CIS 457 - Data Communications

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Images taken from Kurose and Ross book

Email

Email is one of the oldest and most popular applications on the internet

Consists of three main parts

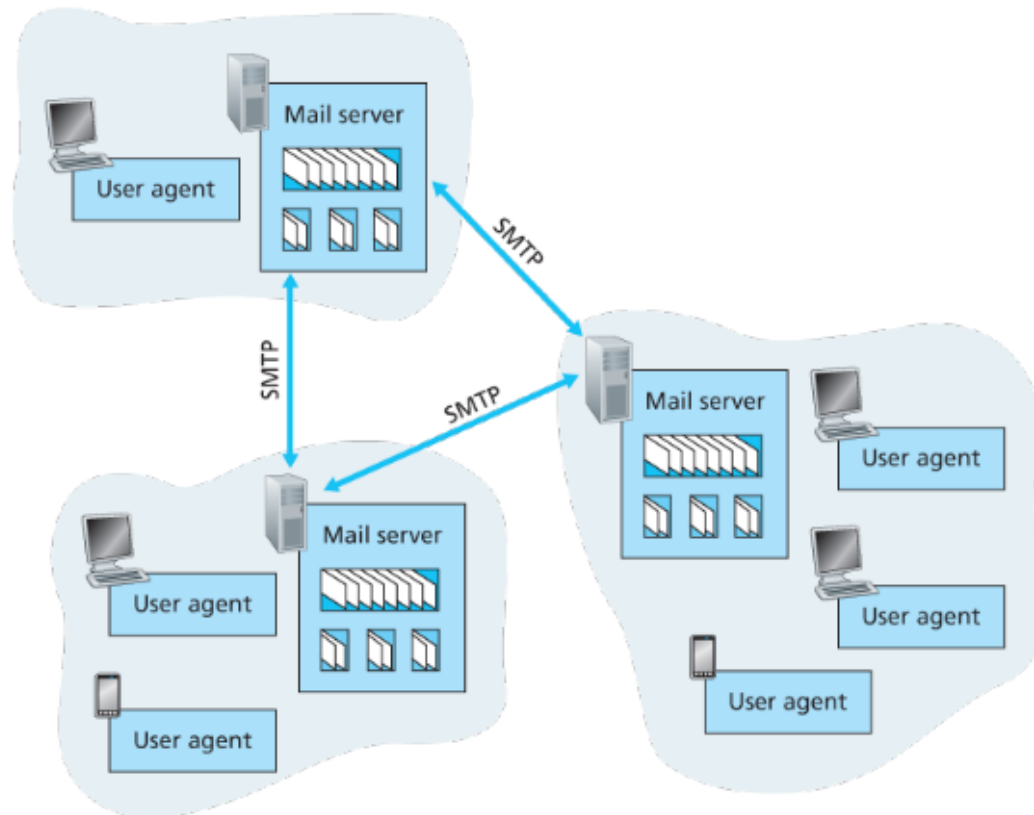- user agents
- mail servers
- SMTP protocol

User agent is what end user interacts with

Allows you to read, reply to, forward, compose, etc. emails
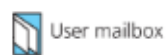
Common examples are Microsoft Outlook, Apple Mail, or Thunderbird

Mail servers send mail to one another using SMTP

Server keeps **mailbox** for each user containing received mail

Key:

⬛ Outgoing message queue

🟦 User mailbox

High-level view of SMTP

Runs over TCP

Like HTTP, protocol has two parts: sender and receiver

Unlike HTTP, sender is considered client because it initiates TCP connection

Each mail server runs both client and server sides of SMTP

Why bother with servers? Why not send email directly from Alice to Bob?

Servers are always on

Bob's (receiving) server needs to be ready to receive email at any point

Alice's (sending) server will automatically retry for her if Bob's server is down

General process of sending email from Alice to Bob:

1. Alice uses her user agent to enter recipient's email address and compose message
2. User agent sends message to Alice's mail server, where it waits in outgoing queue
3. Client SMTP (Alice's server) opens TCP connection to server SMTP

4. SMTP handshake occurs, then client sends message
5. Server SMTP receives message and places into Bob's mailbox
6. Bob's user agent retrieves message and he reads it

Key:
Message queue   User mailbox
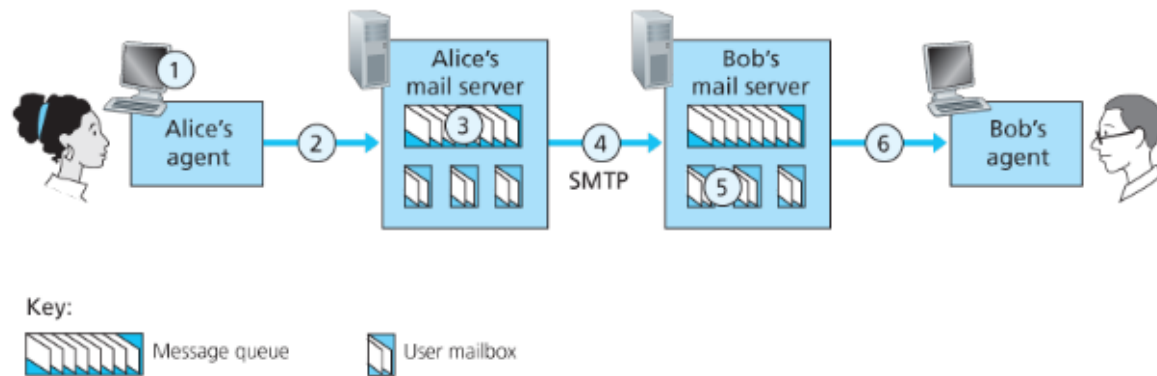
Note that message does not "bounce through" intermediate servers along the way

Message is sent directly from Alice's server to Bob's

Because SMTP is so old relative to HTTP, it comes with some annoying features

Entire message, both header and message itself, must be 7-bit ASCII

To send multimedia (e.g., an image) over SMTP, it must be encoded to ASCII before sending and decoded back after receiving