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Support for iCalendar Relationships

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Abstract

This specification updates RELATED-TO defined in [RFC5545] and introduces new iCalendar properties LINK, CONCEPT and REFID to allow better linking and grouping of iCalendar components and related data.

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1. Introduction

iCalendar entities often need to be related to each other or to associated meta-data. These relationships can take the following forms

Structured iCalendar:
: iCalendar entities are related to each other in some structured way, for example as parent, sibling, before, after.

Grouped iCalendar:
: iCalendar entities are related to each other as a group. CATEGORIES are often used for this purpose but are problematic for application developers.

Linked:
: Entities are linked to each other through typed references.

1.1. Structured iCalendar relationships

The currently existing iCalendar [RFC5545] RELATED-TO property has no support for temporal relationships as used by standard project management tools.

The RELTYPE parameter is extended to take new values defining temporal relationships, a GAP parameter

is defined to provide lead and lag values and RELATED-TO is extended to allow URI values. These changes allow the RELATED-TO property to define a richer set of relationships useful for project management.

1.2. Grouped iCalendar relationships

This specification defines a new REFID property which allows arbitrary groups of entities to be associated with the same key value.

REFID is used to identify a key allowing the association of components that are related to the same object and retrieval of a component based on this key. This may be, for example, to identify the tasks associated with a given project without having to communicate the task structure of the project, or, for example, in a package delivery system all tasks associated to a specific package.

As such, the presence of a REFID property imparts no meaning to the component. It is merely a key to allow retrieval. This is distinct from categorisation which, while allowing grouping also adds meaning to the component to which it is attached.

1.3. Concept relationships

The name CONCEPT is used by the Simple Knowledge Organization System defined in [W3C.CR-skos-reference-20090317]. This more accurately defines what we mean by a category. It's not the words but the meaning.

The introduction of CONCEPT allows a more structured approach to categorization, with the possibility of namespaced and path-like values. Unlike REFID the CONCEPT property imparts some meaning. It is assumed that the value of this property will reference a well defined category.

The current [RFC5545] CATEGORY property is used as a free form 'tagging' field. As such it is difficult to establish formal relationships between components based on their category.

Rather than attempt to add semantics to the current property it seeems best to continue its usage as an informal tag and establish a new property with more constraints.

1.4. Linked relationships

The currently existing iCalendar standard [RFC5545] lacks a general purpose method for referencing additional, external information relating to calendar components.

This document proposes a method for referencing typed external information that can provide additional information about an iCalendar component. This new LINK property is closely aligned to the LINK header defined in [RFC5988]

The LINK property defines a typed reference or relation to external meta-data or related resources. By providing type and format information as parameters, clients and servers are able to discover interesting references and make use of them, perhaps for indexing or the presentation of interesting links for the user.

It is often necessary to relate calendar components. The current RELATED-TO property only allows for a UID which is inadequate for many purposes. Allowing other value types for that property may help but might raise a number of backward compatibility issues. The link property can link components in different collections or even on different servers.

When publishing events it is useful to be able to refer back to the source of that information. The actual event may have been consumed from a feed or an ics file on a web site. A LINK property can provide a reference to the originator of the event.

Beyond the need to relate elements temporally, project management tools often need to be able to specify the relationships between the various events and tasks which make up a project. The LINK property provides

such a mechanism.

The LINK property SHOULD NOT be treated as just another attachment. The ATTACH property is being extended to handle server-side management and stripping of inline data. Clients may choose to handle attachments differently as they are often an integral part of the message - for example, the agenda. See [I-D.daboo-caldav-attachments]

1.5. Caching and offline use

To facilitate offline display the link type may identify important pieces of data which should be downloaded in advance.

In general, the calendar entity should be self explanatory without the need to download referenced meta-data such as a web page.

1.6. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

2. Reference Types

The actual reference value can take three forms specified by the type parameter

URI:
: The default type. This is a URI referring to the target.

UID:
: This allows for linking within a single collection and the value is assumed to be another component within that collection.

REFERENCE:
: An xpointer. In an XML environment it may be necessary to refer to an external XML artifact. The XPointer is defined in [W3C.WD-xptr-xpointer-20021219] and allows addressing portions of XML documents.

3. Link Relation Types

[RFC5988] defines two forms of relation type, registered and extension. Registered relation types are added to a registry defined by [RFC5988] while extension relation types are specified as unique unregistered URIs, (at least unregistered in the [RFC5988] registry).

The relation types defined here will be registered with IANA in accordance with the specifications in [RFC5988].

4. Redefined Relation Type Value

Relationship parameter type values are defined in section 3.2.15. of [RFC5545]. This specification redefines that type to include the new temporal relationship values FINISHTOSTART, FINISHTOFINISH, STARTTOFINISH and STARTTOSTART. It also adds the DEPENDS-ON value to provide a link to a component upon which the current component depends.

This property parameter is defined by the following notation:

```
reltypeparam    = "RELTYPE" "="
                  ("PARENT"    ; Parent relationship - Default
```

```
      / "CHILD"     ; Child relationship
      / "SIBLING"   ; Sibling relationship
      / "DEPENDS-ON" ; refers to previous component
      / "REFID"     ; Relationship based on REFID
      / "CONCEPT"
            ; Relationship based on CONCEPT
      / "FINISHTOSTART" ;  Temporal relationship
      / "FINISHTOFINISH" ;  Temporal relationship
      / "STARTTOFINISH" ;  Temporal relationship
      / "STARTTOSTART" ;  Temporal relationship
      / iana-token  ; Some other IANA-registered
                  ; iCalendar relationship type
      / x-name)     ; A non-standard, experimental
                  ; relationship type
```

Figure 1: Finish to start relationship

Figure 2: Finish to finish relationship

Figure 3: Start to finish relationship

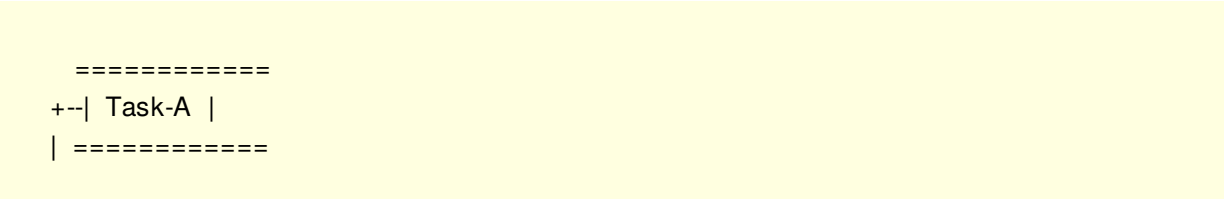

Figure 4: Start to start relationship

Format Definition:

Description:

This parameter can be specified on a property that references another related calendar component. The parameter may specify the hierarchical relationship type of the calendar component referenced by the property when the value is PARENT, CHILD or SIBLING. If this parameter is not specified on an allowable property, the default relationship type is PARENT. Applications MUST treat x-name and iana-token values they don't recognize the same way as they would the PARENT value.

This parameter defines the temporal relationship when the value is one of the project management standard relationships FINISHTOSTART, FINISHTOFINISH, STARTTOFINISH or STARTTOSTART. This property will be present in the predecessor entity and will refer to the successor entity. The GAP parameter specifies the lead or lag time between the predecessor and the successor. In the description of each temporal relationship below we refer to Task-A which contains and controls the relationship and Task-B the target of the relationship.

RELTYPE=PARENT:

See [RFC5545] section 3.2.15.

RELTYPE=CHILD:

See [RFC5545] section 3.2.15.

RELTYPE=SIBLING:

See [RFC5545] section 3.2.15.

RELTYPE=DEPENDS-ON:

Indicates that the current calendar component depends on the referenced calendar component in some manner. For example a task may be blocked waiting on the other, referenced, task.

RELTYPE=REFID:

Establishes a reference from the current component to components with a REFID property which matches the value given in the associated RELATED-TO property.

RELTYPE=CONCEPT:

Establishes a reference from the current component to components with a CONCEPT property which matches the value given in the associated RELATED-TO property.

RELTYPE=FINISHTOSTART:

Task-B cannot start until Task-A finishes. For example, when sanding is complete, painting can begin.

RELTYPE=FINISHTOFINISH:

Task-B cannot finish before Task-A is finished, that is the end of Task-A defines the end of Task-B. For example, we start the potatoes, then the meat then the peas but they should all be cooked at the same time.

RELTYPE=STARTTOFINISH:

The start of Task-A (which occurs after Task-B) controls the finish of Task-B. For example, ticket sales (Task-B) end when the game starts (Task-A).

RELTYPE=STARTTOSTART:

The start of Task-A triggers the start of Task-B, that is Task-B can start anytime after Task-A starts.

5. New Property Parameters

5.1. Rel

This parameter is defined by the following notation:

```
relparam     = "REL" "="
               ("SOURCE"      ; Link to source of this component
               / DQUOTE uri DQUOTE
               / x-name       ; Experimental reference type
               / iana-token)  ; Other IANA registered type
```

Parameter name:

REL

Purpose:

To specify the relationship of data referenced by a LINK property.

Format Definition:

Description:

This parameter MUST be specified on all LINK properties, and defines the type of reference. This allows programs consuming this data to automatically scan for references they support. In addition to the values defined here any value defined in [RFC5988] may be used. There is no default relation type.

REL=SOURCE:

identifies the source of the event information.

Registration:

These relation types are registered in [RFC5988]

5.2. Gap

This parameter is defined by the following notation:

```
gapparam      = "GAP" "=" dur-value
```

Parameter name:

GAP

Purpose:

To specify the length of the gap, positive or negative between two temporaly related components.

Format Definition:

Description:

This parameter MAY be specified on the RELATED-TO property, and defines the duration of time between the predecessor and successor in an interval. When positive it defines the lag time between a task and its logical successor. When negative it defines the lead time.

An example of lag time might be if task A is "paint the room" and task B is "hang the drapes" then task A may be related to task B with RELTYPE=FINISHTOSTART with a gap long enough for the paint to dry.

An example of lead time might be to relate a 1 week task A to the end of task B with RELTYPE=STARTTOFINISH and a negative gap of 1 week so they finish at the same time.

6. New Value Data Types

This specification defines the following new value types to be used with the VALUE property parameter:

UID
: VALUE=UID indicates that the associated value is the UID for a component.

REFERENCE
: VALUE=REFERENCE indicates that the associated value is an xpointer referencing an associated XML artifact.

7. New Properties

7.1. Concept

This property is defined by the following notation:

```
concept       =  "CONCEPT" conceptparam ":"
                 uri CRLF

conceptparam = *(
             ;
             ; The following is OPTIONAL,
             ; and MAY occur more than once.
             ;
             (";" other-param)
             ;
             )
```

The following is an example of this property. It points to a server acting as the source for the calendar object.

```
SCONCEPT:http://example.com/event-types/sports
CONCEPT:http://example.com/event-types/arts/music
CONCEPT:http://example.com/task-types/delivery
```

Property name:
: CONCEPT

Purpose:
: This property defines the formal categories for a calendar component.

Value type:
: URI

Property Parameters:
: IANA, and non-standard parameters can be specified on this property.

Conformance:
: This property can be specified zero or more times in any iCalendar component.

Description:
: This property is used to specify formal categories or classifications of the calendar component. The values are useful in searching for a calendar component of a particular type and category.

  Within the "VEVENT", "VTODO", or "VJOURNAL" calendar components, more than one formal category can be specified by using multiple CONCEPT properties.

  This categorization is distinct from the more informal "tagging" of components provided by the existing CATEGORIES property. It is expected that the value of the CONCEPT property will reference an external resource which provides information about the categorization.

In addition, a structured URI value allows for hierarchical categorization of events.

Possible category resources are the various proprietary systems, for example Library of Congress, or an open source derived from something like the dmoz.org data.

Format Definition:

Example:

7.2. Link

This property is defined by the following notation:

```
link           = "LINK" linkparam  /
                 (
                   ";" "VALUE" "=" "TEXT"
                   ":" text
                 )
                 (
                   ";" "VALUE" "=" "REFERENCE"
                   ":" text
                 )
                 (
                   ";" "VALUE" "=" "URI"
                   ":" uri
                 )
                 CRLF


linkparam      = *(

               ; the following is MANDATORY
               ; and MAY occur more than once

               (";" relparam) /

               ; the following are MANDATORY
               ; but MUST NOT occur more than once

               (";" fmttypeparam) /
               (";" labelparam) /
               ; labelparam is defined in ...

               ; the following is OPTIONAL
               ; and MAY occur more than once

               (";" xparam)

               )
```

The following is an example of this property. It points to a server acting as the source for the calendar object.

```
LINK;REL=SOURCE;LABEL=The Egg:http://example.com/events
```

Property name:
LINK

Purpose:
This property provides a reference to external information about a component.

Value type:
URI, TEXT or REFERENCE

Property Parameters:
Non-standard, reference type or format type parameters can be specified on this property.

Conformance:
This property MAY be specified in any iCalendar component.

Description:
When used in a component the value of this property points to additional information related to the component. For example, it may reference the originating web server.

Format Definition:

Example:

7.3. Refid

This property is defined by the following notation:

```
refid      = "REFID" refidparam ":" text CRLF


refidparam      = *(

                ; the following is OPTIONAL
                ; and MAY occur more than once

                (";" xparam)

                )
```

The following is an example of this property.

```
REFID:itinerary-2014-11-17
```

Property name:
REFID

Purpose:
This property value acts as a key for associated iCalendar entities.

Value type:
TEXT

Property Parameters:
Non-standard parameters can be specified on this property.

Conformance:
This property MAY be specified multiple times in any iCalendar component.

Description:

The value of this property is a text identifier that allows associated components to be located or retrieved as a whole. For example all of the events in a travel itinerary would have the same REFID value.

Format Definition:

Example:

8. Redefined RELATED-TO Property

8.1. RELATED-TO

This property is defined by the following notation:

```
related    = "RELATED-TO" relparam ( ":" text ) /
             (
               ";" "VALUE" "=" "UID"
               ":" uid
             )
             (
               ";" "VALUE" "=" "URI"
               ":" uri
             )
             CRLF

relparam   = *(
           ;
           ; The following are OPTIONAL,
           ; but MUST NOT occur more than once.
           ;
           (";" reltypeparam) /
           (";" gapparam) /
           ;
           ; The following is OPTIONAL,
           ; and MAY occur more than once.
           ;
           (";" other-param)
           ;
           )
```

The following are examples of this property.

```
RELATED-TO:jsmith.part7.19960817T083000.xyzMail@example.com

RELATED-TO:19960401-080045-4000F192713-0052@example.com

RELATED-TO;VALUE=URI;RELTYPE=STARTTOFINISH:
 http://example.com/caldav/user/jb/cal/
 19960401-080045-4000F192713.ics
```

Property name:

RELATED-TO

Purpose:

This property is used to represent a relationship or reference between one calendar component and another. The definition here extends the definition in Section 3.8.4.5. of [RFC5545] by allowing URI or UID values and a GAP parameter.

Value type:

URI, UID or TEXT

Property Parameters:

Relationship type, IANA and non-standard property parameters can be specified on this property.

Conformance:

This property MAY be specified in any iCalendar component.

Description:

By default or when VALUE=UID is specified, the property value consists of the persistent, globally unique identifier of another calendar component. This value would be represented in a calendar component by the "UID" property.

By default, the property value points to another calendar component that has a PARENT relationship to the referencing object. The "RELTYPE" property parameter is used to either explicitly state the default PARENT relationship type to the referenced calendar component or to override the default PARENT relationship type and specify either a CHILD or SIBLING relationship or a temporal relationship.

The PARENT relationship indicates that the calendar component is a subordinate of the referenced calendar component. The CHILD relationship indicates that the calendar component is a superior of the referenced calendar component. The SIBLING relationship indicates that the calendar component is a peer of the referenced calendar component.

The FINISHTOSTART, FINISHTOFINISH, STARTTOFINISH or STARTTOSTART relationships define temporal relationships as specified in the reltype parameter definition.

Changes to a calendar component referenced by this property can have an implicit impact on the related calendar component. For example, if a group event changes its start or end date or time, then the related, dependent events will need to have their start and end dates changed in a corresponding way. Similarly, if a PARENT calendar component is cancelled or deleted, then there is an implied impact to the related CHILD calendar components. This property is intended only to provide information on the relationship of calendar components. It is up to the target calendar system to maintain any property implications of this relationship.

Format Definition:

Example:

9. Security Considerations

Applications using the LINK property need to be aware of the risks entailed in using the URIs provided as values. See [RFC3986] for a discussion of the security considerations relating to URIs.

The CONCEPT and redefined RELATED-TO property have the same issues in that values may be URIs.

10. IANA Considerations

10.1. iCalendar Property Registrations

The following iCalendar property names have been added to the iCalendar Properties Registry defined in Section 8.3.2 of [RFC5545]

Property	Status	Reference
CONCEPT	Current	Section 7.1

Property	Status	Reference
LINK	Current	Section 7.2
REFID	Current	Section 7.3

10.2. iCalendar Property Parameter Registrations

The following iCalendar property parameter names have been added to the iCalendar Parameters Registry defined in Section 8.3.3 of [RFC5545]

Parameter	Status	Reference
REL	Current	Section 5.1
GAP	Current	Section 5.2

10.3. iCalendar Value Data Type Registrations

The following iCalendar property parameter names have been added to the iCalendar Value Data Types Registry defined in Section 8.3.4 of [RFC5545]

Value Data Type	Status	Reference
UID	Current	Section 6
REFERENCE	Current	Section 6

10.4. iCalendar RELTYPE Value Registrations

The following iCalendar "RELTYPE" values have been added to the iCalendar Relationship Types Registry defined in Section 8.3.8 of [RFC5545]

Relationship Type	Status	Reference
DEPENDS-ON	Current	Section 4
REFID	Current	Section 4
CONCEPT	Current	Section 4
FINISHTOSTART	Current	Section 4
FINISHTOFINISH	Current	Section 4
STARTTOFINISH	Current	Section 4
STARTTOSTART	Current	Section 4

10.5. New Reference Type Registration

The following link relation values have been added to the Reference Types Registry defined in Section 6.2.2 of [RFC5988]

Name	Status	Reference
SOURCE	Current	Section 5.1

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12. Normative References

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