Internet Engineering Task Force (IETF)
Request for Comments: 7033
Category: Standards Track
ISSN: 2070-1721

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September 2013

# WebFinger

***Abstract***

This specification defines the WebFinger protocol, which can be used to discover information about people or other entities on the Internet using standard HTTP methods. WebFinger discovers information for a URI that might not be usable as a locator otherwise, such as account or email URIs.

***Status of This Memo***

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc7033.

# Contents

# 1 Introduction

WebFinger is used to discover information about people or other entities on the Internet that are identified by a URI [6] using standard Hypertext Transfer Protocol (HTTP) [2] methods over a secure transport [12]. A WebFinger resource returns a JavaScript Object Notation (JSON) [5] object describing the entity that is queried. The JSON object is referred to as the JSON Resource Descriptor (JRD).

For a person, the type of information that might be discoverable via WebFinger includes a personal profile address, identity service, telephone number, or preferred avatar. For other entities on the Internet, a WebFinger resource might return JRDs containing link relations [8] that enable a client to discover, for example, that a printer can print in color on A4 paper, the physical location of a server, or other static information.

Information returned via WebFinger might be for direct human consumption (e.g., looking up someone's phone number), or it might be used by systems to help carry out some operation (e.g., facilitating, with additional security mechanisms, logging into a web site by determining a user's identity service). The information is intended to be static in nature, and, as such, WebFinger is not intended to be used to return dynamic information like the temperature of a CPU or the current toner level in a laser printer.

The WebFinger protocol is designed to be used across many applications. Applications that wish to utilize WebFinger will need to specify properties, titles, and link relation types that are appropriate for the application. Further, applications will need to define the appropriate URI scheme to utilize for the query target.

Use of WebFinger is illustrated in the examples in Section 3 and described more formally in Section 4. Section 8 describes how applications of WebFinger may be defined.

# 2 Terminology

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 RFC 2119 [1].

WebFinger makes heavy use of "link relations". A link relation is an attribute-value pair in which the attribute identifies the type of relationship between the linked entity or resource and the information specified in the value. In Web Linking [4], the link relation is represented using an HTTP entity-header of "Link", where the "rel" attribute specifies the type of relationship and the "href" attribute specifies the information that is linked to the entity or resource. In WebFinger, the same concept is represented using a JSON array of "links" objects, where each member named "rel" specifies the type of relationship and each member named "href" specifies the information that is linked to the entity or resource. Note that WebFinger narrows the scope of a link relation beyond what is defined for Web Linking by stipulating that the value of the "rel" member needs to be either a single IANA-registered link relation type [8] or a URI [6].

The use of URIs throughout this document refers to URIs following the syntax specified in Section 3 of RFC 3986 [6]. Relative URIs, having syntax following that of Section 4.2 of RFC 3986, are not used with WebFinger.

# 3 Example Uses of WebFinger

This section shows a few sample uses of WebFinger. Any application of WebFinger would be specified outside of this document, as described in Section 8. The examples in this section should be simple enough to understand without having seen the formal specifications of the applications.

## 3.1 Identity Provider Discovery for OpenID Connect

Suppose Carol wishes to authenticate with a web site she visits using OpenID Connect [15]. She would provide the web site with her OpenID Connect identifier, say carol@example.com. The visited web site would perform a WebFinger query looking for the OpenID Connect provider. Since the site is interested in only one particular link relation, the WebFinger resource might utilize the "rel" parameter as described in Section 4.3:

```
GET /.well-known/webfinger?
       resource=acct%3Acarol%40example.com&
       rel=http%3A%2F%2Fopenid.net%2Fspecs%2Fconnect%2F1.0%2Fissuer
       HTTP/1.1
Host: example.com
```

The server might respond like this:

```
HTTP/1.1 200 OK
Access-Control-Allow-Origin: *
Content-Type: application/jrd+json

{
  "subject" : "acct:carol@example.com",
  "links" :
  [
    {
      "rel" : "http://openid.net/specs/connect/1.0/issuer",
      "href" : "https://openid.example.com"
    }
  ]
}
```

Since the "rel" parameter only serves to filter the link relations returned by the resource, other name/value pairs in the response, including any aliases or properties, would be returned. Also, since support for the "rel" parameter is not guaranteed, the client must not assume the "links" array will contain only the requested link relation.

## 3.2 Getting Author and Copyright Information for a Web Page

Suppose an application is defined to retrieve metadata information about a web page URL, such as author and copyright information. To retrieve that information, the client can utilize WebFinger to issue a query for the specific URL. Suppose the URL of interest is http://blog.example.com/article/id/314. The client would issue a query similar to the following:

```
GET /.well-known/webfinger?
     resource=http%3A%2F%2Fblog.example.com%2Farticle%2Fid%2F314
     HTTP/1.1
```

```
Host: blog.example.com
```

The server might then reply in this way:

```
HTTP/1.1 200 OK
Access-Control-Allow-Origin: *
Content-Type: application/jrd+json

{
  "subject" : "http://blog.example.com/article/id/314",
  "aliases" :
  [
    "http://blog.example.com/cool_new_thing",
    "http://blog.example.com/steve/article/7"
  ],
  "properties" :
  {
    "http://blgx.example.net/ns/version" : "1.3",
    "http://blgx.example.net/ns/ext" : null
  },
  "links" :
  [
    {
      "rel" : "copyright",
      "href" : "http://www.example.com/copyright"
    },
    {
      "rel" : "author",
      "href" : "http://blog.example.com/author/steve",
      "titles" :
      {
        "en-us" : "The Magical World of Steve",
        "fr" : "Le Monde Magique de Steve"
      },
      "properties" :
      {
        "http://example.com/role" : "editor"
      }
    }

  ]
}
```

In the above example, we see that the server returned a list of aliases, properties, and links related to the subject URL. The links contain references to information for each link relation type. For the author link, the server provided a reference to the author's blog, along with a title for the blog in two languages. The server also returned a single property related to the author, indicating the author's role as editor of the blog.

It is worth noting that, while the server returned just two links in the "links" array in this example, a server might return any number of links when queried.

# 4 WebFinger Protocol

The WebFinger protocol is used to request information about an entity identified by a query target (a URI). The client can optionally specify one or more link relation types for which it would like to receive information.

A WebFinger request is an HTTPS request to a WebFinger resource. A WebFinger resource is a well-known URI [3] using the HTTPS scheme constructed along with the required query target and optional link relation types. WebFinger resources MUST NOT be served with any other URI scheme (such as HTTP).

A WebFinger resource is always given a query target, which is another URI that identifies the entity whose information is sought. GET requests to a WebFinger resource convey the query target in the "resource" parameter of the WebFinger URI's query string; see Section 4.1 for details.

The host to which a WebFinger query is issued is significant. If the query target contains a "host" portion (Section 3.2.2 of RFC 3986), then the host to which the WebFinger query is issued SHOULD be the same as the "host" portion of the query target, unless the client receives instructions through some out-of-band mechanism to send the query to another host. If the query target does not contain a "host" portion, then the client chooses a host to which it directs the query using additional information it has.

The path component of a WebFinger URI MUST be the well-known path "/.well-known/webfinger". A WebFinger URI MUST contain a query component that encodes the query target and optional link relation types as specified in Section 4.1.

The WebFinger resource returns a JSON Resource Descriptor (JRD) as the resource representation to convey information about an entity on the Internet. Also, the Cross-Origin Resource Sharing (CORS) [7] specification is utilized to facilitate queries made via a web browser.

## 4.1 Constructing the Query Component of the Request URI

A WebFinger URI MUST contain a query component (see Section 3.4 of RFC 3986). The query component MUST contain a "resource" parameter and MAY contain one or more "rel" parameters. The "resource" parameter MUST contain the query target (URI), and the "rel" parameters MUST contain encoded link relation types according to the encoding described in this section.

To construct the query component, the client performs the following steps. First, each parameter value is percent-encoded, as per Section 2.1 of RFC 3986. The encoding is done to conform to the query production in Section 3.4 of that specification, with the addition that any instances of the "=" and "&" characters within the parameter values are also percent-encoded. Next, the client constructs a string to be placed in the query component by concatenating the name of the first parameter together with an equal sign ("=") and the percent-encoded parameter value. For any subsequent parameters, the client appends an ampersand ("&") to the string, the name of the next parameter, an equal sign, and the parameter value. The client MUST NOT insert any spaces while constructing the string. The order in which the client places each attribute-value pair within the query component does not matter in the interpretation of the query component.

## 4.2 Performing a WebFinger Query

A WebFinger client issues a query using the GET method to the well-known [3] resource identified by the URI whose path component is "/.well-known/webfinger" and whose query component MUST include the "resource" parameter exactly once and set to the value of the URI for which information is being sought.

If the "resource" parameter is absent or malformed, the WebFinger resource MUST indicate that the request is bad as per Section 10.4.1 of RFC 2616 [2].

If the "resource" parameter is a value for which the server has no information, the server MUST indicate that it was unable to match the request as per Section 10.4.5 of RFC 2616.

A client MUST query the WebFinger resource using HTTPS only. If the client determines that the resource has an invalid certificate, the resource returns a 4xx or 5xx status code, or if the HTTPS connection cannot be established for any reason, then the client MUST accept that the WebFinger query has failed and MUST NOT attempt to reissue the WebFinger request using HTTP over a non-secure connection.

A WebFinger resource MUST return a JRD as the representation for the resource if the client requests no other supported format explicitly via the HTTP "Accept" header. The client MAY include the "Accept" header to indicate a desired representation; representations other than JRD might be defined in future specifications. The WebFinger resource MUST silently ignore any requested representations that it does not understand or support. The media type used for the JSON Resource Descriptor (JRD) is "application/jrd+json" (see Section 10.2).

The properties, titles, and link relation types returned by the server in a JRD might be varied and numerous. For example, the server might return information about a person's blog, vCard [14], avatar, OpenID Connect provider, RSS or ATOM feed, and so forth in a reply. Likewise, if a server has no information to provide, it might return a JRD with an empty "links" array or no "links" array.

A WebFinger resource MAY redirect the client; if it does, the redirection MUST only be to an "https" URI and the client MUST perform certificate validation again when redirected.

A WebFinger resource can include cache validators in a response to enable conditional requests by the client and/or expiration times as per Section 13 of RFC 2616.

## 4.3 The "rel" Parameter

When issuing a request to a WebFinger resource, the client MAY utilize the "rel" parameter to request only a subset of the information that would otherwise be returned without the "rel" parameter. When the "rel" parameter is used and accepted, only the link relation types that match the link relation type provided via the "rel" parameter are included in the array of links returned in the JRD. If there are no matching link relation types defined for the resource, the "links" array in the JRD will be either absent or empty. All other information present in a resource descriptor remains present, even when "rel" is employed.

The "rel" parameter MAY be included multiple times in order to request multiple link relation types.

The purpose of the "rel" parameter is to return a subset of "link relation objects" (see Section 4.4.4) that would otherwise be returned in the resource descriptor. Use of the parameter might reduce processing requirements on either the client or server, and it might also reduce the bandwidth required to convey

the partial resource descriptor, especially if there are numerous link relation values to convey for a given "resource" value. Note that if a client requests a particular link relation type for which the server has no information, the server MAY return a JRD with an empty "links" array or no "links" array.

WebFinger resources SHOULD support the "rel" parameter. If the resource does not support the "rel" parameter, it MUST ignore the parameter and process the request as if no "rel" parameter values were present.

The following example uses the "rel" parameter to request links for two link relation types:

```
GET /.well-known/webfinger?
    resource=acct%3Abob%40example.com&
    rel=http%3A%2F%2Fwebfinger.example%2Frel%2Fprofile-page&
    rel=http%3A%2F%2Fwebfinger.example%2Frel%2Fbusinesscard HTTP/1.1
Host: example.com
```

In this example, the client requests the link relations of type "http://webfinger.example/rel/profile-page" and "http://webfinger.example/rel/businesscard". The server then responds with a message like this:

```
HTTP/1.1 200 OK
Access-Control-Allow-Origin: *
Content-Type: application/jrd+json

{
  "subject" : "acct:bob@example.com",
  "aliases" :
  [
    "https://www.example.com/~bob/"
  ],
  "properties" :
  {
      "http://example.com/ns/role" : "employee"
  },
  "links" :
  [
    {
      "rel" : "http://webfinger.example/rel/profile-page",
      "href" : "https://www.example.com/~bob/"
    },
    {
      "rel" : "http://webfinger.example/rel/businesscard",
      "href" : "https://www.example.com/~bob/bob.vcf"
    }
  ]
}
```

As you can see in the response, the resource representation contains only the links of the types requested by the client and for which the server had information, but the other parts of the JRD are still present. Note also in the above example that the links returned in the "links" array all use HTTPS, which is important if the data indirectly obtained via WebFinger needs to be returned securely.

## 4.4 The JSON Resource Descriptor (JRD)

The JSON Resource Descriptor (JRD), originally introduced in RFC 6415 [16] and based on the Extensible Resource Descriptor (XRD) format [17], is a JSON object that comprises the following name/value pairs:

- subject
- aliases
- properties
- links

The member "subject" is a name/value pair whose value is a string, "aliases" is an array of strings, "properties" is an object comprising name/value pairs whose values are strings, and "links" is an array of objects that contain link relation information.

When processing a JRD, the client MUST ignore any unknown member and not treat the presence of an unknown member as an error.

Below, each of these members of the JRD is described in more detail.

### 4.4.1 subject

The value of the "subject" member is a URI that identifies the entity that the JRD describes.

The "subject" value returned by a WebFinger resource MAY differ from the value of the "resource" parameter used in the client's request. This might happen, for example, when the subject's identity changes (e.g., a user moves his or her account to another service) or when the resource prefers to express URIs in canonical form.

The "subject" member SHOULD be present in the JRD.

### 4.4.2 aliases

The "aliases" array is an array of zero or more URI strings that identify the same entity as the "subject" URI.

The "aliases" array is OPTIONAL in the JRD.

### 4.4.3 properties

The "properties" object comprises zero or more name/value pairs whose names are URIs (referred to as "property identifiers") and whose values are strings or null. Properties are used to convey additional information about the subject of the JRD. As an example, consider this use of "properties":

```
"properties" : { "http://webfinger.example/ns/name" : "Bob Smith" }
```

The "properties" member is OPTIONAL in the JRD.

### 4.4.4 links

The "links" array has any number of member objects, each of which represents a link [4]. Each of these link objects can have the following members:

- rel
- type

- href
- titles
- properties

The “rel” and “href” members are strings representing the link’s relation type and the target URI, respectively. The context of the link is the “subject” (see Section 4.4.1).

The “type” member is a string indicating what the media type of the result of dereferencing the link ought to be.

The order of elements in the “links” array MAY be interpreted as indicating an order of preference. Thus, if there are two or more link relations having the same “rel” value, the first link relation would indicate the user’s preferred link.

The “links” array is OPTIONAL in the JRD.

Below, each of the members of the objects found in the “links” array is described in more detail. Each object in the “links” array, referred to as a “link relation object”, is completely independent from any other object in the array; any requirement to include a given member in the link relation object refers only to that particular object.

#### *4.4.4.1 rel*

The value of the “rel” member is a string that is either a URI or a registered relation type [8] (see RFC 5988 [4]). The value of the “rel” member MUST contain exactly one URI or registered relation type. The URI or registered relation type identifies the type of the link relation.

The other members of the object have meaning only once the type of link relation is understood. In some instances, the link relation will have associated semantics enabling the client to query for other resources on the Internet. In other instances, the link relation will have associated semantics enabling the client to utilize the other members of the link relation object without fetching additional external resources.

URI link relation type values are compared using the “Simple String Comparison” algorithm of Section 6.2.1 of RFC 3986.

The “rel” member MUST be present in the link relation object.

#### *4.4.4.2 type*

The value of the “type” member is a string that indicates the media type [9] of the target resource (see RFC 6838 [10]).

The “type” member is OPTIONAL in the link relation object.

#### *4.4.4.3 href*

The value of the “href” member is a string that contains a URI pointing to the target resource.

The “href” member is OPTIONAL in the link relation object.

#### *4.4.4.4 titles*

The “titles” object comprises zero or more name/value pairs whose names are a language tag [11] or the string “und”. The string is human-readable and describes the link relation. More than one title for the

link relation MAY be provided for the benefit of users who utilize the link relation, and, if used, a language identifier SHOULD be duly used as the name. If the language is unknown or unspecified, then the name is “und”.

A JRD SHOULD NOT include more than one title identified with the same language tag (or “und”) within the link relation object. Meaning is undefined if a link relation object includes more than one title named with the same language tag (or “und”), though this MUST NOT be treated as an error. A client MAY select whichever title or titles it wishes to utilize.

Here is an example of the “titles” object:

```
"titles" :
{
  "en-us" : "The Magical World of Steve",
  "fr" : "Le Monde Magique de Steve"
}
```

The “titles” member is OPTIONAL in the link relation object.

#### *4.4.4.5 properties*

The “properties” object within the link relation object comprises zero or more name/value pairs whose names are URIs (referred to as “property identifiers”) and whose values are strings or null. Properties are used to convey additional information about the link relation. As an example, consider this use of “properties”:

```
"properties" : { "http://webfinger.example/mail/port" : "993" }
```

The “properties” member is OPTIONAL in the link relation object.

### 4.5 WebFinger and URIs

WebFinger requests include a “resource” parameter (see Section 4.1) specifying the query target (URI) for which the client requests information. WebFinger is neutral regarding the scheme of such a URI: it could be an “acct” URI [18], an “http” or “https” URI, a “mailto” URI [19], or some other scheme.

## 5 Cross-Origin Resource Sharing (CORS)

WebFinger resources might not be accessible from a web browser due to “Same-Origin” policies. The current best practice is to make resources available to browsers through Cross-Origin Resource Sharing (CORS) [7], and servers MUST include the Access-Control-Allow-Origin HTTP header in responses. Servers SHOULD support the least restrictive setting by allowing any domain access to the WebFinger resource:

```
Access-Control-Allow-Origin: *
```

There are cases where defaulting to the least restrictive setting is not appropriate. For example, a server on an intranet that provides sensitive company information SHOULD NOT allow CORS requests from any domain, as that could allow leaking of that sensitive information. A server that wishes to restrict access to information from external entities SHOULD use a more restrictive Access-Control-Allow-Origin header.

# 6 Access Control

As with all web resources, access to the WebFinger resource could require authentication. Further, failure to provide required credentials might result in the server forbidding access or providing a different response than had the client authenticated with the server.

Likewise, a WebFinger resource MAY provide different responses to different clients based on other factors, such as whether the client is inside or outside a corporate network. As a concrete example, a query performed on the internal corporate network might return link relations to employee pictures, whereas link relations for employee pictures might not be provided to external entities.

Further, link relations provided in a WebFinger resource representation might point to web resources that impose access restrictions. For example, the aforementioned corporate server may provide both internal and external entities with URIs to employee pictures, but further authentication might be required in order for the client to access the picture resources if the request comes from outside the corporate network.

The decisions made with respect to what set of link relations a WebFinger resource provides to one client versus another and what resources require further authentication, as well as the specific authentication mechanisms employed, are outside the scope of this document.

# 7 Hosted WebFinger Services

As with most services provided on the Internet, it is possible for a domain owner to utilize "hosted" WebFinger services. By way of example, a domain owner might control most aspects of their domain but use a third-party hosting service for email. In the case of email, mail exchange (MX) records identify mail servers for a domain. An MX record points to the mail server to which mail for the domain should be delivered. To the sending server, it does not matter whether those MX records point to a server in the destination domain or a different domain.

Likewise, a domain owner might utilize the services of a third party to provide WebFinger services on behalf of its users. Just as a domain owner is required to insert MX records into DNS to allow for hosted email services, the domain owner is required to redirect HTTP queries to its domain to allow for hosted WebFinger services.

When a query is issued to the WebFinger resource, the web server MUST return a response with a redirection status code that includes a Location header pointing to the location of the hosted WebFinger service URI. This WebFinger service URI does not need to point to the well-known WebFinger location on the hosting service provider server.

As an example, assume that example.com's WebFinger services are hosted by wf.example.net. Suppose a client issues a query for acct:alice@example.com like this:

```
GET /.well-known/webfinger?
              resource=acct%3Aalice%40example.com HTTP/1.1
Host: example.com
```

The server might respond with this:

```
HTTP/1.1 307 Temporary Redirect
```

```
    Access-Control-Allow-Origin: *
    Location: https://wf.example.net/example.com/webfinger?
                  resource=acct%3Aalice%40example.com
```

The client can then follow the redirection, reissuing the request to the URI provided in the Location header. Note that the server will include any required URI parameters in the Location header value, which could be different than the URI parameters the client originally used.

# 8 Definition of WebFinger Applications

This specification details the protocol syntax used to query a domain for information about a URI, the syntax of the JSON Resource Descriptor (JRD) that is returned in response to that query, security requirements and considerations, hosted WebFinger services, various expected HTTP status codes, and so forth. However, this specification does not enumerate the various possible properties or link relation types that might be used in conjunction with WebFinger for a particular application, nor does it define what properties or link relation types one might expect to see in response to querying for a particular URI or URI scheme. Nonetheless, all of these unspecified elements are important in order to implement an interoperable application that utilizes the WebFinger protocol and MUST be specified in the relevant document(s) defining the particular application making use of the WebFinger protocol according to the procedures described in this section.

## 8.1 Specification of the URI Scheme and URI

Any application that uses WebFinger MUST specify the URI scheme(s), and to the extent appropriate, what forms the URI(s) might take. For example, when querying for information about a user's account at some domain, it might make sense to specify the use of the "acct" URI scheme [18]. When trying to obtain the copyright information for a web page, it makes sense to specify the use of the web page URI (either http or https).

The examples in Sections 3.1 and 3.2 illustrate the use of different URI schemes with WebFinger applications. In the example in Section 3.1, WebFinger is used to retrieve information pertinent to OpenID Connect. In the example in Section 3.2, WebFinger is used to discover metadata information about a web page, including author and copyright information. Each of these WebFinger applications needs to be fully specified to ensure interoperability.

## 8.2 Host Resolution

As explained in Section 4, the host to which a WebFinger query is issued is significant. In general, WebFinger applications would adhere to the procedures described in Section 4 in order to properly direct a WebFinger query.

However, some URI schemes do not have host portions and there might be some applications of WebFinger for which the host portion of a URI cannot or should not be utilized. In such instances, the application specification MUST clearly define the host resolution procedures, which might include provisioning a "default" host within the client to which queries are directed.

## 8.3 Specification of Properties

WebFinger defines both subject-specific properties (i.e., properties described in Section 4.4.3 that relate to the URI for which information is queried) and link-specific properties (see Section 4.4.4.5). This section refers to subject-specific properties.

Applications that utilize subject-specific properties MUST define the URIs used in identifying those properties, along with valid property values.

Consider this portion of the JRD found in the example in Section 3.2.

```
"properties" :
{
  "http://blgx.example.net/ns/version" : "1.3",
  "http://blgx.example.net/ns/ext" : null
}
```

Here, two properties are returned in the WebFinger response. Each of these would be defined in a WebFinger application specification. These two properties might be defined in the same WebFinger application specification or separately in different specifications. Since the latter is possible, it is important that WebFinger clients not assume that one property has any specific relationship with another property, unless some relationship is explicitly defined in the particular WebFinger application specification.

## 8.4 Specification of Links

The links returned in a WebFinger response each comprise several pieces of information, some of which are optional (refer to Section 4.4.4). The WebFinger application specification MUST define each link and any values associated with a link, including the link relation type ("rel"), the expected media type ("type"), properties, and titles.

The target URI to which the link refers (i.e., the "href"), if present, would not normally be specified in an application specification. However, the URI scheme or any special characteristics of the URI would usually be specified. If a particular link does not require an external reference, then all of the semantics related to the use of that link MUST be defined within the application specification. Such links might rely only on properties or titles in the link to convey meaning.

## 8.5 One URI, Multiple Applications

It is important to be mindful of the fact that different WebFinger applications might specify the use of the same URI scheme, and in effect, the same URI for different purposes. That should not be a problem, since each of property identifier (see Sections 4.4.3 and 4.4.4.5) and link relation type would be uniquely defined for a specific application.

It should be noted that when a client requests information about a particular URI and receives a response with a number of different property identifiers or link relation types that the response is providing information about the URI without any particular semantics.

How the client interprets the information SHOULD be in accordance with the particular application specification or set of specifications the client implements.

Any syntactically valid properties or links the client receives and that are not fully understood SHOULD be ignored and SHOULD NOT cause the client to report an error.

### 8.6 Registration of Link Relation Types and Properties

Application specifications MAY define a simple token as a link relation type for a link. In that case, the link relation type MUST be registered with IANA as specified in Sections 10.3.

Further, any defined properties MUST be registered with IANA as described in Section 10.4.

## 9 Security Considerations

### 9.1 Transport-Related Issues

Since this specification utilizes Cross-Origin Resource Sharing (CORS) [7], all of the security considerations applicable to CORS are also applicable to this specification.

The use of HTTPS is REQUIRED to ensure that information is not modified during transit. It should be acknowledged that in environments where a web server is normally available, there exists the possibility that a compromised network might have its WebFinger resource operating on HTTPS replaced with one operating only over HTTP. As such, clients MUST NOT issue queries over a non-secure connection.

Clients MUST verify that the certificate used on an HTTPS connection is valid (as defined in [12]) and accept a response only if the certificate is valid.

### 9.2 User Privacy Considerations

Service providers and users should be aware that placing information on the Internet means that any user can access that information, and WebFinger can be used to make it even easier to discover that information. While WebFinger can be an extremely useful tool for discovering one's avatar, blog, or other personal data, users should also understand the risks.

Systems or services that expose personal data via WebFinger MUST provide an interface by which users can select which data elements are exposed through the WebFinger interface. For example, social networking sites might allow users to mark certain data as "public" and then utilize that marking as a means of determining what information to expose via WebFinger. The information published via WebFinger would thus comprise only the information marked as public by the user. Further, the user has the ability to remove information from publication via WebFinger by removing this marking.

WebFinger MUST NOT be used to provide any personal data unless publishing that data via WebFinger by the relevant service was explicitly authorized by the person whose information is being shared. Publishing one's personal data within an access-controlled or otherwise limited environment on the Internet does not equate to providing implicit authorization of further publication of that data via WebFinger.

The privacy and security concerns with publishing personal data via WebFinger are worth emphasizing again with respect to personal data that might reveal a user's current context (e.g., the user's location). The power of WebFinger comes from providing a single place where others can find pointers to information about a person, but service providers and users should be mindful of the nature of that information shared and the fact that it might be available for the entire world to see. Sharing location information, for example, would potentially put a person in danger from any individual who might seek to inflict harm on that person.

Users should be aware of how easily personal data that one might publish can be used in unintended ways. In one study relevant to WebFinger-like services, Balduzzi et al. [20] took a large set of leaked email addresses and demonstrated a number of potential privacy concerns, including the ability to cross-correlate the same user's accounts over multiple social networks. The authors also describe potential mitigation strategies.

The easy access to user information via WebFinger was a design goal of the protocol, not a limitation. If one wishes to limit access to information available via WebFinger, such as WebFinger resources for use inside a corporate network, the network administrator needs to take necessary measures to limit access from outside the network. Using standard methods for securing web resources, network administrators do have the ability to control access to resources that might return sensitive information. Further, a server can be employed in such a way as to require authentication and prevent disclosure of information to unauthorized entities.

## 9.3 Abuse Potential

Service providers should be mindful of the potential for abuse using WebFinger.

As one example, one might query a WebFinger server only to discover whether or not a given URI is valid. With such a query, the person may deduce that an email identifier is valid, for example. Such an approach could help spammers maintain a current list of known email addresses and to discover new ones.

WebFinger could be used to associate a name or other personal data with an email address, allowing spammers to craft more convincing email messages. This might be of particular value in phishing attempts.

It is RECOMMENDED that implementers of WebFinger server software take steps to mitigate abuse, including malicious over-use of the server and harvesting of user information. Although there is no mechanism that can guarantee that publicly accessible WebFinger databases won't be harvested, rate-limiting by IP address will prevent or at least dramatically slow harvest by private individuals without access to botnets or other distributed systems. The reason these mitigation strategies are not mandatory is that the correct choice of mitigation strategy (if any) depends greatly on the context. Implementers should not construe this as meaning that they do not need to consider whether to use a mitigation strategy, and if so, what strategy to use.

WebFinger client developers should also be aware of potential abuse by spammers or those phishing for information about users. As an example, suppose a mail client was configured to automatically perform a WebFinger query on the sender of each received mail message. If a spammer sent an email using a unique identifier in the 'From' header, then when the WebFinger query was performed, the spammer would be able to associate the request with a particular user's email address. This would provide information to the spammer, including the user's IP address, the fact the user just checked email, what kind of WebFinger client the user utilized, and so on. For this reason, it is strongly advised that clients not perform WebFinger queries unless authorized by the user to do so.

## 9.4 Information Reliability

A WebFinger resource has no means of ensuring that information provided by a user is accurate. Likewise, neither the resource nor the client can be absolutely guaranteed that information has not been manipulated either at the server or along the communication path between the client and server. Use of

HTTPS helps to address some concerns with manipulation of information along the communication path, but it clearly cannot address issues where the resource provided incorrect information, either due to being provided false information or due to malicious behavior on the part of the server administrator. As with any information service available on the Internet, users should be wary of information received from untrusted sources.

# 10 IANA Considerations

## 10.1 Well-Known URI

This specification registers the "webfinger" well-known URI in the "Well-Known URIs" registry as defined by RFC 5785 [3].

URI suffix: webfinger

Change controller: IETF

Specification document(s): RFC 7033

Related information: The query to the WebFinger resource will include one or more parameters in the query string; see Section 4.1 of RFC 7033. Resources at this location are able to return a JSON Resource Descriptor (JRD) as described in Section 4.4 of RFC 7033.

## 10.2 JSON Resource Descriptor (JRD) Media Type

This specification registers the media type application/jrd+json for use with WebFinger in accordance with media type registration procedures defined in RFC 6838 [10].

Type name: application

Subtype name: jrd+json

Required parameters: N/A

Optional parameters: N/A

> In particular, because RFC 4627 already defines the character encoding for JSON, no "charset" parameter is used.

Encoding considerations: See RFC 6839, Section 3.1.

Security considerations:

> The JSON Resource Descriptor (JRD) is a JavaScript Object Notation (JSON) object. It is a text format that must be parsed by entities that wish to utilize the format. Depending on the language and mechanism used to parse a JSON object, it is possible for an attacker to inject behavior into a running program. Therefore, care must be taken to properly parse a received JRD to ensure that only a valid JSON object is present and that no JavaScript or other code is injected or executed unexpectedly.

Interoperability considerations:

This media type is a JavaScript Object Notation (JSON) object and can be consumed by any software application that can consume JSON objects.

Published specification: RFC 7033

Applications that use this media type:

The JSON Resource Descriptor (JRD) is used by the WebFinger protocol (RFC 7033) to enable the exchange of information between a client and a WebFinger resource over HTTPS.

Fragment identifier considerations:

The syntax and semantics of fragment identifiers SHOULD be as specified for “application/json”. (At publication of this document, there is no fragment identification syntax defined for “application/json”.)

Additional information:

Deprecated alias names for this type: N/A

Magic number(s): N/A

File extension(s): jrd

Macintosh file type code(s): N/A

Person & email address to contact for further information:

Paul E. Jones <paulej@packetizer.com>

Intended usage: COMMON

Restrictions on usage: N/A

Author: Paul E. Jones <paulej@packetizer.com>

Change controller:

IESG has change control over this registration.

Provisional registration? (standards tree only): N/A

## 10.3 Registering Link Relation Types

RFC 5988 established a “Link Relation Types” registry that is reused by WebFinger applications.

Link relation types used by WebFinger applications are registered in the “Link Relation Types” registry as per the procedures of Section 6.2.1 of RFC 5988. The “Notes” entry for the registration SHOULD indicate if property values associated with the link relation type are registered in the “WebFinger Properties” registry with a link to the registry.

## 10.4 Establishment of the "WebFinger Properties" Registry

WebFinger utilizes URIs to identify properties of a subject or link and the associated values (see Sections 8.3 and 8.6). This specification establishes a new "WebFinger Properties" registry to record property identifiers.

### 10.4.1 The Registration Template

The registration template for WebFinger properties is:

> Property Identifier:
>
> Link Type:
>
> Description:
>
> Reference:
>
> Notes: [optional]

The "Property Identifier" must be a URI that identifies the property being registered.

The "Link Type" contains the name of a link relation type with which this property identifier is used. If the property is a subject-specific property, then this field is specified as "N/A".

The "Description" is intended to explain the purpose of the property.

The "Reference" field points to the specification that defines the registered property.

The optional "Notes" field is for conveying any useful information about the property that might be of value to implementers.

### 10.4.2 The Registration Procedures

The IETF has created a mailing list, webfinger@ietf.org, which can be used for public discussion of the WebFinger protocol and any applications that use it. Prior to registration of a WebFinger property, discussion on the mailing list is strongly encouraged. The IESG has appointed Designated Experts [13] who will monitor the webfinger@ietf.org mailing list and review registrations.

A WebFinger property is registered with a Specification Required (see RFC 5226 [13]) after a review by the Designated Experts. The review is normally expected to take on the order of two to four weeks. However, the Designated Experts may approve a registration prior to publication of a specification once the Designated Experts are satisfied that such a specification will be published. In evaluating registration requests, the Designated Experts should make an effort to avoid registering two different properties that have the same meaning. Where a proposed property is similar to an already-defined property, the Designated Experts should insist that enough text be included in the description or notes section of the template to sufficiently differentiate the new property from an existing one.

The registration procedure begins with a completed registration template (as defined above) sent to webfinger@ietf.org. Once consensus is reached on the mailing list, the registration template is sent to iana@iana.org. IANA will then contact the Designated Experts and communicate the results to the registrant. The WebFinger mailing list provides an opportunity for community discussion and input, and

the Designated Experts may use that input to inform their review. Denials should include an explanation and, if applicable, suggestions as to how to make the request successful if resubmitted.

The specification registering the WebFinger property MUST include the completed registration template shown above. Once the registration procedure concludes successfully, IANA creates or modifies the corresponding record in the "WebFinger Properties" registry.

# 11 Acknowledgments

This document has benefited from extensive discussion and review by many of the members of the APPSAWG working group. The authors would like to especially acknowledge the invaluable input of Eran Hammer-Lahav, Blaine Cook, Brad Fitzpatrick, Laurent-Walter Goix, Joe Clarke, Peter Saint-Andre, Dick Hardt, Tim Bray, James Snell, Melvin Carvalho, Evan Prodromou, Mark Nottingham, Elf Pavlik, Bjoern Hoehrmann, Subramanian Moonesamy, Joe Gregorio, John Bradley, and others that we have undoubtedly, but inadvertently, missed.

The authors would also like to express their gratitude to the chairs of the APPSAWG working group, especially Salvatore Loreto for his assistance in shepherding this document. We also want to thank Barry Leiba and Pete Resnick, the Applications Area Directors, for their support and exhaustive reviews.

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