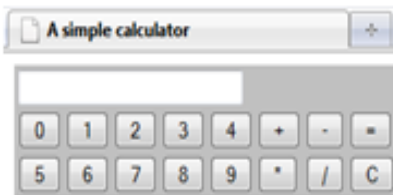


## JavaScript tutorial-A simple calculator

In this small sample project, you will learn to create a simple JavaScript calculator. This calculator has only one text box and sixteen buttons. The text box allows users to enter numbers to be calculated and shows the result. The input numbers and result are shown above the text box. This will help the user see the progress of the operation easily. The nine of sixteen buttons are labeled from 0 to 9 and named from button0 to button9. These nine buttons let users to input number characters to the text box by clicking on them. The rest of buttons are adding, subtracting, multiplying, dividing, showing result, and clearing buttons. The functions of these buttons will discuss later.



Now let's consider some restrictions to make the calculator more sense:

-Users can input only ten characters at a time in to the text box.

-Only the number character is allowed when the key is pressed.

Now you understand the requirements, as well as some restrictions of our simple calculator. Next we will move to the Interface Design phase.

### Interface Design

As you already knew, our JavaScript calculator has one text box and sixteen buttons.

The text box that is used to input number characters and show the final result is named txtvalue. Above the text is a div tag used to display the numbers and result.

The nine of sixteen buttons are used to input the number characters. They are labeled from 0 to 9 and named from button0 to button9. Six more additional buttons are named buttonadd, buttonsubtract, buttonmultiply, buttondivide, buttonresult, and buttonclear. The buttonadd, buttonsubtract, buttonmultiply, buttondivide are not intended to do calculations. Their functions are only to record the (+,-,\*, or /) and the first input number. We leave the calculations with the buttonresult. The buttonreult will record the second input number, make calculations and show to the result in the text box. The buttonclear is used to to clear he values stored in variables as well as in the text box and in the div tag. By running the code shown below, you see a simple calculator.

```
<html>
<head>
<title>A simple calculator</title>

</head>
<body>
<form >
<table style="border: 2; background-color: silver;">
```

```
<tr>
<td colspan="6">
<div id="display"></div>
<input type="text" name="txtvalue" maxlength="10" style="width: 164px" onkeypress="return
check(event)"></td>
</tr>
<tr >

<td><input type="button" name="button0" value="0"></td>
<td><input type="button" name="button1" value="1"></td>
<td><input type="button" name="button2" value="2"></td>
<td><input type="button" name="button3" value="3"></td>
<td><input type="button" name="button4" value="4"></td>
<td><input type="button" name="buttonadd" value="+"></td>
<td><input type="button" name="buttonsubtract" value="-"></td>
<td><input type="button" name="buttonresult" value="="></td>

</tr>
<tr>

<td ><input type="button" name="button5" value="5"></td>
<td><input type="button" name="button6" value="6"></td>
<td><input type="button" name="button7" value="7"></td>
<td><input type="button" name="button8" value="8"></td>
<td><input type="button" name="button9" value="9"></td>
<td><input type="button" name="buttonmultiply" value="*"></td>
<td><input type="button" name="buttondivide" value="/"></td>
<td><input type="button" name="buttonclear" value="C"></td>

</tr>
</table>

</form>
</body>
</html>
```

### Make the nine buttons to function

Now you have nine buttons labeled from 0 to 9 that you hope they will input the number characters in to the text box. However, you need to write some JavaScript code to make them work as expected. Each function will append one number character to text box when it is clicked.

To make each of the buttons work we create one function for each button. These functions are get0(), get1(), get2(), get3(), get4(), get5(), get6(), get7(), get8(), and get9(). Each function is attached to the onclick event of each button respectively.

```
<html>
<head>
<title>A simple calculator</title>
```

```
<script type="text/javascript" language="JavaScript">
function get0(){
document.forms[0].txtvalue.value+="0";
}
function get1(){
document.forms[0].txtvalue.value+="1";
}
function get2(){
document.forms[0].txtvalue.value+="2";
}
function get3(){
document.forms[0].txtvalue.value+="3";
}
function get4(){
document.forms[0].txtvalue.value+="4";
}
function get5(){
document.forms[0].txtvalue.value+="5";
}
function get6(){
document.forms[0].txtvalue.value+="6";
}
function get7(){
document.forms[0].txtvalue.value+="7";
}
function get8(){
document.forms[0].txtvalue.value+="8";
}
function get9(){
document.forms[0].txtvalue.value+="9";
}

```

```
</script>
```

```
</head>
```

```
<body>
```

```
<html>
```

```
<head>
```

```
<title>A simple calculator</title>
```

```
</head>
```

```
<body>
```

```
<form >
```

```
<table style="border: 2; background-color: silver;">
```

```
<tr>
```

```
<td colspan="6">
```

```
<div id="display"></div>
```

```
<input type="text" name="txtvalue" maxlength="10" style="width: 164px" onkeypress="return
check(event)"></td>
```

```
</tr>
```

```
<tr >
```

```
<td><input type="button" name="button0" value="0"></td>
<td><input type="button" name="button1" value="1"></td>
<td><input type="button" name="button2" value="2"></td>
<td><input type="button" name="button3" value="3"></td>
<td><input type="button" name="button4" value="4"></td>
<td><input type="button" name="buttonadd" value="+"></td>
<td><input type="button" name="buttonsubtract" value="-"></td>
<td><input type="button" name="buttonresult" value="="></td>
```

```
</tr>
```

```
<tr>
```

```
<td ><input type="button" name="button5" value="5"></td>
<td><input type="button" name="button6" value="6"></td>
<td><input type="button" name="button7" value="7"></td>
<td><input type="button" name="button8" value="8"></td>
<td><input type="button" name="button9" value="9"></td>
<td><input type="button" name="buttonmultiply" value="*"></td>
<td><input type="button" name="buttondivide" value="/"></td>
<td><input type="button" name="buttonclear" value="C"></td>
```

```
</tr>
```

```
</table>
```

```
</form>
```

```
</body>
```

```
</html>
```

```
<td><input type="button" name="button0" value="0" onclick="get0()"></td>
<td><input type="button" name="button1" value="1" onclick="get1()"></td>
<td><input type="button" name="button2" value="2" onclick="get2()"></td>
<td><input type="button" name="button3" value="3" onclick="get3()"></td>
<td><input type="button" name="button4" value="4" onclick="get4()"></td>
<td><input type="button" name="buttonadd" value="+"></td>
<td><input type="button" name="buttonsubtract" value="-"></td>
<td><input type="button" name="buttonresult" value="="></td>
```

```
</tr>
```

```
<tr>
```

```
<td ><input type="button" name="button5" value="5" onclick="get5()"></td>
<td><input type="button" name="button6" value="6" onclick="get6()"></td>
<td><input type="button" name="button7" value="7" onclick="get7()"></td>
<td><input type="button" name="button8" value="8" onclick="get8()"></td>
<td><input type="button" name="button9" value="9" onclick="get9()"></td>
<td><input type="button" name="buttonmultiply" value="*"></td>
<td><input type="button" name="buttondivide" value="/"></td>
```

```
<td><input type="button" name="buttonclear" value="C"></td>
```

```
</tr>  
</table>  
  
</form>  
</body>  
</html>
```

## Do calculations

To do calculations on the input numbers, you need to make the rest of the buttons to perform their work.

The button `buttonadd`, `buttonsubtract`, `buttonmultiply`, and `buttondivide` are used to record the arithmetic operators(+,-,\*, and /) respectively as well as the first input number.

The button `buttonresult` will do calculations and display the result.

The button is used to clear the values stored in variables, text box, and div tag.

```
<html>  
<head>  
<title>A simple calculator</title>  
<script type="text/javascript" language="JavaScript">  
var sign;  
var val1;  
var val2;  
function get0(){  
document.forms[0].txtvalue.value+="0";  
}  
function get1(){  
document.forms[0].txtvalue.value+="1";  
}  
function get2(){  
document.forms[0].txtvalue.value+="2";  
}  
function get3(){  
document.forms[0].txtvalue.value+="3";  
}  
function get4(){  
document.forms[0].txtvalue.value+="4";  
}  
function get5(){  
document.forms[0].txtvalue.value+="5";  
}  
function get6(){  
document.forms[0].txtvalue.value+="6";  
}  
function get7(){
```

```
document.forms[0].txtvalue.value+="7";
}
function get8(){
document.forms[0].txtvalue.value+="8";
}
function get9(){
document.forms[0].txtvalue.value+="9";
}

function add(){
sign="+";
val1=document.forms[0].txtvalue.value;
document.forms[0].txtvalue.value="";

}
function subtract(){
sign="-";
val1=document.forms[0].txtvalue.value;
document.forms[0].txtvalue.value="";

}

function multiply(){
sign="*";
val1=document.forms[0].txtvalue.value;
document.forms[0].txtvalue.value="";

}

function divide(){
sign="/";
val1=document.forms[0].txtvalue.value;
document.forms[0].txtvalue.value="";

}

function result(){
var res;
val2=document.forms[0].txtvalue.value;
if(sign=="+") res=parseInt(val1)+parseInt(val2);
else if(sign=="-") res=parseInt(val1)-parseInt(val2);
else if(sign=="*") res=parseInt(val1)*parseInt(val2);
else res=parseInt(val1)/parseInt(val2);
if(!isNaN(res)) document.forms[0].txtvalue.value=res;

}

function cleartext(){
```

```
document.forms[0].txtvalue.value="";

val1="";

val2="";

res="";

}

</script>
</head>
<body>
<form >
<table style="border: 2; background-color: silver;">
<tr>
<td colspan="6">
<div id="display"></div>
<input type="text" name="txtvalue" maxlength="10" style="width: 164px"></td>
</tr>
<tr >

<td><input type="button" name="button0" value="0" onclick="get0()"></td>
<td><input type="button" name="button1" value="1" onclick="get1()"></td>
<td><input type="button" name="button2" value="2" onclick="get2()"></td>
<td><input type="button" name="button3" value="3" onclick="get3()"></td>
<td><input type="button" name="button4" value="4" onclick="get4()"></td>
<td><input type="button" name="buttonadd" value="+" onclick="add()"></td>
<td><input type="button" name="buttonsubtract" value="-" onclick="subtract()"></td>
<td><input type="button" name="buttonresult" value="=" onclick="result()"></td>

</tr>
<tr>

<td ><input type="button" name="button5" value="5" onclick="get5()"></td>
<td><input type="button" name="button6" value="6" onclick="get6()"></td>
<td><input type="button" name="button7" value="7" onclick="get7()"></td>
<td><input type="button" name="button8" value="8" onclick="get8()"></td>
<td><input type="button" name="button9" value="9" onclick="get9()"></td>
<td><input type="button" name="buttonmultiply" value="*" onclick="multiply()" ></td>
<td><input type="button" name="buttondivide" value="/" onclick="divide()" ></td>
<td><input type="button" name="buttonclear" value="C" onclick="cleartext()"></td>

</tr>
</table>
```

```
</form>
</body>
</html>
```

Note: we use `isNaN()` function to make sure that the result value is the number before the result is assigned to text box and display it in the `div` tag. This is to avoid displaying `NaN`.

### JavaScript code to allow only a ten- character number input

This JavaScript simple calculator allows the user to input a number of ten characters. It doesn't accept numbers that contain more than ten characters.

You can do this by using the `maxlength` property of the text box:

```
<input type="text" name="txtvalue" maxlength="10" style="width: 164px"></td>
```

The `maxlength="10"` lets the user press the keys ten time only. By using this property you can limit the characters of a number to input. However, when the user makes input by pushing buttons the input number can be more than ten characters long. To allow the use to input a number that contain characters less than to equal to 10, you need to check the length of the number input before appending more characters.

Example:

```
function get0(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="0";
}
```

### Accept only number keys

Now your JavaScript calculator seems to work well. However, when a user inputs characters (by pressing keyword) that are not number characters(from 0 to 9), the calculator still accepts those characters. This will lead to an error when the user clicks the `buttonresult` button to make calculations.

To solve this problem, you need a piece of JavaScript code that applies to the `onkeypress` event of the text box:

```
function check(e){
var code=e.keyCode? e.keyCode:e.charCode;
if((code>=48 && code<=57)|| code==8) return true;
else return false;
}
```

This function needs to be applied to the event `onkeypress` of the text box:

```
<input type="text" name="txtvalue" maxlength="10" style="width: 164px" onkeypress="return
check(event)"></td>
```

### Make more user-friendly



To make the JavaScript calculator more user-friendly, we use a div tag to display the progress of the operation. This will show the numbers input by the user and the result right above the text box that displays only the final result.



To complete this task we have to modify the JavaScript code in the function `add()`, `subtract()`, `multiply()`, and `divide()`. We also declare `i` variable to store the value 0 or 1 to help us identify the first click. We modify them to make user our calculator can handle some important things:

-When the user changes from one operation to another(e.g. from add to subtract) before clicking the result button.

-When the user clicks buttons to add, subtract, multiply, or divide numbers without a number in the text box.

How to change value display right above the text box?

To understand how we handle these situations, please read the piece code and expiations:

```
function add(){
sign="+";

if(i==0) {
if(document.forms[0].txtvalue.value=="") val1=0;
else val1=document.forms[0].txtvalue.value;
i=1;
}
document.getElementById("display").innerHTML =val1+" ";
document.forms[0].txtvalue.value="";

}
```

When a user clicks on the button to add, subtract, multiply, or divide numbers, the first thing is to record the operator(+, -, \*, and /). The second thing is to check whether it is the first click(`i=0`). If it is the first click and the text box is blank, the 0 will be assigned to variable `val1`(stores the first value). If it is the first click and the text box is not blank, the variable `val1` will contain the value of the text box. Then `i` is updated to 1. The value of the `i` variable will be reset to 0 when the clear or results button is clicked. The final step of this piece of JavaScript code is to update the value displayed right above the text box and clear the text box for further input.

The final code of JavaScript calculator program is shown below:

```
<html>
<head>
<meta http-equiv="Content-Language" content="en-us">
<title>A simple calculator</title>
```

```
<script type="text/javascript" language="JavaScript">
var sign;
var val1;
var val2;
var i=0;
function get0(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="0";
}
function get1(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="1";
}
function get2(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="2";
}
function get3(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="3";
}
function get4(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="4";
}
function get5(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="5";
}
function get6(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="6";
}
function get7(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="7";
}
function get8(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="8";
}
function get9(){
if(document.forms[0].txtvalue.value.length<=10)
document.forms[0].txtvalue.value+="9";
}

function add(){
sign="+";

if(i==0) {
if(document.forms[0].txtvalue.value=="") val1=0;
```

```
else val1=document.forms[0].txtvalue.value;
i=1;
}
document.getElementById("display").innerHTML =val1+" ";
document.forms[0].txtvalue.value="";

}
function subtract(){
sign="-";
if(i==0) {
if(document.forms[0].txtvalue.value=="") val1=0;
else val1=document.forms[0].txtvalue.value;
i=1;
}
document.getElementById("display").innerHTML =val1+"-";

document.forms[0].txtvalue.value="";

}

function multiply(){
sign="*";
if(i==0) {
if(document.forms[0].txtvalue.value=="") val1=0;
else val1=document.forms[0].txtvalue.value;
i=1;
}
document.getElementById("display").innerHTML =val1+"*";
document.forms[0].txtvalue.value="";
i=1;
}

function divide(){
sign="/";
if(i==0) {
if(document.forms[0].txtvalue.value=="") val1=0;
else val1=document.forms[0].txtvalue.value;
i=1;
}
document.getElementById("display").innerHTML =val1+"/";
document.forms[0].txtvalue.value="";

}

function result(){
var res;
val2=document.forms[0].txtvalue.value;
if(sign=="+") res=parseInt(val1)+parseInt(val2);
else if(sign=="-") res=parseInt(val1)-parseInt(val2);
```

```
else if(sign=="*") res=parseInt(val1)*parseInt(val2);
else res=parseInt(val1)/parseInt(val2);
if(!isNaN(res)) {
document.forms[0].txtvalue.value=res;
document.getElementById("display").innerHTML+=val2+"="+res;
i=0;

}
```

```
}

function cleartext(){
document.forms[0].txtvalue.value="";
val1="";
val2="";
res="";
document.getElementById("display").innerHTML="";

i=0;
}
```

```
function check(e){
var code=e.keyCode? e.keyCode:e.charCode;
if((code>=48 && code<=57)|| code==8) return true;
else return false;
}
```

```
</script>
</head>
<body>
<form action="#">
<table style="border: 2; background-color: silver;">
<tr>
<td colspan="6">
<div id="display"></div>
<input type="text" name="txtvalue" maxlength="10" style="width: 164px" onkeypress="return
check(event)"></td>
</tr>
<tr >
<td><input type="button" name="button0" value="0" onclick="get0()"></td>
<td><input type="button" name="button1" value="1" onclick="get1()"></td>
<td><input type="button" name="button2" value="2" onclick="get2()"></td>
<td><input type="button" name="button3" value="3" onclick="get3()"></td>
<td><input type="button" name="button4" value="4" onclick="get4()"></td>
<td><input type="button" name="buttonadd" value="+" onclick="add()"></td>
<td><input type="button" name="buttonsubtract" value="-" onclick="subtract()"></td>
<td style="width: 6px"><input type="button" name="buttonresult" value="="
onclick="result()"></td>
```

```
</tr>
```

```
<tr>
```

```
<td ><input type="button" name="button5" value="5" onclick="get5()"></td>
<td><input type="button" name="button6" value="6" onclick="get6()"></td>
<td><input type="button" name="button7" value="7" onclick="get7()"></td>
<td><input type="button" name="button8" value="8" onclick="get8()"></td>
<td><input type="button" name="button9" value="9" onclick="get9()"></td>
<td><input type="button" name="buttonmultiply" value="*" onclick="multiply()" ></td>
<td><input type="button" name="buttondivide" value="/" onclick="divide()" ></td>
<td style="width: 6px"><input type="button" name="buttonclear" value="C"
onclick="cleartext()"></td>
```

```
</tr>
```

```
</table>
```

```
</form>
```

```
</body>
```

```
</html>
```