

ICS 451: Today's plan

- email
 - overview
 - structure
- protocols:
 - SMTP
 - POP
 - IMAP

Email overview

- A mail client is used to prepare and read email
 - Message User Agent, MUA
- A mail server forwards and stores email
 - Message Transfer Agent, MTA
 - providing Message Handling Service, MHS
- Global service providing user-to-user transmission of messages
 - everything, including multimedia, encoded using 7-bit ASCII

Email structure

- Email consists of a header and a body, separated by an empty line
 - similar to HTTP, but structure visible to user
- Each line in the header has the form
field-name: field value
 - From, To, Subject, Date
- Received fields indicate the path of the message (see book, p. 39)
- Message-id unique for each message

MIME

- Multipurpose Internet Mail Extension
- A way to send non-ASCII data across email
 - non-English text: 江戸
 - multimedia: images, sounds, video
- Mime-Version, Content-Type
- Content-Transfer-Encoding:
 - quoted-printable (=xx is char xx, =3D is =)
 - base64 (6 bits per character A-Za-z0-9+/
 - padded with = to make multiple of 3 chars
 - 7bit

Email Clients

- Used to prepare email and send it to the first server, and used to read email
 - local application or webmail
- Once email is composed, sent using Simple Mail Transfer Protocol, SMTP
 - server may be default server for machine
 - server may be given by MX record

Typical email transmission

- Sender's MUA sends to local MTA (Mail Submission Agent, MSA)
- MSA sends to MTA indicated by MX record
- MTA sends to receiver's local MTA (Mail Delivery Agent, MDA, stores mail in inbox)
- SMTP used everywhere except MTA to MDA
 - where IMAP and POP may be used

SMTP

- Simple Mail Transfer Protocol
- TCP port 25 (587 for message submission)
- ASCII text based
 - HELO or EHLO begins session
 - MAIL FROM: gives the sender
 - RCPT TO: the receiver
 - DATA gives the body
 - ending with a '.' on a line by itself
 - QUIT ends the session
- Reply codes similar to HTTP

SMTP example

- see **textbook**, pages 44-45

SMTP open relays

- An MTA could accept connections from anywhere and forward email to anywhere
- This is called an Open Relay
- Open Relays are useful to anyone wishing to hide the origin of an email
- Most Relays today apply some authentication before forwarding email
 - e.g. IP-based authentication
- Open Relays used for spam may be blacklisted

POP

- Post Office Protocol
- Downloads messages from local email server
- Authentication, commands, then `QUIT`
- Client sends commands to server:
 - `STAT`, status (list of emails)
 - `RETR`, retrieve a specific email
 - `DELE`, delete an email
- ASCII-based

IMAP

- Internet Message Access Protocol
- Assumes email is permanently stored on server, client just used to view email
 - and save it for offline use
- Lets multiple clients access same mailbox simultaneously
 - (not in textbook)

Email overview (again)

- POP and IMAP used to retrieve messages from server
- HTTP used to send and retrieve over webmail
- SMTP used everywhere else
- Generally message goes from sender MUA to sender MTA (MSA) to receiver MTA to receiver MDA to receiver MUA