Web Systems & Technologies: An Introduction

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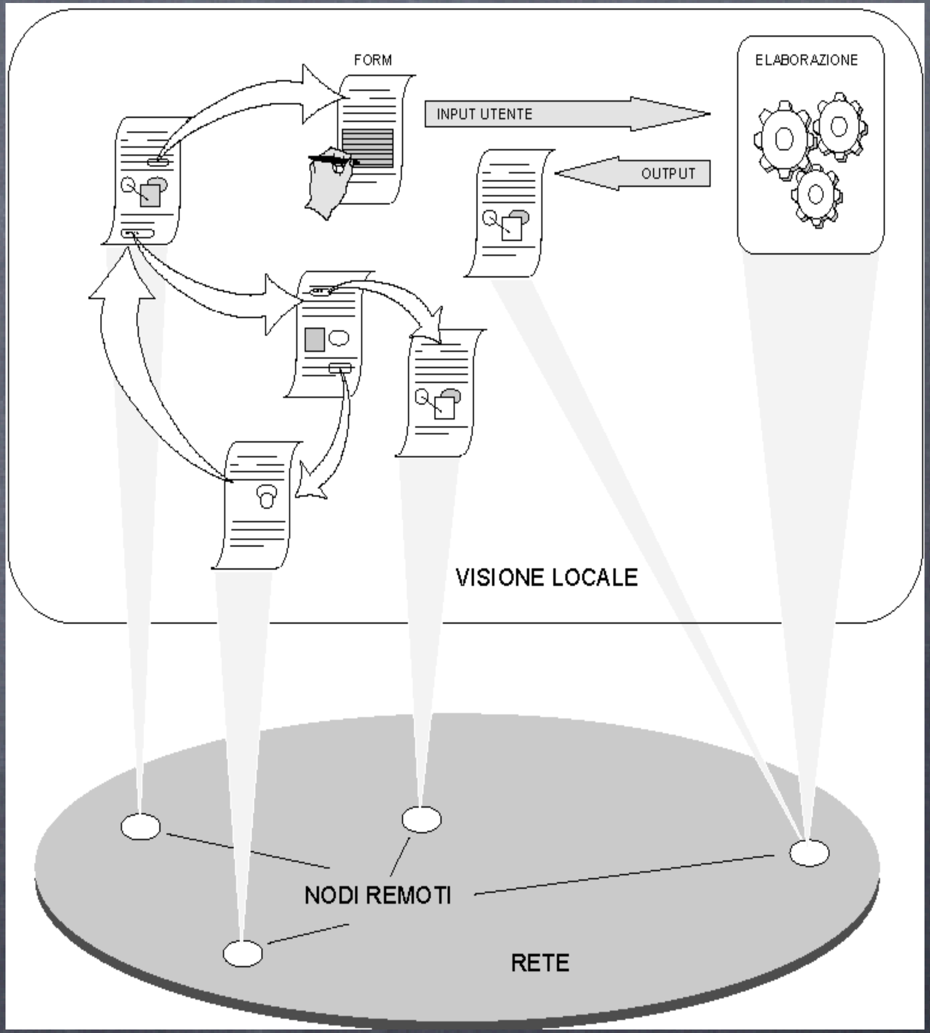
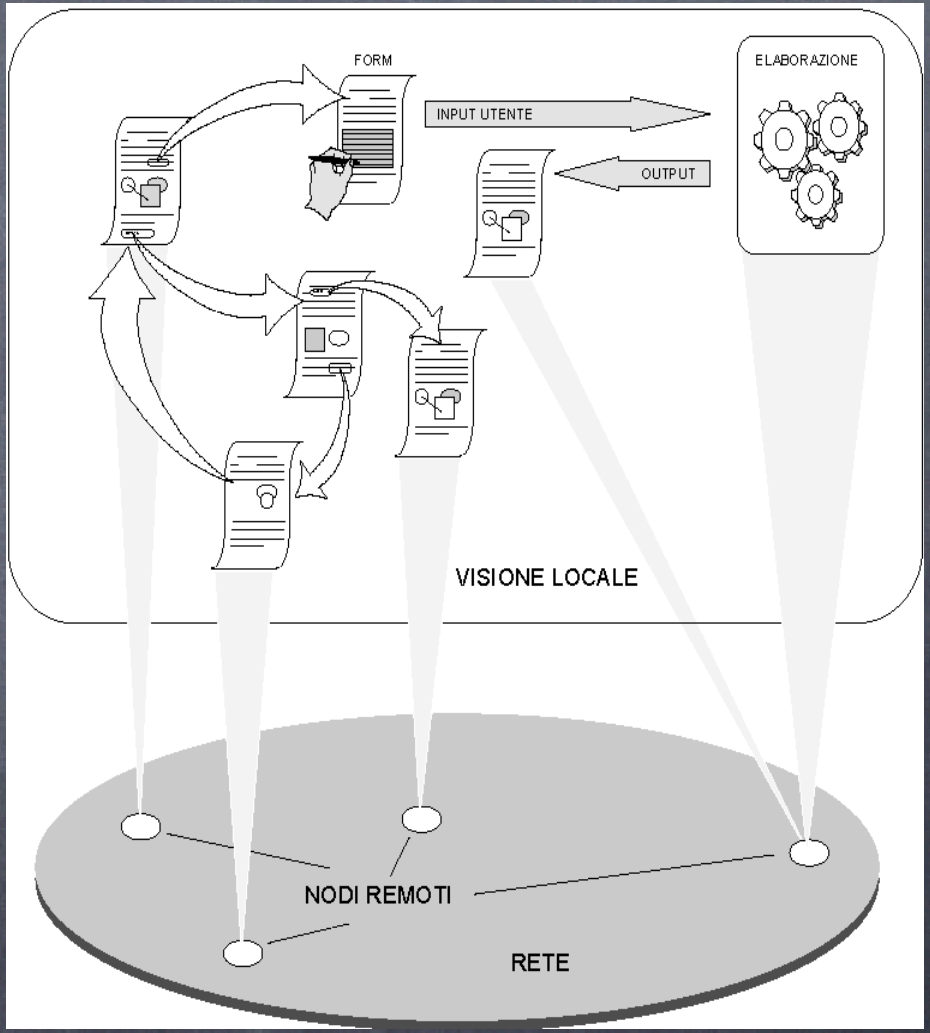
Web Systems Architecture

- Basic architecture
  - information is structured as an ipertext
    - allocation transparency
    - resources as information
  - Use of graphical interfaces
    - ease of use
    - uniform access
      - to heterogeneous resources
      - from heterogeneous envs



Perception of Web Systems

- Clicking on a work/image, you can expand a portion of the document we are interested in
  - the document may / may not be a local one - such a perception is not needed
- Clicking on a link that represents a resource is enough to access it
  - without worrying about the nature of the resource itself
    - whatevet it is, a doc, a text, a picture, whatever else



World Wide Web (WWW)

- CERN (1989)
  - scenario: ipertextual integration of Internet resources
- Goals
  - access & allocation transparency
    - usability
  - multimedial presentation
    - effectiveness
  - different protocols, the same interface
    - interoperability
  - accessing and sharing information
    - accessibility
- W3C: http://w3c.org

Basic Components: Client-side

- Browsers
  - doing presentation, handling requests
- Helper Applications
  - particular presentations & formats, such videos, sounds, animations
- Applets
  - local execution of Java applications
- Script
  - local execution of **small** applications written either in JavaScript or other scripting languages

Basic Components: Server-side

- Web Server
    - managing access control, accepting requests, administering information
- Server-side Applications
    - remote execution
        - CGI, servlet, JSP, PHP, ASP...

Advanced Components: Client-side Applications

- The main problem
  - executing applications server-side does not scale up
- Observations
  - the web is an excellent opportunity for distributing knowledge & process – that is, data & applications
  - high standardisation of web technologies may overcome the problem of heterogeneity of computing platforms
- The approach
  - a tight integration of client- and server-side computation along with strict control & widespread diffusion of web standards to allow for the development of web-based client-side full-fledged

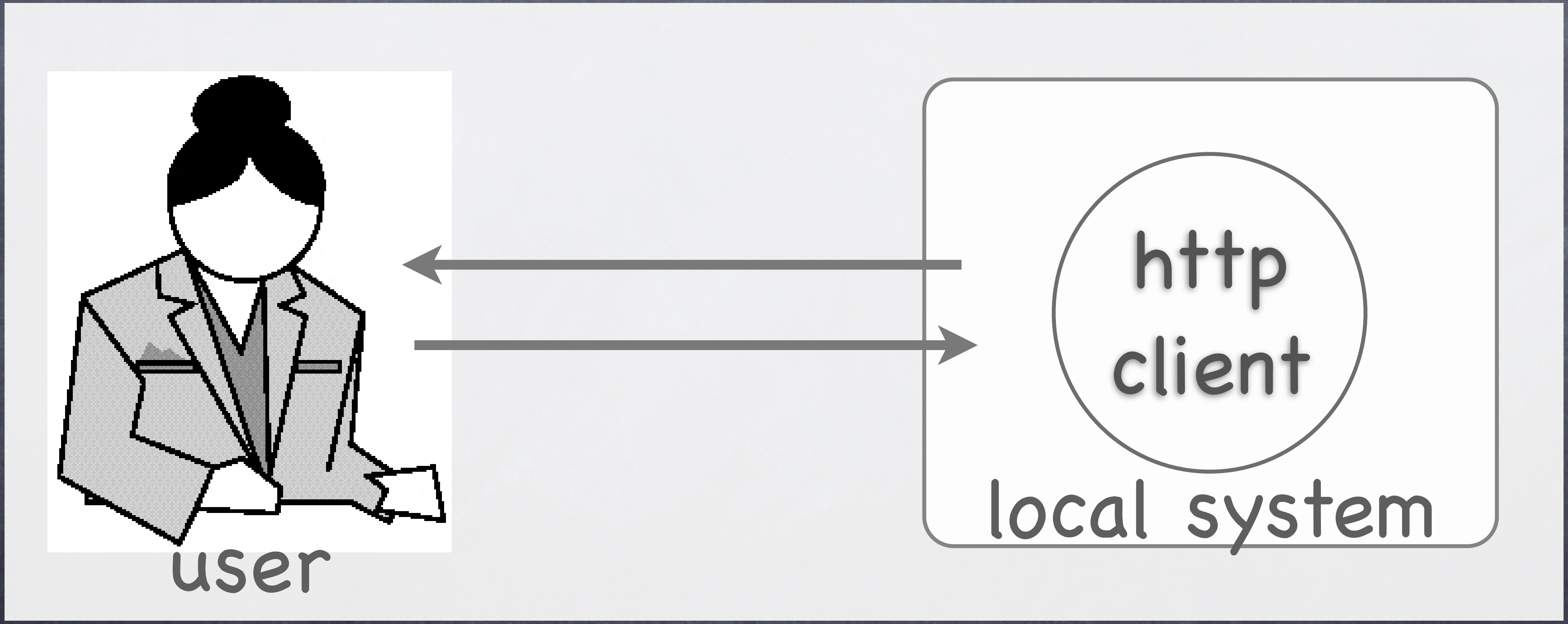
Advanced Components: Examples

- Google applications have paved the way
- Today, Web Applications are likely to be the next step
  http://www.whatwg.org/specs/web-apps/current-work/
- In this course, however, we will just deal with basic web models and technologies, sorry :)

Fundamental Standard Specifications & Languages

- Universal Addressing System
  - URI & URL
    - Uniform Resource Identifier/Location
- HTTP Protocol
  - HyperText Transfer Protocol
- HTML / XHTML + CSS
  - (eXtended) HyperText Markup Language
  - Cascading Style Sheets
- CGI
  - Common Gateway Interface
- Java language for Applet, Servlet & JSP

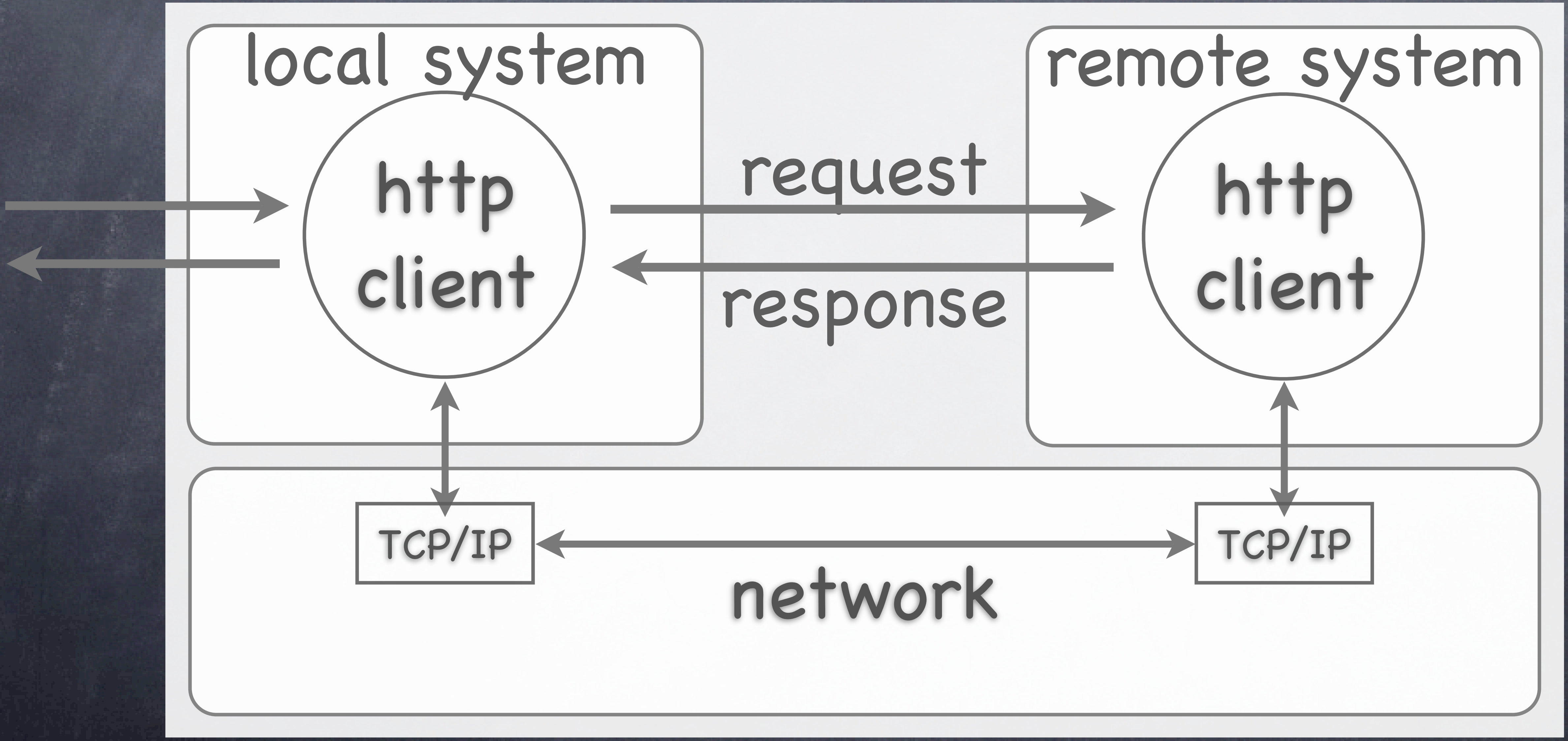
WWW: Base Architecture



Client / Server Connection

- HTTP Client
  - client/server pattern toward one HTTP server at a time
  - by specifying an URL (either writing or clicking)
  - HTML page requests via HTTP
  - HTTP response as HTML pages + other contents (images, scripts...)
- One-shot connection
  - one different connection per each object
  - e.g.: an HTML page with a JPEG image = 2 HTTP connections

HTTP Connection



Uniform Resource Locators

- Unique names for system resources, specified by clients to determine the server
- Uniform Resource Locators (URL)
  - node providing the resource
  - resource access protocol (e.g. http, gopher)
  - TCP port number (service default port)
  - local path of the resource within the server
    - <protocol>[://<host>][:<port>][<path>]
    - e.g.: http://www.address.edu:1234/path/subdir/file.ext
- Internet services and their protocols are recognised
  - http, gopher, ftp, wais, telnet, news, nntp, e mail (mailto)

http://www.w3.org/Addressing/

HTTP for Dummies (I)

- HyperText Transfer Protocol
  - client / server interface protocol
  - based on TCP connections
    - default port 80
- HTTP version 1.0
  - Request/response: only data are requested / sent
  - One-shot connection: TCP connection maintained only as long as necessary to send data
  - Stateless: no information is kept by server between two subsequent requests
    - then, information should be kept by clients

HTTP for Dummies (II)

- typical HTTP interaction
  - client request containing information for server (i.e., page local path)
  - server response containing information (i.e, requested page, or error message)
  - some negotiation possible on information and services
    - e.g., give me a page only if changed since my last request
- HTTP version 1.1: some improvements
  http://www.w3.org/Protocols/
- It will be the subject of future courses, like “Computer Networks” (Reti di calcolatori)

HTML for Dummies (I)

http://www.w3.org/MarkUp/

- HyperText Markup Language
  - specification language to encode information
  - derived from SGML (Standard Generalized Markup Language)
    - it is a markup language (TeX, RTF)
    - markup languages use tags to add features to enclosed text
  - very simple so as not to make clients computationally complex

HTML for Dummies (II)

- tag HTML: examples
  - header level 1
    - <h1>text</h1>
  - bold text
    - <strong>text</strong > or <B>text</B>
    - browser-dependent visualisation
  - link
    - <a href = "destination"> description </a>
  - image
    - <img src = "myimage.gif">
  - Java applet
    - <applet code="Hello.class" width=”100” height=”80”>

XHTML for Dummies

- eXtended HyperText Markup Language
- goals
  - solve HTML problems
  - toward XML
  - some backward compatibility toward HTML
    - to avoid migration problems to programmers and tools
- in this course, we mainly deal with XHTML

Web Style Sheets for Dummies

http://www.w3.org/Style/

- Style sheets decribe how elements of a web page should be represented on a specific medium
  - screen, audio, paper, ecc.
- CSS-1 e CSS-2
  - Cascading Stye Sheets
  - for HTML pages
- XSL (Extensible Stylesheet Language Family)
  - for XML sheets
  - XSL Transformations (XSLT)
  - XML Path Language (XPath)
  - XSL Formatting Objects (XSL-FO)

Programming the Web: A First Approach

- JavaScript
  - [the main block of the course, only for LTI-LA]
  - associating computations to Web pages (and browser events)
  - to be execute by clients (browsers)
  - to interact with servers (AJAX!!!)

Browsers: the Ancient Times

version	browser	properties
1.0	historic	header, lists, emph
2.0	Mosaic	inline images, forms
2.1	Netscape/Microsoft	tables, alignment
3.2	Netscape/Microsoft	frames, ...
4.0	Netscape/Microsoft	styles, JavaScript

Browsers Today…

- Mozilla / Firefox & Company
  - a world-wide project
  - the reference browser engine for this course
  - also for web page construction / verification
    - Composer is fine, Front Page NOT allowed
- Different versions of Internet Explorer
  - bad seeds we should coexist with
- Safari, Opera, Konqueror, …
  - good
  - however, remember to verify compliance to standards
    - both in theory [they claim to]
    - and in practice [they actually do]