JavaScript & DOM

Using HTML Script Tag

```
<script>
Script code here
</script>
```

Use to tell the browser the beginning and ending point of scripting language in HTML Doc.

```
<script type="text/javascript">
JavaScript code here
</script>
```

```
<script type="text/javascript" src="yourfile.js">
</script>
```

<script> location

- Any number of <script> are allowed in the HTML document
- <script> can be placed in <head> or <body> or both
- Trick: placing scripts at the bottom of <body> improves speed of page rendering

External JavaScript

- In the external JavaScript file cannot contain <script>
- Advantages:
  - HTML and JavaScript are separated physically
  - Easier to maintain
  - Proxy server or browser caches can store frequently used JS file - speed up page loading

Variables

- Declaring variables: *var,let* keyword
- Variables are case sensitive
- Avoid using reserved as variables name
- The variable values (or type) can include number, string, Boolean and null
- JavaScripte allows virtually any value to be assigned to any variable
- Special characters can be used in string type variables (ex. \t, \n, \\, \", \')

Variables

- Examples

```
var web;
var str="web technology";
var str1='web technology';
let x=120;
var code=true;
var t=null;

y=200.5;
```

var VS let

	var	let
Declaring variable	Y	Y
Declare many var in 1 statement (separate by comma)	Y	Y
Re-declare var.	Y	N
Block scope	N	Y
Use var. before it is declared	Y	N

Hoisting Behavior

- Hoisting is the behavior of moving all declarations to the top of the current scope
  - All variables in the scope can be used right from the start of the scope (before the declaration of variables)
  - Only variables declared with var keyword
- Keyword 'let' also has this behavior
  - But that var. cannot be used before its declaring point
  - Temporal dead zone

Functions

- Declaring function

```
function functionname()
{
    code
}
```

- Function names are case sensitive
- The function name must begin with a letter or underscore and cannot contain any space

Functions

- Functions can have one or more parameters

```
function func1(var1, var2)
{  document.write("var1="+var1+", var2="+var2); }
```

Nameless function

- Sometimes called anonymous function
- Function without name
  - Ex: (function() { ... });
- Usage:
  - Immediately invoked function
    - <button onclick="(function() { alert('Hello World'); }) ();">Click</button>
  - Using anonymous functions as arguments
  - Assign the function to var. for calling later
    - let test = function() { alert("Hello World"); }; test();
- Arrow function is a shorthand for declaring anonymous function
  - let test = () => alert("Hello World");

Operators

- Mathematical Operators
  - +, -, *, /, %, ++, --
- Assignment Operators
  - =, +=, -=, *=, /=, %=
- Comparison Operators
  - ==, !=, >, <, >=, <=, ===, !==
- Logical Operators
  - &&, ||, !, &, |, ^, >>, >>>, <<
  - >> preserved the sign bit while >>> doesn't

Conditional Statements

- if/else

```
If (condition) {
    javascript statement
}
else {
    javascript statement
}
```

Conditional Statements

- switch

```
switch(varname) {
    case "X":
            javascript statement;
            break;
    case "Y":
            javascript statement;
            break;
    default:
            javascript statement; }
```

Loops

- for
- while
- do ... while

Event Handlers

- Event is something that happens when viewer of the page perform some actions such as clicking a mouse button
- Event Handlers can be used to identify the occurring event and then perform a task or a set of task
- With Event Handler, the page can react to the action of the viewer

Event Handler

- Using event handler in an HTML element

<input type="button" value="Click Me!" onclick="*JavaScript code here*" />

Example

```
<body>
<form>
<input type="button" value="Click Me!"
onclick="window.alert('Hi!');window.alert('Bye!');" />
</form>
</body>
```

Js_event_01.js

```
function hi_and_bye() {
window.alert('Hi!');
window.alert('Bye!');
}
```

```
<body>
<form>
<input type="button" value="Click Me!" onclick="hi_and_bye();"
/>
</form>
<script type="text/javascript" src="js_event_01.js"></script>
</body>
```

Js_event_01.js

```
function hi_and_bye() {
window.alert('Hi!');
window.alert('Bye!');
}
var hi_button = document.getElementById("say_hi");
hi_button.onclick = hi_and_bye;
```

```
<body>
<form>
<input type="button" value="Click Me!" id="say_hi" />
</form>
<script type="text/javascript" src="js_event_01.js"></script>
</body>
```

Event Handlers

- The blur event: onblur

Example

```
<form>
<input type="text" onblur="window.alert('Hey! Come back!');"
/><br />
<input type="text" />
</form>
```

Event Handlers

- The click event: onclick

Example

```
<body>
<form>
<input type="button" value="Do not Click Here"
onclick="window.alert('I told you not to click me!');">
</form>
</body>
```

Event Handlers

- The click event: onclick

Example

```
<body>
<a href="http://www.kmitl.ac.th"
onclick="return false;">Click me</a>
</body>
```

Event Handlers

- The focus event: onfocus

Example

```
<form>
Enter Your Name:
<input type="text" onfocus="window.alert('Don\'t forget to capitalize!');" />
</form>
```

Event Handlers

- The mouse over event: onmouseover

Example

```
<a href="http://www.kmitl.ac.th"
onmouseover="window.alert('mouse over');">
Try Clicking Me!</a>
```

Event Handlers

- The submit event: onsubmit

Example

```
<form onsubmit="window.alert('Thank You');">
What's your name?<br />
<input type="text" id="thename" /><br />
<input type="submit" value="Submit Form">
</form>
```

DOM

- DOM: Document Object Model
- DOM represents a document as a family tree

What is DOM?

- A programming interface for HTML or XML
- DOM represents the document as nodes and objects
  - Nodes and objects can be created or changed or removed
- 3 different parts
  - Core DOM
  - XML DOM
  - HTML DOM

The Levels of DOM

- Level 0: Supports an interface DOM and refers to what existed before the standard
- Level 1: allows Navigation of DOM, content manipulation
- Level 2: Support namespace, filtered views and event
- Level 3: has many specifications:
  - Core
  - Load and Save
  - XPath
  - Views and formatting
  - Requirements
  - Validation

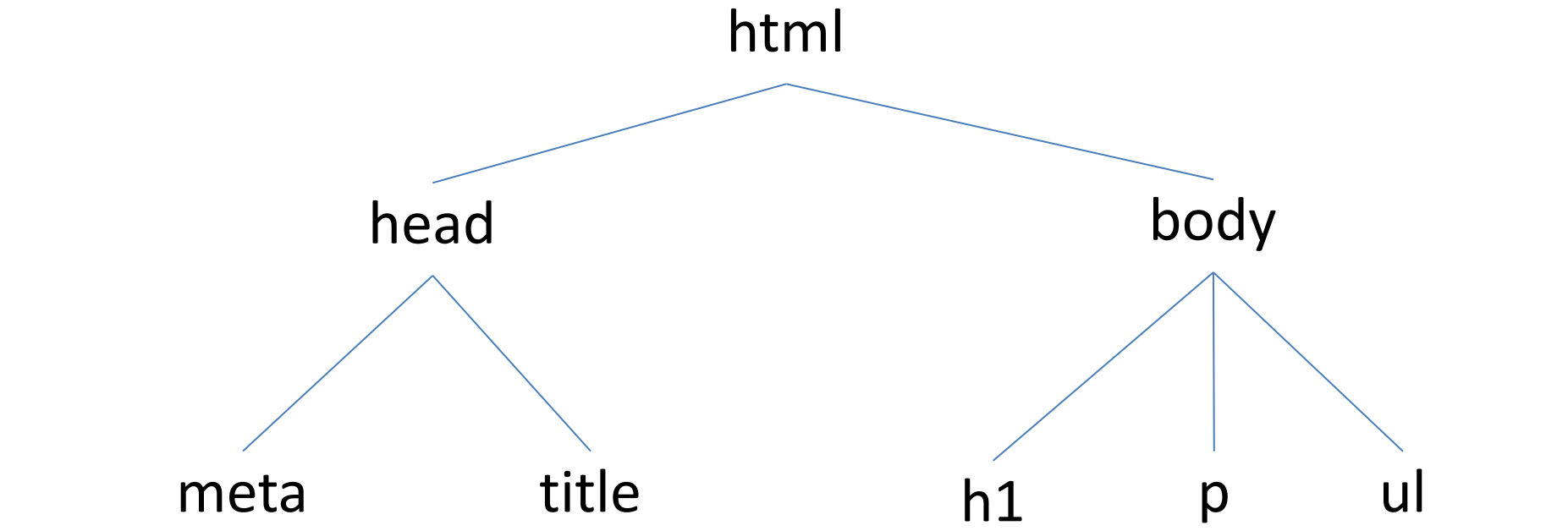
(further reading: https://www.c-sharpcorner.com/UploadFile/79037b/let%E2%80%99s-understand-the-levels-of-dom-document-object-model/)

Fundamental Data Types

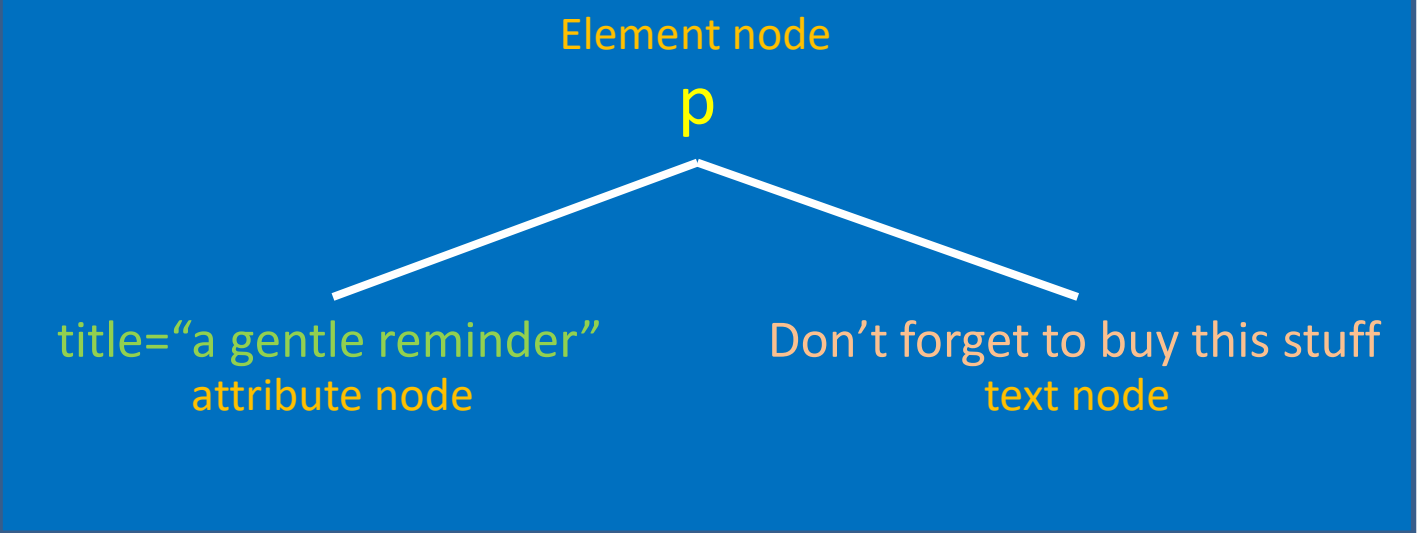
- Document
  - Represent web page
- Node : basic object within document
  - Element : type of node
    - NodeList : Array of elements
  - Attribute : type of node
  - Text
  - Comment
  - etc.

Example

```
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en">
<head>
    <meta http-equiv="content-type" content="text/html;
charset=utf-8" />
    <title>Shopping list</title>
</head>
<body>
    <h1>What to buy</h1>
    <p title="a gentle reminder">Don't forget to buy this stuff.</p>
    <ul id="purchases">
        <li>A tin of beans</li>
        <li>Cheese</li>
        <li>Milk</li>
    </ul>
</body>
```



Don’t forget to buy this stuff.



DOM accessing

- As of now, every web browser uses DOM as a gateway to the document for scripting language (e.g. JavaScript)

Working with Document Object

- Properties of Document Object
  - Image property
  - Form property
- Method of Document Object
  - getElementById
  - getElementsByClassName
  - getElementsByTagName

The getElementById() method

- Allow access to an element by the value of its id attribute

Example

```
<div id="some_text">This is some text.</div>
```

```
var text_element =
        document.getElementById("some_text");
```

The getElementsByClassName() method
The getElementsByTagName() method

- Get an array filled with all the elements in the document that have specified class/tag name

Document node creation

```
<body>
<div id="div1" title="All about me!">
This page is about me, me, and... me!
</div>
</body>
```

```
var me_div = document.getElementById("div1");
var inner_div = document.createElement("div"); <div></div>
var inner_div_text = document.createTextNode("More...");
inner_div.appendChild(inner_div_text);<div>More...</div>
me_div.appendChild(inner_div);
```

Result

<body>

This page is about me, me, and... me!

More...

</body>

getAttribute() method

- Get the values of attribute of an element

Example

```
<img id="i1" src="images/pr.gif" alt="my image" />
```

```
var i_id = document.getElementById("i1");
var i_src = i_id.getAttribute("src");
```

setAttribute() method

- Set the values of attribute of an element

Example

```
<img id="i1" src="images/pr.gif" alt="my image" />
```

```
var i_id = document.getElementById("i1");
i_id.setAttribute("src", "images/xx.jpg");
```

Js_event_01.js

```
function test(v) {
window.alert(v.getAttribute("type"));
}
```

```
<body>
<form>
<input type="button" value="Click Me!" onclick="test(this);"
/>
</form>
<script type="text/javascript" src="js_event_01.js"></script>
</body>
```

Events

- Normally used in combination with functions
- Examples of DOM event:
  - abort: loading of a media is aborted
  - blur: element loses focus
  - change: content of element has changed
  - click: mouse clicks on element
  - focus: element gets focus
  - etc.

(further reading: https://www.w3schools.com/jsref/dom_obj_event.asp)

Example

```
<div>
    <button onclick="this.innerHTML='OK!'">
    Click here</button>
</div>
```

Navigator Object

- Contains information about the browser
- Examples:
  - appName: name of the browser
  - appVersion: version of the browser
  - cookieEnabled: cookies are enabled or not
  - etc.

(further reading: https://www.w3schools.com/jsref/obj_screen.asp
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