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Authors: M. Koster, Ed. G. Illyes, Ed.  
Stalworthy Computing, Ltd. Google LLC.  
H. Zeller, Ed. L. Sassman, Ed.  
Google LLC. Google LLC.

## **Robots Exclusion Protocol**

### **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.

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## 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" [[ROBOTSTXT](#)] that crawlers are expected to obey when accessing URIs.

These rules are not a form of access authorization.

## 1.1. Requirements Language

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.

## 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:

\*Rule: A line with a key-value pair that defines how a crawler may access URIs. See section 2.2.2.

\*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 section 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           ; We start with a user-agent
    *(startgroupline / emptyline) ; ... and possibly more
    ; user-agents
    *(rule / emptyline)          ; 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

Table 1: Example of a user-agent header and user-agent robots.txt token for 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 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%84	/foo/bar/%E3%83%84	/foo/bar/%E3%83%84
/foo/bar/%62%61%7A	/foo/bar/%62%61%7A	/foo/bar/baz

Table 2: Examples of matching percent-encoded URI components

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 on its own line"
"\$"	Designates the end of the match pattern.	"allow: /this/path/exactly\$"
"*"	Designates 0 or more instances of any character.	"allow: /this/*/exactly"

Table 3: List of special characters in robots.txt files

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

Percent-encoded 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-\$

Table 4: Example of percent-encoding

### 2.2.4. Other Records

Clients **MAY** interpret other records that are not part of the robots.txt protocol. For example, 'sitemap' [[SITEMAPS](#)]. 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`

`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.

#### 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).

### 3. 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 makes the URIs discoverable.

### 4. IANA Considerations

This document has no actions for IANA.

### 5. Examples

#### 5.1. Simple Example

The following example shows:

\*foobot: A regular case. A single user-agent token followed by rules.



\*barbot and bazbot: A group that's relevant for more than one user-agent.

\*quxbot: An empty group at end of the file.

```
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

## 5.2. 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.

```
User-Agent : foobot
Allow : /example/page/
Disallow : /example/page/disallowed.gif
```

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[SITEMAPS] "Sitemaps Protocol", n.d., <<https://www.sitemaps.org/index.html>>.

## Authors' Addresses

Martijn Koster (editor)  
Stalworthy Computing, Ltd.  
Suton Lane  
Wymondham, Norfolk  
NR18 9JG  
United Kingdom

Email: [m.koster@greenhills.co.uk](mailto:m.koster@greenhills.co.uk)

Gary Illyes (editor)  
Google LLC.  
Brandschenkestrasse 110  
CH-8002 Zurich  
Switzerland

Email: [garyillyes@google.com](mailto:garyillyes@google.com)

Henner Zeller (editor)  
Google LLC.  
1600 Amphitheatre Pkwy  
Mountain View, CA, 94043  
United States of America

Email: [henner@google.com](mailto:henner@google.com)

Lizzi Sassman (editor)  
Google LLC.  
Brandschenkestrasse 110  
CH-8002 Zurich  
Switzerland

Email: [lizzi@google.com](mailto:lizzi@google.com)