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Quota and Size Properties for Distributed Authoring and Versioning (DAV) Collections

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Abstract

Web Distributed Authoring and Versioning (WebDAV) servers are frequently deployed with quota (size) limitations. This document discusses the properties and minor behaviors needed for clients to interoperate with quota (size) implementations on WebDAV repositories.

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1. Introduction

1.1 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 [\[RFC2119\]](#).

The definition of live property is provided in [\[RFC2518\]](#). The definition of protected and computed properties is provided in [\[RFC3253\]](#), Section 1.4.

1.2 Requirement for Quotas

WebDAV servers based on [\[RFC2518\]](#) have been implemented and deployed with quota restrictions on collections and users, so it makes sense to standardize this functionality to improve user experience and client interoperability.

The reasons why WebDAV servers frequently have quotas enforced are the same reasons why any storage system comes with quotas.

- Sometimes the storage service charges according to quota.
- Sometimes the storage service is provided free, but the storage service provider has limited storage space (e.g., university-provided student accounts).
- Even in cases where the storage can be upgraded, the storage managers may choose to limit quota in order to encourage users to limit the files they store on the system and to clean up obsolete files (e.g., IT departments within corporations).

In order to work best with repositories that support quotas, client software should be able to determine and display the DAV:quota-available-bytes (defined below) on collections. Further, client software should have some way of fairly reliably determining how much storage space is already counted towards that quota.

Support for the properties defined in this document enhances the client experience, because the client has a chance of managing its files to avoid running out of allocated storage space. Clients may not be able to calculate the value as accurately on their own, depending on how total space used is calculated by the server.

2. Solution Overview

The approach to meeting the requirements and scenarios outlined above is to define two live properties. This specification can be met on a server by implementing both DAV:quota-available-bytes and DAV:quota-used-bytes on collections only.

A <DAV:allprop> PROPFIND request SHOULD NOT return any of the properties defined by this document. However, these property names MUST be returned in a <DAV:propname> request for a resource that supports the properties, except in the case of infinite limits, which are explained below.

The DAV:quota-available-bytes and DAV:quota-used-bytes definitions below borrow heavily from the quota definitions in the Network File System (NFS) [\[RFC3530\]](#) specification.

3. DAV:quota-available-bytes

Name: quota-available-bytes
Namespace: DAV:
Purpose: Indicates the maximum amount of additional storage available to be allocated to a resource.
DTD: <!ELEMENT quota-available-bytes (#PCDATA) >

The DAV:quota-available-bytes property value is the value in octets representing the amount of additional disk space beyond the current allocation that can be allocated to this resource before further allocations will be refused. It is understood that this space may be consumed by allocations to other resources.

Support for this property is **REQUIRED** on collections, and **OPTIONAL** on other resources. A server **SHOULD** implement this property for each resource that has the DAV:quota-used-bytes property.

Clients **SHOULD** expect that as the DAV:quota-available-bytes on a resource approaches 0, further allocations to that resource may be refused. A value of 0 indicates that users will probably not be able to perform operations that write additional information (e.g., a PUT inside a collection), but may be able to replace through overwrite an existing resource of equal size.

Note that there may be a number of distinct but overlapping limits, which may even include physical media limits. When reporting DAV:quota-available-bytes, the server is at liberty to choose any of those limits but **SHOULD** do so in a repeatable way. The rule may be configured per repository, or may be "choose the smallest number".

If a resource has no quota enforced or unlimited storage ("infinite limits"), the server **MAY** choose not to return this property (404 Not Found response in Multi-Status), although this specification **RECOMMENDS** that servers return some appropriate value (e.g., the amount of free disk space). A client cannot entirely assume that there is no quota enforced on a resource that does not have this property, but might as well act as if there is no quota.

The value of this property is protected (see Section 1.4.2 of [\[RFC3253\]](#) for the definition of protected properties). A 403 Forbidden response is **RECOMMENDED** for attempts to write a protected property, and the server **SHOULD** include an XML error body as defined by DeltaV [\[RFC3253\]](#) with the <DAV:cannot-modify-protected-property/> precondition tag.

4. DAV:quota-used-bytes

Name:	quota-used-bytes
Namespace:	DAV:
Purpose:	Contains the amount of storage counted against the quota on a resource.
DTD:	<!ELEMENT quota-used-bytes (#PCDATA) >

The DAV:quota-used-bytes value is the value in octets representing the amount of space used by this resource and possibly a number of other similar resources, where the set of "similar" meets at least the criterion that allocating space to any resource in the set will count against the DAV:quota-available-bytes. It **MUST** include the total count including usage derived from sub-resources if appropriate. It **SHOULD** include metadata storage size if metadata storage is counted against the DAV:quota-available-bytes.

Note that there may be a number of distinct but overlapping sets of resources for which a DAV:quota-used-bytes is maintained (e.g., "all files with a given owner", "all files with a given group owner", etc.). The server is at liberty to choose any of those sets but **SHOULD** do so in a repeatable way. The rule may be configured per repository.

Support for this property is **REQUIRED** on collections, and **OPTIONAL** on other resources. A server **SHOULD** implement this property for each resource that has the DAV:quota-available-bytes property.

This value of this property is computed (see Section 1.4.3 of [\[RFC3253\]](#) for the definition of computed property). A 403 Forbidden response is **RECOMMENDED** for attempts to write a protected property, and the server **SHOULD** include an XML error body as defined by DeltaV [\[RFC3253\]](#) with the <DAV:cannot-modify-protected-property/> precondition tag.

5. Example PROPFIND Request and Response

Request:

```
PROPFIND /~milele/public/ HTTP/1.1
Depth: 0
Host: www.example.com
Content-Type: text/xml
Content-Length: xxx

<?xml version="1.0" ?>
<D:propfind xmlns:D="DAV:">
  <D:prop>
    <D:quota-available-bytes/>
    <D:quota-used-bytes/>
  </D:prop>
</D:propfind>
```

Response:

```
HTTP/1.1 207 Multi-Status
Date: Tue, 16 Oct 2001 22:13:39 GMT
Content-Length: xxx
Content-Type: text/xml; charset=UTF-8

<?xml version="1.0" encoding="utf-8" ?>
<D:multistatus xmlns:D="DAV:">
<D:response>
  <D:href>http://www.example.com/~milele/public/</D:href>
  <D:propstat>
    <D:prop>
      <D:quota-available-bytes>596650</D:quota-available-bytes>
      <D:quota-used-bytes>403350</D:quota-used-bytes>
    </D:prop>
    <D:status>HTTP/1.1 200 OK</D:status>
  </D:propstat>
</D:response>
</D:multistatus>
```

6. Error Reporting

WebDAV [RFC2518] defines the status code 507 (Insufficient Storage). This status code SHOULD be used when a client request (e.g., a PUT, PROPFIND, MKCOL, MOVE, or COPY) fails because it would exceed their quota or physical storage limits. In order to differentiate the response from other storage problems, the server SHOULD include an XML error body as defined by DeltaV [RFC3253] with the appropriate precondition tag.

Preconditions:

(DAV:quota-not-exceeded): the request MUST NOT cause the allocated quota to be exceeded.

(DAV:sufficient-disk-space): there is sufficient physical space to execute the request.

Example error response:

```
HTTP/1.1 507 Insufficient Storage
Content-Length: xxx
Content-Type: text/xml

<?xml version="1.0">
<error xmlns="DAV:">
  <quota-not-exceeded/>
</error>
```

Implementation note: some clients may be able to take advantage of the different precondition codes when mapping to operating system status codes, such as E_NOSPC and E_DQUOT in NFS (see [RFC3530], Section 12).

7. Notes

Server implementations store and account for their data in many different ways. Some of the challenges:

- Some server implementations find it prohibitive to count storage used for metadata; others may choose to do so for better accounting.
- Older versions of resources may be stored as well.
- Variants of one resource may exist with different content lengths.
- Content may be dynamically generated.
- Resource bodies can be compressed.
- Some resources may be stored for "free", not counting against quota.

Since server storage accounting can vary so much, clients should expect the following:

- The size of a file on the client's file system, or in a PUT message, may not correspond to the amount of storage required by the server to store the resource. Thus, the client cannot predict with 100% accuracy whether a given file will be allowed given the storage quota.
- Deleting or overwriting a resource may not free up the same amount of storage as indicated by the `DAV:getcontentlength` property defined in [RFC2518] for the resource. If deleting a resource does not free up any space, the file may have been moved to a "trash" folder or "recycle bin", or retained as in versioning systems ([RFC3253]).
- Since there are many factors that affect the storage used by a set of resources, including automatic compression, the size of associated metadata, and server-inserted content (such as that created by PHP code) in the on-the-wire representation of resources, clients are advised not to depend on the value of `DAV:quota-used-bytes` being the sum of the `DAV:getcontentlength` properties for resources contained by a collection.
- Additionally, because there may be a number of distinct but overlapping sets of resources for which a `DAV:quota-used-bytes` is maintained (Section 4), there may be no correlation between the size of the resources in a collection and `DAV:quota-used-bytes`. For example, for a server that implements user-based quotas, `DAV:quota-used-bytes` usually will be the same for a collection and its members.
- On some systems where quota is counted by collection and not by user, a quota on a sub-collection may be larger than the quota on the parent collection that contains it. For example, the quota on `/~milele/` may be 100 MB, but the quota on `/~milele/public/` may be unlimited. This allows the space used by `/~milele/public/` to be as large as the quota on `/~milele/` allows (depending on the other contents of `/~milele/`) even if the quota on `/~milele/` is changed. Thus, even when the quota on a parent collection is changed, it is not necessarily required to change the quota on every child or descendant collection.

8. Security Considerations

A hacker may prefer to store files in collections with a large quota. This isn't strictly a security concern because it doesn't make it any easier to store files. On the other hand, the DAV:quota-used-bytes property may make it easier to detect tampering or misuse.

9. Internationalization Considerations

Quota is counted in Arabic numerals expressed in strings. There are no internationalization considerations.

10. Acknowledgements

Stefan Eissing, Geoff Clemm, Jim Luther, Julian Reschke, and Jim Whitehead, among others, have provided valuable comments on this document.

11. References

11.1 Normative References

- [RFC2119] Bradner, S., "[Key words for use in RFCs to Indicate Requirement Levels](#)", BCP 14, RFC 2119, March 1997.
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- [RFC3253] Clemm, G., Amsden, J., Ellison, T., Kaler, C., and J. Whitehead, "[Versioning Extensions to WebDAV \(Web Distributed Authoring and Versioning\)](#)", RFC 3253, March 2002.

11.2 Informative References

- [RFC3530] Shepler, S., Callaghan, B., Robinson, D., Thurlow, R., Beame, C., Eisler, M., and D. Noveck, "[Network File System \(NFS\) version 4 Protocol](#)", RFC 3530, April 2003.

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