WEB TECHNOLOGIES

A COMPUTER SCIENCE PERSPECTIVE

CHAPTER 3
STYLE SHEETS: CSS

Modified by Ahmed Sallam

Based on original slides by Jeffrey C. Jackson

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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

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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

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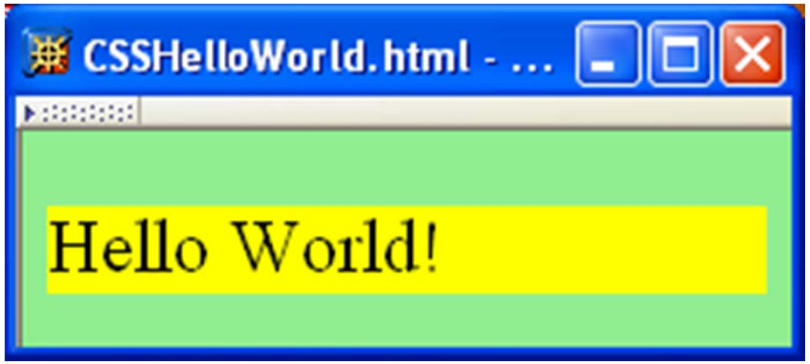
CSS INTRODUCTION

A styled HTML document

produced by the




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

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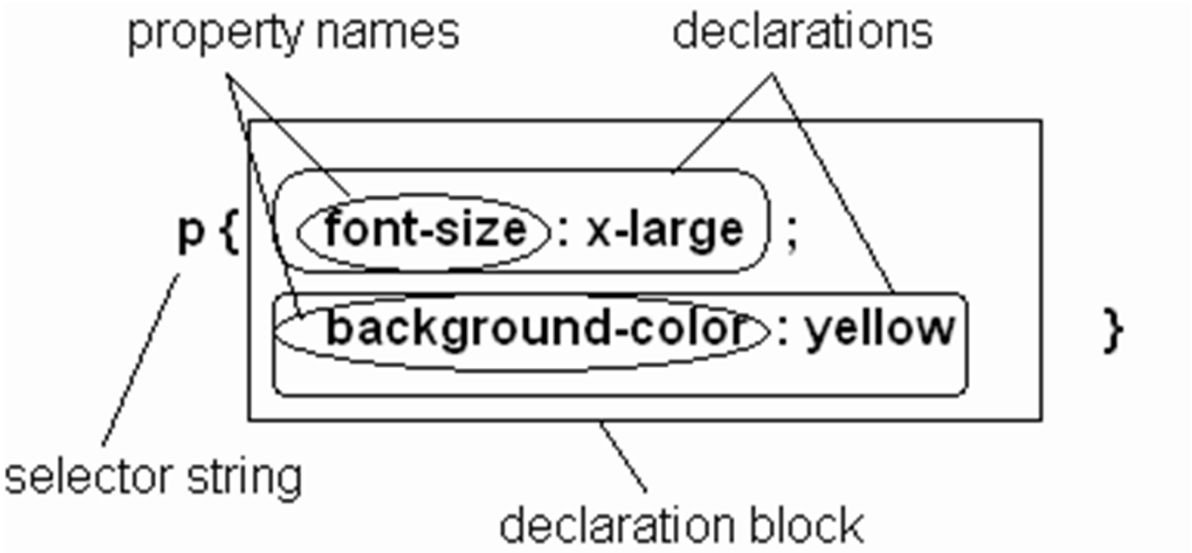
CSS SYNTAX

Parts of a style rule (or statement)



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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 }
```

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CSS SYNTAX: SELECTOR STRINGS

Single element type:

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

type selector

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 }
```

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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 }
```

universal selector

Specific elements by id:

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

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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 }
```

ID selector

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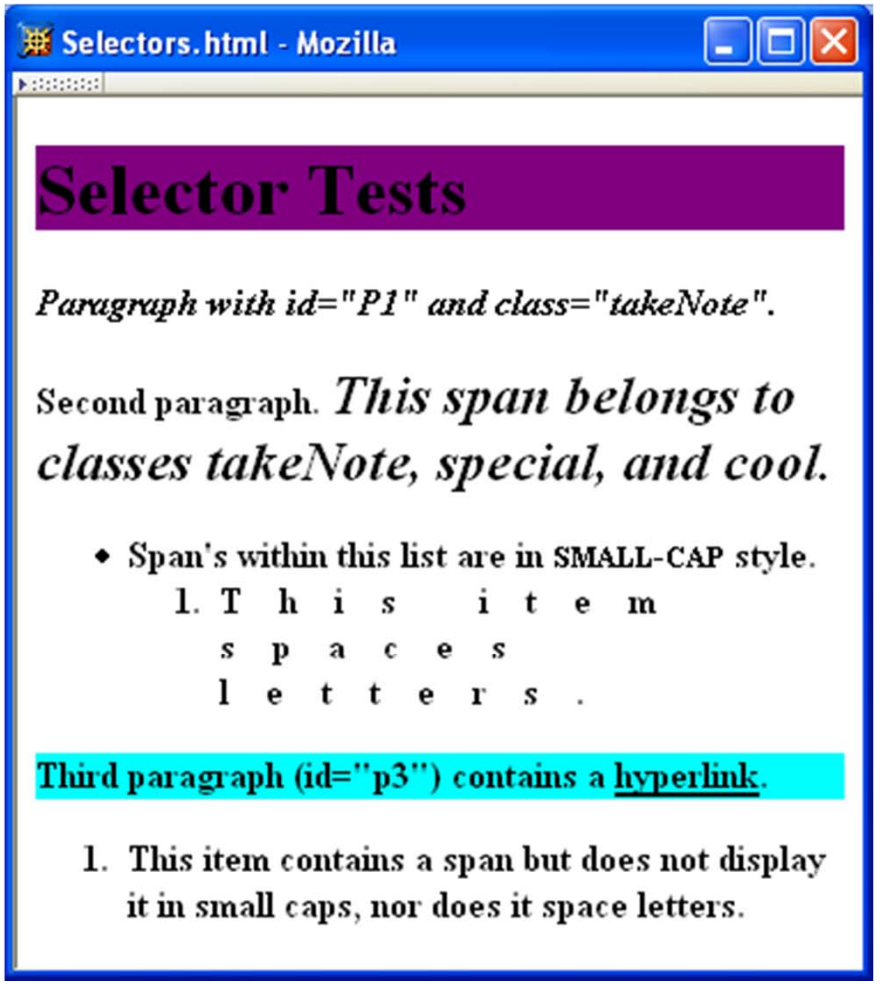
CSS SYNTAX: SELECTOR STRINGS

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



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CSS SYNTAX: SELECTOR STRINGS

Elements belonging to a style class:

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

class selector

- Referencing a style class in HTML:

Eleme

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

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

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CSS SYNTAX: SELECTOR STRINGS

Elements belonging to a style class:

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

- Referencing a style class in HTML:

Eleme

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

this span belongs to three style classes

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

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CSS SYNTAX: SELECTOR STRINGS

Elements belonging to a style class:

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

- Referencing a style class in HTML:

Eleme

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

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

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

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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 }
```

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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

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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

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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:

```
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

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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 H lue is list of style d

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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

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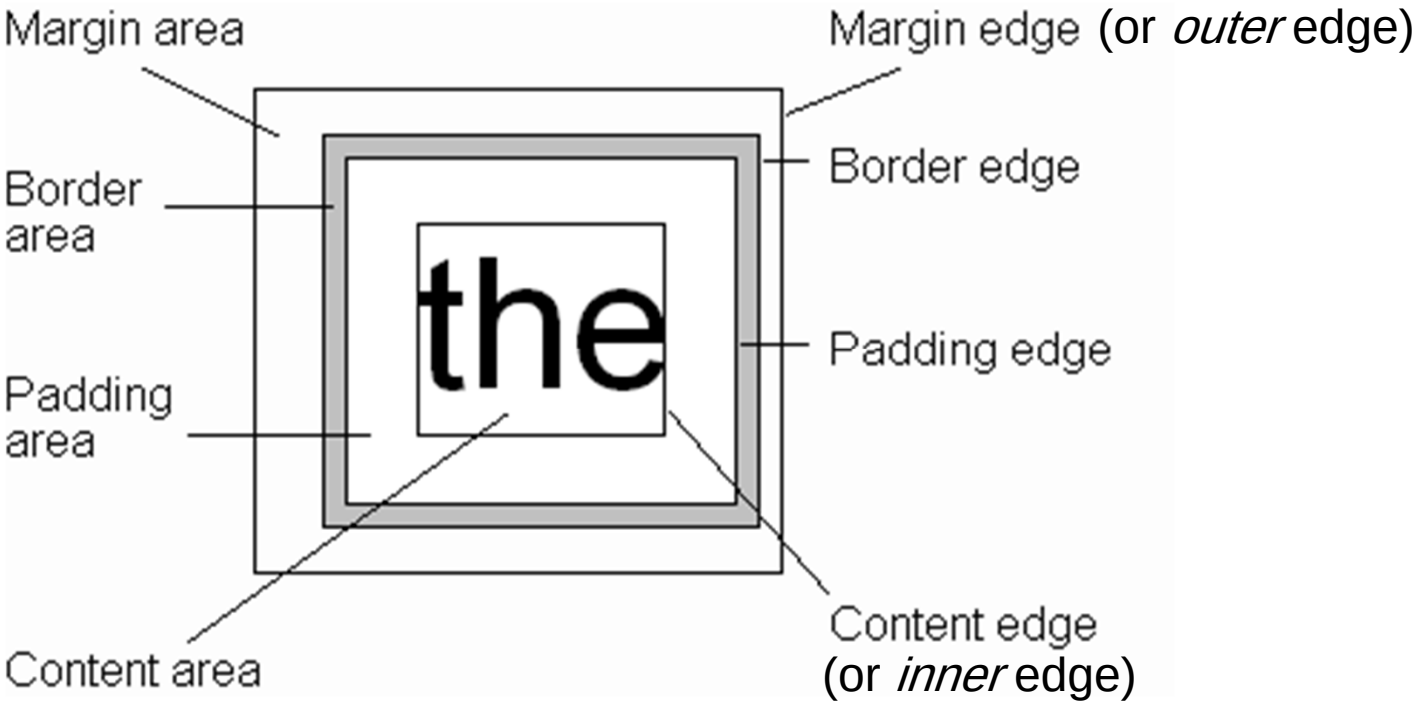
CSS BOX MODEL

Every rendered element occupies a box:



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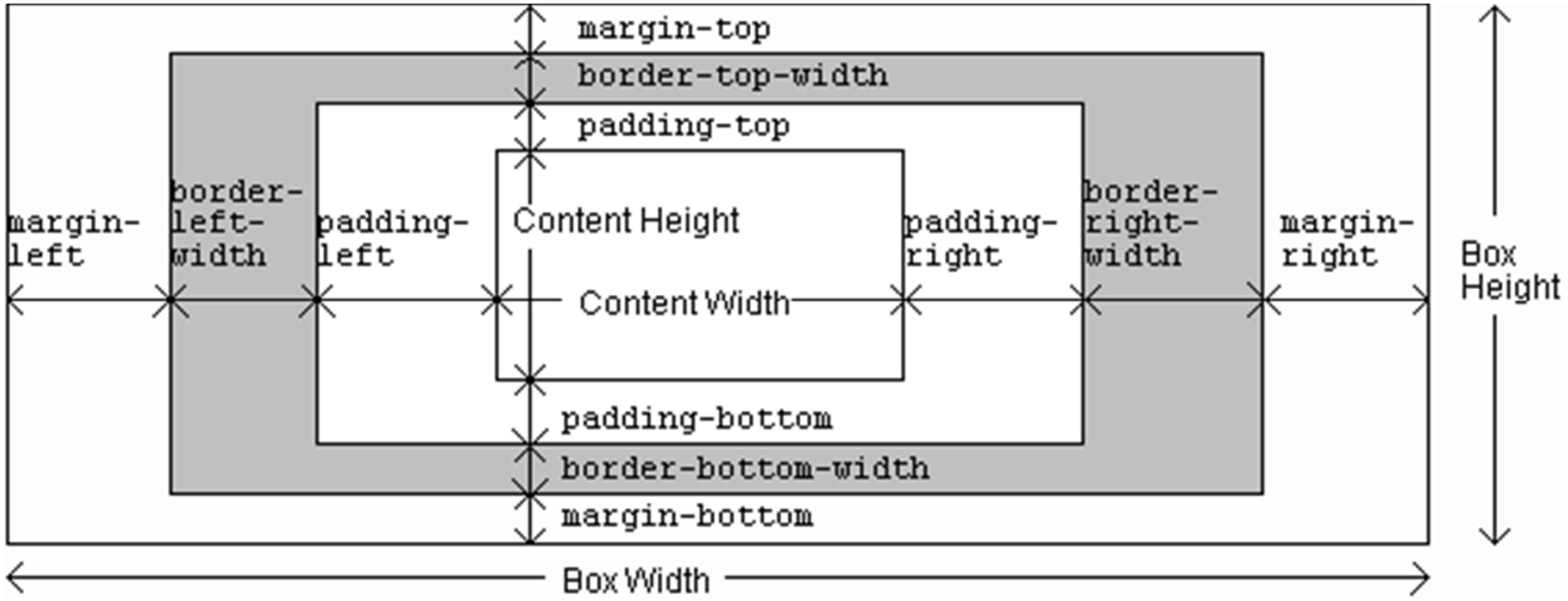
CSS BOX MODEL



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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 }
```

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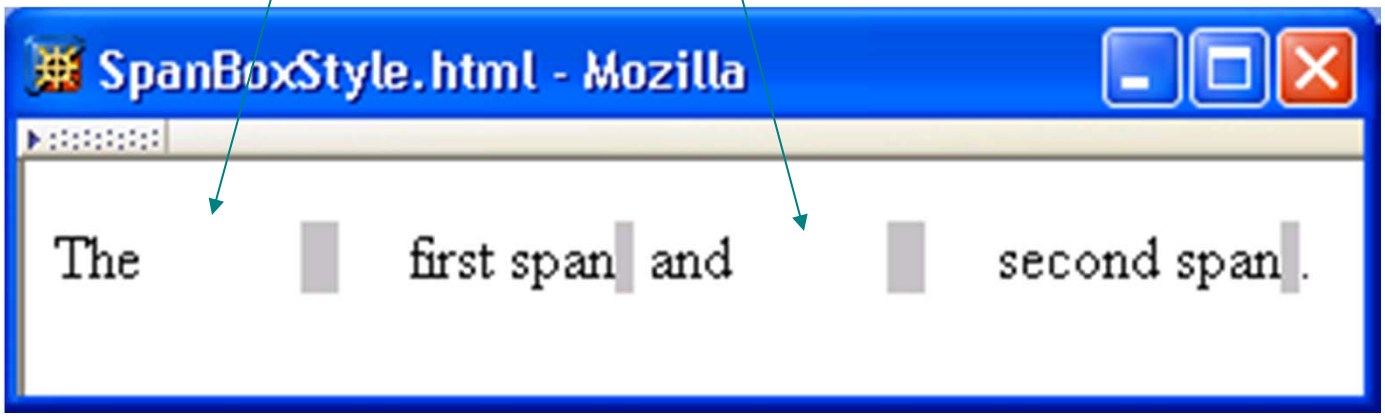
CSS BOX MODEL

```
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 }
```



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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 }
```

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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`.

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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.

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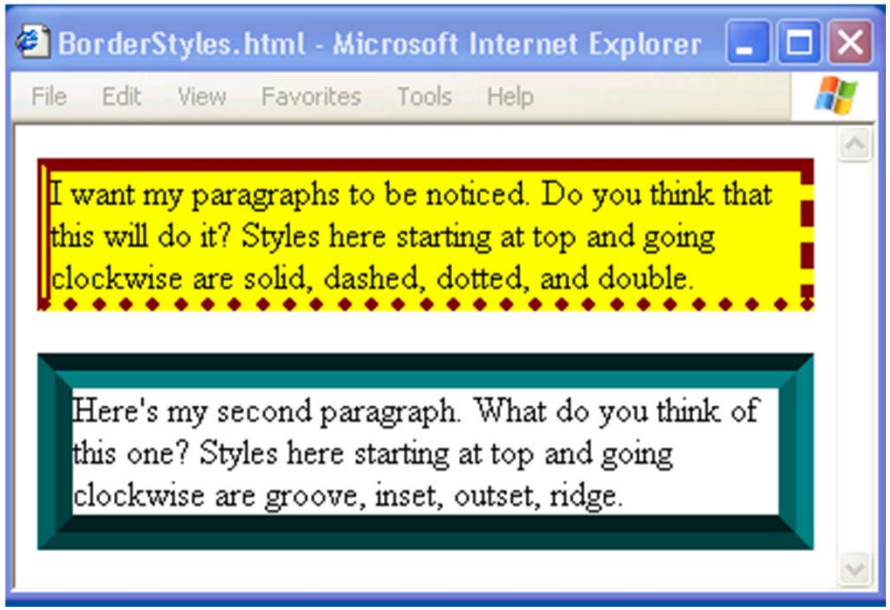
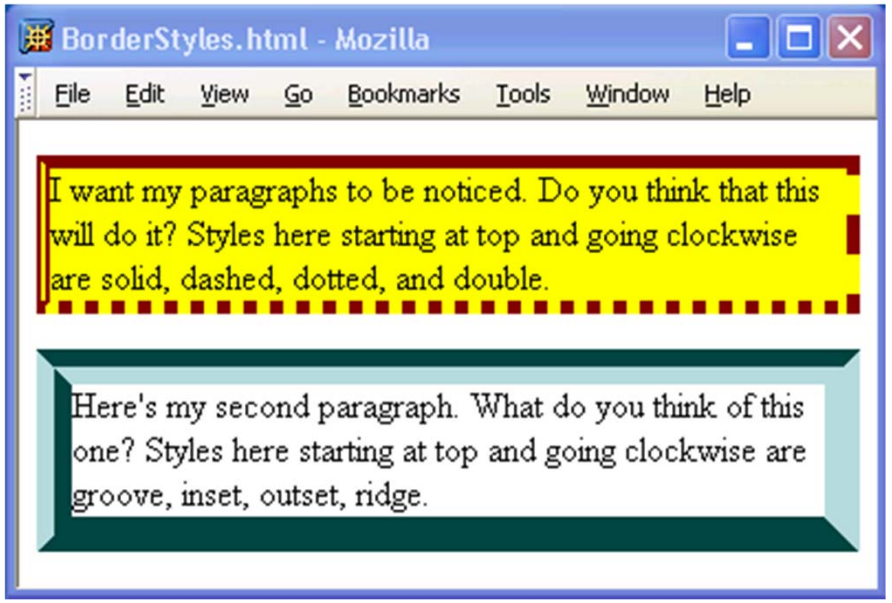
CSS BOX MODEL

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.





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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.

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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

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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

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BACKGROUNDS

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

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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

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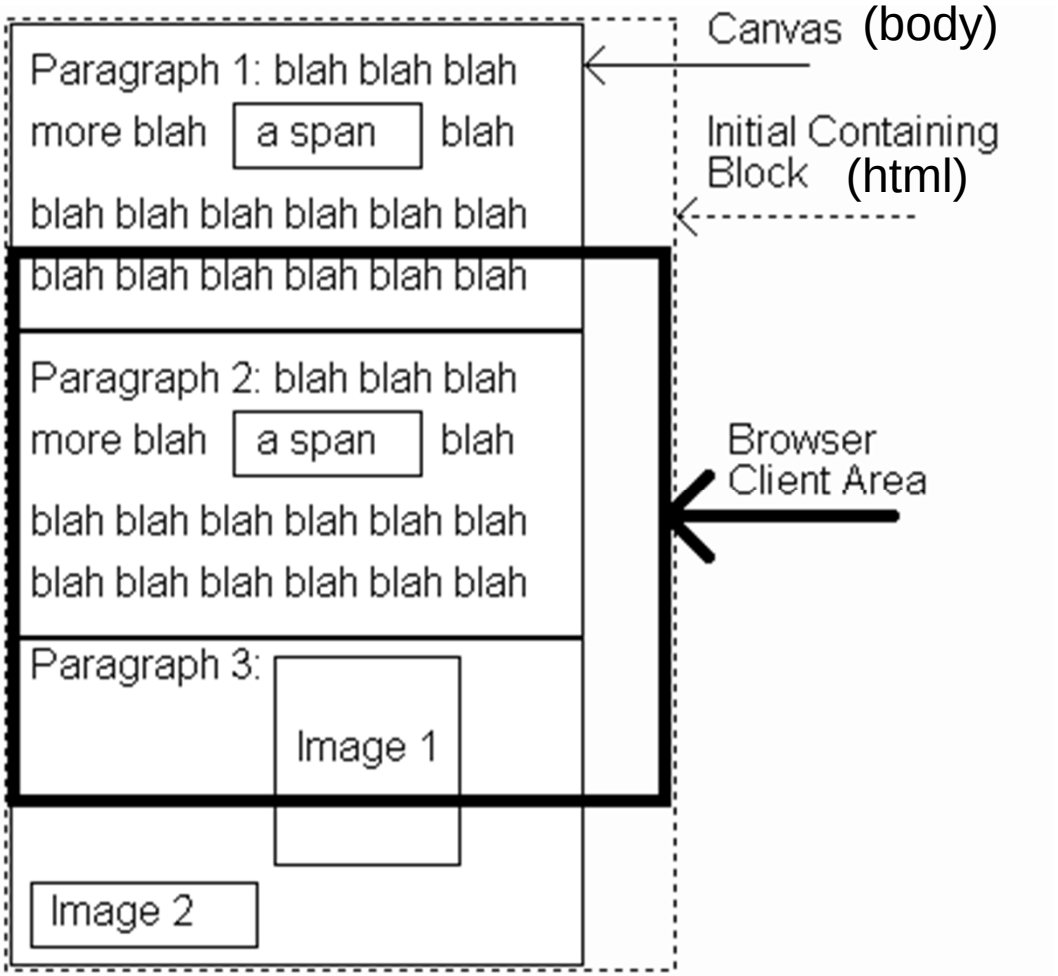
NORMAL FLOW LAYOUT



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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 }
```

Block elements only

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

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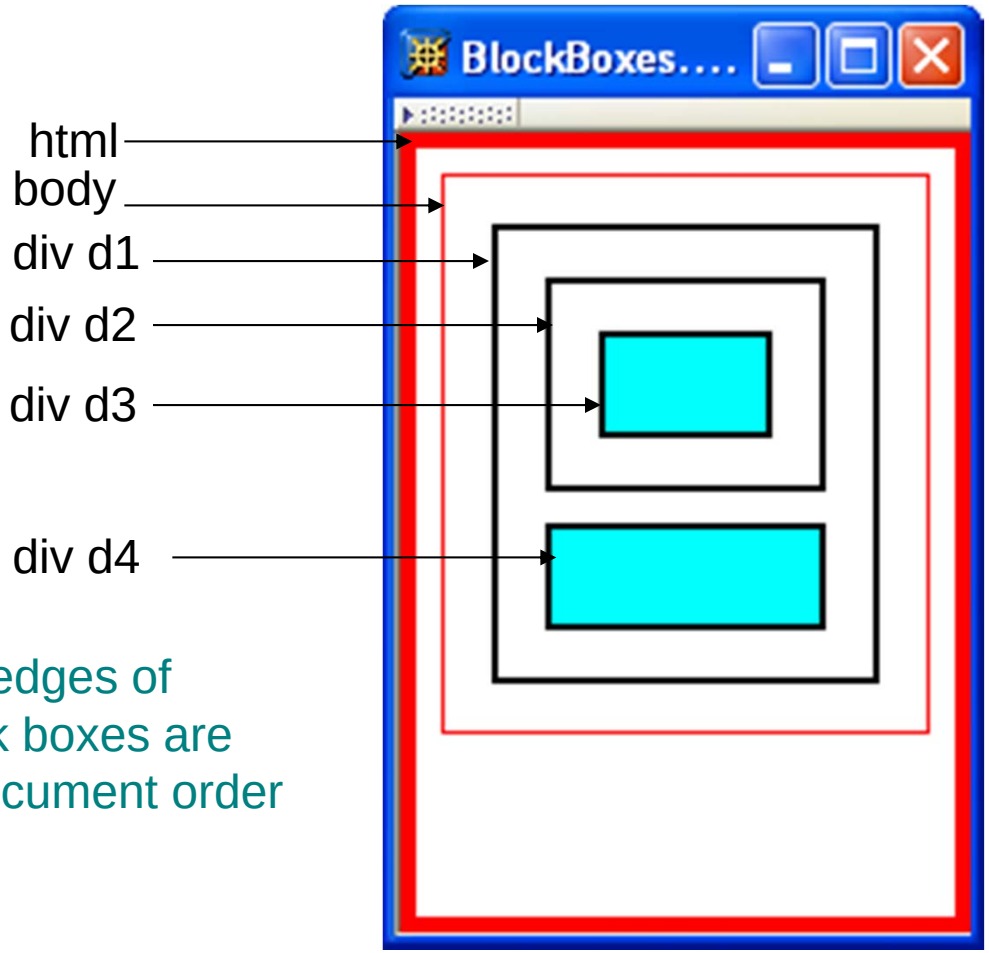
NORMAL FLOW LAYOUT



Top edges of block boxes are in document order

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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`

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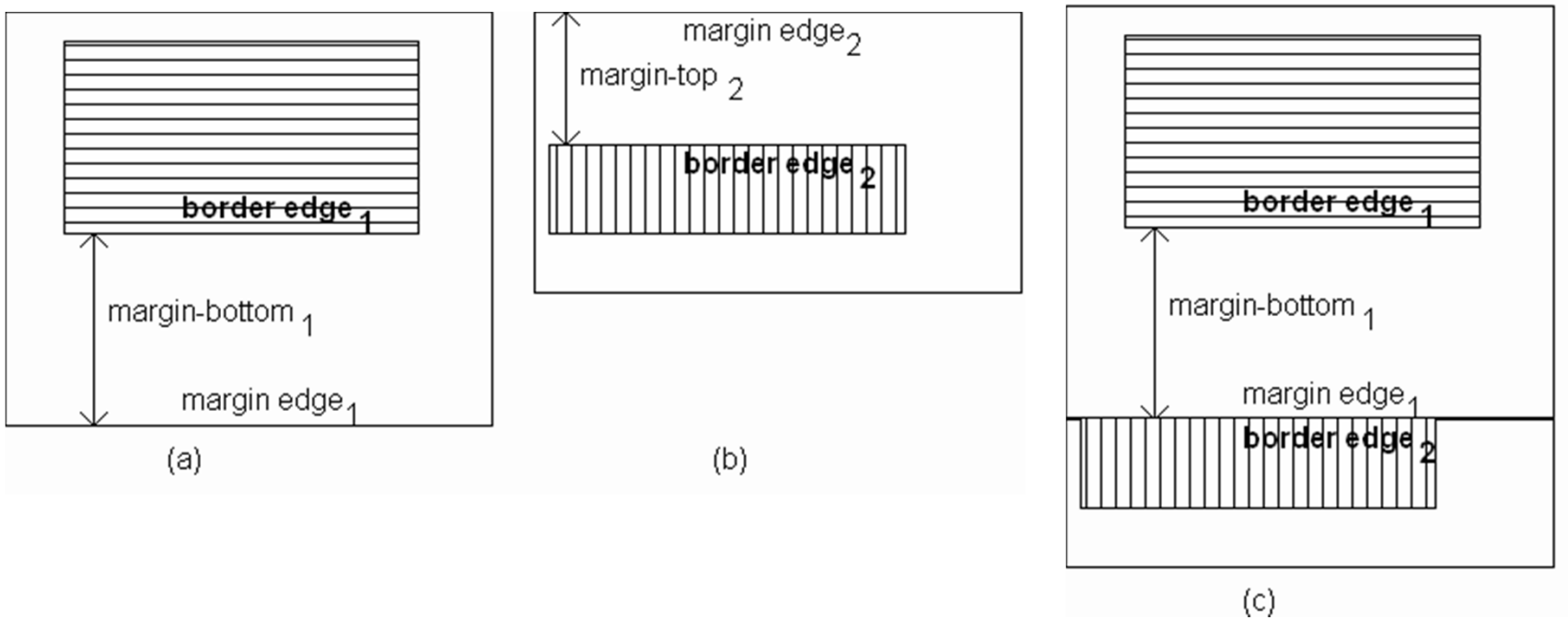
NORMAL FLOW LAYOUT

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



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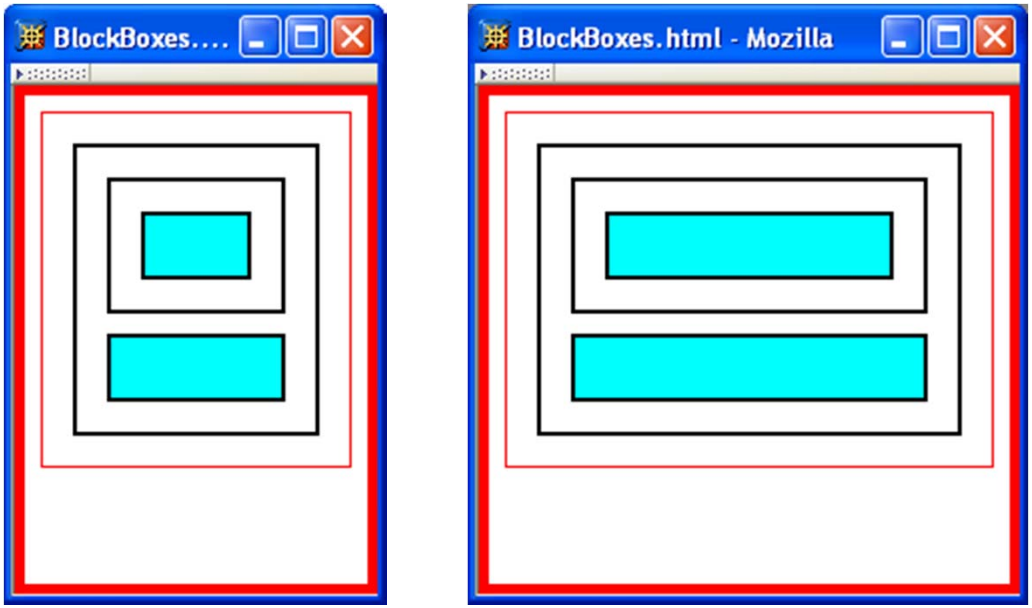
NORMAL FLOW LAYOUT

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

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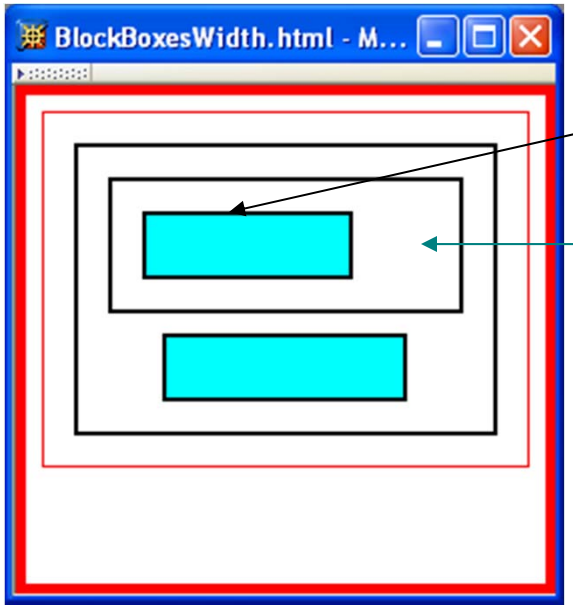
NORMAL FLOW LAYOUT

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




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

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

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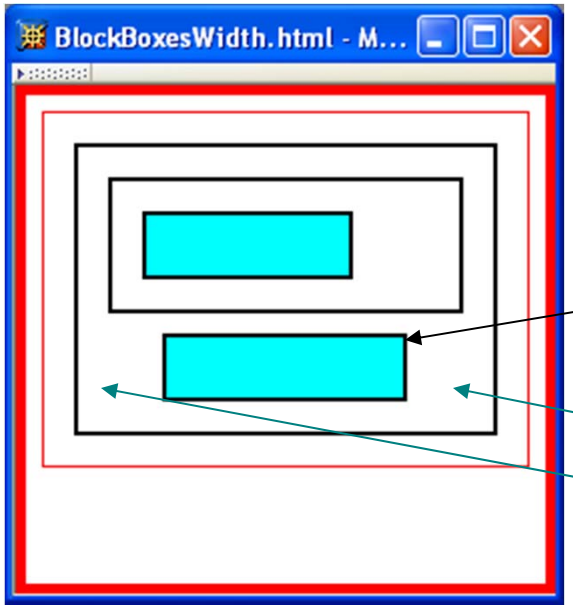
NORMAL FLOW LAYOUT

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




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

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

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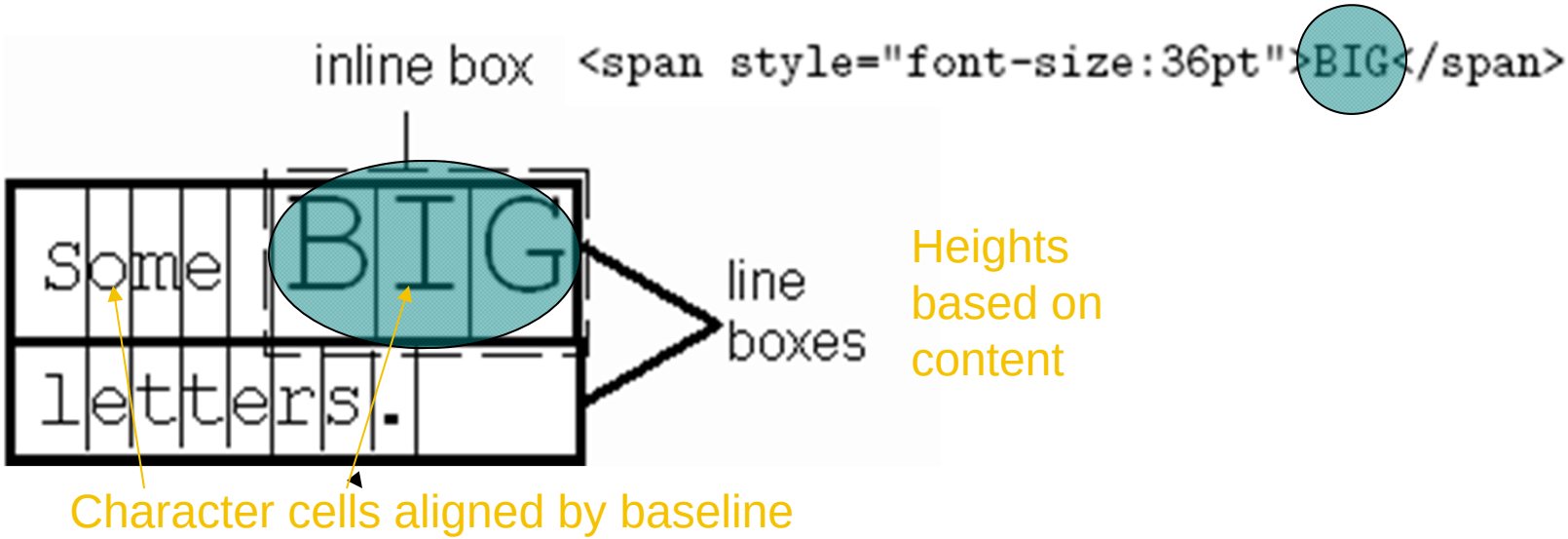
NORMAL FLOW LAYOUT

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



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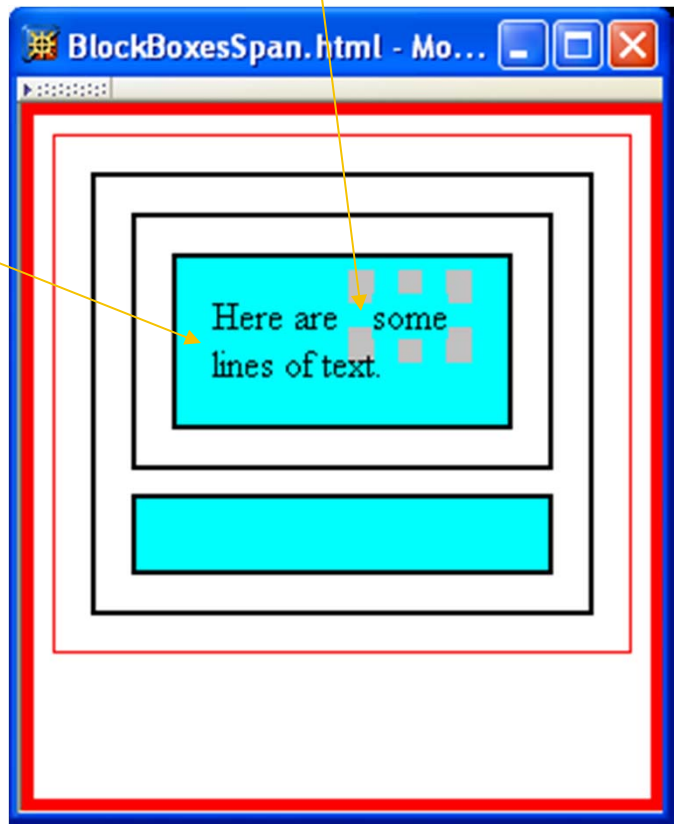
NORMAL FLOW LAYOUT

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>
```



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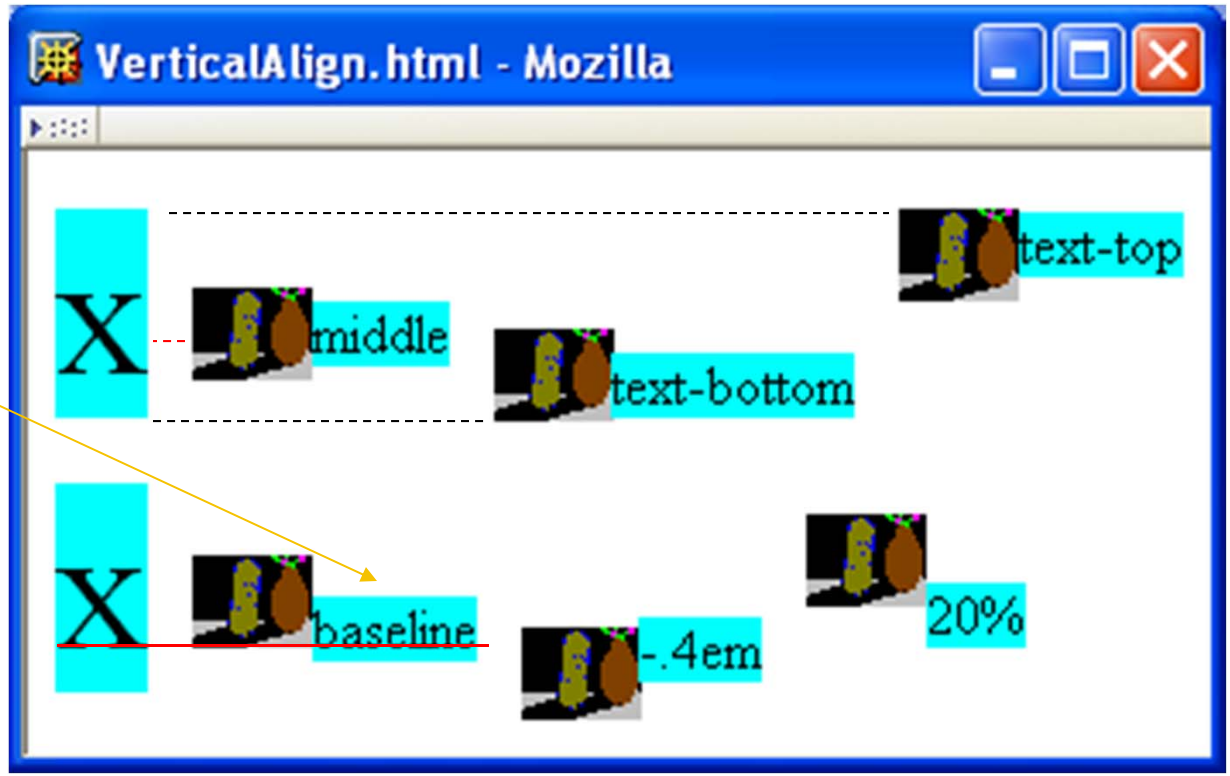
NORMAL FLOW LAYOUT

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

initial value of vertical-align



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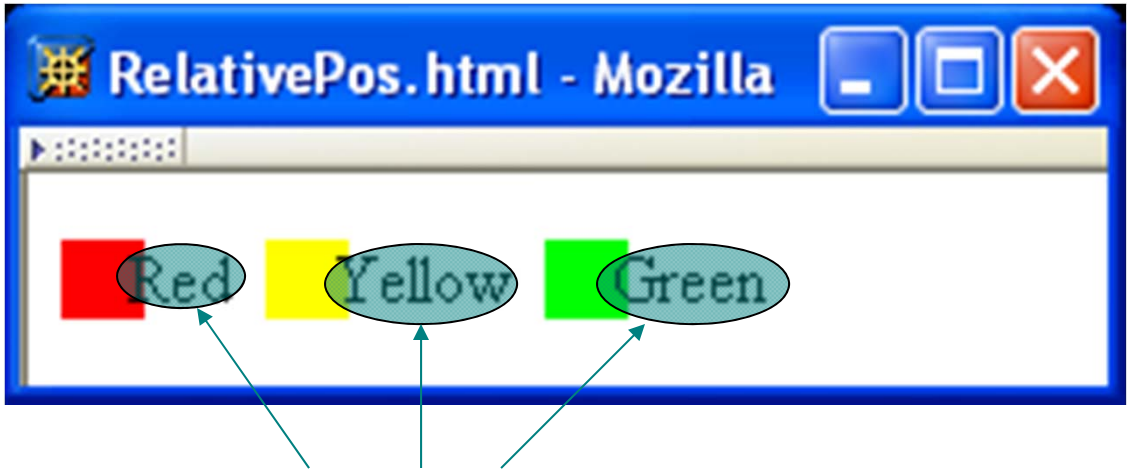
BEYOND NORMAL FLOW

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

- Relative positioning



span's shifted backwards relative to normal flow

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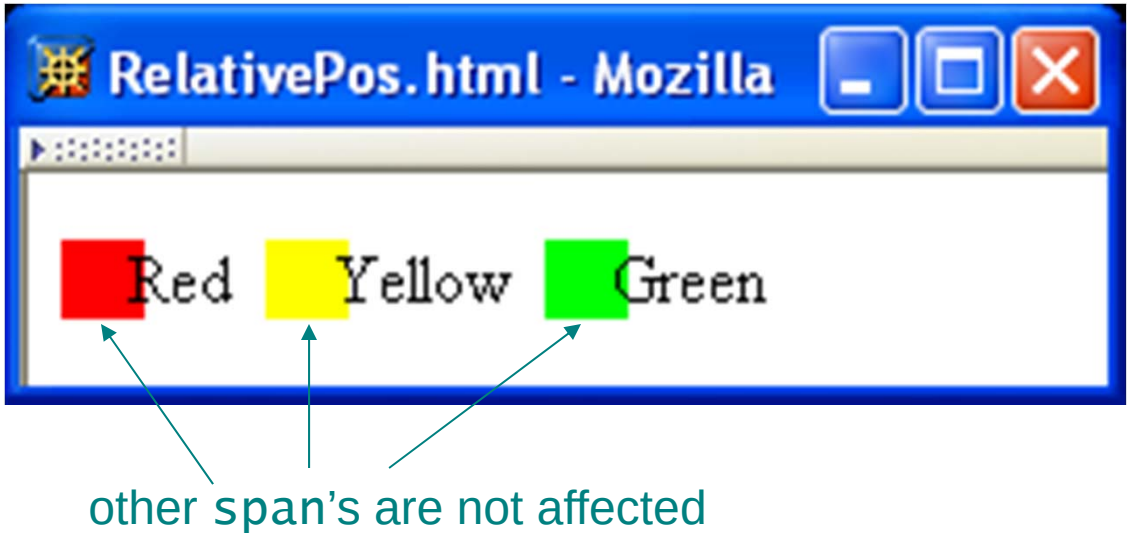
BEYOND NORMAL FLOW

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

- Relative positioning



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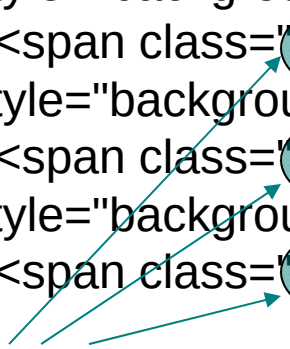
BEYOND NORMAL FLOW

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

- Relative positioning

```
<span style="background-color:red">    
</span><span class="right">Red</span>
<span style="background-color:yellow">    
</span><span class="right">Yellow</span>
<span style="background-color:lime">    
</span><span class="right">Green</span>
```



style rules that move `span`'s away from normal-flow right edge

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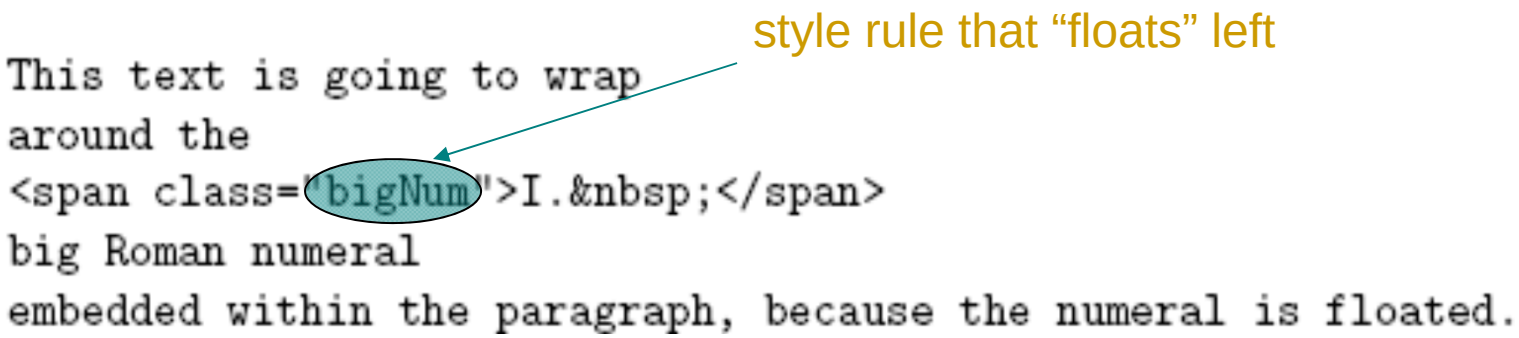
BEYOND NORMAL FLOW

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

- Float positioning



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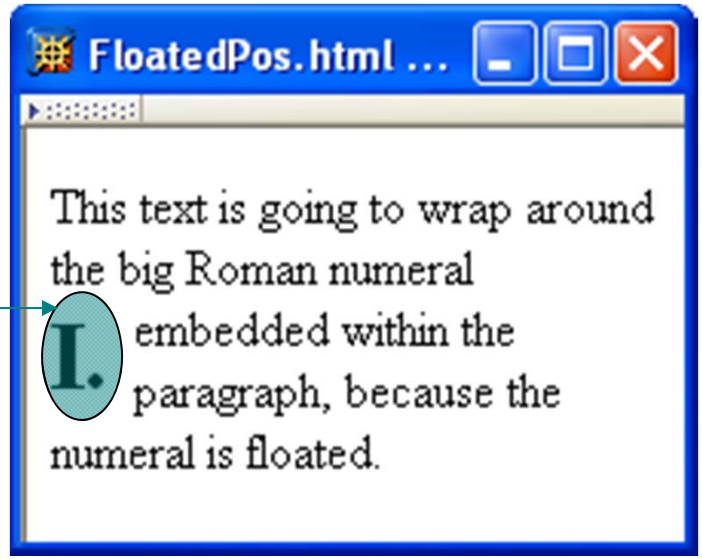
BEYOND NORMAL FLOW

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

- Float positioning

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



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BEYOND NORMAL FLOW

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

- Absolute positioning

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

style rule that moves `span` relative to upper left corner of containing `p` element's box

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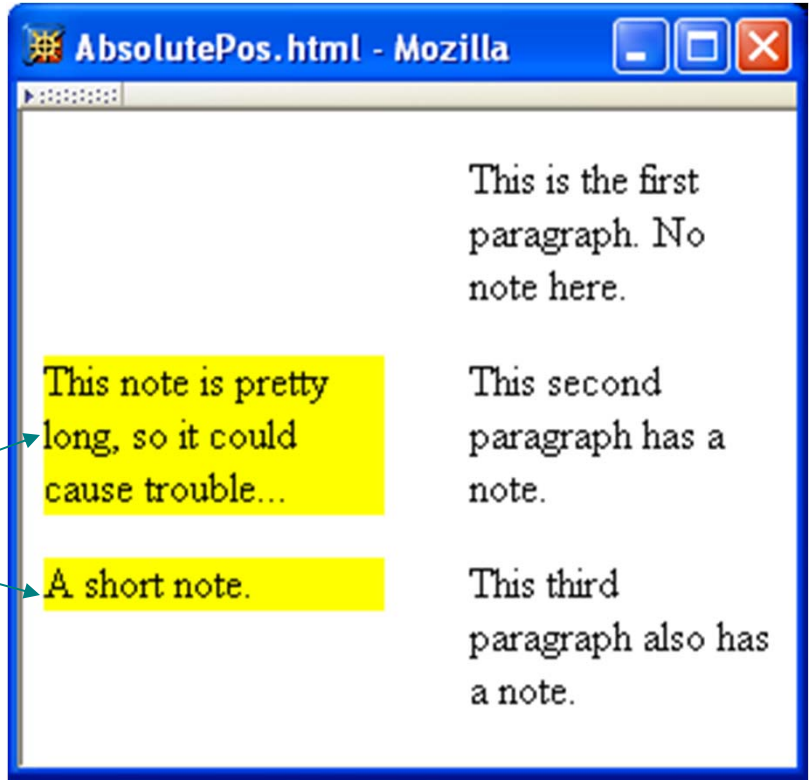
BEYOND NORMAL FLOW

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

- Absolute positioning

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



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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

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BEYOND NORMAL FLOW

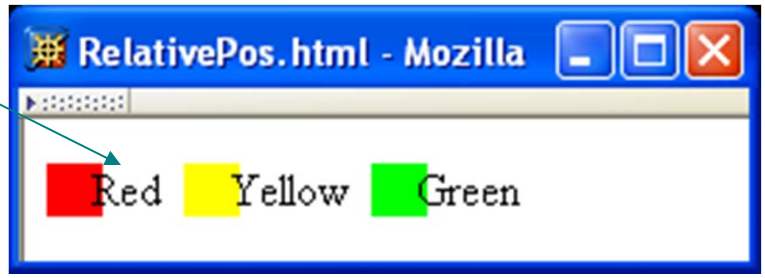
Relative positioning

- 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">    
    </span><span class="right">Red</span>
```

span containing text moves left



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BEYOND NORMAL FLOW

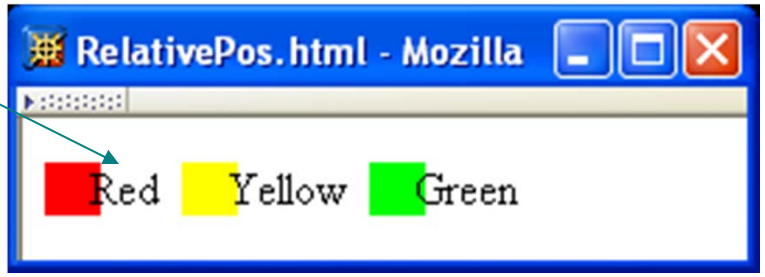
Relative positioning

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

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

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

same effect as before



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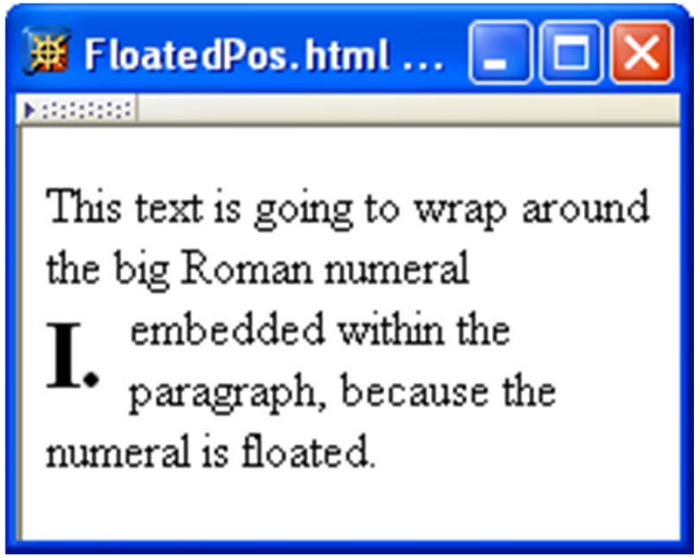
BEYOND NORMAL FLOW

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. </span>
big Roman numeral
```



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BEYOND NORMAL FLOW

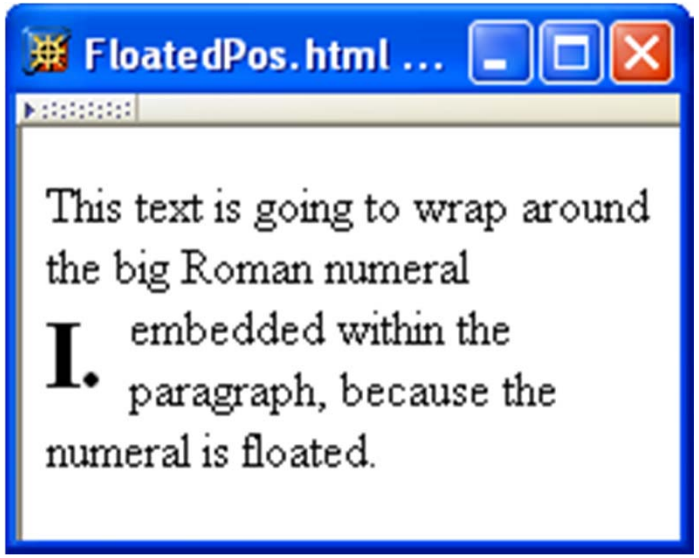
Float positioning

- 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. </span>
big Roman numeral
```

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



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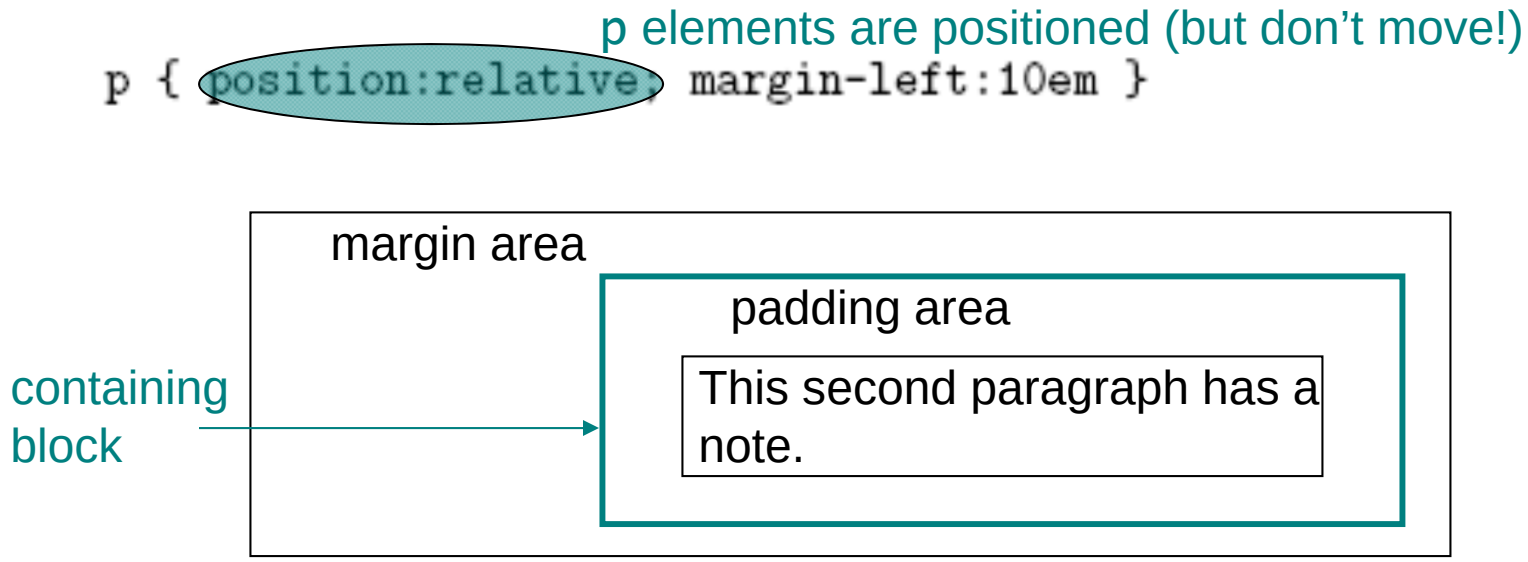
BEYOND NORMAL FLOW

Absolute positioning

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



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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 }
```

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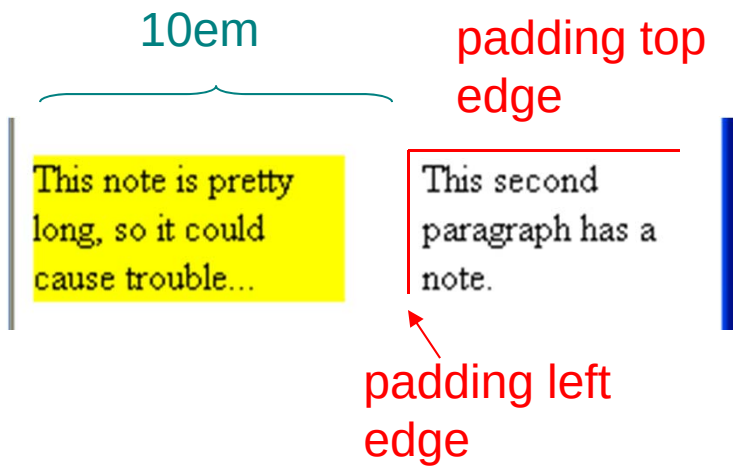
BEYOND NORMAL FLOW

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>
```

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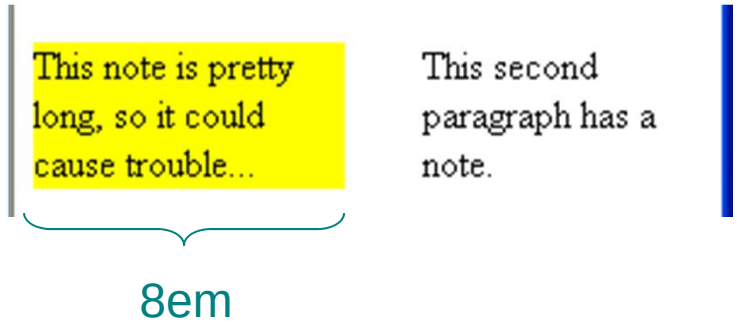
BEYOND NORMAL FLOW

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>
```

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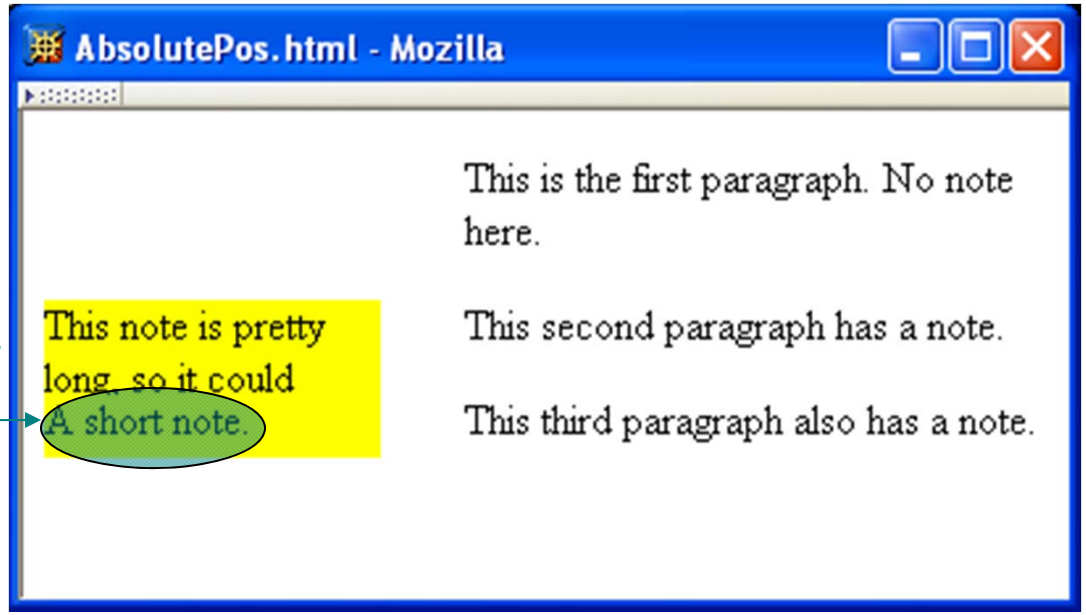
BEYOND NORMAL FLOW

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

Second absolutely positioned box obscures first



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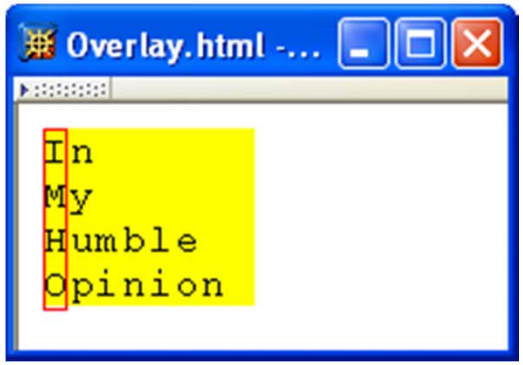
CSS POSITION-RELATED PROPERTIES

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 }
```



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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

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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

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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

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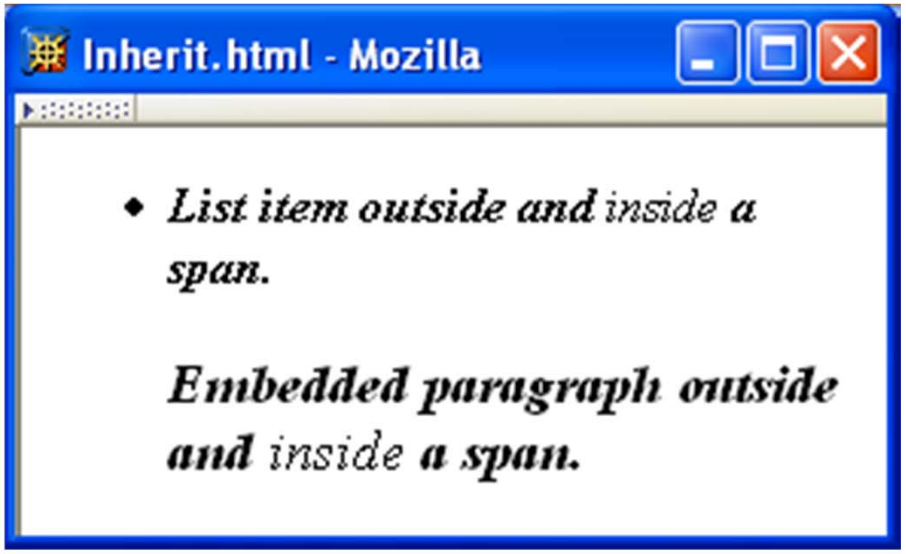
CSS INHERITANCE

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




```
<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>
```

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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)

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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

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EXTERNAL CSS

```
<!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.

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EXTERNAL CSS

```
<!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

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EXTERNAL CSS

```
<!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

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EXTERNAL CSS

```
<!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

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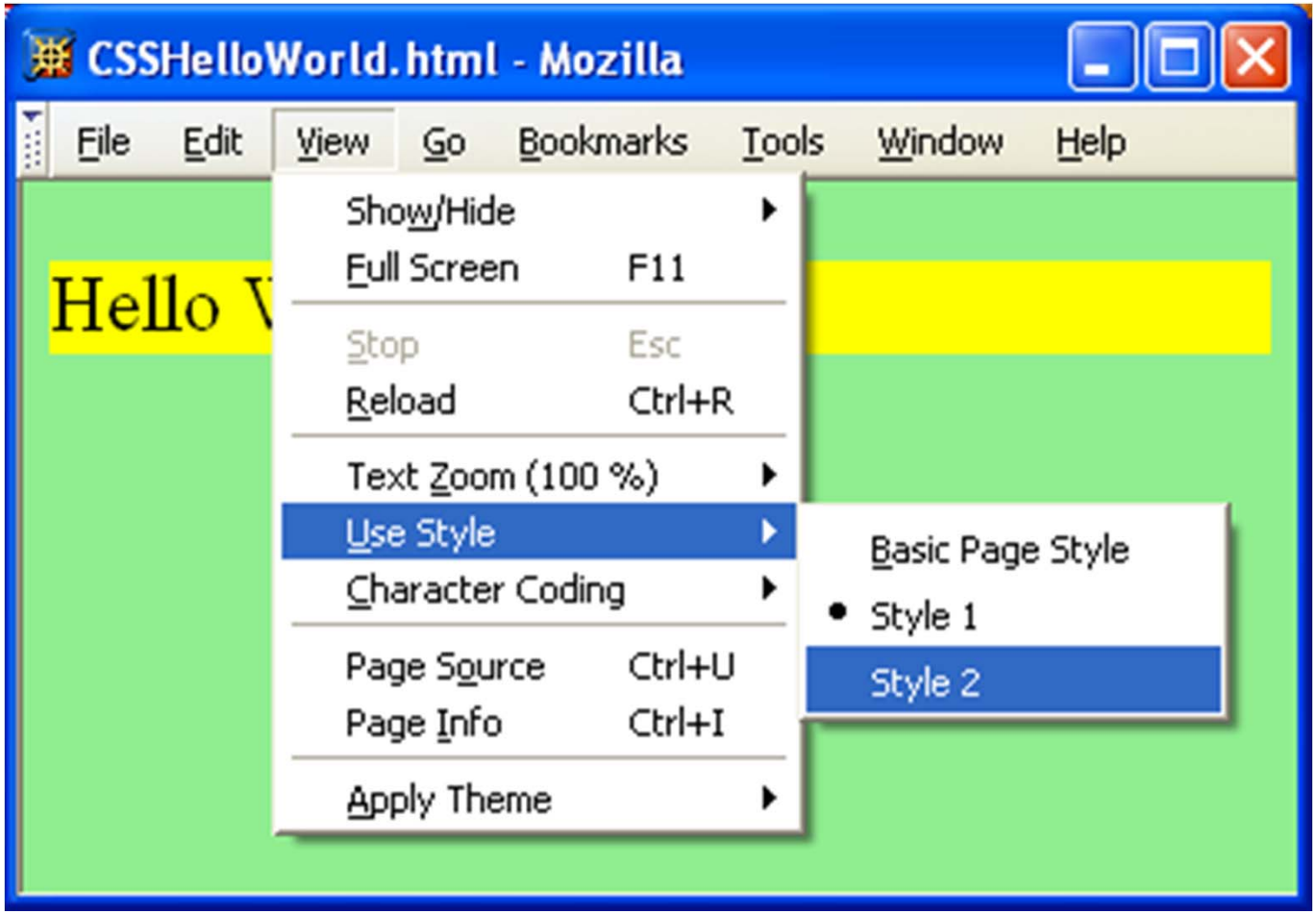
EXTERNAL CSS



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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

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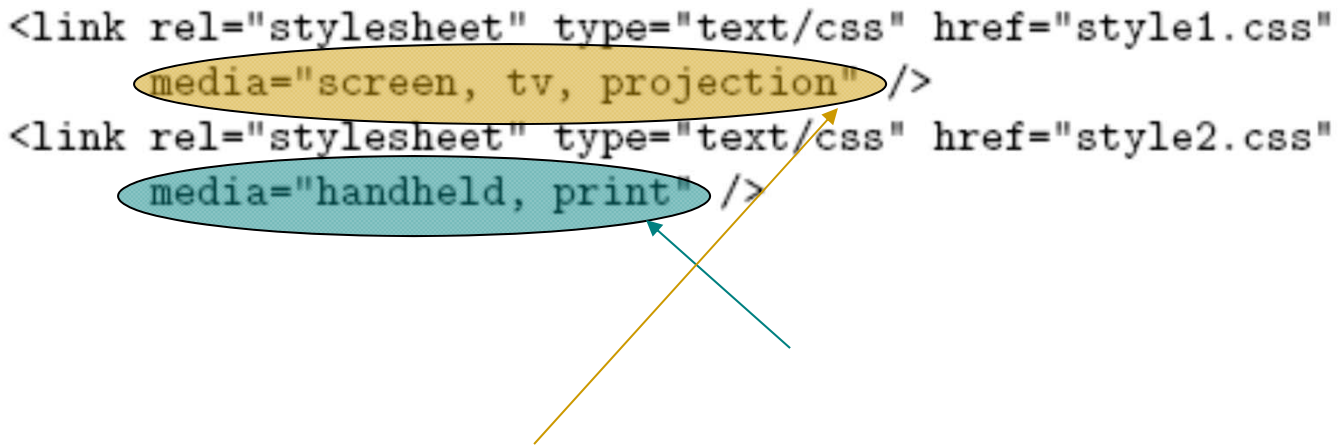
CSS & MEDIA

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

This d

```
<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" />
```



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