附属書1(参考) 5. Topic Maps architecture, ISO/IEC 13250:2000 Information technology – SGML Application – Topic Maps

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.) --
   addthems       -- 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 --
-- bosspcat --    -- 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 --
  - O
  ( 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 *addthems* 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--
  O O
  (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 --
   - O
  (#PCDATA)       -- String to be used as name --
>
<!element
     dispname     -- Display name --
      - O
  (#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 *addthems* attribute of the containing *topicmap* document element.

The optional *occrl* attribute can be used to provide a mnemonic name for the occurrence role. If the *occrl* 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 *occrl* attribute (or, if the *occrl* 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 *occrl* 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 *occrl* 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 *occrl* 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 --
```

```
                  -- Reftype: topic+ --
      #IMPLIED    -- Default: No themes are added to the scope
                     by means of this attribute. --
   occrl          -- 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 occrl
                     attribute. --
      CDATA       -- Reference --
                  -- Reftype: topic --
      #IMPLIED    -- 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
                     occrl 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 occrl"
>
```

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 *addthems* 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 --
  - O
  (%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 --
   addthems        -- 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 --
  - O
  (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*, *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 *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 --
  - O
  (%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"
>
```