

Applicazioni Web 2014/15

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!

Prossime lezioni

- venerdì 20 marzo,
- mercoledì 25 marzo,
- mercoledì 1 aprile...
- ... e tutti i mercoledì a seguire.

Esame?

Elaborato seguito da orale

Prerequisiti

- Avere voglia di programmare
- Conoscenza di Linux/Unix
- Conoscenza di SQL



[http://
virtualboxes.org/
images/ubuntu/](http://virtualboxes.org/images/ubuntu/)

Scopo del corso

Testo

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

Le più importanti invenzioni - I

Le più importanti invenzioni - I L'alfabeto

1			aleph
2			beth
3			gimel
4			daleth
5			he
6			waw
7			zayin
8			chet
9			tet
10			yod
20			kaf
N	P	H	

30			lamed
40			mem
50			nun
60			samekh
70			ayin
80			pe
90			tsade
100			qof
200			resh
300			sin/shin
400			tav
N	P	H	

wikipedia - Flyingbird

Le più importanti invenzioni - II

Le più importanti invenzioni - II

Le cifre arabe

Sicut debemus Indos subtilissimum Ingenium habere. cunctas
gentes et Inanachmaeu geometricarum. et cunctis liberalibus
disciplinis concedere. et hoc manifestum est In nobis
figuris quibus designantur unum quodlibet gradum.
cuiuslibet gradus quatuor hęc sunt forme

9 8 7 6 5 4 3 2 1 ||| —————

Le più importanti invenzioni - III

Le più importanti invenzioni - III

La stampa a caratteri mobili



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*

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>

Un articolo dedicato a “RESTful Web Services”

<http://example.com/blog/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*’*

URI e URL

URI: Universal Resource *Identifier*

URL: Universal Resource *Locator*

URL refers to the *subset of URI* that identify resources via a 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/11dbe2460af15fe6>

<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

<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

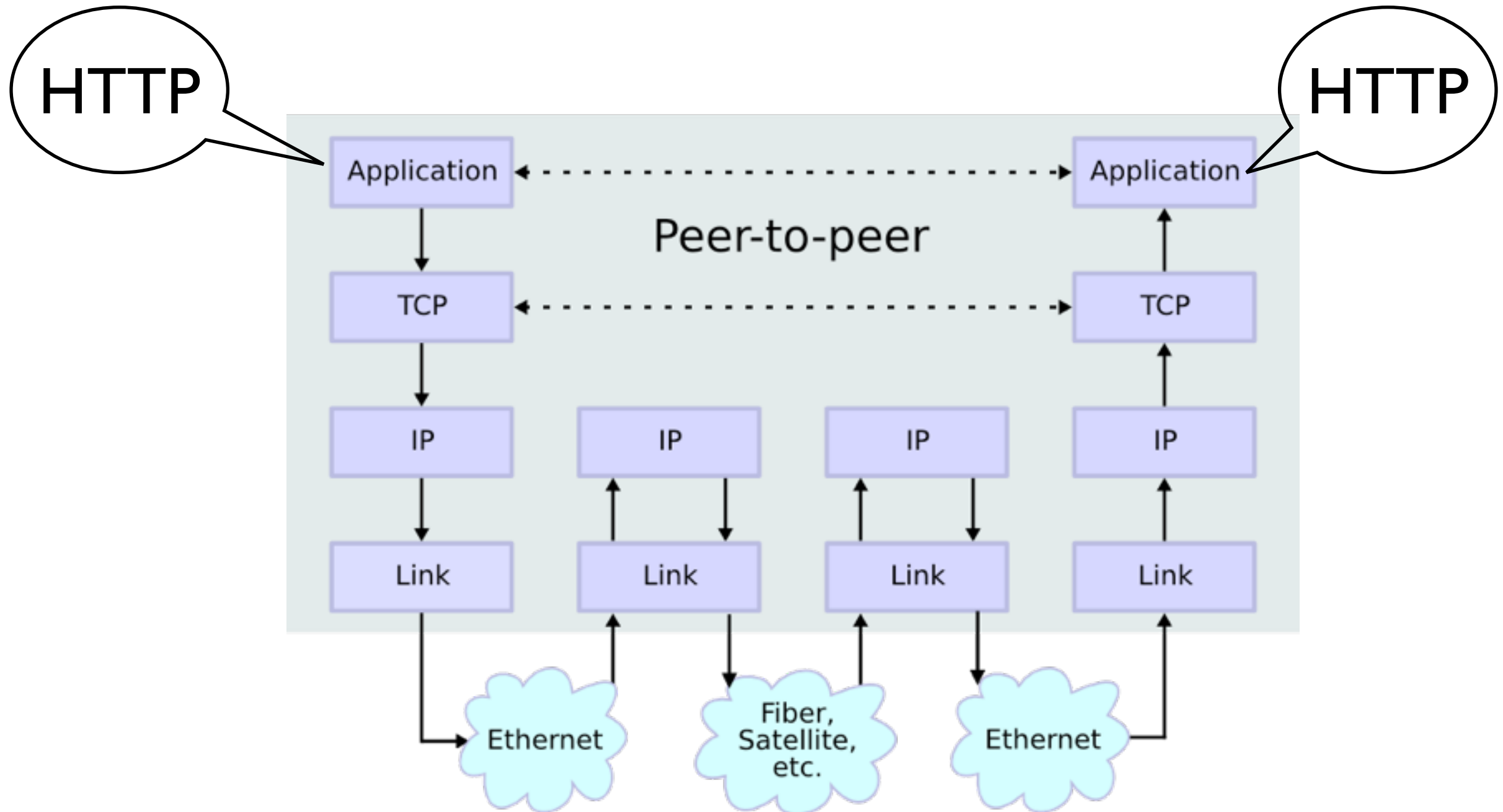
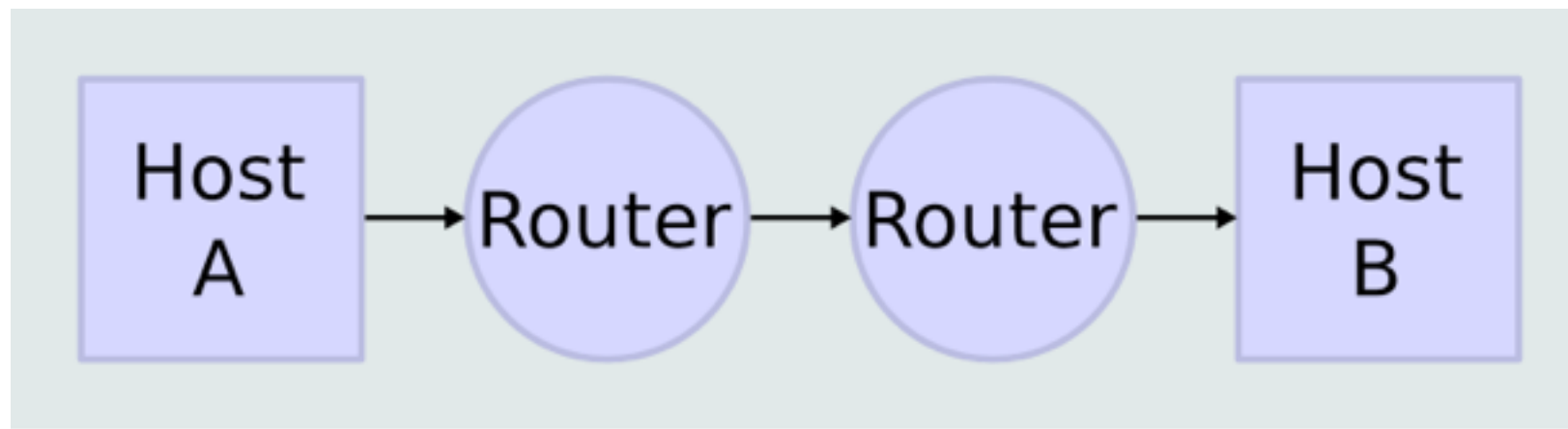
host: www.example.com

path: /search

query string: q=facoceri&start=10

fragment: fragm

Richiami di reti



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

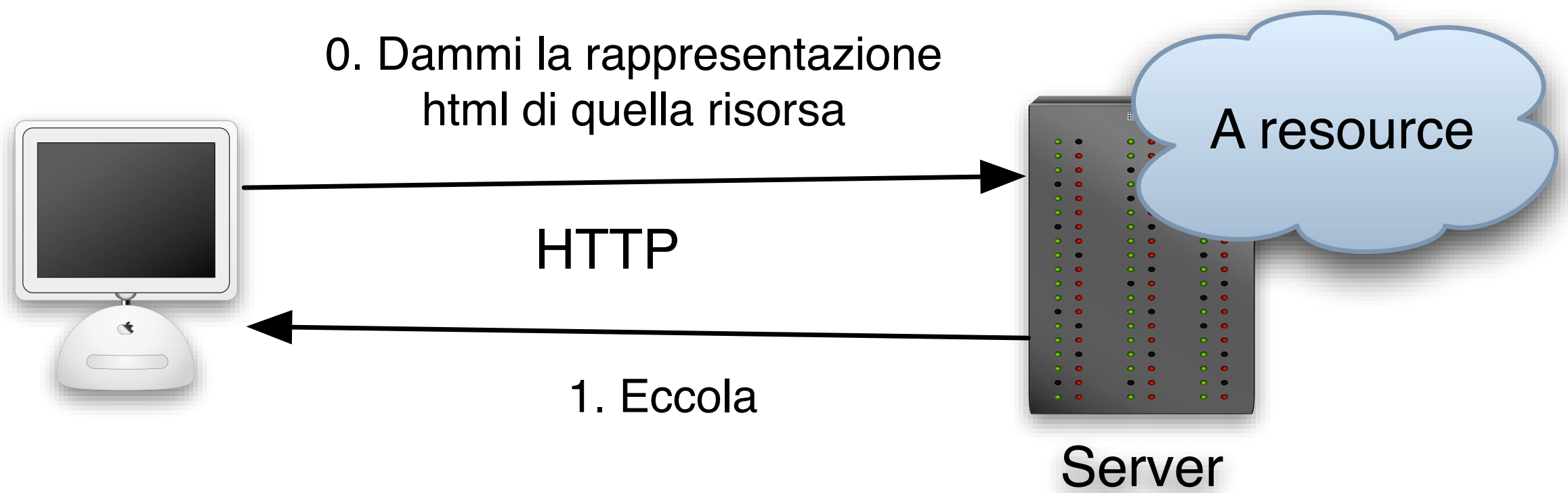
Domain Name System (DNS)

```
$ 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>

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

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

 <http://www.google.com/search?q=facoceri&start=15>[Web](#) [Images](#) [Video](#) [News](#) [Maps](#) [Gmail](#) [more ▼](#)[matteo.vaccari@gmail.com](#) | [My Notebooks](#) | [My Account](#) | [Sign out](#)

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 - Dialecto 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](#)

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

200 OK

301 Moved Permanently

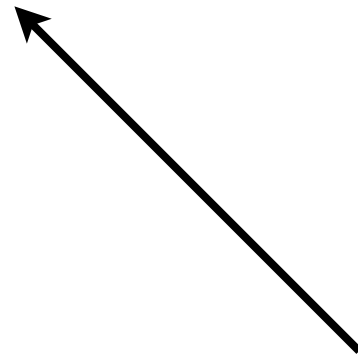
401 Unauthorized

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

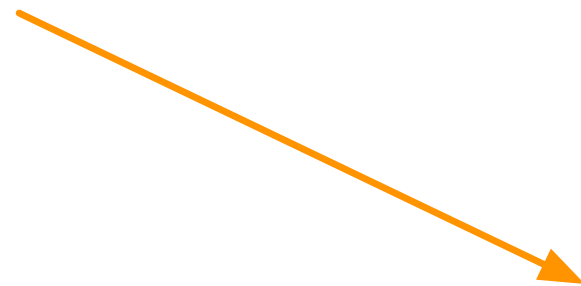
302 Found

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



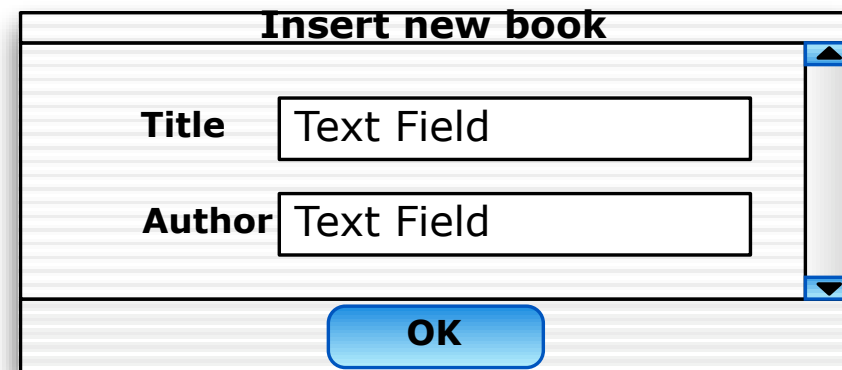
200 OK

...

<form action='/books/new'>

</form>

GET /books/new



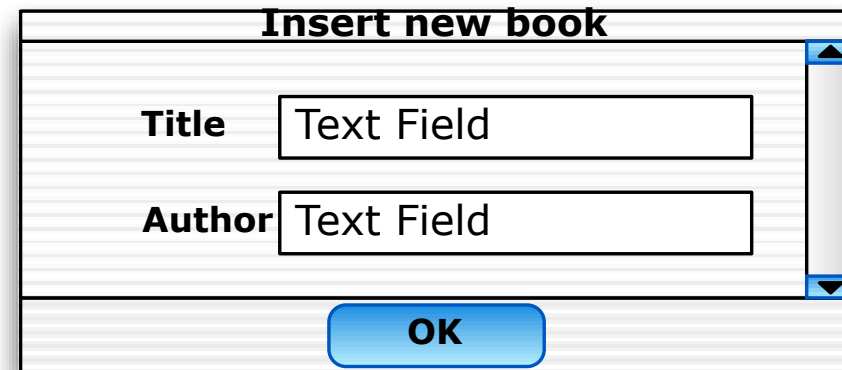
The image shows a web form titled "Insert new book". It contains two text input fields, one labeled "Title" and one labeled "Author", both containing the text "Text Field". Below the input fields is a blue button labeled "OK". The form has a light gray background and a thin black border.

200 OK

...

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

GET /books/new



The image shows a web form titled "Insert new book". It contains two text input fields: one labeled "Title" and another labeled "Author". Both fields are currently empty and labeled "Text Field". Below the input fields is a blue button labeled "OK". The form has a light gray background and a thin border.

200 OK

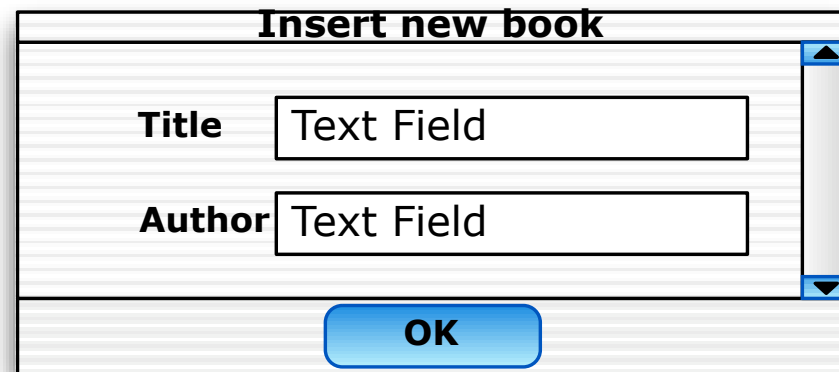
...
<form action='/books/new'>
</form>

POST /books/new

...

title=Amleto&author=Shakespeare

GET /books/new



The diagram shows a web browser window with a form titled "Insert new book". The form contains two text input fields: one labeled "Title" and another labeled "Author". Below these fields is a blue button labeled "OK". An orange arrow points from the text "GET /books/new" to the top of the form, and a green arrow points from the right side of the form to the HTML code snippet.

200 OK

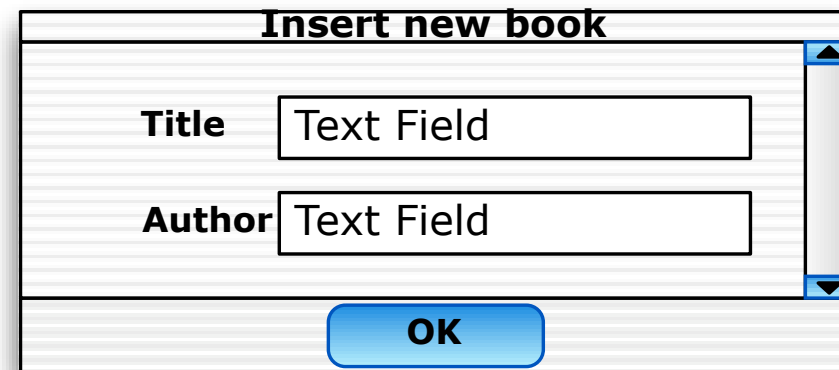
...
<form action='/books/new'>
</form>

POST /books/new

...
title=Amleto&author=Shakespeare

303 See other
Location: /books/show/1234

GET /books/new



The form is titled "Insert new book". It contains two text input fields: one labeled "Title" and one labeled "Author". Below the input fields is a blue button labeled "OK".

200 OK

...

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

POST /books/new

...

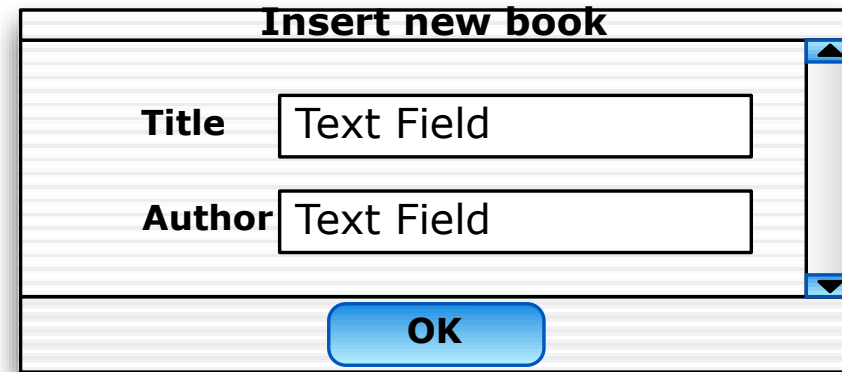
title=Amleto&author=Shakespeare

303 See other

Location: /books/show/1234

GET /books/show/1234

GET /books/new



The diagram shows a web browser window with a form titled "Insert new book". The form contains two text input fields: "Title" and "Author", each followed by a "Text Field" label. Below the fields is a blue "OK" button. An orange arrow points from the URL "GET /books/new" to the form, and a green arrow points from the form to the HTML response snippet.

200 OK

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

POST /books/new

...

title=Amleto&author=Shakespeare

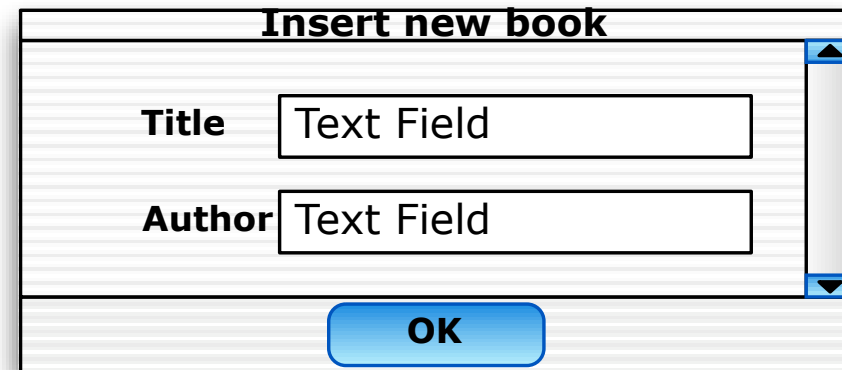
303 See other
Location: /books/show/1234

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

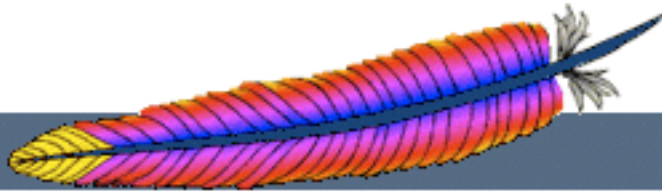
Mime types

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/
<html xmlns="http://www.w3.org/1999/xhtml" lang="en" xml:lang="en"><head><!--
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    This file is generated from xml source: DO NOT EDIT
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
-->
<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="all" type="text/css">
```



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

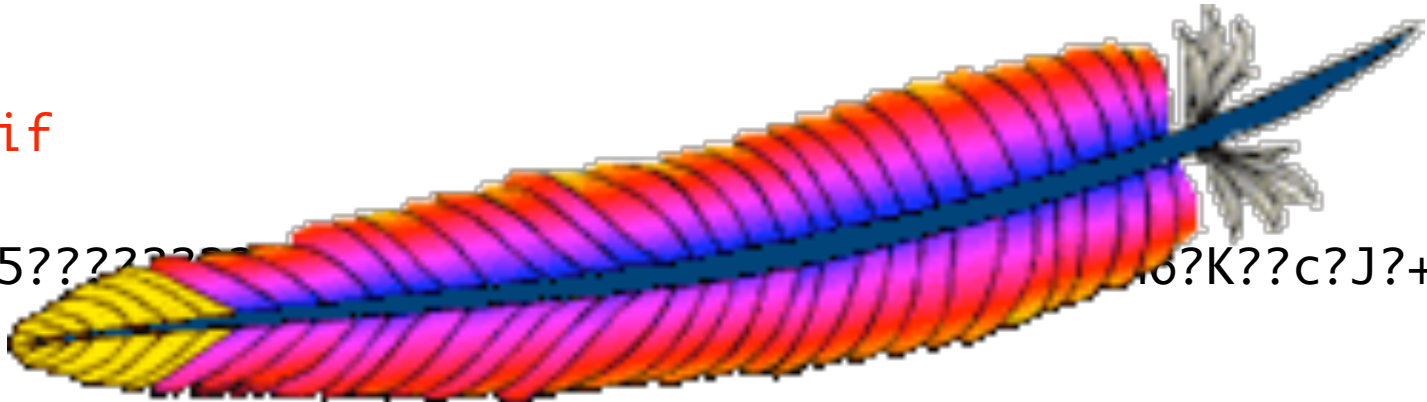
- [Compiling and Installing](#)
- [Starting](#)
- [Stopping or Restarting](#)
- [Run-time Configuration Directives](#)
- [Directive Quick-Reference](#)
- [Modules](#)
- [Multi-Processing Modules \(MPMs\)](#)
- ...

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





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