

μ

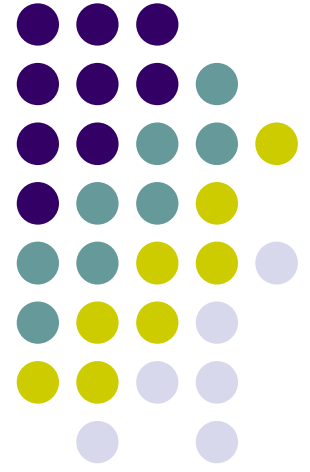
μ  
SMTP



μ μ

μ  
μ

&

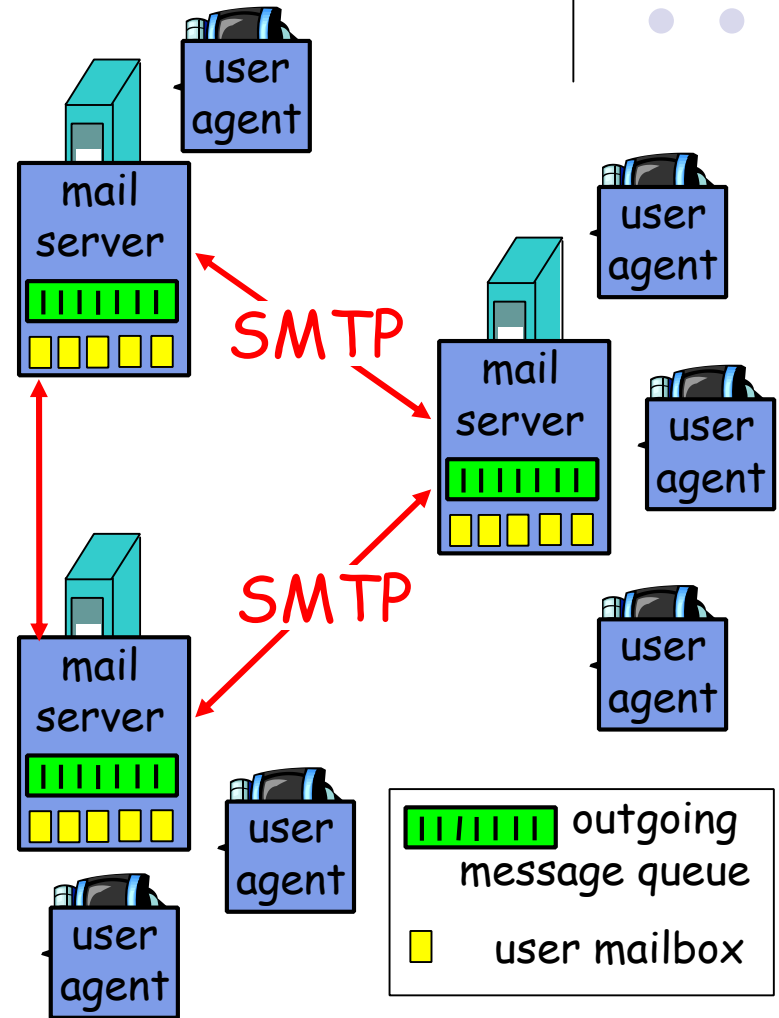


μ  
.

μ



- - User agents
  - Mail servers
  - SMTP: Simple Mail Transfer Protocol
- User Agent “mail reader”
  - μ μ
  - μ
  - . . Eudora, Outlook, elm, Mozilla  
Thunderbird
- μ μ
- μ μ server



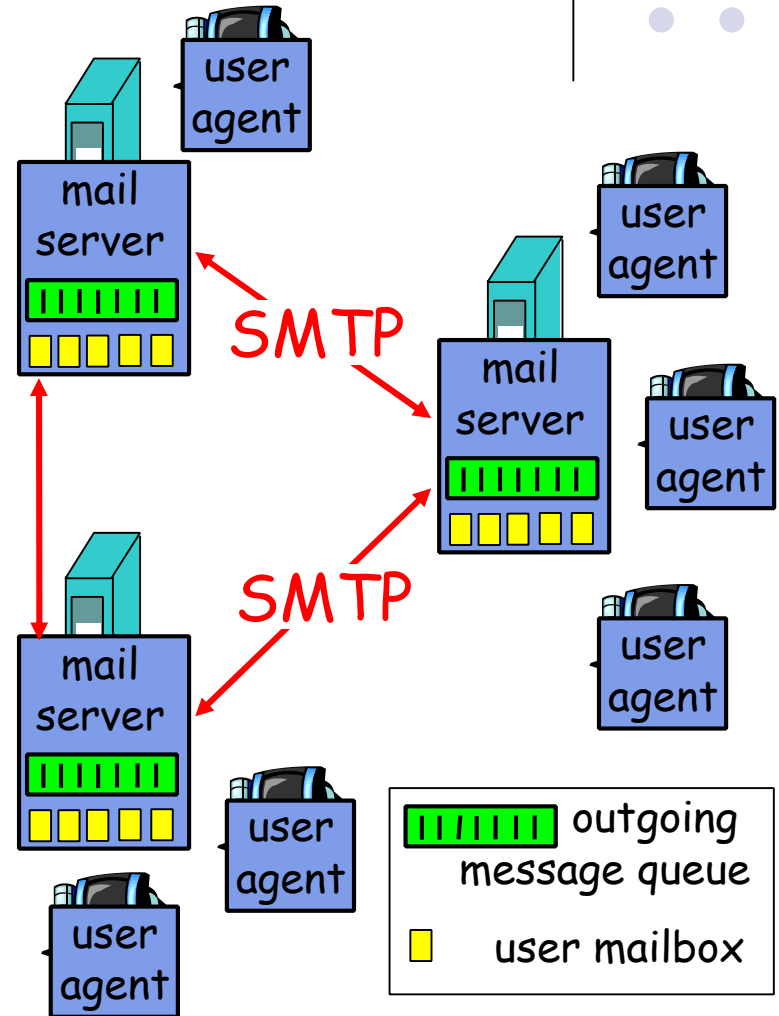
μ



# μ : Mail

## Servers

- Mailbox: μ μ
- μ μ ( μ μ : μ μ e-mail
- SMTP: email μ mail servers
- client/server
- Client: mail server
- Server: server μ mail
- Mail Server client
- server



# 2821)

## μ : SMTP (RFC



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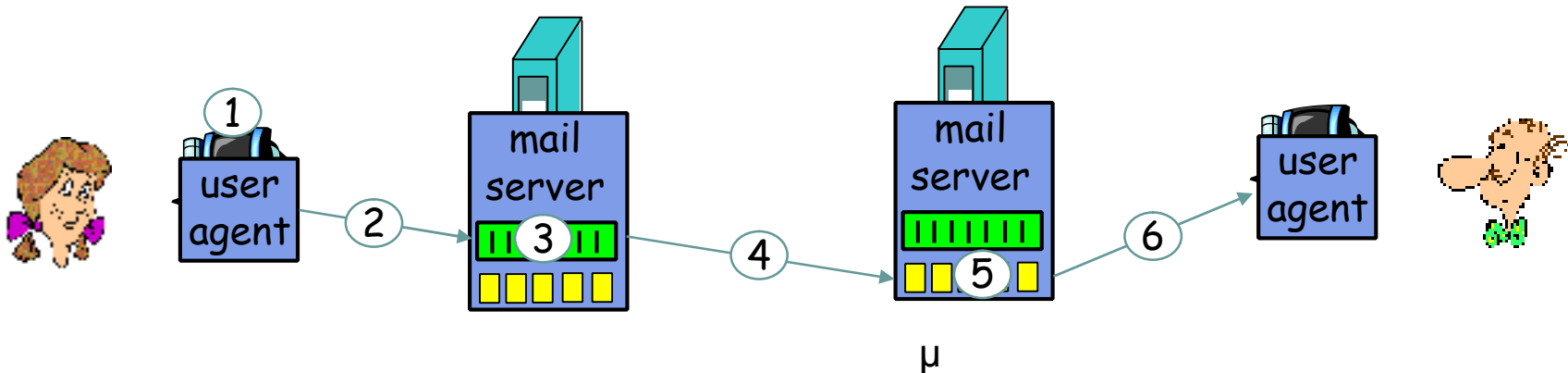
- SMTP μ TCP μ client μ server ( mail server)
- μ μ μ
- TCP
- μ :
- μ (greeting)
- μ μ
- μ μ
- /
- (commands): μ ASCII
- (responses):
- μ μ 7-bit ASCII

# SMTP:



μ μ

- μ user agent (UA)  
nikos@cnmslab.uop.gr μ μ μ
- UA μ μ mail server
- SMTP client TCP μ mail server
- SMTP client μ μ μ TCP
- mail server μ μ mailbox
- μ user agent μ μ
- mail server , μ μ
- μ mail server o



# SMTP



```
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
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
```



# SMTP

- SMTP  $\mu$  (persistent)  
TCP
- SMTP  $\mu$   $\mu$  ( $\mu$ )  
7-bit ASCII
- SMTP Server  $\mu$  CRLF. CRLF  
 $\mu$   $\mu$



# SMTP - HTTP

- HTTP

- pull

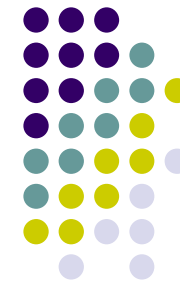
- $\mu$  / ASCII
- $\mu$  (status codes)  $\mu$   $\mu$

- SMTP

- push

- $\mu$  / ASCII
- $\mu$  (status codes)  $\mu$   $\mu$   $\mu$   $\mu$





μ μ  
μ

SMTP:

μ μ

RFC 822:

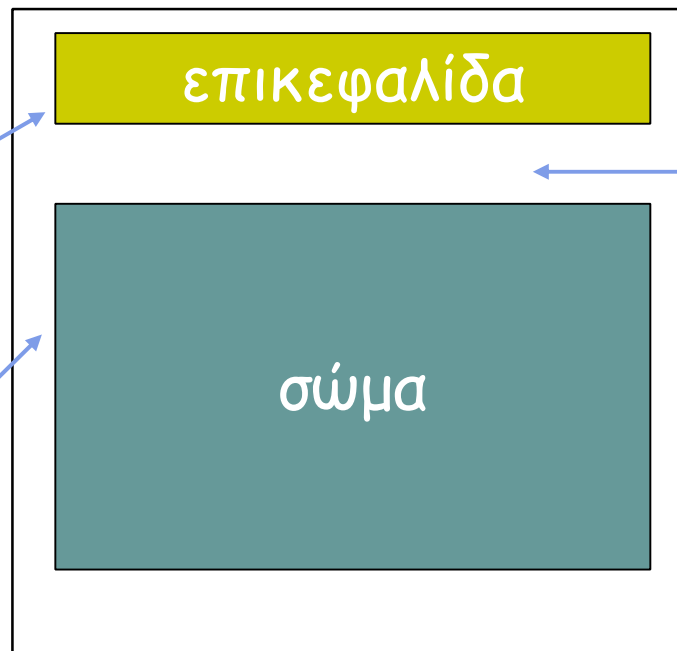
μ (format) μ μ  
μ :

• μμ  
(header lines), . .

- To:
- From:
- Subject:

• μ (body):

- « » μ μ
- ASCII μ



κενή  
γραμμή



μ μ  
μ μ :  
μ

- MIME: multimedia mail extension, RFC 2045, 2056

- μ μ μ μ (header)

μ μ

μ

έκδοση MIME

μέθοδος κωδικοποίησης  
δεδομένων

είδος πολυμεσικών  
δεδομένων

κωδικοποιημένα  
δεδομένα

```
From: alice@crepes.fr
To: bob@hamburger.edu
Subject: Picture of yummy crepe.
MIME-Version: 1.0
Content-Transfer-Encoding: base64
Content-Type: image/jpeg

base64 encoded data .....
.....
.....base64 encoded data
```



# MIME types

Content-Type: type/subtype; parameters

## Text

- subtypes: `plain`, `html`

## Image

- subtypes: `jpeg`, `gif`

## Audio

- subtypes: `basic` (8-bit), `32kadpcm`  
(32 kbps)

## Video

- subtypes: `mpeg`,  
`quicktime`

## Application

- $\mu$   
 $\mu$   
 $\mu$   
• subtypes: `msword`,  
`octet-stream`

# Multipart Type



```
From: alice@crepes.fr
To: bob@hamburger.edu
Subject: Picture of yummy crepe.
MIME-Version: 1.0
Content-Type: multipart/mixed; boundary=StartOfNextPart
```

```
--StartOfNextPart
Dear Bob, Please find a picture of a crepe.
--StartOfNextPart
Content-Transfer-Encoding: base64
Content-Type: image/jpeg
base64 encoded data .....
.....base64 encoded data
--StartOfNextPart
Do you want the recipe?
```





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- SMTP: / Mail Server

- 

μ (Mail Access Protocols)

- POP: Post Office Protocol (RFC 1939)

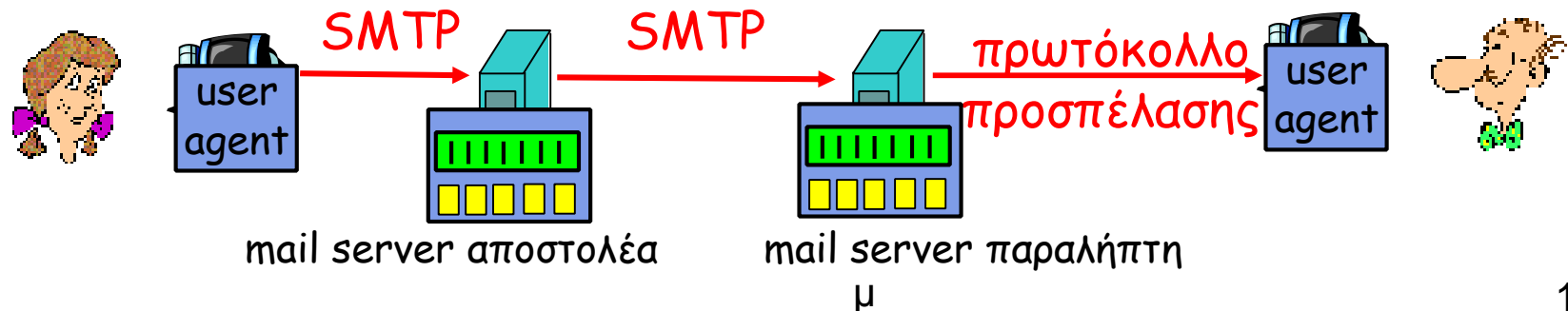
- μ agent server  
download

- IMAP: Internet Mail Access Protocol (RFC 1730)

- ( )

- μ μ μ server

- HTTP: Gmail, Hotmail, Yahoo! Mail, . . .





# POP3

## (authorization)

- client:
  - user: username
  - pass: password
- server
  - +OK
  - ERR

```
S: +OK POP3 server ready
C: user bob
S: +OK
C: pass hungry
S: +OK user successfully logged on
```

## (transaction)

- client:
  - list:  $\mu$   $\mu$
  - retr:  $\mu$   $\mu$
- server
  - $\mu$
  - dele:  $\mu$
  - quit:  $\mu$

```
C: list
S: 1 498
S: 2 912
S: .
C: retr 1
S: <message 1 contents>
S: .
C: dele 1
C: retr 2
S: <message 1 contents>
S: .
C: dele 2
C: quit
S: +OK POP3 server signing off
```



# POP3      IMAP

- POP3

- «download and delete»
  - μ e-mail client
- «download and keep»
  - μ μ clients
- “Stateless”

- IMAP

- μ μ μ : server
- μ μ
- (folders)
- « » μ
- μ
- μ μ μ μ