Network Services

Email
SMTP, Internet Message Format

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SS 2006

Agenda

- Email
- SMTP
- Internet Message Format

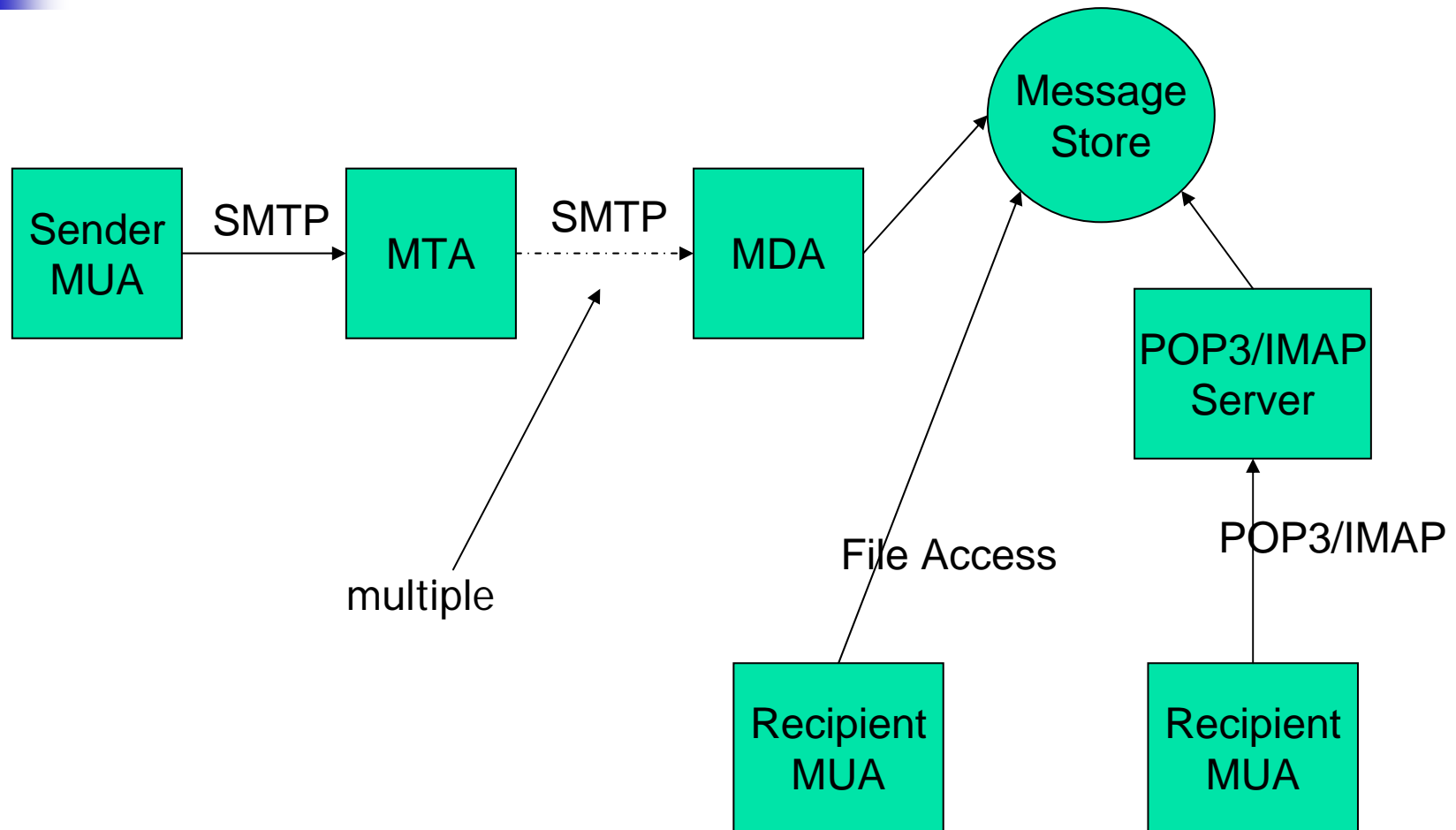# Email Protocols

- SMTP
  - Send emails
- POP3/IMAPv4
  - Read Emails
  - Administrate mailboxes

Email Agents

- **Mail User Agent (MUA)**
  - Mail Client
    - Sends emails (via MTA)
    - Let users read emails
- **Mail Transfer Agent (MTA)**
  - Delivers email to target mailbox
- **Mail Delivery Agent**
  - Final delivery of messages for local recipient
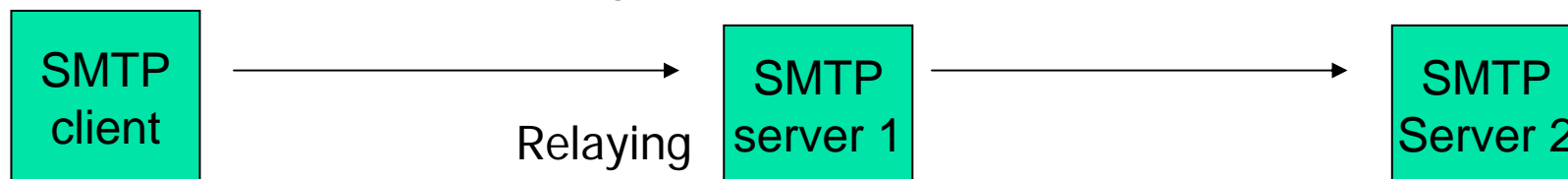 - Filtering or categorizing

Email delivery

Sender MUA → (SMTP) → MTA → (SMTP) → MDA → Message Store

multiple

MDA → Message Store

Recipient MUA → (File Access) → Message Store

Recipient MUA → (POP3/IMAP) → POP3/IMAP Server → Message Store

SMTP

- **Simple Mail Transfer Protocol**
  - Used to SEND mails
- **Originated in 1982**
  - SMTP RFC 2821 (821)
    - How to transmit
  - Internet Message Format RFC 2822 (822)
    - Transmission format
- **Goals**
  - Transfer email
  - Reliability and Efficiency

SMTP Server

- **Standard Port: TCP 25**
- **Types**
  - Final destination
  - Intermediate Relay
    - Mail may pass through intermediate relay or gateway hosts
    - Server plays role of client after receiving
  - Gateway
    - Transport messages other than SMTP
- **Responsibilities**
  - Server accepts responsibility to deliver a message
  - Properly reports failures to do so
  - "Either message is delivered or not"

```
┌──────────┐              ┌──────────┐              ┌──────────┐
│  SMTP    │─────────────▶│  SMTP    │─────────────▶│  SMTP    │
│  client  │   Relaying   │ server 1 │              │ Server 2 │
└──────────┘              └──────────┘              └──────────┘
```

MX Resource Record

- How does SMTP server know to which address send SMTP message
- Example: joe@infosys.tuwien.ac.at
  - infosys.tuwien.ac.at is domain, no single host
- MX (Mail Exchanger) Record says which host
- Example

domain   IN   MX   10   mail-exchanger

- 10 is priority
  - If multiple hosts exist use entry with smallest value

Mail address

joe	@	infosys.tuwien.ac.at

- Identifies users to whom mail will be sent
- Domain part
  - Host where mail will be delivered to
- Local-part
  - Location into which mail will be stored
- Alias
  - Alternative Names that refer to same mailbox
    - j.oberleitner@infosys.tuwien.ac.at

SMTP Commands

- **NVT commands**
  - Sent as 7 bit ascii text
  - Each command ends with CR LF
- **Commands**
  - EHLO, initiates SMTP session
  - MAIL FROM, tells server who sends email
  - RCPT TO, tells server where mail goes to
  - DATA, gives server email text
  - QUIT

SMTP session

220 smtp
EHLO myhost.mydomain.com
250-mail.mydomain.com
250 8BITMIME
MAIL FROM:xyz@mydomain.com
250 Ok
RCPT TO:abc@otherdomain.com
250 Ok
DATA
354 End data with <CR><LF>.<CR><LF>

Subject: TestSubject
To: abc@otherdomain.com
Test Line
.
250 Ok: queued as 12345678AB
QUIT

SMTP commands

- **EHLO sender-domain**
  - Extended HELLO
  - Server responds with capabilities of SMTP server
- **MAIL FROM sender-email-address**
  - Tells SMTP server who sends the email
- **RCPT TO receiver-email-address(es)**
  - Tells SMTP server who shall receive email
  - Multiple RCPT TO are allowed

SMTP Commands

- ## DATA

  - Tells SMTP server the contents of the email to be transmitted

  - Is ended with a CRLF . CRLF
    (= Newline DOT Newline)

- ## QUIT

  - Ends SMTP session

SMTP Server Replies

- **Acknowledgment or Error Code**
  - From receiver to sender
  - Response to a command
- **About 20 numeric codes**
  - 1xx : Positive Preliminary reply (only in extended SMTP)
  - 2xx : Positive Completion reply
  - 3xx : Positive Intermediate reply
  - 4xx : Transient Negative Completion reply
  - 5xx : Permanent Negative Completion reply

Internet Message Format

- RFC 2822 (822)
- Specifies email structure
  - Header
  - Contents
- Originator fields
  - Subject: email subject
  - From: sender-authors
  - Sender: mailbox of sender
  - Reply-To: reply address

Internet Message Format

- **Destination address fields**
  - To: primary recipient
  - Cc: Carbon copy
  - Bcc: Blind carbon copy
    - Sends message to recipient without revealing this address to other recipients
    - Dependent on SMTP server how it deals with BCC

MIME

- **Multipurpose Internet Mail Extensions**
    - RFC 2045-2049 + other RFCs
- **Other media-types than text**
    - Described with Content-Type and Subtype
    - Eg. image/jpeg, multipart/mixed
- **Multiple formats in one file allowed**
    - Attachments (Content-Type = `multipart`)
- **Binary data encoded with 7bits**
    - Base64 encoding
        - 64 Ascii characters used to represent binary data
        - `=` special processing
    - Other formats possible

MIME - Sample

…

Subject: Sample Message

MIME-Version: 1.0

Content-type: multipart/mixed; boundary=``end``

Note to non-MIME conformant readers

--end

Mail part one

--end

Another part

--end--

Procmail

- Mail processing system
- Goals
  - Sort incoming mail into folders
  - Preprocess emails
  - Start programs upon arrival
- http://student.tuwien.ac.at/procmail/
- http://www.ii.com/internet/robots/procmail/qs/
- Uses regular expressions to filter mails

Procmail – Brief sample

```
# rule to delete all mails that have a
# from address containing Mail Delivery
# originating from Ukraine
:0:
* ^From:.*Mail Delivery.*ua$
/dev/null

# rule to forward all emails < 256000 chars to
# spamc
:0fw
* < 256000
| spamc
```

Summary / 1

- **EMail**
  - SMTP
  - POP3/IMAPv4 next lesson
- **Internet Message Format**
- **MIME**
- **Procmail**
  - Pre-Filtering of emails