

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.

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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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