University of St Andrews

CS2003 W02
HTML and CSS

Özgür Akgün

Slides adapted from Saleem Bhatti

HTML tags [1]

- Tags describe the **structure** of the page.
- A page must have:

```
<!DOCTYPE html><html> </html>
```
"envelope"

```
<head> </head>
```
"header"

```
<body> </body>
```
"content"

- I say "must have", but browsers are forgiving ...
- Comments:

```
<!-- begin comment          end comment -->
```

– comments **do not** nest

University of St Andrews

HTML tags [2]

- Tags used to delimit/label parts of a web page.
- Tags give the page structure.
- Tag names give semantic “hints” to the content, e.g.:
  - <h1> - header, level 1
  - <p> - paragraph
  - <table> - a table
- Effectively, the web page is a large, complex data structure, with different “types” of information.
- However, tags do not define “presentation”:
  - well … apart form the ones that do …

HTML “presentation” elements.

University of St Andrews

- <b> - bold (stylistically offset):
  - keywords etc.
- <i> - italic (alternative voice):
  - technical terms, foreign language words, etc.
- - emphasis (stress):
  - different pronunciation
- - stronger emphasis (importance)
- The ways these are presented can be set by CSS3.

University of St Andrews

Some useful tags

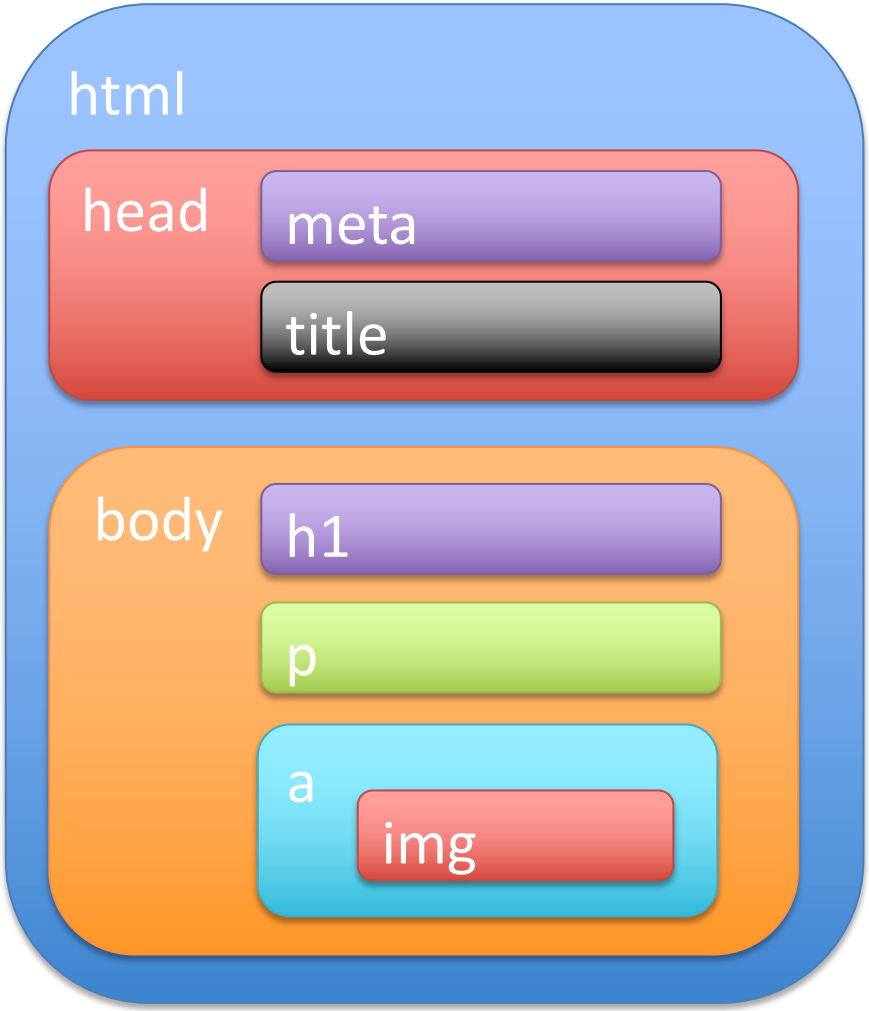
- Headings, e.g.: <h1> </h1>, <h2> </h2>
- Hyperlink: <a href="mylink">:
  - local page, same dir
  - local page, same server
  - remote page
- Paragraph:
- Image:
- Lists: <ul> , <ol> , <li>
- Tables: <table> </table>, <tr> </tr>, <td> </td>
- Sections: (page), <span (line)
- https://developer.mozilla.org/en-US/docs/Web/HTML
  - Mozilla Developer Network – good reference

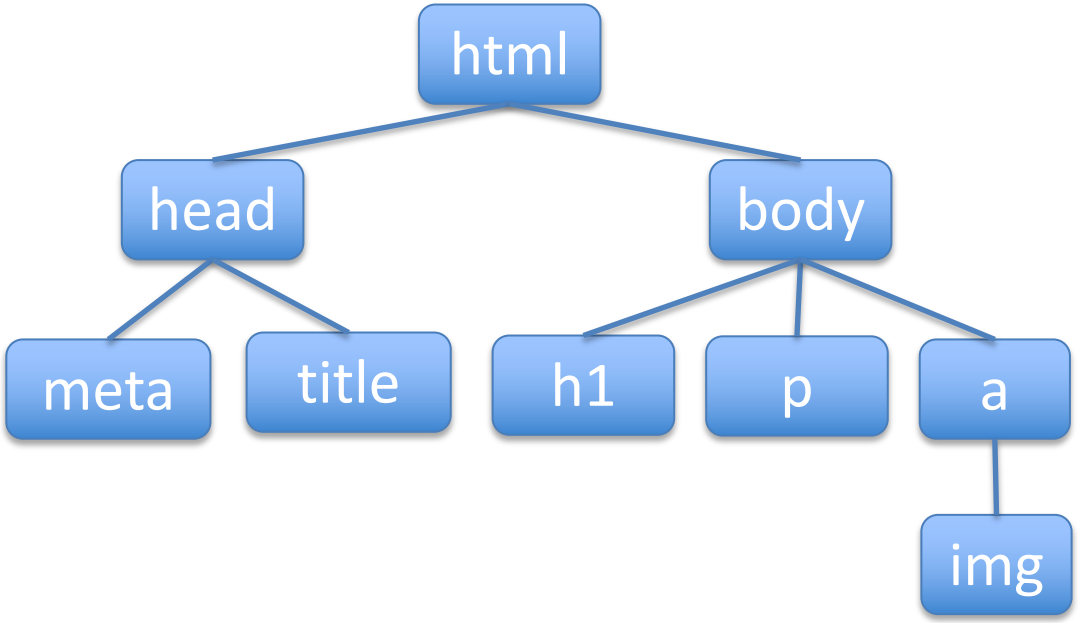
Web page – (data) structure [1]

University of St Andrews

```
<!DOCTYPE html>
  <html>

  <head>
    <meta author="Ozgur Akgun" />
    <title>Sample Page</title>
  </head>

  <body>

    <h1>Sample Page</h1>

    <p>A very small example.</p>

    <a href="https://ozgur.host.cs.st-andrews.ac.uk"><img src="ozgur.jpg" /></a>

  </body>

</html>
```

Web page – (data) structure [2]





Document Object Model (DOM)

Web page – location and identification [1]

University of St Andrews

- Uniform Resource Locator (URL):
  - Uniform Resource Identifier (URI) Generic Syntax
  - RFC 3986 http://tools.ietf.org/html/rfc3986
- URL:
  - *identifies* a **resource** (a data object of interest).
  - *locates* that resource within the network.
- Uniform Resource Name (URN):
  - RFC8141 https://tools.ietf.org/html/rfc8141
  - " ... persistent, location-independent resource identifier."

Web page – location and identification [2]

https://ozgur.host.cs.st-andrews.ac.uk/cs2003/index.html

protocol (scheme)

service/server name (usually a DNS domain name – can use IP address but that is discouraged)

local path for resource

[a-zA-Z0-9-_.~] – can be used in URL

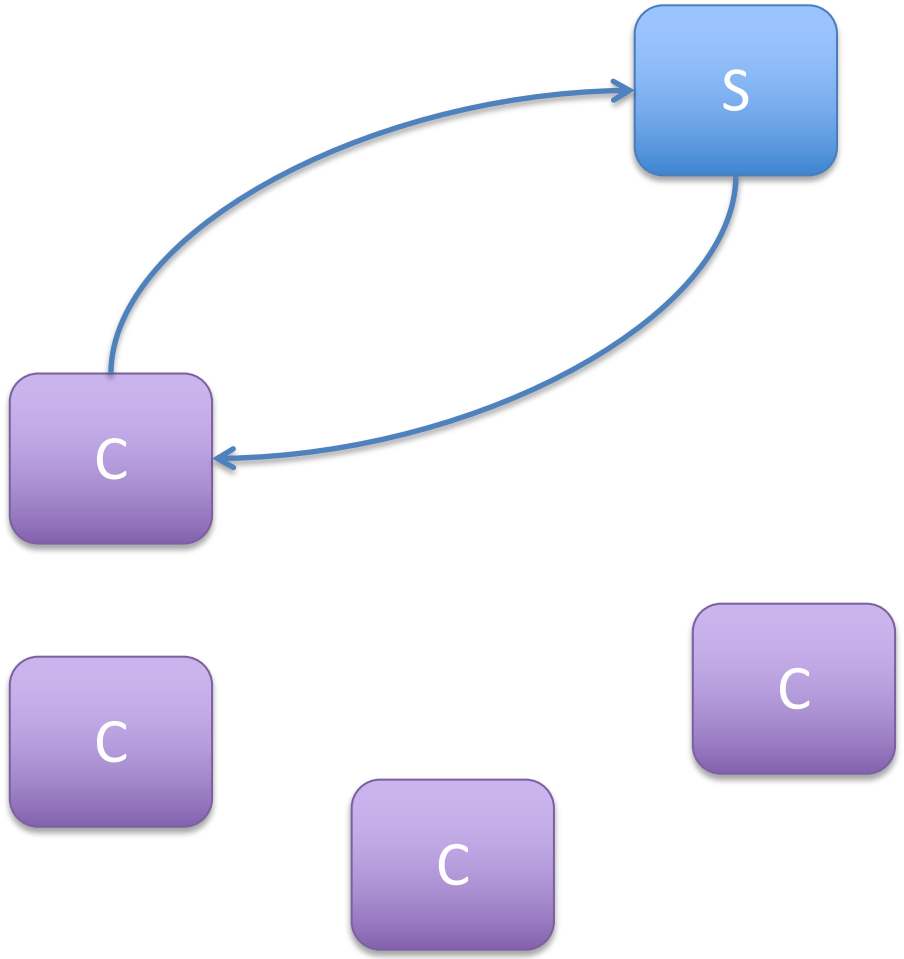
HTTP – Hyper Text Transfer Protocol

http://www.blob.com:8080/ - optional port number (8080 in this example) for server, if not using the standard ports (port 80 for http, 443 for https)

https://www.blob.com/ - HTTPS is secure HTTP (HTTP running over TLS)

Client-Server

- Server:
  - provider of a service (information)
  - waits for requests from (usually many) client systems
- Client:
  - accesses information from service provider (service)
  - sends requests for information
- Communication requires a protocol



Web communication – HTTP [1]

University of St Andrews

- Methods – text commands, “invoked” by client on server.
  - (HTTP 1.0 may still be around … but should not be.)
  - **HTTP 1.1 is (probably) the most widely now (RFC 7231/2/3/4/5).**
  - HTTP/2 now being deployed and used (RFC 7540/1).
- GET:
  - client sends a request for a resource (“page”)
- HEAD:
  - client requests HTTP header information only (**not** the same as the information in <head></head>)
- POST:
  - client sends arguments in URL to be processed by server
- **Key difference for deployed HTTP/2 – secure connections:**
  - major vendors only support HTTP/2 with Transport Layer Security (TLS), i.e. in reality, HTTP/2 is only HTTPS (but not required by standard).
  - other differences to HTTP 1.1. are mainly performance enhancements.

Web communication – HTTP [2]

University of St Andrews

```
$ curl -ivs //ozgur.host.cs.st-andrews.ac.uk/cs2003/web1/hello.html -o blob.txt

 .... [ security handshake and other set-up ] ....

> GET /cs2003/web1/hello.html HTTP/2
> Host: ozgur.host.cs.st-andrews.ac.uk
> User-Agent: curl/7.64.1
> Accept: */*
>
* Connection state changed (MAX_CONCURRENT_STREAMS == 128)!
< HTTP/2 200
< server: nginx/1.14.1
< date: Sun, 20 Sep 2020 21:13:07 GMT
< content-type: text/html
< content-length: 6
< last-modified: Sat, 19 Sep 2020 21:51:19 GMT

   .... [ rest of page ] ....
```

Useful CLI tools for the web

University of St Andrews

- wget - https://www.gnu.org/software/wget/ :
  - HTTP, HTTPS, FTP, FTPS.
- curl - https://github.com/curl/ :
  - HTTP, HTTPS, FTP, FTPS, SFTP, and many others.
- Both are:
  - available on unix-like systems (BSD, Linux, macOS).
  - can be used in shell scripts.
- curl also has various libraries accessible via other programming languages.

Cascading Style Sheets (CSS3)

University of St Andrews

- HTML gives a page its structure:
  - text is marked with tags to give it some meaning.
- How about making it look nice? ☺
- Cascading Style Sheets (CSS3):
  - allows separation of content from presentation.
  - allows different presentation for same content (e.g. useful for accessibility, different screen sizes for devices, etc.)

CSS3 summary

University of St Andrews

- A set of rules that can apply to a tag with respect to its presentation
- Layout, size, colour (color ☺):
  - relationships.
  - selectors.
- CSS3 has good support for media and graphics:
  - transitions.
  - 2D images and transforms.
  - 3D transforms.

CSS3 resources to try

University of St Andrews

- http://css3test.com
  - checks what your browser can do, and has a list of all the CSS3 capabilities.
- https://developer.mozilla.org/en-US/docs/Web/CSS
  - Mozilla Developer Network – good reference.
- https://www.w3.org/Style/CSS/
  - Official W3C reference.

CSS3 has lots of prettiness

University of St Andrews

- Color:
  - RGB, e.g. #1a2b3c
  - Colour names https://html-color-codes.info/color-names/
  - Units of measurement: pixels (px), em, rem.
- Borders, margins (control spacing of items).
- Fonts.
- 2D and 3D graphics support.

CSS3 selectors [1]

University of St Andrews

- These are extremely useful!
- Logic/operators applied to the way elements are selected for the CSS3 rules to be applied
- .classname:
  - class="classname" attribute in HTML.
- #idname:
  - id="idname" attribute HTML.
- A B:
  - only apply to B if it is a descendant of A.

CSS3 selectors [2]

University of St Andrews

- A + B:
  - only select B when it is immediately followed by A.
- A > B:
  - only select direct (first level) children.
- A:after and A:before :
  - content after / before tag.
- A:hover :
  - when the mouse hovers over that tag.
- Many others ... e.g: https://code.tutsplus.com/tutorials/the-30-css-selectors-you-must-memorize--net-16048

Clever tricks possible with CSS3

University of St Andrews

- A lot of these are blog pages ... you can find plenty yourself, I am sure! ☺
- https://css-tricks.com
- https://3dtransforms.desandro.com
- https://freshdesignweb.com/html5-css3-3d-examples-demo/
- https://www.hongkiat.com/blog/coding-graphics-with-css3/