

WWW extensions

Introduction

WWW extensions: beyond the primitive, classical WWW

- **The initial, primitive, classical WWW started in the early 1990's.**
- **It evolves towards a more powerful network environment.**
- **This is possible because of more recent**
 - » tools,
 - » standards / protocols,
 - » extensions,
 - » ...
- **The client-server architecture is applied.**

WWW extensions

Advanced HTML

WWW extensions: advanced HTML

Advanced aspects and versions of HTML allow

- **forms in pages**
- **frames on pages**
- **program scripts in HTML documents**
- **“Cascading Style Sheets” to describe the outlook of pages**
- **moving and changing objects (for instance pictures)**
- **...**

WWW extensions: advanced HTML: an example

Interactive multimedia information about the chemical elements
(in advanced HTML)



WWW extensions

XML

?? Question ??

**Why can HTML not be extended
to satisfy all needs for all types of users?**

**In other words, why is HTML not developed further,
but instead XML has been developed
and XML applications are developed?**



WWW extensions: XML = eXtended Markup Language

- **XML = eXtended Markup Language**
- **Developed by a working group
of the *World-Wide Web Consortium (W3C)***
- **A subset of the
Standard Generalised Markup Language (SGML)**
- **Still evolving**
- **Requires an XML capable browser to view/interpret
documents marked-up with XML**

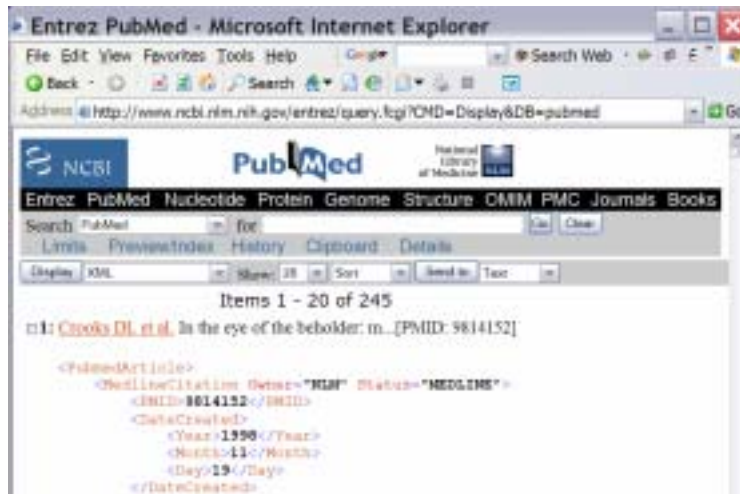
WWW extensions: XML versus SGML and HTML

- **XML is simpler than SGML**
- **XML is more powerful and complex than HTML**
- **XML allows the creation of documents that contain more meta-information = mark-up tags = fields = structure than HTML**
(for instance in a document generated from a database)

WWW extensions: XML mark-up tags

- XML allows the creation of semantic mark-up tags**
- **that are specific for the domain of the application**
 - **that are readable by a user and/or by a computer**
 - **that allow more structure in the information**
 - **that make a web page more similar to a record with a field structure from a database**

WWW extensions: XML mark-up tags: example



**_

?? Question ??

How can the additional meta-tags
of XML be applied?
How can they be useful?
Which advantages do they offer
(in comparison with the simpler HTML)?



WWW extensions: applications of XML mark-up tags (1)

- **Improved rendering / visualization / interpretation / layout of the information by the browser,**
 - » as specified in a XSL Style Sheet that is also provided by the information producer,
together with the core information marked-up with XML,
or
 - » as specified by the user through the browser

WWW extensions: applications of XML mark-up tags (2)

- **Improved searching / retrieval of XML web pages from the WWW, using web search engines that allow sophisticated searching, analogous to field searching in databases.**
However, most Internet / web search tools do not exploit meta-tags / fields, except the title tag.

WWW extensions: applications of XML mark-up tags (3)

- **Improved import in other programs than a browser, for further analysis, storage, interpretation, searching...**

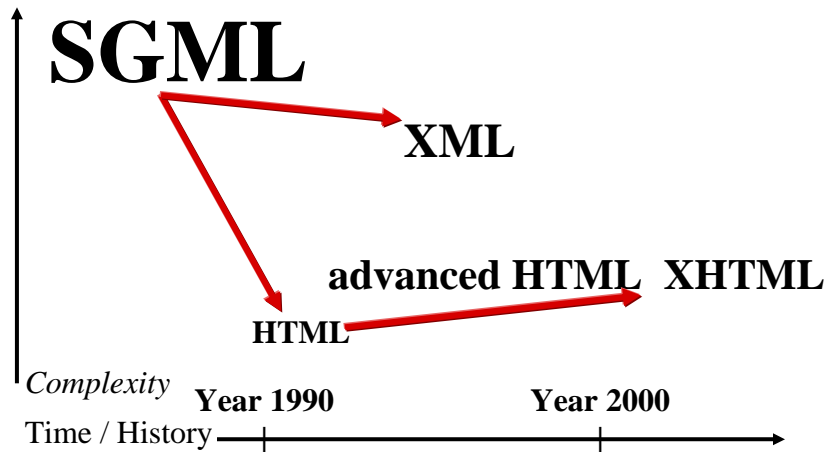
For instance import in

- » a spreadsheet
- » a database
- » ...

WWW extensions: applications of XML mark-up tags (4)

- ***Microsoft Office* from version 2000 onwards offers:**
 - » Saving of a Word document as a set of XML/HTML files for printing and for use on the web. This keeps properties that are typical for word processing files (such as page breaks) that cannot be stored in pure HTML.
 - » Saving of PowerPoint presentation files as XML/HTML for printing, for presentations with slides, and for distribution of the slides through the web, using advanced HTML (for instance for slide transitions with effects).

WWW extensions: from HTML to XML and XHTML



!! Task - Assignment !!

Read an introduction to XML:

<http://www.w3.org/XML/1999/XML-in-10-points>



!! Task - Assignment !!

Read

XML. Introductory paper. [online]

Available from:

<http://www.coe.missouri.edu/~DL/iDLR/viewpaper.php?pid=12>

[cited 2005]



!! Task - Assignment !!

Read an introduction to XML:

Kampherbeek, Jan

Kickstart tutorial XML. [online]

Available from: <http://www.spiderpro.com/>, 2001.

[cited 2005]



!! Task - Assignment !!

Read an introduction to XML:

FAO and UNESCO

Information Management Resource Kit (IMARK)

Module on Digitization and Digital Libraries.

Unit 2. Electronic documents and formats.

Lesson 5. Descriptive mark-up: XML

[online]

Available free of charge from: <http://www.imarkgroup.org/> 2005
also published free of charge on CD-ROM, by FAO, Roma, Italia.



?? Question ??

**Give an example
of an application in some domain
of additional mark-up tags allowed by XML.**



?? Question ??

Why does it make sense to say
that XML is more a computer meta-language
than a computer language?



WWW extensions

Additional programs for browsers

?? Question ??

Why are Internet browsers not extended so that they can view all file formats?



WWW extensions: additional programs for browsers (1)

To interpret / view / execute an incoming document which cannot be interpreted directly by the naked WWW browser, a suitable program can be activated on the client computer, that was installed earlier to work with the browser:

- *external viewers* can be activated by applying the MIME standard, independent of the web client program
- *plug-ins* are programs, that have been developed to work within the window of a specific web browser

WWW extensions: additional programs for browsers (2)

- **There is not always a sharp distinction between**
 - » browser
 - » operating system
 - » other programs
- **Furthermore various versions of browsers used with various operating systems behave differently.**

?? Question ??

Give examples
of viewers and
of plug-in programs.



Additional programs for browsers to interpret file formats (Part 1)

File format	Typical file name extensions
• Word (document), by Microsoft	DOC
• PowerPoint (presentation), by Microsoft	PPT, PPS
• Portable Document Format, by Adobe	PDF
• Real (audio and video)	RA, RAM
• AVI (audio and video)	AVI

Additional programs for browsers to interpret file formats (Part 2)

File format	Typical file name extensions
• Quicktime (video)	MOV, QT
• MPEG (video)	MPG, MPEG
• MPEG version 3 (sound)	MP3
• WAV (sound)	WAV
• MIDI (music)	MID
• Virtual Reality Modeling Language = VRML (3-dimensional scenes)	WRL, WRZ
• Macromedia Flash	
• AutoCAD	

?? Question ??

**What are plug-ins commonly used for?
(select one)**

- 1. Attaching your modem to a computer**
- 2. Keeping your computer switched on**
- 3. Viewing images and text on the web**
- 4. Viewing multimedia content on the web**



!! Task - Assignment - Exercise !!

**Have a look with you Internet browser
at a file in such a format
that it requires
a viewer or a plug-in program.**



Additional programs for browsers: more multimedia

- Together with the evolution of viewer software, the multimedia content increases on the WWW.
- Journals start publishing papers on the Internet, which include not only text and pictures, but also animation / movies for instance.

Additional programs for browsers: more multimedia: example

- Example: the *Elsevier* journal named *New Astronomy*
- This offers equivalents to printed articles, but with the added value of multimedia elements that do not (cannot) have a counterpart in hard copy.
See under “New Media” on the WWW site of this journal.



!! Task - Assignment - Exercise !!

**Have a look with you Internet browser
at a journal accessible through the Internet
that exploits hypermedia with multimedia.**



WWW extensions

Virtual reality

Virtual reality: introduction

- computer generated
- 3-dimensional
- interactive: user-computer

?? Question ??

In which areas/domains
is virtual reality applied?



Virtual reality application areas

- **Architecture;**
models and plans of cities;
management of building sites;...!!
- **Chemical modeling!**
- **Flight simulation**
- Games
- Artificial 3-dimensional chatting worlds / environments
- Interfaces for information retrieval and other services
- ...

Virtual reality and VRML (Part 1)

- **Virtual Reality Modeling Language = VRML**
- **Computer language to create virtual reality environments/scenes**
- **Written and generated in ASCII**
- **The code is interpreted by a VRML interpreter program on the user's computer**



Virtual reality and VRML (Part 2)

- **Independent of computer platform (hardware and operating system)**
- **“open language” = not proprietary**
- **History:**
 - » VRML 1; without animations
 - » VRML 2; with animations;
standardised by ISO in 1997: VRML 97



Virtual reality and VRML as extensions of WWW

- **VRML files can be used in the WWW with HTTP**
- **Programs to interpret VRML are**
 - » included in a WWW browser, or
 - » available as a plug-in for a WWW browser



HTML, VRML and WWW

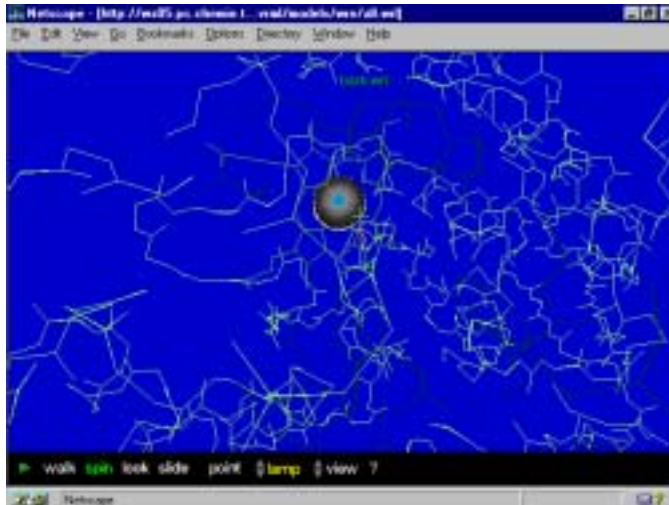
HTML and VRML are both

- standardised computer languages
- based on pure ASCII code
- to be interpreted by a client program on the user's computer
- aimed at generating output for display on the user's computer
- mainly used in the WWW

HTML
2 dimensions



VRML: example of an application in biochemistry



VRML: example of an application in a city model



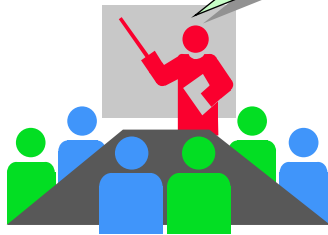
!! Task - Assignment - Exercise !!

Check online through the WWW
if your pc is ready for to view VRML files:
<http://cic.nist.gov/vrml/vbdetect.html>



!! Task - Assignment - Exercise !!

Have a look at (for instance) a model in VRML of a city through the WWW.



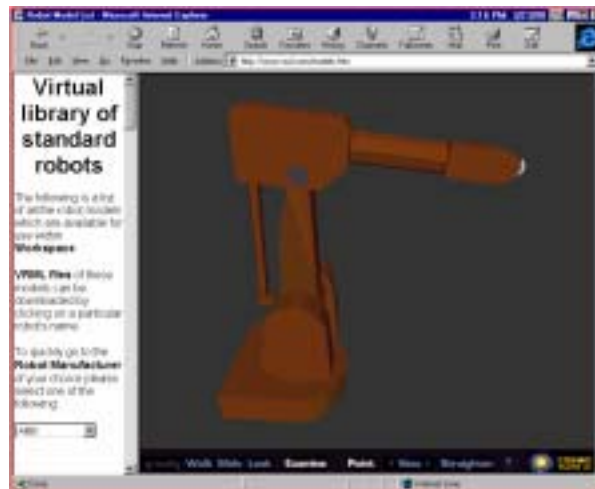
VRML: example of an application in information retrieval



VRML: example of an application: a museum model



VRML: example of an application: industrial robots



Animated virtual reality: example of an application

An industrial robot in operation:



VRML in combination with JavaScript and Java

VRML can be combined with JavaScript and with Java programs to extend the possibilities:

- » better user-scene interactions
- » better physical modeling
- » better communication among simultaneous users of large scale virtual environments
- » ...



Virtual reality: information sources related to VRML

- A Usenet newsgroup.
- Virtual Reality Modelling Language [online]
<http://www.3dsite.com/n/sites/3dsite/cgi/VRML-index.html>
- More information about VRML
and 3-dimensional visualisation in general
can be found via
<http://www.web3d.org/>



?? Question ??

Do you know other file formats besides VRML
that use only pure ASCII
to code and store the information?



Virtual reality: *QuickTime VR by Apple*

- not based on VRML
- allows 3-dimensional images:
zooming in and out, panning,...
- requires a plug-in for your WWW browser from *Apple*
- Examples:
 - » <http://www.brusselsdiscovery.com/indexgourmet.html>
 - » <http://www.muhka.be/>

!! Task - Assignment - Exercise !!

Have a look at
a *Quicktime VR* application.



?? Question ??

Is the application of virtual reality with VRML or *Quicktime VR* based mainly on the client or on the server?



WWW extensions

Programs and scripts on the client

WWW extensions: programs for the client, that allow “active documents”

The open programming systems

- **Java,** developed by *Sun*
 - **ActiveX,** developed by *Microsoft*
- make it possible to create more “active” documents.

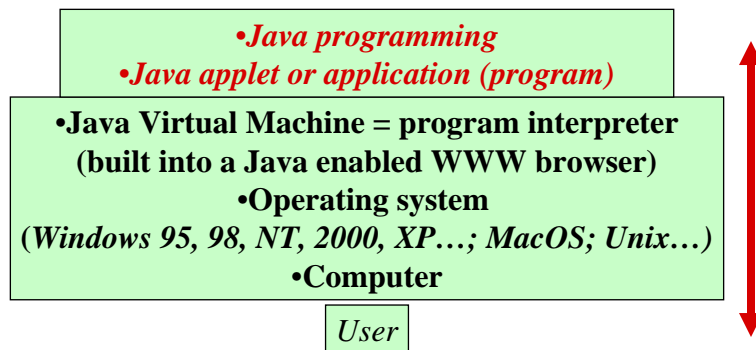
Java programming language: platform independence (!?)

- **Ideally, programs in the Java programming language can run on several different computing platforms (hardware and operating systems) which run the correct version of the Java environment.**
- **For programmers Java should allow “Write once, run everywhere”**
- **Java is NOT JavaScript.
JavaScript is NOT Java.**

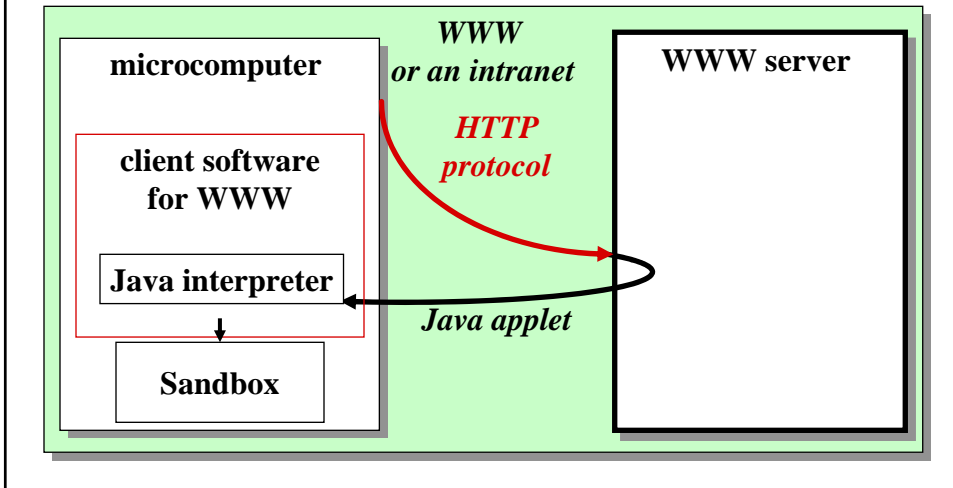
Java programming language: some properties

- Simple
 - Object oriented
 - Compiled
 - Architecture neutral = Platform independent
 - Robust
 - Small
 - Multithreaded
 - Collects “garbage”
- Fast
 - Secure:
 - the Java Virtual Machine is software designed to run programs written in Java, and this prevents a virus-like attack of the user’s machine
 - ...

Java: How it works



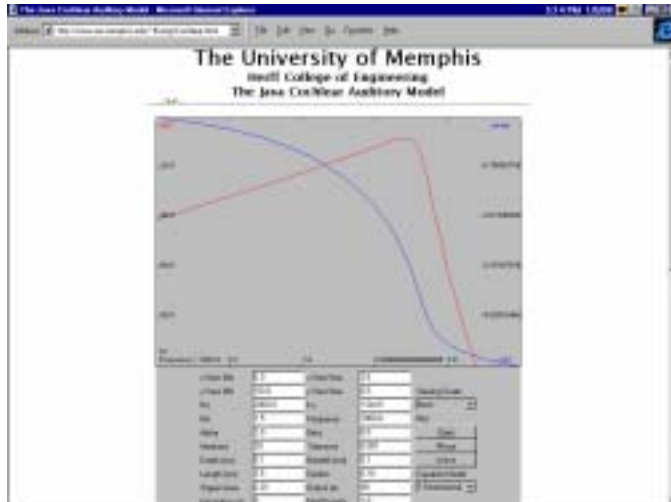
WWW extensions: Java applets: scheme



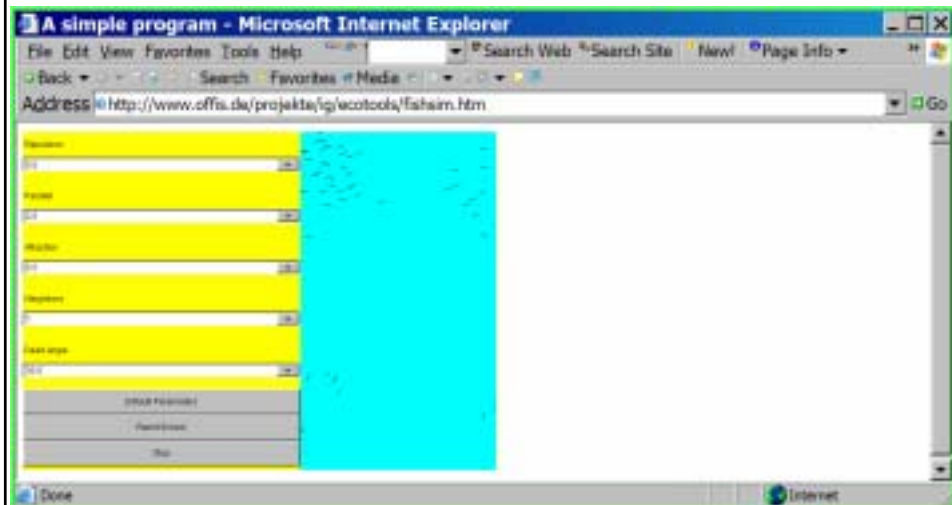
Java applet example: Unit Converter



Java applet example: a model and simulation in medicine



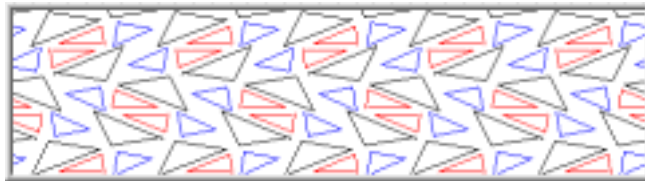
Java applet example: a model and simulation in ecology



Java applet example: drawing symmetrical patterns

Java Kali is a program that lets you draw symmetrical patterns.

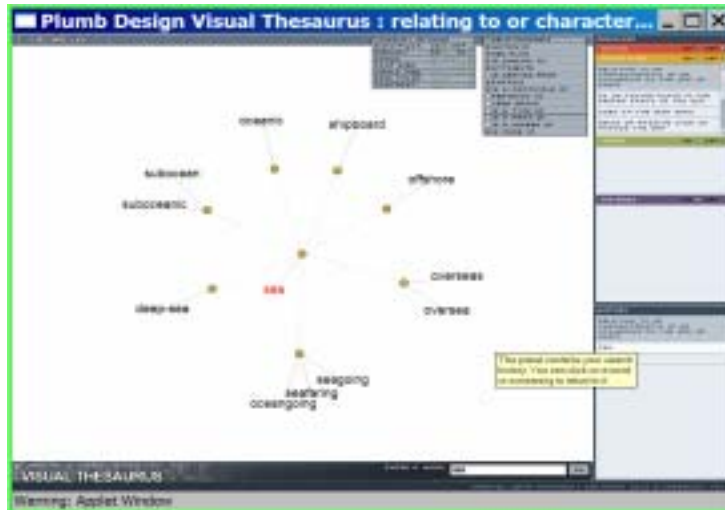
<http://www.geom.umn.edu/java/Kali/>



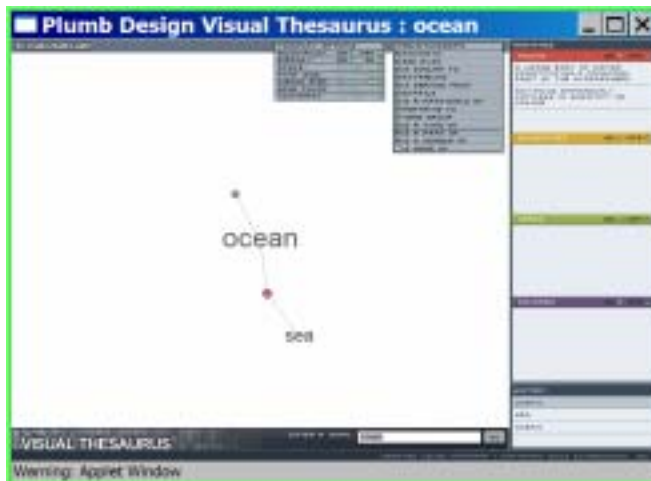
Java applet example: a thesaurus system

- **A general thesaurus system.**
- **Available free of charge.**
- **For English.**
- **Available from:**
<http://www.plumbdesign.com/thesaurus/index.html>
<http://thesaurus.plumbdesign.com/index.jsp>

Java applet example: a thesaurus system: screenshot *sea*



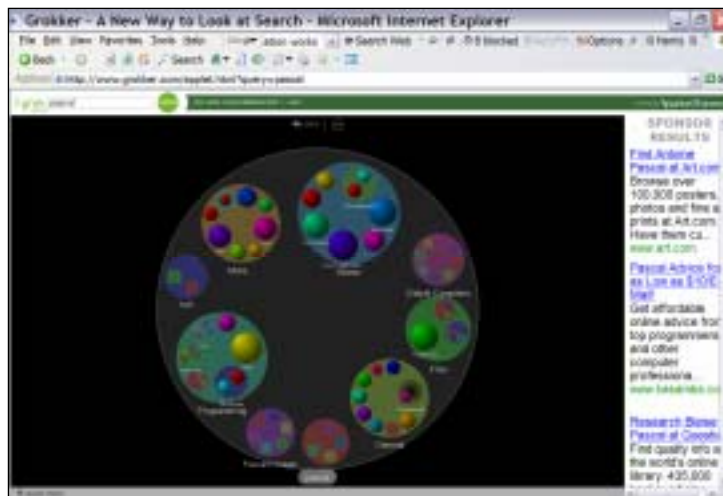
Java applet example: a thesaurus system: screenshot *ocean*



Java applet example: a meta-search system

- Offers an advanced graphical user interface.
- Based on Java applet.
- Exploits the *Yahoo!* WWW database.
- Available since 2005.
- <http://www.grokker.com/>

Java applet example: a meta-search system: screenshot



!! Task - Assignment - Exercise !!

Take a look at a working
Java applet.



!! Task - Assignment !!

Read

Sun Microsystems

About the Java Technology. [online]

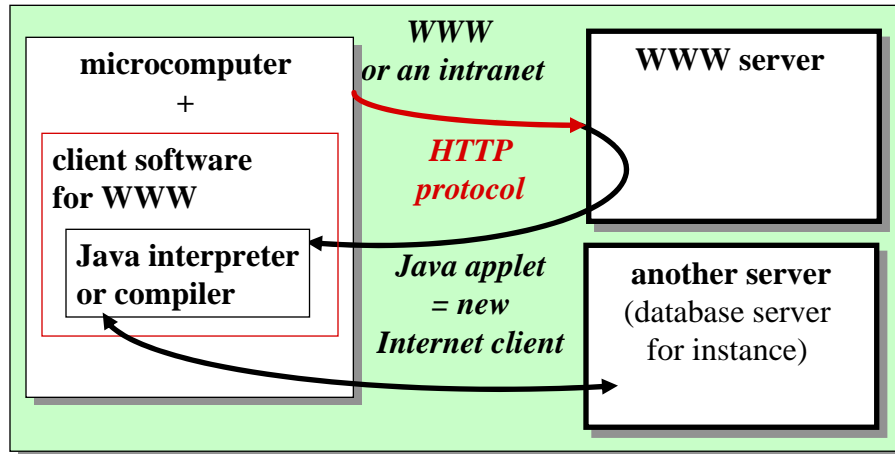
Available free of charge from:

<http://java.sun.com/docs/books/tutorial/getStarted/intro/definition.html>

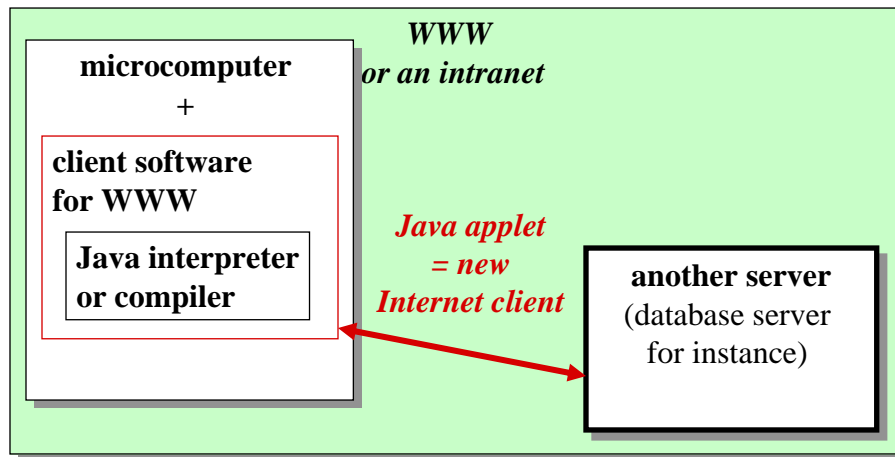
[cited 2006]



WWW extensions: Java applets as new clients (1)



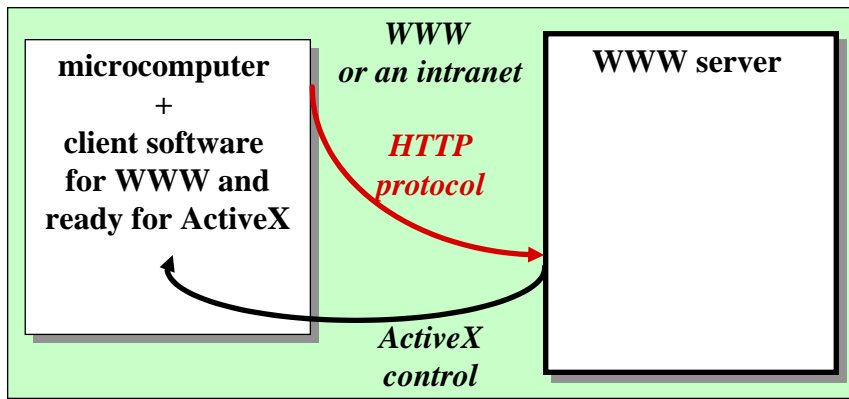
WWW extensions: Java applets as new clients (2)



Java: information sources related to Java

- The Java Virtual Machine developed by Sun for various types of client computers can be downloaded free of charge from
 - » <http://www.java.com/>
- Links to Java applets are provided on the WWW by
 - » <http://gamelan.earthweb.com/>
 - » <http://java.sun.com/applets/>
- Usenet newsgroup discussing Java:
 - » <news://comp.lang.java>

WWW extensions: ActiveX: scheme



ActiveX controls: examples

**Examples of ActiveX software are plug-ins
for *Microsoft Internet Explorer*
to view**

- » Adobe Acrobat Portable Document Format files (.PDF),
- » Microsoft PowerPoint presentation files (.PPT, .PPS),
- » Virtual Reality Modelling Language files (.WRL),...
- » the version of your Microsoft Windows operating system
so that updates can be downloaded and installed from the
Microsoft Windows WWW site

ActiveX: information related to ActiveX

**Information about ActiveX and links to ActiveX controls
are provided on the WWW by**

- » <http://www.download.com/PC/Activex/>
- » <http://www.gamelan.com/>
- » <http://www.microsoft.com/com/tech/activex.asp>

Java applets versus ActiveX controls

<ul style="list-style-type: none"> • Programming language(s) • Programs • <i>Rules for interaction among programs</i> 	<ul style="list-style-type: none"> • Java programming language • “Java applets” 	<ul style="list-style-type: none"> • Various programming languages (Visual Basic,...) • “ActiveX controls” • <i>“ActiveX”</i>
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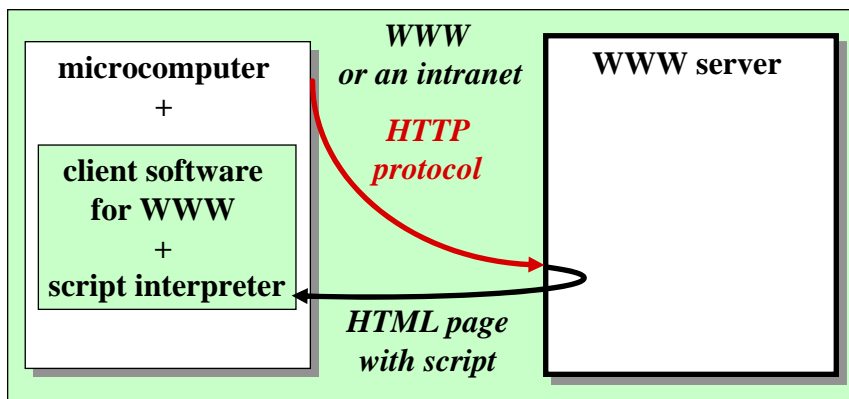
WWW extensions: comparison of viewers and plug-ins, ActiveX, Java

<ul style="list-style-type: none"> • Viewers and plug-ins (except ActiveX or Java) • ActiveX controls • Java applets (“pure” ones that do NOT use direct Windows API) 	<p style="text-align: center;"><u>Computer platform independent?</u></p> <p style="text-align: center;">No ☹</p> <p style="text-align: center;">No ☹ (mainly Windows)</p> <p style="text-align: center;">Yes ☺☺</p>	<p style="text-align: center;"><u>Browser independent?</u></p> <p style="text-align: center;">No ☹</p> <p style="text-align: center;">No ☹</p> <p style="text-align: center;">Yes ☺☺</p>
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WWW extensions: scripts in HTML documents: basics

- Several scripting (programming) systems allow to embed scripts in HTML documents.
 - » JavaScript by *Netscape*, for many computing platforms
 - » Visual Basic Script (VBScript) by *Microsoft*, for Windows
- JavaScript is NOT Java. Java is NOT JavaScript.
- Such scripts should be interpreted and executed by the WWW client.

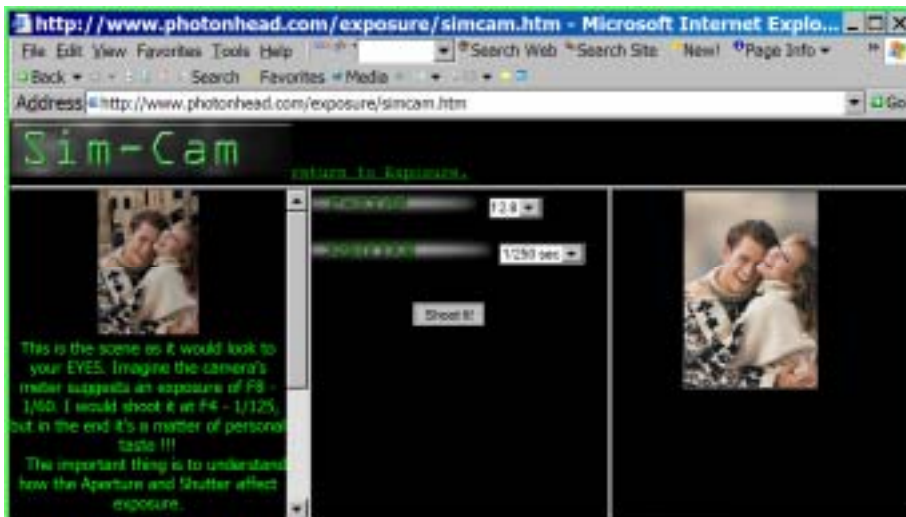
WWW extensions: scripts in HTML documents: scheme



Scripts in HTML documents: applications

- Scripts for the client can yield more “active”, “dynamic”, “intelligent” WWW documents.
- For instance:
“intelligent” electronic forms in HTML WWW pages, which are processed on the client computer. This requires less interaction with the server to provide feedback to the user. That can save time and network bandwidth.

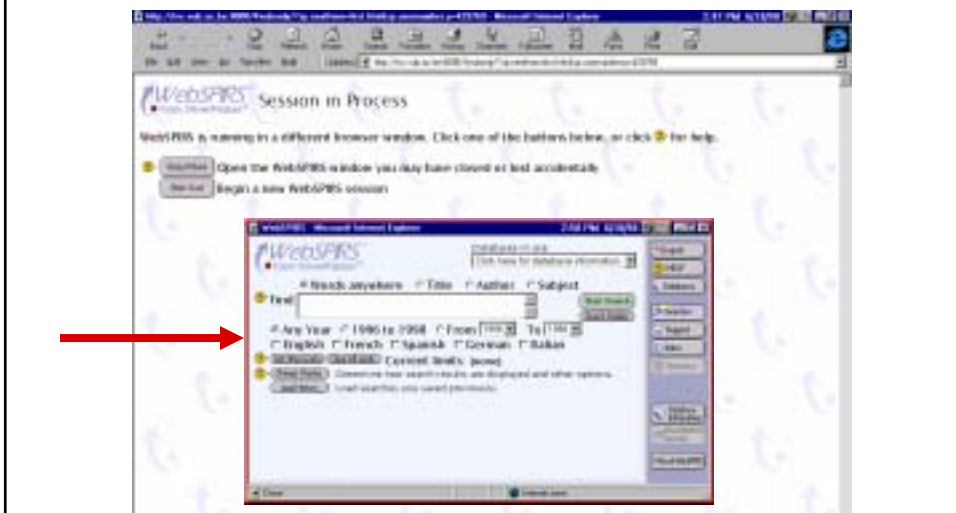
Scripts in HTML documents: example of a page with JavaScript (1)



Scripts in HTML documents: example of a page with JavaScript (2)



Scripts in HTML documents: JavaScript for database searching



Scripts in HTML documents: comments

- **In general, they allow easier development**
 - » than when the Java programming language is used,
 - » than when ActiveX controls are created.
- **On the other hand, they are by definition more dependent on HTML and HTML interpreters than the more general programming language Java.**

Scripts in HTML documents: JavaScript collection

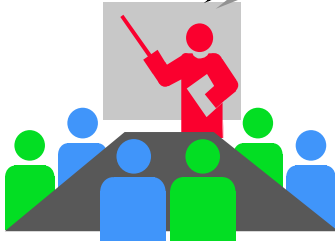
Information about JavaScript and a collection of scripts
can be found online from

<http://javascript.internet.com>



Task - Assignment - Exercise

Look at a web document with a script embedded in it, and see how it functions.



!! Task - Assignment - Exercise !!

Look at the *source code* of a script embedded in a web document.



?? Question ??

**Java as well as JavaScript
can extend the functionality
of an Internet client.
Explain the difference between both.**



?? Question ??

**In the process of
accessing information sources and services
through the WWW,
the functionality of the web browser client
can be extended with various methods.
Which methods? Compare these methods briefly.**



Data collections + dedicated programs available through WWW

- **Data collections are valuable in scientific domains like astronomy, molecular biology, medicine...**

Data collections + dedicated programs available through WWW: example

- **For example, astronomical data catalogues are available on the Internet through**
http://cdsads.u-strasbg.fr/ads_catalogs.html



Data collections + dedicated programs available through WWW: example

- For example, digital recordings of respiratory sounds in health and disease are available on the Internet through <http://www.rale.ca/>



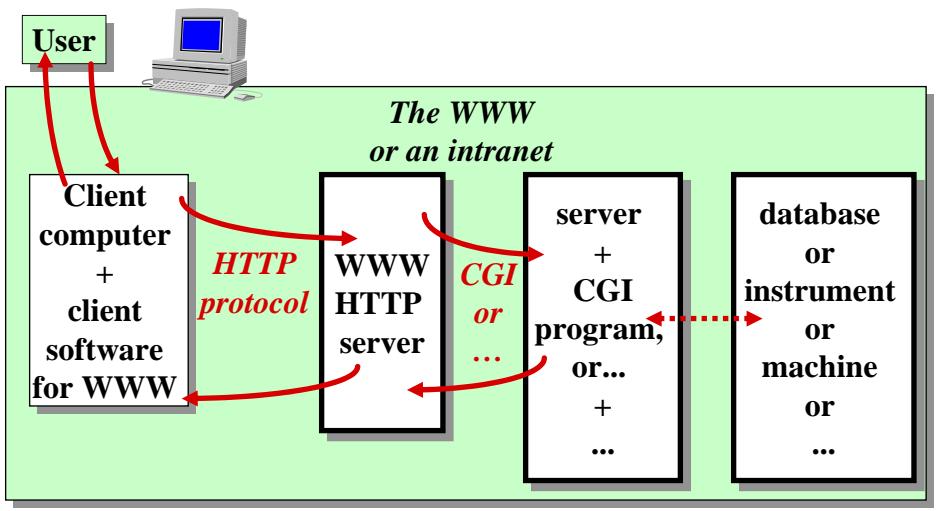
WWW extensions

Programs and scripts on the server

WWW extensions: programs on the server: introduction

Forms in an HTML document/page allow more interaction with the WWW server computer, by accessing information and executing programs on a server.

WWW extensions: programs on the server: scheme



WWW extensions: programs on the server: CGI

- **One of the first approaches for more communication / interaction between browser client and the server in the WWW, is based on a standard: the *Common Gateway Interface* standard or “CGI”.**
- **This is a set of rules that define how a WWW server program communicates with another piece of software at the server side.**
- **A script or program on the WWW server that handles input and output according to the CGI standard is called a CGI script or program.**

WWW extensions: programs on the server: applications 1

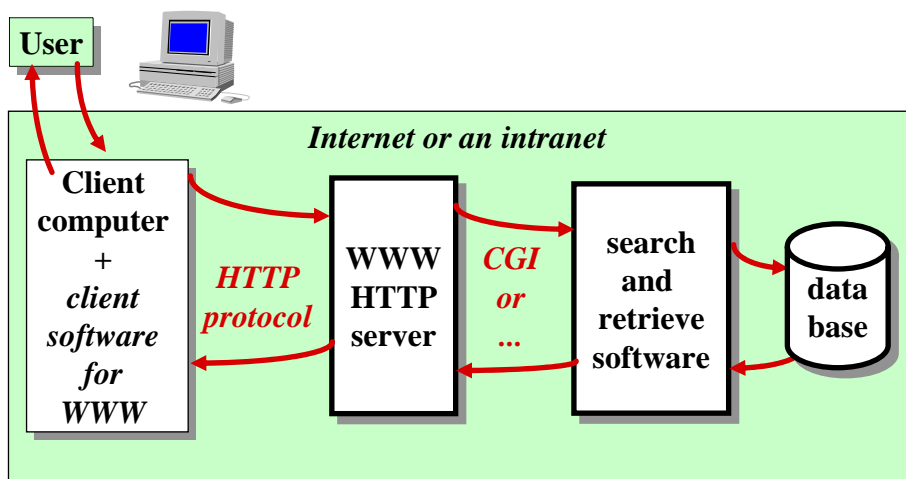
Applications are for instance:

- **to search a database at the server side (for instance a catalogue, a dictionary...)**
- **to use an interactive atlas at the server**
- **to make a calculation using programs and data at the server side**
- **to translate a text**
- **speech synthesis (answers to “How is this pronounced?”)**

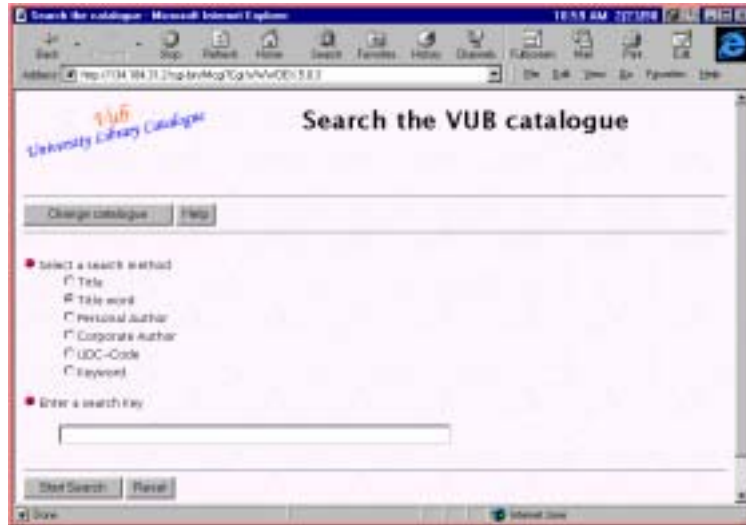
WWW extensions: programs on the server: applications 2

- to convert the data from a WWW form into an electronic mail message
to an email box, or to a GSM / mobile phone
- the control (remotely) a camera, a scientific instrument (a microscope, a telescope,...); “teleprocessing”
- to use an expert system on the server
- to start and use an intelligent software agent at the server side
- ...

WWW extensions: database searching: scheme



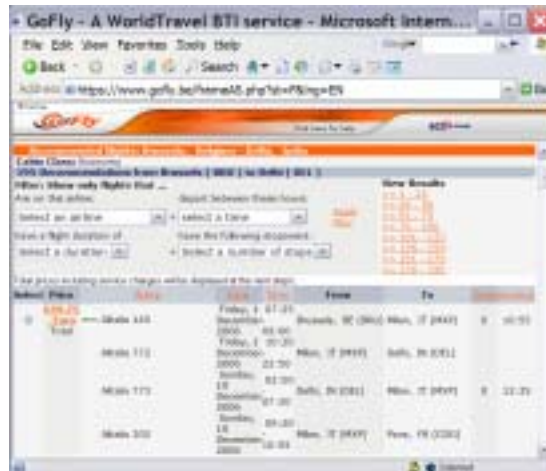
WWW extensions: database searching: catalogue



WWW extensions: database searching: train schedules



WWW extensions: database searching: flight schedules



WWW extensions: database searching: applications

An increasing number of classical, character-based databases are offered in this way: examples:

- **library catalogues**
- **commercial, public access databases**
such as CSA, Data-Star, Dialog, Ovid, ERL...
- **time schedules of**
 - » trains
 - » flights

WWW extensions: database searching: pro and contra

- **+ Advantages:**
 - » Requires only common, well-known, “universal” WWW browser software on the client computers.
 - » Graphical interface is possible with graphical client software.
- **- Disadvantage:**
 - » Using a graphical interface requires a relatively powerful client workstation.

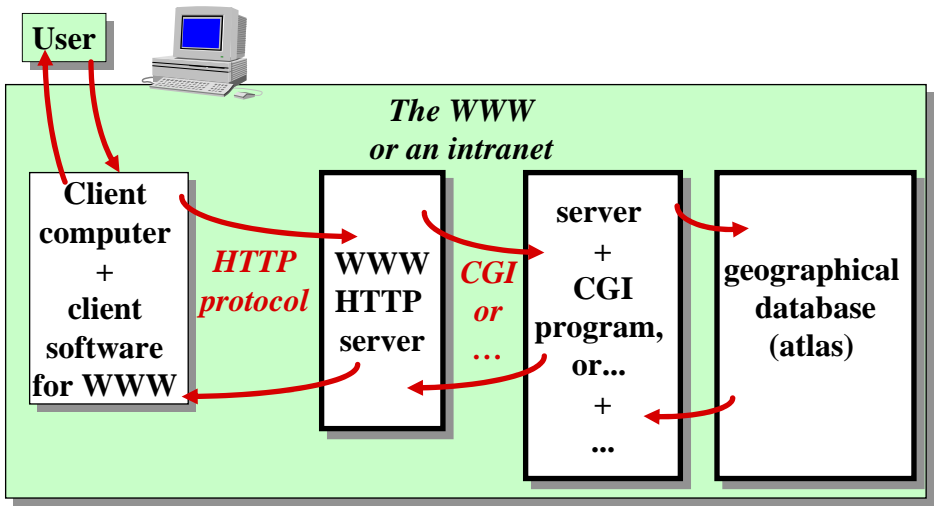
WWW extensions: database searching: complications

- **In more complicated systems, a**
 - » Java applet, or
 - » script (JavaScript, VBScript...)**may be sent from the WWW server to the client computer to support further interactions between the client computer and the database server (even besides HTTP).**
- **Example:**
access to some bibliographic reference databases

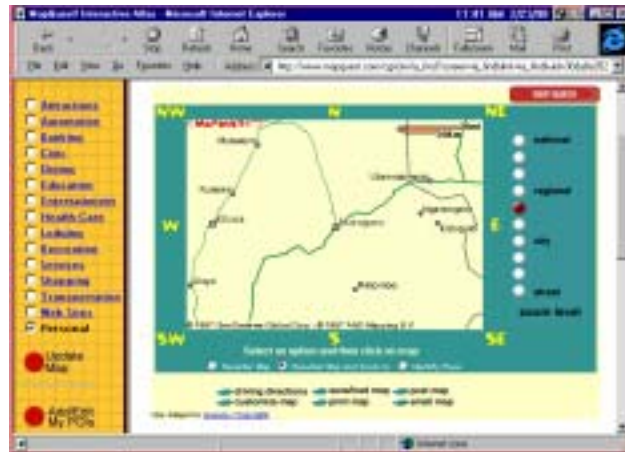
!! Task - Assignment - Exercise !!



WWW extensions: interactive atlases: scheme

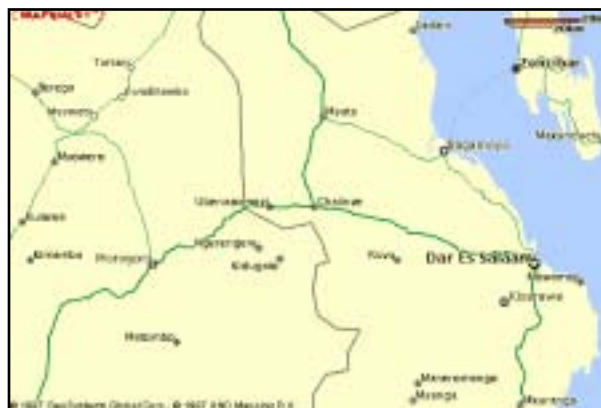


WWW extensions: interactive atlases: screenshot of an example



WWW extensions: interactive atlases: example of a result

Result of a “search”:



WWW extensions: interactive atlases: example of a city map



WWW extensions: interactive atlases: examples of world maps

- <http://maps.google.com/>
- <http://www.map24.com/>
- <http://www.mapblast.com/> +
- <http://www.maporama.com/> -
- <http://www.mapquest.com/> ++
- <http://mappoint.msn.com/>

- Google Earth, which requires a dedicated client program, since 2005

**WWW extensions: interactive atlases:
Google Earth screenshot**



**WWW extensions: interactive atlases:
examples**

- **Europe maps and aerial photographs:**
» <http://www.mappy.com/>
- **City maps:**
» <http://www.hot-maps.de/>

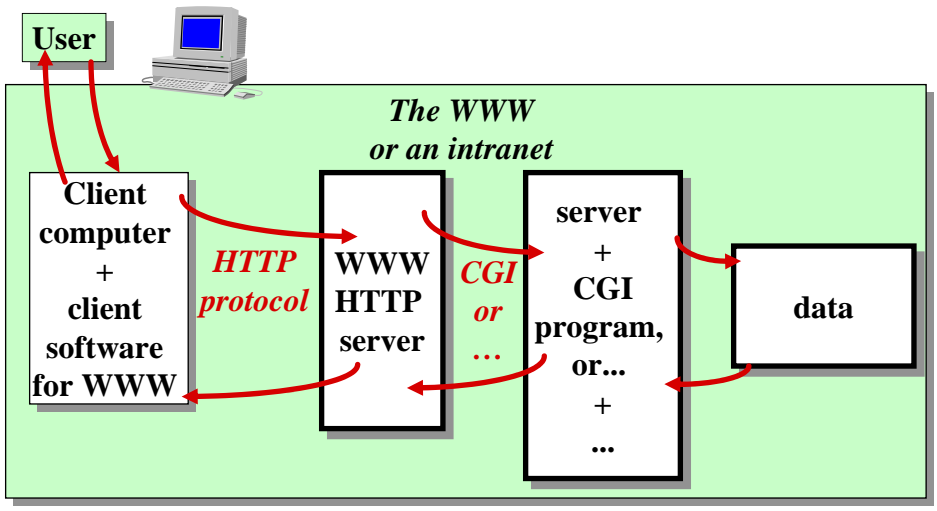
!! Task - Assignment - Exercise !!

Have a look at an interactive atlas through the WWW.

Create a map and save it to your computer.



WWW extensions: calculating with data at the server: scheme



WWW extensions: calculating with data at the server: example

The Universal Currency Converter



WWW extensions: translation services

- **Demonstrations of translation by computer are offered through the WWW, free of charge.**
- **The systems can translate (from a few to a few languages)**
 - » the text on a chosen WWW page
 - » a text inserted by the user

WWW extensions: translation services: *Babelfish*

- <http://babelfish.altavista.digital.com/>
[accessed in 2006]
- For instance, includes from English to Dutch.

WWW extensions: a translation service: screen shot



WWW extensions: translation services: *Google*

- http://www.google.com/language_tools?hl=en
[accessed in 2006]
- For instance, does NOT include from English to Dutch.

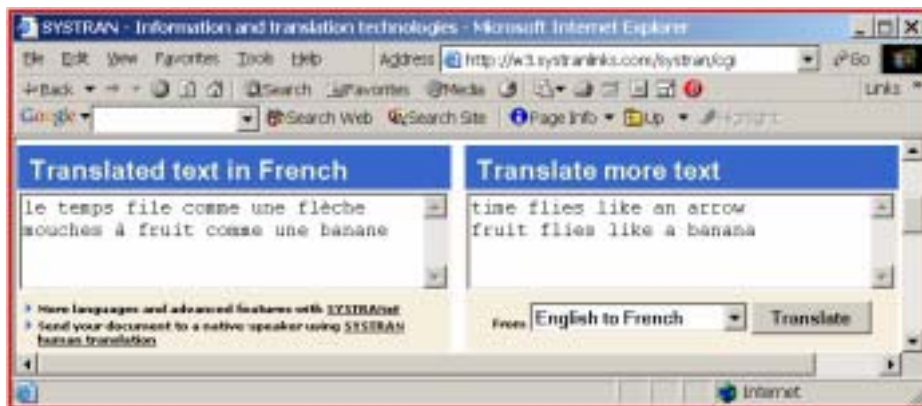
WWW extensions: a translation service: screen shot



WWW extensions: translation services: *Systran*

- <http://www.systransoft.com/> [accessed in 2006]
or <http://www.systranbox.com/> [accessed in 2006]
- For instance, includes from English to Dutch
- Limited to text of 150 words.
- Claims to form the basis for the web translation tools *Babelfish AltaVista* and *Google*.

WWW extensions: a translation service: screen shot



WWW extensions: a translation service: screen shot



WWW extensions: speech synthesis

- An answer to a question like
“How is this word pronounced?”
can be provided by a service that offers speech synthesis
free of charge:

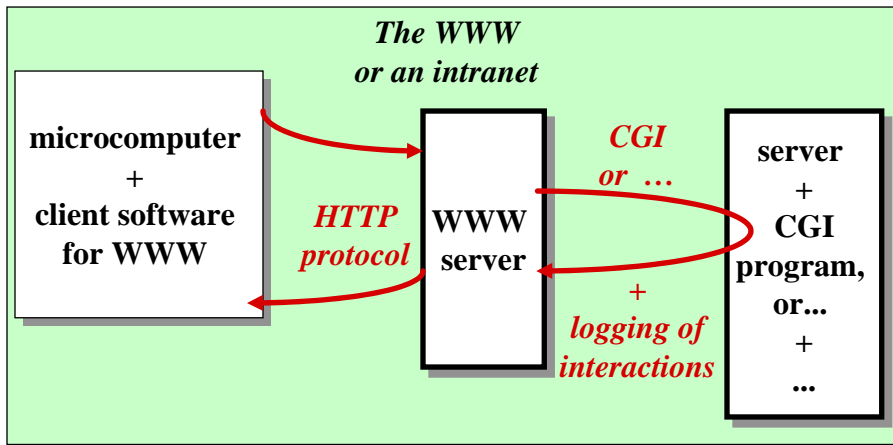
http://www.latl.unige.ch/english/latl_e.html

!! Task - Assignment - Exercise !!

Have a look at a server-based service (besides databases and atlases) through WWW.



Adaptive hypertext provided by the server: scheme



Adaptive hypertext provided by the server: comments

- **2 categories:**
 - » adaptive presentation
 - » adaptive navigation/links
- **Application:**
distance learning with output adapted to the student.
- **Problem:**
lack of standardisation and standard software.

WWW extensions: software agents

- “Knowbot” “Webbot”
“intelligent agent” “software agent”
= (in this context): a program
- **that is started**
 - » from the client computer, or
 - » from a remote server computer,
 - **that “works / acts” for its user,
more independent of the user than in the more classical
desktop model of computer usage.**

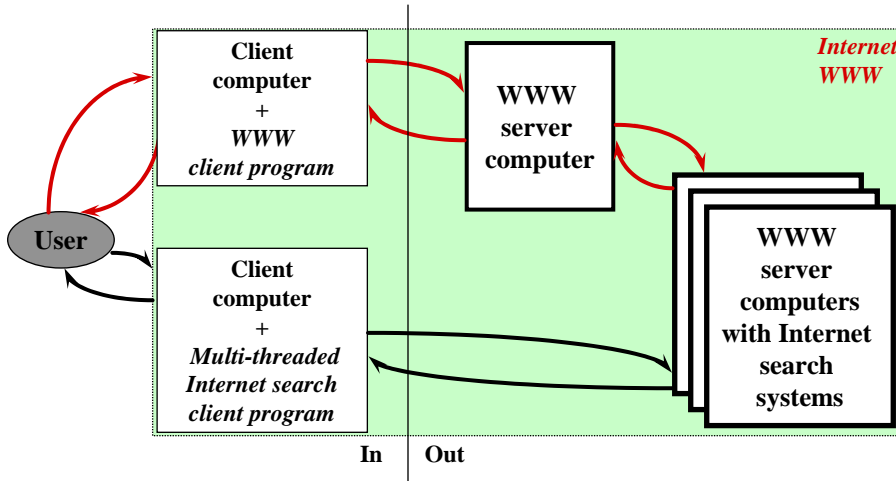
WWW extensions: software agents: possible functions and applications

- **seek/search information or filter information**
 - » for instance to gather interesting news
- **recommend services and products (“shopbots”)**
 - » for instance books, music CD’s, movies on video...
- **make matches**
 - » for instance bring people together with similar interests
- **automate transactions**
 - » selling and buying

WWW extensions: software agents: how they work

- **An agent starts to work on the basis of a user profile**
 - » in which is stored a particular interest of the user and
 - » which can be compared
 - with the properties of targets in the network, and/or
 - with other user’s profiles
- **After some work, the agent reports to the user.**

Software agents: multi-threaded Internet search systems: scheme



Software agents: multi-threaded search systems and shopbots



!! Task - Assignment - Exercise !!

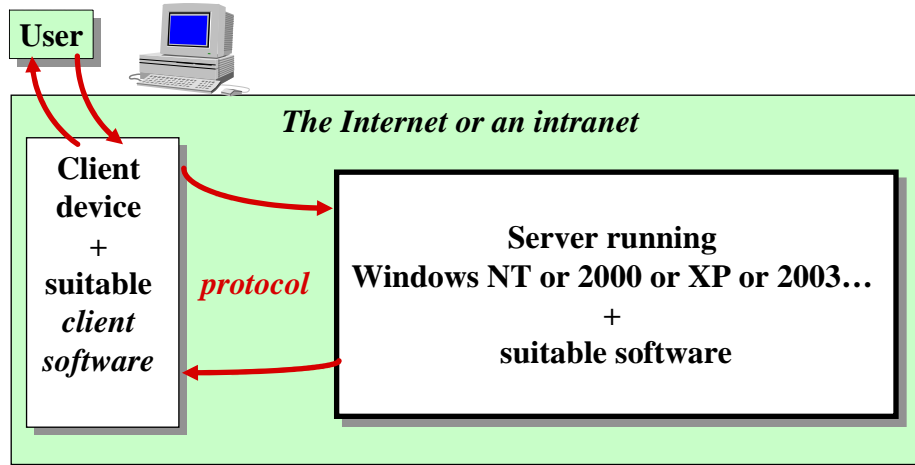
**Have a look at
a multi-threaded
specialised Internet search engine and shopbot
through the WWW.**



Executing programs on a *Microsoft Windows* server: basics

- **These days, many programs are normally executed on a PC and not on a central mainframe computer.**
- **However, it is possible to execute many programs on a server computer through a network (and to retrieve information for instance).**
- **With a *Unix* server, this is made possible by *X-Windows*.**
- **With a *Windows* server, this is made possible by *Windows Terminal Server* or by software developed by *Citrix*.**

Executing programs on a *Microsoft Windows server: scheme*



Executing programs on a *Microsoft Windows server: comments*

+ Pro:

- » Reduced equipment costs
- » Enhanced reliability
- » Reduced management costs in the long run...

- Contra:

- » Single point of failure
- » Does not work with all applications
- » High network bandwidth required
- » Manager needs extra knowledge and expertise...

Executing programs on a *Microsoft Windows* server: browsers

- Suitable client software is incorporated in recent versions of common, “universal” WWW browser software on the client computers.
- This allows running programs on a *Windows* server from such a browser.
- This approach clearly allows more functions, more interactive services, than simple, classical WWW surfing with a WWW client program.

Executing programs on a *Microsoft Windows* server from a browser



!! Task - Assignment - Exercise !!

Read more about server-based computing:

Stevens, Alan

Network: Server-based computing: Centre of gravity.

PC World UK, May 2004, pp. 167-170.

Introduction

Server-based computing and Windows

Terminal Server and 2003

The Citrix connection

Pros of server-based computing

Cons of server-based computing



WWW extensions

Client-side versus server-side processing

?? Question ??

Explain that the functionality of WWW can be extended by mechanisms/systems that involve mainly the server or mainly the client. Illustrate this with examples of such mechanisms and with examples of applications.



Client-side versus server-side processing

Methods which allow interactivity are based on the execution of scripts/programs

- **on the client**
 - » viewers, plug-ins (for instance for video, VRML...)
 - » Java
 - » ActiveX
 - » JavaScript, Jscript, Visual Basic Script
- **on the server**
 - » CGI, Active Server Pages...

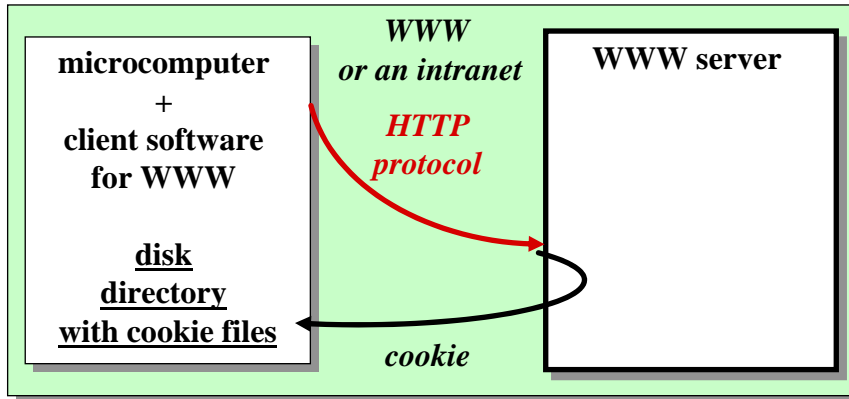
WWW extensions

Cookies

WWW extensions: cookies put on the client: basics

- A “cookie” is
 - » a file on the user’s Internet access computer,
 - » with data about earlier interactions with a particular server/site,
 - » which is put in place during interaction with that WWW server without intervention by the user,
 - » which can influence the future interactions with that server/site
(including the documents that are selected and viewed)

WWW extensions: cookies put on the client: scheme



WWW extensions: cookies put on the client: comments

- Cookies are supported by the leading WWW browsers.
- The purpose of cookies is to make the workstation and the interactions with servers more personal. Cookies are required for efficient access to many sites.
- Lack of standardisation of cookies has been a problem. This hinders various servers to obtain information from the same cookie, even when the user would not mind.

WWW extensions: cookies on the client are controversial

Cookies are controversial:

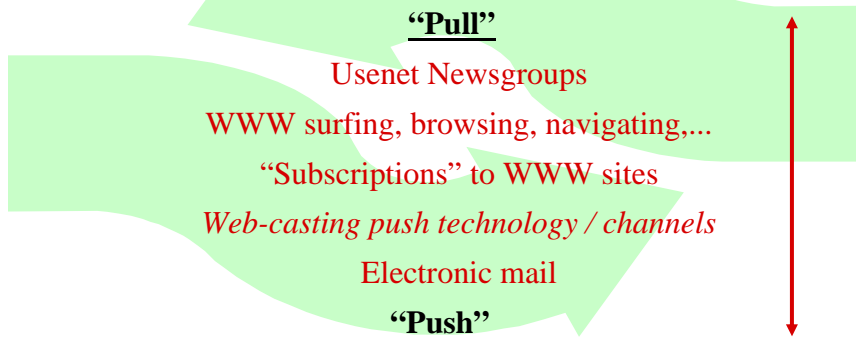
- » because they are put on the hard disk without much control by the user
- » because some servers may make copies of the cookies to collect personal information about the user; in this way cookies threaten privacy
- » because the advantages for the user are not directly clear in most cases
- » because cookies all cost some disk space anyway

WWW extensions

Internet “pull” and “push” technology

Internet “pull” and “push” technology

Distinction “pull - push” is not always clear



Internet push technology / Web-casting / channels: basics

- Channels are web sites that are automatically delivered to the desktop of the user.
- The system can deliver personalised, up-to-date information and/or programs to the client.
- The method allows self-updating in the background, when bandwidth is available.
- It is complementary to classical WWW, which is not push but pull technology.
- It makes Internet and WWW more like television.

Internet push technology / Web-casting / channels: data display

The data from the server can be displayed on the client

- » as a sudden screen flash, or
- » as screen wallpaper, or
- » as a screensaver.

Internet push technology / Web-casting / channels: components

Components:

- » Server computers and server software
- » Protocols (for channels / web casting)
- » Client software
 - Stand-alone
 - Incorporated in a WWW browser
- » Information / contents

Web-casting: examples of contents

Current information:

- » Business information
- » Weather information
- » Tables of contents of new numbers of (scientific) journals,
“pushed” by the editors
- » ...

WWW extensions

Miscellany

Web animation

- **Animations are used more and more on the WWW.**
- **Various technologies are used to create such animations:**
 - » Animated GIFs
 - » Dynamic HTML
 - » Java
 - » Shockwave and Flash
 - » ...

!! Task - Assignment !!

Read

Harris, Tom

How web animation works. [online]

Available from:

<http://computer.howstuffworks.com/web-animation.htm>

[cited 2005]



Virtual social worlds besides WWW

- **Internet is the basis for several virtual communities, social worlds, social environments, 3-D chat worlds.**
- **Goes beyond text-based chatting based on IRC protocol.**
- **Access requires**
 - » software incorporated in a WWW browser
 - » or a separate dedicated client program.
- **The virtual world can contain and offer information (for instance as virtual posters on virtual walls)**
- **Participation may require a powerful client computer.**

WWW extensions: PICS

- **PICS:**
labels (meta-information) about documents on WWW
- **This creates improved opportunities to add meta-information and thus value to documents in the Internet in ways impossible and inconceivable in the case of more classical, “unconnected” documents.**

Continuously changing information sources: description

- Some publications on the network have a beginning but no end.
- The information keeps on flowing and changing.
- They can hardly be called “documents”.
- They rely on programs to capture the changing data and to make these accessible over the network.

Παντα ρει

Continuously changing information sources: applications

Examples of applications of such changing data flows are

- » Current prices and values in business
- » Current car traffic speed around a city
- » Current water levels
- » Current weather information
- » ...

Παντα ρει

Continuously changing information sources: client programs

Client programs to access the changing information sources can be

- » a normal, classical WWW browser
- » (a suitable client for a Web casting channel)
- » (a client dedicated to the particular type of data)
- » ...

Παντα ρει

Continuously changing information sources: weather

A dedicated client program provides access to continuously changing data related to the weather all over the world:

City	Date	Temp	Wind	Pres	Wind	Wind	Wind
San Francisco	11 Aug 1997 11AM-4PM PST	+17°	444	1022	162	10	cloudy
Los Angeles	11 Aug 1997 11:55 AM PST	+20°	444	1021	163	2	clear
London	11 Aug 1997 10:20:24 (GMT)	+12°	100	1004	100	100	cloudy
Brussels	11 Aug 1997 10:20:24 (GMT)	+17°	100	1004	100	100	cloudy
Amsterdam	11 Aug 1997 10:20:24 (GMT)	+18°	100	1004	100	100	cloudy
Das El Solman	11 Aug 1997 10:20:24 (GMT)	+20°	100	1004	100	100	clear
Mumbai	11 Aug 1997 10:20:24 (GMT)	100	100	1004	100	100	clear
Houston	11 Aug 1997 10:20:24 (GMT)	+13°	100	1004	100	100	clear
Adress	11 Aug 1997 10:20:24 (GMT)	+25°	100	1004	100	100	clear

Παντα ρει

Continuously changing information sources: traffic (1)

Current average speed of cars around cities
in The Netherlands

http://www.anwb.nl/servlet/Satellite?pagename=OpenMarket/ANWB_verkeer/Verkeersinformatie_nederland

Παντα ρει

Continuously changing information sources: traffic (2)



Personally composed information sources through WWW

Example:

Fodor's Personal Trip Planner
with
"Create your own mini guide"
for a number of cities in the world.



Personally composed information sources through WWW: example



WWW: Hyperlinking

- **Linking in the scholarly environment has gone further than the basic linking of the classical, primitive WWW.**
- **More about linking can be read for instance in**

Samuels, Harry E.

Linking: where are we now and where are we going?

VINE, Vol. 32, No. 2, 2002

Where we are now

pp. 47-49

WWW: similar developments

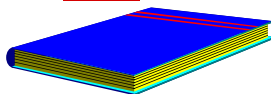
- **VOD = Video on demand?**
- ***HyperWave*:**
WWW server software that remedies some of the deficiencies of the classical WWW
- **...**

WWW extensions

Document+program hybrids

Evolution from static to active documents: FROM ...

documents
either documents,



FROM

and

programs,

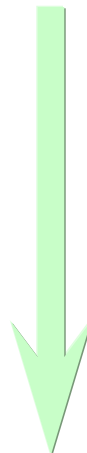
or programs

which are both



- classical, traditional, and therefore easy to understand
- neatly separated, distinct, apart from each other, so that the static documents can exist without computer

...



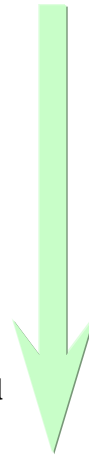
Evolution from static to active documents: ... TO ...

...TO

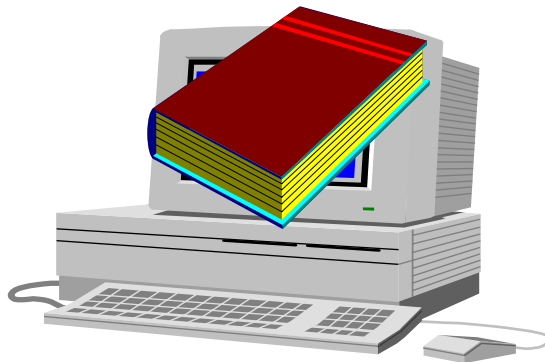
document *or (?)* program:

More complex document+program hybrid entities

- which can NOT exist without each other
- which can NOT be printed
- which can only work by involving a computer
- which live in synergy
- where the classical distinction between content and container is blurred



Evolution from static to active documents: ... TO ...



From static documents, to active document+program hybrids

static, hard copy documents

static, computer-based, multimedia documents

static, computer and network based,
linked hypermedia documents

dynamic / active / highly interactive,
computer and network based,
linked hypermedia hybrid information entities
(document+program hybrids)

Document+program hybrids in the Internet: domain of discourse

Some Internet information “services” or “documents” or “document+program hybrids” are remarkable, as they

- » run a script / program on the client computer, or
- » use a program plus data on the server, or
- » address subsequent servers, combine results, eliminate irrelevant, or double information,

to produce a “result” or “document” with some valuable / interesting information content.

Document+program hybrids in the Internet: a vocabulary problem

How to name the *remarkable*
active / dynamic / non-printable / highly interactive
hybrids of
documents or data collections
+ programs/services
with a high added value
(in comparison with classical, static documents)
based on networks / Internet / WWW ?
“document+program hybrids” ?

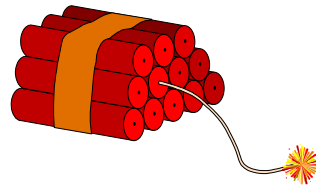
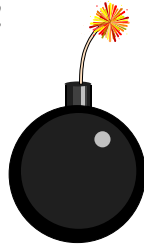
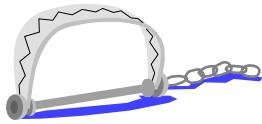
Document+program hybrids in the Internet: a selection

A selection of examples can be found through
<http://www.vub.ac.be/BIBLIO/>
in the section on Internet-based information sources as a
subsection on *interactive services*

Document+program hybrids in Internet: security concerns (1)

A subject of dispute is the security of the client computer
which uses files coming from the network with

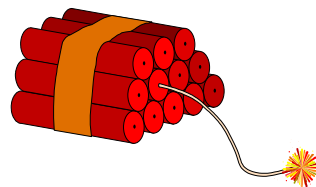
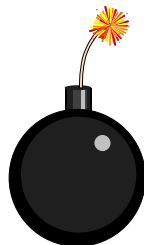
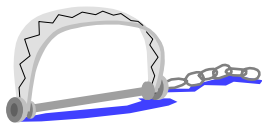
- additional plug-ins !!
- ActiveX programs !
- JavaScript or JScript !
- applications of Java



Document+program hybrids in Internet: security concerns (2)

To increase security of your computer system, try to update
as soon as updates are available for

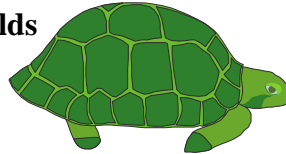
- your operating system
- your Internet browser(s)



Powerful client computer required for various Internet applications

It can be a problem that a relatively powerful client computer is required for

- WWW + multimedia in general and VRML in particular
- WWW + scripts in documents
- WWW + Java applets or ActiveX controls
- complex virtual social worlds



Document+program hybrids: effects of fast evolution

Technical development is so fast that it is difficult

- for developers of services to keep pace and to apply the new methods, tools, extensions and standards quickly and usefully
- for users to understand and to apply the services; they can be surprised, confused, or even be frightened.



Universal access to information using only 1 browser: the aims

- 👉 Only 1 client program to install and maintain.
- 👉 Client program available free of charge or at low cost.
- 👉 User friendly interface.
- 👉 Similar interface for information using many formats and communication protocols.
- 👉 Same access method to information on many carriers
local disk, CD-ROM, Local Area Network (“intranet”), Internet...



Universal access to information using only 1 browser: the problems (Part 1)

- 👉 Viewers or plug-in software for WWW browsers are required for extensions of classical WWW applications.
- 👉 The most recent versions of browsers are required for full use of some sources/documents/services and hybrids.



Universal access to information using only 1 browser: the problems (Part 2)

👉 **Standardisation and compatibility is not (yet) satisfactory in**

- » non-standard HTML extensions
- » VRML applications
- » Java applets
- » scripts in HTML documents



⇒ **different client programs are required for usage.**

Relations among the systems applied in document+program hybrids (1)

- **A document+program hybrid can incorporate more than one of the relatively advanced methods/systems and use these more or less at the same time.**

Relations among the systems applied in document+program hybrids (2)

- **Examples:**

- » Advanced HTML allows the incorporation of program scripts in pages.
- » Many plug-in programs for *Microsoft Internet Explorer* use ActiveX.
- » Viewing VRML items may require an additional plug-in program for your browser.
- » Intelligent agents starting from a server are accessed by the user through WWW by using CGI or a similar technique.

Relations among the systems applied in document+program hybrids (3)

- » Some intelligent agents may work on the basis of a user profile stored on the client in the form of a cookie file.
- » *Sun* has developed a WWW browser which itself is programmed in Java.
- » Executing programs on a remote *Windows* server from an older WWW browser may require an additional plug-in program for the browser.

Relations among the systems applied in document+program hybrids (4)

- » Continuously changing information sources can be accessed by various types of client-server applications.
- » “Customizable Web sites” can involve
 - CGI gateways to a server,
 - an intelligent agent,
 - adaptive hypertext,
 - the possibility to create personal pages,
 - ...

Document+program hybrids as information sources

- **Information content of most is (still) low, but evolution is fast.**
- **They contribute to the increasing importance of computers and networks as essential tools in information distribution and usage.**
- **They force information intermediaries, librarians, and also directly the end-users, more than ever, to adjust to the changing information landscape.**
- ...

Document+program hybrids: options for information intermediaries? (1)

- **To provide access through Internet client workstations**
- **To ensure the suitability of these workstations by regular updating of**
 - » hardware
 - » basic Internet browser client program(s)
 - » viewers and plug-ins
- **Complementary to collecting hard-copy materials: to create guides to information search tools and sources**
- **To train (potential) information users**

Document+program hybrids: options for information intermediaries? (2)

- **To provide network access in such a way that the user**
 - » can apply personal preferences and options in the browser
 - » can apply personal bookmarks/favorites
 - » can exploit personal cookies
 - » can use personalised software agents at the client side
- by offering**
 - » personal disk space for personal data files to be used with the Internet client, or
 - » direct Internet access for personal notebook computers

Document+program hybrids: options for information intermediaries? (3)

- **To provide access to in-house information, such as current awareness information**
 - » by pull techniques such as WWW
 - » by push techniques such as e-mail and Web-casting channels?
- **To collect and archive not only Internet-based documents, but (also) document+program hybrids, in spite of the fast evolution of required hardware and software?**

Recent Internet information services: what's next ?

- **Computer and Internet specialists should and will cooperate more closely with information specialists and information content providers.**
- **The prime focus may and should shift**
from developing and demonstrating frameworks in which information could possibly fit,
to offering useful information content with a high added value, based on the new techniques.



Evolution of document types in the computer networks

From well separated, easily understandable documents *and* programs



to more complex hybrid entities:
document *or (?)* program
To... ?

Analogous evolution of humans to human-computer hybrids?

From well separated, easily understandable humans *and* computers



to more complex, hybrid entities:
human *or (?)* computer



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