Chapter 2

jQuery

CT313H – WEB TECHNOLOGIES

Objectives

To introduce jQuery and
use jQuery in user and web application interaction

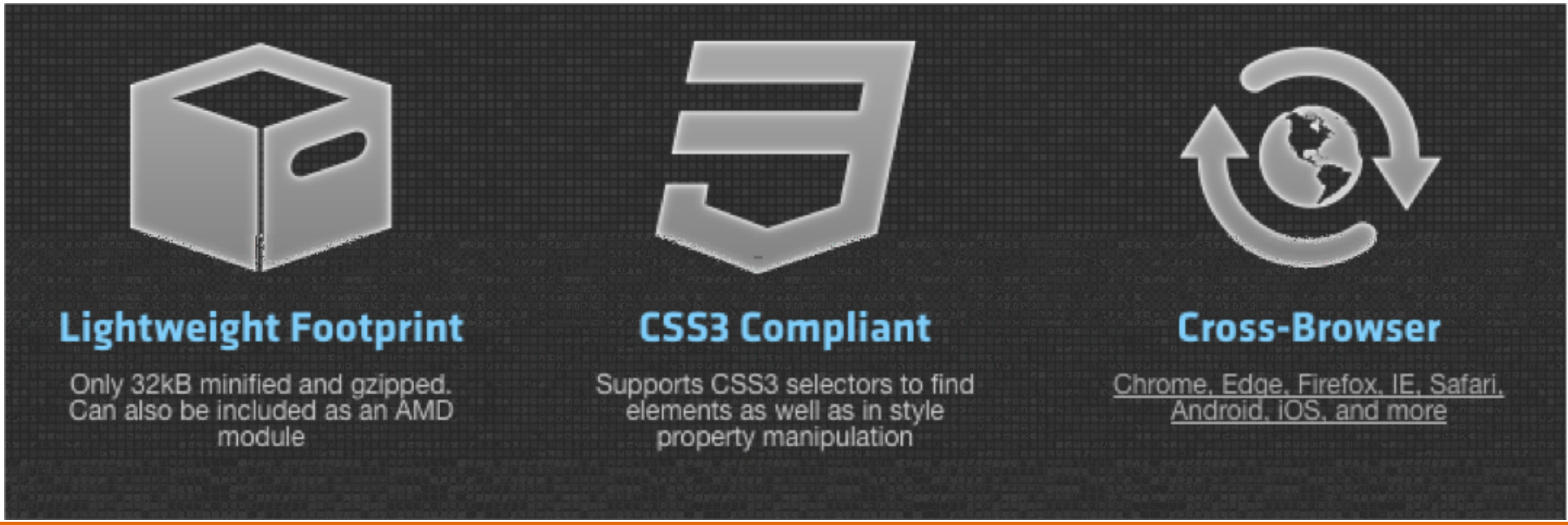
Content

- jQuery introduction
- DOM selection
- DOM element manipulation
- Event processing
- Effects
- AJAX with jQuery
- jQuery plugins

jQuery Introduction

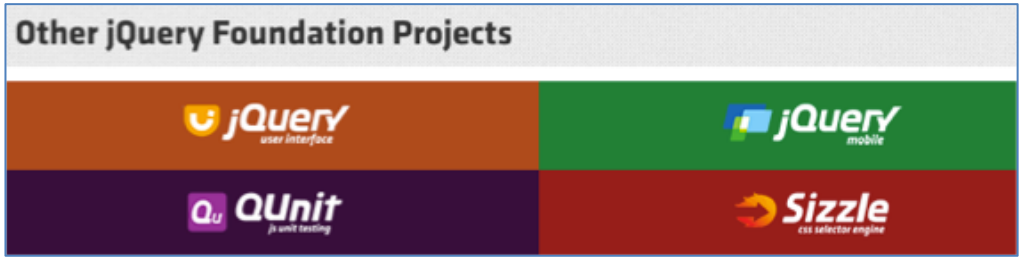
What is jQuery?

- Fast, small, feature-rich JS library
- It makes HTML document traversal, manipulation, event-handling, animation and Ajax much simpler ever



Why jQuery?

- Simple and easy-to-use
- Free and open source
- Cross-browser
- Versatibility
- Extensibility (through plugins)
- Big community ⇒ good support



Who are using jQuery?

How to use jQuery?

1. Offline: download jQuery library
   - Access: https://jquery.com
   - Download the newest version of jQuery
   - Unzip the jQUery library
     - `*.min.js`: used in deployment phase
     - `*.js`: used in development phase
   - Create reference to jQuery library:

```
<head>
  <title>My jQuery page</title>
  <script type="text/javascript"
          src="<path/>jquery-1.x.x-min.js"></script>
  <!– other scripts -->
</head>
```

How to use jQuery?

2. Online: use CDN (Content Deliverv Nertwork)

```
<head>
  <title>My jQuery page</title>
  <script type="text/javascript"
          src="https://ajax.googleapis.com/ajax/libs/jquery/1.12.4/jquery.min.js">
  </script>
  <!-- other scripts -->
</head>
```

- Microsoft CDN: https://ajax.aspnetcdn.com/ajax/jQuery/jquery-3.2.1.min.js

Basic syntax

- A jQuery statement:
  1. Selects HTML elements in the webpage
  2. Operate on the selected elements
- Syntax: **`$(selector).action()`**
  - **`$`**: indicates using jQuery functions (or `jQuery()` function)
  - **`selector`**: selects HTML elements to operate (CSS)
  - **`action()`**: action that will be perform on the selected elements
- Example:
  - `$("p").hide()`: hides all <p> elements

Check for document readiness

- HTML elements must be created before jQuery selects and accesses them
- jQuery allows to register a callback function that will be called after the document is ready:

```
$(document).ready(function() {
    // jQuery methods go here…
});
```

Shorthand syntax:

```
$(function() {
    // jQuery methods go here…
});
```

jQuery Selectors

jQuery Selectors

- Used to select HTML elements to process
- Support all CSS selectors
- Syntax: **`$(selector)`**
- Returned result: a jQuery object
  - Represents for 0 to many elements selected in the page
  - The `length` property is used to identify number of elements
  - Example:

```
$('div').length
```

returns the number of tags in the webpage

jQuery Selectors

1. Element selector
2. ID selector
3. Class selector
4. Attribute selector
5. Descendent selector
6. Combine selector
7. Form related selectors
8. Selector based on position
9. Others

Element Selector

- Syntax: **$('<HTML tag name>')**
- Select all HTML elements identified by the selector
- Example:
  - `$('p')`: selects all <p> tags in the webpage
  - `$('div')`: selects all tag in the webpage
  - `$('*')`: selects all elements in the webpage
  - `$(this)`: selects <html> tag

ID Selector and Class Selector

- ID selector:
  - Selects 1 element by id
  - Syntax: **`$('#<id>')`**
- Class selector:
  - Select all elements belong to the given class
  - Syntax: **`$('.<class>')`**
- Example:
  - `$('#header')`: select the element with the id is header
  - `$('.test')`: selects all elements belong to class `test`

Attribute Selector

- Select HTML elements with a desired attributes

Syntax	Selected elements
[attribute]	Have the attribute
[attribute="avalue"]	Have the attribute with the desired avalue
[attribute~="avalue"]	Have the attribute containing the word avalue
[attribute*="avalue"]	Have the attribute containing avalue
[attribute^="avalue"]	Have the attribute beginning with avalue
[attribute$="avalue"]	Have the attribute ending with avalue
HTML-tag[attribute-selector]	HTML elements HTML-tag with the attribute selected by the attribute-selector

More ref.: *https://www.w3schools.com/cssref/css_selectors.asp*

Attribute Selector

- Example:
  - `$(["href"])`: selects all elements that have `href` attribute
  - `$(["href*='xxx'"])`: selects all element whose `href` attribute contains 'xxx'
  - `$("a[href]")`: selects all <a> elements that have `href` atribute
  - `$("input[type='text'"])`: selectes all <input> elements whose `href` attribute value is "text"

Descendent selector

- Syntax: ances-selector desc-selector
- Selects all elements that are descendants of a given ancestor
- Note: use symbol > instead of space to select direct descendents
- Example:
  - `$("ul em")`: selects all elements inside <ul> elements
  - `$("ul>b")`: selects all <b> elements that are direct chidlrens of <ul> elements

Combine selectors and Nested selectors

- Selectors can be combined, for example:
  - `$("p.intro")`: selects <p> elements that are belongs to class intro
  - `$("a[href]")`: selects all <a> elements that have href attribute
- Selectors can also be nested:
  - `$("div#header p em.required")`: selects an element that belongs to class required and is a decendant of a element with the id is “header”
- Selector exercise: *https://testmozusercontent.com/38107/student*

Selectors for Form

- `$(":button")`
- `$(":checkbox")`
- `$(":file")`
- `$(":image")`
- `$(":password")`
- `$(":submit")`
- …

⇒ Selects all **<input>** with the expected type

Position-based selectors

- Select elements based on their position inside the DOM model:
  - `$(".article:eq(2)")`: selects the 3rd element in class article
  - `$(".article.gt(1)")`: selects the elements of class article whose index is greater than 1
  - `$(".article.lt(3)")`: selects 3 first elements of class article
  - `$(".article:first")`: selects the 1st element of class article
  - Some other position-based selectors:
    `::after, ::before, :first-child, ::first-letter, ::first-line, :last-child, :nth-child(n),...`

Other selectors

Example	Selected elements
`$('p:contains("Bootstrap")')`	<p> tags that contain “Bootstrap”
`$('div:has("h2")')`	tags that contain atleast 1 <h2> element
`$('option:not(:selected)')`	<option> tags that don’t have seleted attribute
`$('p:hidden')`	<p> tags that are hidden

- `:active, :checked, :disabled, empty, :enabled, :focus, :hover, :invalid, :not(selector), :has(element), :visited, :valid, :required, :`

JQuery traversing methods

- Used to iterate DOM elements in returned by a jQuery selector
- Some related methods:
  - `$('span').parent()`: selects the direct parent of
  - `$('.article').children('p')`: selects all <p> elements that are the direct children of elements whose class is article
  - `$('.article').find('p')`: selects all <p> elements that are the children of <p> tags belonging to class article
  - `$('.article).sibling('p')`: selects all <p> tags that are siblings of the elements belonging to class article

Filter methods

- Used to filter elements returned by a jQuery selector:
  - `$('#content h2'`

DOM Element Manipulation

Create DOM element

- Syntax:

```
var <var-name> = $(<element definition>)
```

- Example:

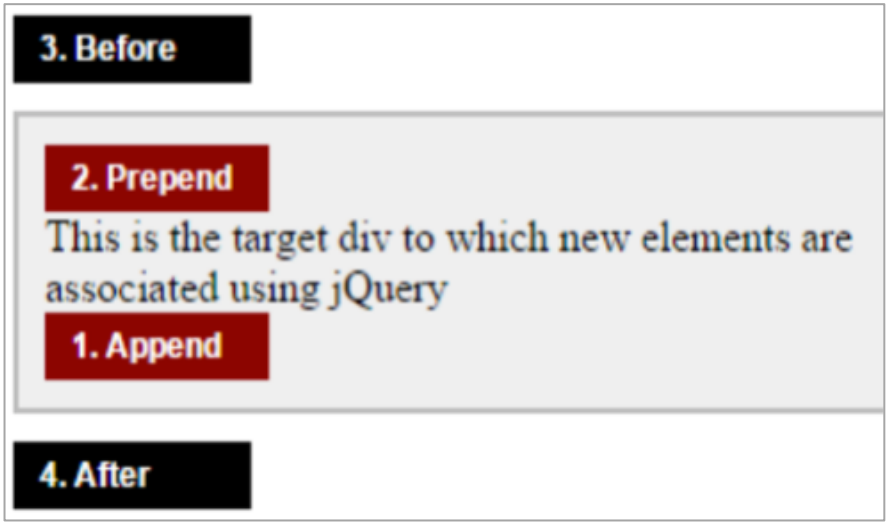
```
var menuli1 = $('<li class="menu-li1">Italian Food</li>');
```

or

```
var menuli1 = $('<li/>', {
        'class': 'menu-li1',
        'text':  'Italian Food'
});
```

Insert elements

- An element can be inserted in the following orders (sibling):
  - Before an existing element: `insertBefore(), before()`
  - After an existing element: `insertAfter(), after()`
- An element can also be inserted inside an existing element (children):
  - `appendTo()`, `append()`
    Append at the end
  - `prependTo()`, `prepend()`
    Append at the beginning



Insert elements

```
<ul>
  <li class="menu-li1">French Food</li>
  <ul class="menu-ul1">
    <li class="menu-li2"><a href="#">Link1</a></li>
    <li class="menu-li2"><a href="#">Link2</a></li>
    <li class="menu-li2"><a href="#">Link3</a></li>
  </ul>
  <li class="menu-li1">American Food</li>
  <ul class="menu-ul1">
    <li class="menu-li2"><a href="#">Link1</a></li>
    <li class="menu-li2"><a href="#">Link2</a></li>
    <li class="menu-li2"><a href="#">Link3</a></li>
  </ul>
</ul>
```

Insert before (sibling)

- Insert an item before the item “French Food”:
  - insertBefore():

```
var menuli1 = $('<li class="menu-li1">Italian Food</li>');
menuli1.insertBefore('.menu-li1:first');
```

  - before():

```
var menuli1 = $('<li class="menu-li1">Italian Food</li>');
$('.menu-li1:first').before(menuli1);
```

or:

```
$('.menu-li1:first').before(
                    '<li class="menu-li1">Italian Food</li>');
```

Insert after (sibling)

- Insert an item after the last item in the menu:
  - **insertAfter()**:

```
var menuli1 = $('<li class="menu-li1">Italian Food</li>');
menuli1.insertAfter('.menu-ul1:last');
```

  - **after()**:

```
var menuli1 = $('<li class="menu-li1">Italian Food</li>');
$('.menu-ul1:last').after(menuli1);
```

or:

```
$('.menu-ul1:last').after(
                    '<li class="menu-li1">Italian Food</li>');
```

Append at the end (children)

- Append an item after the last menu item (Link 3 - American):

```
var menuli2 = $('<li class="menu-li2">
                    <a href="#">Link4</a></li>');

menuli2.appendTo('.menu-ul1:last’);
```

or:

```
$('.menu-ul1:last').append(menuli2);
```

Shorthand:

```
$('.menu-ul1:last').append(
   '<li class="menu-li2"><a href="#">Link4</a></li>');
```

Append at the beginning (children)

- Add an item before the first existing item (Link 1 - French):

```
var menuli2 = $('<li class="menu-li2">
                    <a href="#">Link0</a></li>');

menuli2.prependTo('.menu-ul1:first');
```

or:

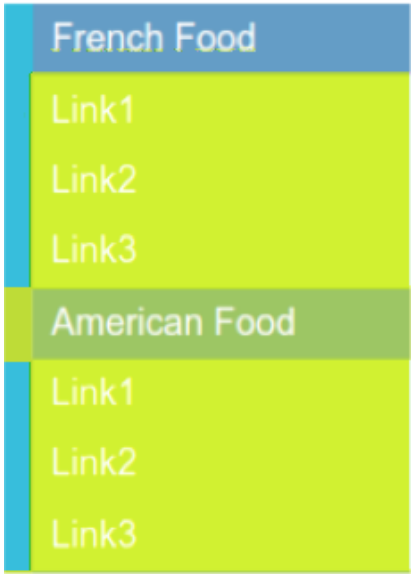
```
$('.menu-ul1:first').prepend(menuli2);
```

or:

```
$('.menu-ul1:first').prepend(
    '<li class="menu-li2"><a href="#">Link0</a></li>');
```

Move elements

- Use the insert/append methods
- Moved element is the method's paremeter
- Selectors are used to identify the moved element
- Example: move the 1st item of French food to the end of the list:




```
$('.menu-li1:last').append($('.menu-li1:first'));
```

or:

```
$('.menu-li1:first').appendTo($('.menu-li1:last'));
```

Copy elements

- Copying an element includes 2 steps:
  1) Clone (copy) the element
  2) Insert the new element to the desired position
- Example: copy the 1st element of "French Food" to the end of the list:

① `var f_item=$('.menu-li2:first').clone();`

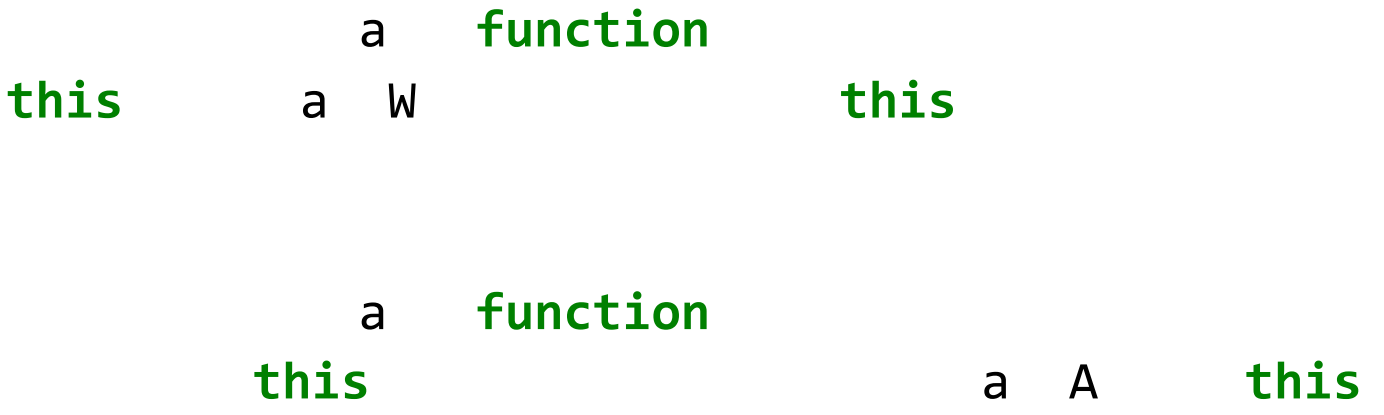
② `$('.menu-li2:last').append(f_item);`

Or:

```
$('.menu-li2:last').append(          ①
                    ②       $('.menu-li2:first').clone());
```

Delete and replace elements

- Delete an element:
  - **`detach()`**: the deleted element can be reused (added back)
  - **`remove()`**: delete and dispose an element (cannot reuse)
- Replace an element: **`replaceWith()`**, **`replaceAll()`**:



Get element content: HTML vs. text

- Get element content, including the html code: **`html()`**
- Get element text, , excluding the html code: **`text()`**
- Example:
  - `$('p').html()`: get the content of the 1st <p> element in the page, including the html code (This is a paragraph.)
  - `$('p:last').text()`: get the text of the last element in the page, excluding html code (This a another paragraph.)

```
<body> <p>This is a <b>paragraph.</b></p>
       <p>This is <b>another paragraph.</b></p>
</body>
```

: don’t use these functions to get value of the

Set element content: HTML vs. text

- `html()` and `text()` can also be used to set elements' value
- Example:
  - `$('p').html('This is the 1<sup>st</sup> paragraph')`: the 1st paragraph in the page will display "This is the 1st paragraph"
  - `$('p').text('This is the 1<sup>st</sup> paragraph')`: the 1st paragraph in the page will display "This is the 1 st paragraph"

Get element attributes

- Get the HTML attribute:
  - `.attr(attrName)`: get the value of the attribute `attrName` of the 1st element in the set of selected elements
  - `.attr(attrName, attrVal)`: set the value of the attribute `attrName` of the 1st element in the set of selected elements
- Get the DOM attribute:
  - `.prop(propName)`: get the value of the attribute `propName` of the 1st element in the selected elements
  - `.prop(propName, propVal)`: set the value of the attribute `propName` of the 1st element in the selected elements

DOM properties: selectedIndex, tagName, nodeName, nodeType, ownerDocument, defaultChecked, or defaultSelected

Access element CSS

- Get/Set the CSS value:
  - `.css(propName)`: get the value of the CSS property `propName` of an element
  - `.css(proprName, propVal)`: set the value for the CSS property `propName` of an element

```
//Get background value of the 1st <div>
$('div').css('backgroundColor');

//Set CSS style for the 1st element of the class article
$('.article').css({
  'backgroundColor': '#C2F5BF',
  'borderColor': 'yellow',
});
```

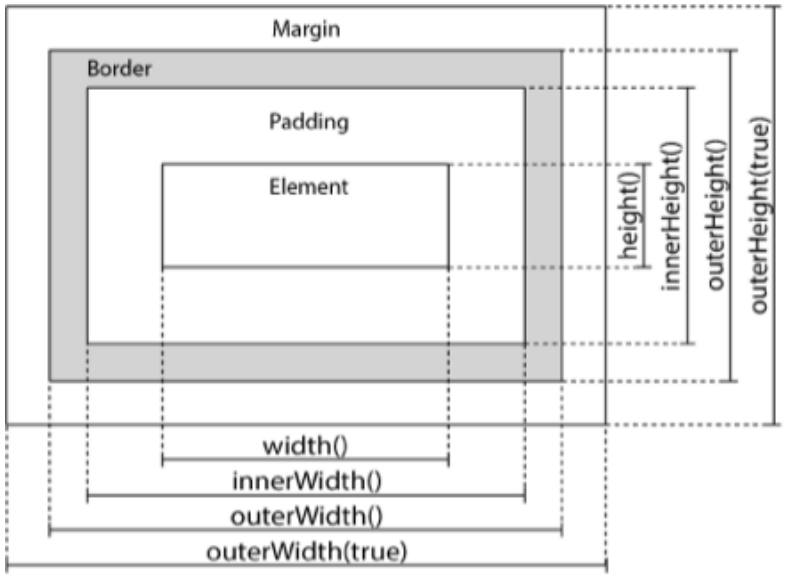
Access element CSS

- Other methods for accessing CSS of elements:
  - **`.addClass(clsName)`**: add element to the CSS class `clsName`
  - **`.removeClass(clsName)`**: remove element from the CSS class `clsName`
  - **`.toggleClass(clsName)`**: toggle the CSS class `clsName` for the element
  - **`.hasClass(clsName)`**: check the element is belonging to the CSS class clsName or not (returns true/false)

```
$("button").click(function(){
    $("h1, h2, p").addClass("blue");
    $("div").toggleClass("important");
});
```

Get/Set element size

- **`.height()`, `.width()`**: get/set element width and height
- **`.innerHeight()`**, **`.innerWidth()`**: get/set element width and height + padding
- **`.outterHeight()`**, **`.outterWidth()`**: get/set element width and height + padding + border + margin



Event Handling

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```
$('<selector>').on('<event>', ['child selector'], function() {
    //Code to handle the event
});
```

H

```
$('<selector>').<event>([parameter], function() {
    //Code to handle the event
});
```

HTML events

Mouse	Keyboard	Form	Window/Document
c c	e e	b	ad
dbc c	e d	cha ge	e e
ee e	e	f c	c
e ea e		b	ad

- Example:

```
/* When an element belonging to class header are clicked, its background
   will become yellow */
    heade    c  c  function
    this  c    bac g    d c          e
```

More example on event handling

```
$('.header').on('click', function() {
   //Handle the click event for elements of the class header
});

$('.header').on('click mouseleave', function() {
   // Handle the click and mouse leave events for elements of the class header
});

$('.article'.on('click', '.header', function() {
   //Handle the click event for elements of the class header that are the children of class article
});

$(document).on('click', '.btn-control', function() {
   // Handle the click event for elements of the class btn-control
});
```

Event handling for multiple elements

```
$("p").on({
    mouseenter: function(){
        $(this).css("background-color", "lightgray");
    },
    mouseleave: function(){
        $(this).css("background-color", "lightblue");
    },
    click: function(){
        $(this).css("background-color", "yellow");
    }
});
```

Remove event handler

- Syntax:

```
$('selector').off('events' , 'child-selector',
                  handle-Function)
```

- Example:

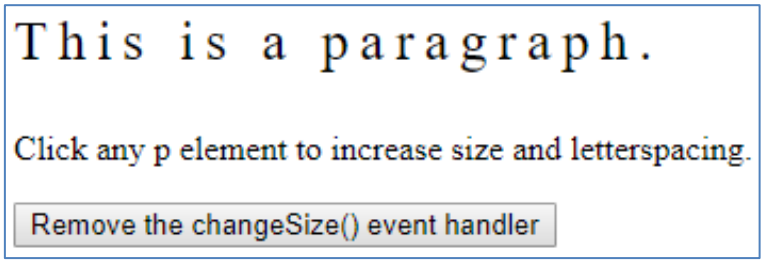
  `.off('click')`: remove the click event handler

  `.off('click', clickHandle)`: remove the `clickHandle` function out of the click event handler

  `.off()`: remove all event hadlers

Remove event handler

```
<script>
f nction changeSize() {
    $(this).animate({fontSize: "+=10px"});
}
f nction changeSpacing() {
    $(this).animate({letterSpacing: "+=5px"});
}
$(document).ready(f nction(){
    $("p").on("click", changeSize);
    $("p").on("click", changeSpacing);
    $("button").click(f nction(){
        $("p").off("click", changeSize);
    });
});
</script>
```



Event Objects

- Each event handler function receives an event object that contains information of the triggered event
- Some basic attributes and method of the event object:
  - pageX, pageY: mouse position where the event occur
  - target: the DOM element that triggers the event
  - type: event type (click, dblclick,...)
  - data: data passed when create the event binding
  - preventDefault(): prevent the default event handling

Event Objects – Example

```
//display the mouse position while the mouse is moving
$(document).mousemove(function(event){
  $("span").text("X: " + event.pageX +
                 ", Y: " + event.pageY);
});
```

```
//disable links' default behavour and define a new behaviour
$(document).ready(function(){
  $("a").click(function(event){
    event.preventDefault();
    var newDiv = $("<div>default click prevented</div>E");
    $("#log").append(newDiv);
  });
});
```


```
<body>
  <a href="https://google.com/">Go to Google.com</a>
  <div id="log"></div>
</body>
```

jQuery Effects

- Popular effects:
  - Hide, show
  - Fade in, fade out
  - Slide up, slide down
  - Animation
  - Toggle
- Typically, an effect function has 2 optional parameters:
  - Effect speed (ms)
  - A callback function that will be called when the effect ends

jQuery Effect – Example

```
$('.menu-ul1').hide();

$('.menu-li1').toggle(function() {
    $(this).next('.menu-ul1').show();
},function(){
    $(this).next('.menu-ul1').hide();
});

$('.menu-li1').toggle(function() {
    $(this).next('.menu-ul1').fadeIn();
},function(){
    $(this).next('.menu-ul1').fadeOut();
});
```

jQuery Effect – Example

```
$('.menu-li1').toggle(function() {
   $(this).next('.menu-ul1').slideDown();
},function() {
   $(this).next('.menu-ul1').slideUp();
});


$('.menu-li2').click(function() {
  $(this).animate({
    borderLeftWidth:"0px",
    borderRightWidth:"12px"
  }, 600);
});
```

AJAX

What is AJAX?

- AJAX: Asynchronous JavaScript and XML
- Used to create asynchronous call to web servers from web browsers
  - **Asynchronous**: asynchronous communication, using the XMLHttpRequest object
  - **JavaScript**: a programming language used to create the asynchronous communication from the client side (browser)
  - **XML**: a markup language used as a data format in the communication between web browsers and servers (JSON is an alternative)

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  - @&/10 , >&A)10 , >&B . <C : >&D2)E&1 - &2> . <1 - 0& : - E&><: - 2= . <>1 - 0&E : > :
  - 6F- > : G&12&21C1/ : <&> . &5 : ; : 6+<1=> 7 7H&2F2> : G&
  - I : 2F&> . &><: - 2B . <C&5678&E : > : &> . &56& . *?)+>2

```
K&&
  L)C=/.F))L9&M&&K&&&&&&&&
    L-:C)L9&L5:C)2&N.-EL0&&&&&&
    L:0)L9&PQ&&&&
  R0&&&&
  K&&&&&
    L-:C)L9&L".C&!<D12)L0&&&&&&
    L:0)L9&P3&&&&
  R&S
R&
```

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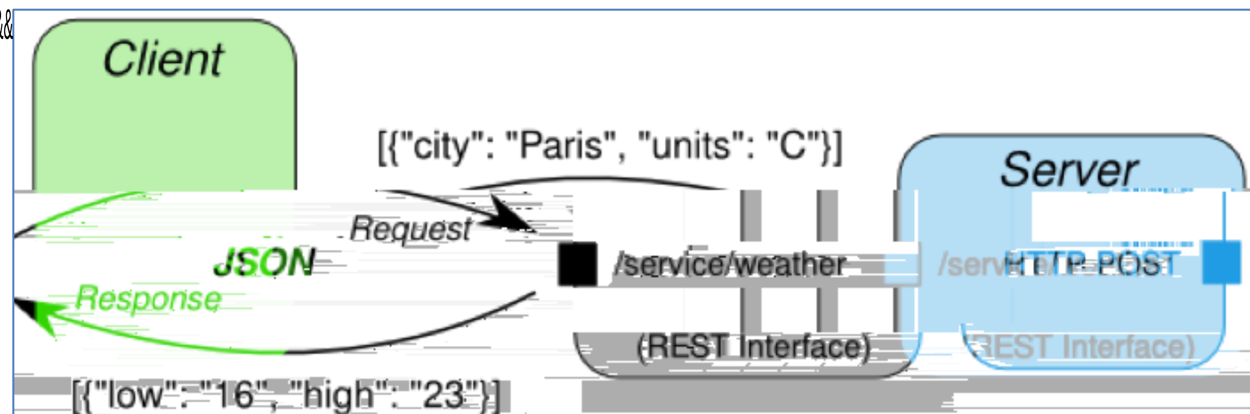


Q e AJAX

- Q e de e e a e d f AJAX f c
  - **$("selector").load()** ad da a f e e e a d e ed da a e e ec ed e e e
  - **$get()** e e da a f e e e g HTTP GET
  - **$post()** e e da a f e e e g HTTP POST
  - **$ajax()** e f a a c AJAX e e

jQuery AJAX – load()

- Syntax:

```
$(selector).load(URL, data, callback);
```

  - **URL**: URL you wish to load
  - **data**: (optional) data to send to the server
  - **callback**: (optional) callback function to run when load method is completed
    - : contains the result data from the request
    - : contains the status of the response ("success", "notmodified", "error", "timeout", or "parsererror"
    - : contains the `XMLHttpRequest` object

jQuery AJAX – load()

```
$("#div1").load("demo_test.txt",
                function(responseTxt, statusTxt, xhr) {
  if(statusTxt == "success")
    alert("External content loaded successfully!");
  if(statusTxt == "error")
    alert("Error: " + xhr.status + ": " + xhr.statusText);
});
```

https://www.w3schools.com/jquery/tryit.asp?filename=tryjquery_ajax_load_callback

https://www.w3schools.com/jquery/tryit.asp?filename=tryjquery_ajax_load_data

jQuery AJAX – `get()`

- Syntax:

```
$.get(url [, data] [, callback] [, dataType])
```

  - **url**: URL you wish to request
  - **data**: (optional) data sent along with the request
  - **callback**: (optional) callback function to run when load method is completed
    - **response**: contains the result data from the request
    - **status**: contains the status of the response ("success", "notmodified", "error", "timeout", or "parsererror")
    - **xhr**: contains the `XMLHttpRequest` object

jQuery AJAX – get()

- Request "demo_test.php" and display the returned data

```
$("button").click(f nc i n() {
    $.get("demo_test.php", f nc i n(data, status) {
        alert("Data: " + data + "\nStatus: " + status);
  });
});
```

- More examples on get() function:

```
$.get("test.php"); //Request "test.php" and ignore return results

//Request "test.php", pass data to the server (ignore return results):
$.get("test.php", { name:"Donald", town:"Ducktown" });

//Request "test.php" and pass arrays of data to the server  (ignore return results):
$.get("test.php", { 'colors[]' : ["Red","Green","Blue"] });
```

( )

-

```
$.ajax({name:value, name:value, ... });
```

  -
    - **method** **GET**
    - **url**
    - **data**
    - **success(result, status, xhr)**
    - **error(xhr, status, error)**

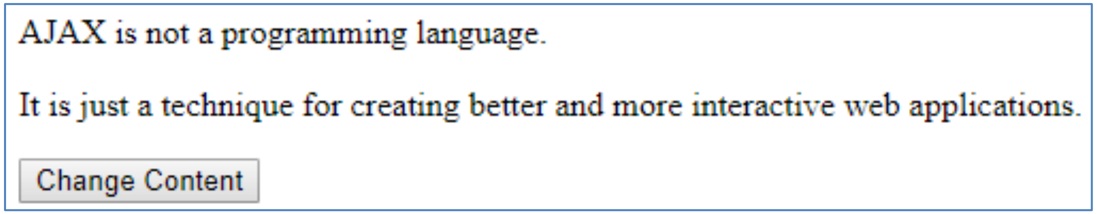
More names: *https://www.w3schools.com/jquery/ajax_ajax.asp*

567)89&:;:<&' =5=>()

```
$(document).ready(          (){
   $("button").click(          (){
      $.ajax({url: "jquery_ajax.txt", async:       ,
              success:          (result) {
         $("div").html(result);
      }});
   });
});
```

```
<body>
  <div><h2>Let AJAX change this text</h2></div>
  <button>Change Content</button>
</body>
```

jquery_ajax.txt	?@A:;:<&12&-.B&=&@8.08=CC1-0&/=-07=0)D?E@A ?@AFB&12&572B&=&B)+,-1G7)&H.8&+8)=B1-0&*)BB)8&=-I&C.8)&1-B)8=+B1J)&K)*&=@@/1+=B1.-2D?E@A



jQuery Plugins

jQuery plugins

- A jQuery plugin is a set of jQuery code to provide a particular functionality
- jQuery allows users to create plugins to extend jQuery functionality:
  - effects, presentation, form validation, form auto fill, extend table interaction,...
- Common jQuery libraries:

  https://plugins.jquery.com/

Common jQuery plugins

- Image:
  - ColorBox (A lightweight customizable lightbox plugin): http://www.jacklmoore.com/colorbox/
  - Cycle (transition effects): http://malsup.com/jquery/cycle/download.html
  - Jcrop (add image cropping functionality to your web app): http://deepliquid.com/content/Jcrop_Download.html
- Form:
  - JQuery Validation (form validation): https://jqueryvalidation.org/
- Table:
  - DataTable (add advanced interaction controls to HTML table): https://www.datatables.net/

jQuery plugin – Example

```
<html>
  <head>
    <link rel="stylesheet" href="colorbox.css">
    <script src="jquery.min.js"></script>
    <script src="jquery.colorbox-min.js"></script>
  </head>
  <body>
    <a class='gallery' href='image1.jpg'>Photo_1</a>
    <a class='gallery' href='image2.jpg'>Photo_2</a>
    <a class='gallery' href='image2.jpg'>Photo_2</a>
    <script>
      $('a.gallery').colorbox({rel:'group1'});
    </script>
  </body>
</html>
```

jQuery Plugins – Example

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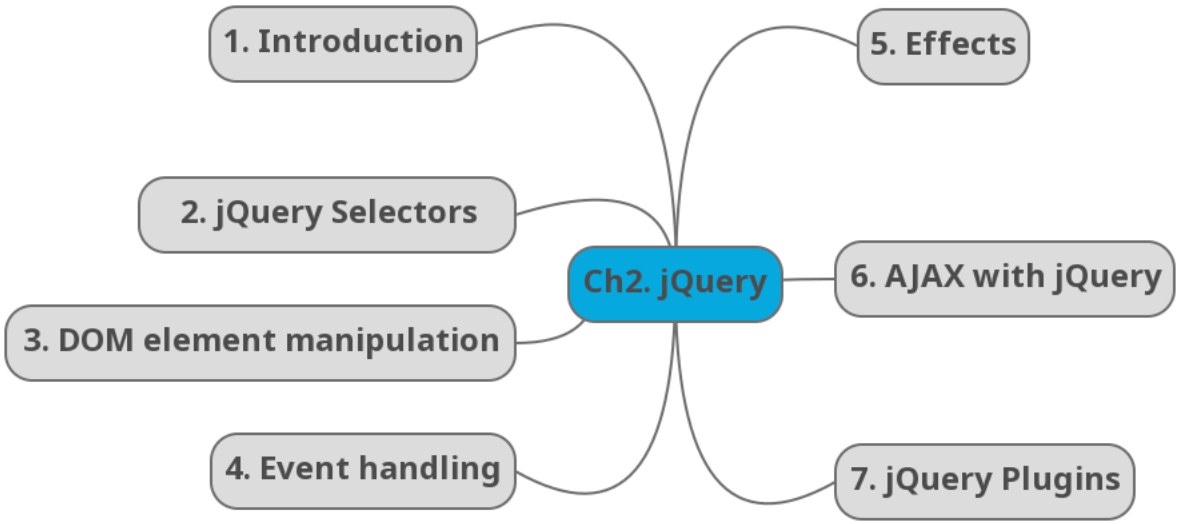
Recap


1. Introduction
2. jQuery Selectors
3. DOM element manipulation
4. Event handling
Ch2. jQuery
5. Effects
6. AJAX with jQuery
7. jQuery Plugins

Question?

CT313H – WEB TECHNOLOGIES