MIS3690 WEB TECHNOLOGIES

BABSON COLLEGE

TOIM DIVISION

INTRODUCTION TO JAVASCRIPT

WHAT IS JAVASCRIPT?

- A programming language
- It is interpreted by Web browsers and servers
  - Just like HTML and CSS
  - HTML – identifies the content (elements) of a web document for so that the browser knows how to present it on the webpage.
  - CSS – defines how each element is to be formatted/displayed in the document/page.
- JavaScript creates interactive or dynamic web pages
  - Can change content and/or formatting as the user is browsing a page
- With JavaScript, a web page can
  - Respond to user events
  - Mouse-click, Mouse-over, mouse-out, enter/exit fields
  - Validate data entry in forms
  - Create custom HTML code and pages on-the-fly

HOW TO USE JAVASCRIPT?

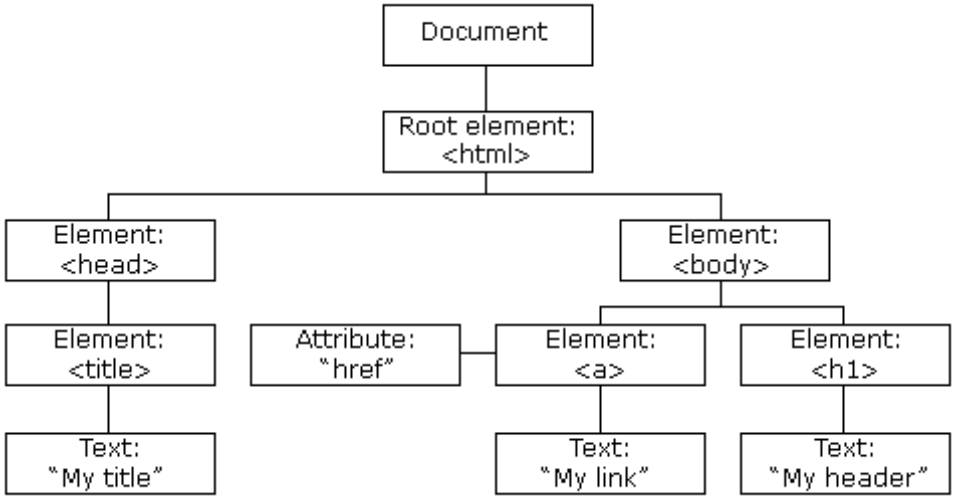
- Three key concepts for using JavaScript:
  - **Element** – what is the web page element that the user will interact with to start a JavaScript function
  - **Event** – what is the event, associated with the element, that will "trigger" the JavaScript function
  - **Action** – what must the JavaScript function do?
  - All three must be defined for the JavaScript function to work.
    - THIS IS HOW THE **ACTION** IS LINKED TO THE **EVENT** and **ELEMENT**.

JAVASCRIPT EXAMPLES

- Please refer to the file:
  - CS11-InClass-demo.htm
- What is the event?
- What are the elements?
- What are the actions?
- JavaScript uses the concept of "functions" to define the actions.
- Note the parenthesis – open and close – right next to the name of the function.
  - These are mandatory!

JAVASCRIPT – SOME BASIC CONCEPTS

- Manipulating Web page elements
  - We need to understand how the elements are organized so that we can know WHAT to manipulate to achieve our end.
  - Called **DOM** – Document Object Model



OBJECT ORIENTED LANGUAGE

- JavaScript is Object Oriented
  - We need to understand how JavaScript identifies the elements so that we know HOW to write the JavaScript statements
- The HTML DOM is a standard **object** model and **programming interface** for HTML. It defines:
  - The HTML elements as **objects**
  - The **properties** of all HTML elements
  - The **methods** to access all HTML elements
  - The **events** for all HTML elements

MANIPULATING WEB PAGE ELEMENTS

- We first need to get the "strings" to the element (like a puppet):
- `document.getElementById(x)`
  - A pre-defined function that gets the strings to the Web page element whose id is x
  - Example:

```
document.getElementById("title")
```

- Save that in a variable.
  - Example:

```
var mytitle=document.getElementById("title");
```

- Manipulate the Web page element.
  - Example:

```
mytitle.style.color="red";
```

JAVASCRIPT IS "OBJECT ORIENTED"

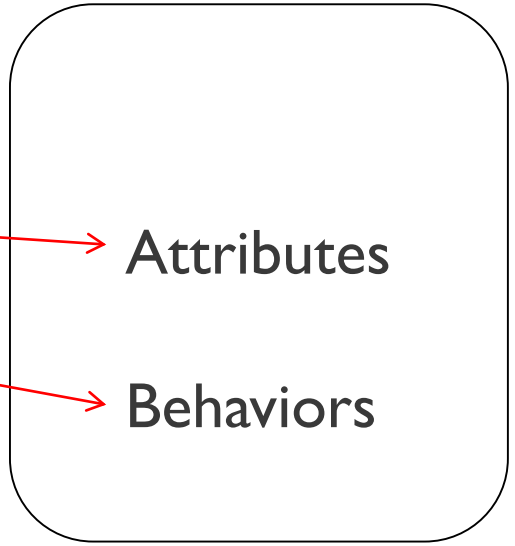
- Treats everything as an object
  - Every web page element is considered an object
  - Uses the DOT Notation
- Examples of JavaScript Object Types
  - Window (the outside-most element of a web page)
  - Document (the web page you create)
  - <h> tag (an element inside the document)
  - <hr/>,
 (other elements inside the document)
  - Table (element inside the document)
    - <tr>, <td> (elements inside the table inside the document)
  - Form (element inside the document)
    - <input>, <button>, <textarea>… (elements inside form inside document)

OBJECT TERMINOLOGY

- Type of object is called an "object class"
  - Form
  - h1 heading
- Specific object is called an "object instance" or sometimes just an "object"
- Every object should have an id that we define
  - `<form id="form1" action="" method="post">`
  - `<h1 id="top">`

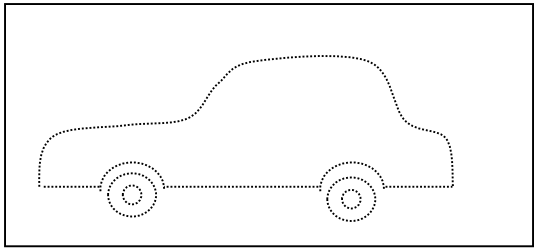
CLASSES AND OBJECTS

- Class
  - is a blueprint for objects of a particular type
  - Defines the structure (number, types) of the **attributes**
  - Defines available **behaviors** of its objects
- Object
  - is an instance of a class



CLASS VS. OBJECT EXAMPLE

- Class: Car



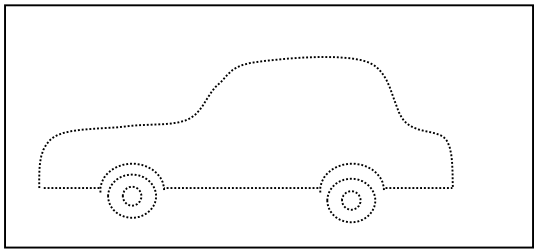
- Attributes:
  - `owner`
  - `color`
  - `amountOfGas`
  - `is_4wd`
- Behaviors
  - start engine
  - refuel

- Object: my_old_honda

- Attributes:
  - `owner = "Zhi"`
  - `color = "blue"`
  - `amountOfGas = 16`
  - `is_4wd = false`
- Behaviors

CLASS VS. OBJECT EXAMPLE

- Class: Car



- Attributes:
  - `owner`
  - `color`
  - `amountOfGas`
  - `is_4wd`
- Behaviors
  - start engine
  - refuel

- Object: my_new_jeep

- Attributes:
  - `owner = "Zhi"`
  - `color = "black"`
  - `amountOfGas = 20`
  - `is_4wd = true`
- Methods

OBJECTS HAVE PROPERTIES

- Properties describe the characteristics of an Object
- Dot Notation: `object.property`
  - `document.title` (the title property of a web page doc.)
  - `image.src` (the source property of the image element)
- Different types of objects have different properties

OBJECTS HAVE METHODS

- Methods are functions that are performed by an object (object class)
  - think of them as verbs
- Dot Notation: `object.method(argument)`
- Examples:

1. `document.getElementById(x)`
   - "`document`" is the object
   - "`getElementById(x)`" is the function (or method) that is part of this object.
   - It gets the "puppet strings" to the object whose id is "`x`".
2. `window.open()`
   - `window` is the object
   - `open()` is the method – it opens a new window

REFERENCING OBJECT PROPERTIES AND METHODS

Element Object
(e.g., `h1` tag)

Element Properties
(examples)

```
id
name
style
```

```
-color
-fontFamily
-textAlign
```

Document Object

Properties (examples):

```
title
URL
```

Methods examples:

```
write ("");
getElementById("id");
```

INTERESTING NOTATION IN JAVASCRIPT

- All CSS styles can be used – must be written differently – for example:
  - `text-align` (CSS) == `textAlign` (JavaScript)
  - `background-color` (CSS) = = `backgroundColor` (JavaScript)
  - `font-family` (CSS) == `fontFamily` (JavaScript)
  - `font-weight` (CSS) == `fontWeight` (JavaScript)
- When combining multiple words into one term, JavaScript capitalizes the first letter of each word, starting from the second word.
  - **camelCase**

JAVASCRIPT FUNCTIONS

- A function is a set of instructions to the browser to do something
  - Typically – associated with an event, an element, and an action.
- Events can be asked to "trigger" functions
- Examples:
  - When user clicks (this is an event) on button (the element), function causes background color to change (the action)
  - When user moves mouse over (another event) an image (the element), function causes image to grow bigger (the action)

VARIABLE IN JAVASCRIPT

- A variable is a temporary holding place for keeping web page elements, their properties, or values.
- We create variables in JavaScript using
  - `const myform;`
  - `const userchoice;`
- A variable is valid only within the function where it is created (there are some exceptions – for later…)
- Typically, variables make it easy to write functions.
- You can assign values to variables:
  - `mycolor="red";`
- You can name a variable anyway you want – just do not use "**reserved**" words (e.g., don't name a variable as "form" or "element" or "color")

JAVASCRIPT VARIABLES

- Variable's value can change.
- Example:

```
const x;
```

  - this just "declares" or creates a variable named "x".

```
x=10;
```

  - this assigns a value of 10 to the variable "x".

- Assume there are some Javascript statements here;

```
x=20;
```

  - this assigns a different value of 20 to the same variable "x"

- Variable can be created and given a value in one step.
- Example:

```
let x=10;
```

OPERATING ON VARIABLES

- + Addition
- - Subtraction
- * Multiplication
- / Division
- ++ increment by 1
- -- decrement by 1

JAVASCRIPT CODE

- You must end each JavaScript statement with a semicolon (`;`) or a new line (or both)
- Each statement is either
  - A JavaScript command (we will learn about these)
  - or a JavaScript function