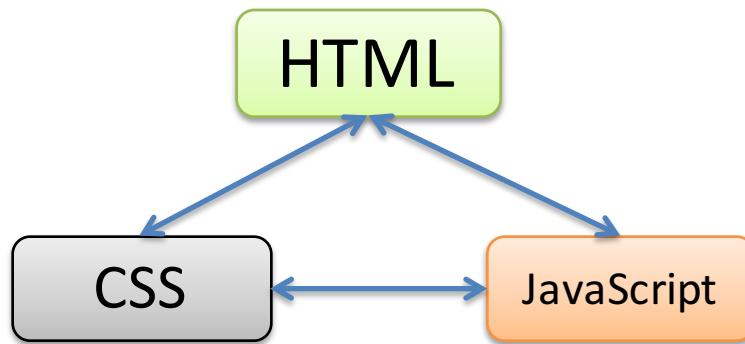


# Web Programming



Step by step Exercises

Hans-Petter Halvorsen, M.Sc.

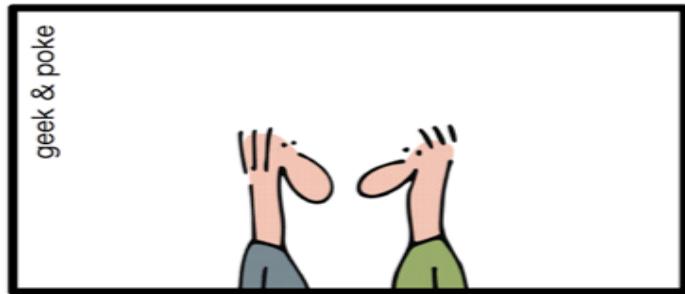
# History of the Web

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



# The Web Browser

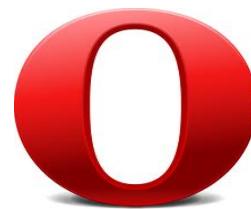
WHAT DO YOU  
THINK WILL BE THE  
LAST APPLICATION  
BEING MOVED INTO  
THE CLOUD?



Internet Explorer



Chrome



Opera



Firefox



Safari

Microsoft Word Online - Work together on Word documents

NI myDAQ.docx - Microsoft Word Online

Word Online | OneDrive > myDAQ

NI myDAQ

Share Hans-Petter Halvorsen | Sign out ?

FILE HOME INSERT PAGE LAYOUT REVIEW VIEW Tell me what you want to do OPEN IN WORD

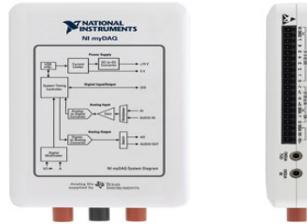
Font Paragraph Styles Editing

Calibri (Body) 11 A A A B I U abc x<sub>2</sub> x<sup>2</sup> A A BbCc Normal AaBbCc Code AaBbCc ExampleTitle

Paste Clipboard

## 1. Introduction to myDAQ

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



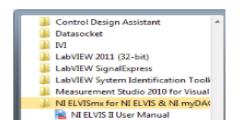
In addition to traditional I/O, the myDAQ have a built-in **Digital Multimeter**. The myDAQ can be used as a **Power Supply**. Using the built-in software the myDAQ can also be used as an **Oscilloscope** and **Function Generator**.

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



Note! You need to install the NI ELVISmx driver software first

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



# Web Pages Examples

store.apple.com

Apple Store Mac iPhone Watch iPad iPod iTunes Support

Finn en forhandler Bedrifter Få hjelp Kjøp tilbehør

Apple Store Kjøp Mac Kjøp iPhone Kjøp iPad Kjøp iPod Kjøp Apple TV Kjøp tilbehør

iPad Air 2  
Forandring som fryder.

Fra kr 4.190

Gratis frakt på alle bestillinger over 1.038,-. Og gratis retur.

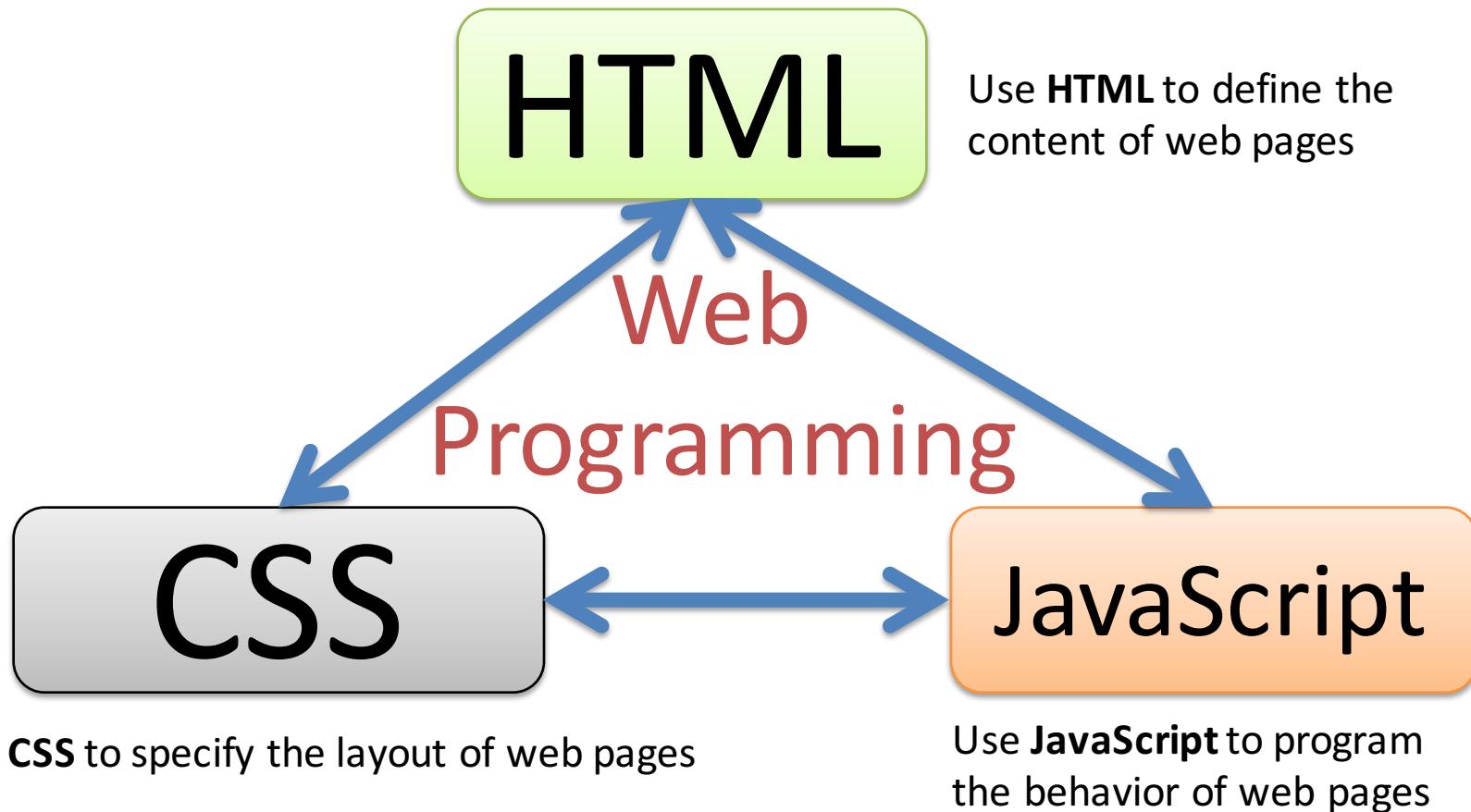
A screenshot of the Apple Store website featuring the iPad Air 2.

Større. På absolutt alle måter.

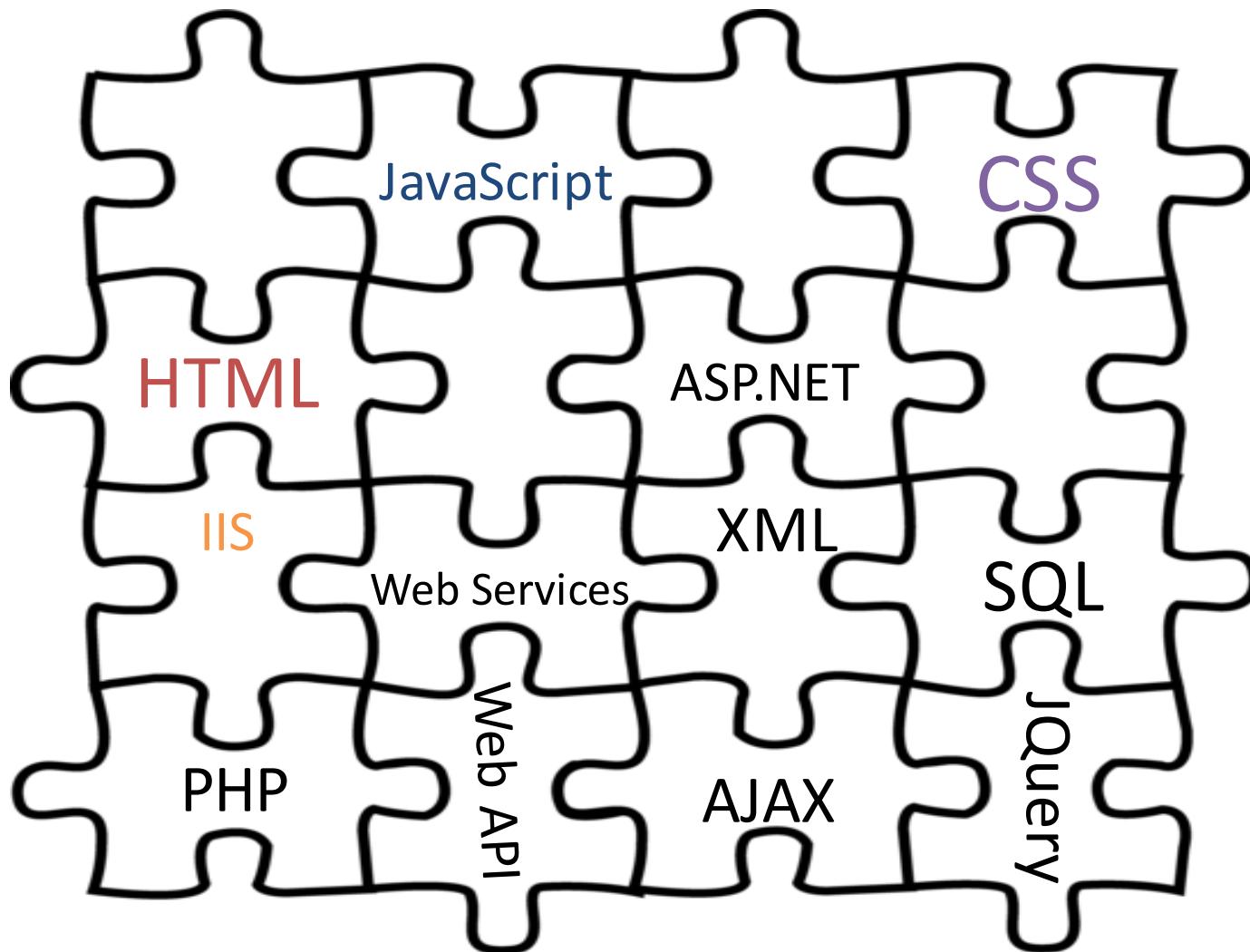
Kjøp nå

A screenshot of the Apple iPhone website featuring the iPhone 6s.

# The Web Programming Triangle



# Web Programming

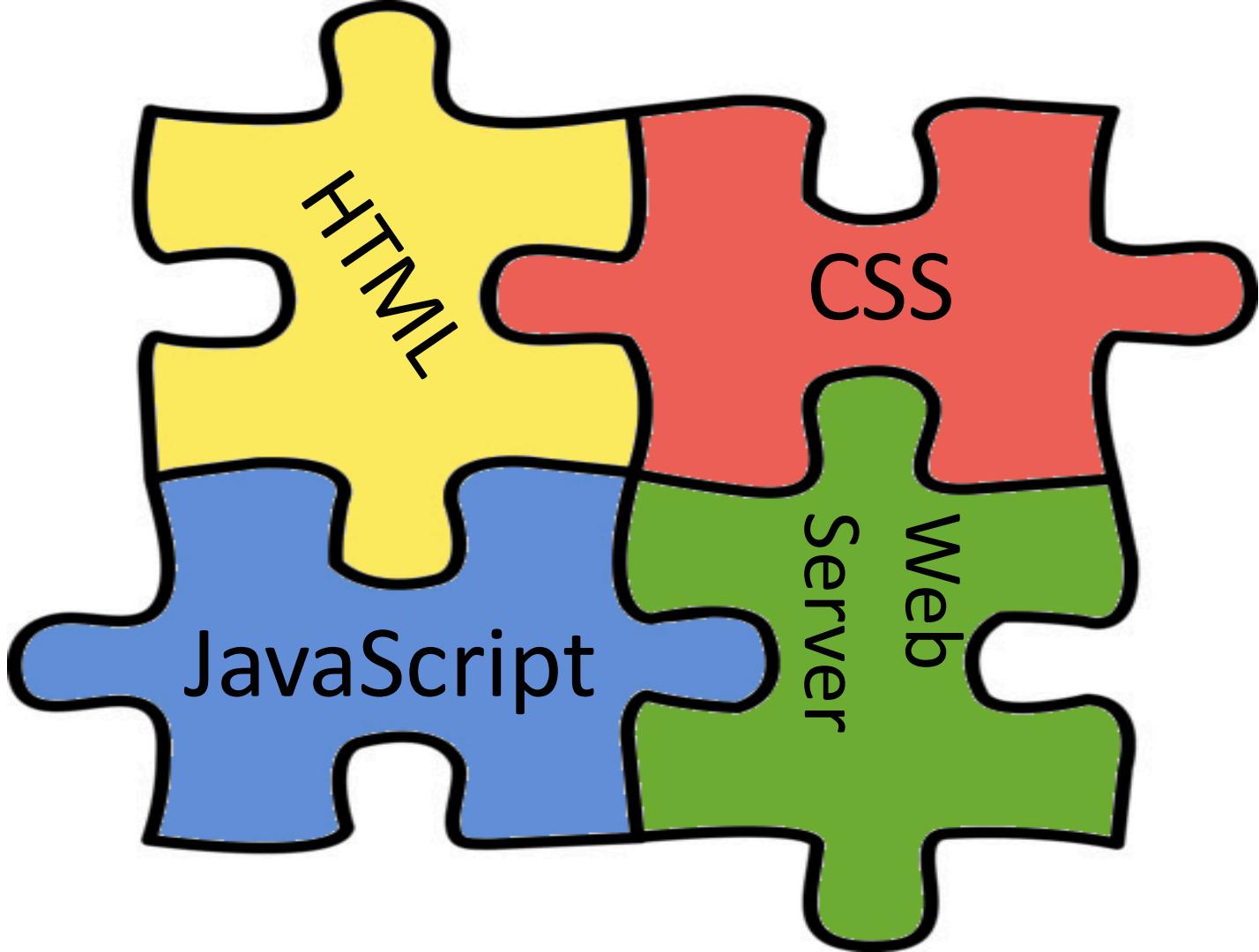


# Basic Web Programming

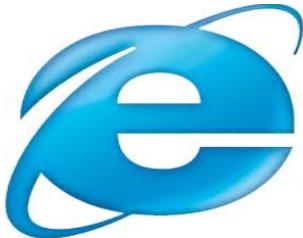
- HTML
- CSS
- JavaScript

For more Dynamic Web Programming we use e.g.,

- ASP.NET
- SQL
- AJAX
- PHP
- etc. (But these are not part of this Tutorial)



# Web Architecture



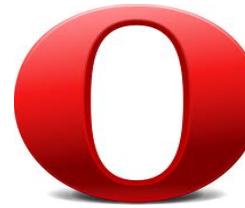
Internet Explorer



Chrome



Firefox



Opera



Safari

Client

Web Browser

HTML

CSS

JavaScript

Server-side

Web Server

# Client-Server Example

**Client**



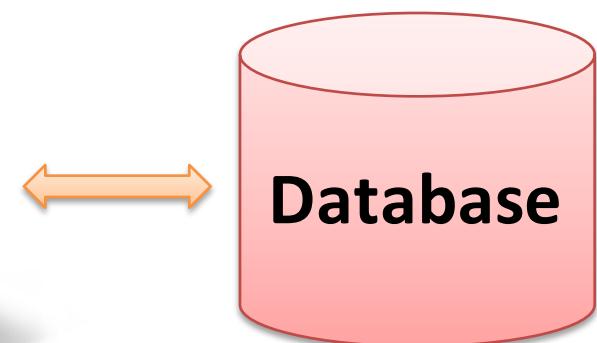
Web Browser

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

```
<!DOCTYPE html>
<html>
<body>

<h1>My First Heading</h1>

<p>My first paragraph.</p>

</body>
</html>
```



the HTML code

**My First Heading**

My first paragraph.

HTML, CSS, JavaScript

Client-side

Web Browser



Web Page (HTML)

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

ASP.NET, PHP, ...

Web Server

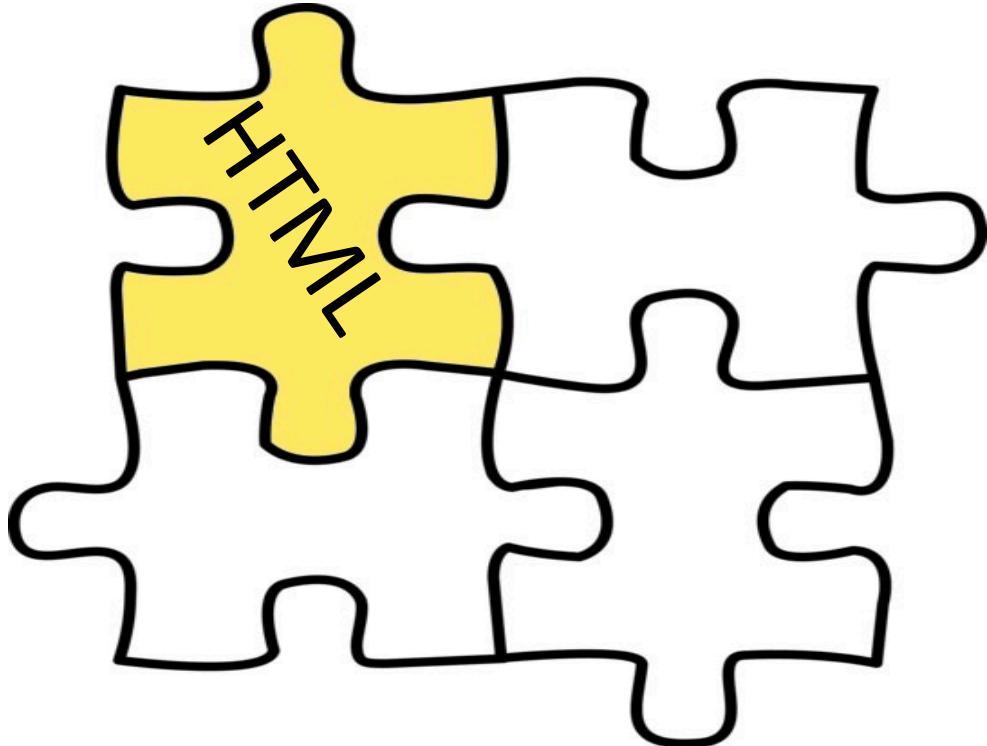
Server-side

Internet Information Services (IIS), Apache, etc.



A chalkboard with a wooden frame. Inside, the equation  $2+2=4$  is written in white chalk. A piece of white chalk lies horizontally across the bottom of the board.

$$2+2=4$$



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

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8">
    <title>Title of the document</title>
  </head>

  <body>
    Content of the document.....
  </body>

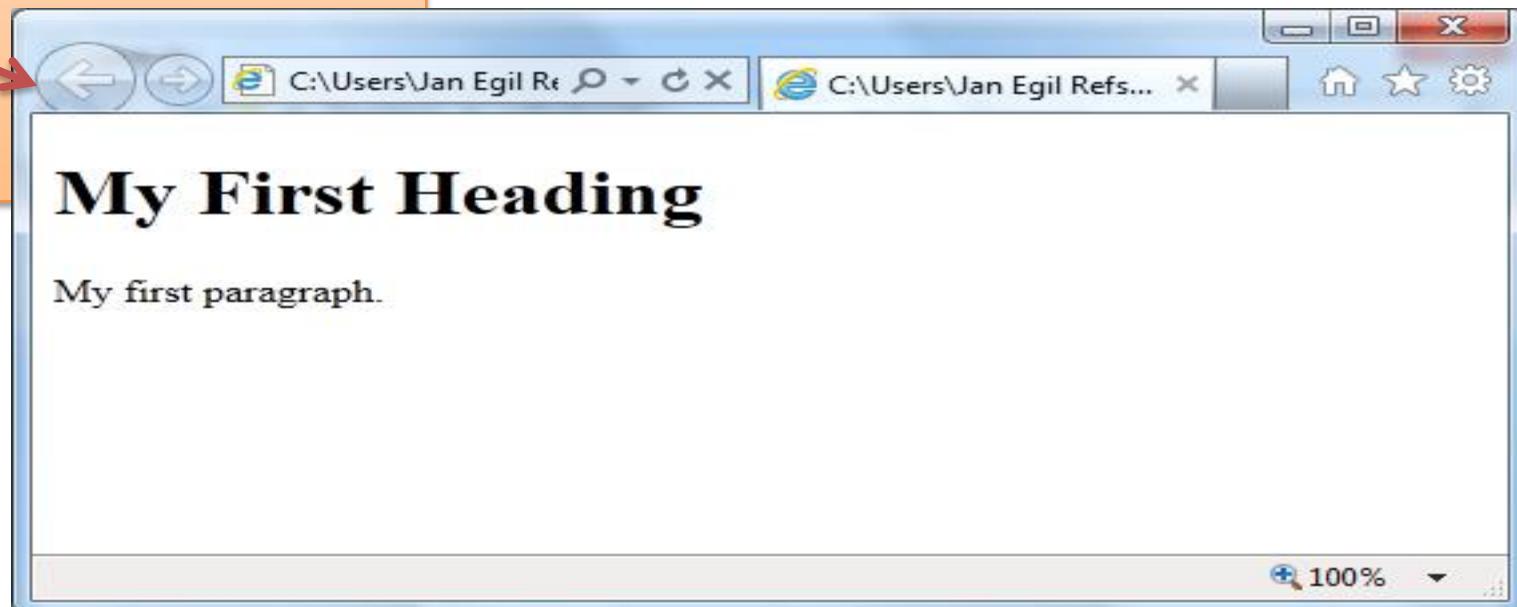
</html>
```

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

HTML Code

HTML

Web Browser



# HTML Page Structure

```
<html>
```

```
  <body>
```

```
    <h1>This is a heading</h1>
```

```
    <p>This is a paragraph.</p>
```

```
    <p>This is another 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 we only need Notepad (Windows) orTextEdit (Mac)

# My First HTML Web Page

<tagname>content</tagname>

```
<!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 a 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).

# Images

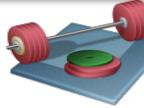
# Hyperlinks

```
<!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>
```



Students: Create these Examples

```
<!DOCTYPE html>
<html>
<body>

<h1>This is a heading</h1>



</body>
</html>
```

# HTML Tags

Hyperlink:

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

Bold Text:

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

Headers:

```
<h1>This is my Header</h1>
```

```
<h2>This is my Header</h2>
```

```
<h3>This is my Header</h3>
```

Title:

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

Image:

```

```

Paragraph:

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

Line Break:

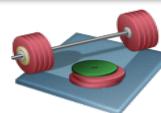
```
This is my Text
```

```
<br>
```

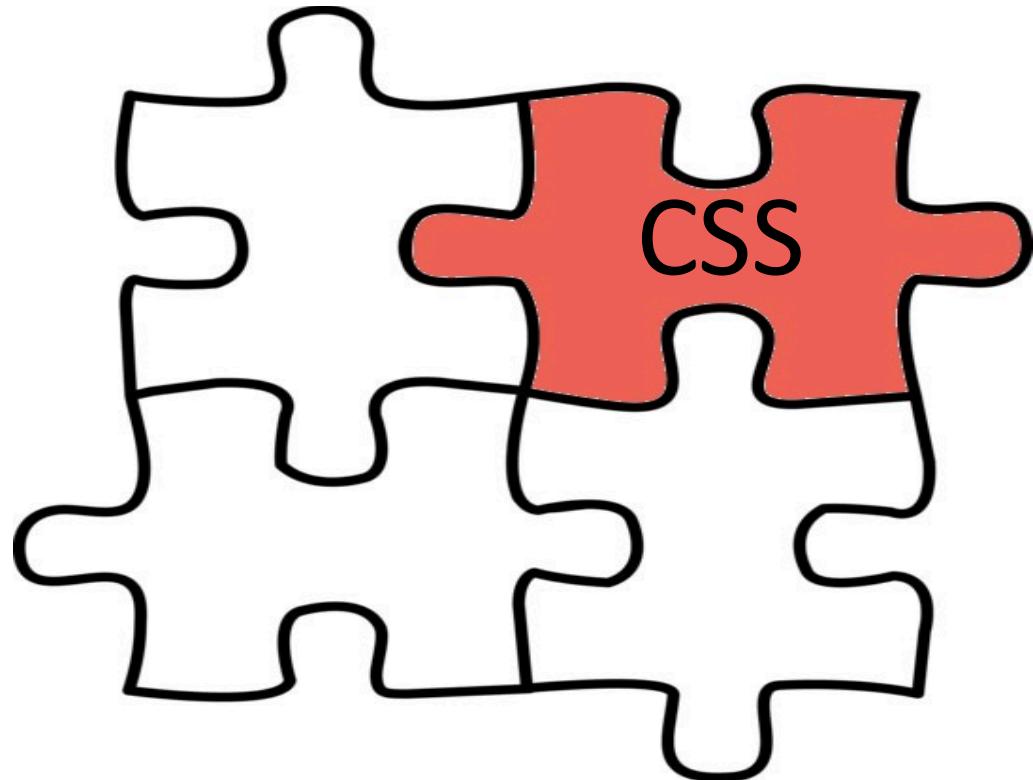
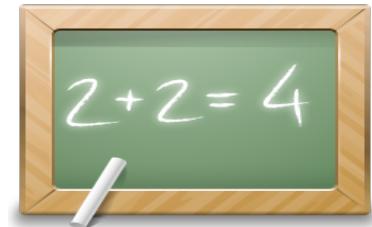
```
This is also my Text
```

Comments:

```
<!-- 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

```
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

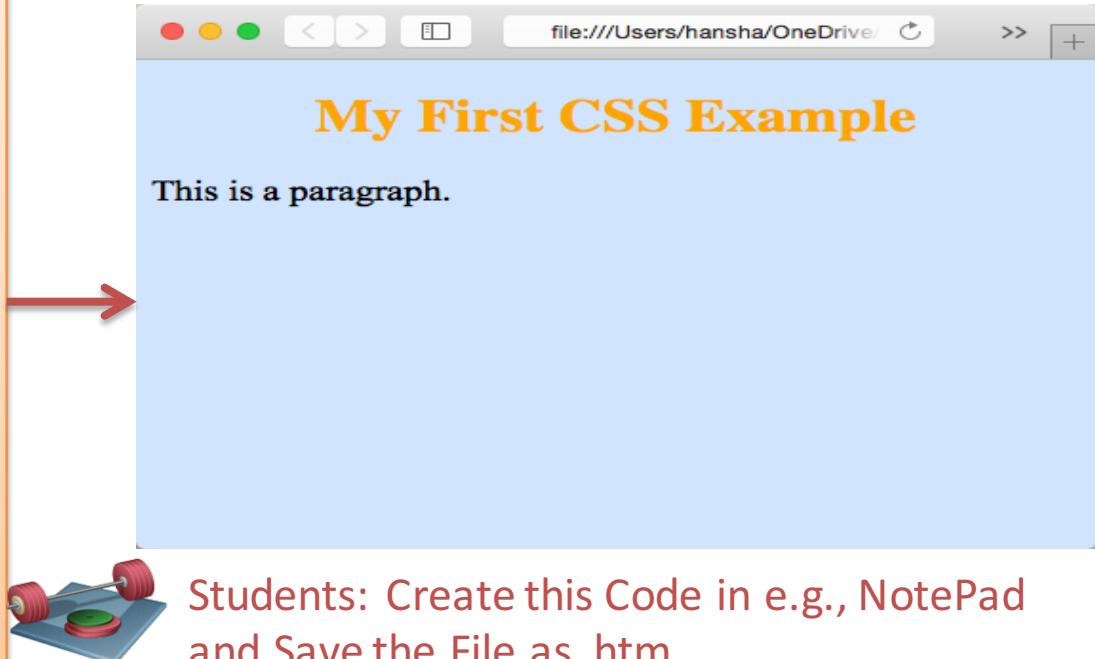
```
<!DOCTYPE html>
<html>
<head>
<style>
body {
    background-color: #d0e4fe;
}

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

p {
    font-family: "Times New Roman";
    font-size: 20px;
}
</style>
</head>
<body>

<h1>My First CSS Example</h1>
<p>This is a paragraph.</p>

</body>
</html>
```



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.

# CSS Syntax



A CSS declaration always ends with a semicolon, and declaration groups are surrounded by curly braces, e.g.:

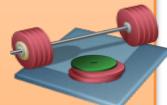
```
p {color:red;text-align:center;}
```

# CSS Classes

```
.center {  
    text-align: center;  
    color: red;  
}
```

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

```
<!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>
```



```
<!DOCTYPE html>  
<html>  
<head>  
<style>  
p.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:

```
<head>
<style>
body {
    background-color: linen;
}
h1 {
    color: maroon;
    margin-left: 40px;
}
</style>
</head>
```



Students: Try this Example

```
<!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

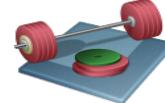
Each HTML page must include a link to the style sheet with the <link> tag. The <link> tag goes inside the head section:

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

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

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

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



Students: Try this Example

# CSS Properties

## Text Color

```
body {  
    color: blue;  
}  
  
h1 {  
    color: #00ff00;  
}  
  
h2 {  
    color: rgb(255,0,0);  
}
```

## Text Alignment

```
h1 {  
    text-align: center;  
}  
  
p.date {  
    text-align: right;  
}  
  
p.main {  
    text-align: justify;  
}
```

## Text Font

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



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

## Background Color

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

## Text Size

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

```
h2 {  
    font-size: 30px;  
}
```

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

# CSS Example

[http://www.w3schools.com/css/demo\\_default.htm](http://www.w3schools.com/css/demo_default.htm)

## Welcome to My Homepage

Use the menu to select different Stylesheets

Stylesheet 1

Stylesheet 2

Stylesheet 3

Stylesheet 4

No Stylesheet

## Same Page Different Stylesheets

This is a demonstration of how different stylesheets can change the layout of your HTML page. You can change the layout of this page by selecting different stylesheets in the menu, or by selecting one of the following links:

[Stylesheet1](#), [Stylesheet2](#), [Stylesheet3](#), [Stylesheet4](#).

### No Styles

This page uses DIV elements to group different sections of the HTML page. Click [here](#) to see how the page looks like with no stylesheet:

[No Stylesheet](#).

### View Stylesheets

The stylesheets uses CSS syntax to layout the HTML page. Take a look at the stylesheets used in this demonstration:

[Stylesheet1](#), [Stylesheet2](#), [Stylesheet3](#), [Stylesheet4](#).

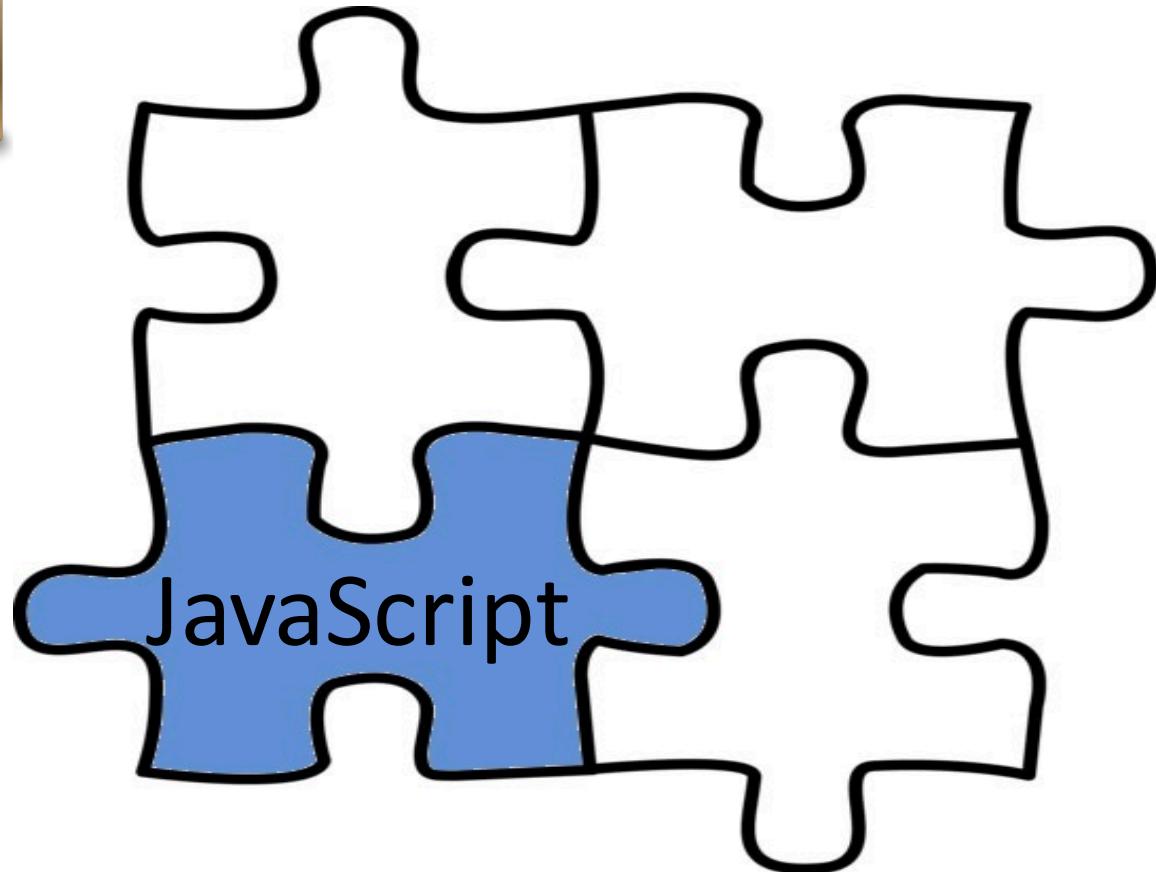
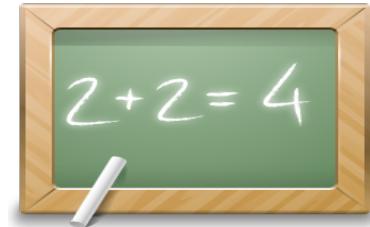
### Side-Bar

Lore ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat.

Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat. Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum dolore eu feugiat nulla facilisis at vero eros et accumsan et iusto odio dignissim qui blandit praesent luptatum zzril delenit augue duis dolore te feugait nulla facilisi.



Students: Open this Example and see how different styles totally changes the display and layout of a HTML page



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.

# JavaScript Example



Students: Try this 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>
```

## My First JavaScript

JavaScript can change the content of an HTML element:

[Click Me!](#)

Hello JavaScript!

# JavaScript Example 2

```
<!DOCTYPE html>
<html>
<body>

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

<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

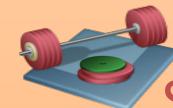
    if (isNaN(x) || x < 1 || x > 10) {
        text = "Input not valid";
    } else {
        text = "Input OK";
    }
    document.getElementById("demo").innerHTML = text;
}
</script>

</body>
</html>
```

Please input a number between 1 and 10:

Input not valid



Students: Try this Example

# 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:

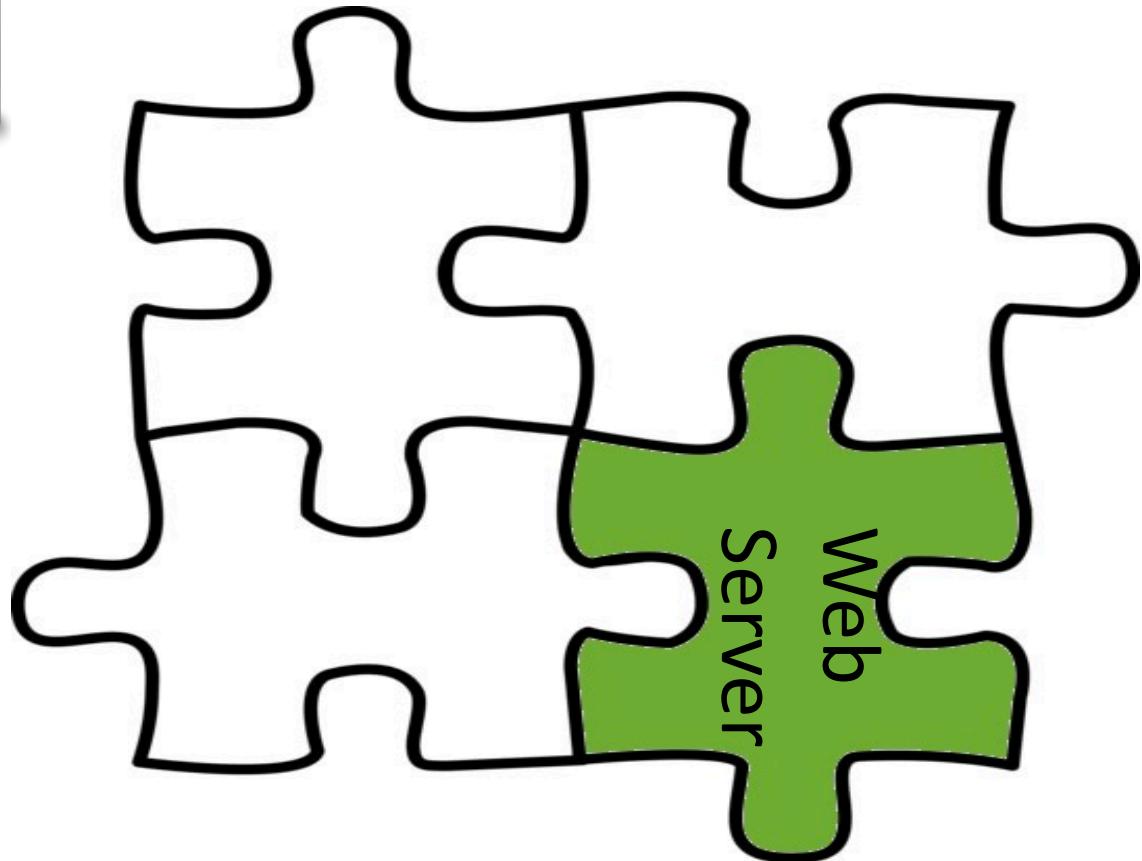
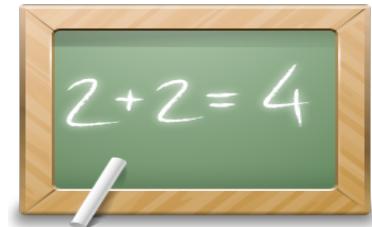
```
//document.getElementById("myH").innerHTML = "My First Page";  
document.getElementById("myP").innerHTML = "My first paragraph.;"
```

```
/*  
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.

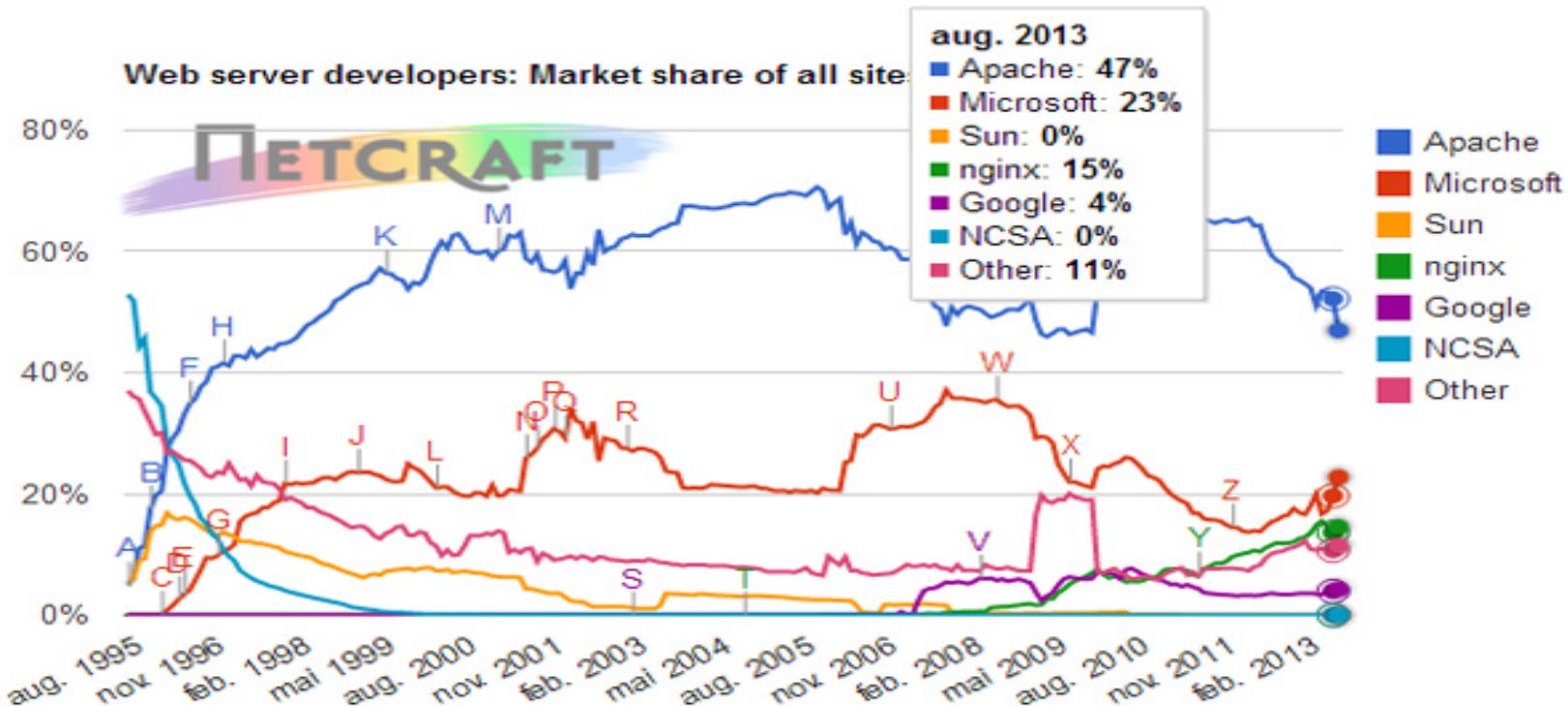
# Web Server

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)**
- ...

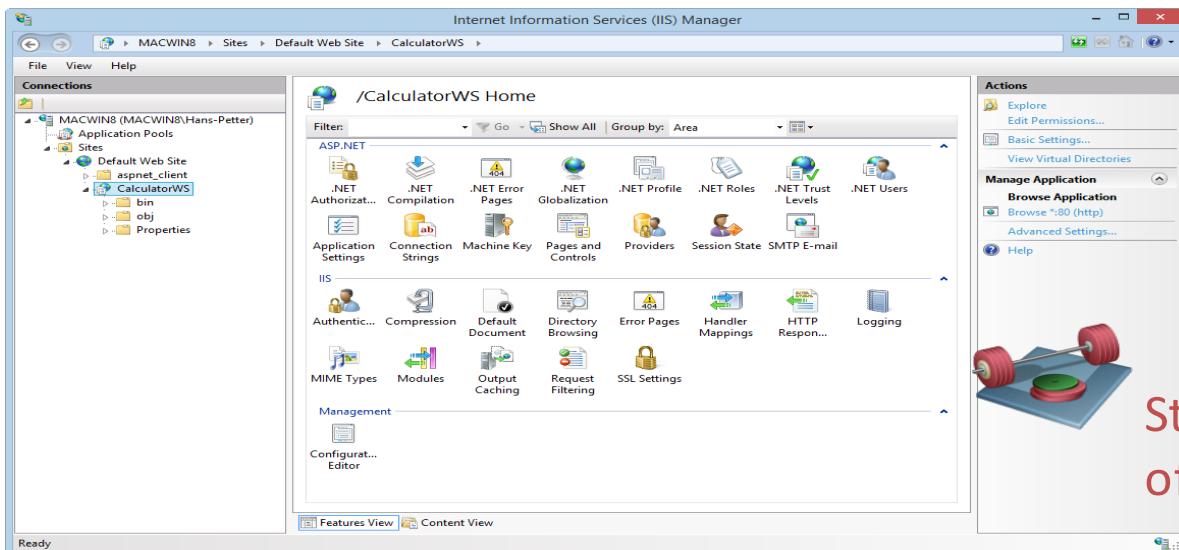
# Web Server Popularity



<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

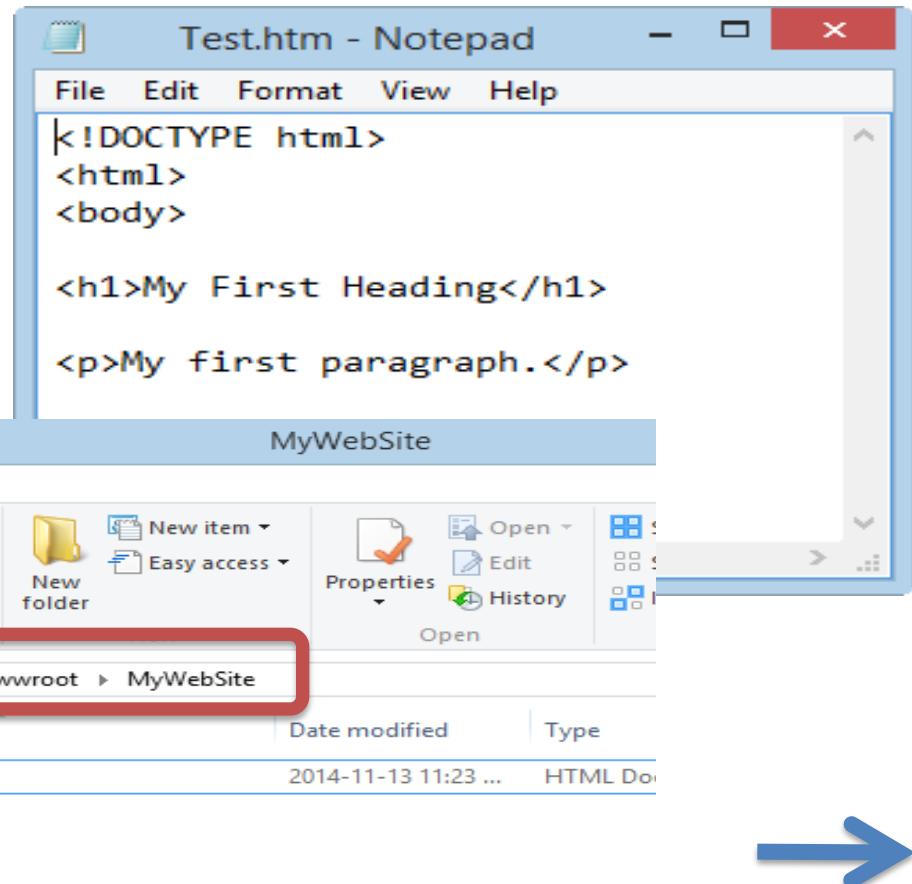
```
<!DOCTYPE html>
<html>
<body>

<h1>My First Heading</h1>

<p>My first paragraph.</p>

</body>
</html>
```

# IIS Deployment



# IIS Deployment

The screenshot illustrates the process of deploying a web application using Internet Information Services (IIS) on a Windows server.

**IIS Manager:** The top half of the image shows the "Internet Information Services (IIS) Manager" interface. A blue arrow points from the "Add Application..." option in the context menu of the "Default Web Site" to the "Add Application" dialog box. The dialog box contains the following settings:

- Site name:** Default Web Site
- Path:** /
- Alias:** MyWebSite (highlighted with a red box)
- Application pool:** DefaultAppPool
- Physical path:** C:\inetpub\wwwroot\MyWebSite (highlighted with a red box)
- Pass-through authentication:** Connect as... Test Settings...
- Enable Preload

**Browser:** The bottom half of the image shows a web browser window displaying the deployed application. The address bar shows the URL <http://localhost/MyWebSite/Test.htm>. The page content includes:

- My First Heading** (bold text)
- My first paragraph.
- A callout box containing the text: “localhost” is your personal computer, you can also use your IP address.
- A callout box containing the text: Test your Web Page in your Web browser.



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[HTML Tag Reference](#)



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[CSS Reference](#)



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Learn how to create a website on your own computer  
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Color Picker

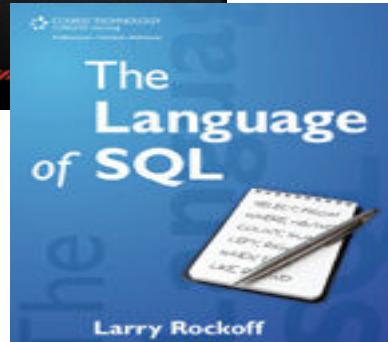
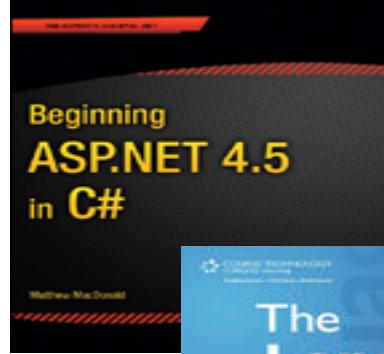
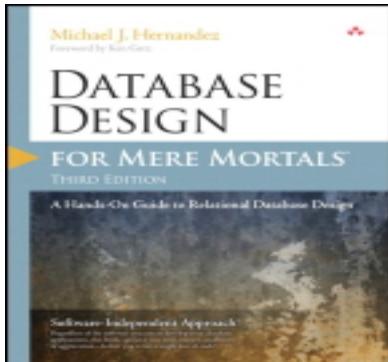
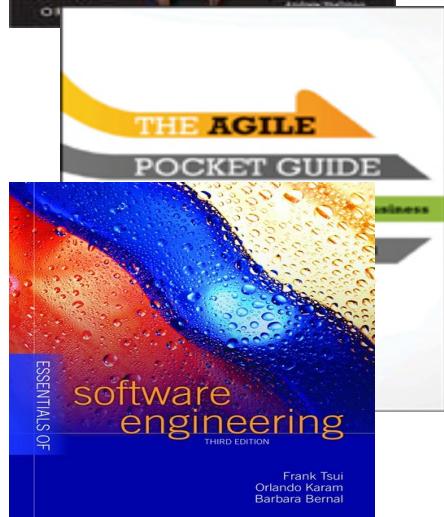
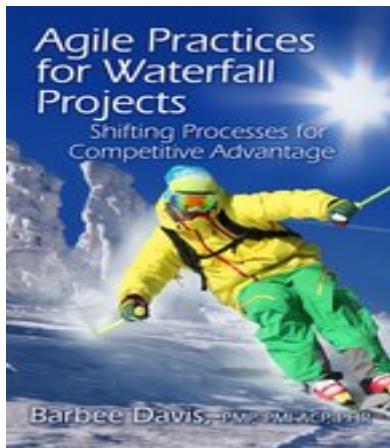
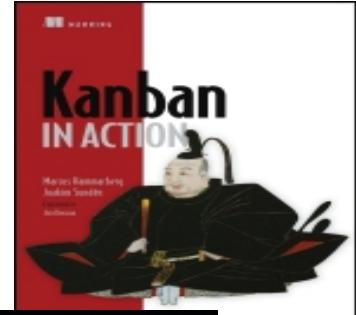
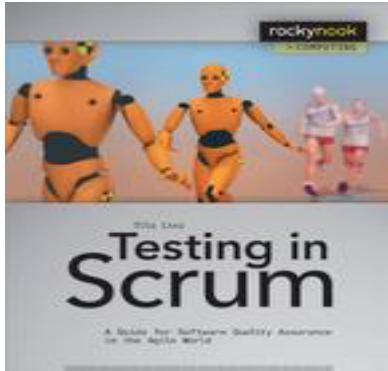
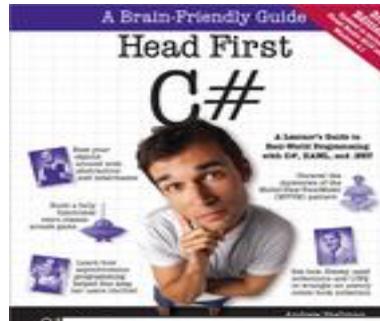
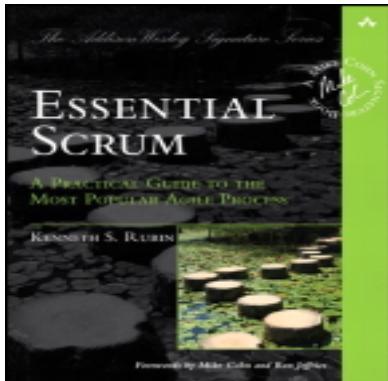
[1000+ Examples](#)

## References

- » HTML/HTML5 Tags
- » HTML Colors
- » HTML Characters
- » HTML Symbols
  
- » CSS 1,2,3
- » CSS3 Support
  
- » JavaScript
- » HTML DOM
- » jQuery
- » jQuery Mobile
- » Google Maps
  
- » PHP
- » SQL
- » ASP.NET
  
- » XML DOM
- » XSLT
- » XPath
- » SVG

# 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>

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