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M. Nottingham
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Standardising Structure in URIs
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Abstract

Sometimes, it is attractive to add features to protocols or applications by specifying a particular structure for URIs (or parts thereof). This document cautions against this practice in standards (sometimes called "URI Squatting").

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1. Introduction

URIs [[RFC3986](#)] very often include structured application data. This might include artifacts from filesystems (often occurring in the path component), and user information (often in the query component). In some cases, there can even be application-specific data in the authority component (e.g., some applications are spread across several hostnames to enable a form of partitioning or dispatch).

Furthermore, constraints upon the structure of URIs can be imposed by an implementation; for example, many Web servers use the filename extension of the last path segment to determine the media type of the response. Likewise, pre-packaged applications often have highly structured URIs that can only be changed in limited ways (often, just the hostname and port they are deployed upon).

Because the owner of the URI is choosing to use the server or the software, this can be seen as reasonable delegation of authority. When such conventions are mandated by standards, however, it can have several potentially detrimental effects:

- o Collisions - As more conventions for URI structure become standardised, it becomes more likely that there will be collisions between such conventions (especially considering that servers, applications and individual deployments will have their own conventions).
- o Dilution - Adorning URIs with extra information to support new standard features dilutes their usefulness as identifiers when that information is ephemeral (as URIs ought to be stable; see [[webarch](#)] [Section 3.5.1](#)), or its inclusion causes several alternate forms of the URI to exist (see [[webarch](#)] [Section 2.3.1](#)).
- o Brittleness - A standard that specifies a static URI cannot change its form in future revisions.
- o Operational Difficulty - Supporting some URI conventions can be difficult in some implementations. For example, specifying that a particular query parameter be used precludes the use of Web servers that serve the response from a filesystem. Likewise, an application that fixes a base path for its operation (e.g., "/v1") makes it impossible to deploy other applications with the same prefix on the same host.
- o Client Assumptions - When conventions are standardised, some clients will inevitably assume that the standards are in use when those conventions are seen. This can lead to interoperability problems; for example, if a specification documents that the "sig" URI query parameter indicates that its payload is a cryptographic signature for the URI, it can lead to false positives.

While it is not ideal when a server or a deployed application

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constrains URI structure (indeed, this is not recommended practice, but that discussion is out of scope for this document), publishing standards that mandate URI structure is inappropriate because the structure of a URI needs to be firmly under the control of its owner, and the IETF (as well as other organisations) should not usurp this ownership; see [[webarch](#)] [Section 2.2.2.1](#).

This document explains best current practices for establishing URI structures, conventions and formats in standards. It also offers strategies for specifications to avoid violating these guidelines in [Section 3](#).

[1.1](#). Who This Document Is For

These guidelines are IETF Best Current Practice, and are therefore binding upon IETF standards-track documents, as well as submissions to the RFC Editor on the Independent and IRTF streams. See [[RFC2026](#)] and [[RFC4844](#)] for more information.

Other Open Standards organisations (in the sense of [[RFC2026](#)]) are encouraged to adopt them. Questions as to their applicability ought to be handled through the liaison relationship, if present.

Ad hoc efforts are also encouraged to adopt them, as this RFC reflects Best Current Practice.

This document's requirements specifically targets a few different types of specifications:

- o URI Scheme Definitions ("scheme definitions") - specifications that define and register URI schemes, as per [[RFC4395](#)].
- o Protocol Extensions ("extensions") - specifications that offer new capabilities to potentially any identifier, or a large subset; e.g., a new signature mechanism for 'http' URIs, or metadata for any URI.
- o Applications Using URIs ("applications") - specifications that use URIs to meet specific needs; e.g., a HTTP interface to particular information on a host.

Requirements that target the generic class "Specifications" apply to all specifications, including both those enumerated above and others.

Note that this specification ought not be interpreted as preventing the allocation of control of URIs by parties that legitimately own them, or have delegated that ownership; for example, a specification might legitimately specify the semantics of a URI on the IANA.ORG Web site as part of the establishment of a registry.

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1.2. Notational Conventions

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

2. Best Current Practices for Standardising Structured URIs

Different components of a URI have differing practices recommended.

2.1. URI Schemes

Applications and extensions MAY require use of specific URI scheme(s); for example, it is perfectly acceptable to require that an application support 'http' and 'https' URIs. However, applications SHOULD NOT preclude the use of other URI schemes in the future, to promote reuse, unless they are clearly specific to the nominated schemes.

Specifications MUST NOT define substructure within URI schemes, unless they do so by modifying [[RFC4395](#)], or they are the registration document for the URI scheme(s) in question.

2.2. URI Authorities

Scheme definitions define the presence, format and semantics of an authority component in URIs; all other specifications MUST NOT constrain, define structure or semantics for them.

2.3. URI Paths

Scheme definitions define the presence, format, and semantics of a path component in URIs; all other specifications MUST NOT constrain, define structure or semantics for any path component.

The only exception to this requirement is registered "well-known" URIs, as specified by [[RFC5785](#)]. See that document for a description of the applicability of that mechanism.

2.4. URI Queries

The presence, format and semantics of the query component of URIs is dependent upon many factors, and MAY be constrained by a scheme definition. Often, they are determined by the implementation of a resource itself.

Applications SHOULD NOT directly specify the syntax of queries, as

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this can cause operational difficulties for deployments that do not support a particular form of a query.

Extensions MUST NOT specify the format or semantics of queries. In particular, extensions MUST NOT assume that all HTTP(S) resources are capable of accepting queries in the format defined by [\[HTML4\]](#), Section 17.13.4.

2.5. URI Fragment Identifiers

Media type definitions (as per [\[RFC6838\]](#)) SHOULD specify the fragment identifier syntax(es) to be used with them; other specifications MUST NOT define structure within the fragment identifier, unless they are explicitly defining one for reuse by media type definitions.

3. Alternatives to Specifying Static URIs

Given the issues above, the most successful strategy for applications and extensions that wish to use URIs is to use them in the fashion they were designed; as run-time artifacts that are exchanged as part of the protocol, rather than statically specified syntax.

For example, if a specific URI needs to be known to interact with an application, its "shape" can be determined by interacting with the application's more general interface (in Web terms, its "home page") to learn about that URI.

[\[RFC5988\]](#) describes a framework for identifying the semantics of a link in a "link relation type" to aid this. [\[RFC6570\]](#) provides a standard syntax for "link templates" that can be used to dynamically insert application-specific variables into a URI to enable such applications while avoiding impinging upon URI owners' control of them.

[\[RFC5785\]](#) allows specific paths to be 'reserved' for standard use on URI schemes that opt into that mechanism ('http' and 'https' by default). Note, however, that this is not a general "escape valve" for applications that need structured URIs; see that specification for more information.

Specifying more elaborate structures in an attempt to avoid collisions is not adequate to conform to this document. For example, prefixing query parameters with "myapp_" does not help.

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4. Security Considerations

This document does not introduce new protocol artifacts with security considerations.

5. IANA Considerations

This document clarifies appropriate registry policy for new URI schemes, and potentially for the creation of new URI-related registries, if they attempt to mandate structure within URIs. There are no direct IANA actions specified in this document.

6. References

6.1. Normative References

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[Appendix A](#). Acknowledgments

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Author's Address

Mark Nottingham

Email: mnot@mnot.net

URI: <http://www.mnot.net/>

