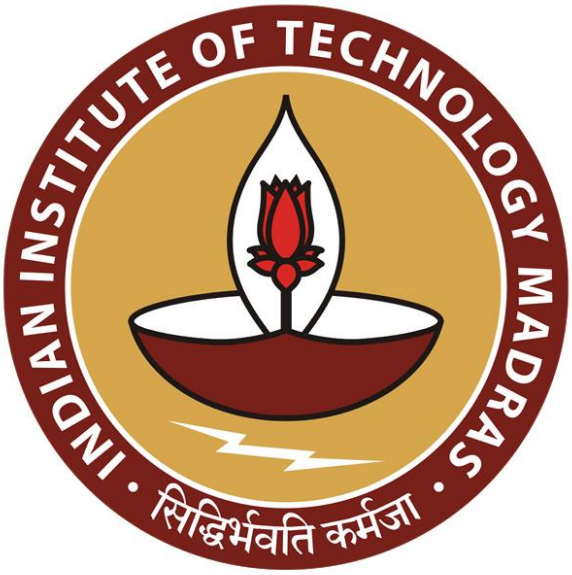

IIT Madras

ONLINE DEGREE

Modern Application Development II
Online Degree Programme
B. Sc in Programming and Data Science
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Week 2 - Javascript - Basic Calculator

(Video Start: 00:14)

Welcome to the modern application development 2 Screencast. In this Screencast we will build a simple calculator using just html and Javascript and nothing else. To follow along open an editor in this case I am using sublime text you can use VSodium or any other and have a browser Chrome or Firefox yeah. To start with I have just created a template of html. So, we can quickly start and I have opened the same thing in the browser same html.

Here I have opened the same. Now we are going to you know build a calculator in the first part of it we are just going to make it very simple where we will probably have a text box and then a button called you know maybe calculate. And then you know when you give an expression here. Let us say 5 star 6 and then click on calculator it should return 30. that is the first part that we are going to build and then we are going to enhance it.

Now that this is out of the way let us add some style sheet to this to make it pretty we can add it from bootstrap project as we know. So, let me just copy the CSS and add CSS and add parts of Javascript bundle as well. I have added Javascript bundle now I will just add a structure using the grid you can look at here in the grid how to add a structure you know columnar structure I am just going to do that here very quickly and copy paste from my existing code.

So, it is faster and add some form elements basically one text box and one button like we need those two let me add them here. So, what we need is a container and a row like we have in grid system and then let me just add by one by one. So, there is one container

one row I am just going to close the container and within this one row I am going to have three columns.

I am just going to use the middle column but I am going to have three columns class call. So, you can check this out on bootstrap grid to see how this works I think we have already gone through this mad modern application development one in the bootstrap Screencast you can revisit that to you know see if you want to learn more about it. So, I have three columns I am going to use the middle column for my input box and a and a button.

So, let me just create an input, input is a text box type is also input this is the one where you know you will give an expression. So, I will call it an expression. So, this is probably this and we are calling this as expression because that is the one we are going to evaluate and then you know I will have a placeholder for people to help let us say 3 star 5 as a placeholder. So, they will know what to do I will just end it and we are going to add a class you know form control to this.

So, we have added this let us just check ones now let me just save this go here and so, this is how it is going to think it you can edit it if you want. Now I am going to add a button or just below it and button type is button type only. So, nothing to worry about there and I will give an id I will calc call this calculate because you know that is what the button is going to do c a l c u l a t e and then I will add a class button I want to make it blue.

You can check the colors on bootstrap I think the primary one is blue. So, I am going to just make it btn primary yeah you can check this for class names there. So, let us see if it looks ok? It looks ok, we are not given a name. So, you know we will give a label. So, there you go. So, we have a button and when we click we want to update this content and then show the value.

Now Javascript has a very interesting function called eval where you can give an expression in the form of string and it will evaluate in run time and return you the result you can check that on mdn docs. It is not very safe but for our example it works. So, you

know we can use it for example I will just quickly run that here in the console eval it takes a string 3 star 5 it gives you 15.

Let me just zoom in here three star five it gives you that and then you know three star five + two it checks off the operator in what order it should be evaluated etcetera. So, we do not have to worry any of those. So, you know if you give an operation like you know expression and then you can evaluate directly. So, that is what we are going to do now the most important part is adding a event to this button what should happen when you click the button.

So, that can be done in two ways the most easiest one is a function you can call on this called on click and you can give a function let us say we want to call a function called calculate on click of this button. We do not have this function defined we can define. So, what happens is when this button is clicked this function will get called. So, we can define this function.

Let us just define a simple function starts with function as you would know and then open up all I am just going to just alert something. Now if I have saved it and reload it that is happening because I did not give the script tag. So, basically you should put the Javascript function in a script tag right. So, script tag. So, I am going to add it here I am just going to format a bit for it to look good.

Now let us refresh this screen. So, it is there if I click on calculate that function gets called alert now what we have to do is get the value from here and evaluate it and return the answer. So, now you know you can get a value of id by calling a function got get value or get an element by id and then calling the value attribute on that. So, what you could do is you know write a simple line which actually then paste.

Let us write anyway expression is equal to document dot get element by id we are trying to get element id of this id expression and then we want the value of it. So, I can just console.log just to check whether we are getting the value let us do that. So, now if I refresh this and let us say I enter 3 + 6 of 3 + 6 and we calculate it is logging here. So, I know that has been entered and we are getting the value.

Now we need to just evaluate and return it. So, what we will do is we will just call answer is equal to eval of this expression once answer is found I am going to set it back into this same text box. So, once calculate this gets replaced and should go become nine like that all right. So, I will do answer then I will copy this and then equal to answer now if I reload and if I do six star seven calculate gives 42 and the answer is it automatically filters.

So, you have a calculator basically you can do many thing 4 divided by 2 + 3 for example you know 5. So, you can do many things for example what happens if you give empty and click calculate nothing happens but it prints undefined because this value is undefined. So, we can add an extra validation here we will do this only if there is a if there is a valid value in the expression we can do that within if not do nothing now if we calculate nothing happens because no value nothing happens.

So, that we have angled one thing but there could be other things for example you know somebody enters that and it calculated throws an exception. So, you can always add a try and catch block much easier to allow try and catch block. You can always add try and then catch exception or and I will probably do nothing for now. And then you know we can for now I will just log ctrl S I will do console dot log yeah bad expression, and reload.

And let us say somebody enters this is a bad expression. Now actually I want to show all the logs of the thing what all the expressions have evaluated whether there is error etcetera at the bottom of this. We can just create a div you know and then add ordered list and keep adding to the ordered list I will show it to you. So, let us say if there is an ordered list.

And let us call that a log right and then slash ul. So, we are going to keep adding li or list items to this as and when we ex express run the expression. So, for that I will just write another function and call that function instead of you know adding it to the same function just that the work is different and so, it is better to keep the functions on smaller and purposeful than you know adding everything to the same function.

So, let us say this function is called add log and then let us say it has a log called message to this ui. So, first thing I will get is where I will just I will just get a reference to this yeah ul is equal to document dot get element by id you no id is a log. So, log now you know to add to this we need to create an li. So, I will have to create an element. So, I will create an element where li is that is done using a create element function on document create.

So, you can create any tag dynamically by calling this function create element and passing the name of the tag. So, I am going to create element li how to add text to it means I have to create a text node as well or a message node and add it to li and then add li to ul. So, I will just create another one called message node all right. So, var message text node is equal to.

So, that can be directly created by calling document dot create text node node and passing the actual message and then I will add this to this as a child and this to this as a child. So, let us add to li li dot append child I am adding message text note to the li. So, now we have the fully formed li with with the text inside it now we are going to add it to ul. So, I will add same thing ul dot append child li.

Now we can call this whenever we want. So, let us say along with logging I want to say expression is bad please fix it let us see if it works I am going to enter some random thing click on. So, it shows the message x is bad please fix it I just want it to be a little more significant. So, I will just add a h or maybe h3 saying log. So, let us say this it is bad please fix it. So, if when it gets evaluated also I want to add.

So, I will just add similar thing here then say add log expression equal to answer let us see what happens. So, if I do 3 + 5 and click on calculate it shows here and we are logged. So, let me do one more six and calculate it adds to the same it skip it is adding the nodes to this li dynamically and then divided by 2 does that then in case there is an arrow click on calculate it goes wrong and then it shows the message.

So, you can you can modify it as much as you want. Now you know this is simplest calculate if you want to go little more higher and actually use a math expression you could use master dot js and you know actually call evaluate on that. So, you can also call

you know scientific functions for example let me just do that and include the math dot js. So, let us see math is get started or like.

So, download and you can download from any cdn let us do it from js deliver I will just copy it and then add script src. So, that is been included now it gives us another function called math if you see their example and that we can use to evaluate all right so this function. So, let us create another function let us not modify this function I will just copy this function.

So, I will just call it math calculate instead of thing and instead of calling eval I will call math dot what is it evaluate now instead of calling this function calculate we can call math calculate now if I go back here and let us say we have sin 90 click calculate now we are getting even scientific answers all right. So, we now have even a simple scientific calculator and what we learned here is how to create nodes dynamically?

How to create html nodes dynamically and add it to the existing DOM you know how to answer to an you know event and then you know how to respond to an event how to catch an exception and handle it you know how to write functions. One more thing that we want to do is if there is another way to attach the event we do not have to attach it here. If you want it we can attach it as part of the script itself.

For example if you want to do all the event attachments centralized we can do that as well for example let me just create another function called initialize app right. So, what I am going to do is initialize the app here. So, I am not going to add on click event here this is going to be plain simple html no Javascript within this part I am just going to do everything here. Let us say you want to do get element by id similar to this I want to get this button calculate.

So, calculate, now you can attach an event to this calculate by calling admin listener you can say calculate dot on event listener and then it takes two things one is the event name what is the event click and what is the function that needs to be called. In our case the function needs to be called is math calculate just to separate it out I there is two the functions and the variable are same name.

So, I want to call I will call this calculate button just to keep it clean and separate because there could be confusing. Now you can see that it gets button reference and then on button click we are collecting the function math calculate. So, functions of first class elements you can pass around the functions. So, I am passing the function here now this has to be called on loading of the application.

So, we can actually call it at the end here once the DOM is loaded we can call initialize app and then it should work right. So, let us say there seems to be some error here let us check oh sorry it should be add event list not on event listener I am adding the event listener to that button you can add many multiple ones not just one for the same button but I am here I am adding only one.

Now refresh you can say sin of 90 and calculate it gives an answer. So, you know it gets initialized like this but you can also do other thing you can also call on body you can call on load that is also another event which gets called on the load of the body once the body is loaded completely that that gets called. So, we can remove this part to make it. So, here on body load we are initializing the app which is adding an event listener which is doing everything else to handle right.

So, now if I would zoom a bit 3 star 5 calculate it gives 15 and here it is and if I do star sin 90 you know you can calculate and you can go on. That is it actually the simple calculator we are going to do part 2 of it where we are going to add a grid of buttons to make it look more like the regular calculator. Let us see how the regular calculator looks like you.

(Video End: 23:47)