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A Retention Priority Attribute for HTTP Cookies
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Abstract

This document defines the "Priority" attribute for HTTP cookies. This attribute allows servers to specify a retention priority for HTTP cookies that will be respected by user agents during cookie eviction.

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[1.](#) Introduction

This document defines the "Priority" attribute for HTTP cookies. Using the "Priority" attribute, servers may indicate that certain cookies should be protected, and others preferentially deleted. When a user agent evicts cookies in the enforcement of a per-domain quota, lower priority cookies will be deleted first, potentially preserving higher-priority cookies that would otherwise have been deleted according to the rules of [[RFC6265](#)].

[2.](#) Terminology and notation

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](#)].

This specification uses the Augmented Backus-Naur Form (ABNF) notation of [[RFC5234](#)].

Two sequences of octets are said to case-insensitively match each other if and only if they are equivalent under the "i;ascii-casemap" collation defined in [[RFC4790](#)].

3. Overview

This section outlines a way for an origin server to indicate the retention priority for individual cookies and for the user agent to respect retention priorities during cookie eviction.

To indicate a cookie's retention priority, the origin server includes a "Priority" attribute in the "Set-Cookie" HTTP response header. A value of "Low" indicates that the cookie should be given lower retention priority (evicted prior to other cookies). A value of "High" indicates that a cookie should be given higher retention priority (evicted after other cookies). The value of "Medium" corresponds to the default behavior.

In order to prevent starvation of functionality dependent on low- and medium-priority cookies, a fraction of the cookie quota should be reserved for them.

[\[RFC6265\]](#), [Section 5.3](#), describes a strategy that user agents must follow when "removing excess cookies". A user agent implementing the current specification for a retention priority attribute will implement an extended priority order, dividing the second priority ("Cookies that share a domain field with more than a predetermined number of other cookies") into multiple levels corresponding to the three retention priorities.

As a result, when the cookies for a given domain exceed user agent limits, cookies with low priority will be evicted first, followed by medium and high priority cookies.

3.1. Examples

Using the Priority attribute, an origin server may assign a retention priority to a cookie stored by a user agent. For example, the origin server may prioritize the retention of session security tokens while indicating that superficial data such as a user's favorite color should be discarded in preference to other data.

The following figure illustrates a series of 33 cookies received by a user-agent from the example.com server during one or more HTTP responses. Each cookie is represented by an L, M, or H indicating low, medium, or high priority, respectively.

== Least Recently Accessed -> Most Recently Accessed ==

M L H H H H M H L L M M M M M M M L L L L M M M M M H M M L L M

Assume that the user agent is configured to evict all but 25 cookies from a domain when the number of cookies exceeds 31. [\[RFC6265\]](#) specifies the following eviction order. Cookies are separated in the vertical axis by priority. Evicted cookies are labeled with a '1' and retained cookies with an 'X'.

== Least Recently Accessed -> Most Recently Accessed ==

```

L   1           X X           X X X X X           X X
M  1           1       X X X X X X X       X X X X X   X X   X
H       1 1 1 1   1           X

```

A user agent that implements the current specification, reserving room for 5 low-, 15 medium-, and 5 high-priority cookies, would implement a modified eviction order as follows. '1', '2', and '3' indicate cookies evicted during various phases of the algorithm.

== Least Recently Accessed -> Most Recently Accessed ==

```

L   1           1 1           1 1 X X X           X X
M  2           2       X X X X X X X       X X X X X   X X   X
H       3 X X X   X           X

```

Of note is that the retention priority does not impact the relative eviction priority of cookies being evicted due to the global threshold (i.e., once no domain exceeds the per-domain threshold). Furthermore, this new attribute has no effect on domains that do not send it.

4. Server Requirements

This section describes the syntax and semantics of the "Priority" cookie attribute.

4.1. Syntax

The Set-Cookie HTTP response header syntax is defined in [\[RFC6265\]](#), [Section 4.1.1](#). The grammar defined therein provides for tokens of type 'extension-av'. The Priority attribute is a subset of 'extension-av' that may appear zero or one times in a given 'set-cookie-header'. If it appears, the 'priority' attribute must conform to the following grammar:

```

priority-av    = "Priority=" priority-value
priority-value = "Low" / "Medium" / "High"

```


4.2. Semantics (Non-Normative)

This section describes a simplified semantics of the "Priority" attribute in the "Set-Cookie" HTTP response header. The full semantics are described in [Section 5](#).

4.3. The 'Priority' Attribute

The "Priority" attribute indicates a retention priority relative to other cookies from the same domain as the cookie carrying the attribute. During cookie eviction in enforcement of per-domain cookie limits, "Low" priority cookies will be evicted before "Medium" and "Medium" before "High". Cookies without a specified priority are considered to have "Medium" priority.

5. User Agent Requirements

[\[RFC6265\]](#), [Section 5.2](#) describes how user agents must parse the value of the "Set-Cookie" HTTP response header. This specification provides additional processing steps that user agents must follow when they encounter a "Priority" attribute.

"Set-Cookie" headers that do not specify the "Priority" attribute MUST be treated as if the attribute was present and had the value Medium.

5.1. The 'Priority' Attribute

If the "attribute-name" case-insensitively matches the string "Priority", the user agent MUST process the "cookie-av" as follows:

If the "attribute-value" case-insensitively matches the string "Low", the cookie is assigned a low retention priority.

If the "attribute-value" case-insensitively matches the string "Medium", the cookie is assigned a medium retention priority.

If the "attribute-value" case-insensitively matches the string "High", the cookie is assigned a high retention priority.

Otherwise, the cookie is assigned a medium retention priority.

5.2. Storage Model

[\[RFC6265\]](#), [Section 6.1](#) recommends that user agents set limits on the number of cookies they will store. [\[RFC6265\]](#), [Section 5.3](#), describes a strategy that user must follow when "removing excess cookies".

A user agent implementing the current specification for a retention priority attribute will set aside a small portion of its storage quota for low-priority cookies, and another portion for medium-priority cookies. During eviction, compatible user agents will implement an extended priority order, dividing the second priority ("Cookies that share a domain field with more than a predetermined number of other cookies") into three, according to the retention priorities and the space reserved for them. Assuming that no other extensions amend the rules defined in [RFC6265], a compatible user agent MUST therefore evict cookies in the following priority order (L and M refer to the amount of space reserved for low- and medium-priority cookies respectively, per domain). As per [RFC6265], within each category the least-recently accessed cookies should be deleted first.

1. Expired cookies.
2. Cookies with a low retention priority that share a domain field with more than a predetermined number of other cookies, excluding the first L low-priority cookies from that domain.
3. Cookies with a low or medium retention priority that share a domain field with more than a predetermined number of other cookies, excluding the first L + M low- and medium-priority cookies from that domain.
4. Cookies that share a domain field with more than a predetermined number of other cookies.
5. All cookies.

6. Implementation Considerations

This specification extends [RFC6265] in order to enable improved behaviour when servers are unable or unwilling to keep the number of distinct cookies served by their domains within the limits of user agents. As this specification is unlikely to ever achieve universal adoption by user agents, servers SHOULD gracefully degrade if their specified cookie retention priorities are not respected.

7. References

7.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.

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- [RFC5234] Crocker, D., Ed. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", STD 68, [RFC 5234](#), DOI 10.17487/RFC5234, January 2008, <<http://www.rfc-editor.org/info/rfc5234>>.
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[7.2. Informative References](#)

- [Wright2013]
Wright, E. and S. Huang, "A Retention Priority Attribute for HTTP Cookies", n.d., <<https://docs.google.com/a/google.com/file/d/0B3o1I1TKoADVR1lKWGlyWGxIVTg/edit>>.

[Appendix A. Acknowledgements](#)

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