A Mail Service for Mobility Era

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Mail is a major tool for group collaboration and is now used as a general document exchange tools in HEP collaborations. As people are moving from one place to another, they need to keep access to their daily mail environment. Also more and more people are using several desktop at the same time : one at office, one at home for example. Mail services have to deal with this mobility. This is the goal of the emerging protocols IMAP4 and ACAP.

Key words: Mail; IMAP; ACAP; POP;

1 Introduction

Electronic mail started to be a major tool for communication in HEP several years ago. Not as a fashion but as a need because of the international collaboration in each experiment. Email emerged as an attractive alternative to phone and mail because it was fast, cost effective and integrated with the computing environment of physicists.

But at this time, computing infrastructure was mainly made of timesharing computers from big central computers in national computing centers to mini computers in the labs. Remote access to these infrastructures was mainly done through remote terminal protocols like X29 or other proprietary protocols.

2 The POP3 lesson

When microcomputers arrived in our labs, there were integrated to main computing resources as a kind of "intelligent" terminal. But quickly, need raised for a more sophisticated integration of desktop microcomputers with main resources. Mainly two directions were investigated : exchange of sophisticated document formats and local processing of email on microcomputers.

In fact the quick acceptance of MIME extension to basic mail protocol (SMTP) addressed the first need and allowed to provide a very good level of interoperability between different end user tools running on different platforms. And it is clear today that any mail agent not able to deal correctly with MIME has no real future.

With respect to the second need, the answer which emerged at the end of the 80s was POP3 protocol. This protocol has been very successful and spread around the world because it was the foundation for some very nice and very easy to use user agents, like Eudora and Netscape Mail, designed for microcomputers desktop environment. The idea behind POP3 was quite simple : provide a light weight protocol to combine stability and reliability of central resources with ease of use of microcomputers. In this model, all the routing was done by "central" servers acting as store and forward relays. But the mail processing (sending, reading, archiving) was done on microcomputers. In fact POP3 provided a message downloading protocol between a store-and-forward relay and the microcomputer : before any processing can occur, a message received had to be downloaded on the microcomputer and after downloading it was generally no longer available on the server.

This "offline" model gave great satisfaction to a lot of users who had a microcomputers on their desks as their unique desktop. But with the growing numbers of people having one desktop device at office and a personal microcomputer (notebook or not) at home, POP3 model began to reach its limits because it was not able to correctly address the need for mobility. With two dimensions to this mobility : have access to the same messages wherever you are and see the same messaging environment whatever desktop platform you use (Macintosh, Windows or Motif), without having to synchronize your different desktops with floppy or telnet from remote locations.

An attempt to address mobility was experimented at the same time of POP3 by some large sites using the distributed file system approach, in particular with AFS. The idea was to take advantage of the universal accessibility in a strongly authenticated mode of these kind of file system. But this approach faced two major difficulties : performance problems inherent to cache management in this type of file system and not broad enough deployment of AFS to allow development of very attractive mail agent.

3 IMAP4 model and basic services

This is to address properly this need for mobility by a client/server protocol not linked to some specific underlying infrastructure like distributed file systems that started work on IMAP4 protocol. As its name suggests, IMAP4 is based on some previous experiments, mainly IMAP2 deployed in some american universities like Washington.

The base model in IMAP (since first version of this protocol) is an "online" model based on the message store concept (also implemented by X400 P7 protocol). The "message store" is a server offering services to a lot of clients and having the responsibility to receive, store and archive messages for a user. Clients connect to this "message store" to access messages and tell the server how to organize message archiving (folder management). In this model, conversely to POP3, messages are not downloaded on the client. Thus you can easily connect from different locations and different desktop platforms and have access to the same messages, new ones and archived.

In this online model, the server needs to provide one important service in addition to message and folder management : message searching and selection. This is very important for performances, else you'll have to read all the messages on the client before being able to select some of them based on some criterias. This is the reason for a very powerful searching feature in IMAP4, allowing several criterias on both message headers and message bodies.

To cope with all the remote access possibilities available today, in particular with PPP, IMAP4 integrated, as an extension to the "online" model, a disconnected mode. In this mode, you can process your mail in much the same way as in the "offline" mode of POP3 (that means without an active connection to the server, but underlying features of IMAP (in particular UID for messages) allow the user to resynchronize the server when he reconnects.

IMAP4 is now widely accepted and almost all of the major mail agent editors (Microsoft, Netscape, Apple...) and mail server editors (Sun, HP, Innosoft, Microsoft, Netscape, ...) are committed to support IMAP in the very short term.

4 Need for a companion protocol : ACAP

At the same time, to really address mobility, it appeared necessary to complement IMAP protocol for mailbox access with a companion protocol targeted to provide the same kind of server based approach (and thus client independence) for access to user agent options, including environmental options (server name, user identity, mail agent specific configuration...) and address books.

First work was initiated by Carnegie Mellon University when they started with IMAP4 and led to definition of a companion protocol for IMAP4 called IMSP. After two years, this experimental protocol was refined to provide a more general approach to option serving, not specific to mail applications. It was then renamed ACAP, for Application Configuration Access Protocol. ACAP should be quickly supported by some of the most famous IMAP clients like Pine and Simeon. Other major commercial IMAP products are expected to follow after stabilization of the protocol in the next few months.

In addition to allow full support of mobility through option serving, ACAP provides some very interesting features, for the end user and for the management. First is the sharing of address books between users and between different clients. Cross client sharing is possible because address book is just one type of dataset, the basic object in ACAP, associating an entity (the address book entry) with some attributes (full name, email address, ...). Thus address book format is no longer specific to a client. Powerful and fast search features are provided by the protocol and executed on the server to maintain good performances that can compare with local address book even for large numbers of entries ($>$1000).

There is a set of predefined attributes for address book entries (full name, alias, email), some of them required.But this list can be extended by the user to match its personal view of address book organization. This is the main difference with schema based approach as X500/LDAP where a new attribute cannot be added by the user without modifying the schema of the underlying database.

Sharing between clients is done by ACL where a user can list who can access, modify... entries in its address book. In addition it is possible to create non user owned address book, like a group wide or site wide address book.

From the management point of view, ACAP brings the possibility for several management levels of options. In particular, it is easy to define a site-wide settings of options with some of them modifiable by the user and other not. This is possible because, in ACAP, entry attributes have a flag indicating if they are readonly or writable. This is very convenient because it avoids erroneous setting of some crucial options, like mail servers name, by the users. It also greatly simplifies the initial setting of new accounts.

5 IMAP4 advanced features

All these advanced features for sharing of information between users are also present in IMAP for mailbox access. First it is possible for the owner of a mailbox to control the level of sharing it allows to a named list of users. It is also possible to create a special type of mailboxes called bulletin board that behaves like a newsgroup : they are not related to personal mailboxes hierarchy and message flags (unread, marked) are maintained per user. As with ordinary mailboxes, type of access for every user is controlled through ACL.

Sharing of mailboxes, and in particular bulletin boards, is a distinctive feature of message store approach. It is almost impossible to share a mailbox in more traditional approaches, except through file sharing. Bulletin boards are very useful for many purposes : dispatch of information to a group of users, unique local recipient to distribution list, newsgroup dispatching (alternative to news clients), shared mailbox for problem reporting and user support...

6 Conclusion

In conclusion, the combination of featureful IMAP4 protocol for mailbox access and emerging ACAP protocol for configuration options access allow to set a powerful client/server architecture for mail services without the drawback of client management, like in POP3, because nothing specific to a user is stored on the client itself but everything is accessed through client/server protocols. This combination lets envision some other interesting services, from access to ACAP, and thus IMAP, through URL semantics to replication and distribution of mailboxes through several IMAP servers for high availability and performance in very large sites.