Client/Server Programming for Internet Applications

TCSS460

Summer 2020

Lecture 7
jQuery (Part II)

TACOMA

Common Element Manipulations in jQuery
→ HTML Attributes *(review)*

- in jQuery, we can both set and get an **attribute** value by using the `attr()` method on any element returned from a selector
  - two parameters
    - **first**: attribute name [required]
    - **second**: value for modifying the attribute [optional]
  - if no second parameter is passed, method returns current value of attribute

```
<script>
    // link is assigned the href attribute of the first <a> tag
    var link = $("a").attr("href");
    // change all links in the page to http://uw.edu
    $("a").attr("href", "http://uw.edu");
    // change the class for all images on the page to fancy
    $("img").attr("class ", "fancy");
</script>
```

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Common Element Manipulations in jQuery → HTML Properties *(review)*

- many HTML tags include **properties** as well as **attributes**
  - e.g. checked property of a radio button or checkbox
  - early versions of jQuery, HTML properties could be set using attr() method
  - the `prop()` method is now the **preferred** way to **retrieve** and **set** the **value** of a **property** although, `attr()` may return some (less useful) values

```
<input class="meh" type="checkbox" checked="checked">
...
<script>
    var theBox = $(".meh");
    theBox.prop("checked"); // evaluates to TRUE
    theBox.attr("checked"); // evaluates to "checked"
</script>
```

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Common Element Manipulations in jQuery → Changing CSS *(review)*

- jQuery provides the extremely intuitive `css()` method
- two versions of this method (two different signatures):
  - **first**: retrieve value (single parameter containing CSS attribute)

```
// get the color of HTML tag with id element
var color = $("#element").css("background-color");
```

  - **second**: modify existing value

```
// set color to red
$("#element").css("background-color", "red");
```

if you test this in a browser and then inspect it, you will notice that jQuery modifies the element's style attribute

- e.g., `<div id="element" style="background-color: red">)`

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Common Element Manipulations in jQuery
→ Changing CSS (manipulating classes)

- you can programmatically set CSS classes instead of overriding a particular CSS attribute individually
- this can be achieved using the jQuery methods
  - `addClass(className)` → add a CSS class
  - `removeClass(className)` → removes a CSS class
    - `className` can contain a **space-separated list of class** names to be added or removed
  - `hasClass(className)` is a method that returns true if the element has the `className` currently assigned
  - `toggleClass(className)` will add or remove a class, depending on whether it is currently present in the list of classes

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Common Element Manipulations in jQuery

- `html()` method is an easy way to retrieve and manipulate the HTML contents

```
<script src="http://code.jquery.com/jquery-3.5.1.min.js"></script>

<script>
    // retrieve the content
    var content = $("#sample").html();
    // modify the content of an element
    $("#sample").html("brand new content");
    // modify the content of ALL <p> elements
    $("p").html("jQuery is fun");
</script>
```

- `html()` method should be used with **caution** since the `innerHTML` of a DOM element can itself contain nested HTML elements

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Event Handling in jQuery

- just like JavaScript, jQuery supports creation and management of listeners/handlers for JavaScript events
  - **conceptually** the same but some minor **syntactic** differences
- setting up **listeners** for particular events is done in much the same way as JavaScript
- while pure JavaScript uses the `addEventListener()` method, jQuery has
  - `on()`
  - `off()`
  - shortcut methods to *attach* events

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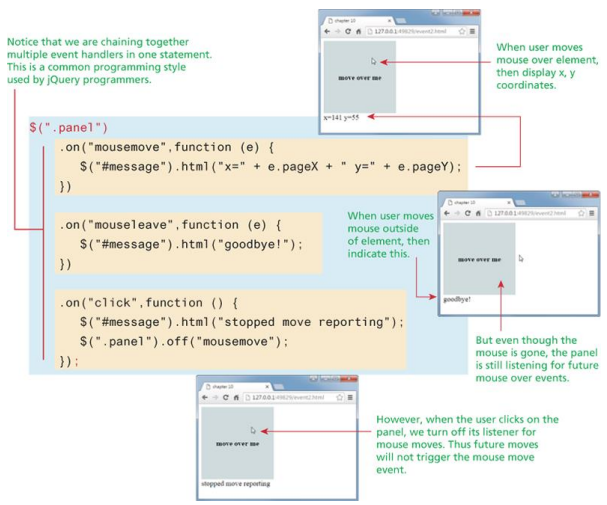
Event Handling in jQuery
→ Binding and Unbinding Events

- **jQuery** is much less verbose than **JavaScript**
- **jQuery** simplifies many **common tasks** when working with **events**



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Event Handling in jQuery
→ Binding and Unbinding Events (cont'd)

ex1

```
<button id="example">Click me</button>
<span id="message"></span>
<script>
    // javascript version
    document.getElementById("example").addEventListener("click", function () {
        document.getElementById("message").innerHTML = "you clicked";
    });

    // jquery version
    $("#example").on("click", function () {
        $("#message").html("you clicked");
    });

    // alternate jquery version using defined function instead of anonymous one
    $("#example").on("click", clicker);

    function clicker() {
    $("#message").html("you clicked");
    }

    // alternate jquery version using click() shortcut method
    $("#example").click(function () {
        $("#message").html("you clicked");
    });
</script>
```

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Event Handling in jQuery
→ Page Loading

- it is a good practice to have your listeners setup inside the `window.addEventListener("load", …)` event
  - ensures the entire page and all DOM elements are **loaded before** trying to **attach listeners** to them
- **jQuery**: we do the same but use `$(document).ready()` event
- **example**: setup event listener after HTML document has been loaded and parsed into its DOM representation

```
<script>
    $(document).ready(function () {
        // set up listeners knowing page loads before this runs
        $("#example").click(function () {
            $("#message").html("you clicked");
        });
    });
</script>
```

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Event Handling in jQuery
→ Page Loading

- `onload()` event in JavaScript (*lecture 5 examples*)
  - this event occurs when an object is loaded (in browser)
  - mainly associated with the body tag
    - you can run a script once the HTML page loads all content
  - can use onload to check browser type/version
    - may be load proper HTML page version based on browser information
  - can be used to deal with cookies

```
<p id="element"></p>
<script>
    window.onload=initPage;
    function initPage() {
       $("#element").html("Now redirecting to U of Washington website...  please wait");
    }
</script>
```

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Event Handling in jQuery
→ Page Loading (cont'd)

ex2

- `onload()` example: redirect when document is ready

```
<!DOCTYPE html>
<script src="http://code.jquery.com/jquery-3.5.1.min.js"></script>
<html>
<body>
    <p id="element"></p>
    <script>
        window.onload=initPage;
        function initPage() {
           $("#element").html("Now redirecting to U of Washington website... please wait");
        }
        $(document).ready(function () {
           // when document is ready... call this function
           window.setTimeout(function () {
              window.location.href = "http://www.uw.edu";
           }, 3000);
           });
    </script>
</body>
</html>
```

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DOM Manipulation
→ Creating Nodes

- **jQuery** provides many useful methods to manipulate DOM elements
  - we already introduced **`html()`, `attr()`, `prop()`, `css()`**
- **creating nodes**
- **jQuery** can convert strings containing valid DOM syntax into DOM objects **automatically**

```
// using JavaScript
var jsLink = document.createElement("a");
jsLink.href = "http://www.uw.edu";
jsLink.innerHTML = "UWashington";
jsLink.title = "new element using JS";
```

```
// using jQuery (latest version)
$('<a>', {
    href: 'http://uw.edu',
    title: 'new element using jQuery',
    text: 'UWashington'
}
);
```

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DOM Manipulation
→ Adding DOM Elements

- after creating nodes, we must then **add** them to existing DOM tree:
- **`append()`** method is used to insert node(s) after the last child to the element(s) being selected
  - **parameters**: accepts HTML string, a DOM object or a jQuery object
- **`prepend()`** method is used to insert at the beginning of each element
  - **parameters**: accepts HTML string, a DOM object or a jQuery object

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DOM Manipulation
→ Adding DOM Elements (cont'd)

```
<div class="dest">
existing content
</div>
```

```
var link = $('<a href="http://funwebdev.com">Fun</a>');
```

```
$(".dest").append(link);
```

```
<div class="dest">
existing content
<a href="http://funwebdev.com">Fun</a>
</div>
```

```
$(".dest").prepend(link);
```

```
<div class="dest">
<a href="http://funwebdev.com">Fun</a>
existing content
</div>
```

```
link.appendTo($(".dest"));
```

```
<div class="dest">
existing content
<a href="http://funwebdev.com">Fun</a>
</div>
```

```
link.prependTo($(".dest"));
```

```
<div class="dest">
<a href="http://funwebdev.com">Fun</a>
existing content
</div>
```

```
$(".dest").before(link);
```

```
<a href="http://funwebdev.com">Fun</a>
<div class="dest">
existing content
</div>
```

```
$(".dest").after(link);
```

```
<div class="dest">
existing content
</div>
<a href="http://funwebdev.com">Fun</a>
```

```
link.insertBefore($(".dest"));
```

```
<a href="http://funwebdev.com">Fun</a>
<div class="dest">
existing content
</div>
```

```
link.insertAfter($(".dest"));
```

```
<div class="dest">
existing content
</div>
<a href="http://funwebdev.com">Fun</a>
```

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DOM Manipulation
→ Wrapping Existing DOM in New Tags

- one of the most common ways you can enhance a website that supports JavaScript is to add new HTML tags as needed to support some jQuery functions
- **example**

```
<div class="external-links">
    <div class="gallery">Uffuzi Museum</div>
    <div class="gallery">National Gallery</div>
    <div class="link-out">funwebdev.com</div>
</div>
```

- assume we wanted to wrap all the gallery items in the whole page inside, another →

```
$(".gallery").wrap('<div class="galleryLink"</div>');
```

```
<div class="external-links">
    <div class="galleryLink">
        <div class="gallery">Uffuzi Museum</div>
    </div>
    <div class="galleryLink">
        <div class="gallery">National Gallery</div>
    </div>
    <div class="link-out">funwebdev.com</div>
</div>
```

resulting HTML

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DOM Manipulation
→ Wrapping Existing DOM in New Tags (cont'd)

- let's extend the previous example such that it will create a unique div for each element
- **example**
- and we then apply this jQuery…

```
<div class="external-links">
    <div class="gallery">Uffuzi Museum</div>
    <div class="gallery">National Gallery</div>
    <div class="link-out">funwebdev.com</div>
</div>
```

```
$(".gallery").wrap(function () {
    return "<div class='galleryLink' title='Visit " + $(this).html() + "'></div>";
});
```

```
<div class="external-links">
    <div class="galleryLink" title="Visit Uffuzi Museum">
        <div class="gallery">Uffuzi Museum</div>
    </div>
    <div class="galleryLink" title="Visit National Gallery">
        <div class="gallery">National Gallery</div>
    </div>
    <div class="link-out">funwebdev.com</div>
</div>
```

resulting HTML

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Effects and Animation

- **jQuery** provides easy-to-use animation and effects
- **animation and effects shortcuts**
  - one of the common features performed within a dynamic web page is to show and hide elements
    - can be done using `css()` (can cause an element to change **instantaneously**)
  - `hide()` and `show()` methods allow developers to easily hide elements **gradually** rather than through an immediate change

  - `fadeIn()` and `fadeOut()` shortcut methods control the opacity of an element

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Effects and Animation (cont'd)
→ animation and effects shortcuts example

ex3

```
<!DOCTYPE html>
<script src="http://code.jquery.com/jquery-3.5.1.min.js"></script>
<div class="contact">
    <p>Eyhab Al-Masri</p>
    <div class="email">Show email</div>
</div>
<div class="contact">
    <p>Eyhab Al-Masri</p>
    <div class="email">Show email</div>
</div>
<script type='text/javascript'>
    $(".email").click(function () {
        // Build email from 1st letter of first name + lastname @uw.edu
        var fullName = $(this).prev().html();
        var firstName = fullName.split(" ")[0];
        var address = firstName.charAt(0) + fullName.split(" ")[1] + "@uw.edu";
        address=address.replace(/-/g,'');
        $(this).hide(); // hide the clicked icon
        $(this).html("<a href='mailto:" + address.toLowerCase() + "'>E-Mail Me</a>");
        $(this).show(1000); // take 1 second to show the email address
    });
</script>
```

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Effects and Animation (cont'd)
→ sliding

ex4

```
<!DOCTYPE html>
<script src="http://code.jquery.com/jquery-3.5.1.min.js"></script>
<div id="menuBtn">Menu</div>
<ul id="menu">
    <li><a href="#">Menu item 1</a></li>
    <li><a href="#">Menu item 2</a></li>
    <li><a href="#">Menu item 3</a></li>
    <li><a href="#">Menu item 4</a></li>
</ul>
<script type='text/javascript'>
    $(function () {
        $("#menu").hide(); // hide menu when page loads
        $("#menuBtn").on("mouseenter", function () {
            // slide list down in 0.5 seconds when mouse hovers over it
            $("#menu").slideDown(500);
        });

        $("#menuBtn").on("mouseleave", function () {
            // slide list down in 0.5 seconds when mouse is no longer hovering over
            it
            $("#menu").slideUp(300);
        });
    });
</script>
```

jQuery Mouse Events
https://api.jquery.com/category/events/mouse-events/

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Effects and Animation
→ Raw Animation

ex5

- animations introduced so far are all variations of the generic **`animate()`** method
- if you need to perform more advanced animation actions, you will need to make use of this method
  - **`animate()`** enables you to animate any numeric CSS property

```
<style>
      .notifyBox {
      width:400px;
      position: absolute;
      padding: 15px;
      border: 1px solid transparent;
      color: #3c763d;
      background-color: #dff0d8;
      text-align:center;
      }
</style>
```

```
<button id="notifyUp">Notify Up</button>
<button id="notifyDown">Notify Down</button>
<div class="notifyBox">Notification Box Activated. </div>
<script type='text/javascript'>
      $('#notifyUp').click(function () {
         $(".notifyBox").animate({right:'0px', top:"0"}, 1000)
      });
      $('#notifyDown').click(function () {
        $(".notifyBox").animate({right:'0px', bottom:"0"}, 1000)
      });
</script>
```

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Asynchronous JavaScript with XML (AJAX)

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AJAX

- **Asynchronous JavaScript with XML (AJAX)**
  - a paradigm that allows a web browser to send messages back to the server without interrupting the flow of what's being shown in the browser.
- this makes use of a browser's **multithreaded design**
  - one thread handle the browser and interactions while other threads wait for responses to asynchronous requests.
- **responses** to **asynchronous requests** are caught in JavaScript as **events**
  - events can subsequently trigger changes in the user interface or make additional requests
  - this differs from the typical **synchronous** requests we have seen thus far, which require the entire web page to refresh in response to a request.

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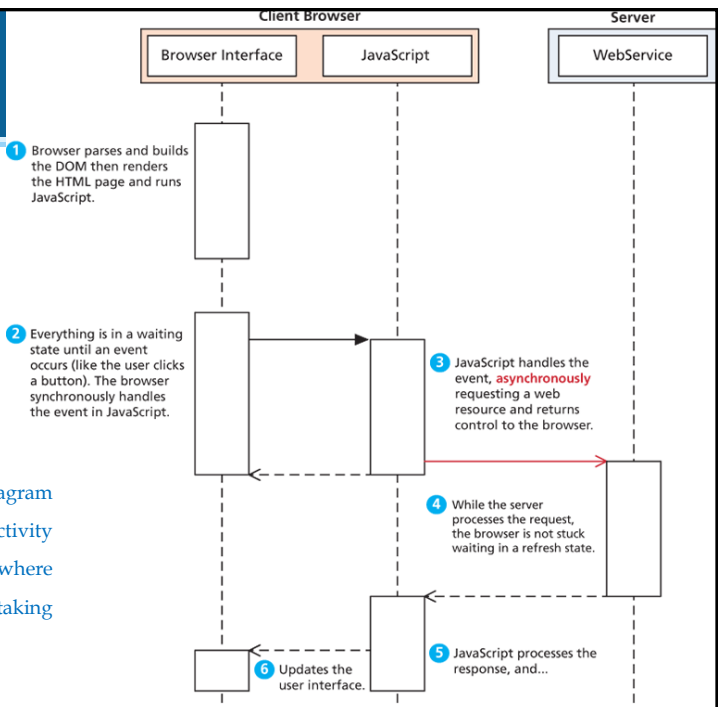
AJAX (cont'd)



UML sequence diagram where the white activity bars illustrate where computation is taking place

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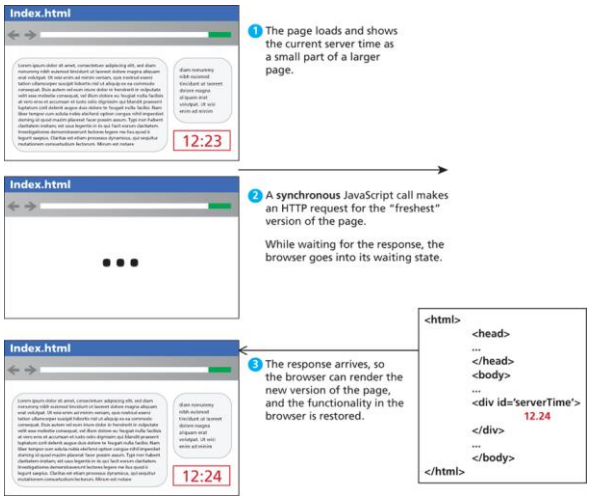
AJAX (cont'd)

Illustration of a **synchronous** implementation of the server time web page



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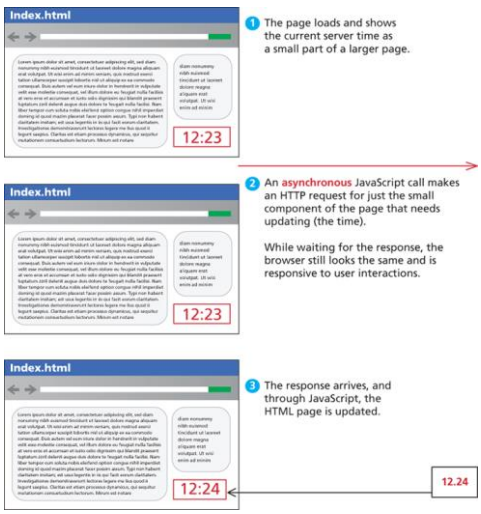
AJAX (cont'd)

Illustration of an **AJAX** implementation of the server time web page



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AJAX
→ Making Asynchronous Requests (cont'd)

- jQuery provides a family of methods to make asynchronous requests
- example
  - assume we have a server-side script named curentTime.php that returns a single string and you would like to load that value **asynchronously** into the an HTML element
    - i.e. `<div id="timeDiv">`
- jQuery makes this extraordinarily simple:

```
$("#timeDiv").load("currentTime.php");
```

- this code must be running on a web server in order for it to work
  - when this code is executed on the server, jQuery makes an HTTP GET request
  - browser receives response and sets HTML content of the element equal to the response

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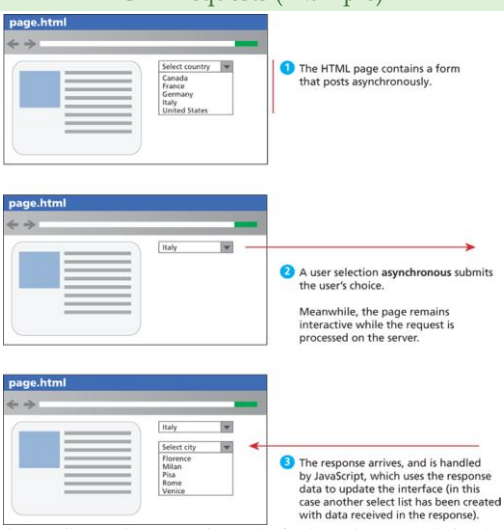
AJAX
→ Making Asynchronous Requests (cont'd)

GET Requests (Example)



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AJAX
→ Making Asynchronous Requests (cont'd)

Making Asynchronous requests – GET format

- **jQuery.get (** url [, data] [, success([data, textStatus, jqXHR])] [, dataType] **)**
- `url` is a string that holds the location to send the request
- `data` is an optional parameter (query string or JavaScript object literal)
- `success(data, textStatus, jqXHR)` is an optional callback function
  - `data` holding the body of the response as a string
  - `textStatus` holding the status of the request (i.e., "success")
  - `jqXHR` holding a jqXHR object
- `dataType` is an optional parameter to hold the type of data expected

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AJAX
→ Making Asynchronous Requests (cont'd)

`jqXHR` object

- `$.get()` requests made by jQuery return **a `jqXHR` object**
  - **jqXHR → jQuery XMLHttpRequest** (wraps browser native XMLHttpRequest)
- this object is a superset of the `XMLHttpRequest` object
  - `abort()` stops execution and prevents any callback or handlers from receiving the trigger to execute.
  - `getResponseHeader()` takes a parameter and gets the current value of that header.
  - `readyState` is an integer from 1 to 4 representing the state of the request.
    - the values include 2: request sent, 3: response being processed, and 4: completed.
  - `responseXML` and/or `responseText` the main response to the request.
  - `setRequestHeader(name, value)` allows headers to be changed for the request.
  - `status` is the HTTP request status codes
  - `statusText` is the associated description of the status code.

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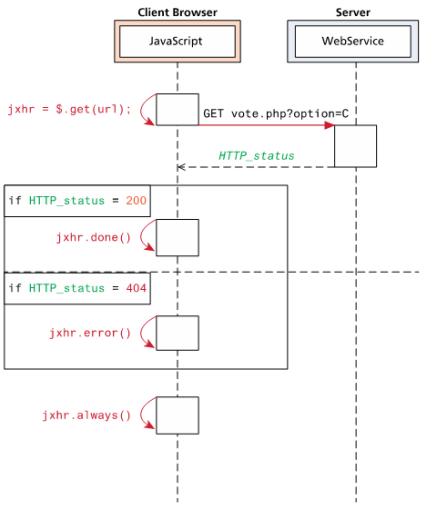
AJAX
→ Making Asynchronous Requests (cont'd)

jqXHR object

- **jqXHR** objects implement the methods
  - **done()**
  - **fail()**
  - **always()**



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AJAX
→ Making Asynchronous Requests (cont'd)

POST Method

- jQuery handles POST almost as easily as GET, with the need for an added field to hold our data.

```
$.get("serviceTravelCities.php", param)
```

to

```
$.post("serviceTravelCities.php", param)
```

- **POST → form serialization**
  - the **serialize()** method can be called on a DOM form element to encode it into a query string

```
var postData = $("#someForm").serialize();
$.post("formHandler.php", postData);
```

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AJAX
→ Making Asynchronous Requests (cont'd)

POST Method (cont'd)

- here we add headers

```
$.ajax({ url: "vote.php",
    data: $("#voteForm").serialize(),
    async: true,
    type: post,
    headers: {"User-Agent" : "Homebrew Vote Engine",
         "Referrer": "http://uw.edu"
    }
});
```

https://api.jquery.com/jquery.ajax/

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Module Topics

- ☑ jQuery (Part I)
- ☑ jQuery (Part II)
- JavaScript Frameworks

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