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**DOCUMENTS AND WEB SITES – STRUCTURE, DESCRIPTION
LANGUAGES**

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- suport de curs destinat studenților de la secția engleză -
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DOCUMENTS AND WEB SITES – STRUCTURE, DESCRIPTION LANGUAGES

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4. DOCUMENTS AND WEB SITES – STRUCTURE, DESCRIPTION LANGUAGES

4.1 Web pages and Web sites

The documents for World Wide Web (www) are known as Web pages and they are stored on an Internet server and displayed by a Web browser on your computer. The Web page is the basic element of a web site. Web browsers display Web pages by interpreting the special HyperText Markup Language (HTM or HTML) tags which are used to encode Web pages with display information. The formatting of Web pages is controlled by a collection of markup codes called HTML tags that mark off parts of Web page to display in certain style.

Web pages usually are linked to many different files, such as graphic and multimedia files. Typically these files are stored locally in a folder or set of folders on the computer's disk drive where constructed the Web site (this folder is known as local web site). When the site published its files and folders are stored, typically, to the hard drive of the Web server that hosts the site. The mechanism used to create access path between documents (more generally resources) is called hypertext. A hypertext document is made up of links to other documents/ resources, combined together with its displayed content. When a user clicks on a linked file, such as a piece of text, a graphic, or a portion of a graphic, their browser display the file that the link points to. Links embedded with text are easily identifiable. Most browsers default to coloring and underlining linked text, and user can set the color and underline option as they prefer.

A Web site is defined as a collection of files that are linked to a central Web page, made available via the Web (the pages forms a cohesive collection of information) as entry point for the website. The Web server is a type of server dedicated to storing, transmitting and receiving the Web pages and Web related files (such GIF and JPEG graphics, AVI sound and images and so on).

The site's collection of linked files and Web pages are typically tied together into a cohesive collection of information by a home page (generally called default.htm[1], index.htm[1] or simply home.htm[1]). The letter "I" from .html is optional and not included for compatibilities with the "8.3" filenames format (and for that reason included in []). The home page typically contains a topic list (as a table of contents or index, or any other kind of overview type of the content) which links it to other Web pages in its Web site. All other pages, in a well designed Web site, must offer a button or a link to go back home (or that is provided by the Web browser). When you publish your Web site, you upload the local site folder (and its contents including subfolders) to a Web server, which contains the software that "serves" your Web pages out to Web browsers on computers that are connected to the Internet. Once your local site is published to the Web server it becomes a Web site. The main or home page of the Web site is accessed by using Internet URLs/URIs. The Internet has two attributes that improve the company's success factor: Web sites can be accessed by a global audience 24 hours a day, 365 days a year, and those sites can be made to appear personalized for individual users. With a Web site organizations can also service the needs of their customers on a global, 24-hour-a-day basis, and marketers can finally realize their dream of mass-customized, one-to-one marketing when they structure Web sites effectively. The web sites is an are ideal medium for communication of any type of content having a digital representation, does no mater how this baptised or categorized (such as blogs and journals, shopping catalog, online education etc).

The www (World Wide Web) is a collection of interlinked documents, which might be written using (X)HTML format, accesible over standardized protocol (such as HTTP), and each document is identified by a unique address a Uniform Resource Identifier (URI). According to W3C (World Wide Web Consortium) the Web is "an information space in which the items of interest, referred to as resources, are identified by global identifiers called Uniform Resource Identifiers (URI)".

In order to be easy found by the target auditory the website must get best search engine visibility. To obtain that visibility the website design must follow at least the rules:

- easy to read;
- easy to navigate;
- easy to find;
- consistent in layout;
- consistent in design;
- compliance with standards.

In a layered approach a web document can consists of up to three layers:

1) *content layer*, that is always present and comprise the information the author wishes communicate to the target audience. The content layer is embedded within HTML or XHTML markup languages;

2) *presentation layer*, that defines how the content will be presented to the user (the layer can be realized with Cascading Style Sheet language);

3) *behavior layer*, that involves real-time user interaction with the document. This layer is realized generally by intermediate of scripting languages, from which the most used and platform independent is JavaScript.

We have also the option to create and publish online our content by using content-management applications (such as WordPress, Blogger, Joomla, Drupal etc) the advantage being represented by that we dont have to build the entire web pages by hand we must only fill the content into the interface and that is put automatically into the layout when publishing.

Depending on the way a site interacts with the end user and reacts to user actions, how pages delivered as answer to user request realized (existing or generated), and what type of resources the site is able to manipulate the site architectures can be grouped in the following categories of architectures:

1. Static (HTML) Architecture;
2. DHTML Architecture;
3. High Level Languages based Architecture;
4. Dynamic Pages Architecture;
5. Advanced Management Architecture;
6. Multi-tier (three tiers) Architecture.

The architectures will be presented following a layered decomposition starting with the one introduced in § 2.1.1 The Logical Structure of Web Servers. For the second level, denoted by HTTP server, the description can have additional functionalities that will be introduced in the paragraphs bellow.

4.2 Static (HTML) Architecture

An e-commerce site, for example, offering the products catalog (the services for product presentation) and the recording of orders can be realized only by using HTML. The functional structure of such site is shown in figure 4.1.

In this architecture the site must contain, with except of general use pages (home page, contact, company presentation etc.), the following page types:

- the page for presentation of offered products/services (the catalog) as a rule in a shape of a table containing information of general interest about the offered product/service (such as product/service name, image, price, identification/ reference etc.);
- the pages containing details about the product/service;
- page with order fill-in form.

In order to realize electronic transactions and placing orders the order fill-in form can contain or can be accompanied by:

- page with user account fill-in form – page required to collect user identification data (name, address, phone number, e-mail address etc);
- login form – required to connect and place orders
- page with payment fill-in form.

If that accompanying page types present the site cannot have only a static architecture and requires data repository for the corresponding records.

Generally the page with order fill-in form, the login form, payment form and user account manipulation must run in a secure environment ensured by the protocol HTTPS (HTTP Secure).

This architecture type is satisfactory for business that sell (offers) a small number of products/services (for example, selling automotives, real estate, consultancy etc) and having a pronounced static behavior/character of their evolution. With except of the functionalities related to consumer (client, buyer) the site must also offer specialized functionalities represented by:

- a management module (the Control Workstation in the figure want suggests the access point in that module) for processing the clients orders;
- an administrative module (that can be accessed from the administrative workstation) for additions/deletions of product presentation pages and maintenance of products/services catalog. This operations can be realized at the host computer or from a company's workstation if the administration and maintenance of the

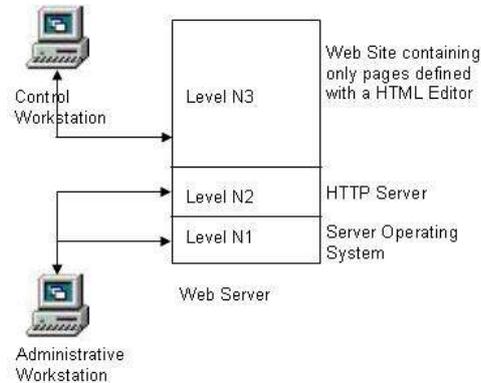


Figure 4.1 The functional structure of a site with static architecture

the site realized by the company itself. In that case, generally the Web service provider offers a tool for administration in a form of a control panel. Figure 4.2 shows a control panel of Plesk 7.5.6 for Microsoft Windows produced by the company SWsoft, Inc.

The level N3 is responsible for the management of site's Web pages: upload/download of pages, site directory maintenance, backup/recovery, security etc.

HTML Document

The commands for displaying text use their own language called Hypertext Markup Language, or HTML. HTML is nothing more than a coding system that combines formatting information in textual form with the readable text of a document.

In order to learn about HTML you must remember the following terms related to HTML and Web pages:

- **WWW** - World Wide Web;
- **Web** - World Wide Web;
- **SGML** - Standard Generalized Markup Language – a standard for describing markup languages on which based HTML;
- **DTD** - Document Type Definition – this is the formal specification of a markup language, written using SGML;
- **HTML** - HyperText Markup Language – HTML is an SGML DTD

In practical terms, HTML is a collection of platform-independent styles (indicated by markup tags) that defines the various components of a World Wide Web document. HTML was invented by Tim Berners-Lee while at CERN, the European Laboratory for Particle Physics in Geneva (actually at MIT - USA and founder of World Wide Web Consortium, www.w3c.org). HTML is used to structure content of documents. The markup languages, as HTML or XML for example, have been hugely successful because they are both human-readable yet easily parseable by machines.

The browser reads the formatting commands and organizes the text in accordance with them, arranging it on the page, selecting the appropriate font and emphasis, and intermixing graphical elements. The HTML commands are set off by a special prefix (called tag's) so that the browser knows they are commands and not plain text. Writing in HTML is only a matter of knowing the right

codes and where to put them. Web Authoring tools embed the proper commands using menu-driven interfaces so that you don't have to do the memorization. More than, today's HTML editors have a user friendly interface WYSIWYG, so that you can do the job visually and by using all the knowledge and practice you accumulate about word-processors (or, generally, about document editors).



Figure 4.2 An example of Control Panel for the administrative workstation (Plesk 7.5.6 for Microsoft Windows; SWsoft, Inc)

WYSIWYG is an acronym for "what you see is what you get"; it means that you design your HTML document visually, as if you were using a word processor, instead of writing the markup tags in a plain-text file and imagining what the resulting page will look like. It is useful to know enough HTML to code a document before you determine the usefulness of a WYSIWYG editor, in case you want to add HTML features that your editor doesn't support.

HTML documents are plain-text (also known as ASCII) files that can be created using any text editor (e.g. *Emacs* or *vi* on UNIX machines; *SimpleText* on a Macintosh; *Notepad* on a Windows machine). You can also use word-processing software but you must save your document as "text only with line breaks" (Save as ..., Save as type: Plain Text) or, if such option is present, save as HTML or as Web Page.

The HTML language includes a diversity of tags (markers), expressed following the next generalized syntax:

`<Tag_name> Text associated..... [</ Tag_name>]`

where `<Tag_name>` is the beginning of the tag and `</Tag_name>` is the ending of the tag. Tag's are special text strings that are interpreted as formatting commands by the browser. Some tag's contains attributes (or parameters) that can take a finite number of specified values and whose syntax takes the format:

`<Tag_name attribut1="value 1" attribut2="value 2" ... >`

The attributes can be specified in any order, since they uses keywords, and the value assigned, does no matter his data type, must be enclosed in quotation marks. The pairs attribute-value and other keywords are separated by one or more spaces (at least one!). An HTML document contains hyperlinks, the embedded links to other documents on the web, that allows defining pathways between documents and surfing on the web. These hyperlinks contains several pieces of vital information, that instruct the Web browser where to go for content, such as:

- the protocol to use (generally HTTP);
- the server to request the document from;

- the path on the server to the document;
- the document's name (optional).

The information is assembled together in an URL.

Web documents are made up of several nested layers, each one delimited by a specific HTML tag. The first tag in a HTML document is DOCTYPE (document type, must be written in uppercase) specified in constructions similar to the following:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
```

This tag specifies the following information:

- The document's top tag level is HTML (html);
- The document adheres to the formal public identifier (FPI) "W3C HTML 4.01 English" standards (PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN");
- The full DTD can be found at the URI <http://www.w3.org/TR/html4/loose.dtd>.

The first tag for a HTML 5 documents is simply:

- <!DOCTYPE html>



The HTML5 is based on various design principles (addressing compatibility, utility, interoperability, and universal access) defined by the specification of the group WHATWG (Web Hypertext Application Technology Working Group) and is the result of cooperation between three important organizations: WHATWG, W3C, and IETF (Internet Engineering Task Force) [LAS-11]. Compatibility is realized by supporting existing content and by degrading gracefully the behavior when a HTML5 functionality/ feature is not supported by the browser. If previous versions of HTML do not address at all security in HTML5 each part of the specification has sections on security considerations. It realizes also a clean separation of presentation and content, whenever that is possible, by using CSS. In that way it avoid the poor accessibility, eliminates the unnecessary complexity, and reduces document size. The interoperability is ensured by transferring operations as browser native features instead being realized by complex JavaScript code. Some of the new or enhanced functions available HTML5 refer to improved semantics, forms, canvas drawing, drag and drop, limited local storage, page-to-page messaging, desktop notifications, video and audio, web sockets, geolocation, history, and microdata. The smaller icons in the form bellow represents the different technologies used by HTML5 (from left to right): 3D effects, connectivity, multimedia, device access, offline storage, performance, semantic, and styling (CSS3).



The minimal structure of an HTML document is shown in figure 4.3. Any HTML document includes a heading and a body, and any other tag's needed to specify the document structure, appearance and behavior:

- <HTML>: defines the beginning/ending of the document or web page;
- <HEAD>: beginning/ending document heading;
- <TITLE>: beginning/ending document title;
- meta-tags: allows embedding extra-information within a webpage;
- <BODY>: beginning/ending of the document itself, the visible content.

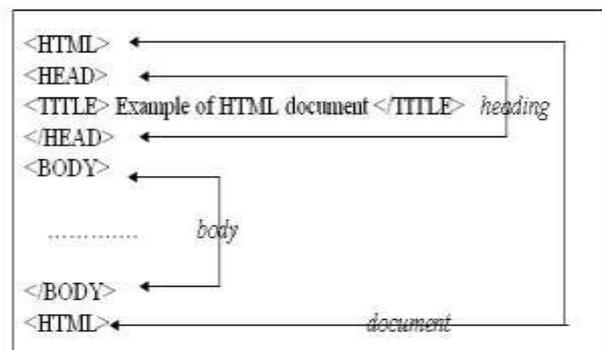


Figure 4.3 The HTML document structure

After we create a new HTML document this must be saved in a file having the extension "webpagegivenname.html"

An element is a fundamental component of the structure of a text document. Some examples of elements are *heads*, *tables*, *paragraphs*, *links(anchors)*, and *lists*. Think of it this way: we use HTML tags to mark the elements of a file for the browser. Elements can contain plain text, other elements, or both. To denote the various elements in an HTML document, you use tags. HTML tags consist of a left angle bracket (<), a tag name, and a right angle bracket (>). Tags are usually paired (e.g., <H1> and </H1>) to start and end the tag instruction. The end tag looks just like the start tag except a slash (/) precedes the text within the brackets. These formatting elements are parsed by the browser and then interpreted and applied to the page content they refer to.

Some elements may include an attribute, which is additional information that is included inside the start tag. For example, you can specify the alignment of images (top, middle, or bottom) by including the appropriate attribute with the image source HTML code.

NOTE: HTML is not case sensitive. <title> is equivalent to <TITLE> or <TiTlE>. There are a few exceptions noted in Escape Sequences.

Not all tags are supported by all World Wide Web browsers. If a browser does not support a tag, it will simply ignore it. Any text placed between a pair of unknown tags will still be displayed, however.

Every HTML document should contain certain standard HTML tags. Each document consists of head and body text. The head contains the title, and the body contains the actual text that is made up of paragraphs, lists, and other elements. Browsers expect specific information because they are programmed according to HTML and SGML specifications.

The required elements are the <html>, <head>, <title>, **meta-tags**, and <body> tags (and their corresponding end tags):

- **HTML.** This element tells the browser that the file contains HTML-coded information. The file extension .html also indicates an HTML document and must be used.
- **HEAD.** The head element identifies the first part of a HTML-coded document that contains the title. The title is shown as part of the browser's window. The heading section can contain:
 - **style section** – used to declare general and local styles to the document;
 - **script section** – used to place global scripts within the HTML page such as javascript and VBScript, for example.
- **TITLE.** The title element contains the document title and identifies its content in a global context. The title is typically displayed in the title bar at the top of the browser window, but not inside the window itself. The title is also what is displayed on someone's hot-list or bookmark list, so choose something descriptive, unique, and relatively short. A title is also used to identify your page for search engines (such as Google). Generally the titles must have up to 64 characters or fewer.
- **Meta-tags.** Meta tags enable web authors to embed extra information in their documents to provide information to search engines, to control browser caching of documents, etc. The typical syntax of a metatag is:

<meta name="meta-name" content="data-content">

Examples:

```
<meta name="Keywords" content="JavaScript, javascript, HTML, function">
<meta name="resource-type" content="document">
<meta name="revisit-after" content="30 Days">
<meta name="Classification" content="Education">
<meta name="Robots" content="INDEX, NOFOLLOW">
<meta name="distribution" content="Global">
<meta name="rating" content="Safe For Kids">
<meta name="Author" content="Vasile Avram">
```

The metatag syntax was simplified for HTML5 and can be of the form:

<meta data-content>

```

Examples (this code is for both mobile and desktop):
<!DOCTYPE html><html><head>
<meta name="viewport" content="width=410, height=400, initial-scale=1">
<meta content="text/html; charset=utf-8" http-equiv="Content-Type" />
<title>Body Mass Index (BMI) Computation</title>
<link rel="stylesheet" type="text/css" href="themes/inspector.min.css" >
<link rel="stylesheet" type="text/css" href="jquery.mobile.min.css" >
<script type="text/javascript" src="jquery.min.js"></script>
<script type="text/javascript" src="jquery.mobile.min.js"></script>

```

BODY. The second, and largest, part of a HTML document is the body, which contains the content of the document (displayed within the text area of the browser window). The body part of the document is where the visible content appears.

The HTML5 defines new elements for sectioning the content (Figure 5.4) as semantic markups, such as:

- header – header content for a page or a section of the page;
- hgroup – group the headings;
- nav – navigation menu;
- article – independent article content;
- section – a section in a web page;
- aside – vertical panel to left/ right side of the page;
- footer – footer content for a page or a section of the page.

A vital element to realize a website, to link together the component resources in a cohesive collection, and to define the navigational pathways inside/outside the site, is represented by the anchor tag (hyperlink) `link-name `, where the *resource-name* is the relative/absolute pathname (expressed as URL/URI) to the wanted resource and *link-name* is the object displayed on which the user can click to access the resource (can be text, graphic, etc).

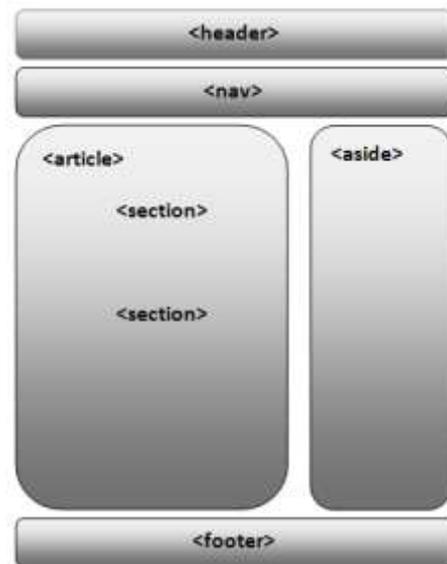


Figure 5.4 HTML5 page structure

4.3 DHTML Architecture

DHTML stands for Dynamic HTML and is not a W3C standard. It was defined by Netscape and Microsoft as a “marketing term” describing a new technology that the generation 4.x (and following) of browser must support. It is a combination of “HTML/XHTML, style sheets and scripts that allows documents to be animated”. With DHTML a web developer can control how to display and position dynamically the HTML elements in a window. This is possible by intermediate of HTML DOM, a W3C standard that defines a standard set of objects for HTML and a standard way to access and manipulate these HTML objects. The HTML DOM specifies the objects together with their associated properties (or attributes, generally the equivalent to tag attributes such as *id*, *name*, *alt*, *title* etc), and where appropriate, methods that can be invoked for the object (such as *blur()*, *focus()*, *click()* etc).

DHTML represents the usage of a lot of languages that allows realizing animated pages and presentations, computations, and the control and validation of primary fields in fill-in forms, such as:

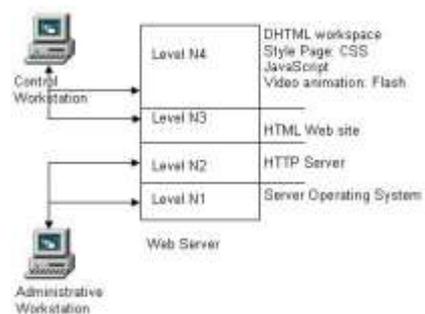


Figure 4.4 The functional structure of a site with DHTML architecture

- HTML/XHTML;
- Style Pages (Cascading Style Sheets);
- Scripts (JavaScript, VBScript etc).

The animation inside of the site can be realized using different specialized applications from which Flash is the one most frequently used. The functional architecture of the site with DHTML is shown in figure 4.4.

The site content is similar to those previously described the difference being given by the way in which the presentation take place to the end user (represented by client). In this architecture the new level introduced N4 contains:

- Cascading Style Sheets;
- Scripts;
- Video animation (Flash).

These features can help to make the site easier to read, navigate, and react. They must be used in such ways that preserve or rise the search engine visibility (remember that search engine crawlers look for text on a web page and index and rank the page according to that text). Below is a brief presentation of these features. They accompanied by an extended introduction containing examples of usage in different circumstances in separate chapters.

4.3.1 CSS - Cascading Style Sheets

CSS is a language that allows defining the way in which a document displayed referring to the usage of parental levels of pages, of the fonts (name, color, size) and font family, or in other words, CSS is a style language that defines layout of HTML documents. CSS is used for formatting structured content. By using styles we can change the definition once and the change affects every element using that style. The styles provide an easy means to update document formatting and maintain consistency across a site. Styles are grouped together in style sheets and are normally stored in external files with a .css extension. The external style sheet allows define and change just once and apply that to more pages. The addition of CSS style in a document can be realized:

- a) in the current line (inline style, the style defined directly in the line specifying the tag);
- b) global, by specifying the document style at his beginning (in the heading part);
- c) by linking the style page (defined in a separate document and stored in a separate file, too) to the document by using tags with the general syntax:
`<LINK REL="stylesheet" TYPE="text/css" HREF="styl/documentname.css">`
- d) browser default.
 Example:
`<link rel="stylesheet" type="text/css" href="styles/sitestyl.css">` where the sitestyl.css file contains:

The CSS syntax is very simple and is made up of three elements *selector* {*property: value; property: value ...*} where the *selector* is normally the HTML element/tag you wish define the style (such as BODY, A:link, DIV.intro etc), and the *property* is the attribute you wish change for the selector (such as BACKGROUND, COLOR, FONT-FAMILY for BODY selector, for example), and the *value* specifies the value you wish assign to the property (such as white for BACKGROUND,

```

BODY { BACKGROUND: white; COLOR: black; FONT-FAMILY: sans-serif }
A:link { BACKGROUND: none transparent scroll repeat 0% 0%; COLOR: #00e }
A:active { BACKGROUND: none transparent scroll repeat 0% 0%; COLOR:
#00e }
A:visited { BACKGROUND: none transparent scroll repeat 0% 0%; COLOR:
#529 }
A:hover{background:transparent none repeat scroll 0% 0%;color:#999999}
DIV.intro { MARGIN-LEFT: 5%; MARGIN-RIGHT: 5%; FONT-STYLE: italic }
PRE { FONT-FAMILY: monospace }
A:link IMG { BORDER-TOP-STYLE: none; BORDER-RIGHT-STYLE: none;
BORDER-LEFT-STYLE: none; BORDER-BOTTOM-STYLE: none }
A:visited IMG { BORDER-TOP-STYLE: none; BORDER-RIGHT-STYLE: none;
BORDER-LEFT-STYLE: none; BORDER-BOTTOM-STYLE: none }
A IMG { COLOR: white }
@media All { A IMG { } }
UL.toc { LIST-STYLE-TYPE: none }
DIV.issue { PADDING-RIGHT: 0.5em; PADDING-LEFT: 0.5em; PADDING-
BOTTOM: 0.5em; BORDER-TOP-STYLE: none; MARGIN-RIGHT: 5%; PADDING-
TOP: 0.5em; BORDER-RIGHT-STYLE: none; BORDER-LEFT-STYLE: none;
BORDER-BOTTOM-STYLE: none }
.hideme { DISPLAY: none }
.avbkgtop{border:medium none;background-position:center;BACKGROUND-
IMAGE:url('http://www.avrams.ro/imgs/tt077.jpg');FONT-FAMILY:'Times
New Roman';BACKGROUND-COLOR:transparent}
#menub{padding:0;margin:0;height:1em;list-style-type:none;border-left:1px
solid #c0c0c0;color: #bbbbbb;font-family:Verdana;font-weight: normal;font-
size: xx-small}
#menub li{float:left;width:8em;height:1em;line-height:1em;border-right:1px
solid #c0c0c0;position:relative;text-align:center;color:#efbb22;font-family:
Verdana;font-weight:normal;font-size:xx-small}
#menub li a, #menub li a:visited{display:block;text-
decoration:none;color:#efbb22}
#menub li a span, #menub li a:visited span{display:none}
#menub li a:hover{border:0px none;color:#c0c0c0}
#menub li a:hover span{display:block;width:8em;height:1em;text-
align:center;position:absolute;left:-1px;top:-
4px;color:#efbb22;cursor:pointer;font-family:Verdana;font-
weight:normal;font-size:x-small}
@media Print { TABLE { page-break-inside: avoid } }
ul, li { margin-left:0px}
.marybkg
{ border: medium none;
BACKGROUND-IMAGE: url('http://www.avrams.ro/brad-0167.jpg');
FONT-FAMILY: 'Times New Roman';
BACKGROUND-COLOR: transparent;
BACKGROUND-REPEAT: repeat; }

```

black for COLOR in the BODY selector).

- CSS supports the following metrics for property values [W3C; SS05]:
- CSS keywords and other properties, such as thin, thick, transparent, ridge, and so forth
 - Real-world measures:
 - Inches (in)*
 - Centimeters (cm)*
 - Millimeters (mm)*
 - Points (pt) (1/72 of an inch)*
 - Picas (pc) (1 pica=12 points)*
 - Screen measures in pixels (px)
 - Relational to font size (font size (em) or x-height size (ex))
 - Percentages (%)
 - Color codes (#rrggbb or rgb(r,g,b))
 - Angles:

Degrees (deg)

Grads (grad)

Radians (rad)

- Time values (seconds (s) and milliseconds (ms)) — Used with aural style sheets
- Frequencies (hertz (Hz) and kilohertz (kHz)) — Used with aural style sheets
- Textual strings

CSS gives many benefits to site designers such as:

- realizing control layout of many documents (web pages) from one single style sheet;
- a more precise control of layout;
- the possibility to define and apply different layout for different media type (display, print etc) to the same document;
- the availability of numerous advanced and sophisticated techniques.

There are three levels of CSS the main differences between them are as follows:

- CSS1 defines basic style functionality, with limited font and limited positioning support;
- CSS2 adds aural properties, paged media, and better font and positioning support;
- CSS3 adds presentation-style properties, allowing you to effectively build presentations from Web documents (similar to Microsoft PowerPoint presentations).

All styles defined for a document “cascade in a virtual” style following this rules (from a high to low priority):

1. Inline style;
2. Global style sheet;
3. External style sheet;
4. Browser default.

4.3.2 Scripts

The scripts are source programs expressed in a scripting language and can act at client side or at server side. Not all scripting languages allows writing scripts for both sides. In the paragraphs below we talk about client side scripting and scripting languages allowing defining those scripts.

The client side scripts are small source programs, expressed in a scripting language, embedded in the HTML page and that the browser, when loading and displaying the page, interprets and executes them. A scripting language is a lightweight programming language designed to add interactivity to HTML pages. A scripting language gives to HTML designers a programming tool with a easy to use simple syntax.

The scripts inside the web page can change dynamically the page (for example, can change the font size) when some events appears (for example, clicking the mouse), can verify if data in a fill-in form are correct or not, etc. To include a script in a HTML page place his content between the tags `<script>` and `</script>` or between the additional tags `<noscript>` and `</noscript>` for the browsers that do not understand scripts. The scripting languages situated at an intermediary level between HTML and high level programming languages such as JAVA, C++ and Visual Basic. If HTML used generally for formatting the text and link creation and the programming languages for complex instruction the script languages used for specifying of complex instructions whose syntax is more flexible than those of programming languages. Meanwhile, the script languages can format the text, and in that way they realize the interaction between the web page and the user.

4.3.2.1 DOM - Document Object Model

The scripts allow restructuring an entire HTML/XHTML document for which we can add, remove, change, or reorder items on a page. In order to change anything on a page, the script needs access to all elements in the HTML/XHTML document. This access, along with methods and properties to add, move, change, or remove HTML/XHTML elements, is given through the Document Object Model (DOM). The Document Object Model view HTML/XHTML documents as a collection of objects (having attributes/properties and methods) and provides access to every element in a document. Every element is modeled in a web browser as a DOM *node*, and the nodes make up the DOM *tree* describing the relationships between elements in a *child-parent* fashion. The children of the

same node (having the same parent) referred to as *siblings*. A node can have multiple children but only one parent. Because of that access, any element may be modified by a snippet of JavaScript. Elements are easily accessed by use of an *id* attribute (that must be unique within a given document) and a method of the document object. The *document* object is the parent of all the other objects in an HTML/XHTML document, for example *document.title* represents the <title> element of the HTML/XHTML document as in the figure 4.5.

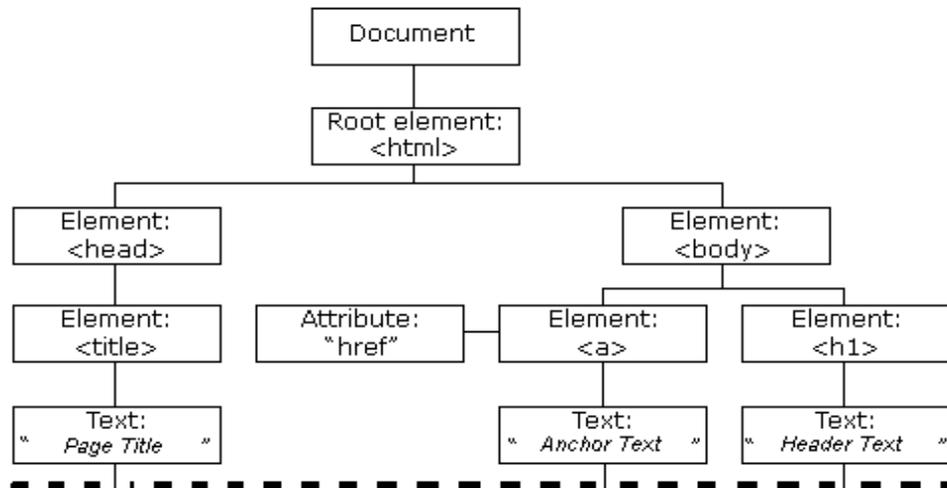


Figure 4.5 The tree structure of HTML documents (partly; theoretical)

In 1998, W3C published the Level 1 DOM specification. This specification allowed access to and manipulation of every single element in an HTML page. All browsers have implemented this recommendation, and therefore, incompatibility problems in the DOM have almost disappeared. The DOM can be used by JavaScript to read and change HTML, XHTML, and XML documents. The DOM is separated into different parts (Core, XML, and HTML) and different levels (DOM Level 1/2/3):

- Core DOM - defines a standard set of objects for any structured document;
- XML DOM - defines a standard set of objects for XML documents;
- HTML DOM - defines a standard set of objects for HTML documents.

Every object can have his own Collections, Attributes (Properties) and Methods. The table 4.1 gives the objects in DHTML DOM.

Table 4.1 The objects in DHTML DOM

Object	Description
window	The top level object in the DHTML DOM. It contains information about the window and the frames. The objects listed below are the children of the window object.
document	Represents the HTML document, and is used to access the HTML elements inside the document
frames	Represents the frameset
history	Keeps track of the sites visited by the browser object.
navigator	Contains information about the user's browser
location	Contains the URL of the rendered document
event	Contains information about events that occurs
screen	Contains information about the computer screen for the computer on which the browser is

Table 4.2 shows the properties (attributes) of a Document object as implemented in Microsoft Script Editor (Windows).

Table 4.2 The properties of a HTML Document object

Property	Description
aLink	Sets the color of hyperlinks as they are clicked.
Background image	Provides the path to a background image for the page.
bgcolor	Sets a background color for the page.
bgProperties	Sets whether the background for the page will be scrolling (default) or fixed (watermark)
bottomMargin	Sets the height of the blank margin at the bottom of the page.
charset	Selects the character set for the page.
defaultClientScript	Sets the default client scripting language.
dir	Sets the reading order of page objects.
keywords	Adds keywords to the META KEYWORDS tag in the <HEAD> of your document
leftMargin	Sets the width of the blank margin on the left side of the page.
link	Sets the default color of hyperlinks before they are clicked.
pageLayout	Selects whether page components added in design view will be positioned in-line as they occur on the page or positioned at specified locations (enables the positioning grid).
rightMargin	Sets the width of the blank margin on the right side of the page.
showGrid	Determines whether the positioning grid will appear in Design View.
targetSchema	Sets the minimum version of HTML required to view this page, and (in some cases) the preferred document object model (DOM) for client scripts on the page.
text	Sets the default color for foreground text on the page.
title	Provides the text string inserted between the <TITLE> and </TITLE> tags in the page HEAD.
topMargin	Sets the height of the blank margin at the top of the page.
vLink	Sets the default color of hyperlinks that have been clicked.

Table 4.3 shows the methods of a Document object.

Table 4.3 The methods of Document object

Method	Description
close()	Closes an output stream opened with the document.open() method, and displays the collected data
getElementById("id")	Returns a reference to the first object (node) with the specified "id"
getElementsByName("name")	Returns a collection of objects with the specified "name"
getElementsByTagName("tagname")	Returns a collection of objects with the specified "tagname"
open()	Opens a stream to collect the output from any document.write() or document.writeln() methods
write()	Writes HTML expressions or JavaScript code to a document
writeln()	Identical to the write() method, with the addition of writing a new line character after each expression

4.3.2.2 JavaScript

JavaScript is a platform independent scripting language that gives HTML designers a programming tool and that can be used for easy management of user interface: it can put dynamic text into a HTML page, it can make the page react to events or it can create and easy manipulate cookies. A JavaScript consists of lines of executable computer code usually embedded directly into HTML pages. JavaScript is an interpreted language and can be used without purchasing a license. JavaScript is a client-based language, a scripting language with definite limitations, and code visible in the document it appears. Can be used for tasks such as: forms verification, document animation and automation, and basic document intelligence (changes in the document based on other dynamic criteria by exploiting the DOM model).

A JavaScript inserted in the HTML document allows a local recognition and processing (that means at client level) of the events generated by the user such as those generated when the user scans the document or for management of fill-in forms (for example, we must recuperate the information referencing the client such as name, address, payment etc). By inserting a JavaScript in the HTML page we can validate the data filled by the client (for example we can validate the Credit Card Account, we can check for solvability, we can see transactions history, etc) before it is submitted to the server.

A JavaScript can:

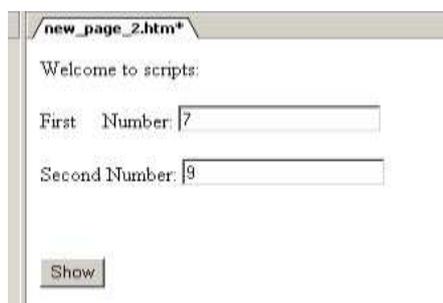
- put dynamic text into a HTML;
- react to events;
- read and write HTML elements;
- be used to validate data;
- be used to detect the visitor's browser;
- be used to create cookies.

JavaScript allows restructuring an entire HTML document for which we can add, remove, change, or reorder items on a page. In order to change anything on a page, JavaScript needs access to all elements in the HTML document through the Document Object Model (DOM).

JavaScript is hardware and software platform independent. Within a JavaScript inserted in the HTML page we can validate the data supplied by the client (for example, to validate the card account, financial availability, history regarding previous transactions etc.).

For an inserted JavaScript the `<script type="text/javascript">` and `</script>` tags tells where the JavaScript starts and ends:

```
<html>
<body>
<script type="text/javascript">
<!--
... // put here the script body
/-->
</script>
</body>
</html>
```



A JavaScript example - what the browser displays

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<title>New Page 2</title>
<script type="text/javascript" language="javascript">
  <!--
    function calc(a, b){ return (a*b);}
  -->
</script>
<script id=clientEventHandlersVBS language=vbscript>
```



```

<script language="vbscript">
<!--
function Easter_Date(Wanted_Year)
    Dim D, E
    D = ((Wanted_Year Mod 19) * 19 + 15) Mod 30
    E = (((Wanted_Year Mod 4) * 2 + (Wanted_Year Mod 7) * 4)
+ 6 * D + 6) Mod 7
    Easter_Date = DateAdd("d", (D +
E+0.), CDate("04/04/" + Trim(Wanted_Year)))
end function
function validComp()
    if not isnumeric(trim(wantedYear.value)) then
        msgbox "Err.1. Wrong value for year: is not a
number!","", "Easter Date"
        wantedYear.focus
        exit function
    end if
    if len(trim(wantedYear.value)) < 3 or
len(trim(wantedYear.value)) > 4 then
        msgbox "Err.2. Wrong value for year: is a to little/large
number (min 3 and max 4 digits allowed)!" + Chr(10) + chr(13) + "[This
limitation is given by the way in which Microsoft implements the
functions]" + Chr(10) + chr(13) + "[DateAdd(...) and CDate(...)].
Eliminate this test and enjoy computing!","", "Easter Date"
        wantedYear.focus
        exit function
    end if
    easterDate.value = Easter_Date(trim(wantedYear.value))
end function
-->
</script>
</head>

<body>
    Pope pleases the great mathematician Gauss to tell him when
Easter will be in a wanted year. <br/>
    Gauss says that Eastern will be always on: 4 April + D days + E days
where: <br/>
D is determined by following the steps <br/>
1 - the year is divided by 19; <br/>
2 - the remainder is multiplied by 19; <br/>
3 - to the result of step two add fix factor 15; <br/>
4 - the sum of values obtained in the steps 1 to 3 is divided to 30 and
the remainder is D <br/>
E is determined by following the steps: <br/>
1 - the year is divided by 4 and the remainder will be multiplied by 2
<br/>
2 - the year is divided by 4 and the remainder will be multiplied by
4 <br/>
3 - compute the sum of values obtained to step 1 and 2 <br/>
4 - to the sum add 6*D and to product add 6 <br/>
5 - the total sum is divided by 7 and the remainder will be E <br/>
Note: This Formulas Compute The Easter Date For Orthodox (even
Pope is Catholic!) <br/>
A code that implements this algorithm is implemented in the VBScript
in that page. <br/> <br/>

```



```

shockwave-flash" width="191" height="35">
</embed>
</object>

```

Macromedia definition of Flash is: “Flash is an authoring tool that designers and developers use to create presentations, applications, and other content that enables user interaction.”

The individual pieces of content created with Flash, in a process denoted by the notion “authoring document”, are called applications and are stored in files having a *.fla* extension. When you have finished authoring and publish the file a compressed version (with a very small size: a JPEG graphic can be represented in a Flash document 11 times less in size of the file) of file with the extension *.swf* (SWF) will be uploaded. This file can be played by Flash Player in a browser or as a standalone application.

A Flash application is build generally by mixing graphics created with the Flash drawing tools (visually) together with imported additional media and defining how and when you to use each of those elements.

A Flash document has four main parts:

- 1) **Stage** - specifying **where** graphics, videos, buttons, and so on appears during playback;
- 2) **Timeline** - is the part where we specify **when** we want the graphics and other elements of the project to appear;
- 3) **Library panel** - is where Flash **displays a list** of the media elements in the Flash document;
- 4) **ActionScript code** - that allows **adding interactivity** to the media elements in the document.

Figure 4.7 shows the structure of a *.fla* file [RRSD] and how Flash documents are composed of individual scenes that contain keyframes to describe changes on the Stage. The figure shows also the efficiency of sharing Flash Libraries among several Flash documents by loading other Flash movies into a parent, or "master," Flash movie using the *loadMovie()* action, or creating interactive elements with scripting methods.



The figure 4.8 outlines the characteristics of a published Flash file (.swf file) such as:

- **portability**, meaning that is compatible with most operating systems and browsers applications;
- **extensibility**, that allows adding new features in subsequent versions;
- **scalability**, allowing movies be played at multiple resolution with preventing loose in quality.

The heart of the Flash application is a vector-based drawing program that draws shapes by defining points that are described by coordinates. Lines that connect these

Figure 4.7 Elements of a Flash document (.fla) in the authoring environment (Source: Macromedia Flash 8 Bible by Robert Reinhardt and Snow Dowd, John Wiley & Sons © 2006, [RRSD])

points are called paths, and vectors at each point describe the curvature of the path. Because this scheme is mathematical, there are two distinct advantages the vector content is significantly more compact, and it's thoroughly scalable without image degradation, advantages that are especially significant for Web use.

The vector animation component of the Flash application relies on the slim and trim vector format for transmission of the final work. Instead of storing megabytes of pixel information for each frame, Flash stores compact vector descriptions of each frame.

Flash quickly renders the vector descriptions as needed and with far less strain on either the bandwidth or the recipient's machine and this is, indeed, a huge advantage when transmitting animations and other graphic content over the Web.

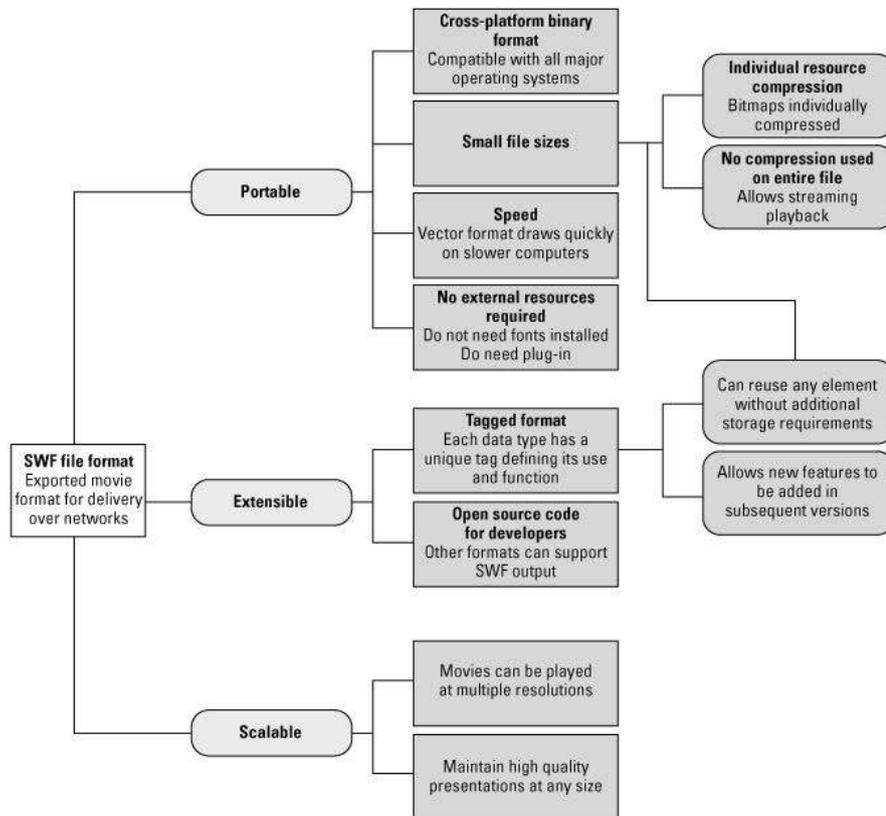


Figure 4. 8 Overview of the Flash movie (.swf) format (Source: Macromedia Flash 8 Bible by Robert Reinhardt and Snow Dowd, John Wiley & Sons © 2006)

4.3.4 Ajax

Asynchronous JavaScript and XML – uses the JavaScript-based XMLHttpRequest object to fire requests to web server asynchronously (or without having to refresh the page). Figure 4.9 shows the usage of traditional server request/response model, the most used technology in Internet, in which the web server responds with a new content for the page at the user request, together with the use of Ajax asynchronous methodology in which the server responds with changes within the web page as answer to the user requests.

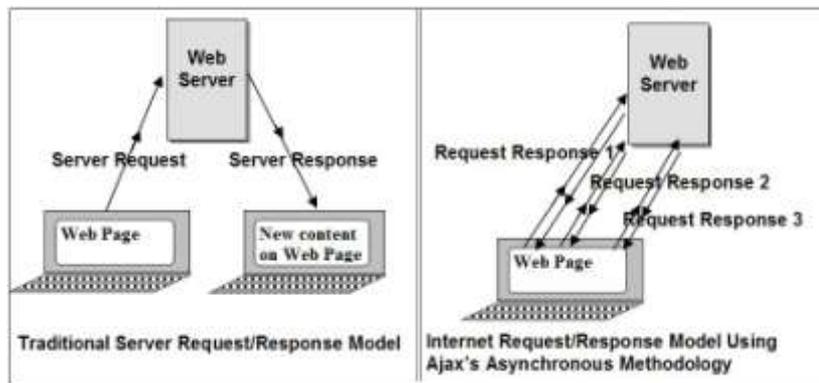


Figure 4. 9 Traditional Server Request/Response Model vs. Ajax Methodology

Ajax is not a really technology at all. It is a term to describe the process of using JavaScript-based XMLHttpRequest object to retrieve information from web server in a dynamic manner (asynchronously). The only requirement to use Ajax is to enable JavaScript within the used browser to surf on Internet. Even whether is based on JavaScript and seem be difficult the structure of an Ajax-based server request is quite easy to understand and invoke: you must simply create an object of the XMLHttpRequest type, validate that it has been created successfully, point where it will go and where the result will be displayed, and then send it.

Figure 4.10 shows an Ajax page as displayed in Mozilla Firefox browser. By pressing on one of the outlined hyperlinks will start the event “onclick” that calls a function named *makerequest(url)* having as argument an URL address.

The function loads the resource at the indicated address and replaces the part indicated from the page with the text response from the server where that resource resides. Figure 4.11 shows the source code of that page including the Ajax code.



Figure 4. 10 An Ajax page example

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta content="text/html; charset=windows-1252" http-equiv="Content-Type"
/>
<title>Ajax - Change Page Content</title>
<script type="text/javascript">
<!--
var xmlhttp;
function state_Change()
{
if (xmlhttp.readyState==4)
```

```

    // 4 = "loaded"
    if (xmlhttp.status==200)
    {
        // 200 = "OK"
        document.getElementById('repme').innerHTML=xmlhttp.responseText;
    }
    else
    {
        alert("Problem retrieving data:" + xmlhttp.statusText);
    }
}
}
function makerequest(url){
xmlhttp=null;
if (window.XMLHttpRequest){// code for Firefox, Opera, IE7, etc.
xmlhttp=new XMLHttpRequest();
} else if (window.ActiveXObject){// code for IE6, IE5
xmlhttp=new ActiveXObject("Microsoft.XMLHTTP");
}
if (xmlhttp!=null) {
xmlhttp.onreadystatechange=state_Change;
xmlhttp.open("GET",url,true);
xmlhttp.send(null);
}else {
alert("Attention! Your browser does not support Ajax. To view properly that
page Enable usage of JavaScript / ActiveX");
}}
//-->
</script>
</head>
<body onload="makerequest('pgs/ajax-1.html')">
<a name="none"></a>
<div align="center">
<h1>Internet Technologies for Business - Chapter 3</h1>
<!-- This links defines a menu like on which you click and new content replaces
the division
identified by 'repme' -->
<a href="#none" onclick="makerequest('pgs/ajax-1.html');return false;">Page
1</a>
| <a href="#none" onclick="makerequest('pgs/ajax-2.html');return false;">Page
2</a>
| <a href="#none" onclick="makerequest('pgs/ajax-3.html');return false;">Page
3</a>
<p></p>
<div id="repme" name="repme" style="width: 99.9%">This content will be
replaced by the requested page</div>
</div>
</body>
</html>

```

Figure 4. 11 The source code corresponding to the page in figure 4.10

4.4 High Level Languages based Architecture

In this architecture a new level N5 introduced (figure 4.12) where the communication client-server take place, in a real client-server relationship, and producing a significant reduction of data traffic (comparing with CGI). The most used high level languages represented by Java and XML.

4.4.1 Java

Java is a full programming language (in the same way C or C++ are) that offers the same services like other programming languages. His main advantage is represented by portability (the independence relatively to the used processor and operating system). The portability is ensured to both source and binary (executable) code. For the programs written in other programming languages even the source has portability the binary code generated by the compiler is specific to a processor type (figure 4.13).

The Java programs source composed by primary data of the same dimension does no matter the used development platform. The binary files are portable because they executed without requiring recompiling and this quality given by the pseudo-code (called *byte codes*) used to describe the procedures (figure 4.14). The pseudo-code is represented by a multitude of instructions closed to the machine language but without being dedicated to a specific processor type.

The *bytes codes* interpreter is incorporated (embedded) in the compatible navigation programs/applications (browsers). Java language is an object oriented programming language and the creation of programs is modular and the modules reusable. Java has class libraries that supply the basic data types, realizes the system input/output operations, and other utility functions. Java programs, called applet, are executed (run) to the client machine (computer) and the server is involved only in the phase of initial loading of the applet (when it downloads to the client the requested page containing the applet). This behavior is very important in intranet applications.

By his conception and behavior (the language itself and the compiler) Java ensure an increased security. Java has a syntax of instructions and sentences as the C language with except of that Java do not uses pointers (the source of many problems) and registry data types but keeps the references to objects (realized by intermediate of pointers with an increased control).

The pseudo-code sequences are tested before execution to see if they do not violate the access constraints. A Java applet cannot read or write the local drives, cannot execute programs on the local computer and cannot connect to other web machines with except of the server from where taken. The compiler and interpreter verify the source code and the pseudo-code. A Java applet can be executed in multiple tiers but the management of the time allowed to each tier is his responsibility (and not of the host operating system as is happening for normal executables; the operating system allows the

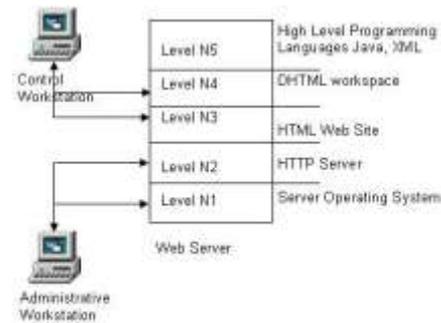


Figure 4.12 High level languages based architecture

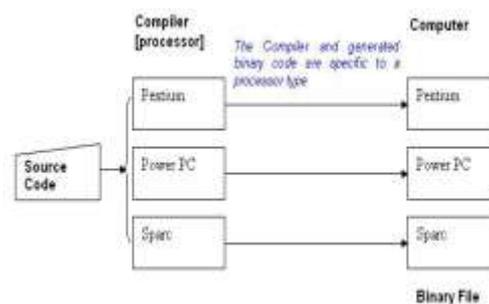


Figure 4.13 Programs "classic" compiled

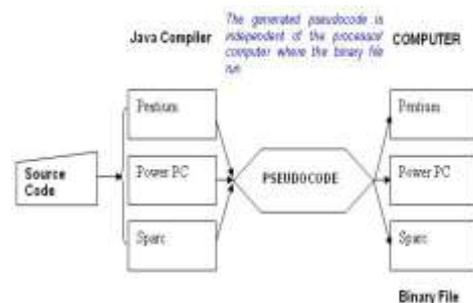


Figure 4.14 Compiled Java programs

execution time to the applet and this, in turn, ensure the sharing of this by the execution tiers that it spawn).

Unlike an application, applets cannot be executed directly from the operating system and a well-designed applet can be invoked from many different applications. Web browsers, which are often equipped with Java virtual machines, can interpret applets from Web servers. Because applets are small in files size, cross-platform compatible, and highly secure (can't be used to access users' hard drives), they are ideal for small Internet applications accessible from a browser.

Generally is not necessary for end users to know Java to install applets in their pages. There are thousands of free applets available on the Internet for almost any purpose and most of them can be customized without programming. An applet can be embedded into a webpage and usually has several settings that allow personalize it. For instance, if you insert an applet that will work as a menu, you can specify which options should be in the menu, and which pages should be loaded upon click on an option. Since Java is a real programming language there aren't many limitations to it. Any program running on your computer could possibly have been made as an applet. When an applet is put on a page the applet and the HTML page the applet is embedded in must be saved on the server. When the page is loaded by a visitor the applet will be loaded and inserted on the page that embedded it. Applets have the file extension ".class". Some applets consist of more than just one class file, and often other files need to be present for the applet to run (such as JPG or GIF images used by the applet). When we use existing applets we must check the documentation for the applet to see if we have all files for it to run, and before embedding an applet on a page, we need to upload the required files to the server.

Example:

```
<Html>
<Head>
<Title>A Java Example</Title>
</Head>

<Body>
This is a page with applet<br>
Below you see an applet<br>
<br>
<Applet Code="anapplet.class" width=200 Height=100>
</Applet>
</Body>
</Html>
```

The following attributes can be set for the <Applet> tag:

Attribute	Explanation	Example
Code	Name of class file	Code="anapplet.class"
Width=n	n=Width of applet	Width=200
Height=n	n=Height of applet	Height=100
Codebase	Library where the applet is stored. If the applet is in same directory as your page this can be omitted.	Codebase="applets/"
Alt="Text"	Text that will be shown in browsers where the ability to show applets has been turned off.	alt="Menu Applet"
Name=Name	Assigning a name to an applet can be used when applets should communicate with each other.	Name="starter"
Align=Left Right	Justifies the applet according to the text and images surrounding it.	Align=Right

Top Texttop Middle Absmiddle Baseline Bottom Absbottom		
Vspace=n	Space over and under the applet.	Vspace=20
Hspace=n	Space to the left and right of applet.	Hspace=40

4.4.2 XML – eXtensible Markup Language

Extensible Markup Language (XML) is a simple, very flexible text format derived from SGML (ISO 8879). Originally designed to meet the challenges of large-scale electronic publishing, XML is also playing an increasingly important role in the exchange of a wide variety of data on the Web and elsewhere.

XML is not a language; it is actually a set of syntax rules for creating semantically rich markup languages in a particular domain. In other words, you *apply* XML to create new languages [DOS_03].

XML was developed by the XML Working Group (initially called SGML Editorial Review Board) from W3C (World Wide Web Consortium) in 1996. The initial specification of the language establishes the following objectives for this:

- XML must be directly usable in Internet;
- XML must support a variety of applications;
- XML must be compatible with SGML;
- The XML pages creation must be as simple as possible and rapidly done;
- XML may not contains facultative functions;
- The XML must have a high readable degree;
- The syntax must be formal and concise;
- The code concision is an element of little importance.

XML (Extensible Markup Language) has become far more than just a way of delimiting comma or tab separated files. XML has become an entire ecosystem of declarative languages and tools to process them. XML Schema are commonly used to efficiently validate form and structure. XML is now the most common way to express domain specific languages (DSLs). The new standard for HTML, XHTML, is a DSL expressed in XML. XML is a meta-language that allows defining specialized languages, extensible, that will be used for describing data structures specific to an applicative domain. XML is a markup language without having predefined tags (as HTML have): the author (user) defines (creates) all the markup tags it believe will be used, eventually qualified by attributes, and define the document structure (how the tags interacts with one another). For example, lets consider a Student record (table) having the fields outlined in figure 4.15).

Field Name	Data Type
StudID	Double
First_Name	String, 30 characters
Last_Name	String, 30 characters
Birth_Date	Short Date
Gender	String, 8 characters
Notes	String, 60 characters

Figure 4.15 Fields in Student record

The XML schema description of the Student is shown in figure 4.16.

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2000/10/XMLSchema"
xmlns:od="urn:schemas-microsoft-com:officedata">
<xsd:element name="dataroot">
```

```

<xsd:complexType>
<xsd:choice maxOccurs="unbounded">
<xsd:element ref="Student"/>
</xsd:choice>
</xsd:complexType>
</xsd:element>
<xsd:element name="Student">
<xsd:annotation>
<xsd:appinfo/>
</xsd:annotation>
<xsd:complexType>
<xsd:sequence>
<xsd:element name="StudID" minOccurs="0" od:jetType="double"
od:sqlSType="float" type="xsd:double"/>
<xsd:element name="First_Name" minOccurs="0" od:jetType="text"
od:sqlSType="nvarchar">
<xsd:simpleType>
<xsd:restriction base="xsd:string">
<xsd:maxLength value="30"/>
</xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Last_Name" minOccurs="0" od:jetType="text"
od:sqlSType="nvarchar">
<xsd:simpleType>
<xsd:restriction base="xsd:string">
<xsd:maxLength value="30"/>
</xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Birth_Date" minOccurs="0" od:jetType="datetime"
od:sqlSType="datetime" type="xsd:timeInstant"/>
<xsd:element name="Gender" minOccurs="0" od:jetType="text"
od:sqlSType="nvarchar">
<xsd:simpleType>
<xsd:restriction base="xsd:string">
<xsd:maxLength value="8"/>
</xsd:restriction>
</xsd:simpleType>
</xsd:element>
<xsd:element name="Notes" minOccurs="0" od:jetType="text"
od:sqlSType="nvarchar">
<xsd:simpleType>
<xsd:restriction base="xsd:string">
<xsd:maxLength value="60"/>
</xsd:restriction>
</xsd:simpleType>
</xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
</xsd:schema>

```

Figure 4.16 The XML schema description of Student record

The associated XML document (containing data) to the Student schema description is illustrated in figure 4.17.

```

<?xml version="1.0" encoding="UTF-8"?>
<dataroot xmlns:od="urn:schemas-microsoft-com:officedata"
xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="Student.xsd">
<Student>
<StudID>1001</StudID>
<First_Name>Ion</First_Name>
<Last_Name>IONESCU</Last_Name>
<Birth_Date>1986-09-26T00:00:00</Birth_Date>
<Gender>Male</Gender>
</Student>
<Student>
<StudID>1003</StudID>
<First_Name>Ana</First_Name>

```

```
<Last_Name>POPESCU</Last_Name>
<Birth_Date>1987-03-21T00:00:00</Birth_Date>
<Gender>Female</Gender>
</Student>
</dataroot>
```

Figure 4.17 The XML document containing data

Each application must give a semantic to markers by associating of a behavior to each element type. XML simplifies the language syntax and easiest considerably the implementation of different application. It offers the possibility for producing, changing, and processing of “well formed” (syntactically correct) documents without requiring from their part to include compulsory an explicit and strong declaration of their structure.

XML offers an elegant and efficient mechanism for defining namespaces allowing, in that way, applications to recognize (distinguish) them in a data multitude, to identify the structures that must be processed as such, ignored or processed in another manner. The namespace allows realizing the distinction between the elements created by different authors. Because authors can create custom elements, it leads to the possibility of naming collisions - different elements that each have the same name. An XML namespace is a collection of element and attribute names and has a unique name. The namespace can be used as namespace prefixes within a markup tag to indicate the associated namespace (for example <student:first_name> or <person:first_name >, where *student* and *person* are namespace prefixes). The keyword *xmlns* is used to declare a default namespace for an XML document. The default namespace is declared within the root element.

XML, by simplifying the data exchange between heterogeneous applications and by unifying the data processing with the HTML documents, generated major changes in IT sectors such as electronic data exchange (EDI), “company’s memory” and datamining.

4.4.2.1 Differences between XML, HTML, and SGML

XML - SGML Comparison. SGML was build for the purpose of storing documents in large centralized libraries while XML is designated to be used in a distributed environment and for storing documents while ensuring the interoperability by intermediate of data exchange. XML allows defining his elements and sub-elements. A document has a strong tree structure integrally accessible starting from his top element (root). This data structure type is more general and powerful than the relational data structure. A tree describes the composition of each element (his substructures); an element can be a hyperlink pointing any kind of informatic element located anywhere, or an element of a XML document (located in the same document or in another one).

XML - HTML Comparison. HTML defines only the page formatting of a document while XML defines the structure, content and semantic independent of the page formatting. The XML documents have a type definition given by DTD (Document Type Definition) while the HTML documents have not. The HTML grammar is fixed, standard defined and the keywords and structures are enclosed between tags. XML allows defining any structure that can be modeled as tree and the description is done by using the tags defined and wanted by user. In that way can be build standard data structures at profession level, for example, similarly to the definition of standard formats for EDI. The HTML documents have a sequential static structure with a heading and a body while the HML documents are hierarchies. Is another difference regarding the way the hyperlinks used in the advantage of XML.

4.4.2.2 XSL: the formatting language of XML

For displaying, printing, and voice synthesizing control XML provides two categories of style sheets:

- CSS, cascading style sheets used beginning with HTML 4 and applicable to XML too;
- XSL, style sheets based on an extensible language for style sheets - eXtensible Stylesheets Language, language representing developments SGML in accordance to ISO 10179. The XSL processor completes the technology of XML navigators (figure 4.1,85) and the XSL processing take place in two phases:

- in the first step is generated a new XML tree, based on the source document, expressed in XML or HTML;
- in the second phase the generated tree allows the fusion of XML data together with the static fragments of the document and a table of contents (that allows easy navigation) or a graphic element is generated.

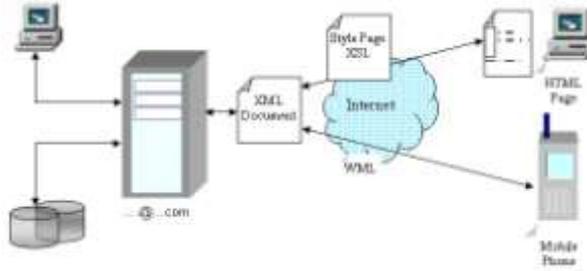


Figure 4.18 The steps of an XSL processing

The passing from a form to another one is realized simply by passing from a XSL page to another. The XSL processor can be used at server side in different ways.

Example:

The xsl page for Student (partly) is:

```
<?xml version="1.0"?>
<xsl:stylesheet xmlns:xsl="http://www.w3.org/TR/WD-xsl" language="vbscript">
<xsl:template match="/">
<HTML>
<HEAD>
<META HTTP-EQUIV="Content-Type" CONTENT="text/html;charset=UTF-8" />
<TITLE>Student</TITLE>
<STYLE TYPE="text/css">
.Style0 { BORDER-STYLE: solid; COLOR: #000000; BACKGROUND-COLOR: #ffffff;
BORDER-WIDTH: 1px; BORDER-COLOR: #333399; TEXT-ALIGN: general;
WRITING-MODE: lr-tb; VISIBILITY: visible; FONT-WEIGHT: 400; FONT-SIZE: 9pt;
FONT-FAMILY: Tahoma; FONT-STYLE: normal; TEXT-DECORATION: none;
PADDING-TOP: 0in; PADDING-BOTTOM: 0in; PADDING-RIGHT: 0in; PADDING-
LEFT: 0in }
.Style1 { BORDER-STYLE: none; COLOR: #333399; BACKGROUND-COLOR:
transparent; BORDER-WIDTH: 1px; BORDER-COLOR: #000000; TEXT-ALIGN:
general; WRITING-MODE: lr-tb; VISIBILITY: visible; FONT-WEIGHT: 700; FONT-
SIZE: 9pt; FONT-FAMILY: Tahoma; FONT-STYLE: normal; TEXT-DECORATION:
none; PADDING-TOP: 0in; PADDING-BOTTOM: 0in; PADDING-RIGHT: 0in;
PADDING-LEFT: 0in }
</STYLE>
</HEAD>
<BODY link="#0000ff" vlink="#800080" style="BACKGROUND-
IMAGE:url('Images\Student.bmp'); BACKGROUND-POSITION: center center;
BACKGROUND-REPEAT: repeat">
<xsl:for-each select="/dataroot/Student">
<xsl:eval>AppendNodeIndex(me)</xsl:eval>
</xsl:for-each>
<xsl:for-each select="/dataroot/Student">
<xsl:eval>CacheCurrentNode(me)</xsl:eval>
<xsl:if expr="OnFirstNode">
<DIV style="BORDER-STYLE: none; WIDTH: 4.5416in; BACKGROUND-COLOR:
#ece9d8; VISIBILITY: visible; HEIGHT: 0in; POSITION: relative">
</DIV>
</xsl:if>
<DIV style="BORDER-STYLE: none; WIDTH: 4.5416in; BACKGROUND-COLOR:
#ece9d8; VISIBILITY: visible; HEIGHT: 1.6041in; POSITION: relative">
<SPAN class="Style0" style="TEXT-ALIGN: right; LEFT: 1.3333in; TOP: 0.0833in;
WIDTH: 1.6041in; HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
<xsl:eval no-entities="true">Format(GetValue("StudID", 5),"", "")</xsl:eval>
</SPAN>
<SPAN class="Style1" style="LEFT: 0.0416in; TOP: 0.0833in; WIDTH: 1.2916in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
StudID
</SPAN>
<SPAN class="Style0" style="LEFT: 1.3333in; TOP: 0.3333in; WIDTH: 1.6041in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
<xsl:eval no-entities="true">Format(GetValue("First_Name", 202),"",
"")</xsl:eval>

```

```

</SPAN>
<SPAN class="Style1" style="LEFT: 0.0416in; TOP: 0.3333in; WIDTH: 1.2916in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
First Name
</SPAN>
<SPAN class="Style0" style="LEFT: 1.3333in; TOP: 0.5833in; WIDTH: 1.6041in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
<xsl:eval no-entities="true">Format(GetValue("Last_Name", 202),"
,")</xsl:eval>
</SPAN>
<SPAN class="Style1" style="LEFT: 0.0416in; TOP: 0.5833in; WIDTH: 1.2916in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
Last Name
</SPAN>
<SPAN class="Style0" style="TEXT-ALIGN: right; LEFT: 1.3333in; TOP: 0.8333in;
WIDTH: 0.7187in; HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
<xsl:eval no-entities="true">Format(GetValue("Birth_Date", 7), "Short Date",
,")</xsl:eval>
</SPAN>
<SPAN class="Style1" style="LEFT: 0.0416in; TOP: 0.8333in; WIDTH: 1.2916in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
Birth Date
</SPAN>
<SPAN class="Style0" style="LEFT: 1.3333in; TOP: 1.0833in; WIDTH: 0.6458in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
<xsl:eval no-entities="true">Format(GetValue("Gender", 202),"
,")</xsl:eval>
</SPAN>
<SPAN class="Style1" style="LEFT: 0.0416in; TOP: 1.0833in; WIDTH: 1.2916in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
Gender
</SPAN>
<SPAN class="Style0" style="LEFT: 1.3333in; TOP: 1.3333in; WIDTH: 3.1666in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
<xsl:eval no-entities="true">Format(GetValue("Notes", 202),"
,")</xsl:eval>
</SPAN>
<SPAN class="Style1" style="LEFT: 0.0416in; TOP: 1.3333in; WIDTH: 1.2916in;
HEIGHT: 0.1875in; OVERFLOW: hidden; POSITION: absolute">
Notes
</SPAN>
</DIV>
<xsl:if expr="OnLastNode">
<DIV style="BORDER-STYLE: none; WIDTH: 4.5416in; BACKGROUND-COLOR:
#ece9d8; VISIBILITY: visible; HEIGHT: 0in; POSITION: relative">
</DIV>
</xsl:if>
<xsl:eval>NextNode()</xsl:eval>
</xsl:for-each>
</BODY>
</HTML>
<xsl:script>
<![CDATA[
.....

```

4.4.2.3 XQL – the extended query language

XQL (eXtended Query Language) allows searching in the XML tree and is realized as an extension of XSL for pattern matching that allows the description of searching criteria (for example, *book/author* means searching of elements *author* contained by the elements *book*). XQL allows hyperlinks to all nodes that satisfy some criteria and the string defining the search can be embedded in URL. XQL is declarative as SQL is the difference is that his result is a tree or an XML graph

4.4.2.4 Database Links

Structured Data Exchange. The first XML specifications in 1998 almost aim the definition of a specialized language for describing structured data with the scope of realizing the data exchange between applications in an open system network environment. In that sense XML was defined as a

language for serializing the imported/exported records in/from relational databases. The usage of XML in that scope argued by:

- standardization of syntactical analyzers (efficient and free);
- the representation of relational schemas without data loss in XML is trivial;
- the language coupled with the style sheets (XSL) well matches to data fusion for heterogeneous schemas and sources and schema transformation.

This working manner allows (for example, in an e-commerce application starting with a HTTP request) bringing out from the database the information regarding a product (availability, price etc), coding in XML and fusion with the static part (product image, description etc) for generating “by fly” a personalized commercial offer.

Storage of XML documents in databases. XML is adapted to the storage of any kind of documents such as illustrated technical manuals, e-mail, programs, reports etc. The XML stored data are independent on the hardware, software, and used access methods, on the programming languages and the page layouts and formatting, being in fact a universal standard for storage.

Document Object Model (DOM). The XML/HTML navigator implements an application interface API that offers a programmable access to displayed data. The standard W3C defines an object-oriented API allowing an application program to access the tree formed by an XML object. This API can be implemented in any object oriented programming language (generally in Java). The XML document can contains other forms (such as, for example, a menu form) and the code defining the changes to be done dynamically in the document as reaction to user actions and filled values (not necessarily typed). The document becomes in that way interactive and can be changed (modified), in content and presentation, without server interaction.

The figure 4.19 shows an example of using the document object and his sub-objects and properties of that in code (you can copy and paste in the HTML view in a new page in FrontPage or MS Script Editor or Netscape Composer etc and preview in browser to see the result). The script inside changes the document background when the user clicks somewhere on his surface.

```
<HTML>
<HEAD>
<TITLE>Color Switch</TITLE>
<META NAME="GENERATOR" Content="Microsoft Visual Studio">
<META HTTP-EQUIV="Content-Type" content="text/html; charset=UTF-8">
<script type="text/javascript">
function ChangeColor()
{
    /* to the variable curBgColor assigned the current background color
    that originally is set to red (#ff1001)
    */
    curBgColor = document.body.style.background;
    /* the switch sequence */
    if (curBgColor == "#ff1001" || curBgColor == "")
        { document.body.style.background="yellow";}
    else
        { document.body.style.background="#ff1001";
    }
}
</script>
</HEAD>
<BODY onclick="ChangeColor()" bgcolor="#ff1001">
    <p>Click anywhere on this document to switch the background color from red to
yellow!
    </p>
</BODY>
</HTML>
```

Figure 4.19 An example of using document object in a JavaScript inside of a HTML page

Figure 4.20 illustrates the usage of VBScript together with the DOM model to realize many operations:

- the function validateValues(), is called by the procedure Coresp_Temp() to validate the form fields values passed in by the user by checking if they are numbers. If not numbers an error message returned to the caller and displayed in a message box and the processing stops. The

- fields, such as minTemp.value or maxTemp for example, are objects whose property called value stores the text box content;
- if all typed values are numbers the Coresp_Temp() procedure produces the HTML tags for a table containing the correspondence value between Celsius and Fahrenheit degrees. First the heading of table stored in the memory variable called repx and after that a cycle of transformation started from minTemp.value to maxTemp.value that transforms values at each hop given by stepTemp.value . Each pair Fahrenheit value and corresponding Celsius value will generate a new row in the table "**<tr><td width=120px>" & Right(Space(24) & round(fahrenheit,2),12) & "</td><td width=120px>" & Right(Space(24) & round(celsius,2),16) & "</td></tr>"**
 - after the conversion cycle ends the generated table closed by his end tag and the function displays the table (stored in the memory variable repx) by replacing the division called "replaceMe" in the web page **document.getElementById("replaceMe").innerHTML=repx**.
 - the button called ClearPage clears the forms fields by assigning the empty string to the value property of each field. The content generated in the page is erased too by the command **document.getElementById("replaceMe").innerHTML=""**.

```

<html>
<head>
<title>VBScript solution</title>
<script type="text/vbscript" language="vbscript">
<!--
function validateValues(min,max,pas)
dim ret
ret="Yes"
if isnumeric(trim(minTemp.value)) then
    min=trim(minTemp.value)
else
    if ret="Yes" then ret=" "
    ret=ret & "<<From>>"
end if
if isnumeric(trim(maxTemp.value)) then
    max=trim(maxTemp.value)
else
    if ret="Yes" then ret=" "
    ret=ret & "<<To>>"
end if
if isnumeric(trim(stepTemp.value)) then
    pas=trim(stepTemp.value)
else
    if ret="Yes" then ret=" "
    ret=ret & "<<Step>>"
end if
validateValues=ret
end function
Sub Coresp_Temp()
    Dim min,max,pas,fahrenheit, celsius,conr, repx
    ' Computation of the correspondence Co- Fo
    if (validateValues(min,max,pas))<>"Yes" Then
        msgbox "Err. 01. The value you typed in " & validateValues(min,max,pas) & "
        box is not a number ? Correct them and press again."
        exit sub
    end if
    fahrenheit=0 : celsius=0
    repx="<table border=1 style='text-align:right'><tr><td
width=120px>Fahrenheit </td><td width=120px> Celsius </td></tr>"
    For fahrenheit = min To max Step pas

```


Figure 4.21 An example of using document object model in a VBScript inside of a HTML page
 Figure 4.21 shows how document object and his component objects are accessed and

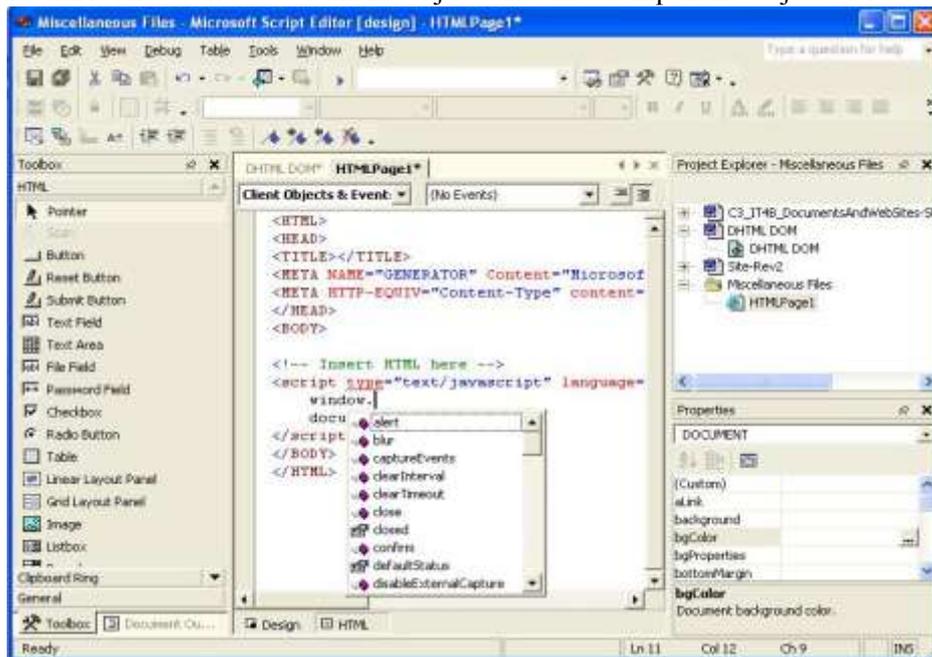


Figure 4. 20 The access to DOM objects in Microsoft Script Editor

manipulated in Microsoft Script Editor.

Access to DHTML documents. For an object oriented programming language the document is an object composed by other objects. When API accessed by the XML interpreter it exists a gateway object that allows access another object, the document, whose elements are objects too. In that conditions any conversion of a XML document can be done under the control of a Java or Visual Basic program (for example).

4.5 Dynamic Pages Architecture

The e-commerce applications must interfaced with the enterprise's databases for data retrieval purposes. The programs for ensuring the link between the web server and databases are written in different languages such as Python, Perl, PHP, ASP, C++, etc.

The generic name that defines such links is CGI – Common Gateway Interface – described in the chapter 1.2.6 (figure 4.22, 4.23, and 4.24). These applications allows, depending on their objectives and characteristics, generating dynamical pages. Figure 4.22 shows the content of a PHP script stored at server side that access a database table to check if a username/password combination exists or not and to allow or deny the access. Figure 4.23 shows what is delivered to the user by the server when this one access the page.

```
<?php
session_start();
// Check if he wants to login:
if (!empty($_POST[username]))
{
    require_once("connect.php");
    $query = mysql_query("SELECT * FROM members
        WHERE username = '$_POST[username]'
        AND password = '$_POST[password]'");
    or die ("Error - Couldn't login user $_POST[username].");
    $row = mysql_fetch_array($query)
    or die ("Error - Couldn't login user $_POST[username].");
    if (!empty($row[username]))
    {
        $_SESSION[username] = $row[username];
        echo "Welcome $_POST[username]! You've been successfully logged in.";
        exit();
    }
    else // bad info.
```

```

    {
        echo "Error - Couldn't login user $_POST[username].<br /><br />
            Please try again.";
        exit();
    }
}
?>
<html>
<head>
<title>Login</title>
</head>
<body>
<form action="login.php" method="post">
<table border="1" cellpadding="3" cellspacing="1" style="width: 37%">
<tr>
<td style="width: 93%; text-align:center; height: 1.2em;"><h2 style="font-size: small; height:
10px; margin-bottom:1px">Login</h2></td>
</tr>
<tr>
<td style="width: 93%; font-size: small; height: 1em;"><label>Username: <input type="text"
name="username" size="29" value="<? echo $_POST[username]; ?>"></label></td>
</tr>
<tr>
<td style="width: 93%; font-size: small; height: 1em;"><label>Password: <input
type="password" name="password" size="25" value=""></label></td>
</tr>
<tr>
<td style="width: 93%"><input type="submit" value="Login"></td>
</tr>
</table>
</form>
</body>
</html>

```

Figure 4. 22 The page content at server side containing access to database tables

```

<html>
<head>
<title>Login</title>
</head>
<body>
<form action="login.php" method="post">
<table border="1" cellpadding="3" cellspacing="1" style="width: 37%">
<tr>
<td style="width: 93%; text-align:center; height: 1.2em;"><h2 style="font-size: small; height:
10px; margin-bottom:1px">Login</h2></td>
</tr>
<tr>
<td style="width: 93%; font-size: small; height: 1em;"><label>Username: <input type="text"
name="username" size="29" value=""></label></td>
</tr>
<tr>
<td style="width: 93%; font-size: small; height: 1em;"><label>Password: <input type="password"
name="password" size="25" value=""></label></td>
</tr>
<tr>
<td style="width: 93%"><input type="submit" value="Login"></td>
</tr>
</table>
</form>
</body>
</html>

```

Figure 4. 23 The page content at client side as generated and downloaded to the user

The dynamic page is not stored to the server as the static one is. She is generated (manufactured) according to the client request and the information content is prepared to the web server (an image of that) and send to client that can read them on his computer and used browser (figure 4.24). In figure 4.24 is represented a functional architecture of the site containing dynamical pages and figure 4.25 the synthetic representation of the process of generating pages.

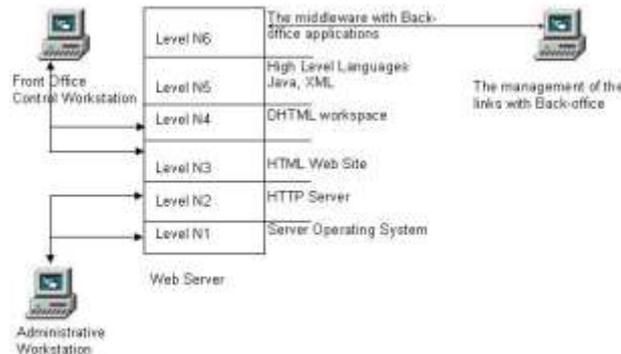


Figure 4.24 Functional architecture for dynamic pages

The communication process involved by the new level N6 introduced by that architecture take place as indicated in the chapters 2.2.6, paragraph Client/Server Technology, and chapter 3.1 paragraphs Intranet, Extranet, and The e-business – e-commerce relationships.

SSI (Server-Side Include). The server can generate dynamic (“by fly”) the HTML file, that it sends to client for displaying, in accordance with the data send/requested by client with SSI. SSI is a language that can create dynamically the page content send to client. Not all Web servers offer support for SSI. How SSI works? For example, for including a header (stored in a file named *header.txt*) in every page that will be displayed by the browser we must write in the HTML file, to the beginning of the body:

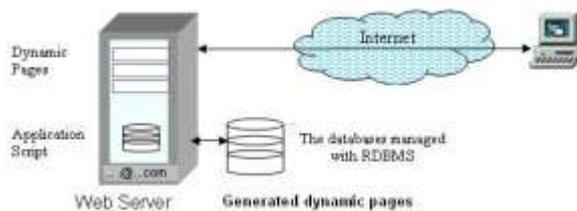


Figure 4.25 The generation of a dynamic page

```
<pre>
<!--#include
file="header.txt" -->
</pre>
```

When a client request that page the server processes first the command and send to client the HTML file containing the content of the file “header.txt” substituted to the command (the header.txt content is substituted to the comment). The SSI commands are invisible to the client this one receiving (his browser) only the result of the processing of that commands.

ASP - Microsoft ® Active Server Pages. ASP is a Web environment for developing server scripts and used for dynamic execution of Web server interactive applications. As idea ASP is similar to SSI, but is more complex. ASP is characteristic to Microsoft Web servers and is nothing than a way to

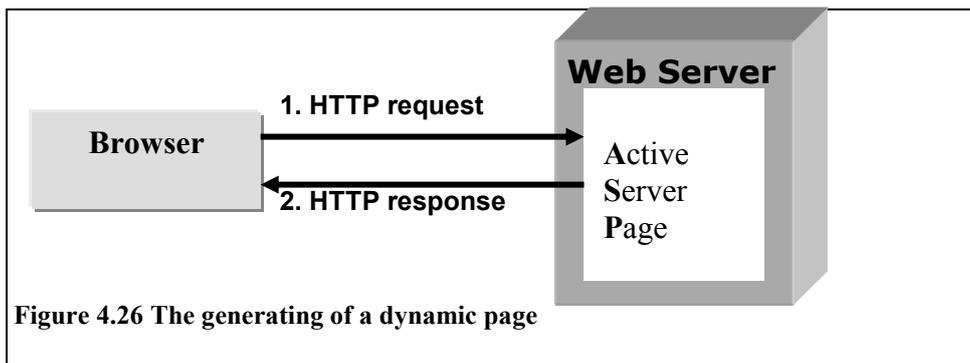


Figure 4.26 The generating of a dynamic page

process the scripts at server side. The difference is that the client side scripts are send to client

(usually embedded in the HTML documents) and this one processes locally the script while the ASP is processed by the server and the result is included and send in the HTML file to client (figure 4.26).

PHP. Is a language similarly to C and used in the same way as ASP. Is a development of Apache and is completely free. For PHP it exist interpreters on a variety of Web servers (including Microsoft) and can run under a variety of operating systems. As a rule the files containing PHP have the extension “.php”. The PHP code is enclosed in special start (<?php) and end (?>) tags that allow you to jump into and out of "PHP mode" (figure 4.22).

Example:

```
</html>
<?php
    echo "Text afisat de script PHP.<br>";
?>
</body>
</html>
```

PHP [OLS07], which stands for "PHP: Hypertext Preprocessor" is a widely-used Open Source general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. Its syntax draws upon C, Java, and Perl, and is easy to learn. The main goal of the language is to allow web developers to write dynamically generated web pages quickly, but you can do much more with PHP.

There are three main areas where PHP scripts are used:

- Server-side scripting, this is the most traditional and main target field for PHP and can do anything any other CGI program can do (such as collect form data, generate dynamic page content, send and receive cookies etc). This type of usage requires three things to make this work: a PHP parser (CGI or server module), a web server and a web browser.
- Command line scripting, the PHP script can be run without any server or browser but PHP parser;
- Writing desktop applications, even PHP is not the very best language to create a desktop application with a spectacular graphical user interface can be used in combination with PHP-GTK to write cross-platform client application programs.

PHP can be used on all major operating systems (including Linux, many Unix variants, Microsoft Windows, Mac OS X, RISC OS etc) has support for most of the web servers today (including Apache, Microsoft Internet Information Server, Personal Web Server, Netscape and iPlanet servers, O'Reilly Website Pro server, Caudium, Xitami, OmniHTTPd, and many others).

PHP scripts can be realized using procedural programming or object oriented programming, or a mixture of them. PHP has the ability to output different kinds of documents such as HTML, XHTML, XML, images, PDF files and even Flash movies (using *libswf* and *Ming*) generated on the fly. PHP can auto-generate these files, and save them in the file system, instead of printing it out, forming a server-side cache for your dynamic content.

A strongest and significant feature of PHP is its support for writing a database-enabled web page for a wide range of databases: Adabas D, InterBase, Postgre, SQL, dBase, FrontBase, SQLite, Empress, mSQL, Solid, FilePro (read-only), Direct MS-SQL, Sybase, Hyperwave, MySQL, Velocis, IBM DB2, ODBC, Unix dbm, Informix, Oracle (OCI7 and OCI8), Ingres, Ovrims.

4.6 Advanced Management Architecture

For better usage of information produced by the site or to offer complementary services to their clients (figure 4.27) we must provide the site with specific utilities (applications or programs) that answers to that requirements, such as, tools for site activity analysis or those for obtaining statistic information.

4.6.1 Statistic

All collected and database schemas that generates about how many unique site, how many on. Analytics can popular pages, person stays on percentage of leave the site from thus the who explore the

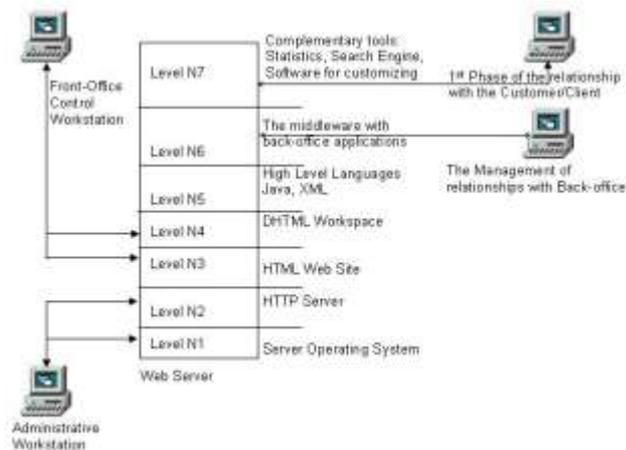


Figure 4.27 The Advanced Management Functional Architecture

utilities

statistic information are analyzed in a form of Analytics is software metrics for example times files are accessed, IP addresses access the pages are served, and so calculate the most how long the typical the typical page, the people who "bounce" or a particular page, and percentage of people site more deeply.

In the following paragraphs two examples of analytics packages introduced: AWStats as an open source site side solution and Google Analytics as **AWStats**. AWStats (Advanced Web Statistics) is an open source log analyzer written in Perl that can use a variety of log formats and runs on a variety of operating systems. AWStats is primarily a site statistics program, residing at host server side, a log analyzer, that counts more than it calculates. Figure 4.28 shows the first screen of the Web pages report given by AWStats where the left panel is a menu and list of topics reported.

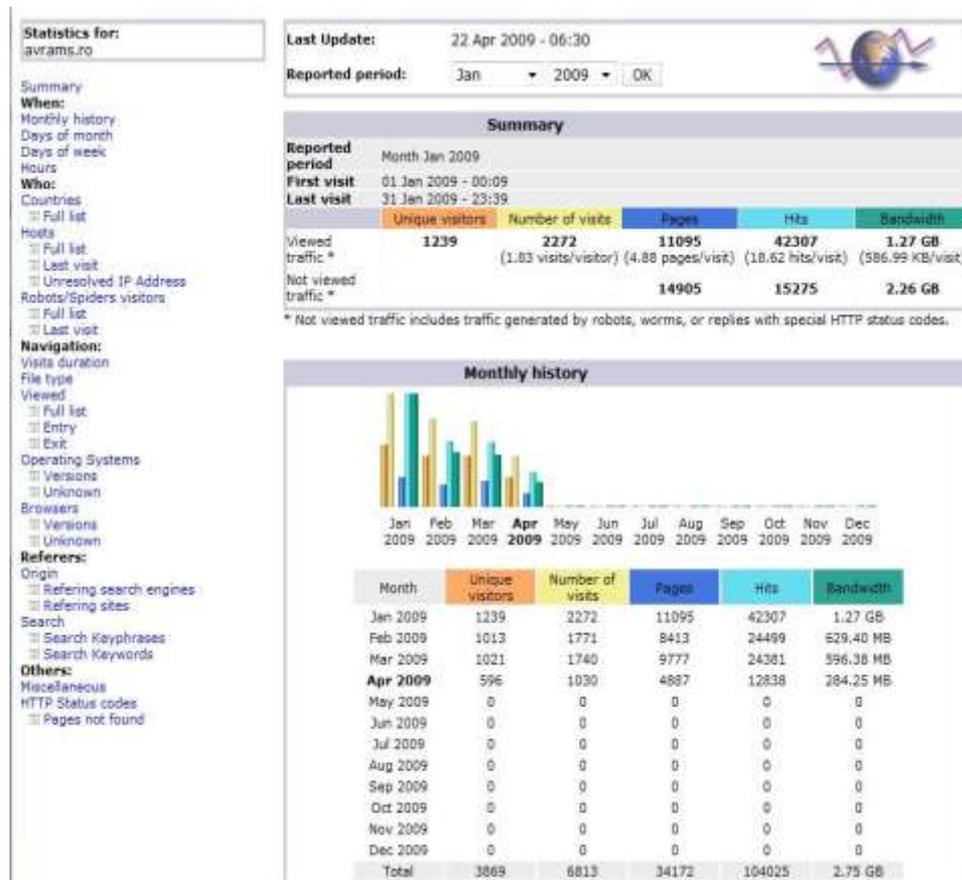


Figure 4. 28 AWStats reports (main screen)

Google Analytics. “Google Analytics (figure 4.29) helps you find out what keywords attract your most desirable prospects, what advertising copy pulled the most responses, and what landing pages and content make the most money for you (http://www.google.com/analytics/feature_benefits.html). “

Google Analytics uses a snippet of JavaScript code to track the traffic on your web site as the following one:

```
<script src="http://www.google-analytics.com/urchin.js" type="text/javascript">
</script>
<script type="text/javascript">
  <!--
    _uacct = "UA-1653633-1"; // domain unique code given by Google when registered
    urchinTracker(); // call the tracker for the specified domain
  //-->
</script>
```

The code introduced in the body section of every page you want monitorize. The left panel in the figure 4.29 is a navigational menu to a variety of reports included in one of the fourth broad categories: Visitors, Traffic Sources, Content, and Goals.



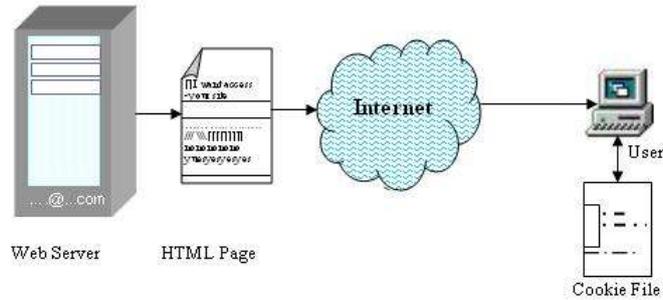
Figure 4. 29 The Google Analytics reports

4.6.2 Cookie

Cookie offers complementary means for identifying the visitors/users and distinguished of other solutions in three strong points:

- a cookie is stored always on the user’s computer;
- a cookie is accessible uniquely to the server that generating it;
- a cookie is editable only in the moment the user visits the site that generated this.

Being build as a character string a cookie represents a powerful tool for developing web sites. The creation of a cookie can be done in two ways (figure 4.30):



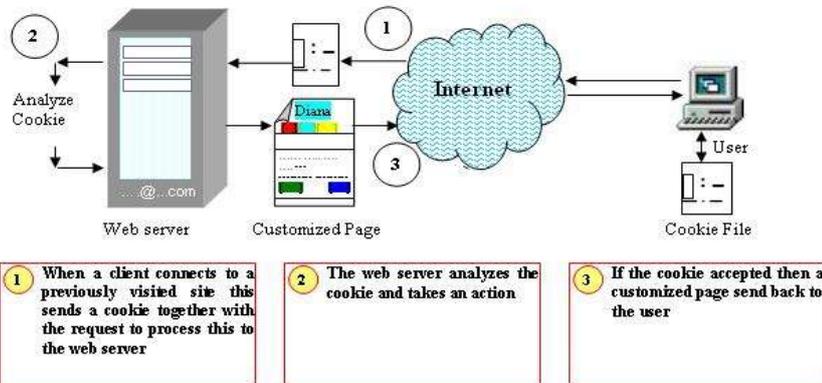
At the first contact of a new client with the web site the server sends to this one a HTML page defining the syntax for creating a cookie

When the script interpreted by the browser this one creates a cookie file containing some pre-established information (including the address and visit date).

Figure 4.30 The implementation of a cookie

1. by transmitting from server to navigator the order for creation (instruction `set_cookie`);
2. by executing the instructions for creating cookies on the client computer by intermediate of one of programming languages whose instructions embeds in HTML pages.

In both cases the starting of the command for generating cookie is the corollary of the client request of/access to a HTML page. Figure 4.31 shows the evolution way of a cookie.



1 When a client connects to a previously visited site this sends a cookie together with the request to process this to the web server

2 The web server analyzes the cookie and takes an action

3 If the cookie accepted then a customized page send back to the user

Figure 4.31 The evolution of a cookie

A cookie can be used for different purposes such as:

- 1) Restricting access to some web pages (for services that requires subscription, for example). In that case the access requires as a rule the pair username/password given to the user when registering in the site. The script for this case can transmit a cookie to client containing his name or an access code to the page. For this purpose (restricted access) the webmaster must write every page having restricted access as a CGI script and later on must verify dynamically the existence of cookie (for limit the duplicates of this and repeating the authentication by username/password);
- 2) Building purposefulness forms. Some sites presents to every visit the same form that requires the same information from the client that can embarrassing this and can produce redundant information. Solving of that problem can be done by a CGI script that searches the presence of a generic cookie created after the user fills the minimal set of acceptable data in the registering form. If the cookie present the registration page will not be created and the access is given to the next page. If the cookie is missing then the registering form will be generated.
- 3) Web pages personalization. This is one of most judicious usage of cookies. Many sites (generally informational) allow users to configure/customize the home page. By intermediate of the associated (assigned) cookie it recuperates the personalization at any login.

- 4) Piloting a virtual kadi (cart). The absence of the management of a memory (primary or secondary) by the HTML protocol makes this inadequate for e-commerce. By the appearance of cookies becomes possible the creation of a virtual Kadi that follows the client in his virtual travel. The cookie memorizes the integrality of buying session that allows displaying on each new page the selected articles (name, quantity, price etc). The concurrent solutions developed in JavaScript do not eliminates cookie because by intermediate of this one the nominative information shared with the server do not requires retyping to the next login.

4.6.3 Network traffic analysis

The quality of services offered by a selling site can be measured by intermediate of traffic analysis tools (figure 4.32).

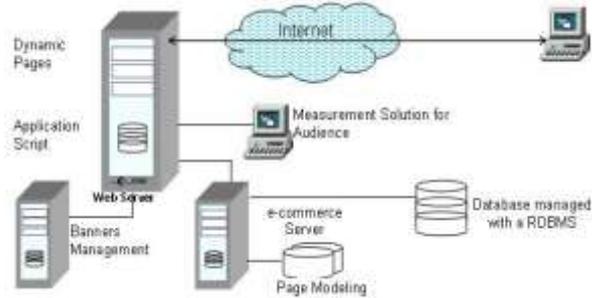


Figure 4.32 Network traffic analysis tools

4.7 Multi-tier (three tiers) Architecture

In the integration process of company's e-commerce site with his current activities appears the necessity, in mean or long term, to realize the link with the existing management informatic systems (to integrate the site with these ones).

The manufacturing process, enterprise management, and the ERP (Enterprise Resource Planning) utilities are permanently linked to the selling architecture (if not embedded in this one). In the case in which the organization disposes of heterogeneous application to automate his activities these must be interfaced with the selling site. The first function that must be accomplished by the application server is to ensure that interfacing and integration (figure 4.33).

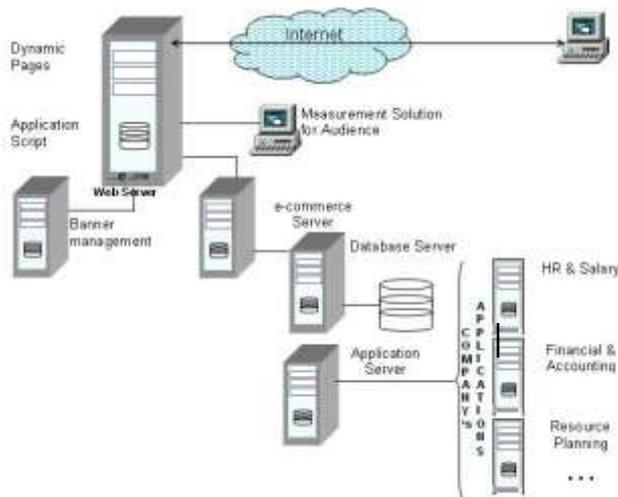


Figure 4.33 Three-tier Architecture

The client-server infrastructure allows generally the support for interfacing and integrating (the description of client-server technology introduced in chapter 1.1).

The client-server technology can be categorized in the following architectures:

- Client-server 1st generation: this architecture consists of a client that uniquely manages the presentation layer and a server running the entirely application;
- Client-server 2nd generation: this architecture developed on Windows platform and PC. The basic idea was that of using the processing capabilities of PC (at client side) and the server manages the database access by the SQL queries of the client.
- Client-server 3rd generation: this generation was born due to Internet technology. It consists of a client managing the presentation layer, a server layer for application whose task represented by applications, and a third layer containing the database.

The client-server architecture has three simple layers:

- Client workstation;

- Communication intermediaries;
- Access to standardized services.

The client workstations, provided with browsers from which the client components, such as Java applets and ActiveX controls, are automatically updated. This solves the software distribution problem and the software versions management to the client workstation. More than the application logic migrates to server side authorizing, in that way, an efficient control of his deployment.

4.7.2 Application Server

The main function of the application server is to deserve the information system applications. The enterprise's information system concentrates in three poles (figure 4.34) – human resources organization, information and technology – that allows a centralization of enterprise's intelligence so that we can qualify this assembly be the enterprise "know how".

In order to develop this architecture the enterprises must choose between the "as it is possible" in-house development and buying an offer "ready to use" from third parties, generally, less flexible.

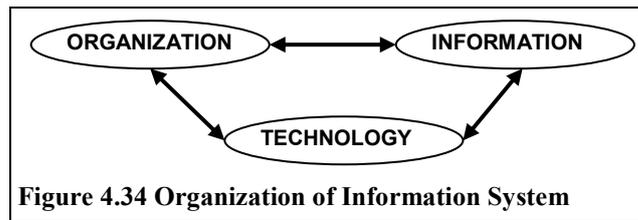


Figure 4.34 Organization of Information System

Now is possible to realize a mixed approach: the development on the basis of existing components of J2EE (Java 2 Enterprise Edition) in association with EJB (Enterprise Java Beans) components, as an emergency solution.

The enterprise's intelligence and the information system can be divided in three layers:

- information capital, that is a prime material of the enterprise;
- processes, that models the enterprise activity;
- applications, that constitutes the functional part, the graphic interface, and processing processes.

The information base is shared between all enterprise processing processes, and each processing process is sharable between many applications. In that way, by preserving this architecture until the implementation, we can obtain a maximal rate of usage of the information system components.

The logical structures of the architecture of information system can be represented by using a layered approach as in figure 4.35. In that logical structure:

- the application layer decomposed in two (sub)layers presentation and coordination;
- the layer information database composed by the domain layer and persistency layer;

In that way the logical architecture composed by five layers:

1. **Presentation:** manages the visual domain;
2. **Coordination:** his tasks are to invoke the processes of the inferior layer, to manage the user workspace and working session;
3. **Services:** his main purpose is to supply services specific to the domain activities. The main tasks of this layer represented by the component distribution (deployment), transaction control, and security;

4. **Domain:** is concerned on the enterprise activities common to all applications and his main task is to guarantee the domain model by applying the processing rules;
5. **Persistency:** the last layer in the architecture but the most important by that all persistency of the system is reported to it. At this layer we found basic functionalities that allow creation, updating, searching, retrieval, and deletion of components of the entity processing processes.

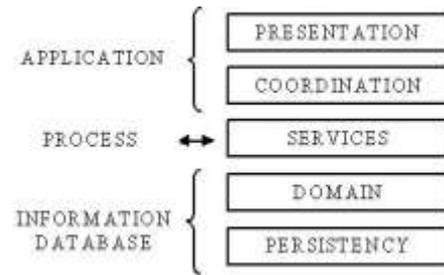


Figure 4.35 The logical layers of the information system

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