Cascading Style Sheets (CSS)

Motivation

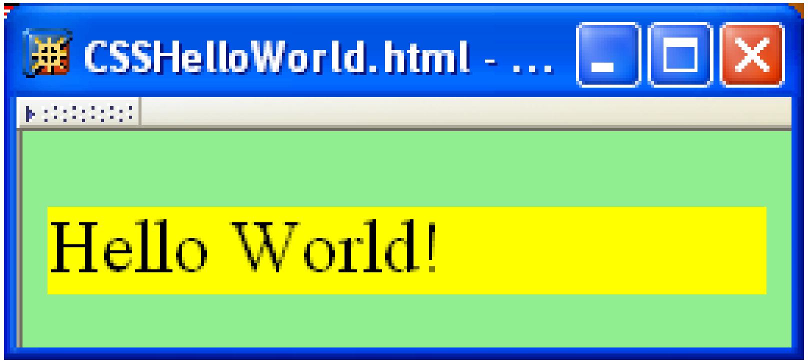
- HTML markup can be used to represent
  - Semantics: `h1` means that an element is a top-level heading
  - Presentation: `h1` elements look a certain way
- It's advisable to separate semantics from presentation because:
  - It's easier to present documents on multiple platforms (browser, cell phone, spoken, …)
  - It's easier to generate documents with consistent look
  - Semantic and presentation changes can be made independently of one another (division of labor)
  - User control of presentation is facilitated

Style Sheet Languages

- Cascading Style Sheets (CSS)
  - Applies to (X)HTML as well as XML documents in general
  - Focus of this chapter
- Extensible Stylesheet Language (XSL)
  - Often used to transform one XML document to another form, but can also add style
  - XSL Transformations covered in later chapter

CSS Introduction

- A styled HTML document

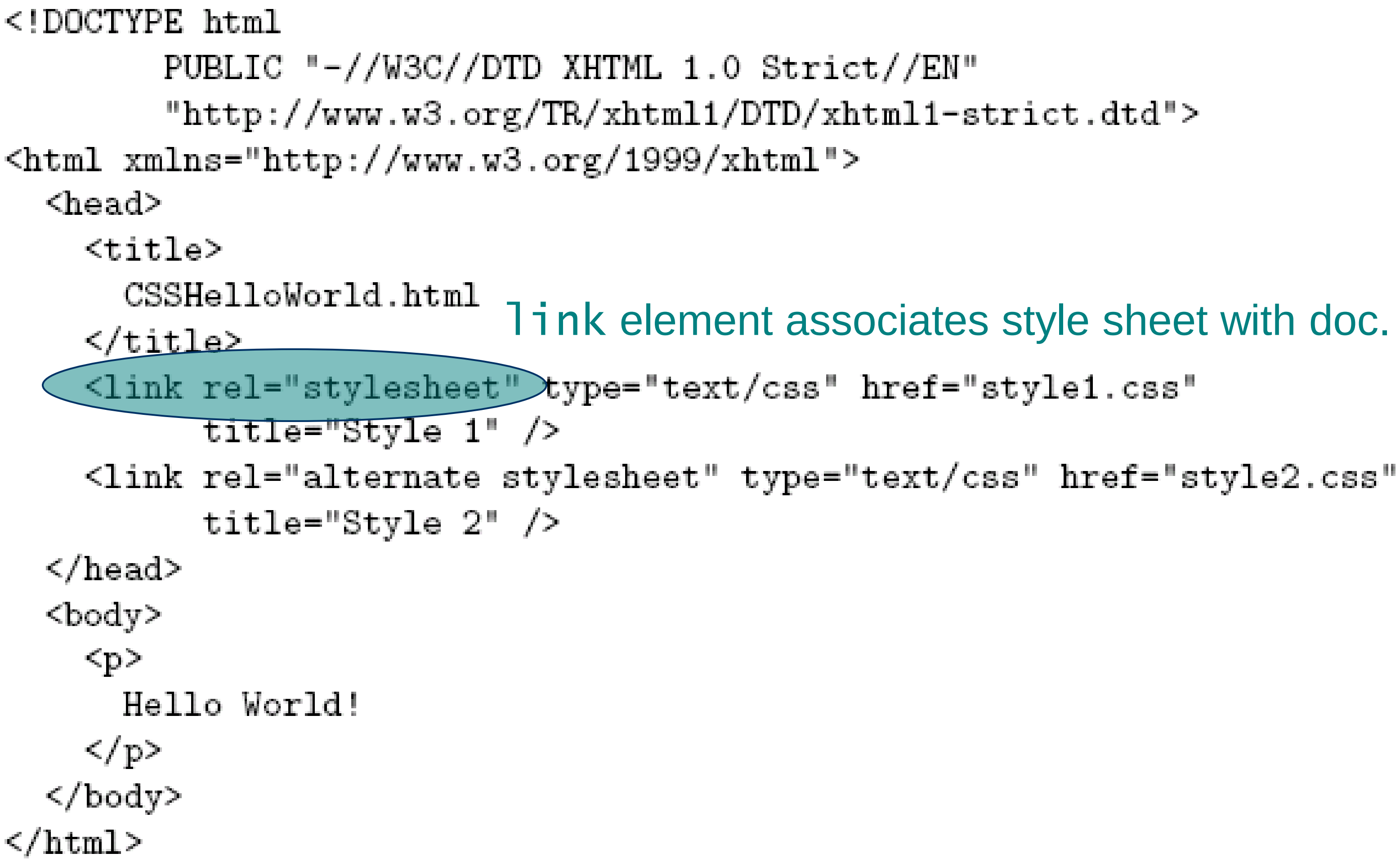


Hello World!

produced by the style sheet `style1.css`:

```
body   { background-color:lime }
p      { font-size:x-large; background-color:yellow }
```

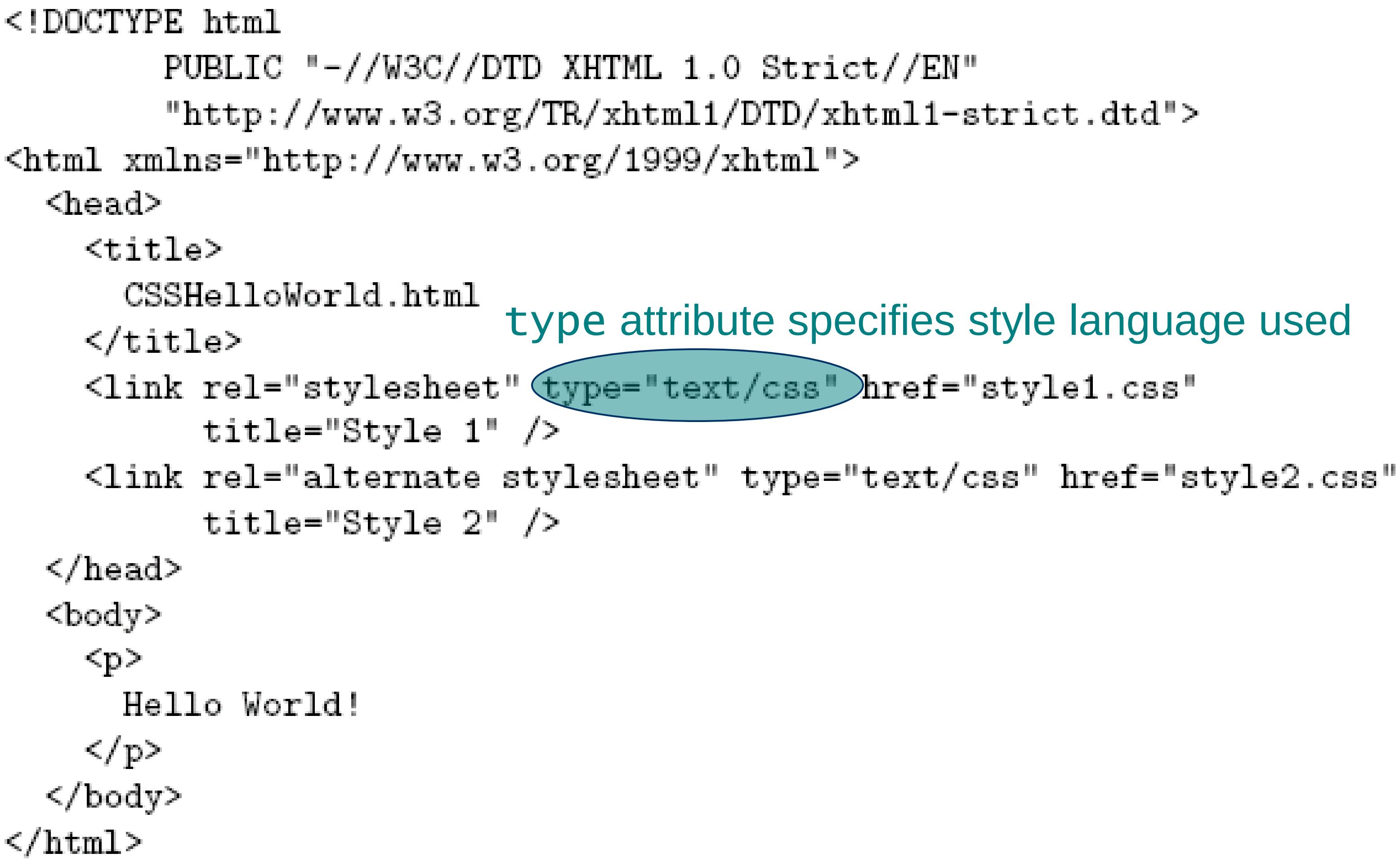
CSS Introduction



```
<!DOCTYPE html
        PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
        "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>
      CSSHelloWorld.html
    </title>
    <link rel="stylesheet" type="text/css" href="style1.css"
          title="Style 1" />
    <link rel="alternate stylesheet" type="text/css" href="style2.css"
          title="Style 2" />
  </head>
  <body>
    <p>
      Hello World!
    </p>
  </body>
</html>
```

`link` element associates style sheet with doc.

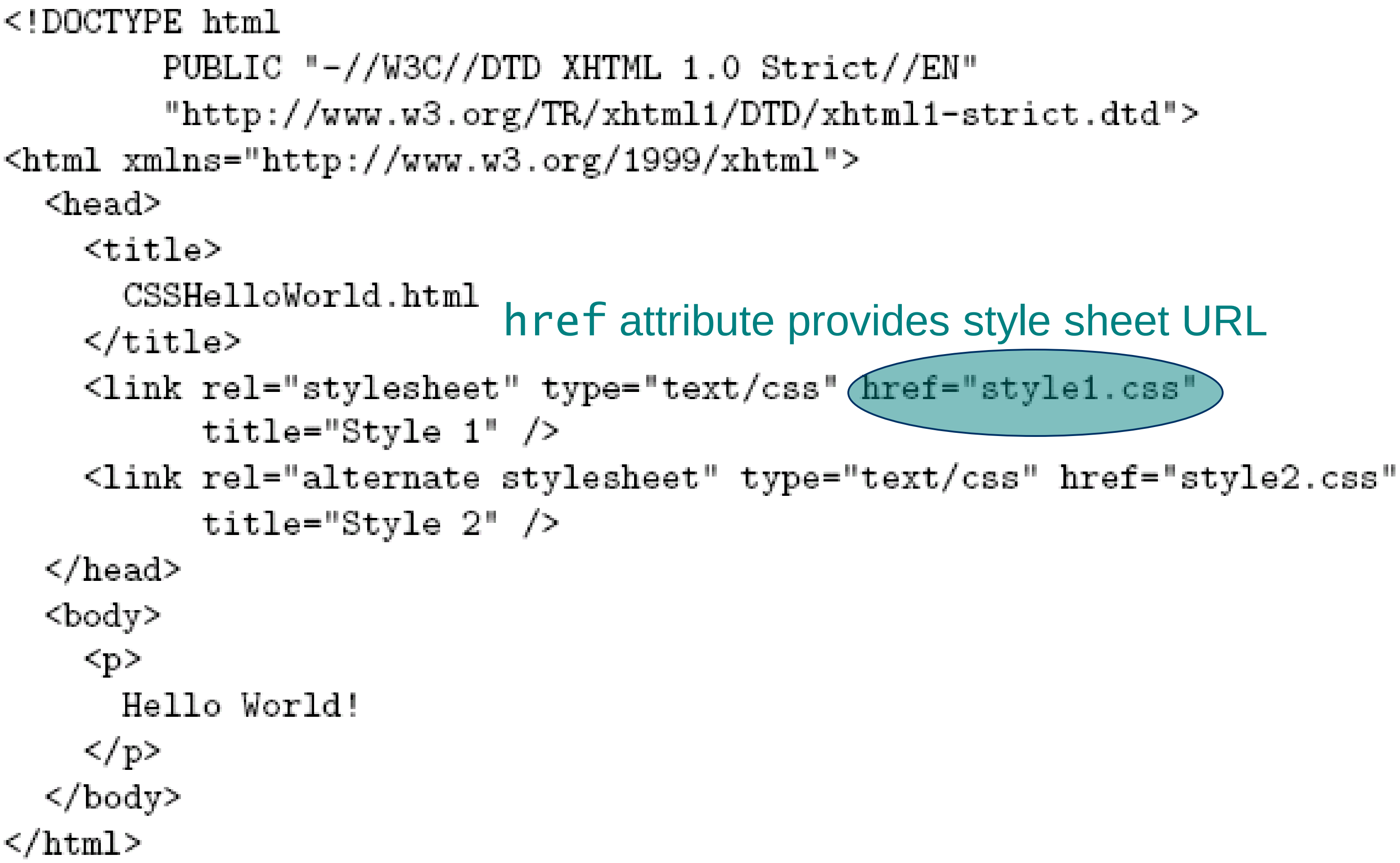
CSS Introduction



```
<!DOCTYPE html
        PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
        "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>
      CSSHelloWorld.html
    </title>
    <link rel="stylesheet" type="text/css" href="style1.css"
          title="Style 1" />
    <link rel="alternate stylesheet" type="text/css" href="style2.css"
          title="Style 2" />
  </head>
  <body>
    <p>
      Hello World!
    </p>
  </body>
</html>
```

type attribute specifies style language used

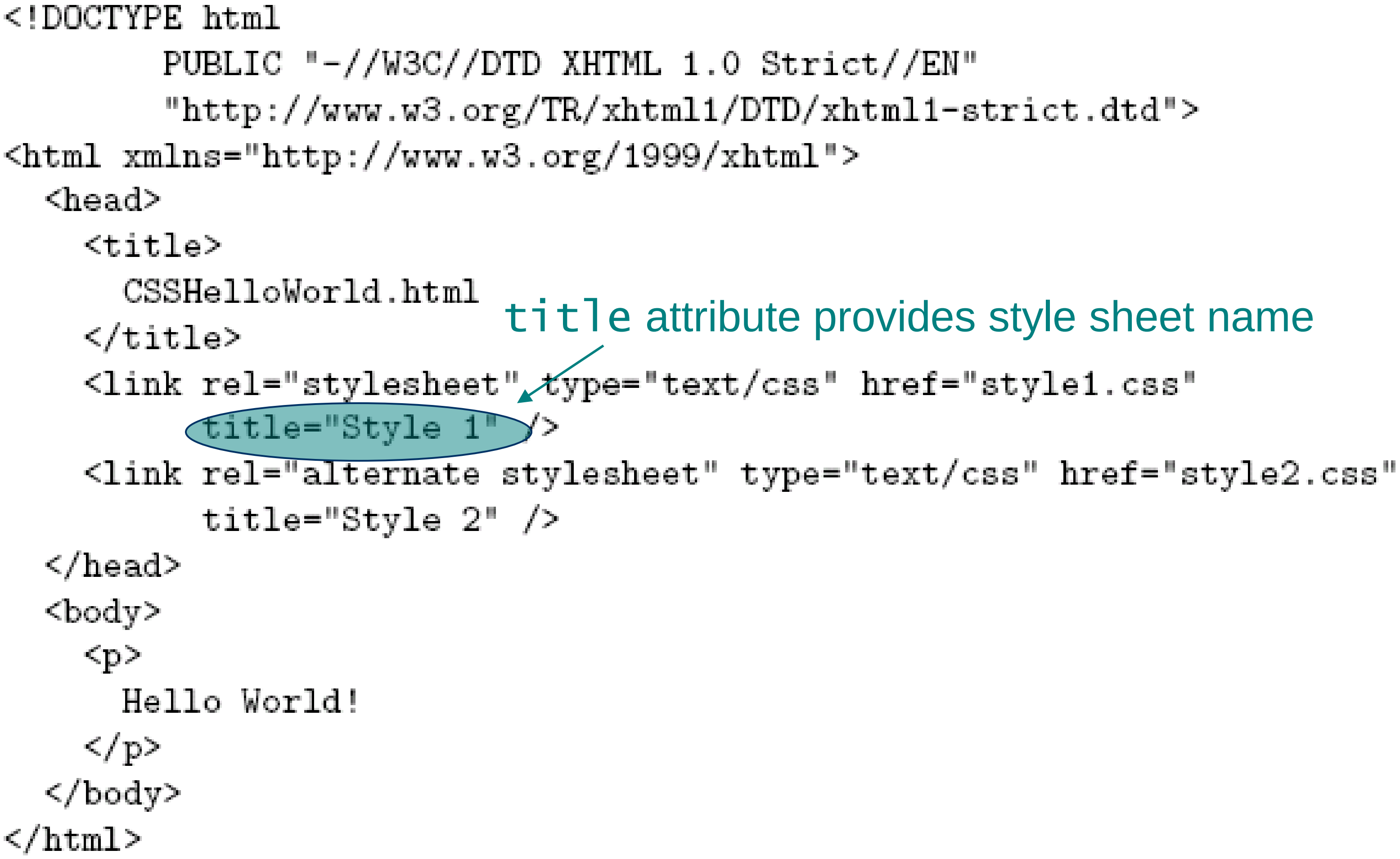
CSS Introduction



```
<!DOCTYPE html
        PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
        "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>
      CSSHelloWorld.html
    </title>
    <link rel="stylesheet" type="text/css" href="style1.css"
          title="Style 1" />
    <link rel="alternate stylesheet" type="text/css" href="style2.css"
          title="Style 2" />
  </head>
  <body>
    <p>
      Hello World!
    </p>
  </body>
</html>
```

`href` attribute provides style sheet URL

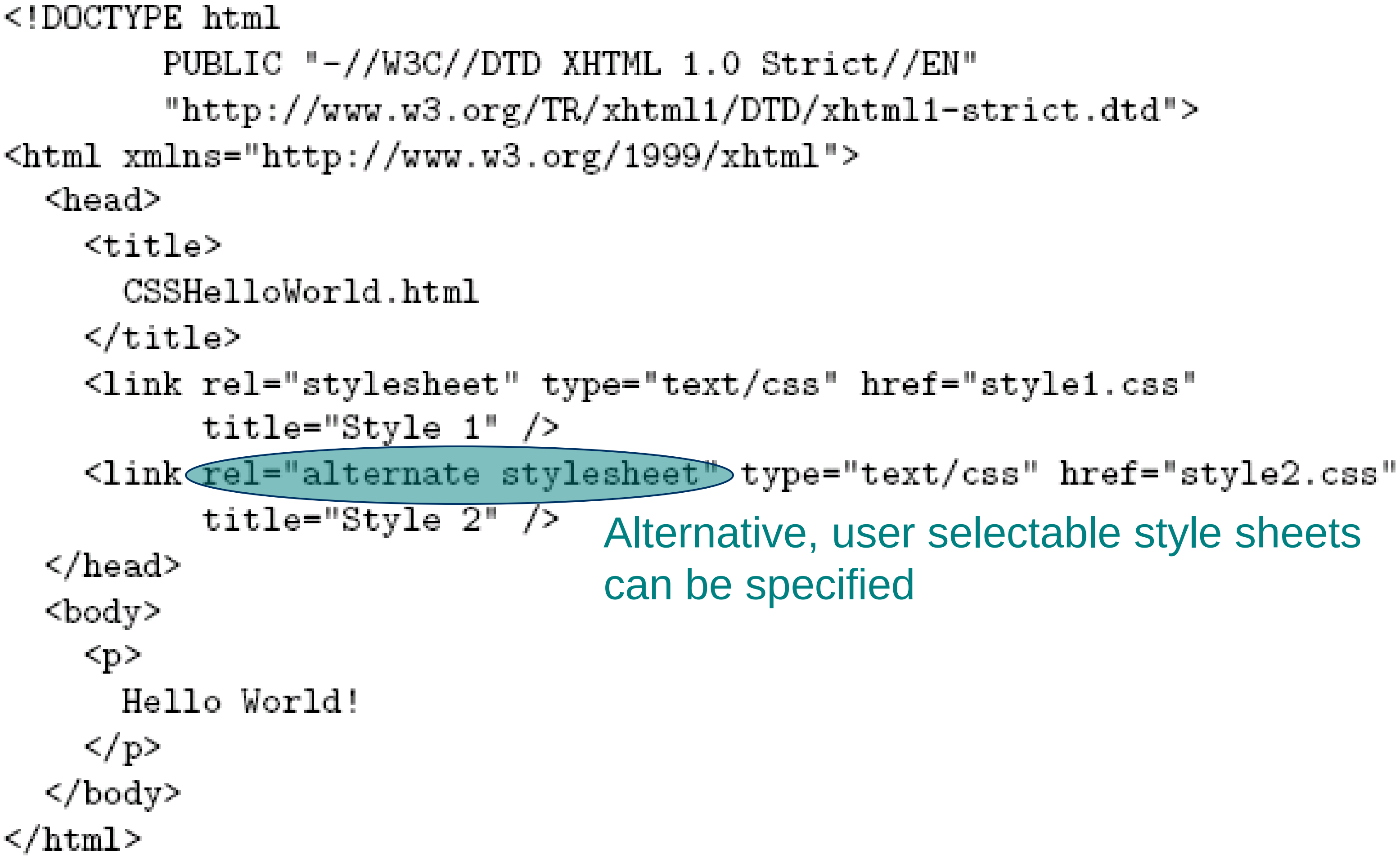
CSS Introduction



```
<!DOCTYPE html
        PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
        "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>
      CSSHelloWorld.html
    </title>
    <link rel="stylesheet" type="text/css" href="style1.css"
          title="Style 1" />
    <link rel="alternate stylesheet" type="text/css" href="style2.css"
          title="Style 2" />
  </head>
  <body>
    <p>
      Hello World!
    </p>
  </body>
</html>
```

`title` attribute provides style sheet name

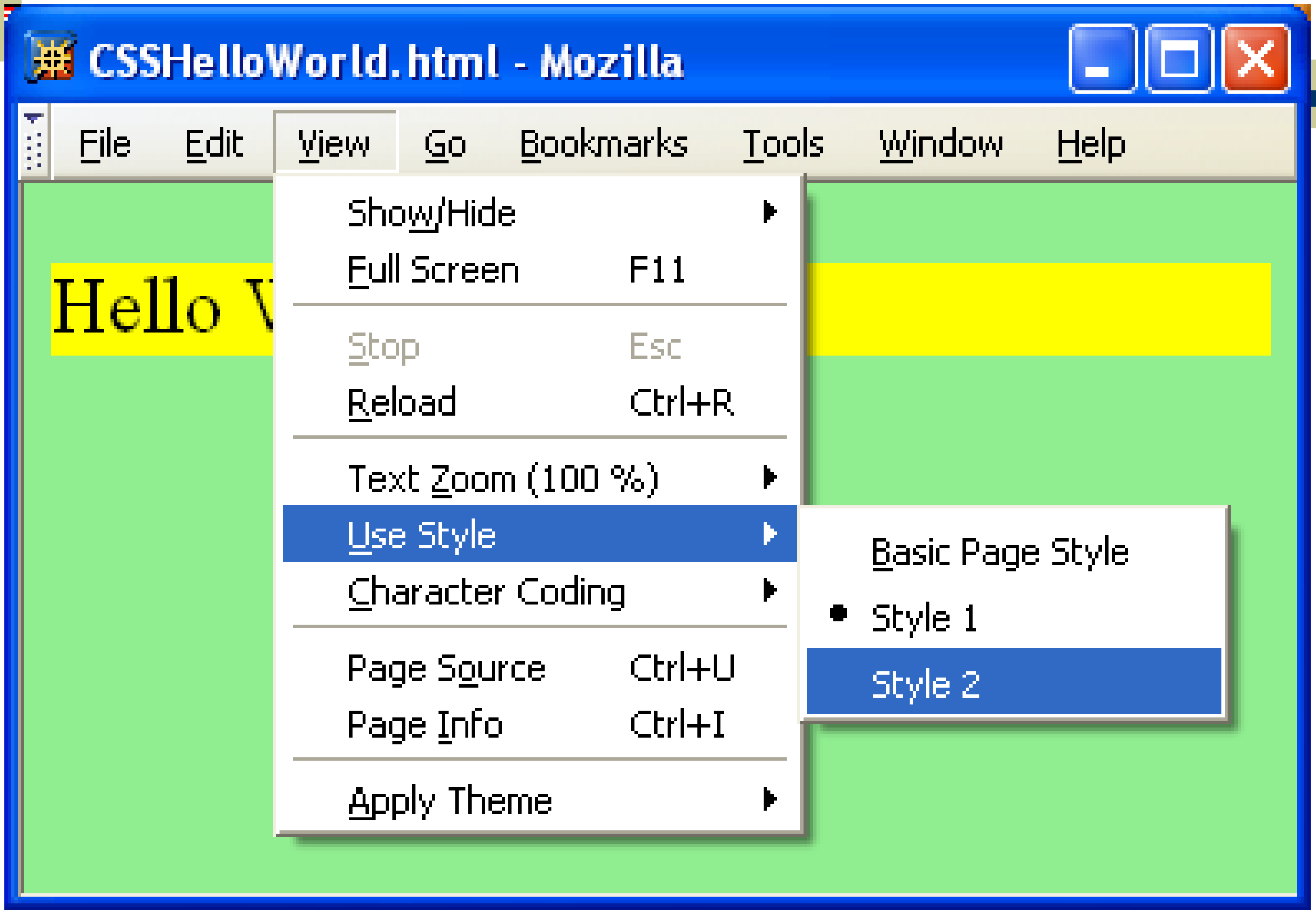
CSS Introduction



```
<!DOCTYPE html
        PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
        "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>
      CSSHelloWorld.html
    </title>
    <link rel="stylesheet" type="text/css" href="style1.css"
          title="Style 1" />
    <link rel="alternate stylesheet" type="text/css" href="style2.css"
          title="Style 2" />
  </head>
  <body>
    <p>
      Hello World!
    </p>
  </body>
</html>
```

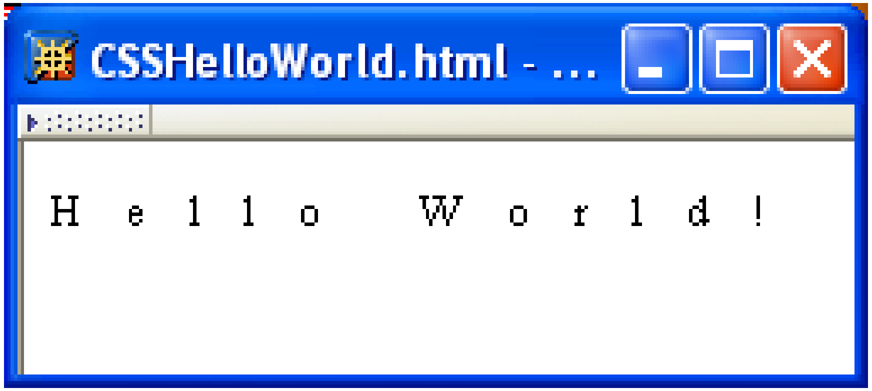
Alternative, user selectable style sheets can be specified

CSS Introduction



CSS Introduction

- A styled HTML document



Hello World!

produced by the style sheet `style2.css`:

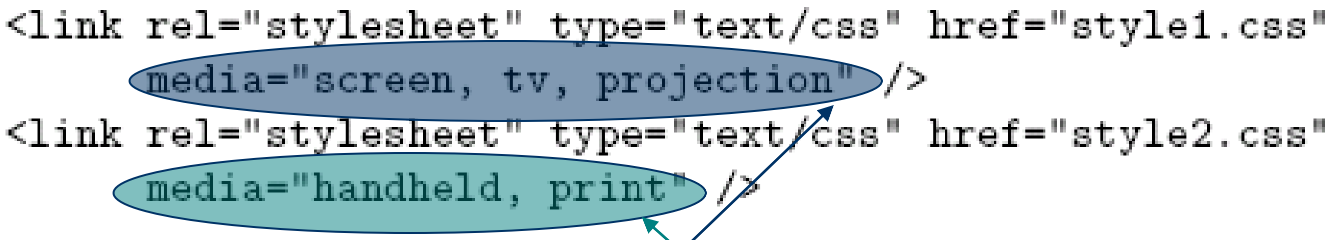
```
p     { font-size:smaller; letter-spacing:1em }
```

CSS Introduction

Note that alternate, user selectable style is not widely supported: firefox 3 and IE 8 do, but IE 6, IE 7 and Chrome don’t.

CSS Introduction

- Single document can be displayed on multiple media platforms by tailoring style sheets:

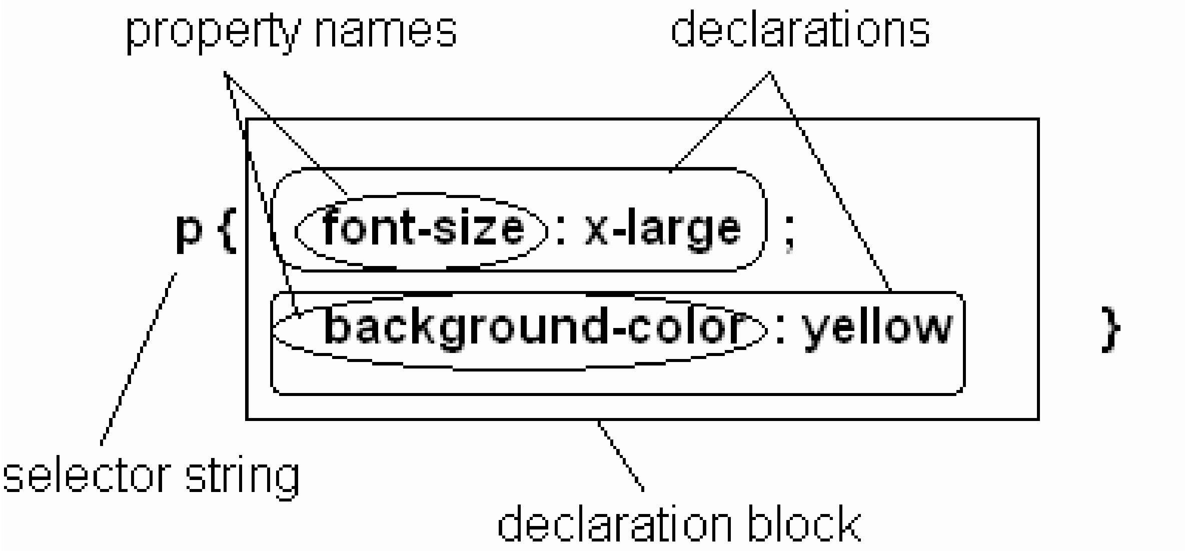


```
<link rel="stylesheet" type="text/css" href="style1.css"
      media="screen, tv, projection" />
<link rel="stylesheet" type="text/css" href="style2.css"
      media="handheld, print" />
```

This document will be printed differently than it is displayed.

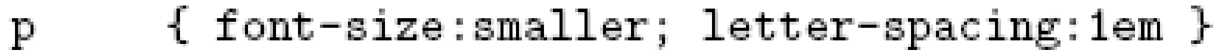
CSS Syntax

- Parts of a style rule (or statement)



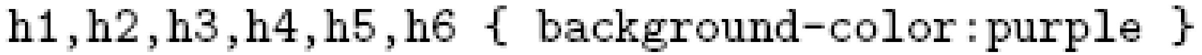
CSS Syntax: Selector Strings

- Single element type:



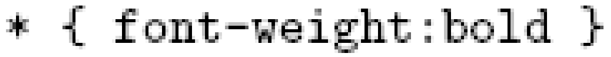
```
p     { font-size:smaller; letter-spacing:1em }
```

- Multiple element types:



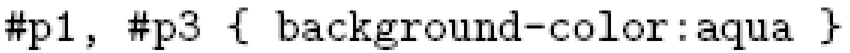
```
h1,h2,h3,h4,h5,h6 { background-color:purple }
```

- All element types:



```
* { font-weight:bold }
```

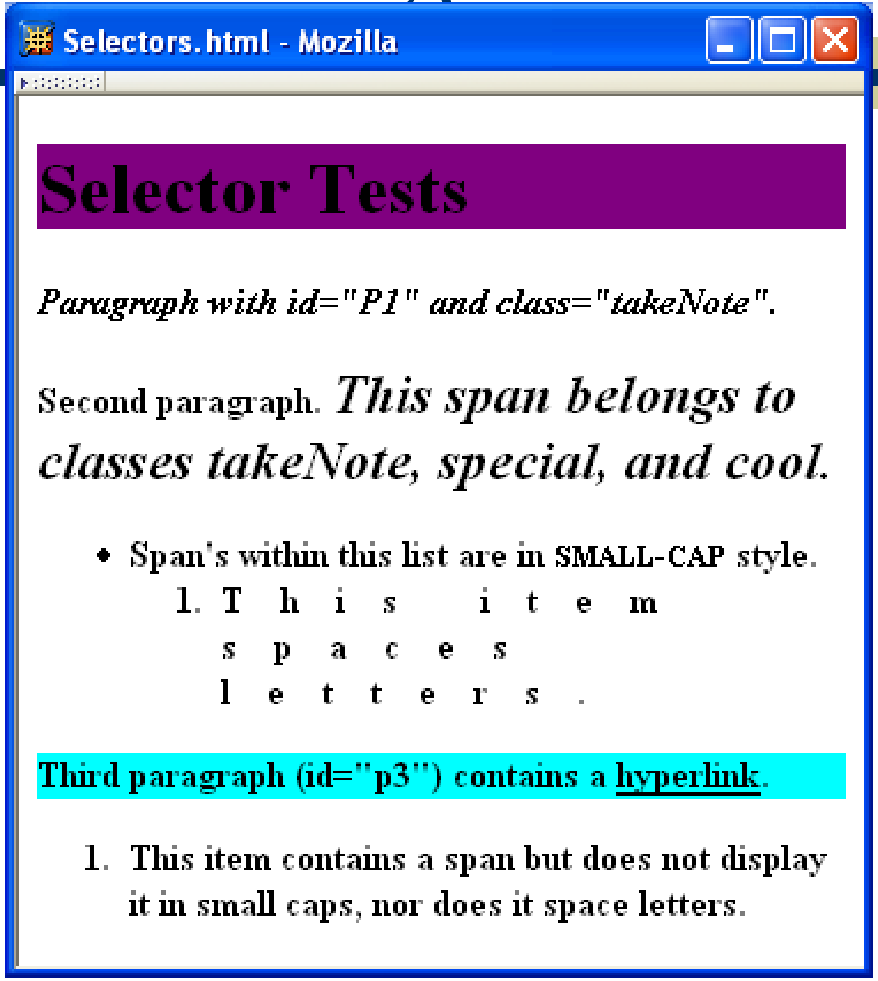
- Specific elements by id:



```
#p1, #p3 { background-color:aqua }
```

CSS Syntax: Selector Strings

```
<p id="p3">
  Third paragraph (id="p3")
```



Selector Tests

Paragraph with id="P1" and class="takeNote".

Second paragraph. *This span belongs to classes takeNote, special, and cool.*

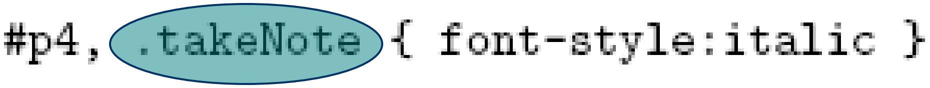
- Span's within this list are in SMALL-CAP style.
  1. This item spaces letters.

Third paragraph (id="p3") contains a hyperlink.

1. This item contains a span but does not display it in small caps, nor does it space letters.

CSS Syntax:
Selector Strings

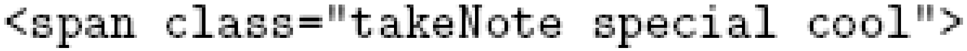
- Elements belonging to a style class:



```
#p4, .takeNote { font-style:italic }
```

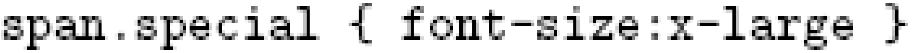
class selector: begins with a period .

  - Referencing a style class in HTML:



```
<span class="takeNote special cool">
```

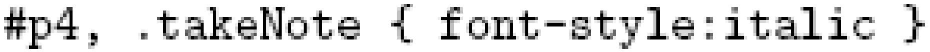
- Elements of a certain type and class:



```
span.special { font-size:x-large }
```

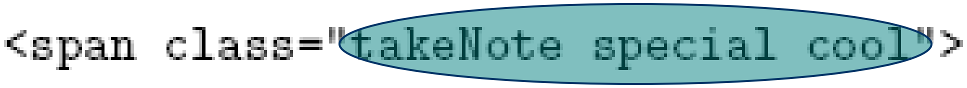
CSS Syntax:
Selector Strings

- Elements belonging to a style class:



```
#p4, .takeNote { font-style:italic }
```

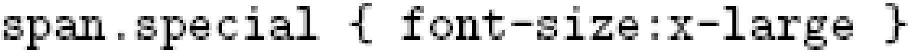
  - Referencing a style class in HTML:



```
<span class="takeNote special cool">
```

this span belongs to three style classes

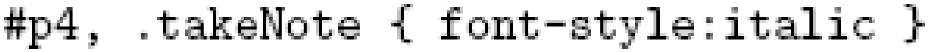
- Elements of a certain type and class:



```
span.special { font-size:x-large }
```

CSS Syntax: Selector Strings

- Elements belonging to a style class:



```
#p4, .takeNote { font-style:italic }
```

  - Referencing a style class in HTML:

```
<span class="takeNote special cool">
```

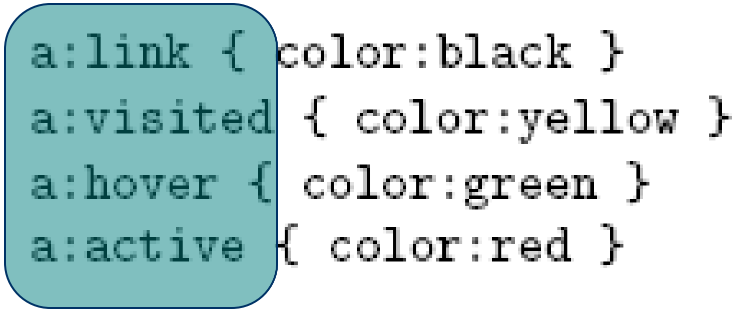
- Elements of a certain type and class:

```
span.special { font-size:x-large }
```

this rule applies only to `span`’s belonging to class `special`

CSS Syntax: Selector Strings

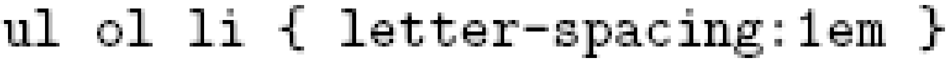
- Source anchor elements:



```
a:link { color:black }
a:visited { color:yellow }
a:hover { color:green }
a:active { color:red }
```

pseudo-classes

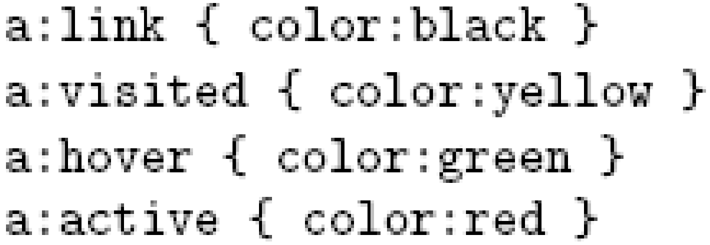
- Element types that are descendents:



```
ul ol li { letter-spacing:1em }
```

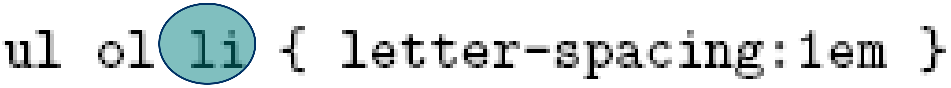
CSS Syntax: Selector Strings

- Source anchor elements:



```
a:link { color:black }
a:visited { color:yellow }
a:hover { color:green }
a:active { color:red }
```

- Element types that are descendants:

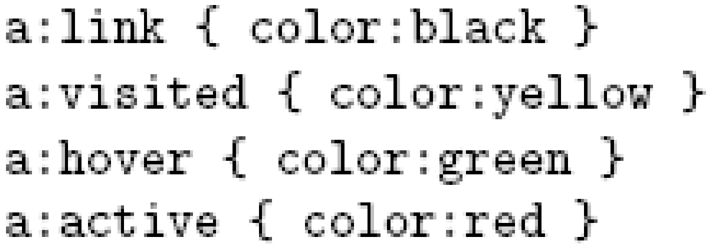


```
ul ol li { letter-spacing:1em }
```

rule applies to `li` element that is

CSS Syntax: Selector Strings

- Source anchor elements:



```
a:link { color:black }
a:visited { color:yellow }
a:hover { color:green }
a:active { color:red }
```

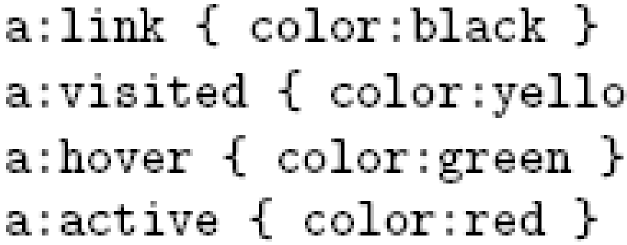
- Element types that are descendants:

```
ul ol li { letter-spacing:1em }
```

rule applies to `li` element that is
part of the content of an `ol` element

CSS Syntax: Selector Strings

- Source anchor elements:



```
a:link { color:black }
a:visited { color:yellow }
a:hover { color:green }
a:active { color:red }
```

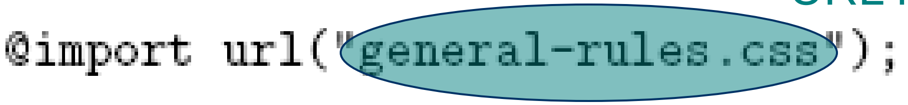
- Element types that are descendants:

```
ul ol li { letter-spacing:1em }
```

rule applies to `li` element that is
part of the content of an `ol` element
that is part of the content of a `ul` element

CSS Syntax

- Style rules covered thus far follow ruleset syntax
- At-rule is a second type of rule



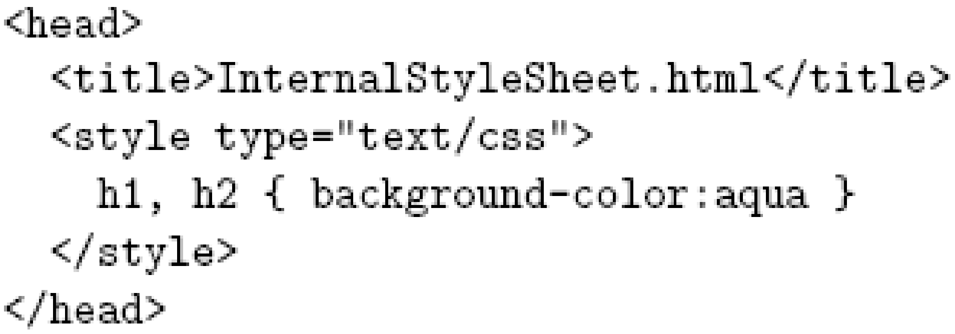
```
@import url("general-rules.css");
```

URL relative to style sheet URL

  - Reads style rules from specified URL
  - Must appear at beginning of style sheet

Style Sheets and HTML

- Style sheets referenced by `link` HTML element are called external style sheets
- Style sheets can be embedded directly in HTML document using `style` element



```
<head>
  <title>InternalStyleSheet.html</title>
  <style type="text/css">
    h1, h2 { background-color:aqua }
  </style>
</head>
```

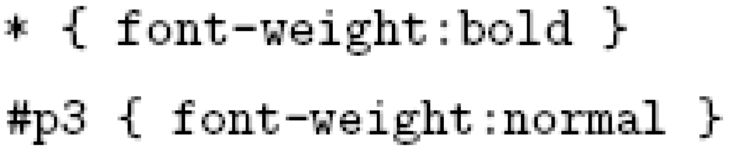
- Most HTML elements have `style` attribute (value is list of style declarations)

Style Sheets and HTML

- Rules of thumb:
  - Use external style sheets to define site-wide style
  - Prefer style sheets (either external or embedded) to `style` attributes
  - XML special characters
    - Must use references in embedded style sheets and `style` attribute
    - Must *not* use references in external style sheets

CSS Rule Cascade

- What if more than one style declaration applies to a property of an element?



```
* { font-weight:bold }
#p3 { font-weight:normal }
```

- The CSS rule cascade determines which style rule’s declaration applies

CSS Rule Cascade

To find the value for an element/property combination, user agents must apply the following sorting order:

1- Find all declarations that apply to the element and property in question, for the target media type. Declarations apply if the associated selector matches the element in question.

CSS Rule Cascade

2- The primary sort of the declarations is by weight and origin: for normal declarations, author style sheets override user style sheets which override the default style sheet. For "!important" declarations, user style sheets override author style sheets which override the default style sheet. "!important" declaration override normal declarations. An imported style sheet has the same origin as the style sheet that imported it.

Five origin/weight levels:

1. user/important
2. author/important
3. author/normal
4. user/normal
5. user agent/normal

CSS Rule Cascade

3- The secondary sort is by specificity of selector: more specific selectors will override more general ones. Pseudo-elements and pseudo-classes are counted as normal elements and classes, respectively.

Specificity:

1. `style` attribute
2. rule with selector:
    1. ID
    2. class/pseudo-class
    3. descendant/element type
    4. universal
3. HTML attribute

CSS Rule Cascade

4- Finally, sort by order specified: if two rules have the same weight, origin and specificity, the latter specified wins. Rules in imported style sheets are considered to be before any rules in the style sheet itself.

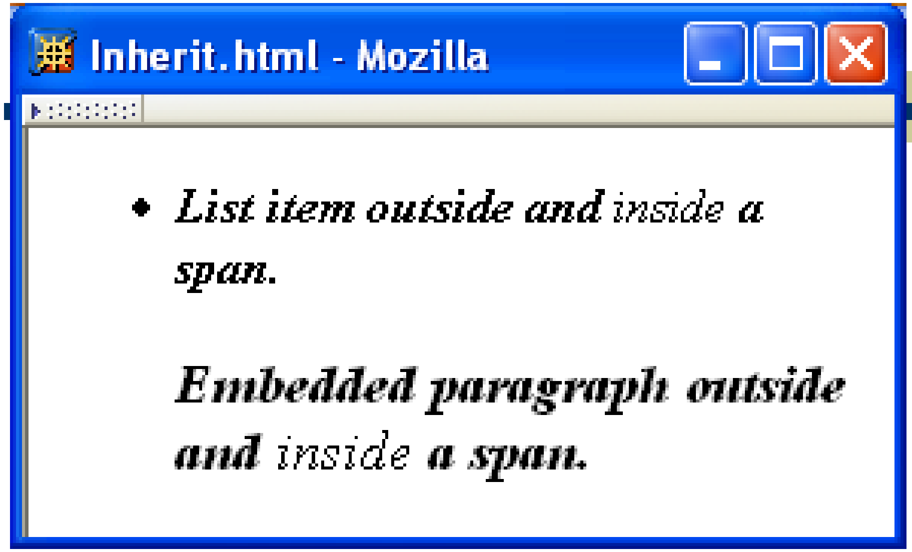
Conceptually, create one long style sheet. Later style rules have higher priority than earlier rules.

CSS Inheritance

- What if no style declaration applies to a property of an element?
- Generally, the property value is inherited from the nearest ancestor element that has a value for the property
- If no ancestor has a value (or the property does not inherit) then CSS defines an initial value that is used

CSS Inheritance

```
body { font-weight:bold }
li { font-style:italic }
p { font-size:larger }
span { font-weight:normal }
```



- ***List item outside and** inside **a span.***

  Embedded paragraph outside and** inside **a span.

```
<body>
  <ul>
    <li>
      List item outside and <span>inside</span> a span.
      <p>
        Embedded paragraph outside and <span>inside</span> a span.
      </p>
    </li>
  </ul>
</body>
```

CSS Inheritance

- Property values:
  - Specified: value contained in declaration
    - Absolute: value can be determined without reference to context (*e.g.*, `2cm`)
    - Relative: value depends on context (*e.g.*, `larger`)
  - Computed: absolute representation of relative value (*e.g.*, `larger` might be 1.2 x parent font size)
  - Actual: value actually used by browser (*e.g.*, computed value might be rounded)

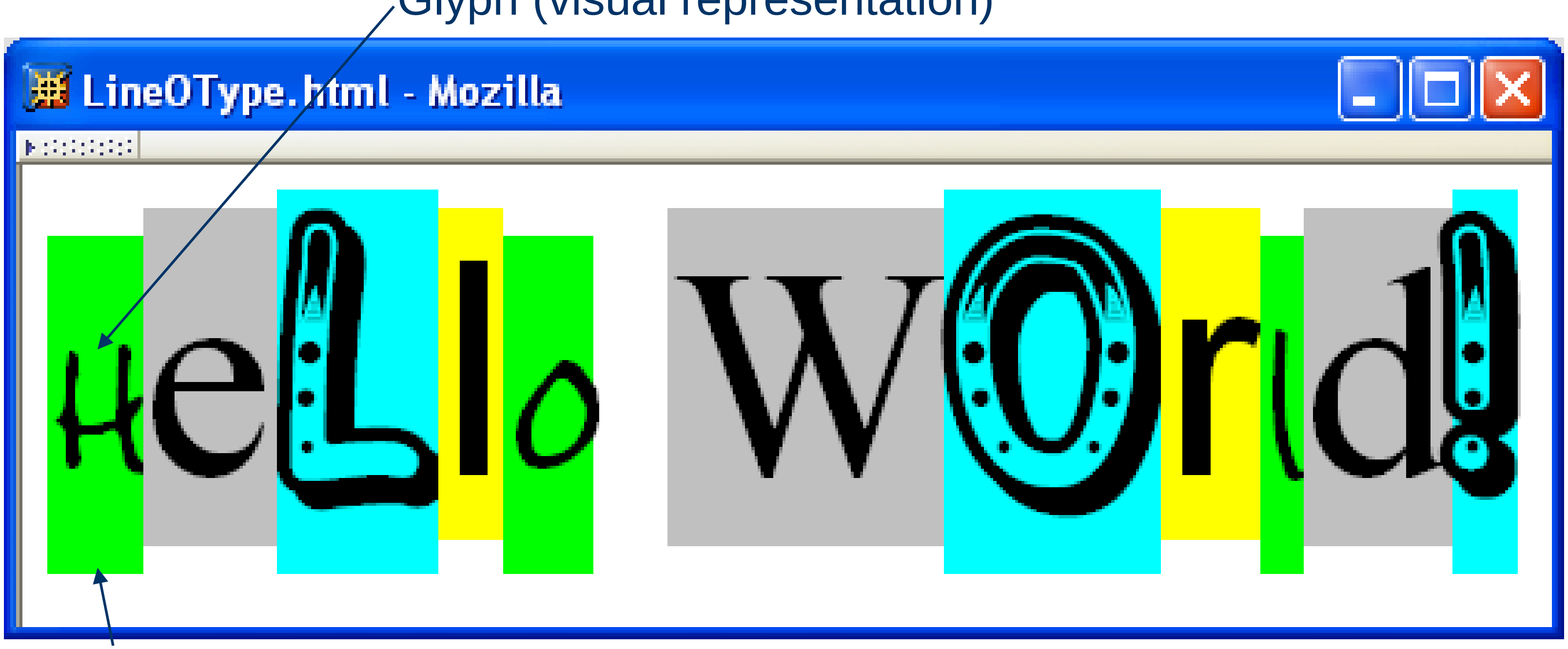
CSS Inheritance

- Most properties inherit computed value
  - Exception discussed later: `line-height`
- A little thought can usually tell you whether a property inherits or not
  - Example: `height` does not inherit

CSS Font Properties

- A font is a mapping from code points to glyphs

Glyph (visual representation)

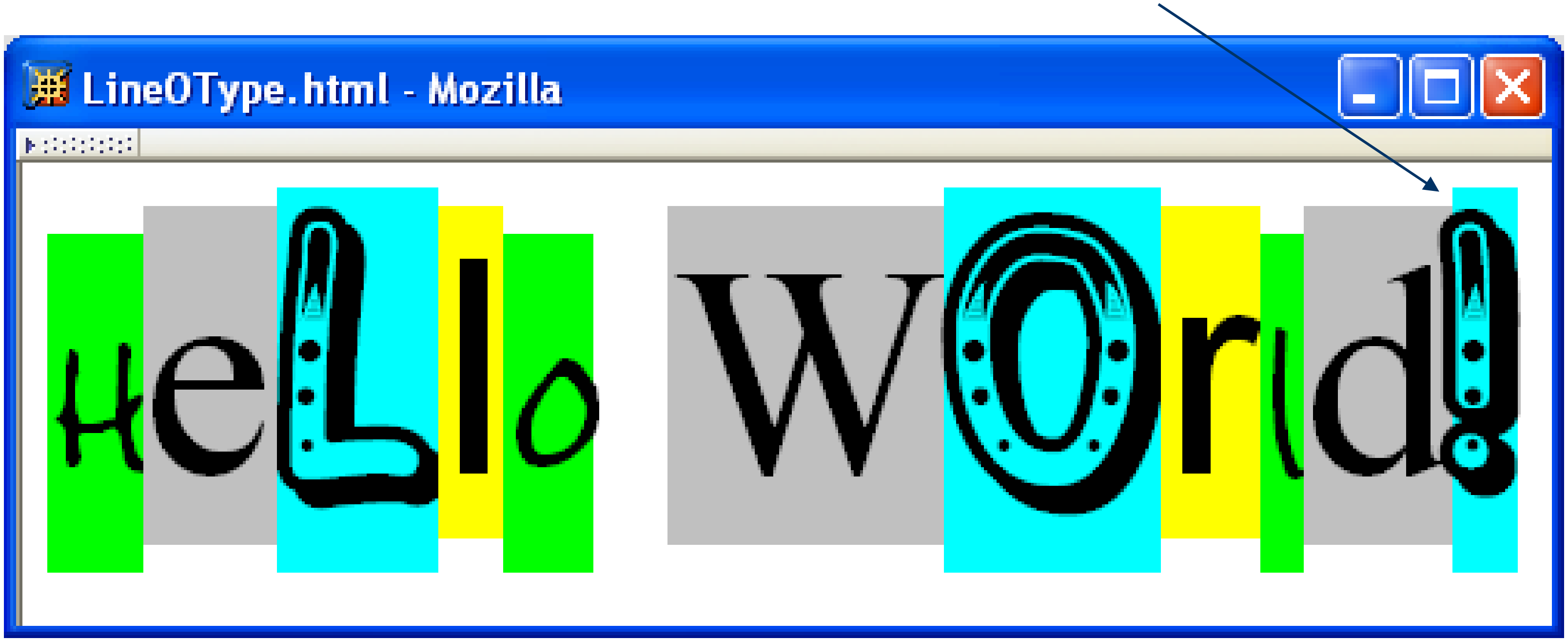


character cell
(content area)

CSS Font Properties

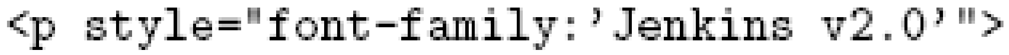
- A font is a mapping from code points to glyphs

glyphs do not necessary stay inside cells!



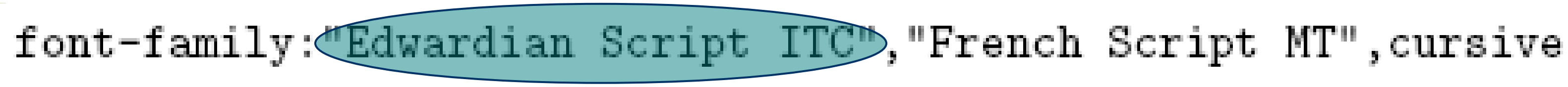
CSS Font Properties

- A font family is a collection of related fonts (typically differ in size, weight, etc.)



```
<p style="font-family:’Jenkins v2.0’">
```

- font-family property can accept a list of families, including generic font families

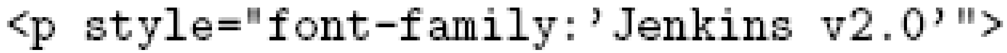


```
font-family:"Edwardian Script ITC","French Script MT",cursive
```

first choice font

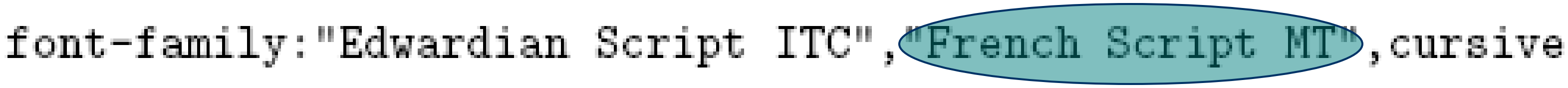
CSS Font Properties

- A font family is a collection of related fonts (typically differ in size, weight, etc.)



```
<p style="font-family:’Jenkins v2.0’">
```

- font-family property can accept a list of families, including generic font families

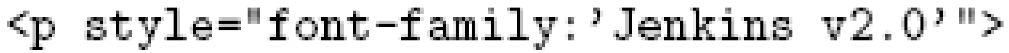


```
font-family:"Edwardian Script ITC","French Script MT",cursive
```

second choice font

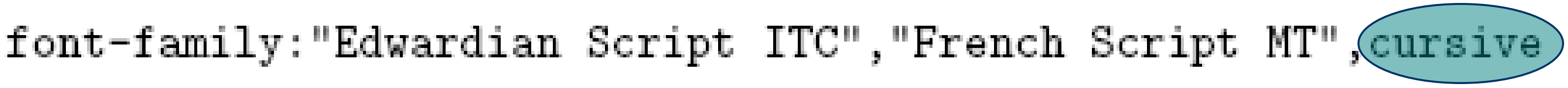
CSS Font Properties

- A font family is a collection of related fonts (typically differ in size, weight, etc.)



```
<p style="font-family:'Jenkins v2.0'">
```

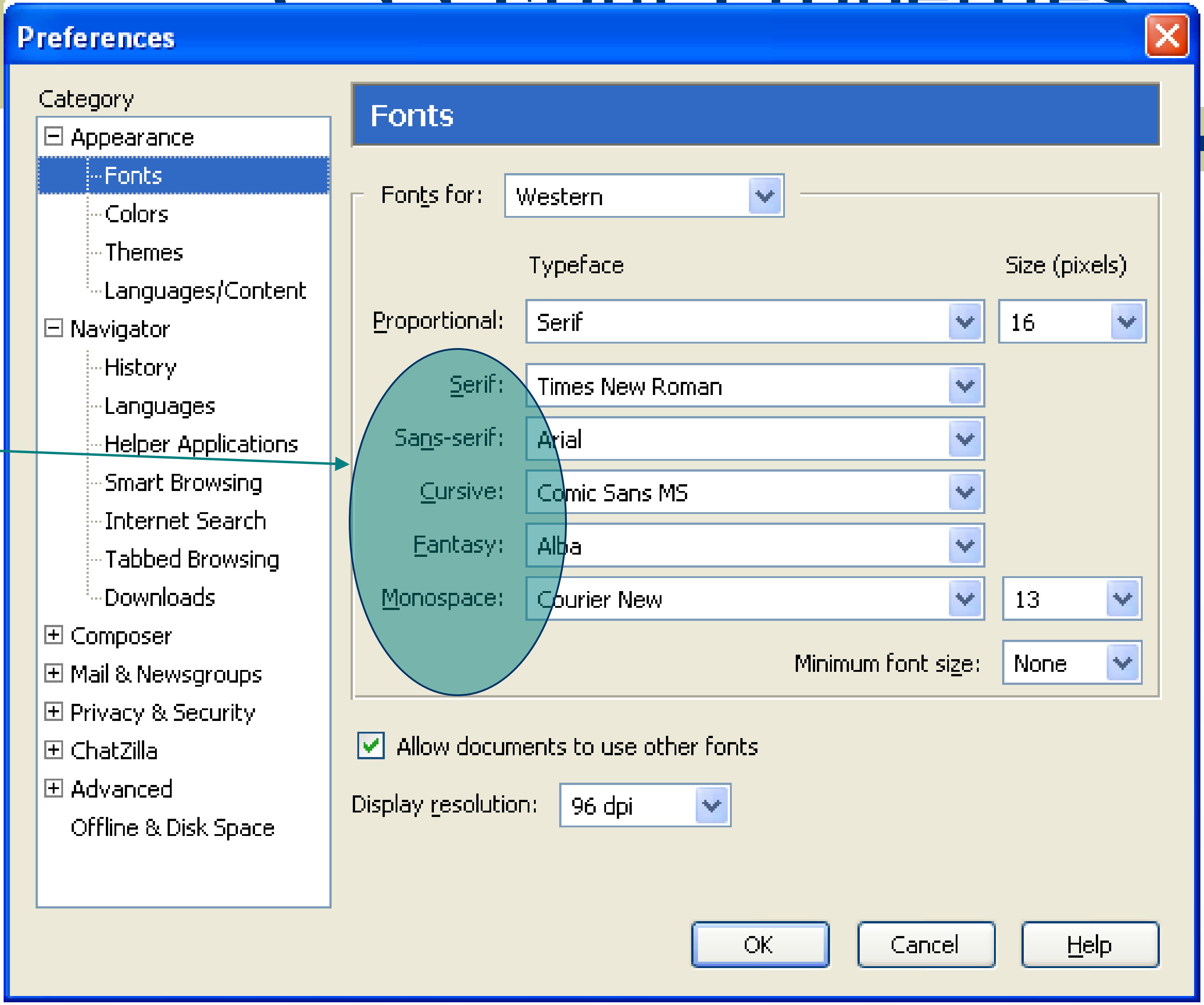
- font-family property can accept a list of families, including generic font families



```
font-family:"Edwardian Script ITC","French Script MT",cursive
```

generic

CSS Font Properties



Fonts

Fonts for: Western

	Typeface	Size (pixels)
Proportional:	Serif	16
Serif:	Times New Roman	
Sans-serif:	Arial	
Cursive:	Comic Sans MS	
Fantasy:	Alba	
Monospace:	Courier New	13

Minimum font size: None

☑ Allow documents to use other fonts

Display resolution: 96 dpi

generic fonts are system-specific

CSS Font Properties

- Note that most generic font can be easily set on Firefox and Chrome, but such option doesn’t seem to be available on IE 7 and 8. IE will still default to something although maybe not what you had hoped for!

CSS Font Properties

- Many properties, such as `font-size`, have a value that is a CSS length
- All CSS length values except 0 need units

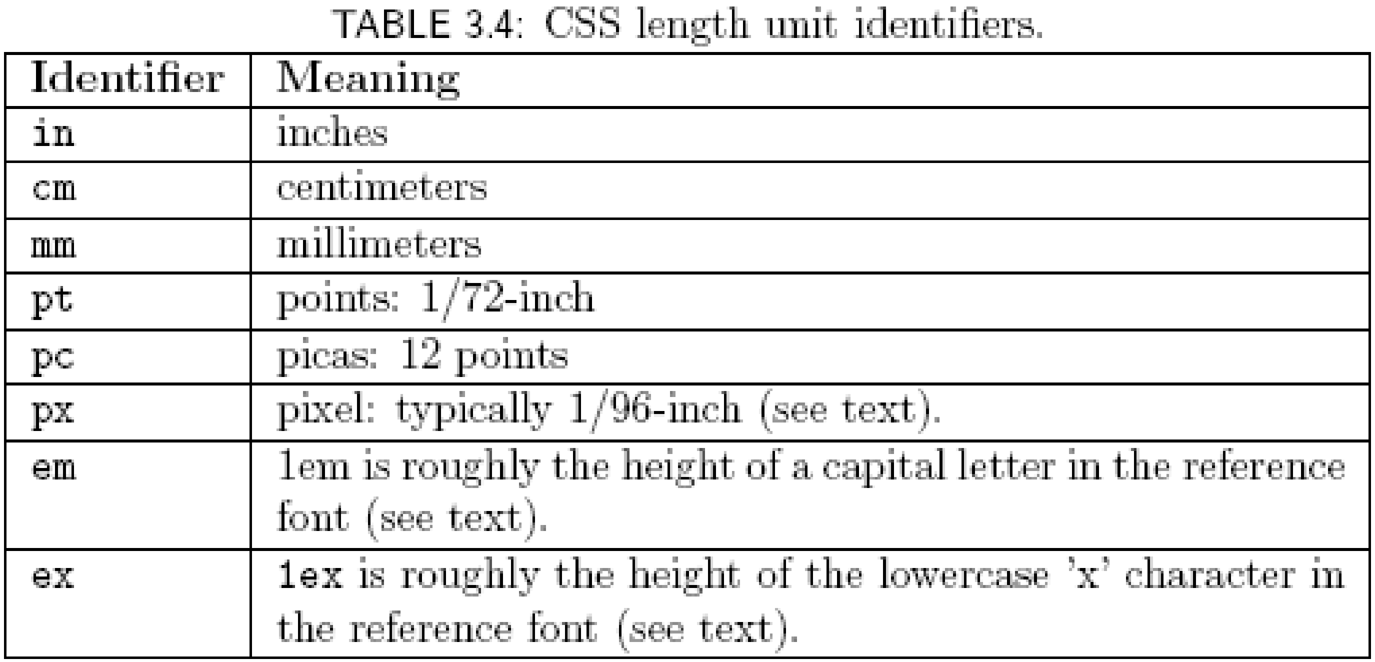
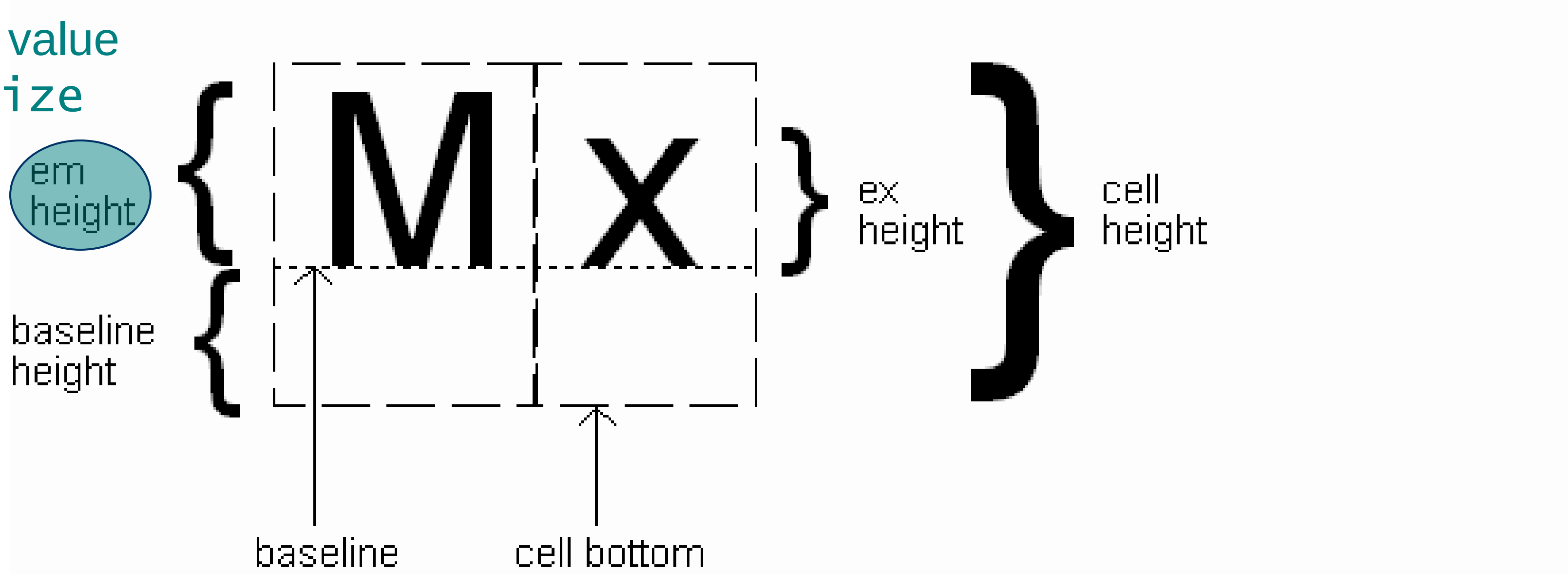


TABLE 3.4: CSS length unit identifiers.

Identifier	Meaning
`in`	inches
`cm`	centimeters
`mm`	millimeters
`pt`	points: 1/72-inch
`pc`	picas: 12 points
`px`	pixel: typically 1/96-inch (see text).
`em`	1em is roughly the height of a capital letter in the reference font (see text).
`ex`	`1ex` is roughly the height of the lowercase ’x’ character in the reference font (see text).

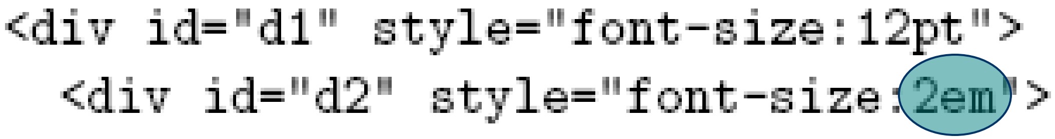
CSS Font Properties

Computed value of `font-size` property



CSS Font Properties

- Reference font defines em and ex units
  - Normally, reference font is the font of the element being styled
  - Exception: Using em/ex to specify value for `font-size`



```
<div id="d1" style="font-size:12pt">
  <div id="d2" style="font-size:2em">
```

parent element’s font is reference font

CSS Font Properties

- Other ways to specify value for `font-size`:
  - Percentage (of parent `font-size`)

    ```
    font-size:85%
    ```
  - Absolute size keyword: `xx-small`, `x-small`, `small`, `medium` (initial value), `large`, `x-large`, `xx-large`
    - User agent specific; should differ by ~ 20%
  - Relative size keyword: `smaller`, `larger`
    - Relative to parent element’s font

CSS Font Properties

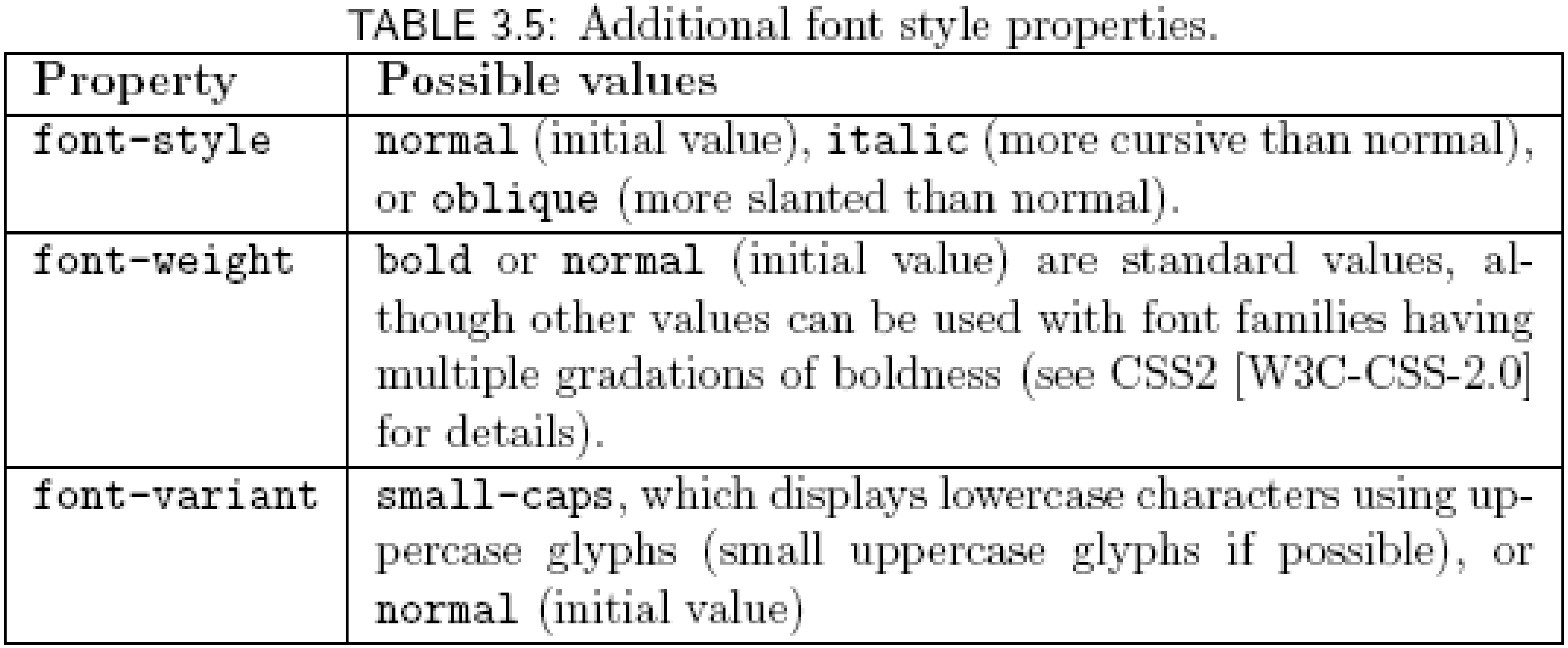
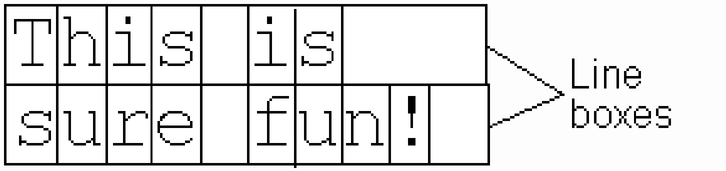


TABLE 3.5: Additional font style properties.

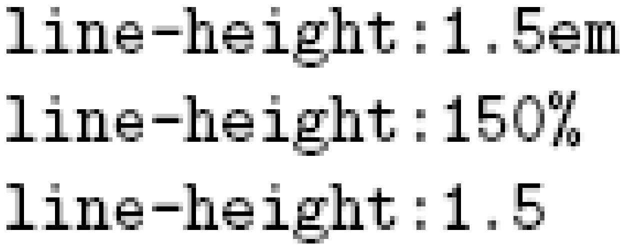
Property	Possible values
`font-style`	`normal` (initial value), `italic` (more cursive than normal), or `oblique` (more slanted than normal).
`font-weight`	`bold` or `normal` (initial value) are standard values, although other values can be used with font families having multiple gradations of boldness (see CSS2 [W3C-CSS-2.0] for details).
`font-variant`	`small-caps`, which displays lowercase characters using uppercase glyphs (small uppercase glyphs if possible), or `normal` (initial value)

CSS Font Properties

- Text is rendered using line boxes



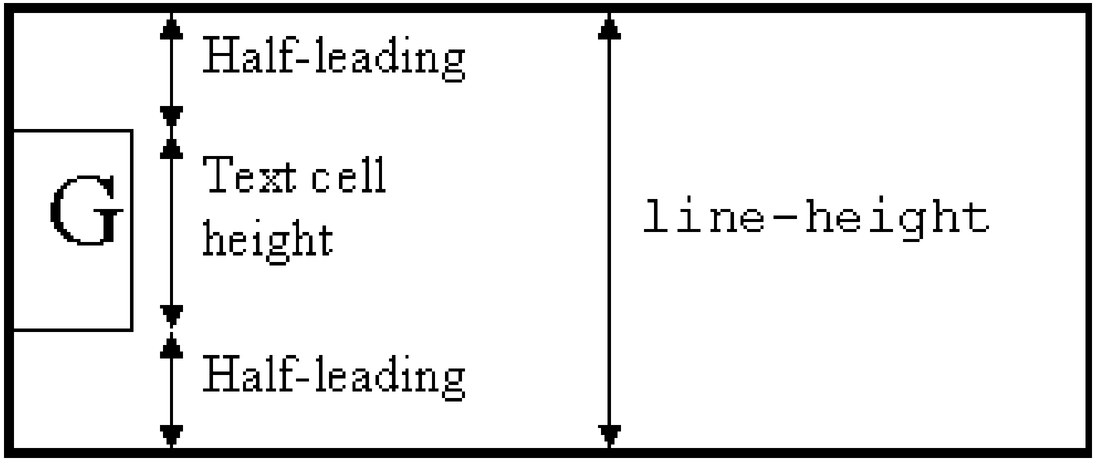
- Height of line box given by `line-height`
  - Initial value: `normal` (*i.e.*, cell height; relationship with em height is font-specific)
  - Other values (following are equivalent):



```
line-height:1.5em
line-height:150%
line-height:1.5
```

CSS Font Properties

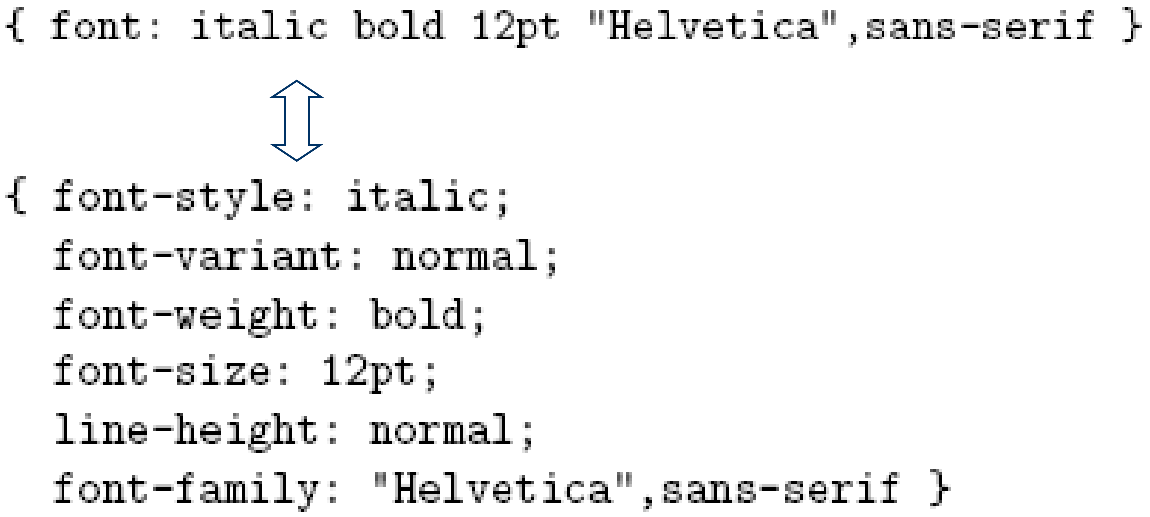
- When `line-height` is greater than cell height:



- Inheritance of `line-height`:
  - Specified value if `normal` or unit-less number
  - Computed value otherwise

CSS Font Properties

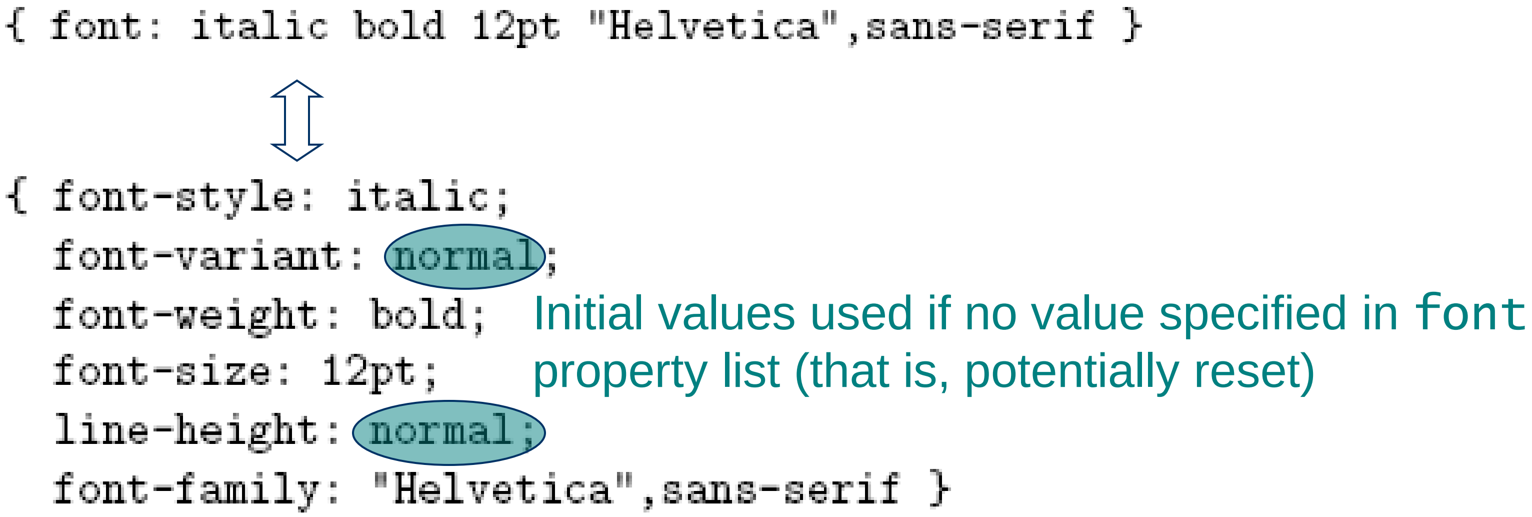
- `font` shortcut property:



```
{ font: italic bold 12pt "Helvetica",sans-serif }

              ⇕

{ font-style: italic;
  font-variant: normal;
  font-weight: bold;
  font-size: 12pt;
  line-height: normal;
  font-family: "Helvetica",sans-serif }
```

CSS Font Properties

- `font` shortcut property:

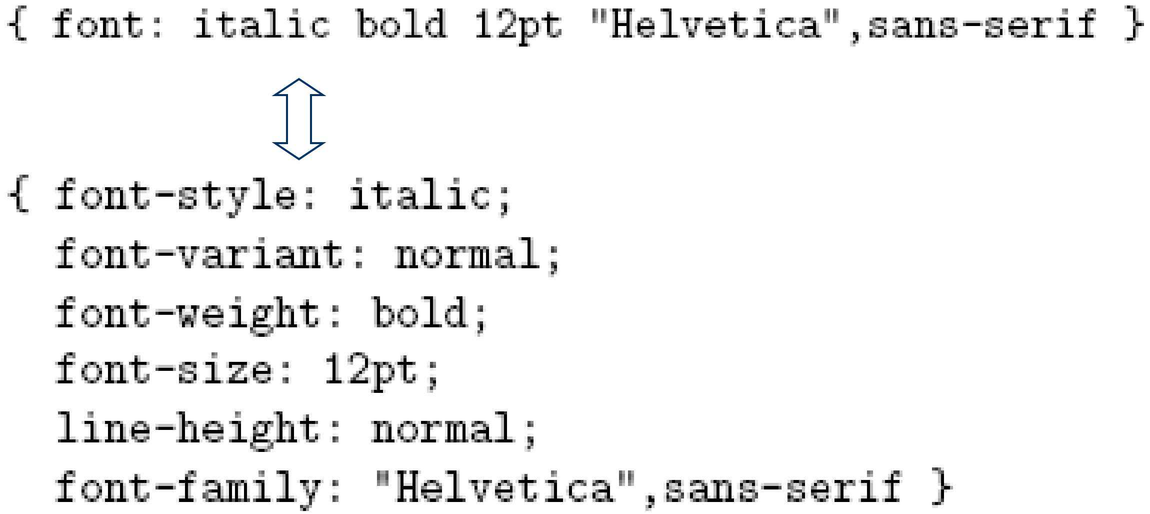


```
{ font: italic bold 12pt "Helvetica",sans-serif }

           ⇕

{ font-style: italic;
  font-variant: normal;
  font-weight: bold;
  font-size: 12pt;
  line-height: normal;
  font-family: "Helvetica",sans-serif }
```

Initial values used if no value specified in `font` property list (that is, potentially reset)

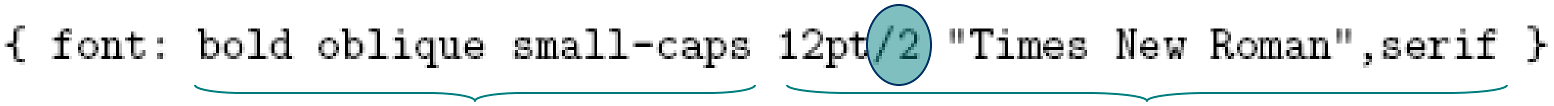
CSS Font Properties

- `font` shortcut property:



```
{ font: italic bold 12pt "Helvetica",sans-serif }

⇕

{ font-style: italic;
  font-variant: normal;
  font-weight: bold;
  font-size: 12pt;
  line-height: normal;
  font-family: "Helvetica",sans-serif }
```

specifying line-height (here, twice cell height)



```
{ font: bold oblique small-caps 12pt/2 "Times New Roman",serif }
```

any order

size and family required, order-dependent

CSS Text Formatting

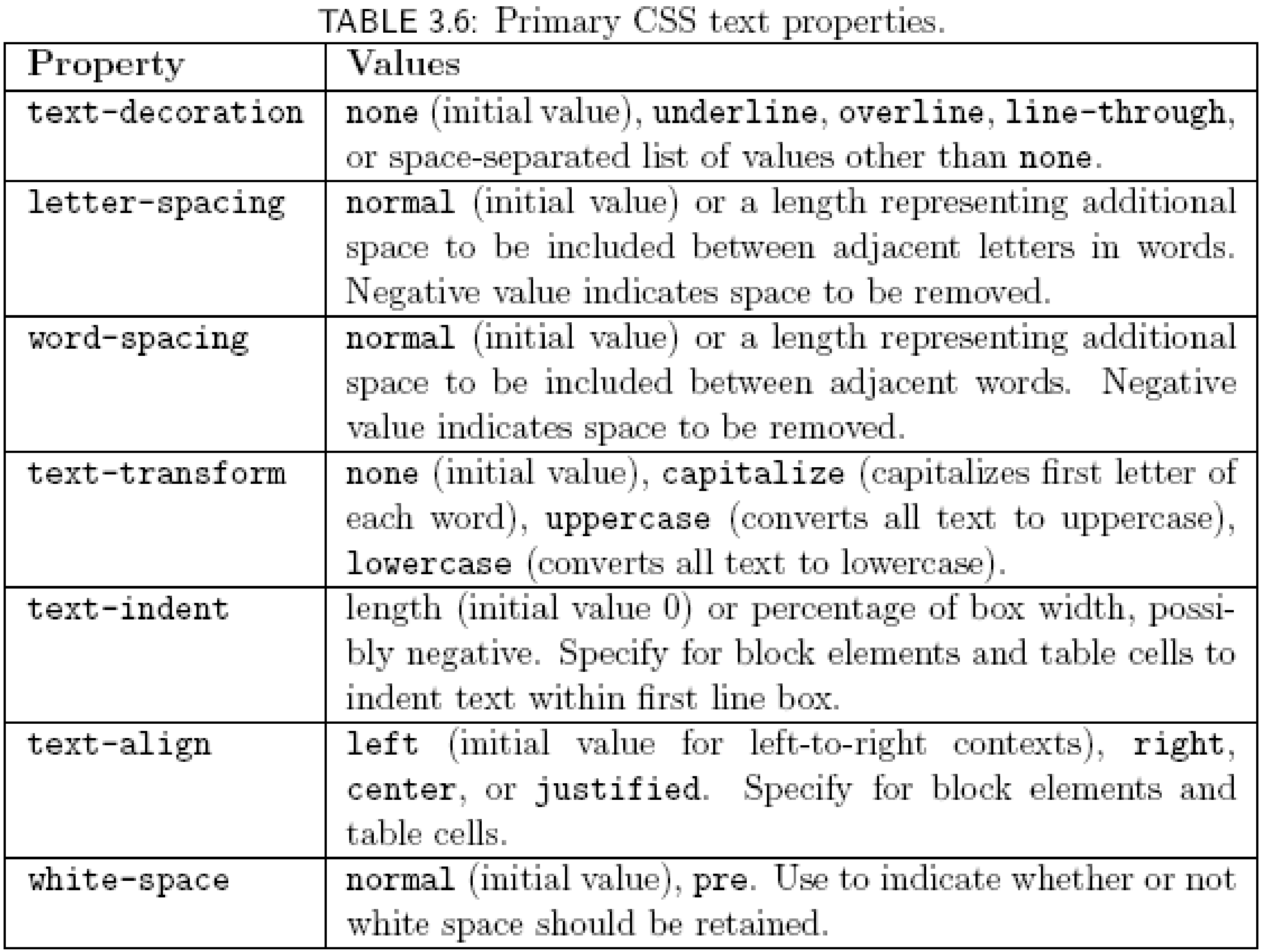


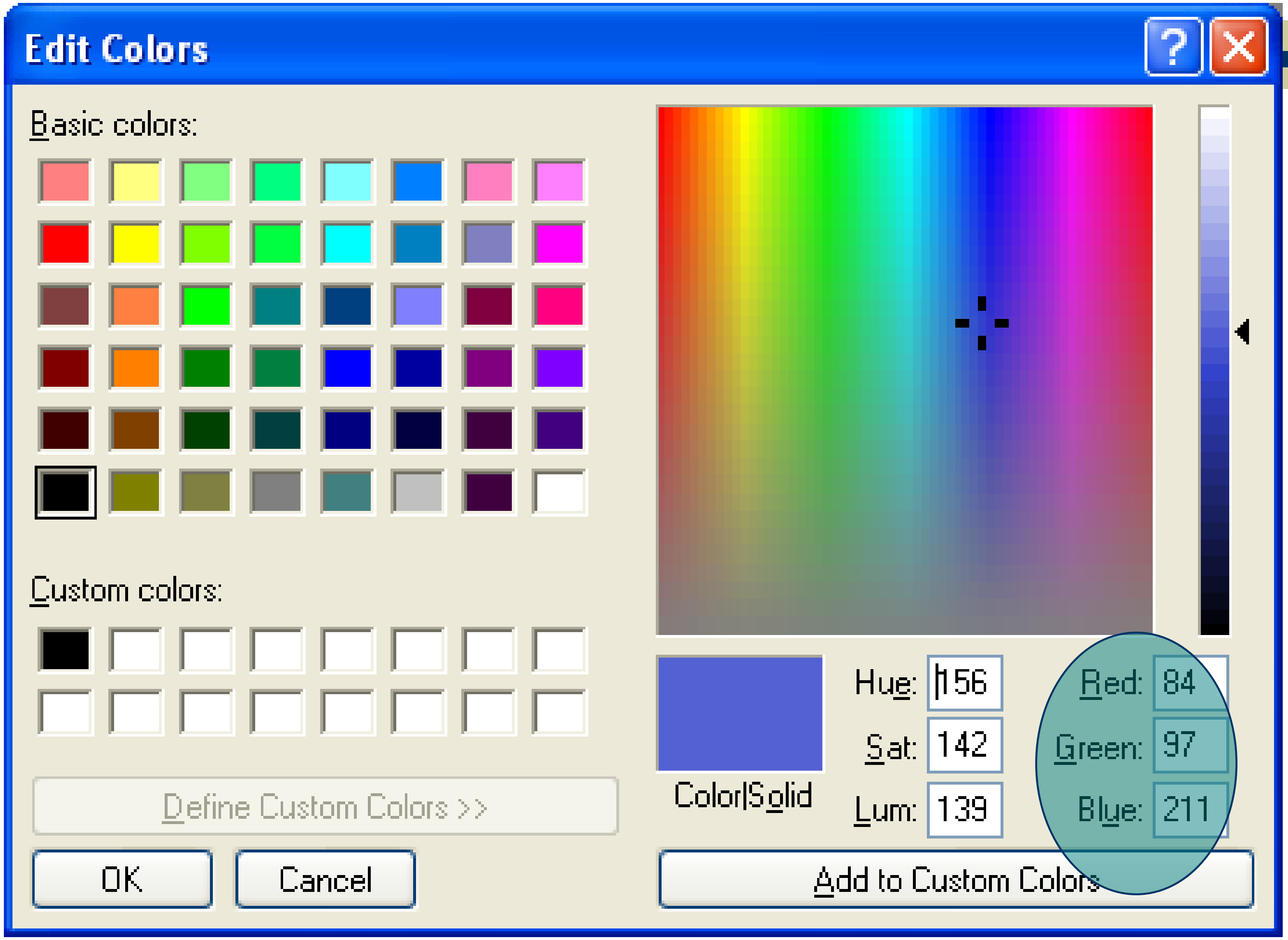
TABLE 3.6: Primary CSS text properties.

Property	Values
`text-decoration`	`none` (initial value), `underline`, `overline`, `line-through`, or space-separated list of values other than `none`.
`letter-spacing`	`normal` (initial value) or a length representing additional space to be included between adjacent letters in words. Negative value indicates space to be removed.
`word-spacing`	`normal` (initial value) or a length representing additional space to be included between adjacent words. Negative value indicates space to be removed.
`text-transform`	`none` (initial value), `capitalize` (capitalizes first letter of each word), `uppercase` (converts all text to uppercase), `lowercase` (converts all text to lowercase).
`text-indent`	length (initial value 0) or percentage of box width, possibly negative. Specify for block elements and table cells to indent text within first line box.
`text-align`	`left` (initial value for left-to-right contexts), `right`, `center`, or `justified`. Specify for block elements and table cells.
`white-space`	`normal` (initial value), `pre`. Use to indicate whether or not white space should be retained.

CSS Text Color

- Font color specified by `color` property
- Two primary ways of specifying colors:
  - Color name: black, gray, silver, white, red, lime, blue, yellow, aqua, fuchsia, maroon, green, navy, olive, teal, purple, full list at http://www.w3.org/TR/SVG11/types.html#ColorKeywords
  - red/green/blue (RGB) values

CSS Text Color



Hue: 156

Sat: 142

Lum: 139

Red: 84

Green: 97

Blue: 211

CSS Text Color

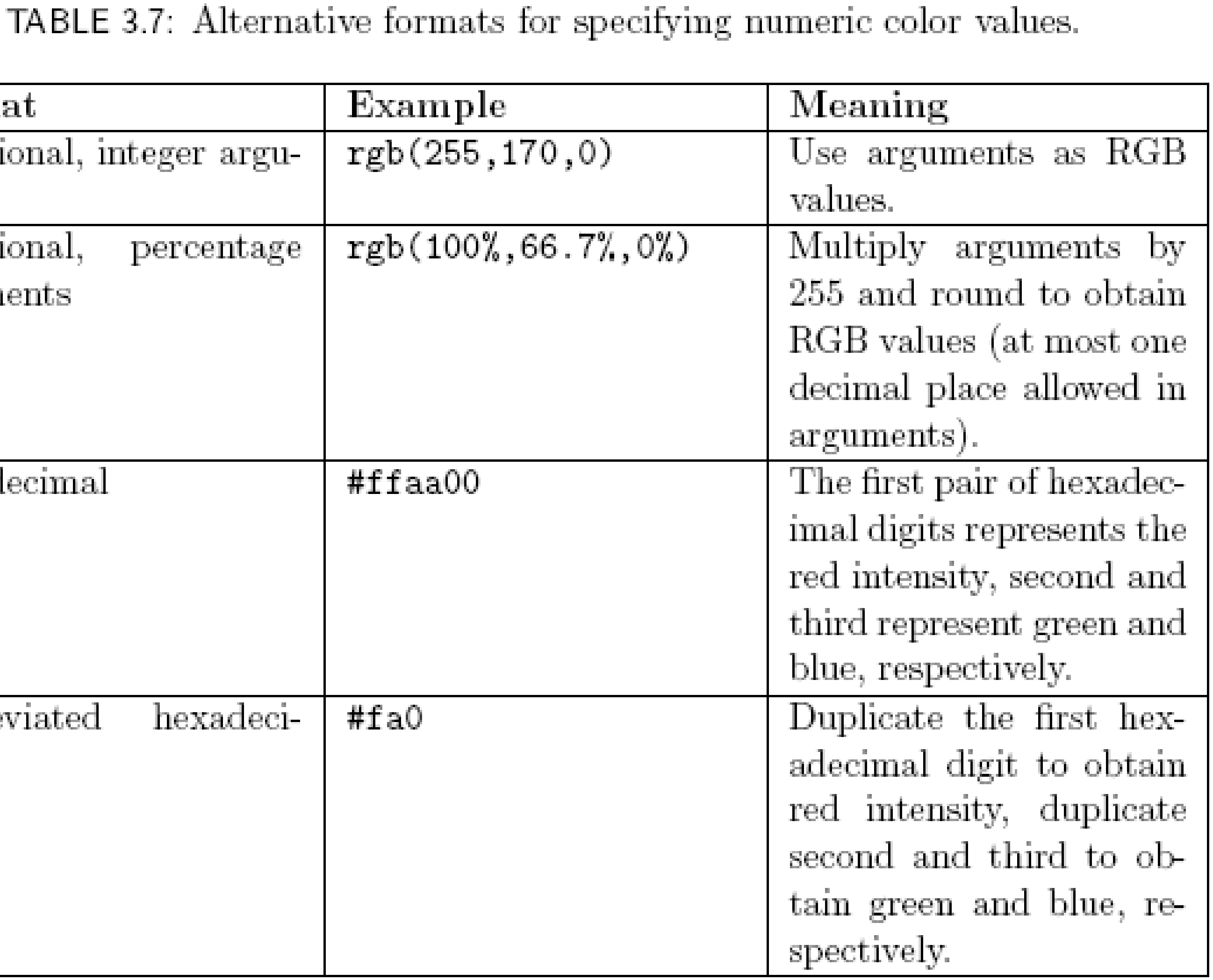
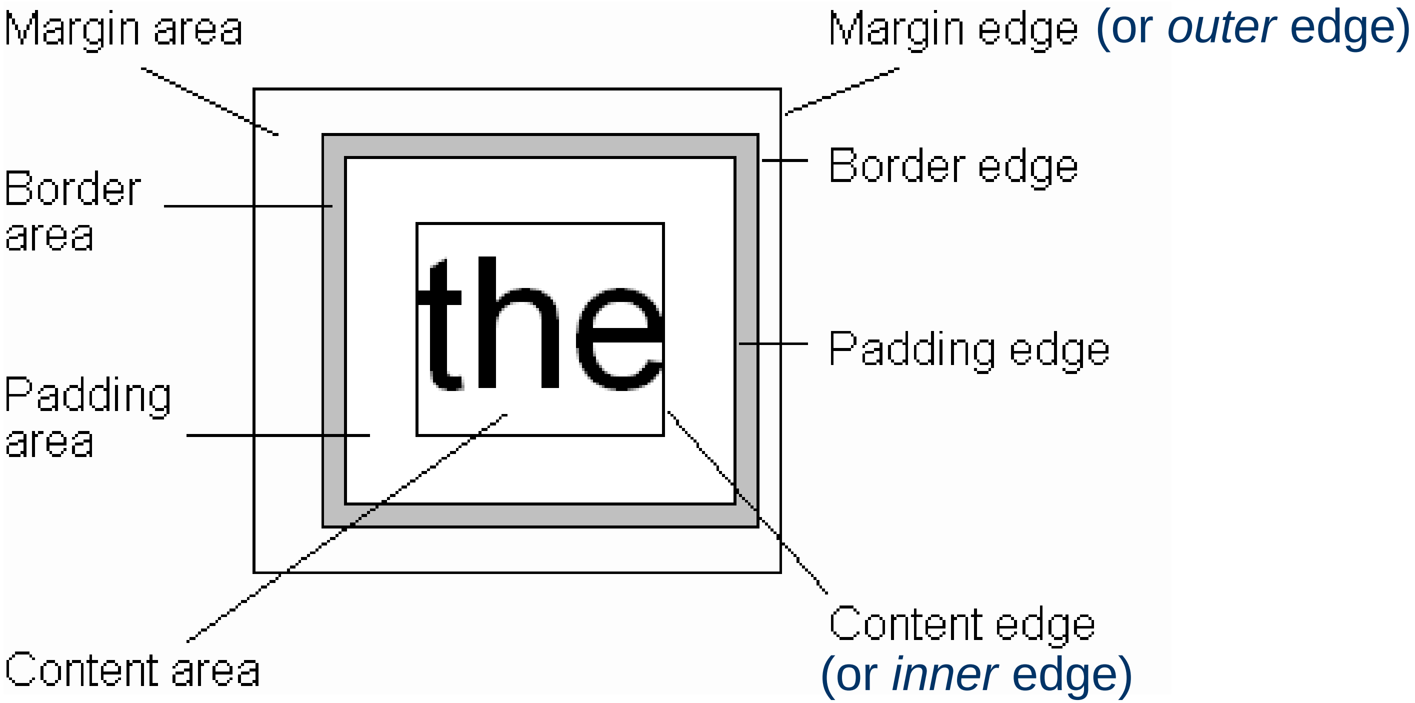


TABLE 3.7: Alternative formats for specifying numeric color values.

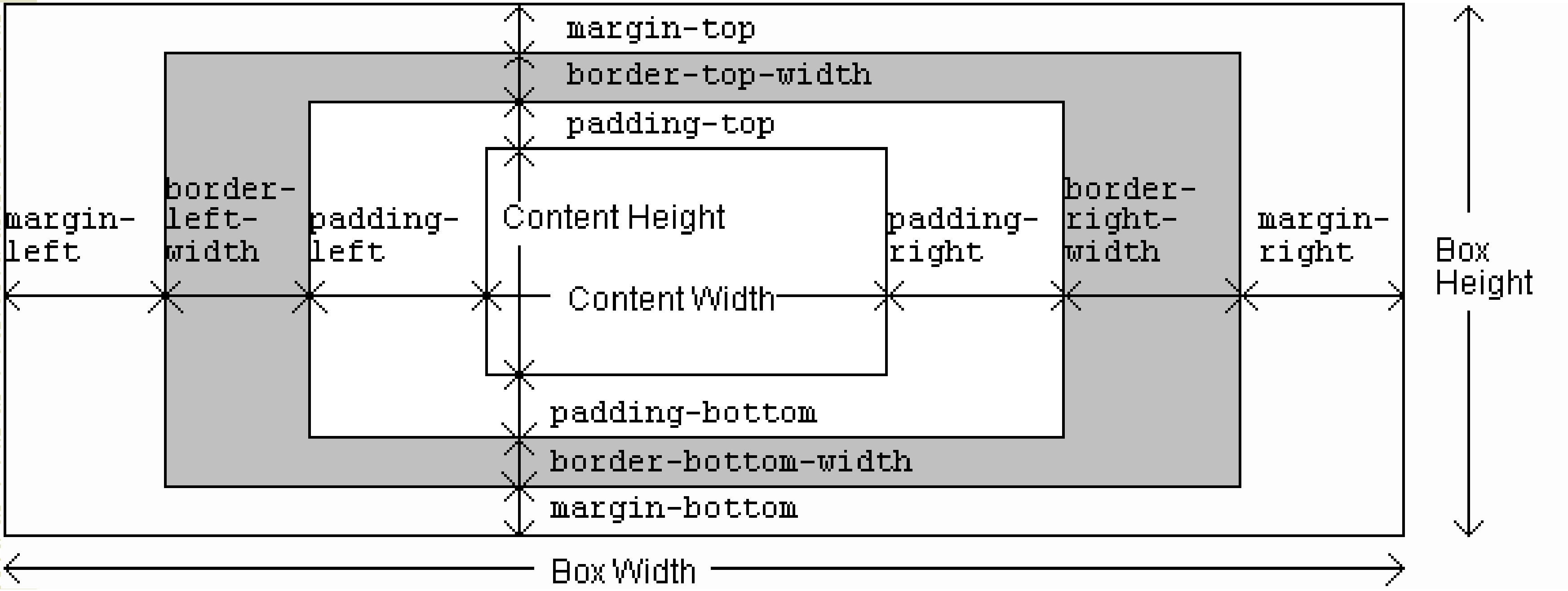
Format	Example	Meaning
Functional, integer arguments	`rgb(255,170,0)`	Use arguments as RGB values.
Functional, percentage arguments	`rgb(100%,66.7%,0%)`	Multiply arguments by 255 and round to obtain RGB values (at most one decimal place allowed in arguments).
Hexadecimal	`#ffaa00`	The first pair of hexadecimal digits represents the red intensity, second and third represent green and blue, respectively.
Abbreviated hexadecimal	`#fa0`	Duplicate the first hexadecimal digit to obtain red intensity, duplicate second and third to obtain green and blue, respectively.

CSS Box Model

- Every rendered element occupies a box:

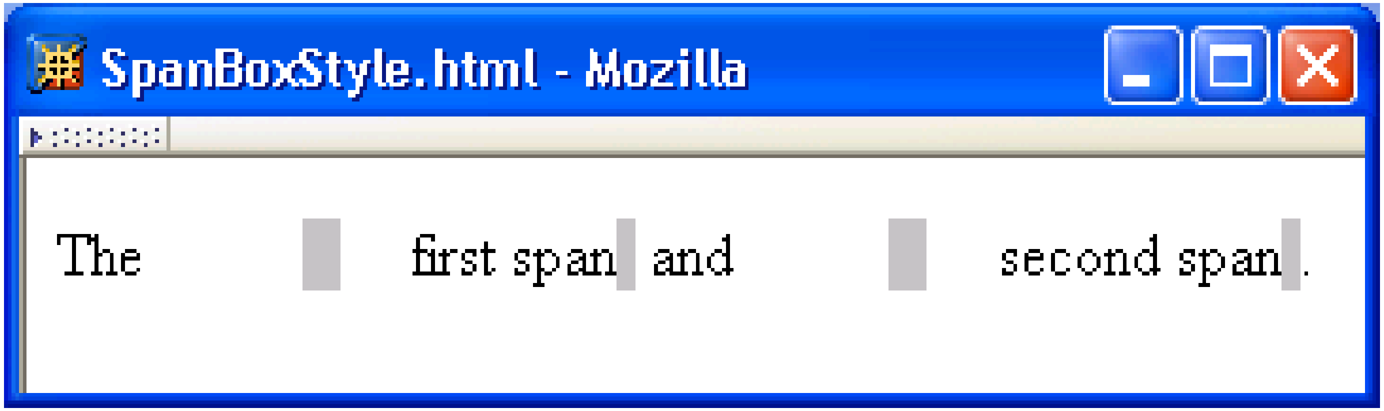


CSS Box Model



CSS Box Model

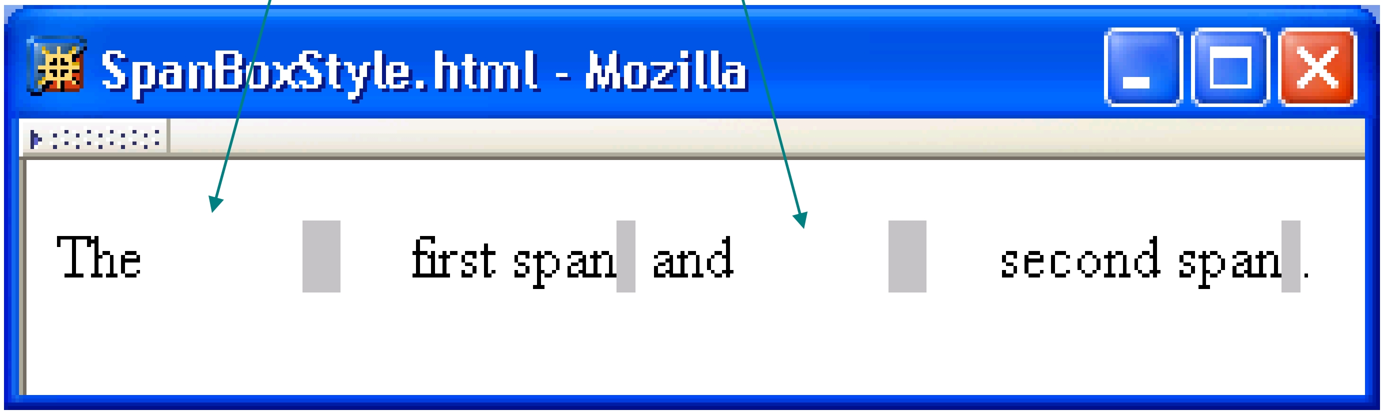
```
span { margin-left: 1cm;
       border-left-width: 10px;
       border-left-color: silver;
       border-left-style: solid;
       padding-left: 0.5cm;
       border-right-width: 5px;
       border-right-color: silver;
       border-right-style: solid }
```



The first span and second span.

CSS Box Model

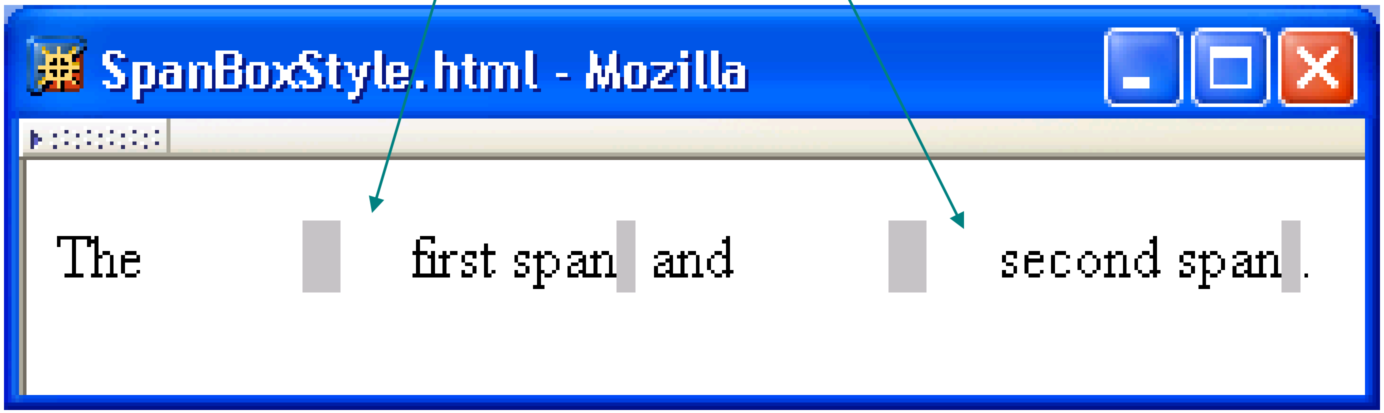
```
span { margin-left: 1cm;
       border-left-width: 10px;
       border-left-color: silver;
       border-left-style: solid;
       padding-left: 0.5cm;
       border-right-width: 5px;
       border-right-color: silver;
       border-right-style: solid }
```



The first span and second span.

CSS Box Model

```
span { margin-left: 1cm;
       border-left-width: 10px;
       border-left-color: silver;
       border-left-style: solid;
       padding-left: 0.5cm;
       border-right-width: 5px;
       border-right-color: silver;
       border-right-style: solid }
```



The first span and second span.

CSS Box Model

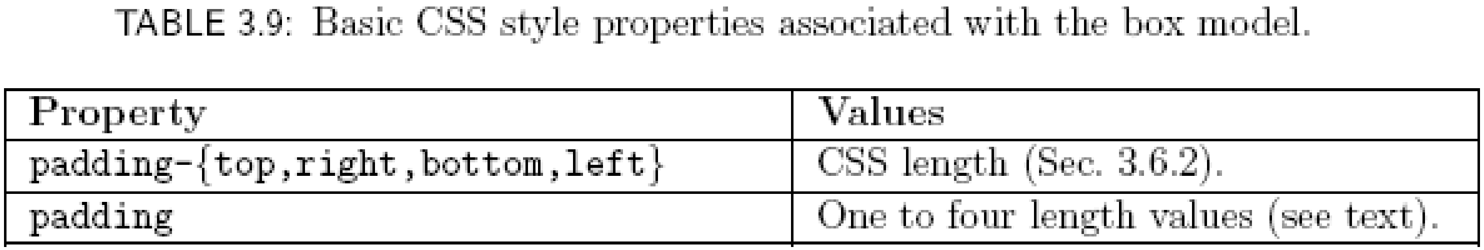


TABLE 3.9: Basic CSS style properties associated with the box model.

Property	Values
`padding-{top,right,bottom,left}`	CSS length (Sec. 3.6.2).
`padding`	One to four length values (see text).

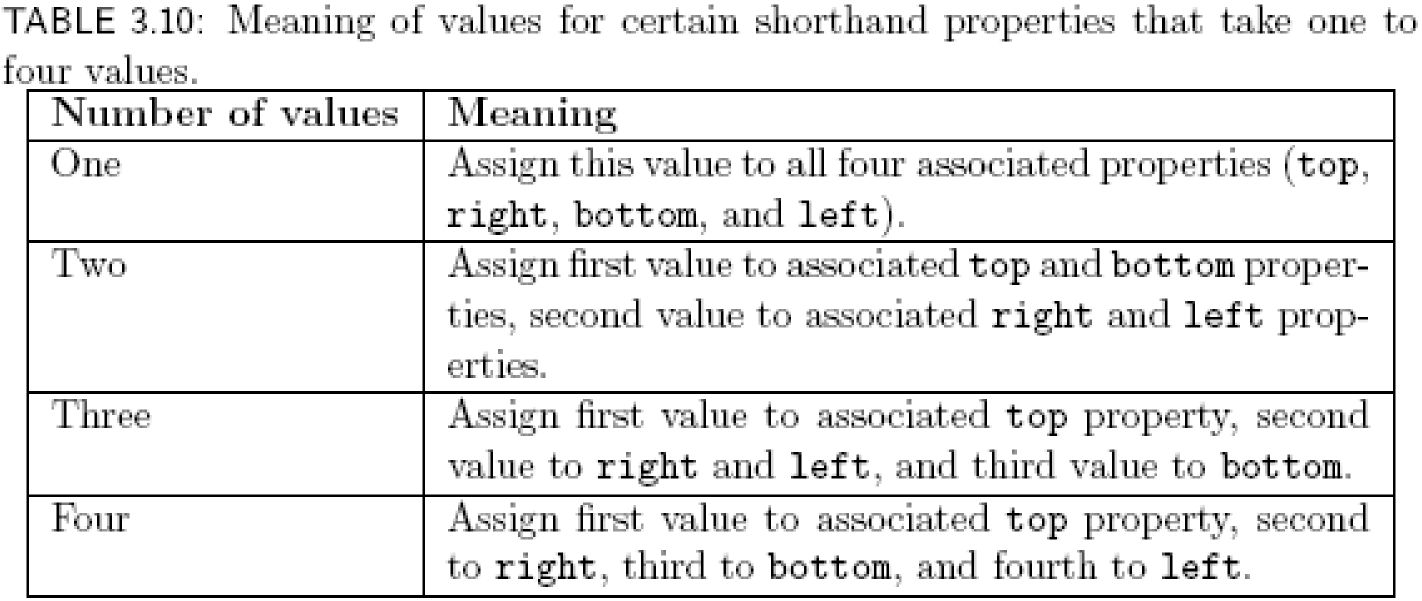


TABLE 3.10: Meaning of values for certain shorthand properties that take one to four values.

Number of values	Meaning
One	Assign this value to all four associated properties (`top`, `right`, `bottom`, and `left`).
Two	Assign first value to associated `top` and `bottom` properties, second value to associated `right` and `left` properties.
Three	Assign first value to associated `top` property, second value to `right` and `left`, and third value to `bottom`.
Four	Assign first value to associated `top` property, second to `right`, third to `bottom`, and fourth to `left`.

CSS Box Model

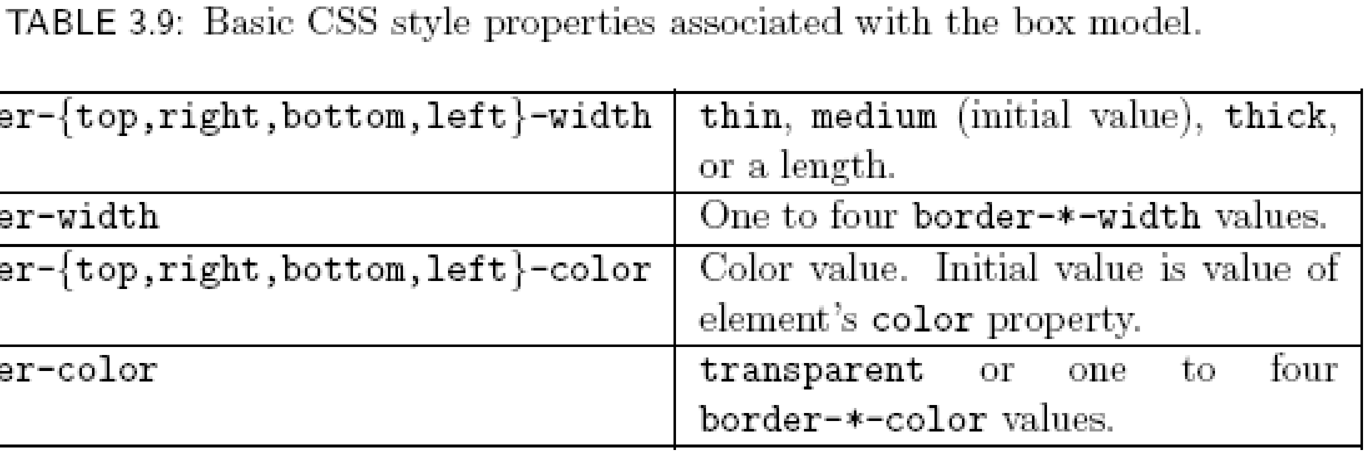


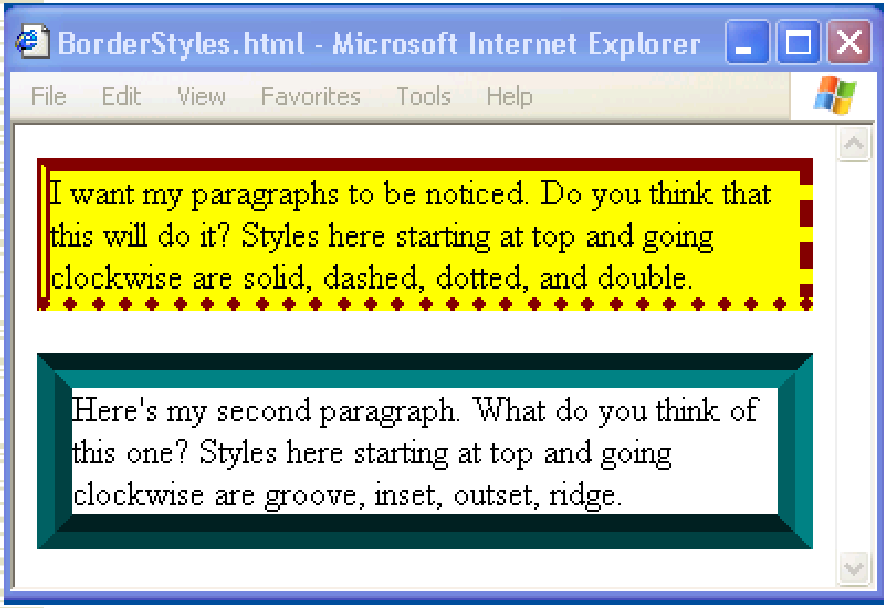
TABLE 3.9: Basic CSS style properties associated with the box model.

border-{top,right,bottom,left}-width	thin, medium (initial value), thick, or a length.
border-width	One to four border-*-width values.
border-{top,right,bottom,left}-color	Color value. Initial value is value of element's color property.
border-color	transparent or one to four border-*-color values.

CSS Box Model

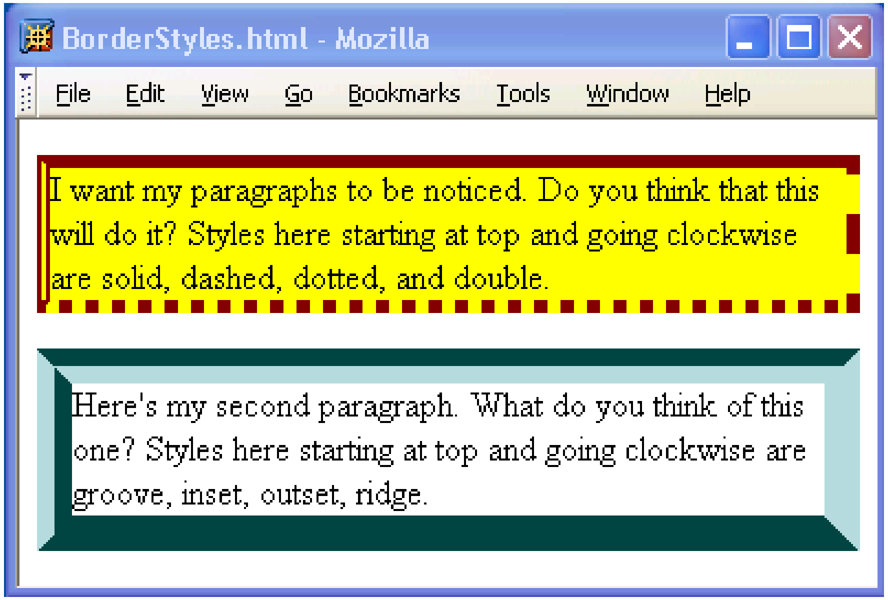
TABLE 3.9: Basic CSS style properties associated with the box model.

`border-{top,right,bottom,left}-style`	`none` (initial value), `hidden`, `dotted`, `dashed`, `solid`, `double`, `groove`, `ridge`, `inset`, `outset`.
`border-style`	One to four `border-*-style` values.



I want my paragraphs to be noticed. Do you think that this will do it? Styles here starting at top and going clockwise are solid, dashed, dotted, and double.

Here's my second paragraph. What do you think of this one? Styles here starting at top and going clockwise are groove, inset, outset, ridge.



I want my paragraphs to be noticed. Do you think that this will do it? Styles here starting at top and going clockwise are solid, dashed, dotted, and double.

Here's my second paragraph. What do you think of this one? Styles here starting at top and going clockwise are groove, inset, outset, ridge.

CSS Box Model

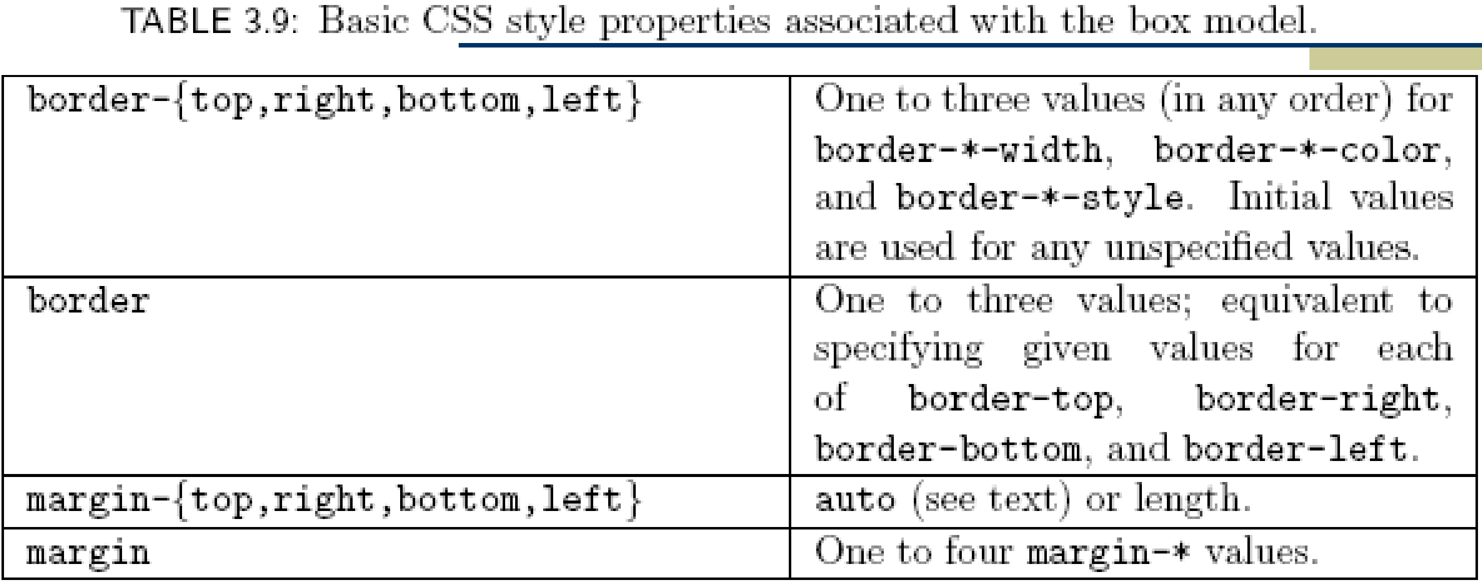
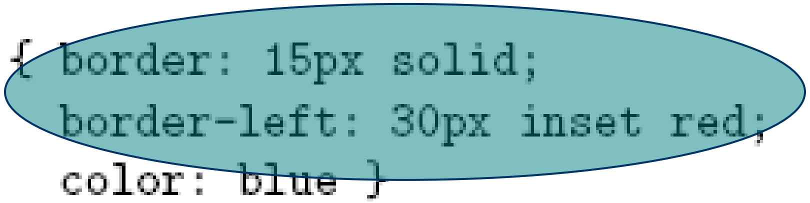


TABLE 3.9: Basic CSS style properties associated with the box model.

border-{top,right,bottom,left}	One to three values (in any order) for border-*-width, border-*-color, and border-*-style. Initial values are used for any unspecified values.
border	One to three values; equivalent to specifying given values for each of border-top, border-right, border-bottom, and border-left.
margin-{top,right,bottom,left}	auto (see text) or length.
margin	One to four margin-* values.

CSS Box Model

- If multiple declarations apply to a property, the last declaration overrides earlier specifications



```
{ border: 15px solid;
  border-left: 30px inset red;
  color: blue }
```

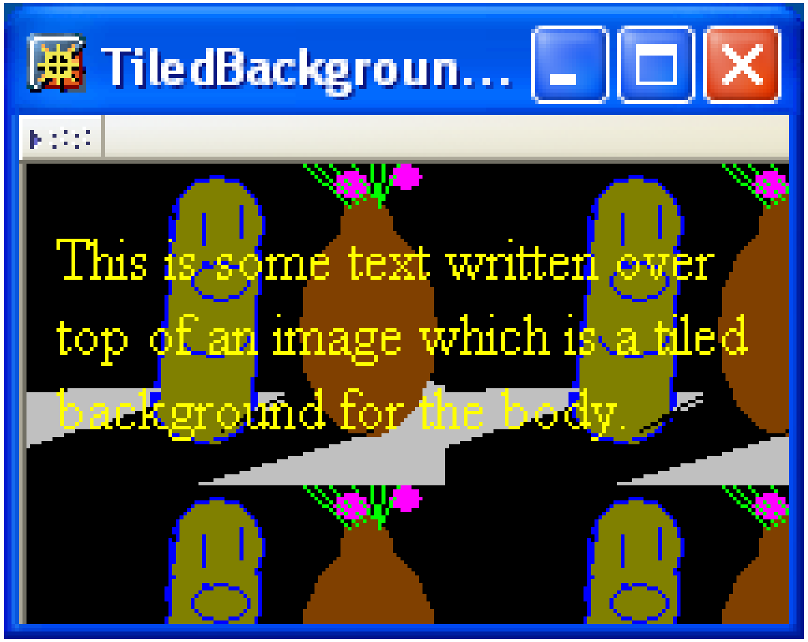
Left border is 30px wide, inset style, and red

Backgrounds

- `background-color`
  - Specifies background color for content, padding, and border areas
  - Margin area is always transparent
  - Not inherited; initial value `transparent`
- `background-image`
  - Specifies (using `url()` function) image that will be tiled over an element

Backgrounds

```
<body style="background-image:url('CucumberFlowerPot.png')">
```

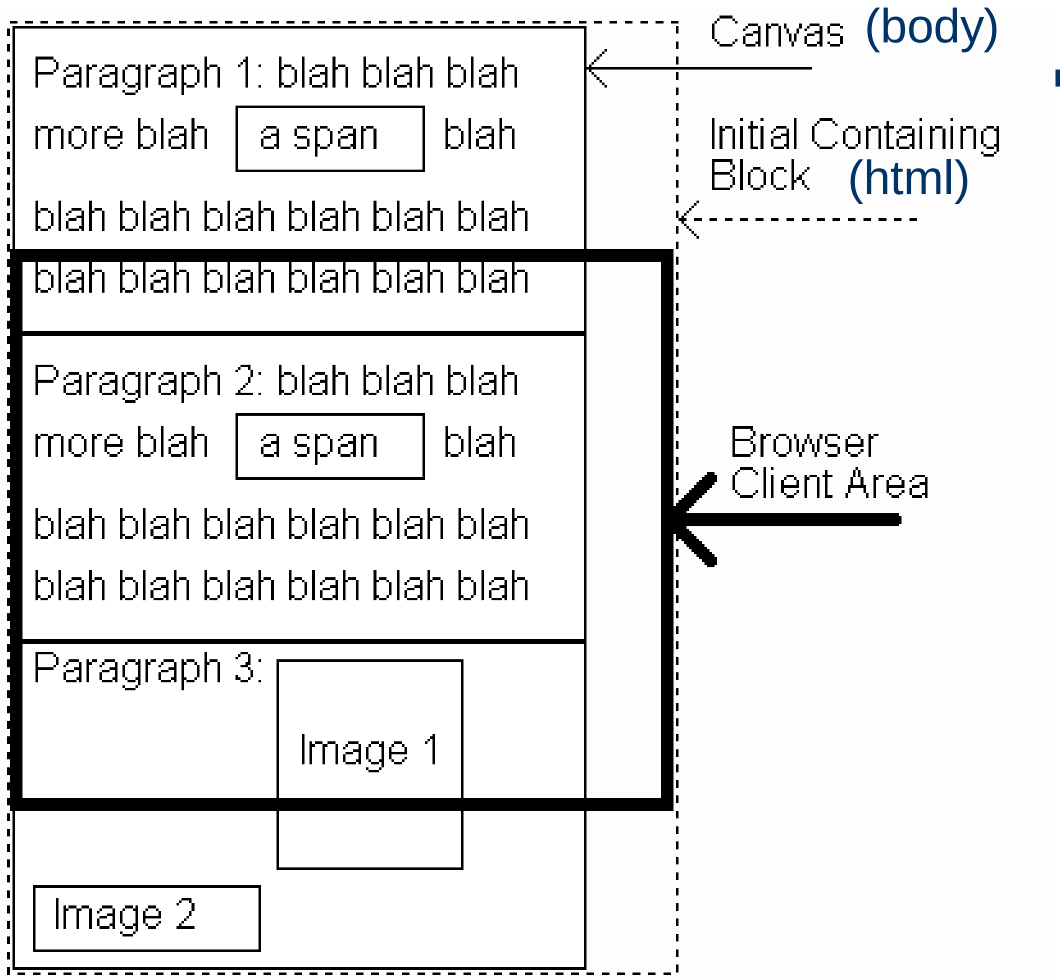


This is some text written over top of an image which is a tiled background for the body.

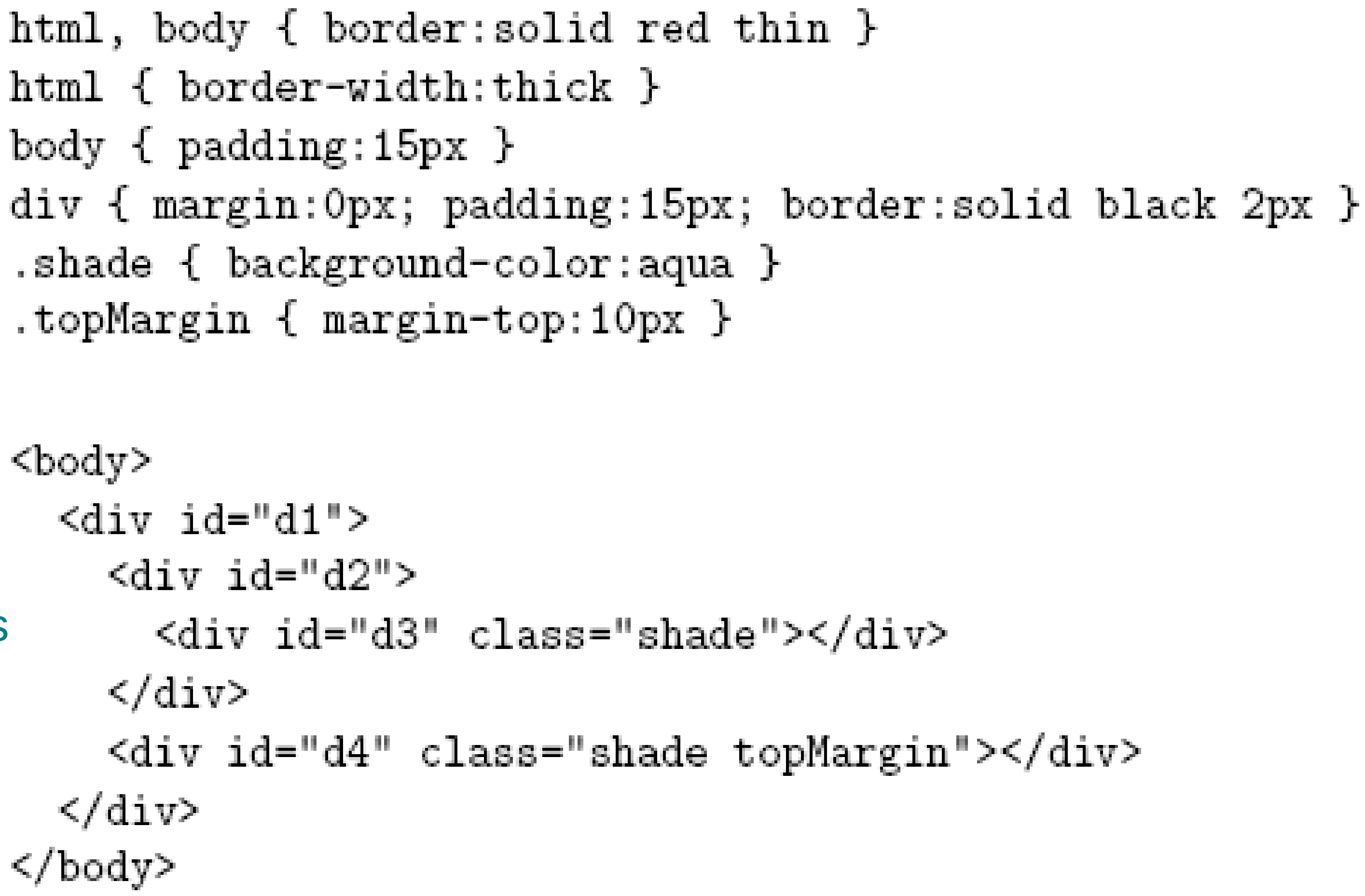
Normal Flow Layout

- In normal flow processing, each displayed element has a corresponding box
  - html element box is called initial containing block and corresponds to entire document
  - Boxes of child elements are contained in boxes of parent
  - Sibling block elements are laid out one on top of the other
  - Sibling inline elements are one after the other

Normal Flow Layout


Paragraph 1: blah blah blah
more blah
a span
blah
blah blah blah blah blah blah
blah blah blah blah blah blah
Paragraph 2: blah blah blah
more blah
a span
blah
blah blah blah blah blah blah
blah blah blah blah blah blah
Paragraph 3:
Image 1
Image 2
Canvas (body)
Initial Containing Block (html)
Browser Client Area

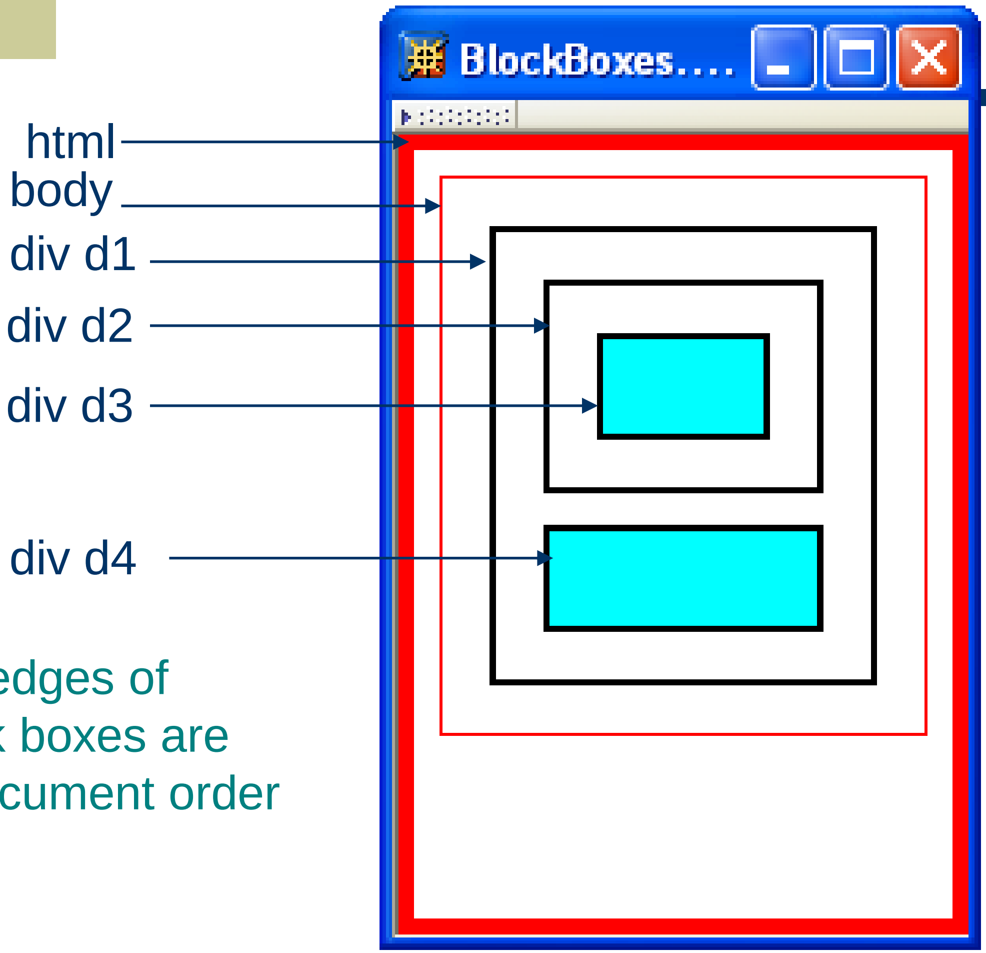
Normal Flow Layout



```
html, body { border:solid red thin }
html { border-width:thick }
body { padding:15px }
div { margin:0px; padding:15px; border:solid black 2px }
.shade { background-color:aqua }
.topMargin { margin-top:10px }


<body>
  <div id="d1">
    <div id="d2">
      <div id="d3" class="shade"></div>
    </div>
    <div id="d4" class="shade topMargin"></div>
  </div>
</body>
```

Block elements only

Normal Flow Layout



html

body

div d1

div d2

div d3

div d4

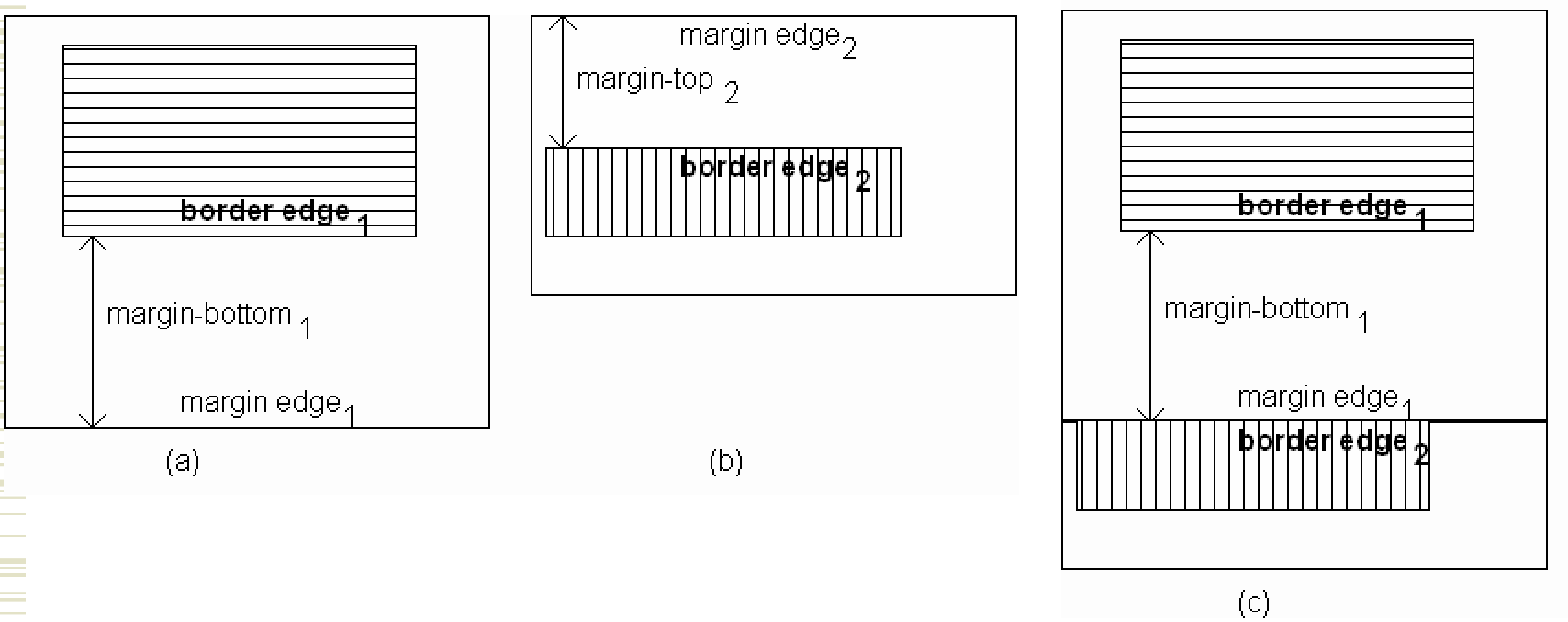
Top edges of
block boxes are
in document order

Normal Flow Layout

- What is a “block element”?
  - Element with value `block` specified for its `display` property
  - User agent style sheet (not CSS) specifies default values; typical block elements include `html`, `body`, `p`, `pre`, `div`, `form`, `ol`, `ul`, `dl`, `hr`, `h1` through `h6`
  - Most other elements except li and table-related have `inline` specified for `display`

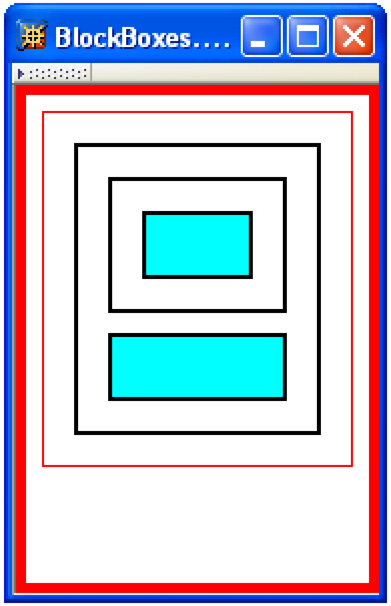
Normal Flow Layout

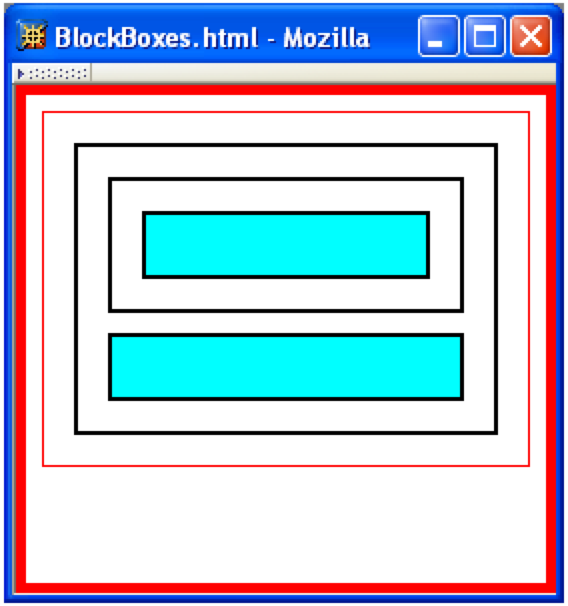
- When blocks stack, adjacent margins are collapsed to the size of the larger margin



Normal Flow Layout

- Initial value of `width` property is `auto`, which for block boxes means to make the content area as wide as possible within margin/padding constraints:

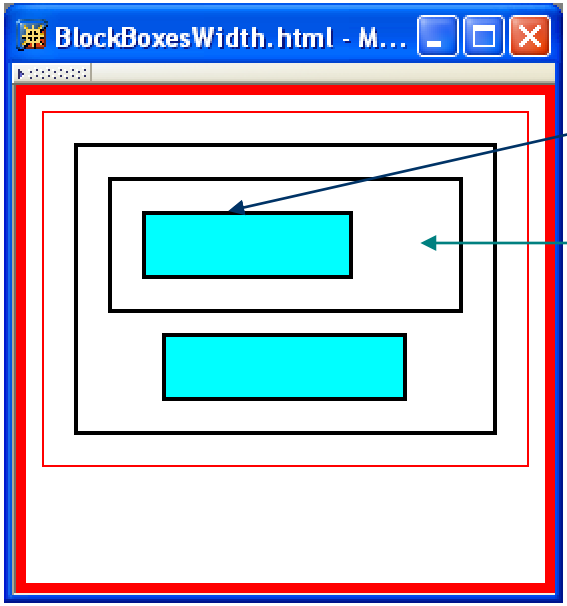




Width of block boxes increases as browser client area is widened

Normal Flow Layout

- Can also specify CSS length or percentage (of parent’s content width) for `width`

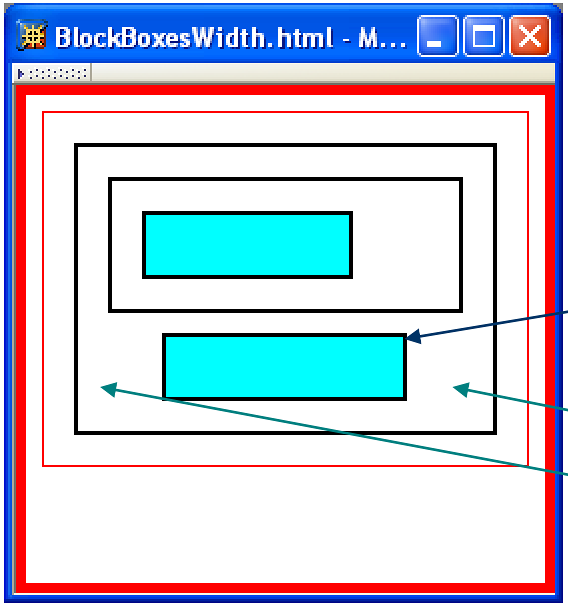


```
#d3 { width:50% }
```

By default, width of right margin is adjusted to accommodate a change to width

Normal Flow Layout

- Can also specify CSS length or percentage (of parent’s content width) for `width`

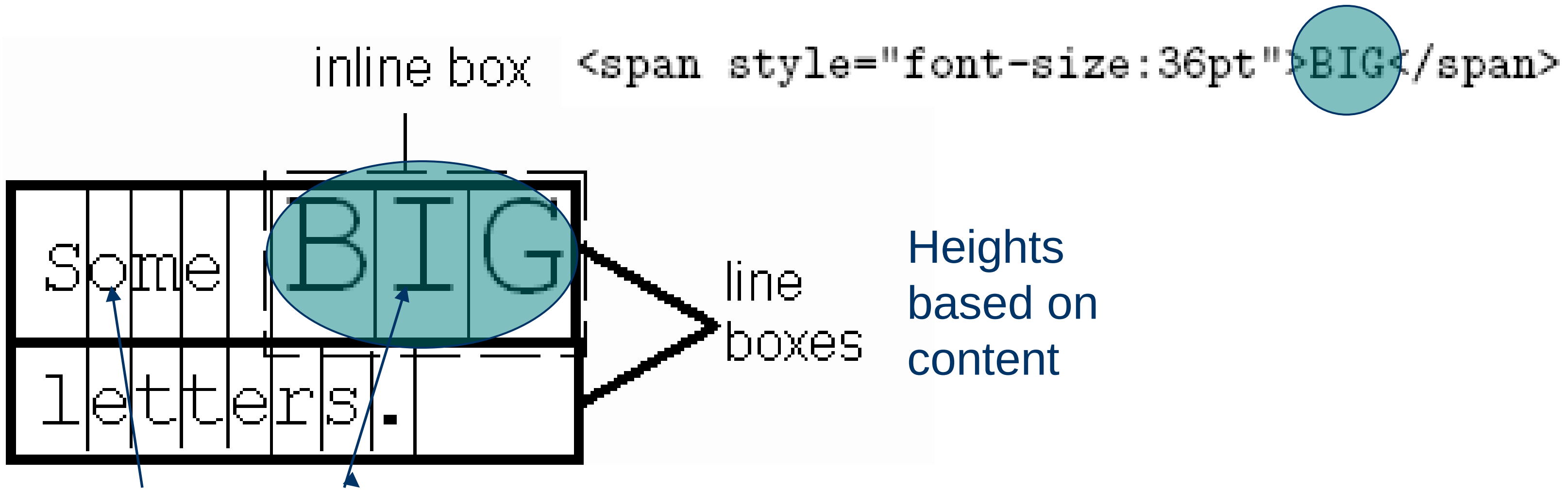


```
#d4 { width:50%; margin-left:auto; margin-right:auto }
```

Centering can be achieved by setting both margins to `auto`

Normal Flow Layout

- Boxes corresponding to character cells and inline elements are laid out side by side in line boxes that are stacked one on top of the other



```
<span style="font-size:36pt">BIG</span>
```

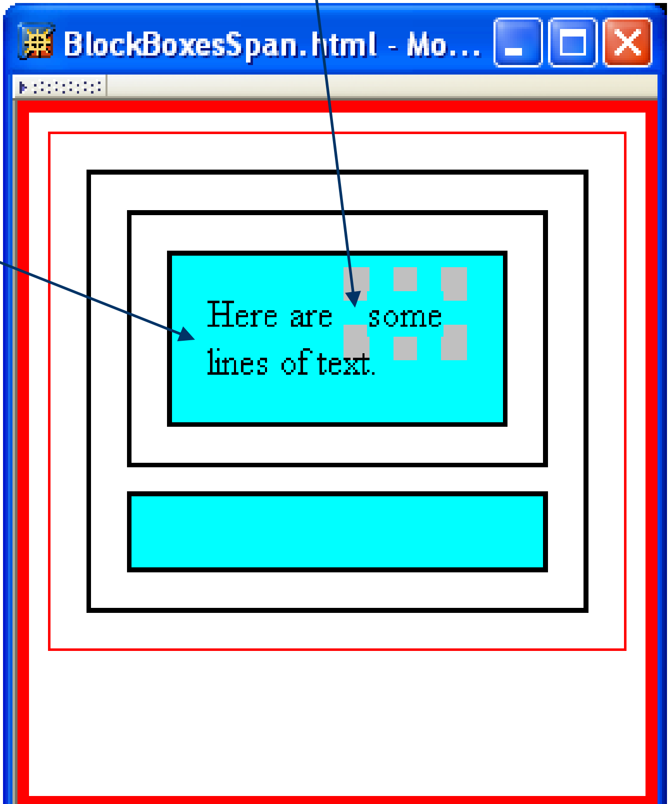
Heights based on content

Character cells aligned by baseline

Normal Flow Layout

Padding/borders/margins affect width but not height of inline boxes

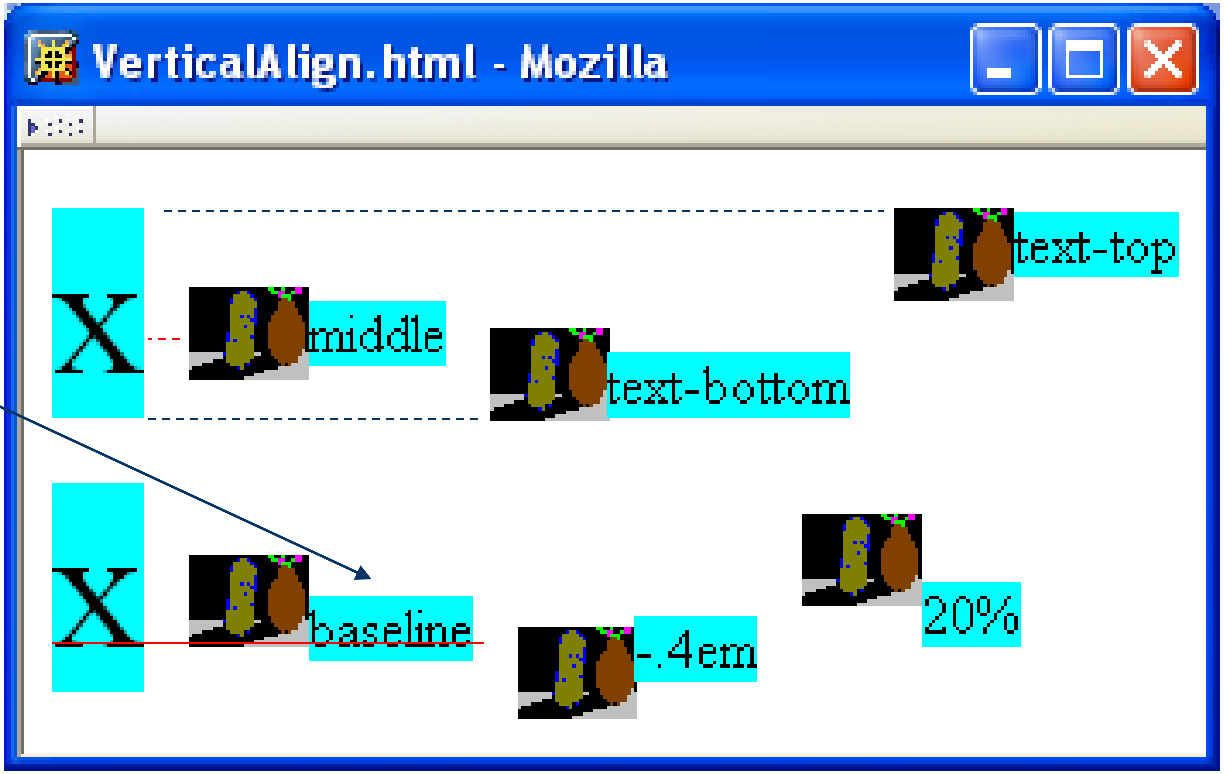
```
<div id="d3" class="shade">
  Here are
  <span style="border:dotted silver 10px">some</span>
  lines of text.
</div>
```



Here are some lines of text.

Normal Flow Layout

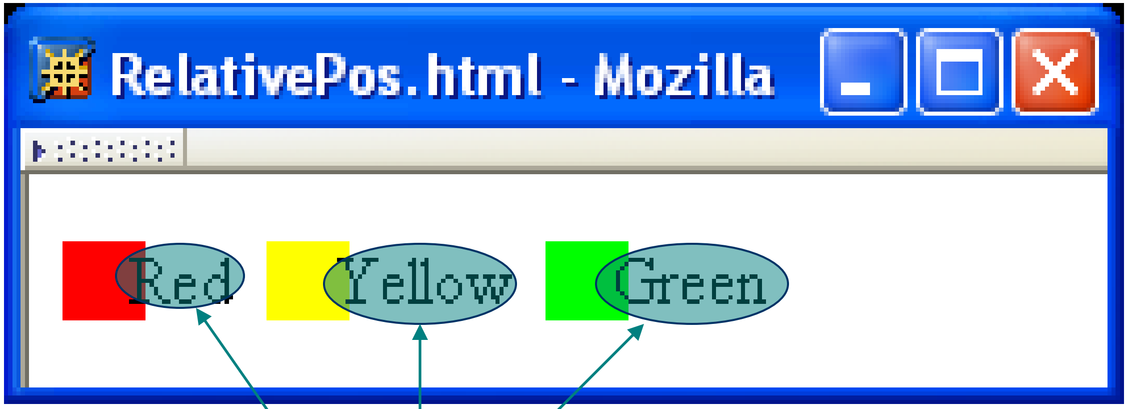
- Specify value for `vertical-align` to position an inline element within line box:



initial value of vertical-align

Beyond Normal Flow

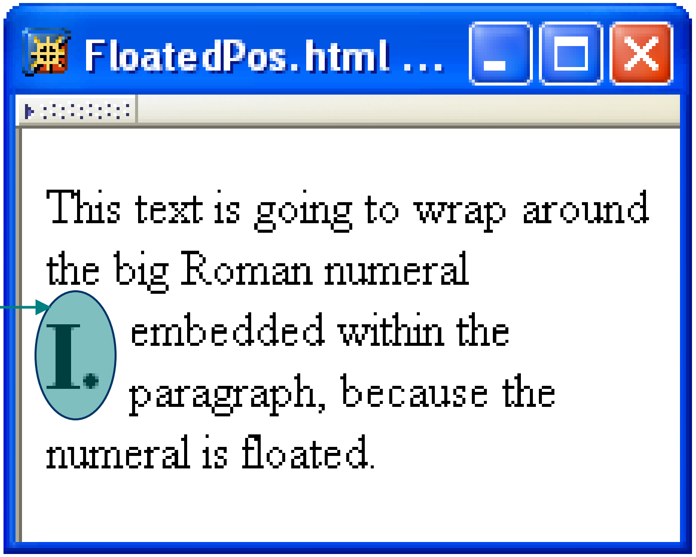
- CSS allows for boxes to be positioned outside the normal flow:
  - Relative positioning



span’s shifted backwards relative to normal flow

Beyond Normal Flow

- CSS allows for boxes to be positioned outside the normal flow:
  - Float positioning

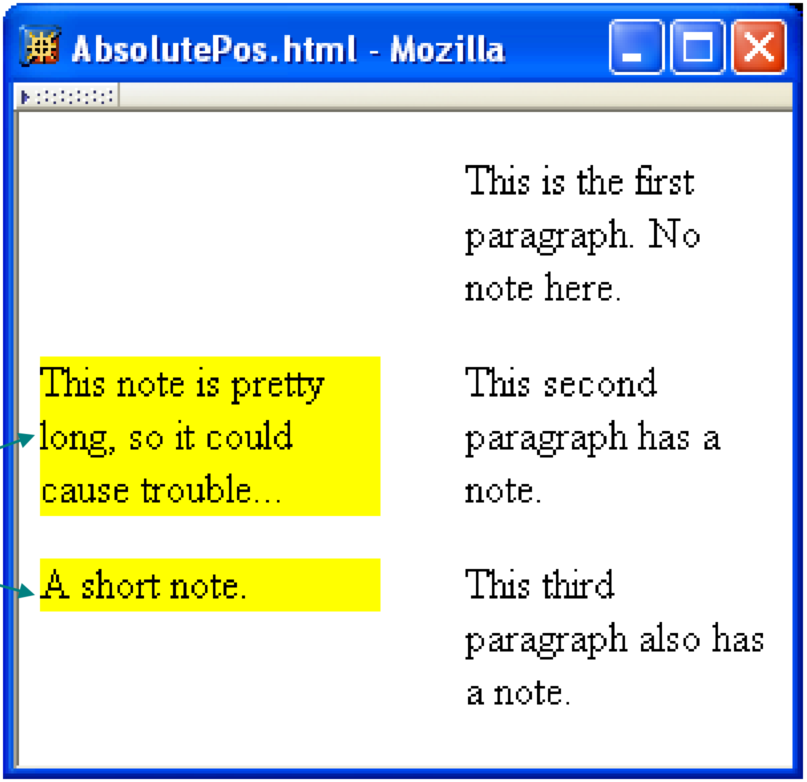


This text is going to wrap around the big Roman numeral embedded within the paragraph, because the numeral is floated.

span taken out of normal flow and “floated” to the left of its line box

Beyond Normal Flow

- CSS allows for boxes to be positioned outside the normal flow:
  - Absolute positioning



This is the first paragraph. No note here.

This note is pretty long, so it could cause trouble…

This second paragraph has a note.

A short note.

This third paragraph also has a note.

span’s removed from normal flow and positioned relative to another box

Beyond Normal Flow

- Properties used to specify positioning:
  - `position`: `static` (initial value), `relative`, or `absolute`
    - Element is positioned if this property not `static`
    - Properties `left`, `right`, `top`, `bottom` apply to positioned elements
      - Primary values are `auto` (initial value) or CSS length
  - `float`: `none`, `left`, or `right`
    - Applies to elements with `static` and `relative` positioning only

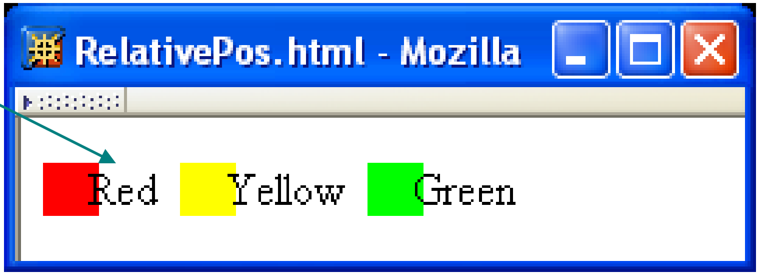
Beyond Normal Flow

- Relative positioning
  - Specifying positive value for `right` property of relatively positioned box moves it to left

```
.right { position:relative; right:0.25em }
```

```
<span style="background-color:red">&nbsp;&nbsp;&nbsp;&nbsp;
    </span><span class="right">Red</span>
```

span containing text moves left



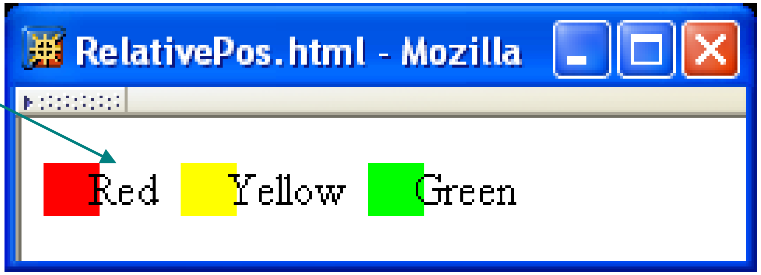
Beyond Normal Flow

- Relative positioning
  - Specifying negative value for `left` property *also* moves box to left

```
.right { position:relative; left:-0.25em }
```

```
<span style="background-color:red">&nbsp;&nbsp;&nbsp;&nbsp;
   </span><span class="right">Red</span>
```

same effect as before

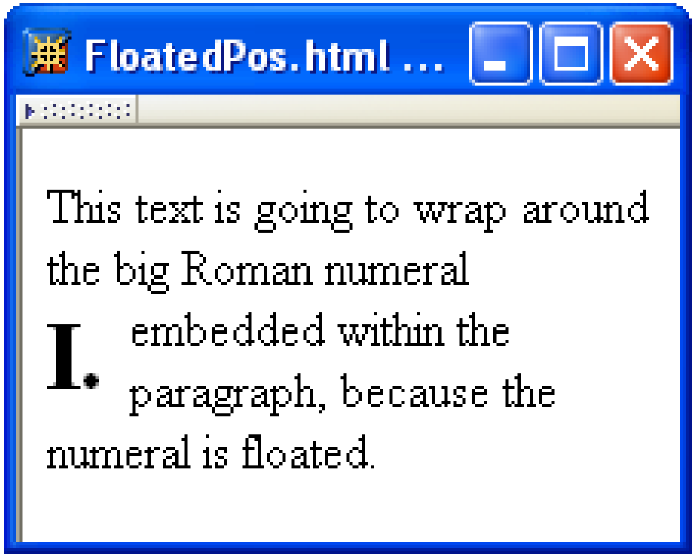


Beyond Normal Flow

- Float positioning
  - Specify value for float property

```
.bigNum {float:left; font-size:xx-large; font-weight:bold }
```

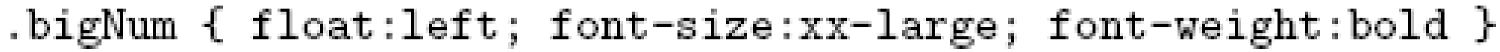
```
This text is going to wrap
around the
<span class="bigNum">I.&nbsp;</span>
big Roman numeral
```



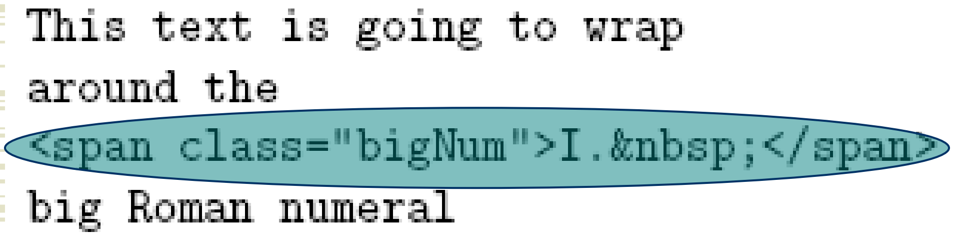
This text is going to wrap around the big Roman numeral **I.** embedded within the paragraph, because the numeral is floated.

Beyond Normal Flow

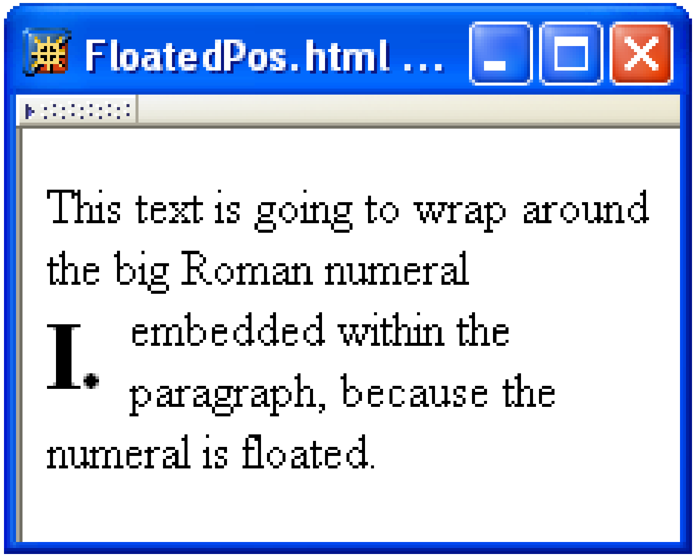
- Float positioning
  - Specify value for float property



```
.bigNum { float:left; font-size:xx-large; font-weight:bold }
```



```
This text is going to wrap
around the
<span class="bigNum">I.&nbsp;</span>
big Roman numeral
```



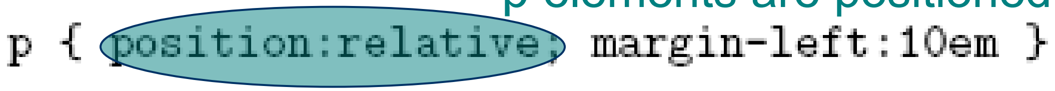
I. This text is going to wrap around the big Roman numeral embedded within the paragraph, because the numeral is floated.

Floated element becomes a CSS block element (e.g., can set `height` and `width`)

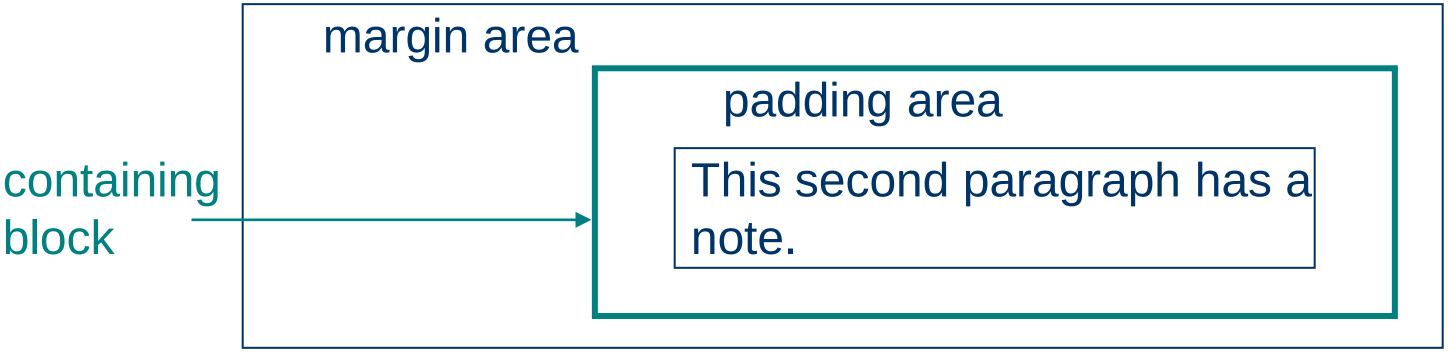
Beyond Normal Flow

- Absolute positioning
  - Specify location for corner of box relative to positioned containing block

p elements are positioned (but don't move!)



```
p { position:relative; margin-left:10em }
```



margin area

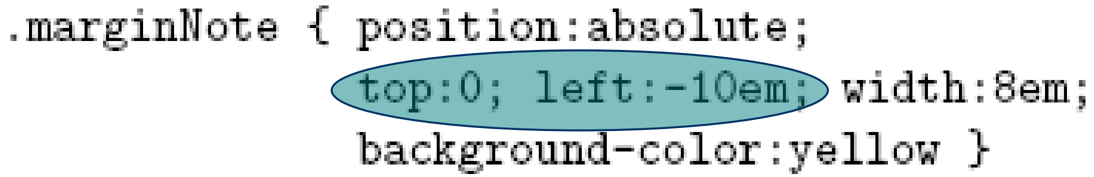
padding area

This second paragraph has a note.

containing block

Beyond Normal Flow

- Absolute positioning
  - Specify location for edges of box relative to positioned containing block



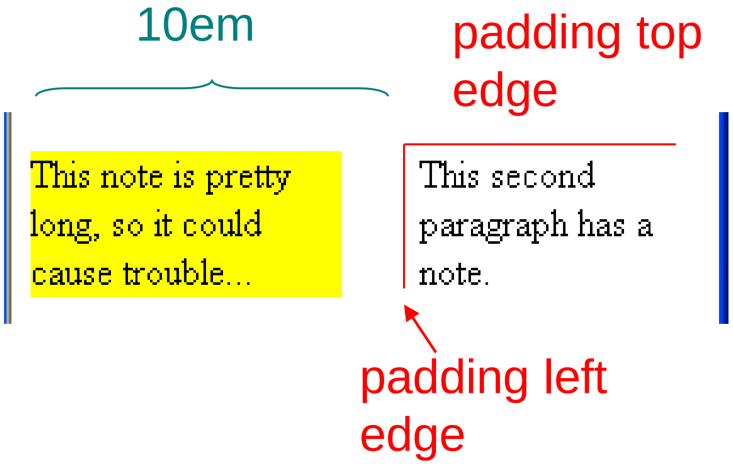
```
.marginNote { position:absolute;
              top:0; left:-10em; width:8em;
              background-color:yellow }
```

Beyond Normal Flow

- Absolute positioning

```
p { position:relative; margin-left:10em }
.marginNote { position:absolute;
              top:0; left:-10em; width:8em;
              background-color:yellow }
```

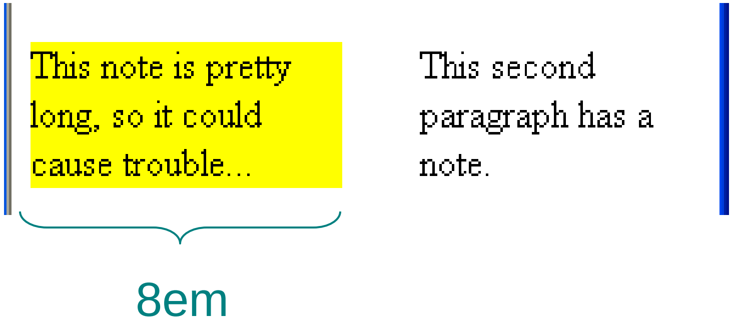
```
<p>
  This second paragraph has a note.
  <span class="marginNote">This note is pretty long, so
  it could cause trouble...</span>
</p>
```


10em
padding top edge
This note is pretty long, so it could cause trouble...
This second paragraph has a note.
padding left edge

Beyond Normal Flow

- Absolute positioning

```
p { position:relative; margin-left:10em }

.marginNote { position:absolute;
              top:0; left:-10em; width:8em;
              background-color:yellow }
```



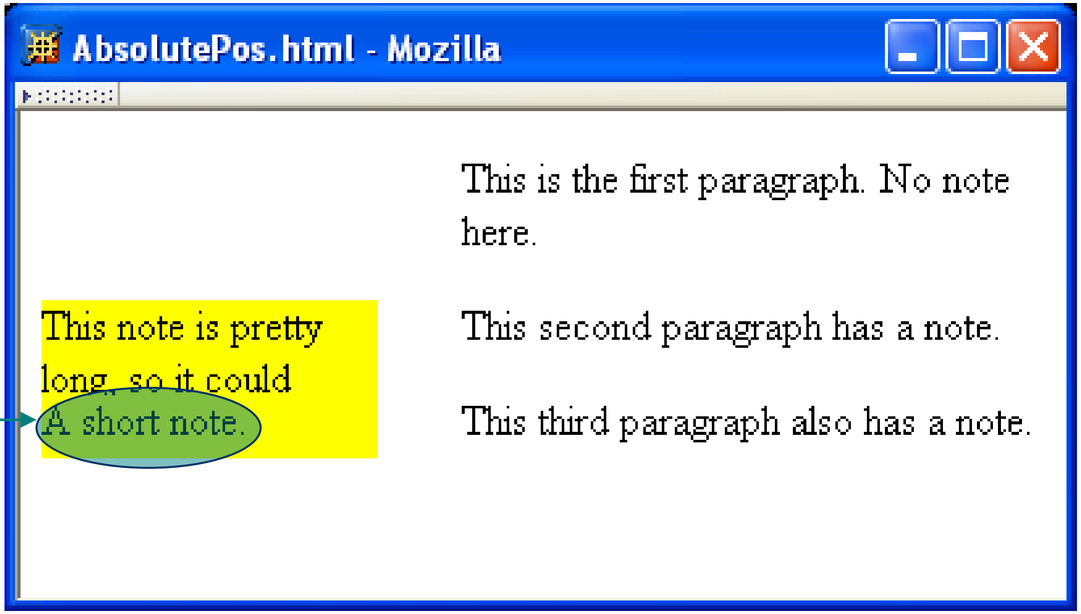
This note is pretty long, so it could cause trouble...

This second paragraph has a note.

```
<p>
  This second paragraph has a note.
  <span class="marginNote">This note is pretty long, so
  it could cause trouble...</span>
</p>
```

Beyond Normal Flow

- Absolutely positioned box does *not* affect positioning of other boxes!



AbsolutePos.html - Mozilla

This is the first paragraph. No note here.

This note is pretty long, so it could

A short note.

This second paragraph has a note.

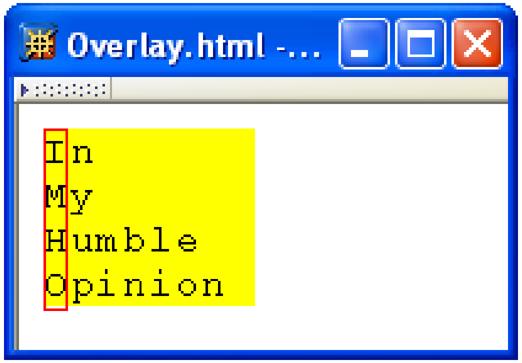
This third paragraph also has a note.

Second absolutely positioned box obscures first

CSS Position-Related Properties

- `z-index`: drawing order for overlaid boxes (largest number drawn last)

```
#text { position:absolute; top:10px; left:10px;
        font-family:"Courier",monospace; letter-spacing:0.1ex;
        background-color:yellow;
        z-index:1 }
#overlay { position:absolute; top:10px; left:10px;
           width:1.1ex; height:4.5em;
           border:solid red 1px;
           z-index:2 }
```



```
In
My
Humble
Opinion
```

CSS Position-Related Properties

- `display`: value `none` means that element and its descendants are not rendered and *do not* affect normal flow
- `visibility`: value `hidden` (initial value is `visible`) means that element and its descendants are not rendered but still *do* affect normal flow