HTML and its origin

Web Engineering

utad UNIVERSIDADE DE TRÁS-OS-MONTES E ALTO DOURO

https://www.w3schools.com/html/default.asp

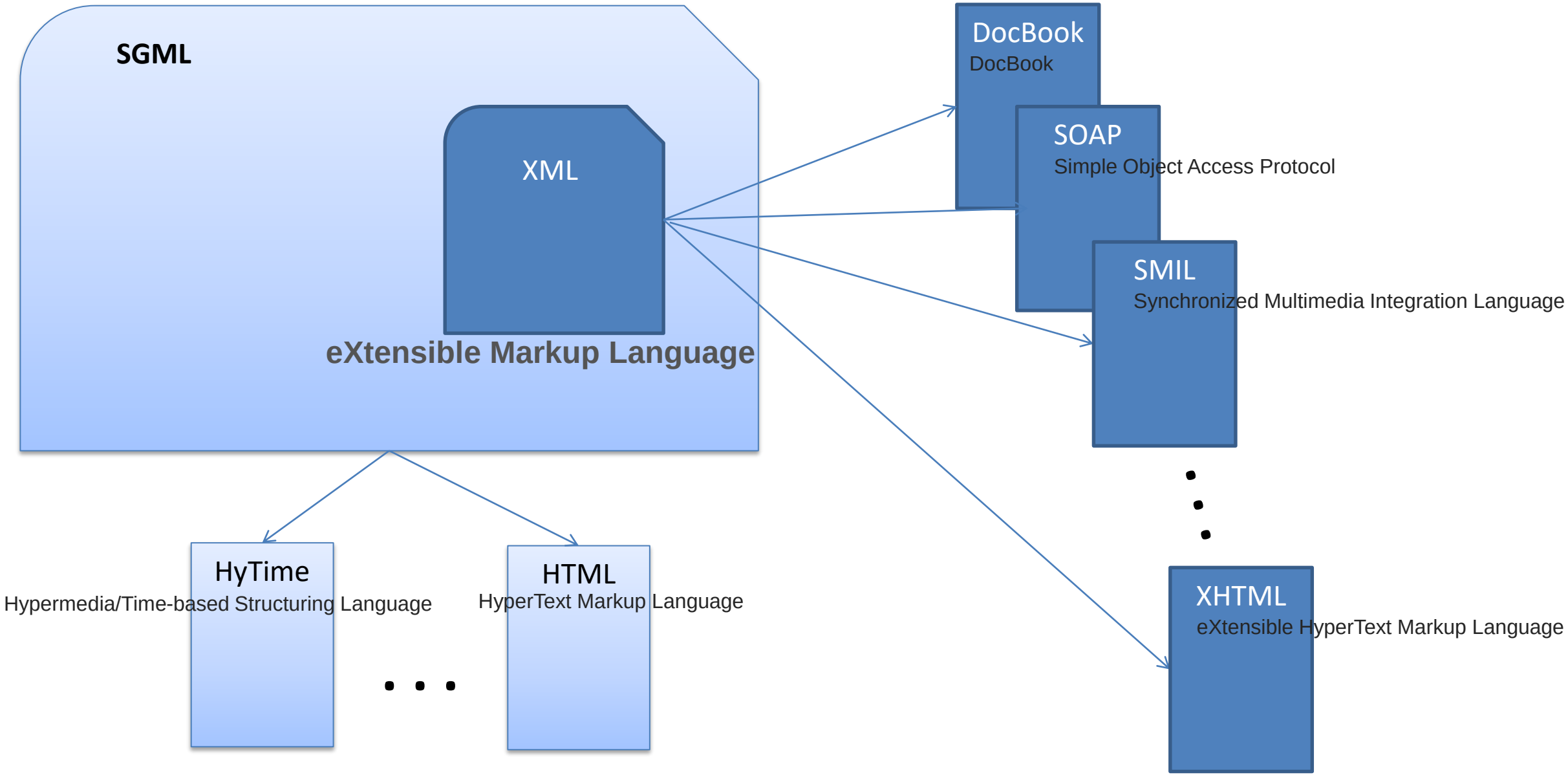
```
<!DOCTYPE html>
<html>
  <head>
    <title>Page Title</title>
  </head>
  <body>

    <h1>This is a Heading</h1>
    <p>This is a paragraph.</p>

  </body>
</html>
```

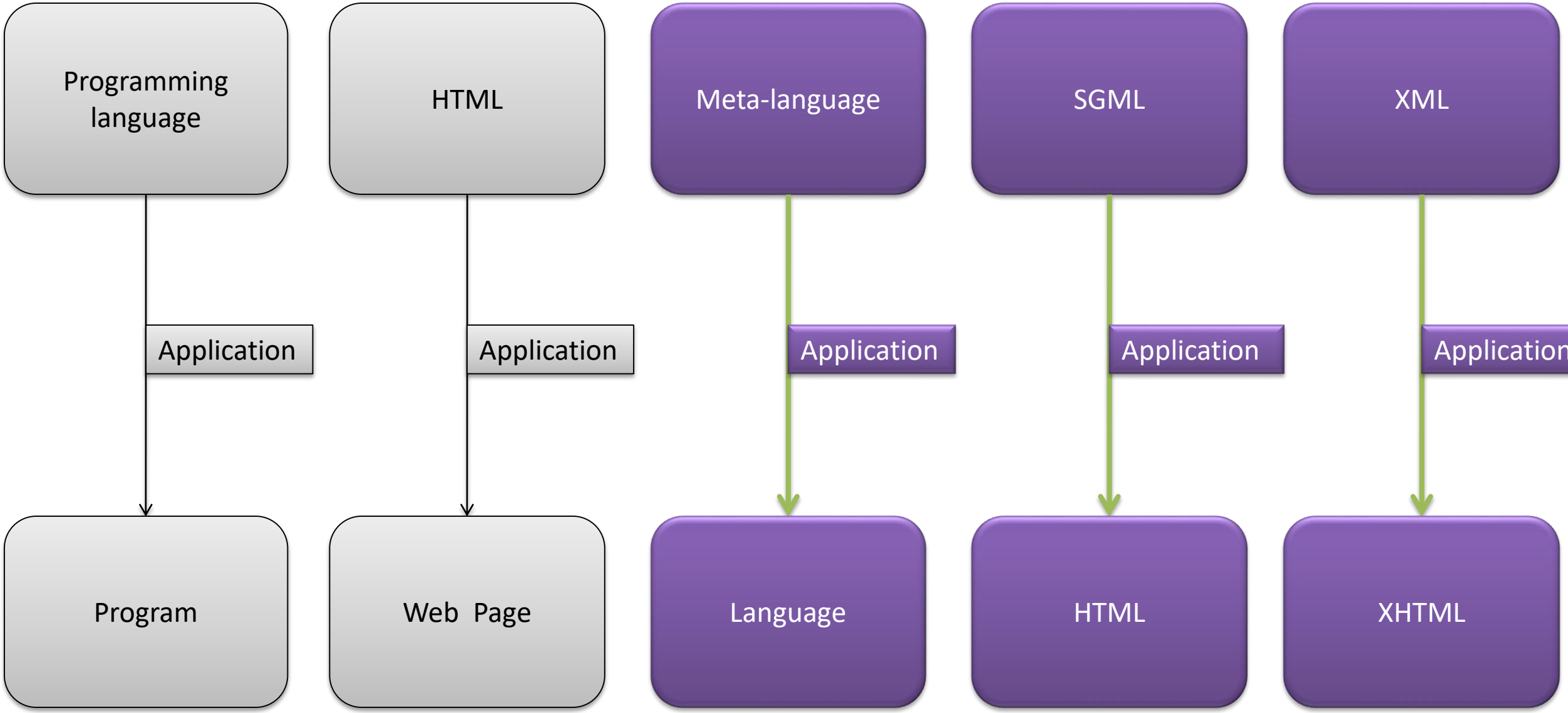
What are the origins of HTML?

Standard Generalized Markup Language



SGML and XML are meta-languages

What is a meta-language?


Programming language
HTML
Meta-language
SGML
XML
Application
Application
Application
Application
Application
Program
Web Page
Language
HTML
XHTML

Each markup language defined in SGML is called the *SGML application*.

An *SGML application* is characterized by:

1. **An SGML statement**. SGML declaration specifies which characters and delimiters can be used in the application.
2. **A document type definition (DTD)**. The DTD defines the syntax of tag constructs. The DTD may include additional definitions such as numeric and named character entities (for example: " or ").
3. **The specification that describes the semantics** to assign to tags. This specification also imposes syntactic constraints that cannot be expressed in DTD.
4. **Document instances** that contain data (content) and tags. Each instance contains the reference to the DTD to be used to interpret it.

Which of these characters are valid in HTML 4.0?

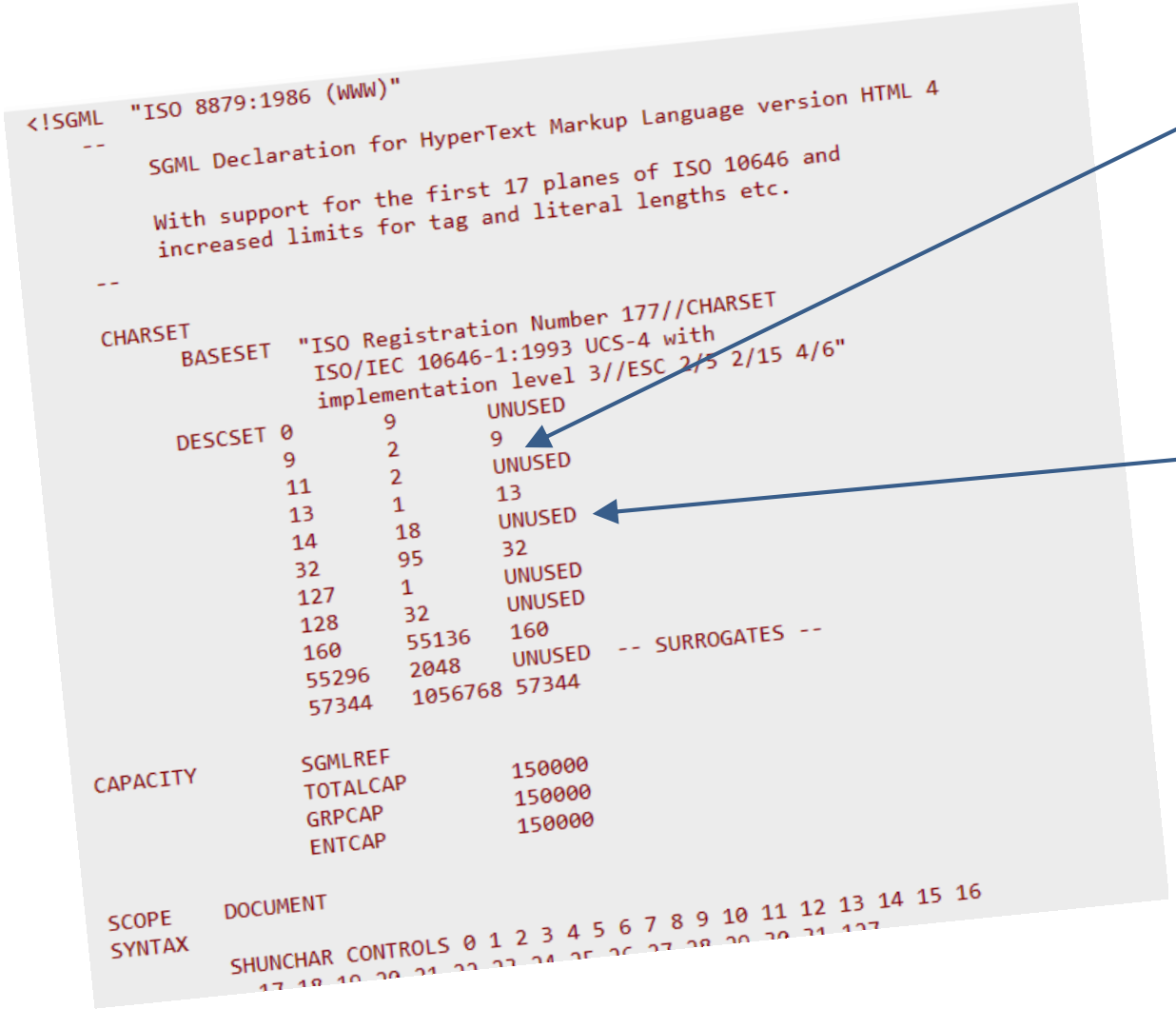
Unicode 1.1

	ISO/IEC 10646-1:1993 UCS-4	HTML 4.0
119575		
32160	綠	綠
9	Tabulação horizontal	Tabulação horizontal
23	Fim de bloco de transmissão	INVALID

UCS = Universal Character Set

SGML Declaration

https://www.w3.org/TR/html4/sgml/sgmldecl.html



```
<!SGML  "ISO 8879:1986 (WWW)"
    --
        SGML Declaration for HyperText Markup Language version HTML 4

        With support for the first 17 planes of ISO 10646 and
        increased limits for tag and literal lengths etc.

    --

    CHARSET
          BASESET  "ISO Registration Number 177//CHARSET
                    ISO/IEC 10646-1:1993 UCS-4 with
                    implementation level 3//ESC 2/5 2/15 4/6"

          DESCSET 0       9       UNUSED
                  9       2       9
                  11      2       UNUSED
                  13      1       13
                  14      18      UNUSED
                  32      95      32
                  127     1       UNUSED
                  128     32      UNUSED
                  160     55136   160
                  55296   2048    UNUSED  -- SURROGATES --
                  57344   1056768 57344

    CAPACITY        SGMLREF         150000
                    TOTALCAP        150000
                    GRPCAP          150000
                    ENTCAP          150000

    SCOPE   DOCUMENT
    SYNTAX
            SHUNCHAR CONTROLS 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
```

Tabulação horizontal (9)

Fim de bloco de transmissão (23)

DTD – Document Type Definition

A DTD defines the document structure with a list of legal **elements** and **attributes**

DTD Newspaper Example

```
<!DOCTYPE NEWSPAPER [

<!ELEMENT NEWSPAPER (ARTICLE+)>
<!ELEMENT ARTICLE (HEADLINE,BYLINE,LEAD,BODY,NOTES)>
<!ELEMENT HEADLINE (#PCDATA)>
<!ELEMENT BYLINE (#PCDATA)>
<!ELEMENT LEAD (#PCDATA)>
<!ELEMENT BODY (#PCDATA)>
<!ELEMENT NOTES (#PCDATA)>

<!ATTLIST ARTICLE AUTHOR CDATA #REQUIRED>
<!ATTLIST ARTICLE EDITOR CDATA #IMPLIED>
<!ATTLIST ARTICLE DATE CDATA #IMPLIED>
<!ATTLIST ARTICLE EDITION CDATA #IMPLIED>

]>
```

Document Instances

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN"
      "http://www.w3.org/TR/html4/strict.dtd">
<HTML>
   <HEAD>
      <TITLE>My first HTML document</TITLE>
   </HEAD>
   <BODY>
      <P>Hello world!
   </BODY>
</HTML>
```

DTD – Document Type Definition

- Entity definitions

```
<!ENTITY % head.misc "SCRIPT|STYLE|META|LINK">
<!ENTITY % heading "H1|H2|H3|H4|H5|H6">
<!ENTITY % attrs "%coreattrs %i18n %events">
<!ENTITY attrs "substitution text">
```

- Element definitions

```
<!ELEMENT OL - - (LI)+>
<!ELEMENT BR - O EMPTY>
<!ELEMENT OPTION - O #PCDATA>
<!ELEMENT TABLE - - (CAPTION?, (COL*|COLGROUP*), THEAD?, TFOOT?, TBODY+)>
```

- Attribute definitions

…

DTD – Document Type Definition

- Entity definitions

  …
- Element definitions

  …
- Attribute definitions

```
<!ENTITY % TAlign "(left|center|right)">
...
<!ATTLIST TABLE          -- table element --
  width       CDATA      #IMPLIED  -- table width relative to window --
  cols        NUMBER     #IMPLIED  -- used for immediate display mode -
  align       %TAlign;   #IMPLIED  -- table position relative to window --
>
<!ATTLIST TH             -- th element --
  rowspan     NUMBER     1
  colspan     NUMBER     1
>
```

DTD – Document Type Definition

- PCDATA

  parsed character data

- CDATA

  character data

https://www.w3.org/TR/html401/sgml/dtd.html

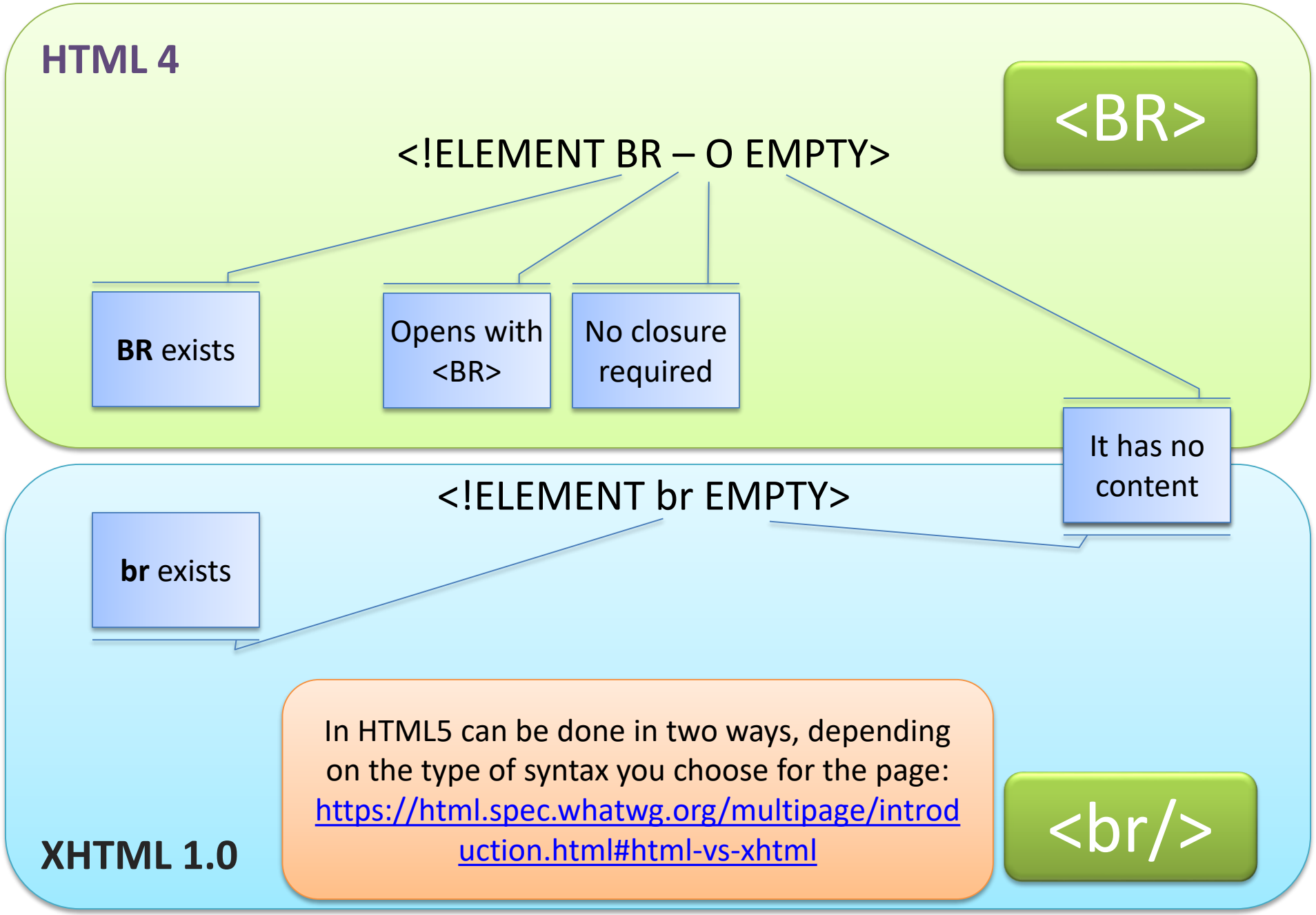
What is the meaning, in SGML DTD for HTML 4.0:

```
<!ELEMENT BR - O EMPTY>
```

And why in the XHTML 1.0 DTD is:

```
<!ELEMENT br EMPTY>
```

?


HTML 4

<!ELEMENT BR – O EMPTY>
BR exists
Opens with
No closure required
It has no content
<!ELEMENT br EMPTY>
br exists
In HTML5 can be done in two ways, depending on the type of syntax you choose for the page: https://html.spec.whatwg.org/multipage/introduction.html#html-vs-xhtml
XHTML 1.0

What is the meaning, in SGML DTD for HTML 4.0:

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

?

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

That the TABLE element:

- Needs <TABLE> and </TABLE>
- And that, in content:
  * May have one CAPTION or not
  * May have several COL or COLGROUP or not
  * May have one THEAD or not
  * May have one TFOOT or not
  * Must have at least one TBODY
  * Must follow the order given (except between COL and COLGROUP)

No, because the content does not specify #PCDATA or #CDATA

A TABLE element can have text inside?

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

So how can we have these tables in HTML?

Station	Latitude	g
Quito, Ecuador	zero degrees N	nine point seven eight zero m slash s sup two base
Madras, India	one three degrees N	nine point seven eight three m slash s sup two base
Hong Kong	two two degree N	nine point seven eight eight m slash s sup two base
Cairo, Egypt	three zero degree N	nine point seven nine three m slash s sup two base
New York, USA	four one degree N	nine point eight zero three m slash s sup two base
London, England	five one degree N	nine point eight one one m slash s sup two base
Oslo, Norway	six zero degree N	nine point eight one nine m slash s sup two base
Murmansk, USSR	six nine degree N	nine point eight two five m slash s sup two base
Spitsbergen	eight zero degree N	nine point eight three one m slash s sup two base
North Pole	nine zero degree N	nine point eight three two

Nothing in this line prevents text inside CAPTION, COL, COLGROUP, THEAD, TFOOT, or TBODY ...

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

```
<!ELEMENT CAPTION  - - (%inline;)*  -- table caption -->
<!ELEMENT THEAD    - O (TR)+       -- table header -->
<!ELEMENT TFOOT    - O (TR)+       -- table footer -->
<!ELEMENT TBODY    O O (TR)+       -- table body -->
<!ELEMENT COLGROUP - O (COL)*      -- table column group -->
<!ELEMENT COL      - O EMPTY       -- table column -->
<!ELEMENT TR       - O (TH|TD)+    -- table row -->
<!ELEMENT (TH|TD)  - O (%flow;)*   -- table header cell, table data cell-->
```

```
<!ENTITY % block
     "P | %heading; | %list; | %preformatted; | DL | DIV | NOSCRIPT | BLOCKQUOTE |
FORM | HR | TABLE | FIELDSET | ADDRESS">

<!ENTITY % inline "#PCDATA | %fontstyle; | %phrase; | %special; | %formctrl;">

<!ENTITY % flow "%block; | %inline;">
```

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

Is this table valid?

Yes?! (Attention to THEAD)

```
<TABLE border=1>
        <THEAD><TR>Tabela 2
        <TBODY><TR><TD>1<TD>2<TD>3
                    <TR><TD>6<TD>8<TD>5
        <TBODY><TR><TD>234</TD><TD>123</TD>
</TABLE>
```

Tabela 2

1	2	3
6	8	5
234	123	

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

Is this table valid?

```
<TABLE border=1>
        <THEAD><TR>Tabela 2
        <TBODY><TR><TD>1<TD>2<TD>3
                    <TR><TD>6<TD>8<TD>5
        <TFOOT><TR>Dezembro de 2008</TR>
</TABLE>
```

No!
(TFOOT cannot appear after TBODY)

In the HTML 4.01 specification:

http://www.w3.org/TR/REC-html40/struct/tables.html

```
<!ELEMENT TABLE - -
     (CAPTION?, (COL*|COLGROUP*), THEAD?, TFOOT?, TBODY+)>

<!ATTLIST TABLE                              -- table element --
  %attrs;                                    -- %coreattrs, %i18n, %events --
  summary     %Text;          #IMPLIED  -- purpose/structure for speech
                                        output--
  width       %Length;        #IMPLIED  -- table width --
  border      %Pixels;        #IMPLIED  -- controls frame width around
                                        table --
  frame       %TFrame;        #IMPLIED  -- which parts of frame to
                                        render --
  rules       %TRules;        #IMPLIED  -- rulings between rows and
                                        cols --
  cellspacing %Length;        #IMPLIED  -- spacing between cells --
  cellpadding %Length;
  >
```

<!ENTITY % Length "CDATA" -- nn for pixels or nn% for percentage length -->

<!ENTITY % Length "CDATA" -- nn for pixels
or nn% for percentage length -->

```
<!ELEMENT TABLE - -
     (CAPTION?, (COL*|COLGROUP*), THEAD?, TFOOT?, TBODY+)>

<!ATTLIST TABLE                              -- table element --
  %attrs;                                    -- %coreattrs, %i18n, %events --
  summary     %Text;          #IMPLIED       -- purpose/structure for speech
                                                output--
  width       %Length;        #IMPLIED       -- table width --
  border      %Pixels;        #IMPLIED       -- controls frame width around
                                                table --
  frame       %TFrame;        #IMPLIED       -- which parts of frame to
                                                render --
  rules       %TRules;        #IMPLIED       -- rulings between rows and
                                                cols --
  cellspacing %Length;        #IMPLIED       -- spacing between cells --
  cellpadding %Length;        #IMPLIED       -- spacing within cells --
  >
```

<TABLE width="10%">

means 10% of the screen, 10% of the browser window or 10% of something else?

Does this definition say TABLE is a table?

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

Not! Just say how you can type
(it's the **syntax**)

`width %Length`

just say how you spell it (it's the **syntax**)

Don't say what it means (don't have **semantics**)

<!ELEMENT TABLE - - (CAPTION?, (COL* | COLGROUP*), THEAD?, TFOOT?, TBODY+)>

```
width %Length
```

Semantics is this ...

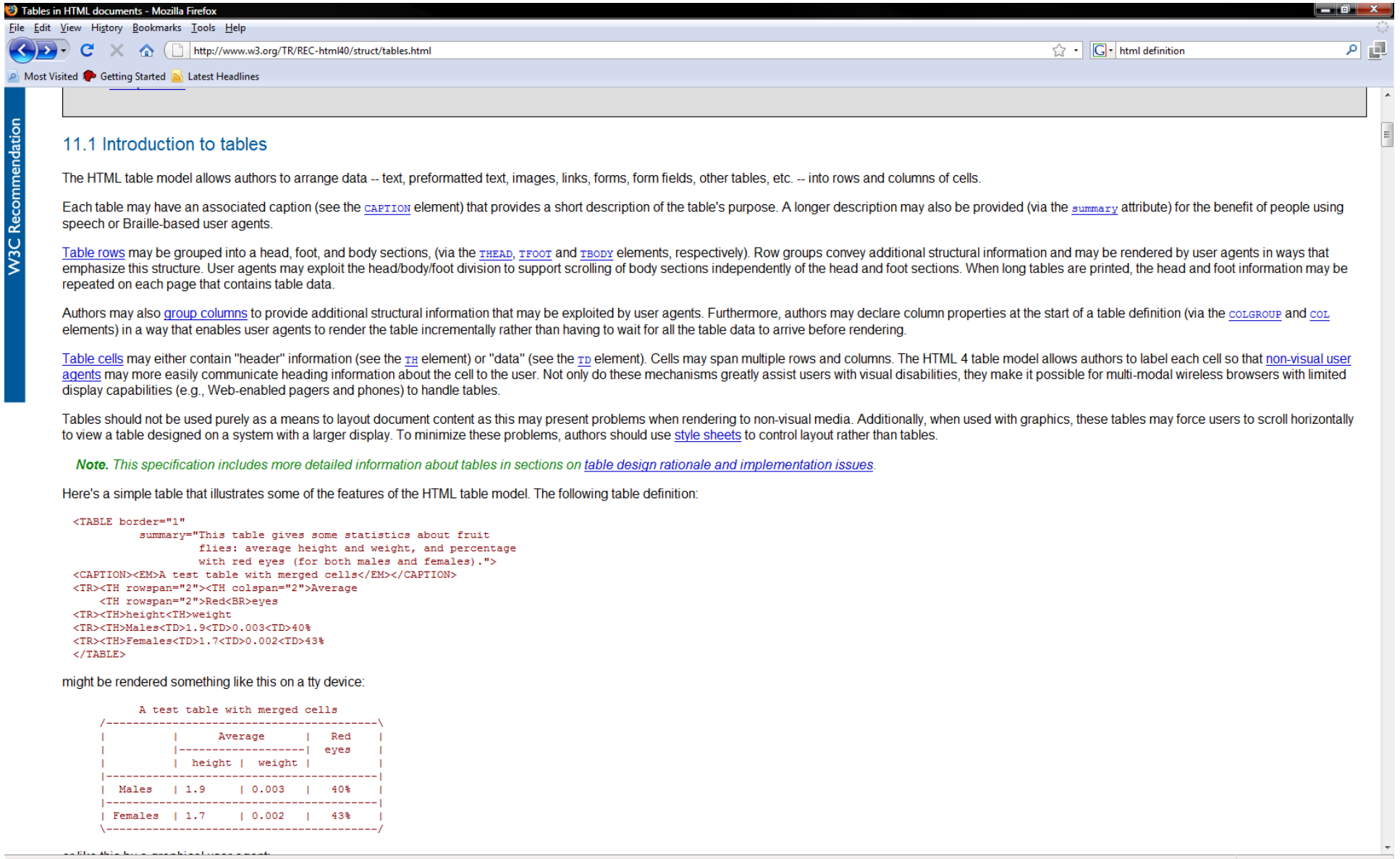
width = *length*

This attribute specifies the desired width of the entire table and is intended for visual user agents. When the value is a percentage value, the value is relative to the user agent's available horizontal space. In the absence of any width specification, table width is determined by the user agent.

-- HTML 4.01 specification

Semantics is this...

https://www.w3.org/TR/REC-html40/struct/tables.html



Who uses semantics?

Browser engine

- This web browser component is a rendering mechanism responsible for showing the graphical or textual representation of HTML+CSS content.

Who uses semantics?

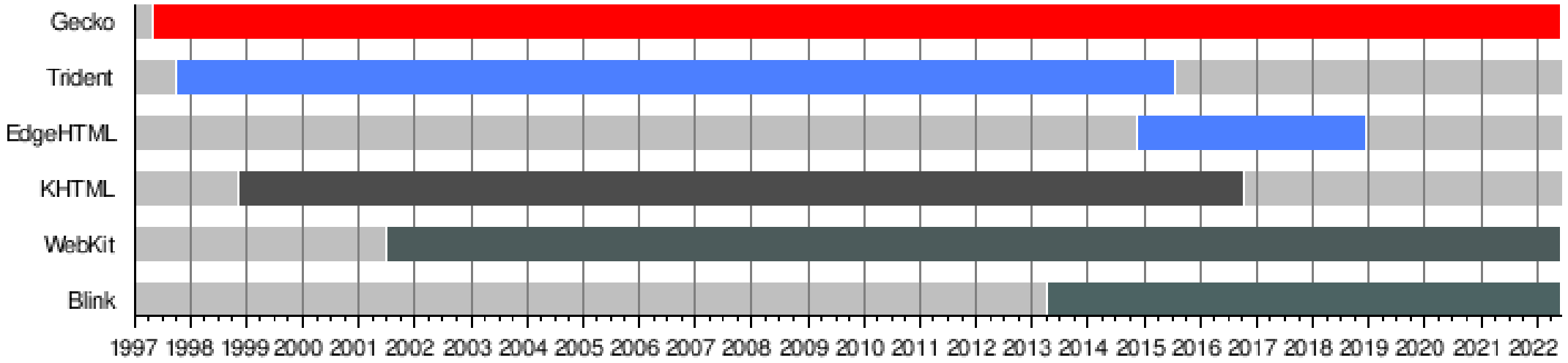
Browser engine

- In addition to layout and rendering, a browser engine enforces the security policy between documents, handles navigation through hyperlinks and data submitted through forms, and implements the Document Object Model (DOM) data structure exposed to page scripts.

Who uses semantics?

Active development of the browser engine

(is when relevant new Web standards continue to be added to the engine)



General information about browser engines

Engine	Status[a]	Steward	License	Embedded in
Blink	Active	Google	GNU LGPL, BSD-style	Google Chrome and all other Chromium-based browsers, notably Microsoft Edge, Brave, Vivaldi, Samsung Internet and Opera[4]
EdgeHTML	Maintained	Microsoft	Proprietary	some UWP apps;[8] formerly in the Edge browser[9]
Flow[10]	Maintained	Ekioh[11]	Proprietary	Flow browser[12]
Gecko	Active	Mozilla	Mozilla Public	Firefox browser and Thunderbird email client
Goanna[b]	Active	M. C. Straver[6]	Mozilla Public	Pale Moon, Basilisk and K-Meleon browsers
KHTML[21]	Discontinued	KDE	GNU LGPL	formerly in the Konqueror browser[22]
LibWeb[e]	Maintained	hobbyists[20]	2-clause BSD	Ladybird browser[19]
NetSurf[d]	Maintained	hobbyists[17]	GNU GPLv2	NetSurf browser[18]
Presto	Discontinued	Opera	Proprietary	formerly in the Opera browser
Servo	Maintained	Linux Foundation	Mozilla Public	experimental browsers[13][14]
Trident[c]	Maintained	Microsoft	Proprietary	Internet Explorer browser
WebKit	Active	Apple	GNU LGPL, BSD-style	Safari browser, plus all browsers for iOS;[3] GNOME Web

HTML – structure and syntax

Header

```
<HEAD>
    <TITLE>
    <META>
    <BASE>
    <LINK>
    <STYLE>
    <SCRIPT>
```

HTML – structure and syntax

Body

https://www.w3schools.com/html/default.asp

```
<BODY>
    <TABLE>
    <H1>
    <H2>
    <IMG>
    <P>
    <OL>
    <FORM>
    ...
```

HTML – structure and syntax

HTML elements that generate HTTP requests

```
<a href=http://www.w3schools.com target="_self">Visit W3Schools.com!</a>
```

```
<form action="demo_form.asp" method="get">
  First name: <input type="text" name="fname"><br>
  Last name: <input type="text" name="lname"><br>
  <input type="submit" value="Submit">
  <input type="reset" value="Clear">
</form>
```

HTML – structure and syntax

HTML elements that generate HTTP requests

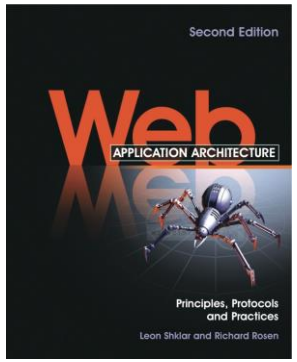
```
<FORM action="http://www.nobody.name/sendFile" method="post"
      enctype="multipart/form-data">
    <P>
    <LABEL for="localpath">Choose local file: </LABEL >
    <INPUT type="file" id="localpath"><BR>
    <LABEL for="filename">Target file name: </LABEL >
    <INPUT type="text" id="filename"><BR>
    <LABEL for="location">Target location: </LABEL >
    <INPUT type="text" id="location"><BR>
    <INPUT type="submit" value="Send"> <INPUT type="reset">
    </P>
 </FORM>
```

- ***application/x-www-form-urlencoded***
- *multipart/form-data*
- *text/plain*

Questions from the book

Would it be very difficult to implement an HTML interpreter? Why? How would you represent the semantics of HTML elements?

Bibliography

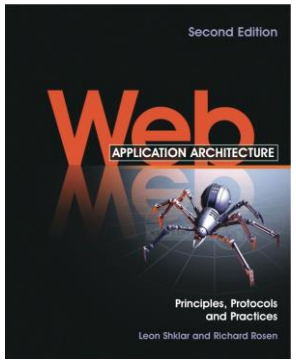


Shklar, Leon & Rosen, Rich (2009). *Web Application Architecture: Principles, Protocols and Pratices*. Chichester, Reino Unido: John Wiley & Sons.

Pages: 63 to 83

Chapter 4

Next class



Shklar, Leon & Rosen, Rich (2009). *Web Application Architecture: Principles, Protocols and Pratices*. Chichester, Reino Unido: John Wiley & Sons.

Pages: 85 to 96

Chapter 5

5.1 CoreXML
5.2 XHTML