
Electronic Mail and SMTP



Electronic Mail

- ❑ Email is a method of exchanging digital messages from an author to one or more recipients.
- ❑ Some early systems required that the author and the recipient both be online at the same time
 - ☞ More like an **instant messaging service**
- ❑ **Store-and-forward model**
 - ☞ Email servers accept, forward, deliver, and store messages.
 - ☞ Neither the users nor their computers are required to be online simultaneously



Predecessor of Email

❑ Host-based mail system

☞ With the introduction of time-sharing systems, multiple users were able to log into a central system

✓ 1965 MIT's CTSS MAIL

✓ 1972 Unix mail program



❑ LAN-based email systems

☞ In the early 1980s, personal computers on LANs became increasingly important.

☞ Server based mailing system

☞ Initially allowed communication only among users logged into the same server infrastructure.

✓ Microsoft Mail, Lotus Notes

The Rise of ARPANET Mail

- ❑ The **ARPANET** network made a large contribution to the development of email.
- ❑ **Ray Tomlinson** is generally credited as having sent the first email in **1971**.



Ray's work was quickly adopted across the ARPANET and later become the basis for email in the Internet.

Key Components

❑ Mail transfer agent (MTA/mail relay)

- ☞ An MTA implements both the **client** (sending) and **server** (receiving) portions of the **SMTP**.

❑ Mail delivery agent (MDA)

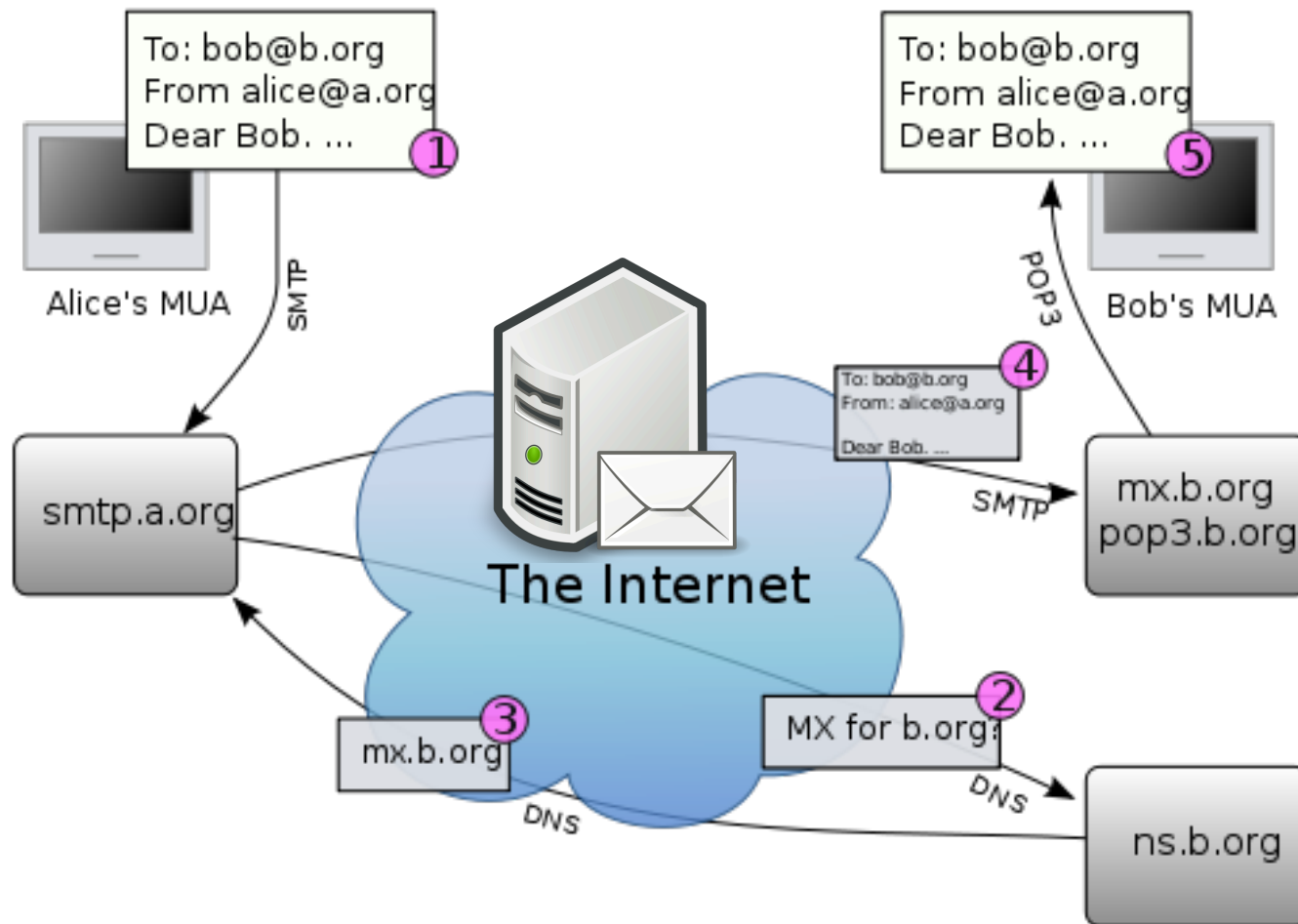
- ☞ A computer software component that is responsible for the delivery of e-mail messages to a local recipient's **mailbox**.

❑ Mail user agent (MUA)

- ☞ a computer program used to access and manage a user's email
- ☞ e.g. Microsoft Outlook, Thunderbird



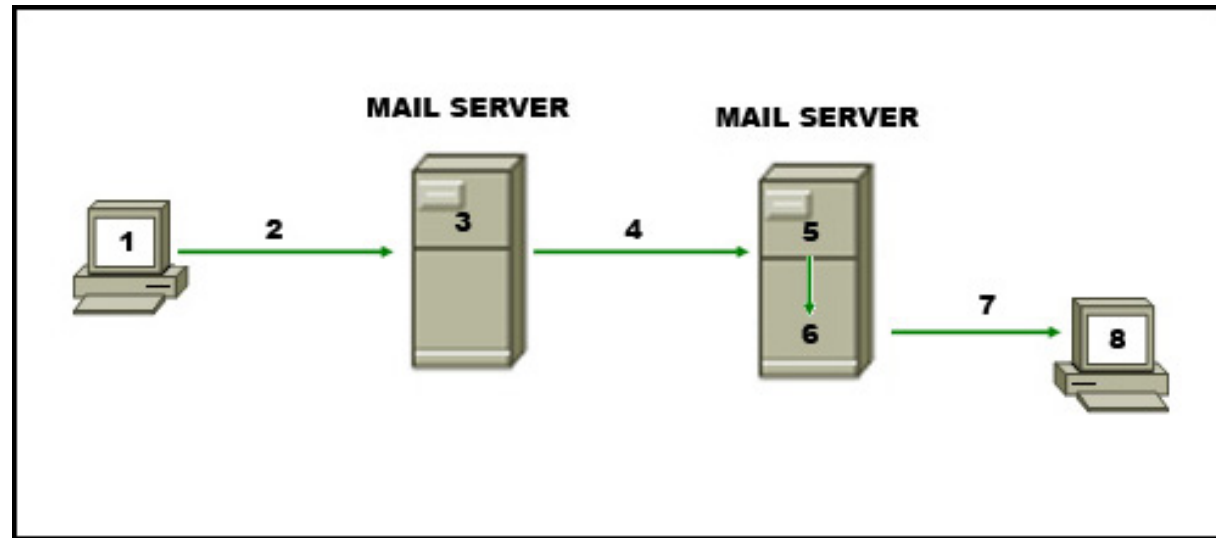
Email Operations



- ❑ **Open Mail Relays:** accept messages for any recipient on the Internet and do their best to deliver them

Quick exercise

❑ Which software component is used in step 6?



- ❑ A. MUA
- ❑ B. MTA
- ❑ C. MDA
- ❑ D. Open Mail Relay

Message Format

❑ The Internet email message format is now defined by **RFC5322**.

❑ Email message consists of two major sections

☞ **Header**

✓ Structured into fields such as **from**, **to**, **cc**, **subject**, **date**, etc.

☞ **Body**

✓ Basic content, as unstructured text

✓ Can use HTML format

Content-type: text/html



Quick exercise

❑ Most mail programs automatically complete the following two parts in an e-mail message:

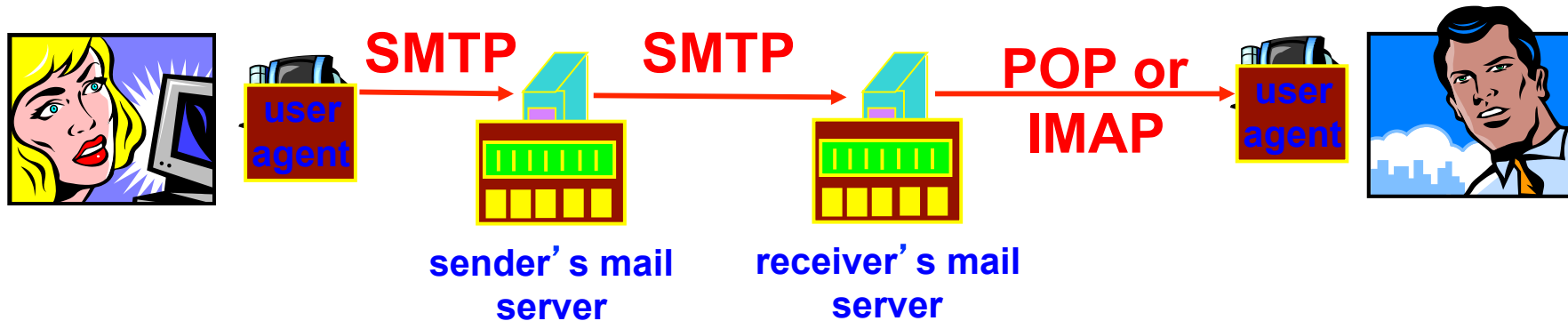
☞ A. From: and Body:

☞ B. From: and Subject:

☞ C. From: and Date:

☞ D. From: and To:

Mail Protocols



- ❑ **SMTP**: delivery/storage to receiver's mail server
- ❑ **Mail access protocols**: retrieval from server
 - ☞ **POP**: Post Office Protocol [RFC 1939]
 - ✓ Mail is deleted from the server after retrieval
 - ☞ **IMAP**: Internet Mail Access Protocol [RFC 1730]
 - ✓ More complete and complex remote access to mailbox
 - ✓ Usually mail is saved on a mail server
 - ☞ **HTTP**: Hotmail , Google GMail, etc.

Quick exercise

❑ Currently, the latest versions of the mail access protocols are _____ and _____

👉 A. POP3, IMAP2

👉 B. POP4, IMAP1

👉 C. POP3, IMAP4

👉 D. None of the above

Simple Mail Transfer Protocol

- ❑ Uses **TCP** to reliably transfer email messages from client to server, on port **25**

- ❑ Three phases of transfer
 - ☞ Handshaking (greeting)
 - ☞ Transfer of messages
 - ☞ Closure

- ❑ Command/response interaction
 - ☞ **Commands**: 7-bit ASCII text
 - ☞ **Response**: status code and phrase



Sample SMTP Interaction

S: 220 mx.lentil.edu
C: HELO mx.halva.fr
S: 250 Hello halva.fr, pleased to meet you
C: MAIL FROM: <alice@halva.fr>
S: 250 alice@halva.fr... Sender ok
C: RCPT TO: <bob@lentil.edu>
S: 250 bob@lentil.edu ... Recipient ok
C: DATA
S: 354 Enter mail, end with "." on a line by itself
C: Do you like dahl?
C: How about with naan?
C: .
S: 250 Message accepted for delivery
C: QUIT
S: 221 lentil.edu closing connection



Quick exercise

❑ SMTP is a _____ protocol.

👉 A. pull

👉 B. push

👉 C. both a and b

👉 D. none of the above

Tracking of Sent Mail

- ❑ **Original SMTP mail service provides limited mechanisms for tracking a transmitted message, and none for verifying that it has been delivered or read.**
- ❑ **Recommended solution from IETF**
 - ☞ **Delivery Status Notification message**
 - ☞ **Message Disposition Notifications message**
 - ✓ **e.g. allow sender to see if messages have been opened**

