Web Programming Spring 2021 #8

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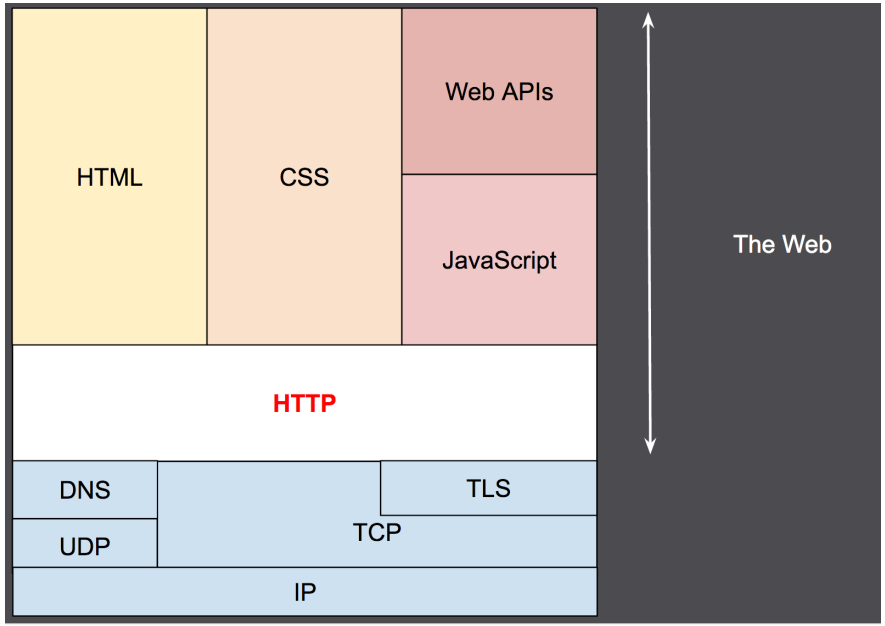
Topics

- The concepts of Web Services
- Web data protocols
  - HTTP, WebSocket, WebRTC
  - HTML, CSS
- **Web JavaScript programming**
- Cookies and sessions
- Web Frontend frameworks
- Web Backend frameworks
- RESTful API design

Web data protocols

- HTTP, HTTPS
- Web APIs
- HTML, HTML5
- CSS, CSS3
- **JavaScript**
- Conclusion



Inside a function

不要超過100行

變數命名原則

```
let numberOfStudents

const numberOfLegs

function setBackgroundColor()

class Student{}
```

TREE

```
"    *"
"   ***"
"  *****"
"*******"
"    *"
"    *"
"    *"
```

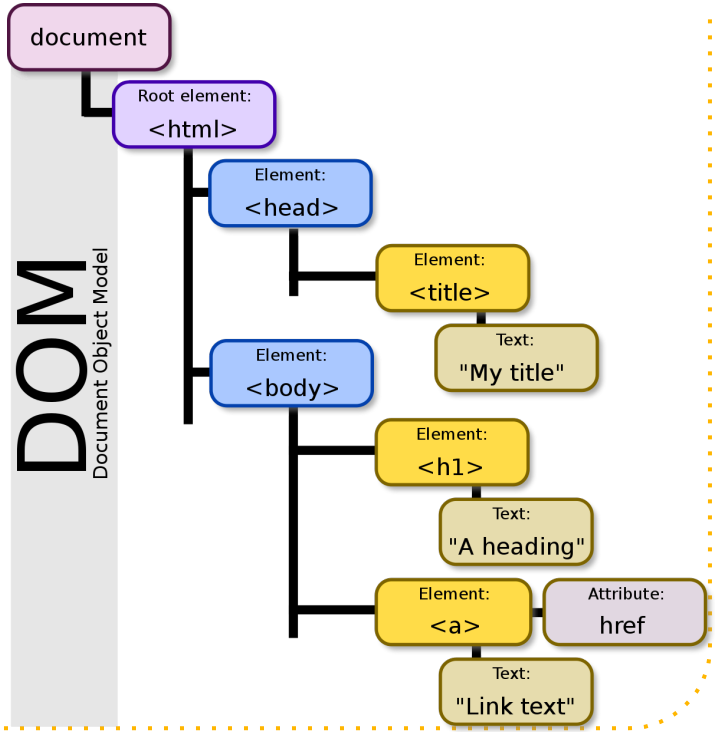
```
function tree(n) {
  printTreeTop(n);
  printTreeBottom(n);
}
function printTreeTop(n) {
  // repeatchar(‘ ’, i) + repeatchar(‘*’, j)
}
function printTreeBottom(n) {
  // repeatchar(‘ ’, i) + ‘*’
}
function repeatchar(n, arg_char) {
}
```

JavaScript

- Introduction
- Basics
- Document Object Model
- Browser Object Model
- JavaScript ES6
- jQuery & AJAX

Document Object Model

- Introduction
- DOM Programming Interface
- DOM Document Object
- DOM Navigation
- DOM Events
- DOM EventListener
- DOM HTML & CSS



Document Object Model

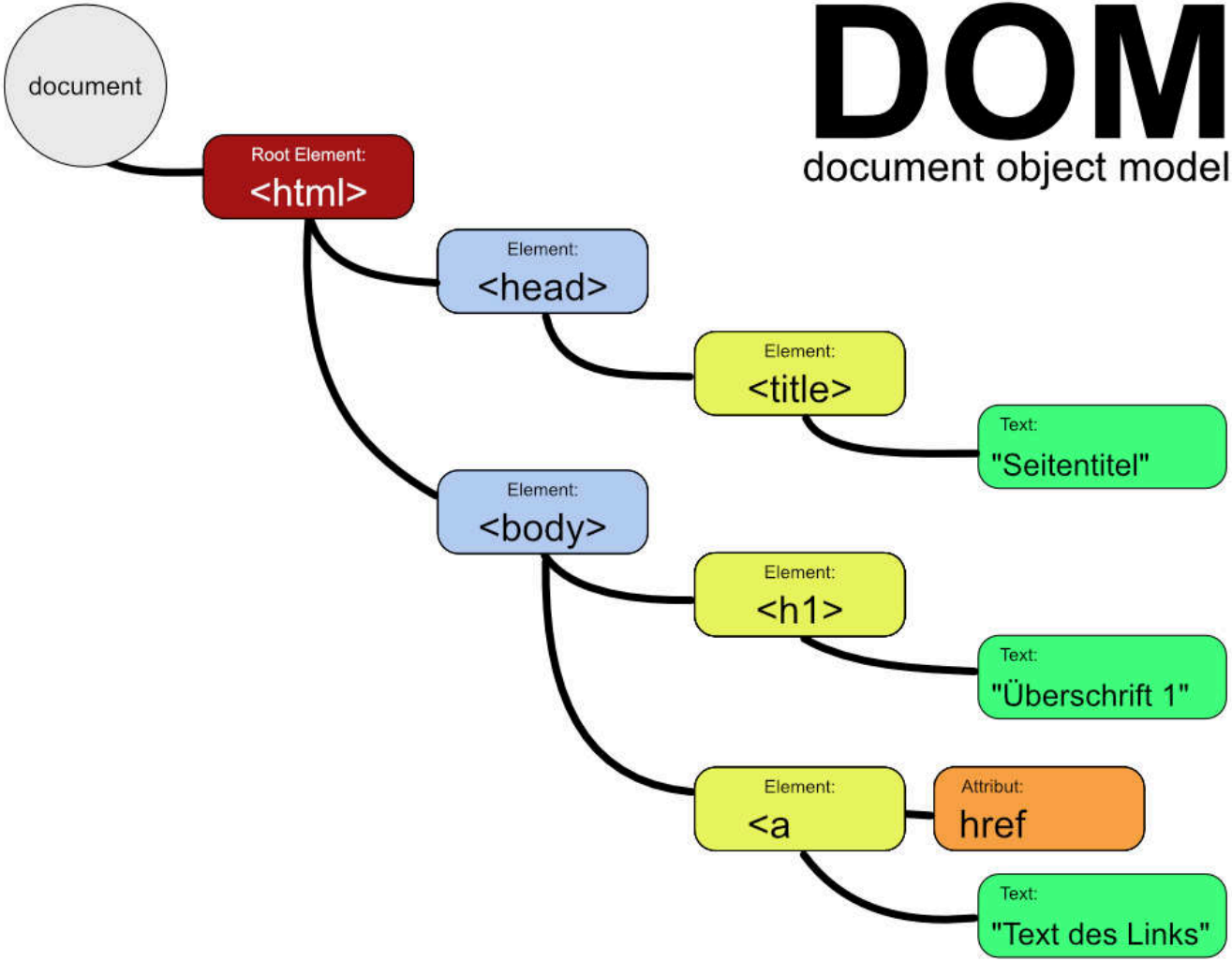
- A programming interface for HTML and XML documents
- Be independent of any particular programming language
- DOM represents an HTML or XML document in memory

Document Object Model

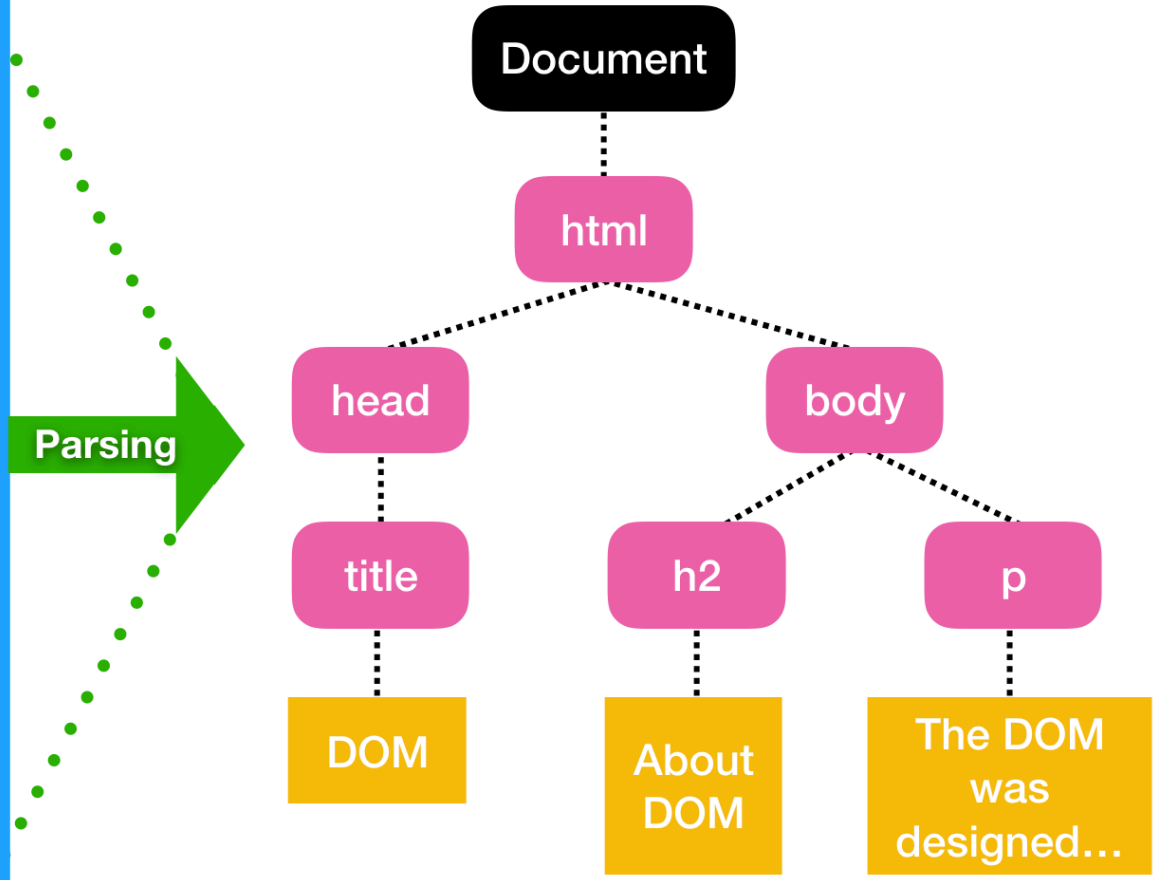
- Document
  - 這份文件
- Element
  - 文件內的各個標籤，因此像是 、<p> 等
- Text
  - 被各個標籤包起來的文字，舉例來說在 <h1>Hello CGU !!</h1>
- Attribute
  - 各個標籤內的相關屬性
  - HTML, CSS, Event

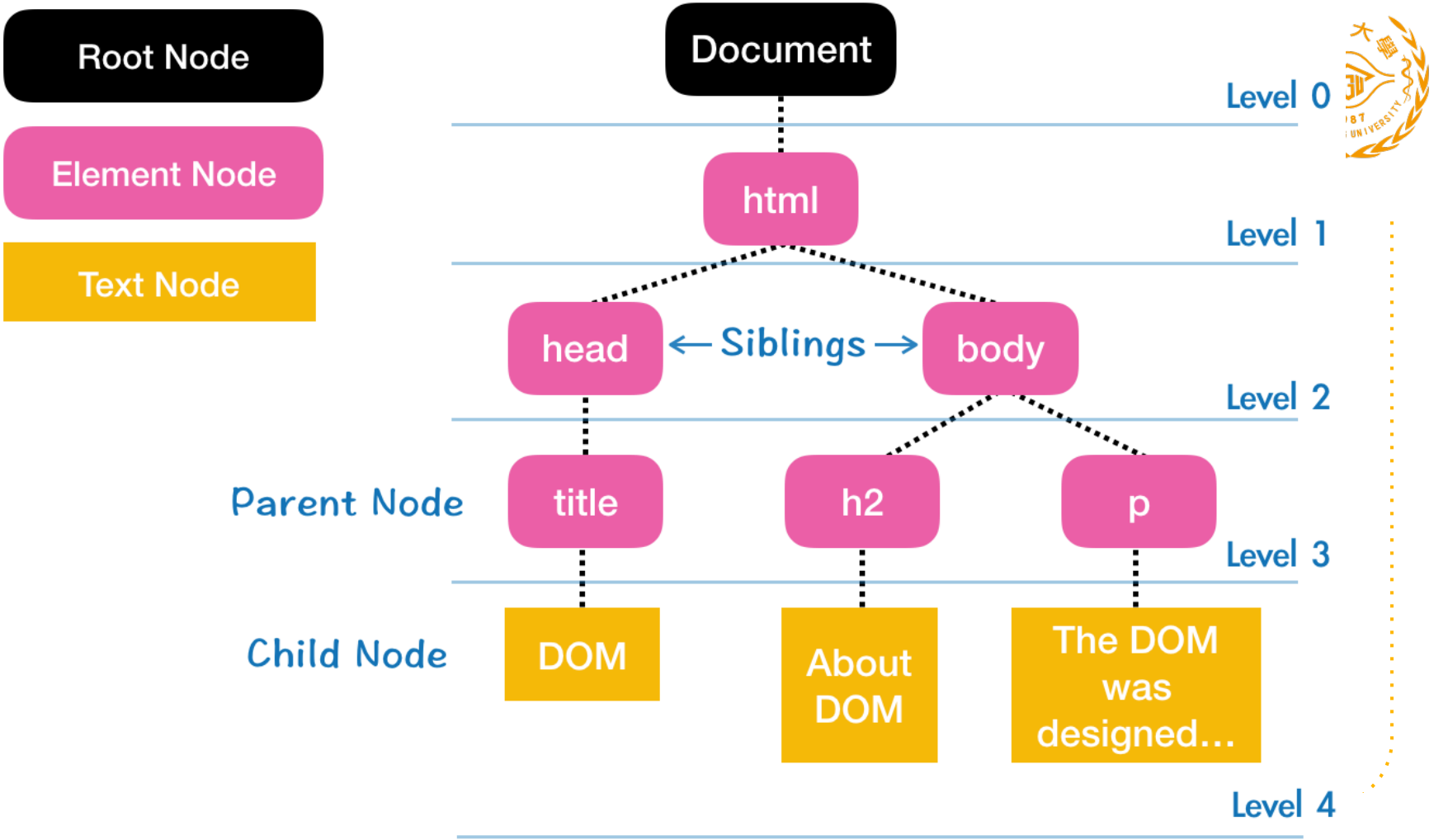
DOM

document object model



```
<!doctype html>
 <html>
   <head>
     <title>
       DOM
     </title>
   </head>
     <h2>
       About DOM
     </h2>
     <p>
       The DOM was designed…
     </p>
   <body>
   </body>
 </html>
```



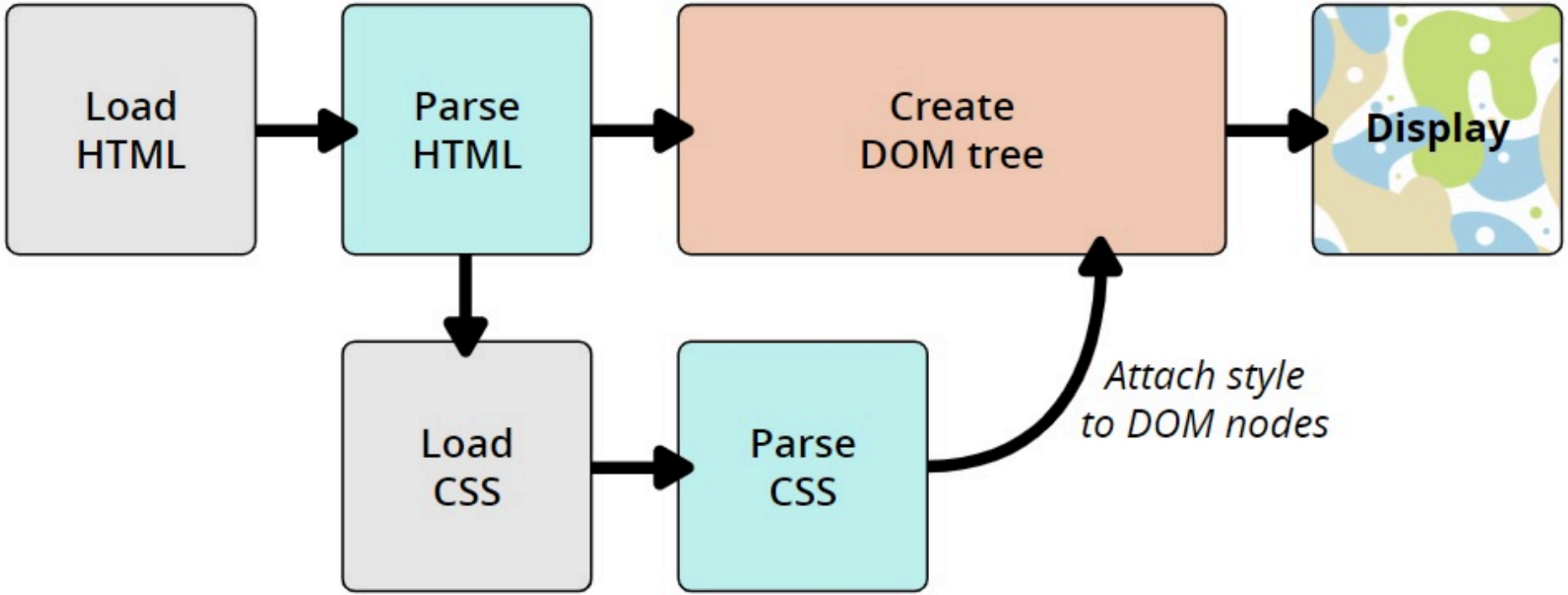

Root Node
Element Node
Text Node
Document
html
head
Siblings
body
title
h2
p
DOM
About DOM
The DOM was designed…
Parent Node
Child Node
Level 0
Level 1
Level 2
Level 3
Level 4

The DOM Tree and Nodes

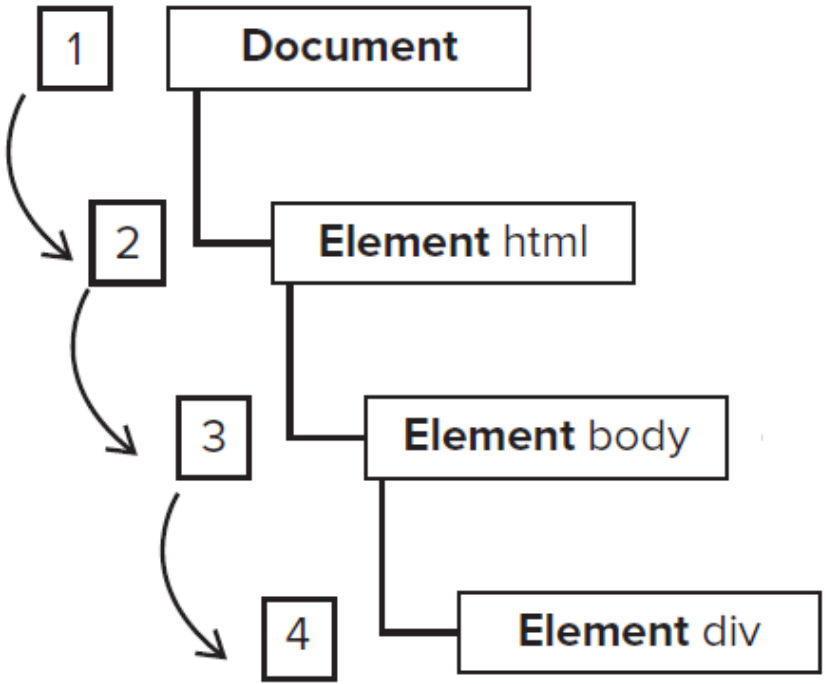
- Element nodes
- Text nodes
- Comment nodes

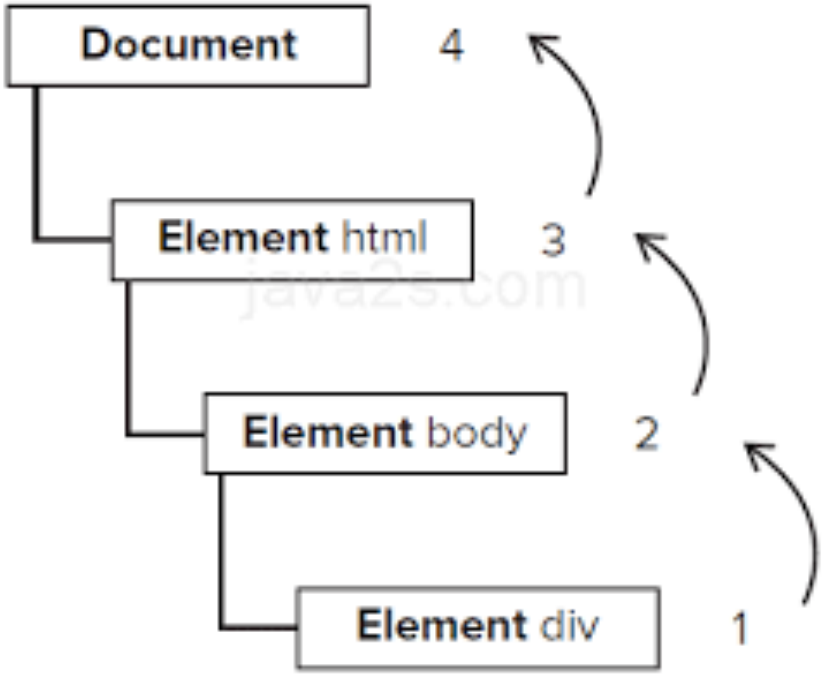
Node Type	Value	Example
`ELEMENT_NODE`	1	The `<body>` element
`TEXT_NODE`	3	Text that is not part of an element
`COMMENT_NODE`	8	`<!-- an HTML comment -->`

資料呈現和控制


Load HTML
Parse HTML
Create DOM tree
Display
Load CSS
Parse CSS
Attach style to DOM nodes

Event Propagation





Finding HTML Elements

Method	Description
document.getElementById(*id*)	Find an element by element id
document.getElementsByTagName(*name*)	Find elements by tag name
document.getElementsByClassName(*name*)	Find elements by class name
document.querySelectorAll(*CSS Selectors*)	Find elements by CSS Selectors
document.querySelector(*CSS Selector*)	Find elements by CSS Selector

Changing HTML Elements

Property	**Description**
element.innerHTML = *new html content*	Change the inner HTML of an element
element.attribute = new value	Change the attribute value of an HTML element
element.style.*property = new style*	Change the style of an HTML element
Method	**Description**
element.setAttribute*(attribute, value)*	Change the attribute value of an HTML element

Elements.Text

- **innerText** :
  - "This element has extra spacing and contains a span element."
- **innerHTML** :
  - "This element has extra spacing and contains a span element."
- **textContent** :
  - “This element has extra spacing and contains a span element."

Adding and Deleting Elements

Method	Description
document.createElement(*element*)	Create an HTML element
document.removeChild(*element*)	Remove an HTML element
document.appendChild(*element*)	Add an HTML element
document.replaceChild(*new, old*)	Replace an HTML element
document.write(*text*)	Write into the HTML output stream

An Example

HTML

```
<html>
<head>
  <title>DOM</title>
</head>
<body>
  <p id="imHere">Hello</p>
  <button onclick="changeColor('black');">black</button>
</body>
</html>
```

document.getElementById('imHere')

document.getElementsByTagName('p')

quiz#1

```
<html>
<head>
 <title>My Document</title>
 <script type="text/javascript">
 function change() {
  var header = document.getElementsByTagName("H1").item(0);
  header.innerHTML = "CSIE@CGU";

  var para = document.getElementsByTagName("P").item(0);
  para.innerHTML = "怎麼那麼棒！！.";
 }
 </script>
</head>
<body>
 <input type="button" value="Change this document." onclick="change()">
 <h1>CGU</h1>
 <p>好棒棒</p>
</body>
</head>
</html>
```

Change this document.

Change this document.

CGU

CSIE@CGU

好棒棒

怎麼那麼棒！！.

線上練習 quiz#1

https://codepen.io/pen/

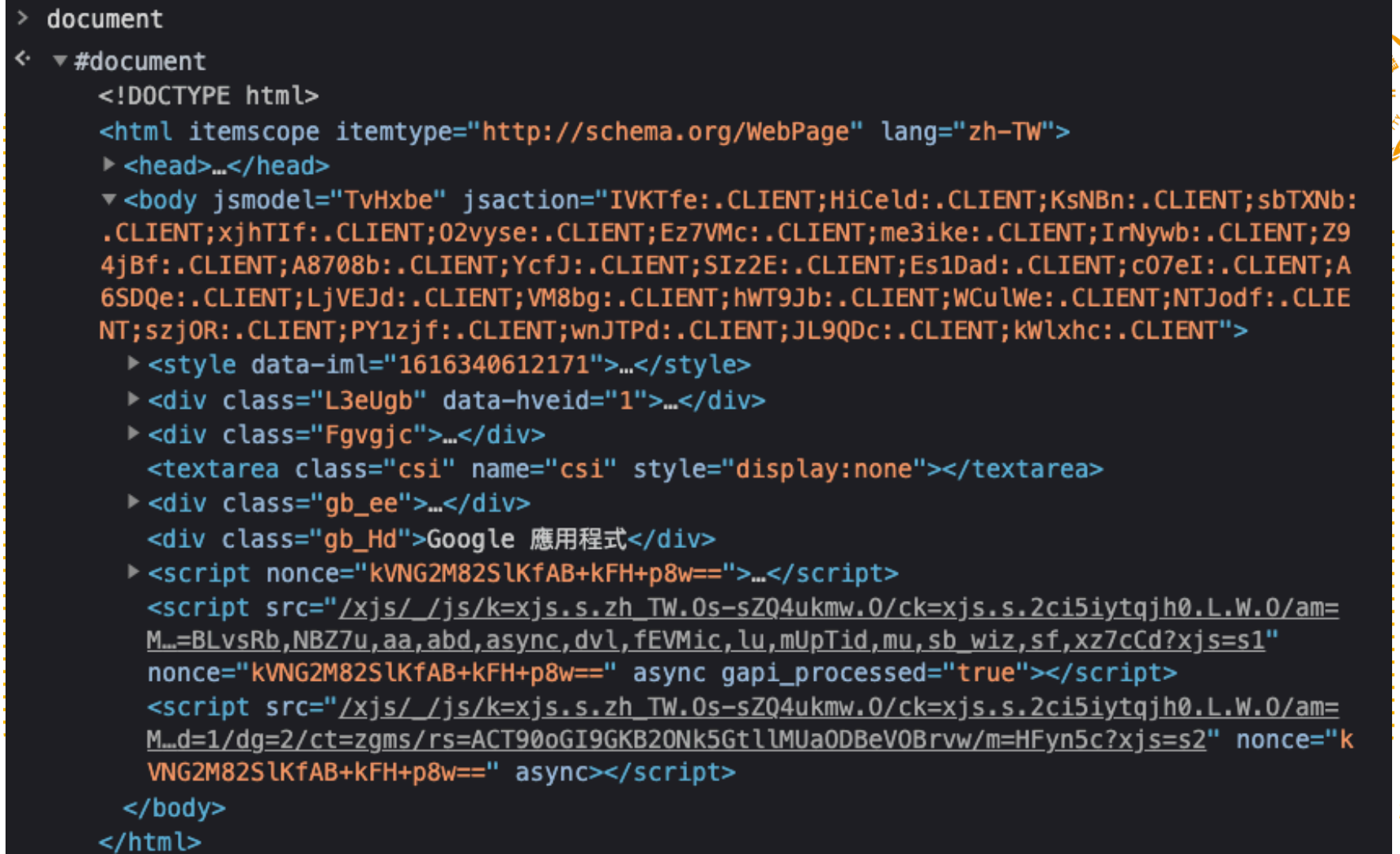
document.getElementsByTagName
改成
document.getElementById

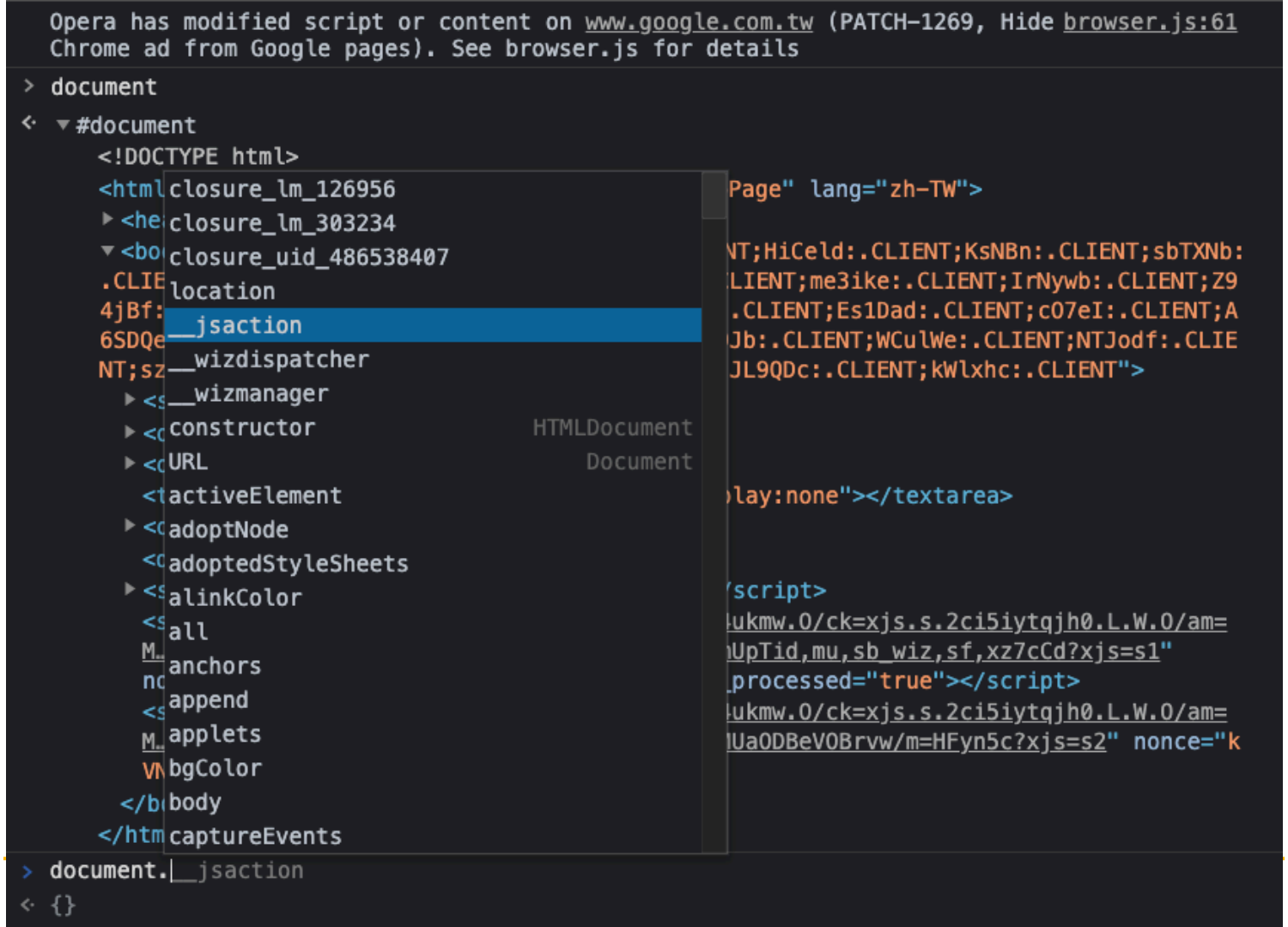
1. Create github quiz repository
2. Add **quiz1.html** and push to quiz repository

```
<html>
<head>
  <title>My Document</title>
  <script type="text/javascript">

  function change() {
    var header = document.getElementById("hid123");
    header.innerHTML = "CSIE@CGU";

    var para = document.getElementById("pid123");
    para.innerHTML = "怎麼那麼棒！！.";

  }
  </script>
</head>
<body>
  <input type="button" value="Change this document." onclick="change()">
  <h1 id="hid123">CGU</h1>
  <p id="pid123">好棒棒</p>
</body>
</head>
```

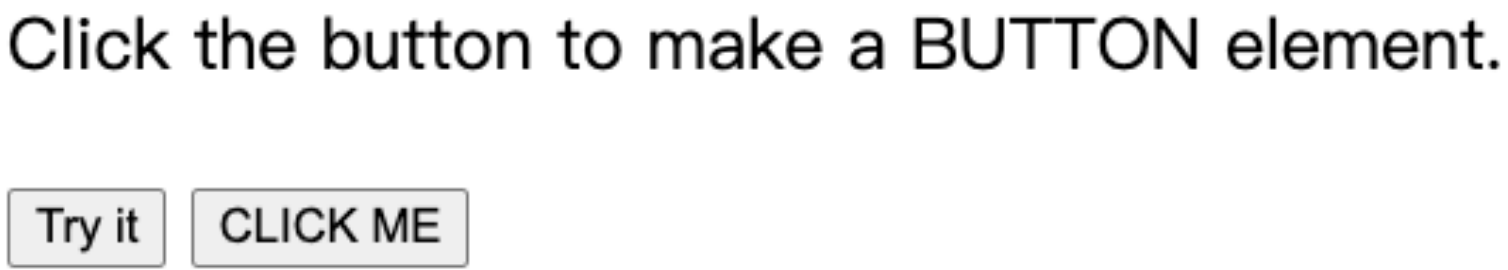
Loop through each HTML element

```
<script>
var x, i, l;
x = document.getElementsByTagName("*");
l = x.length;
for (i = 0; i < l; i++) {
  document.write(x[i].tagName + "<br>");
}
</script>
```

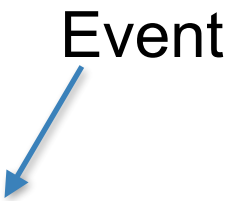

> document
#document
<!DOCTYPE html>
<html itemscope itemtype="http://schema.org/WebPage" lang="zh-TW">
<head>…</head>
<body jsmodel="TvHxbe" jsaction="IVKTfe:.CLIENT;HiCeld:.CLIENT;KsNBn:.CLIENT;sbTXNb:.CLIENT;xjhTIf:.CLIENT;O2vyse:.CLIENT;Ez7VMc:.CLIENT;me3ike:.CLIENT;IrNywb:.CLIENT;Z94jBf:.CLIENT;A8708b:.CLIENT;YcfJ:.CLIENT;SIz2E:.CLIENT;Es1Dad:.CLIENT;cO7eI:.CLIENT;A6SDQe:.CLIENT;LjVEJd:.CLIENT;VM8bg:.CLIENT;hWT9Jb:.CLIENT;WCulWe:.CLIENT;NTJodf:.CLIENT;szjOR:.CLIENT;PY1zjf:.CLIENT;wnJTPd:.CLIENT;JL9QDc:.CLIENT;kWlxhc:.CLIENT">
<style data-iml="1616340612171">…</style>
…
…
<textarea class="csi" name="csi" style="display:none"></textarea>
…
Google 應用程式
<script nonce="kVNG2M82SlKfAB+kFH+p8w==">…</script>
<script src="/xjs/_/js/k=xjs.s.zh_TW.Os-sZQ4ukmw.O/ck=xjs.s.2ci5iytqjh0.L.W.O/am=M…=BLvsRb,NBZ7u,aa,abd,async,dvl,fEVMic,lu,mUpTid,mu,sb_wiz,sf,xz7cCd?xjs=s1" nonce="kVNG2M82SlKfAB+kFH+p8w==" async gapi_processed="true"></script>
<script src="/xjs/_/js/k=xjs.s.zh_TW.Os-sZQ4ukmw.O/ck=xjs.s.2ci5iytqjh0.L.W.O/am=M…d=1/dg=2/ct=zgms/rs=ACT90oGI9GKB2ONk5GtllMUaODBeVOBrvw/m=HFyn5c?xjs=s2" nonce="kVNG2M82SlKfAB+kFH+p8w==" async></script>
</body>
</html>


Opera has modified script or content on www.google.com.tw (PATCH-1269, Hide Chrome ad from Google pages). See browser.js for details
browser.js:61
document
#document
<!DOCTYPE html>
closure_lm_126956
closure_lm_303234
closure_uid_486538407
location
__jsaction
__wizdispatcher
__wizmanager
constructor HTMLDocument
URL Document
activeElement
adoptNode
adoptedStyleSheets
alinkColor
all
anchors
append
applets
bgColor
body
captureEvents
Page" lang="zh-TW">
NT;HiCeld:.CLIENT;KsNBn:.CLIENT;sbTXNb:
LIENT;me3ike:.CLIENT;IrNywb:.CLIENT;Z9
.CLIENT;Es1Dad:.CLIENT;cO7eI:.CLIENT;A
Jb:.CLIENT;WCulWe:.CLIENT;NTJodf:.CLIE
JL9QDc:.CLIENT;kWlxhc:.CLIENT">
lay:none"></textarea>
'script>
ukmw.O/ck=xjs.s.2ci5iytqjh0.L.W.O/am=
UpTid,mu,sb_wiz,sf,xz7cCd?xjs=s1"
processed="true"></script>
ukmw.O/ck=xjs.s.2ci5iytqjh0.L.W.O/am=
UaODBeVOBrvw/m=HFyn5c?xjs=s2" nonce="k
document.__jsaction
{}

```
<!DOCTYPE html>
<html>
<body>
<p>Click the button to make a BUTTON element with text.</p>
<button onclick="myFunction()">Try it</button>
<script>
function myFunction() {
  var btn = document.createElement("BUTTON");
  btn.innerHTML = "CLICK ME";
  document.body.appendChild(btn);
}
</script>
</body>
</html>
```



DOM addEventListener() Method




```
document.getElementById("myBtn").addEventListener("click", function() {
    document.getElementById("demo").innerHTML = "Hello World";
});
```

https://www.w3schools.com/jsref/dom_obj_event.asp

addEventListener() Method with defined function

```
var x = document.getElementById("myBtn");
x.addEventListener("click", myFunction);
x.addEventListener(“click", someOtherFunction);

function myFunction() {
  alert ("Hello World!")
}

function someOtherFunction() {
  alert ("This function was also executed!")
}
```

線上練習 quiz#1.1

https://codepen.io/pen/

1. 修改 **quiz1.html**

增加一個動態button

線上練習 quiz#1.1

https://codepen.io/pen/

1. 修改 quiz#1
2. Commit **quiz1.html** to quiz#1.1

線上練習 quiz#1.2

https://codepen.io/pen/

1. 修改 **quiz1.html**
2. 新增 **quiz1**.js
3. <script src="**quiz1**.js"></script>

把 javascript 搬到 **quiz1.js**

4. **Commit quiz1.html quiz1.js to GitHub**

The Navigator Object
contains information about the browser

appCodeName	Returns the code name of the browser
appName	Returns the name of the browser
appVersion	Returns the version information of the browser
cookieEnabled	Determines whether cookies are enabled in the browser
geolocation	Returns a Geolocation object that can be used to locate the user's position
language	Returns the language of the browser
onLine	Determines whether the browser is online
platform	Returns for which platform the browser is compiled
product	Returns the engine name of the browser
userAgent	Returns the user-agent header sent by the browser to the server

The Navigator Object

```
<script>
var txt = "";
txt += "<p>Browser CodeName: " + navigator.appCodeName + "</p>";
txt += "<p>Browser Name: " + navigator.appName + "</p>";
txt += "<p>Browser Version: " + navigator.appVersion + "</p>";
txt += "<p>Cookies Enabled: " + navigator.cookieEnabled + "</p>";
txt += "<p>Browser Language: " + navigator.language + "</p>";
txt += "<p>Browser Online: " + navigator.onLine + "</p>";
txt += "<p>Platform: " + navigator.platform + "</p>";
txt += "<p>User-agent header: " + navigator.userAgent + "</p>";

document.getElementById("demo").innerHTML = txt;
</script>
```

The Navigator Object

Browser CodeName: Mozilla

Browser Name: Netscape

Browser Version: 5.0 (Macintosh; Intel Mac OS X 10_14_6) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/89.0.4389.72 Safari/537.36 OPR/75.0.3969.50 (Edition beta)

Cookies Enabled: true

Browser Language: zh-TW

Browser Online: true

Platform: MacIntel

User-agent header: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_6) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/89.0.4389.72 Safari/537.36 OPR/75.0.3969.50 (Edition beta)

Screen Object
contains information about the visitor's screen

availHeight	Returns the height of the screen (excluding the Windows Taskbar)
availWidth	Returns the width of the screen (excluding the Windows Taskbar)
colorDepth	Returns the bit depth of the color palette for displaying images
height	Returns the total height of the screen
pixelDepth	Returns the color resolution (in bits per pixel) of the screen
width	Returns the total width of the screen

The Screen Object

```
<script>
var txt = "";
txt += "<p>Total width/height: " + screen.width + "*" + screen.height + "</p>";
txt += "<p>Available width/height: " + screen.availWidth + "*" +
screen.availHeight + "</p>";
txt += "<p>Color depth: " + screen.colorDepth + "</p>";
txt += "<p>Color resolution: " + screen.pixelDepth + "</p>";

document.getElementById("demo").innerHTML = txt;
</script>
```

The Screen Object

Your Screen:

Total width/height: 1920*1080

Available width/height:
1920*1057

Color depth: 24

Color resolution: 24

用來偵測RWD的範圍

DOM Style Object

availHeight	Returns the height of the screen (excluding the Windows Taskbar)
availWidth	Returns the width of the screen (excluding the Windows Taskbar)
colorDepth	Returns the bit depth of the color palette for displaying images
height	Returns the total height of the screen
pixelDepth	Returns the color resolution (in bits per pixel) of the screen
width	Returns the total width of the screen

DOM Style Object

```
<script>
function myFunction() {
  var x = document.createElement("STYLE");
  var t = document.createTextNode("body {font: 20px verdana;}");
  x.appendChild(t);
  document.head.appendChild(x);
}
</script>
```

DOM Events Object

allow JavaScript to register different event handlers on elements in an HTML document

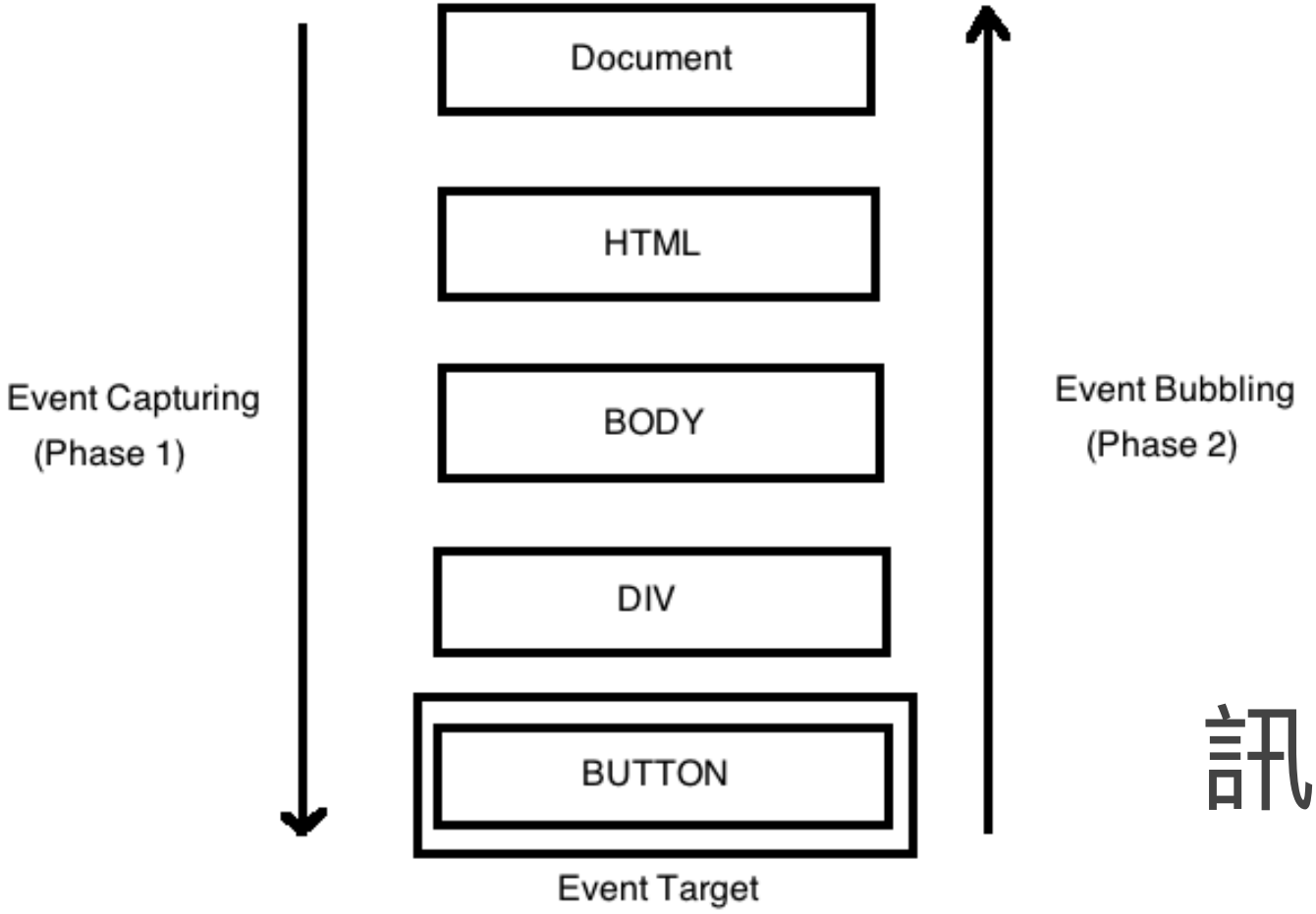
- event can be something the browser does
- Or something a user does
- Some examples of HTML events
  - An HTML web page has finished loading
  - An HTML input field was changed
  - An HTML button was clicked

Common HTML Events

onchange	An HTML element has been changed
onclick	The user clicks an HTML element
onmouseover	The user moves the mouse over an HTML element
onmouseout	The user moves the mouse away from an HTML element
onkeydown	The user pushes a keyboard key
onload	The browser has finished loading the page

Event Propagation

- addEventListener ()
  - event
  - handler
  - boolean value
    - True, capture
    - False, bubbling
- stopPropagation()


Document
HTML
BODY
DIV
BUTTON
Event Target
Event Capturing
(Phase 1)
Event Bubbling
(Phase 2)

訊息控制

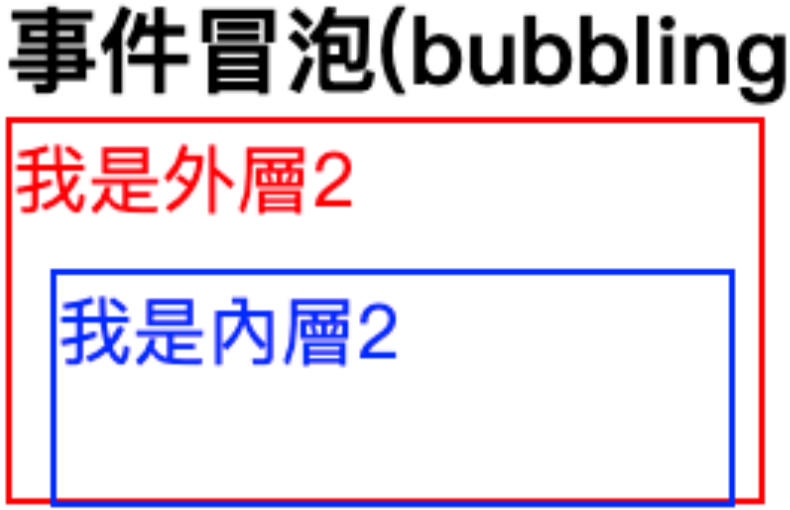
訊息控制 capturing

Click event 會先被
“**我是外層**” 抓到
然後在傳遞到
“**我是內層**”

訊息控制 bubbling

Click event 會先被
“**我是內層**” 抓到
然後在傳遞到
“**我是外層**”

訊息控制 bubbling



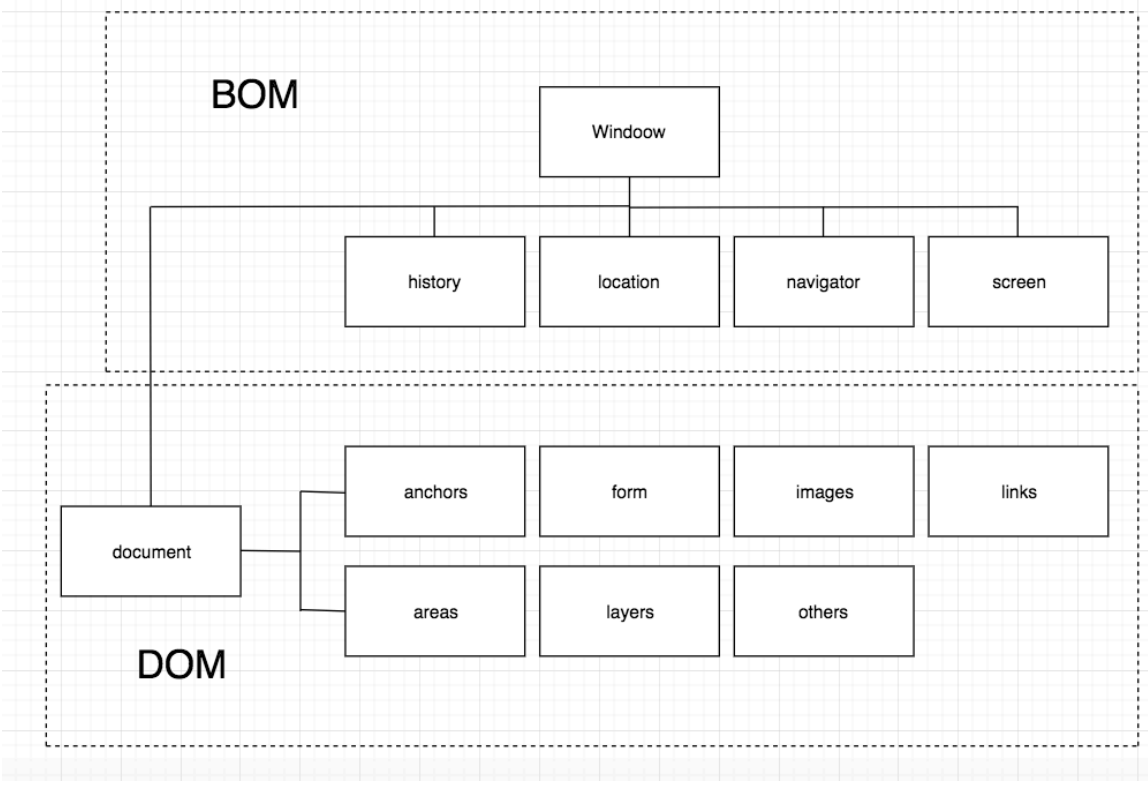
Click event 會先被
“**我是內層**” 抓到

然後在傳遞到

- stopPropagation

~~“**我是外層**”~~

Browser Object Model



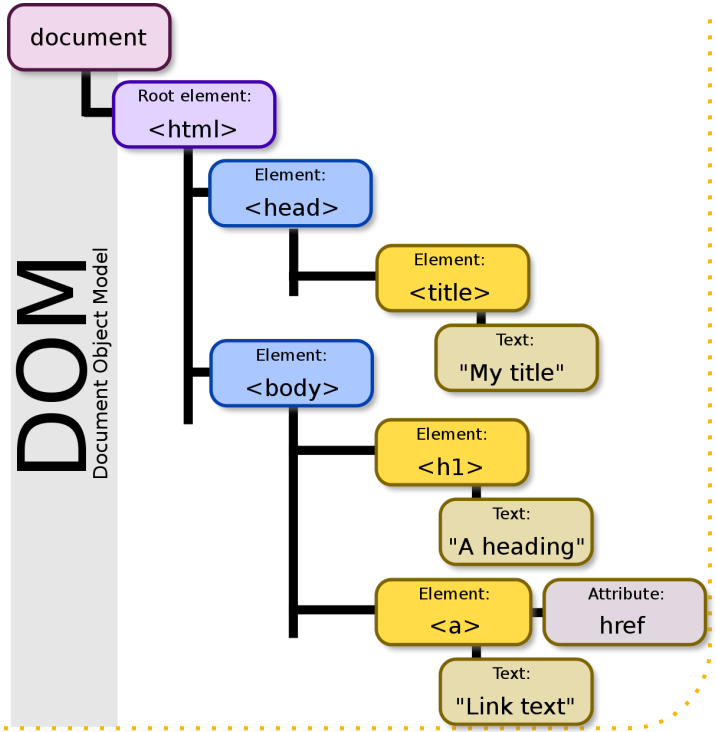
經過瀏覽器大戰後
一起納入了
HTML5 的標準

Document Object Model 應用

- internet of things (IOT)
  - 房子
    - 前窗戶
      - 窗簾
      - 窗戶
        - 打開, 關閉
    - 後窗戶
    - 前門
    - 後門

Conclusion

- Introduction
- DOM Programming Interface
- DOM Document Object
- DOM Navigation
- DOM Events
- DOM EventListener
- DOM HTML & CSS
- BOM



Thanks!

Open for any questions

CJ Wu

cjwu@mail.cgu.edu.tw

線上練習 quiz#2

https://codepen.io/pen/

1.打字機 1.0

鍵盤打什麼 就出現什麼！！

document.addEventListener('**keydown**',

線上練習 quiz#2

https://codepen.io/pen/

1. Commit **quiz2.html, quiz2.js** to quiz and push to quiz repository