

Applicazioni Web 2013/14

Lezione I - Il protocollo HTTP

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(cc) Alcuni diritti riservati.

Informazioni

- <http://matteo.vaccari.name/aw>
- <http://matteo.vaccari.name/aw/diario>
- Iscrivetevi alla mailing list!

Esame?

Elaborato seguito da orale

Prerequisiti

Scopo del corso

Testo

<http://matteo.vaccari.name/aw/diario>

Le più importanti invenzioni - I L'alfabeto

1			aleph	30			lamed
2			beth	40			mem
3			gimel	50			nun
4			daleth	60			samekh
5			he	70			ayin
6			wav	80			pe
7			zayin	90			tsade
8			chet	100			qof
9			tet	200			resh
10			yod	300			sin/shin
20			kaf	400			tav
	N	P	H		N	P	H

wikipedia - Flyingbird

http://commons.wikimedia.org/wiki/Image:Phoenizisches_alphabet.jpg

Le più importanti invenzioni - II

Le cifre arabe

Sicut debentur in Indos subtilissimum Ingenium habere. et ceteris
generis in anachimacum et comaricu. et ceteris liberulis
disciplinis concedere. et hoc munusculum et in nobem
figuris quibus designantur unum quodlibet gradum.
cuiuslibet gradus quatuor hęc sunt forme

٩ ٨ ٧ ٦ ٥ ٤ ٣ ٢ ١ ||| —————

Le più importanti invenzioni - III

La stampa a caratteri mobili



http://en.wikipedia.org/wiki/Image:Metal_movable_type.jpg

Le più importanti invenzioni - IV

Le più importanti invenzioni - IV

<http://www.example.org/>

Le più importanti invenzioni - IV

<http://www.example.org/>

URI

Uniform Resource Identifier

URI

Uniform Resource Identifiers (URI) provide a **simple** and **extensible** means for **identifying** a **resource**.

Tim Berners-Lee, Roy Fielding, rfc2396

What is a *resource*?

A resource can be *anything that has identity*.

Familiar examples include an electronic document, an image, a service (e.g., “today's weather report for Los Angeles”), and a collection of other resources.

Not all resources are network “retrievable”; e.g., human beings, corporations, and bound books in a library can also be considered resources.

Tim Berners-Lee, Roy Fielding, rfc2396

Altri esempi di *risorse*

Richardson and Ruby, *RESTful Web Services*

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

<http://example.com/software/releases/latest.tgz>

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

<http://example.com/software/releases/latest.tgz>

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

<http://example.com/software/releases/latest.tgz>

Gli articoli di un blog del 2 ottobre 2007

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

<http://example.com/software/releases/latest.tgz>

Gli articoli di un blog del 2 ottobre 2007

<http://example.com/blog/2007/10/2>

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

<http://example.com/software/releases/latest.tgz>

Gli articoli di un blog del 2 ottobre 2007

<http://example.com/blog/2007/10/2>

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

<http://example.com/software/releases/latest.tgz>

Gli articoli di un blog del 2 ottobre 2007

<http://example.com/blog/2007/10/2>

L'articolo dedicato a “RESTful Web Services”

Richardson and Ruby, *RESTful Web Services*

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

<http://example.com/software/releases/latest.tgz>

Gli articoli di un blog del 2 ottobre 2007

<http://example.com/blog/2007/10/2>

L'articolo dedicato a “RESTful Web Services”

<http://example.com/blog/restful-web-services>

Richardson and Ruby, *RESTful Web Services*

Altri esempi di *risorse*

La versione 22.1 di un'applicazione

<http://example.com/software/releases/22.1.tgz>

L'ultima versione di un'applicazione

<http://example.com/software/releases/latest.tgz>

Gli articoli di un blog del 2 ottobre 2007

<http://example.com/blog/2007/10/2>

L'articolo dedicato a “RESTful Web Services”

<http://example.com/blog/restful-web-services>

Richardson and Ruby, *RESTful Web Services*

E che ci facciamo con le *risorse?*

*Having identified a resource, a system may perform a variety of operations on the resource, as might be characterized by such words as ‘*access*’, ‘*update*’, ‘*replace*’, or ‘*find attributes*’*

Tim Berners-Lee, Roy Fielding, rfc2396

URI e URL

URI: Universal Resource *Identifier*

URL: Universal Resource *Locator*

URL refers to the *subset of URI* that identify resources via a *representation of their primary access mechanism* (e.g., their network “location”)

Tim Berners-Lee, Roy Fielding, rfc2396

Addressability

Un'applicazione Web è *indirizzabile* se espone
gli aspetti interessanti dei suoi dati come
risorse

Google Mail è indirizzabile?

<https://mail.google.com/mail/#inbox/11d5e2460af15fe6>

<https://mail.google.com/mail/#label/aaa-agire>

<https://mail.google.com/mail/#search/marco>



Wordpress è indirizzabile?

<http://matteo.vaccari.name/blog/archives/138>

<http://matteo.vaccari.name/blog/archives/date/2008/10>

<http://matteo.vaccari.name/blog/archives/category/agile>



Anatomia di una URI

Anatomia di una URI

<scheme>:<scheme-specific-part>

Anatomia di una URI

<scheme>:<scheme-specific-part>

mailto:vaccari@pobox.com

Anatomia di una URI

<scheme>:<scheme-specific-part>

mailto:vaccari@pobox.com

http://www.example.com/pages/hello.txt

Anatomia di una URI

<scheme>:<scheme-specific-part>

mailto:vaccari@pobox.com

http://www.example.com/pages/hello.txt

telnet://192.0.2.16:80/

Anatomia di una URI

<scheme>:<scheme-specific-part>

mailto:vaccari@pobox.com

http://www.example.com/**pages/hello.txt**

telnet://192.0.2.16:80/

news:rec.arts.int-fiction

http uri

http://<host><path>

http://www.example.com/

scheme: http

host: www.example.com

path: /

http uri

http://<host><path>

http://www.example.com/books/list.html

scheme: http

host: www.example.com

path: /books/list.html

http uri

http://<host><path>[<query>]

http://www.example.com/search?q=facoceri&start=10

scheme: http

host: www.example.com

path: /search

query string: q=facoceri&start=10

http uri

`http://<host><path>[<query>][<fragment>]`

`http://www.example.com/search?q=facoceri&start=10#fragm`

scheme: http

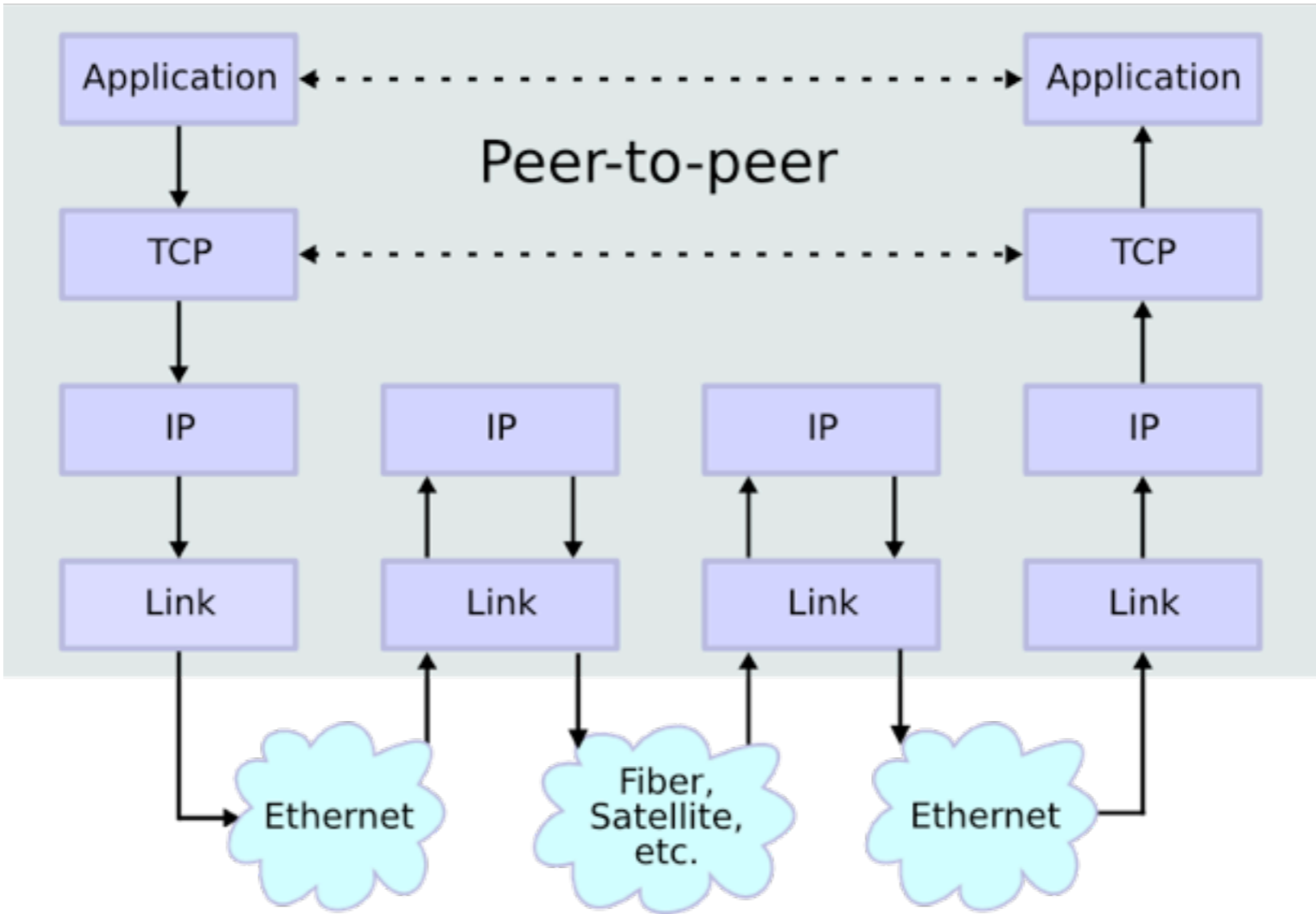
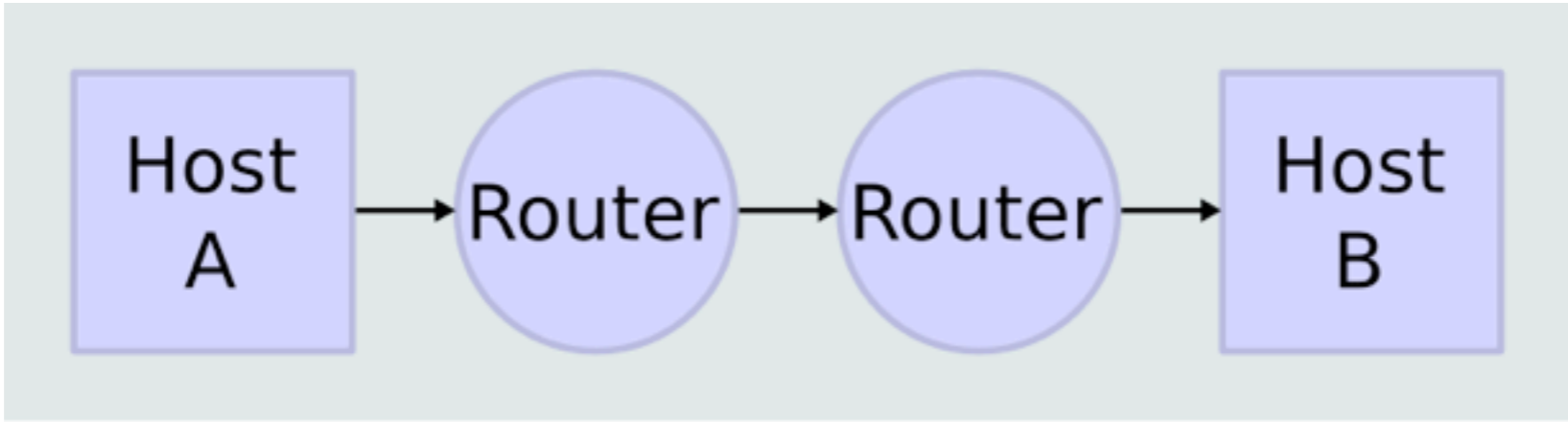
host: www.example.com

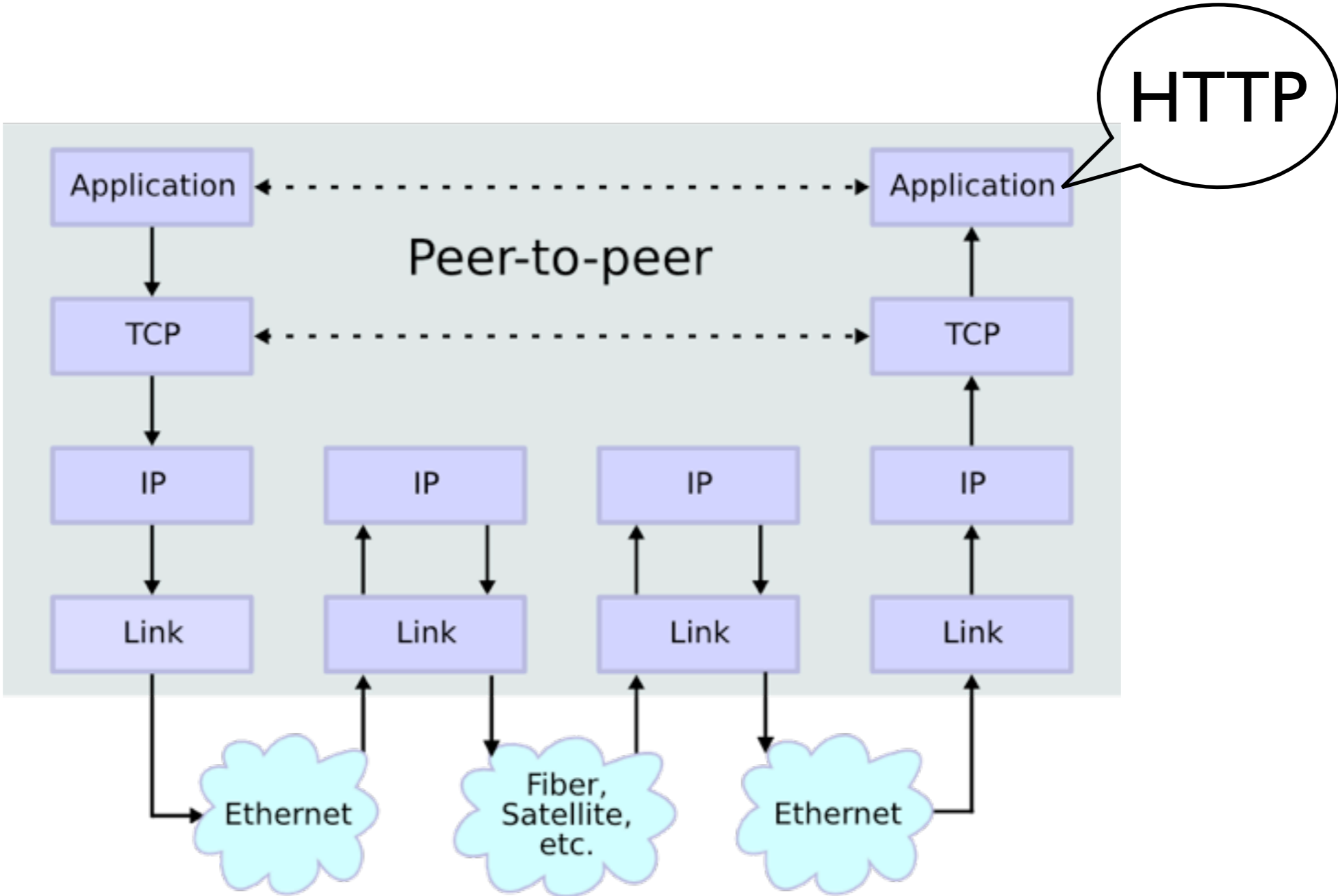
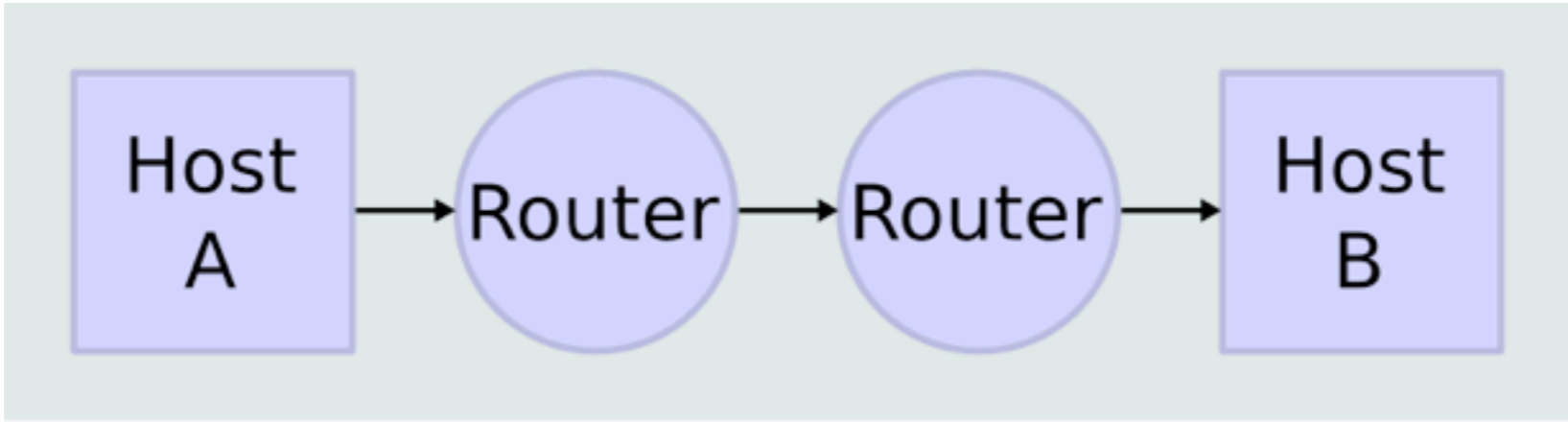
path: /search

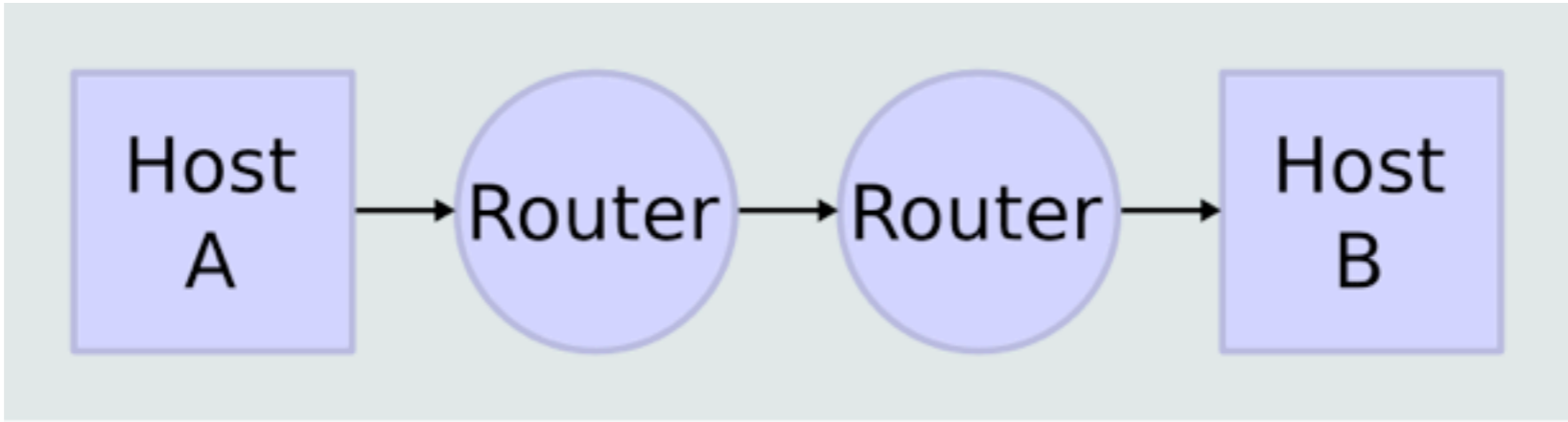
query string: q=facoceri&start=10

fragment: fragm

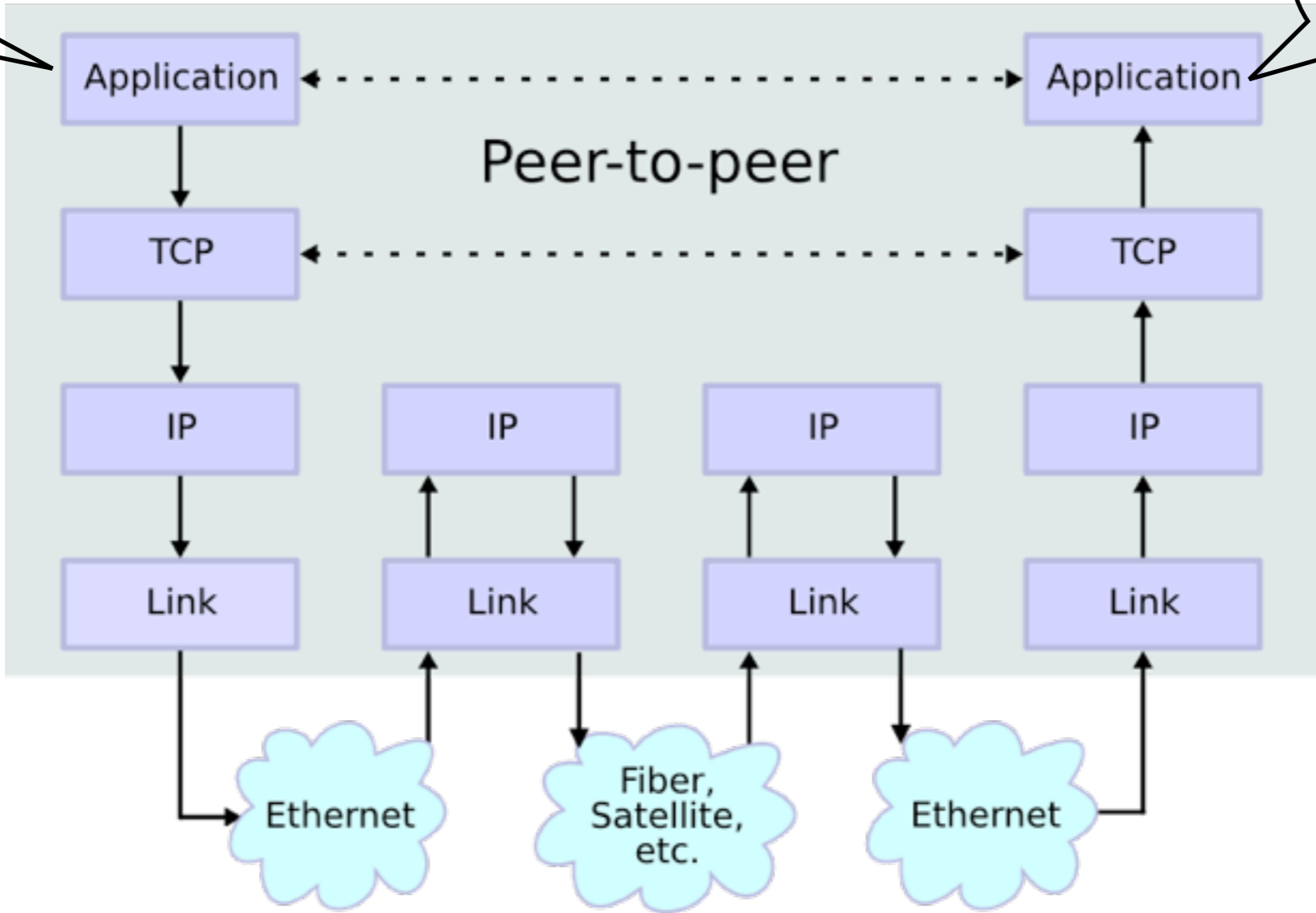
Richiami di reti







HTTP



HTTP

Il protocollo IP

- Ogni host è identificato da un *indirizzo IP*
- Un numero di 32 bit (es. 193.206.179.151)
- Invia singoli pacchetti
- Non è affidabile

Esercizio

Osservare l'indirizzo IP della nostra macchina
con *ifconfig*

Il protocollo TCP

- Usa IP
- Crea una *connessione* fra due host
- Invia uno *stream di byte*
- E' affidabile
- I *port* identificano i servizi
 - 80: http
 - 25: smtp (email)
 - 22: ssh

Esercizio

- Realizzare una *chat* TCP con netcat

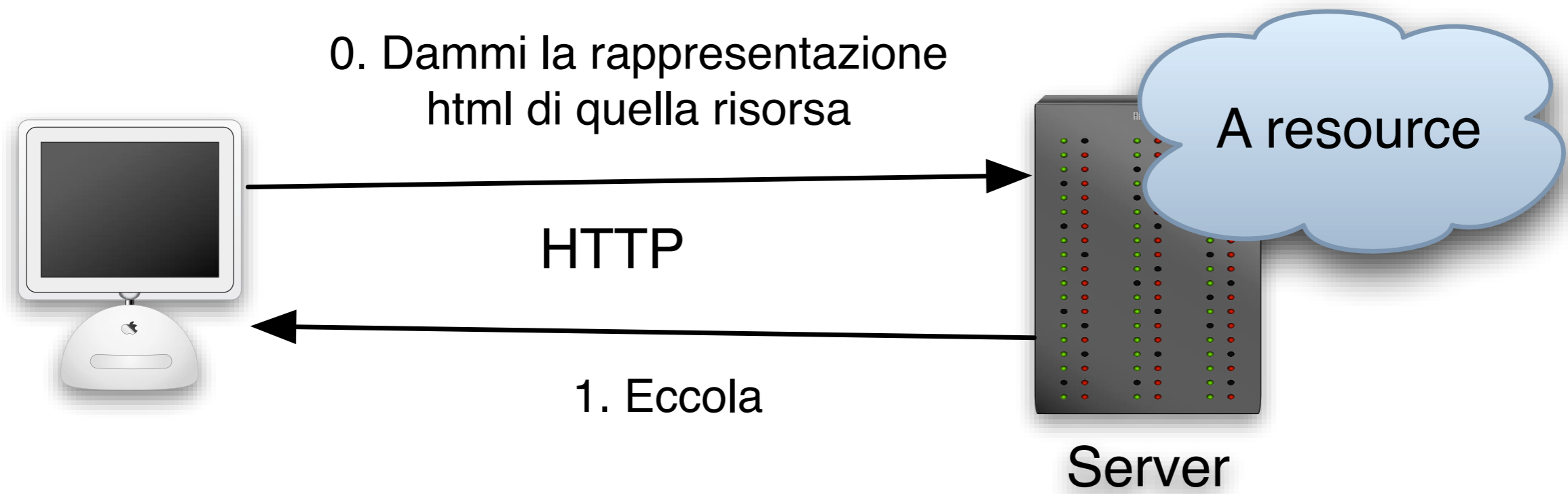
Domain Name System (DNS)

```
$ host www.uninsubria.it  
www.uninsubria.it has address 193.206.179.151
```

Il protocollo HTTP

The Hypertext Transfer Protocol (HTTP) is an **application-level** protocol for **distributed**, collaborative, hypermedia information systems. It is a generic, **stateless**, protocol ...
A feature of HTTP is the **typing** and **negotiation** of data representation,...

rfc2616



HTTP, circa 1989

Client request

GET /hello.txt

Server response

Hello, world!

Http 1.1

Client request

GET /hello.txt HTTP/1.1

Host: www.example.com

Server response

Start line

HTTP/1.1 200 OK

Headers

Content-type: text/plain

<empty line>

body

Hello, world!

GET /books/list.html HTTP/1.1

Host: localhost:3001

User-Agent: Mozilla/5.0 (Intel Mac OS X; en-US; rv:1.8.0.7) Gecko

Accept: text/xml,application/xml;text/html;q=0.9,*/*

Accept-Language: en-us,en

Accept-Encoding: gzip,deflate

Accept-Charset: ISO-8859-1,utf-8

HTTP/1.1 200 OK

Date: Fri, 29 Sep 2006 17:00:03 GMT

Content-Type: text/html; charset=UTF-8

Server: WEBrick/1.3.1 (Ruby/1.8.4/2005-12-24)

Content-Length: 5552

<html>

<head>

<title>La lista dei libri</title>

</head>

<body>

...

Esercizio

Osservare richieste e risposte http con *netcat*

Risoluzione di un URL

<http://www.uninsubria.it/home.html>

Risoluzione di un URL

<http://www.uninsubria.it/home.html>

- I. Chiedi al DNS l'indirizzo IP di www.uninsubria.it

Risoluzione di un URL

<http://www.uninsubria.it/home.html>

1. Chiedi al DNS l'indirizzo IP di www.uninsubria.it
2. Connessione TCP alla porta 80 di 193.206.179.151

Risoluzione di un URL

<http://www.uninsubria.it/home.html>

1. Chiedi al DNS l'indirizzo IP di `www.uninsubria.it`
2. Connessione TCP alla porta 80 di `193.206.179.151`
3. Manda *GET /home.html HTTP/1.1*

Risoluzione di un URL

<http://www.uninsubria.it/home.html>

1. Chiedi al DNS l'indirizzo IP di www.uninsubria.it
2. Connessione TCP alla porta 80 di 193.206.179.151
3. Manda *GET /home.html HTTP/1.1*
4. Ricevi il documento *home.html*

Risoluzione di un URL

<http://www.uninsubria.it/home.html>

1. Chiedi al DNS l'indirizzo IP di www.uninsubria.it
2. Connessione TCP alla porta 80 di 193.206.179.151
3. Manda *GET /home.html HTTP/1.1*
4. Ricevi il documento *home.html*
5. Mostra il documento sullo schermo

Stateless

Stateless

<http://www.google.com/search?q=facoceri&start=15>



facoceri

Search

[Advanced Search](#)
[Preferences](#)

New! [View and manage your web history](#)

Web Results **16 - 25** of about **12,400** for **facoceri**. (0.03 seconds)

[7Cervelli.com - Dialetto Perugino](#) - [[Translate this page](#)]

... ce l'metti pe l'alito???? sinnò co sta manata de robba stendi i **facoceri!** ... ce l'metti pe l'alito???? sinnò co sta manata de robba stendi i **facoceri!** ...

www.7cervelli.com/modules.php?file=viewtopic&name=Forums&t=1409 - 89k -

[Cached](#) - [Similar pages](#) - [Note this](#)

[IZEYE's WORLD](#) - [[Translate this page](#)]

Tracked from **facoceri** 07/04/08 20:11 x. 제목: **facoceri. facoceri facoceri facoceri facoceri**

<http://craigiwa.prohosts.org/img/styles/facoceri.htm> **facoceri** ...

imtl.skku.ac.kr/~izeye/tt/index.php?pl=260&ct1=1 - 428k - [Cached](#) - [Similar pages](#) - [Note this](#)

[Rayman Raving Rabbids PS2 recensione su Yahoo! Giochi - Guida ai ...](#) - [[Translate this page](#)]

La demenzialità dei vari minigiochi è quindi dominante: si passa dalle corse in groppa ai

facoceri alla caccia al maiale sul dorso di un pipistrello, ...

it.videogames.games.yahoo.com/ps2/recensioni/rayman-raving-rabbids/f4a6a5.html - 23k -

[Cached](#) - [Similar pages](#) - [Note this](#)

Navigation icons for the search results list

Esempio non-stateless: ftp

```
$ ftp ftp.funet.fi
```

```
Connected to ftp.funet.fi.
```

```
331-Welcome to the FUNET anonymous ftp archive
```

```
Password:
```

```
Using binary mode to transfer files.
```

```
ftp> cd pub
```

```
250 OK. Current directory is /pub
```

```
ftp> get README
```

```
local: README remote: README
```

```
226-File successfully transferred
```

```
ftp> quit
```

```
221-Goodbye.You uploaded 0 and downloaded 18 kbytes.
```

```
221 Logout.
```

```
$
```

Status codes

2xx	success
3xx	redirection
4xx	client error
5xx	server error

Per esempio

Per esempio

200 OK

Per esempio

200 OK

301 Moved Permanently

Per esempio

200 OK

301 Moved Permanently

410 Unauthorized

Per esempio

200 OK

301 Moved Permanently

410 Unauthorized

404 Not Found

Per esempio

200 OK

301 Moved Permanently

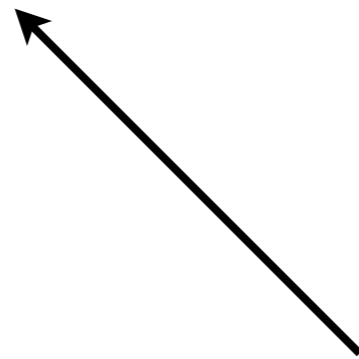
410 Unauthorized

404 Not Found

500 Internal Server Error

Request line

GET /foo/bar.html HTTP/1.1



method

Http methods

GET	Get a document from the server.
POST	Send data to the server for processing.
HEAD	Get just the headers
PUT	Upload resource
DELETE	Remove a document
OPTIONS	Ask what methods are available.

Safe methods

Un metodo è *sicuro* (safe) se non provoca effetti visibili sullo stato dell'applicazione

GET vs. POST

GET	POST
safe	not safe
bookmarkable	not bookmarkable
parametri nella URI	parametri nel BODY

Get vs Post

Get: appropriato per *leggere* informazioni

Post: appropriato per *modificare* informazioni

Esercizio:

Fabbricare una *form html* ed osservare la richiesta effettuata tramite *netcat*

Redirections

301 Moved Permanently

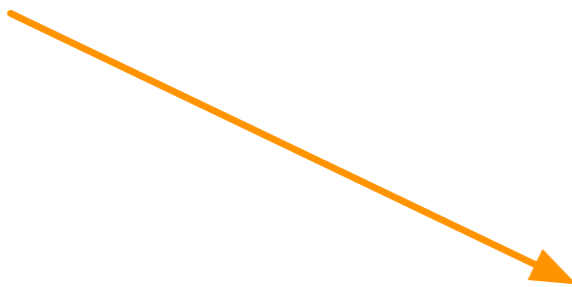
302 Found

303 See Other

```
$ printf "GET /manual HTTP/1.1\r\nHost: localhost\r\n\r\n" | nc localhost 80
HTTP/1.1 301 Moved Permanently
Date: Mon, 06 Dec 2010 17:19:49 GMT
Server: Apache/2.2.14 (Unix) mod_ssl/2.2.14 OpenSSL/0.9.7l DAV/2 PHP/5.2.14 mod_fastcgi/
2.4.2
Location: http://localhost/manual/
Content-Length: 232
Content-Type: text/html; charset=iso-8859-1
```

```
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>301 Moved Permanently</title>
</head><body>
<h1>Moved Permanently</h1>
<p>The document has moved <a href="http://localhost/manual/">here</a>.</p>
</body></html>
```

GET /books/new



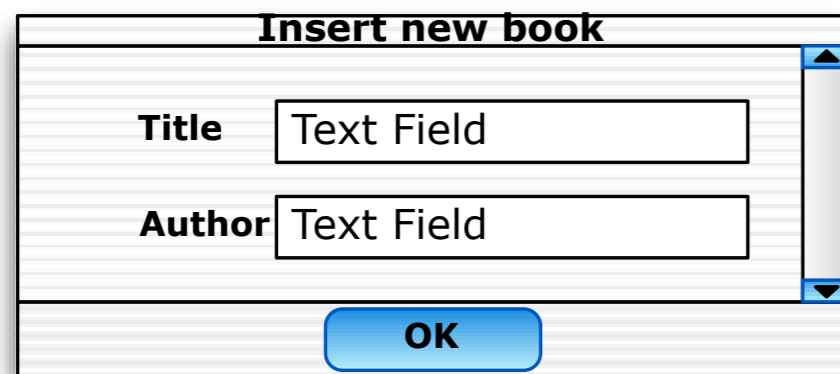
200 OK

...

<form action='/books/new'>

</form>

GET /books/new



Insert new book

Title

Author

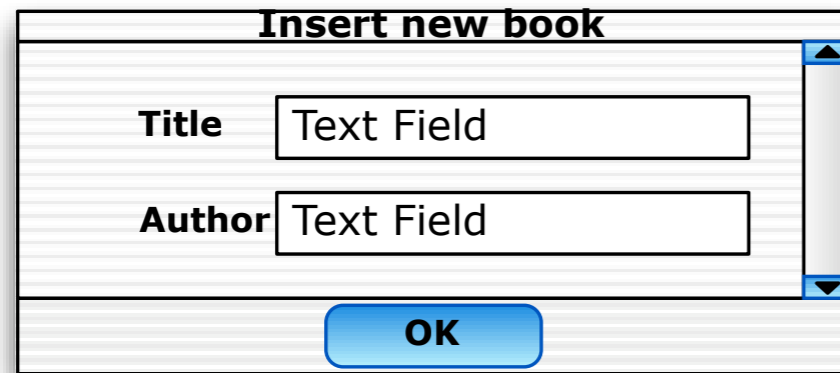
OK

200 OK

...

`<form action='/books/new'>`
`</form>`

GET /books/new



The image shows a browser window with a form titled "Insert new book". The form contains two text input fields: "Title" and "Author", both containing the text "Text Field". Below the fields is a blue "OK" button. An orange arrow points from the text "GET /books/new" to the top of the form, and a green arrow points from the "OK" button to the HTML code on the right.

200 OK

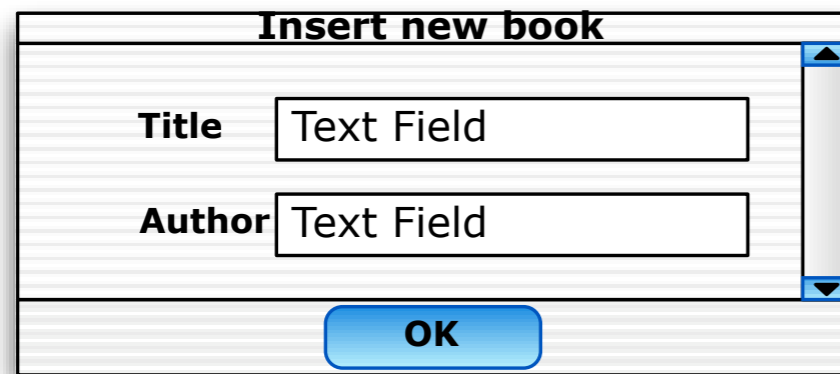
...
<form action='/books/new'>
</form>

POST /books/new

...

title=Amleto&author=Shakespeare

GET /books/new



The screenshot shows a web form titled "Insert new book". It contains two text input fields: "Title" and "Author", both labeled "Text Field". Below the fields is a blue "OK" button. The form is presented in a window-like style with a scrollbar on the right side.

200 OK

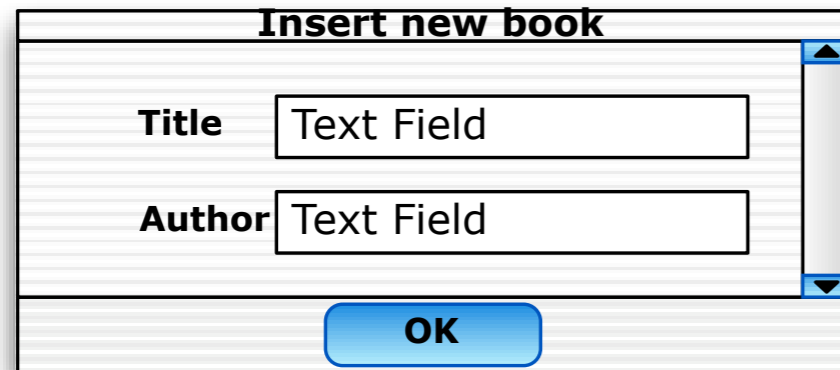
...
<form action='/books/new'>
</form>

POST /books/new

...
title=Amleto&author=Shakespeare

303 See other
Location: /books/show/1234

GET /books/new



The image shows a web browser window with a form titled "Insert new book". The form contains two text input fields: "Title" and "Author". Below the fields is a blue button labeled "OK".

200 OK

...

<form action='/books/new'>
</form>

POST /books/new

...

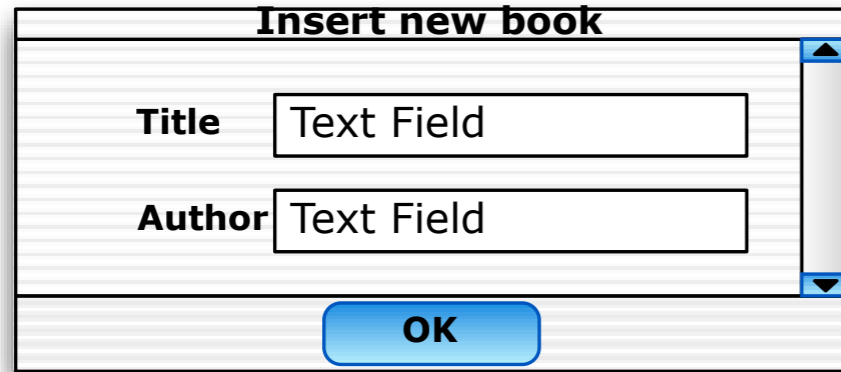
title=Amleto&author=Shakespeare

303 See other

Location: /books/show/1234

GET /books/show/1234

GET /books/new



The image shows a browser window with a form titled "Insert new book". The form contains two text input fields: "Title" and "Author", both containing the text "Text Field". Below the fields is a blue button labeled "OK".

200 OK

...
<form action='/books/new'>
</form>

POST /books/new

...
title=Amleto&author=Shakespeare

303 See other
Location: /books/show/1234

GET /books/show/1234

200 OK

...
<html>...</html>

GET /books/new

Insert new book

Title

Author

OK

200 OK

...

<form action='/books/new'>

</form>

POST /books/new

...

title=Amleto&author=Shakespeare

303 See other

Location: /books/show/1234

GET /books/show/1234

Ragione e sentimento

200 OK

...

<html>...</html>

Mime types

text/plain

text/html

image/gif

<primary type>/<subtype>

image/jpeg

application/pdf

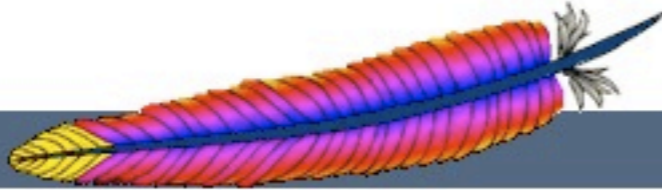
Mime types

text/html; charset=UTF-8

<primary type>/<subtype>; <parameters>

```
$ printf "GET /manual/ HTTP/1.1\r\nHost: localhost\r\n\r\n" | nc localhost 80
HTTP/1.1 200 OK
Date: Mon, 06 Dec 2010 17:39:15 GMT
Server: Apache/2.2.14 (Unix) mod_ssl/2.2.14 OpenSSL/0.9.7l DAV/2 PHP/5.2.14 mod_
Content-Location: index.html.en
Last-Modified: Tue, 06 Jan 2009 21:41:23 GMT
Content-Length: 7709
Content-Type: text/html
Content-Language: en
```

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/x
<html xmlns="http://www.w3.org/1999/xhtml" lang="en" xml:lang="en"><head><!--
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    This file is generated from xml source: DO NOT EDIT
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
-->
<title>Apache HTTP Server Version 2.2
Documentation - Apache HTTP Server</title>
<link href="./style/css/manual.css" rel="stylesheet" media="all" type="text/css"
<link href="./style/css/manual-loose-100pc.css" rel="alternate stylesheet" media
```



Apache HTTP Server Version 2.2 Documentation

Release Notes

- [New features with Apache 2.1/2.2](#)
- [New features with Apache 2.0](#)
- [Upgrading to 2.2 from 2.0](#)
- [Apache License](#)

Reference Manual

- [Compiling and Installing](#)
- [Starting](#)
- [Stopping or Restarting](#)
- [Run-time Configuration Directives](#)
- [Directive Quick-Reference](#)
- [Modules](#)
- [Multi-Processing Modules \(MPMs\)](#)
- ...

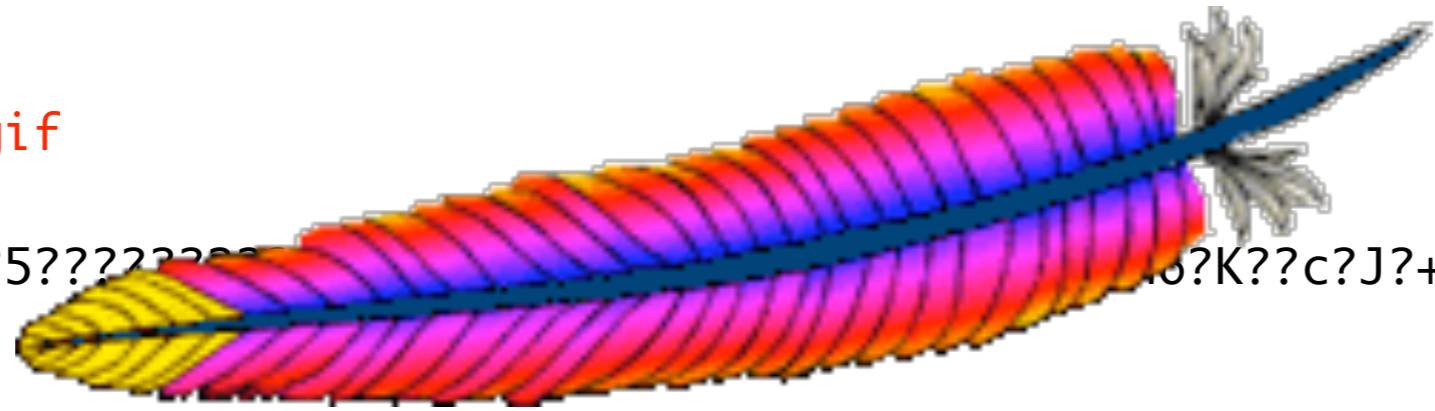
Users' Guide

- [Binding](#)
- [Configuration Files](#)
- [Configuration Sections](#)
- [Content Caching](#)
- [Content Negotiation](#)
- [Dynamic Shared Objects \(DSO\)](#)
- [Environment Variables](#)
- [Log Files](#)
- [Mapping URLs to the Filesystem](#)
- [Performance Tuning](#)
- [Security Tips](#)
- [Server-Wide Configuration](#)
- [SSL/TLS Encryption](#)

```
$ printf "GET /manual/images/feather.gif HTTP/1.1\r\nHost: localhost\r\n\r\n" | nc localhost 80
HTTP/1.1 200 OK
Date: Mon, 06 Dec 2010 17:42:45 GMT
Server: Apache/2.2.14 (Unix) mod_ssl/2.2.14 OpenSSL/0.9.7l DAV/2 PHP/5.2.14 mod_fastcgi/2.4.2
Last-Modified: Sat, 20 Nov 2004 20:16:24 GMT
ETag: "eeff-1947-3e9564c23b600"
Accept-Ranges: bytes
Content-Length: 6471
Content-Type: image/gif
```

```
GIF89a?F????????o?0?5????????????p??`?Xo?3???P?p?s?/?????n6?K??c?J?+
?3P??n??V??F?w@qU
?j
?:??0+?8 ??2?$r)??7?R?
???? .??8?0f???嚶?mi[l}e??CCCX7???QPK????
```

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```
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?3P??n??V??F?w@qU
?j
?:??0+?8 ??2?$r)??7?R?
????..??8?0f???嚶?mi[l}e??CCCX7???QPK????
```




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