H16S35 - Managing a web server

1 - Web server concepts

michael.ferrie@edinburghcollege.ac.uk

CONTENTS

01 **What is a web server?**
HTTP - Hypertext transfer protocol
HTML - Hypertext markup language

02 **PHP and JavaScript**
PHP introduction
JavaScript introduction

03 **Software Selection**
Why Debian
Web server

04 **Q and A**
Any Questions

HTTP and HTML/CSS

michael.ferrie@edinburghcollege.ac.uk

Web server?

- The primary function of a web server is to store, process and deliver web pages to clients
- The communication between client and server takes place using the Hypertext Transfer Protocol (HTTP)
- Pages delivered are most frequently HTML documents, which may include images, style sheets and scripts in addition to the text content

HTTP
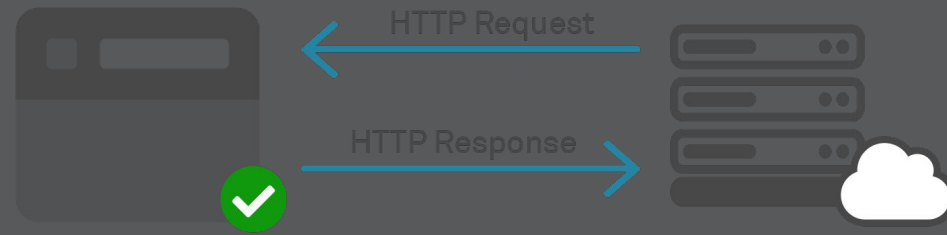
- HTTP stands for Hypertext Transfer Protocol
- The www is about communication between web clients and web servers
- Communication between client computers and web servers is done by sending HTTP Requests and receiving HTTP Responses

HTTP Request

HTTP Response

HTTP request

HTTP response
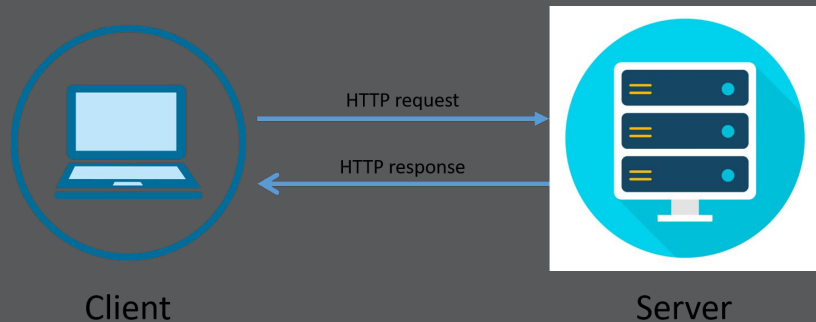
Client

Server

HTTP Request / Response overview

1. A client (a browser) sends an HTTP request to a web server
2. A web server receives the request
3. The server runs an application to process the request
4. The server returns an HTTP response (output) to the browser
5. The client (the browser) receives the response

HTTP request →

HTTP response ←

Client

Server

6
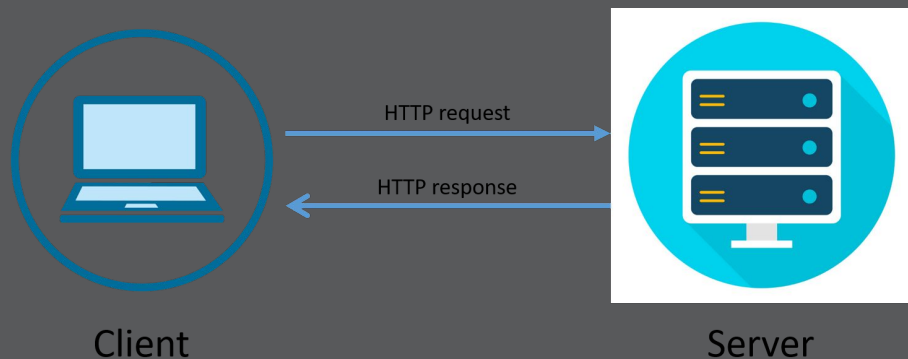
HTML

HTML is the standard markup language for creating web pages, HTML is not the only Markup Language:

- HTML stands for Hyper Text Markup Language
- HTML describes the structure of Web pages using markup
- HTML elements are the building blocks of HTML pages
- HTML elements are represented by tags
- HTML tags label pieces of content such as "heading",
- "paragraph", "table", and so on
- Browsers do not display the HTML tags, but use them to
- render the content of the page
- The definitive resource is here: https://www.w3schools.com/

HTML example

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

<h1>My First Heading</h1>

<p>My first paragraph.</p>

</body>
</html>
```

Line wrap

```
1
2  <!DOCTYPE html>
3  <html id="js-context" class="js-off is-not-modern id--signed-out" lang="en" data-page-path="/uk">
4
5
6      <head>
7
8
9
10 <!--
11
12
13
14
15
16
17     Ever thought about joining us?
18     https://workforus.theguardian.com/careers/product-engineering/
19     -->
20
21
22
23 <title>News, sport and opinion from the Guardian's UK edition | The Guardian</title>
24
25
26
27
28 <meta charset="utf-8" />
29
30     <meta name="description" content="Latest news, sport, business, comment, analysis and reviews from the Guardian, the world&#x27;s leading liberal voice" />
31
32
33 <meta http-equiv="X-UA-Compatible" content="IE=Edge" />
34 <meta name="format-detection" content="telephone=no" />
35 <meta name="HandheldFriendly" content="True" />
36 <meta name="viewport" content="width=device-width,minimum-scale=1,initial-scale=1">
37
38
39 <link rel="dns-prefetch" href="https://assets.guim.co.uk/" />
40 <link rel="dns-prefetch" href="https://i.guim.co.uk" />
41 <link rel="dns-prefetch" href="https://api.nextgen.guardianapps.co.uk" />
42 <link rel="dns-prefetch" href="https://hits-secure.theguardian.com" />
43 <link rel="dns-prefetch" href="//j.ophan.co.uk" />
44 <link rel="dns-prefetch" href="//ophan.theguardian.com" />
45 <link rel="dns-prefetch" href="//phar.gu-web.net" />
46
47 <link rel="preconnect" href="https://assets.guim.co.uk/" />
48 <link rel="preconnect" href="https://i.guim.co.uk" />
49 <link rel="preconnect" href="//interactive.guim.co.uk" />
50
51     <link rel="preconnect" href="https://sourcepoint.theguardian.com" />
52
53
54 <link rel="apple-touch-icon" sizes="152x152" href="https://assets.guim.co.uk/images/favicons/fee5e2d638d1c35f6d501fa397e53329/152x152.png" />
55 <link rel="apple-touch-icon" sizes="144x144" href="https://assets.guim.co.uk/images/favicons/1fe70b29879674433702d5266abcb0d4/144x144.png" />
56 <link rel="apple-touch-icon" sizes="120x120" href="https://assets.guim.co.uk/images/favicons/c58143bd2a5b5426b6256cd90ba6eb47/120x120.png" />
57 <link rel="apple-touch-icon" sizes="114x114" href="https://assets.guim.co.uk/images/favicons/68cbd5cf267598abd6a026f229ef6b45/114x114.png" />
58 <link rel="apple-touch-icon" sizes="72x72" href="https://assets.guim.co.uk/images/favicons/873381bf11d58e20f551905d51575117/72x72.png" />
59 <link rel="apple-touch-icon-precomposed" href="https://assets.guim.co.uk/images/favicons/6a2aa0ea5b4b6183e92d0eac49e2f58b/57x57.png" />
```

8

CSS solved a big problem

- HTML was not intended to contain tags for **formatting** a web page!
- HTML was created to describe the content of a web page:

```
<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, this created a lot of extra code in pages describing the format of elements
- Development of large websites, 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 which removed the style formatting from the HTML page

9

CSS examples

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

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

p {
  font-family: verdana;
  font-size: 20px;
}
```

Inline CSS

```html
<p style="color: blue;">This is a paragraph.</p>
```

Internal CSS

```html
<head>
  <style type = text/css>
    body {background-color: blue;}
    p { color: yellow;}
  </style>
</head>
```

External CSS

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

PHP and JavaScript

michael.ferrie@edinburghcollege.ac.uk

PHP

- PHP or Hypertext Preprocessor (Pre-Hypertext Processor)
- PHP is a widely-used, open source scripting language
- PHP scripts are executed on the server
- PHP is free to download, and PHP files have extension .php
- PHP files can contain HTML, CSS, JavaScript, and PHP
- PHP code are executed on the server, and the result is returned to the browser as plain HTML
- PHP version 7.x is the latest version

JavaScript and example

- JavaScript is the programming language of the web

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

<h2>What Can JavaScript Do?</h2>

<p id="demo">JavaScript can change HTML content.</p>

<button type="button"
onclick='document.getElementById("demo").innerHTML =
"Hello JavaScript!"'>Click Me!</button>

</body>
</html>
```

What Can JavaScript Do?

JavaScript can change HTML content.

Click Me!

Summary

- HTML to define the content of web pages
- CSS to specify the layout of web pages
- PHP for server-side scripting
- JavaScript to program the behaviour of web pages
- HTTP is the protocol used to exchange web pages between servers and clients


14
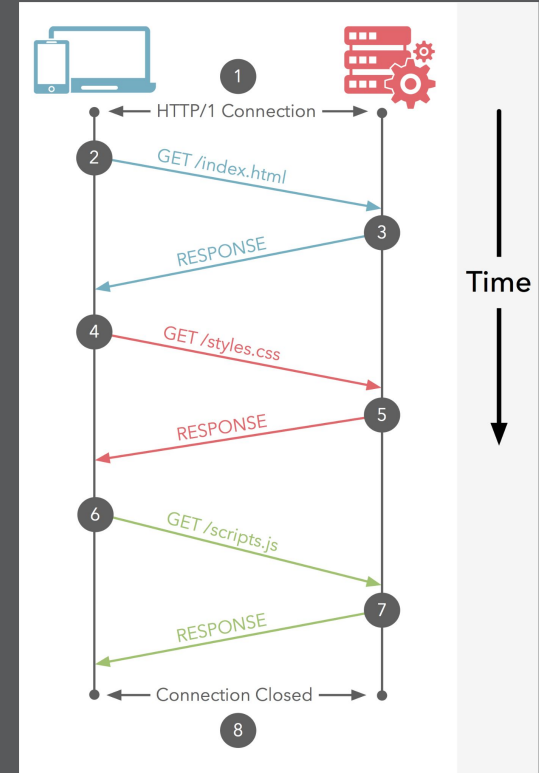
Software for this class

michael.ferrie@edinburghcollege.ac.uk

Why debian?

- Free and stable Linux distribution - will run the Apache server, huge list here: https://www.debian.org/intro/why_debian
- Some of the Popular Debian Derivatives:
  - Ubuntu (Popular Desktop / Server)
  - Kali (Hacking/Security)
  - Raspbian (Raspberry Pi)
  - MX Linux (New Desktop)
  - Mint (Easy to use and popular Desktop)
  - Tails (Privacy based OS)
  - Who's using Debian https://www.debian.org/users/

Why Apache?

- Apache is one of the most widely used web servers
- Developed and maintained by Apache Software Foundation, Apache is an open source software available for free
- It runs on 31% of all web servers in the world (Sep,2021)
- It is fast, reliable, and secure
- It has recently been overtaken by Nginx in popularity

Usage of web servers, 2 Sep 2021, W3Techs.com
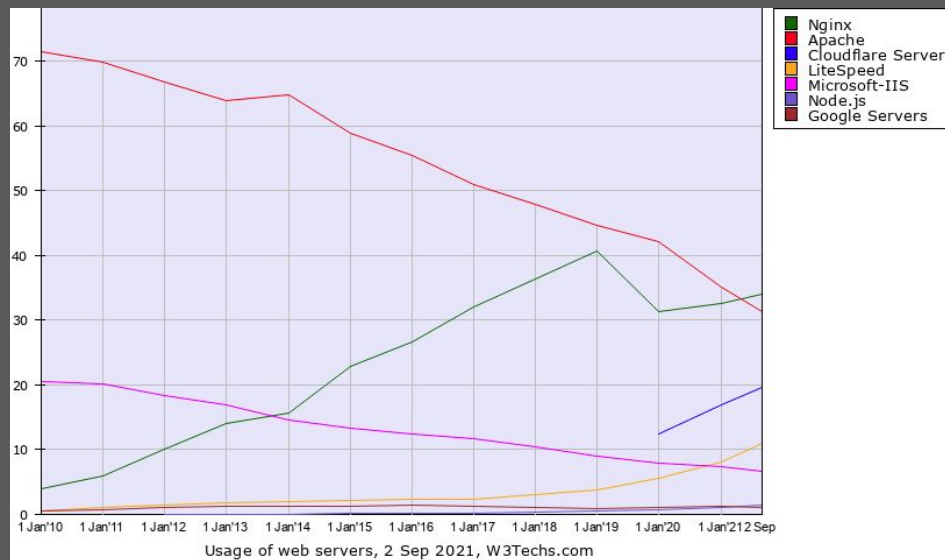
**Thanks for listening.
Any questions?**

michael.ferrie@edinburghcollege.ac.uk