HyTime attribute be *HyBrid* when there are no contained *occurs* elements, and that it be *varlink* when there are any such contained *occurs* elements. It is anticipated that future versions of the HyTime architecture will permit varlink elements that contain no anchspec elements, and if such a change in the HyTime standard is made, it will be possible to fix the value of the *HyTime* attribute of all *topic* elements at *varlink*.

The optional **hyperlink type** (*linktype*) attribute is defined by the HyTime architecture in order to allow the link type name to be different from the generic identifier.

NOTE 24 Neither the value of the *linktype* attribute nor the generic identifier of a topic link has any significance with respect to the topic mapping semantics defined by this International Standard.

```
<!element
  topic          -- Topic link --
                -- Clause: 5.2.1 --
  - 0
  ( topname | occurs)*
>
<!attlist
  topic
```

```

HyTime      -- HyTime architectural form name --
(varlink|HyBrid)
varlink     -- Constraint: varlink must be specified
            when occurrences exist. If topic has no
            occurrences, it must be declared as a
            HyTime bridge element (HyBrid). --
id          -- Unique identifier --
  ID
  #REQUIRED
identity    -- Subject identity --
            -- Reference to information (one or more
            subject descriptors) that confers
            understanding of the identity of the
            subject of this topic link. --
  CDATA     -- Reference --
  #IMPLIED  -- Default: No subject descriptors; the
            subject must be inferred from the
            topic's characteristics. --
types       -- Topic types --
            -- Topics whose subjects are the classes
            of topics of which this topic is an
            instance. --
  CDATA     -- Reference --
            -- Reftype: topic+ --
  #IMPLIED  -- Default: No class-instance topic
            associations are established via this
            attribute. --
            -- Note: Some might still be specified by
            topic association links, however. --
scope       -- Scope --
            -- The themes that are added to the scopes
            of all the names and occurrences
            specified by this topic link. --
  CDATA     -- Reference --
            -- Reftype: topic+ --
  #IMPLIED  -- Default: No themes are added by this
            attribute. --
linktype    -- Hyperlink type --
  NAME
  #IMPLIED  -- Default: Generic identifier --
>

```

5.2.2 Topic Name Architectural Form

A topic may have zero or more name characteristics (topic names). Topic names are specified using **topic name** (*topname*) elements; all such names become topic characteristics of the topic whose subject is the subject of the containing topic link.

This International Standard distinguishes three kinds of topic name: **base name** (*basename*), **display name** (*dispname*), and **name used as sort key** (*sortname*), specified by means of the three corresponding element types that a *topname* element may contain.

The **scope** (*scope*) attribute of the *topname* element specifies the themes that are common to the scopes of all of the topic name characteristics specified by the contained *basename*, *dispname* and *sortname* elements. The scope is the context (or area of validity) in which the name characteristic(s) specified by a *topname* element is/are assigned to the topic whose subject is the subject of the containing topic link.

The *scope* attributes of the contained name elements (*basename*, *dispname* and *sortname*) may be used to add more themes on a name-by-name basis, in the same manner as the *scope* attribute of the containing *topname* element.

NOTE 25 Thus, the *scope* attribute of the *topname* element form is really just a means of avoiding the syntactic redundancy of specifying the themes common to the contained elements separately via the *scope* attribute of each contained element.

NOTE 26 See also the definitions of 'theme' and 'scope' in 3.

If no *scope* attribute is specified by a *basename*, *dispname* or *sortname* element and no *scope* attribute is specified by its containing *topname* nor by the containing *topname*'s containing *topic* link, then the scope of the name characteristic specified by that *basename*, *dispname* or *sortname* is unconstrained. If any of the aforementioned *scope* attributes are specified, then the scope is constrained to the themes specified by those scope attributes, even if the *scope* attributes specify no themes, plus any themes added via any applicable *addthms* elements in the bounded object set, plus any themes added via the *addthms* attribute of the containing *topicmap* document element.

The content of the optional **display name** (*dispname*) element specifies a name that is designed to be displayed by an application to a user, when the name specified by the *basename* elements within the same containing *topname* should not be used for display purposes.

NOTE 27 The display name can be used to specify an abbreviated name for use in situations where display resources are limited, or it can be a graphic expressed in some data content notation.

The content of the optional **name to be used as sort key** (*sortname*) element specifies a name that is designed to be used to represent the topic in a sorting process that arranges a list of topics in some order, when the name specified by the *basename* elements within the same containing *topname* should not be used for that purpose.

NOTE 28 Thus, the *basename* elements, at least one of which is required, is also, in effect, the default content of the optional *dispname* and *sortname* elements. If no *dispname* elements are specified, the *basename* elements are to be used as display names. Similarly, if no *sortname* elements are specified, the *basename* elements are to be used as sort keys.

The data content of both *basename* and *sortname* elements must be text strings, and they may be words or phrases. The data content of a *dispname* element may be either a text string or notation data; if it is notation data, it may be a displayable graphic or other information intended to identify the subject to one or more of the senses of the user of the topic map. If the content of a *dispname* is notation data, it must declare the notation via the HyTime-defined *notation* common attribute (see ISO/IEC 10744:1997).

NOTE 29 There are two reasons why base names, display names, and names used as sort keys may share a single containing *topname* element:

- a) to allow them to share a common scope, specified via the *scope* attribute of the containing *topname* element, and/or
- b) to indicate that base names, display names, and sort keys correspond to one another. Therefore, if a one-to-one relationship is desired between base names and display names, for example, each pair, consisting of one base name and one display name, must be contained in a separate *topname* element. However, if no display names or sort names are used, and many base names of a single topic have the same scope, all of the base names may appear within a single *topname* element.

This International Standard does not permit two distinct subjects to have the same name characteristic within exactly the same scope (the 'topic naming constraint'). When topic maps are processed, each distinct set of themes that serves as a scope constitutes a namespace in which no two subjects can have the same name. If a conforming topic map application detects a situation in which multiple topic links have the same name characteristic within the same scope, they shall be merged.

NOTE 30 This means that applications that render the topic map will behave as though there was only a single topic link whose characteristics comprise the union of the topic characteristics of all of the topic links that had the same name within the same scope.

NOTE 31 The topic naming constraint is designed to preserve the ability to identify subjects unambiguously in terms of their topic name characteristics. The topic naming constraint is also necessary in order to support the most basic functionality of indexes and glossaries, which must make distinctions between the various meanings of words and phrases in order to support navigation to the relevant occurrences. Topic map authors must use scopes to distinguish between the different meanings of any name that is used for more than one subject. Consequently, if a topic map author does not wish to specify *scope* attributes explicitly, that author cannot use the same name for any two different subjects, because the default scope is a single scope: the unconstrained scope. Since any two identical names will appear within that single scope, the two subjects of which the two names are topic characteristics will be automatically merged. Such merging is erroneous and extremely undesirable unless the two topic links that have the same name in the same scope also have the same subject identity.

NOTE 32 As an aid to topic map authors, topic map authoring and merging applications may be designed in such a way as to give warning when topic links are being merged on account of the fact that they have the same name in the same scope.

NOTE 33 One of the effects of the topic naming constraint is that the merging of topic maps can be accomplished in such a way as to make the merger maintainable even when the member topic maps are maintained separately, asynchronously, and with no extra, agreed-upon discipline (such as some sort of element naming discipline) designed to permit easy maintenance of references among the component documents of the merged topic map. The topic naming constraint makes the addressing of the subjects covered by topic maps dependent only on their names and the distinguishing criteria of their names (the scopes within which their name characteristics are valid), and not on the organization or tagging of their corresponding topic links. The process of merging topic maps can be accomplished by creating a topic map hub document that specifies other topic maps as being members of its BOS, and that contains topic links whose names are the same as the names of topics in the member topic map documents, within the same scopes. The process of replacing one of the component topic maps with a newer version of itself is a matter of replacing the old version with the new version, and reprocessing the bounded object set in the usual way. There may be name and scope changes in the new version which will necessitate some thought and effort on the part of the operator in order to obtain the best possible merger, but the required effort will be limited to the resolution of issues created by the changes that were made to the component topic maps since the last merger was completed.

NOTE 34 If any two topic maps that are to be merged conflict with one another because they happen to provide the same name within the same scope for two different subjects, the merger of the different subjects can be prevented by applying different added themes to one or both of their containing topic map documents, using one or more *addthms* elements. The added themes specified by such *addthms* elements can serve to distinguish the two identical names, because they will no longer appear within exactly the same scope.

```
<!element
  topname          -- Topic name --
                  -- Clause 5.2.2--
  0..1
  (basename+, dispname*, sortname* )
                  -- If dispnames or sortnames are not
                  -- specified, applications use basenames
                  -- for display and sorting purposes. --
>
<!attlist
  topname
  scope            -- Scope --
                  -- Reference to a set of themes (topic
                  -- links) to be added to the scopes of the
                  -- name characteristics specified by the
                  -- contained basename, dispname, and
                  -- sortname elements. Scopes are sets of
                  -- themes that collectively define the
                  -- limited context within which
                  -- characteristics are validly applicable
                  -- to the topic. --
```

```

        CDATA          -- Reference --
                        -- Reftype: topic+ --
        #IMPLIED       -- Default: No themes are added via this
                        attribute. --
>
<!element
  (basename | sortname)
                        -- Base name --
                        -- and --
                        -- Name to be used as sort key --
  - 0
  (#PCDATA)           -- String to be used as name --
>
<!element
  dispname            -- Display name --
  - 0
  (#PCDATA|TMBrid)*
                        -- String (or notation data) to be
                        displayed as name --
>
<!attlist ( basename | sortname | dispname)
  scope              -- Scope --
                        -- References to a set of themes (topic
                        links) to be added to the scope of the
                        name characteristic specified in the
                        content. --
        CDATA          -- Reference --
                        -- Reftype: topic+ --
        #IMPLIED       -- Default: No themes are added via this
                        attribute. --
>

```

5.2.3 Topic Occurrence Architectural Form

By means of location addresses specified in its content, the **topic occurrence** (*occurs*) element references information (one or more ‘occurrences’) that is relevant to the subject of the containing topic link. This International Standard imposes no constraints on the nature of information objects that can be specified as occurrences of topics, nor on the addressing notations used to reference such occurrences.

NOTE 35 Applications may impose such constraints.

NOTE 36 Topic occurrences may be offline resources.

All of the occurrences specified by any given *occurs* element fall into a single user-defined category of occurrences called an ‘occurrence role’ -- the role played by the occurrences in contributing to the information that participates in the subject characterized by the containing topic link. Within a single topic link, more than one *occurs* element may reference the same information, in which case the information plays multiple occurrence roles.

NOTE 37 For example, if the subject of a topic link is Leonardo Da Vinci, there may be a ‘scientific-biography’ occurrence role, and a separate ‘artistic-biography’ occurrence role. Some information resources may fall into both categories; if so, such resources will be referenced by both of the *occurs* elements that correspond to the two occurrence roles.

The occurrence role is the scope within which the occurrences are relevant to the subject of the containing topic link. The set of themes (topics) that constitute the scope is specified via the optional **scope** (*scope*) attribute. If no *scope* attribute is specified by an *occurs* element, and no *scope* attribute is specified by its containing *topic* link element, then the scope of the occurrence

characteristics specified by that *occurs* element is unconstrained. If either of the aforementioned *scope* attributes are specified, then the scope is constrained to the themes specified by those *scope* attributes (even if the *scope* attributes specify no themes), plus any themes added via any applicable *addthms* elements in the bounded object set, plus any themes added via the *addthms* attribute of the containing *topicmap* document element.

The optional *occr1* attribute can be used to provide a mnemonic name for the occurrence role. If the *occr1* attribute is not specified, the generic identifier is regarded as the mnemonic name of the occurrence role.

The optional **occurrence role type** (*type*) attribute references a single topic link. The subject of the referenced topic link is a class of occurrence role of which the occurrence role expressed by the *occurs* element is an instance. The class-instance relationship established between the subject of the referenced topic link and the referencing *occurs* element could alternatively be established by making the *occurs* element an occurrence of the referenced topic link, within the scope of an occurrence role whose meaning is that the occurrence role is an instance of the subject of the topic link.

If the **occurrence role type** (*type*) attribute is specified, and if the topic referenced by the *type* attribute has a name characteristic that lies within a scope that is appropriate to the topic map user's context, the referenced topic's name characteristic is used to characterize the occurrence role for the user. Otherwise, the value of the *occr1* attribute (or, if the *occr1* attribute is not specified, the generic identifier) is used to characterize the occurrence role for the user.

NOTE 38 The topic referenced via the *type* attribute can have many names in scopes designed for many different user contexts, including many different natural languages and delivery platforms, while the *occr1* attribute or generic identifier is just a single token. Therefore, the use of a topic, referenced by the *type* attribute, to characterize the occurrence role offers far more flexibility and representational power than the simple mnemonic naming facility offered by the *occr1* attribute or generic identifier.

The *occurs* element type is derived from the *anchspec* element type of the HyTime architecture. Most of the remaining attributes (*linktrav*, *listtrav*, *multmem* and *emptyanch*) are inherited from the *anchspec* element type defined by the HyTime standard; these have been given default values that are generally appropriate for topic map applications, but they are not necessarily the same as the default values specified by the HyTime architecture (see ISO/IEC 10744:1997). The *HyNames* architectural control attribute is used here to indicate that for HyTime processing purposes the *occr1* attribute should be regarded as the HyTime *anchrole* attribute. (See ISO/IEC 10744:1997.)

```
<!element
  occurs          -- Topic occurrence --
                  -- Clause: 5.2.3 --
  - O
  (%loc;)*
>
<!attlist
  occurs
    HyTime        -- HyTime architectural form name --
    NAME
    #FIXED
    anchspec
    scope          -- Scope --
                  -- Reference to themes that are added to
                  -- the scope within which the occurrences
                  -- are applicable to the topic
                  -- characterized by the containing topic
                  -- link.--
    CDATA          -- Reference --
```



```

#IMPLIED      -- Reftype: topic+ --
-- Default: No themes are added to the scope
-- by means of this attribute. --
occr1         -- Occurrence role name --
-- Note: Not displayed for the topic map
-- user if the topic referenced by the
-- type attribute has displayable
-- characteristics within the user's
-- scope. --
NAME
#IMPLIED      -- Default: GI of element is treated as
-- occurrence role name. --
type         -- Occurrence role type --
-- Reference to the topic that names
-- and/or otherwise characterizes the
-- occurrence role. The characteristics
-- of the referenced topic, if
-- appropriate, will be displayed to the
-- user instead of the value of the occr1
-- attribute. --
CDATA        -- Reference --
#IMPLIED      -- Reftype: topic --
-- Default: No topic characterizes the
-- occurrence role, unless this element is
-- an occurrence (with an occurrence role
-- whose meaning is instance) of a topic
-- whose subject is the nature of the
-- occurrence role. The value of the
-- occr1 attribute will be displayed as
-- the occurrence role name. --
linktrav      -- Hyperlink traversal rules --
-- Traversal between anchors of hyperlinks:
-- A any traversal or departure (EID)
-- D departure after internal arrival
-- E traversal after external arrival
-- I traversal after internal arrival
-- N no traversal after internal arrival
-- P no internal arrival
-- R return traversal after internal arrival --
NAMES        -- Lextype: ("A"|"EI"|"ER"|"ED"|"EN"|"EP"|"ERD"|
-- "I"|"ID"|"D"|"N"|"P"|"R"|"RD") --
A
listtrav      -- List traversal rules --
-- Traversal between members of list anchors:
-- A adjacent (both left and right) traversal
-- L left traversal
-- N no traversal
-- R right traversal
-- W wrapping traversal --
NAMES        -- Lextype: ("A"|"AW"|"L"|"LW"|"N"|"R"|"RW") --
N            -- Default: Show the whole list --
multmem      (single|list|corlist)
list
emptyanc     (error|noterror)
error
HyNames
CDATA
"anchrole occr1"
>

```

5.3 Association Link

5.3.1 Association Link Architectural Form

The **association link** (*assoc*) element form is used to express relationships among topics. Topic Maps applications define the nature of the relationships, and of the roles played by topics in those relationships.

The optional **scope** (*scope*) attribute specifies the scope (the set of themes) within which the association is applicable to the topics that serve as anchors of the association link. If the *scope* attribute is not specified, the scope is unconstrained. If the *scope* attribute is specified, then the scope is constrained to the themes specified by the *scope* attribute (even if the *scope* attribute specifies no themes), plus any themes added via any applicable *addthms* elements in the bounded object set, plus any themes added via the *addthms* attribute of the containing *topicmap* document element.

The optional **hyperlink type** (*linktype*) attribute can be used to provide a mnemonic name for the association type. If the *linktype* attribute is not specified, the generic identifier is regarded as the mnemonic name of the association type.

The optional **association type** (*type*) attribute references a single topic link. The subject of the referenced topic link is a class of association of which the association expressed by the association link is an instance. The class-instance relationship established between the subject of the referenced topic link and the referencing association link could alternatively be established by making the association link an occurrence of the referenced topic link, with an occurrence role whose meaning is that the association link is an instance of the subject of the topic link.

NOTE 39 If topic links whose subjects are classes of topic associations specify *identity* attributes, and if the subject descriptor(s) referenced by the *identity* attributes describe the same subject, the association links that are instances of those classes can be universally recognized as assertions of equivalent relationships. Depending on the nature of such relationships, the use of public subject descriptors to define association types may significantly facilitate the process of merging topic maps, even when they emanate from disparate sources.

If the **association type** (*type*) attribute is specified, and if the topic referenced by the *type* attribute has a name characteristic that lies within a scope that is appropriate to the topic map user's context, the referenced topic's name characteristic is used to characterize the association type for the user. Otherwise, the value of the *linktype* attribute (or, if the *linktype* attribute is not specified, the generic identifier) is used to characterize the association type for the user.

NOTE 40 The topic referenced via the *type* attribute can have many names in scopes designed for many different user contexts, including many different natural languages and delivery platforms, while the *linktype* attribute or generic identifier is just a single token. Therefore, the use of a topic, referenced by the *type* attribute, to characterize the association type offers far more flexibility and representational power than the simple mnemonic naming facility offered by the *linktype* attribute or generic identifier.

```
<!element assoc      -- Association link --
  -- Clause: 5.3.1 --
  - O (assocrl)+ >
<!attlist assoc
  HyTime             -- HyTime architectural form name --
  NAME
  #FIXED
  varlink
  scope              -- Scope --
```

```

-- Reference to themes that are added to
-- the scope within which the association
-- is applicable. --
CDATA -- Reference --
-- Reftype: topic+ --
#IMPLIED -- Default: Scope is unconstrained. --
linktype -- Hyperlink type. --
-- Mnemonic name for the association
-- type. --
-- Note: Not displayed for the topic map
-- user if the topic referenced by the
-- type attribute has displayable
-- characteristics within the user's
-- scope. --
NAME
#IMPLIED -- Default: Generic identifier --
type -- Association type --
-- Topic whose subject is the class of
-- association of which this association
-- is an instance. --
CDATA -- Reference --
-- Reftype: topic --
#IMPLIED -- Default: No type is specified by this
-- attribute. --
-- Note: A type might exist by virtue of
-- the fact that this association link is
-- an occurrence (where the occurrence
-- role means "instance") of a topic whose
-- subject is the nature of the
-- association, however. --
>

```

5.3.2 Association Role Architectural Form

The **association role** (*assocrl*) element form specifies a user-defined role played by one or more specific topics in the relationship asserted by the containing association link element. The topics that play the role, if any, are referenced by means of the location addresses specified in the content of the association role element. Within a single association link, more than one *assocrl* element may reference the same topic, in which case the topic plays multiple roles in the association.

NOTE 41 Thus, the containing *assoc* element can assert that a topic has one or more specific relationships to itself.

Regardless of the association role(s) they play in the relationship expressed by the containing *assoc* element, all topics referenced in the content of the contained *assocrl* elements play their roles in that relationship within the same scope.

NOTE 42 This is the reason why there is no *scope* attribute on the *assocrl* element form.

The optional HyTime-defined **anchor role** (*anchrole*) attribute can be used to provide a mnemonic name for the association role. If the *anchrole* attribute is not specified, the generic identifier is regarded as the mnemonic name of the association role.

The optional **association role type** (*type*) attribute references a single topic link. The subject of the referenced topic link is a class of association role of which the association role expressed by the *assocrl* element is an instance. The class-instance relationship thus established between the subject of the referenced topic link and the referencing *assocrl* element could alternatively be established by making the *assocrl* element an occurrence of the referenced topic link, within the scope of an

occurrence role whose meaning is that the association role is an instance of the subject of the topic link.

NOTE 43 If the topic links whose subjects are association role types specify *identity* attributes, and if the subject descriptor(s) referenced by those *identity* attributes describe the same subject, the *assocrl* elements that are instances of those association role types can be universally recognized as specifications of equivalent association roles. Depending on the nature of such association roles, the use of public subject descriptors to define association role types may significantly facilitate the process of merging topic maps, even when they emanate from disparate sources.

If the **association role type** (*type*) attribute is specified, and if the topic referenced by the *type* attribute has a name characteristic that lies within a scope that is appropriate to the topic map user's context, the referenced topic's name characteristic is used to characterize the association role for the user. Otherwise, the value of the *anchrole* attribute (or, if the *anchrole* attribute is not specified, the generic identifier) is used to characterize the association role for the user.

NOTE 44 The topic referenced via the *type* attribute can have many names in scopes designed for many different user contexts, including many different natural languages and delivery platforms, while the *anchrole* attribute or generic identifier is just a single token. Therefore, the use of a topic, referenced by the *type* attribute, to characterize the association role offers far more flexibility and representational power than the simple mnemonic naming facility offered by the *anchrole* attribute or generic identifier.

The *assocrl* element type is derived from the *anchspec* element type of the HyTime architecture. The remaining attributes (*linktrav*, *listtrav*, *multmem* and *emptyanch*) are inherited from the *anchspec* element type defined by the HyTime standard; these have been given default values that are generally appropriate for Topic Maps applications, but which are not necessarily the default values specified by the HyTime architecture (see ISO/IEC 10744:1997).

```
<!element
  assocrl          -- Association role --
                  -- Clause: 5.3.2 --
  - 0
  (%loc;)+        -- Reftype: topic+ --
>
<!attlist
  assocrl
    HyTime        -- HyTime architectural form name --
    NAME
    #FIXED
    anchspec
    anchrole      -- Anchor role --
                  -- Note: Not displayed for the topic map
                  -- user if the topic referenced by the
                  -- type attribute has displayable
                  -- characteristics within the user's
                  -- scope. --
    NAME
    #IMPLIED      -- Default: GI of element is treated as
                  -- anchor role. --
    type          -- Association role type --
                  -- Reference to the topic that names
                  -- and/or otherwise characterizes the
                  -- association role. The characteristics
                  -- of the referenced topic, if
                  -- appropriate, will be displayed to the
                  -- user instead of the value of the
                  -- anchrole attribute. --
    CDATA         -- Reference --
                  -- Reftype: topic --
    #IMPLIED      -- Default: No topic characterizes the
                  -- association role, unless this element
                  -- is an occurrence (with an occurrence
```

```

role whose meaning is instance) of a
topic whose subject is the nature of
the association role. The value of the
anchrole attribute will be displayed as
the association role name. --
linktrav -- Hyperlink traversal rules --
-- Traversal between anchors of hyperlinks:
A any traversal or departure (EID)
D departure after internal arrival
E traversal after external arrival
I traversal after internal arrival
N no traversal after internal arrival
P no internal arrival
R return traversal after internal arrival --
NAMES -- Lextype: ("A"|"EI"|"ER"|"ED"|"EN"|"EP"|"ERD"|"
      "I"|"ID"|"D"|"N"|"P"|"R"|"RD" --
A
listtrav -- List traversal rules --
-- Traversal between members of list anchors:
A adjacent (both left and right) traversal
L left traversal
N no traversal
R right traversal
W wrapping traversal --
NAMES -- Lextype: ("A"|"AW"|"L"|"LW"|"N"|"R"|"RW") --
N -- Default: Show the whole list --
multmem
(single|list|corlist)
list
emptyanc
(error|noterror)
error
>

```

5.4 Themes To Be Added Architectural Form

The **themes to be added** (*addthms*) element allows themes to be added:

- to all the scopes of all topic characteristic assignments (that is, all topic names, topic occurrences and roles played in associations with other topics) specified by topic links and topic associations in the topic map documents referenced via the **topic map document entities** (*tmdocs*) attribute, and/or
- to the scopes of all topic names and topic occurrences specified by specific topic links (and the subelements of topic links) referenced via the **characteristic assigners** (*cassign*) attribute, if any, and/or
- to the scopes of all roles played by topics in topic associations specified by specific association links referenced via the **characteristic assigners** (*cassign*) attribute, if any.

The **added themes** (*addthems*) attribute's value is a reference to one or more topic link elements. The referenced topic link elements must be regarded by topic map applications as additional themes in the scopes of the topic characteristics specified via the *tmdocs* and *cassign* attributes.

The *tmdocs* and *cassign* attributes are independent of one another. If both are specified, the *tmdocs* attribute does not establish a location source for the addresses specified via the *cassign* attribute; the *cassign* attribute must be used in such a way that it establishes its own location source(s).

NOTE 45 When topic maps are to be merged, the *tmdocs* attribute can be used to allow applications to distinguish between the characteristics of topics in terms of the different topic maps that contributed those characteristics. For example, a topic can be created that represents the rhetorical position or purpose of a given topic map, and then, by means of an *addthms* element, that a new topic can be used as an additional scope within which all the topic characteristics specified by the topic map are said to be valid. After the topic map document is merged with other topic map documents, the contributions that it made to the resulting merged topic map can be distinguished from all others by virtue of the fact that everything it contributed continues to appear within the scope of the topic representing the document or hyperdocument that contributed it.

NOTE 46 The *addthms* element's content is not defined by the Topic Maps architecture.

```
<!element
  addthms          -- Themes to be added --
                  -- (To scopes specified by topic map
                  -- documents and/or by topic links and/or
                  -- association links.) --
                  -- Clause: 5.4 --
  - O
  (TMBrid)*        -- No content defined by the Topic Maps
                  -- architecture --
>
<!attlist
  addthms          -- Themes to be added --
                  -- Clause: 5.4 --
  addthms          -- Added themes --
                  -- Themes to be added to the scopes
                  -- specified by the tmdocs and cassign
                  -- attributes --
  CDATA            -- Reference --
                  -- Reftype: topic+ --
  #REQUIRED
  tmdocs            -- Topic map document entities --
  ENTITIES         -- Constraint: Must be one or
                  -- more document entities of
                  -- topic map documents. --
  #IMPLIED
  cassign           -- Characteristic assigners --
                  -- Elements that assign characteristics to
                  -- topics. The themes specified by the
                  -- addthms attribute are to be added to
                  -- the scopes within which the
                  -- characteristics they specify are
                  -- regarded as valid --
  CDATA            -- Reference --
                  -- Reftype: (topic | topname | basename |
                  -- dispname | sortname | occurs | assoc)+
                  --
  #IMPLIED
>
```

5.5 Facet Linking

By means of the *facet linking* facility, property/value pairs can be added to read-only information objects. The properties are called *facet types*, and the values are called *facet values*. This International Standard does not constrain the nature of facet linking applications; they may or may not also use topic links.

NOTE 47 The property/value pairs applied by facet links can be used, for example, as selection criteria to create partial views of a corpus of information.

NOTE 48 Topic links are much more generalized and powerful than facet links.

5.5.1 Facet Link Architectural Form

The **facet link** (*facet*) element form is used to apply property/value pairs to information objects specified by the contained *fvalue* elements. Facet link properties ('facet types') and values (specified by means of the contained *fvalue* elements) are user-defined.

The optional **hyperlink type** (*linktype*) attribute can be used to provide a mnemonic name for the property (facet type). If the *linktype* attribute is not specified, the generic identifier is regarded as the mnemonic name of the property.

The optional **facet type** (*type*) attribute references a single topic link. The subject of the referenced topic link is the property (the facet type) specified in all of the property/value pair assignments made by the facet link. The class-instance relationship established between the subject of the referenced topic link and the referencing facet link could alternatively be established by making the facet link an occurrence of the referenced topic link, with an occurrence role whose meaning is that the facet link is an instance of the subject of the topic link. If the **facet type** (*type*) attribute is specified, and if the topic referenced by the *type* attribute has a name characteristic that lies within a scope that is appropriate to the topic map user's context, the referenced topic's name characteristic is used to characterize the property (the facet type) for the user. Otherwise, the value of the **hyperlink type** (*linktype*) attribute (or, if the *linktype* attribute is not specified, the generic identifier) is used to characterize the property for the user.

NOTE 49 The topic referenced via the *type* attribute can have many names in scopes designed for many different user contexts, including many different natural languages and delivery platforms, while the *linktype* attribute or generic identifier is just a single token. Therefore, the use of a topic, referenced by the *type* attribute, to characterize the property (the facet type) offers far more flexibility and representational power than the simple mnemonic naming facility offered by the *linktype* attribute or generic identifier.

The *facet* element type is derived from the *varlink* element type of the HyTime architecture.

```
<!element
  facet                -- Facet link --
                      -- Clause: 5.5.1 --
  - 0
  (fvalue)+
>
<!attlist facet
  HyTime              -- HyTime architectural form name --
    NAME
    #FIXED
    varlink
  linktype            -- Hyperlink type. --
                      -- Mnemonic name for the property (facet
                      -- type). --
                      -- Note: Not displayed for the topic map
                      -- user if the topic referenced by the
                      -- type attribute has displayable
                      -- characteristics within the user's
                      -- scope. --
    NAME
    #IMPLIED          -- Default: Generic identifier --
  type                -- Facet type --
                      -- Topic whose subject is the property of
                      -- the property/value pair(s) being
                      -- assigned to the anchor(s). --
  CDATA               -- Reference --
```

```

-- Reftype: topic --
#IMPLIED -- Default: No facet type topic is
          specified by this attribute. --
-- Note: A facet type topic might exist by
          virtue of the fact that this facet link
          is an occurrence (where the occurrence
          role means "instance") of a topic whose
          subject is the nature of the property,
          however. --
>

```

5.5.2 Facet Value Architectural Form

The **facet value** (*fvalue*) element form specifies a user-defined value of the property (facet type) being applied by the containing facet link. The information objects to which the property/value pair is being assigned are referenced by means of the location addresses specified in the content of the *fvalue* element.

The optional **facet value name** (*facetval*) attribute specifies the token which is the value of the property/value pair being assigned. If the *facetval* attribute is not specified, the generic identifier of the *fvalue* is the value being assigned.

The optional **facet value type** (*type*) attribute references a single topic link. The subject of the referenced topic link is the significance of the facet value. The class-instance relationship established between the subject of the referenced topic link and the referencing *fvalue* element could alternatively be established by making the *fvalue* element an occurrence of the referenced topic link, with an occurrence role whose meaning is that the *fvalue* element is an instance of the subject of the topic link.

The *fvalue* element type is derived from the *anchspec* element type of the HyTime architecture. The attributes (*linktrav*, *listtrav*, *multitem* and *emptyanch*) are inherited from the *anchspec* element type defined by the HyTime standard; these have been given default values that are generally appropriate for *fvalue* elements, but which may differ from the default values specified in the HyTime standard (see ISO/IEC 10744:1997). The *HyNames* architectural control attribute is used here to indicate that for HyTime processing purposes the *facetval* attribute should be regarded as the HyTime *anchrole* attribute. (See ISO/IEC 10744:1997.)

```

<!element
  fvalue          -- Facet value --
                  -- Clause: 5.5.2 --
  0
  (%loc;)*
>
<!attlist
  fvalue
    HyTime        -- HyTime architectural form name --
    NAME
    #FIXED
    anchspec
    facetval      -- Facet value name --
                  -- Token is value of property being
                  -- assigned. --
    NAME
    #IMPLIED     -- Default: Facet value name is GI of
                  -- element. --
    type          -- Facet value type --
                  -- Reference to a topic whose subject is
                  -- the significance of the facet value

```



```

name. --
CDATA      -- Reference --
           -- Reftype: topic --
#IMPLIED   -- Default: No facet value type topic is
           -- specified by this attribute. --
           -- Note: A facet value type topic might
           -- exist by virtue of the fact that this
           -- fvalue element is an occurrence (where
           -- the occurrence role means "instance")
           -- of a topic whose subject is the
           -- significance of the facet value name,
           -- however. --
linktrav    -- Hyperlink traversal rules --
           -- Traversal between anchors of hyperlinks:
           -- A any traversal or departure (EID)
           -- D departure after internal arrival
           -- E traversal after external arrival
           -- I traversal after internal arrival
           -- N no traversal after internal arrival
           -- P no internal arrival
           -- R return traversal after internal arrival --
NAMES       -- Lextype: ("A"|"EI"|"ER"|"ED"|"EN"|"EP"|"ERD"|"
           -- "I"|"ID"|"D"|"N"|"P"|"R"|"RD") --
A
listtrav    -- List traversal rules --
           -- Traversal between members of list anchors:
           -- A adjacent (both left and right) traversal
           -- L left traversal
           -- N no traversal
           -- R right traversal
           -- W wrapping traversal --
NAMES       -- Lextype: ("A"|"AW"|"L"|"LW"|"N"|"R"|"RW") --
N           -- Default: Show the whole list --
multmem     (single|list|corlist)
list
emptyanc    (error|noterror)
noterror
HyNames
CDATA
"anchrole. facetval"
>

```

6 Conformance

If a topic map document complies with all provisions of this International Standard, is a conforming SGML document as defined in ISO 8879, and is a conforming HyTime document as defined in ISO/IEC 10744, it is a conforming topic map document.

A conforming application intended to use existing topic maps must be able to:

- parse the interchange syntax,
- identify the topic map constructs defined by this International Standard, and
- apply whatever processing the application designers considered appropriate, in light of the requirements to be fulfilled by the application, and the semantics of those constructs as defined by this International Standard.

A conforming application intended to create topic maps must be able to export the information expressible using the constructs defined by this International Standard in conformance with the syntax of those constructs.

A conforming application intended to read and write topic maps must meet both of the above sets of requirements. If an application can import topic maps, has features to edit them, but cannot export altered topic maps in the interchange syntax defined by this International Standard, then it is not a conforming application.

NOTE 50 This International Standard constrains neither the uses to which topic maps can be put, nor the character of the processing that may be applied by a conforming application. This conformance clause is intended to guarantee that conforming topic maps can be understood to whatever degree conforming read-only applications are intended to understand them, and that the topic mapping information expressed using the topic map syntax will be preserved by conforming read/write applications (except to the extent that the users of read/write applications deliberately alter that information).

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Annexes

A Annex A: Topic Maps Meta-DTD (Normative)

While the meta-DTD that appears here is normative, it is also possible for conforming applications to use a meta-DTD that is the same in all respects except for differences dictated by the need to use a different SGML declaration.

NOTE 1 For example, the meta-DTD will differ in certain syntactic details when used in XML (WebSGML) applications.

```
<!-- HyTime architectural support declarations -->

<?IS10744 ArcBase HyTime>
<!NOTATION HyTime
  PUBLIC "ISO/IEC 10744:1997//NOTATION AFDR ARCBASE
        Hypermedia/Time-based Structuring Language (HyTime)//EN"
>
<!ATTLIST #NOTATION HyTime
  ArcFormA NAME      HyTime
  ArcNamrA NAME      HyNames
  ArcSuprA NAME      sHyTime
  ArcIgnDA NAME      HyIgnD
  ArcDocF NAME       #FIXED HyDoc
  ArcDTD CDATA       "HyTime"
  ArcQuant CDATA     #FIXED "NAMELEN 12"
  ArcDataF NAME      #FIXED HyBridN
  ArcBridF NAME      #FIXED HyBrid
  ArcAuto (ArcAuto|nArcAuto) nArcAuto
  ArcOptSA NAMES     "base links locs"
  hyqcnt NUMBER      32
  base CDATA         "bos bosspec"
  locs CDATA         "agrovdef bibloc dataloc datatok grovplan listloc
                    mixedloc multloc nameloc nmsploc pathloc
                    pgrovdef proploc queryloc referatt refloc
                    reftype relloc spanloc treecom treeloc treetype"
  links CDATA        "varlink"
  exrefs NAME        exrefs
  manyanch NUMBER    #IMPLIED
>
<!NOTATION AFDRMeta
  PUBLIC "ISO/IEC 10744//NOTATION AFDR Meta-DTD Notation//EN"
>
<!ENTITY HyTime
  PUBLIC "ISO/IEC 10744//DTD AFDR Meta-DTD
        Hypermedia/Time-based Structuring Language (HyTime)//EN"
  CDATA AFDRMeta
>

<!--          HyTime common attributes          -->

<!-- The attribute form "HyTime common attributes"
      (common) declares the HyTime attributes shared by all
      topic map forms. -->

<!attlist
  -- Common --
  -- HyTime common attributes --
  -- HyTime Clause A.5.2, 7.8 --
```

```

#ALL
id          -- Unique identifier --
  ID
  #IMPLIED -- Default: None --
-- refloc -- -- Reference Location Address --
-- HyTime Clause: 7.8 --

#ALL
loctype     -- Reference location addresses type --
-- Each named attribute treated as if it were an
-- IDREF to a location address element. --
-- Constraint: The declared values of named
-- attributes must be lexically compatible with
-- their specified interpretation. --
-- Note: The declared value CDATA always meets this
-- requirement. --
  CDATA     -- Lextype: (ATTORCON, ("IDLOC"|"TREELOC"|
--                                     "PATHLOC"|"RELLOC"|
--                                     ("QUERYLOC",NOTATION)))+ --

  #IMPLIED -- Constant --
-- Default: All references use SGML IDREFs, and each
-- IDREF in an IDREFS attribute is considered
-- separately --
  rflocsrc  -- Reference location source --
-- Associates referential attributes with their
-- location sources. --
  CDATA     -- Lextype: (ATTORCON,ATTORCON)+ --
-- Constraint: Attributes named must be referential
-- attributes. --
  #IMPLIED -- Constant --
-- Default: All referential attributes have this
-- element as their location source. --
-- rflocspn -- -- Reference location span --
-- HyTime Clause: 7.8 --

#ALL
rflocspn    -- Reference location span --
-- Names pairs of referential attributes that
-- address spans when both attributes are
-- specified. --
  CDATA     -- Lextype: (ATTORCON,ATTORCON)+ --
-- Constraint: Attributes named must be referential
-- attributes. --
  #IMPLIED -- Constant --
>

<!-- HyTime meta-DTD content model parameter entities -->

<!entity %
  HyCFC      -- HyTime context-free content --
-- Note: %loc, %link, %resorce qualify but are used
-- as meta-inclusions rather than meta-proper-
-- subelements --
  "HyBrid"
>
<!entity %
  loc        -- Location address forms --
  "anchloc|bibloc|dataloc|fcsloc|linkloc|listloc|mixedloc|nameloc|
  nmsploc|pathloc|proploc|queryloc|relloc|treeloc"
>
<!entity %
  link       -- Hyperlink forms --
  "varlink"
>
<!entity %
  resbase    -- Base module resource forms --
  "bosspec"
>
<!entity %

```

```

    resloc          -- Location address module resource forms --
    "agrovdef|datatok|grovplan|pgrovdef"
>
<!entity %
    resource        -- All resource architectural forms --
    "%resbase;|%resloc;"
>

<!--          HyTime document element form          -->

<!element
    HyDoc            -- HyTime document element --
                    -- HyTime Clause: 6.4 --

    - 0
    (%HyCFC;)*
    +(%link;|%loc;|%resource;)
-- OptionalAttributes [base]: bos, bosspecat --
-- OptionalAttributes [locs]: dgrvplan --
-- CommonAttributes [locs]: refloc, reftype, rflocspn --
>
<!attlist
    -- bos --        -- HyTime bounded object set --
                    -- HyTime Clause: 6.5.1 --

    (HyDoc)
    maxbos           -- Maximum bounded object set level --
                    -- Bounding level of HyTime bounded object set when
                    -- document is a hub or subhub. --
    NUMBER           -- Constraint: Depth of nested entities to include
                    -- in BOS (0=no limit, 1=hub only) --
    0
    boslevel         -- Bounded object set level --
                    -- Default BOS level used by data entities declared
                    -- in hub document. --
    NUMBER           -- Constraint: Depth of nested entities to include
                    -- in BOS (0=no limit, 1=this entity only) --
    #IMPLIED         -- Default: No HyTime BOS --
-- bosspecat --     -- BOS except specification attributes --
                    -- HyTime Clause: 6.5.3 --
    bosspec          -- Bounded object set exception specification --
                    -- Adjustments to be made to the bounded object
                    -- set. --
    IDREFS           -- Reference --
                    -- Reftype: bosspec+ --
                    -- Constraint: Must be internal reference --
    #IMPLIED         -- Default: No BOS exception specification --
-- dgrvplan --     -- HyTime document grove plan --
                    -- HyTime Clause: 7.1.4.1 --
    grovplan         -- Grove plan --
                    -- Grove plan for HyTime extended SGML document
                    -- grove --
    CDATA            -- Reference --
                    -- Reftype: grovplan --
    #IMPLIED         -- Default: HyTime default grove plan --
>

<!-- HyTime bounded object set control forms -->

<!-- HyTime BOS control data attributes -->

<!attlist #NOTATION
-- bosdatt --       -- HyTime BOS control data attributes --
                    -- HyTime Clause: 6.5.2 --
    #ALL
    boslevel         -- BOS level --
                    -- Bounded object set level for the entity --
    NUMBER           -- Constraint: Depth of nested entities to include
                    -- in BOS (0=no limit, 1=this entity only) --
    #IMPLIED         -- Default: Value of boslevel attribute of HyDoc
                    -- element. --

```

```

inbos          -- Include in BOS --
               -- Unconditional include in, or exclude from, BOS --
               (inbos|notinbos)
               #IMPLIED -- Default: Inclusion controlled by BOS level --
bosprty        -- Bounded object set priority --
               -- Default BOS priority of objects in entity tree
               -- rooted at this entity. --
               (foregrnd|backgrnd)
               foregrnd
subhub         -- Is entity a subhub? --
               (subhub|nosubhub)
               nosubhub
>

<!-- HyTime bounded object set exception specification -->

<!element
  bosspec      -- Bounded object set exception specification --
               -- HyTime Clause: 6.5 --
               -- Used to affect the HyTime BOS by overriding the
               -- inclusion or exclusion and priority of the
               -- entities identified by the BOS path or paths
               -- given as content. --
  - 0
  (#PCDATA)    -- Lextype: ((ENTITY,(cname|literal)*)|
               -- (GRPO,ENTITY,(cname|literal)*,GRPC)+)
               --
               -- Constraint: If parentheses are used, each
               -- parenthesized list is a separate BOS path. --
               -- Constraint: Each word or literal in a BOS path is
               -- the name of an entity declared in the entity
               -- identified by the previous word, literal, or
               -- entity name. --
  -- Attributes [base]: bosspec --
  -- Referrers [base]: HyDoc:bosspec --
  >
<!attlist
  bosspec      -- Bounded object set exception specification --
               -- HyTime Clause: 6.5 --
  boslevel     -- BOS level --
               -- The BOS level from the last entity named in
               -- each specified BOS path to be affected by this
               -- bosspec. --
               NUMBER -- Constraint: Depth of nested entities to include
               1      -- in BOS (0=no limit, 1=last entity only) --
inbos         -- Include in BOS --
               -- Unconditionally include or exclude objects
               -- declared by the last entity named in each BOS
               -- path, to the BOS level specified by this
               -- bosspec's boslevel attribute. --
               (inbos|notinbos)
               #IMPLIED -- Default: BOS unaffected --
bosprty       -- Bounded object set priority --
               -- Unconditionally specify the BOS priority of
               -- objects declared by the last entity named in each
               -- BOS path, to the BOS level specified by this
               -- bosspec's boslevel attribute. --
               -- Note: The semantic of the bosprty attribute is
               -- not affected by the value of the inbos attribute
               -- (that is, whether it is explicitly "inbos" or the
               -- value is implied). --
               (foregrnd|backgrnd)
               #IMPLIED -- Default: No priority change --
  >

<!-- Topic Map specific architectural forms -->

```