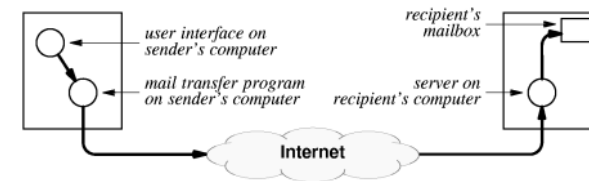


Email

COMP476
Networked Computer Systems

Overview

- Email is basically a file, with a specific header format, that is transferred to the mailbox of the recipient.
- There are two major parts to email:
 - Sending the email
 - Viewing and editing the email



Standards

- **X.400** defines the email file format.
- **Simple Mail Transfer Protocol (SMTP)** define how mail is sent between mail servers.
- **POP** and **IMAP** are protocols for retrieving your mail from your mailbox.

Viewing Email

- Programs that edit and view email.
 - pine
 - webmail
- These applications are started by the user and handle the user interface.
- Some users remotely access their email mailboxes.

Sending Email

- Background email daemon sends and receives email files.
- Files are stored in the system spool directory in a file named for the user.

Email File Format

- Email is an ASCII file.
- The beginning of the file contains parameters about the email. The parameters are in the format

parm-name:value↵

- The header is separated from the message text by a blank line

Header Fields

Keyword	Meaning
From	Sender's address
To	Recipients' addresses
Cc	Addresses for carbon copies
Date	Date on which message was sent
Subject	Topic of the message
Reply-To	Address to which reply should go
X-Charset	Character set used (usually ASCII)
X-Mailer	Mail software used to send the message
X-Sender	Duplicate of sender's address
X-Face	Encoded image of the sender's face

Email Addresses

- There are two basic formats for email addresses
 - userid@computer
fred@dungeon.acme.com
 - userid@domain
fred@acme.com
- Domain Name Servers can provide the IP address of the domain's email server.

Extending Email

- Email was originally used to just send short text notes.
- Now people want to send graphics, audio, video, program binaries, etc.
- Additional files appear as “attached files” in most email systems.

Multipurpose Internet Mail Extension (MIME)

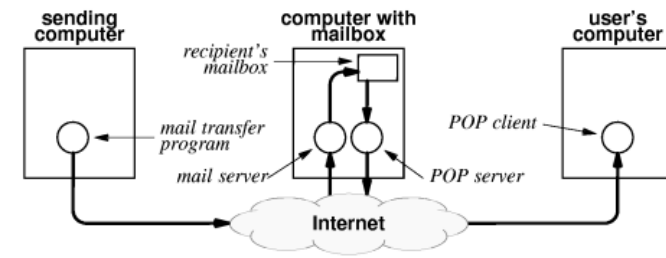
- Allows arbitrarily formatted data to be send via email.
- Specifies the content type of the data.
 - text/html
 - image/gif
 - application/*program*
- Can be used to include security information.

MIME Encoding

- Data transmitted as printable characters to avoid translation and format errors.
- base64 encoding
 - splits three bytes (24 bits) into four 6 bit units.
 - The 6 bit units are sent as upper and lower case letters, numbers, “+” and “/”.
- quoted-printable encoding
 - 7-bit ASCII with characters above 127 sent as an equal sign followed by two hex digits.

Remote Mailbox Access

- Some users access their mail remotely
- Programs like Outlook and Eudora get the mail from the mail server
- Clients use POP or IMAP



Simple Mail Transfer Protocol

- Runs over TCP
- Used between
 - Mail transfer program on sender's computer
 - Mail server on recipient's computer
- Specifies how
 - Client interacts with server
 - Recipients specified
 - Message is transferred

SMTP Example

```
220 ncatmail.ncat.edu ESMTP Sendmail
    2.1.1/8.9.1/Execmail 2.1; Thu, 22 Apr 1999
    17:54:33 -0400 (EDT)
helo williams.comp.ncat.edu
250 ncatmail.ncat.edu Hello
    williams.comp.ncat.edu [152.8.251.41], pleased
    to meet you
mail from: <williams@ncat.edu>
250 <williams@ncat.edu>... Sender ok
```

SMTP Example (cont.)

```
rcpt to:<jb988330@ncat.edu>
250 <jb988330@ncat.edu>... Recipient ok
data
354 Enter mail, end with "." on a line by itself
This is an example of SMTP.
.
250 RAA13983 Message accepted for delivery
quit
221 ncatmail.ncat.edu closing connection
```

Email List Servers

- List servers are used to send mail to many recipients.
- Users can usually enroll or remove themselves from the list.
- Email sent to the list server will be sent to all users on the list server list.
- Some email list servers are moderated.

Urban Myth – Email Tax

- Circulating endlessly a few years ago was an email message warning that the government was going to tax email.
- How would the government know you sent email?