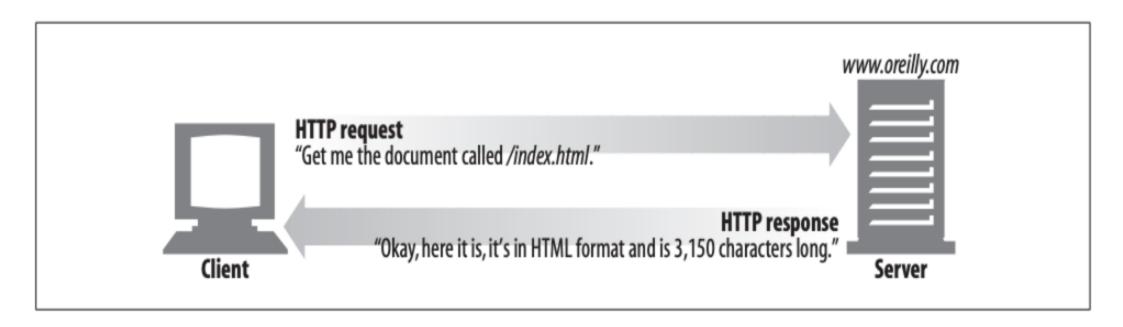
chapter1. Overview of HTTP

Sunggon

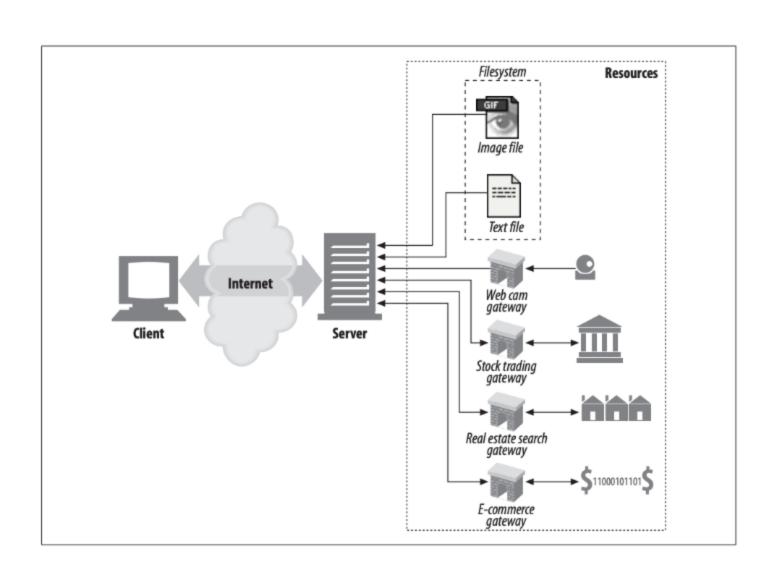
Contents

- · How web clients and servers communicate
- · Where resources (web content) come from
- How web transactions work
- The format of the messages used for HTTP communication
- · The underlying TCP network transport
- The different variations of the HTTP protocol
- Some of the many HTTP architectural
 components installed around the Internet

Web Clients and Servers

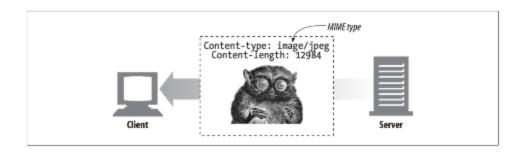


Resources



Media Types

MIME (Multipurpose Internet Mail Extensions)



primary object type/specific subtype

For example, text/html, text/plain image/jpeg, image/gif, video/quicktime, ...

URIS (uniform resource identifier)



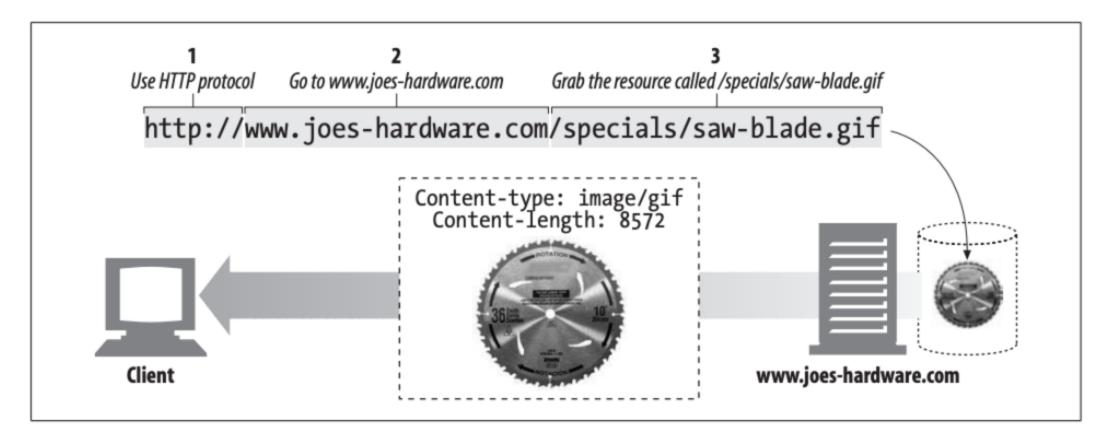
URNS

uniform resource

http://www.joes-hardware.com/specials/saw-blade.gif

urn:ietf:rfc:2141

URLS



Description
The home URL for O'Reilly & Associates, Inc.
The URL for the Yahoo! web site's logo
The URL for a program that checks if inventory item #12731 is in stock
The URL for the <i>locking-pliers.gif</i> image file, using password-protected FTP as the access protocol

Transactions

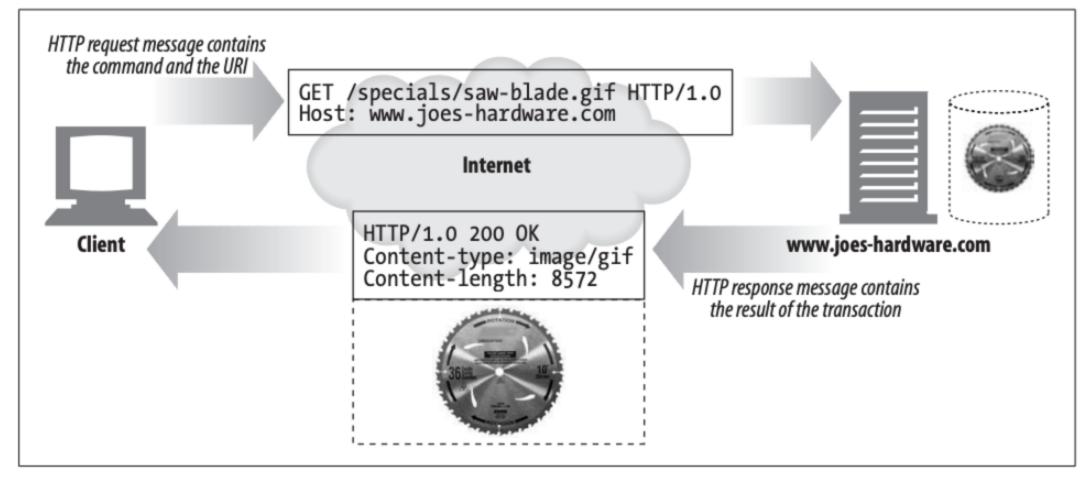
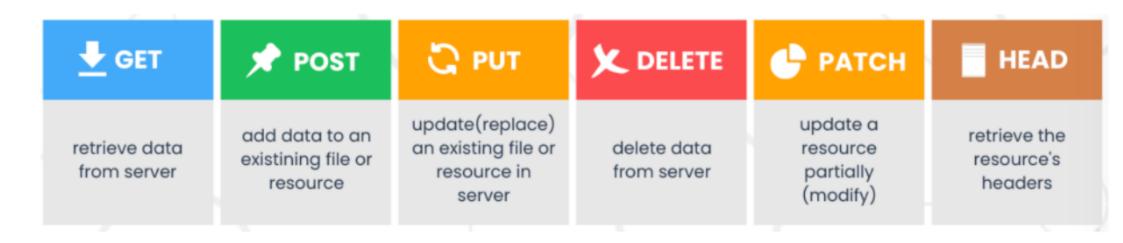


Figure 1-5. HTTP transactions consist of request and response messages

Methods



Status Codes



Web Pages Can Consist of Multiple Objects

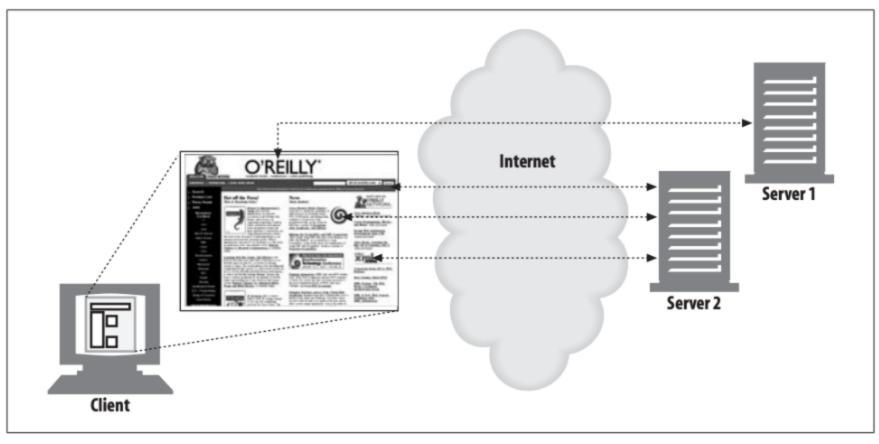


Figure 1-6. Composite web pages require separate HTTP transactions for each embedded resource

Messages

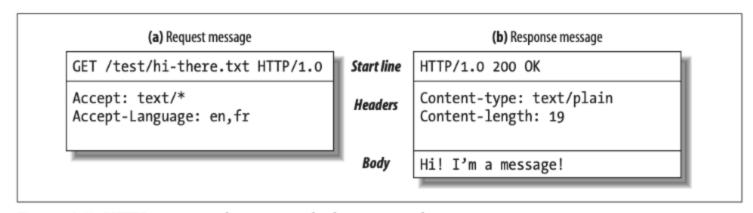


Figure 1-7. HTTP messages have a simple, line-oriented text structure

HTTP network protocol stack

HTTP

TCP

IΡ

Network-specific link interface

Physical network hardware

Application layer

Transport layer

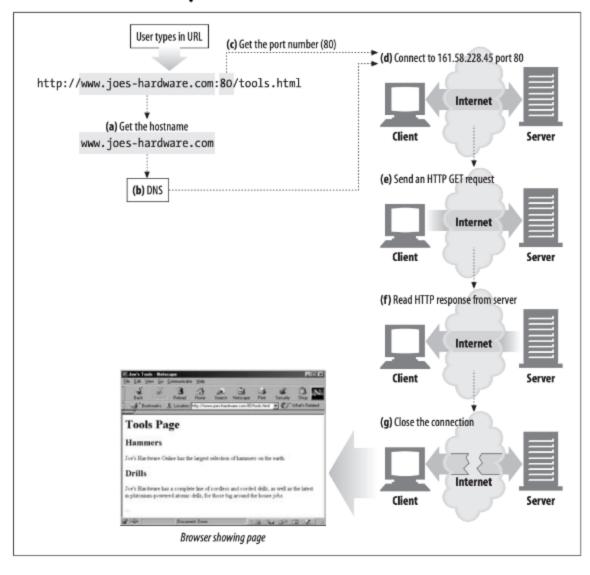
Network layer

Data link layer

Physical layer

Basic browser connection

process



An HTTP transaction using telnet

```
% telnet www.joes-hardware.com 80
 Trying 161.58.228.45...
 Connected to joes-hardware.com.
 Escape character is '^]'.
 GET /tools.html HTTP/1.1
 Host: www.joes-hardware.com
 HTTP/1.1 200 OK
 Date: Sun, 01 Oct 2000 23:25:17 GMT
 Server: Apache/1.3.11 BSafe-SSL/1.38 (Unix) FrontPage/4.0.4.3
 Last-Modified: Tue, 04 Jul 2000 09:46:21 GMT
 ETag: "373979-193-3961b26d"
 Accept-Ranges: bytes
 Content-Length: 403
 Connection: close
 Content-Type: text/html
<HTML>
<HEAD><TITLE>Joe's Tools</TITLE></HEAD>
<BODY>
<h1>Tools Page</h1>
<H2>Hammers</H2>
<P>Joe's Hardware Online has the largest selection of hammers on the earth.
<H2><A NAME=drills></A>Drills</H2>
<P>Joe's Hardware has a complete line of cordless and corded drills, as well as the latest
in plutonium-powered atomic drills, for those big around the house jobs.</P> ...
</BODY>
</HTML>
```

Connection closed by foreign host.

Protocol Versions

HTTP/0.9

[1991]; oneline protocol used to transfer plain HTML files

HTTP/1.0

[1996]; concept of headers, version information, status codes were introduced

HTTP/2

[2015]; based on Google's SPDY allows multiplexing and server push













HTTPS

[1994]; Netscape created https to be used with SSL for its browser

HTTP/1.1

[1997]; Introduced persistent connection, pipelining, cachecontrol and many other features

HTTP/3

[2019]; based on Google's QUIC that uses UDP instead of TCP

Proxies

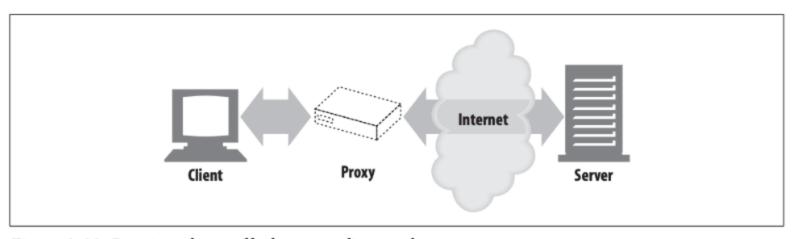


Figure 1-11. Proxies relay traffic between client and server

Caches

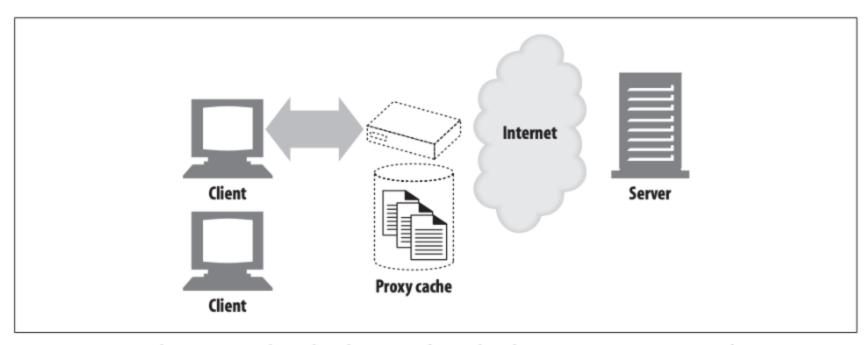


Figure 1-12. Caching proxies keep local copies of popular documents to improve performance

Gateways

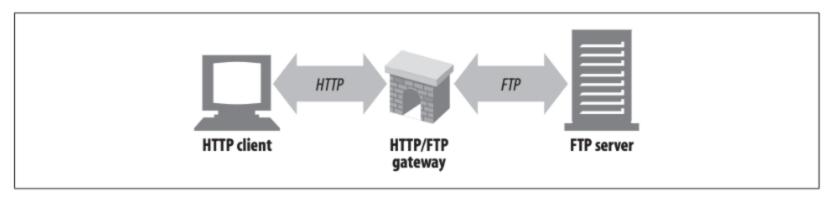


Figure 1-13. HTTP/FTP gateway

Tunnels

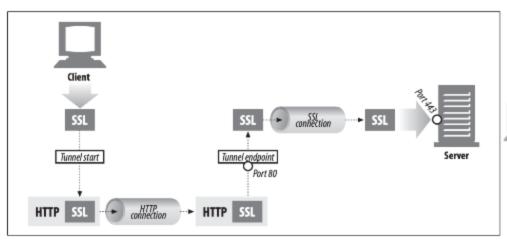
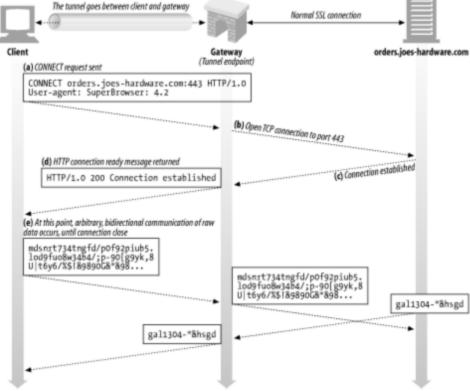


Figure 1-14. Tunnels forward data across non-HTTP networks (HTTP/SSL tunnel shown)

ka.	115	Serve	Destination	Protocol	bright file
	7 0.265761	192,160,07.9	172,24,90,49	TCP	00 49743 + 0000 SWI Seq=0 Nin=0192 Sen=0 NS=1/460 NS=2/56 SWK PEN=1
	8.6.299899	172,24,98,49	192,168,87.9	TCP	66 3333 - 49740 [SWI, ACK] Seq 9 Ack 1 Min 67575 Len 9 MS 1769 MS 256 SACK PERM 1
	9.8.299122	192,168,87.9	172,24,98,49	TCP	51 1971) = 8888 [ACK] Seq 1 Ack 1 Min 10102 Len 8
	THE REPORT AND	197,160,07,9	177,70,98,09	HILL	228 CORRECT Associations of Commodes HEID/T.B
	11 0 . 307949	172,24,96,49	192,168,87,9	107	54 8888 + 49743 [ACK] Scopt, Adve225 Mine2082272 Lone8
	12 0 . 334519	172,24,90,49	192,160,07.9	HTTP	111 HTTP/1.0 200 Connection Established
	13 0.334331	192,160,07.9	172,24,99,49	TCP	54 49743 + 3333 [ACK] Seq 225 Ack 100 Htn 131072 Len 0
	14.6.000085	192,168,27.9	172,24,98,49	T13v1.2	222 Cifent Helia
	15 87 475715	1777-797-987-99	197,168,87,9	14.9	мя жеке — лясти [и к] мерлик оскнови ийонстилить перни
	15 6 46 78 93	172,24,96,49	192,163,37,9	11.591.2	1914 Server Hello
	17 0.407848	172,24,96,49	192,168,87,9	107	1514 8888 : 40748 [ACK: Sep-1568 Ackes98 Hure/166816 Lore/1466 RCP separation of a reassemble:

Figure 8-10. Using CONNECT to establish an SSL tunnel



Agents

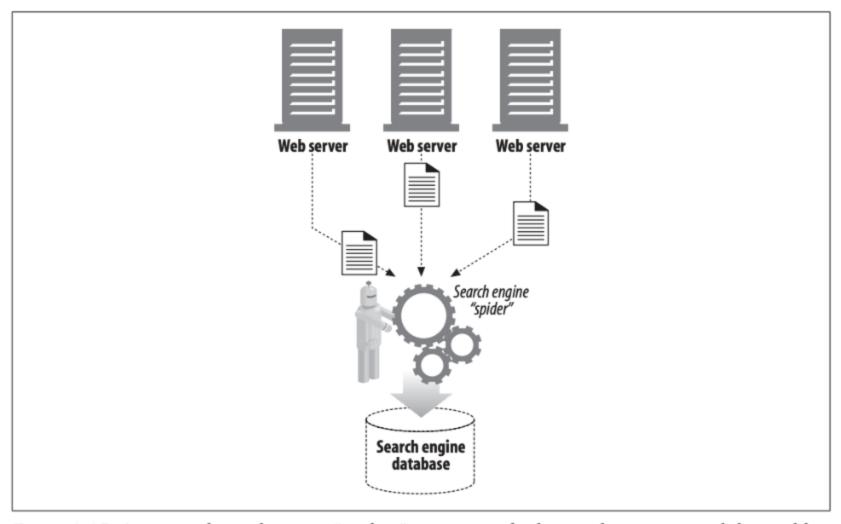


Figure 1-15. Automated search engine "spiders" are agents, fetching web pages around the world

For More Information

- https://datatracker.ietf.org/doc/html/rfc9114 HTTP/3
- https://datatracker.ietf.org/doc/html/rfc9113 HTTP/2
- http://www.ietf.org/rfc/rfc2616.txt HTTP/1.1
- http://www.ietf.org/rfc/rfc1945.txt HTTP/1.0
- https://developer.mozilla.org/en-US/docs/Web/HTTP/Resources_and_specifications
 HTTP Resources and specifications