



Overview of HTTP

Authored and Presented by : Sushant B.
Email : sushantba@cybage.com | Extn. 7221

Agenda

- Introduction
- Clients and Servers
- Web Resources
- HTTP Transactions
- Messages
- Connections
- Architecture

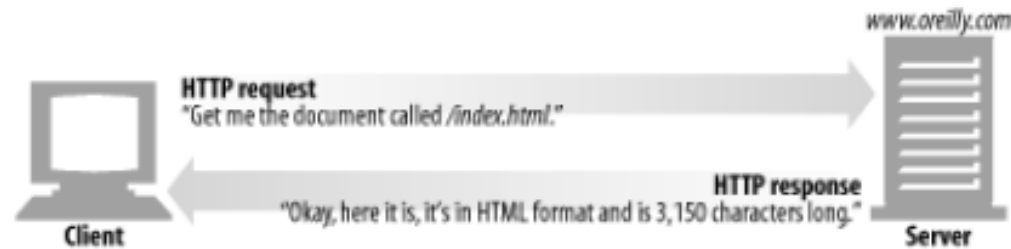


Introduction

- Hypertext Transfer Protocol
 - It is a common language for browsers, servers and web applications
 - It moves all types of data from server to client
 - It ensures reliable transmission of data.

Clients and Servers

- Client and server communications
 - Web servers understand HTTP protocols
 - Client sends HTTP requests to servers
 - Servers return data in HTTP response.



HTTP Client

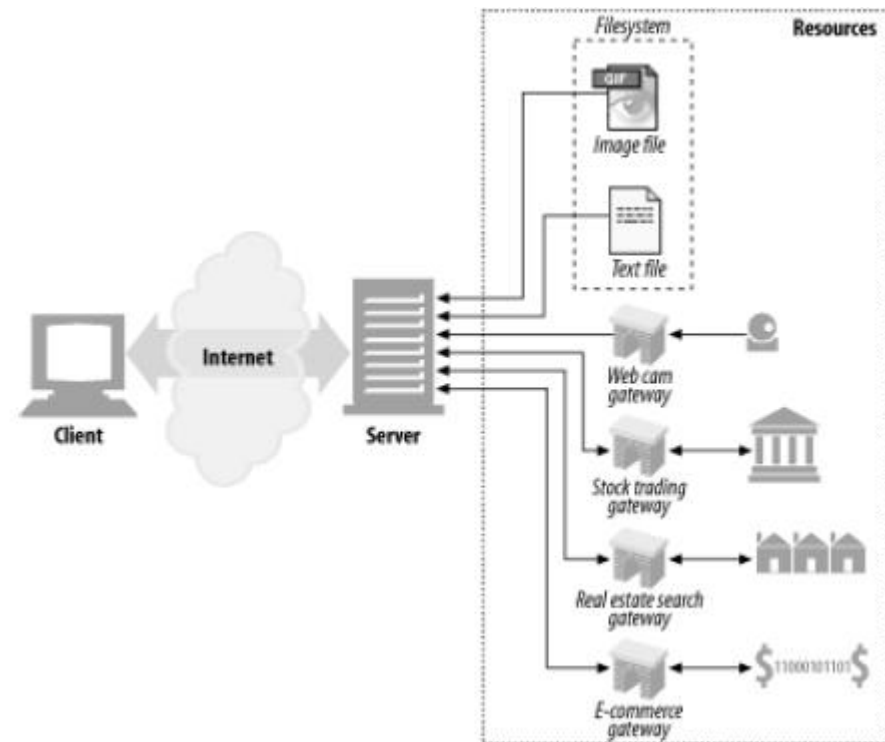
- Web Browsers – IE, Chrome, Firefox etc.
 - Browsers know how to send HTTP requests
 - Typing URL we tell the browser where to send
 - Browsers also know how to receive the response.

Web Servers

- Web Servers / HTTP Servers / IIS
 - Server understands HTTP protocols
 - It tries to find requested resources
 - Creates response and send back to the client.

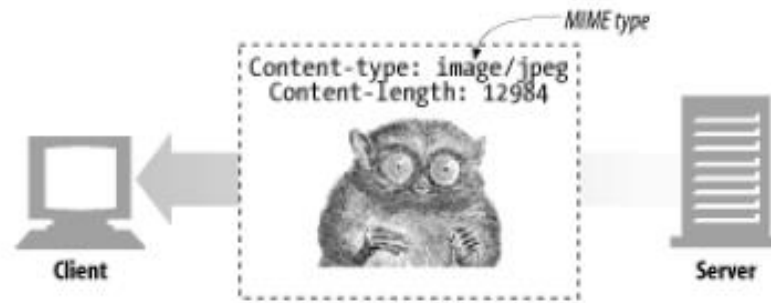
Web Resources

- Web server hosts web resources
 - A web resource can be any static file
 - A static file can be text, images, pdf, word, HTML etc.
 - Can be a software programs generates dynamic content.



MIME Types

- Multipurpose Internet Mail Extensions Types
 - Web servers host many resources of different data types
 - Servers attach MIME type to every HTTP object data
 - Browsers decide how to handle response by reading MIME type.



MIME Types...

- Popular media types
 - HTML formatted text document – text/html
 - Image files – image/jpeg, image/gif etc.
 - Xml formatted document – application/xml
 - JSon formatted document – application/json.

URIs

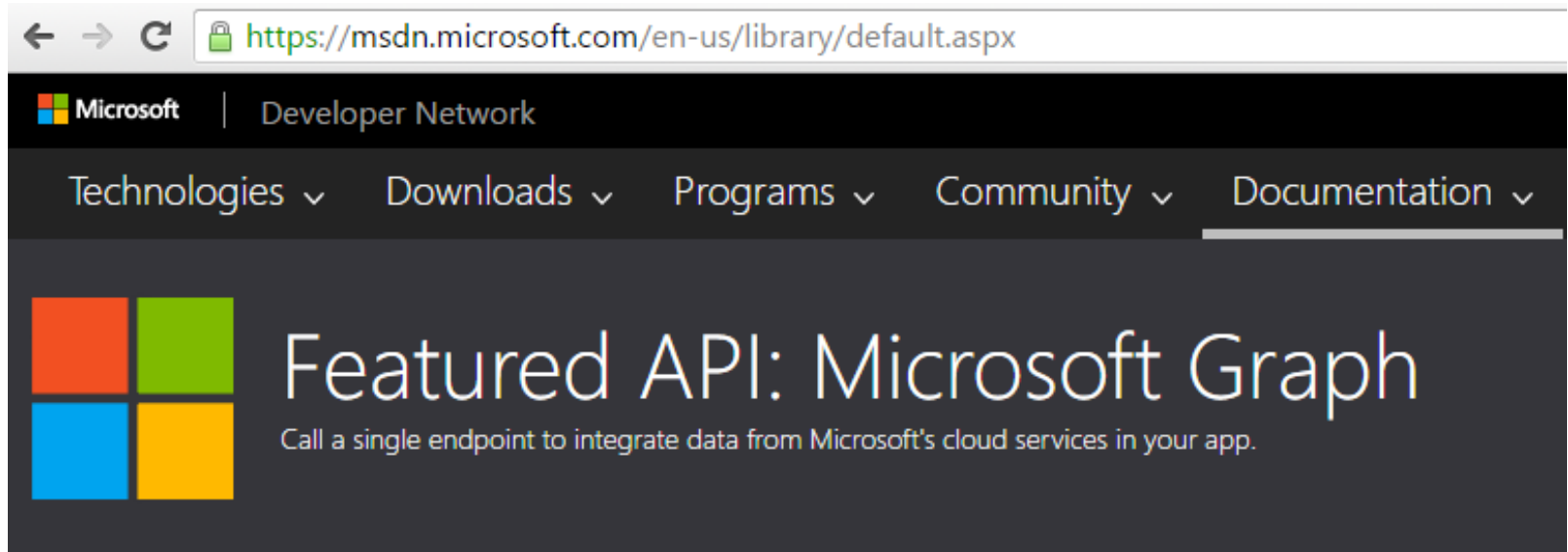
- Uniform Resource Identifiers (URI)
 - Each resource in the server has a name
 - Client can request a resource by name
 - URIs can uniquely identify and locate resources
 - URIs are two types – URLs and URNs.

URLs

- Uniform Resource Locators (URL)
 - URLs are most common form of URIs
 - It describes specific location of a resource
 - Server uses specific location to find the resource.

URLs...

- URLs has three main parts
 - First part is called scheme describes protocol (http://)
 - Second part describes server internet address (www.google.com)
 - The rest part describes name of the resource (/index.html).

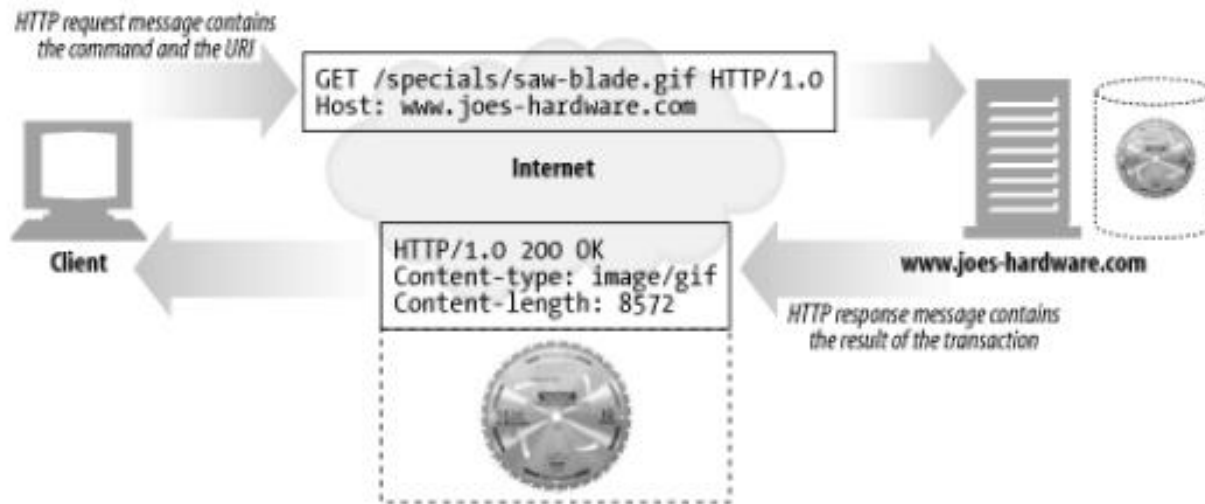


URNs

- Uniform Resource Name (URN)
 - It describes a unique name of particular resource
 - URNs do not specify the location of the resource
 - Benefit is resource can be moved from server to server
 - But still a client can point the resource using same URN
 - URNs are still experimental and not yet widely adopted.

HTTP Transactions

- HTTP transaction consists of
 - A request command and a response command
 - These commands generates HTTP messages
 - HTTP message is a formatted block of data.



HTTP Methods

- **GET**
 - Retrieves the representation of the resource at a specified URI
 - No side effects on the server
- **POST**
 - Creates a new resource
 - Response message returns with URI of newly created object
- **PUT**
 - Updates a resource at a specified URI
- **DELETE**
 - Deletes a resource at a specified URI.

HTTP Status Codes

- A status code group refers related status codes.
- An HTTP status code describes HTTP response
- It also describes the reason for the response

STATUS CODE GROUP	DESCRIPTION
1xx	Informational: The request was received, and the server is continuing to process.
2xx	Success: The action was successfully received, understood, and accepted.
3xx	Redirect Command: The client must access a different resource instead.
4xx	Client Error: The request has a syntax error or the server does not know how to fulfill the request.
5xx	Server Error: The server failed to fulfill a request that appears to be valid.

Common HTTP Status Codes

STATUS CODE	REASON
100	Continue
200	OK
201	Created
300	Multiple Choices
301	Moved Permanently
302	Found
400	Bad Request
401	Unauthorized
403	Forbidden
404	Not Found
407	Proxy Authentication Required
408	Request Time-out
413	Request Entity Too Large
500	Internal Server Error
501	Not Implemented

HTTP Messages

- HTTP messages consist of three parts
 - Start line – what to do for a request/what happened for a response
 - Header fields – contains name : value (Content-type : text/html)
 - Body – carries data to and from servers.

(a) Request message		(b) Response message	
GET /test/hi-there.txt HTTP/1.0 Accept: text/* Accept-Language: en,fr	<i>Start line</i>	HTTP/1.0 200 OK	
	<i>Headers</i>	Content-type: text/plain Content-length: 19	
	<i>Body</i>	Hi! I'm a message!	

HTTP Connections

- HTTP network protocol stack
 - HTTP – Application layer protocol
 - TCP – Transport layer protocol
 - IP – Network layer protocol.

TCP/IP

- Transmission Control Protocol / Internet Protocol
 - Internet is based on TCP/IP
 - It hides details of communication among network and hardware devices
 - HTTP relies on TCP connections for reliable message delivery.

TCP

- TCP provides
 - Error free data transportation
 - In-order delivery
 - Unsegmented data stream

IP Addresses

- TCP/IP connection requires
 - IP addresses of the servers
 - Port number associated with software applications
 - IP addresses are unique identification of server machines.

Resolving IP Addresses

- DNS – Domain Name Service
 - URLs contains domain name/host name instead of IP address
 - Domain names are easy to remember
 - Domain names are converted to IP addresses using DNS.

HTTP Architecture

- Architectural components of web
 - Internet communications include many other web applications
 - An HTTP communications may use those applications
 - Proxies, Caches, Gateways etc. are some examples.

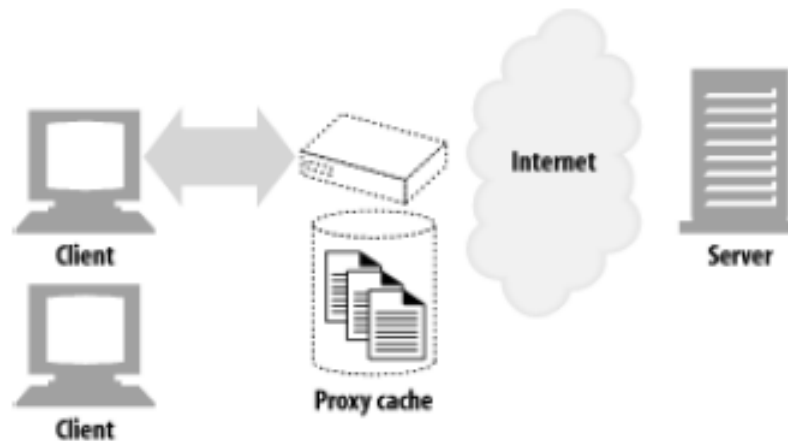
Proxy Servers

- A Proxy server sits between a client and a server
 - It receives HTTP requests and relay the requests to server
 - It can also filter requests and response
 - Benefits - Web security and Performance optimization.



Cache Server

- A cache is a special type of proxy server
 - It keeps copy of popular documents
 - The next request for same document served by cache
 - Client can access documents quickly from nearest cache facility.



Gateways Servers

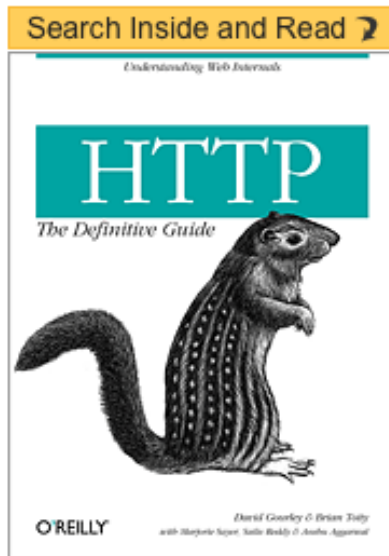
- Gateways are special servers
 - Act as intermediaries for other servers
 - Can convert HTTP traffic to another protocol
 - Gateways receives requests as if it is original server.



Demo

References

- Links
 - https://en.wikipedia.org/wiki/Hypertext_Transfer_Protocol
- Book



HTTP: The Definitive Guide

By David Gourley, Brian Totty, Marjorie Sayer, Anshu Aggarwal, Sailu Reddy

Publisher: O'Reilly Media

Final Release Date: September 2002

Pages: 658



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Behind every web transaction lies the Hypertext Transfer Protocol (HTTP) — the language of web browsers and servers, of portals and search engines, of e-commerce and web services. Understanding HTTP is essential for practically all web-based programming, design, analysis, and administration. While the basics of HTTP are...

[Full description](#)



Thank you!