
MAC0352 - Redes de Computadores e Sistemas Distribuídos

Daniel Macêdo Batista

IME - USP, 18 de Maio de 2021

Roteiro

Email

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E-mail

Three major components:

E-mail

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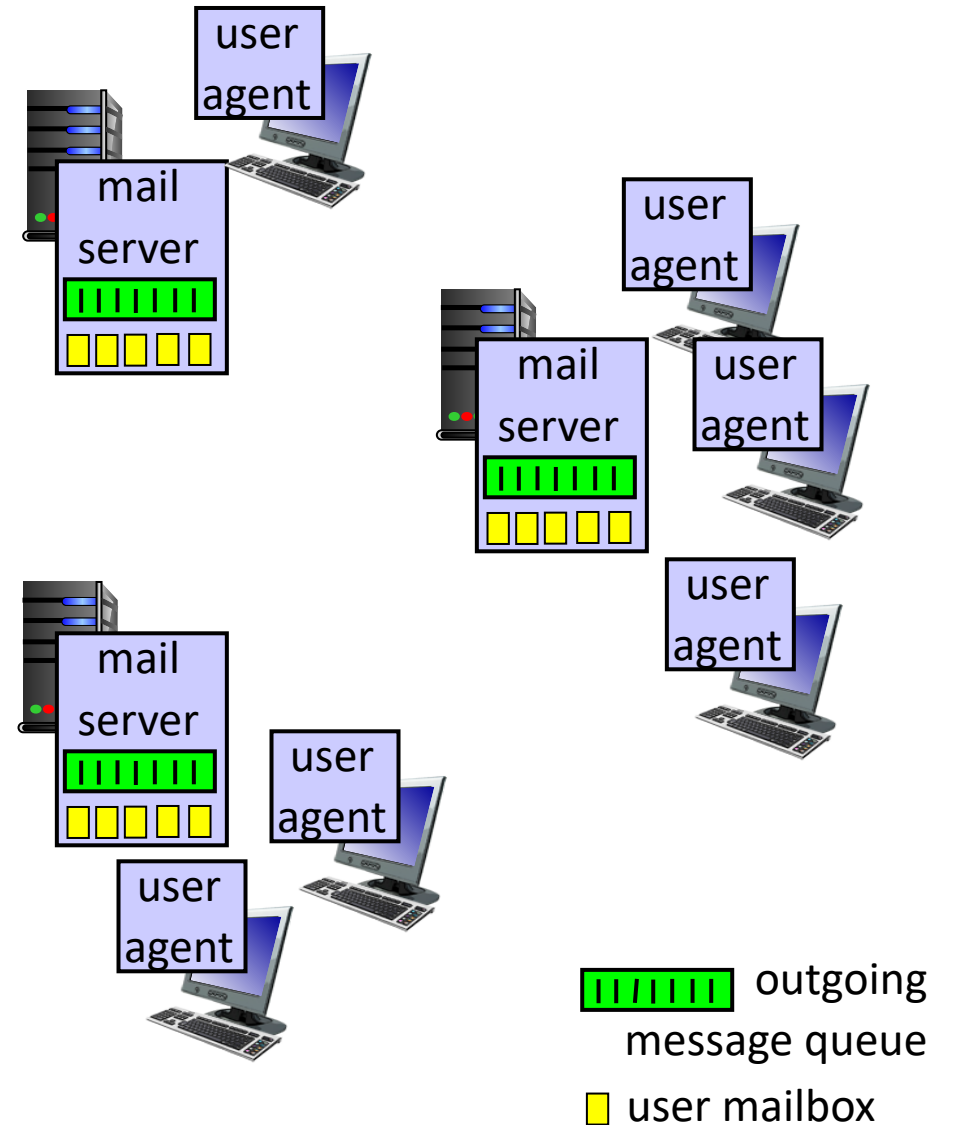
- user agents



E-mail

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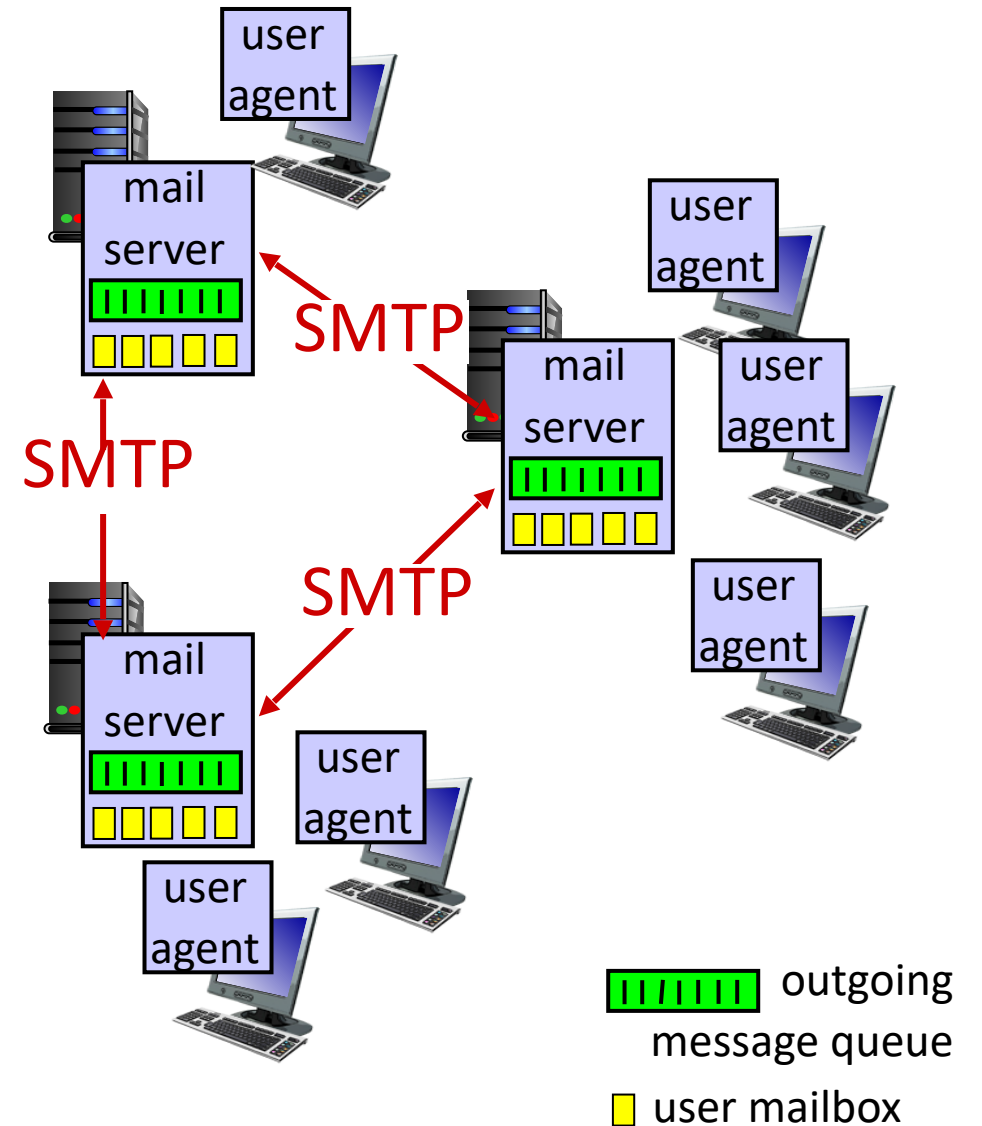
- user agents
- mail servers



E-mail

Three major components:

- user agents
- mail servers
- simple mail transfer protocol: SMTP



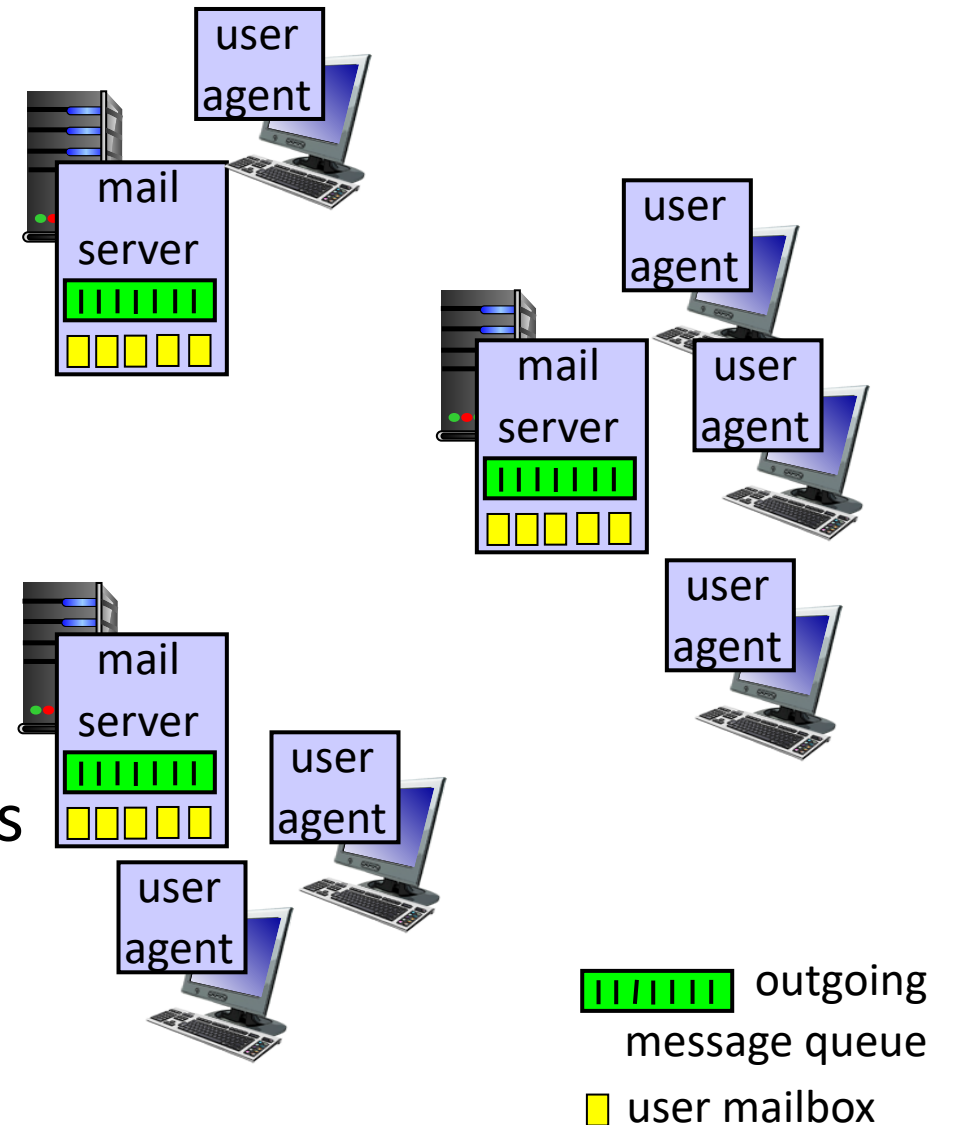
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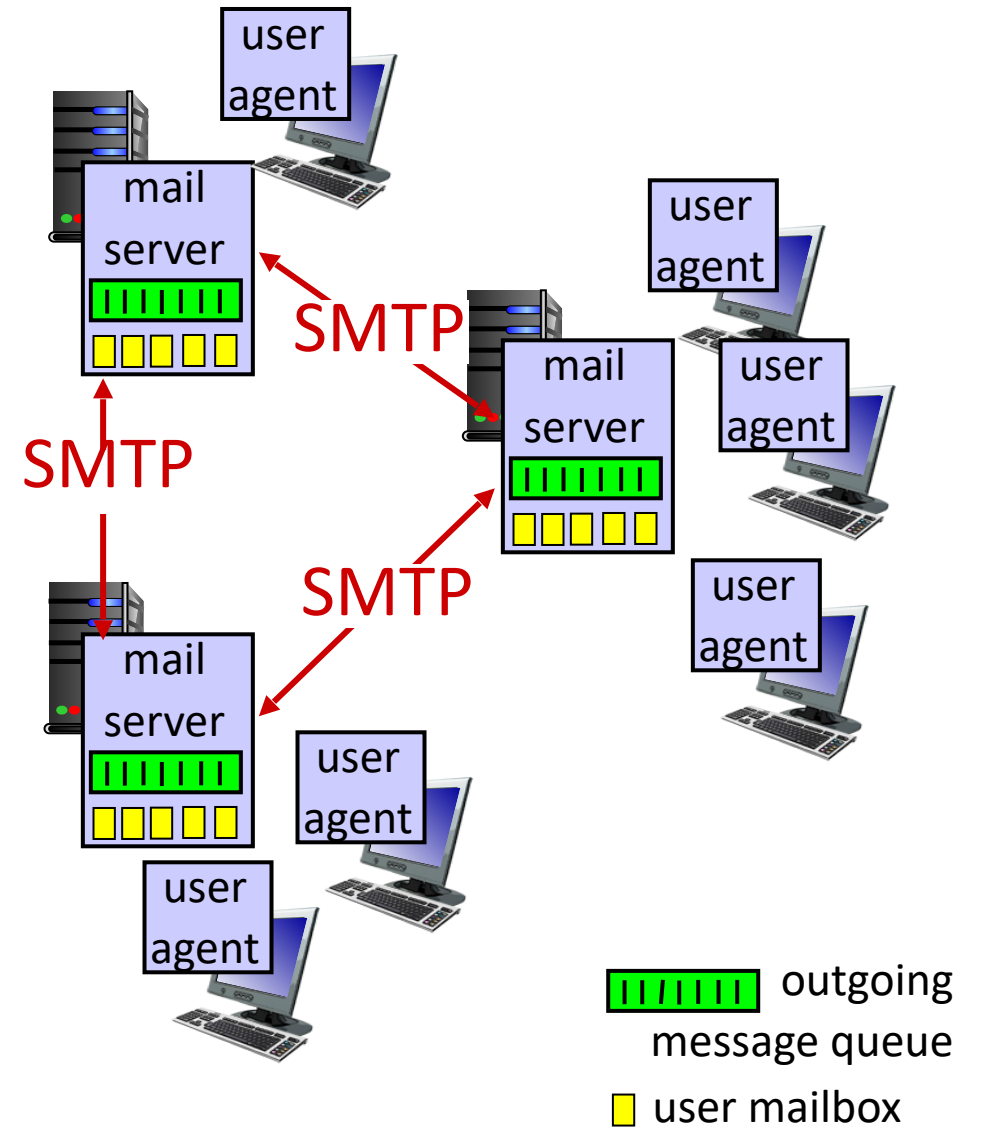
User Agent

- a.k.a. “mail reader”
- composing, editing, reading mail messages
- e.g., Outlook, iPhone mail client
- outgoing, incoming messages stored on server



E-mail: mail servers

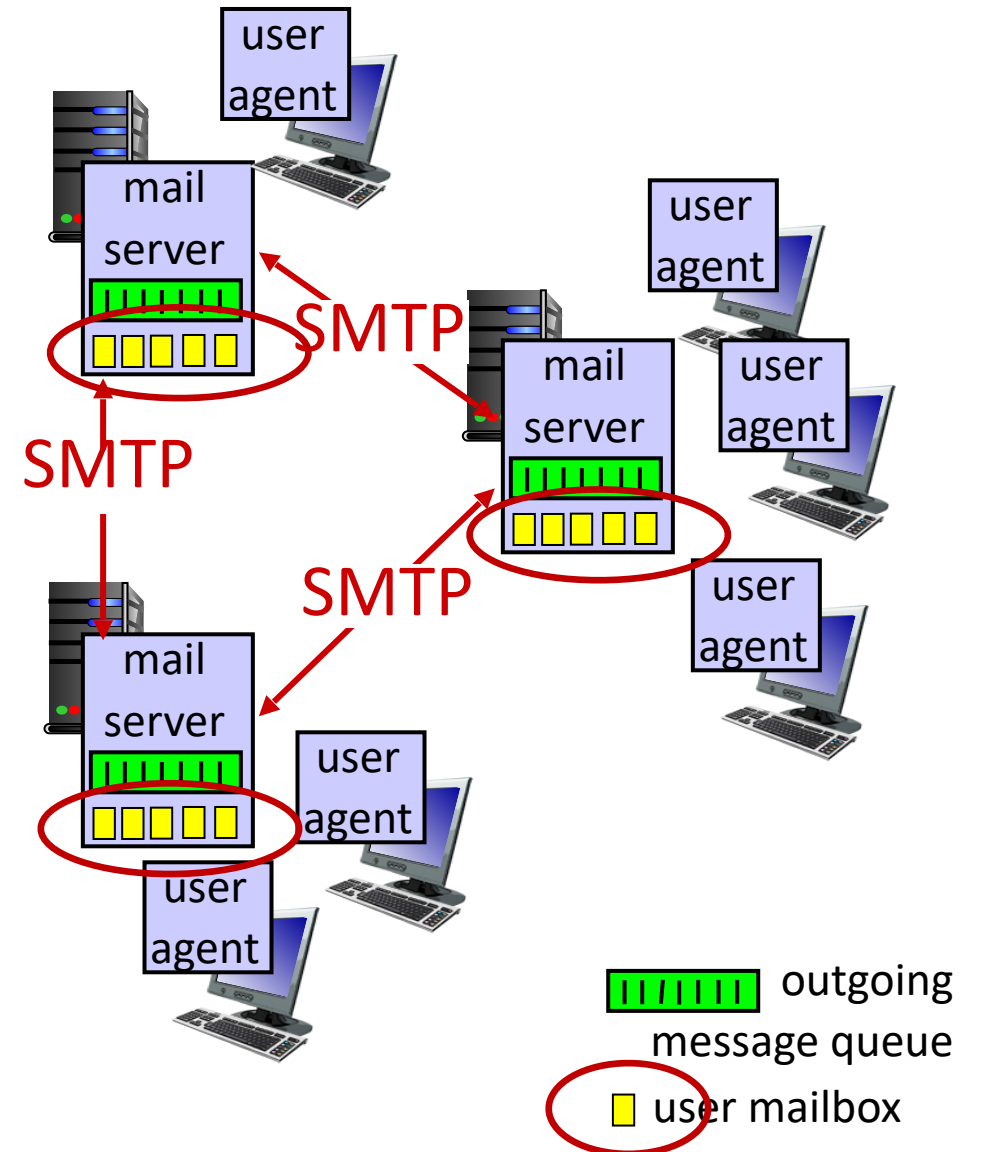
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E-mail: mail servers

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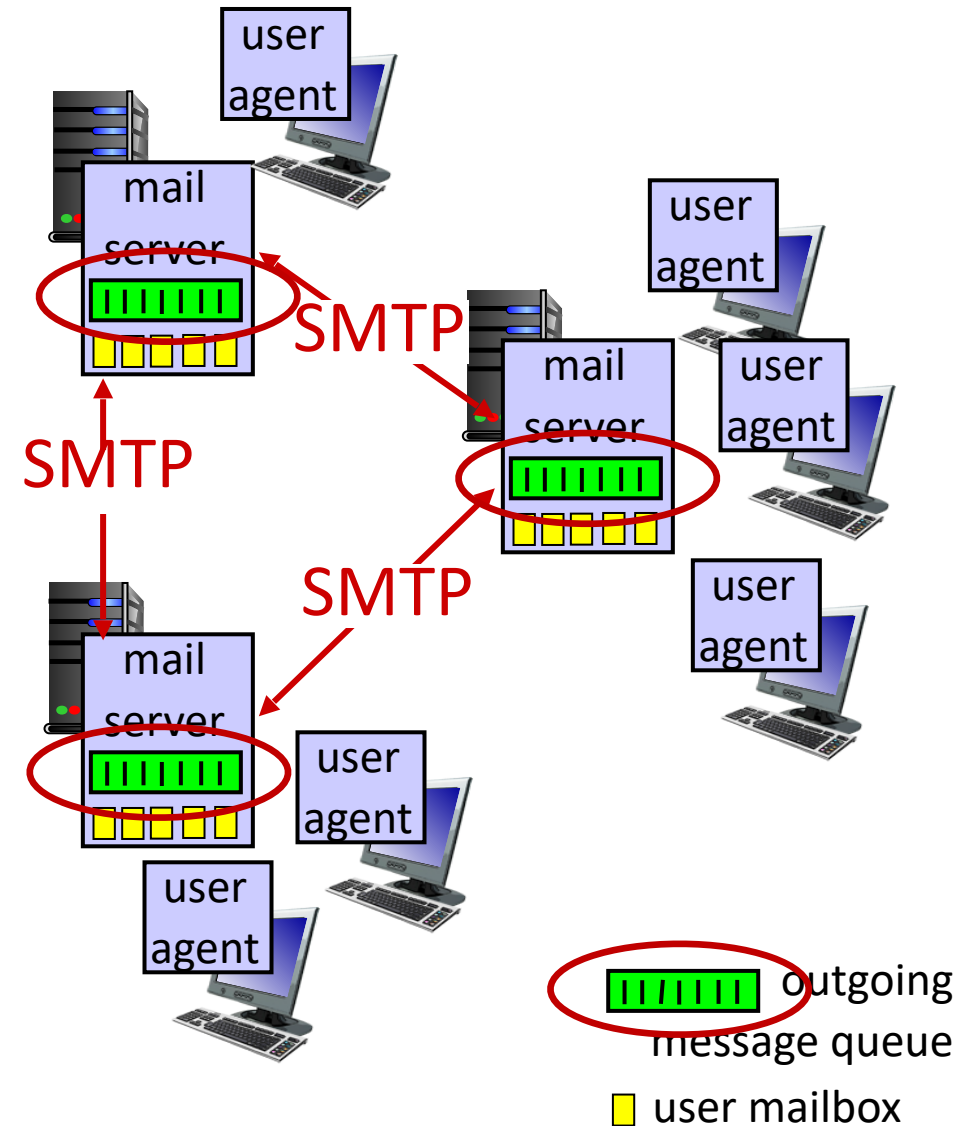
- *mailbox* contains incoming messages for user



E-mail: mail servers

mail servers:

- *mailbox* contains incoming messages for user
- *message queue* of outgoing (to be sent) mail messages



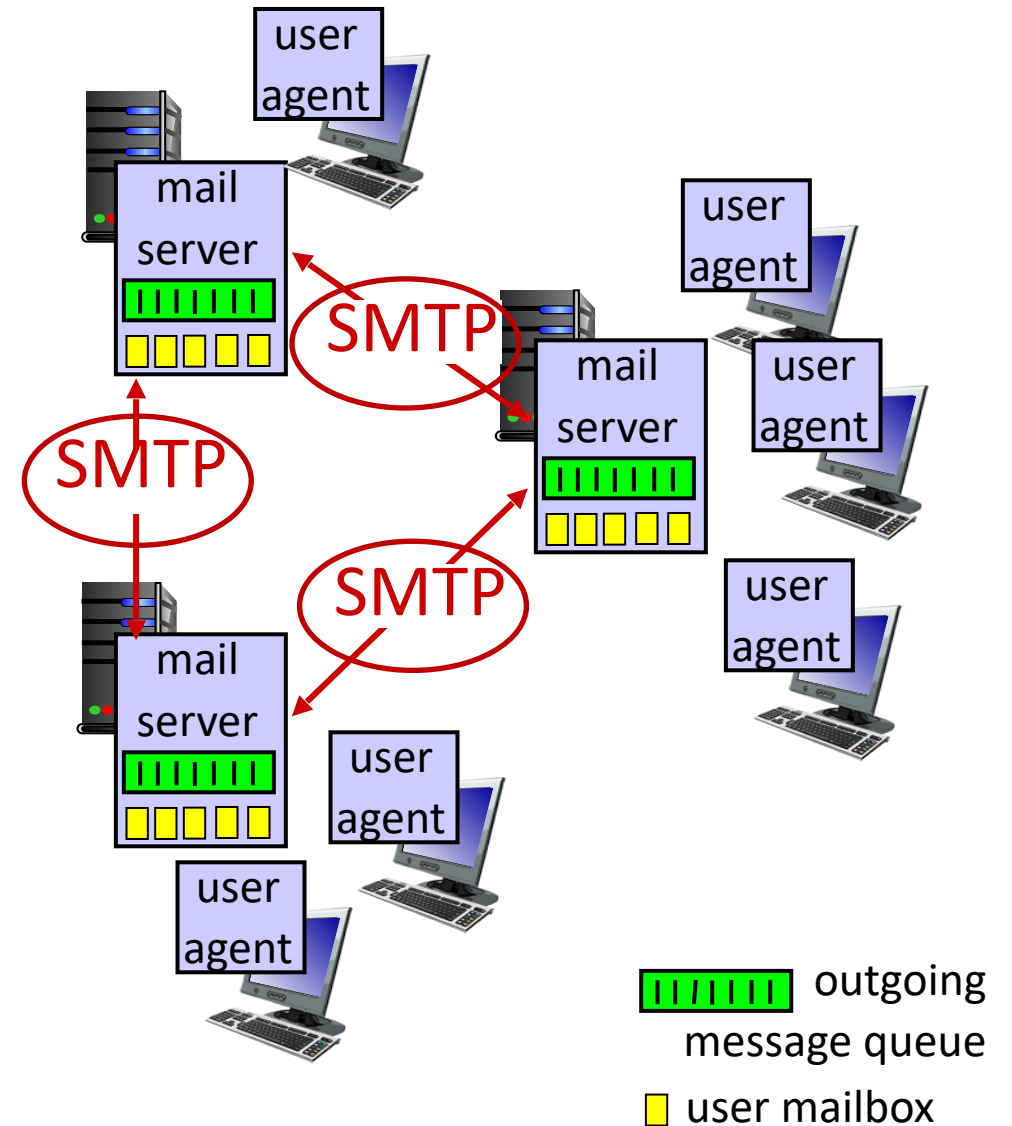
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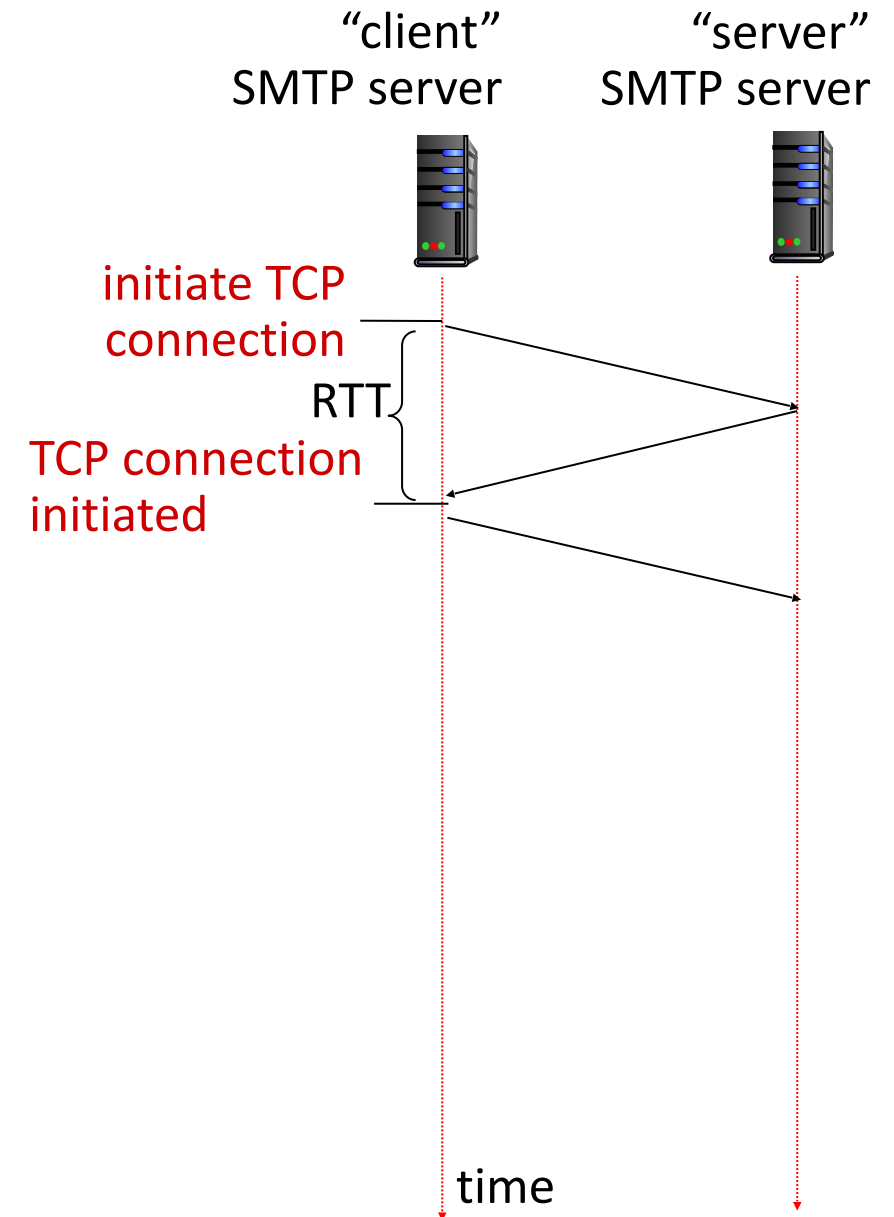
SMTP protocol between mail servers to send email messages

- **client**: sending mail server
- **“server”**: receiving mail server



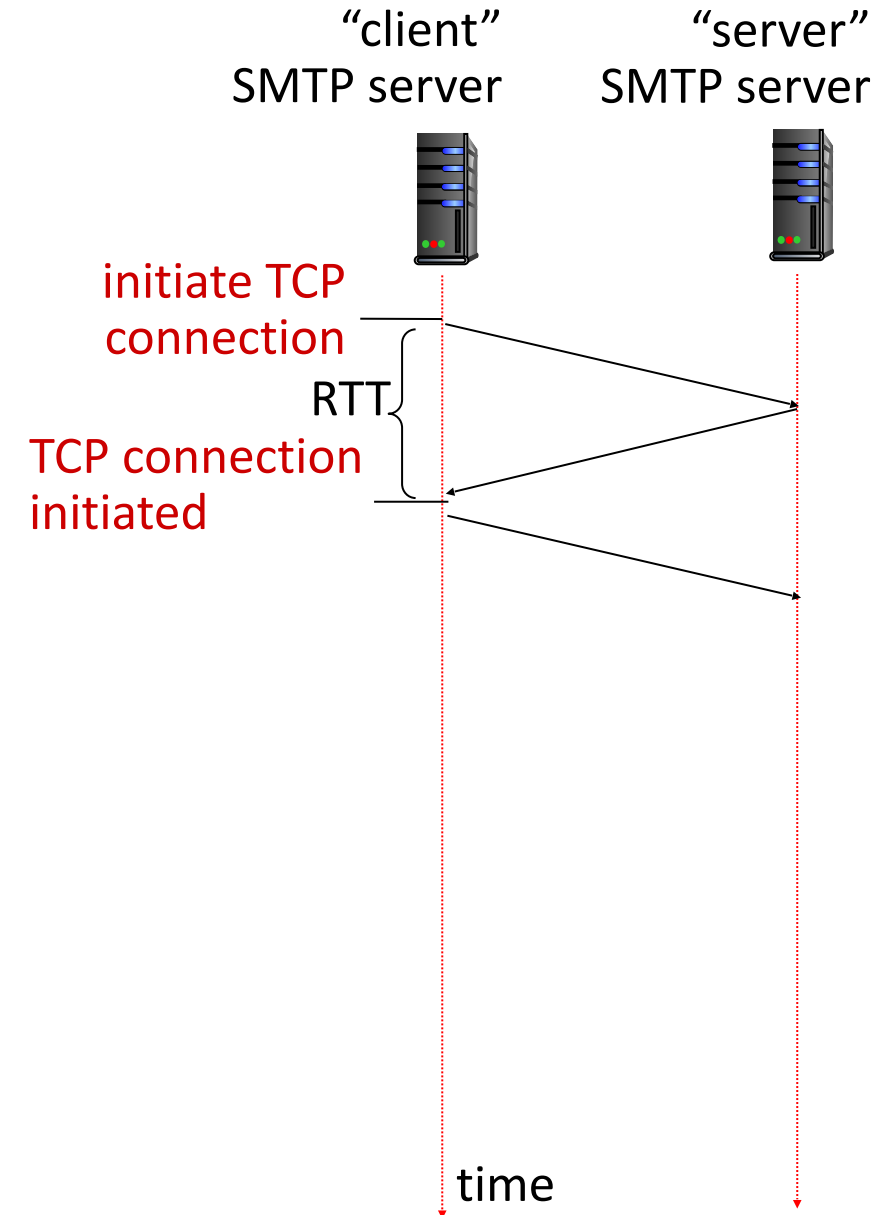
SMTP RFC (5321)

- uses TCP to reliably transfer email message from client (mail server initiating connection) to server, port 25
 - direct transfer: sending server (acting like client) to receiving server



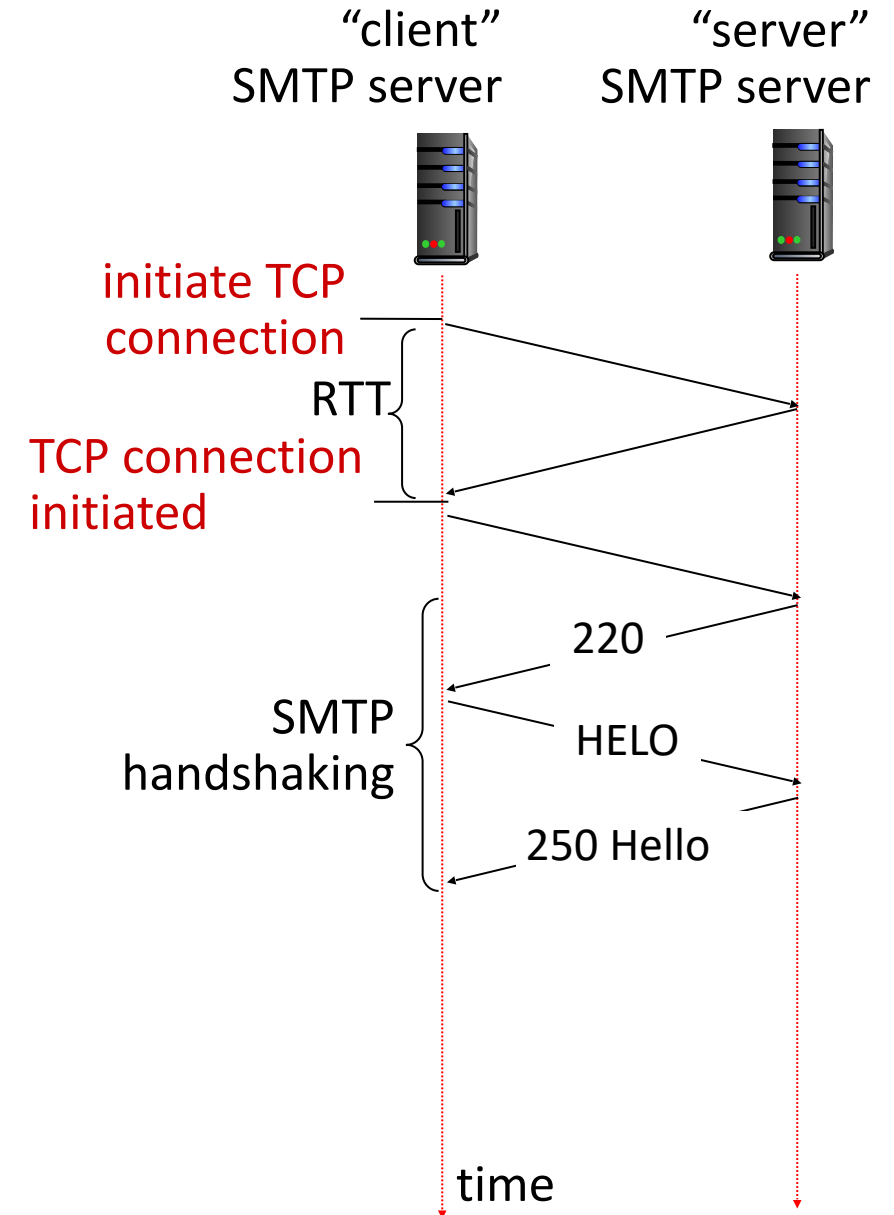
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- three phases of transfer



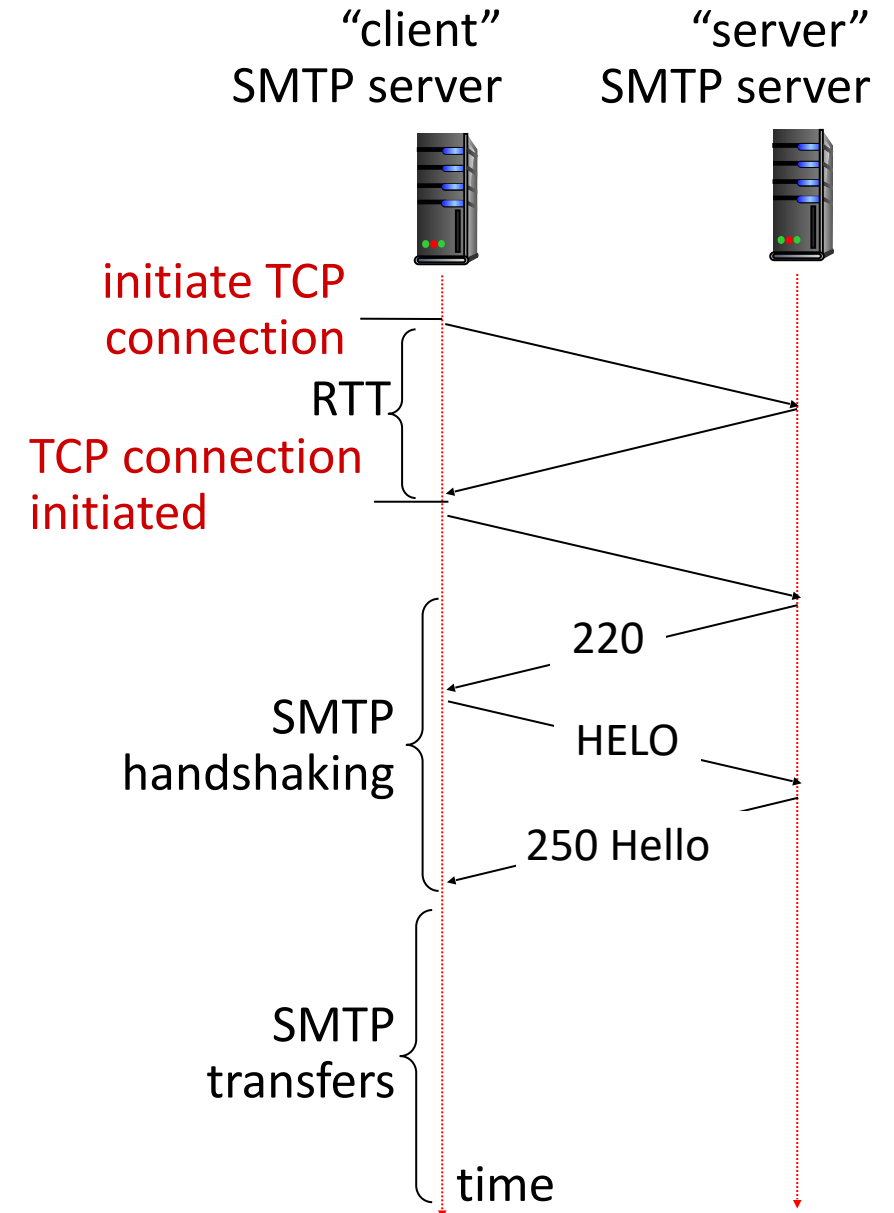
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 - SMTP handshaking (greeting)



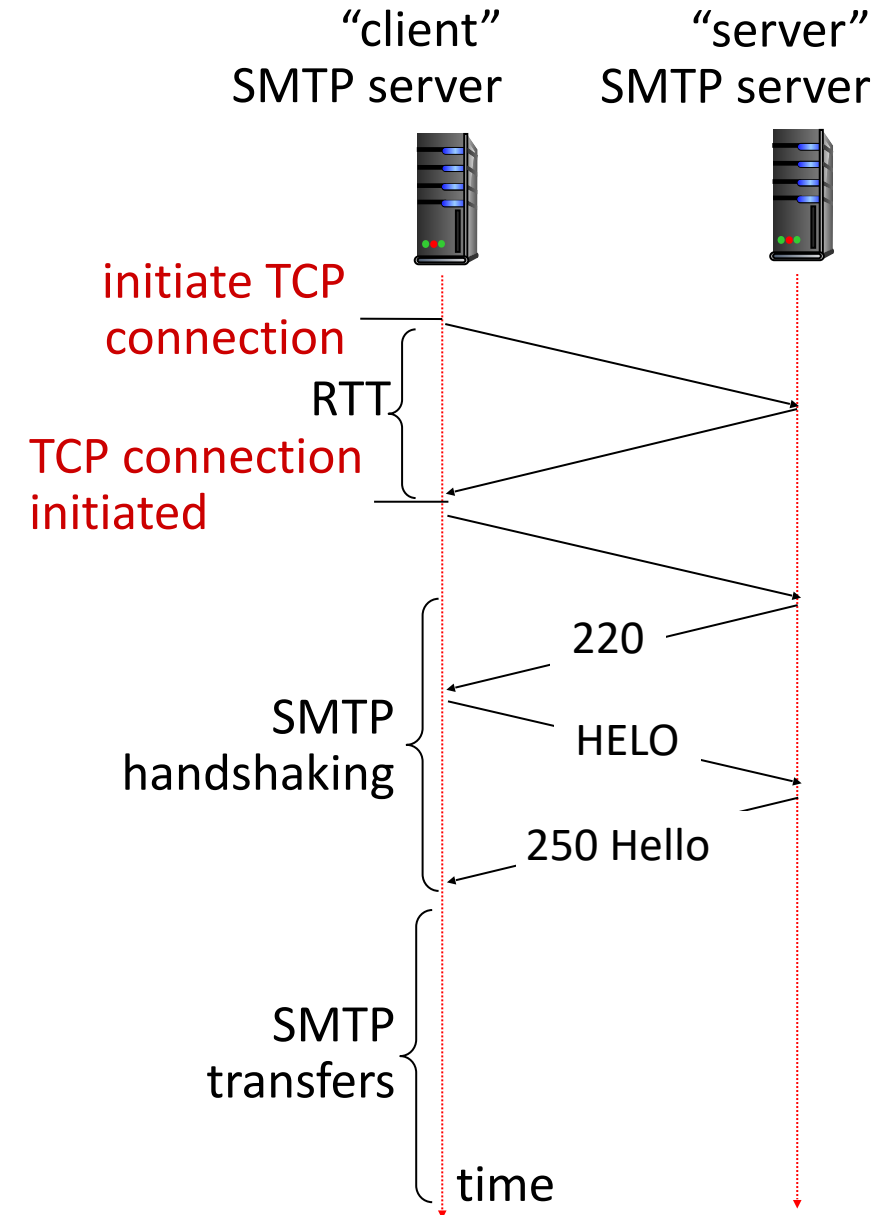
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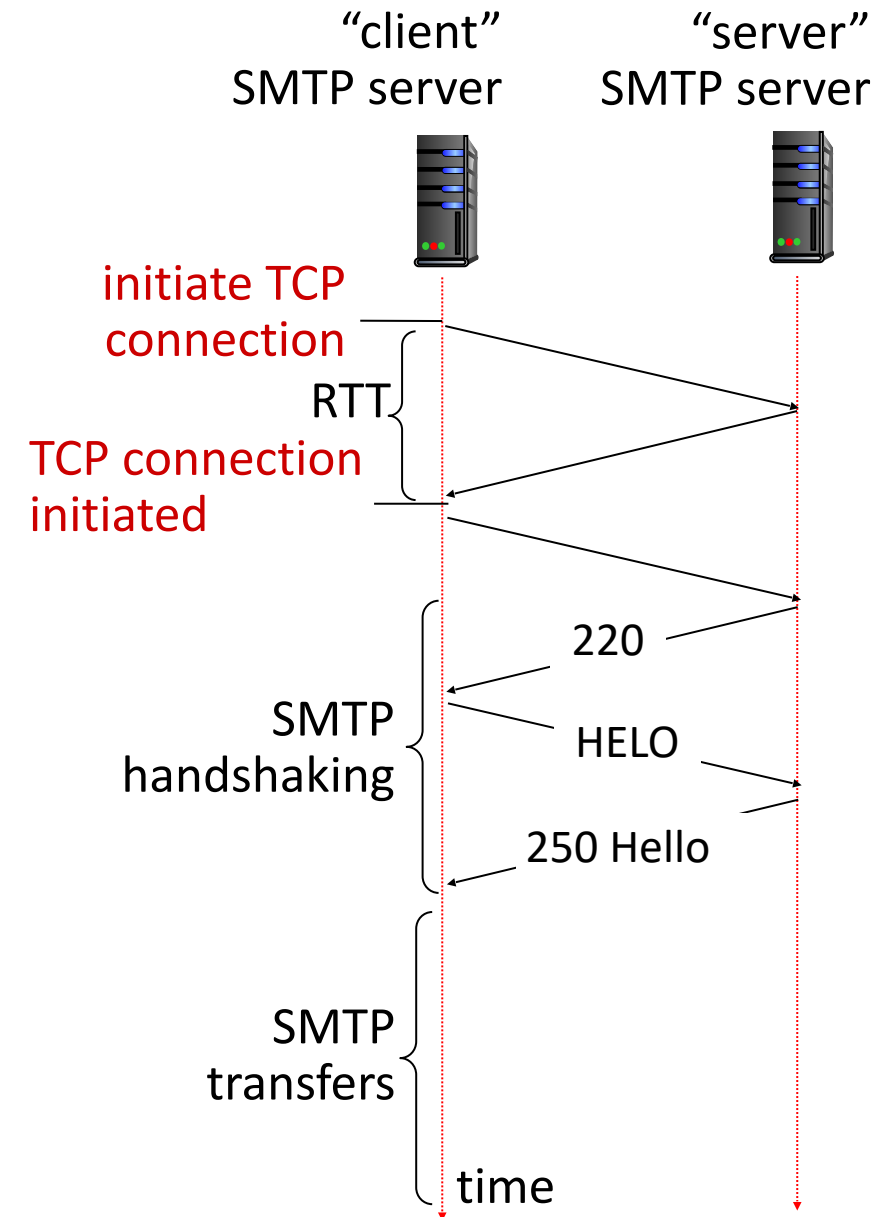
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 - SMTP closure



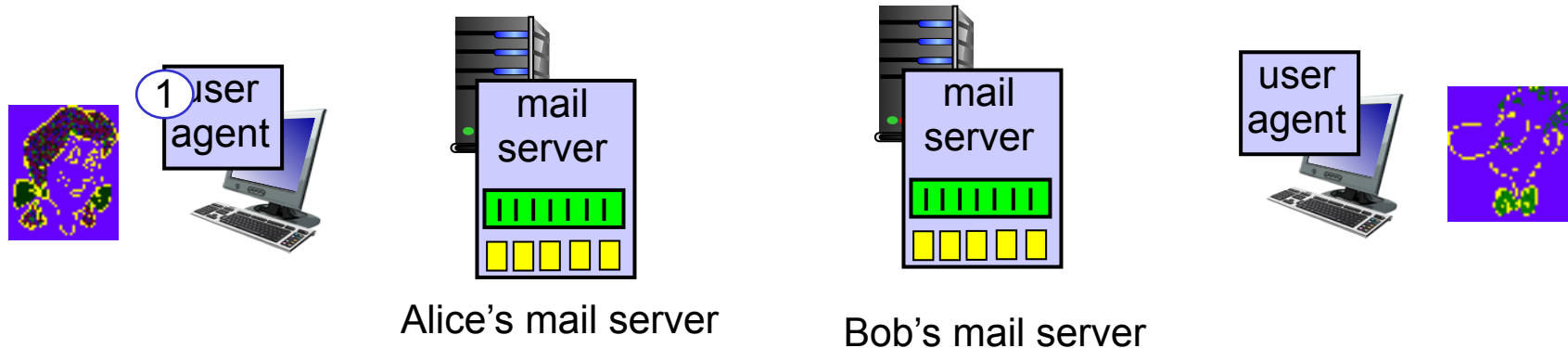
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 - SMTP closure
- command/response interaction (like HTTP)
 - **commands:** ASCII text
 - **response:** status code and phrase



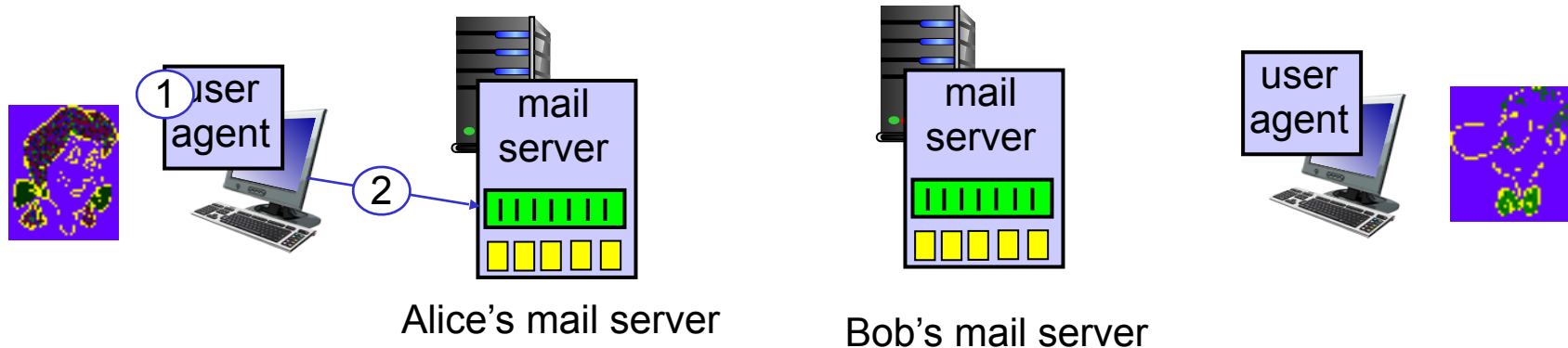
Scenario: Alice sends e-mail to Bob

- 1) Alice uses UA to compose e-mail message "to" bob@someschool.edu



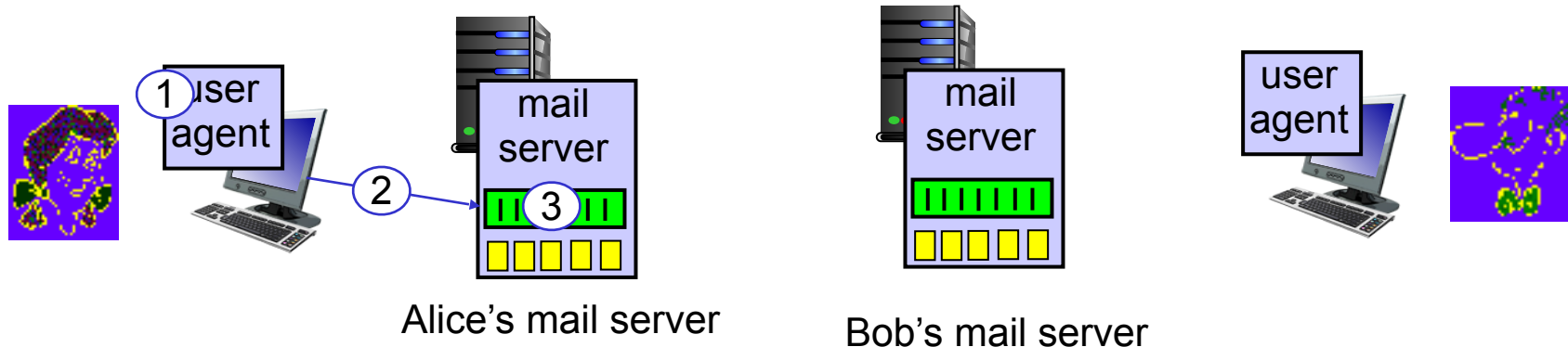
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- 1) Alice uses UA to compose e-mail message "to" bob@someschool.edu
- 2) Alice's UA sends message to her mail server using SMTP; message placed in message queue



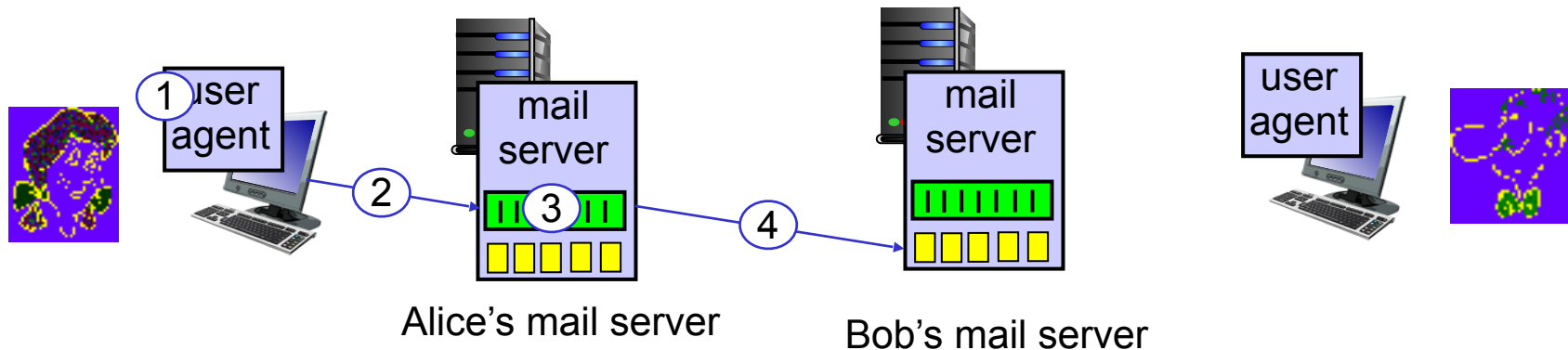
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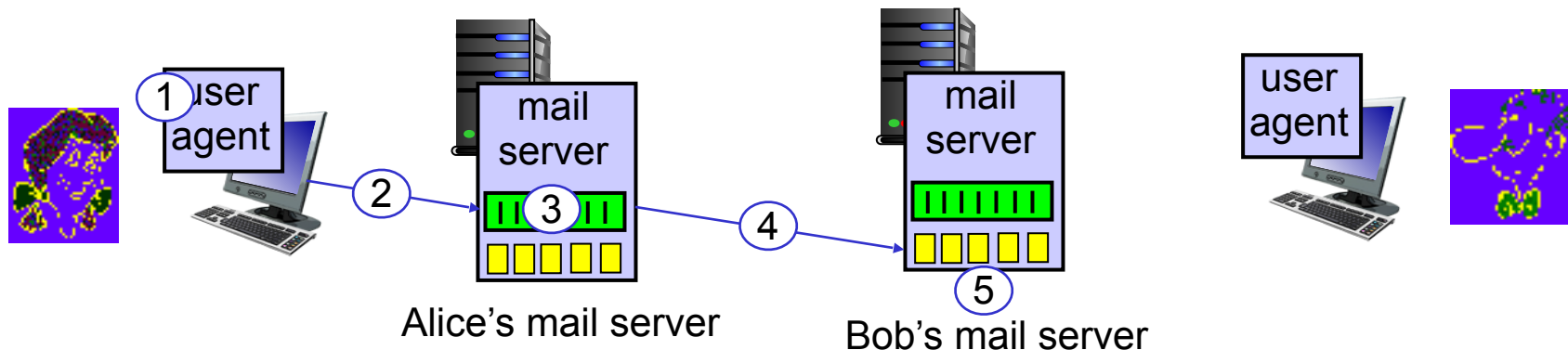
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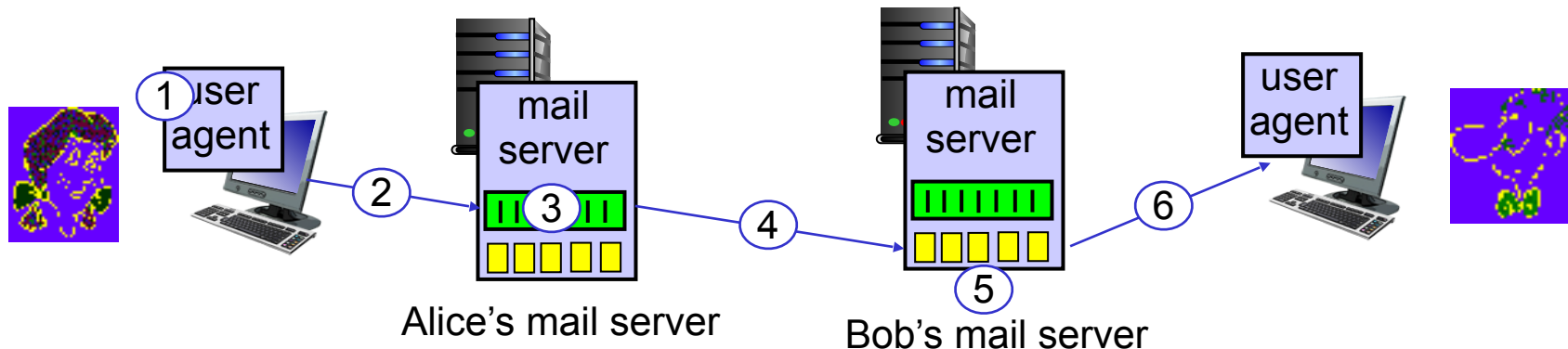
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- 5) Bob's mail server places the message in Bob's mailbox
- 6) Bob invokes his user agent to read message



Sample SMTP interaction

S: 220 hamburger.edu

Sample SMTP interaction

S: 220 hamburger.edu

C: HELO crepes.fr

S: 250 Hello crepes.fr, pleased to meet you

Sample SMTP interaction

```
S: 220 hamburger.edu
C: HELO crepes.fr
S: 250 Hello crepes.fr, pleased to meet you
C: MAIL FROM: <alice@crepes.fr>
S: 250 alice@crepes.fr... Sender ok
C: RCPT TO: <bob@hamburger.edu>
```

Sample SMTP interaction

```
S: 220 hamburger.edu
C: HELO crepes.fr
S: 250 Hello crepes.fr, pleased to meet you
C: MAIL FROM: <alice@crepes.fr>
S: 250 alice@crepes.fr... Sender ok
C: RCPT TO: <bob@hamburger.edu>
S: 250 bob@hamburger.edu ... Recipient ok
C: DATA
```

Sample SMTP interaction

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S: 250 Hello crepes.fr, pleased to meet you
C: MAIL FROM: <alice@crepes.fr>
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C: RCPT TO: <bob@hamburger.edu>
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C: DATA
S: 354 Enter mail, end with "." on a line by itself
C: Do you like ketchup?
```

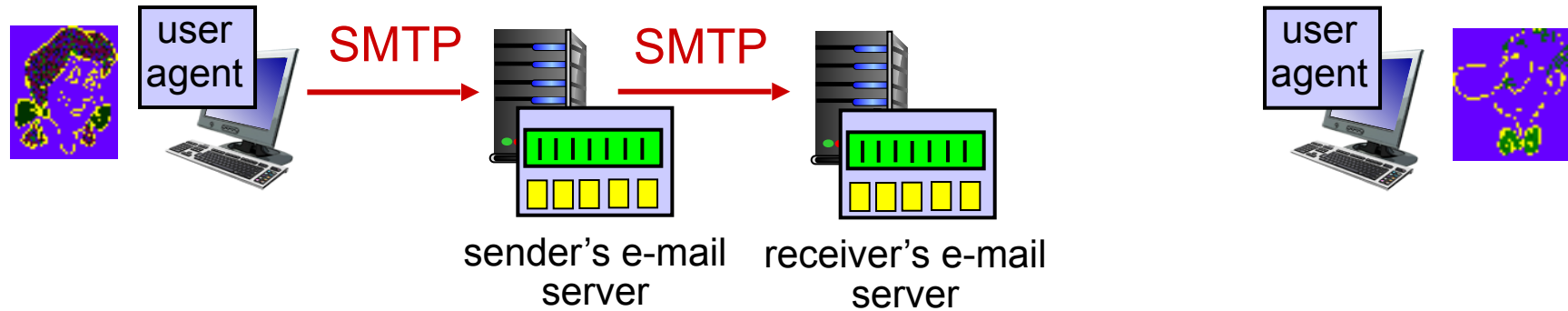
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S: 250 bob@hamburger.edu ... Recipient ok
C: DATA
S: 354 Enter mail, end with "." on a line by itself
C: Do you like ketchup?
C: How about pickles?
C: .
S: 250 Message accepted for delivery
~
```

Sample SMTP interaction

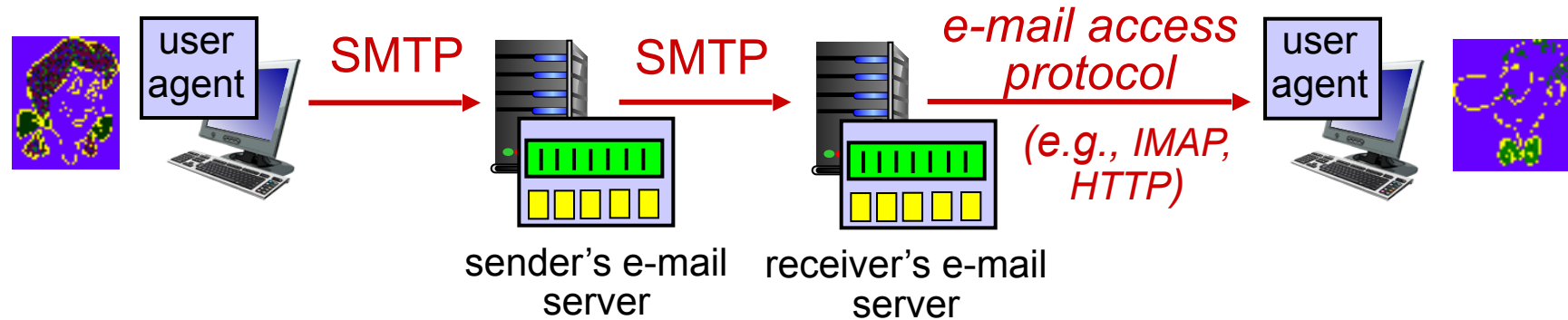
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S: 354 Enter mail, end with "." on a line by itself
C: Do you like ketchup?
C: How about pickles?
C: .
S: 250 Message accepted for delivery
C: QUIT
S: 221 hamburger.edu closing connection
```

Retrieving email: mail access protocols



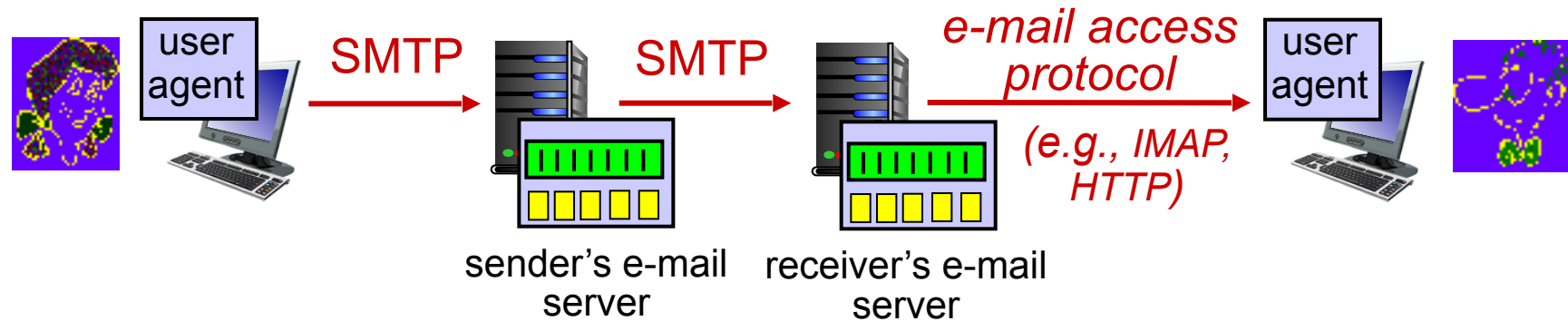
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Retrieving email: mail access protocols



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- mail access protocol: retrieval from server
 - **IMAP:** Internet Mail Access Protocol [RFC 3501]: messages stored on server, IMAP provides retrieval, deletion, folders of stored messages on server

Retrieving email: mail access protocols



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 - **IMAP**: Internet Mail Access Protocol [RFC 3501]: messages stored on server, IMAP provides retrieval, deletion, folders of stored messages on server
- **HTTP**: gmail, Hotmail, Yahoo!Mail, etc. provides web-based interface on top of SMTP (to send), IMAP (or POP) to retrieve e-mail messages