Document Object Model (DOM) : An HTML/JavaScript Example

Step 1. Open http://www1.csisdmz.ul.ie/curstudents/modules/2stsem/cs4146/labs/lab04/ and download the file `domproject.zip`.

Step 2. Unzip `domproject.zip` to a folder called `domproject`. Open it and take a look at its content.

Step 3. The folder `domproject` should contain a single subfolder `pictures` as well as the following files:

```
ireland.xml
picturegallery.css
picturegallery.html
picturegallery.js
pictureset.dtd
summer.xml
```

The file `picturegallery.html` is the main file in this HTML/JavaScript project. Load it in Internet Explorer and check how it works. Note that it is designed specifically for MS Internet Explorer and may not work properly if loaded in other web browsers.

Step 4. The file `picturegallery.css` contains CSS styles applied to `picturegallery.html`. It is not an object of interest in this lab exercise. However, feel free to modify it if you wish.

Step 5. Open `ireland.xml`, `summer.xml` and `pictureset.dtd` with Oxygen. Check whether `ireland.xml` and `summer.xml` are valid XML files, i.e. whether they conform to `pictureset.dtd`. Note that the `thumbnail` element is optional. If a thumbnail file is not specified for a picture then we can load the big picture in a browser and scale it down to the size of a thumbnail. Normally, it is a good idea to keep separate small pictures for thumbnails because they can be loaded faster.

Step 6. Download about 5 pictures from the web (any pictures) to the folder `domproject/pictures` and create your own XML file `anotherset.xml` (in folder `domproject`) that describes them according to the rules in `pictureset.dtd`. Make sure `anotherset.xml` is valid.

Task A: Open `picturegallery.html` in Oxygen. Can you modify it to display your new picture set alongside the other two?

Step 7. Note that `picturegallery.html` contains some references to JavaScript code. You can embed JavaScript code in your web pages in order to enrich their functionality. For instance, JavaScript code can be used to validate the data entered by a user in an HTML form, to display pop-up windows, to modify the content of a webpage as a response to an action by the user, etc. JavaScript code does not require separate compilation; you simply include your source code in an HTML file and when the HTML file gets loaded into a browser, the browser runs a JavaScript interpreter that executes the JavaScript code.

Note that each piece of JavaScript code is available to the user who opens a webpage. This could be bad if you prefer to hide your code from other people and good because you can study and reuse the code of other programmers.

Step 8. Before you continue with this lab exercise you may want to go trough the W3Schools' JavaScript tutorial available at `http://www.w3schools.com/js/default.asp`

Step 9. The main file of our project, i.e. `picturegallery.html`, contains three references to JavaScript code. The two lines

```
<script type="text/javascript" language="JavaScript" src="picturegallery.js">
</script>
```

include the external JavaScript file `picturegallery.js` (`.js` stands for JavaScript). The end tag `</script>` is important. If you use

```
<script type="text/javascript" language="JavaScript" src="picturegallery.js"/>
```

instead then the external file will not be included correctly.

Step 10. The second place with JavaScript code in `picturegallery.html` is

```
<script type="text/javascript" language="JavaScript">
<!--
   var xmlPictureSets = ['summer.xml', 'ireland.xml'];
//-->
</script>
```

It simply declares an array `xmlPictureSets` of two strings. The two lines `'<!--'` and `'//-->'` ensure old web browsers which do not understand JavaScript will not mistake your JavaScript code for character data and display it without interpretation.

Step 11. The last bit of JavaScript code in `picturegallery.html` occurs in the value of the attribute `onload` of the `<body>` element. The JavaScript function `listPictureSets` will be executed immediately after the HTML document is loaded into the browser. This function is defined in the external file `picturegallery.js`.

Step 12. The external JavaScript file `picturegallery.js` contains three functions

`popItUp`	- displays a pop-up window with a picture
`listPictureSets`	- displays the list of textual links to picture sets
`displayPictureSet`	- displays a set of thumbnails

The functions `listPictureSets` and `displayPictureSet` read the XML documents which describe the picture sets and manipulate the webpage. They do this by manipulating DOM trees. From their point of view each XML document is a tree the nodes of which are the XML elements, attributes and character data. The DOM tree of an XML document is available trough the object `xmlDoc` in both functions.

Step 13. Similarly, from the point of view of `listPictureSets` and `displayPictureSet` the HTML webpage looks like a tree which is accessible trough the object `document`. They modify the webpage content by manipulating the `document` object.

Step 14. You may want to go trough the W3Schools XML DOM tutorial available at `http://www.w3schools.com/dom/default.asp` which also includes a reference to the XML DOM interfaces.

Task B: Each `picture` element in the example XML files contains a child element called `description`. Can you modify the JavaScript function `displayPictureSet` so that it displays the text of each description under the corresponding thumbnail? Can you also put the descriptions in the title bar of the pop-up windows?

Hint: The present version of `displayPictureSet` adds the following HTML code to webpage for each thumbnail:

```
<td width=100>
    <a href=”javascript:popItUp(‘filename’, ‘width=100, height=60’)>
        <img src=”filename” width=”100” height=”60”>
    </a>
</td>
```

The element `td` represents a cell in a `table`. Try instead to add the following code to the webpage:

```
<td width=100>
    <a href=”javascript:popItUp(‘filename’, ‘width=100, height=60’)>
        <img src=”somefile.jpg” width=”100” height=”60”>
        <br/>
        here comes the description of this picture
   </a>
</td>
```

What is the meaning of the style for the `td` element (in `picturegallery.css`)?