# CS2204 Fundamentals of Internet Applications Development

# 4. CSS - Part I

CSS stands for Cascade Style Sheet, a language to set the appearance of Web pages.

Two main aspects are covered by CSS techniques: style setting of individual elements and layout of Web page.

3 parts of lecture notes:

- understanding styles
- reference guide in setting style properties
- layout & advanced techniques

## 4.1. What is style?

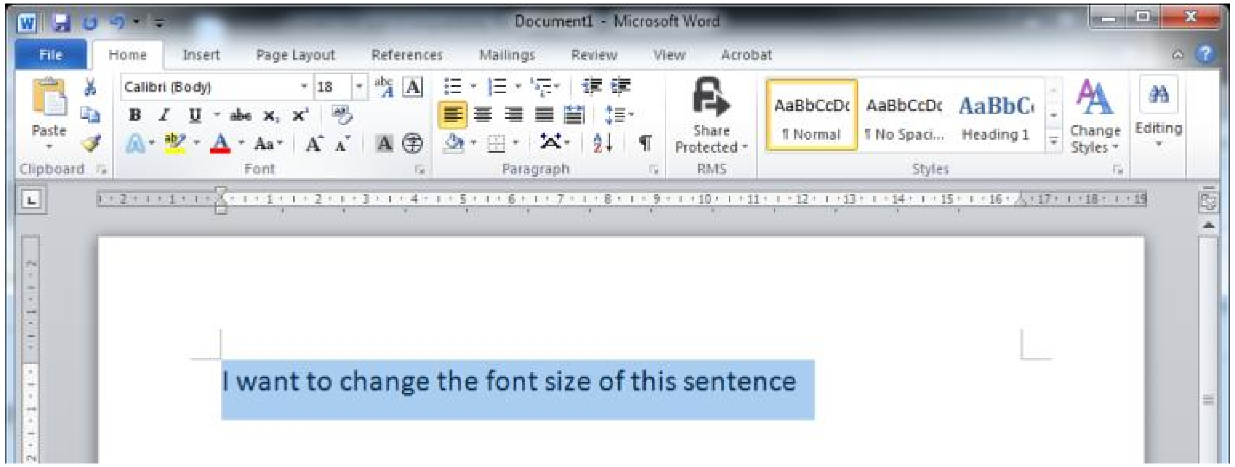
How do you change the font-size when you edit your MS word document? You probably highlight the text and set the style using the menu bar. Will this work when you edit a large, multiple-chapter, document? You better apply pre-defined or your own created styles to different text sharing the same style, e.g. chapter heading or section headings, etc.

HTML by design is not good at controlling appearance of Web pages, e.g.

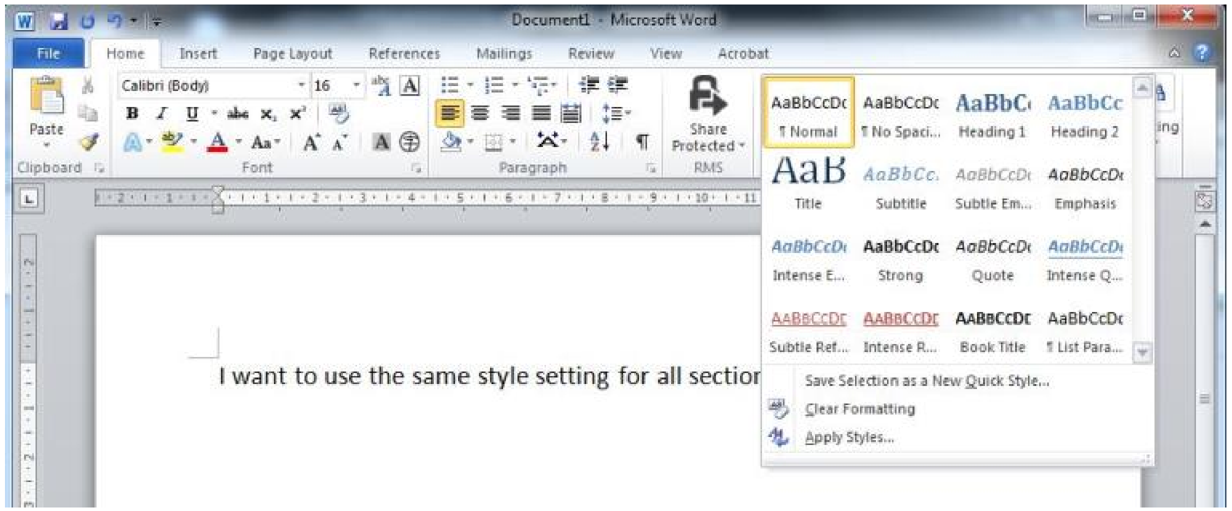
- cannot control alignment by using space (space collapse - only one will be shown)
- cannot position elements without using table
- limited attributes can be used (width & height, border in table) and they create problems

Style with CSS is therefore a technique separated from and enhances the capability of HTML in controlling the appearance of elements

- all default set styles for elements, e.g. size of h1, the biggest heading, th is different from td, etc. are defined in the browser's default style sheet
- author (i.e. you who write up the Web page) can use styles to redefine the way that content in tags are displayed



I want to change the font size of this sentence



I want to use the same style setting for all sectior

## 4.2. What is CSS and why use it?

Let us look at a demo first – the CSS Zen Garden. Note that:

- the home page
- the page without style, how to add the sample style
- changing different style by clicking different style sheets
- look at which line has been changed

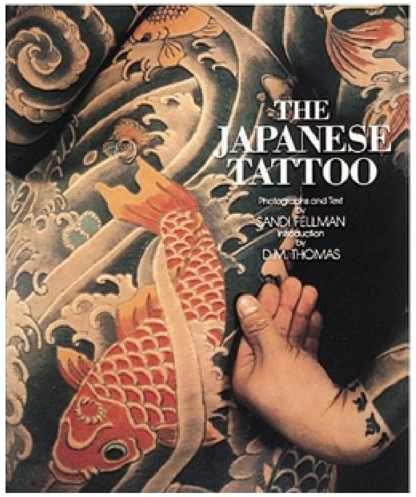
The line that is changed points/links to another file, known as a style sheet or simply a .css file

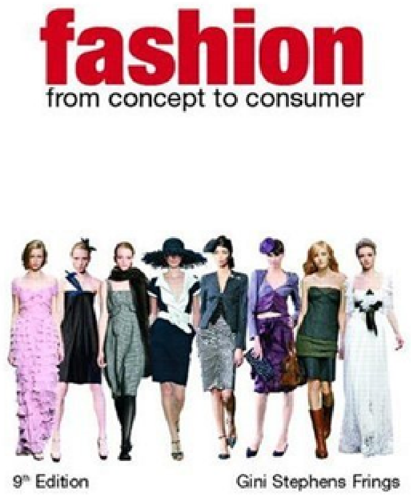
Compare this method to that of highlighting text in MS word or using HTML attributes:

- separate styles completely from the html file
- same style sheet can be used in many html files or vice versa
- easy to change, update and maintain
- but we need to learn how to write the style sheet

Cascade in the dictionary means "a small waterfall, typically one of several that fall in stages down a steep rocky slope". Since the effect of styles can cascade from outer elements into inner elements, and if we use multiple style sheets, the effect from one sheet can cascade into another, therefore this technique is called CSS - Cascade Style Sheet.

*If you want to look beautiful, how would you like to do it?*


THE JAPANESE TATTOO
Photographs and Text by SANDI FELLMAN
Introduction by D.M. THOMAS



*HTML (make some tattoo)* *CSS (wear some nice clothes)*

*Book Covers Source : www.amazon.com*

**4.2.1. Versions of CSS** | **CSS Zen Garden - http://www.csszengarden.com/** | **Example of zen garder - http://courses.cs.cityu.edu.hk/cs2204/example/html/11-csszengarden.html**

## 4.2.1. Versions of CSS

CSS Level 1 (CSS1), 1996

- simple styles for HTML elements, such as format text, set fonts, and set margins

CSS Level 2 (CSS2), 1998

- same page, different style sheets for different media, such as visual browsers, aural devices, printers, Braille devices

CSS Level 2 Revision 1 (CSS 2.1), 2006

- corrected some errors in CSS2 errata and adds a small amount of new property values
- a stable, widely used version

## CSS Level 3 (CSS3), 2000

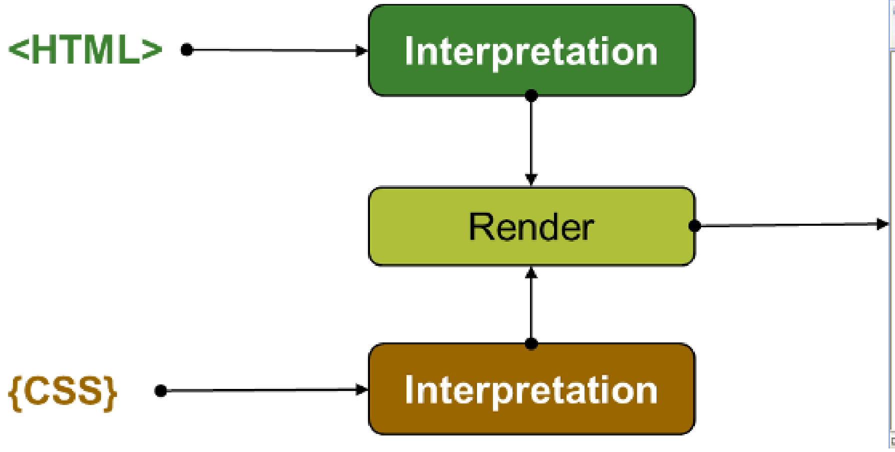
- chosen to work with HTML5 and in active development
- many new features: web fonts, animation, transform, etc.

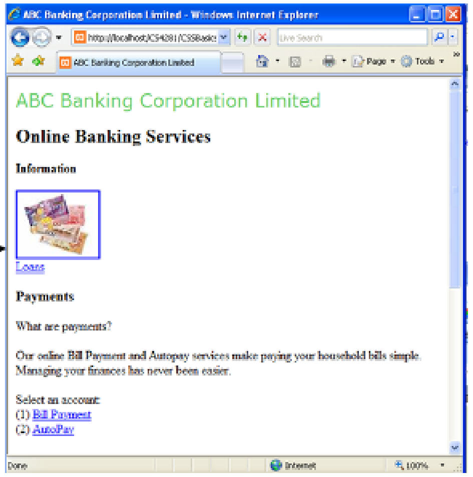
## 4.2.2. How does CSS works?

CSS codes can be either embedded (put directly inside) in the HTML file or linked to it as style sheets.

When a web page is requested, the server sends the HTML file first followed by any files embedded to or linked, such as images and .css files.

After getting the CSS codes, the browser will interpret it and apply the CSS to the HTML, and then display the final page in the browser window.




ABC Banking Corporation Limited - Windows Internet Explorer
http://localhost/CS4281/CSSBasic
Live Search
ABC Banking Corporation Limited
Page
Tools
Done
Internet
100%

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## 4.3. How to set styles for elements?

The basic idea is to find/select an element and set styles on it. One simple way is to do this manually by finding the element with an editor and use the style attribute to set the properties, e.g.

```
<h1 style="color: blue; font-size: 20pt;">

A big and blue color heading

</h1>
```

this kind of styles is in fact called inline style. Problems:

- very tedious to find and set styles for each and every element
- difficult to change because the styles are mixed together with html and scattered all over the page

We need a way to select element or elements more efficiently and set styles without mixing with HTML mark-ups. CSS rule is the answer. Each rule consists of:

```
selector {property1: value1; property2: value2; ...}
```

These rules are put in either the <head> section or an external file, not mixing with HTML.

### 4.3.1. CSS rule example

## 4.3.1. CSS rule example

I want to set all level-1 headings to red color with a font size 20pt.

```
h1 {
  color: red;
  font-size: 20pt;
}
```

- identify the component h1, set value red to property color of “all h1”
- h1 is called the Selector, it starts each rule, appearing before the left curly brace, used to identify the component
- then different styles are set inside the curly bracket
- styles are represented in pairs: property and value
- more than one properties can be set in one rule

Note the good practice for writing CSS rules:

- the selector and open curly bracket in one line
- each property : value with ; in one line (easy to insert or delete later)

- close curly bracket in last line

### 4.3.2. Basic selectors

## 4.3.2. Basic selectors

Type Selector - select by the type of HTML tags, e.g. h1, td, ...etc

```
h1 {...}
```

ID Selector - want to select a particular HTML tag, e.g. only “that” h1. A unique ID will be given to an element as an attribute.
<h1 id=“myid”> </h1>

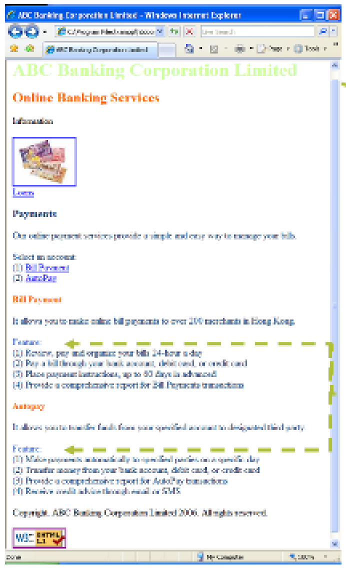
```
#myid {...}
```

Class Selector - want to select a particular group of HTML tags, regardless of the type or relationship. A class name will be given to each element to form a group.
<h1 class=“myclass”>...</h1>
<tr class=“myclass”>...</tr>

```
.myclass {...}
```

Group Selector - combining different methods of selection as a group. Missing the , means a different selector, remember to use it!

```
h1, #myid, .myclass {...}
```



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It allows you to make online bill payments to over 200 merchants in Hong Kong.

Feature:
(1) Review, pay and organize your bills 24-hour a day
(2) Pay a bill through your bank account, debit card, or credit card
(3) Place payment instructions, up to 60 days in advanced
(4) Provide a comprehensive report for Bill Payments transactions

Autopay

It allows you to transfer funds from your specified account to designated third party.

Feature:
(1) Make payments automatically to specified parties on a specific day
(2) Transfer money from your bank account, debit card, or credit card
(3) Provide a comprehensive report for AutoPay transactions
(4) Receive credit advice through email or SMS

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**Type Selector:**

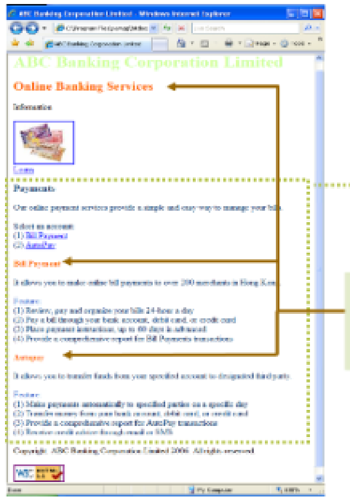
```
h1 { color: #CCFF99;}
```

*Name of desired element*

**Class Selector:**

```
.subHeader {color:
      #3366CC; }
```

*Class*



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(4) Receive credit advice through email or SMS

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**ID Selector:**

```
#pageContent {color: #003366;}
```

**Group Selector:**

```
h2, #billPayment, #autopay {color: #FF6600;
    }
```

**4.3.3. Contextual & Document Tree** | **Basic selector example - http://courses.cs.cityu.edu.hk/cs2204/example/html/11-BasicSelector.html**

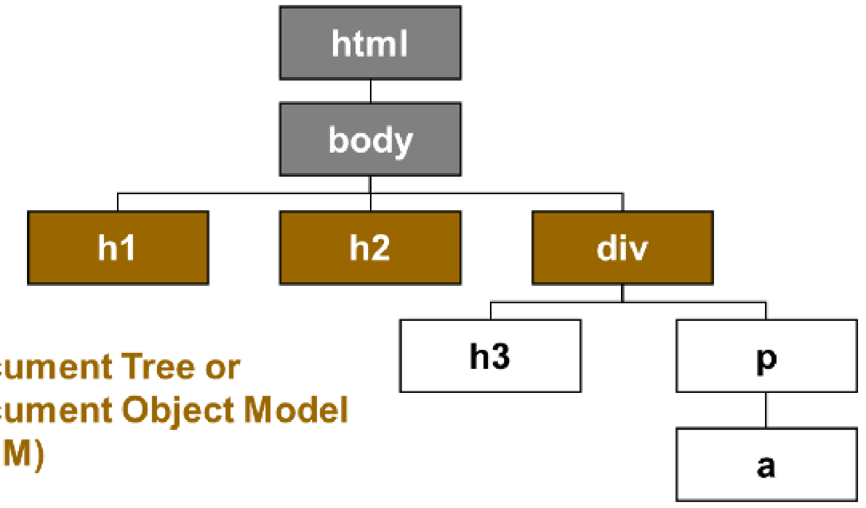
## 4.3.3. Contextual & Document Tree

Contextual means depending on the context - the position where you are relative to the surrounding. The context inside a Web page is defined by the Document Tree.

Different kinds of relationships are defined in a document tree, sometimes known as the Document Object Model (DOM):

- parent: an element directly above another in the document tree
- child: an element directly one level below another element within the document tree
- descendant: can be a child, grandchild, great-grandchild or further descendent down the line
- ancestor: can be a parent, grandparent, great-grandparent, or higher within the tree
- sibling – elements that share the same parent

these relationships are used to form contextual selector.



Parent

Child
*Parent*

*Children*
Siblings

Document Tree or
Document Object Model
(DOM)

## 4.3.4. Contextual Selectors

## 4.3.4. Contextual Selectors

**D**escendant Selector - to select an element that is a descendant of a defined ancestor element

```
#maincontainer a {background-color: #CCFF00;}
```

**C**hild Selector - to select an element that is a child of a defined parent element

```
#pageContent > p {font-size: 0.75em;}
#footer > p {font-size: 0.6em;}
```

**A**djacent Sibling Selector - to select an element that appears immediately after another, must be at the same level in document tree

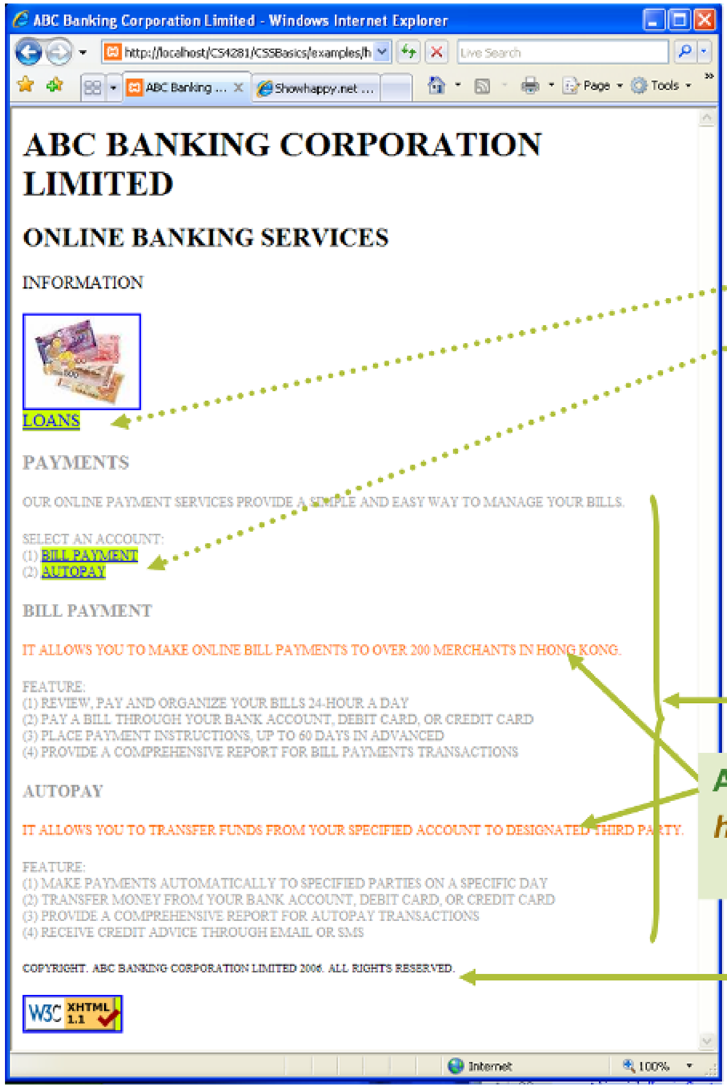
```
h4 + p {color: #FF6600;}
```

should be read from right to left, i.e. to select a <p> that immediately follows a <h4>

**U**niversal Selector - represented by an asterisk * (wild card), to select any element

```
* {margin: 0; padding: 0}
```

this sounds strange but in fact very useful. This rule resets/clears all margin and padding setting for all elements (default settings by the browser which is different in different browsers) so that you can set your own. This idea is commonly used in a style sheet called reset.css to first clear all browser defaults and initialize your own favourite style settings.


ABC Banking Corporation Limited - Windows Internet Explorer
http://localhost/CS4281/CSSBasics/examples/h
Live Search
ABC Banking ...
Showhappy.net ...
Page
Tools
Internet
100%
W3C XHTML 1.1

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(2) PAY A BILL THROUGH YOUR BANK ACCOUNT, DEBIT CARD, OR CREDIT CARD
(3) PLACE PAYMENT INSTRUCTIONS, UP TO 60 DAYS IN ADVANCED
(4) PROVIDE A COMPREHENSIVE REPORT FOR BILL PAYMENTS TRANSACTIONS

AUTOPAY

IT ALLOWS YOU TO TRANSFER FUNDS FROM YOUR SPECIFIED ACCOUNT TO DESIGNATED THIRD PARTY.

FEATURE:
(1) MAKE PAYMENTS AUTOMATICALLY TO SPECIFIED PARTIES ON A SPECIFIC DAY
(2) TRANSFER MONEY FROM YOUR BANK ACCOUNT, DEBIT CARD, OR CREDIT CARD
(3) PROVIDE A COMPREHENSIVE REPORT FOR AUTOPAY TRANSACTIONS
(4) RECEIVE CREDIT ADVICE THROUGH EMAIL OR SMS

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**Universal Selector:**

```
* {text-transform: uppercase; }
```

**Descendant Selector:**

```
#mainContainer a {
    background-color: #CCFF00;}
```

**Child Selector:**

```
#pageContent > p {
    font-size: 0.75em; }
```

**Adjacent Sibling Selector:**

```
h4 + p {
    color: #FF6600;}
```

**Child Selector:**

```
#footer > p {
    font-size: 0.6em; }
```

## 4.3.5. Advanced selector

Attribute Selector - to select an element based on its attribute or attribute value. Most useful for input selection in form

```
input[type] {...}
input[type='submit'] {...}
```

select all input tags with attribute "type" defined; select input tag with the type attribute equal to submit which is in fact the submit button.

Pseudo Class - pseudo means not real, a class not defined by using class name but by the state of the element. The class member(s) may change in time and by action of user, e.g. :hover which is in fact mouse-over, when an element is pointed by the mouse, it becomes a member of the pseudo class :hover; when the mouse moves away, the element switches back to non-member.

Pseudo Element - similar to pseudo class but depends on the position in the DOM, more detail then contextual selector

```
p:first-child {...}
```

select all <p> that must be the first child, not just child

## 4.4. Where to put CSS rules?

## 4.4. Where to put CSS rules?

Where you put the CSS rules determines the type of styles you are using. Different style types have different characteristics. Knowing the advantages and disadvantages would help understand how to organize styles into proper groups and in turn sheets.

Inline – we have seen this type, set in the style attribute. No CSS rules are required, only properties and values.

Embedded – put inside the Web page

External – CSS rules are put in a .css file linked to Web pages using <link>

Import – again rules are in .css file but links differently with @import directive/command

4.4.1. Inline style

## 4.4.1. Inline style

Set styles directly in the Web page using the style attribute of an element.

```
<div style="color: #003366; font-size:.8em;">
```

Advantages:

- good for diagnostics (testing or finding errors)
- a quick (dirty) way to make sure the style is properly set because when using selectors in CSS rules, sometimes it is difficult to select elements correctly because of complexity
- some editors do not support other types of styles, e.g. Canvas page editing by teacher

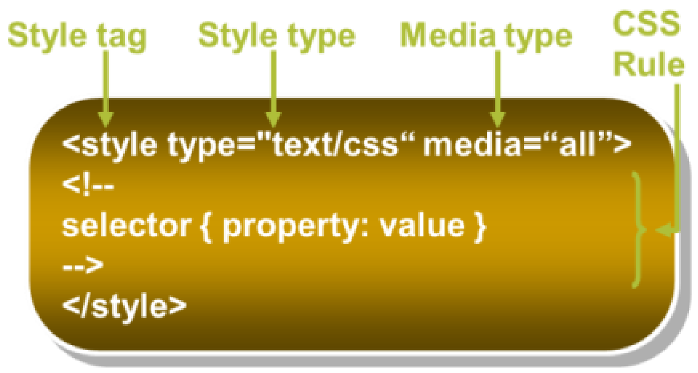
Disadvantage: extremely difficult to use or update because you need to find the elements one by one. It should not be used unless really necessary.

## 4.4.2. Embedded style

Put CSS rules in the <head> section. The <style> tag is used to enclose all rules which will be applied to all elements, if selected, in the entire page (but not other pages).

Advantages:

- easier to write and change
- write once, apply to the whole page
- good for styles for one (this) page only
- can use for overriding styles coming from other style sheets, i.e. the page will follow some overall styles (theme) but has some page-specific styles
- will learn more later about cascading
- can use the media attribute in the <style> tag



```
<style type="text/css“ media=“all”>
<!--
selector { property: value }
-->
</style>
```

## 4.4.3. External style

Put all CSS rules go in a separate .css file (a style sheet), which can be used with any number of Web pages (.html files)

Advantages:

- write once, apply to all elements in all linked pages
- easy to write and update
- good for set up themes (consistent styles) applying to all Web pages in a Web site
- increase accessibility through the use of consistent styles
- can use media attribute

Disadvantages: need to be careful with the effect of multiple style sheets interacton.

Two possible ways to use an external style sheet:

- link style
- import style

#### 4.4.3.1. Link style

## 4.4.3.1. Link style

Linking to a style Sheet means using the <link> tag in the head section to load all CSS rules and apply their effect to the page. Note that more than one style sheet can be linked

In the link tag, the rel is always "stylesheet" while type is now always "text/css" because the intial design of style sheet allows for use of other language, not just css. The media attribute specifies under which condition this style sheet will be used, e.g. media=print means use this style sheet only when the page is printed.

```
<link rel="stylesheet" href="xxx.css" type="text/css" media="all">
```

## 4.4.3.2. Import style

Other .css files can be loaded into current embedded styles or style sheet by using the @import directive.

Use in embedded style

```
<style type="text/css" media="all">
  @import url ("xxx.css");
</style>
```

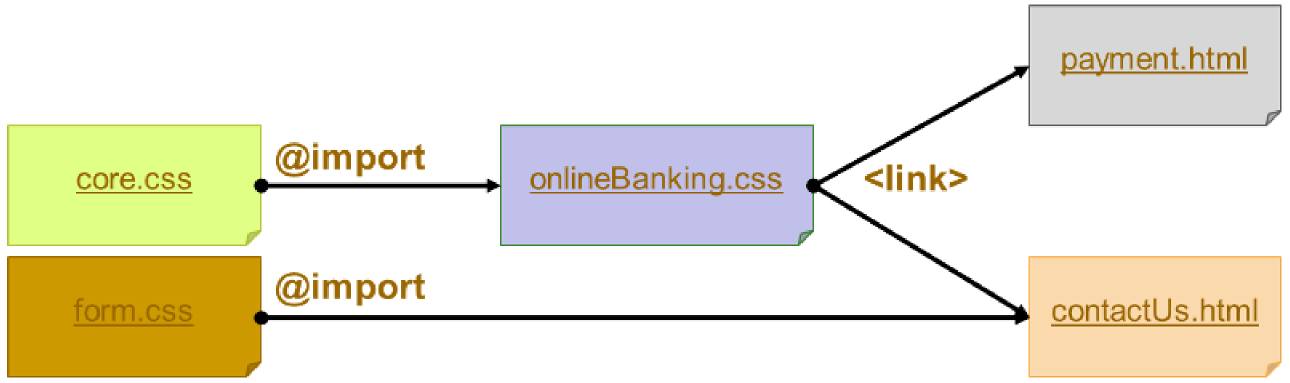
When used in style sheet, use the same @import directive. Note that the @import must be put before all other CSS rules.

4.4.3.3. Difference between Link and Import

## 4.4.3.3. Difference between Link and Import

What is the difference between link and import? It is related to a concept called coupling in programming. Referring to the diagram below, from the view point of payment.html, one style sheet onlineBanking.css can be seen as used. It does not know core.css is used by onlineBanking.css through import. For contactUs.html, it can see both onlineBanking.css and form.css are used, one by link and the other by import.

If something can be seen, or directly related to, it is called tightly coupled. Something indirectly seen or related is loosely coupled. In general, use less tight coupling is better because it is easier to maintain but different situations demand different design, no one single, straight forward answer.



## 4.5. When to use what?

## 4.5. When to use what?

Should review the characteristics of different kinds of styles to determine when to use what:

- never use Inline style except in special circumstances
- if the styles are only used in one page, use Embedded or Link style
- when the styles will be used in more than one pages, have to use Link style
- if the styles are selectively used, e.g. on screen or on print, Embedded or Link style should be used because the media attribute can be used
- whether to use Import style depends on the strategy of the Web site

In principle, Link style only can handle all situations but how to group styles into one or more style sheets need to be considered.

4.6. How to organize style sheets?

## 4.6. How to organize style sheets?

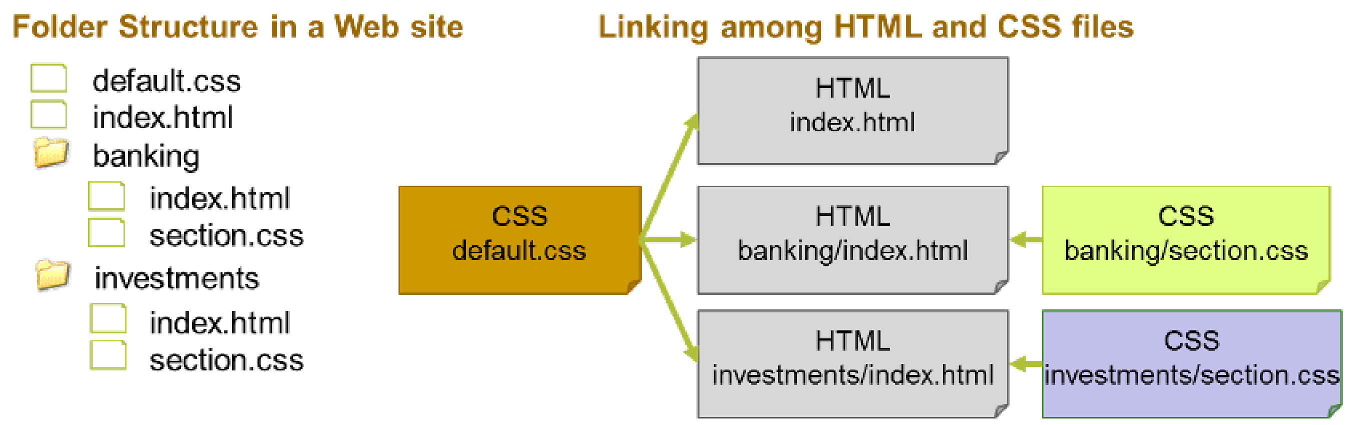
Link style can be used in nearly all situations, shall we use one or two style sheets? How many style sheets should be used? There are 2 common approaches.

By application functions - referring to a typical bank Web site in the diagram below, there is a landing page (highest level index.html) from which different sub-systems such as banking and investment can be pointed to. Organize style sheets as:

- one highest level default.css containing styles used in all pages in the whole Web site, e.g. logo layout, corporate color scheme, font, etc.
- one style sheet section.css each for sub-systems grouping styles specific to banking or investment sub-systems. Usually, we might change the color scheme a little bit to let users know that they are browsing in a sub-system and note the change when they move into another

By content (HTML) type - to maintain consistency in interfaces throughout the Web site, can consider set up style sheets to control forms, tables or lists, etc. and apply them to pages that have those HTML.

When multiple style sheets are used, need to think about the order of linking into a Web page.



## 4.7. Cascade Order

We learn that effect of CSS rules may cascade. Properties of an element may be set, sometimes conflictedly, by more than one CSS rules. This would happen even if one style sheet is used. The final result, that is which rule will win, must be determined systematically and consistently. Cascade Order is the way to determine the result which must be standardized so that all browsers will render the page in the same way.

2 situations when more than one rules may affect an element:

- inheritance
- multiple origins of styles

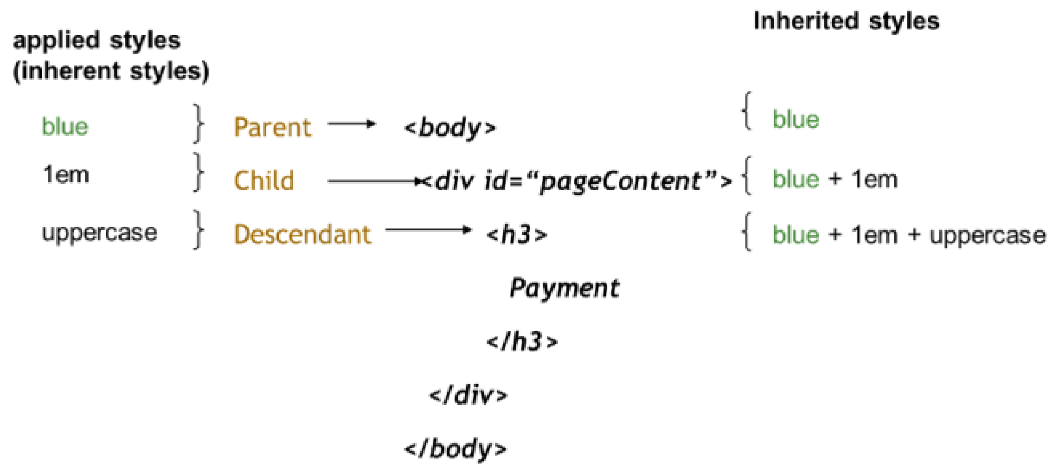
## 4.7.1. Inheritance

Consider the following CSS rules acting on the page in the diagram:

```
body { color: blue; }
#pageContent { font-size: 1em; }
h3 { text-transform: uppercase; }
```

The <h3> element has 3 rules affecting it for 3 properties although 2 rules are not explicitly used for it.

CSS rules set for ancestors go on affecting decendants is called inheritance.Note that not all properties would have inheritance effect. Information can be obtained from W3C reference.



```
<body>
<div id="pageContent">
<h3>
  Payment
</h3>
</div>
</body>
```

## 4.7.2. Who will win in cascading? | CSS2 full properties table - https://www.w3.org/TR/CSS2/propidx.html

## 4.7.2. Who will win in cascading?

To answer this question, need to consider 4 factors:

- origin of styles - user agent (i.e. browser default), author (i.e. you) or user (those who are looking at your Web page)
- types of style - inline, embedded or link
- the order of applying CSS rules
- selector - how the element is selected in the rule (specificity)

**4.7.2.1. Origin of styles**

## 4.7.2.1. Origin of styles

First consider the origin - according to standard the order of precedence (i.e. more important) is author > user > user agent. This means the users have no way to override the Web page according to their need, not good for accessibility. Here comes the !important declaration.

For any rule, it can be declared as important and result in higher priority, e.g.

```
p {margin-left: 5px !important}
```

with !important the precedence order of orign becomes - user important > author important > author normal > user normal > user agent. However, !important should only be used with care in author style, otherwise it becomes somewhat like Inline Style.

After this, move on to consider precedence inside author styles.

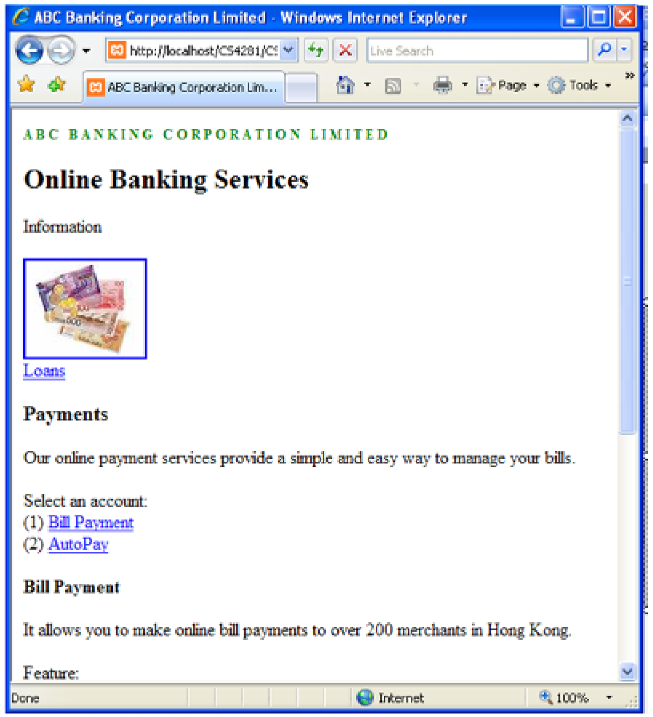
## 4.7.2.2. Order of styles

As we have already learnt some ideas, inside Author Styles (in a Web page):

- inline styles ALWAYS override other styles and are of highest priority, except !important
- embedded and linked styles have no difference in priority and only depend on their order of application, i.e. is the <link> tag before or after <style> tag?
- if everything being equal, the latest rule in terms of order will win.

What will be the result of switching the order of embedded and link styles in the diagram below?

| Method | CSS Rules |
|---|---|
| External | h1 { color: blue; font-size: 24px; text-transform: uppercase; } |
| Embedded | h1 { color: green; font-size: 18px; } |
| Inline | <h1 style="font-size: 12px; letter-spacing: .2em;"> |


ABC Banking Corporation Limited - Windows Internet Explorer
http://localhost/CS4281/CS
Live Search
ABC Banking Corporation Lim...
Page
Tools
Done
Internet
100%

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(2) AutoPay

Bill Payment

It allows you to make online bill payments to over 200 merchants in Hong Kong.

Feature:

## 4.7.2.3. Specificity

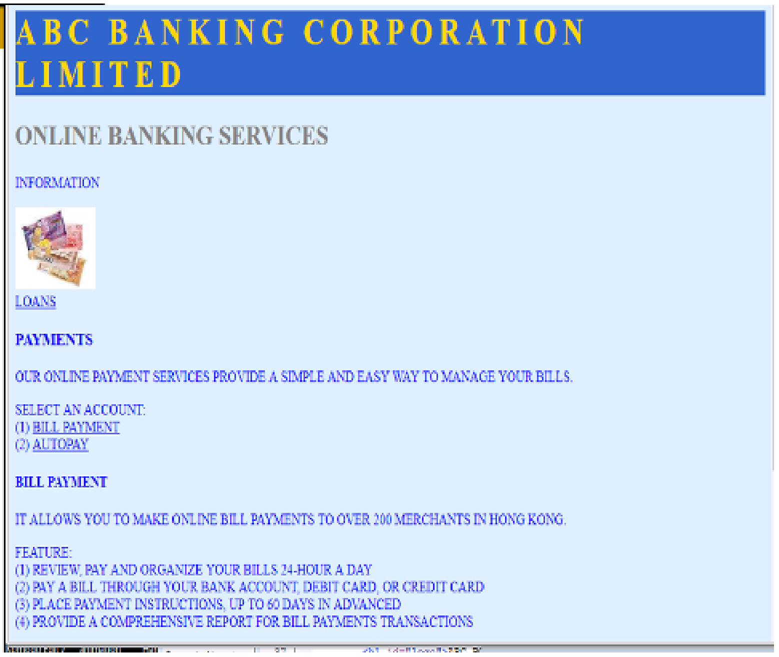
## 4.7.2.3. Specificity

Consider the CSS rules in the diagram below, what will be the final styles for the id logo? If everything being equal, the latest rule will win?

Compare the following selectors: type, class and id. The result tells us id selector wins. If more than one rules select the SAME element, need to look at how specific the selector is, that is how many elements will be selected, less is more specific - this is a rule of thumb (easy to remember, not very exact), more exact calculation is described in the standard. Consider some more selectors:

```
ul li {...}
ul ol li.red {...}
```

| Selector | CSS Rules |
|---|---|
| ID | #logo {<br>font-size: 2em;<br>letter-spacing: .2em;<br>color: Gold; } |
| Type | body {<br>color: Blue;<br>background-color: #DDEEFF;<br>font-size: 1em;<br>text-transform: uppercase; } |
| Class | . header {<br>font-size: 1.2em;<br>color: Grey; } |



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**4.8. Media type and Media Query** | **Specificity calculation - https://www.w3.org/TR/CSS2/cascade.html#specificity**

## 4.8. Media type and Media Query

Styles could be used selectively depending on different conditions. Two ways to specify media dependencies for style sheet:

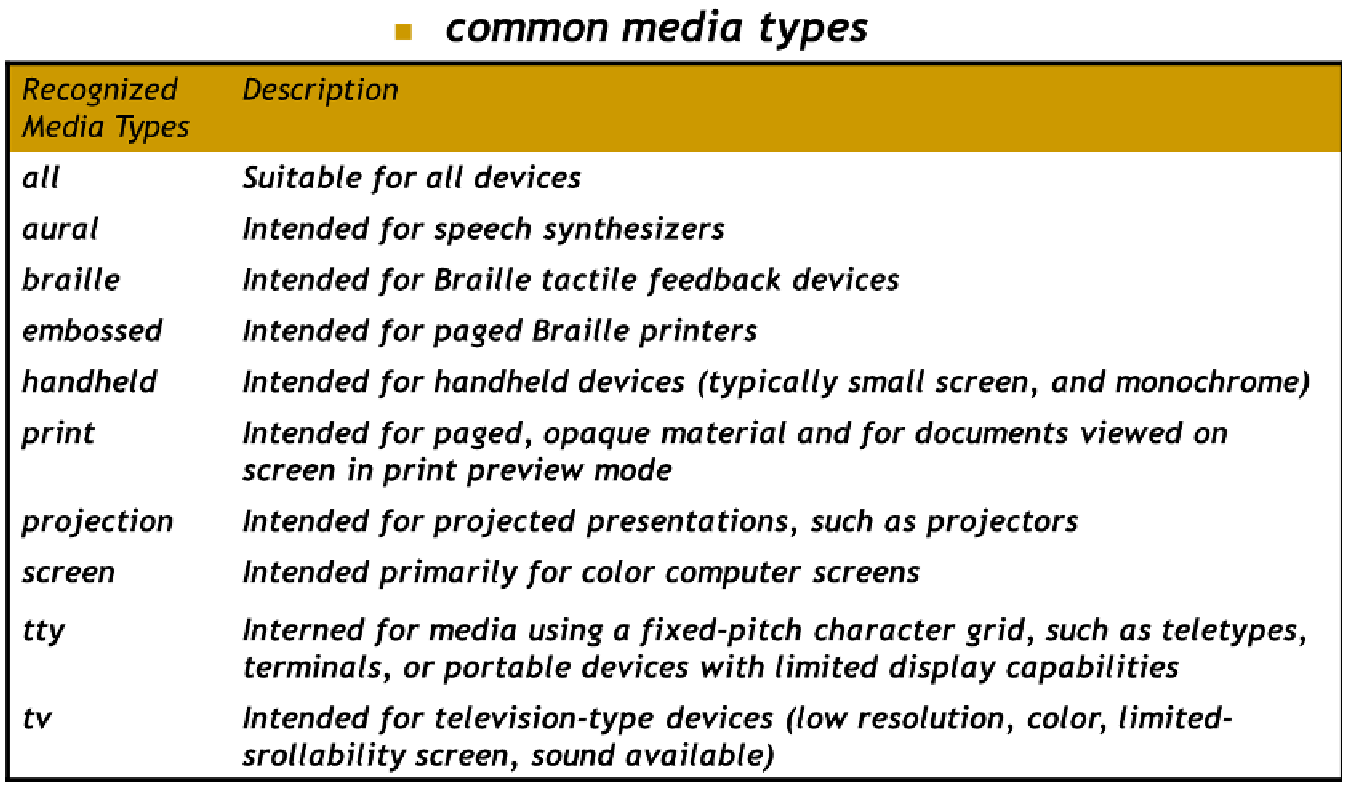
- specify the target media inside a style sheet with the @media or @import at-rules

```
@import url("../styles/screen.css") screen;
@import url("../styles/print.css") print;
or
@media screen {
div ul {width: 90%}
div ul li {width: 100%;}
}
```

- specify the target medium with external style sheet

```
<link rel="stylesheet" href="../css/13-screen.css"
type="text/css" media="screen">
<link rel="stylesheet" href="../css/13-print.css" type="text/css"
media="print">
```

The media type has been further developed into more complicated as well as combined (e.g. and, or, etc.) conditions in CSS3 known as Media Queries.



- *common media types*

| *Recognized Media Types* | *Description* |
|---|---|
| *all* | *Suitable for all devices* |
| *aural* | *Intended for speech synthesizers* |
| *braille* | *Intended for Braille tactile feedback devices* |
| *embossed* | *Intended for paged Braille printers* |
| *handheld* | *Intended for handheld devices (typically small screen, and monochrome)* |
| *print* | *Intended for paged, opaque material and for documents viewed on screen in print preview mode* |
| *projection* | *Intended for projected presentations, such as projectors* |
| *screen* | *Intended primarily for color computer screens* |
| *tty* | *Interned for media using a fixed-pitch character grid, such as teletypes, terminals, or portable devices with limited display capabilities* |
| *tv* | *Intended for television-type devices (low resolution, color, limited-srollability screen, sound available)* |

## 4.9. Conclusions

Extension readings:

- text book CSS chapters
- only common examples are learnt to illustrate concepts, some more detail values are provided in CSSReference.pdf

Critical thinking:

- shall I remember all these properties and values ?!
- where to find relevant information?