upcomillas.es

upcomillas.es

5-Design of User Interfaces

Advanced Computing Tools for Applied Research

(***Herramientas Computacionales Avanzadas para la Investigación Aplicada***)

Rafael Palacios, Jaime Boal
(Eugenio Sánchez)

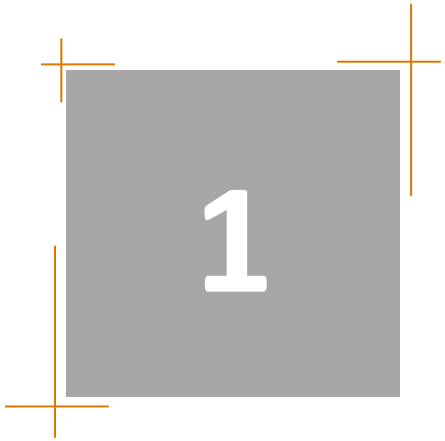
MS. Investigación en Modelado de Sistemas de Ingeniería

Advanced Computing Tools for Applied Research
Contents

Implementing computational tools

1. Introduction
2. Interface design
3. Web-based applications

Source: Many slides from Eugenio Sánchez course on User Interface Design



Introduction

Introduction to user-interfaces

- A User interface allows a person to interact with a machine.

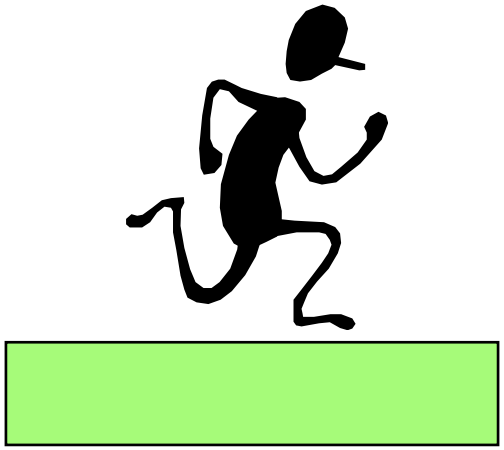
- Most user interfaces are based on combining a display and input devices.

- Examples of user interfaces:
  - Computer: Display and keyboard & mouse.
  - Computer for a blind person: Braille reader (or sound-based reader) and keyboard.
  - Standard telephone: No display, sound and keyboard.
  - iPhone, iPod, iPad: No keyboard, just multi-touch display and voice commands.

Motivation

- Why do we need a good user interface?

Bad interface



Good interface

Characteristics of a good user interface

A user interface is well designed when the program behaves exactly how the user thought it should

-Joel Spolsky

Characteristics of a good user interface

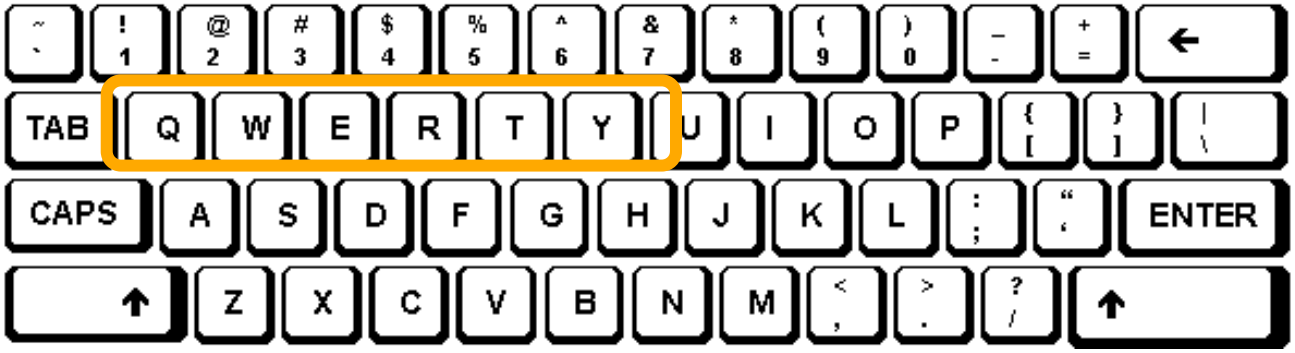
- Quick response to user actions.
- Dynamic options to help the user and minimize mistakes.
  - Group options.
  - Enable/disable but generally display them all.
- Minimize the number of actions.
- Support different ways for doing the same thing (Ex. hit return on the keyboard or click on "next" with the mouse).
- Accessibility and Compatibility.

First Graphical User Interfaces

- 1970 Project Smalltalk (Xerox PARC)
  - mostly ideas and concepts
- Jan 1984 Macintosh (Apple)
  - First GUI for a personal computer
  - Mouse, Windows, icons…
- Nov 1985 Microsoft Windows 1.0
- 1990 Windows 3.0
- 2007 iPhone

Input devices: Keyboard

- QWERTY Keyboard



Remington

Input devices: Pointers

2

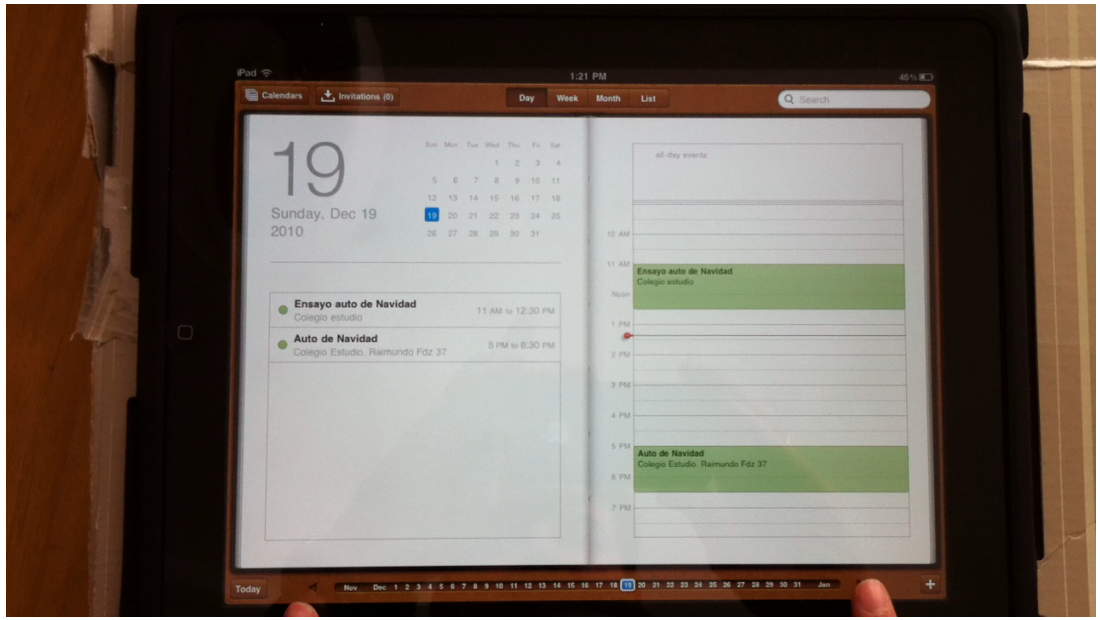
Interface design

How to define the interface

- Maximize the user experience: simpler + faster = better
- Know what the user will need at any time
- Simple, easy to use, intuitive, able to prevent errors, able to avoid confusion…

Menu transitions

¿Forward or Backwards?



Page transitions

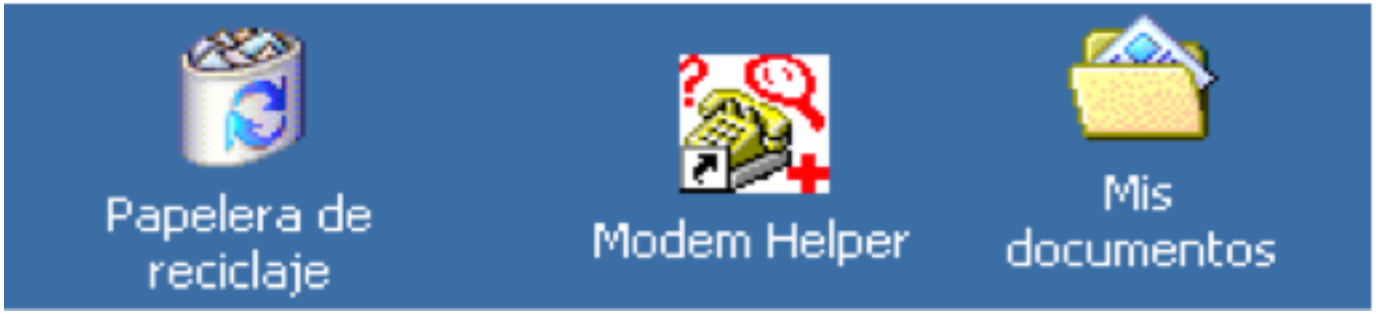
Concept of Metaphor

- **Metaphor** is the concept of understanding one thing in terms of another

Concept of Metaphor

- More examples

Desktop

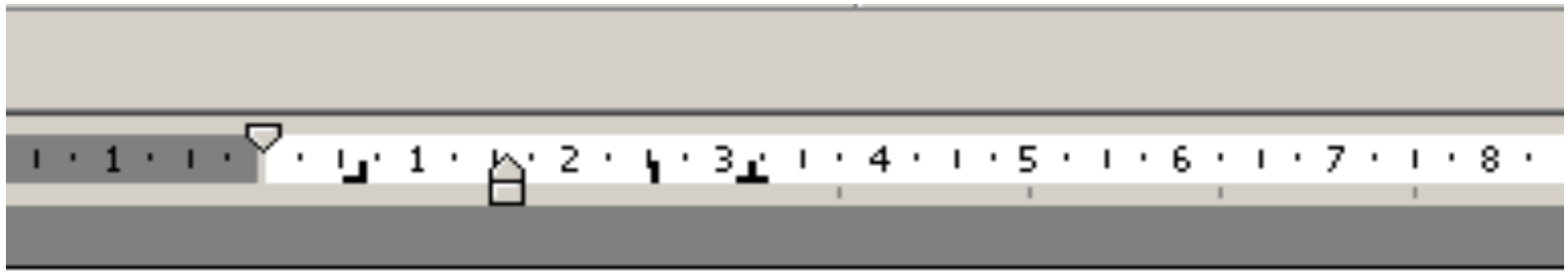


Windows 2000: CD Player

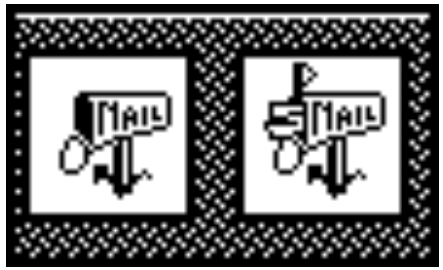
Concept of Metaphor

- Bad examples

Ruler



Mailbox



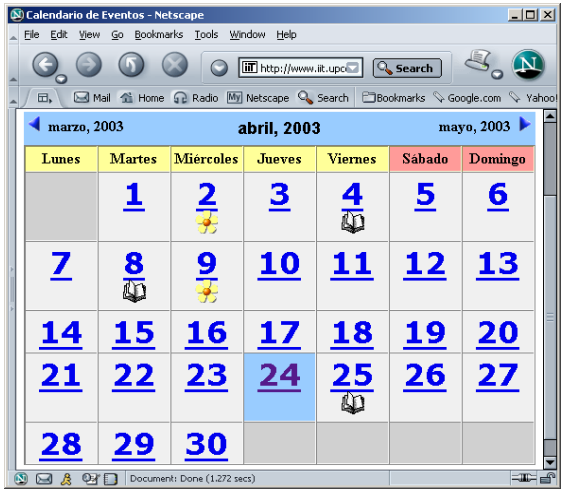
Save (?)

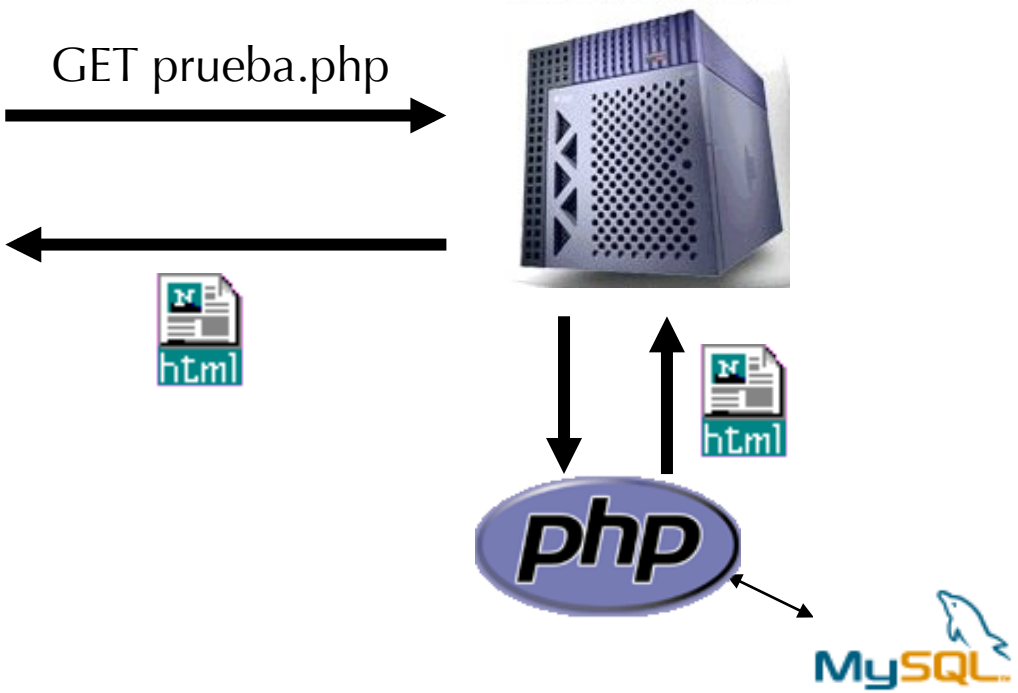
3

Web-Based Interface

Introduction

- Web-based applications use the client-server paradigm
- The user interface runs in any Internet Browser
- Very common for accessing databases





Different perspectives

- Server-side execution
  - Program running in the server
  - Activated upon client request
  - Sends responses to the client

- Client-side execution
  - Small programs running in the client (in the browser)
  - Useful for checking parameters and reduce the server load
  - Can be avoided by the user
  - May communicate with the server

Basic concepts

- HTTP: Hyper-Text Transfer Protocol.
  - Communications protocol running over TCP/IP
  - Similar to FTP, but always anonymous
  - All web pages use http

- HTML: Hyper-Text markup Language
  - Not a protocol. Not a programming language
  - It's a Page description language
  - Similar to PostScript and PDF but adjustable to the device
  - Includes hyper-text features and multimedia objects

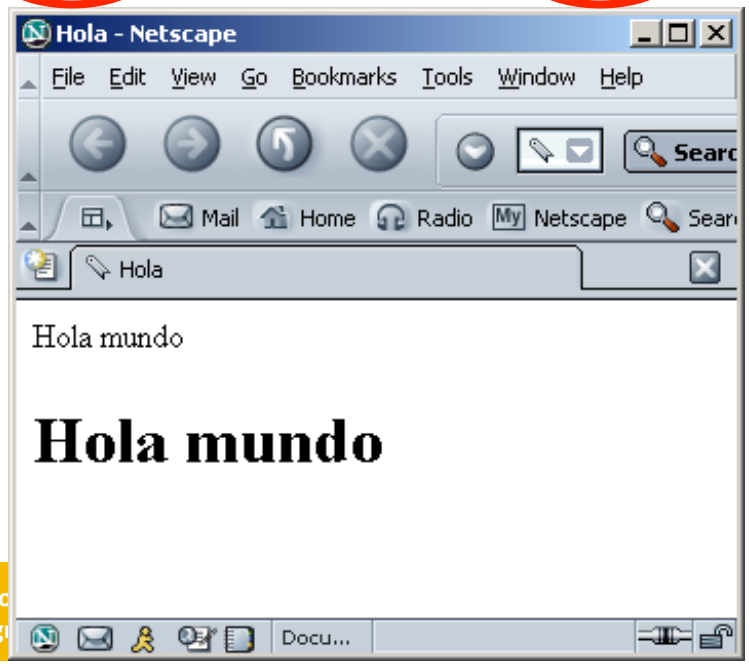
- CSS: Cascading Style Sheet
  - Style definitions
  - May be applied to several pages or the whole website

HTTP/HTML/CSS example

- Sample HTML code:

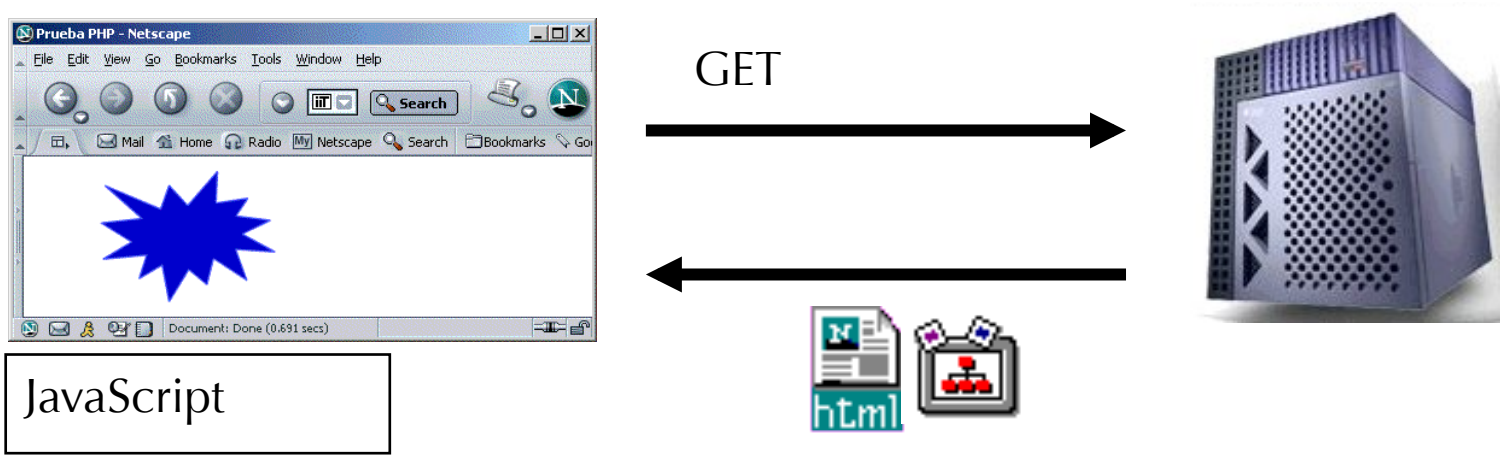
```
<HTML>
<HEAD>
        <TITLE>Hola</TITLE>
        <LINK href="estiloRAE.css" type="text/css" rel="stylesheet">
</HEAD>
<BODY>
        <P>Hola mundo</P>
        <h1>Hola mundo</h1>
</BODY>
</HTML>
```

http://website.com/index.html



Client-side languages

- The Browser downloads the code along with standard HTML
- Then the software runs in the browser

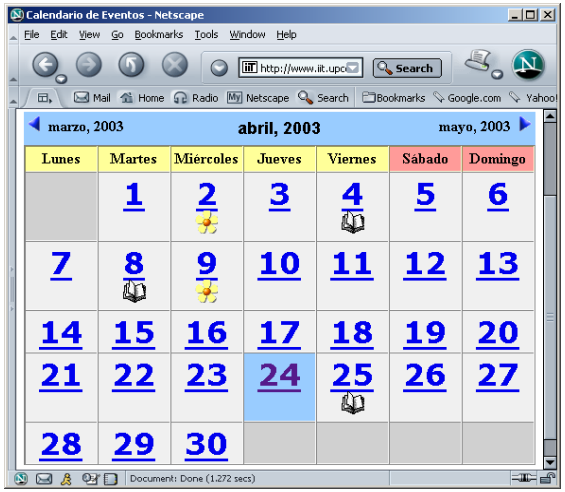


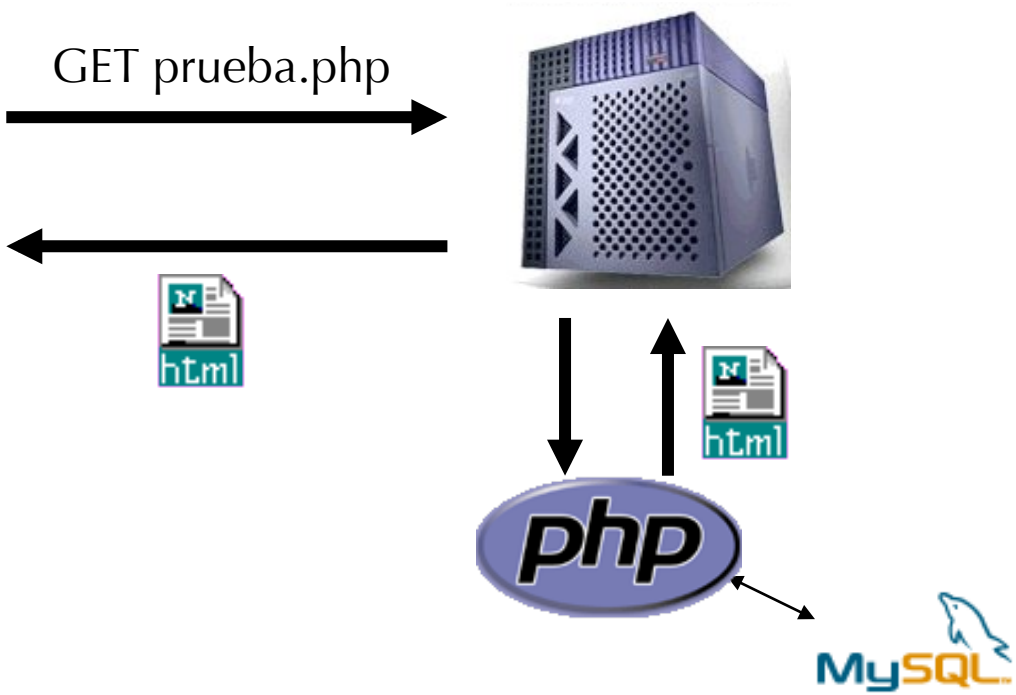
Client-side languages

- **JavaScript**
  - Universal support
  - Syntax similar to Java
  - Open code
  - Good HTML integration
    - Able to modify style properties of HTML objects
    - Able to handle HTML events: onSubmit, onChange, onMouseOver, onMouseOut…
- Java **Applets**
  - Broad support
  - Java with some security restrictions
  - Code not accessible. (could be signed to increase security)
- **VBScript**: Visual Basic Script
  - Restricted to Internet Explorer
- **Active X**
  - Restricted to Internet Explorer. Many security issues

Server-side languages

- The server runs the program and generates HTML code for the browser.
- The HTML code generated may depend on input data (acquired with forms) .





Server-side languages

- **CGI** (common gateway interface)
  - This is not a language, it's a protocol to delegate the creation of HTML pages.
  - Can be programmed in any computing language: typically unix scripts like perl.
  - Created initially to manage form information
- **PHP** (Hypertext Preprocessor)
  - Programming language embedded in HTML code
  - Open source. Widely available for any web server
- **ASP** (Active Server Pages)
  - Restricted to Microsoft Internet Information Server
- **Servlets**
  - Java programs that run on the server.
  - In contrast with CGIs, servlets can remain active and keep opened connection

AJAX

- AJAX = Asynchronous JavaScript and XML
- It is not a programming language
- It is a group of web development methods to create interactive web applications
- Combines HTML, CSS, JavaScript, XML, and web services

Ajax example

1. HTML + CSS + JavaScript is loaded from the server

2. A JavaScript function retrieves data from the server asynchronously (without loading any new page).
   - Web services

3. The same JavaScript functions changes the format or the content of specific objects in the page.

- JavaScript functions may be executed due to:
  - Events resulting from user interaction
  - Time-based events

Instituto de Investigación Tecnológica
C/ Santa Cruz de Marcenado, nº 26
28015 Madrid
Tel +34 91 542 28 00
Fax + 34 91 542 31 76
info@iit.upcomillas.es

www.iit.upcomillas.es

UNIVERSIDAD PONTIFICIA
ICAI ICADE
COMILLAS
MADRID