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Technologies for eBusiness

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MOBILE APPLICATIONS DEVELOPMENT
(Adapting user interfaces to mobile devices using HTML5,
CSS3, and jQuery)

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7 Mobile Applications Development

The mobile applications can be categorized in three types:

- Mobile Web Applications – realized as websites designed to run as applications in a browser;
- Purely Native Applications – written in a device specific language and using a user interface (UI) specific to the device (such as Objective-C for iOS – Apple; or Java for Android);
- Hybrid Native Applications – that uses HTML to define the user interface and a specific language for the application itself.

Since the development of types two and three of mobile applications requires additional specific programming languages and technologies we analyze in what follows the mobile web applications and we describe the minimal web standards and technologies that must be known to develop such applications.

To install a Mobile Web Application on your device follow one of the procedures:

- iOS (iPod Touch, iPhone, iPad):
 1. Open the mobile application in Safari;
 2. Press the bookmark icon (+) / ;
 3. Select the option Add to Home Screen;
 4. Press the button Add;
 5. Press the application icon to start the application.
- Android:
 1. Open the application in the Android's Web browser;
 2. Press bookmark (somewhere near to the URL address box);
 3. Choose a free slot;
 4. Press the OK button.

To move the application icon in another position on the screen press the icon until icons start trembling and then use the finger to move in the desired position (move to trash if want delete) and then press the OK button of the device. Instead of that procedure you can type Add Shortcut to Home.

For mobile web application development to which you want allow to easy change dynamically the code (and also the corresponding display) is necessary to use additional technologies from which the most used is jQuery.

For both HTML5 and jQuery you can find a lot of editors from paid, such as Dreamweaver of Adobe (all platforms) or Expression 4 (Windows only) of Microsoft, or you can find free editors such as Komodo Edit (<http://activestate.com>) or alternatively JsFiddle (<http://jsfiddle.net/>).

A mobile web application runs inside the web browser that is based on web standards, including the following:

- HTML/XHTML (HTML 4.01 and XHTML 1.9, XHTML mobile profile document types);
- CSS (CSS 2.1 and partial CSS3);
- JavaScript (ECMAScript 3 (ECMA 262), JavaScript 1.4);
- AJAX (for example, XMLHttpRequest);
- SVG (Scalable Vector Graphics) 1.1;
- HTML5 media tags;
- Ancillary technologies (video and audio media, PDF, and so on).

When developing Web solutions using standard markup and technologies gives to developer/ user a lot of benefits, as introduced in [SI-11], such as:

- The search engine crawlers can index documents more adequately, and the content is basically optimized for search engines;
- The standard-compliant websites can be downloaded and parsed faster;
- Well-structured markup provides faster rendering;
- Web documents that apply standards properly are rendered accurately;
- Lower development costs;
- Standard-compliant markup serves as the basis for website accessibility;
- Backward compatibility is ensured as browsers evolve;

- Allows obtain optimal content lengths and file size as well as cost-optimal storage;
- Standard-compliant markup is easier to maintain and update than the markup that violates standards;
- Standard-compliant source codes become obsolete later but upgrading is much easier when new standards are introduced;
- Compatibility with current and future browsers is guaranteed (at least from a developer's point of view);
- Inspire implementation and force web browsers to support standards progressively.

One key design consideration is that the finger, used on mobile user interface for object manipulation, is not a mouse. Finger input does not always correspond to a mouse input. A mouse has a left click, right click, scroll, and mouse move. In contrast, a finger has a tap, flick, drag, and pinch.

The significances and results for gestures are shown in the table 7.1.

Table 7.1 Gestures for Mobile Devices Provided with Touch Screen

Gesture	Description
Tap	Equivalent to a mouse click
Drag	Moves around the viewport
Flick	Scrolls up and down a page or list
Double-tap	Zooms in and centers a block of content
Pinch open	Zooms in on content
Pinch close	Zooms out to display more of a page
Touch and hold	Displays an info bubble
Two-finger scroll	Scrolls up and down an iframe or element with CSS overflow: auto property

The devices and their used technologies can give some limitation in the dimension of resources manipulated such as size of downloaded text file (HTML, CSS, JavaScript etc., limited for example to 10 MB, in iOS), size and type for picture files (for example 128 MB for jpeg, png, gif, and tiff limited to 8 MB etc.),

7.1 HTML5

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. The complete HTML5 language and also different other elements accessed via APIs (Application Program Interfaces) have a lot sentences and nuances that not covered here. Here is only an introduction that outlines some aspects of that.

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 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.

The last version of HTML, HTML5, give us a standard for how creating web applications with powerful APIs (Application Programming Interface) for different things such as canvas, drag and drop, offline storage, native video in the browser, and all these are realized having in mind the security concerns. HTML5 has been created on the foundations of HTML 4 with backward compatibilities fully insured and focused on developers. It insure also support to the browser in handling the interpretation of errors caused by incorrect markup implementation.

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 /content 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 uses keywords, and the value assigned, does not matter its data type, they must be enclosed in quotation marks. The pair 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, which allows defining pathways between documents and surfing on the web. These hyperlinks contains several pieces of vital information, which 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 (Uniform Resource Locator) or URI.

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 ([W3C]) 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).



Some of new or enhanced functions available in HTML5 combined with CSS3 (Cascading Style Sheet) style language are:

- improved semantics for tags that allow clearly describe tag's meaning to both user and browser (such as header, nav, section, article etc.);
- an enhanced set of form controls such as new input types (tel, email, datetime, number, color etc), form elements (datalist, keygen, output), form attributes (auto complete, novalidate and new attributes for input), new form events;
- canvas element for 2D/ 3D drawing, on the fly, via scripting (usually JavaScript);
- drag and drop on elements declared draggable;
- support for local storage that allow store and manipulate data locally within the user browser;
- enhanced dialog with the user by desktop specification;
- native video and audio for media playback (as alternative/ replacer of today plug-in's);
- page-to-page messaging exchange;
- web workers realized as JavaScript that runs in the background, independently of other scripts, without affecting the web page performance);
- geolocation API to get the geographical position of the user (only with user agreement/ approval);
- application cache that allows build an offline version of a web application;
- integrating device data;
- browser handling;
- manipulating browser history;
- enhanced integration with third-party libraries such as those of JavaScript and jQuery.

HTML document structure

The minimal structure of an HTML document is shown in Figure 7.1. Any HTML document includes a heading and a body, and any other tag's needed to specify the document structure, appearance and behavior:

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

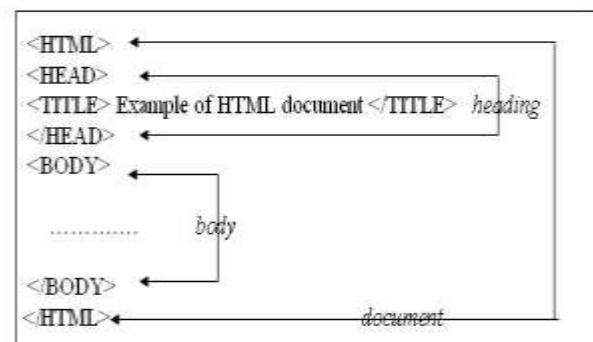


Figure 7.1 The HTML Document Structure

After we create a new HTML document this must be saved in a file having the extension *.html* with a pattern similar to: "webpagegivenname.html"

NOTE: To learn html exercise the introduced notions by using a developer tool such as Expression Web of Microsoft or Dreamweaver of Adobe. A simple way to learn and practice in the same time the tags is by accessing the site <http://www.w3schools.com> from the browser and exercise the examples accessible by the command button **Try it yourself >>** (Figure 7.2).

An element is a fundamental component of the structure of a text document. Some examples of elements are *headers, 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, we use tags. HTML tags consist of a starting left angle bracket (<), a tag name, and a closing right angle bracket (>). Tags are usually paired (e.g., <H1> and </H1>, that means beginning level 1 heading and, respectively, ending level 1 heading) 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. For the tags that do not refer to a content the end tag can be specified by a slash preceding the ending angle bracket, such as
, that means insert here a new line, or <hr /> that inserts a horizontal line, for example. These formatting elements are parsed by the browser and then interpreted and applied to the page content they refer.

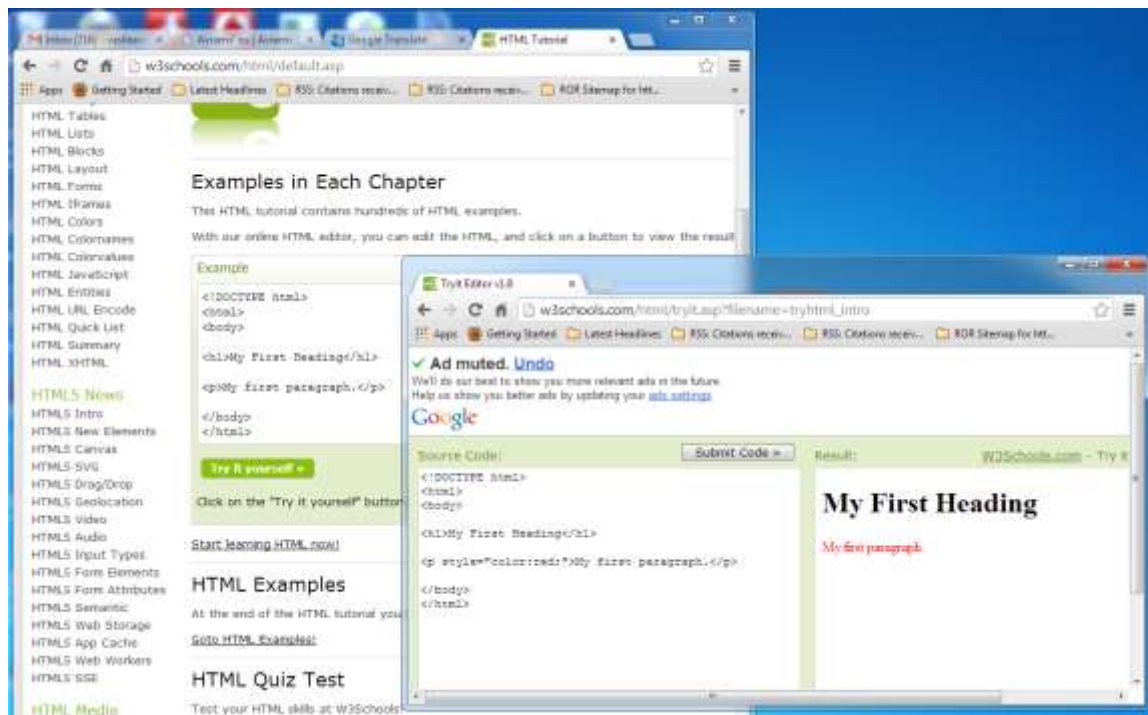


Figure 7. 2 Online Exercising HTML Elements at <http://www.w3schools.com>

An element is a fundamental component of the structure of a text document. Some examples of elements are *headers*, *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, we use tags. HTML tags consist of a starting left angle bracket (<), a tag name, and a closing right angle bracket (>). Tags are usually paired (e.g., <H1> and </H1>, that means beginning level 1 heading and, respectively, ending level 1 heading) 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. For the tags that do not refer to a content the end tag can be specified by a slash preceding the ending angle bracket, such as
, that means insert here a new line, or <hr /> that inserts a horizontal line, for example. These formatting elements are parsed by the browser and then interpreted and applied to the page content they refer.

Some elements may include an attribute, which is additional information (used to adapt tag's action to our needs) 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 used to describe special characters or symbols, such as the escape sequence &Alpha used to represent the upper case letter alpha Greek and the escape sequence &alpha used to represent the lower case for the same, for example.

Not all tags are supported by all World Wide Web browsers. If a browser does not support a tag, by convention, 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, tables, and other elements. Browsers expect specific information because they are programmed according to HTML and SGML specifications.

The minimal required elements of a web page delivered to a web browser by the server at user request are the **<html>**, **<head>**, **<title>**, **meta-tags**, and **<body>** tags (and their corresponding end tags, even included in):

- **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 contains:
 - **meta-tag section** (see down, bellow);
 - **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">`

where:

- "meta-name" is the name of the metatag as recognized by the objects to which addressed;
- "data=content" is represented by user defined words, keywords, addresses etc whose syntax obey to the rules of the destinary objects.

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">
<base href="http://www.avrams.ro">
```

The metatag's earlier are used to:

- "Keywords" to tell to the search engines which are the keywords of the content;
- "resource-type" specify what kind of resource represents the file;
- "revisit-after" tells to web robots the period you expect update the page end after which it must came to re-index the content;
- "Robots" tells to web robots if the page can be indexed and if allowed (follow) or not (nofollow) the following of the hyperlinks contained;
- "Classification" the category to which the content belongs to;
- "Author" the web page author/ designer;

- "rating" the safety category of content;
- <base href=...> the URL address that must be added as prefix to references specified only by the filename in the hyperlinks (<a...> tags).

The addresses of resources can be given as **absolute pathname**, which contains the whole expression of the path to, or as **relative pathname**, when the addresses are partly specified, from the *base* down and for which the browser must concatenate the prefix shown in base tag to have a complete path to the resource.

For example the reference realized in the tag <link rel="stylesheet" type="text/css" href="styles/sitestyl.css"> is a relative one because the absolute pathname is "<http://www.avrams.ro/styles/sitestyl.css>" where styles is a folder/ directory in the *avrams.ro* domain folder at the web server side. Since the resource referenced is precisely localized only by having an absolute address the browser must concatenate the base tag content with the *href* content in the link tag (anchor, *a*) before trying to locate the file on the external hard drive.

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 browsers):

```
<!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>
```

The metatags here used for:

- "viewport" defines the size of the screen in which defined at a 1:1 scale;
- link rel="stylesheet" a link to an external file containing style definitions that can be used anywhere in the page;
- <script ...> reference to an external file (src=...) containing a script written in a specific scripting language (type=...), here JavaScript.

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 7.3) 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 used 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) whose general syntax is

link-name

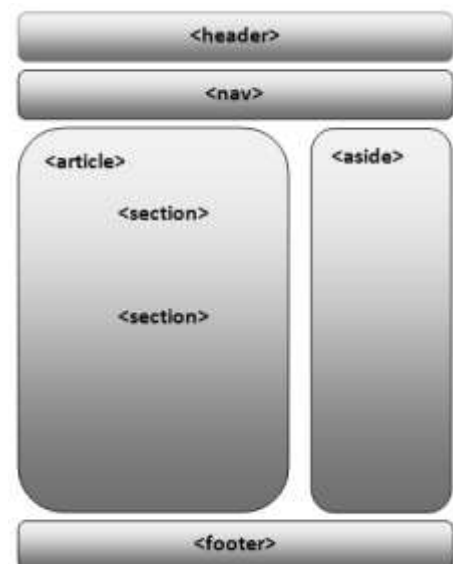


Figure 7.3 HTML5 Enhanced Page Structure

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). The obsolete ... denote the common and specific attributes the tag may have.

The comments within a HTML page are given by placing them between the tags <!-- (beginning comment) and --> (end comment). Comments are not analyzed, interpreted, and displayed by the browser. They contains information for the developer. Comments enlarges the dimension of the page and requires more resources when the page delivered (more traffic, for example) or processed (more time to load in memory, to analyze, etc.).

Figure 7.4 shows a web page using the parts illustrated in Figure 7.3 to realize the layout. The corresponding elements to those introduced in Figure 7.3 are shown in parenthesis and written in green. The HTML5 code of the page is accompanied by a style sheet defining the properties/ attributes of these structuring parts.

The main new elements introduced by HTML5 can be described briefly as:

<**header**> - allows defining a set of introductory aids and can be applied to different sections of the document. Can contain the section's headings, wrap indexes, search forms, logos, etc;

<**nav**> - a section of links for navigational purposes, such as menus or indexes;

<**section**> - a generic section in the document that can include several blocks of content (for example, columns) in order to group content that shares a specific theme, such as chapters or pages of a book, groups of news articles, a set of articles, etc.

<**aside**> - used to describe content that is related to the main content but not part of it (such as quotations, information on side bar, advertising, etc.);

<**footer**> - allows describing additional information related to its parent element (such as copyright, for example);

<**article**> - describe a self-contained portion of relevant information—for example, every article of a newspaper or every entry of a blog. The <article> element can be nested and used to show a list within a list of related items. It can contain heading, body and footer structural parts;

<**hgroup**> - used to group a set of H elements when the heading has multiple levels such as, for example, a heading with a title and a subtitle.

<**figure**> - an independent portion of content (for example, images, diagrams or videos) that is referred to in the main content. This is information that could be removed from the main content without affecting its normal flow;

<**figcaption**> - used to show a caption or legend to be used along with the <figure> element;

<**mark**> - used to highlights a text that has relevance in a particular situation or that is shown in response to user's input;

<**small**> - used to represent side comments, such a small print (for example, disclaimers, legal restrictions, copyrights);

<**cite**> - used to show the title of a work (book, movie, poem, etc);

<**address**> - used to enclose contact information for an <article> or the entire document (should be inserted within a <footer>);


```

<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8" >
  <title>HTML5 Semantic Tags - Example Web Page</title>
  <link rel="stylesheet" href="html5-example.css">
</head>
<body>
<header>
  <h1>Introduction to HTML5 (<b
style="color:green;">Header</b>)</h1>
  <h2 style="background-image:url('images/topmenu.png')">Using Semantic Tags and CSS3 &nbsp;
  (<b style="color:green;">Subtitle in Header</b>)</h2>
  <h4 style="color: olivedrab;"> <h4 style="color: olivedrab;">Semantic Tags for Page Layout & <br>
     - Companion Technologies
  </h4></h4>
</header>
<div id="container"><br><br>
  <nav>
    <h3>Menu (<b style="color:green;">Nav</b>)</h3>
    <a href="http://avrams.ro">Avrams.ro</a>
    <a href="http://avrams.eu">Avrams.eu</a>
    <a href="http://avrams.ro/determine-BMI-az.html">Body Mass Index</a>
  </nav>
  <section>
    <article>
      <header><h1> Introduction to HTML(<b style="color:green;">Article Header</b>)</h1></header>
      <p style="font-size:small;">The commands for displaying text use their own language called Hypertext
Markup Language, or HTML. </p>
      <p style="font-size:small;">HTML is nothing more than a coding system that combines formatting
information in textual form with the readable text of a document.</p>
      <footer><h2><b style="color:green;">Article Footer</b></h2></footer>
    </article>
    <article>
      <header><h1>Displaying Web Pages(<b style="color:green;">Article Header</b>)</h1></header>
      <p style="font-size:small;">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) so that the browser knows
      they are commands and not plain text.</p>
      <footer><h2><b style="color:green;">Article Footer</b></h2></footer>
    </article> <br><br>
  </section>
  <aside> <h3>(<b style="color:green;">Aside</b>)</h3>
  <p>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.</p>
  </aside>
  <footer style="height:23px;"><h2>(<b style="color:green;">Page Footer</b>)</h2></footer>
  <p style="font-size:xx-small;color:orange;font-style:oblique;padding-top:0px; margin-top:0px;"><a
target="_blank" href="http://www.avrams.ro/" title="Visit the avrams.ro website">Copyright 2013-2017 Vasile
Avram http://avrams.ro</a></p>
  <br>
</div>
</body>
</html>

```

Figure 7. 5 The Page Source Associated to Figure 7.4

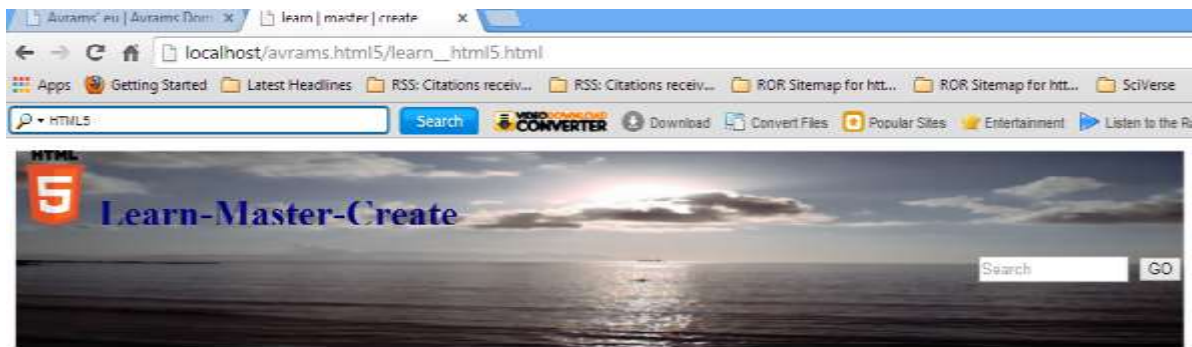
Figure 7.6 shows the source code for the page in Figure 7.7 and illustrates the usage of new HTML5 features.


```

<!DOCTYPE html ><html><head><meta charset="utf-8" />
<title>learn | master | create</title></head>
<body style="margin:10px;">
<HEADER>
<section style="background-image:url('images/cropped-avrams-horizon.png'); height: 168px;
width:960px;"><a href="#"></a>
<b style="color: navy; font-size:xx-large;">Learn-Master-Create</b>
<p></p><header id="header" style="text-align:right;">
<form method="get" action="http://www.google.com/search">
<input type="text" name="q" size="15" maxlength="255" value="" placeholder="Search"/>
<input type="submit" value="GO"/> <input type="hidden" name="sitesearch" value="http://avrams.ro"/>
</form></header></section>
<h1>The Navigation Menu to Lecture Notes</h1>
<h2>(Described as a List in the New &lt;nav> Semantic Tag)</h2>
<h3>(press mouse right button and then View page source)</h3>
<NAV><ul>
<li><a title="Internet - Architecture and services provided " href="http://www.avrams.ro/pgs/c1-teb.pdf">
Internet - Architecture and services provided </a></li>
<li><a title="Internet - communication and navigation " href="http://www.avrams.ro/pgs/c1-teb.pdf">
Internet - communication and navigation </a></li>
<li><a title="Securing Data in computer networks and Internet" href="http://www.avrams.ro/pgs/c3-
teb.pdf"> Securing Data in computer networks and Internet </a></li>
<li><a title="Business models in Internet" href="http://www.avrams.ro/pgs/c4-teb.pdf">Business models in
Internet</a></li>
<li><a title="Web documents and sites - structure, description languages"
href="http://www.avrams.ro/pgs/c5-teb.pdf">Web documents and sites - structure, description
languages</a></li>
<li><a title="Techniques for collecting and analyzing data in business applications"
href="http://www.avrams.ro/pgs/c6-teb.pdf">Techniques for collecting and analyzing data in business
applications</a></li>
<li><a title="Content management systems" href="http://www.avrams.ro/pgs/c6-teb.pdf">Content
management systems - architecture. Sites (Joomla), Blog(WordPress), eCommerce (PrestaShop) - install,
configure, manage.</a></li>
<li><a title="Adapting user interface to mobile device using HTML5 and CSS3"
href="http://www.avrams.ro/pgs/c7-teb.pdf">Adapting user interface to mobile device using HTML5 and
CSS3</a></li></ul> </NAV></HEADER>
<section>
<p>The Time Corresponding to Courses and Labs is &nbsp;<mark style="color:lime;">
<METER value="42" min="0" max="56" low="28" high="70" optimum="56">42 hours</meter>
</mark></p>Progress: <PROGRESS value="0" max="42">7.14% weekly.<br><br></PROGRESS>&nbsp; 
<FORM>
<label >First Name </label> <input name="FirstName" type="text" required placeholder="John">
<label >Last Name </label> <input name="LastName" type="text" required placeholder="Doe">
<label >Date Of Birth </label> <input name="dn" type="date" placeholder="mm/dd/yyyy">
<label >Email Address </label> <input name="email" type="email"
placeholder="vasileavram@gmail.com"><br>
<label >Personal Web Site</label> <input name="WebSite" type="URL"
placeholder="http://www.avrams.ro">
<label >How Many Hours Do You Exercise Web Technologies Each Week ? </label>
<input name="LearnWeb" type="range" min="1" max="20" value="0">
<output name="result" onforminput="value=a.value">0</output><br>
<label>Select the Currency Name:</label><datalist id="listcurrency"> <option value="RON"/><option
value="USD"/><option value="EUR"/></datalist>
<input list="listcurrency" id="valuta" name="valuta" placeholder="RON" value=""></FORM>
</section><section contenteditable="true" style="color:red; font-style:italic; background-color:silver">
<h1>You CAN EDIT This Content!</h1><p>You can select, edit, retype the content here.</p></section>
<FOOTER><P>Copyright © 2013 Avram's RO</P></FOOTER>
</body></html>

```

Figure 7. 6 Source Code for Figure 7.7



The Navigation Menu to Lecture Notes

(Described as a List in the New <nav> Semantic Tag)

(press mouse right button and then View page source)

- [Internet - Architecture and services provided](#)
- [Internet - communication and navigation](#)
- [Securing Data in computer networks and Internet](#)
- [Business models in Internet](#)
- [Web documents and sites - structure, description languages](#)
- [Techniques for collecting and analyzing data in business applications](#)
- [Content management systems - architecture, Sites \(Joomla\), Blog \(WordPress\), eCommerce \(PrestaShop\) - install, configure, manage.](#)
- [Adapting user interface to mobile device using HTML5 and CSS3](#)

The Time Corresponding to Courses and Labs is

Progress:
 First Name Last Name Date Of Birth Email Address
 Personal Web Site How Many Hours Do You Exercise Web Technologies Each Week ?
 Select the Currency Name:

You CAN EDIT This Content!

You can select, edit, retype the content here.

Copyright © 2013 Avram's R.O

Figure 7. 7 The Displayed Page from Source Code in Figure 7.5

Video

The allowed attributes for video tag are shown in the following table:

ATTRIBUTE	DESCRIPTION
autoplay	When set to true, the video plays as soon as it is ready to play
controls	If true, the user is shown playback controls
end	Specifies the end point to stop playing the video. If not defined, the video plays to the end
height	Defines the height of the video player
loopend	Defines the ending point of a loop
loopstart	Defines the starting point of a loop
playcount	Specifies the number of times a video clip is played. Defaults to 1
poster	Specifies the URL of a "poster image" to show before the video begins playing.
src	Defines the URL of the video
start	Sets the point at which the video begins to play. If not defined, the video starts

	playing at the beginning
width	Defines the width of the box for video player

The following code uses the <video> tag to allow see an mp4 file on a mobile device (all types supporting mp4 video format). The sample here is an excerpt from an avi file with the movie “Planes” and was converted to mp4 video format.

```
<!DOCTYPE html>
<html>
<head>
  <title>Video Player</title>
  <meta name="viewport" content="width=320; height=170; initial-scale=1.0; maximum-scale=1.0;
user-scalable=0;"/>
  <style type="text/css">
    body{
      background-color: #cfcfcf;
      margin: 10;
      color: olive;
      font-family: Helvetica, sans-serif;
      font-size:10px;
    }
    video {
      background-color: black;
    }
  </style>
</head>
<body>
  <div style="text-align: center">
    <p>Check out the new trailer for our upcoming movies release.</p>
    <video src="http://localhost/avrams.html5/videos/sample.mp4" controls="true" width="300"
style="height: 160px"/>
  </div>
</body>
</html>
```



The Page Display

Canvas

The canvas tag is used to realize drawing and animation inside the HTML5 document and is provided technically as an API (Application Program Interface).

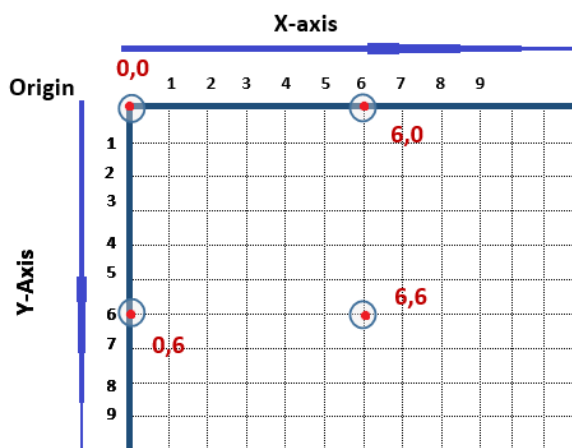


Figure 7. 8 The Determination of Points Coordinates onto the Canvas

The canvas API is one of the most powerful features of HTML5. It allows developers to work with a dynamic and interactive visual medium to provide desktop applications capabilities for the web. The canvas API allows easy management of graphics aspect in an extremely efficient way by allowing to draw and render graphics, animate and process images and text, and can easy combined with all other features to create full applications (including, for example, 2D and 3D games for the web).

Figure 7.9 is an illustration of usage of canvas API and of the way to draw some objects. The code shows how to compute the coordinates of the drawing points onto the

canvas. The code was compacted to fit into one page here. The canvas created and used by Apple and later on by others.

```

<!DOCTYPE html><html><head><title>Using Canvas</title>
<meta name="viewport" content="width=320; height=210; initial-scale=1.0;maximum-scale=1.0; user-
scalable=0;" />
<script>
function drawOnCanvas() { // Get the canvas element and its drawing context
var canvas = document.getElementById('applecanvas');
var context = canvas.getContext('2d');
context.fillStyle="red"; // draw a red rectangle onto the canvas
context.fillRect(10,10,150,75);
context.beginPath();// Create a path in absolute coordinates and establishes from ... to ... coordinates
context.moveTo(10, 10); // origin-->from
context.lineTo(160,85); // destination-->to
context.stroke();// Draw the line onto the canvas
context.moveTo(160, 10);// draw the back line
context.lineTo(10,85);// Draw the line onto the canvas
context.stroke();
// draw a circle
context.arc(160,85,30,0,1.7*Math.PI); //context.arc(x,y,r,sAngle,eAngle,counter-clockwise);
context.stroke();
context.strokeText("Using Canvas!",110,90);
}
window.addEventListener("load", drawOnCanvas, true);
</script>
<style type="text/css">
.cnvs { background-color: white; width:300px; height:312px;text-align :center;}
canvas {text-align:center; color:white; background-color:gray;height:170px; width:200px;}
#container {text-align:center;}
p {text-align:justify;}
.expl {font-style: italic; font-size: small;color: #808000;margin-top:-1em;margin-left:2em;}
</style>
</head> <body>
<div id="container">
<label style="color:olive; font-size:large;">The usage of the &lt;canvas> tag.
</label>
<p>It uses absolute values for coordinates. You can show the difference in
alignment: the canvas element has the starting coordinates 10,10 and
remains in that position while the figure paragraph and element is centered
in the available screen space as indicated in the style of their containing
element (the div container).</p>
<div class="cnvs"><canvas id="applecanvas" >Use the canvas to play or draw.</canvas></div>
<div class="cnvs" style="margin-left:302px; margin-top:-320px;">
<p>The Figure 1 shows the way to determine the coordinates of the points onto a canvas.</p>
<figure>
<figcaption>Figure 1 The computation of coordinates</figcaption>
</figure></div>
<p>The Figure 2 shows the way to draw a circle using the instruction<br>
<mark style="font-style:italic; font-size:large;">context.arc(x,y,r,sAngle,eAngle,counter-clockwise)</mark>
<br>where:</p><p class="expl">x,y - center;</p><p class="expl">r - ray;</p><p class="expl">sAngle -
start angle;</p>
<p class="expl">eAngle - end angle;</p><p class="expl">counter-clockwise - <span style="text-
decoration: underline;">true</span> or false
(optional).</p>
<figure> 
<figcaption>Figure 2 Determining Circle Dimensions</figcaption></figure>
</div>
</body>
</html>

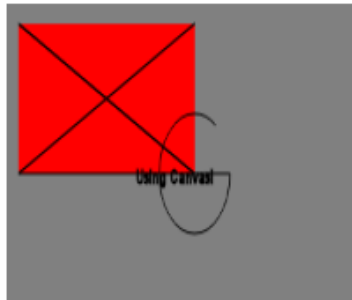
```

Figure 7. 9 The Page Source Illustrating The usage of API canvas

The output produced by that code into a browser is shown in Figure 7.10. The canvas tag is declared into the body of the document and is initiated and used within JavaScript.

The usage of the <canvas> tag.

It uses absolute values for coordinates. You can show the difference in alignment: the canvas element has the starting coordinates 10,10 and remains in that position while the figure paragraph and element is centered in the available screen space as indicated in the style of their containing element (the div container).



The Figure 1 shows the way to determine the coordinates of the points onto a canvas.

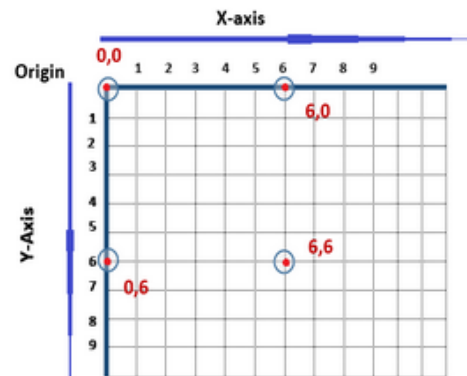


Figure 1 The computation of coordinates

The Figure 2 shows the way to draw a circle using the instruction

`context.arc(x,y,r,sAngle,eAngle,counterclockwise)`

where:

x,y - center;
r - ray;
sAngle - start angle;
eAngle - end angle;
counterclockwise - true or false (optional).

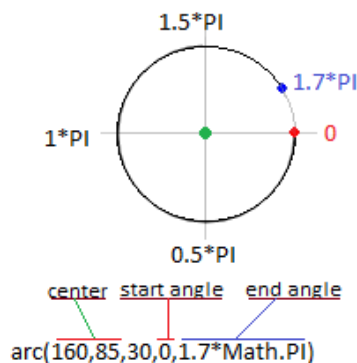


Figure 2 Determining Circle Dimensions

Figure 7. 10 The Example Page Layout for Canvas tag

In Figure 7.9 the function drawOnCanvas() realizes the initialization of the canvas surface/ object by the definition of the variables:

```
var canvas = document.getElementById('applecanvas');
var context = canvas.getContext('2d');
```

where the first variable locates the element identified into the body by “applecanvas” and establishes for that object the context by using the method `getContext()`, that generates the canvas and associates to these one the context. The canvas is created and become available (permit the drawing of other graphical objects on that) by the command:

```
window.addEventListener("load", drawOnCanvas, true);
```

The other sentences in the script body realizes the operations indicated by the inline comments associated and mainly draws a red filled rectangle, its diagonals as lines, and an incomplete circle. The Figure 7.10 is the page displayed by the code and contains some explanations about the used objects.

SVG

The SVG (Scalable Vector Graphics) standard allow create illustrations to our HTML5 web sites. SVG is a complimentary language for creating visual structures. SVG documents are live trees of elements that can be manipulated by scripts and styles, just like HTML elements. The graphics realize with SVG are high quality graphics: when magnify, rotate, or otherwise transform SVG content, all of the lines making up the image are crisply redrawn. SVG scales without losing quality and the vector information that makes up an SVG document is preserved when it is rendered.

SVG has predefined shape elements with their corresponding tags:

1. Rectangle <rect>
2. Circle <circle>
3. Ellipse <ellipse>
4. Line <line>
5. Polyline <polyline>
6. Polygon <polygon>
7. Path <path>



Figure 7. 11 Using SVG to Generate Images

```
<!DOCTYPE html><html> <head><title>Drawing SVG</title>
<meta name="viewport" content="width=320; height=170; initial-scale=1.0;maximum-scale=1.0; user-
scalable=0;"/>
</head><body>
<div id="container" style="text-align: center; margin-left:10%">
<p style="text-align: left;"> SVG has predefined shape elements with their corresponding tags:<br/>
  1. Rectangle &lt;rect&gt;<br/>2. Circle &lt;circle&gt;<br/>
  3. Ellipse &lt;ellipse&gt;<br/>4. Line &lt;line&gt;<br/>
  5. Polyline &lt;polyline&gt;<br/>6. Polygon &lt;polygon&gt;<br/>
  7. Path &lt;path&gt;<br/> </p>
<svg width="300" height="200">
  <defs>
    <radialGradient id="gradrect" cx="50%" cy="50%" r="50%" fx="50%" fy="50%">
      <stop offset="0%" style="stop-color:olive;stop-opacity:0" />
      <stop offset="100%" style="stop-color:darkolivegreen;stop-opacity:1" />
    </radialGradient>
  </defs>
  <rect x="8" y="00" rx="20" ry="20" width="190" height="190" style="fill:url(#gradrect);
    stroke:olivedrab;stroke-width:7;opacity:0.5" />
  <polygon points="100,10 40,180 190,60 10,60 160,180" style="fill:url(#gradellipse);
    stroke:darkslategray;stroke-width:5;fill-rule:evenodd;" />
  <circle cx="100" cy="92" r="27" stroke="darkred" stroke-width="3" fill="red" />
  <defs>
    <linearGradient id="gradellipse" x1="0%" y1="0%" x2="100%" y2="0%">
      <stop offset="0%" style="stop-color:rgb(255,255,0);stop-opacity:1" />
      <stop offset="100%" style="stop-color:rgb(255,0,0);stop-opacity:1" />
    </linearGradient>
  </defs>
  <ellipse cx="101" cy="93" rx="20" ry="10" style="fill:url(#gradellipse);stroke:purple;stroke-width:2" />
</svg></div></body></html>
```

Figure 7. 12 Using SVG to Generate Images – Page Source Code

The Figure 7.12 contains a SVG tag in which drawn, in that order, a round corner rectangle, a polygon, a circle, and an ellipse.

In the Figure 7.12 the <svg> tag contains:

- a definition for a gradient (the <defs> tag) called “gradrect” for the round corners rectangle on which other drawings placed;
- the drawing of the rectangle filled according the “gradrect” definition - fill:url(#gradrect);
- the drawing of the polygon in the shape of a star with the center pentagon not filled and with the star tips filled with the gradient given by the definition “gradellipse”;
- the drawing of the circle inscribed in the pentagon and filled in red;
- the drawing of the ellipse inside of the circle and filled by a gradient color.

Geolocation

The geolocation allows find the coordinates of a device (of the navigator running on) when the geolocation web page opened in a browser. Figure 7.13 shows how to use the API to get the position.

```
<!DOCTYPE html><html><head><title>Get Geolocation</title>
<meta name="viewport" content="width=320; height=170; initial-scale=1.0;maximum-scale=1.0; user-
scalable=0;"/>
<script type="text/javascript">
  const PREC=100;
</script>
</head>
<body>
<p id="showloc">Click the button to get the coordinates:</p>
<button onclick="getLocation()">Coordinates</button>
<script>
var x=document.getElementById("showloc");
function getLocation()
{
  if (navigator.geolocation)
    {navigator.geolocation.watchPosition(showPosition);
    }else{x.innerHTML="At! 001*Geolocation is not supported by this browser.";}}
function showPosition(position)
{x.innerHTML="<p style='color:olive;'>Latitude: " + Math.round(position.coords.latitude*PREC)/PREC +
  "<br/>Longitude: " + Math.round(position.coords.longitude*PREC)/PREC + "</p>";}
</script></body>
</html>
```

Figure 7. 13 Using Geolocation

The Geolocation API was designed for browsers to provide a detection mechanism by default that will let developers determine the user’s physical location by taking advantage of new systems, such as network triangulation or GPS, to return an accurate location of the device running the application. The specific methods provided to use the API are:

- `getCurrentPosition(location, error, configuration)` - used for single requests;
- `watchPosition(location, error, configuration)` - start a watch process for the detection of new locations;
- `clearWatch(id)` - returns a value that can be saved in a variable and then used as an id by the `clearWatch()` method to stop the watch.

The attributes are:

- *location* - a function to process the location returned;
- *error* - a function to process the errors returned;
- *configuration* - an object that configure how the information will be acquired;
- *id* - the id of the variable to save the returned value.

7.2 CSS3

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. CSS gives us the control needed to format the content of the document on the screen. It must be think as a set of instructions that explain to the browser how a document should be presented. CSS has been designed to be easily reused and shared throughout the web 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. . By using external CSS we can create a separate document in the site containing the style information and allows share it with all of site's web pages.

The addition of CSS style in a document can be realized:

- 1) in the current line (inline style, the style defined directly in the line specifying the tag);
- 2) global, by specifying the document style at his beginning (in the heading part);
- 3) 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="styledocumentname.css">
```

- 4) 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 called *selector*, *property*, and *value*:

```
selector {property: value; property: value ...}
```

where:

- the { (beginning block) and } (ending block) represents the delimiters of the block of pairs *property: value*; (and separated/ delimited by a semicolon character from the next pair) associated to the selector;

- *selector* is normally the HTML element/tag you want define the style (such as BODY, A:link, DIV.intro etc) but can be also defined by user as **id selector** or as **class selector**.

An **id selector** apply to a single element (individually) by prefixing the name with a pound character, such as **#menuv** is defined in the example. An id selector is used as value for the id property of the tag to which the style applied, as for example:

```
<ul id="menuv" title="Navigator Bar" style="font-size: x-small;">
```

A **class selector** specifies the style for a group and is defined by prefixing the name with a dot character such as .hideme or .avbkgtop. A class selector is used in the page as value for the property class of the element to which applies:

```
<td title="The image is ..', click to enlarge" valign="top" style="height: 46px; width: 746px; margin-top: 0px;" class="avbkgtop" onclick='ShowSmallWindow("descript-horizon.html", "HorizonInSunshine", "640", "656", "no", "no")'>
```

- *property* is the attribute you want change for the selector (such as BACKGROUND, COLOR, FONT-FAMILY for BODY selector, for example);

- *value* specifies the value you want assign to the property (such as white for BACKGROUND, black for COLOR in the BODY selector).

Comments are given by including them between /* and */ and can be a separate single line, inline defined before/after an element (not embedded) or on multiple lines.

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, as a hex number specifying the color code or rgb(r,g,b), as function call having in argument color codes, or as a colorname);

- Angles: *Degrees (deg)*, *Grads (grad)*, and *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;

```
/* This is a partly content of a stylesheet file */
BODY { BACKGROUND: white; COLOR: black; FONT-FAMILY: sans-serif; }
/* The following are the four link states: unvisited or normal, visited, the mouse is over it, and a link
the moment is clicked */
A:link { BACKGROUND: none transparent scroll repeat 0% 0%; COLOR: #00e; }/* unvisited */
A:visited { BACKGROUND: none transparent scroll repeat 0% 0%; COLOR: #529; }/* visited */
A:hover{background:transparent none repeat scroll 0% 0%;color:#999999;}/* mouse over it*/
A:active { background: none transparent scroll repeat 0% 0%; COLOR: #00e;}/*now clicked */
/* Defines style for the element DIV identified by intro */
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; }
@media All { A IMG { } }
UL.toc { LIST-STYLE-TYPE: 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;}
#menuv{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}
#menuv 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;}
#menuv li a, #menuv li a:visited{display:block;text-decoration:none;color:#efbb22}
#menuv li a span, #menuv li a:visited span{display:none}
#menuv li a:hover{border:0px none;color:#c0c0c0}
ul, li { margin-left:0px}
```

- 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). CSS3 was split into

specialized “modules” such as selectors, 2D/3D transformations, animations, user interface, text effects etc.

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

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

Creating Animation with CSS3

The HTML code and CSS style allow you to add a bouncing image and text to the screen. The text and HTML5 logo bounces back and forth.



The HTML5 logo

Using CSS3 to Split Text Across Columns

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). CSS3 was split into specialized “modules” such as selectors, 2D/3D transformations, animations, user interface, text effects etc. All styles defined for a document “cascade in a virtual” style following these rules (from a high to low priority): 1. Inline style; 2. Global style sheet; 3. External style sheet; 4. Browser default.

Figure 7. 14 Using CSS3 to Enhance the Content

CSS3 introduces additional pseudo class styles we can use, as follow:

- Active - the active element;
- Focus - the element with focus;
- Visited - a visited link;
- Hover - the cursor is over a link;
- Link - an unvisited link;
- Disabled - the state of an element when it has been disabled;
- Enabled - the state of an element when it has been enabled;
- Checked - element that has been checked
- Selection - selected range of content on the page;
- Lang - language to use for the style;
- Nth-child(n) - an element that is a specified child of the first sibling;

- Nth-last-child(n) - an element that is a specified child of the last sibling;
- First-child - the first use of an element on the page;
- Last-child - the last use of an element on the page;
- Only-child - the only use of an element on the page.

CSS3 has a new extension called pseudo elements. A pseudo element allows us to control aspects of an element in the page, such as magnifying the first letter of paragraphs, for example. There are four pseudo-elements we can use:

- First-letter;
- First-line;
- Before;
- After.

The definition for pseudo elements is very similar to pseudo-classes. Note that the pseudo element leads with two colons. For example, the following style applies first-letter pseudo element styles to the P element: `p::first-letter {font-size: 36px; }`. CSS3 allows defining animation and in that

```
<!DOCTYPE html><html><head>
<meta name="viewport" content="width=300, height=300, initial-scale=1">
<title>Bouncing HTML5 Logo</title>
<style type="text/css" media="screen">
@-webkit-keyframes bounce {from {left: 0px;}to {left: 300px;}}
.animation {-webkit-animation-name: bounce;-webkit-animation-duration: 1.5s;
-webkit-animation-iteration-count: 6;-webkit-animation-direction: alternate;
position: relative; left: 0px;}
div {width:300px; height: 300px;}
#anim {width:400px; height: 90px;
background-color: silver; -moz-border-radius: 10px;
-webkit-border-radius: 10px; border: 4px solid #FF0000; }
span {color: navy; font-size: medium; font-style: italic;}
p::first-letter {font-size: 36px; font-weight: bold;}
.complex {font-family: "Arial", Tahoma, Geneva, Verdana;
font-size: 1.1em; color: navy; text-align: left;
-moz-column-count: 3; -moz-column-gap: 1em; -moz-column-rule: 2px dotted silver;
-webkit-column-count: 3; -webkit-column-gap: 1em; -webkit-column-rule: 2px dotted silver;
}</style></head>
<body>
<h1>Creating Animation with CSS3</h1>
<div style="height: auto;"><p style="width: 300px">The HTML code and CSS style allow you
to add a bouncing image and text to the screen. The text and HTML5 logo bounces back and forth.
</p></div>
<p id="anim"></p>
<p class="animation"><span>The HTML5 logo</span></p>
<h2>Using CSS3 to Split Text Across Columns</h2>
<p class="complex"> A challenge ... (multicolumn)</p>
</body>
</html>
```

Figure 7. 15 The Source Code for Page in Figure 7.14

example the definition is given by:

- `@-webkit-keyframes bounce {from {left: 0px;}to {left: 300px;}}` – that defines the boundaries for a bounce animation;
- `.animation {-webkit-animation-name: bounce;-webkit-animation-duration: 1.5s; -webkit-animation-iteration-count: 6;-webkit-animation-direction: alternate; position: relative; left: 0px;}` – which defines the class `.animation` which produces the defined effect on the objects declared in that class.

CSS3 multicolumn definition, here called `.complex`, allows spread content over two or more columns (in that example is 3 specified by `-moz-column-count: 3`). There are three parts to a column layout: number of columns, gap between the columns, and column design (optional).

Figure 7.14 shows a webpage that uses CSS3 features such as animation, pseudo-elements, classes, and multicolumn. In Figure 7.15 is the source code of the page containing both CSS3 definitions and HTML5 code using those.

7.3 jQuery

jQuery mobile is a JavaScript library that must be added to the HTML5 documents and that uses the declarative programming style. It uses the \$ sign character and data-* for the personalized attributes in HTML5. It allows modifying the contents of HTML documents by manipulating the DOM structure created by the browser when processing the HTML document. jQuery is expressive, its methods apply to multiple elements, it deals with implementations differences between browsers, and is open source (<http://jquery.com> the main website; you can download the version you want). The usage of jQuery requires the inclusion of the javascript libraries and the corresponding style sheet file by using meta-tags, for example:

```
<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>
```

The Figure 7.16 shows the mobile version of the usage of Geolocation combined with jQuery. The source code associated to the page is in Figure 7.17. The examples are available in the website <http://avrams.ro> the menu option Mobile, as mobile applications, or in website <http://avrams.eu> as desktop applications.

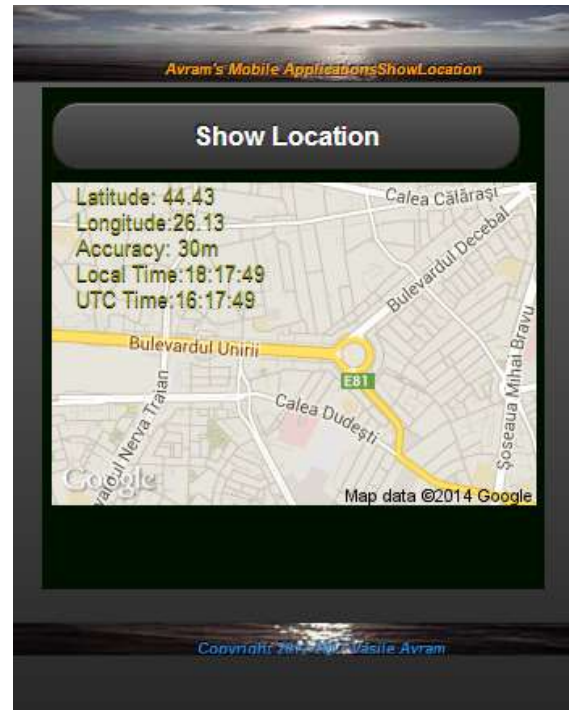


Figure 7. 16 The Mobile Version for Geolocation

```
<!DOCTYPE html><html><head>
<meta name="viewport" content="width=300, height=300, initial-scale=1">
<meta content="text/html; charset=utf-8" http-equiv="Content-Type" />
<title>Mobile Geolocation</title>
<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>
<script>
const PREC=100;
$(document).bind("mobileinit", function(){
$.mobile.touchOverflowEnabled=true;
$.mobile.allowCrossDomainPages = true;
});
var wiw=window.innerWidth;
//align left
var aleft='<div data-role="content" id="dtr" style="margin-top:1px; margin-left:1px; padding-top:1px;padding-left:1px; " align="left" >';
var acenter='<div data-role="content" id="dtr" style="margin-top:1px; margin-left:1px; padding-top:1px;padding-left:1px; " align="center" >';
var bleft='<div id="maploc" style="width:228px; height:195px;">';
var bcenter='<div id="maploc" style="width:228px; height:195px;">';
```

Figure 7. 17 The Mobile Version for Geolocation (continuation on next page)

```

...
</script>
<style type="text/css">
  body { margin: 0px; } label { color:white;font-size: medium;} /* #bmiarea { margin: 5px; padding:10px; width:
  300px; height: 300px; background-color: #010;}*/ #bmiarea { margin: 5px; padding:10px; background-color:
  #010;} #messLblx { margin-top:-80px;width:160px; margin-left:5px;}}
</style></head>
<!--body onload="adapttoscreen();"-->
<body >
  <div data-role="page" id="one" data-theme="a" >
    <div data-role="header">
      <p style="font-size:xx-small; color:orange;font-style:oblique; padding-top:35px; margin-top:0px; margin-
      left:2px; text-align:center; " >
        <a href="#popup" data-rel="dialog" data-transition="pop" style="text-decoration:none; font-size:xx-small;
        color:orange;font-style:oblique; "> Avram&#39;s Mobile Applications</a>ShowLocation</p> </div>
      <div data-role="content" id="dtr" style="margin-top:1px; margin-left:1px; padding-top:1px;padding-left:1px; "
      align = "center" >
        <div id="bmiarea" align="center" style="width: 300px; height:300px;margin-top :1px; margin-left:1px;
        padding-top:1px;padding-left:1px; "> <button onclick="getLocation()">Show Location</button>
        <div id="maploc" style="width:300px; height:295px; margin-left:5px;"></div>
        <p id="showloc" style="margin-top:-295px; margin-left:-60px;width :200px; height:172px; text-
        align:left;">Click the button to get the coordinates:</p> </div>
      </div><!-- /content -->
      <div data-role="footer" style="height:20px;">
        <p style="font-size:xx-small;color:orange;font-style:oblique;padding-top:10px; margin-top:0px;
        text-align:center"><a href="#popup" data-rel="dialog" data-transition="pop">Copyright 2012-2017 Vasile
        Avram</a></p>
      </div><!-- /footer -->
    </div><!-- /page one -->
    <div data-role="page" id="popup">
      <div data-role="header" data-theme="e">
        <p align="center" style="text-align:center; font-size:medium;font-style:italic; ">About Avram's Mobile
        Applications</p>
      </div><!-- /header -->
      <div data-role="content" data-theme="d">
        <p>You can find details about all Mobile Applications realized by Vasile Avram by visiting the
        website
        <a href="http://www.avrams.ro" title="Avram's non-commercial website"
        target="_blank">http://www.avrams.ro</a> or <a href="http://www.avrams.eu" title="Avram's website"
        target="_blank">http://www.avrams.eu</a>
        <br>
        You can contact Vasile Avram at e-mail:<br>
        -&nbsp;<a href="mailto:vasileavram@ie.ase.ro" title="Prepare and Send Mail to Vasile Avram at this
        address">vasileavram@ie.ase.ro</a>
        <br>
        -&nbsp;<a href="mailto:web@avrams.ro" title="Prepare and Send Mail to Vasile Avram at this
        address">web@avrams.ro</a>
        </p>
        <p><a href="#one" data-rel="back" data-role="button" data-inline="true" data-icon="back" title="Go
        back to the first page!">Close</a></p>
      </div><!-- /content -->
      <div data-role="footer">
        <!--h4>Page Footer</h4-->
        <p style="font-size:xx-small;color:orange;font-style:oblique;padding-top:0px; margin-top:0px;"><a
        target="_blank" href="http://www.avrams.ro/" title="Visit the avrams.ro website">Copyright 2012-2017 Vasile
        Avram</a></p>
      </div><!-- /footer -->
    </div><!-- /page popup -->
    <script src="http://www.google-analytics.com/urchin.js" type="text/javascript"></script>
    <script type="text/javascript"> _uacct = "UA-1653633-1"; urchinTracker(); </script>
  </body></html>

```

Figure 7.17 The Mobile Version for Geolocation (continuation from previous page)

7.4 JavaScript

7.4.1 JavaScript – An introduction

JavaScript is a 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 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 (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, solvability, transactions history, etc.) before it is submitted to the server.

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. This access, along with methods and properties to add, move, change, or remove HTML elements, is given through the Document Object Model (DOM).

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. Table 7.1 shows the JavaScript objects and table 7.2 shows the HTML DOM objects.

Table 7.1 The JavaScript objects

Object	Description
Window	The top level object in the JavaScript hierarchy. The Window object represents a browser window. A Window object is created automatically with every instance of a <body> or <frameset> tag
Navigator	Contains information about the client's browser
Screen	Contains information about the client's display screen
History	Contains the visited URLs in the browser window
Location	Contains information about the current URL

Table 7.2 HTML DOM objects

Object	Description
Document	Represents the entire HTML document and can be used to access all elements in a page
Anchor	An <a> element
Area	An <area> element inside an image-map
Base	An <base> element
Body	The <body> element
Button	A <button> element
Event	Represents the state of an event
Form	A <form> element
Frame	A <frame> element
Frameset	A <frameset> element

Iframe	An <iframe> element
Image	An element
Input button	A button in an HTML form
Input checkbox	A checkbox in an HTML form
Input file	A fileupload in an HTML form
Input hidden	A hidden field in an HTML form
Input password	A password field in an HTML form
Input radio	A radio button in an HTML form
Input reset	A reset button in an HTML form
Input submit	A submit button in an HTML form
Input text	A text-input field in an HTML form
Link	A <link> element
Meta	A <meta> element
Option	An <option> element
Select	A selection list in an HTML form
Style	An individual style statement
Table	A <table> element
TableData	A <td> element
TableRow	A <tr> element
Textarea	A <textarea> element

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.). The comments are defined by // for single line comments or /* (beginning comment) and */ (ending comment) for delimiting multiline comments.

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>
```

The properties innerText and innerHTML allow us to access the contents - the code - contained in an object. By manipulating the innerText and innerHTML properties, we can change, dynamically, the text on a page (without reloading the page). For example, given a paragraph whose id = "sampleparagraph", its innerText and innerHTML may be accessed via:

document.getElementById('sampleparagraph').innerHTML – this is interpreted as HTML

document.getElementById('sampleparagraph').innerText – this is interpreted as text

If the content of sampleparagraph is “ inner text” then:

- innerText would display as inner text
- innerHTML would display as **inner text**.

Figure 3.1 shows a HTML form and the corresponding source code containing a VBScript and a JavaScript.

Table 7.7 Style properties

Property	Description
style.background	Sets or retrieves the background picture tiled behind the text and graphics in the object.
style.backgroundAttachment	Sets or retrieves how the background image is attached to the object within the document.
style.backgroundColor	Sets or retrieves the color behind the content of the object.
style.backgroundImage	Sets or retrieves the background image of the object.
style.border	Sets or retrieves the width of the border to draw around the object.
style.borderBottom	Sets or retrieves the properties of the bottom border of the object
style.borderBottomColor	Sets or retrieves the color of the bottom border of the object.
style.borderBottomStyle	Sets or retrieves the style of the bottom border of the object.
style.borderBottomWidth	Sets or retrieves the width of the bottom border of the object.
style.borderCollapse	Sets or retrieves a value that indicates whether the row and cell borders of a table are joined in a single border or detached as in standard HTML.
style.borderColor	Sets or retrieves the border color of the object.
style.borderLeft	Sets or retrieves the properties of the left border of the object
style.borderLeftColor	Sets or retrieves the color of the left border of the object.
style.borderLeftStyle	Sets or retrieves the style of the left border of the object
style.borderLeftWidth	Sets or retrieves the width of the left border of the object.
style.borderRight	Sets or retrieves the properties of the right border of the object.
style.borderRightColor	Sets or retrieves the color of the right border of the object.
style.borderRightStyle	Sets or retrieves the style of the right border of the object.
style.borderRightWidth	Sets or retrieves the width of the right border of the object.
style.borderStyle	Sets or retrieves the style of the left, right, top, and bottom borders of the object
style.borderTop	Sets or retrieves the properties of the top border of the object.
style.borderTopColor	Sets or retrieves the color of the top border of the object.
style.borderTopStyle	Sets or retrieves the style of the top border of the object.
style. borderTopWidth	Sets or retrieves the width of the top border of the object.
style.borderWidth	Sets or retrieves the width of the left, right, top, and bottom borders of the object.
style.bottomMargin	Sets or retrieves the bottom margin of the entire body of the page.
style.color	Sets or retrieves the color of the text of the object

style.font	Sets or retrieves a combination of separate font properties of the object. Alternatively, sets or retrieves one or more of six user-preference fonts.
style.fontFamily	Sets or retrieves the name of the font used for text in the object.
style.fontSize	Sets or retrieves a value that indicates the font size used for text in the object.
style.fontStyle	Sets or retrieves the font style of the object as italic, normal, or oblique.
style.fontVariant	Sets or retrieves whether the text of the object is in small capital letters.
style.fontWeight	Sets or retrieves the weight of the font of the object
style.margin	Sets or retrieves the width of the top, right, bottom, and left margins of the object.
style.marginBottom	Sets or retrieves the height of the bottom margin of the object.
style.marginHeight	Sets or retrieves the top and bottom margin heights before displaying the text in a frame.
style.marginLeft	Sets or retrieves the width of the left margin of the object.
style.marginRight	Sets or retrieves the width of the right margin of the object.
style.marginTop	Sets or retrieves the height of the top margin of the object.
style.marginWidth	Sets or retrieves the left and right margin widths before displaying the text in a frame.
style.padding	Sets or retrieves the amount of space to insert between the object and its margin or, if there is a border, between the object and its border
style.paddingBottom	Sets or retrieves the amount of space to insert between the bottom border of the object and the content.
style.paddingLeft	Sets or retrieves the amount of space to insert between the left border of the object and the content.
style.paddingRight	Sets or retrieves the amount of space to insert between the right border of the object and the content.
style.paddingTop	Sets or retrieves the amount of space to insert between the top border of the object and the content.
style.position	Sets or retrieves the type of positioning used for the object.
style.textAlign	Sets or retrieves whether the text in the object is left-aligned, right-aligned, centered, or justified.
style.textDecoration	Sets or retrieves a value that indicates whether the text in the object has blink, line-through, overline, or underline decorations.
style.textIndent	Sets or retrieves the indentation of the first line of text in the object.
style.topMargin	Sets or retrieves the margin for the top of the page.
style.vAlign	Sets or retrieves how text and other content are vertically aligned within the object that contains them.
style.visibility	Sets or retrieves whether the content of the

	object is displayed.
style.zIndex	Sets or retrieves the stacking order of positioned objects.

The JavaScript sentences involving text strings can be brake up within the text string by using the \ (backslash) character.

The multiline comments can be defined between /* and */; the one line or the inline comments can be defined by using // (two slashes). The extra space is ignored and the sentences are case sensitive. The ; (semicolon) ending sentence character is optional for sentences defined alone on a line and compulsory for separating the commands defined in the same line (generally the inline scripts).

7.4.2 Using and placing JavaScripts in a HTML page

In the following paragraphs are introduced some examples of using (and placing) JavaScripts in a HTML page.

7.4.2.1 JavaScript in the body of the HTML file

Java script in the body of the HTML page will be executed when the page loads. Generally, the scripts in the body, will generate the content of the page.

Example:

```
<html>
<head>
  <title>
    Page containing JavaScript
  </title>
</head>
<body>
  <script type="text/javascript">
    document.write("This text is displayed by a JavaScript!")
  </script>
</body>
</html>
```

Comments:

The tag <script> have the attribute „type”, that specifies the script type (JavaScript in our case). This script composed by a single command that displays inside the page the text: "This text is displayed by a JavaScript!". If you want include many commands on the same line this must be separated by the ";" (semi colon) character.

The concatenation of text string is realized by using the + character, for example the expression "This text is " + "concatenated." will produce the string "This text is concatenated."

The „/” have a special meaning for the HTML language and consequently when we want display the slash character itself we must precede (prefix) this by a „\” (backslash), as illustrated in this example:

```
document.write("<i>"+ "The Operator + is Concatention!" + "</i>")
```

If the script is included in a comment tag (<!--) then the browsers that do not „know” (interpret) JavaScript will not display in the page the script text (script source), as shown in the folowing sample:

```
<!--
document.write("<i>"+ "This text is displayed by a JavaScript!" + "</i>")
//-->
```

The browsers that know JavaScript will process the script, even this included in a comment line.

The string „/”, comment in JavaScript, tell to the browser do not process the line „-->”. We cannot use the syntax „/!-”, because a browser that do not interpret JavaScript will display that string „/”.

7.4.2.2 JavaScript in heading

If we want be shure that the script executes before displaying any element in the page we can include this in the heading part of the HTML page (file). The JavaScript in the head section will be executed when called, or when an event is triggered.

Example:

```
<html>
<head>
  <title>
    Page with JavaScript
  </title>
  <script type="text/javascript">
    document.write("This text is displayed by a JavaScript!")
  </script>
</head>
<body>
  <P> This text must appear in the page after the execution of the Javascript.
</body>
</html>
```

The number of scripts placed in the head section and in the body of a HTML page is unlimited.

7.4.2.3 External JavaScript

A JavaScript can be stored into an external script file from where we can use in many Web pages. In that way the script is written only once and in every HTML file we want use is enough to invoke the file containing the script. The stored script cannot contain the tag <script> or his pair </script>.

The steps followed when using externally stored scripts are:

1. The creation of the external file containing the script lines, for example the line:
document.write("Text from an external stored script.")
2. The file is saved with the wanted name and the extension *js* (java script), for example we name the file *scriptex.js*
3. In the HTML pages we want include the stored script file is added the following script:

```
<script type="text/javascript" src="scriptex.js">
</script>
```

The „src” attribute of the tag <script> allows specifying the file containing the script we want execute.

7.4.3 Defining and Using Variables and Constants

JavaScript can contain variable definitions and references to that variables. The variables can be used to store values and the references to that values can be done by referencing the name of the variable. The lifetime of variables can be:

- for variables declared within a function - can only be accessed within the function; they created when encountered their declaration as the function progress and destroyed when exiting; they called local variables and you can use the same name in different functions;

- for variables declared outside a function – can be accessed anywhere in the page and for that reason they called global variables; the name must be unique at that level; the lifetime of these variables starts when they are declared, and ends when the page is closed.

The variable declaration can include an assignment and can be done using one of sentences:

`var variableName=somevalue`

or

`variableName=somevalue`

In the following example, on define a variable called „mess” that is initialized with the value „This text contained by the variable called mess”, and later on referenced in a write sentence:

```
<html>
<head>
  <title>
    Page with JavaScript
  </title>
</head>
<body>
  <script type="text/javascript">
    <!--
    var mess= " This text contained by the variable called mess"
    document.write("<i>"+mess+"</i>")
    //-->
  </script>
</body>
</html>
```

The variables, functions and, objects names are case-sensitive and must begin with a letter or a _ (underscore) character.

JavaScript uses *const* keyword to declare constants. These will be declared similarly to variables only that *var* replaced by *const* in the assignment declaration and, by convention, will be written in uppercase. In that way we allow to avoid confusions. The declaration:

`const PI=3.14;`

will define a memory location whose value will remains the same 3.14 until the page closed.

The JavaScript reserved words (that cannot be used as user defined names) are the following:

abstract	boolean	break	byte	case
catch	char	class	const	continue
debugger	default	delete	do	double
else	enum	export	extends	false
final	finally	float	for	function
goto	if	implements	import	in
instanceof	int	interface	long	native
new	null	package	private	protected
public	return	short	static	super
switch	synchronized	this	throw	throws
transient	true	try	typeof	var
void	volatile	while	with	

7.4.4 Methods

JavaScript is an object based programming language and uses objects (as shown in tables 7.1 and 7.2). It has many built-in objects such as Area, Image, Date, Window, and Document, and allow also user defining his own objects. In the following table some methods for document and window explained:

Method	Explanation-Example
document.write("msg")	Displays the message „msg” in the page containing the script Example: 1) displaying text in a page: document.write("This text will be displayed in the page") 2) displaying attributes of a page, such as title and URL: <script type="text/javascript"> document.write(document.title+"."+document.URL) </script> </body> *) The formatting of the message to be displayed by write and alert methods or other intrinsic functions that manipulate strings is realized by intermediate of escape sequences.
window.alert("msg")	Displays a dialog box (alert box) containing the message „msg” and the OK button. Example: function display_alert() { alert("The message formatting is ensured" + '\n' + "by using a lot of so called \'escape sequences\'") }
window.prompt("msg", "default")	Displays a dialog box prompting the user for input and confirm/cancel the dialog. Example: function display_prompt() { var name=prompt("Type your name here","") if (name!=null && name!="") { document.write("You typed " + name + "! It is that correct ?") } }
window.confirm("msg")	Displays a dialog box with a message, a Cancel, and an OK button (similar to MsgBox,). Example: function display_confirm() { var buttonpressed=confirm("Press a button") if (buttonpressed ==true) { document.write("You pressed the OK button!") } else { document.write("You pressed the Cancel button!") } }

window.open("URL", "name_of_new_window", "specifications")	<p>Opens a new browser window for the page indicated by the URL argument. The window can be referenced by the name "name_of_new_window" and can be customized by the values supplied by the "specifications" argument.</p> <p>Example:</p> <pre> <html> <head> <script type="text/javascript"> function open_win_ase() { window.open("http://www.ase.ro", "_blank", "toolbar=yes, location=yes, directories=no, status=no, menubar=yes, scrollbars=yes, resizable=no, copyhistory=yes, width=400, height=300") } function open_win_avrams() { window.open("http://www.aavrams.ro", "_blank", "toolbar =yes, location=yes, directories=no, status=no, menubar=yes, scrollbars=yes, resizable=no, copyhistory=yes, width=400, height=300") } </script> </head> <body> <form> <input type="button" value="Faculty" onclick="open_win_ase()"> <input type="button" value="Course Notes" onclick="open_win_avrams()"> </form> </body> </html> </pre>
-------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

*) Common Escape Sequences for text display formatting are represented by:

Ampersand	\&	Carriage return	\r	Backslash	\\
Double quote	\"	Newline	\n	Backspace	\b
Single quote	\'	Form feed	\f	Tab	\t

7.4.5 Document Object Model (DOM)

The Document Object Model defines HTML documents as a collection of objects and provides access to every element, identified uniquely by intermediate of an id attribute, in a document. Any element may be accessed (by using the method getElementById) and modified by a snippet of JavaScript. The Window object is the top level object in the JavaScript hierarchy (it represents a browser window). A Window object is created automatically with every instance of a <body> or <frameset> tag. You can see and exercises the various elements of DOM HTML by following the link:

http://www.w3schools.com/html/dom/dom_examples.asp

Examples:

a) This sample displays the message „This is first paragraph! Click, and see”. If you click somewhere in the displayed text it displays:

„The background is: *the current color name*
Will be changed in Yellow!”:

```

<html>
<head>
<title>Using DOM</title>
<script language="javascript">

```

```

<!--
function xalert()
{
var x=document.getElementById("par1");
x.style.background="red";
alert("The background is:" + x.style.background+"\n Will be changed in Yellow!")
if(x.style.background=="red")
{
x.style.background="yellow";
}
else
{
x.style.background="red";
}
}
-->
</script>
</head>
<body>
<p id="par1" onclick="xalert()" >This is first paragraph! Click, and see</p>
</body>
</html>

```

b) This sample uses innerHTML to change dynamically the header identified by „chgheader“:

```

<html>
<head>
<script type="text/javascript">
function getValue()
{
var x=document.getElementById("myHeader")
alert(x.innerHTML)
}
function chgval()
{
document.getElementById("chgheader").innerHTML="My Header (Changed)"
}
</script>
</head>
<body>
<h1 id="myHeader" onclick="getValue()">This is first header</h1>
<p>Click on the header to alert its value</p>
<h2 id="chgheader" onclick="chgval()">This is the second header</h2>
<p>Click on the header to change its value</p>
</body>
</html>

```

7.4.6 Using and Defining Function

A function contains code (a set of statements) which is executed when triggered by an event or a call to that function. In JavaScript it is possible to use the Java language intrinsic functions or user defined functions (must be defined before any usage).

In the case of user defined functions it is preferable that the definition is made in the head section of the HTML page to be sure (or to ensure) in that way they are loaded before calling. This is required because the browser starts processing the HTML page before completely downloading this from the server. You may call a function from anywhere within a page (or even from other pages if the function is embedded in an external script).

The general syntax of a function is:

```
function function_name([argument1,argument2,etc])
{
    some_statements
    [return expression]
}
```

where:

function_name is the name the function you want have;

argument1,argument2,... the name for the function parameters if it has. Is allowed do not pass any parameter to the function;

some_statements generally variable declarations and executables statements that describes the steps of the algorithm you model. They define together with the return statement (if present) the body of the function;

expression is the expression whose evaluation will represent the returned value. A function can return (the sentence return must be present in the body) a value or not (the return statement is not appearing between those of the function's body);

A function can be invoked in one of the ways :

- without arguments:

```
function_name()
```

- or with arguments:

```
function_name(argument1,argument2,etc)
```

A function is executed when is called. The function can be called within a JavaScript block, via an event handler (inside an HTML tag) or via a href link.

In the following example is called the function „alert” (a standard function of the JavaScript language) with the argument „mess” (the variabe used in the previous example) and that determine the display of an alert box in which the content of variable „mess” displayed.

Example:

The call of an JavaScript intrinsic function.

```
<html>
<head>
  <title>
    Page with JavaScript
  </title>
</head>
<body>
  <script type="text/javascript">
    <!--
    var mess= " This text contained by the variable called mess"
    document.write("<i>"+mess+"</i>") // a method of the document object
    alert(mess) // the intrinsic function invoked
    //-->
  </script>
</body>
</html>
```

Example:

The call of an user defined function.

```
<html>
<head>
  <title>
    Page with JavaScript
  </title>
  <script type="text/javascript">
    <!--
    function suma(a,b)
    {
      result=a+b
      return result
    }
  </script>
</head>
<body>
  <!--
  <script>
    suma(2,3)
  </script>
  </body>
</html>
```

```

    }
    //-->
</script>
</head>
<body>
  <script type="text/javascript">
    <!--
    var mess= " This text contained by the variable called mess"
    document.write("<i>"+mess+"</i>")
    alert(mess)
    alert(suma("This text is a ", "<String Concatenation>"))
    document.write("This digit is the result of adding 2 to 7 by using the user defined function
suma:" + suma(2,7))
    //-->
  </script>
</body>
</html>

```

Example :

In this example the JavaScript defined in the head part of the page and in the body part in a href tag.

```

<html>
<head>
<title>A Page with scripts</title>
<script type="text/javascript">
  function chgbgcolor()
  {
    document.bgColor="green"
  }
  function chcolor()
  {
    document.bgColor="orange"
  }
</script>
<script id=clientEventHandlersJS language=javascript>
<!--
function window_onload() {
  document.bgcolor="orange"
}
//-->
</script>
<script language=javascript for=window event=onload>
<!--
return window_onload()
//-->
</script>
</head>
<body>
<p>The page not empty </>
<a href="javascript:chcolor(); alert('The background was changed!')">This is a script in
href</a></p>
<h1 id="header1" onclick="chgbgcolor()"> IT4B: </h1>
<h2 id="header2">Errata</h2>
</body>
</html>

```

7.4.7 Assignments and Expressions

The general syntax for assignment is:

variable = expression

The interpretation of this is: the *variable* before the assignment operator is assigned a value of the *expression* after it, and in the process, the previous value of *variable* is destroyed. An *expression* can be an arithmetic expression, a logical expression or expression on character string. It can be a variable, a constant, a literal, or a combination of these connected by appropriate operators.

An assignment statement stores a literal value or a computational result in a variable and is used to perform most arithmetic operation in a program.

7.4.7.1 Arithmetic Expression

An *arithmetic expression* uses the syntax:

<operand₁><arithmetic_operator><operand₂>

where:

- *<operand₁>, <operand₂>* can be numeric variables, constants or arithmetic expressions (or calls to functions that returns numeric values)

- *arithmetic_operator* (binary operators) is one of those shown in table 7.3.

Table 7.3 Arithmetic Operators

Operator	Description	Example
		Suppose x=2
+	Addition	x+2 = 4
-	Subtraction	5-x = 3
*	Multiplication	x*5 = 10
/	Division	9/3 = 3; 5/2 = 2.5
%	Modulus (division remainder)	5%2 = 1; x%2 = 0; 10%5 = 0
++	Increment By One ^{*)}	x++ = 3
--	Decrement By One ^{*)}	x-- = 1

^{*)} The increment and decrement operators can either be used as a pre- or a post- operator:

Post-Increment: the line of code is executed as then the increment/decrement is performed. y = x++ is equivalent to the sequence: y = x x = x + 1	Pre-Increment: the increment or decrement is performed before whatever other operations are present within the given line of code. y = ++x is equivalent to the sequence: x = x + 1 y = x
-------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

For arithmetic expressions the assignment operator can be combined with the arithmetic ones to define compact expressions as shown in the table 7.4.

Table 7.4 Assignment Operators

Operator	Example	Is The Same As
=	x = y	x = y
+=	x += y x+=y-12	x = x + y x=x+(y-12)
-=	x-=y x -= y +12	x=x-y x = x - (y + 12)
=	x=y x *= 3 + y	x=x*y x = x * (3 + y)
/=	x /= y x/=y+2	x = x / y x=x/(y+2)
%=	x %= y x%=y+2	x = x % y x=x%(y+2)

7.4.7.2 Logical Expression

A *logical expression* can be:

- **simple**, with the general syntax:

<variable>[<relation_operator><variable>]

or

<variable>[<relation_operator><constant>]

<relation_operator>::=<|<=>|>|=|==|!=

Table 7.5 shows and explains the comparison operators.

- **complex**, with the general syntax:

$e_1 \ \&\& \ e_2$ - logical and;

$e_1 \ || \ e_2$ - logical or;

! e_1 - logical not.

<logical_expression₁><logical_operator><logical_expression₂>

where the *logical_operator* can be:

&& (and; two ampersand character), || (or; two vertical bar character) as binary operators (connectives);

! (not) as unary operator.

The precedence of evaluation of logical operators is Not, And, Or. The logical operator together with the truth table defining the way they operate and usage examples are shown in table 7.6.

Table 7.5 Comparison Operators

Operator	Description	Example Suppose x=2
==	is equal to	x == 3 returns false
===	Is equal to (checks for both value and data type)	y="2" x==y returns true x===y return false (x integer; y string)
!=	is not equal	x != 3 returns true
>	is greater than	x > 3 returns false
<	is less than	x < 3 returns true
>=	is greater than or equal to	x >= 3 returns false
<=	is less than or equal to	x <= 3 returns true

Table 7.6 Logical Operators

Operator	Description			Example Suppose x=2; y=3
&&	x	y	and	(x < 9 && y > 1) returns true (x < 9 && y < 1) returns false (x > 9 && y > 1) returns false (x > 9 && y < 1) returns false
	T	T	T	
	T	F	F	
	F	T	F	
	F	F	F	
	x	y	or	(x < 9 y > 1) returns true (x < 9 y < 1) returns true (x > 9 y > 1) returns true (x > 9 y < 1) returns false
	T	T	T	
	T	F	F	
	F	T	F	
	F	F	F	
!	x		not	!(x == y) returns true !(x > y) returns false
	F		T	
	T		F	

7.4.7.3 String Expression

An *expression on character string* can be built (in Java but not only) using:

- the concatenation operator: +
- intrinsic functions for extracting substrings from a string variable or string constant such as:
`Right(string,number_of_characters)` - extracting substring from the end
`Left(string,number_of_characters)` - extracting substring from the beginning
- functions that manipulate strings:
`Cstr(expression)` – convert the expression in a character string;
`Lcase(string_expression)` – convert the string in lower case;
`Ltrim(string)`, `Rtrim(string)`, `Trim(string)` – eliminates the spaces (trailing) from left (leading blanks), right and, respectively left-right;
`Str(number)` – converts number in string;
`Ucase(string)` – converts string to uppercase.

The code sequence below is string concatenation by using the concatenation operator + example.

```
text1 = "Faculty of"
text2      =      "Business
Administration"
text3 = text1 + " " + text2
```

The variable text3 now contains the string "Faculty of Business Administration". The concatenation with the space character " " is realized to separate the strings (generally stored with no trailing blanks).

7.4.8 Conditional Execution

A script can include branches (If...Then...Else...) allowing the definition of conditional executions similarly to the example in the following sequence:

```
if (navigator.appName.indexOf("Internet Explorer")!=-1)
{
    alert("The used Navigator is Internet Explorer!")
}
else
{
    alert(("The used Navigator is not Internet Explorer!")
}
```

These code sequence will display an alert box containing a different text depending on the type of the used browser in which the page displayed. The conditional expression of the IF sentence searches for the text „Internet Explorer” in the name of the browser (navigator) application. If this text does not appear in the browser name then the function „indexOf” returns the value „-1”. The condition evaluates to True only if the return of that function is not „-1”. The JavaScript IF sentence, „switch” sentence or the conditional operator „?” can be used to define the conditional execution.

7.4.9 Decision sentences

The decision sentences are used to model the decision structure and that is used for choosing an alternative (an operation or block of operations) from two possible alternatives. Algorithm steps that select from a choice of actions are called decision steps.

If ... Then ... Else ...

```
if (condition)
    operationi;
else
```

operation₂;

If one of operations includes a sentences sequence then this sequence will be included in a sentence block:

```
{  
    operationi;  
}
```

The decision block can be expressed in a natural language as:

- evaluate the expression that defines the logical condition *<condition>*;
- If the result of evaluation is True
 Then execute *operation₁*
 Else execute *operation₂*;
- continue the execution with the next step in the flow

If ... Then ...

if (*condition*) *operation*;

```
if (condition) {  
    operations;  
}
```

if...else if....else statement

This statement allows select one of many blocks of code to be executed.

```
if (condition1)  
{  
    code to be executed if condition1 is true  
}  
else if (condition2)  
{  
    code to be executed if condition2 is true  
}  
else  
{  
    code to be executed if condition1 and condition2 are not true  
}
```

The logical condition *<condition_x>* is a logical expression that will be evaluated either to True or either to False. The logical conditions can be simple or complex logical conditions.

A simple logical condition has the general syntax:

<variable> [*<relation_operator>* *<variable>*]

or

<variable> [*<relation_operator>* *<constant>*]

The *relation_operator* can be one of:

Relation Operator	Interpretation
<	Less than. Example: delta < 0
<=	Less than or equal. Example: delta <= 0
>	Greater than. Example: delta > 0
>=	Greater than or equal. Example: delta >= 0
=	Equal to. Example: a == 0
!=	Not equal. Example: a!=0

The simple logical conditions will be connected by the **AND**, **OR**, and **NOT** logical operators to form complex conditions. The logical operators are evaluated in the order NOT, AND,

and OR. The change of the natural order of evaluation can be done by using parenthesis in the same way for arithmetic expressions.

Example:

```
<html> <head> <title>New Page 1</title> </head><body>
<script type="text/javascript">
// If the time is less than 10,write a "Good morning" greeting
// If time between 10 and 16 write a "Good day" greeting
// Otherwise "Hello world"
// Write the hour and If time <12 write AM else write PM
var computerdate = new Date()
var time = computerdate.getHours()
if (time<10)
{
document.write("<b>Good morning! Now is " +time+((time<12)?' AM':' PM')+"</b>")
}
else if (time>10 && time<16)
{
document.write("<b>Good day! Now is " +time+((time<12)?' AM':' PM')+"</b>")
}
else
{
document.write("<b>Hello World! Now is " +time+((time<12)?' AM':' PM')+"</b>")
}
</script> </body>
</html>
```

Switch. Execute one of several groups of statements depending on the value of an expression (called selector). The case structure (and statement) can be especially used when selection is based on the value of a single variable or a simple expression (called the case selector).

```
switch (expression_int) {
    case constant_expression1:
        operations1
    case constant_expression2:
        operations2
    :
    default:
        operationsn
}
```

- *expression_int* is an expression that must produced an integral value (int);
- *constant_expression_i* must be a constant expression;
- the label **default:** can be used only once.

The *expression_int* is also called the selector of instruction Case.

- if the value of the selector don't fit to a constant the operations specified on branch Default (otherwise) will be executed;
- the values of constants must be unique for a *switch sentence*.

Example:

The sequence below uses the switch statement to find out the Romanian name for the day of the week of a date.

```
<HTML>
<HEAD>
<meta name=vs_defaultClientScript content="JavaScript">
<TITLE></TITLE>
<META NAME="GENERATOR" Content="Microsoft Visual Studio">
<META HTTP-EQUIV="Content-Type" content="text/html" >
<script type="text/javascript">
/* The sequence will write the name of the day in romanian
```

```

    (Sunday=0, Monday=1, Tuesday=2, etc)
*/
function RODay(aDayNumber)
{
    switch (aDayNumber)
    {
        case 0:
            return "Duminica"
        case 1:
            return "Luni"
        case 2:
            return "Marti"
        case 3:
            return "Miercuri"
        case 4:
            return "Joi"
        case 5:
            return "Vineri"
        case 6:
            return "Sambata"
        default:
            alert("What day is it? \n The computer is virused or hardware damaged !")
            return "What day is it? \n The computer is virused or hardware damaged !"
    }
}
</script>
<script id=clientEventHandlersJS language=javascript>
<!--
function Button1_onclick() {
    var i=0
    var datadeazi=new Date()
    var ziua=datadeazi.getDay()
    for (i=ziua;ziua<=6;ziua++){
        document.write(ziua+": " + RODay(ziua)+"<br />")
    }
}
//-->
</script>
<script language=javascript for=Button1 event=onclick>
<!--
return Button1_onclick()
//-->
</script>
</HEAD>
<BODY>
<p>This page contains a Java Script exploiting the switch sentence.</p>
<p>
    <input id=Button1 type=button value="Press This"></p>
</BODY>
</HTML>

```

Conditional Operator (?)

The conditional operator has the syntax:

(conditional_expression) ? true_case_expression: false_case_expression

where:

<conditional_expression> is a logical expression that will be evaluated either to True or either to False. Is a very good idea to include the expression in parenthesis (to enforce his evaluation).



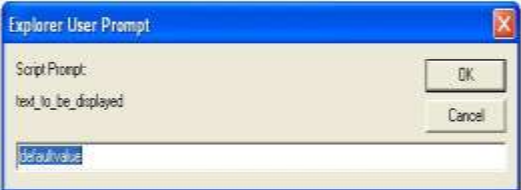
`<true_case_expression>` is the expression whose evaluation will be returned if the conditional expression evaluates to True
`<false_case_expression>` is the expression whose evaluation will be returned if the conditional expression evaluates to False.

Example:

```
<HTML> <HEAD>
<meta name=vs_defaultClientScript content="JavaScript">
<TITLE></TITLE>
<META NAME="GENERATOR" Content="Microsoft Visual Studio">
<META HTTP-EQUIV="Content-Type" content="text/html; charset=UTF-8">
</HEAD>
<BODY>
<script language=javascript>
  var TotalBalance, savings=300
  TotalBalance =(savings==0) ? 0:(savings*1.03)
  // TotalBalance is now 309
  document.write("Total Balance is now: " + TotalBalance)
</script>
</BODY></HTML>
```

7.4.10 Popup Boxes

In JavaScript we can create three kinds of popup boxes by invoking the associated intrinsic function. These functions are:

Function	Description
<code>alert("text_to_be_displayed")</code>	Displays an alert box containing the message passed in argument and an OK button. This call produces the box: 
<code>confirm("text_to_be_displayed")</code>	Displays a box containing the message passed in argument provided with an OK (confirm) and Cancel (deny) button. This call produces the box: 
<code>prompt("text_to_be_displayed", "defaultvalue")</code>	Displays an input dialog box provided with a text box to fill data and an OK (return the value typed to the caller) and Cancel (return a Null value to caller). This call produces the box: 

7.4.11 Cycles

The repeating structure repeats a block of statements while a condition is True or Until a condition becomes True. The repetition of steps in a program is called a **loop**.

The repeated execution of a sequence of instructions (loop) can be done by using the looping sentences „while”, „do...while” and, for.

Example:

```
<html>
<head>
<title>
  Page containing loop
</title>
</head>
<body>
<script type="text/javascript">
<!--
  for (i=0; i<5; i++)
  {
    document.write("Step i: "+i+"<br>")
  }
  //-->
</script>
</body>
</html>
```

In this example the values of i are written into the page „Step i:the_vale_of_i” from the value 0 to 4.

a) The condition evaluated first

- first syntax:

while (*condition*) *operation*;

- second syntax:

```
while (condition)
{
  operations;
  [continue;]
  [break;]
}
```

where:

- **continue** jump to the condition evaluation;
- **break** interrupt the cycle and transfer the execution to the sentence that follows to the end block marker }

Note. The ; character ending sentences is optional if the sentence is written alone on the line. It is necessary if you define mode sentences on the same line.

The executions of such blocks follow the scenario (while): the condition is evaluated and if the condition evaluates to:

- **True** then executes the block of statements;
- **False** then end the execution of the cycle (Loop) and continue the execution of the program.

If for the first time the condition is False the sentence block is simply skipped.

b) the condition evaluated after

```
do
{
    operations;
} while conditions
```

In this case the operation is executed first and then the condition is evaluated and can be described as:

- the *operations* are executed;
- the *condition* is evaluated;
- **if** the result of the evaluation of the *condition* is False *then loop* to execute again the *operations*;
- **if** the evaluation of the *condition* is True *then* continue the execution of the program (and close the loop).

c) counted loop

```
for (expression1; expression2; expression3) operation;
```

If many operations desired in the cycle they must be included as block;

expression₁ – is an expression that initializes the counter, having the general syntax *counter=startvalue*;

expression₂ – contains the definition for ending the loop, generally a logical condition of the form *counter<=endvalue*;

expression₃ – is an expression to increment or decrement the value for the counter, for example *counter=counter+increment*.

The cycle can be unconditionally stopped by using the instruction **break** and can be unconditionally restarted by using the sentence: **continue**.

Example:

```
for (counter = iv; fv; s) {operations};
```

The execution of For sentence follows the scenario:

1. The value *i_v* is assigned to the variable *counter*;
2. The value of variable *counter* is compared with the end value *f_v* (the value can be determined by evaluating an expression);
3. The operations are executed;
4. The value of variable *counter* is incremented with the value step (1 if step not specified);
5. Repeat the steps from 2 to 5.

Example :

Figure 7.1 shows the usage of document object for accessing the forms collection and displaying, as comma separated values, the attributes Name, Value and Type.

```

<html>
<head>
<title>A form and javascript</title>
</head>
<body>
<form method="POST" action="--
WEBBOT-SELF--">
  <!--webbot bot="SaveResults" u-
file="C:\Documents and Settings\Vio\My
Documents\My
Webs\_private\form_results.csv"
s-format="TEXT/CSV" s-label-
fields="TRUE" -->
  <!-- This is the description of the form --
>
  <p>First name:<input type="text"
name="FName" size="20"></p>
  <p>Last Name:<input type="text"
name="LName" size="20"></p>
  <p>Gender:<input type="radio" value="V1" name="Male" checked>Male
  <input type="radio" name="Female" value="V2">Female</p>
  <p><input type="submit" value="Submit" name="B1">
    <input type="reset" value="Reset" name="B2"></p>
</form>
<script type="text/vbscript">
  document.write("Name, Value, Type "+<br />")
</script>
<script type="text/javascript">
  for (i=0; i < document.forms[0].elements.length;i++)
  {
    document.write(document.forms[0].elements[i].name + ", ");
    //syntax below uses the name attribute of the form to access the form's elements
    document.write(document.forms[0].elements[i].value + ", ");
    document.write(document.forms[0].elements[i].type + "<br />");
  }
</script>
</body>
</html>

```

Name	Value	Type
FName		text
LName		text
Male	V1	radio
Female	V2	radio
B1	Submit	submit
B2	Reset	reset

Figure 7.1 Accessing HTML form elements

For ... In statement

for (*variable in object*)
 { *code to be executed* }

Example :

In this example is defined an array object called divisions and the first three elements initialized. The for...in sentence will fill in the HTML document the lines initialized in the array.

```

html>
<body>

<script type="text/javascript">

var x, nr

var divisions = new Array()
divisions[0] = "English"
divisions[1] = "French"
divisions[2] = "German"

for (x in divisions)
{

```

```

nr=x/1+1;
document.write(nr+": "+divisions[x] + "<br />")
}
</script>

```

```

</body>
</html>

```

that produces the output :

```

1: English
2: French
3: German

```

7.4.12 Using Events to Trigger Script Execution

Some events that can be associated with HTML pages are represented by the following:

Event	Occurs when...
onabort	a user aborts page loading
onblur	a user leaves an object
onchange	a user changes the value of an object
onclick	a user clicks on an object
ondblclick	a user double-clicks on an object
onerror	an error occurs
onfocus	a user makes an object active
onkeydown	a keyboard key is on its way down
onkeypress	a keyboard key is pressed
onkeyup	a keyboard key is released
onload	a page is finished loading (in Netscape, this event occurs during the loading of a page).
onmousedown	a user presses a mouse-button
onmousemove	a cursor moves on an object
onmouseover	a cursor moves over an object
onmouseout	a cursor moves off an object
onmouseup	a user releases a mouse-button
onreset	a user resets a form
onselect	a user selects content on a page
onsubmit	a user submits a form
onunload	a user closes a page; a frequent usage is to deal with cookies.

The table below shows common usage of events:

Event	Usage
onload, onunload	The onload event is often used to check the visitor's browser type and browser version, and load the proper version of the web page based on the information. Both events frequently used to deal with cookies.
onfocus, onblur, onchange	Generally used in combination with validation of form fields.
onsubmit	Is used to validate All form fields before submission (is possible to deal with logical validation involving more fields from the form).

onmouseover, onmouseout	Generally used for creating “animated” buttons.
----------------------------	-------------------------------------------------

In the following example is shown an inline JavaScript code (without the tags <script> and </script>). The web page contains a button whose property „Caption” has the value „ASE”. When the event „onclick” occurs (when clicking the button) is called the function „open” (member of „windows” functions group), having in arguments the arguments required to open the ASE site home page in a window called internally „ase_home”.

Example:

```
<html>
<head>
<title>
  Command button link
</title>
</head>
<body>
  <form>
    <input type="button" value="ASE" onclick='window.open("http://www.ase.ro", "ase_home")'>
  </form>
</body>
</html>
```

Example:

```
<html>
<head>
<title>Pagina cu Cronometru </title>
<script type="text/javascript">
  function startTime()
  {
    var today=new Date()
    var h=today.getHours()
    var m=today.getMinutes()
    var s=today.getSeconds()
    // add a zero in front of numbers<10
    m=checkTime(m)
    s=checkTime(s)
    document.getElementById('txt').innerHTML=h+":"+m+":"+s
    t=setTimeout('startTime()',500)
  }
  function checkTime(i)
  {
    if (i<10)
    {i="0" + i}
    return i
  }
</script>
</head>
<body onload="startTime()">
<div id="txt" align=right></div>
<script type="text/javascript">
  var x, nr
  var divisions = new Array()
  divisions[0] = "English"
  divisions[1] = "French"
  divisions[2] = "German"
  for (x in divisions)
  {
    nr=x/1+1;
    document.write(nr+": "+divisions[x] + "<br />")
  }
</script>
```

```
</script>
</body>
</html>
```

7.4.13 Handling Errors

In JavaScript are two ways for catching errors in a Web page:

- by using the **try...catch** statement;
- by using the **onerror** event.

Try...catch

The code you want prevent harassing user by error messages is included between try sentence and catch(err) sentence:

```
try
{
//Run some code here
}
catch(err)
{
//Handle errors here
}
```

Throw

Throw statement allows user to create an exception that can be catch and processed later on by try..catch. The syntax is:

```
throw(exception)
```

onerror event

The syntax for the **onerror** event and his associated error handler is:

Onerror=handleError

```
function handleError(msg, url, l)
{
// handle the error here
return true (success) or false (failure)
}
```

7.4.14 Commented samples

1. Displaying web content in new browser window

Below is a couple of two general functions:

ShowSmallWindow(from_uri,win_name, win_height, win_width, resize,scroll)

and

MakeCallString(to_uri,win_name, win_height, win_width, resize)

The function ShowSmallWindow opens a new window with a specified dimension and behavior to user interaction in which displays the content at the address indicated by the from_uri argument.

Required arguments:

- from_uri - in general the URL address of the resource to be displayed;
- win_name - the name of the window;
- win_high, win_width the high and, respectively, width of the window;
- resize - if resizing of the window allowed (Yes) or not (no);

- scroll - if the scroll bars will be available and viewable (Yes) or not (no).

```
function ShowSmallWindow(from_uri,win_name, win_height, win_width, resize,scroll)
{
    var sFeature;
    sFeature='directories=no, location=no, status=no, menubar=no, scrollbars=' + scroll + ',
    resizable=' + resize + ', toolbar=no, height=' +
        win_height + ', width=' + win_width;
    window.open(from_uri, win_name, sFeature);
}
```

The function uses the open method available via DOM. The opened window do not have menu bar, status line, and toolbar and do not have the directory pannel and don't displays the current location. A call example of that function is from the the index.htm page of the site <http://www.avrams.ro>:

```
<td title="The image is from Avrams Collection and called 'Horizon in the sunshine', click to enlarge"
valign="top" style="height: 46px; width: 746px; margin-top:0px;" class="avbkgtop" onclick=
'ShowSmallWindow("http://avrams.ro/descript-horizon.html",
"HorizonInSunshine","640","656","no","no")'>
```

The function MakeCallString opens a new window with a specified dimension and behavior to user interaction in which displays the content at the relative address indicated by the user in a form field called 'dnx' prefixed by the from_uri argument, as a base address.

The function MakeCallString requires in arguments as follows:

- to_uri specifying the resource base address to which concatenate what user types in the text box called 'dnx' (the name="dnx" and/or id="dnx");
- win_name the name given to the opened window;
- the dimensions of that window (win_height, win_width);
- resize - if resizable (yes) or not (no).

```
function MakeCallString(to_uri,win_name, win_height, win_width, resize)
{
    var from_uri;
    from_uri=to_uri + '/' + document.getElementById('dnx').value;
    ShowSmallWindow(from_uri,win_name, win_height, win_width,"yes","yes")
}
```

2. Convert decimal integer numbers to a new power of two number base

This is the definition of a general function called Dec_To_NewBase(oldNumber, newBase, twoPower) whose required arguments means:

- oldNumber the decimal integer number you want convert in a new base;
- newBase the new base in which you want express the number;
- twoPower which power of two represents the number.

The variable Digits is a global variable (defined outside of any function body) of type string containing the digits in the new bases (here taken only 0 to f, as to cover binary, octal, and hexadecimal number bases).

The function can be changed to either:

- validate if truly the power of two is the power of the integer;
- determine if the integer is a power of two and which one, and to eliminate from the call model of twoPower argument.

```
var Digits="0123456789abcdef";

function Dec_To_NewBase(oldNumber, newBase, twoPower)
```

```

{
  var newNumber = Digits.substr(oldNumber & (newBase-1), 1);
  while(oldNumber > (newBase-1))
  {
    oldNumber >>= twoPower;
    newNumber = Digits.substr(oldNumber & (newBase-1), 1) + newNumber;
  }
  return newNumber;
}

```

The variable newNumber is reserved and initialized to the leftmost character of the result of applying the logical and (“anding”) between the oldNumber and the highest digit in the new base, (newBase-1). If the oldNumber is greater than the (newBase-1) then a cycle computation started until oldNumber becomes less than (newBase-1).

In the cycle we have two operations:

- a) oldNumber>>twoPower (shift right) which means divide the value of the content of variable called oldNumber to two at the power twoPower and store the quotient of the division in the variable oldNumber;
- b) the new content of the variable newNumber is the concatenation between:
 - the leftmost character of the string obtained by “anding” the oldNumber and the highest digit in the new base, (newBase-1);
 - the old content of the variable newNumber.

When the cycle ends the new number value is returned to the caller and the function ends his execution.

The following functions are specialized and they implement a particular conversion, for that reason the values for newBase and twoPower are defined locally in the body of the function. They implemented in that way in the page *Convert-integer-numbers.html* of the website <http://www.avrams.ro> with the purpose to easy understanding the algorithm.

The code of that function is:

```

<script type="text/javascript" language=javascript>
<!--
  var Digits="0123456789abcdef";

/* Convert Decimal Integers (base 10) to Hexadecimal (base 16), two power 4 */
function dec2hex(d)
{
  var h = Digits.substr(d & 15, 1);
  while(d > 15)
  {
    d >>= 4;
    h = Digits.substr(d & 15, 1) + h;
  }
  return h;
}

/* Convert Decimal Integers (base 10) to Octal (base 8), two power 3 */
function dec2oct(d)
{
  var o = Digits.substr(d & 7, 1);
  while(d > 7)
  {
    d >>= 3;
    o = Digits.substr(d & 7, 1) + o;
  }
  return o;
}

```

```

}

/* Convert Decimal Integers (base 10) to Binary (base 2), two power 1 */
function dec2bin(d)
{
    var b = Digits.substr(d & 1, 1);
    while(d > 1)
    {
        d >>= 1;
        b = Digits.substr(d & 1, 1) + b;
    }
    return b;
}
--> </script>

```

3. Compute Easter date for a wanted year

The function requires as in argument Wanted_Year containing the decimal integer representing the year for which you compute when Easter will be, computes the Easter date based on Gauss algorithm, and displays it. You can find another implementation and a description of the modeled algorithm in the page *compute-easter-date.html* of the website <http://www.avrams.ro>.

```

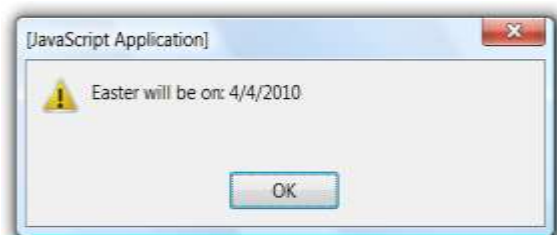
function Easter_Date(Wanted_Year){
    var D;
    var E;
    if (Wanted_Year<0){
        alert("The value for Year must be a positive number!");
        return -1;
    }
    D = ((Wanted_Year % 19) * 19 + 15) % 30;
    E = (((Wanted_Year % 4) * 2 + (Wanted_Year % 7) * 4) + 6 * D + 6) % 7;
    D=D+E+4;
    if(D>30){
        alert( 'Easter will be on: '+'5/'+(D-30.)+'/'+Wanted_Year);
    }
    else
    {
        alert( 'Easter will be on: '+'4/'+(D)+'/'+Wanted_Year);
    }
}

```

In the line bellow the press of the button will trigger the call of the Easter_Date function (the event onclick) having in argument the year 2010:

```
<input name="callEaster" type="button" value="Easter" onclick="Easter_Date(2010)" />
```

and will produce the output (the alert call):



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