Web Programming

Step by step Exercises

https://www.halvorsen.blog
History of the Web

• Internet (1960s)
• World Wide Web - WWW (1991)
• First Web Browser - Netscape, 1994
• Google, 1998
• Facebook, 2004
• Smartphones (iPhone), 2007
• Tablets (iPad), 2010
1. Introduction to myDAQ

myDAQ is a simple and intuitive DAQ device from National Instruments. myDAQ has 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 LabVIEW Instrument Launcher):

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

If not, you find it in the National Instruments folder:
Web Pages Examples

https://www.halvorsen.blog
Use **HTML** to define the content of web pages.

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

Use **JavaScript** to program the behavior of web pages.

**The Web Programming Triangle**
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)

These are typically used together with a Database System, such as MySQL, SQL Server, etc.
The Web Pages are stored on the Web Server and sent to the client on request from the Web Browser.

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>
```

Web Browser

- HTML, CSS, JavaScript
- Client-side

Web Server

- ASP.NET, PHP, ...
- Internet Information Services (IIS), Apache, etc.
- Server-side

The code runs on the server and converted to HTML before sending to client (Web Browser).
Hans-Petter Halvorsen, M.Sc.
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>
```
<!DOCTYPE html>
<html>
<body>
<h1>My First Heading</h1>
<p>My first paragraph.</p>
</body>
</html>
<!DOCTYPE html>
<html>
<body>
<h1>This is a heading</h1>
<p>This is a paragraph.</p>
<p>This is another paragraph.</p>
</body>
</html>
HTML Editors

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

For the simple examples in this Tutorial you may only need Notepad (Windows) or TextEdit (Mac)

Another Editor is **Visual Studio Code**
My First HTML Web Page

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

Exercise: 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).

- 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
**Hyperlinks**

```html
<!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>
```

**Images**

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

Exercises: 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>
```

or

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

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:

```html
This is my Text
<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">
```

Exercises: Try these Examples
CSS

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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.
Exercises: Create this Code in e.g., NotePad or Visual Studio Code and Save the File as .html. 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>
```

Exercises: 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>
```

Exercise: Try this Example
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;
}
```

Exercise: Try this Example
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;
}
```

Exercise: Create a Style Sheet (.CSS) and a HTML page where you use these Properties
CSS Example

http://www.w3schools.com/css/demo_default.htm

Exercise: Open this Example and see how different styles totally changes the display and layout of a HTML page
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.
<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`. 
Hans-Petter Halvorsen, M.Sc.
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 installed with ASP.NET sub components

Default IIS Directory: C:\inetpub\wwwroot

Exercise: 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

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

http://proquest.safaribooksonline.com
References

• HTML Tutorial: http://www.w3schools.com/html
• CSS Tutorial: http://www.w3schools.com/css
• JavaScript Tutorial: http://www.w3schools.com/js
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