



Computer Networks

— Unit - 5 —

— Application Layer —

Domain Name System

25.1 Name Space

Flat Name Space

Hierarchical Name Space

25.2 Domain Name Space

Label

Domain Name

Figure 25.1 Domain name space

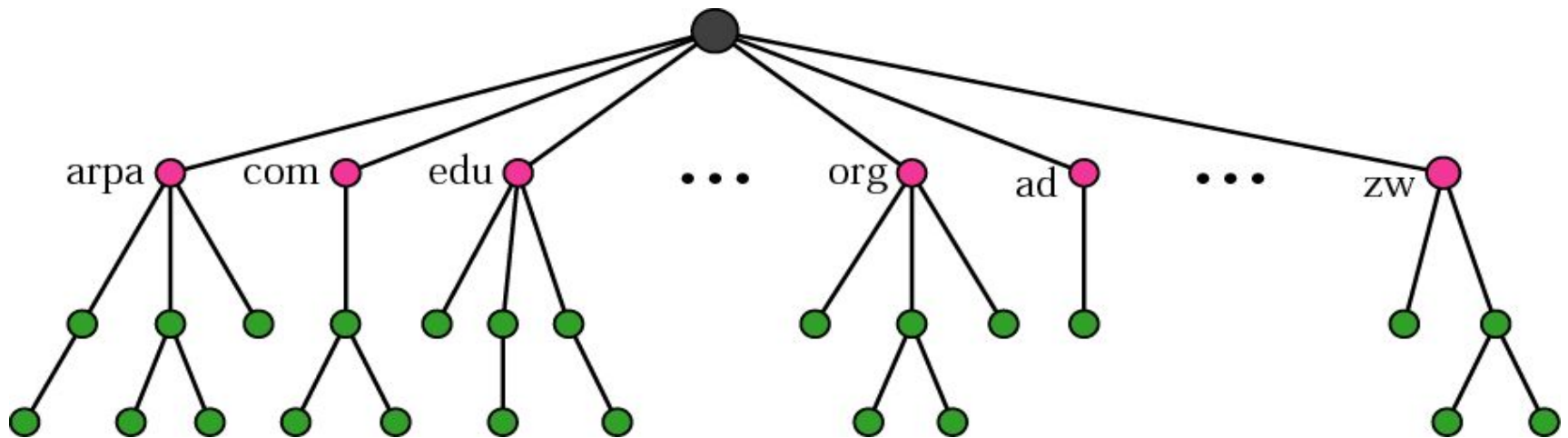
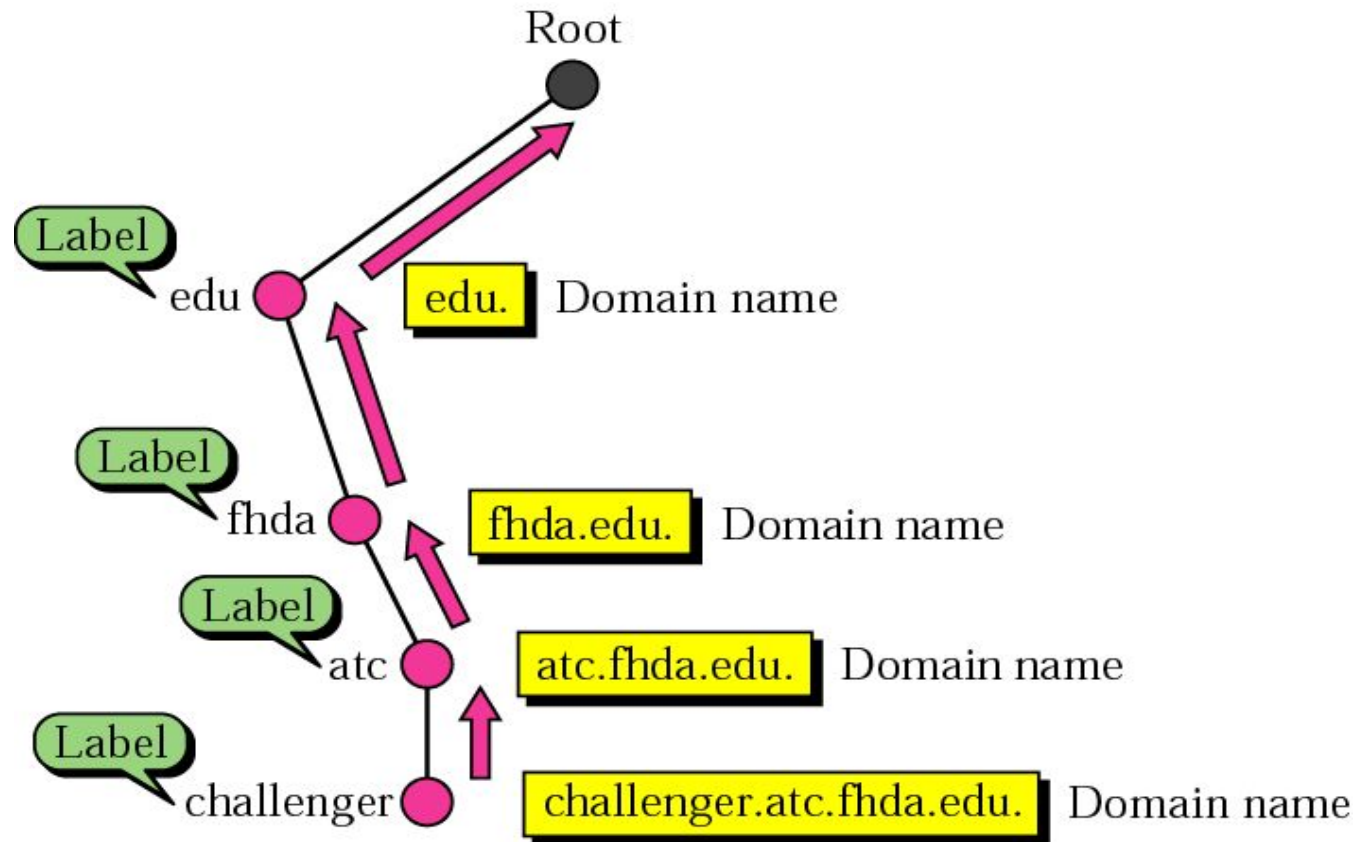


Figure 25.2 Domain names and labels



25.6 DNS Messages

Header

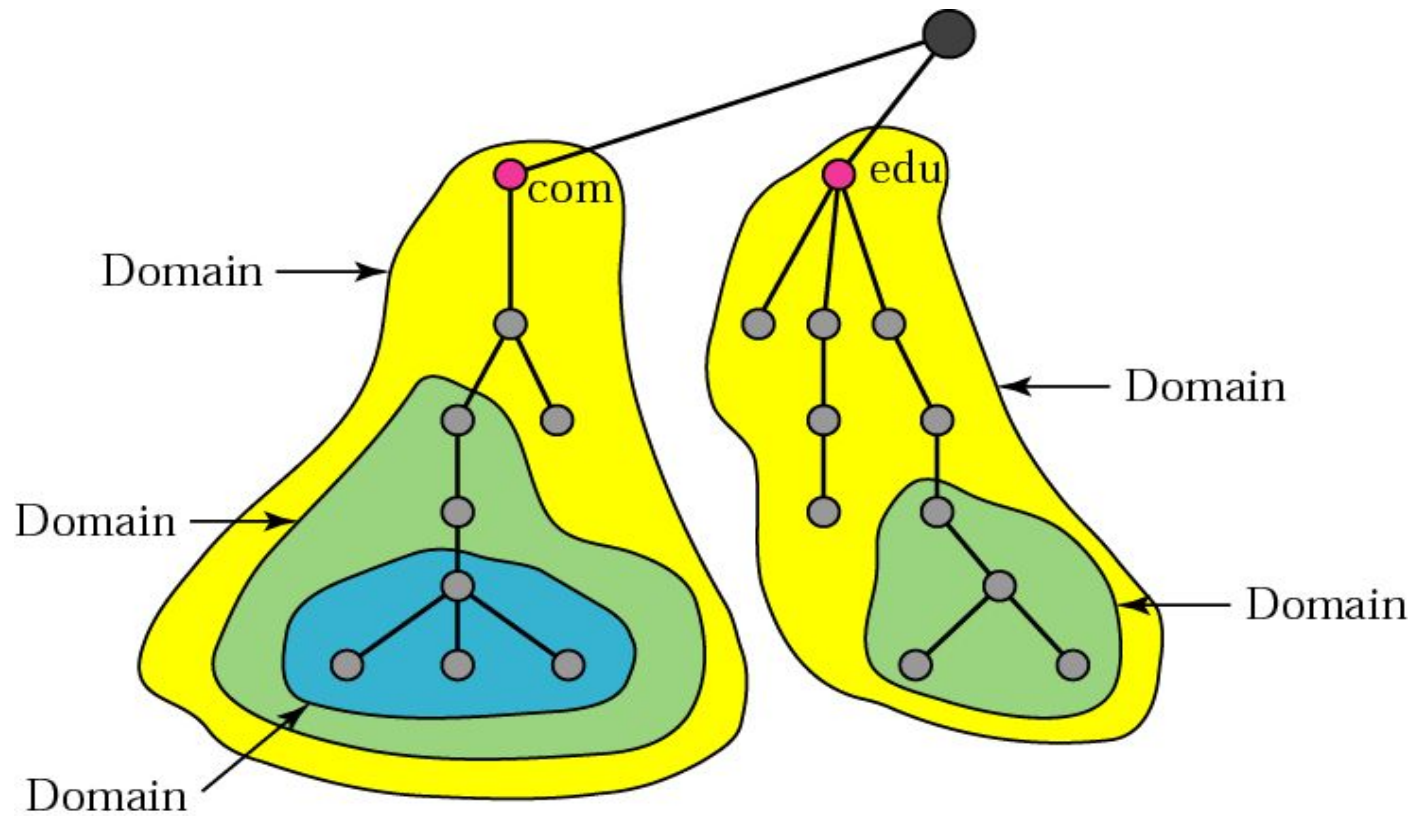
Question Section

Answer Section

Authoritative Section

Additional Information Section

Figure 25.4 Domains



25.3 Distribution of Name Spaces

Hierarchy of Name Servers

Zone

Root Server

Primary and Secondary Servers

Figure 25.5 Hierarchy of name servers

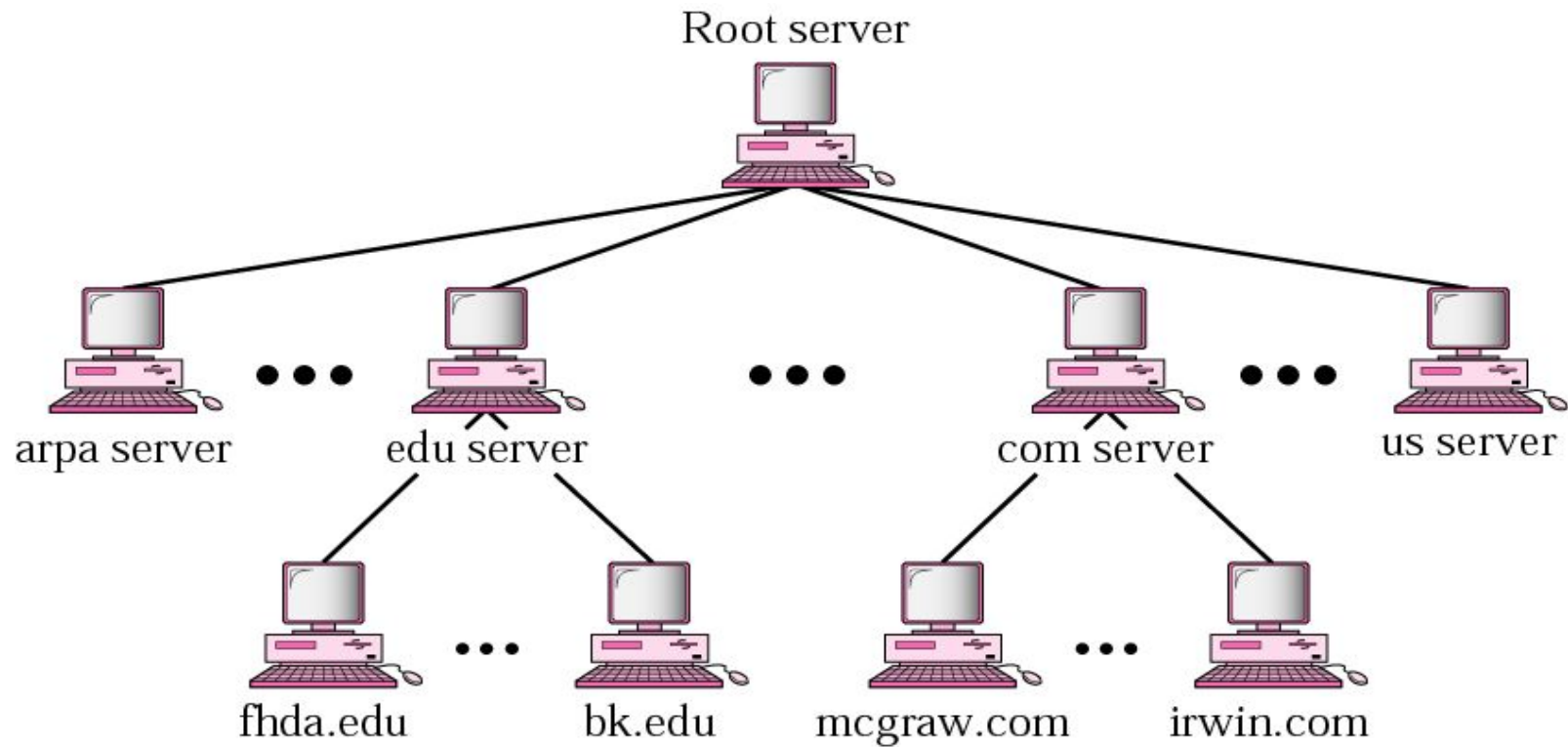
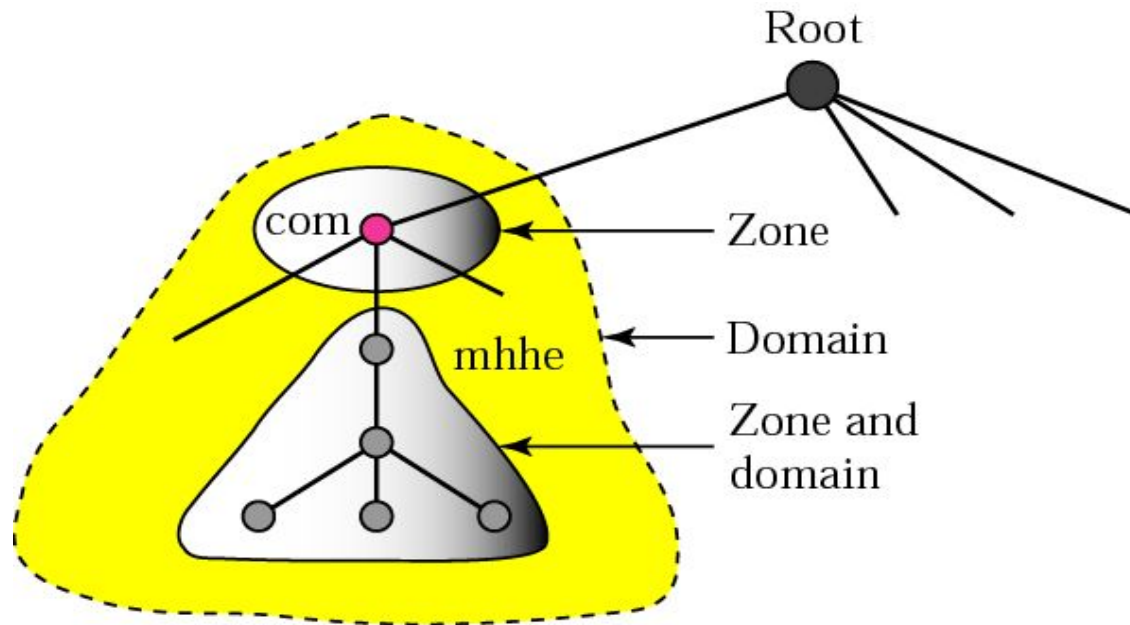


Figure 25.6 Zones and domains





A primary server loads all information from the disk file; the secondary server loads all information from the primary server.

25.4 DNS In The Internet

Generic Domain

Country Domain

Inverse Domain

Figure 25.7 DNS in the Internet

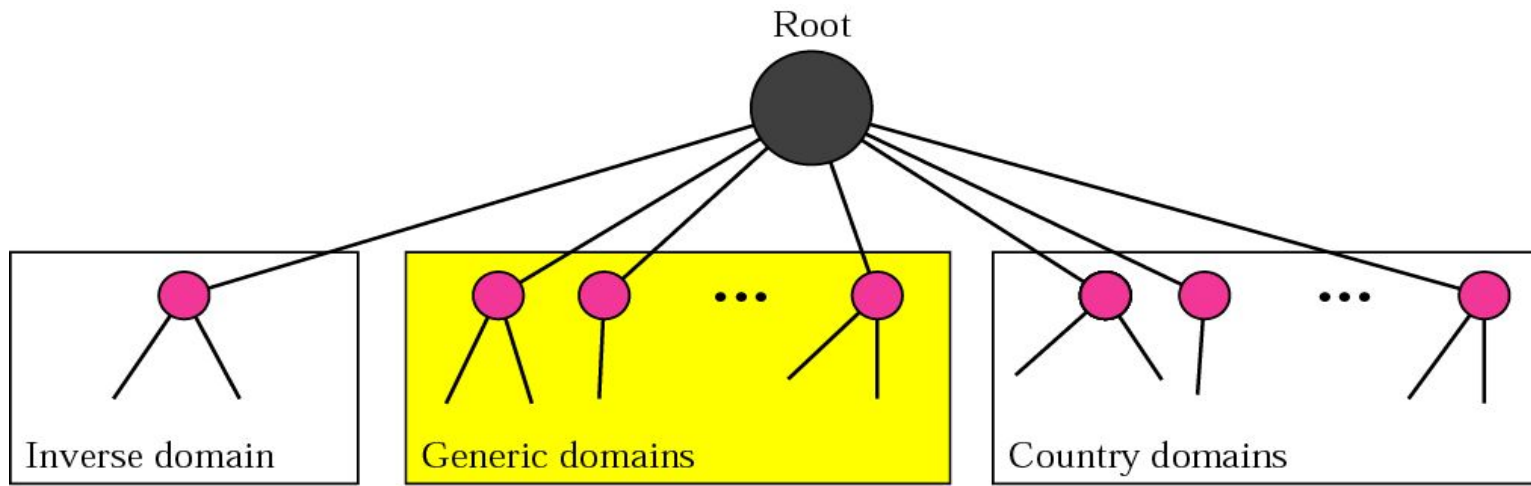


Figure 25.8 Generic domains

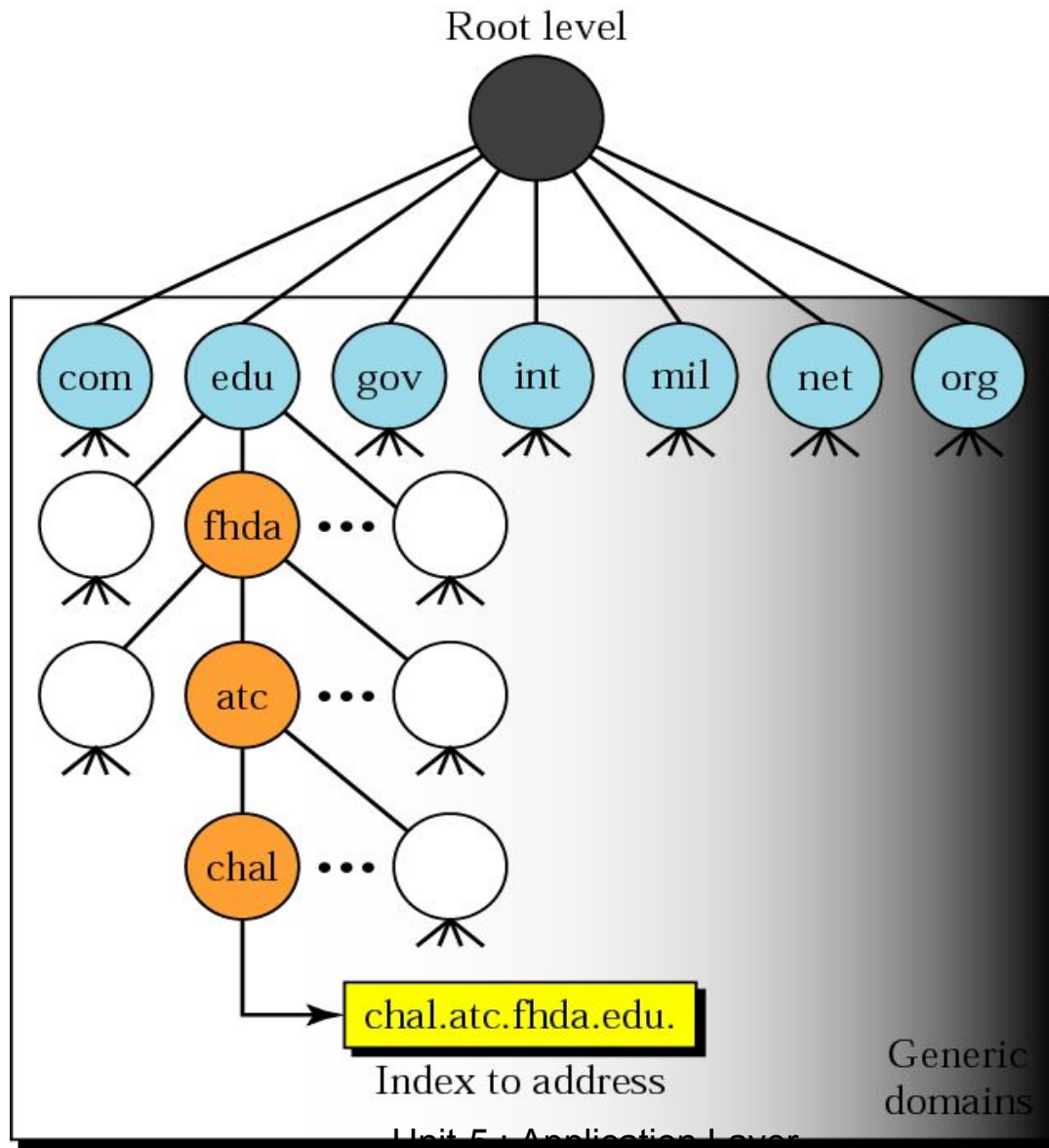


Table 25.1 Generic domain labels

Label	Description
com	Commercial organizations
edu	Educational institutions
gov	Government institutions
int	International organizations
mil	Military groups
net	Network support centers
org	Nonprofit organizations

Table 25.2 New generic domain labels

Label	Description
aero	Airlines and aerospace companies
biz	Businesses or firms (similar to com)
coop	Cooperative business organizations
info	Information service providers
museum	Museums and other nonprofit organizations
name	Personal names (individuals)
pro	Professional individual organizations

Figure 25.9 Country domains

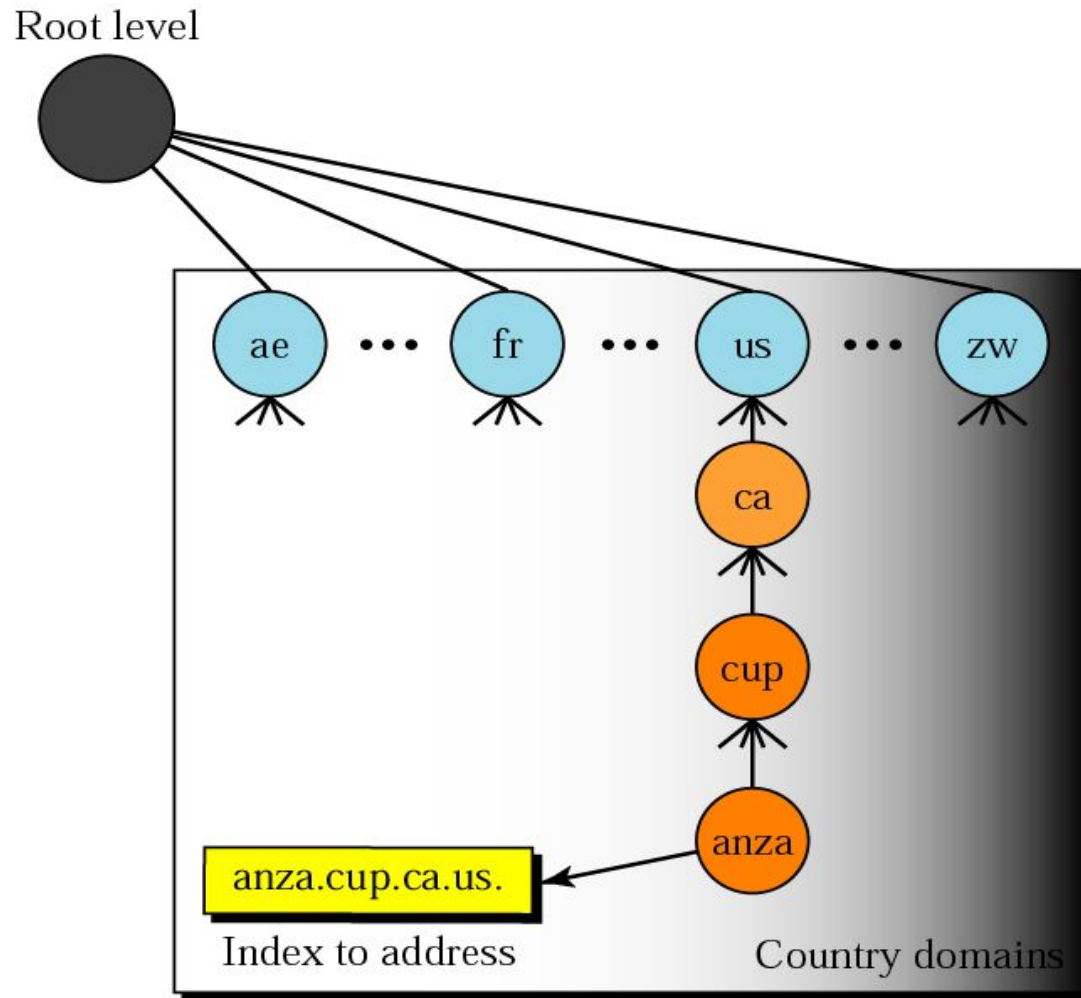
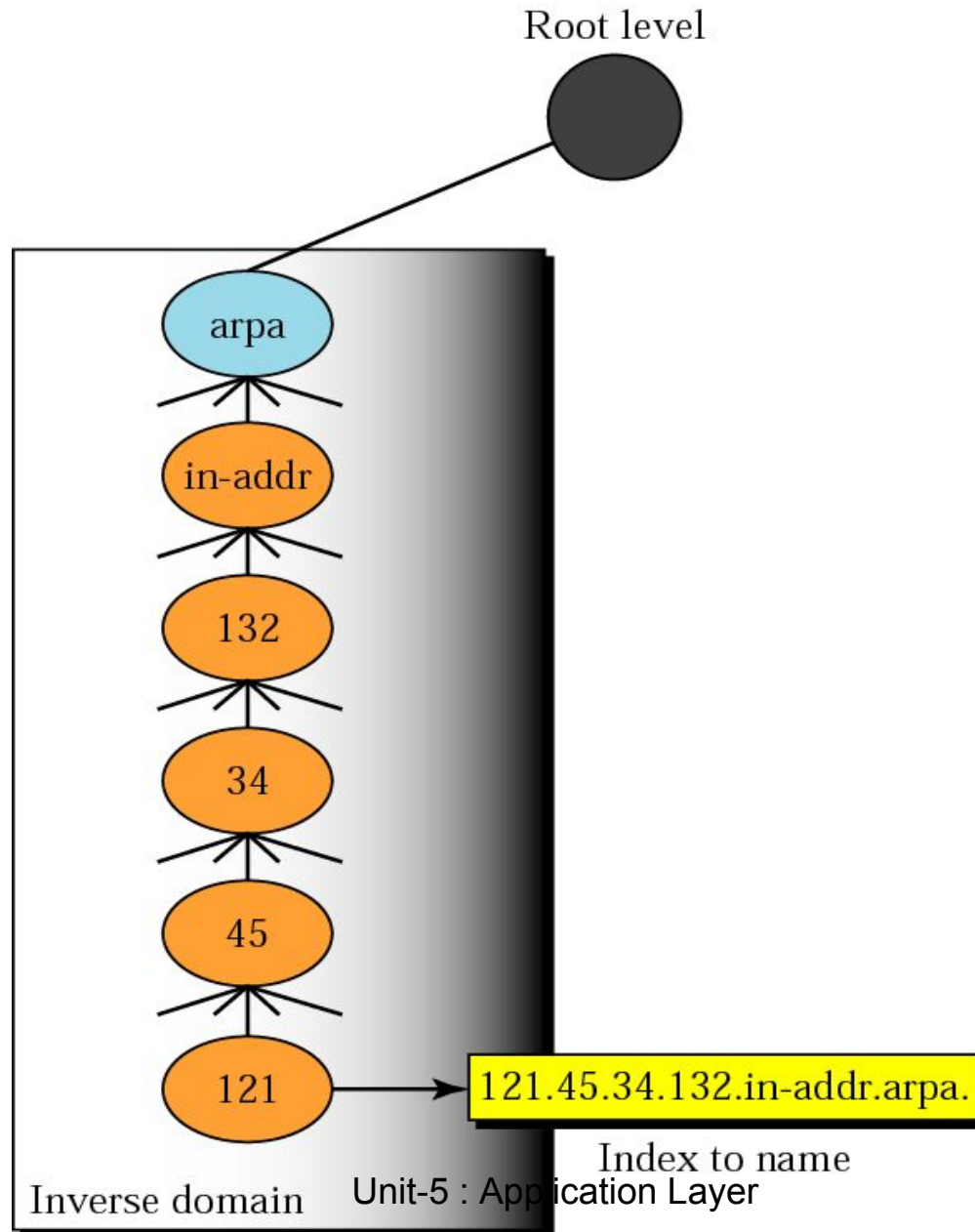


Figure 25.10 Inverse domain





*DNS can use the services of
UDP or TCP,
using the well-known port 53.*

SMTP and FTP

26.1 Electronic Mail

Sending/Receiving Mail

Addresses

User Agent

MIME

Mail Transfer Agent

Mail Access Protocols

Figure 26.1 Format of an email

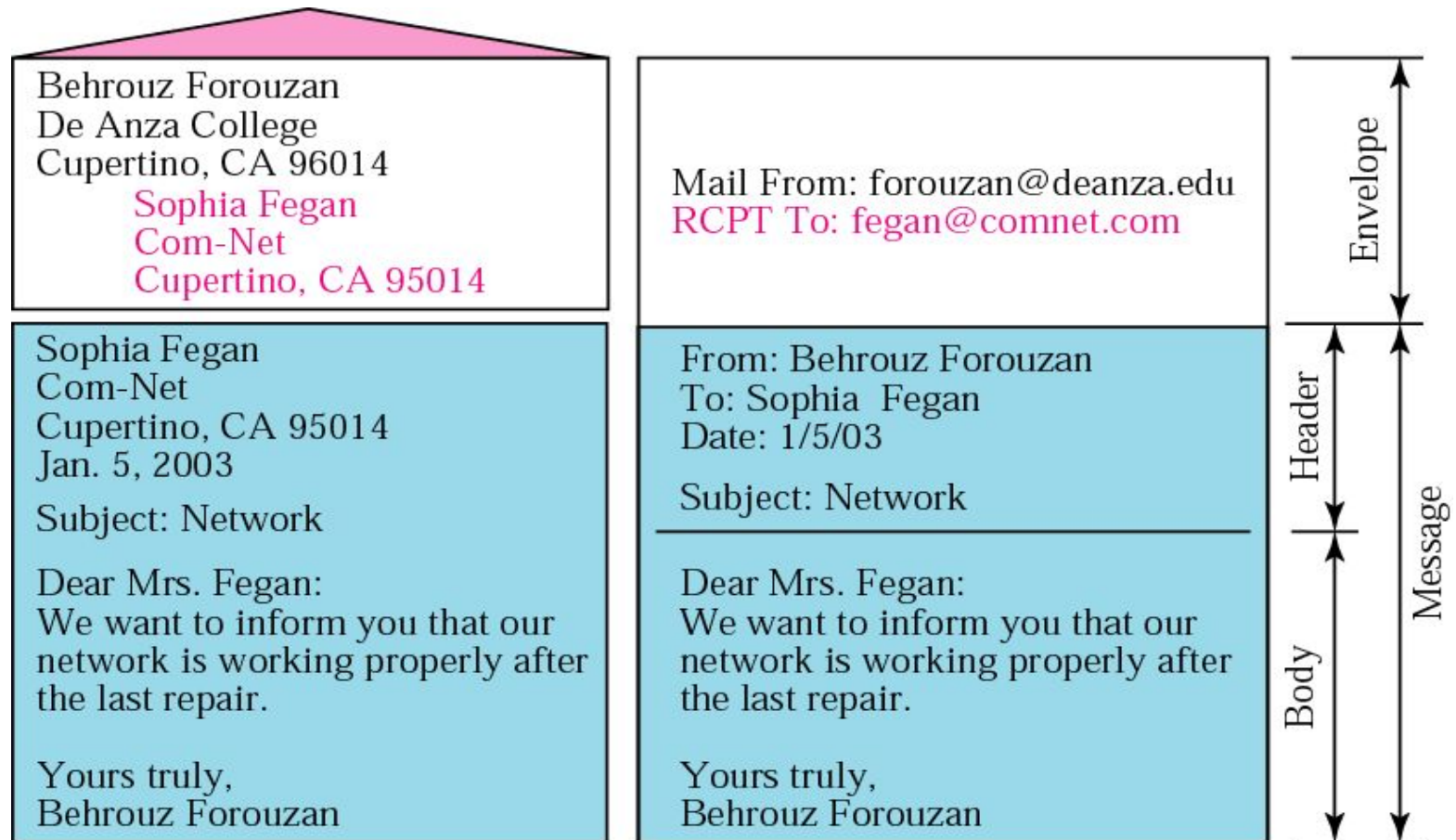


Figure 26.2 Email address

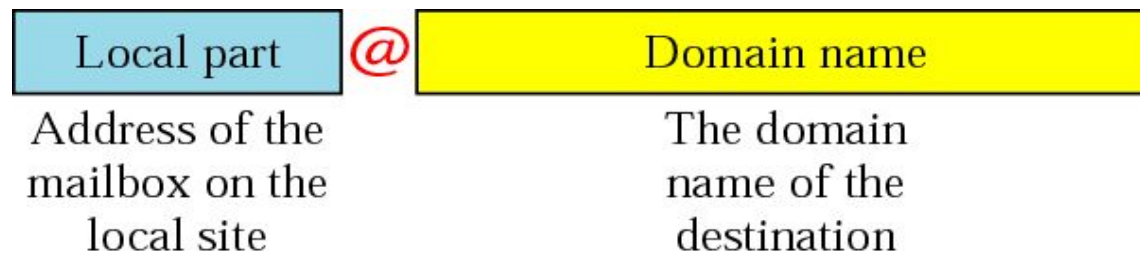
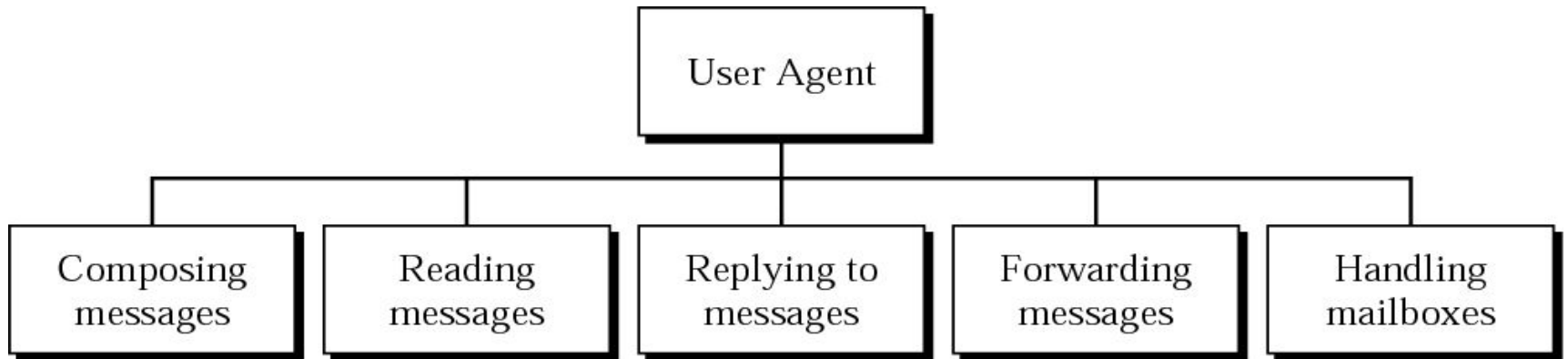


Figure 26.3 User agent





Some examples of command-driven user agents are mail, pine, and elm.



Some examples of GUI-based user agents are Eudora, Outlook, and Netscape.

Figure 26.4 MIME

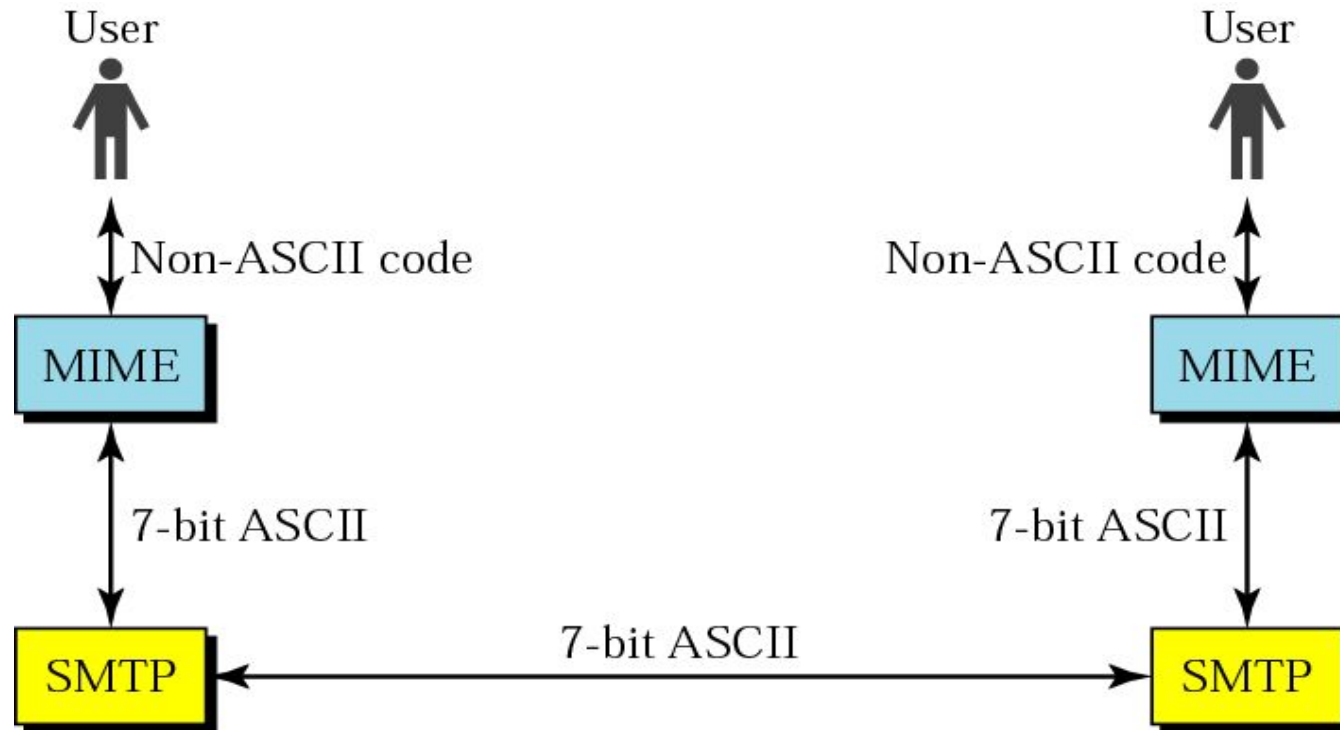
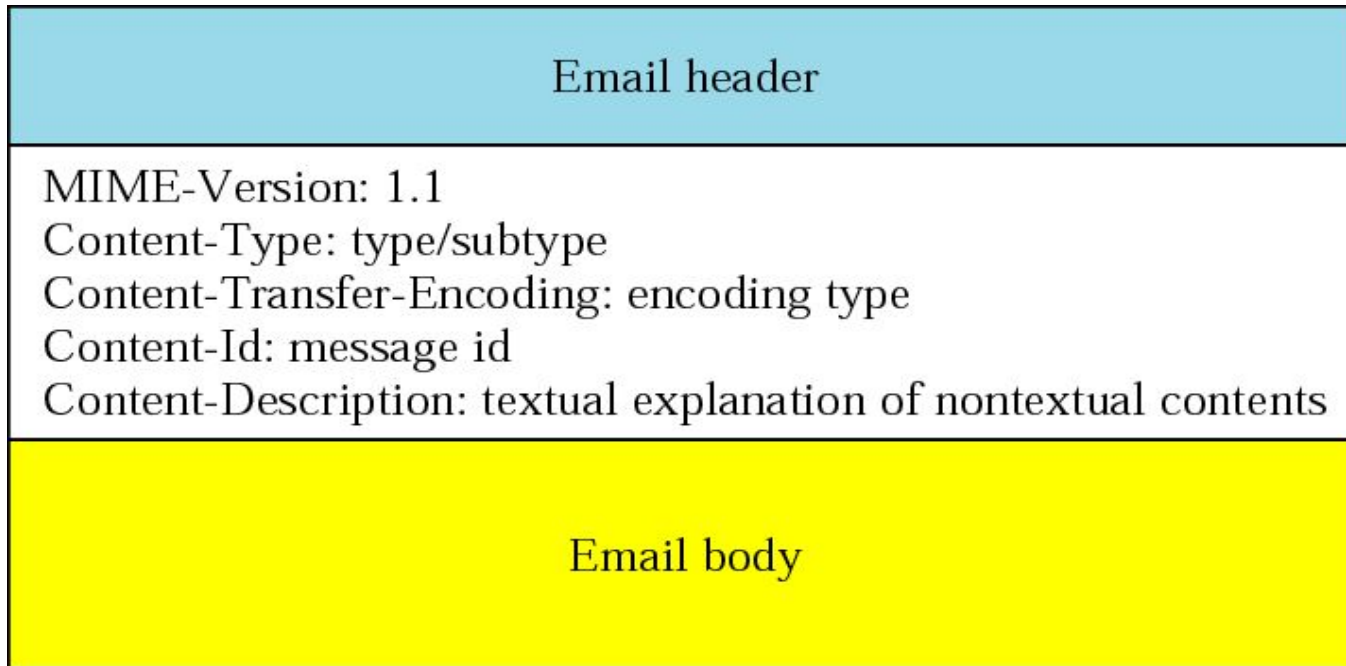




Figure 26.5 MIME header



MIME header

Table 26.1 Data types and subtypes in MIME

Type	Subtype	Description
Text	Plain	Unformatted text
Multiport	Mixed	Body contains ordered parts of different data types
	Parallel	Same as above, but no order
	Digest	Similar to mixed, but the default is message/RFC822
	Alternative	Parts are different versions of the same message
Message	RFC822	Body is an encapsulated message
	Partial	Body is a fragment of a bigger message
	Ext. Body	Body is a reference to another message
Image	JPEG	Image is in JPEG
	GIF	Video is in GIF format
Video	MPEG	Video is in MPEG format
Audio	Basic	Single-channel encoding of voice at 8 KHz
Application [*]	PostScript	Adobe PostScript
	Octet-Stream	General binary data (8-bit bytes)

Table 26.2 Content-transfer encoding

Category	Description
Type	ASCII characters and short lines
7bit	Non-ASCII characters and short lines
8bit	Non-ASCII characters with unlimited-length lines
Binary	6-bit blocks of data are encoded into 8-bit ASCII characters
Base64	Non-ASCII characters are encoded as an equal sign followed by an ASCII code

Figure 26.8 MTA client and server

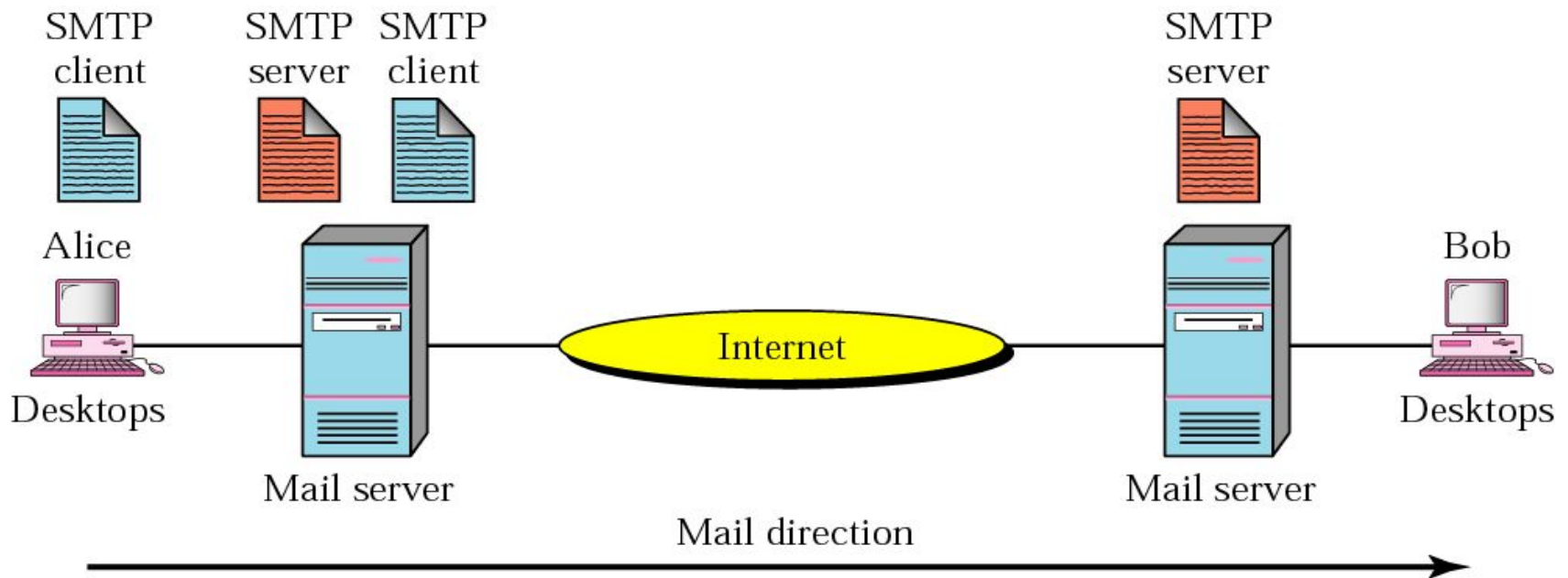


Figure 26.9 Commands and responses

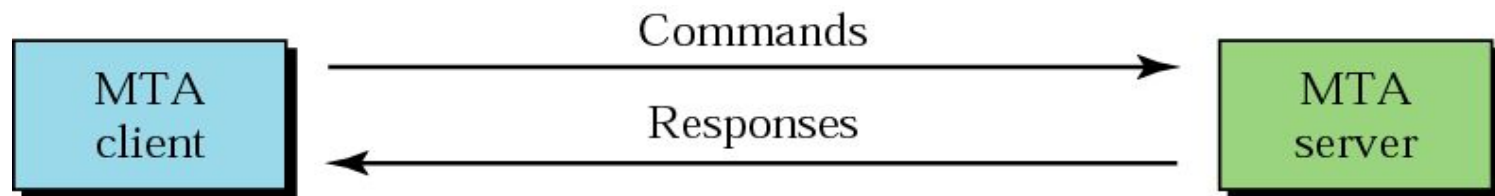


Figure 26.10 Email delivery

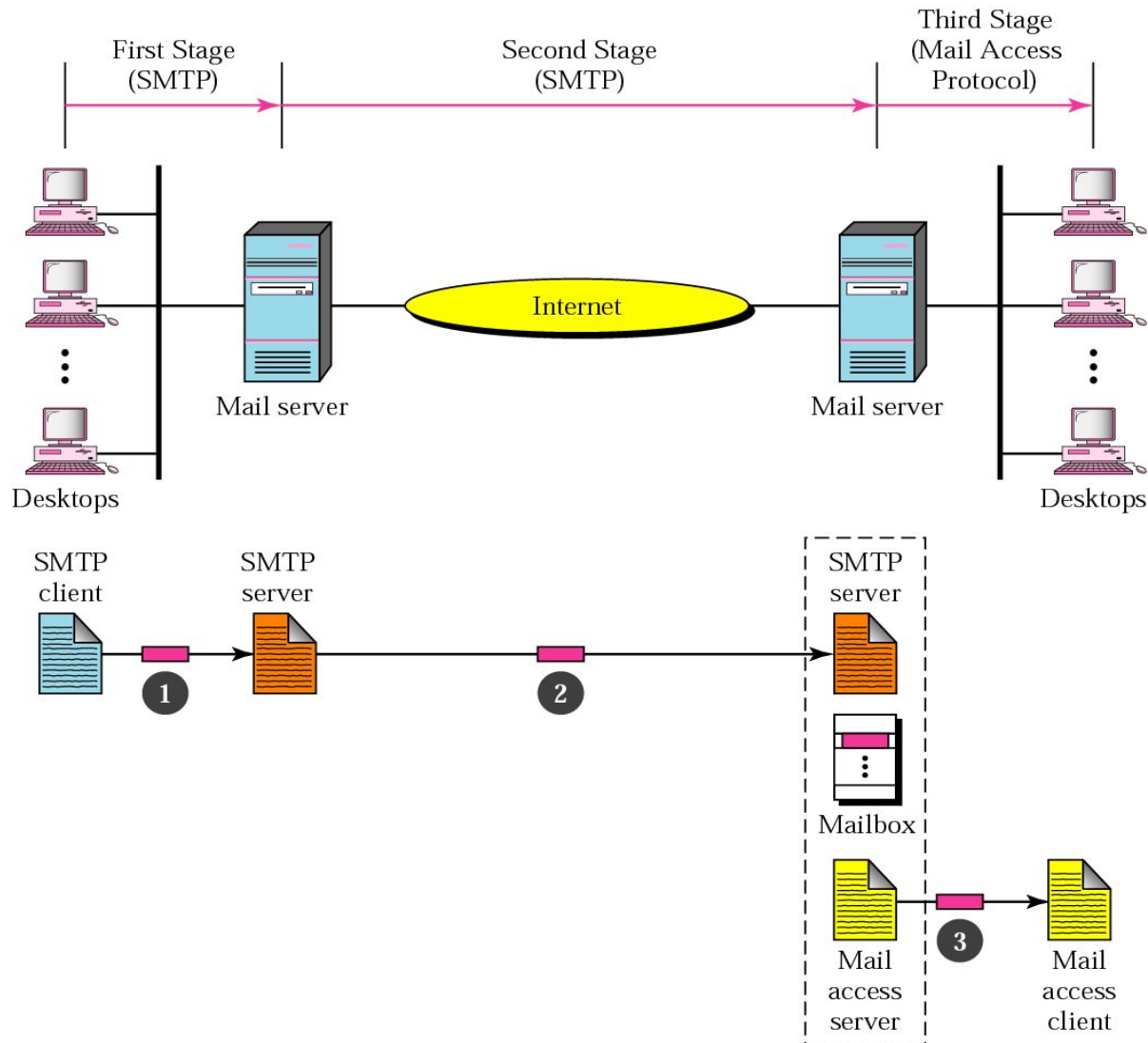
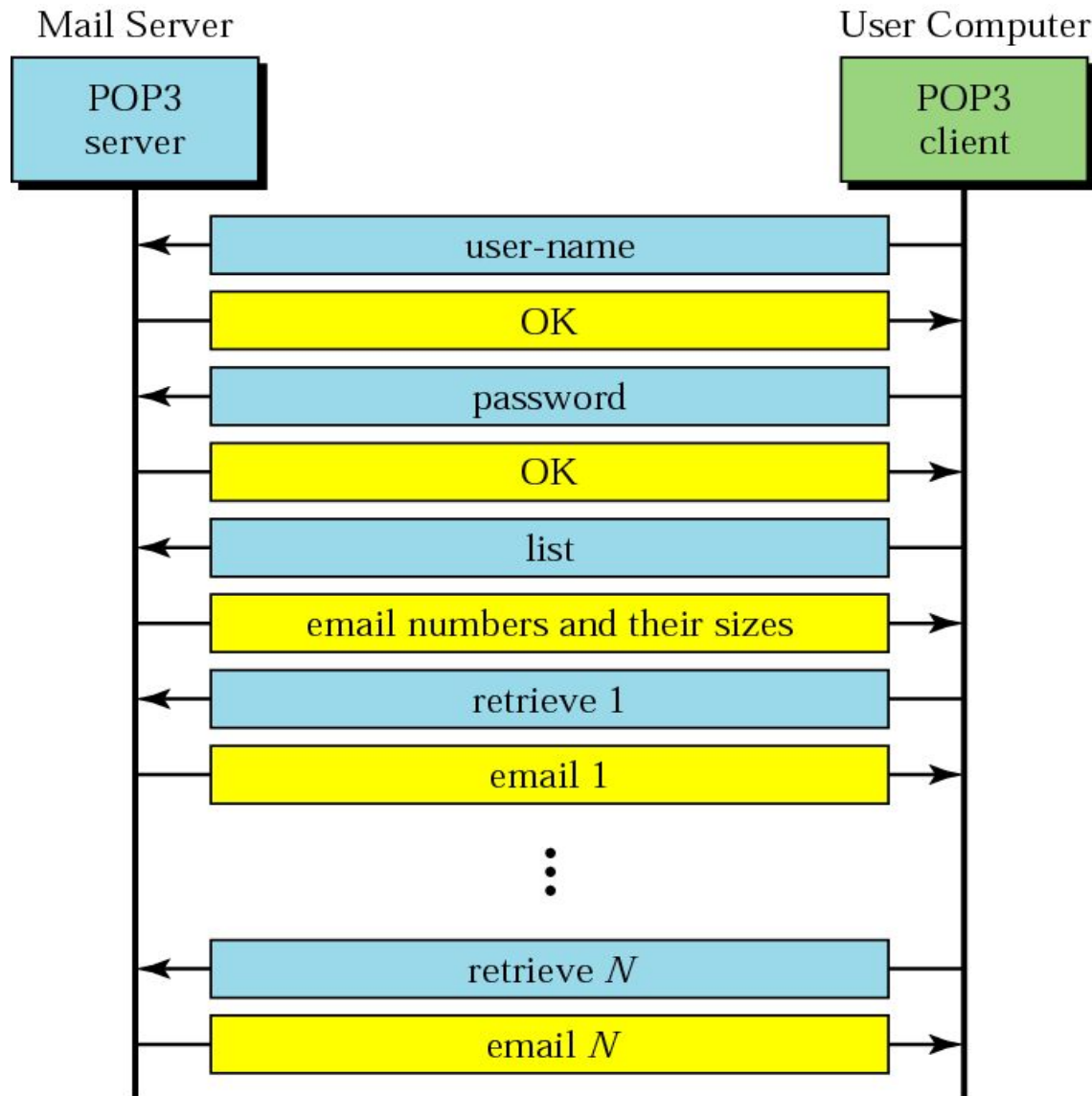


Figure 26.11 POP3



26.2 File Transfer

Connections

Communication

File Transfer

User Interface

Anonymous



Note:

FTP uses the services of TCP. It needs two TCP connections. The well-known port 21 is used for the control connection, and the well-known port 20 is used for the data connection.

Figure 26.12 FTP

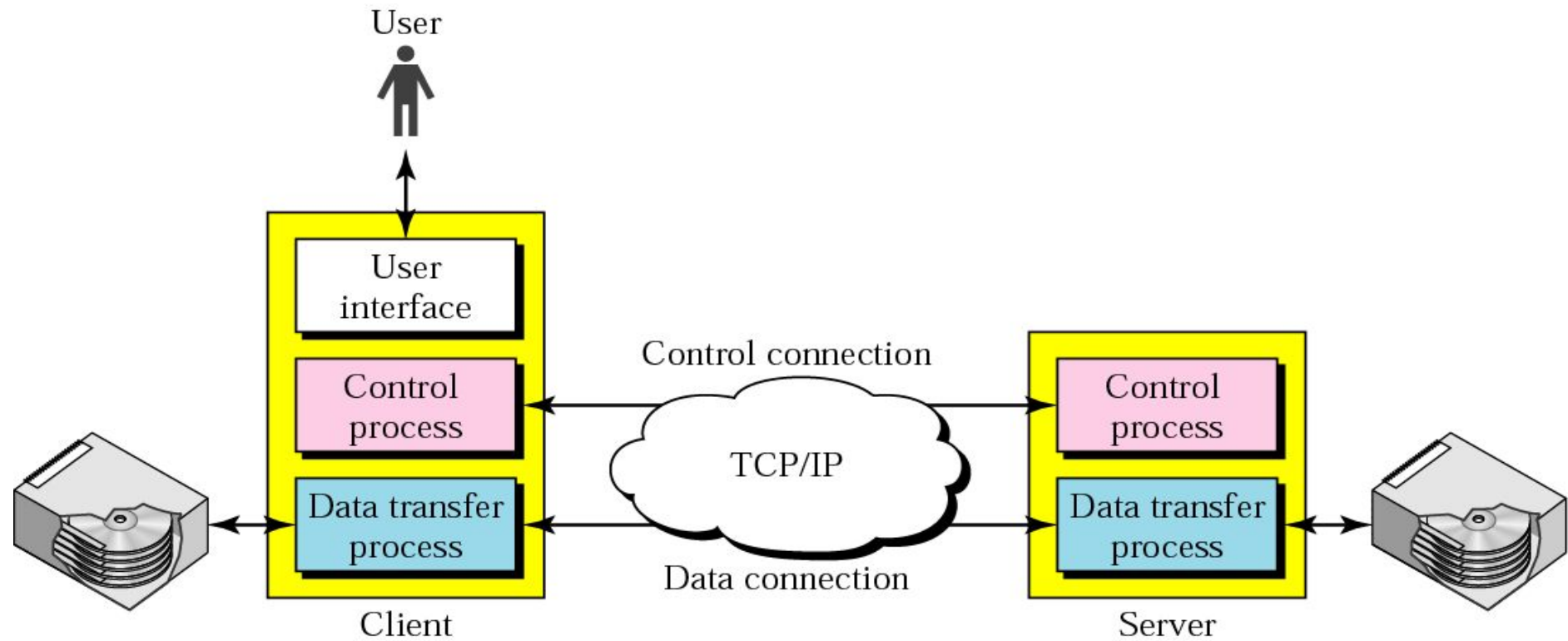


Figure 26.13 Using the control connection

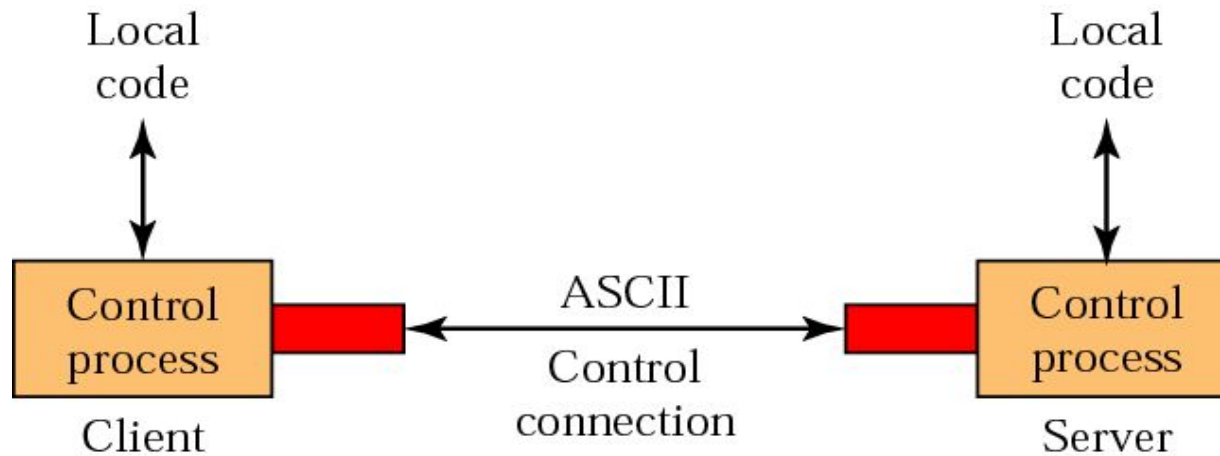


Figure 26.14 Using the data connection

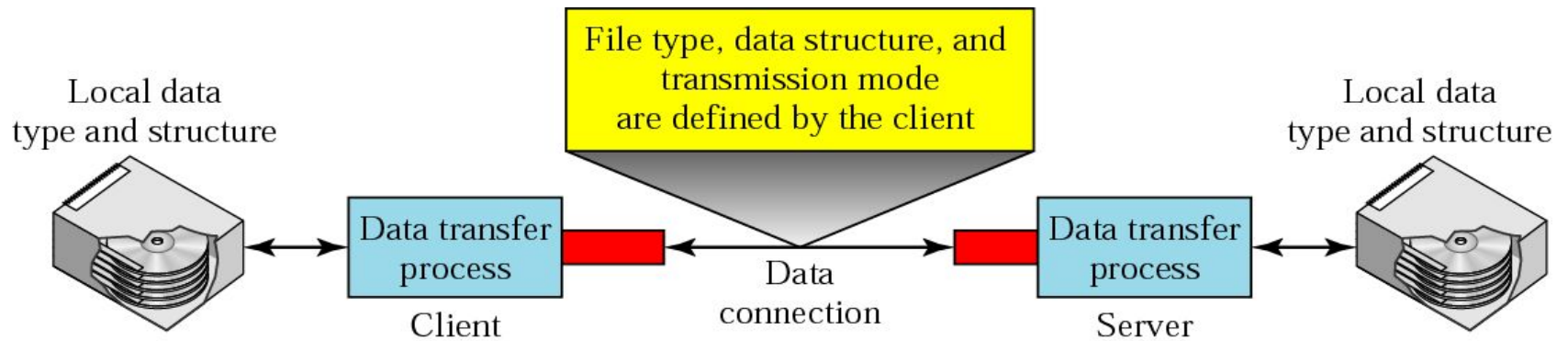


Figure 26.15 File transfer

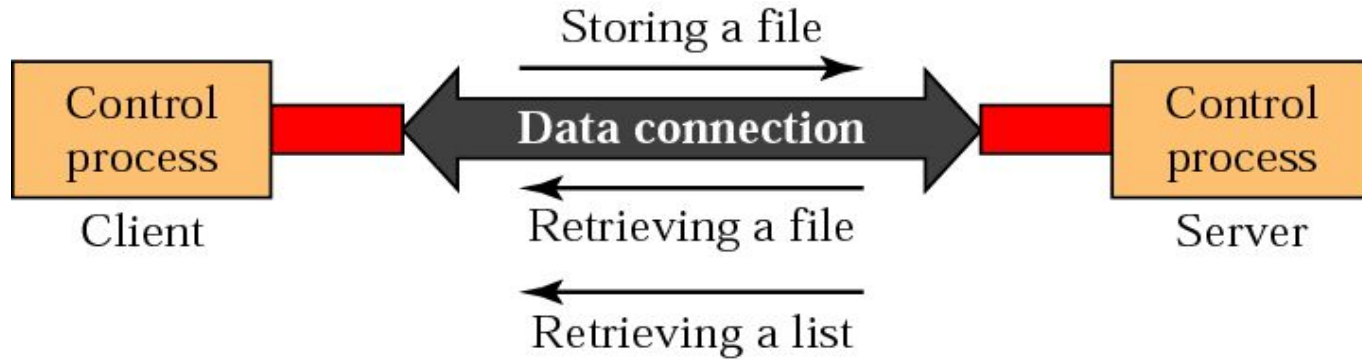
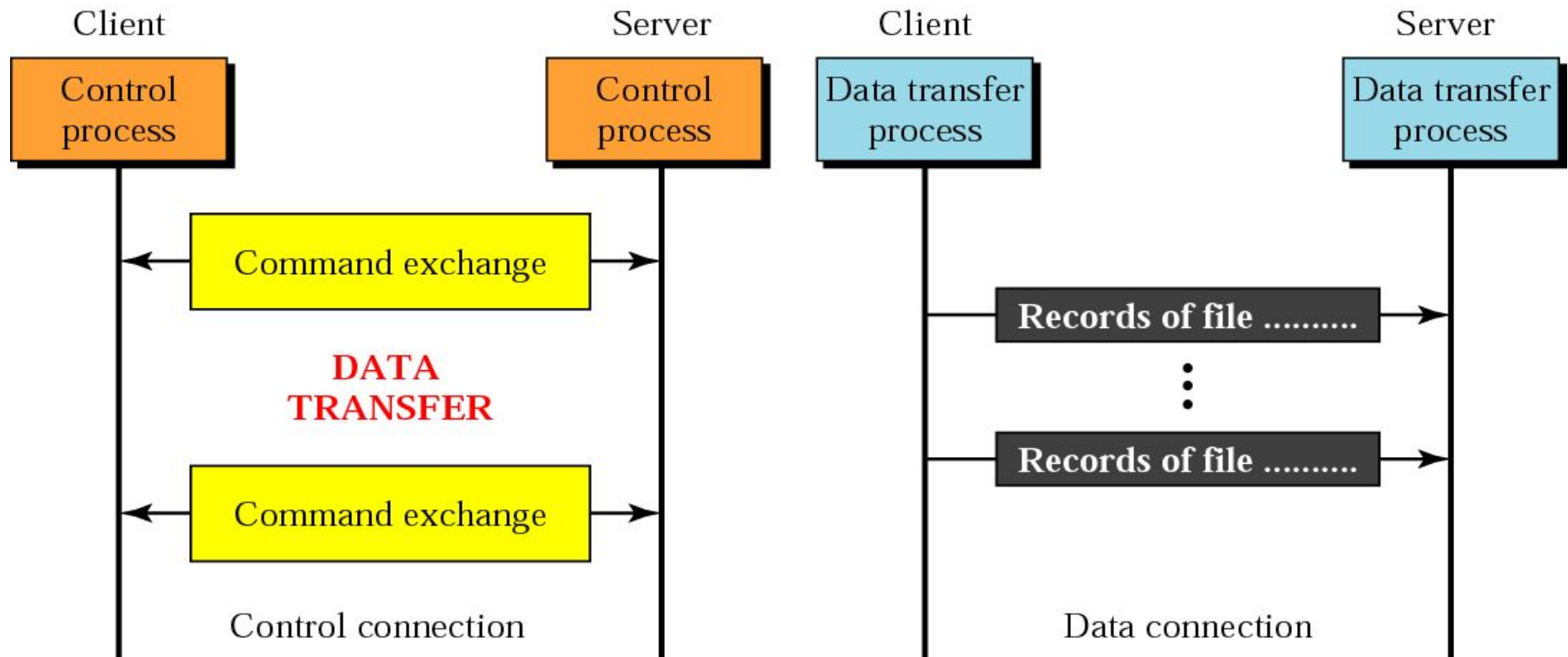


Figure 26.16 Example 1



HTTP *and* *WWW*

27.1 HTTP

Transaction

Request Message

Response Message

Headers



HTTP uses the services of TCP on well-known port 80.

Figure 27.1 HTTP transaction

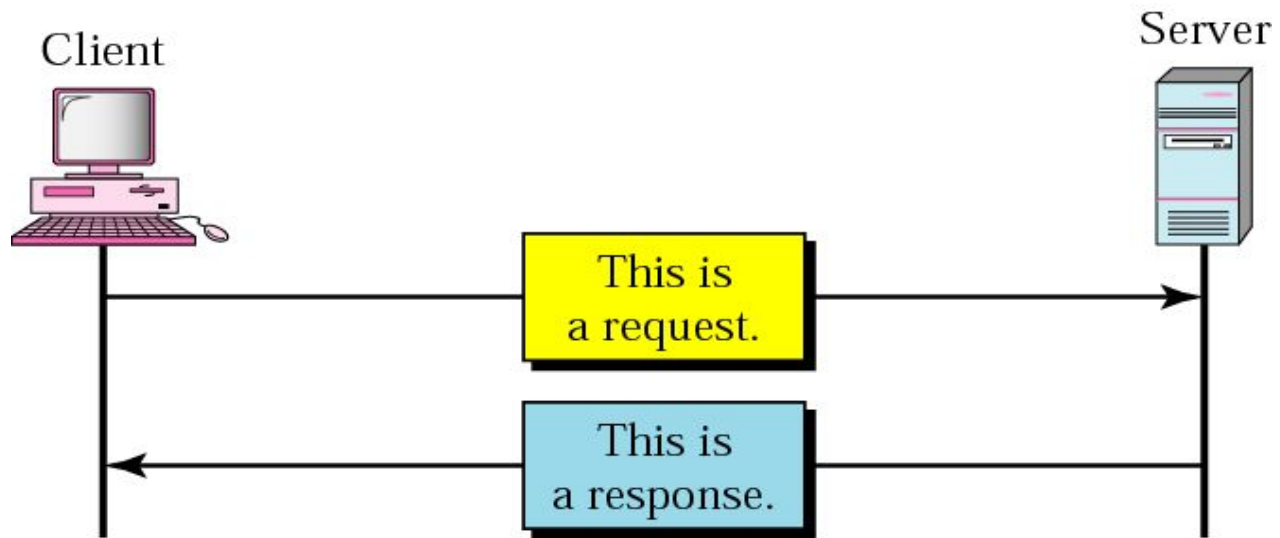


Figure 27.2 Request message

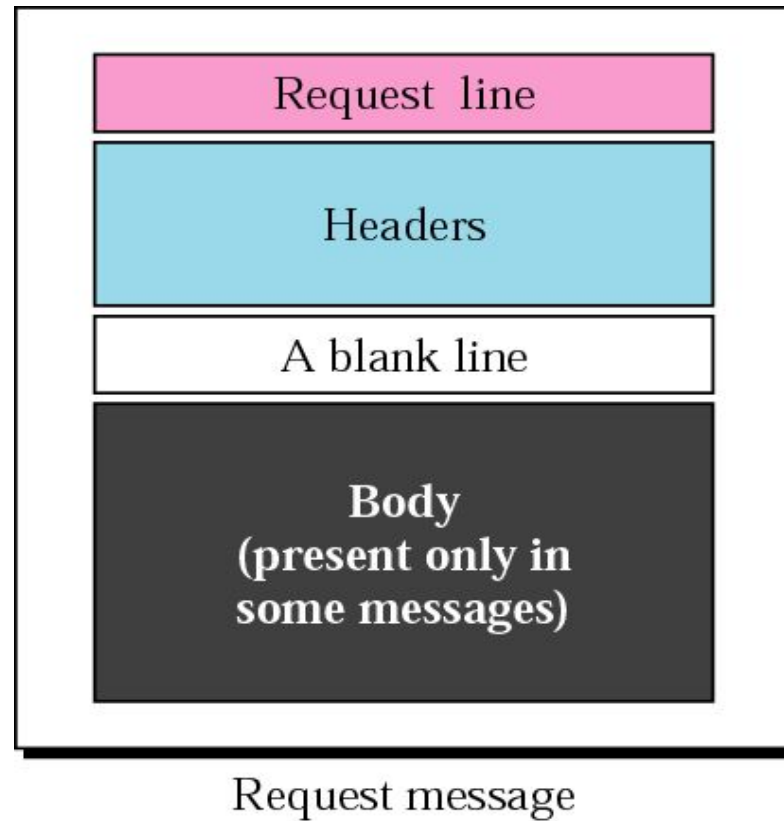


Figure 27.3 Request line



Figure 27.4 URL

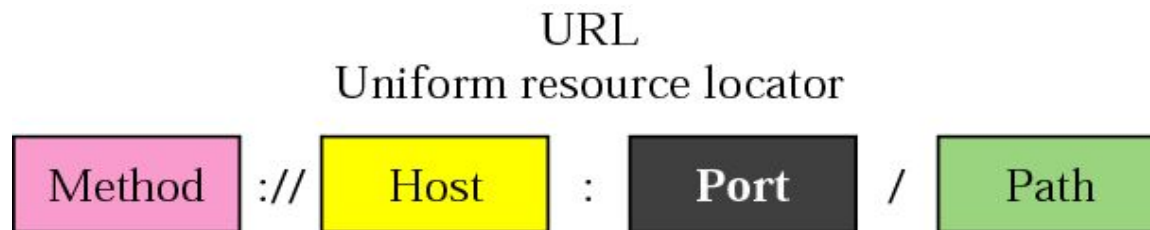
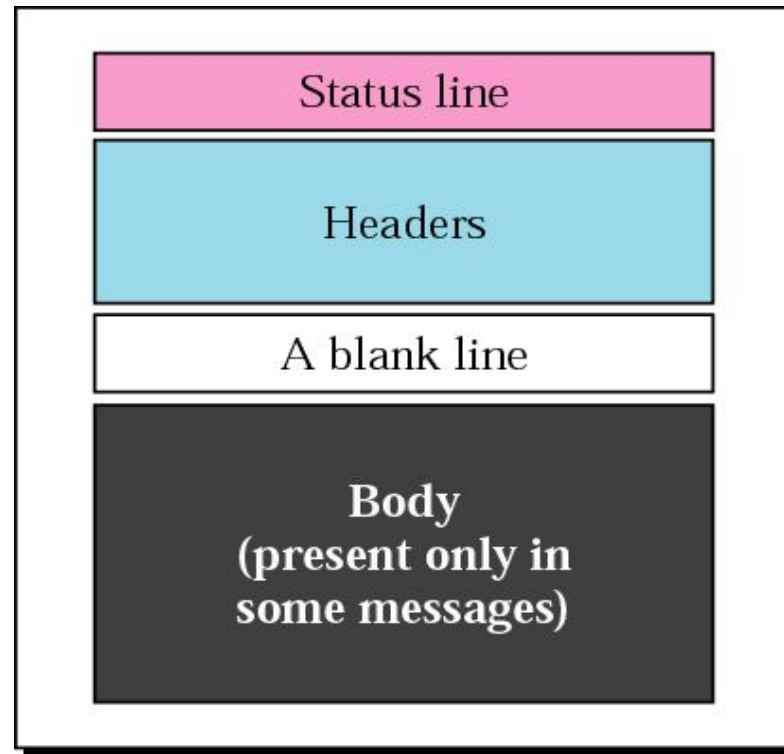


Figure 27.5 Response message



Response message

Figure 27.6 Status line

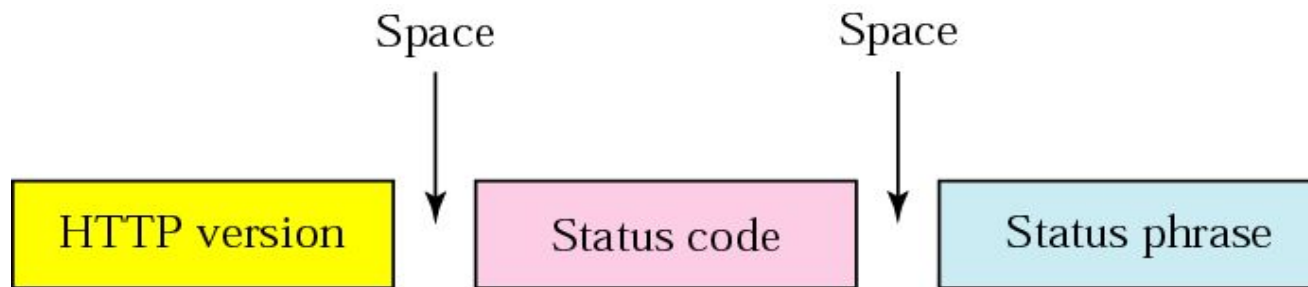


Figure 27.7 Header format

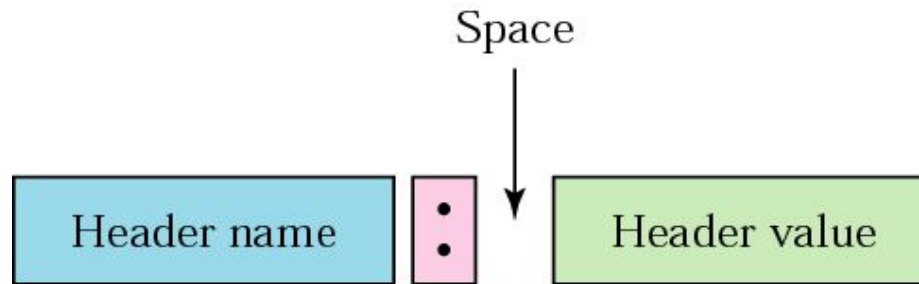
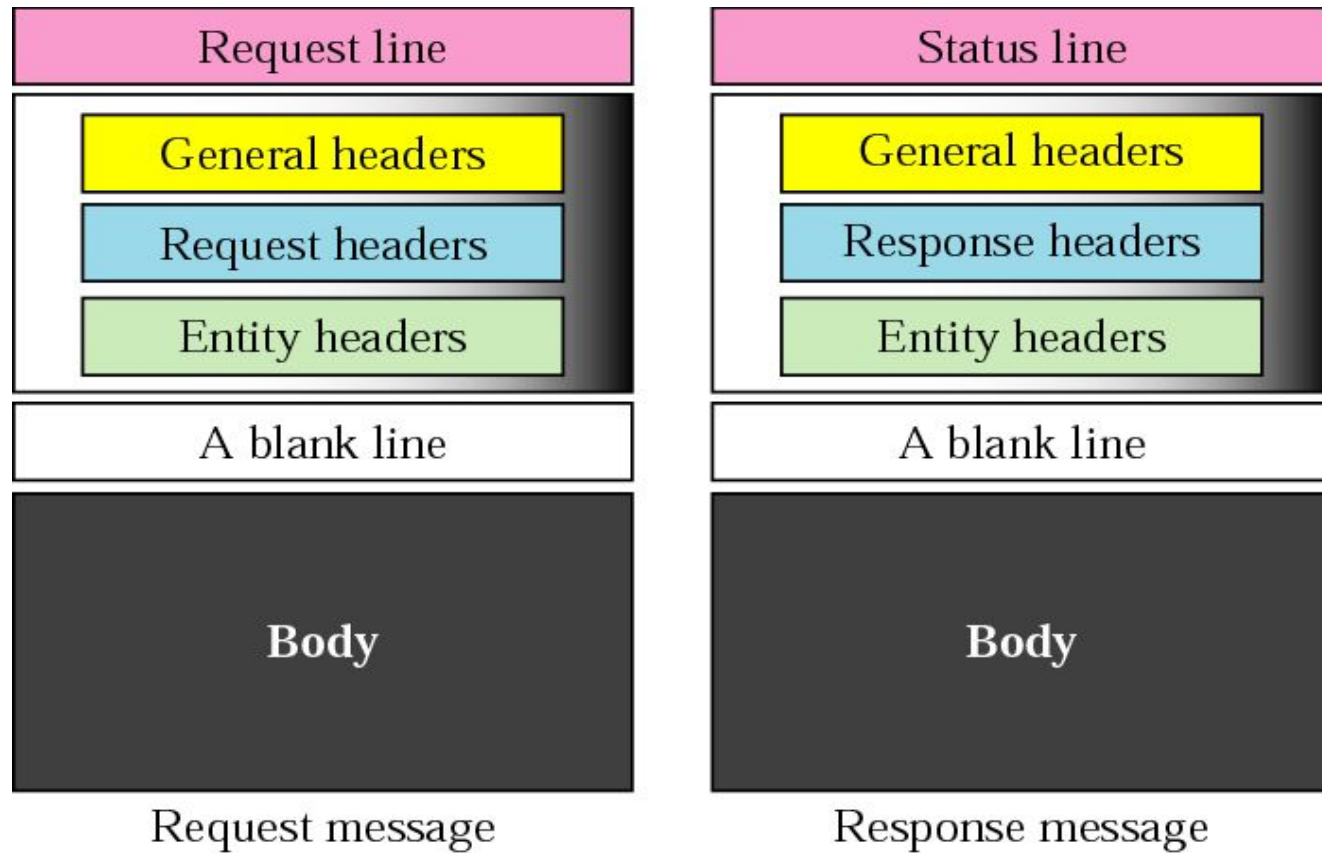


Figure 27.8 Headers



27.2 World Wide Web

Hypertext and Hypermedia

Browser Architecture

Static Document/HTML

Dynamic Document/CGI

Active Document/Java

Figure 27.11 Distributed services

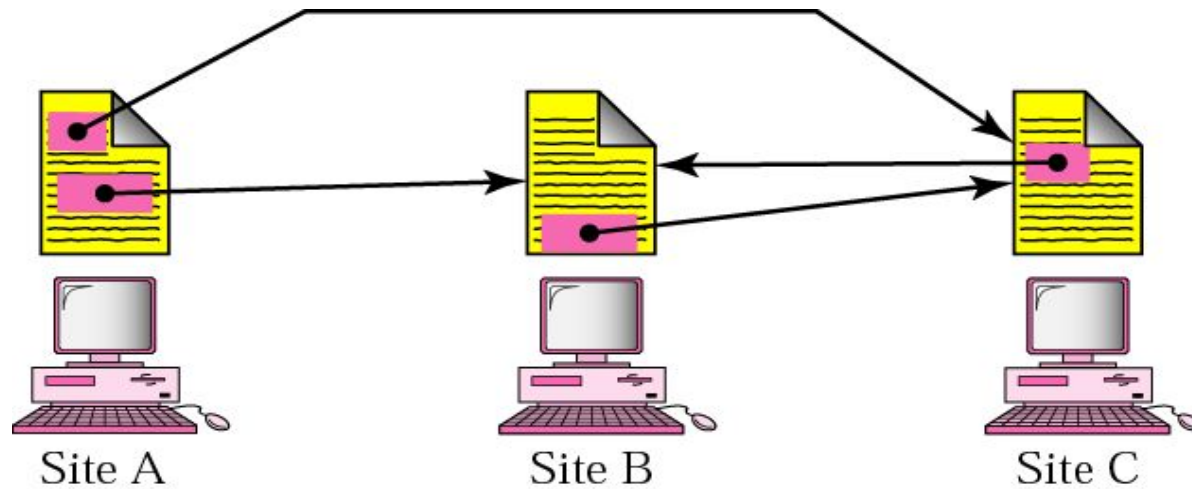


Figure 27.12 Hypertext

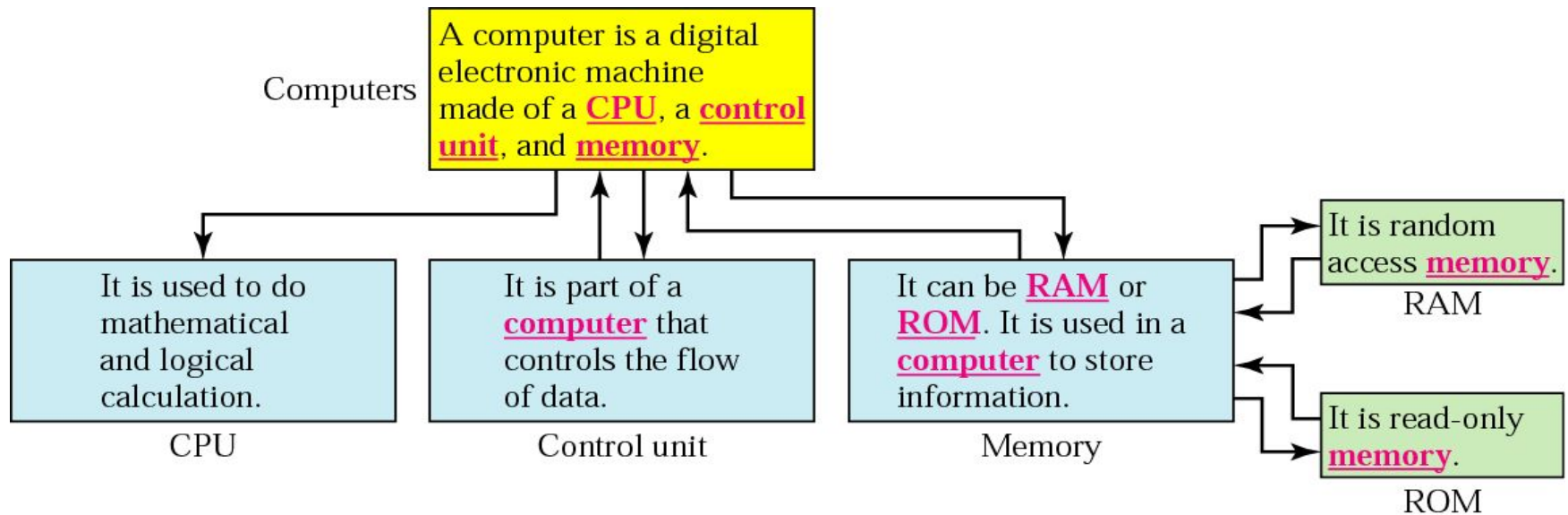


Figure 27.13 Browser architecture

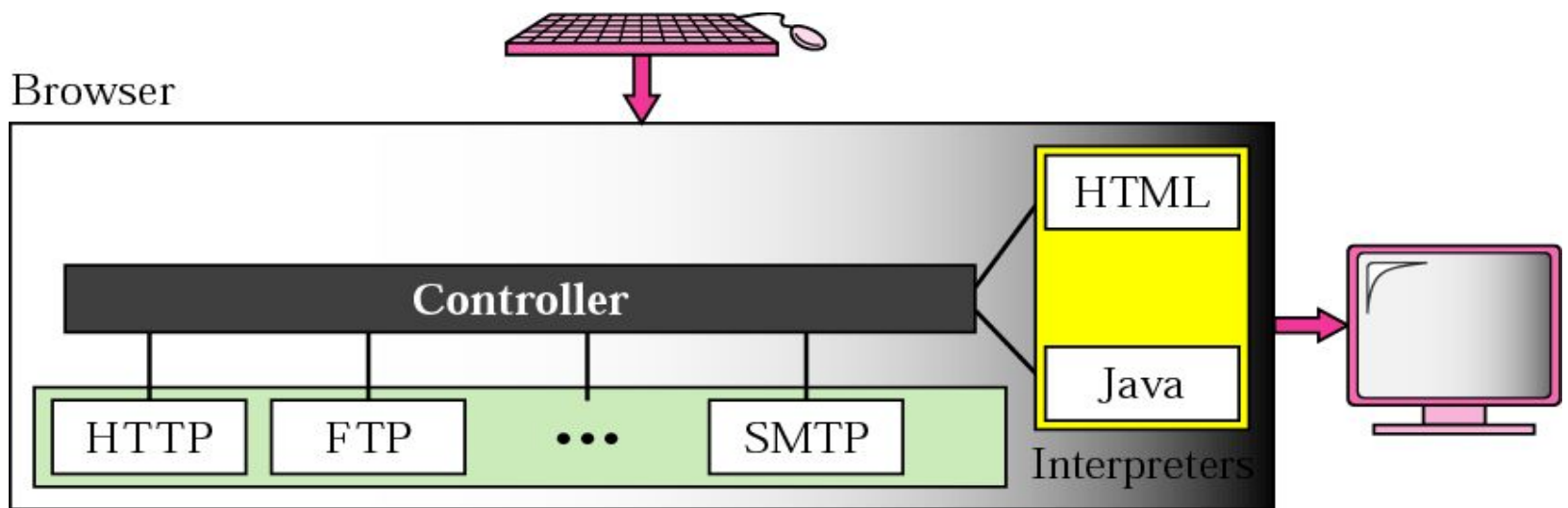


Figure 27.14 Categories of Web documents

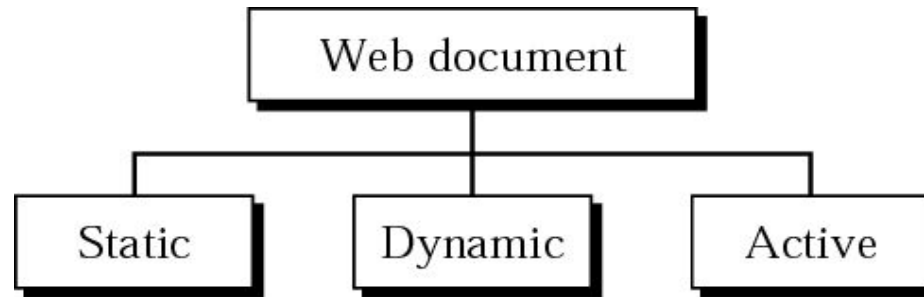


Figure 27.15 Static document

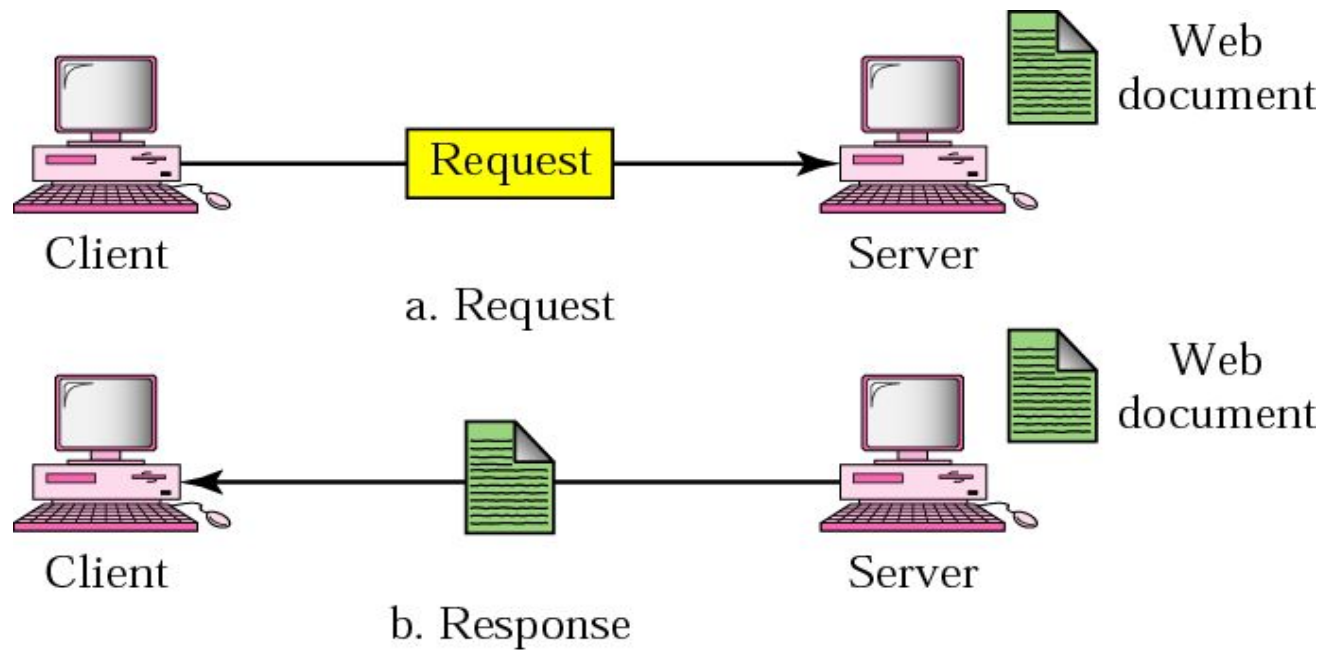


Figure 27.16 Boldface tags

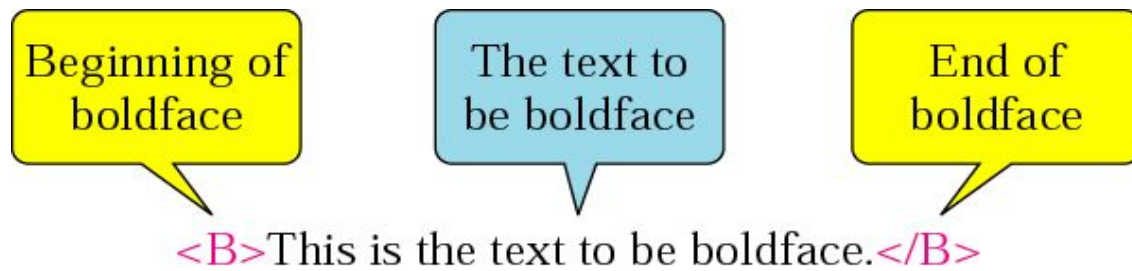


Figure 27.17 Effect of boldface tags

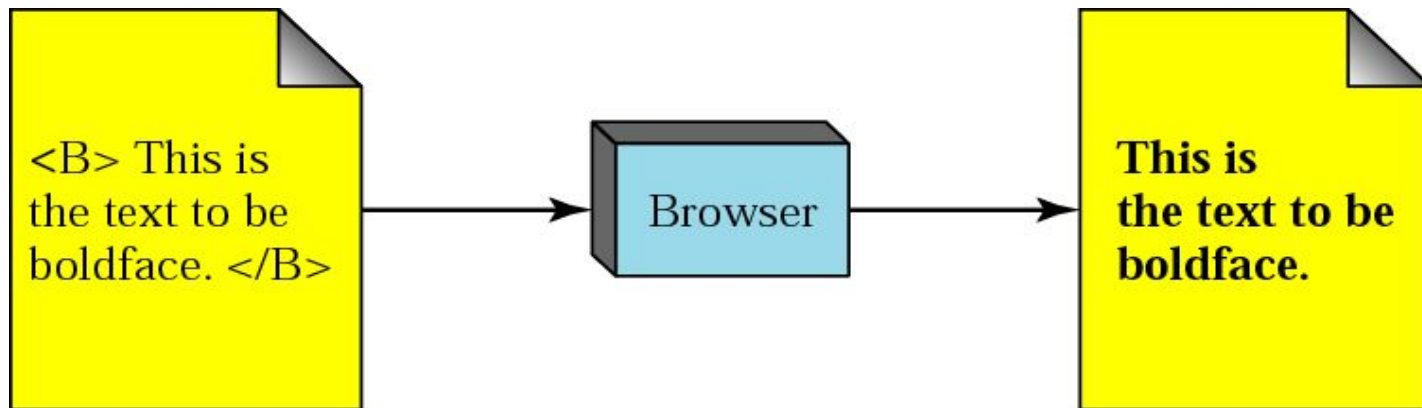


Figure 27.18 Beginning and ending tags

< TagName Attribute 5 Value Attribute 5 Value ... >

a. Beginning tag

< /TagName >

b. Ending tag

Table 27.1 Common tags

Beginning Tag	Ending Tag	Meaning
Skeletal Tags		
<HTML>	</HTML>	Defines an HTML document
<HEAD>	</HEAD>	Defines the head of the document
<BODY>	</BODY>	Defines the body of the document
Title and Header Tags		
<TITLE>	</TITLE>	Defines the title of the document
<Hn>	</Hn>	Defines the title of the document

Table 27.1 Common tags (continued)

Beginning Tag	Ending Tag	Meaning
Text Formatting Tags		
		Boldface
<I>	</I>	Italic
<U>	</U>	Underlined
_		Subscript
[]	Superscript
Data Flow Tag		
<CENTER>	</CENTER>	Centered
 	</BR>	Line break

Table 27.1 Common tags (continued)

Beginning Tag	Ending Tag	Meaning
List Tags		
		Ordered list
		Unordered list
		An item in a list
Image Tag		
		Defines an image
Hyperlink Tag		
<A>		Defines an address (hyperlink)
Executable Contents		
<APPLET>	</APPLET>	The document is an applet

*

Figure 27.19 Dynamic document

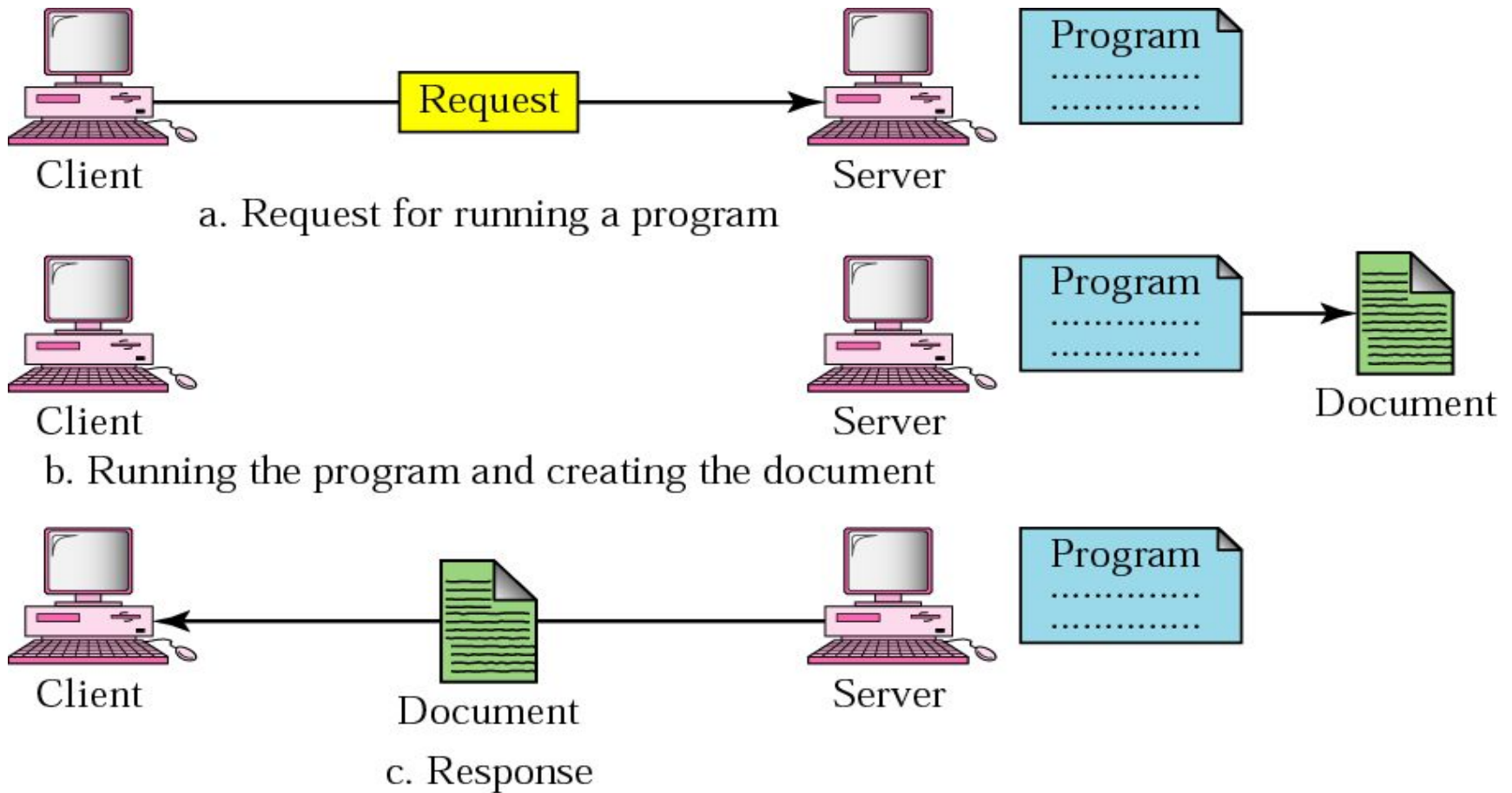
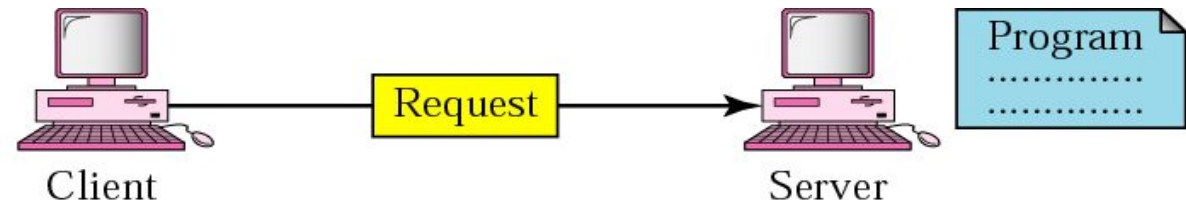
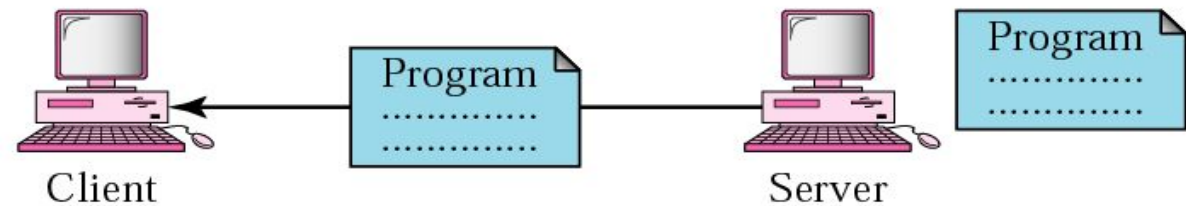


Figure 27.20 Active document



a. Request for a copy of a program



b. Sending a copy of the program



c. Running the program and creating the document