Link Relation Types for Web Services

Abstract

   Many resources provided on the Web are part of sets of resources that
   are provided in a context that is managed by one particular service
   provider. Often, these sets of resources are referred to as "Web
   services" or "Web APIs". This specification defines link relations
   that represent relationships from Web services or APIs to resources
   that provide documentation, descriptions, metadata, or status
   information for these resources. Documentation is primarily intended
   for human consumers, whereas descriptions are primarily intended for
   automated consumers. Metadata provides information about a service's
   context. This specification also defines a link relation to identify
   status resources that are used to represent information about service
   status.

Status of This Memo

   This document is not an Internet Standards Track specification; it is
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1. Introduction

   One of the defining aspects of the Web is that it is possible to
   interact with Web resources without any prior knowledge of the
   specifics of the resource. Following the practices described in Web
   architecture [W3C.REC-webarch-20041215] by using URIs, HTTP, and
   media types, the Web's uniform interface allows interactions with
   resources without the more complex binding procedures often necessary
   with other approaches.

   Many resources on the Web are provided as part of a set of resources
   that are referred to as a "Web service" or a "Web API". In many
   cases, these services or APIs are defined and managed as a whole, and
   it may be desirable for clients to be able to discover this service
   information.

   Service information that provides information on how to use service
   resources can be broadly separated into two categories: One category
   primarily targets human users and often uses generic representations
   for human readable documents, such as HTML or PDF. The other
   category is structured information that follows a more formalized
   description model and is primarily intended for consumption by
   machines -- for example, tools and code libraries.

   In the context of this memo, the human-oriented variant is referred
   to as "documentation", and the machine-oriented variant is referred
   to as "description".

   These two categories are not necessarily mutually exclusive, as
   representations have been proposed that are intended for both human
   consumption and interpretation by machine clients. In addition, a
   typical pattern for service documentation/descriptions is that there
   is human-oriented, high-level documentation that is intended to put a
   service in context and explain the general model, which is
   complemented by machine-level descriptions that are intended as
   detailed technical descriptions of the service. These two resources
   could be interlinked, but since they are intended for different
   audiences, it can make sense to provide entry points for both of
   them.

   In addition, while both documentation and descriptions may be
   provided as part of a Web service, there may be other information as
   well. Generally speaking, a Web service may have any metadata/
   resources associated with it (with documentation and descriptions
   being two specific kinds of resources). If there is a way in which
   all of these metadata/resources can be represented, then it should be
   possible to find such a resource that provides access to general Web
   service metadata.

In addition to these resources about mostly static aspects of a Web
service, this memo also defines a link relation that allows providers
of a Web service to link to a resource that represents status
information about the service. This information often represents
operational information that allows service consumers to retrieve
information about "service health" and related issues.

This memo places no constraints on the specific representations used
for all of these resources. It simply allows providers of a Web
service to make the documentation, descriptions, metadata, and status
of their services discoverable and defines link relations that serve
that purpose.

2. Terminology

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
BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all
capitals, as shown here.

3. Web Services

"Web Services" or "Web APIs" (sometimes also referred to as "HTTP
API" or "REST API") expose information and services on the Web.
Following the principles of Web architecture
[W3C.REC-webarch-20041215], they expose URI-identified resources,
which are then accessed and transferred using a specific
representation. Many services use representations that contain
links, and these links are often typed links.

Using typed links, resources can identify relationship types to other
resources. RFC 8288 [RFC8288] establishes a framework of registered
link relation types, which are identified by simple strings and
registered in an IANA registry. Any resource that supports typed
links according to RFC 8288 can then use these identifiers to
represent resource relationships on the Web without having to
reinvent registered relation types.

In recent years, Web services, as well as their documentation and
description languages, have gained popularity due to the general
popularity of the Web as a platform for providing information and
services. However, the design of documentation and description
languages varies according to a number of factors, such as the
general application domain, the preferred application data model, and
the preferred approach for exposing services.

This specification allows service providers to use a unified method
to link to service documentation and/or descriptions. This link
should not make any assumptions about the provided type of
documentation and/or descriptions, so service providers can choose
those that best fit their services and needs.

This specification also allows service providers to link to general
service metadata. One part of the metadata may have links to
documentation and/or description as well as other information about a
service, such as deployment or operational information.

3.1. Documenting Web Services

In the context of this specification, "documentation" refers to
information that is primarily intended for human consumption.
Typical representations of this kind of documentation are HTML and
PDF.

Documentation is often structured, but its structure depends on the
structure of the service in question as well as the specific way in
which the authors choose to present it.

3.2. Describing Web Services

In the context of this specification, "description" refers to
information that is primarily intended for machine consumption.
Typical representations are dictated by the technology underlying the
service itself, which means that description formats in today's
technology landscape are based on XML, JSON, Resource Description
Framework (RDF), and a variety of other structured data models. In
each of those technologies, there may be a variety of languages
defined to serve the same general purpose of describing a Web
service.

Descriptions are always structured, but the structuring principles
depend on the nature of the described service. For example, one of
the earlier service description approaches, the Web Services
Description Language (WSDL), uses "operations" as its core concept,
which are essentially identical to function calls because the
underlying model is based on the Remote Procedure Call (RPC) model.
Other description languages for non-RPC approaches to services will
use different structuring approaches, such as structuring service
descriptions by URIs and/or URI patterns.

3.3. Unified Documentation/Description

   If service providers use an approach where there is no distinction
   between service documentation (Section 3.1) and service description
   (Section 3.2), then they may not feel the need to use two separate
   links. In such a case, an alternative approach is to use the
   previously defined "service" link relation type [RFC5023], which does
   not indicate whether it links to documentation or description and
   thus may be a better fit if no such differentiation is required.

4. Link Relations for Web Services

   In order to allow Web services to represent the relation of
   individual resources to service documentation/description and
   metadata, this specification introduces and registers three new link
   relation types.

4.1. The service-doc Link Relation Type

   The "service-doc" link relation type is used to represent the fact
   that a resource or a set of resources is documented at a specific
   URI. The target resource is expected to provide documentation that
   is primarily intended for human consumption.

4.2. The service-desc Link Relation Type

   The "service-desc" link relation type is used to represent the fact
   that a resource or a set of resources is described at a specific URI.
   The target resource is expected to provide a service description that
   is primarily intended for machine consumption. In many cases, it is
   provided in a representation that is consumed by tools, code
   libraries, or similar components.

4.3. The service-meta Link Relation Type

   The "service-meta" link relation type is used to link to available
   metadata for the service context of a resource. Service metadata is
   any kind of data that may be of interest to existing or potential
   service users, with documentation/description being only two possible
   facets of service metadata. The target resource is expected to
   provide a representation that is primarily intended for machine
   consumption. In many cases, it is provided in a representation that
   is consumed by tools, code libraries, or similar components.

   Since service metadata can have many different purposes and use many
   different representations, it may make sense for representations
   using the "service-meta" link relation to offer additional hints
   about the specific kind or format of metadata that is being linked.

This definition of the "service-meta" link relation makes no specific
assumptions about how these link hints will be represented, and the
specific mechanism will depend on the context where the "service-
meta" link relation is being used.

One example is that a "service-desc" link may identify an OpenAPI
description, which is supposed to be the machine-readable description
of a Web API. A "service-meta" link may identify a resource that
contains additional metadata about the Web API, such as labels that
classify the API according to a labeling scheme and a privacy policy
that makes statements about how the Web API manages personally
identifiable information.

5. Web Service Status Resources

Web services providing access to one or more resources often are
hosted and operated in an environment for which status information
may be available. This information may be as simple as confirming
that a service is operational, or it may provide additional
information about different aspects of a service and/or a history of
status information, possibly listing incidents and their resolution.

The "status" link relation type can be used to link to such a status
resource, allowing service consumers to retrieve information about a
Web service's status. Such a link may not be available for and from
all resources provided by a Web service -- only from key resources
such as a Web service's metadata resource and/or a service's home
resource (i.e., a resource analogous to the home page of a Web site).

This memo does not restrict the representation of a status resource
in any way. It may be primarily focused on human or machine
consumption or a combination of both. It may be a simple "traffic
light" indicator for service health or a more sophisticated
representation conveying more detailed information, such as service
subsystems and/or a status history.

6. IANA Considerations

   The link relation types below have been registered by IANA per
   Section 4.2 of RFC 8288 [RFC8288].

6.1. Link Relation Type: service-doc

   Relation Name: service-doc

   Description: Identifies service documentation for the context that
      is primarily intended for human consumption.

   Reference: RFC 8631

6.2. Link Relation Type: service-desc

   Relation Name: service-desc

   Description: Identifies service description for the context that is
      primarily intended for consumption by machines.

   Reference: RFC 8631

6.3. Link Relation Type: service-meta

   Relation Name: service-meta

   Description: Identifies general metadata for the context that is
      primarily intended for consumption by machines.

   Reference: RFC 8631

6.4. Link Relation Type: status

   Relation Name: status

   Description: Identifies a resource that represents the context's
      status.

   Reference: RFC 8631

7. Security Considerations

   Web service providers should be aware that service descriptions and
   documentation may be used by attackers to gain additional information
   about a service (particularly its implementation) and to test for
   known security issues. It may thus be advisable to restrict service
   descriptions and documentation to aspects of a service that are
   necessary and to exclude any details that are not necessary for using
   the service.

   Another potential security issue for Web service providers is that
   publishing service descriptions and documentation may generally allow
   clients (both malicious and otherwise) more automated and systematic
   access to a service. It may therefore be possible that more of a
   service's potential vulnerabilities are made easier to find and
   exploit or simply that a service might receive more load because it
   is accessed by automated clients.

   Web service consumers should be aware that service descriptions and
   documentation can be out of sync or simply incorrect. Blindly
   trusting service descriptions and documentation (particularly when
   descriptions are retrieved and interpreted programmatically) is not a
   safe practice. Web service consumers SHOULD always assume that
   service descriptions and documentation may be incorrect and SHOULD
   therefore be prepared to handle errors at runtime.

8. References

8.1. Normative References

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