Informatics 1
Internet, HTML, CSS

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Network – IP address

- Machines connected to the internet are addressed by a unique IP address
  - IPv4 standard: format: `nnn.nnn.nnn.nnn` (32 bits, 4 number of 8-bit numbers in decimal format) – it already ran out
  - IPv6 standard: format: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx (128 bits, 8 number of 16 bits in hexadecimal format)

machine	IP address	how to find out?
local network	172.17.148.238	ifconfig (WIN ipconfig)
	192.168.xxx.xxx	Reserved IP addresses
outside IPv4:	152.66.83.241	https://www.whatismyip.com/
		http://www.howtofindmyipaddress.com/
IPv6:	2001:738:2001:2010:891b:efb:2b36:5447	
		http://whatismyipaddress.com/
server	152.66.83.17	ping leibniz.math.bme.hu

Ping

- ping is a system utility, it provides a means to check if a data package reaches its destination.
- If the ping command is followed by something other than an IP address it will find the IP address paired with that host name using the DNS (Domain Name System)
- PING means "Send a packet to a computer and wait for its return (Packet INternet Groper)"

```
C:\Users\Tofi>ping bme.hu

Pinging bme.hu [152.66.115.203] with 32 bytes of data:
Reply from 152.66.115.203: bytes=32 time=66ms TTL=52
Reply from 152.66.115.203: bytes=32 time=69ms TTL=52
Reply from 152.66.115.203: bytes=32 time=73ms TTL=52
Reply from 152.66.115.203: bytes=32 time=62ms TTL=52

Ping statistics for 152.66.115.203:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 62ms, Maximum = 73ms, Average = 67ms

C:\Users\Tofi>_
```

World Wide Web
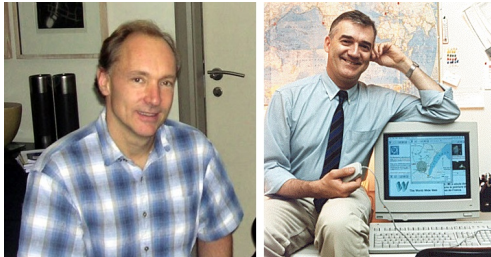
Pictures: Sir Tim Berners-Lee (left) and Robert Cailiau (right)

In 1990 at CERN Sir Tim Berners-Lee and Robert Cailliau designed the WWW, to create a network where anyone can create publicly available information.

World Wide Web

- At the end of 1990 they created the first browser, then in 1991 the WWW was made public on the internet.
- They introduced the URL (Uniform Resource Locator), HTML-t (HyperText Markup Language) and HTTP (HyperText Transfer Protocol).
- In 1993 CERN announced that the Web will be free for everyone, later in the same year the first widely used browser was created, Mosaic.
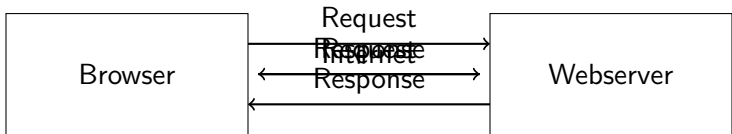
- The web simplified
- Cookies

Browser and webserver

The browser is connected to the webserver through the internet.

The browser sends a request to the webserver, telling it what page it wants to load, it sends other information as well.

The browser receives a response that contains the HTML as well as other information.

This is how browsing works in a nutshell, whenever we go the a new page the browser sends a requests and waits for a response.

- The web simplified
- **Cookies**

Cookies

- A webserver may receive thousands of requests every second, for a static page this is okay, but what about for example a social website?

- The user can log in and stays logged in, but how does the webserver know who's who?

- The webserver may send more then just the HTML as a response, it can send cookies as well.

- A cookie is a temporary minimal text file, it is associated with the website that sent it, the browser stores this cookie on the users computer.

- When the browser sends a request it sends the cookies associated with that website as well, this is how a website knows who's who.

Contents of a cookie

- *Name:* Name of the cookie
- *Value:* The data it stores
- *Attributes:*
    - *Expiry date:* when should the browser delete the cookie
    - *Domain:* which website sent this cookie
    - etc.

The browser only sends the name of the cookie and the value in the request, the others are information for the browser only.

Name: PREF

Content: ID=1111111111111111

Domain: .google.hu

Path: /

Send For: Any type of connection

Expires: 31 December, 2015 17:02:22

Cookie safety

- Cookies can't just contain the username of the user, it would be too easy to forge a fake cookie.
- A cookie isn't a virus, it doesn't contain an executable program.
- Typically it contains a long key (string), that is stored on the webserver as well, and is associated with the user.
- This way the users don't know what key belongs to others, but the webserver does.
- Example: most search engines personalize their results, this is based on the previous searches as well as visited websites.

- The web simplified
- Cookies

HTML markup language – tag, attribute

- Markup language, made up of tags.
- Can be edited in a simple text editor, easy to generate through a program.
- An item is part of the HTML marked by a tag.
- The format is `<name_of_tag>content</name_of_tag>`, if it has some data `<name_of_tag>` or `<name_of_tag />`, if it is by itself.
- For example `<em>text</em>` indicates that the *text* is emphasized, while `<br>` or `<br />` is a line break.
- Tags may contain attributes, the syntax for these is `name_of_attribute="attribute"` for example
  `Here is my <a href="timetable.html">timetable</a>.`
- Comment in HTML:
  `<!-- whatever's here doesn't show -->`

Example page

```html
<!DOCTYPE html>
<html lang="en">
    <head>
        <meta charset="utf-8">
        <title>
            Title of the page
        </title>
    </head>
    <body>
        <h1>Title</h1>        <!-- Title -->
        <h2>Subtitle</h2>     <!-- Subtitle -->
        <p>A paragraph.</p>   <!-- Paragraph -->
    </body>
</html>
```

HTML
CSS
Content and form in HTML
Other language items

The most important tags

- `<h1>Title</h1>` (heading)
- `<h6>Subtitle</h6>` (heading)
- `<p>Paragraph</p>`
- `<em>Emphasize</em>` (emphasize)
- `<strong>Strong emphasize</strong>`
- `<a>Link</a>` (anchor)
- `<ul>Unordered list</ul>`
- `<ol>Ordered list</ol>`
- `<li>List item</li>`
- `<blockquote>Quotation</blockquote>`
- `<div>Division</div>`
- `<span>Inline division</span>`
- `<img>` (image)

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Content and visual representation

- Some non-content, visual tags:
  - `<i>Italic</i>`
  - `<b>Bold</b>`
  - `<sub>Subscript</sub>`
  - `<sup>Superscript</sup>`
  - `<pre>Preformatted</pre>`
  - `<hr />` (horizontal rule – thematic change in the content)
  - `<br />` (line brake)
- Organizing content
  - `div` and `span` indicates semantic cohesion.
  - `div` usually contains more text, even more `div`s, that can also contain more `div`s
  - `span` does this inline.

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Attributes

- title title for an HTML item:

  `<p title="This is very important!">Here's the important`
- href together with the a tag gives us links:

  `HTML <a href="http://www.w3schools.com">course</a>.`
- src is a reference, alt alternative visualization, width and height is size in pixels:

  `<img src="bme.jpg" alt="BME" width="90" height="30">`
- style="attribute:value" this sets the item's style:

  ```
  <body style="background-color:lightgrey">
  <p style="color:red">Red paragraph.</p>
  <p style="font-family:courier">Courier paragraph.</p>
  <h1 style="text-align:center">Centered title</h1>
  ```

Special characters

character	html	name
<	<	less-than
>	>	greater-than
&	&	ampersand
		non-breaking space

CSS

- CSS: Cascading Style Sheets
- Aim: separating content from visualization
- Possibility for separation: .css files
- Serves to format HTML items
- Advantages: reusable, easy to modify
- Documentation: www.w3schools.com/css,
- Validating: jigsaw.w3.org/css-validator/

CSS syntax

- CSS follows the following basic syntax:
  ```
  identifier {attribute: value; attribute2: value2;}
  ```
- Example:
  ```
  p {color: red;}
  ```
  Or it can be separated to make it readable:
  ```
  p {
    color:#f00;
    background: white;
  }
  ```
- Modifying more tags at once:
  ```
  h1, h2 {color: red;}
  ```
- Comment:
  ```
  /* Whatever is here doesn't show. */
  ```

CSS placement

- Inline (inline):

  ```
  <p style="......CSS code.....">content</p>
  ```

- Embedded, in the *head* tag of the html:

  ```
  <style>
      CSS formatting
  </style>
  ```

- Separate file, link in the *head* tag:

  ```
  <link rel="stylesheet" href=".......css">
  ```

- Inline is prioritised, then embedded, lastly the separate file.

Grouping

We can group tags in the html, we can give them unique names, or create classes.

id for every page an id is unique to one html item.

```
<div id="news">.....</div>
```

class more than one tag can have the same class, and an item can have more than one class

```
<p class="comment">............</p>
<p class="comment">............</p>
...
<div class="comment">............</div>
```

Identifiers

- item identifier: an HTML tag

  p {color: red;}

- id identifier: references the item with this id

  #news {background: white;}

- class identifier: identifies the tags with this tag

  .comment {font-size: small;}

- we can combine item and class identifiers:

  p.comment {color: blue;}

  this makes those p tags blue that belong to the comment class

Modifying links

- Links have special states that can have separate styles
  - baseline (link),
  - if the linked website has been visited (visited),
  - if the cursor is above the link (hover),
  - when we click on the link (active).
- Example (LoVe-HAte order):

```
a:link {
  color: green;
  text-decoration: underline;
}
a:visited { color: purple; }
a:hover {
  color: blue;
  text-decoration: none;
}
a:active { color:red; }
```

Code convention

- In HTML the followings are equivalent:
  - `<p> paragraph <span>word</span></p>`
  - `<p>`

        `paragraph <span>word</span>`

    `</p>`
  - the latter is preferred
- In CSS the followings are equivalent:
  - `p{color:black;background-color:white;}`
  - `p {`

        `color: black;`
        `background-color: white;`

    `}`
  - the latter is preferred
- This is a code convention, every syntax has a preferred look.
- The purpose is to understand it better by the look of it.
- The identation is when you put spaces before the lines of the embedded elements.

Questions

- How many address can the IPv4 standard specify?
- What are cookies, what are they used for?
- Which tag is used to include a picture in a website?
- Which tag can be used to link another website?
- With which attribute can we provide inline CSS formatting?
- How can we separate content from visualization in HTML?
- What states does a link have? Give an example where CSS is used to modify them.
- What's the difference between class and id? Give an example for both.