JavaScript II
Two-Dimensional Arrays

- JavaScript does not support actual two-dimensional arrays
- You can simulate two-dimensional arrays by using an array of arrays
- About two-dimensional arrays
  - You can pass them and return them from functions like one-dimensional arrays
  - Any modifications in the function will be permanent
  - You can have ragged arrays
- Example: ArraysTwoDim.html
DOM (Document Object Model)

- **DOM** – representation of the elements of a web page (e.g., headings, lists, paragraphs, styles, etc.) used by a JavaScript program to manipulate web page elements

- **DOM** – Allows JavaScript programs to **dynamically** access and update the content, structure, and style of documents.
  - From a JavaScript program you can control the image displayed in your page every hour
  - From a JavaScript program you can let users decide what background color to use
  - You could add/remove new items from a list
  - Others
Example DOM for HTML File

```html
<html>
  <head>
    <title>DOM Example</title>
  </head>
  <body>
    <p id="message">Traveling the road less traveled. </p>
  </body>
</html>
```
DOM (Document Object Model)

- We can access information by using
  
  ```javascript
  document.getElementById("elementId");
  ```

- `getElementById` returns a reference to an element that we can use to:
  - Retrieve the value of the element (e.g., text field in a form)
    ```javascript
    var login = document.getElementById("loginId").value;
    ```
  - Set the function to call when an element is clicked on (e.g., button)
    ```javascript
    document.getElementById("processButton").onclick = functionDoesProcessing;
    ```
  - Get/Set Attributes
    ```javascript
    var imageElement = document.getElementById("myImage");
    var imageName = imageElement.getAttribute("src");
    imageElement.setAttribute("src", "imageFile.jpg");
    ```

- **Example:** PhotoViewer.html
- **Example:** Animation.html
Event Handler Attributes

- **Mouse Related**
  - `onclick` – mouse button is pressed and released
  - `ondblclick` – mouse button is double-clicked over the element
  - `onmouseover` – mouse moves over element
  - `onmouseout` – mouse moves off element
  - `onmousemove` – mouse pointer is moved
  - `onmousedown` – mouse is pressed down while cursor is over the element
  - `onmouseup` – mouse is released while the cursor is over the element

- **Keyboard Related**
  - `onkeypress` – key pressed and released
  - `onkeydown` – key is pressed
  - `onkeyup` – key is released

- **Other**
  - Keep in mind that there are additional handlers that are specific to certain tags
Objects

- **Object** – entity that aggregates multiple values in a single unit

- **Property** – entity associated with an object that has a name and a value. They are like variables (you can store values in them and read values from them)

- **Object** (alternate definition) – unordered collection of properties, where each property has a name and a value

- A property value can be any data type we have seen, including objects
Objects

- You use the . (period) operator to access an object’s properties
  `OBJECT>.<PROPERTY>`
- You can create your own objects by either:
  ```javascript
  var myObj = {};
  var myOtherObj = new Object();
  ```
- You can create properties by assigning a value to it (we do not use `var`)
  ```javascript
  myObj.created = “Monday”;
  ```
- You can update the property by assigning a new value
- You can delete a property with the delete operator
  ```javascript
  delete myObj.created;
  ```
- You can check for the existence of a property using the “in” operator
Nothing happens until we submit data
We must wait until the server request is processed (can do anything with the page)
A page must be completed loaded even if most of the content identical to previous page
Compare with a desktop application
Can we do better? Can the page be updated without requiring a page load?
AJAX is the answer
AJAX

- AJAX → Asynchronous JavaScript and XML
- Combination of technologies
- Adds a layer between the browser and the web server, handling server requests and processing the results

- Layer Name → Ajax Framework/Ajax Engine
- The requests are not synchronized with user actions (e.g., clicking on links, buttons, etc.). User can continue interacting with the browser while request is being processed
In the traditional client/server model we submit server requests by clicking on a link or via submit (this generates the HTTP request for us)
- Notice we get a new web page as a result

XMLHTTPRequest
- JavaScript object that will issue the HTTP request
- No page load is generated as a result of the request
- Can only issue request to URLs within the same domain
- Cannot directly access a remote server

There is nothing the server needs to do just because the request is associated with AJAX). The server is just receiving an HTTP request

AJAX application just care about receiving an HTTP response
AJAX

❖ When/how to get the results
  ❖ We need to add code to detect when the request has been completed
  ❖ We need to add code to process the results (e.g., update page components)
❖ Creating the object (JavaScript code)
   ```javascript
   var requestObj = new XMLHttpRequest();
   ```
XMLHttpRequest Properties

- `readystatechange` → Request’s status
  - 0 → *uninitialized*, assumed when initial server request is submitted
  - 1 → *loading*, placing data in XMLHttpRequest object
  - 2 → *loaded*, loading completed
  - 3 → *interactive*, object interaction is possible
  - 4 → *completed*

- `onreadystatechange` → event handler called when `readyState` property changes

- `responseText` → results in text form
- `responseXML` → results in XML
- `status` → HTTP status returned by the server
- `statusText` → HTTP reason phrase
XMLHTTPRequest Functions

- **open** → Initializes the XMLHttpRequest object
  - **open(httpMethod, targetURL, requestMode)**
    - **httpMethod** → GET or POST
    - **requestMode** → true for asynchronous, false for synchronous. It is an option
  - If GET is used targetURL must include any necessary parameters
- **send(data)** → sends the request
  - For GET request data is set to null
- **EXAMPLE**: directoryLookup.html, directory.php, processMemo.php
Submitting a Synchronous Request

- We can also submit a synchronous request using Ajax
  - You want to get results from the server but cannot proceed without them
Resources

- **Lint**
  - [http://www.javascriptlint.com/online_lint.php](http://www.javascriptlint.com/online_lint.php)

- **JavaScript Error Console**
  - Tools → Error Console

- **Firebug Debugger**

- **Debugging**

- Material presented based on “Ajax in 10 Minutes” by Phil Ballard, ISBN 0–672–32868–2