Messaging Systems Challenges for the High Energy Physics Community Implementations at DESY and at CERN

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CERN and DESY

In the last years, several High Energy Physics computer centers undertook migrations of their infrastructure to distributed computing environments. Moreover, as collaborations are working world-wide, physicists need good communication systems and in particular a high quality, feature-rich and interoperable messaging system. In this context, CERN and DESY as well as other HEP laboratories have decided to provide site-wide solutions based on Internet messaging technologies around the Internet Mail Access Protocol. This paper will review market technologies, evolutions and challenges. In a second part the CERN and DESY implementations will be exposed.

1 General context

Over the last decades, computer centers have provided different kinds of electronic mail solutions. Mainframe systems (IBM), Decnet Mail11 on VMS, QuickMail for Macintoshes, or MSMail on PCs, as well as other proprietary or X.400 based systems were driving the market. The main issue, connectivity between these systems, was solved with the help of gateways. The Internet explosion initiated by the Web and developments in the telecommunication sector modified the computing environment, user requirements, and user habits especially for electronic mail.

Many mail implementations do not interoperate, transparent document interchange is not insured, integration with directory services and location independence are often missing, and gateways quite often impose intolerable limitations. Few vendors offer integrated messaging solutions like Lotus with Notes or Microsoft with Exchange. These proprietary products are however often too expensive, too difficult to administer or too manpower intensive for HEP institutes or sites. Even today, no global open messaging solution exists, although essential components1 can be found within the Internet protocol family.

2 Architecture of a Mail Solution based on Internet Protocols

Figure 1 describes how an open, platform independent messaging architecture based on Internet protocols could look like. All but one protocol are Internet standards; ACAP is still in draft status. Some components and features are still missing (see below). The older protocols SMTP (mail transport), NNTP (transport and access to news) and MIME (document interchange) are well known, while the newer ones need a bit more explanation:

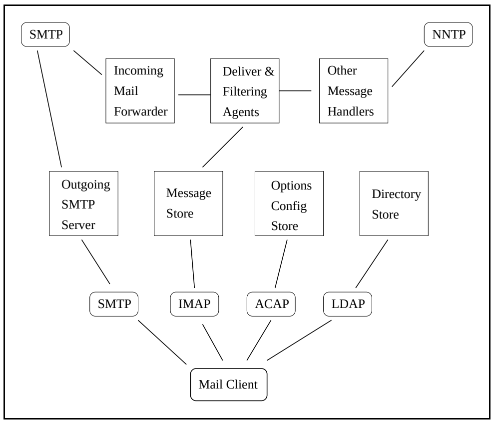

Fig. 1. Architecture

IMAP (refer to [5]): This protocol allows an access of user mailboxes and folders in online, offline and disconnected mode. In online mode, only the directory information but not the mail contents is transferred over the network unless explicitly requested. In offline mode (equivalent to POP), all or part of the contents of the mailbox is transferred to the local machine. In disconnected mode, the local message cache is manipulated and will be resynchronized once the connection to the server is re-established. Finally, message folders can be remotely stored and accessed, which makes it a really location independent.

LDAP (refer to [6]): With this protocol, centrally managed data like the directory of people and their e-mail addresses on the site as well as at other sites can be accessed. LDAP usually interfaces to already existing X.500 directories. There is a strong tendency in industry to adopt this directory standard for mail and efforts are made to agree on a common minimal database schema. If HEP sites want to exploit the possibilities of a global HEP directory, they need to agree on a schema as well.

ACAP (refer to [4]): While LDAP accesses global directory information, ACAP is used to access personal profiles, address books and other personal data. The protocol is still in draft status and the first alpha implementation appeared in January 1997. It should be noted here that LDAP v3 is under development with competing functionality. Despite the better design of ACAP for this functionality, its adoption by industry is still unclear. In either case, the functionality will be there in the end.

3 Implementations

Almost all the big names in this area, commercial as well as non-commercial, are providing solutions based on these standards. On the server side many implementations already exist: SMTP (public domain sendmail 8.x.x, Innosoft PMDF, etc.), NNTP (public domain c_news and inn), MIME (implemented by all good servers and clients), IMAP/POP (University of Washington, CMU Cyrus, Sunsoft, ISOCOR, Innosoft, Netscape, Microsoft, Portola, ESYS, etc.), LDAP (University of Michigan, Netscape, Microsoft, IBM, etc.), ACAP (CMU alpha version, Innosoft). On the client side, clients are coming which support most of the above protocols: Netscape Communicator 4.0, pine, Simeon, Microsoft Exchange Client, dtmail (COSE/CDE for Solaris), Roam (Sunsoft), Java Mail Client, Nokkia 9000 telephone (sic!), etc.

4 Missing features

Missing features can be summarized in the following list: A good filtering mechanism at message delivery time on the server and client side, a well designed notification scheme for new messages in mailboxes and folders, acknowledgement on delivery, an agreement on security mechanisms and pre-authentication possibilities, better managment tools to scale IMAP servers transparently, quota, access control, mail queue handling, etc.

5 Current and Future Implementations at CERN and DESY

Both laboratories have deployed IMAP servers on their sites and are planning to implement ideas originating from a joint trip [3] in November 1996. Figure 2 shows the current setup at DESY with the newly proposed LDAP and ACAP servers. In this "white box" model, the mail folders, personal profiles, forwarding information, etc. are residing in the AFS home directories of the users. The mailboxes are stored up to now in standard Berkeley mail format in the central mail store. Non-AFS client machines access the mailboxes via IMAP. This has to be compared with the proposed CERN setup in figure 3. Here, the IMAP servers will handle their own home directory space. The disadvantage of yet another directory service is well balanced by the fact

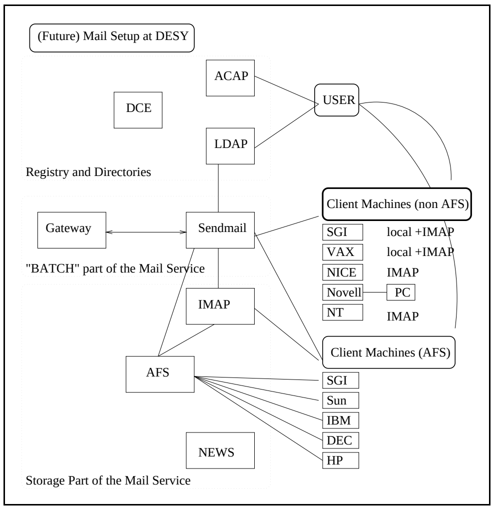

Fig. 2. DESY model

that new implementations of IMAP servers in this "black box" model are optimized for resource usage, storage response time and scalability. With already 6000 accounts (2000 active on a weekly basis) and more than 600 client hosts [2], this setup is essential for CERN, especially since AFSmail, QuickMail and MSMail users need to migrate to IMAP servers at some point in time.

Both CERN and DESY are designing their registry component and LDAP service, and are building common interfaces. In CERN's IT Division the Mail ARCHitecture (MARCH) working group [1] was started in order to rationalize the mail service.

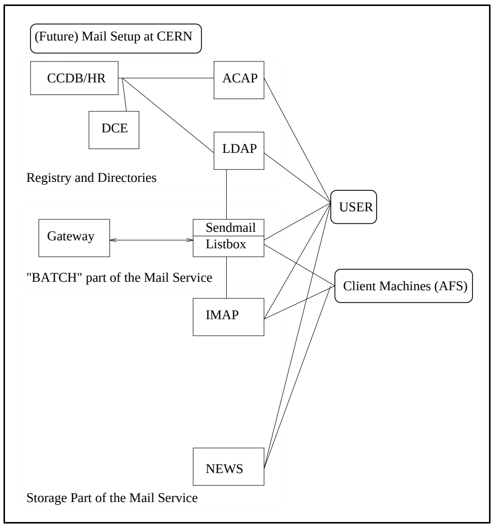

Fig. 3. CERN model

6 Conclusion

The transformation of existing mail services to this new paradigm will take some time but will result in much more platform and location independence. A change of mailbox format is needed for performance reasons. New services like LDAP and ACAP need to be introduced to improve scalibility and user services.

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