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Problem Solving / JavaScript Programming

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Problem Solving / JavaScript Programming

This lab experiment is a 2-part lab, which focuses on JavaScript Programming. Upon completing the lab, you will be able to understand each of the following:

- The definition of **Algorithmic Problem Solving**.
- The role of **JavaScript** in web pages.
- The concept of **Iteration** in computer programming.

PART 1

Web pages that are purely HTML are **static**, and do not change over time. The HTML page that you wrote in the previous lab experiment is static, and does not change over time. That (html) web page does not provide an option for user input.

JavaScript programming allows you to add code to your HTML document so that it can become interactive, and change. JavaScript allows you to add code to your HTML document so that it can become **interactive** (respond to user input), and **dynamic** (change over time).

JavaScript code within an HTML document is surrounded by the script tag :

```
<script language = "JavaScript">

</script>
```

Note: JavaScript is case sensitive, unlike HTML.

1) **OUTPUT**

JavaScript provides several options for a program to output (display results) to the user. We will first focus on the **alert box**.

☐ Type or copy and paste (pls do not click on) the following URL into your browser:

www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScript1.html

The following example shows how an alert box works. The page source code is below:

```
<html>
   <head>
      <title> Simple JavaScript </title>
   </head>
   <body>
```

```
        <h2> Showing the alert </h2>
                <script language = "JavaScript">
                alert("hi");
                 </script>
   </body>
</html>

<HTML>
<HEAD>
```

To prevent problems with older browsers, the JavaScript code is usually placed between HTML comments, as follows:

```
<script language="JavaScript">

     < !- - Beginning of JavaScript -

          (all your JavaScript instructions)

     // - End of JavaScript - -->

</script>
```

note: The <!-- and --> tags are used to hide comments in HTML from the browser.

☐ Copy and paste the following URL into your browser:
www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScript1.html

☐ Display the source code:

- Right click anywhere on the page.
- When the menu is displayed, select **View Page Source**.

☐ Copy the source code from the webpage and paste into your own **.html** file.

☐ Modify the code to change the alert message: replace **hi** with your own message.

☐ To check that this source code works**:** open the file in a Browser Window.

☐ Save your code.

If your browser window displays a warning message about active content, or the webpages do not appear properly, proceed to do the following :

Go to *Tools/Internet Options*.
Click on the *Advanced* Tab.
Check the boxes (enable) near the following options:

· **Allow Active content to run files on my computer**
· **Allow Active content from CDs**

☐ Copy and paste the following URL into your browser:

www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScriptError.html

What does the webpage display ?

Despliega el texto "Showing the alert"

_____

☐ Look at the source code using View/Source:
Click anywhere on the page
Right click
Select from the menu, View\Source

☐ Debug the page, by checking the first line that is not executing properly.

☐ Copy and paste the correct code here.

_____

What does this page do now?

Muestra la alerta "hi" y despliega el texto "Showing the alert"

_____

☐ The **prompt box** is similar to the alert box that is discussed above. The prompt box allows for user input. The prompt syntax is as follow:

```
var name=prompt("Please enter your name","Harry Potter");
```

The instruction above sets aside space in computer memory for the variable **`name`**. The parentheses include the prompt and the default value for the location. In the example above, "Please enter your name" is the **prompt**, and the **default value** is: `Harry Potter`.

You can also declare the variable and initialize the value using the following two statements:

```
var name;
name =prompt("Please enter your name","Harry Potter");
```

View this webpage in your web browser:

www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScriptPrompt.html

Describe what this webpage computes:

El usuario ingresa el total de la factura y la página regresa la propina.

What is your input to this webpage: El total de la factura, en este caso 10

What is the output on this webpage: La propina, en este caso 1.5

☐ Copy & paste the source code from the following webpage into a new notepad file:

www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScriptPrompt.html

☐ Save the file with a filename of your choice with the extension **.html**.

☐ Remove the **,0** from the prompt statement.

☐ Open your source code in a web browser.

Describe what is displayed. Explain why this happened.

Deja de salir un valor predefinido en el prompt, esto al eliminarlo y dejar vacío el parámetro

☐ Re-insert the **,0** in your source code and change the line:

```
total =

     to

TOTAL =
```

☐ Open the source code in a web browser.

Describe what is displayed. Explain why this happened.

El resultado cambia por NaN, esto debido a que al ser sensible a las mayúsculas, la variable total nunca recíbe ningún valor

Assignment

Create a webpage that will **Compute a College Student's Tuition Bill.**

Instructions

An **alert box** should first **Welcome the Student**.

After the alert appears, your web page should display the other fees. Up to two paragraphs in HTML is sufficient.

Your page should **display three (3) prompts**, requesting the name of the student, their academic year (freshman, sophomore, junior, or senior), and the number of credits to be taken this semester.

The price for each credit is $360 dollars. If a student takes more than 12 credits, the additional credits (i.e. more than 12 credits) are free. Therefore, the maximum charge for credits is $360/credit x 12 credits = $4,320.

In addition, freshmen have a student fee of $50, sophomores have a fee of $75, and juniors and seniors have a fee of $100.

The program should compute the total tuition bill including the price for the total credits and the student fee.

When the program is done, the amount of the tuition bill should be properly displayed.

Preparing the Algorithm

Input
Describe the data that the student needs to input (to the program) ?

Su nombre completo, semestre y créditos

Processing
Which calculations are needed in this program ?

El cálculo del valor del pago de los créditos, y el total de pago sumando el pago por semestre con el pago de créditos.

Output
What are the results displayed when the program is done ?

El nombre del estudiante y su total de pago

PART 2

1) The web page document, tables, buttons, images, and links are known as **objects**. Each **object** has certain properties that can be changed.

For example, the document has a color property that can be changed by assigning to it a different color. The code below could be added to the **SimpleJavaScript.html** file as follows:

- ☐ View the webpage below.
  www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScript1.html

- ☐ Display the source code as follows:
  - ☐ Right click anywhere on the page; a menu will be displayed.
  - ☐ Select View Page Source.
- ☐ Copy the source code from the webpage into a new **.html** file:

- ☐ Insert the following line between the **script** tags in the source code:

document.body.style.backgroundColor = "red";

☐ View the **.html** file in a new browser window.

☐ Modify the code to change the document color.

☐ Save the file.

☐ View the file again in a new browser window.

Instead of using a word to reference a color, the hexadecimal value can be used to specify the color.

For example:

document.bgColor = "#ff0000"

Explore **html color codes** online for the **hex codes** corresponding to other colors.

☐ Save your code.

Which **property** has been assigned a value in the line above? El color del fondo

What is the **value** that has been assigned? El valor hexadecimal del color rojo

- ☐ Add an **id property** within the **<h2>** tag so that we can identify that tag in our code.

```
<h2 id = "heading" > Showing the alert </h2>
```

☐ Copy the source code from the following webpage into your own .html file:
www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScript1.html

☐ Place the following line within the script tags of the source code:

```
<h2 id = "heading" > Showing the alert </h2>
```

☐ Save your code.

```
document.getElementById("heading").style.color = "green";
```

(refer to the line above): What is the **object** ?
El objeto h2, debido a que tiene el mismo id que el valor por seleccionar

What is the **property** of that object ? Su color

What is the **value** assigned to the property of that object ?

El color verde

The actual contents of the page can be changed in the same way.

☐ Add the following line:

```
document.getElementById("heading").innerHTML = "Alert shown!";
```

☐ Save your code.

Which **property** of which **object** has been assigned a value in the line above?

Se está asignando la propiedad innerHTML del objeto DOM

What is the **value of** the property assigned to object **document** ? "Alert shown!"

☐ Save your code.

2) **INPUT**
JavaScript allows input to a program in different ways. Let's examine the **text box**.

a) Copy and paste the following URL into your browser:

www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScript2.html

☐ **Type** a value into the text box, then **click** outside of the text box.

Describe what happens: Se da enter al valor y se muestra en el mensaje de alerta

b) Copy and paste the source code from SimpleJavaScript2.html into your own **.html** file.

Input a value in the text box and then click outside of the textbox. The text box that is in the script above is also an **object**. We can refer to its **value** in the following way:

```
document.Sample.dayOfWeek.value = "Sunday";
```

In the statement above the value **property** of the text box **dayOfWeek** in the form **Sample**, in the **document**, is assigned the value of "**Sunday**". The text box, form and document are all **objects**. The text box is an **element** in the form.

An **event** is an occurrence. An example of a user-caused event in the JavaScript code above is when the text box value changes. **onChange** is the event-handling attribute for the text box. The event handler is JavaScript code (no script tags are needed because event handlers are understood to be code).

In the case above, an alert box pops up with the information.

c) Change the event handler above. Some suggestions are as follows:

Modify the code so that the **background** changes color when something is entered.

Modify the code so that a **message** is printed inside the input box.

note: **onChange** is activated only when you click the mouse outside of the text box.

Write the code you wrote to change the event:

_____

Describe how the event changed: _____

d) View this webpage:
www.cs.csi.cuny.edu/~zelikovi/csc115/SimpleJavaScript5.html

☐ Copy and paste the JavaScript source code into a new **.html** file.

☐ Review the code.

The event that is triggered is the **click of a button**. In the example above the **onClick** is the event-handling attribute for the two buttons.

e) **Modify the code** to provide a choice of four colors instead of two colors.

Write the modified code below:

_____

_____

_____

3) The following is an example of a simple game in JavaScript:

https://www.cs.csi.cuny.edu/~zelikovi/csc115/hitTheDot.html

☐ Play the game once, by clicking on GAMe below:

GAMe

https://www.cs.csi.cuny.edu/~zelikovi/csc115/hitTheDot.html

☐ Proceed to answer the following questions:

a. What was your **score**? 30

b. How did you input information into the script? specify.

_____

c. How was information output (displayed) ?

3) A random number between 0 and 1 (not including 1) can be obtained by running the following line of JavaScript code (function):

```
Math.random()
```

An example of an alert box which uses this function is below:

www.cs.csi.cuny.edu/~zelikovi/csc115/random1.html

To obtain a random number between **0** and any other **number** (not including that number), multiply the statement above by that **number**.

For example, to obtain a random number between 0 and 5:

```
Math.random()*5
```

The following illustrates an example using an **alert** box:

www.cs.csi.cuny.edu/~zelikovi/csc115/random2.html

To produce whole numbers without decimals, extract only the whole number by adding the following statement:

```
Math.floor(Math.random()*5)
```

An example using an **alert** box is displayed on the following webpage:

www.cs.csi.cuny.edu/~zelikovi/csc115/random3.html

If a variable **number** is declared as follows: `var number;`
Number can then be assigned a random number value between 0-4 using the following assignment statement:

```
number = Math.floor(Math.random()*5);
```

4) **Create a JavaScript Program**

You are now ready to create a web page that **Predicts the Future**.

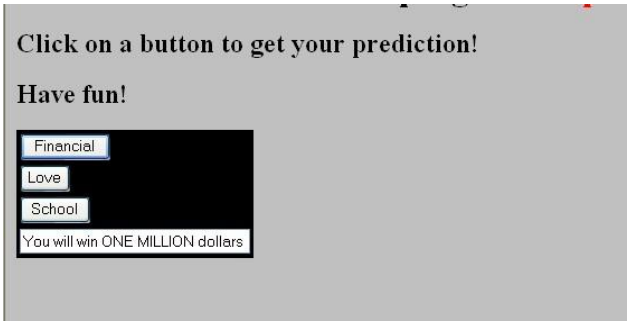
Begin your web page with some nice HTML lines/paragraphs welcoming the user, and explaining what your web page will do. Use color, fonts, images to make this webpage appear professionally presentable.

Create a **table** with **three** buttons and a **text box**. The buttons are named for three life topics that your page will predict. (ex: Financial, Love, School, Work, Family, Social).

When a user clicks on one of the buttons, the text box fills with a random prediction for the future in that particular life topic. For example, if the user clicks on Financial, the text box may display: "You will win the lottery tomorrow!".

Your program should get a random number, and use an "if statement" to select a prediction based upon that random number. Each of the three buttons (life topics), should include five possible predictions; depending upon the random number, the text box will select a particular prediction to display.

Below is a sample of a portion of the page, after the Financial button has been clicked:



5) **Iteration**

- Click on the following link (or copy & paste into a new browser window) to see how iteration works:

  https://www.cs.csi.cuny.edu/~zelikovi/csc115/iteration1.html

- Click the button and describe what happens on this webpage.

Note that there are two **.jpg** files and they are alternatively shown. As in section 2) above (Input), the **`src`** attribute of the **`img`** tag is changed. Review the code using View/Source and the **.jpg** files used for this program on the following webpage.

- ☐ Click on the following link:

  http://www.cs.csi.cuny.edu/~zelikovi/csc115/iteration2.html

  Describe what happens when the stop button is removed ?

  El loop ya no podrá detenerse

When the same code is executed again and again, etc. until the browser is closed, it is known as an **infinite loop**.

Congratulations ! You have completed the JavaScript Lab.

References:

1. Fluency With Information Technology, 7th edition
   Lawrence Snyder, Ray Henry

2. https://www.w3schools.com/

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