ReMail: A Reinvented Email Prototype

Steven L. Rohall and Dan Gruen
IBM T.J.Watson Research Center
One Rogers Street
Cambridge, MA 02142 USA
+1 617 693 1840, 693 5786
firstname_lastname@us.ibm.com

ABSTRACT

Electronic mail has become the most widely used business productivity application. However, people increasingly feel frustrated by their email. They are overwhelmed by the volume, lose important items, and feel pressure to respond quickly.   Though email usage has changed, our email clients largely have not.

In this demonstration, we will show a prototype email client developed as part of a larger project on "reinventing email." This prototype incorporates capabilities for dealing with threads of related messages, a synchronous communication facility, and the ability to annotate individual messages. The prototype has been tested on a small set of users to evaluate its features. People particularly liked tools to view and navigate among messages in a thread, and the integration of synchronous awareness and communication with the email experience.

Keywords

Email, threads, instant messaging.

MOTIVATION

Electronic mail has become the primary business productivity application. It has emerged as the most-used communications tool in the US and Canada and, according to an Institute for the Future study, 97% of workers report using email daily or several times each week [8]. In fact, US workers average 49 minutes a day managing email, and 25% spend more than one hour per day on that task [4].

Despite our reliance on electronic mail, our tools for handling email have failed to keep pace [3]. First, workers feel **overwhelmed** by their email. The average user gets approximately 24 messages per day while "high-volume" users can easily get several hundred [6] [8]. Ironically, 34% of internal business messages were deemed "unnecessary" [4]. Second, people use their email inboxes to manage their tasks, yet they complain, **"things fall through the cracks."** Current organizational structures within email clients, such as folders, prove inadequate, especially for high-volume email users [12]. Finally, people feel pressure to be **more responsive** in replying to

email messages, reporting that 27% of messages sent "require" immediate attention [4].

Email clients have changed little since they were first invented. Although today's email clients are more graphical with onscreen buttons, pull-down menus and rich-text display, they are essentially "souped-up" cousins of the email clients from thirty years ago. Most email clients today have the same set of features and organizational structures: multiple folders in which messages can be filed, a textual listing of the messages within a given folder, and the ability to preview a selected message. However, studies have shown that folder systems quickly degrade with the number of messages people receive [12]. Most people end up keeping all of their email in one large folder [1]. The content and use of email has also changed. In addition to traditional letters, email now consists of invitations, receipts, transactions, discussions, conversations, tasks, and newsletters, to name a few variations [3].

To address these problems, our research group has been investigating electronic mail. Our investigations have included user observations and interviews, design mockups, prototype implementations, and user evaluations.

THE PROTOTYPE

In order to better evaluate our ideas, we have implemented a prototype email client incorporating several of them. In particular, this prototype 1) incorporates new ways to visualize, manage, and interact with threads and other groups of related messages, 2) integrates an instant messaging capability that treats chat transcripts as other email messages, and 3) provides an annotation facility for reminding oneself as well as for communicating with others in a shared inbox.

Threads

Email threads are groups of replies that, directly or indirectly, are responses to an initial email message. Ideally, e-mail threads can reduce the perceived volume of mail in users' inboxes, enhance awareness of others' contributions on a topic, and minimize lost messages by clustering related e-mail.

Our prototype supports threads of email messages by providing a visualization of the thread tree when any message is selected [9]. At the same time, other messages

in the thread are shown with a secondary highlighting color. The secondary highlights show the user which messages are related to the selected one (Figure 1). Hovering over the nodes in the tree view provides summary information of those messages and clicking on a node automatically scrolls the list view to the selected message. This automatic scrolling is very useful when a thread has gone on for several days and older messages are no longer visible on screen.
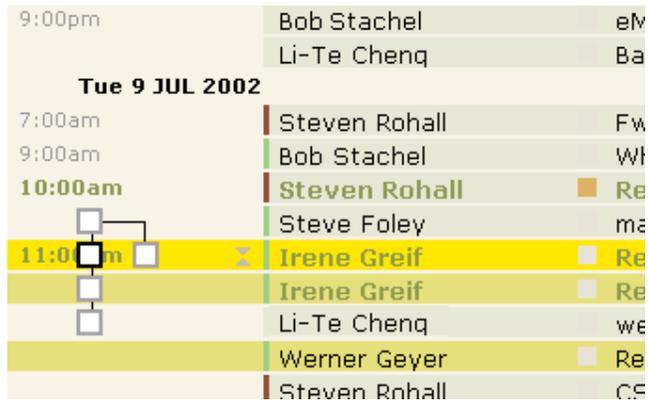

Figure 1. The client in use, showing the thread map on the left, and online awareness indicators next to each name.

The user also has the ability to "gather" a thread. When a thread is gathered, all of the individual messages are collapsed into one item in the list view. This item appears in the list at the place where the most recently received individual message was located and, as new messages in that thread are received, the gathered thread moves to those positions (Figure 2). Moving the gathered thread ensures that the user will always have access to the entire thread of messages whenever a new message is received, even if the thread has been inactive and has scrolled out of view. At any time, the user may "scatter" a thread and replace the single item with the individual constituent messages in their proper places within the list.
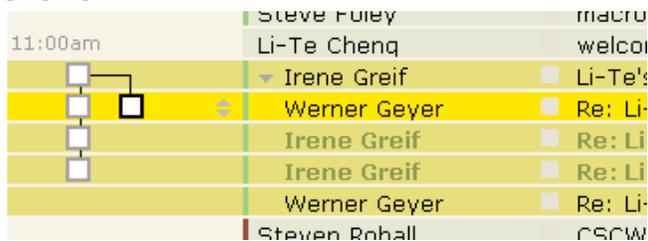

Figure 2. A gathered thread.

While our prototype has used threads for grouping and navigation as others have done [2], we feel that threads have other uses as well. For example, other research in our group investigated using threads to facilitate the automatic generation of summaries of email messages to enable a user to more quickly determine whether or not to deal with a message [5].

Synchronous Awareness and Instant Messaging

Instant messaging, or "chat," has become an increasingly important application for communication. Products such as Lotus Sametime from IBM [10] have brought instant messaging into the workplace. Traditional use of instant messaging has a serious limitation, however: unless a user is in your "buddy list," it is difficult to monitor that person's status as well as initiate communication.

Our prototype addresses this limitation by providing a "live names" feature where names in the "From," "To," and "CC" fields show that user's online status and allow one to start a chat simply by clicking on the person's name. In a business sense, what is important is not that a person is your "buddy," but rather that you are able to get them the information they need in a timely fashion. In a large company, this context-based awareness opens up the possibility of chatting in reply as easily as composing an email reply.

Further, the chat transcript in ReMail is saved as a part of the thread of messages. In fact, a user can reply with email or chat based upon the urgency of the communication. Threads of conversation may move between synchronous and asynchronous modes fluidly.

Annotations

A third shortcoming of current email applications is the lack of a feature for annotating email messages. Annotations serve two purposes. First, they serve as reminders for the user much in the same way that physical notes attached to documents help remind people of related information. Second, in situations where more than one person is sharing an inbox, the annotations allow people to communicate with each other about the work (e.g., "check with me before responding to this" or "spoke to her on the telephone—no need to follow up").
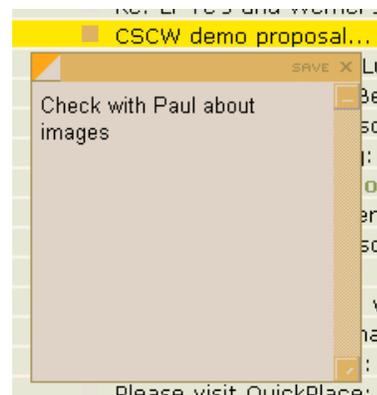

Figure 3. An annotation attached to an email message.

The ReMail prototype annotation feature has two parts. One is the ability to place a colored icon on a message without any annotation text. For example, all messages with red icons might need immediate attention. In addition, the user is able to add text to the annotation; the icon changes to indicate that there is text included (Figure 3). These icons could be used to sort and categorize messages.

IMPLEMENTATION

Our goal in building this prototype was to produce a system robust enough that people could use it on a daily basis with their own email. We feel that email is so personal that it is not possible to get true user feedback unless people try it on the email with which they are already familiar and are having problems. In our case, that meant being able to handle mail databases with tens of thousands of messages and upwards of one gigabyte of data.

The user population for this trial consisted of Lotus Notes users [7]. To access the mail databases, we wrote a custom COM object in C++ using the C++ API to Lotus Notes. This COM object was highly optimized to access the mail data, which might be located on a server. It took advantage of Notes' selective replication to create a small, index database on the user's local computer. This index database provided quick access to message summary data to the front end user interface.

The user interface for the prototype was written in Dynamic HTML and JavaScript using IBM Sash [11]. Sash provides an integrated development environment for creating Windows applications using the DHTML capabilities of Internet Explorer 5+. The most complicated piece of the user interface is the list control, which displays the user's inbox. We did not want to create the list as a big table since an inbox might contain thousands of messages. Instead, we implemented a window onto a much larger virtual table. This is standard practice; however, it was complicated in our case since we wanted to provide secondary highlights for other messages in a thread and we wanted to be able to scroll to any message in a thread by clicking on the thread tree map. We needed to do quite a bit of bookkeeping to perform these sorts of thread manipulations quickly.

Sash was also a good choice for rapid prototyping since it has extensions that allowed us to script access to our corporate LDAP and Sametime servers. We utilized several other Sash extensions for writing user log data to the file system and for recording system state in the Windows registry.

Since we wanted people to try the prototype with their actual mail, we had to implement features that were not on our research path. Despite this, most of the users who initially tested the client mentioned missing features (such as "Reply to All with History") that we did not have time to implement. To help alleviate these problems, the test client included an "Open in Notes" button that would quickly open the currently selected message in the user's existing Notes client.

USER TRIALS

We tested the prototype client with 8 business email users who used the client against their own email over periods of 2 to 5 weeks. Our goal was to get people's general impressions of the new features, see how useful they are and in what situations they provide value, gain feedback to improve details of the user interface, and fine tune the algorithms used to thread messages together. All subjects for this initial test were Notes users in our own company.

The client was instrumented to log the subjects' actions with details of the messages and threads in an encrypted format. Thus we could know that the user had hovered over an item in the thread map and see later if they returned to the same thread and message, without knowing the subject of the message or the people it involved.

Procedure

We started by asking subjects a series of basic questions about their email practices, the volume of mail they received and sent each day, how often they checked their mail, how much mail they saved, and other questions about their procedures for dealing with mail. We also asked them to describe the role email played in their life, and to describe any problems they were encountering with email.

We then installed the test client on their machine. During the installation, while the system was creating its local index, we described the client and the new features it included. We demonstrated how to use these features on a separate machine against the experimenter's email file, ensuring that the subject's email remained confidential. We then asked the subjects to use the client for a few minutes against their own email while we stayed to record their initial impressions and answer any questions that arose.

We left the subjects to use the test client over a period of at least two weeks. We instructed them to use the client whenever they could comfortably, but told them to always feel free to use their existing Notes client and not to let the testing impede any ongoing work they had to get done. We also gave the subjects a small logbook to record any thoughts or problems they encountered. Each page of this logbook had a place to check off the kind of comment (Usefulness; UI; Problem; Threading; or Other) and places to record details of the comment, what they were doing at the time, and the messages it involved.

At the end of the test period, we interviewed the subjects again, asking for their general impressions of the client, what they did and did not like, and then about each of the specific features. We also went through the logbooks with the subjects item by item to be sure we understood them and hear any additional comments they prompted.

Initial Results

All subjects saw email as an important business tool in their work. Subjects were asked to describe the role email played in their daily activities, and the following responses are typical:

"Critical to my job"
"One of the most important communication tools… It's your work."

"Critical role. I use it to communicate with just about everyone I know. In fact, people who don't use email, I've become more distant."

In general, users reported liking the client, and specifically mentioned threading, Sametime integration, and the way the list view divided messages by date as features they found most useful. Because of its limited functionality, none of the subjects used the ReMail client as their main email tool.

Threads were seen as a useful feature, both for finding information and for collecting related documents together before dealing with an issue. Not all found the thread map intuitive, however. In the prototype, the nodes in the thread map are spaced equally; one subject suggested it would be clearer if the visualization indicated the time the messages were received, an idea we have discussed in other contexts [9]. Another subject commented that the structure of the map did not give enough clues on what was important. People liked being able to find a single message in a thread and then gather the other messages in the thread together. One commented that this was particularly useful for locating an earlier message in a thread (e.g., the one with a link or an attachment) without needing to hunt through the inbox.

As expected, all users encountered situations in which threads were not constructed correctly. For example, messages from the same sender years apart with the same subject (e.g. "Hello" or "Meeting") were all grouped together. While errors often resulted because the system was "too aggressive", one subject expressed a desire to be able to tell the system to be "more aggressive" for a specific thread. There was also a suggestion that improvements to the thread map visualization could compensate for imperfect threading. For example, the addition of time to the visualization (as described above and in [9]) would show that two sets of messages threaded together had, in fact, been received years apart.

The ability to annotate messages wasn't used much, but there was a suggestion that some of this was due to the fact that the annotations were not visible in Notes, and people did not use the ReMail test client as their main mail reader. Several users complained that the operation of the annotation widget was not intuitive. Users did like the ability to mark messages to return to later.

Subjects found it useful to have online awareness information near messages, and said it saved having to go to a separate window to see who was online. Several commented that his was often more useful than a buddy list, as the list of email senders dynamically reflected the people with whom they were currently working even if they had not been explicitly added to their buddy list. There was a suggestion that this aided their decision of which message to reply to first.

People generally liked the way mail was divided by day, and this was often mentioned unprompted as one of the nice aspects of the design. This was especially true for those who did not receive large amounts of mail as several day breaks would be visible on the screen at the same time. One user commented that this display was particularly useful after returning from vacation as it gave him a clearer view of what had come in.

ONGOING RESEARCH

We are currently using the lessons learned from this implementation in the development of a newer prototype, with additional features, and more complete support of the general email features users expect.

ACKNOWLEDGEMENTS

REFERENCES

1. Bälter, O., "Electronic Mail in a Working Context," doctoral dissertation, Royal Institute of Technology, Stockholm, Sweden, 1998.
2. Cadiz, J.J., L. Dabbish, A. Gupta, and G.D. Venolia, "Supporting Email Workflow," Microsoft Research Technical Report # MSR-TR-2001-88.
3. Ducheneaut, N. and V. Bellotti, "E-mail as Habitat," *Interactions*, 8(5), Sept.-Oct. 2001, ACM, pp. 30-38.
4. "The Spam Within: Gartner Says One-Third of Business E-Mail is 'Occupational Spam'," Gartner, Inc. press release, April 19, 2001.
5. Lam, D., S.L. Rohall, C. Schmandt, and M.K. Stern, "Exploiting Email Structure to Improve Summarization," submitted to the ACM Conference on Information and Knowledge Management, McLean, VA, November 4-9, 2002.
6. Levitt, M., "Email Usage Forecast and Analysis, 2000-2005," IDC Report # W23011, September 2000.
7. Notes information is at http://www.lotus.com/domino.
8. "Pitney Bowes Study Reveals Increased Use of Electronic Communications Tools Among North American and European Workers," Pitney Bowes press release, August 7, 2000.
9. Rohall, S.L., D. Gruen, P. Moody, and S. Kellerman, "Email Visualizations to Aid Communications," *Late Breaking, Hot Topic Proceedings of the IEEE Symposium on Information Visualization*, San Diego, CA, October 22-23, 2001, pp. 12-15.
10. Sametime information is at http://www.lotus.com/sametime.
11. Sash information is at http://sash.alphaworks.ibm.com.
12. Whittaker, S. and C. Sidner, "Email Overload: Exploring Personal Information Management of Email," *Proceedings of CHI'96*, Vancouver, B.C., April 13-18, 1996, pp. 276-283.