Web Programming

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Web is the Present and the Future

With HTML5 powerful Web Applications can be made

Desktop Applications

Web Applications

Mobile Apps
History of the Web

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

Edge
Chrome
Opera
Firefox
Safari

WHAT DO YOU THINK WILL BE THE LAST APPLICATION BEING MOVED INTO THE CLOUD?

geek & poke

THE BROWSER?

1. Introduction to myDAQ

myDAQ is a simple and intuitive DAQ device from National Instruments. Ni myDAQ have 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 also 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 ELVIS Instrument Launcher):

Note! You need to install the Ni ELVIS software first

If not, you find it in the National Instruments folder:
Web Development Environments

Microsoft:
• Visual Studio (Windows, a scaled version is in beta for MacOS)
• Visual Studio Code (Cross-platform, open-source)

Others:
• WebStorm (JavaScript IDE, client-side development and server-side development with Node.js, etc.)
• Eclipse
• Atom (free and open-source text and source code editor for macOS, Linux, and Windows)
• Sublime
• ...
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
Web Programming

- HTML
- CSS
- JavaScript
- IIS
- ASP.NET
- XML
- SQL
- PHP
- Web Services
- AJAX
- JQuery
- Web API
Basic Web Programming

- HTML
- CSS
- JavaScript

For more Dynamic Web Programming we use e.g.,
- ASP.NET
- SQL
- AJAX
- PHP
- etc.
Web Architecture

Client

Web Browser

HTML

CSS

JavaScript

Server-side

Web Server

Internet Explorer

Chrome

Firefox

Opera

Safari
Client-Server Example

Client

Web Browser

Response

Web Server

Request

Database

Internet Information Services (IIS), Apache, etc.
The Web Browser creates the visual webpage you see in the browser based on the HTML code.

```
<!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 Server: ASP.NET, PHP, ...

Web Browser: HTML, CSS, JavaScript

Client-side

Internet Information Services (IIS), Apache, etc.

Server-side
Server-side Development Framework

- ASP.NET (Programming Language: C#, IDE: Visual Studio)
- PHP
- Python Django (Programming Language: Python)
- Ruby on Rails (Programming Language: Ruby)
- Node.js (Programming Language: JavaScript)
Client-side Development Framework

JavaScript is the de facto client-side programming language. Typically you want to use a JavaScript Framework.

Here are some popular JavaScript Frameworks:
• AngularJS, Angular2 (JavaScript Framework, Google)
• Bootstrap (JavaScript/HTML, CSS Framework), Open source framework
• JQuery
• TypeScript (Microsoft)
Web Server

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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
HTML
HTML

• HyperText Markup Language (HTML)
• The Visual appearance of a Web Site
• “Web Browser Language”: All Web Browser understand HTML
• HTML 5.x 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>
```
## The History of HTML

<table>
<thead>
<tr>
<th>Year</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>Tim Berners-Lee invented www</td>
</tr>
<tr>
<td>1991</td>
<td>Tim Berners-Lee invented HTML</td>
</tr>
<tr>
<td>1993</td>
<td>Dave Raggett drafted HTML+</td>
</tr>
<tr>
<td>1995</td>
<td>HTML Working Group defined HTML 2.0</td>
</tr>
<tr>
<td>1997</td>
<td>W3C Recommendation: HTML 3.2</td>
</tr>
<tr>
<td>1999</td>
<td>W3C Recommendation: HTML 4.01</td>
</tr>
<tr>
<td>2000</td>
<td>W3C Recommendation: XHTML 1.0</td>
</tr>
<tr>
<td>2008</td>
<td>WHATWG HTML5 First Public Draft</td>
</tr>
<tr>
<td>2012</td>
<td>WHATWG HTML5 Living Standard</td>
</tr>
<tr>
<td>2014</td>
<td>W3C Recommendation: HTML5</td>
</tr>
<tr>
<td>2016</td>
<td>W3C Candidate Recommendation: HTML 5.1</td>
</tr>
</tbody>
</table>

[https://www.w3schools.com/html/html5_intro.asp](https://www.w3schools.com/html/html5_intro.asp)
HTML5 is supported in all modern Browsers

- Edge
- Chrome
- Opera
- Safari
- Firefox
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;
}
```
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!
JavaScript
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
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.
JavaScript Example

<!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>
JavaScript Frameworks

JavaScript is the de facto client-side programming language. Typically you want to use a JavaScript Framework.

Here are some popular JavaScript Frameworks:
• AngularJS, Angular2 (JavaScript Framework, Google)
• Bootstrap (JavaScript/HTML, CSS Framework)
• JQuery
• TypeScript (Microsoft)
AngularJS, Angular2

JavaScript Framework developed and maintained by Google

• https://angularjs.org
• http://www.w3schools.com/angular/
Bootstrap

• Bootstrap is a popular HTML, CSS, and JavaScript framework for developing responsive, mobile first projects on the web.
• Bootstrap is a free and open-source front-end web framework for designing websites and web applications.
• It contains HTML- and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions.
• Unlike many web frameworks, it concerns itself with client-side/front-end development only.

• [http://getbootstrap.com](http://getbootstrap.com)
• [http://www.w3schools.com/bootstrap/](http://www.w3schools.com/bootstrap/)
JQuery

• http://www.w3schools.com/jquery/
TypeScript

- TypeScript is a free and open-source programming language developed and maintained by Microsoft.
- It is a superset of JavaScript that compiles to JavaScript

http://www.typescriptlang.org
ASP.NET

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ASP.NET

- ASP.NET is a Web Framework for creating Web Pages created and maintained by Microsoft
- ASP.NET is built on top of the .NET Framework
- You use Visual Studio and C#
- ASP.NET Web Forms are very similar to standard Win Forms that you are already familiar with.
- If you know ordinary Win Forms, you also know ASP.NET Web Forms!
Web & ASP.NET

Client
- HTML
- JavaScript
- CSS

Server-side
- Web Server
- ASP.NET
- C#/VB.NET
- .NET Framework
ASP.NET – 3 different Development Models

- Web Sites
- Web Pages
- Web Forms
- MVC
- ASP.NET
- C#/VB.NET
- .NET Framework
ASP.NET supports three different development models:

<table>
<thead>
<tr>
<th><strong>Web Pages</strong></th>
<th><strong>MVC</strong></th>
<th><strong>Web Forms</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single Pages Model</strong></td>
<td><strong>Model View Controller</strong></td>
<td><strong>Event Driven Model</strong></td>
</tr>
<tr>
<td>Simplest ASP.NET model.</td>
<td>MVC separates web applications into 3 different components:</td>
<td>The traditional ASP.NET event driven development model:</td>
</tr>
<tr>
<td>Similar to PHP and classic ASP.</td>
<td>- Models for data</td>
<td>Web pages with added server controls, server events, and server code.</td>
</tr>
<tr>
<td>Built-in templates and helpers for database, video, graphics, social media and more.</td>
<td>- Views for display</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Controllers for input</td>
<td></td>
</tr>
<tr>
<td>Very similar to PHP</td>
<td>For more experienced Web Developers</td>
<td>The Web version of classic WinForms GUI and Code is separated.</td>
</tr>
<tr>
<td>GUI and Code mixed together</td>
<td>If you are familiar with PHP this is a good starting point.</td>
<td>If you are familiar with WinForms or WPF, this is a good choice.</td>
</tr>
</tbody>
</table>
ASP.NET Core

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ASP.NET – The Future

The new .NET Core is a lightweight cross-platform subset of the full .NET Framework
Choosing the right .NET

• .NET Framework (latest release .NET 4.6)
  – Windows only
  – Mature

• .NET Core (latest release .NET Core 1.0)
  – Cross-platform (Windows, Mac, Linux)
  – Immature, partly unfinished
  – Open source
  – Modular (NuGet packages)
ASP.NET Web Forms vs MVC

• Only MVC (ASP.NET Core MVC) will work with the new .NET Core Framework
  – .cshtml (mix of GUI and Code, so-called Razor files) + .cs files (pure C# code files)
  – No Visual Designer is available!
• ASP.NET Web Forms will continue to work with .NET Framework 4.6.x (but not part of .NET Core!)
  – .aspx (GUI) and .aspx.cs (Code behind) files + .cs (pure C# code files) files
  – Visual Designer is available
MVC

Each controller is responsible for handling user requests.

Controller

Web Requests

Updates

View

Updates

Model

Get Data from

User Interface
PHP

- **PHP** is a server-side scripting language for web development. It is used to make dynamic and interactive Web Pages
- Old and well-known Technology
- Very Popular and easy to learn
- Open Source/Free and Cross-platform
- PHP + MySQL is a powerful combination

PHP

- PHP files can contain text, HTML, CSS, JavaScript, and PHP code
- PHP code are executed on the server, and the result is returned to the browser as plain HTML
- PHP files have extension ".php"

https://en.wikipedia.org/wiki/PHP
http://www.w3schools.com/php/
<?php
    echo "Hello World!";
?>

<h1>My first PHP page</h1>
AJAX

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AJAX

• The key technique in an AJAX web application is the partial refresh.
• With partial refreshes, the entire page doesn’t need to be posted back and refreshed in the browser.
• Instead, when something happens, the web page asks the web server for more information.
• The request takes place in the background, so the web page remains responsive.
• When the web page receives the response, it updates just the changed portion of the page
AJAX


SIMPLY EXPLAINED

ONE BEER PLEASE!

ONE BEER PLEASE!

NO AJAX

AJAX
3. party Web Components

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Telerik

- Web Components for ASP.NET, ASP.NET Core, PHP, ...
- Components:
  - Grid
  - Charts
  - ...

- [Image of a grid and chart interface]
References

• Wikipedia
• Web Server: [http://www.digi.no/921119/under-halvparten-bruker-apache](http://www.digi.no/921119/under-halvparten-bruker-apache)
• [http://www.w3schools.com](http://www.w3schools.com)
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