Web Fundamentals – Session 1

Introduction – Course Overview

What will we learn

- How websites are made
- How to put up your own webpage
- Basic skills and tools that will be useful for any coding you do

We hope you will become curious about how the Internet works and will look at websites in a different way.

How courses will be run

The hardest thing about learning to program is knowing **where** to start and **what** to learn.

The course **aims** to provide a basic overview of the technologies used, along with the tools and resources to discover more.

The **focus** of this course is learning the basics of how and why things work and to provide the basis to build upon in future courses. We will **not** be able to cover everything in great depth or comprehensive detail.

Sessions will be as **hands-on and practical** as possible. Each week there will be a number of tasks to do in between the sessions to reinforce what you have learnt.

It's up to you whether you do the tasks or not, but the more you put in the more you will get out! If you're ever in doubt, Google it, check StackOverflow, ask the person beside you, or ask one of us!

Note:

DEMOS will be in blue with a salmon background – Like this. – Please show them to do this as you talk through it.

STUDENT TASKS will be in red with a pale-blue highlighted background – Like this.

In this lesson

Before we go on to make our websites, it is worth taking some time to think about how the web works, and look at the big picture of how websites are made.

Chapter 1 – What makes a website?

Demo:

- Use developer tools to show Sources of webpage to show file system

Content:

A **website** is a collection of linked webpages (and their associated resources); a set of related files that is compatible to your browser.

A **webpage** is just a file that your web browser is able to read and display, written in a markup language; **HTML**.

The website's main webpage (or *point of entry*) is referred to as the **homepage**, or a **landing page**. This is predefined, and its document name must be set as index.html.

To **display** the page on the client-side device, a browser starts out by reading the HTML. This is why additional resources, such as CSS & JS, are written in dedicated documents and are "plugged-in" or linked into HTML documents, as we will see later.

A typical webpage depends on several technologies (such as CSS, JavaScript, Flash, AJAX, JSON) to control what the end-user sees, but most fundamentally, developers write webpages in HTML, without which there can be no webpages. Associated (additional) **resources** can be embedded into your HTML file. These include, and are not limited to:

- page styles; **CSS** (Cascading StyleSheets)
- scripts – *for interactivity*; **JavaScript**
- media – *videos, music, etc.*

Demo:

Here is a demonstration of how additional resources can affect the HTML document. Recap from course prep the role of each language & do a Q&A of languages – ask what they think each language does to the page and clarify, etc.

Content/style separation

Back in the early days of the web HTML would both store the information and tell the browser how to display it. People then realised that this was a bad idea – making a small change such as changing the colour of a heading would require edits all over the place, which made sites hard to maintain. HTML is now used just to display the information (text etc.) that is stored in the page. CSS is used to tell the browser how to display the information.

Viewing HTML, CSS and JS of any given webpage online

Because the web document files are sent to your browser, it is easy for you to look at them. **There are no secrets in HTML, CSS or js.** If there's a part of a webpage that you like, it's easy to find out how it is coded and use the technique yourself.

Every browser provides a way to look at the source of the page you're currently viewing.

In Chrome you do View > Developer > View Source. This will show you the raw HTML but isn't always the easiest thing to look at.

Several browsers also provide developer tools, which allow you to *interactively* view the page source. In Chrome you can access these by doing View > Developer > Developer Tools. If you use Firefox, you can get similar functionality with the Firebug plugin.

These tools are the best way to investigate a web page. Over the course you will be using them a lot on your own pages, especially when things aren't working exactly as you expect.

There are a few features of the Chrome developer tools that it is worth pointing out now.

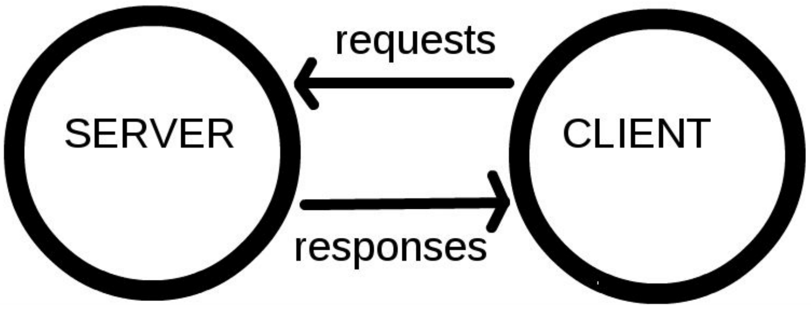
Task:

1. Open any website in Google Chrome, or the Code First: Girls website
2. View the page source by doing one of the following:
   - View > Developer > View Source
   - Tools > View Source
3. Open the developer tools by doing one of the following:
   - View > Developer > Developer Tools
   - Tools > Developer Tools
4. Use the square with a pointer in the bottom left to hover over bits of the page and find the related HTML.
5. Hover over the HTML code in the developer tools box and watch as different parts of the page are highlighted.
6. Try changing some of the CSS on the right hand side. To undo any changes just refresh the page.
7. Have a look on the Resources tab. See if you can find the CSS, javascript and image files used on this page.
8. Visit a few of your favourite websites and repeat this process.

Chapter 2 – How the Internet Works

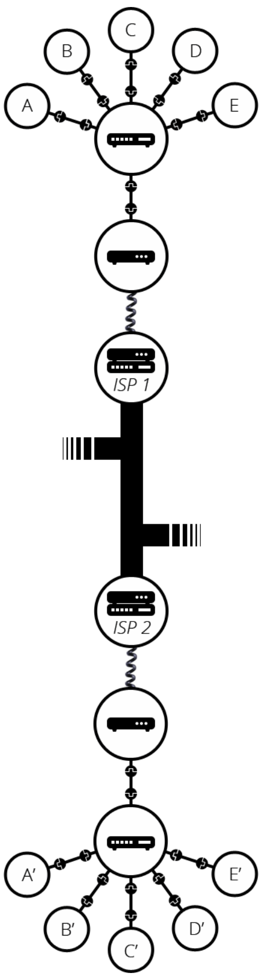
How does someone find your website? How do we publish our websites for other people to find?

Computers connected to the Web are called **clients** and **servers**



The computers that hold web pages, sites and applications are called **servers**. *Web servers are large, specialised computers that are (almost) permanently connected to the internet.*

The computers that allow people to access the web by providing software (browsers) for them to do so are called **clients**. They are the typical user's Internet-connected device.



The **Internet** is the technical infrastructure that makes the Web possible. You can think of the Internet as a massive network of computers that can send files to one another.

As more and more computers join the network, it gets a little bit too complicated to keep track of.

To solve this problem, we use special tiny computers called **routers**, which only have one job: to make sure that a message sent from one computer to another is done correctly.

By connecting computers to routers, and then routers to each other, we are able to scale infinitely.

To connect routers to each other, we make use of existing telephone infrastructure by using **modems**, and connect our network to an Internet Service Provider (**ISP**) – a company that manages special routers which all link together and can access special routers of other ISPs.

This is how the infrastructure of the Internet was created.

Adapted from Mozilla Web Developer Tutorials, here.

Chapter 3 – How the Web Works

Many of our web interactions begin with a URL (*uniform resource locator*) being typed into our web browser address bar.

Let's look at an example: http://www.bbc.co.uk/news/.

This URL has several different parts to it:

- http : the *protocol* or *how* to fetch the information
- www.bbc.co.uk : the *host* or *where* to fetch it from
- /news : the *path* or precisely *what* information to fetch

When we type the URL into the address bar a request is sent over the internet and some information is returned to us.

The protocol describes how the information is transmitted. Other possibilities include https for secured communication, ftp for file transfer and git which you'll learn about later.

The host describes where the information should come from and the path tells that location precisely what information to send.

In general a URL can be more complicated than this. URLs can also contain *query parameters*, *fragments* and *port information*. We will leave these for now but will point them out when we meet them later. Instead we will focus on exactly what information is being sent and who is sending it.

Each computer on the internet has an address (an *IP address*) so that requests can be sent to it and files returned – much like a telephone number. The backbone of the internet is a network of *routers* that are responsible for routing files from one IP address to another.

DNS

IP addresses are a sequence of numbers and '.'s such as 212.58.244.67. These aren't very easy to remember. Instead the internet works on a domain name system, that matches domain names such as bbc.co.uk to IP addresses.

Task:

Type 74.125.224.72 into your browser's address bar. What happens?

One of the first things that happens when you type a URL into your browser is a *DNS lookup*: your computer contacts a DNS server (*Domain Name System server*), which is basically a massive address book of IP addresses. The DNS server converts the domain name from the URL (e.g. bbc.co.uk) into an address for a server (such as 212.57.244.67).

Once the address of the web server has been found your request is forwarded on to it, the web server will interpret your request and send back one or more files.

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Static vs dynamic sites

There are two main possibilities server-side: either your site is static or dynamic.

- In a **static** site, all pages are pre-prepared and the web server just sends them to the browser.
- In a **dynamic** site, pages are prepared on-the-fly pulling information out of a database depending on what the user asked for.

Most of the sites you can think of will be dynamic sites (e.g. facebook.com, reddit.com, amazon.com, ..).

Server-side technologies

There are many options for building a dynamic server-side site. Common choices are:

Ruby on Rails	**PHP**	**Django**	**node.js**	WordPress
Web development framework written in Ruby (programming language)	Programming language popular in the early 2000s.	Web development framework written in Python (programming language)	Web development framework written in Javascript.	A blogging platform (now capable of much more) written in PHP.

Putting up a website

If you want to put up your own website at your own domain name you need two things:

1. A web server to serve your site
2. A domain name to point towards it

There are many options for web servers – you don't have to physically have your own one. Many companies that will offer **web hosting**, often providing you with space on a shared server. Later in the course we will use the free hosting offered by GitHub through GitHub Pages.

To buy a domain name you need to use a domain registrar. This is not necessary for our course, but it will be useful to know how they work.

Examples include 123-reg.co.uk, godaddy.com and namecheap.com. You pay the registrar to contact the body who manages a TLD (e.g. .com, .org., .co.uk) and put your server's IP address in their DNS address book.

Many domain registrars will try to sell you hosting and other site building tools when you buy a domain. It's important to remember that the domain name is completely separate from the hosting and you don't need to do them both through the same company – don't buy anything you're not going to use.

Chapter 4 – Creating an HTML page

One of the nice things about HTML is you don't need any fancy software to test it out on your laptop: all you need is a text editor and a web browser.

Task:

1. Create a folder called coding_course to hold all your work for the course.
2. Inside your coding_course folder create another folder called first_site.
3. Open Sublime Text.
4. Write "Hello"
5. Save the file as index.html in the first_site folder
6. Open index.html in Chrome. Depending on your version of Chrome
   - File > Open
   - Cmd-o (Mac) or Ctrl-o (Windows)

Why index.html?

In the old days of the web, navigating a website was a lot more like moving around the folder system on your laptop. You would go to a base site and there would just be a list of the files and folders available: an index. Because of this index.html is still the default file that a server will serve when you navigate to a folder in the web browser.

Task:

1. Go back to 'index.html' in Sublime Text.
2. Change the text to

```
<h1>Hello</h1>
```

1. Save 'index.html' – Cmd-S [Mac] or Ctrl-S [Windows]. *Hint: if there is a circle next to your file tab in Sublime Text, it's not saved!*

2. Go back to 'index.html' in Chrome and refresh the page (Cmd-R [Mac] or Ctrl-R [Windows])

This is your first line of HTML. It has an open tag and a close tag. They tell your browser to display the text in-between as a heading.

Chapter 5 - HTML Basics

Elements, Tags & Attributes

HTML uses a *predefined* set of **elements** for different **types of content**; they define the **semantic value** (or meaning) of their content. Elements include two matching tags and everything in between. They contain one or more "tags" which either contain or express content.

For example, the "<p>" element indicates a paragraph; the "<img>" element indicates an image.

HTML attaches special meaning to anything that starts with the less-than sign ("<") and ends with the greater-than sign (">"). Such markup is called a **tag**.

Tags are enclosed by *angle brackets*, and the closing tag begins with a forward slash.

Make sure to **close** the tag, as some tags are closed by default, whereas others might produce unexpected errors if you forget the end tag. An example of a tag that closes by default is the image tag.

```
<img src="smileyface.jpg" alt="Smileyface">
```

The start tag may contain additional information, also known as an **attribute**. Attributes usually consist of *2 parts*, its **name** and corresponding **value**. In the example below, the attribute name is "class", and the class of the div is "main".

```
<div class="main">
```

Valid Code

To write **valid** code, you must properly nest start and closing tags, that is, write close tags in the opposite order from the start tags.

Valid code:

```
<div>

      <p>

            <em>I <strong>really</strong> mean that</em>.

      </p>

</div>
```

Invalid code:

```
<div> <p> <em>I <strong>really</em> mean</div> that</strong>.</p>
```

HTML DOM

The **Document Object Model** specifies the hierarchical layout of the HTML document. It is an Application Program Interface *(set of routines, protocols and tools for building software applications)*, or **API**, that represents and interacts with any HTML or XML (markup) document.

It is loaded in the browser, and represents the document as a node tree, with each node representing a part of the document. In other words, it tells the browser where to look for a specific thing in the document.

Every HTML5 document requires this layout:

```
<!DOCTYPE html>
<html>
    <head>
        <title>Page title</title>
    </head>
    <body>
        ...
    </body>
</html>
```

- The !DOCTYPE tells you what version of html you're using (html5, html4 …):
    - With html5 (latest) it's simple – you just write html.
- Everything is wrapped in an <html> ... </html> tag
- Things within the <head> .. </head> are used to provide information about the page – "The Brain"
- Only things within the <body> ... </body> tags are displayed on the page
- … for example the text within <title> ... </title> will be displayed in the browser bar

HTML Syntax

Demo here – Talk through this!

Now you will use these ideas to create a richer web page.

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Task:

1. Go to the github repository for this session: https://github.com/code61/learning_html
2. Download the code into your coding_course folder (by clicking 'Download ZIP' in the bottom right).
3. Open the whole folder in Sublime Text
4. Open the file example.html in Chrome and look around with the developer tools
5. Open the file notes.html in Sublime Text.
6. Change notes.html into valid html so that it looks like notes_solution.jpg

Session 1 Homework

Finishing off

Task: Finish the HTML exercise from the last section.

Preparation for next time

Task:

1. Read this guide and this guide on how to use GitHub and version control – **This is vital.**
2. Complete the whole of Project 2 on the General Assembly Dash site.
3. (Optional) Do the projects from the Codecademy Web Track Sections 4, 5 & 6.

Make a start on your own site

Task:

Use what you've learnt from the HTML exercise and the Dash projects to improve your first_site/index.html. Maybe add some content about yourself.

Don't worry if it doesn't look great yet – we'll be working on it more in the next few weeks. Just make sure it says something more than 'Hello'!

Extra Resources

This video talks about how the Internet works in 5 minutes

A summary of the different components of the Internet

File organising for your website

An article from Mozilla's Developer Guides: Introduction to HTML

W3 Schools HTML Tutorial

HTML Terms Glossary

Web Monkey HTML Cheatsheet

Simple HTML Guide Cheatsheet

A HTML Validator that checks your HTML code