

CSIT884

Web Development

**Dynamic Documents with JavaScript,
Animation**



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Objectives:

- use JavaScript to build website with dynamic content;
- use JavaScript to generate animation on your web site.

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, etc.:

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

for input text field:

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

for image:

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

Useful tags for dynamic content:

- The `<div>` tag defines a generic section container
- The `` tag 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:

Last name:

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:

Last name:

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;
```

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

First name: John
Last name: Smith
Say Hi
Hi John Smith!

Say Hi 2

Adding a button “Clear”.

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

First name:

Last name:

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:

``¹⁵

Math 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
---	-----	---	---	---

Math 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	17
---	-----	---	---	---	----

Math Question

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

Math 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;
```

Math 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;
```

Passing parameters to function

Sometimes, it is useful to pass **parameters** 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



Woof woof woof!

New solution: using one function with parameter

Cat & Dog 1B

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



Woof woof woof!

New solution: using one function with parameter

Cat & Dog 1B

```
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('Meao meao meao!')">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;  
}
```



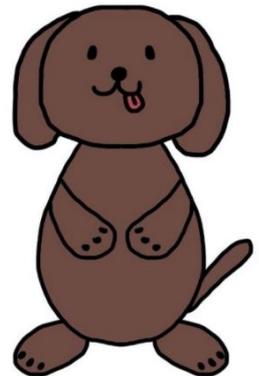
Woof woof woof!

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;  
}
```

Cat Dog



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

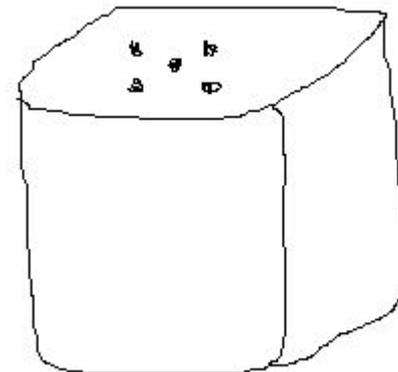
When the button is clicked, a random dice is displayed.

Generate a random integer from 1 to 6:

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

Roll the dice

Roll the dice



Dice 1

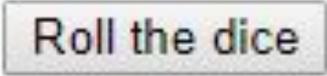
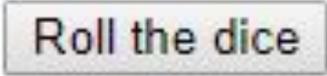
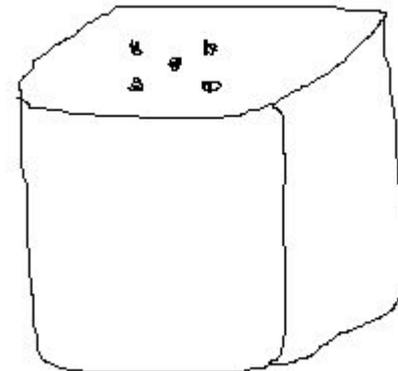
```
<button onClick="rollDice()">
```

```
Roll the dice
```

```
</button>
```

```
<br />
```

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

A rectangular button with a light gray background and a thin border. The text "Roll the dice" is centered on the button in a dark gray, sans-serif font.A rectangular button with a light gray background and a thin border. The text "Roll the dice" is centered on the button in a dark gray, sans-serif font.

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;  
}
```

dice5.png



Animation

Start an animation

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

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 is stop increasing.

```
initially counter = 0
```

```
start animation
```

```
1000 milisec      showCounter()      counter = 1
```

```
1000 milisec      showCounter()      counter = 2
```

```
1000 milisec      showCounter()      counter = 3
```

```
1000 milisec      showCounter()      counter = 4
```

```
1000 milisec      showCounter()      counter = 5
```

```
.....
```

```
stop animation
```

13

Counter animation

```
<button onClick="startCounterAnimation()">  
Start counter  
</button>
```

```
<button onClick="stopCounterAnimation()">  
Stop counter  
</button>
```

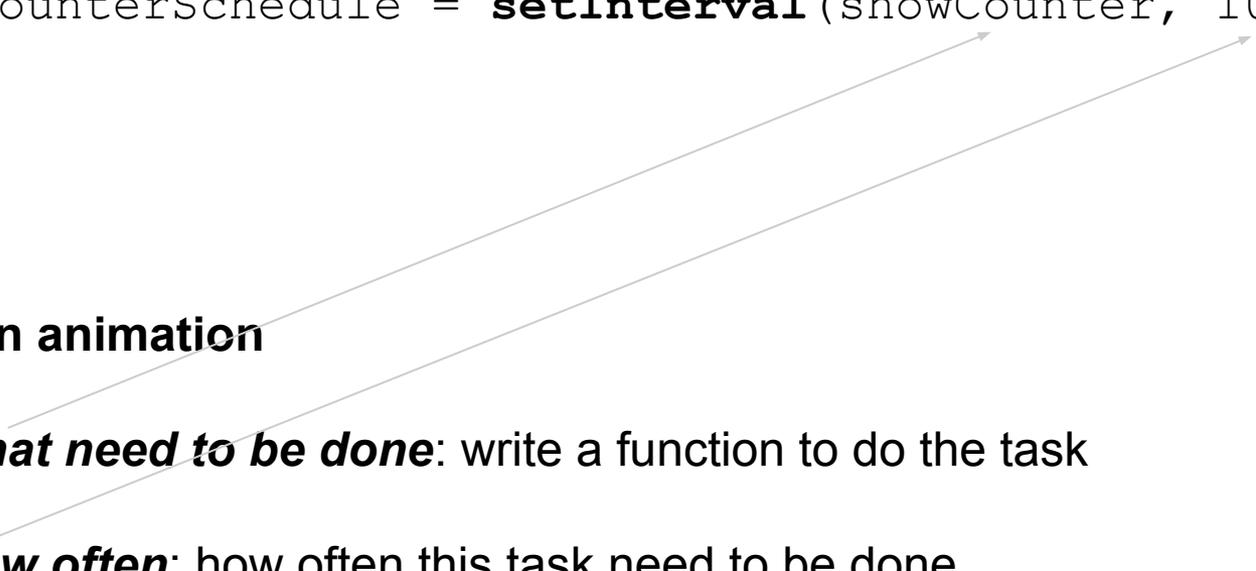
```
<br /><br />
```

```
<font size="7">  
<span id="counter"></span>  
</font>
```

Start counter Stop counter

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

Counter animation

what need to be done:

write a function to do the task of the animation

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

Start counter

Stop counter

Counter animation

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

Start counter Stop counter

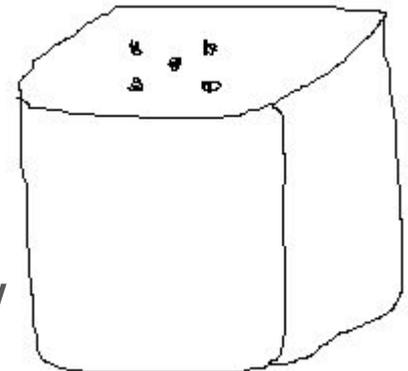
Dice 2 - animation

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

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

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

Roll the dice

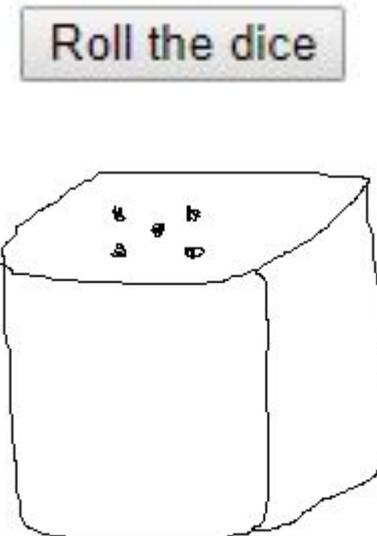


Dice 2 - animation

```
<button onClick="rollDiceAnimation()">  
Roll the dice  
</button>
```

```
<br />
```

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

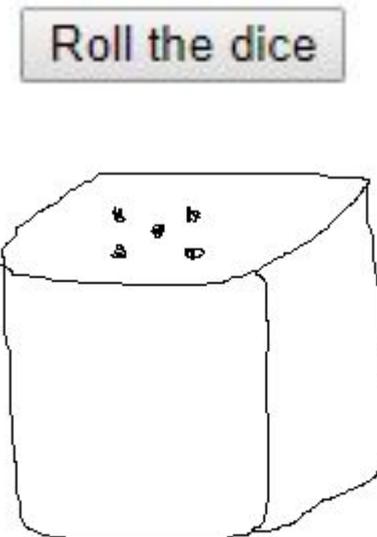


Dice 2 - animation

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

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

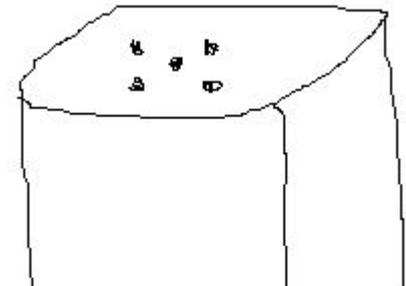


what need to be done:

write a function to do the task of the animation

Dice 2 - 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);  
    }  
}
```



References

- <http://www.w3schools.com/js>
- <http://developer.mozilla.org/en-US/docs/Web/JavaScript>