Web Architecture

Aplicações para a Internet

Engenharia Informática – 2014/2015

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Revised on: February, 2015

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The Internet

In 1969, scientists and researchers of the Department Of Defense of the US government remotely exchanged information. That 1st network was designated ARPANET:

- It connected one computer in Utah with three in California.
- Later, the DOD allowed the universities to join the network for sharing hardware and software resources

During the 1980s the military network was separated from the civil network. The Internet was born.

Internet => **Inter**connected **Net**work

Source: http://www.livinginternet.com/i/ii_arpanet.htm

The Internet

- Global system of interconnected computer networks
- Uses the standard Internet protocol suite (TCP/IP) to link several billion devices worldwide
- It is a network of networks that consists of millions of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies

Source: https://tools.ietf.org/html/rfc1122#page-7

The Internet

- Carries an extensive range of information resources and services, each one with its own protocol, such as:
  - World Wide Web (WWW)
  - email
  - ftp
  - telnet
  - ...

Client/Server Architecture 1/2

Client runs on the computer and makes requests to the services available on the server.

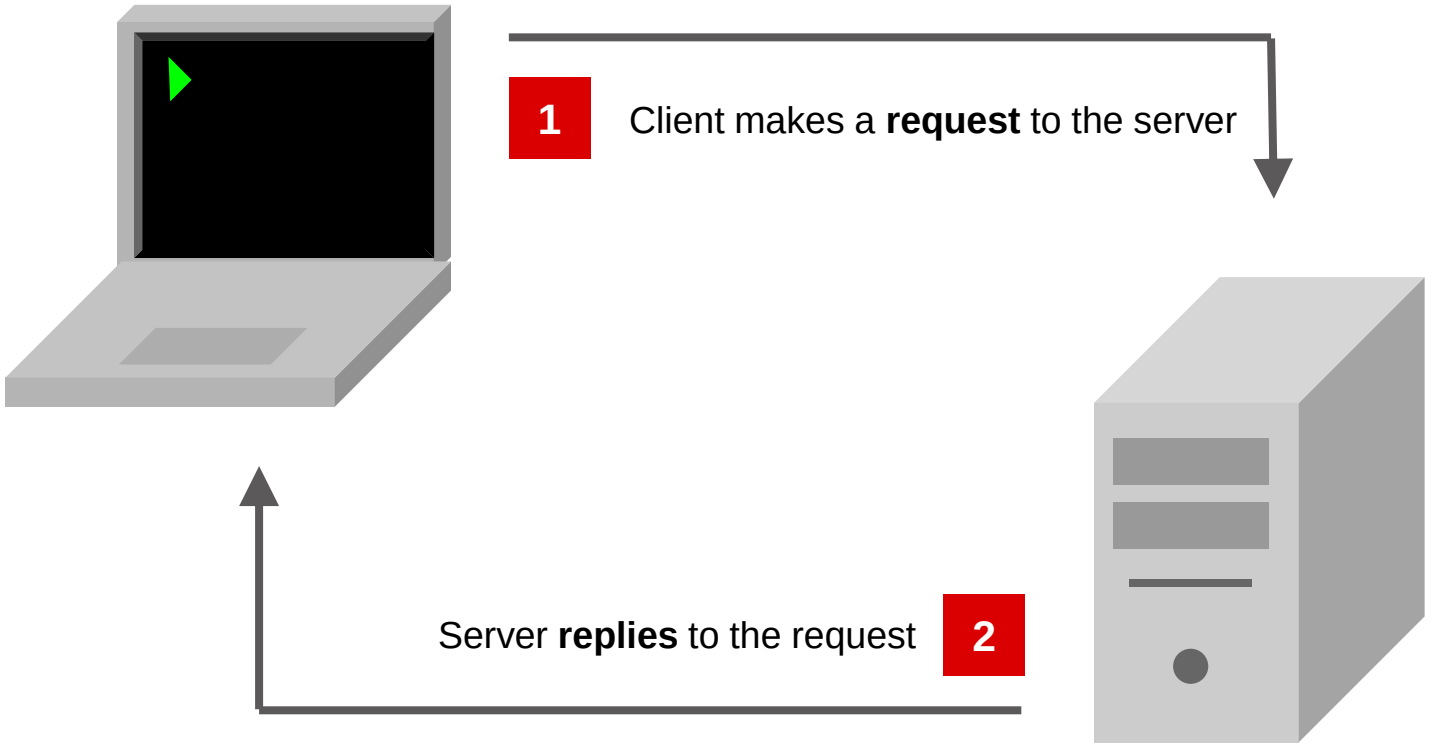
Server is an host that responds to the requests of the clients.

One client can make requests to more than one server.

One server can reply to several clients simultaneously.

There are several types of servers: web, database, e-mail…

Client/Server Architecture 2/2



Internet

Internet Architecture 1/4

- The Internet is the largest computer network
- It uses several protocols for transmitting information between clients and servers
  - **HTTP** is the most widely used protocol
- Other protocols:
  - DNS (*Domain Name Server*)
  - FTP (*File Transfer Protocol*)
  - HTTPS (*HTTP Secure*)

Internet Architecture 2/4

HTTP - Hypertext Transfer Protocol

It is a Request/Reply protocol that operates between clients and web servers.

It allows sending several different data types from the Server to the Client, including HTML code.

When a client “asks” for a URL address, a HTTP request is sent to the server, which by its turn reply to the client, an HTML file for example.

Other type of data: CSS, JPG, SWF

Internet Architecture 3/4

The Web implements the concept of hypertext (text + links)

- **Uniform Resource Identifier** (URI) is a string of characters used to identify a name or a resource on the web
- URIs can be classified as locators (URLs), as names (URNs), or as both.
  - **Uniform Resource Name** (URN) defines an item's identity
  - **Uniform Resource Locator** (URL) provides a method for finding it

Internet Architecture 4/4

URL - Uniform Resource Locator

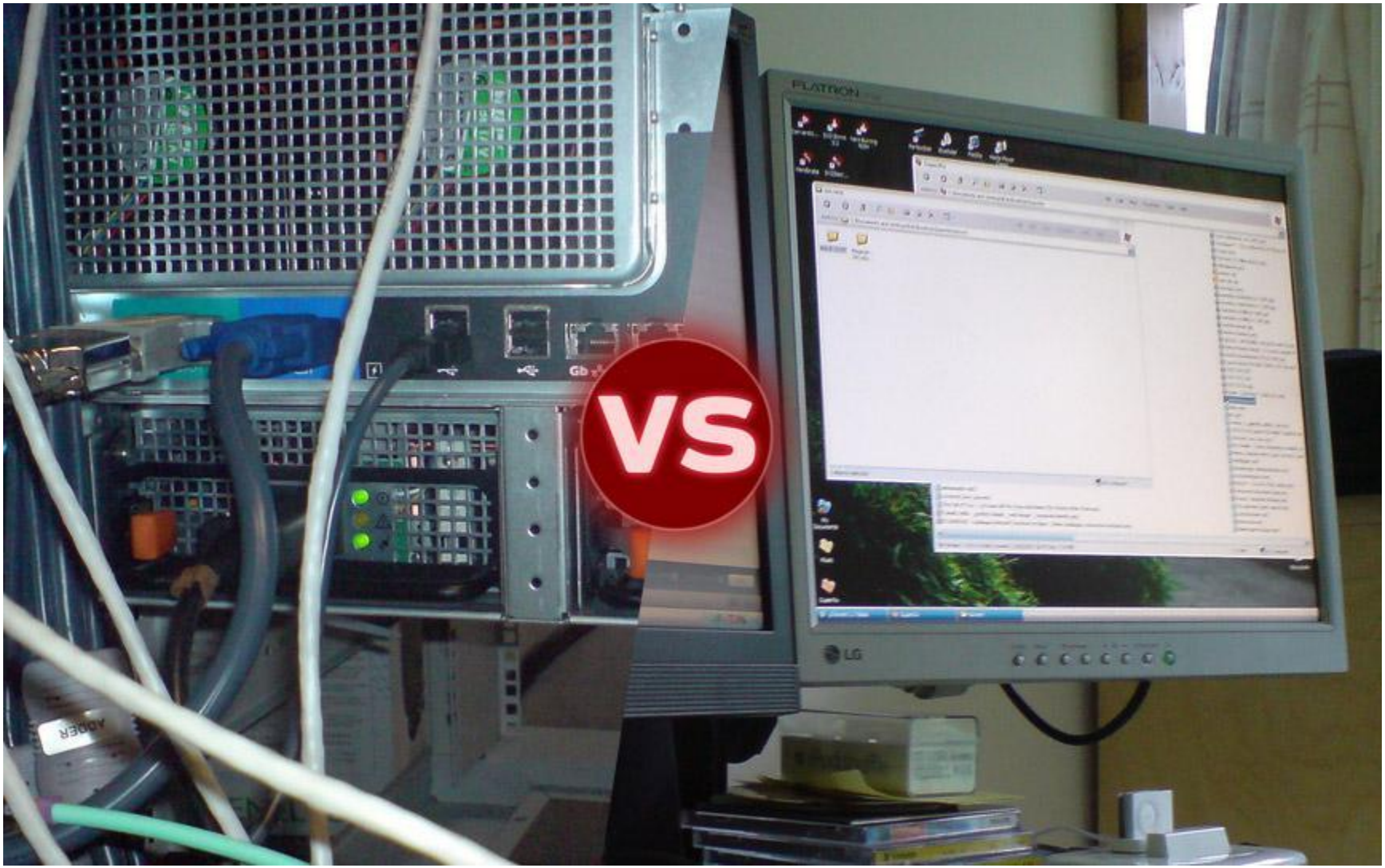
It is a string of characters that is used to identify a name or a resource on the web (Internet or Intranet)

It has the following structure:

`protocol://machine/path/resource`

Example:

http://www.w3.org/Consortium/presskit.html



Server VS Client

Server Technologies 1/3

- Web servers are also known as HTTP servers, since this is the dominant protocol on the web

- Example of web servers:
  - Apache
  - Microsoft Internet Information Services (IIS)
  - …

- The relationship between clients and servers is **N-to-N**. The same client can perform requests to multiple servers; and the same server can reply to several clients

Server Technologies 2/3

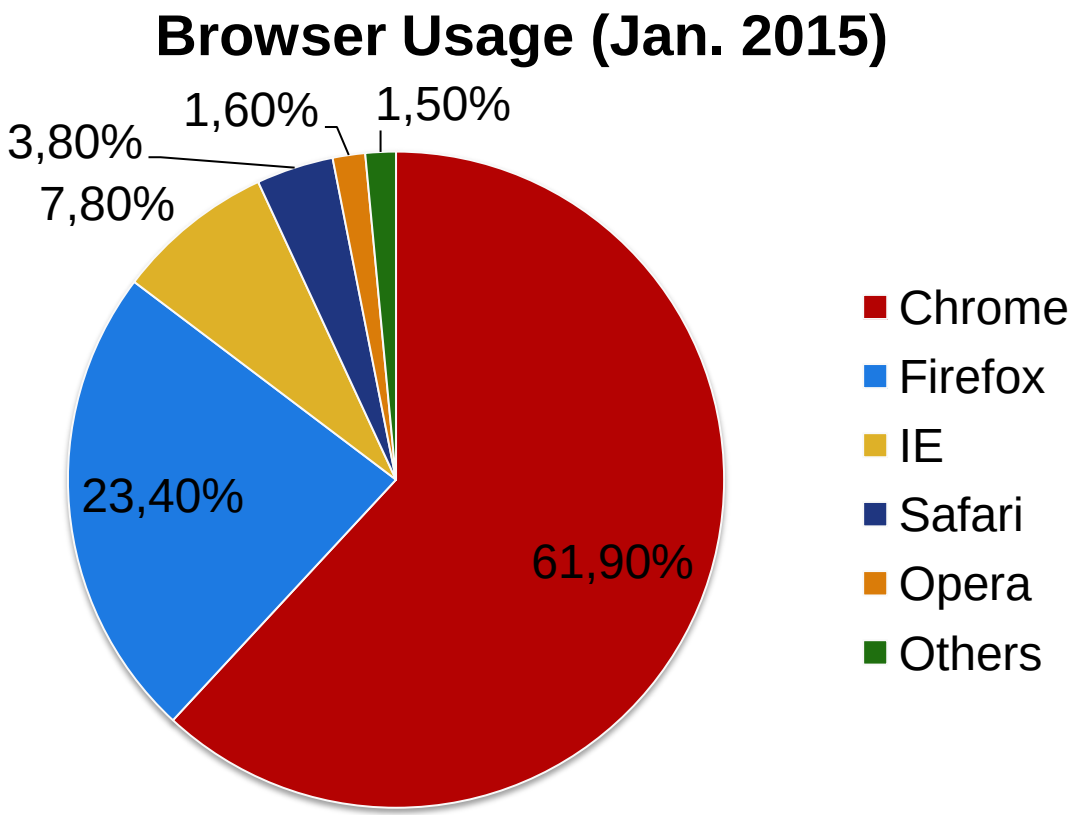
- PHP is a general-purpose server-side scripting language
  - Originally designed for Web development to produce dynamic Web pages
  - Free to use under the PHP License
- Alternatives:
  - ASP.NET (.NET bytecode)
  - JSP/Servlets (JAVA bytecode)
  - Ruby on Rails
  - Perl
  - ...

Server Technologies 3/3

- MySQL is a relational database management system used to support PHP
  - Source code available under the terms of the GNU General Public License
- Alternatives:
  - Microsoft SQL Server
  - Oracle Database System
  - PostgreSQL
  - …

Client Technologies 1/4

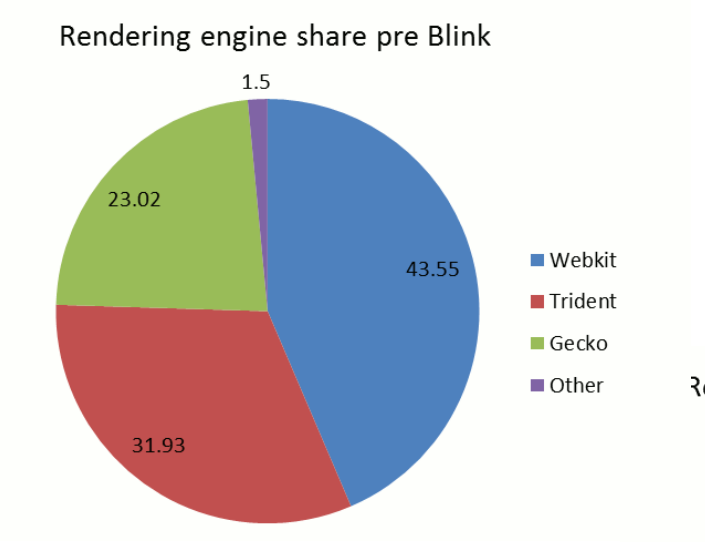
- Clients are known as browsers:
  - Firefox
  - Chrome
  - Internet Explorer
  - Safari
  - Opera
  - Android
  - ...

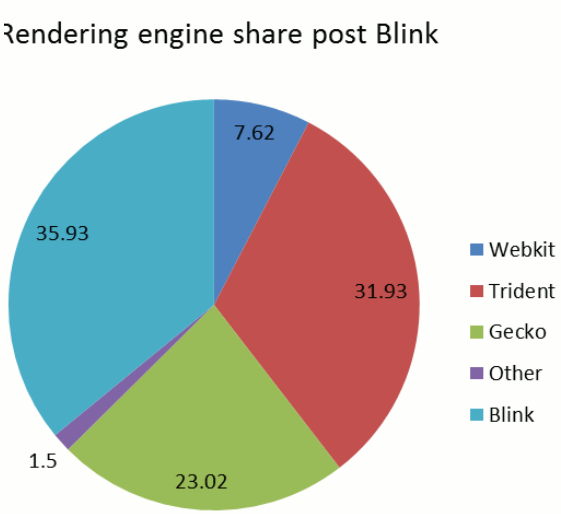


http://www.w3schools.com/browsers/browsers_stats.asp

Client Technologies 2/4

- Browsers use Layout Engines, such as:
  - Webkit
  - Blink
  - Trident
  - Gecko
  - Presto
  - ...





More at: http://gs.statcounter.com

Client Technologies 3/4

- The technologies must be known and interpreted by the client:
  - HTML/XHTML
  - Cascading Style Sheets (CSS)
  - Javascript
  - Document Object Model (DOM)
  - Flash
  - Java
  - ActiveX
  - ...

Client Technologies 4/4

- Usually require specific support, needing to install a plug-in in the browser
- Examples:
  - Flash
  - ActiveX
  - Java
  - Microsoft Silverlight
  - ...

<HTML>

HTML

HTML- Hyper Text Markup Language

- Markup language written in SGML (Standard Generalized Markup Language)
  - SGML is a meta-language which is a system for organizing and tagging elements of a document
  - SGML was developed and standardized by the International Organization for Standards (ISO) in 1986

HTML

- Developed by Tim Berners Lee at CERN (Switzerland) in 1990
- HTML is written in the form of HTML elements consisting of tags enclosed in angle brackets

  Example: <table>
- Current version: HTML5
  - W3C specification at: http://www.w3.org/TR/html5

HTML VS. XHTML

- HTML is a tolerant language to “bad” codification (not standard). This tolerance requires the development of complex parsers to interpret the code, thus making them not suited to be used with limited resources and memory devices.

- XHTML is a more strict language, that uses the XML parsers that are low resource demanding to any device/client.

- This standardization improves the client/devices (mobile or not) accessibility to web pages.

HTML Document

<!DOCTYPE>	Defines the XHTML version and variant used in the document. This element is important to define the valid HTML syntax for the document validation.
<html>	Indicates the beginning of the HTML document. The client (browser) considerer the forward content as HTML codification.
<head>	Defines the header of the HTML document, where meta-data should be located. For example, it can contain the link to the CSS of the document or the title of the page.
<title>	This tag defines the title of the page. Usually this title appears on the upper left corner of the browser.
<body>	Where the main content of the document must be placed. This is the HTML content that is displayed by the browser.

HTML5

- It is still under development, but some browsers already implement some of its features
- It is an improvement of HTML with, for example, support to multimedia, while keeping it easily readable and consistently understood by computers and devices (browsers, parsers,…)
- HTML5 adds many new syntactical and semantic features. These include the new <video>, <audio> and <canvas> elements, as well as the integration of Scalable Vector Graphics (SVG) content

Quirks Mode

- When a HTML document misses the DOCTYPE directive, the client assumes that the document don't apply any norm
  - By this way it will interpret the document in a "quirks mode"
- Quirks mode refers to a technique used by some web browsers for the sake of maintaining backward compatibility with web pages designed for older browsers and older HTML versions
  - Each client makes its own interpretation of the code, making the sites mismatched
- This can be avoided by strictly implement the syntax and define the proper DOCTYPE

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CSS (Cascading Style Sheet)

- All visual layout of the HTML pages should be done using CSSs

- Advantages:
  - Separate the content from appearance
  - More compact code
  - Better control over the visual layout
  - Update the visual appearance of several documents simultaneously

References

- http://www.w3.org/TR/uri-clarification/
- http://www.w3.org/
- http://www.alistapart.com/articles/doctype/
- http://www.quirksmode.org/css/quirksmode.html

Questions