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Internet Draft
Document: draft-ietf-webdav-quota-01.txt
Expires: September 2003

March 2003

Quota and Size Properties for DAV Collections

Status of this Memo

Abstract

WebDAV servers are frequently deployed with quota (size) limitations. This Internet-Draft discusses the properties and minor behaviors needed for clients to interoperate with quota implementations on WebDAV repositories.

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Introduction

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 RFC 2119 [RFC2119].

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. This specification requires WebDAV because it requires PROPFIND support and relies on the WebDAV definition of collections and properties, including the definitions for live and protected properties.

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. www.sharemation.com and 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 quota-limit on collections. Further, client software should have some way of fairly reliably determining how much storage space is already counted towards that quota.

In addition to displaying the quota-limit and quota-used on collections, this specification does not forbid these properties on any resource.

Solution Overview

The approach to meeting the requirements and scenarios outlined above is to define three live properties. This specification can be

met on a server by implementing both quota-limit and quota-used on collections only. Implementing both quota-limit and quota-used on all resources is recommended.

None of these properties need be returned in a <DAV:allprop> request though the server may include them. 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 definitions below for quota-limit and quota-used borrow heavily from the definition of quota in the NFS [RFC3010] specification.

DAV:quota-limit-bytes

Name: quota-limit-bytes
Namespace: DAV:
Purpose: Indicates the total amount of storage potentially allocated.
DTD: <!ELEMENT quota-limit-bytes (#PCDATA) >

The DAV:quota-limit-bytes property value is the total amount of storage space potentially allocated to this file or directory, measured in octets.

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.

A value of 0 indicates that storage is limited to 0. 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.

If a resource has no quota enforced or unlimited storage, 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 disc 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. A 403 Forbidden response is RECOMMENDED for attempts to write a protected property.

DAV:quota-used-bytes

Name: quota-used-bytes
Namespace: DAV:
Purpose: Contains the amount of storage counted against the quota-limit of 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 file or directory and possibly a number of other similar files or directories, where the set of ôsimilarö meets at least the criterion that allocating space to any file or directory in the set will count against the quota-limit. 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 quota-limit.

Clients SHOULD expect that once the quota-used on a file or directory meets or exceeds the quota-limit, further allocations to that file or directory will be refused. A resource may show more quota-used than its quota-limit or quota-assigned appears to allow.

Note that there may be a number of distinct but overlapping sets of files or directories for which a quota-used is maintained (e.g. ôall files with a given ownerö, ôall files with a given group ownerö, 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, or may be ôchoose the set with the smallest quotaö.

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-limit-bytes property.

Support for this property enhances the client experience, because together with DAV:quota-limit-bytes, 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.

DAV:quota-assigned-bytes

Name: quota-assigned-bytes
Namespace: DAV:
Purpose: Indicates the amount of storage assigned.
DTD: <!ELEMENT quota-bytes (#PCDATA) >

The DAV:quota-assigned-bytes property value is the amount of storage space potentially either assigned to or requested for this file or directory, measured in octets.

The value of this property will usually be protected, although a user with sufficient privileges may be permitted to change the value. The property is useful even if it is protected. A 403 Forbidden response is RECOMMENDED for attempts to write a protected property.

Support for this property is OPTIONAL.

Note that a resource may show more quota-used than its quota-assigned appears to allow, and that quota-assigned MUST NOT be less

than the quota-limit. Servers which receive a request to change quota-assigned to a value less than quota-limit MUST reduce quota-limit to this value at the same time.

For many quota systems, quota-assigned is synonymous with quota-limit. However, in any system, quota-limit is a hard limit. For example, imagine a quota system where each collection may have a quota assigned and where a resource contained in a collection is subject to the quota constraints of all parent collections. Assume the administrator creates a collection A and gives it a quota-assigned of 1,000,000 bytes and then creates a sub-collections B which is given quota-assigned of 10,000,000 bytes. In this case, the quota-limit for B is 1,000,000 bytes.

Example PROPFIND request and response

Request:

```
PROPFIND /~milele/public/ HTTP/1.1
Depth: 0
```

```
  Host: www.sharemation.com
  Content-Type: text/xml
  Content-Length: xxx

  <?xml version="1.0" ?>
  <D:propfind xmlns:D="DAV:">
  <D:prop><D:quota-limit-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.sharemation.com/~milele/public/</D:href>
    <D:propstat>
      <D:prop>
        <D:quota-limit-bytes>1000000</D:quota-limit-bytes>
        <D:quota-used-bytes>403350</quota-used-bytes>
      </D:prop>
      <D:status>HTTP/1.1 200 OK</D:status>
    </D:propstat>
  </D:response>
  </D:multistatus>
```


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) is forbidden because it would exceed their allotted quota. 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 <DAV:storage-quota-reached/> precondition tag.

Example error response:

```
HTTP/1.1 507 Insufficient Storage
Content-Length: 100
Content-Type: text/xml

<?xml version=ö1.0ö>
<error xmlns=öDAV:ö>
  <storage-quota-reached/>
</error>
```

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 ôfreeö, not counting against quota.

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

- The size of a file on the clientÆs 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 ôtrashö

folder or ôrecycle binö, or retained as in versioning systems [RFC3253].

- The total size of a collection, DAV:quota-used-bytes, is not

necessarily a sum of the DAV:getcontentlength properties for resources stored in the collection.

- 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 its 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.

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.

If a server chooses to make the DAV:quota-assigned-bytes writable by clients with sufficient authorization, then it is opening up a certain amount of near-administration functionality to clients. However, it is not required for the DAV:quota-assigned-bytes property to be writeable by any clients, so a server can easily avoid this consideration.

Internationalization Considerations

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

IANA Considerations

There are no IANA considerations.

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Acknowledgements

Jim Whitehead and Jim Luther provided valuable comments on this document.

References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2026] Bradner, S., ôThe Internet Standards Process û Revision 3ö, BCP 9, RFC2026, October 1996.

[RFC2518] Goland, Y., Whitehead, E., Faizi, A., Carter, S., and Jensen, D., "HTTP Extensions for Distributed Authoring -- WebDAV", RFC2518, February 1999.

[RFC3010] Shepler S., B. Callaghan, D. Robinson, R. Thurlow, C. Beame, M. Eisler, D. Noveck, ôNFS version 4 Protocolö, RFC3010, December 2000.

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