

Campus Email for Everyone: Making It Work in Real Life

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Abstract

How do you build an electronic mail system for an eclectic mix of people with vastly differing needs for communications, win them over, and keep them coming back for more? From the early days of timesharing to today's mix of Macintosh® computers, workstations, and mainframes, we at Dartmouth College have developed an email system that serves everyone on campus — even people who don't use computers. This paper describes that email system and discusses some of the non-technical issues that it raises. The campus network is a blend of LocalTalk® and ethernet. The central component of the email system is a Macintosh-based client/server mail system called BlitzMail®. The Dartmouth Name Directory, a name service that includes all students, faculty, and staff, is essential to BlitzMail and to implementing campus wide addressing-by-name. A system for printing email messages and delivering them through the campus mail system brings email to those who do not use a computer. Beyond the hardware and software are questions of support, email citizenship, and the impact of a pervasive email system on the institution.

The Dartmouth Environment

Dartmouth comprises a private four-year liberal arts college and professional schools of business, engineering, and medicine, plus a strong association with the Dartmouth-Hitchcock Medical Center. In 1993 there were 4,300 undergraduates and 1,200 graduate and professional students, 900 faculty and 2,200 staff employees of the college and professional schools, and 4,300 employees of the medical center. About 85 percent of this population — over 10,000 people — use the Dartmouth email system.

At present and for the past decade the Macintosh has been the personal computer of choice at Dartmouth. Almost all students purchase one when they arrive, and Macs are found in nearly all faculty and administrative offices. Unix® — and to a lesser degree VMS® — workstations appear in some departments and in the engineering and medical schools. The business school and the medical areas use DOS machines and Unix workstations. The College's Computing Services organization operates Unix, VMS, VM/CMS, and Dartmouth College Timesharing System (DCTS) host systems providing academic, administrative and general-purpose computing for the college. Computing Services also manages the campus network and provides central Macintosh email servers for the college and the medical center. The medical center operates its own network and central computing.

How We Got Here

The first email system at Dartmouth was a traditional line-oriented mail program on the Dartmouth College Timesharing System. Its Teletypes terminals and serial network were used mostly by students, faculty, and staff of the Computer Science department and Computing Services. The computer had no off-campus links.

In 1983 the first Unix system arrived: a VAX™ 11/750 running BSD Unix. With it came the first link to the rest of the world: a dialup UUCP connection. Other systems followed — VMS and CMS — but email remained line-oriented and networking consisted of cobbled-up RS232 host connections quaintly dubbed “milking machines.”

Late in 1983 Dartmouth evaluated the then new Macintosh computer and early the next year selected it as the recommended personal computer for students, faculty, and staff. The Mac had a superior user interface, came with the most sophisticated networking then available for personal computers, and cost about \$1,200 for a reasonable entry-level machine. The college committed to converting the campus network to AppleTalk® and wiring all dormitory rooms. This effort began in the late spring of 1984 and was complete by the beginning of the fall term. Installing the 2,600 LocalTalk ports cost \$750,000 for wire, network routers, and labor, representing a per-port cost of about \$290.

In the fall of 1984 the students could use their Macs as word processors and could use DarTerminal, a Dartmouth-developed terminal emulator, to log onto the central computers. But most students had accounts only on DCTS, and that system’s original mail program remained the only email system available on campus.

By 1987 the limitations of this mail system were evident. Dartmouth had evaluated commercial email packages for the Macintosh but found them unable to scale up to thousands of users. On November 1 a group of college software developers started work on a client/server Macintosh mail system, and after a two-month blitz of effort, they had a prototype system with a Mac client with a server and name directory hosted on the DCTS mainframe. They called the package “blitz mail,” and the name stuck.

In the late 1980s an ethernet network that began with the Unix systems has grown to cover much of the campus and connect Dartmouth to the Internet, and the development of an AppleTalk/TCP gateway has blended the two networks. In 1989 we ported the BlitzMail servers to more flexible and inexpensive Unix platforms, making it possible, for example, to access the name directory from workstations and mainframes. The college has extended campus wiring to include most administrative buildings and many fraternities and sororities. BlitzMail has continued to evolve, and today to many people BlitzMail *is* computing at Dartmouth.

Today’s Dartmouth Network

The Dartmouth network today is a blend of LocalTalk and ethernet, of AppleTalk and TCP/IP, DECNET®, and IPX. Figure 1 is a simplified schematic of the college network. The network at the nearby Dartmouth-Hitchcock Medical Center (DHMC) is a similar blend. Out of habit we refer to the IP network and the AppleTalk network, but DECNET and IPX appear on the IP network, IP appears in parts of the AppleTalk network, and AppleTalk packets appear everywhere. The entire college network is managed by Computing Services; the DHMC Network Operations group manages the DHMC network.

The AppleTalk (AT) network, including the DHMC, contains about 150 AT zones and about 450 AT networks. On a busy day about 5,000 Macs are active on the network. AppleShare servers and LaserWriters® are managed by their owners, so we cannot know their numbers exactly. We estimate about 200 servers and 500 printers.

The AppleTalk routers are NEDCo’s, processors designed and build by New England Digital Corporation to be used as the CPU in NED’s music synthesizers. There are 100 of these unlikely but effective processors in the network. They cost about \$6,000 each, hold a maximum of 128K bytes of memory, and are programmed in a PL/I-like language called DXPL. Dartmouth has used NEDCo’s since 1979, but they are no longer manufactured and we are down to ten spares. Other than the fact that they are paid for, their primary advantage is their flexibility: we have designed RS232, X.25, and ethernet interface boards for them, and *we* program them.

The college IP network is a subnetted class-B network with about 15 active subnets and 700 hosts. The physical layer is a mixture of fiber, thicknet, thinnet, and 10baseT. We use cisco routers and our own AT/IP gateways for routing. We have programmed the NEDCo routers to tunnel IP packets through the

AT network. Since the AT network extends to more campus buildings than the IP network, this gives us the ability to have remote IP subnets.

The key component in the blending of the AT and IP networks is the AT/IP gateway. Dartmouth developed this device on a Mac II platform in 1989. It interconnects LocalTalk and ethernet. It is an AppleTalk extended router and an IP interior gateway. It performs interdomain name and address mapping and it translates TCP to and from the Dartmouth-developed AppleTalk stream protocol. Finally it supports KIP encapsulation of IP packets over LocalTalk, using dynamic or static IP address assignment. The AT/IP gateways make it possible for the BlitzMail Macintosh email client using only AppleTalk protocols to use a server on a Unix host that speaks only TCP/IP. In fact these gateways make it possible for us to refer simply to “the network” in most discussions. For example Figure 2 shows the simple topology of the email system. For email purposes the Macintoshes talk to the BlitzMail servers, and the servers, the mail hub, and the other hosts are TCP/IP and Internet peers.

The Dartmouth Name Directory

The Dartmouth Name Directory (DND) is the linchpin of the Dartmouth email system. The DND is a 17,500-entry database of every student, faculty member, and employee of the college and the medical center. There are also entries for most campus departments and organizations. The DND is used by the BlitzMail email system, by host mail systems, and by various non-mail applications.

The lookup algorithm is designed to make it possible to find a person’s entry given any reasonable form of their name. A query can be any combination of tokens from the *name*, *nickname*, or *deptclass* field. The order of tokens is unimportant, the search is case-insensitive, and punctuation marks are ignored. Tokens can be omitted or written using only an initial substring, but at least one complete token must appear in the query. For example “Mary Jane Doe,” “Mary Doe,” or “M. Doe ’94” are valid queries. There may be zero, one, or many DND entries matching a given query. Some applications such as email addressing require a single unique match, which, if necessary, can be achieved by adding a unique nickname to the entry.

Table 1 shows the important fields in a DND entry. In addition to the name and description of the fields, it shows who is allowed to read (retrieve) and write (change) each field. Each person’s entry has a password which only that person (or the database administrator) may change. The user must provide the password in order to change the value of a field. Some fields, such as the user’s class affiliation, can be changed only by the database administrator.

| Field Name | Read | Write | Description |
|------------|--------|-------|--|
| name | anyone | - | User’s full name (indexed) |
| nickname | anyone | user | User’s nicknames (indexed) |
| uid | anyone | - | College ID number (indexed) |
| deptclass | anyone | admin | Department or Class (indexed) |
| hinmanaddr | anyone | user | Campus mailbox |
| mailaddr | anyone | user | Preferred email address |
| phone | anyone | user | User’s telephone number |
| blitzserv | anyone | admin | Name & zone of user’s BlitzMail server |
| bullserv | anyone | admin | Name & zone of user’s bulletin server |
| pw | - | user | Entry password |

Table 1. DND Fields

A single server computer is home to the Dartmouth Name Directory. The first server was the DCTS system; the current version uses a NeXT® computer. The server uses a database manager to retrieve potential matches, then applies additional tests to generate the final set of matches. The original server used a flat data file, which would still be reasonable if the database contained a few hundred entries. Later versions used Unix *dbm* files; the current version uses Oracle™ as the underlying database manager.

The DND is available to network applications via a stream protocol on a well-known TCP port on the server. The protocol is a series of ASCII commands and responses, similar to SMTP. Important commands in the protocol include LOOKUP to make queries, CHANGE to change field values, VALIDATE to validate a password, and CHPW to allow users to change their passwords. When a password is required for an operation, it is never sent across the network. Instead the server chooses a random string and sends it to the client, which DES-encrypts it with the password and returns the result to the server. The server compares this result to its own encryption of the string. If the two results match, the client is validated. A library of C functions is available to make it easy for applications use to the DND.

The DND administrator can make bulk additions and deletions to the database. These changes come from the registrar and the college and DHMC human resources offices. The administrator also makes individual corrections, additions, and deletions with a separate administrative interface. Users can change their own phone numbers, nicknames, and email addresses.

The original purpose of the DND was to validate BlitzMail users and to hold technical information needed by the BlitzMail server. New applications resulted in new fields being added to the database. These applications include extensions to BlitzMail and mail addressing-by-name for other campus email systems (both described below) as well as a *fingerd* server for the entire institution and a phone book server for Gopher. The DND has also become the de facto authority on who is “a Dartmouth person,” and we use it as a general validation server and for software license enforcement.

Because the DND is critical to so many applications and having an entry in the DND grants access to these applications, it is important to have clear policies about who can be in the DND and who makes the decision. Entries for registered students and full-time faculty and staff are automatic. It becomes less clear for groups such as part-time employees, alumni, spouses and children, and contractors doing work for the college. Our policy is that we will create an entry for these people provided the entry is needed for college-related business and provided there is a directly affiliated person who will act as sponsor. Another issue is when to remove the entry of a student who graduates or an employee who leaves. We retain student entries for one term after graduation; this gives them time to make other arrangements for receiving email. For employees and faculty who leave, we have found that by the time the change information reaches us, the person has generally made other arrangements and it is safe to remove their entry.

BlitzMail

Seventy-five percent of the people at Dartmouth are email users. Ninety-five percent of those — about 13,000 people — use the Macintosh email system called BlitzMail. Figure 3 shows the BlitzMail system data flow. BlitzMail is a client/server system. The client program and the optional notification control panel and driver run on the user’s Macintosh. The three server programs — the BlitzMail server, the DND server, and the notification server — run on Unix machines. Communications between the Mac-based programs and the servers is by AppleTalk stream protocol or by MacTCP. Communications among the servers is by TCP.

The user’s mail messages, mailing lists, and some personal information such as reply-to address and folder sort orders are kept on the BlitzMail server. Only machine-specific user information such as preferred fonts reside on the user’s local disk. This means a person can use BlitzMail from any networked Mac, not just their own.

Here is the sequence of events in a typical session. When the user starts up the BlitzMail client, it connects to the DND server at a well-known network address and retrieves the host name of the user’s BlitzMail server. The client then connects to the designated BlitzMail server, the server validates the user by consulting the DND server. The client then checks for any messages in the user’s “in box.” The user can

then read, compose, file, or delete messages. The BlitzMail server may query the DND server to resolve recipient addresses on newly composed messages. The user may edit her mailing lists or use the client's DND query menu to look people up or change her own DND information. At any time, whether or not the user is running the client, a new message may arrive on the server. The server then sends an arrival notice to the notification server, and if the notification server has a current registration for the user, it sends a notification to the notification driver in the user's Mac. The driver either notifies the client program if it is running or else beeps and flashes an icon that indicates new mail has arrived.

The BlitzMail Client

Like any mail user agent, the BlitzMail client program allows the user to read, reply to, compose, and file mail messages. Figure 4 shows a typical screen of the client showing the In Box window, a message window for a message from the in box, and a compose window for composing a reply to the message.

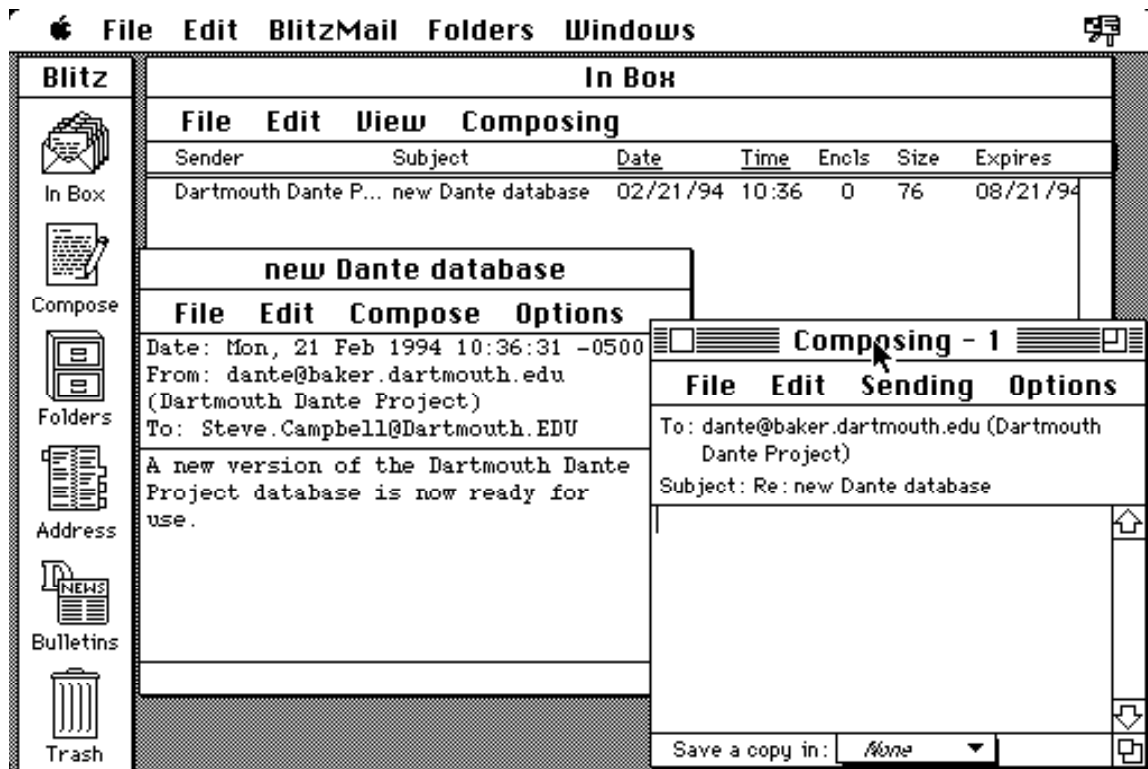


Figure 4. BlitzMail Client Screen

A summary of incoming messages appears in the In Box window, which the user can choose to have appear automatically if there are new messages, or which she can open with the In Box icon. The messages themselves are not yet retrieved from the server. In addition to sender, subject, date, and time (all derived from the message headers), the in box shows a bullet for unread messages, the size of the message (important if you are using a slow modem), the number of enclosures in the message, and the date on which the message will be purged from the server. Double-clicking on a particular message causes the client to retrieve the message (but not the enclosures) and display it in another window. From that window the users can save, reply-to, or delete the message, save any enclosures, or just close the window to keep the message in the in box. Replying to a message or clicking on the Compose icon opens a composing window. The user can type or cut and paste text, include recipient addresses from the address book, and add an arbitrary number of enclosures. A completed message can be sent, filed, or both. The user can define message folders, which reside on the server, for saving messages. Three special folders are automatically created and maintained for the user: the in box, recently sent messages, and recently deleted messages.

The enclosure mechanism allows any Macintosh file to be included in a BlitzMail message. The user adds the enclosures when the message is composed. They can be any Macintosh file, for example a program or a word processor document. When the user tells the client program to send a message, the client transfers the enclosed files to the server along with the body of the message. When an incoming message contains enclosures, the user can tell the client program to save the enclosure. The client then reads the enclosures from the server and saves them on the Mac's local disk. Because *binhex* has become a standard for enclosing Macintosh documents, when a BlitzMail message is sent to a non-BlitzMail recipient, the server binhexes the enclosures and includes them in the message text. When the server receives a message for a BlitzMail user and the message contains binhexed text, the server unbinhexes it and creates an enclosure in the message.

BlitzMail offers several ways of specifying recipient addresses. If the recipient is a person or organization that is listed in the Dartmouth Name Directory, then their address is their name. The BlitzMail server queries the DND server for the person's "real" email address, which might be the recipient's BlitzMail server if the recipient is a BlitzMail user, or it might be a standard RFC822 domain address if the recipient uses some other email system. In any case, the person composing the message does not need to know where another Dartmouth person receives email. The composer may also type an RFC822 domain address directly; this would be required for recipients outside Dartmouth and is optional (and discouraged) for people on campus. BlitzMail also offers several types of email aliases and mailing lists. These can be personal aliases and lists known only to the individual user and kept in the user's mailbox on the server, or they may be public mailing lists that anyone can send to. Public lists may be open or closed, i.e. it may or may not be possible for users to see who is on a particular list.

The BlitzMail client offers the Macintosh user a convenient way to look up someone in the Dartmouth Name Directory or to edit their own DND information. The user can type a name in the lookup window and the server displays up to about a dozen matching names with their affiliation, phone number, and email address. In the editing window the user can change any of the DND fields that they are allowed to change.

The BlitzMail Server

The BlitzMail server program provides the message storage and forwarding functions needed by the BlitzMail client. The server receives incoming messages from other users on that server, from other BlitzMail servers, and from non-BlitzMail SMTP hosts. Messages and enclosures in any of the user's folders, including the in box, are kept in files on the server's disks and sent to the client on demand. When the user composes a message, the server receives it from the client and delivers or forwards it as needed. The server is also the repository for the user's personal email-related information such as mailing lists and optional forwarding instructions. The server uses this information in the course of handling messages and allows the user to display or change it on demand. The server is also responsible for transferring enclosures, including processing them for export and import.

The protocol for client/server communications is a line-oriented protocol similar to SMTP but with extensions for BlitzMail functions including transmission of binary information. It has been optimized to make reading and sending mail easy for the server and to make the process fast on low-speed dialup connections. The protocol for server-to-server communications is SMTP with extensions for binary transmission and for moving a user from one server to another. When the server needs to forward a message to a non-BlitzMail host, it opens a conventional SMTP session with a single designated forwarding host. At Dartmouth that host is the campus mail hub. By forwarding all out-bound mail to a single host, the server avoids complicated address parsing and MX handling. The server also listens on the standard SMTP port for incoming messages from other BlitzMail servers or from non-BlitzMail hosts.

There can be one or more BlitzMail servers in a system. Users are assigned to a server arbitrarily; a person's DND entry indicates which server they use. Dartmouth currently uses five NeXT machines and one Digital Equipment Corporation Alpha AXP® running OSF/1®. The server program, which can handle many simultaneous sessions, runs as one multi-threaded process, and these machines were chosen in part because their operating systems support multi-threading. We use a rule of thumb of one megabyte on the server for each client. The NeXT servers have about two gigabytes of disk storage each while the Alpha has about six gigabytes.

Dartmouth Bulletins

Several years after BlitzMail was introduced, users began asking for a mechanism that would provide them with time-critical messages about specific topics. The solution was Dartmouth Bulletins. Bulletins contain announcements from over 200 student, academic, and administrative organizations ranging from the Afro-American Society to the computer center to fraternities to the performing arts center to the Stargazers Club to the campus police.

Bulletins combine characteristics of mailing lists and USENET news readers. They are a one-to-many message system. Each bulletin topic has one or more moderators who may post to the topic. New moderators take a short course on how to use the bulletin system effectively, and new topics are reviewed before being created. Anyone may read bulletins using the same BlitzMail with which they receive their email. Figure 5 shows a typical screen. When the user clicks the Bulletin icon, a list of all bulletin topics appears. By clicking on any topic, the user can read current bulletins on that topic. For more immediacy the user can choose to “monitor” the topic. When a moderator posts a bulletin to a monitored topic, the user receives an immediate notification of the new bulletin. Notification can be in the form of a beep and flashing icon, or a window for the topic may open automatically showing the new bulletin. Reading a bulletin is like reading an email message, and the usual functions such as saving, forwarding, and replying to the sender are available.

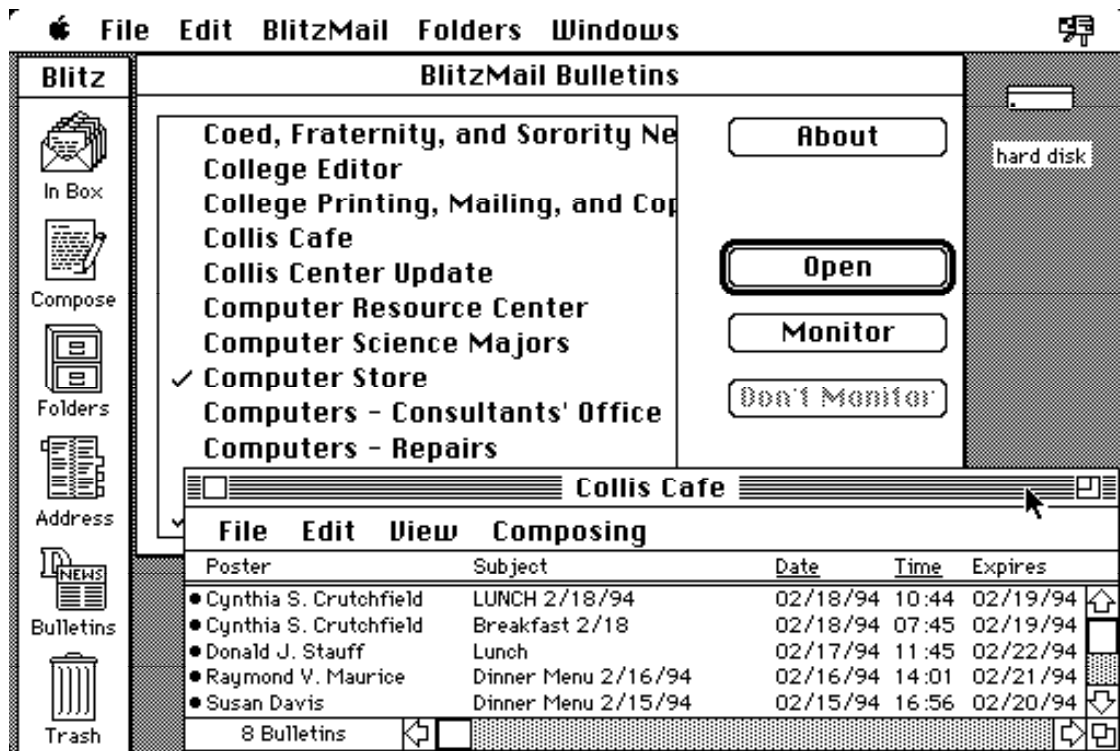


Figure 5. Dartmouth Bulletins Screen

Given Dartmouth Bulletins' similarity to USENET news, it was natural to use the news software to implement the bulletin server. Figure 6 shows the bulletin system data flow. Bulletin topics exist as conventional USENET moderated newsgroups on our campus news server. As such they can be read by anyone with any of the standard news reading programs. A special bulletin server program acts as an intermediary between the Macintosh BlitzMail client and the news system. The bulletin server maintains information about each BlitzMail user's bulletin reading history, i.e. which topics the user monitors and which bulletins he has already read. The server also supports a subset of the NNTP commands. When the user starts the BlitzMail client, the client contacts the server and asks if there are any new unread bulletins

in the topics that the user monitors. If there are, the client requests header information about them and presents it to the user in a format much like an email in box. If the user double clicks on a bulletin, the client retrieves the entire article.

The bulletin server also knows who the topic moderators are. If the BlitzMail user is a moderator of a group, then they are allowed to compose a new bulletin for that group. The client sends the posting to the bulletin server using the NNTP POST command. The news software is configured so that all postings to bulletin newsgroups are also sent to a program called *bullnotify*. *Bullnotify* maintains a list of users who are monitoring each topic and sends a request to the notification server to notify those people's BlitzMail clients of the arrival of a new bulletin. The notification mechanism is the same as that for newly arrived mail messages.

The Notification Server

The notification server provides a flexible mechanism for asynchronously notifying a Macintosh user of some event. This paper has already described two applications: notification of the arrival of new mail and notification of the posting of bulletins. When the user turns on their Mac, the notification control panel registers with the notification server by sending it a message that says "this person is using a Mac at this network address." An application requests notification by sending the notification server a message containing the user's name, an indication of what type of event has happened, and some optional text related to the event, for example the subject of the new mail message. If the notification server has an active registration for the user, it sends a message to the notification driver on that Mac. If the person is not registered, the notification server saves the notice and will send the notification message later when the user registers.

The user can select how to be notified about each type of event. Possibilities include a beep, a flashing icon, a dialog box, or the automatic opening of a window for reading the new message. To accomplish the latter, the reading application such as the BlitzMail client polls the notification driver and initiates the reading operation.

Mail by Name

One of the keys to a successful email system is simple addressing. A person's email address should be intuitively obvious; it should not be necessary to know arbitrary account names and host names. To send someone email, it should be sufficient to know the person's name and the name of their institution. At Dartmouth we have accomplished this addressing-by-name by using the Dartmouth Name Directory in our mail system.

As previously described, the BlitzMail system allows a person's name to be their address; the BlitzMail server looks the name up in the DND and finds their preferred local email address, their "real" email address. We have provided addressing-by-name for users of other email systems at Dartmouth by creating a mail hub that also can look up people in the DND. This allows mail to be addressed to *name*@Dartmouth.EDU with exactly the same semantics for *name* as applies when a BlitzMail user addresses a message by typing the recipient's name.

The mail hub is a Unix machine running the *sendmail* mail forwarding agent. The hub receives all email addressed to *localpart*@Dartmouth.EDU. Most sendmail machines handle mail addressed to the local machine by first seeing if *localpart* is a mail alias and, if not, assuming that it is a user mailbox on the local machine. The slightly modified sendmail on the Dartmouth mail hub also first checks *localpart* to see if it is an alias, but if it is not, *sendmail* looks up *localpart* in the DND and reroutes the message to the preferred email address specified in the DND entry. If the preferred address is BlitzMail, then the hub retrieves the name of the addressee's BlitzMail server and forwards the message to the server. If the preferred address is an RFC822 address, the hub forwards the message in the conventional way. If *localpart* is not found in the DND or if it generates more than one match, then the mail message is rejected.

Email on Paper

Even at Dartmouth some people do not have personal computers or for other reasons do not receive email electronically. But everyone can receive conventional printed mail through campus mailboxes, called “Hinman boxes” after the name of the campus post office.

Once again the Dartmouth Name Directory is the key to reaching these people since everyone has an entry in the DND — even non-computer users — and one field of that entry is the person’s Hinman box number. We created a special domain, `Hinman.Dartmouth.EDU`, to address Hinman boxes. If the person cannot receive email electronically (or chooses not to), their DND preferred email address can be set to `name@Hinman.Dartmouth.EDU`. On the mail hub, *sendmail* directs messages for the Hinman domain to a special program that formats email messages appropriately for sending through the Hinman mail system. The resulting messages are printed several times a day, folded, and given to the Hinman post office for delivery, usually within 24 hours.

Tying It All Together

Having examined the components of the Dartmouth electronic mail system, we can summarize the characteristics that combine to create a successful system.

- The Macintosh is the preferred personal computer for the vast majority of people at Dartmouth. For 10 years it has offered a superior user interface, and many applications are now available both in house and commercially. The machine itself is moderately priced, with the recommended system still costing less than \$1,200.
- The native Macintosh networking protocol suite, AppleTalk, lets a user take a new machine, preloaded with Dartmouth software, out of the box, plug it into a network jack anywhere on campus, and immediately start using network services. No network address administration is required for individual machines. Network components such as routers are relatively inexpensive.
- We have blended the AppleTalk network and the IP network almost seamlessly. A Macintosh client can easily use a server on the IP network.
- A single user directory containing *all* members of the institution is available as a resource for any network application. The directory contains the information needed to route email to a person, and people can easily change the information themselves.
- We have a Macintosh email client, BlitzMail, with an easy-to-use interface and full functionality.
- The notification system provides the proper feedback and reinforcement to users. As good as BlitzMail is, it still takes time to “check your mail.” The notification system informs users exactly when it is useful to do so.
- A central mail hub uses the name directory to route messages among the Macintosh mail server, other campus mail machines, and the Internet. Mail from any source addressed to `name@Dartmouth.EDU` gets rerouted to the person’s preferred address, including their campus paper mailbox if they do not use email.

Email and the Institution

A tool as powerful as email inevitably has an impact on the institution in which it is used, whether that institution is a school, a business, or a household. While it has enormous benefits, it also makes demands on the institution, raises ethical and legal issues, and often causes unexpected changes in the way the institution works.

Staffing

An email system requires people to support it. User support requires people to answer users' questions by email, by phone, and face-to-face. It requires people to plan and carry out training, especially if a large portion of the user base is not technically experienced. It requires someone to produce and distribute documentation and someone to provide postmaster services. Dartmouth has a staff of student consultants and two full-time equivalent employees who answer questions, a staff of two to manage training, and a staff of two to handle documentation.

A large component of administrative support is management of the name directory. This includes obtaining regular updates from the registrar and personnel offices as well as handling individual requests for new entries or special changes to existing ones. Dartmouth has two people who spend part of their time providing this support.

Technical support includes operation, system administration, and maintenance of the servers and the network, repair of personal computers, software development, dealing with vendors, and planning for growth. Dartmouth has two system administrators who spend part of their time on the email servers, two network maintenance technicians, four software developers, and two people who spend part of their time on planning.

Management support includes establishing and enforcing email policies, maintaining good relations with other parts of the institution, and managing finances. The Computing Services organization at Dartmouth has three managers who are involved in these tasks.

Email Rights

An email system raises ethical and legal issues that may be new to the institution. How private are email messages? Does management have the right to read people's email? Do postmasters? System administrators? What if the police ask to see someone's email as part of an investigation? Institutions need to have clear written policies about email privacy. Dartmouth has established a Computing Code that spells out everyone's computing rights and responsibilities, and no one may intentionally read someone else's mail unless there is strong evidence that there has been a violation of the Code or of the law. But these occurrences are rare. What is more common is that email messages get incorrectly addressed or run into technical problems in the mail system and end up being seen by an unintended recipient or by the postmaster. For this reason we emphasize to users that they should not send anything through the email system that they would not want strangers to see. We tell them that the privacy of an email message is between that of a first class letter and a postcard.

What constitutes appropriate use of the email system? How do you handle unsolicited and possibly unwanted messages? How do you handle impersonations and harassment by email? What about using the email system for personal communications? One solution to unsolicited messages is to create a channel for the information so that only those who want to receive it do so. Mailing lists, special newsgroups, and Dartmouth Bulletins provide those channels. Dartmouth handles harassment cases — whether by email or not — through the deans' offices. Members of the college community are welcome to use the email system for personal activities as long as those activities meet accepted standards of ethics and etiquette. For example, people may use the college's email system to participate in mailing lists and newsgroups so long as they observe good manners and the conventions of the group.

In all cases where the use of email raises ethical and legal issues, the institution must guarantee due process to those involved. People on all sides of the issue must know what the rules are, who enforces them, and what the appeals process is. All this should be written and presented to the user when they become a user of the system. Dartmouth provides this information in the packet given to entering students and new faculty and staff.

The Cultural Impact of Email

Email changes the way people conduct their business, but the changes are difficult to quantify. This is a rich field for study. Two anecdotal cases from Dartmouth's experience will illustrate.

Email can be intrusive. The mechanisms we have designed to notify us of the arrival of new messages are as intrusive as that other modern invention, the telephone. Students, faculty, and staff have all reported that if they really need to get some work done, they have to escape not only the phone, but the email system as well. They find it difficult to resist the temptation to check for new mail.

Email breaks down the mechanisms that organizations have built up to control access to people. You can send email to a subordinate, a peer, or the CEO with equal ease. Many people who do not answer their own telephones do read their own email. Answering machines, secretarial staffs, and scheduled office hours no longer provide "protection."

What's Ahead?

Dartmouth College has built a successful campus email system — one that continues to evolve. One of the questions confronting us now is how best to support multi-media and privacy-enhanced email. Another is how to provide email on a network with increased use of dialup and mobile addresses. And finally, as components of our mail system "age," how do we (belatedly) perform life-cycle planning and retire old systems without interrupting the email service that our campus community has come to expect?

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Availability

Dartmouth College licenses the BlitzMail mail system. Corporate and educational/non-profit licenses are available. Contact Software Sales, Dartmouth College, 6028 Kiewit Computation Center, Hanover, NH 03755-3523. Phone 603-646-2643 or fax 603-646-2810. Details are also available on the Internet from [ftp.Dartmouth.EDU](ftp://Dartmouth.EDU) or gopher.Dartmouth.EDU.

The Dartmouth AT/IP gateway code is licensed to Engage Communications Corporation of Aptos, CA.

Bibliography

Specifications and other details about components of the Dartmouth mail system can be found in the following documents. Dartmouth documents are available by contacting Consultants' Office, 6028 Kiewit Computation Center, Dartmouth College, Hanover, NH 03755-3523, phone 603-646-3417.

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