The First Network Email

Ray Tomlinson

During the summer and autumn of 1971, I was part of a small group of programmers who were developing a time-sharing system called TENEX that ran on Digital PDP-10 computers. We were supporting a larger group working on natural language. Earlier, I had worked on the Network Control Protocol (NCP) for TENEX and network programs such as an experimental file transfer program called CPYNET.

I was making improvements to the local inter-user mail program called SNDMSG. Single-computer electronic mail had existed since at least the early 1960's and SNDMSG was an example of that. SNDMSG allowed a user to compose, address, and send a message to other users' mailboxes.

A mailbox was simply a file with a particular name. It's only special property was its protection which only allowed other users to append to the file. That is, they could write more material onto the end of the mailbox, but they couldn't read or overwrite what was already there. The idea occurred to me that CPYNET could append material to a mailbox file just as readily as SNDMSG could. SNDMSG could easily incorporate the code from CPYNET and direct messages through a network connection to remote mailboxes in addition to appending messages to local mailbox files.

The missing piece was that the experimental CPYNET protocol had no provision for appending to a file; it could just send and receive files. Adding the missing piece was a no-brainer -- just a minor addition to the protocol. I don't recall the protocol details, but appending to a file was the same as writing to a file except for the mode in which the file was opened.

Next, the CPYNET code was incorporated into SNDMSG. It remained to provide a way to distinguish local mail from network mail. I chose to append an at sign and the host name to the user's (login) name. I am frequently asked why I chose the at sign, but the at sign just makes sense. The purpose of the at sign (in English) was to indicate a unit price (for example, 10 items @ $1.95). I used the at sign to indicate that the user was "at" some other host rather than being local.

The first message was sent between two machines that were literally side by side. The only physical connection they had (aside from the floor they sat on) was through the ARPANET. I sent a number of test messages to myself from one machine to the other. The test messages were entirely forgettable and I have, therefore, forgotten them. Most likely the first message was QWERTYUIOP or something similar. When I was satisfied that the program seemed to work, I sent a message to the rest of my group explaining how to send messages over the network. The first use of network email announced its own existence.

These first messages were sent in late 1971. The next release of TENEX went out in early 1972 and included the version of SNDMSG with network mail capabilities. The CPYNET protocol was soon replaced with a real file transfer protocol having specific mail handling features. Later, a number of more general mail protocols were developed.

The First Email Computer

The first email was sent between the two machines shown in this photograph. They were (obviously) side-by-side, but the only connection between them was through the ARPANET. In the foreground is BBN-TENEXA (BBNA for short). Host names in 1971 had no .com or dot anything; DNS came along later. BBNA was the machine on which the first email was received. In the background is BBN-TENEXB (BBNB) from which the first email was sent. On the left, foreground, is the Teletype KSR-33 terminal on which the first email was printed. Immediately behind and largely obscured is another KSR-33 on which the first email was typed.

BBNA was a Digital Equipment Corporation KA10 (PDP-10) with 64K (36-bit) words of (real magnetic)

core memory. In modern measure, that's 288 KBytes. BBNB was smaller with only 48K words. Both machines ran the TENEX time-sharing monitor.

Did you send the first network email?
As far as I know, yes. However, there are a few qualifications. Network should be included because there were many earlier instances of email within a single machine. Computer networks, in any real sense, didn't exist until the ARPANET was built starting in 1969. Dick Watson proposed a form of email in July 1971 (RFC 196). I don't think that was ever implemented. It differed in that the mail was directed to numeric mailboxes. RFC 196 also suggests that the final product would be a printer output (i.e. ink on paper). SNDMSG sent messages to named individuals (computer users).

Why did you do it?
Mostly because it seemed like a neat idea. There was no directive to "go forth and invent email". The ARPANET was a solution looking for a problem. A colleague suggested that I not tell my boss what I had done because email wasn't in our statement of work. That was really said in jest because we were, after all, investigating ways in which to use the ARPANET.

Why did you choose the at sign?
The primary reason was that it made sense. at signs didn't appear in names so there would be no ambiguity about where the separation between login name and host name occurred. (Of course, this last notion is now refuted by the proliferation of products, services, slogans, etc. incorporating the at sign.) The at sign also had no significance in any editors that ran on TENEX. I was later reminded that the Multics time-sharing system used the at sign as its line-erase character. This caused a fair amount of grief in that community of users. Multics used IBM 2741 terminals which used EBCDIC character coding. They did not have a "control" modifier key and didn't have many (any?) non-printing characters beyond space, backspace, tab, and return. The designers of Multics were constrained to using printing characters for line-editing.

What was the first message?
The first message of any substance was a message announcing the availability of network email. The exact content is unknown, but it gave instructions about using the at sign to separate the user's name from his host computer name.

Did you receive any rewards, patents, etc.?
Not unless you consider the current interest in the origins of email a reward.

What were the early uses of email?
The early uses were not terribly different from the current uses: The exceptions are that there was only plain text in the messages and there was no SPAM.