

Network Working Group
Request for Comments: 2068
Category: Standards Track

R. Fielding
UC Irvine
J. Gettys
J. Mogul
DEC
H. Frystyk
T. Berners-Lee
MIT/LCS
January 1997

Hypertext Transfer Protocol -- HTTP/1.1

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

The Hypertext Transfer Protocol (HTTP) is an application-level protocol for distributed, collaborative, hypermedia information systems. It is a generic, stateless, object-oriented protocol which can be used for many tasks, such as name servers and distributed object management systems, through extension of its request methods. A feature of HTTP is the typing and negotiation of data representation, allowing systems to be built independently of the data being transferred.

HTTP has been in use by the World-Wide Web global information initiative since 1990. This specification defines the protocol referred to as "HTTP/1.1".

Table of Contents

- 1 Introduction.....7
 - 1.1 Purpose7
 - 1.2 Requirements7
 - 1.3 Terminology8
 - 1.4 Overall Operation11
- 2 Notational Conventions and Generic Grammar.....13
 - 2.1 Augmented BNF13
 - 2.2 Basic Rules15
- 3 Protocol Parameters.....17
 - 3.1 HTTP Version17

- 3.2.2 http URL19
- 3.2.3 URI Comparison20
- 3.3 Date/Time Formats21
 - 3.3.1 Full Date21
 - 3.3.2 Delta Seconds22
- 3.4 Character Sets22
- 3.5 Content Codings23
- 3.6 Transfer Codings24
- 3.7 Media Types25
 - 3.7.1 Canonicalization and Text Defaults26
 - 3.7.2 Multipart Types27
- 3.8 Product Tokens28
- 3.9 Quality Values28
- 3.10 Language Tags28
- 3.11 Entity Tags29
- 3.12 Range Units30
- 4 HTTP Message.....30
 - 4.1 Message Types30
 - 4.2 Message Headers31
 - 4.3 Message Body32
 - 4.4 Message Length32
 - 4.5 General Header Fields34
- 5 Request.....34
 - 5.1 Request-Line34
 - 5.1.1 Method35
 - 5.1.2 Request-URI35
 - 5.2 The Resource Identified by a Request37
 - 5.3 Request Header Fields37
- 6 Response.....38
 - 6.1 Status-Line38
 - 6.1.1 Status Code and Reason Phrase39
 - 6.2 Response Header Fields41
- 7 Entity.....41
 - 7.1 Entity Header Fields41
 - 7.2 Entity Body42
 - 7.2.1 Type42
 - 7.2.2 Length43
- 8 Connections.....43
 - 8.1 Persistent Connections43
 - 8.1.1 Purpose43
 - 8.1.2 Overall Operation44
 - 8.1.3 Proxy Servers45
 - 8.1.4 Practical Considerations45
 - 8.2 Message Transmission Requirements46
- 9 Method Definitions.....48
 - 9.1 Safe and Idempotent Methods48

- 9.1.1 Safe Methods48
- 9.1.2 Idempotent Methods49
- 9.2 OPTIONS49
- 9.3 GET50
- 9.4 HEAD50
- 9.5 POST51
- 9.6 PUT52
- 9.7 DELETE53
- 9.8 TRACE53

- 10.1.1 100 Continue54
- 10.1.2 101 Switching Protocols54
- 10.2 Successful 2xx54
 - 10.2.1 200 OK54
 - 10.2.2 201 Created55
 - 10.2.3 202 Accepted55
 - 10.2.4 203 Non-Authoritative Information55
 - 10.2.5 204 No Content55
 - 10.2.6 205 Reset Content56
 - 10.2.7 206 Partial Content56
- 10.3 Redirection 3xx56
 - 10.3.1 300 Multiple Choices57
 - 10.3.2 301 Moved Permanently57
 - 10.3.3 302 Moved Temporarily58
 - 10.3.4 303 See Other58
 - 10.3.5 304 Not Modified58
 - 10.3.6 305 Use Proxy59
- 10.4 Client Error 4xx59
 - 10.4.1 400 Bad Request60
 - 10.4.2 401 Unauthorized60
 - 10.4.3 402 Payment Required60
 - 10.4.4 403 Forbidden60
 - 10.4.5 404 Not Found60
 - 10.4.6 405 Method Not Allowed61
 - 10.4.7 406 Not Acceptable61
 - 10.4.8 407 Proxy Authentication Required61
 - 10.4.9 408 Request Timeout62
 - 10.4.10 409 Conflict62
 - 10.4.11 410 Gone62
 - 10.4.12 411 Length Required63
 - 10.4.13 412 Precondition Failed63
 - 10.4.14 413 Request Entity Too Large63
 - 10.4.15 414 Request-URI Too Long63
 - 10.4.16 415 Unsupported Media Type63
- 10.5 Server Error 5xx64
 - 10.5.1 500 Internal Server Error64
 - 10.5.2 501 Not Implemented64

- 10.5.3 502 Bad Gateway64
- 10.5.4 503 Service Unavailable64
- 10.5.5 504 Gateway Timeout64
- 10.5.6 505 HTTP Version Not Supported65
- 11 Access Authentication.....65
 - 11.1 Basic Authentication Scheme66
 - 11.2 Digest Authentication Scheme67
- 12 Content Negotiation.....67
 - 12.1 Server-driven Negotiation68
 - 12.2 Agent-driven Negotiation69
 - 12.3 Transparent Negotiation70
- 13 Caching in HTTP.....70
 - 13.1.1 Cache Correctness72
 - 13.1.2 Warnings73
 - 13.1.3 Cache-control Mechanisms74
 - 13.1.4 Explicit User Agent Warnings74
 - 13.1.5 Exceptions to the Rules and Warnings75
 - 13.1.6 Client-controlled Behavior75

- 13.2.2 Heuristic Expiration76
- 13.2.3 Age Calculations77
- 13.2.4 Expiration Calculations79
- 13.2.5 Disambiguating Expiration Values80
- 13.2.6 Disambiguating Multiple Responses80
- 13.3 Validation Model81
 - 13.3.1 Last-modified Dates82
 - 13.3.2 Entity Tag Cache Validators82
 - 13.3.3 Weak and Strong Validators82
 - 13.3.4 Rules for When to Use Entity Tags and Last-
modified Dates.....85
 - 13.3.5 Non-validating Conditionals86
- 13.4 Response Cachability86
- 13.5 Constructing Responses From Caches87
 - 13.5.1 End-to-end and Hop-by-hop Headers88
 - 13.5.2 Non-modifiable Headers88
 - 13.5.3 Combining Headers89
 - 13.5.4 Combining Byte Ranges90
- 13.6 Caching Negotiated Responses90
- 13.7 Shared and Non-Shared Caches91
- 13.8 Errors or Incomplete Response Cache Behavior91
- 13.9 Side Effects of GET and HEAD92
- 13.10 Invalidation After Updates or Deletions92
- 13.11 Write-Through Mandatory93
- 13.12 Cache Replacement93
- 13.13 History Lists93
- 14 Header Field Definitions.....94
 - 14.1 Accept95

- 14.2 Accept-Charset97
- 14.3 Accept-Encoding97
- 14.4 Accept-Language98
- 14.5 Accept-Ranges99
- 14.6 Age99
- 14.7 Allow100
- 14.8 Authorization100
- 14.9 Cache-Control101
 - 14.9.1 What is Cachable103
 - 14.9.2 What May be Stored by Caches103
 - 14.9.3 Modifications of the Basic Expiration Mechanism 104
 - 14.9.4 Cache Revalidation and Reload Controls105
 - 14.9.5 No-Transform Directive107
 - 14.9.6 Cache Control Extensions108
- 14.10 Connection109
- 14.11 Content-Base109
- 14.12 Content-Encoding110
- 14.13 Content-Language110
- 14.14 Content-Length111
- 14.15 Content-Location112
- 14.16 Content-MD5113
- 14.17 Content-Range114
- 14.18 Content-Type116
- 14.19 Date116
- 14.20 ETag117
- 14.21 Expires117
- 14.22 From118

- 14.25 If-Match121
- 14.26 If-None-Match122
- 14.27 If-Range123
- 14.28 If-Unmodified-Since124
- 14.29 Last-Modified124
- 14.30 Location125
- 14.31 Max-Forwards125
- 14.32 Pragma126
- 14.33 Proxy-Authenticate127
- 14.34 Proxy-Authorization127
- 14.35 Public127
- 14.36 Range128
 - 14.36.1 Byte Ranges128
 - 14.36.2 Range Retrieval Requests130
- 14.37 Referer131
- 14.38 Retry-After131
- 14.39 Server132
- 14.40 Transfer-Encoding132
- 14.41 Upgrade132

- 14.42 User-Agent134
- 14.43 Vary134
- 14.44 Via135
- 14.45 Warning137
- 14.46 WWW-Authenticate139
- 15 Security Considerations.....139
 - 15.1 Authentication of Clients139
 - 15.2 Offering a Choice of Authentication Schemes140
 - 15.3 Abuse of Server Log Information141
 - 15.4 Transfer of Sensitive Information141
 - 15.5 Attacks Based On File and Path Names142
 - 15.6 Personal Information143
 - 15.7 Privacy Issues Connected to Accept Headers143
 - 15.8 DNS Spoofing144
 - 15.9 Location Headers and Spoofing144
- 16 Acknowledgments.....144
- 17 References.....146
- 18 Authors' Addresses.....149
- 19 Appendices.....150
 - 19.1 Internet Media Type message/http150
 - 19.2 Internet Media Type multipart/byteranges150
 - 19.3 Tolerant Applications151
 - 19.4 Differences Between HTTP Entities and
MIME Entities.....152
 - 19.4.1 Conversion to Canonical Form152
 - 19.4.2 Conversion of Date Formats153
 - 19.4.3 Introduction of Content-Encoding153
 - 19.4.4 No Content-Transfer-Encoding153
 - 19.4.5 HTTP Header Fields in Multipart Body-Parts153
 - 19.4.6 Introduction of Transfer-Encoding154
 - 19.4.7 MIME-Version154
 - 19.5 Changes from HTTP/1.0154
 - 19.5.1 Changes to Simplify Multi-homed Web Servers and
Conserve IP Addresses155
 - 19.6 Additional Features156
 - 19.6.1 Additional Request Methods156

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.