

Network Working Group  
Internet-Draft  
Intended status: Informational  
Expires: May 6, 2022

M. Koster  
Stalworthy Computing, Ltd.  
G. Illyes  
H. Zeller  
L. Harvey  
Google  
November 07, 2021

**Robots Exclusion Protocol**  
**draft-koster-rep-06**

**Abstract**

This document specifies and extends the "Robots Exclusion Protocol" method originally defined by Martijn Koster in 1996 for service owners to control how content served by their services may be accessed, if at all, by automatic clients known as crawlers.

**Status of This Memo**

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This document may not be modified, and derivative works of it may not be created, except to format it for publication as an RFC or to translate it into languages other than English.

This Internet-Draft will expire on May 6, 2022.

**Copyright Notice**

Copyright (c) 2020 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of

the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Koster, et al.

Expires May 6, 2022

[Page 1]

## Table of Contents

<a href="#">1.</a>	<a href="#">Introduction</a>	<a href="#">2</a>
<a href="#">1.1.</a>	<a href="#">Terminology</a>	<a href="#">2</a>
<a href="#">2.</a>	<a href="#">Specification</a>	<a href="#">3</a>
<a href="#">2.1.</a>	<a href="#">Protocol definition</a>	<a href="#">3</a>
<a href="#">2.2.</a>	<a href="#">Formal syntax</a>	<a href="#">3</a>
<a href="#">2.2.1.</a>	<a href="#">The user-agent line</a>	<a href="#">4</a>
<a href="#">2.2.2.</a>	<a href="#">The Allow and Disallow lines</a>	<a href="#">4</a>
<a href="#">2.2.3.</a>	<a href="#">Special characters</a>	<a href="#">5</a>
<a href="#">2.2.4.</a>	<a href="#">Other records</a>	<a href="#">6</a>
<a href="#">2.3.</a>	<a href="#">Access method</a>	<a href="#">6</a>
<a href="#">2.3.1.</a>	<a href="#">Access results</a>	<a href="#">7</a>
<a href="#">2.4.</a>	<a href="#">Caching</a>	<a href="#">8</a>
<a href="#">2.5.</a>	<a href="#">Limits</a>	<a href="#">8</a>
<a href="#">2.6.</a>	<a href="#">Security Considerations</a>	<a href="#">8</a>
<a href="#">2.7.</a>	<a href="#">IANA Considerations</a>	<a href="#">8</a>
<a href="#">3.</a>	<a href="#">Examples</a>	<a href="#">8</a>
<a href="#">3.1.</a>	<a href="#">Simple example</a>	<a href="#">8</a>
<a href="#">3.2.</a>	<a href="#">Longest Match</a>	<a href="#">9</a>
<a href="#">4.</a>	<a href="#">References</a>	<a href="#">9</a>
<a href="#">4.1.</a>	<a href="#">Normative References</a>	<a href="#">9</a>
<a href="#">4.2.</a>	<a href="#">Informative References.</a>	<a href="#">9</a>
	<a href="#">Author's Address</a>	<a href="#">10</a>

## [1.](#) Introduction

This document applies to services that provide resources that clients can access through URIs as defined in [[RFC3986](#)]. For example, in the context of HTTP, a browser is a client that displays the content of a web page.

Crawlers are automated clients. Search engines for instance have crawlers to recursively traverse links for indexing as defined in [[RFC8288](#)].

It may be inconvenient for service owners if crawlers visit the entirety of their URI space. This document specifies the rules originally defined by the "Robots Exclusion Protocol" [[1](#)] that crawlers are expected to obey when accessing URIs.

These rules are not a form of access authorization.

### [1.1.](#) 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.

Koster, et al.

Expires May 6, 2022

[Page 2]

## 2. Specification

### 2.1. Protocol definition

The protocol language consists of rule(s) and group(s) that the service makes available in a file named 'robots.txt' as described in [section 2.3](#):

- o **\*Rule\***: A line with a key-value pair that defines how a crawler may access URIs. See [section 2.2.2](#).
- o **\*Group\***: One or more user-agent lines that is followed by one or more rules. The group is terminated by a user-agent line or end of file. See 2.2.1. The last group may have no rules, which means it implicitly allows everything.

### 2.2. Formal syntax

Below is an Augmented Backus-Naur Form (ABNF) description, as described in [\[RFC5234\]](#).

```
robotstxt = *(group / emptyline)
group = startgroupline
      *(startgroupline / emptyline)
      *(rule / emptyline)
      ; We start with a user-agent
      ; ... and possibly more
      ; user-agents
      ; followed by rules relevant
      ; for UAs
```

```
startgroupline = *WS "user-agent" *WS ":" *WS product-token EOL
```

```
rule = *WS ("allow" / "disallow") *WS ":"
      *WS (path-pattern / empty-pattern) EOL
```

```
; parser implementors: add additional lines you need (for
; example Sitemaps), and be lenient when reading lines that don't
; conform. Apply Postel's law.
```

```
product-token = identifier / ""
path-pattern = "/" *UTF8-char-noctl ; valid URI path pattern
empty-pattern = *WS
```

```
identifier = 1*(%x2D / %x41-5A / %x5F / %x61-7A)
comment = "#" *(UTF8-char-noctl / WS / "#")
emptyline = EOL
EOL = *WS [comment] NL ; end-of-line may have
                        ; optional trailing comment
NL = %x0D / %x0A / %x0D.0A
WS = %x20 / %x09
```



; UTF8 derived from [[RFC3629](#)], but excluding control characters

UTF8-char-noctl = UTF8-1-noctl / UTF8-2 / UTF8-3 / UTF8-4

UTF8-1-noctl = %x21 / %x22 / %x24-7F ; excluding control, space, '#'

UTF8-2 = %xC2-DF UTF8-tail

UTF8-3 = %xE0 %xA0-BF UTF8-tail / %xE1-EC 2UTF8-tail /  
           %xED %x80-9F UTF8-tail / %xEE-EF 2UTF8-tail

UTF8-4 = %xF0 %x90-BF 2UTF8-tail / %xF1-F3 3UTF8-tail /  
           %xF4 %x80-8F 2UTF8-tail

UTF8-tail = %x80-BF

### [2.2.1.](#) The user-agent line

Crawlers set a product token to find relevant groups. The product token **MUST** contain only "a-zA-Z\_" characters. The product token **SHOULD** be part of the identification string that the crawler sends to the service (for example, in the case of HTTP, the product name **SHOULD** be in the user-agent header). The identification string **SHOULD** describe the purpose of the crawler. Here's an example of an HTTP header with a link pointing to a page describing the purpose of the ExampleBot crawler which appears both in the HTTP header and as a product token:

HTTP header	robots.txt
	user-agent line
user-agent: Mozilla/5.0 (compatible; ExampleBot/0.1; https://www.example.com/bot.html)	user-agent: ExampleBot

Crawlers **MUST** find the group that matches the product token exactly, and then obey the rules of the group. If there is more than one group matching the user-agent, the matching groups' rules **MUST** be combined into one group. The matching **MUST** be case-insensitive. If no matching group exists, crawlers **MUST** obey the first group with a user-agent line with a "\*" value, if present. If no group satisfies either condition, or no groups are present at all, no rules apply.

### [2.2.2.](#) The Allow and Disallow lines

These lines indicate whether accessing a URI that matches the corresponding path is allowed or disallowed.

To evaluate if access to a URI is allowed, a robot **MUST** match the paths in allow and disallow rules against the URI. The matching **SHOULD** be case sensitive. The most specific match found **MUST** be used. The most specific match is the match that has the most octets.

If an allow and disallow rule is equivalent, the allow SHOULD be

Koster, et al.

Expires May 6, 2022

[Page 4]



used. If no match is found amongst the rules in a group for a matching user-agent, or there are no rules in the group, the URI is allowed. The /robots.txt URI is implicitly allowed.

Octets in the URI and robots.txt paths outside the range of the US-ASCII coded character set, and those in the reserved range defined by [RFC3986], MUST be percent-encoded as defined by [RFC3986] prior to comparison.

If a percent-encoded US-ASCII octet is encountered in the URI, it MUST be unencoded prior to comparison, unless it is a reserved character in the URI as defined by [RFC3986] or the character is outside the unreserved character range. The match evaluates positively if and only if the end of the path from the rule is reached before a difference in octets is encountered.

For example:

Path	Encoded Path	Path to match
/foo/bar?baz=quz	/foo/bar?baz=quz	/foo/bar?baz=quz
/foo/bar?baz=http ://foo.bar	/foo/bar?baz=http%3A% 2F%2Ffoo.bar	/foo/bar?baz=http%3A% 2F%2Ffoo.bar
/foo/bar/U+E38384	/foo/bar/%E3%83%84	/foo/bar/%E3%83%84
/foo/bar/%E3%83%8 4	/foo/bar/%E3%83%84	/foo/bar/%E3%83%84
/foo/bar/%62%61%7 A	/foo/bar/%62%61%7A	/foo/bar/baz

The crawler SHOULD ignore "disallow" and "allow" rules that are not in any group (for example, any rule that precedes the first user-agent line).

Implementers MAY bridge encoding mismatches if they detect that the robots.txt file is not UTF8 encoded.

### 2.2.3. Special characters

Crawlers SHOULD allow the following special characters:



Character	Description	Example
"#"	Designates an end of line comment.	"allow: / # comment in line" "# comment at the end"
"\$"	Designates the end of the match pattern. A URI MUST end with a \$.	"allow: /this/path/exactly\$"
"*"	Designates 0 or more instances of any character.	"allow: /this/*/exactly"

If crawlers match special characters verbatim in the URI, crawlers SHOULD use "%" encoding. For example:

Pattern	URI
/path/file-with-a-%2A.html	https://www.example.com/path/file-with-a-*.html
/path/foo-%24	https://www.example.com/path/foo-\$

#### **2.2.4. Other records**

Clients MAY interpret other records that are not part of the robots.txt protocol. For example, 'sitemap' [2]. Parsing of other records MUST NOT interfere with the parsing of explicitly defined records in [section 2](#).

#### **2.3. Access method**

The rules MUST be accessible in a file named "/robots.txt" (all lower case) in the top level path of the service. The file MUST be UTF-8 encoded (as defined in [RFC3629]) and Internet Media Type "text/plain" (as defined in [RFC2046]).

As per [RFC3986], the URI of the robots.txt is:

"scheme:[//authority]/robots.txt"

For example, in the context of HTTP or FTP, the URI is:

<http://www.example.com/robots.txt>

Koster, et al.

Expires May 6, 2022

[Page 6]

`https://www.example.com/robots.txt`

`ftp://ftp.example.com/robots.txt`

### **2.3.1. Access results**

#### **2.3.1.1. Successful access**

If the crawler successfully downloads the robots.txt, the crawler MUST follow the parseable rules.

#### **2.3.1.2. Redirects**

The server may respond to a robots.txt fetch request with a redirect, such as HTTP 301 and HTTP 302. The crawlers SHOULD follow at least five consecutive redirects, even across authorities (for example hosts in case of HTTP), as defined in [[RFC1945](#)].

If a robots.txt file is reached within five consecutive redirects, the robots.txt file MUST be fetched, parsed, and its rules followed in the context of the initial authority.

If there are more than five consecutive redirects, crawlers MAY assume that the robots.txt is unavailable.

#### **2.3.1.3. Unavailable status**

Unavailable means the crawler tries to fetch the robots.txt, and the server responds with unavailable status codes. For example, in the context of HTTP, unavailable status codes are in the 400-499 range.

If a server status code indicates that the robots.txt file is unavailable to the client, then crawlers MAY access any resources on the server or MAY use a cached version of a robots.txt file for up to 24 hours.

#### **2.3.1.4. Unreachable status**

If the robots.txt is unreachable due to server or network errors, this means the robots.txt is undefined and the crawler MUST assume complete disallow. For example, in the context of HTTP, an unreachable robots.txt has a response code in the 500-599 range. For other undefined status codes, the crawler MUST assume the robots.txt is unreachable.

If the robots.txt is undefined for a reasonably long period of time (for example, 30 days), clients MAY assume the robots.txt is unavailable or continue to use a cached copy.



#### **2.3.1.5. Parsing errors**

Crawlers SHOULD try to parse each line of the robots.txt file.  
Crawlers MUST use the parseable rules.

#### **2.4. Caching**

Crawlers MAY cache the fetched robots.txt file's contents. Crawlers MAY use standard cache control as defined in [[RFC2616](#)]. Crawlers SHOULD NOT use the cached version for more than 24 hours, unless the robots.txt is unreachable.

#### **2.5. Limits**

Crawlers MAY impose a parsing limit that MUST be at least 500 kibibytes (KiB).

#### **2.6. Security Considerations**

The Robots Exclusion Protocol is not a substitute for more valid content security measures. Listing URIs in the robots.txt file exposes the URI publicly and thus making the URIs discoverable.

#### **2.7. IANA Considerations.**

This document has no actions for IANA.

### **3. Examples**

#### **3.1. Simple example**

The following example shows:

- o \*foobot\*: A regular case. A single user-agent token followed by rules.
- o \*barbot and bazbot\*: A group that's relevant for more than one user-agent.
- o \*quxbot:\* Empty group at end of file.





```
<CODE BEGINS>
User-Agent : foobot
Disallow : /example/page.html
Disallow : /example/disallowed.gif

User-Agent : barbot
User-Agent : bazbot
Allow : /example/page.html
Disallow : /example/disallowed.gif

User-Agent: quxbot

EOF
<CODE ENDS>
```

### **3.2. Longest Match**

The following example shows that in the case of two rules, the longest one is used for matching. In the following case, /example/page/disallowed.gif MUST be used for the URI example.com/example/page/disallow.gif .

```
<CODE BEGINS>
User-Agent : foobot
Allow : /example/page/
Disallow : /example/page/disallowed.gif
<CODE ENDS>
```

## **4. References**

### **4.1. Normative References**

- [[RFC1945](#)] Berners-Lee, T., Fielding, R., and H. Frystyk, "Hypertext Transfer Protocol -- HTTP/1.0", [RFC 1945](#), May 1996.
- [[RFC2046](#)] Freed, N., Borenstein, N., "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types", [RFC 2046](#), November 1996.
- [[RFC2119](#)] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [[RFC2616](#)] Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., Berners-Lee, T., "Hypertext Transfer Protocol -- HTTP/1.1", [RFC 2616](#), June 1999.
- [[RFC3629](#)] Yergeau, F., "UTF-8, a transformation format of ISO 10646", STD 63, [RFC 3629](#), November 2003.
- [[RFC3986](#)] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, [RFC 3986](#), January 2005.
- [[RFC5234](#)] Crocker, D., Overell, P., "Augmented BNF for Syntax Specifications: ABNF", [RFC 5234](#), STD 68, January 2008.



- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 2119](#), Mar 2017.
- [[RFC8288](#)] Nottingham, M., "Web Linking", [RFC 8288](#), October 2017.

#### **[4.2.](#) Informative References**

- [1] <http://www.robotstxt.org/>
- [2] <https://www.sitemaps.org/index.html>

#### Authors' Address

Martijn Koster  
Stalworthy Manor Farm  
Suton Lane, NR18 9JG  
Wymondham, Norfolk  
United Kingdom  
Email: [m.koster@greenhills.co.uk](mailto:m.koster@greenhills.co.uk)

Gary Illyes  
Brandschenkestrasse 110  
8002, Zurich  
Switzerland  
Email: [garyilleyes@google.com](mailto:garyilleyes@google.com)

Henner Zeller  
1600 Amphitheatre Pkwy  
Mountain View, CA 94043  
USA  
Email: [henner@google.com](mailto:henner@google.com)

Lizzi Harvey  
1600 Amphitheatre Pkwy  
Mountain View, CA 94043  
USA  
Email: [lizzi@google.com](mailto:lizzi@google.com)