



CSIT884:
Web Development

Creating Dynamic Documents with Javascript, Animation



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REVIEW: Change content by JavaScript

- **Step 1:** give the HTML element that we want to change an ID

- **Step 2:** use the function

```
var e = document.getElementById("the-id");
```

to get the HTML element that we want to change

- **Step 3:** change the content of the HTML element

for span, div:

```
e.innerHTML = "the-new-content";
```

for input text field:

```
e.value = "the-new-value";
```

for image:

```
e.src = "the-new-image-src";
```

Useful elements for dynamic content:

- The `<div>...</div>` element - defines a generic section container
- The `...` element - defines a generic inline container

Say Hi 1

The web page displays **2 text fields**: *first name* and *last name*, and a **button** "*Say Hi*". If the user enters John in the first name text field and Smith in the last name text field, and clicks the "Say Hi" button, then a greeting message is displayed on the page: "*Hi John Smith!*".

First name:

Last name:

Hi John Smith!

Say Hi 1

```
First name: <input type="text" id="firstname" /> <br />  
Last name: <input type="text" id="lastname" /> <br />  
<button onClick="sayHi()">Say Hi</button> <br />  
<span id="greeting"></span>
```

First name: John

Last name: Smith

Say Hi

Hi John Smith!

Say Hi 1

```
function sayHi() {  
  // get the first name  
  
  // get the last name  
  
  // construct the greeting message  
  
  // display the greeting message  
}
```

Say Hi 1

```
// get the first name
```

```
var firstnameInput = document.getElementById("firstname");
```

```
var firstname = firstnameInput.value;
```

```
<input type="text" id="firstname" />
```

First name: John

Last name: Smith

Say Hi

Hi John Smith!

Say Hi 1

```
// get the last name
```

```
var lastnameInput = document.getElementById("lastname");
```

```
var lastname = lastnameInput.value;
```

```
<input type="text" id="lastname" />
```

First name: John

Last name: Smith

Say Hi

Hi John Smith!

Say Hi 1

```
// get the first name
var firstnameInput = document.getElementById("firstname");
var firstname = firstnameInput.value;

// get the last name
var lastnameInput = document.getElementById("lastname");
var lastname = lastnameInput.value;

// construct the greeting message
var greetingMessage = "Hi " + firstname + " " + lastname + "!";
```

First name:

Last name:

Hi John Smith!

Say Hi 1

```
// construct the greeting message  
var greetingMessage = "Hi " + firstname + " " + lastname + "!";  
  
// display the greeting message  
var greetingSpan = document.getElementById("greeting");  
greetingSpan.innerHTML = greetingMessage;
```

A diagram illustrating the data flow. Two input fields, 'First name: John' and 'Last name: Smith', are shown. Arrows from these fields point to the 'Say Hi' button. Another arrow points from the 'Say Hi' button to the output 'Hi John Smith!'. A separate arrow points from the 'document.getElementById("greeting");' line in the code above to the output 'Hi John Smith!'.

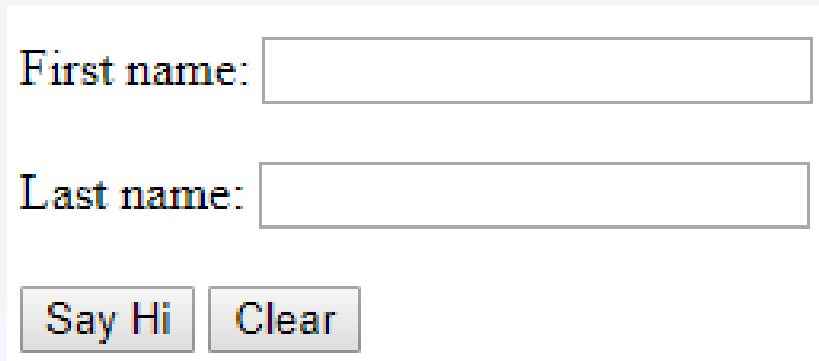
| | |
|-------------|-------|
| First name: | John |
| Last name: | Smith |

Hi John Smith!

Say Hi 2

Adding a button “Clear”.

If the user clicks the “Clear” button then the text in the input fields and the greeting message is removed.

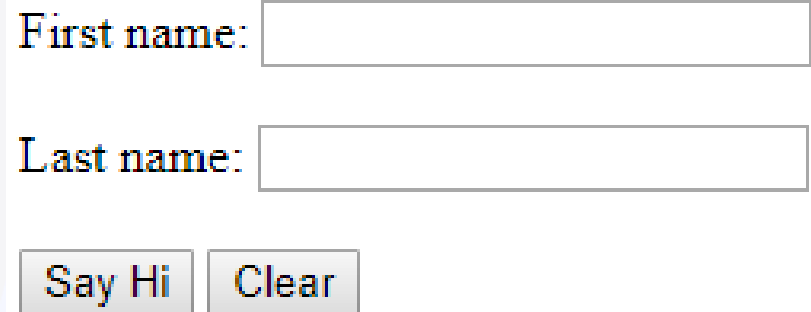


The form consists of two text input fields stacked vertically. The first field is labeled "First name:" and the second is labeled "Last name:". Below the input fields are two buttons: "Say Hi" and "Clear". The "Clear" button is positioned to the right of the "Say Hi" button.

| | |
|--|----------------------|
| First name: | <input type="text"/> |
| Last name: | <input type="text"/> |
| <div><div>Say Hi</div><div>Clear</div></div> | |

Say Hi 2

```
First name: <input type="text" id="firstname" /> <br /><br />
Last name: <input type="text" id="lastname" /> <br /><br />
<button onClick="sayHi()">Say Hi</button>
<button onClick="clearPage()">Clear</button> <br /><br />
<span id="greeting"></span>
```

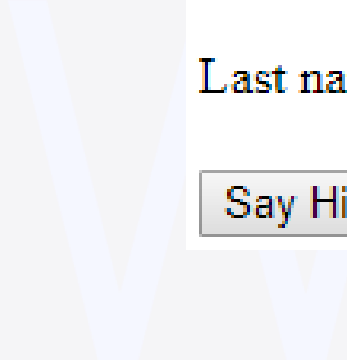



First name:

Last name:

Say Hi 2

```
function clearPage(){  
    // clear the firstname text field  
  
    // clear the lastname text field  
  
    // clear the greeting message  
}
```



First name:

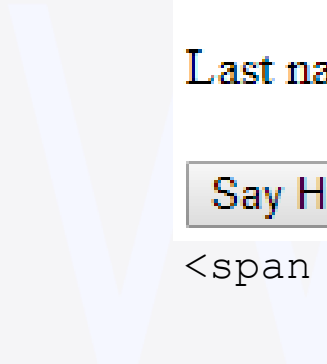

Last name:

Say Hi 2

```
// clear the firstname text field
var firstnameInput = document.getElementById("firstname");
firstnameInput.value = "";

// clear the lastname text field
var lastnameInput = document.getElementById("lastname");
lastnameInput.value = "";

// clear the greeting message
var greetingSpan = document.getElementById("greeting");
greetingSpan.innerHTML = "";
```



First name:

Last name:

Maths Question

The user enters 2 numbers into the two text fields, then selects the operation (+, - , x) from the drop-down list, then clicks the “=” button, then answer will be generated.



| | | | | |
|---|-----|---|---|---|
| 3 | + ▼ | 5 | = | 8 |
|---|-----|---|---|---|

Maths Question

```
<input type="text" id="input1" />
```

```
<select id="operationSelect">
```

```
  <option value="add">+</option>
```

```
  <option value="subtract">-</option>
```

```
  <option value="multiply">x</option>
```

```
</select>
```

```
<input type="text" id="input2" />
```

```
<button onClick="answer ()" = </button>
```

```
<input type="text" id="result" />
```

| | | | | |
|---|-----|---|---|---|
| 3 | + ▼ | 5 | = | 8 |
|---|-----|---|---|---|

Maths Question

```
function answer(){  
  // get the 1st number  
  // get the 2nd number  
  // get the operation  
  // calculate the result  
  // display the result  
}
```

Maths Question

```
// get the 1st number
```

```
var inputField1 = document.getElementById("input1");
```

```
var number1 = Number(inputField1.value);
```

```
// get the 2nd number
```

```
var inputField2 = document.getElementById("input2");
```

```
var number2 = Number(inputField2.value);
```

```
// get the operation
```

```
var operationSelect = document.getElementById("operationSelect");
```

```
var operation = operationSelect.value;
```

| | | | | |
|--------------------------------|----------------------------------|--------------------------------|--------------------------------|--------------------------------|
| <input type="text" value="3"/> | <input type="text" value="+ ▼"/> | <input type="text" value="5"/> | <input type="text" value="="/> | <input type="text" value="8"/> |
|--------------------------------|----------------------------------|--------------------------------|--------------------------------|--------------------------------|

Maths Question

```
// calculate the result
var result;
if(operation == "add") {
    result = number1 + number2;
}else if(operation == "subtract") {
    result = number1 - number2;
}else if(operation == "multiply") {
    result = number1 * number2;
}

// display the result
var resultField = document.getElementById("result");
resultField.value = result;
```

Change style

```
<button onClick="changeHelloWorldStyle();">
```

Click me to change the style of the text

```
</button>
```

```
<span id="hello">Hello world</span>
```

```
<script>
```

```
function changeHelloWorldStyle() {
```

```
    var helloSpan = document.getElementById("hello");
```

```
    helloSpan.style.color = "orange";
```

```
    helloSpan.style.fontSize = "30px";
```

```
    helloSpan.style.fontStyle = "italic";
```

```
}
```

```
</script>
```

Click me to change the style of the text Hello world

Click me to change the style of the text *Hello world*

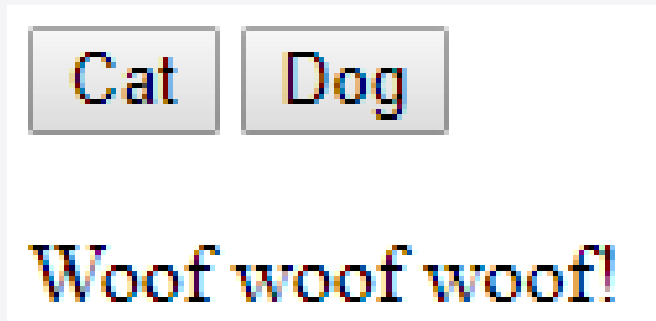
Passing arguments to function

Sometimes, it is useful to pass **arguments** to the **function**

Cat & Dog 1

```
<button onClick="cat()">Cat</button>  
<button onClick="dog()">Dog</button>  
<br /> <br />  
<span id="display"></span>
```

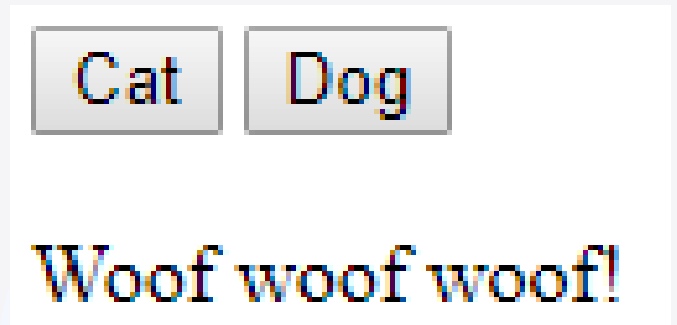
Old solution: using two functions



Cat & Dog 1B

```
<button onClick="showMessage('Meow meow meow!')">Cat</button>  
<button onClick="showMessage('Woof woof woof!')">Dog</button>  
<br /> <br />  
<span id="display"></span>
```

New solution: using one function with parameter



Cat & Dog 1B

New solution: using one function with parameter

```
function showMessage(message) {  
    // get the span element  
    var displaySpan = document.getElementById("display");  
  
    // show the message  
    displaySpan.innerHTML = message;  
}
```

Cat

Dog

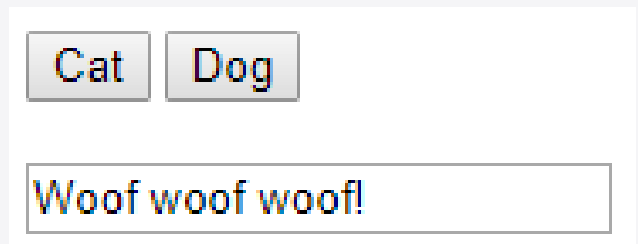
Woof woof woof!

Cat & Dog 2B

```
<button onClick="showMessage('Meow meow meow!')">Cat</button>
<button onClick="showMessage('Woof woof woof!')">Dog</button>
<br /> <br />
<input type="text" id="display" />
```

```
function showMessage(message) {
  // get the text field element
  var displayField = document.getElementById("display");

  // show the message
  displayField.value = message;
}
```



Cat & Dog 3B

```
<button onClick="showImage('cat.png')">Cat</button>
<button onClick="showImage('dog.png')">Dog</button>
<br /> <br />
<img id="display" />
```

```
function showImage(imageFile) {
    // get the image element
    var image = document.getElementById("display");

    // show the animal picture
    image.src = imageFile;
}
```



Random

To get a random (decimal) number from 0 (**inclusive**) to 1 (**exclusive**):

```
var x = Math.random(); // random decimal number 0 → 1
```

Random

Random decimal number from 0 → ~~1~~

`Math.random()`

Random decimal number from 0 → ~~10~~

`Math.random() * 10`

Random **integer** from 0 → ~~10~~

`Math.floor(Math.random() * 10)`

//generate a random integer: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

`var x = Math.floor(Math.random() * 10);`

Random

Random decimal number from 0 → ~~1~~

`Math.random()`

Random decimal number from 0 → ~~10~~

`Math.random() * 10`

Random integer from 0 → ~~10~~

`Math.floor`(`Math.random() * 10`)

Random integer from 1 → ~~11~~

`Math.floor(Math.random() * 10) + 1`

//generate a random integer: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
`var x = Math.floor(Math.random() * 10) + 1;`

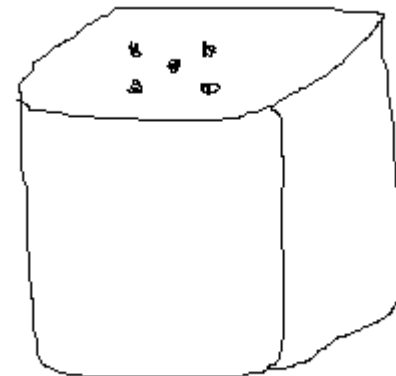
Dice 1

When the button is clicked, a random dice is displayed.

Generate a random integer from 1 to 6:

`Math.floor(Math.random() * 6) + 1`

Roll the dice



Dice 1

```
<button onClick="rollDice()">
```

Roll the dice

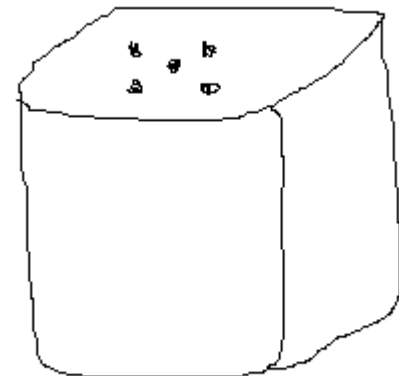
```
</button>
```

```
<br />
```

```
<img id="dice" />
```



Roll the dice



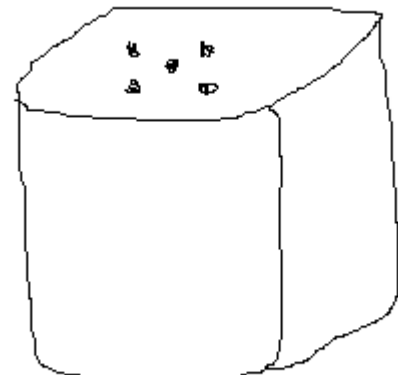
Dice 1

```
function rollDice(){  
    // generate a random dice value from 1 to 6  
    var diceValue = Math.floor(Math.random() * 6) + 1;  
  
    // get image file name for this dice value  
    var imageFile = "dice" + diceValue + ".png";  
  
    // show the image  
    var diceImage = document.getElementById("dice");  
    diceImage.src = imageFile;  
}
```



Roll the dice

dice5.png



Animation

Start an animation

```
var animationSchedule = setInterval(animationFunction, milisecs);
```

specify 2 things:

- **what need to be done**: write a function to do the task
- **how often**: how often this task need to be done

Stop the animation

```
clearInterval(animationSchedule);
```


Counter animation

When the “Start Counter” button is clicked, the counter animation displays a number increasing every 1 second.

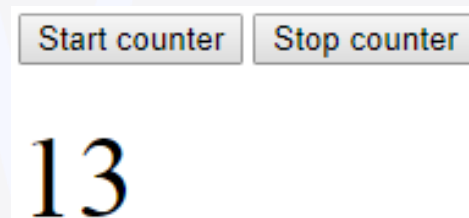
When the “Stop Counter” button is clicked, the number stops increasing.

```
initially counter = 0
```

```
start animation
```

| | | |
|-----------|---------------|-------------|
| 1000 msec | showCounter() | counter = 1 |
| 1000 msec | showCounter() | counter = 2 |
| 1000 msec | showCounter() | counter = 3 |
| 1000 msec | showCounter() | counter = 4 |
| 1000 msec | showCounter() | counter = 5 |
| | | |

```
stop animation
```



Counter animation

```
<button onClick="startCounterAnimation () ">
```

Start counter

```
</button>
```

```
<button onClick="stopCounterAnimation () ">
```

Stop counter

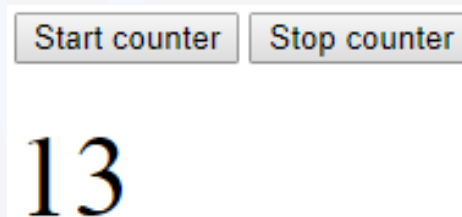
```
</button>
```

```
<br /><br />
```

```
<font size="7">
```

```
<span id="counter"></span>
```

```
</font>
```



Counter animation

```
var counter = 0;  
  
var counterSchedule;  
  
function startCounterAnimation(){  
  
    // start the counter animation  
    counterSchedule = setInterval(showCounter, 1000);  
  
}
```

Start an animation

- ***what need to be done***: write a function to do the task
- ***how often***: how often this task need to be done

Start counter

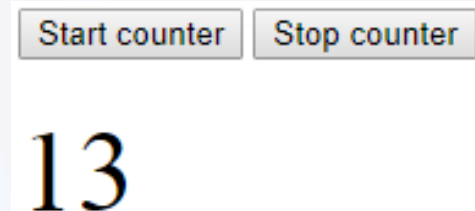
Stop counter

13

Counter animation

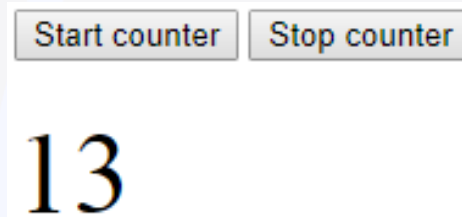
```
function showCounter() {  
    // increase the counter by 1  
    counter = counter + 1;  
  
    // show the counter  
    var counterSpan = document.getElementById("counter");  
    counterSpan.innerHTML = counter;  
}
```

what need to be done:
write a function to do the
task of the animation



Counter animation

```
function stopCounterAnimation() {  
    clearInterval(counterSchedule);  
}
```

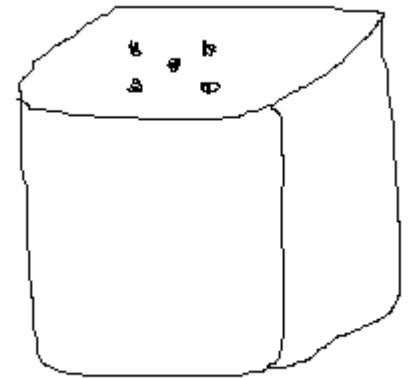


Dice 2 - animation

When the button is clicked, within 1 second, a flash of 10 random dice images are displayed, and then it stops.

```
start animation
100 msec    rollDice()    counter = 0
100 msec    rollDice()    counter = 1
100 msec    rollDice()    counter = 2
100 msec    rollDice()    counter = 3
100 msec    rollDice()    counter = 4
100 msec    rollDice()    counter = 5
100 msec    rollDice()    counter = 6
100 msec    rollDice()    counter = 7
100 msec    rollDice()    counter = 8
100 msec    rollDice()    counter = 9
100 msec    rollDice()    counter = 10
stop animation
```

Roll the dice



Use a **counter variable** to know
when to stop the animation

Dice 2 - animation

```
<button onClick="rollDiceAnimation()">
```

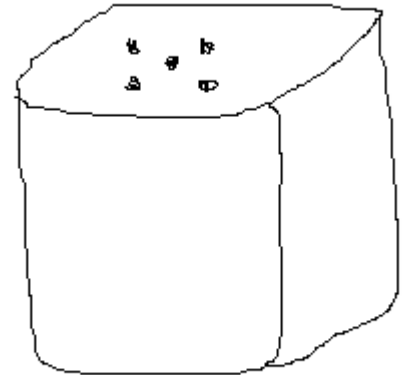
```
Roll the dice
```

```
</button>
```

```
<br />
```

```
<img id="dice" />
```

Roll the dice

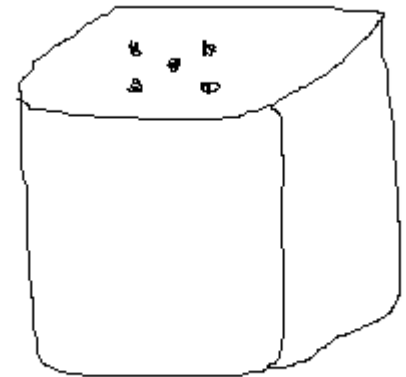


Dice 2 - animation

```
var rollDiceSchedule;  
var rollDiceCounter;  
  
function rollDiceAnimation() {  
    // set the roll dice counter to 0  
    rollDiceCounter = 0;  
  
    // start the roll dice animation  
    rollDiceSchedule = setInterval(rollDice, 100);  
}
```



Roll the dice



Start an animation

- ***what need to be done***: write a function to do the task
- ***how often***: how often this task need to be done

Dice 2 - animation

what need to be done:

write a function to do the task of the animation

```
function rollDice() {  
    // generate a random dice value from 1 to 6  
    var diceValue = Math.floor(Math.random() * 6) + 1;  
  
    // get image file name for this dice value  
    var imageFile = "dice" + diceValue + ".png";  
  
    // show the image  
    var diceImage = document.getElementById("dice");  
    diceImage.src = imageFile;  
  
    // increase the roll dice counter  
    rollDiceCounter = rollDiceCounter + 1;  
  
    // if the roll dice counter reaches 10 then stop the animation  
    if(rollDiceCounter == 10) {  
        clearInterval(rollDiceSchedule);  
    }  
}
```

