Web Programming

Step by step Exercises

Hans-Petter Halvorsen, M.Sc.
History of the Web

- Internet (1960s)
- First Web Browser - Netscape, 1994
- Google, 1998
- Facebook, 2004
- Smartphones (iPhone), 2007
- Tablets (iPad), 2010
The Web Browser

What do you think will be the last application being moved into the cloud?

THE BROWSER?
1. Introduction to myDAQ

myDAQ is a simple and intuitive DAQ device from National Instruments. myDAQ has Analog Inputs (AI), Analog Outputs (AO), Digital Inputs (DI) and Digital Outputs (DO).

In addition to traditional I/O, the myDAQ have a built-in Digital Multimeter. The myDAQ can be used as a Power Supply. Using the built-in software the myDAQ can also be used as an Oscilloscope and Function Generator.

When you plug in the device in the USB connection on your PC, the following will pop-up automatically (NI ELVISIII Instrument Launcher):

Note! You need to install the NI ELVISIII driver software first.

If not, you find it in the National Instruments folder:
The Web Programming Triangle

HTML

Use **HTML** to define the content of web pages

CSS

Use **CSS** to specify the layout of web pages

JavaScript

Use **JavaScript** to program the behavior of web pages
Basic Web Programming

- HTML
- CSS
- JavaScript

For more Dynamic Web Programming we use e.g.,
- ASP.NET
- SQL
- AJAX
- PHP
- etc. (But these are not part of this Tutorial)
Client-Server Example

Client

Web Browser

Response

Web Server

Request

Database

Internet Information Services (IIS), Apache, etc.
Web Platform

The Web Browser creates the visual web page you see in the browser based on the HTML code

```html
<!DOCTYPE html>
<html>
<body>
<h1>My First Heading</h1>
<p>My first paragraph.</p>
</body>
</html>
```

The code runs on the server and converted to HTML before sending to client (Web Browser)

Web Page (HTML)

Web Browser

Web Server

ASP.NET, PHP, ...

Internet Information Services (IIS), Apache, etc.

HTML, CSS, JavaScript

Client-side

Server-side
HTML

- HyperText Markup Language (HTML)
- The Visual Appearance of a Web Site
- “Web Browser Language”: All Web Browser understand HTML
- HTML 5 is the latest
- Maintained by W3C
  - World Wide Web Consortium

```html
<!DOCTYPE html>
<html>
<head>
  <meta charset="UTF-8">
  <title>Title of the document</title>
</head>
<body>
  Content of the document......
</body>
</html>
```
<html>
<body>
<h1>My First Heading</h1>
<p>My first paragraph.</p>
</body>
</html>
HTML Editors

Professional HTML editors:
• Adobe Dreamweaver
• CoffeeCup HTML Editor
• ...

For the simple examples in this Tutorial we only need Notepad (Windows) or TextEdit (Mac)
<!DOCTYPE html>
<html>
<body>
<h1>My First Heading</h1>
<p>My first paragraph.</p>
</body>
</html>

- The DOCTYPE declaration defines the document type
- The text between <html> and </html> describes the web document
- The text between <body> and </body> describes the visible page content
- The text between <h1> and </h1> describes a heading
- The text between <p> and </p> describes paragraph

Students: Create this HTML Code in e.g., NotePad and Save the File as .htm. Then Open the File in a Web Browser (just double-click on the file).
<!DOCTYPE html>
<html>
<body>
<h1>This is a heading</h1>
<a href="http://www.google.com">This is a link to Google</a>
</body>
</html>

<!DOCTYPE html>
<html>
<body>
<h1>This is a heading</h1>
<img src="myimage.jpg" alt="blabla" width="104" height="142">
</body>
</html>

Students: Create these Examples
**HTML Tags**

**Hyperlink:**

```html
<a href="http://www.google.com">This is a link to Google</a>
```

**Bold Text:**

```html
<b>This is my Text</b>
```

**Headers:**

```html
<h1>This is my Header</h1>
<h2>This is my Header</h2>
<h3>This is my Header</h3>
```

**Paragraph:**

```html
<p>My first paragraph.</p>
```

**Line Break:**

This is my Text

```html
<br>
This is also my Text
```

**Title:**

```html
<title>This is my Title</title>
```

**Image:**

```html
<img src="myimage.jpg" alt="blabla" width="104" height="142" />
```

**Comments:**

```html
<!-- Write your comments here -->
```

Students: Try these Examples
Hans-Petter Halvorsen, M.Sc.
CSS

• CSS – Cascading Style Sheets
• Styles define **how to display** HTML elements
• CSS is used to control the style and layout of multiple Web pages all at once

```css
body {
  background-color: #d0e4fe;
}

h1 {
  color: orange;
  text-align: center;
}

p {
  font-family: "Times New Roman";
  font-size: 20px;
}
```
Why CSS is needed

• HTML was never intended to contain tags for formatting a document.
• HTML was intended to define the content of a document, like:
  • `<h1>`This is a heading`</h1>`
  • `<p>`This is a paragraph.`</p>`
• When tags like `<font>`, and color attributes were added to the HTML 3.2 specification, it started a nightmare for web developers. Development of large web sites, where fonts and color information were added to every single page, became a long and expensive process.
• To solve this problem, the World Wide Web Consortium (W3C) created CSS.
• In HTML 4.0, all formatting could be removed from the HTML document, and stored in a separate CSS file.
• All browsers support CSS today.
HTML + CSS Example

Students: Create this Code in e.g., NotePad and Save the File as .htm. Then Open the File in a Web Browser (just double-click on the file). Change color, etc. and see what happens.
A CSS declaration always ends with a semicolon, and declaration groups are surrounded by curly braces, e.g.:

```
p {color:red;text-align:center;}
```
CSS Classes

```html
<!DOCTYPE html>
<html>
<head>
<style>
.center {
  text-align: center;
  color: red;
}
</style>
</head>
<body>
<h1 class="center">My Heading</h1>
<p class="center">My Paragraph</p>
</body>
</html>
```

Students: Try these Examples
Three Ways to Insert CSS

There are three ways of inserting a style sheet:

• **External style sheet** (Recommended!!)
  – An external style sheet is ideal when the style is applied to many pages. With an external style sheet, you can change the look of an entire Web site by changing just one file.
  – An external style sheet can be written in any text editor. The file should not contain any html tags.
  – The style sheet file must be saved with a .css extension

• **Internal style sheet**
  – An internal style sheet should be used when a single document has a unique style.
  – You define internal styles in the head section of an HTML page, inside the <style> tag

• **Inline style**
  – An inline style loses many of the advantages of a style sheet (by mixing content with presentation). Use this method sparingly!
Internal Style Sheet Example

You define internal styles in the head section of an HTML page, inside the <style> tag, like this:

```html
<!DOCTYPE html>
<html>
<head>
<style>
body {
    background-color: linen;
}

h1 {
    color: maroon;
    margin-left: 40px;
}
</style>
</head>
<body>
<h1>This is a heading</h1>
<p>This is a paragraph.</p>
</body>
</html>
```
External Style Sheet Example

Each HTML page must include a link to the style sheet with the `<link>` tag. The `<link>` tag goes inside the head section:

```html
<head>
<link rel="stylesheet" type="text/css" href="mystyle.css">
</head>
```

An example of a style sheet file called “myStyle.css”, is shown below:

```css
body {
    background-color: lightblue;
}

h1 {
    color: navy;
    margin-left: 20px;
}
```
CSS Properties

Text Color

```css
body {
  color: blue;
}

h1 {
  color: #00ff00;
}

h2 {
  color: rgb(255,0,0);
}
```

Text Alignment

```css
h1 {
  text-align: center;
}

p.date {
  text-align: right;
}

p.main {
  text-align: justify;
}
```

Background Color

```css
body {
  background-color: lightblue;
}
```

Text Font

```css
p {
  font-family: "Times New Roman", Times, serif;
}
```

Text Size

```css
h1 {
  font-size: 40px;
}

h2 {
  font-size: 30px;
}

p {
  font-size: 14px;
}
```

Students: Create a Style Sheet (.CSS) and a HTML page where you use these Properties
Students: Open this Example and see how different styles totally changes the display and layout of a HTML page
JavaScript

Hans-Petter Halvorsen, M.Sc.
JavaScript

• JavaScript is the programming language of the Web.
• All modern HTML pages are using JavaScript.
• JavaScript is the default scripting language in all modern browsers, and in HTML5.
• JavaScript is probably the most popular programming language in the world.
• It is the language for HTML, for the Web, for computers, servers, laptops, tablets, smart phones, and more.
• JavaScript can Change HTML Elements! – which makes it very powerful!
Why JavaScript?

JavaScript is one of 3 languages all web developers must learn:

• 1. HTML to define the content of web pages
• 2. CSS to specify the layout of web pages
• 3. JavaScript to program the behavior of web pages

This tutorial is about JavaScript, and how JavaScript works with HTML and CSS.
JavaScript vs. Java

• JavaScript and Java are different languages, both in concept and design.
• JavaScript was invented by Brendan Eich, to be used in Netscape (a no longer existing browser) in 1995, and was adopted by the ECMA standard association in 1997.
<!DOCTYPE html>
<html>
<body>
<h1>My First JavaScript</h1>

<p>JavaScript can change the content of an HTML element:</p>

<button type="button" onclick="myFunction()">Click Me!</button>

<p id="demo">This is a demonstration.</p>

<script>
function myFunction() {
    document.getElementById("demo").innerHTML = "Hello JavaScript!";
}
</script>

</body>
</html>
Please input a number between 1 and 10:

<input id="numb" type="number">

<button type="button" onclick="myFunction()">Submit</button>

<p id="demo"></p>

<script>
function myFunction() {
    var x, text;

    // Get the value of input field with id="numb"
    x = document.getElementById("numb").value;

    // If x is Not a Number or less than one or greater than 10
    if (isNaN(x) || x < 1 || x > 10) {
        text = "Input not valid";
    } else {
        text = "Input OK";
    }

    document.getElementById("demo").innerHTML = text;
}
</script>
JavaScript Comments

// Change heading:
document.getElementById("myH").innerHTML = "My First Page";
// Change paragraph:
document.getElementById("myP").innerHTML = "My first paragraph.";

var x = 5;  // Declare x, give it the value of 5
var y = x + 2;  // Declare y, give it the value of x + 2

/*
The code below will change the heading with id = "myH" and the paragraph with id = "myP" in my web page:
*/
document.getElementById("myH").innerHTML = "My First Page";
document.getElementById("myP").innerHTML = "My first paragraph.";

Using Comments to Prevent Execution:

//document.getElementById("myH").innerHTML = "My First Page";
document.getElementById("myP").innerHTML = "My first paragraph.";

/*
document.getElementById("myH").innerHTML = "My First Page";
document.getElementById("myP").innerHTML = "My first paragraph.";
*/
JavaScript Placement

• You can place any number of scripts in an HTML document. Scripts can be placed in the `<body>`, or in the `<head>` section of an HTML page, or in both.

• It is a good idea to place scripts at the bottom of the `<body>` element. This improves page load, because HTML loading is not blocked by scripts loading.

• Scripts can also be placed in external files. External scripts are practical when the same code is used in many different web pages. JavaScript files have the file extension `.js`.
Web Server

The term web server can refer to either the hardware (the computer) or the software (the computer application) that helps to deliver web content that can be accessed through the Internet.

The most common use of web servers is to host websites, but there are other uses such as gaming, data storage or running enterprise applications.

- **IIS** - Internet Information Services
  - Microsoft Windows

- **Apache** Web Server
  - Open Source
  - Cross-platform: UNIX, Linux, OS X, Windows, ...

- **Nginx** (pronounced "engine x") - Has become very popular lately

- GWS (Google Web Server)

- ...

Web Server Popularity

http://www.digi.no/921119/under-halvparten-bruker-apache
Internet Information Services (IIS)

- IIS – Internet Information Services
- Web Server that host the Web Pages/Web Site
- Make sure to have the IIS Role installed with ASP.NET sub components

Default IIS Directory: C:\inetpub\wwwroot

Students: Deploy one (or) more of your Web pages using IIS
<!DOCTYPE html>
<html>
<body>
<h1>My First Heading</h1>
<p>My first paragraph.</p>
</body>
</html>
IIS Deployment

Test your Web Page in your Web browser

“My First Heading

My first paragraph.

“localhost” is your personal computer, you can also use your IP address.
eBooks from Safari Books Online

http://proquest.safaribooksonline.com/?uicode=telemark
References

• HTML Tutorial: http://www.w3schools.com/html
• CSS Tutorial: http://www.w3schools.com/css
• JavaScript Tutorial: http://www.w3schools.com/js
Hans-Petter Halvorsen, M.Sc.

University College of Southeast Norway

www.usn.no

E-mail: hans.p.halvorsen@hit.no
Blog: http://home.hit.no/~hansha/