<CS105>
What Will We Do Today?

Data Types
Simple Math
String Operations
Functions and Declarations
Making Javascript talk to HTML
Remember this simple program?

```javascript
var firstvariable;
firstvariable=256;
alert(firstvariable);
```
Let's make it a little more interesting

```javascript
var firstvariable;
var secondvariable;
firstvariable=256;
secondvariable=128;
alert(secondvariable);
```
Let's make it a little more interesting

```javascript
var firstvariable;
var secondvariable;
firstvariable=256;
secondvariable=128;
alert(secondvariable-64);
```
Let's make it a little more interesting

var firstvariable;
var secondvariable;
firstvariable=256;
secondvariable=128;
alert(firstvariable+secondvariable);
Let's make it a little more interesting

```javascript
var firstvariable;
var secondvariable;
firstvariable=256;
secondvariable=128;
var thirdvariable=firstvariable+secondvariable;
alert(thirdvariable);
```
But Beware !!!

```javascript
var firstvariable;
var secondvariable;
firstvariable="256";
secondvariable=128;
var thirdvariable=firstvariable+secondvariable;
alert(thirdvariable);
```
Huh? What just happened

That's some strange Math!
Huh? What just happened
That's some strange Math!

Actually, it’s not Math at all....
Huh? What just happened
That's some strange Math!

Actually, it’s not Math at all....

Just a basic "String Operation"
Great. Another new term....

What is a String Operation?
Great. Another new term....

What is a String Operation?

You can do a lot of cool stuff with strings....
Great. Another new term....

What is a String Operation?

You can "concatenate" them, for example.
Great. Another new term....

What is a String Operation?

You can "concatenate" them, for example.

"Hello" + "World"
Concatenate?
Let's try that!

```
alert("Hello" + " World");
```
Concatenate?
Let's try that!

alert("Hello" + " World");

HelloWorld
Concatenate?
Let's try that!

alert("Hello" + " " + "World");

Hello World
var firstvariable;
var secondvariable;
firstvariable="256";
secondvariable=128;
var thirdvariable=firstvariable+secondvariable;
alert(thirdvariable);
Wait. What?
Let's simplify...

```javascript
var firstvariable;
var secondvariable;
firstvariable="256";
secondvariable=128;
var thirdvariable=firstvariable+secondvariable;
alert(thirdvariable);
```
Wait. What?
Let's simplify...

```javascript
var firstvariable;
var secondvariable;
var thirdvariable = "256" + 128;
alert(thirdvariable);
```
Wait. What?
Let's simplify...

```javascript
var firstvariable;
var secondvariable;
var thirdvariable = "256" + 128;
alert(thirdvariable);
```
Wait. What?
Let's simplify...

```javascript
var firstvariable;
var secondvariable;
alert("256"+128);
```
Wait. What?
Let's simplify...

alert("256"+128);
Well, OK, but that's just one string

alert("256"+128);
Well, OK, but that's just one string and a number!

alert("256"+128);
Well, OK, but that's just one string and a number!

`alert("256"+128);`

What’s going on here?
It's all about data types!

So far, we've seen a few of them

Strings

Numbers

For the really cool stuff we'll later use

Objects
It's all about data types!
It's all about data types!

So far, we've seen a few of them
It's all about data types!

So far, we've seen a few of them

Strings

Numbers
It's all about data types!

Most languages use very rigid typing.
It's all about data types!

Most languages use very rigid typing

So you could add two numbers together
It's all about data types!

Most languages use very rigid typing.

So you could add two numbers together.

Or divide them.
It's all about data types!

Most languages use very rigid typing

So you could add two numbers together

Or divide them (but only if you have the right data type for your target number!)
It's all about data types!

Most languages use very rigid typing

So you could add two numbers together

Or divide them (but only if you have the right data type for your target number!)

You can do a lot of Math with number types
It's all about data types!

Most languages use very rigid typing

Or you could concatenate two strings
It's all about data types!

Most languages use very rigid typing

Or you could concatenate two strings

Or take certain characters out

Or search for character
It's all about data types!

Most languages use very rigid typing

Or you could concatenate two strings

Or take certain characters out

Or search for character

You cannot do any Math with strings
It's all about data types!

What are data types good for?
It's all about data types!

What are data types good for?

Different data types have different characteristics (or "shapes" if you like)
It's all about data types!

What are data types good for?

Different data types have different characteristics (or "shapes" if you like)

They can be stored more efficiently if the computer knows what they are
It's all about data types!

What are data types good for?

They are also very helpful in code verification.
It's all about data types!

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The compiler can easily assess whether what you're trying to do is a legal operation or not.
It's all about data types!

What are data types good for?

They are also very helpful in code verification. The compiler can easily assess whether what you're trying to do is a legal operation or not. And that helps prevent a lot of problems.
So what about JavaScript?

*JS uses very weak data typing.*
So what about JavaScript?

*JS uses very weak data typing.*

You can even change variable types without ever declaring what you do.
So what about JavaScript?
So what about JavaScript?

```javascript
var someNumber=1290;
someNumber="Hello!";
alert(someNumber);
```
So what about JavaScript?

```javascript
var someNumber=1290;
someNumber="Hello!";
alert(someNumber);
```

*In most languages this would throw an error.*
So what about JavaScript?

```javascript
var someNumber=1290;
someNumber="Hello!";
alert(someNumber);
```

In most languages this would throw an error.

"Hey, you can't put a string into a number variable. That won’t fit!"
So what about JavaScript?

```javascript
var someNumber=1290;
someNumber="Hello!";
alert(someNumber);
```

JS, however, guesses what you want to do and just changes the type in the background.

This can be both a blessing and a curse.
Time for some `<html>`

Javascript is really great at talking to content in HTML pages

In fact, that's the single most important reason we teach it here
Time for some `<html>`

Here's some simple HTML

```html
<p>
I am a paragraph
</p>
```
Time for some `<html>`

Let's use JavaScript to make `<p>` interactive!

```html
<p>
I am a paragraph
</p>
```
Time for some `<html>`

For that, we must use an "Event Handler"

```html
<p>
I am a paragraph
</p>
```
Time for some `<html>`

For that, we must use an "Event Handler"

```html
<p onClick="changeMe();">
  I am a paragraph
</p>
```
Time for some `<html>`

Let's try that!

`<p onclick="changeMe();">`

I am a paragraph

`</p>`
It's Today's First Bug!
It's Today's First Bug!

Let's look at the console!
It's Today's First Bug!

Let's look at the console!

ReferenceError: changeMe is not defined
It's Today's First Bug!

Of course! We need to write that function first!
It's Today's First Bug!

```javascript
function changeMe(){
}
```
It's Today's First Bug!

<script language="JavaScript">
function changeMeMe(){
}
</script>
No more errors 😊

But it's still pretty boring....
<script language="JavaScript">
function changeMeMe()
{
}
</script>

<p onClick="changeMeMe();">
I am a paragraph
</p>
I am a paragraph

<script language="JavaScript">
function changeMe(){
alert("You clicked me!");
}
</script>

<p onClick="changeMe();">
I am a paragraph
</p>
I am a paragraph
<script language="JavaScript">
  function changeMeMe(){
  }
</script>

<p onClick="changeMeMe(this);">I am a paragraph</p>
<script language="JavaScript">
function changeMeMe(target){
}
</script>

<p onclick="changeMeMe(this);">I am a paragraph</p>

<script language="JavaScript">function changeMeMe(target){target.innerHTML="You changed me!";}</script>

<p onClick="changeMeMe(this);">I am a paragraph</p>
What's That?

I am a paragraph
Technically....
Technically, target is an "object" that represents the paragraph. When we passed "this" to the function, we passed along a lot of information that includes many "methods" and "properties" which we can now access as part of target. We can read and manipulate all kinds of properties about target and the paragraph will change as a result. We can also make it do certain things by invoking built in methods (or functions). Objects are really, really cool and we will learn about them in a few weeks. For now, the good news is that actually
Technically, target is an "object" that represents the paragraph. When we passed "this" to the function, we passed along a lot of information that includes many "methods" and "properties" which we can now access as part of target. We can read and manipulate all kinds of properties about target and the paragraph will change as a result. We can also make it do certain things by invoking built in methods (or functions). Objects are really, really cool and we will learn about them in a few weeks. For now, the good news is that actually you don't need to know all this yet
For now

target.innerHTML="You changed me!";
For now

Just think of target as the paragraph

target.innerHTML="You changed me!";
For now

Just think of target as the paragraph

and of target.innerHTML as a variable that contains the HTML inside of the paragraph.

target.innerHTML="You changed me!";
For now

You can read and write the paragraph by using it like any other variable.

target.innerHTML="You changed me!";
<script language="JavaScript">
function changeMeMe(target){
target.innerHTML="You changed me!";
}
</script>

<p onClick="changeMeMe(this);">I am a paragraph</p>
</CS105>