The open-source ESUP-Portail WebDAV storage solution

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Abstract

The WebDAV server distributed by the consortium ESUP-Portail is an original open-source implementation of the WebDAV protocol.

It is a full-featured WebDAV server, thanks to three key functionalities:

- The support of quotas, to be deployed in large institutions such as universities (scalability);

- A versatile authentication layer, to be accessed by many different clients (web browsers, operating systems, applications…);

- A permission manager that implements ACP (Access Control Protocol), with the ability to delegate permission management to users.

This paper focuses on these three aspects that make the server distinguishable from all the other open-source implementations.

Keywords: WebDAV, quota support, permission manager

1. Introduction

Nomadism is today an important issue in the world of Information Technology. Therefore it is essential to have a distant storage solution where data can be accessed anywhere on the Internet, using different ways. **WebDAV** [1], the HTTP-based protocol, meets this requirement. Many commercial or open-source WebDAV servers are used all over the world. Among them there is the open-source mod_dav [2] Apache module, widely used in Universities.

Though mod_dav is quite effective, it can not be considered as a full-featured WebDAV server because of several limitations, especially:

- No native quota support, which makes it not scalable to big institutions,

- No permission manager, to allow all the users to set permissions on their resources.

- A quite poor authentication schema (mod_dav relies on other Apache modules, such as mod_auth_ldap), that prevents it to be used by heterogeneous clients.

The open-source WebDAV server [3] developed by the ESUP-Portail consortium [4] is based on Jakarta Slide [5] and provides a real distant storage solution with quota support, multiple authentication and rights delegation.

The ESUP-Portail WebDAV server was specified two years ago [6] and is now in use in several universities.

2. WebDAV quotas

Any file storage system has to support quotas to be used by a large population. The behaviour of WebDAV servers supporting quotas was specified in a draft [7] published in April 2005. The ESUP-Portail WebDAV server is the first and only open-source solution that implements it.

Quota support is achieved by:

- handling two additional metadata **DAV:quota-used-bytes** (amount of space used by a resource) and **DAV:quota-available-bytes** (free space left on a resource),

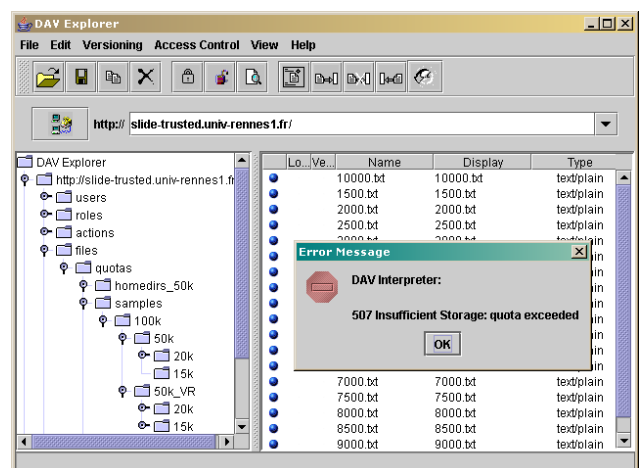- throwing a 507 HTTP response (cf figure 1) when a quota is to be exceeded.

Figure 1 – Quota exceeded while uploading a file to the server

The ESUP-Portail consortium extended the draft to make the quota management more flexible. Actually, it is impossible for a resource to have a quota bigger than its parent(s). Therefore, if someone wanted to put a very large quota on a resource of the filesystem hierarchy, he had to increase the quota on every parent of the resource up to the root. To avoid this problem, the concept of

"**virtual root**" was added (cf figure 2). A virtual root is like a new root in the filesystem, with two consequences:

- At first, the quota set on a virtual root is totally independent from the quota of its parents (it can be bigger);

- Secondly, the `DAV:quota-used-bytes` metadata of a resource does not include the size of its children's virtual roots (as if the sub virtual roots did not exist).
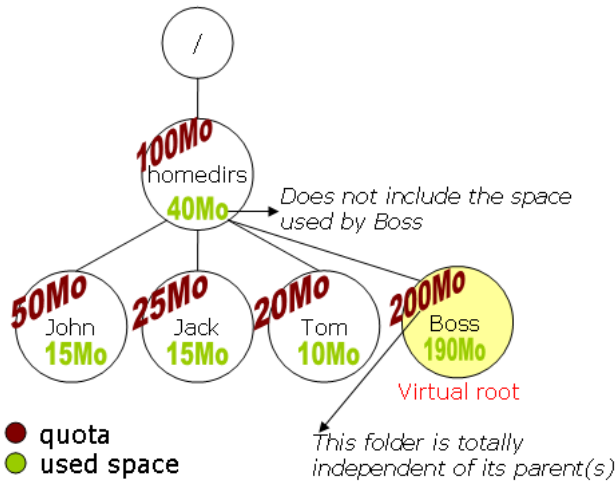

Figure 2 – Virtual root

ESUP-Portail added a third optional metadata named `ESUP:virtual-root` to identify virtual roots. A tool was also developed to easily show, set and modify quota metadata on the server.

3. Multiple authentication layer

In order to provide a single storage area that can be shared by any client, from anywhere, an important feature expected from the ESUP-Portail WebDAV server was to be usable by all known clients, with different capabilities:

- Web browsers that may support only HTTP scheme (not WebDAV extensions) but redirections and HTTP basic authentication scheme (realms);

- Operating systems and system applications that may be fully WebDAV-compliant but do not implement redirections and/or form completion (and thus can not respond to SSO requests);

- Web applications that may be SSO-compliant but not always.

This versatility is achieved with a highly configurable authentication layer shown in figure 3, made up of an authentication router that chooses between three authentication filters:

- CAS [8] authentication for web browsers and applications,

- LDAP authentication for operating systems,

- Trusted authentication for trusted applications (based on a secret shared between the application and the server).

The selection of a filter is performed by the router, depending on the agent (i.e. the type of the client: browser, application…), its localization (IP address), the target (virtual) server name and the configuration set by the administrators of the server.
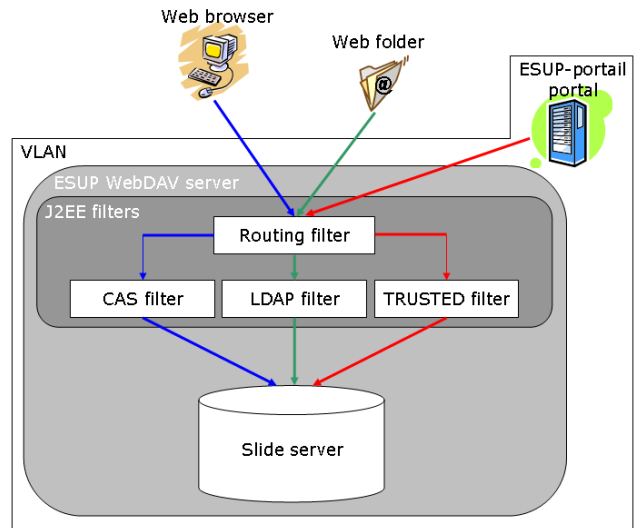

Figure 3 – Authentication layer

4. The permission manager

With quota support and versatile authentication, the possibility for users to set permissions on the resources of the filesystem was a strict requirement.

With the ESUP-Portail software, setting permissions is done in uPortal [9], thanks to a dedicated channel[1]. A screenshot of this channel is shown in figure 4.
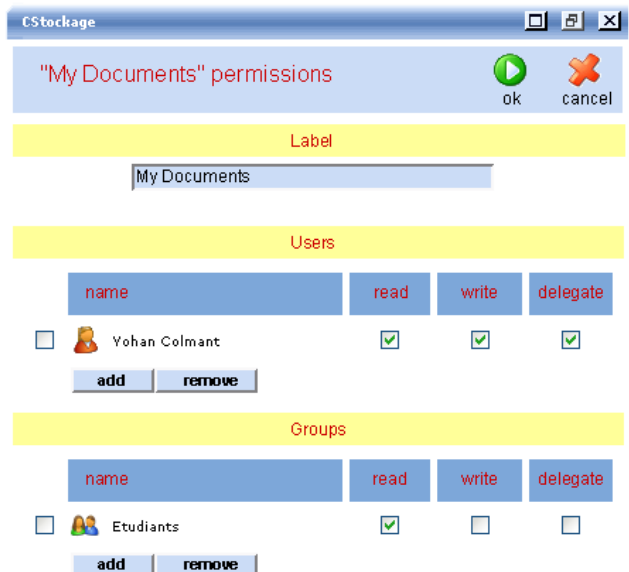

Figure 4 –The permission manager interface

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[1] In the portal terminology, a channel is a web application run by the portal.

The ESUP-Portail WebDAV server implements permissions as specified by ACP (Access Control Protocol [10]).

The permission system of ACP is rich. For instance, with the increasing number of shared documents and projects, there is a strong need of storage solutions where rights can be delegated. The Web portal (ESUP-Portail) on which the WebDAV server is connected to, has an administration channel to manage permissions. When a folder is created on the server, a super administrator can give the right to read/write to people or groups, but he can also designate other administrators. This makes the permissions management very flexible. In this way, the folder tree on the server can be built following the structural organisation of the University it is deployed in. At the University of Rennes 1, folders are created per department. Administrators are designated for each folder (department managers), the said administrators can in their turn create sub-folders, put read/write permissions (for students and teachers) and designate other administrators. This process is recurring. The server administrator just needs to create a few folders and designate the first managers.

5. Conclusion and perspectives

The open-source ESUP-Portail WebDAV solution offers a real new distant storage system, accessible from heterogeneous clients and networks, with quota support and permission management. The server is deployed in several French universities like Nancy, Pau and Rennes 1. The ESUP-Portail consortium works on spreading the project widely not only in France but also in and out of Europe.

The ESUP-Portail consortium is working on making the WebDAV server compliant with **Shibboleth** [11]. This will enable authenticated students to access documents stored in other Universities, and make the server a real knowledge sharing tool.

Acknowledgements

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