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Professional Instructor
and Lean Process Coach
MasterControl

2018 MASTERS SUMMIT

JavaScript Basics for MasterControl Analytics

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Course Objectives

- Become more familiar with JavaScript basics.
- Increase use of the formula editor within MasterControl reports.

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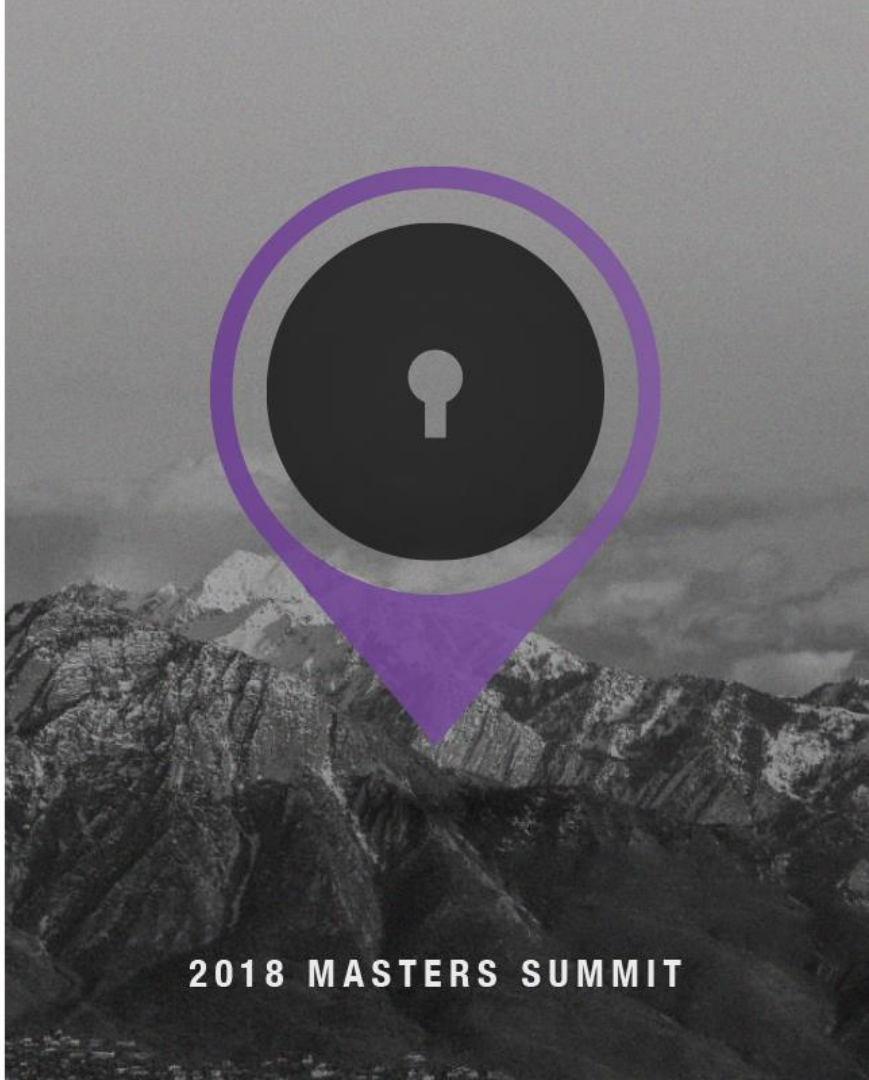


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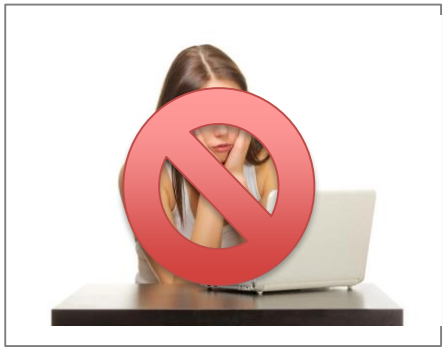
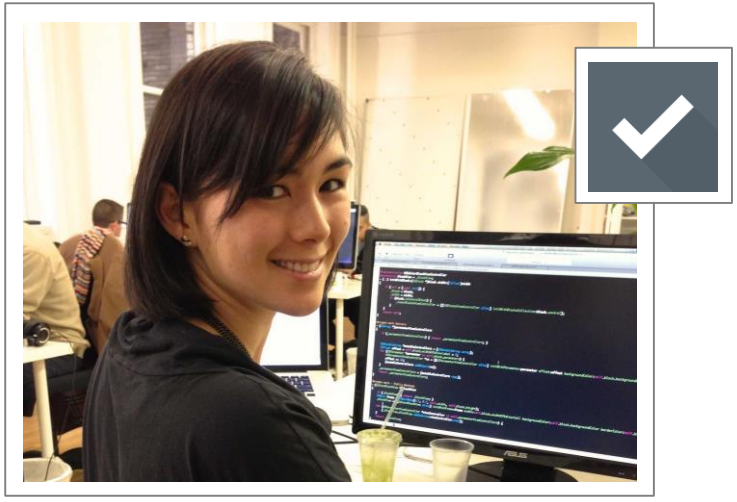
I HAVE NO IDEA WHY





Good Coding Habits

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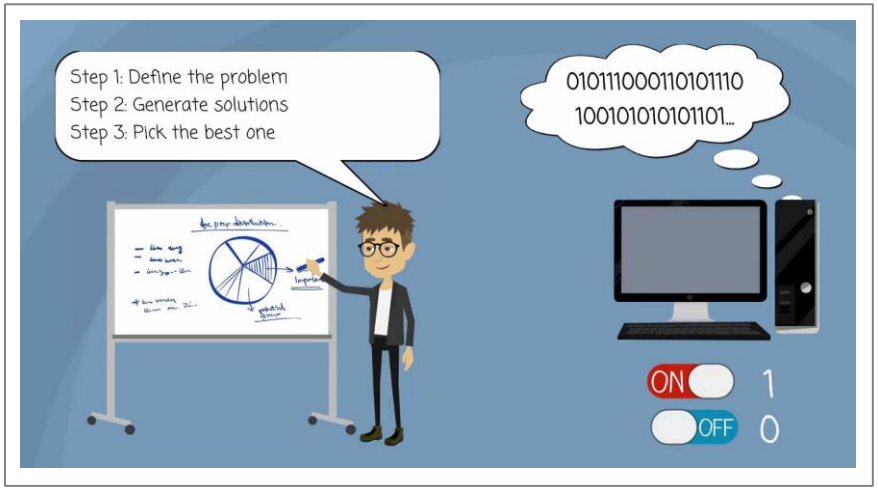
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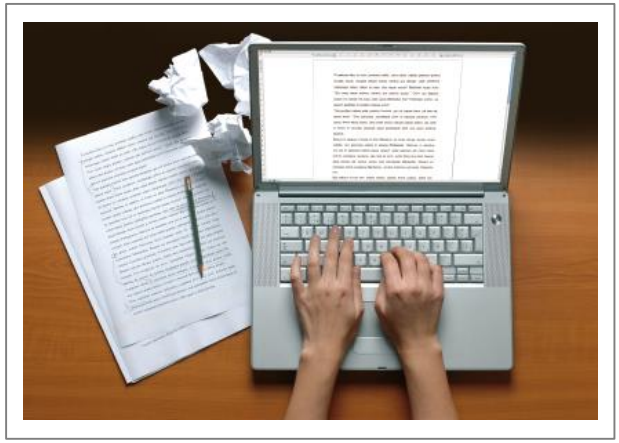

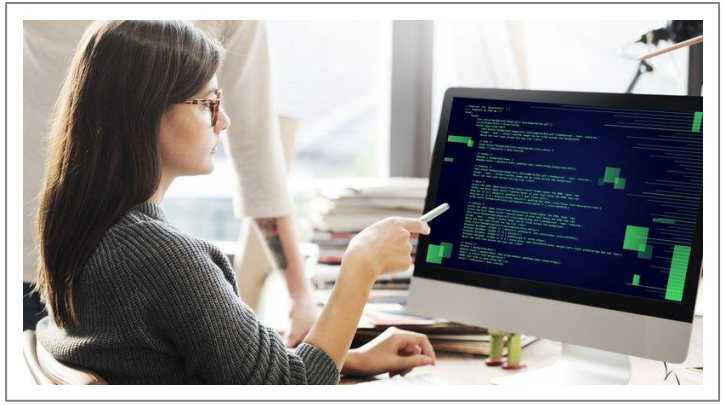

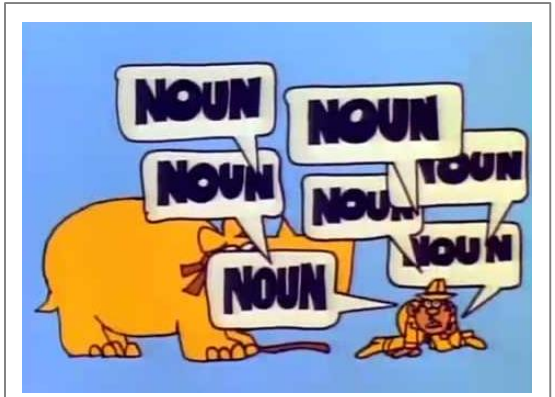
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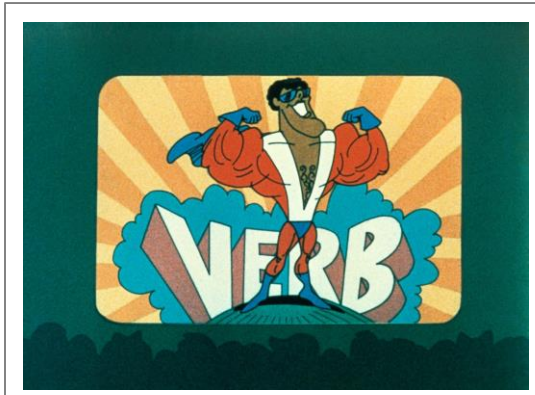
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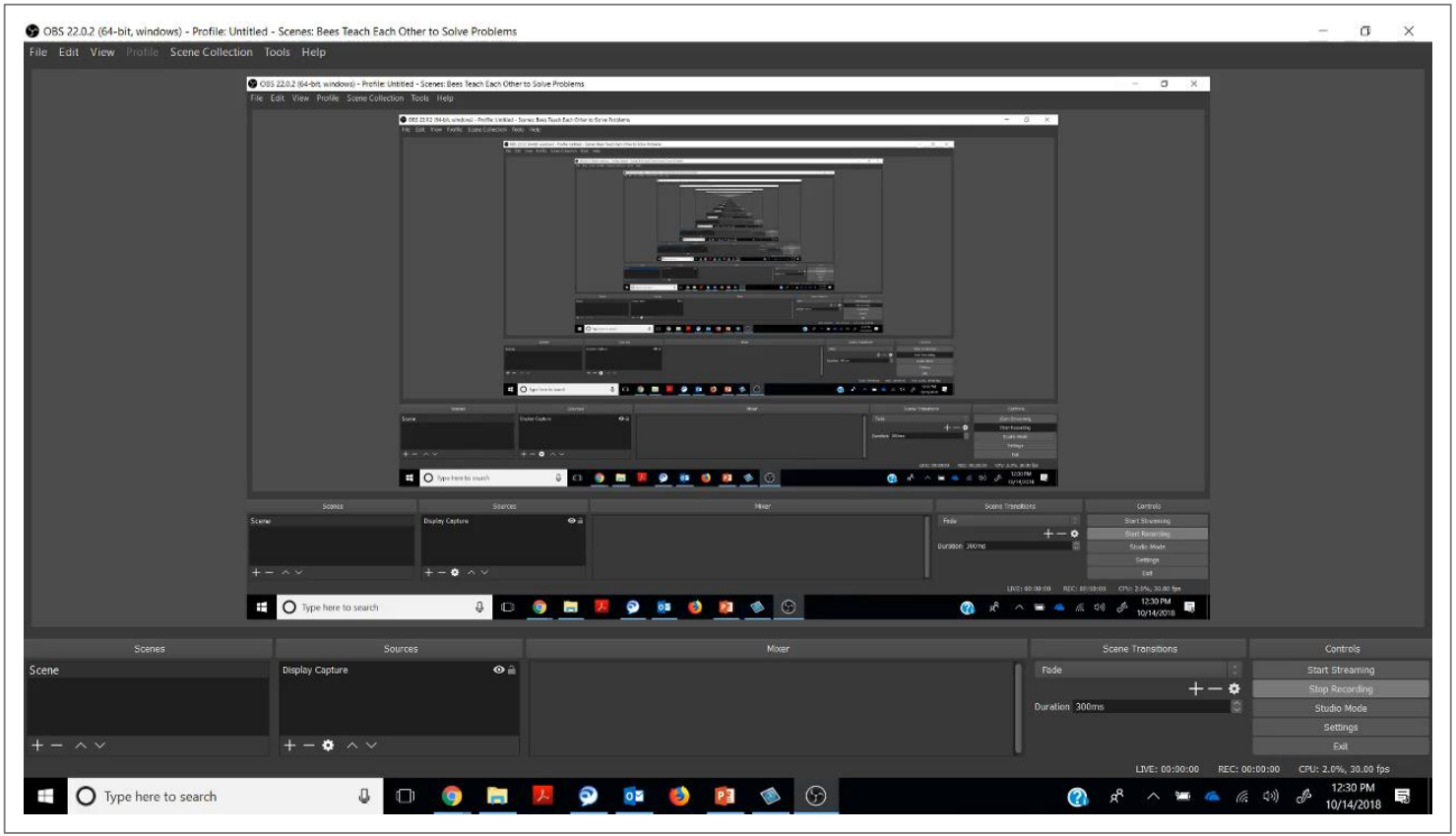
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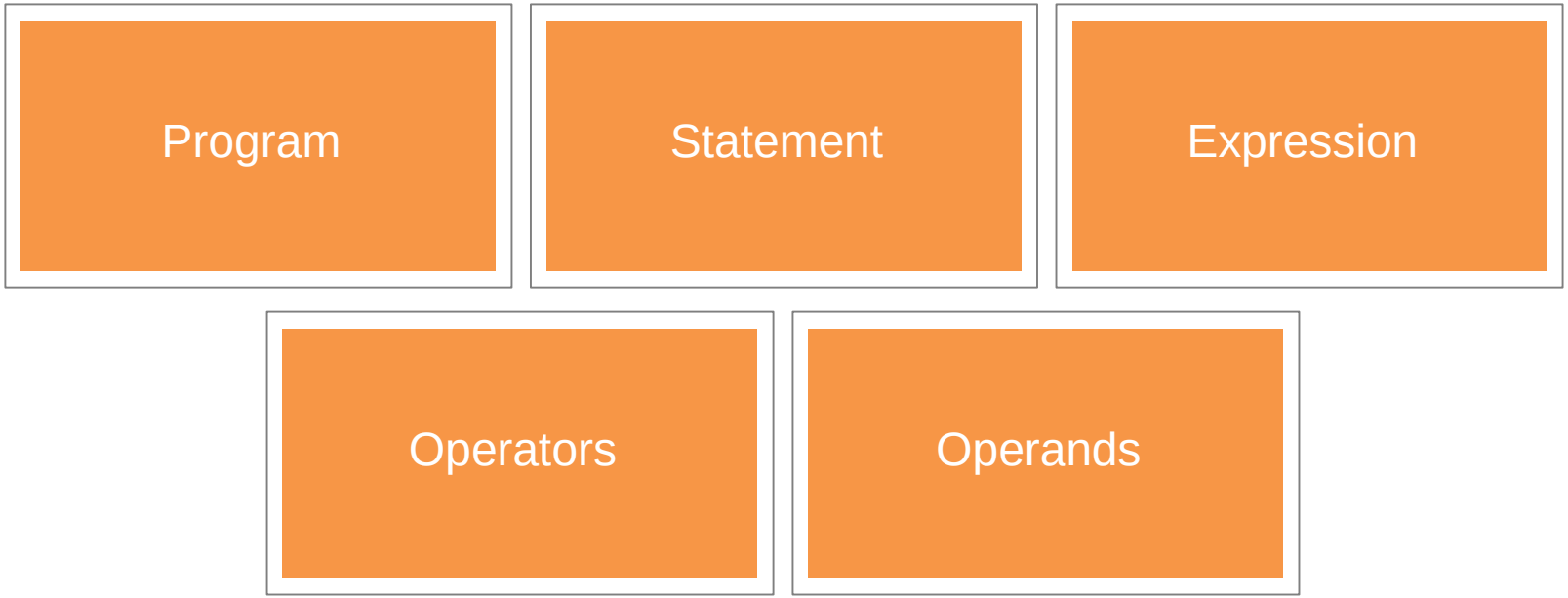
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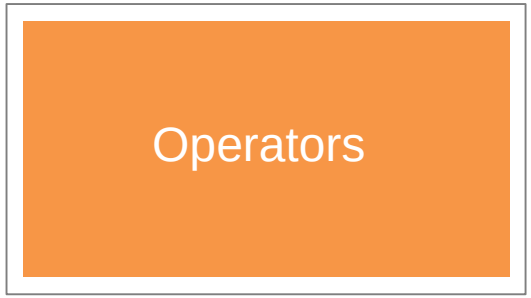
Operands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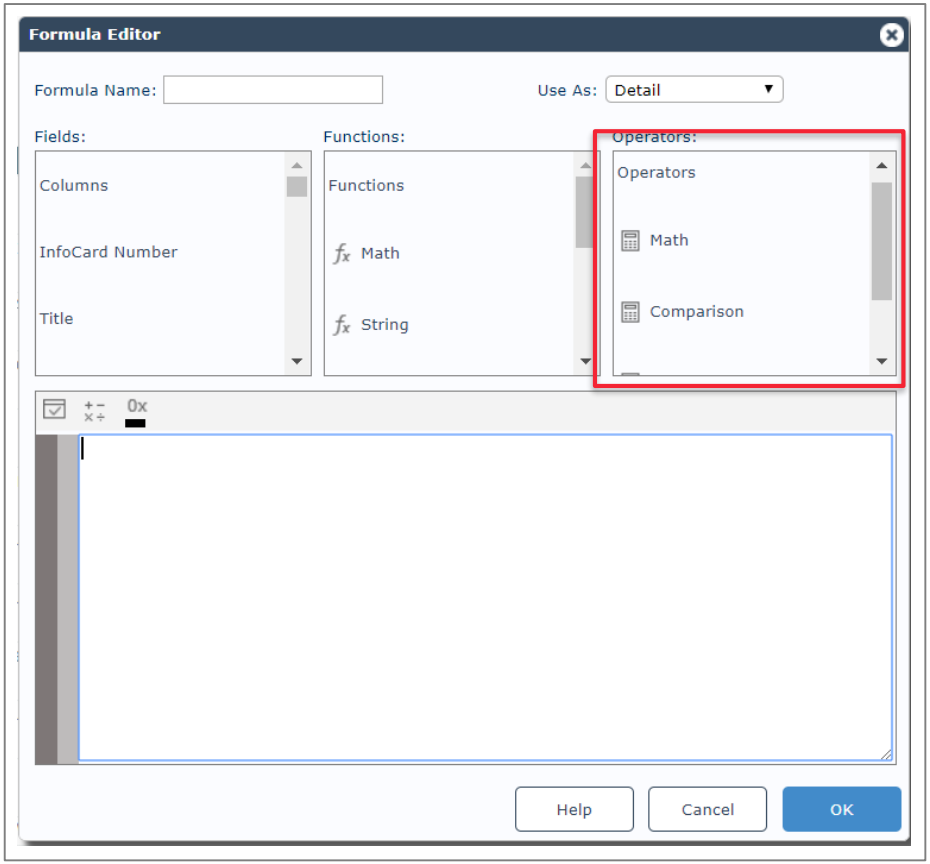
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JavaScript Arithmetic Operators

Arithmetic operators perform arithmetic on numbers (literal or variables).

Operator	Description
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulus (Remainder)
++	Increment
--	Decrement

JavaScript Assignment Operators

Assignment operators assign values to JavaScript variables.

Operator	Example	Same As
=	x = y	x = y
+=	x += y	x = x + y
-=	x -= y	x = x - y
*=	x *= y	x = x * y
/=	x /= y	x = x / y
%=	x %= y	x = x % y
<<=	x <<= y	x = x << y
>>=	x >>= y	x = x >> y
>>>=	x >>>= y	x = x >>> y
&=	x &= y	x = x & y
^=	x ^= y	x = x ^ y
|=	x |= y	x = x | y
**=	x **= y	x = x ** y

Comparison Operators

Comparison operators are used in logical statements to determine equality or difference between variables or values.

Given that x=5, the table explains the comparison operators:

Operator	Description	Comparing	Returns
==	equal to	x == 8	false
		x == 5	true
		x == "5"	true
===	equal value and equal type	x === 5	true
		x === "5"	false
!=	not equal	x != 8	true
!==	not equal value or not equal type	x !== 5	false
		x !== "5"	true
		x !== 8	true
>	greater than	x > 8	false
<	less than	x < 8	true
>=	greater than or equal to	x >= 8	false
<=	less than or equal to	x <= 8	true

JavaScript Bitwise Operators

Operator	Name	Description
&	AND	Sets each bit to 1 if both bits are 1
|	OR	Sets each bit to 1 if one of two bits is 1
^	XOR	Sets each bit to 1 if only one of two bits is 1
~	NOT	Inverts all the bits
<<	Zero fill left shift	Shifts left by pushing zeros in from the right and let the leftmost bits fall off
>>	Signed right shift	Shifts right by pushing copies of the leftmost bit in from the left, and let the rightmost bits fall off
>>>	Zero fill right shift	Shifts right by pushing zeros in from the left, and let the rightmost bits fall off

Conditional (Ternary) Operator

JavaScript also contains a conditional operator that assigns a value to a variable based on some condition.

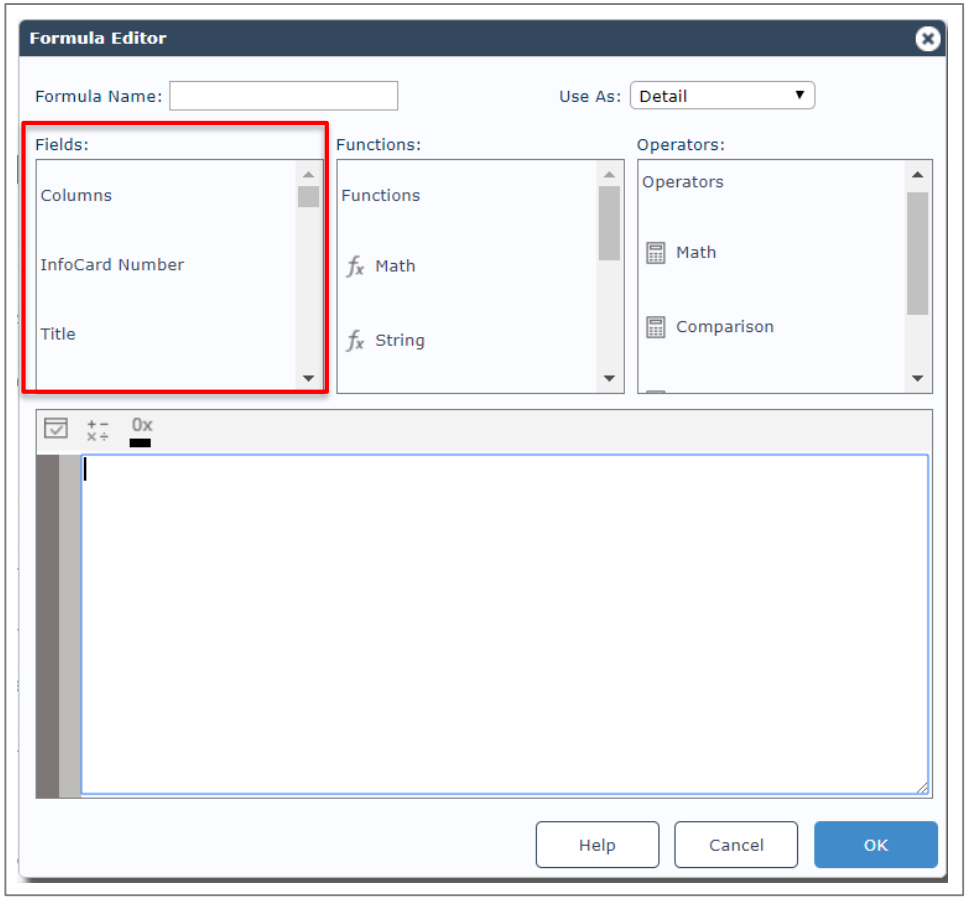
Syntax

```
variablename = (condition) ? value1:value2
```

Example

```
var voteable = (age < 18) ? "Too young":"Old enough";
```

Operands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Operators and Operands

The numbers (in an arithmetic operation) are called operands.

The operation (to be performed between the two operands) is defined by an operator.

Operand	Operator	Operand
100	+	50


Expression

JavaScript Expressions

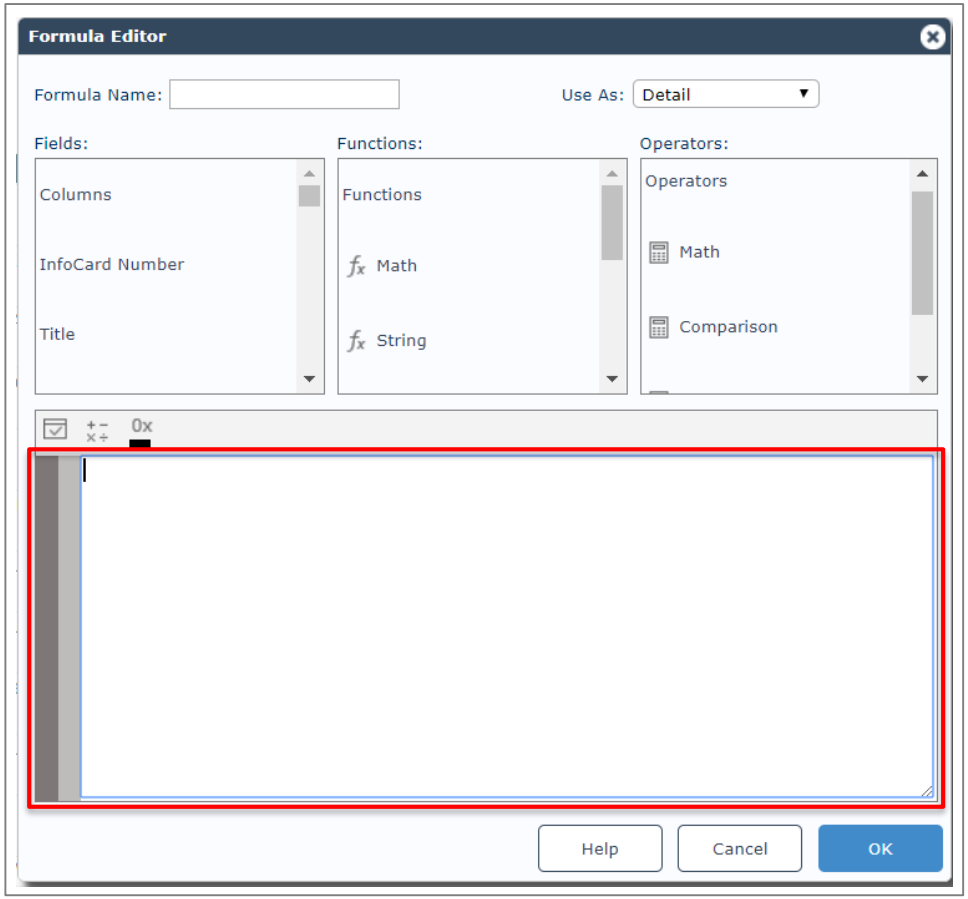
An expression is a combination of values, variables, and operators, which computes to a value.

The computation is called an evaluation.

For example, 5*10 evaluates to 50:

```
5 * 10
```

Statement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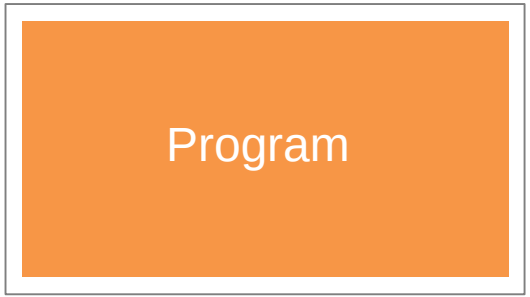
Example

```
var x, y, z;     // Statement 1
x = 5;           // Statement 2
y = 6;           // Statement 3
z = x + y;       // Statement 4
```

Example

```
document.getElementById("demo").innerHTML = "Hello Dolly.";
```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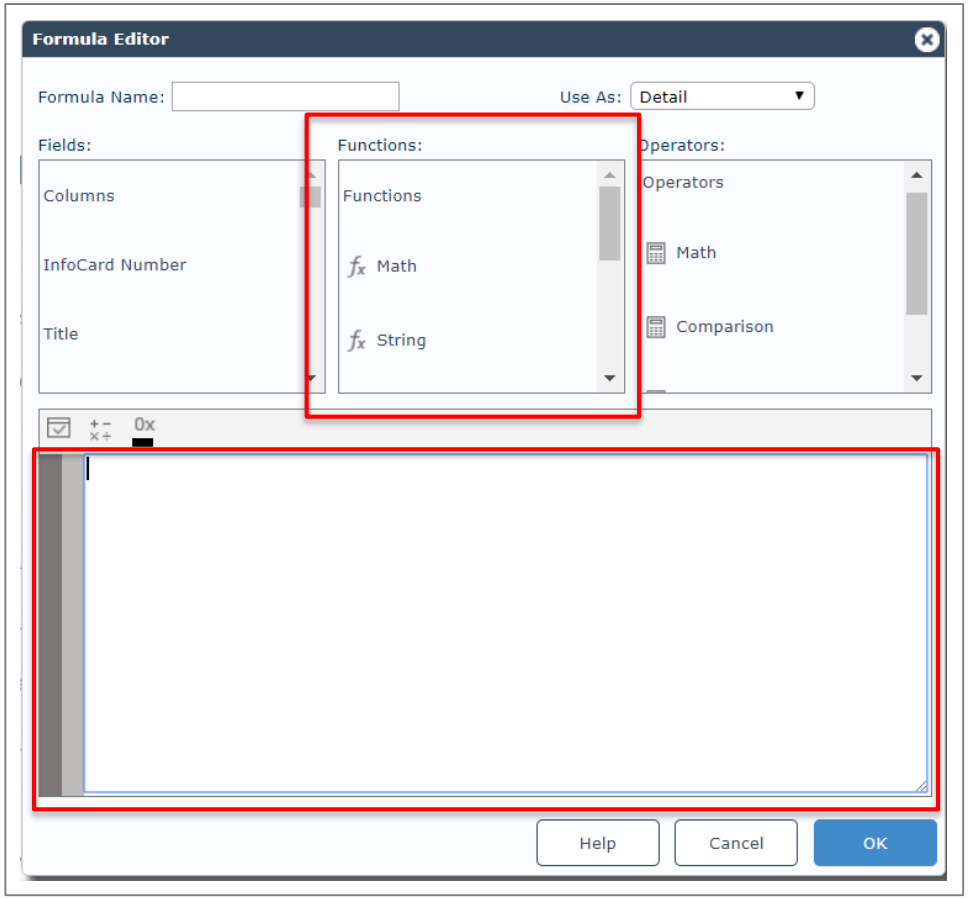
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JavaScript Function Syntax

A JavaScript function is defined with the function keyword, followed by a name, followed by parentheses ( ).

Function names can contain letters, digits, underscores, and dollar signs (same rules as variables).

The parentheses may include parameter names separated by commas:
(*parameter1, parameter2, ...*)

The code to be executed, by the function, is placed inside curly brackets: **{}**

```
function name(parameter1, parameter2, parameter3) {
    code to be executed
}
```

Function **parameters** are listed inside the parentheses () in the function definition.

Function **arguments** are the **values** received by the function when it is invoked.

Inside the function, the arguments (the parameters) behave as local variables.

```
function myFunction() {
    document.getElementById("demo1").innerHTML = "Hello Dolly!";
    document.getElementById("demo2").innerHTML = "How are you?";
}
```

Example

Calculate the product of two numbers, and return the result:

```
var x = myFunction(4, 3);    // Function is called, return value will end up in x

function myFunction(a, b) {
    return a * b;            // Function returns the product of a and b
}
```

The result in x will be:

```
12
```

Convert Fahrenheit to Celsius:

```
function toCelsius(fahrenheit) {
    return (5/9) * (fahrenheit-32);
}
document.getElementById("demo").innerHTML = toCelsius(77);
```

Single-Line Comments

Single-line comments start with //.

Any text between // and the end of the line will be ignored by JavaScript (will not be executed).

Multi-Line Comments

Multi-line comments start with /* and end with */.

Any text between /* and */ will be ignored by JavaScript.

```
var x = 5;   // I will be executed

// var x = 6;   I will NOT be executed
```

JavaScript Is Case Sensitive

All JavaScript **identifiers** are **case sensitive**.

The variables lastName and lastname are two different variables.

```
var lastname, lastName;
lastName = "Doe";
lastname = "Peterson";
```

Variable/Data Types

A place where info can be stored and retrieved.
Identifies the kind of data being stored.

- Number = Math, algebra, +, -, or decimal.
- String = A string of characters seen on screen “ “.
- Object = A noun including properties and methods.
- Boolean = Yes/No or True/False.
- Array = A variable that can hold many variables.
- Undefined = Variable with no value assigned to it.
- Null = Represents no value.

Naming Rules for Identifiers/variables

1. Begin with either a letter, dollar sign or underscore.
2. No other special characters.
3. No spaces between two words which would be one variable/name/identifier.
4. Can't use JavaScript keywords.
5. They are case sensitive.
6. Should be descriptive.
7. When using multiple words, use camel casing (first letter of first word is lower case, any additional words in the name begin with an uppercase with no space before them).
8. Be consistent by following the same naming convention.

JavaScript Keywords

JavaScript statements often start with a keyword to identify the JavaScript action to be performed.

Keyword	Description
break	Terminates a switch or a loop
continue	Jumps out of a loop and starts at the top
debugger	Stops the execution of JavaScript, and calls (if available) the debugging function
do ... while	Executes a block of statements, and repeats the block, while a condition is true
for	Marks a block of statements to be executed, as long as a condition is true
function	Declares a function
if ... else	Marks a block of statements to be executed, depending on a condition
return	Exits a function
switch	Marks a block of statements to be executed, depending on different cases
try ... catch	Implements error handling to a block of statements
var	Declares a variable

JavaScript Statements

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Conditional Statements

Very often when you write code, you want to perform different actions for different decisions.

You can use conditional statements in your code to do this.

In JavaScript we have the following conditional statements:

- Use **if** to specify a block of code to be executed, if a specified condition is true
- Use **else** to specify a block of code to be executed, if the same condition is false
- Use **else if** to specify a new condition to test, if the first condition is false
- Use **switch** to specify many alternative blocks of code to be executed

The “if” Statement

Use the "if" statement to specify a block of JavaScript code to be executed if a condition is true.

Syntax

```
if (condition) {
    block of code to be executed if the condition is true
}
```

Note that **if** is in lowercase letters. Uppercase letters (If or IF) will generate a JavaScript error.

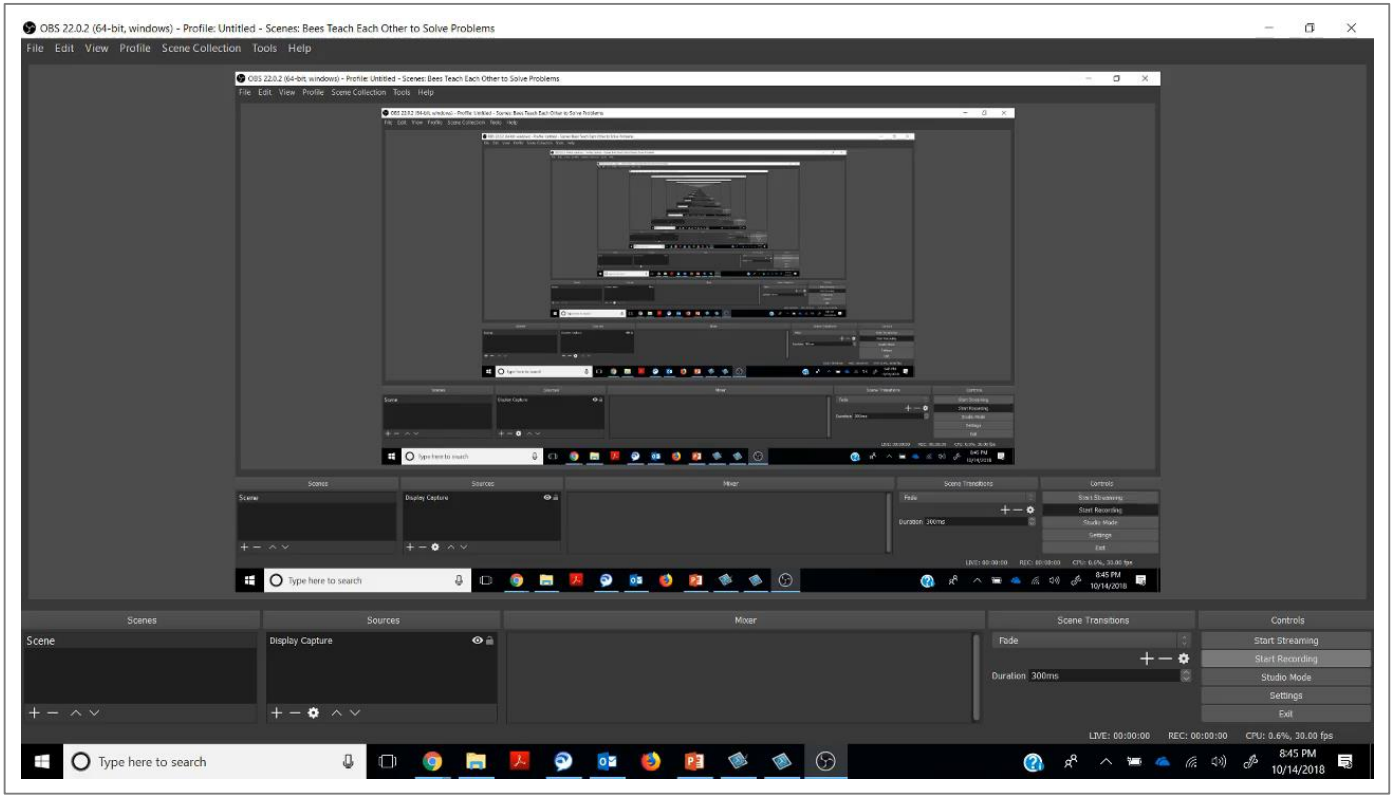
Example

Make a "Good day" greeting if the hour is less than 18:00:

```
if (hour < 18) {
    greeting = "Good day";
}
```

The result of greeting will be:

```
Good day
```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The “else” Statement

Use the "else" statement to specify a block of code to be executed if the condition is false.

```
if (condition) {
    block of code to be executed if the condition is true
} else {
    block of code to be executed if the condition is false
}
```

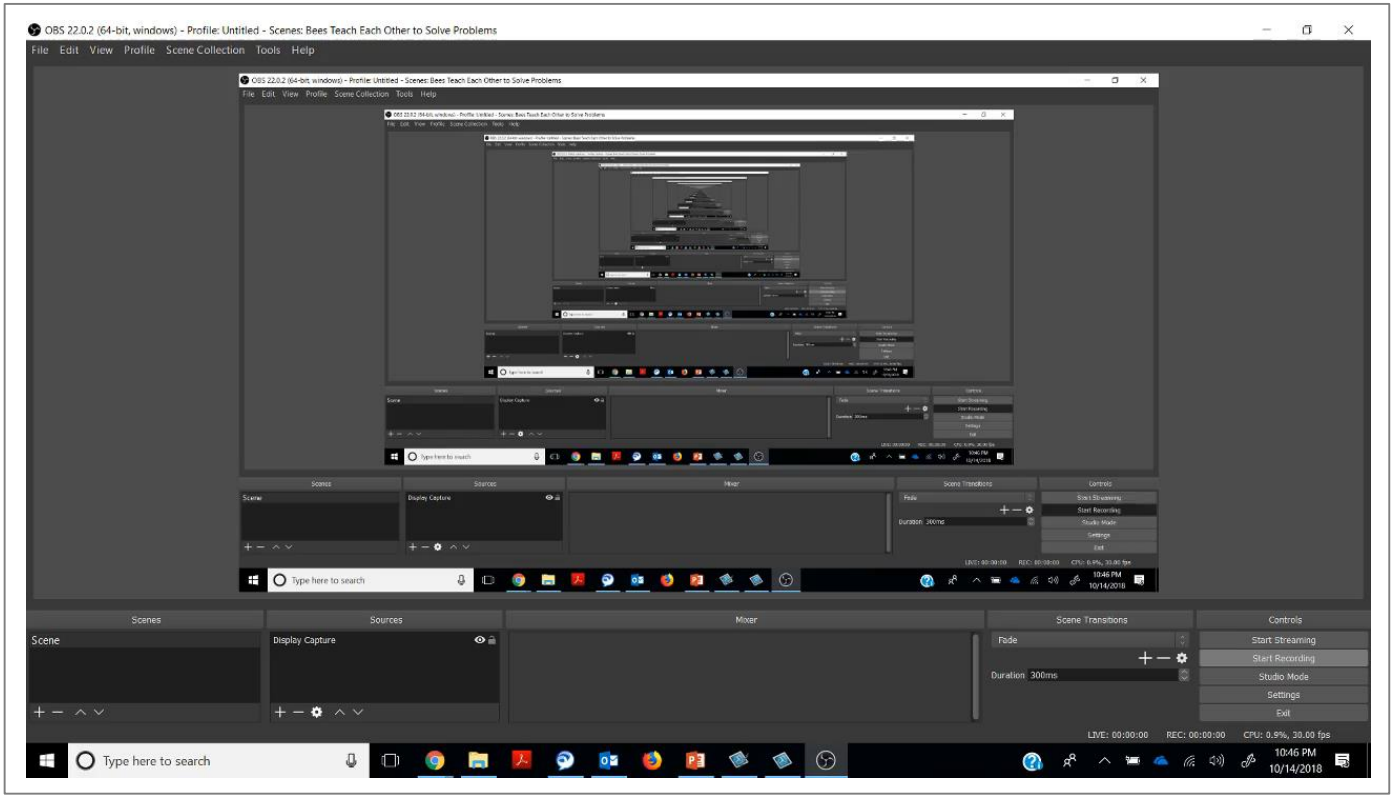
Example

If the hour is less than 18, create a "Good day" greeting, otherwise "Good evening":

```
if (hour < 18) {
    greeting = "Good day";
} else {
    greeting = "Good evening";
}
```

The result of greeting will be:

```
Good day
```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The “else if” Statement

Use the "else if" statement to specify a new condition if the first condition is false.

Syntax

```
if (condition1) {
    block of code to be executed if condition1 is true
} else if (condition2) {
    block of code to be executed if the condition1 is false and condition2 is true
} else {
    block of code to be executed if the condition1 is false and condition2 is false
}
```

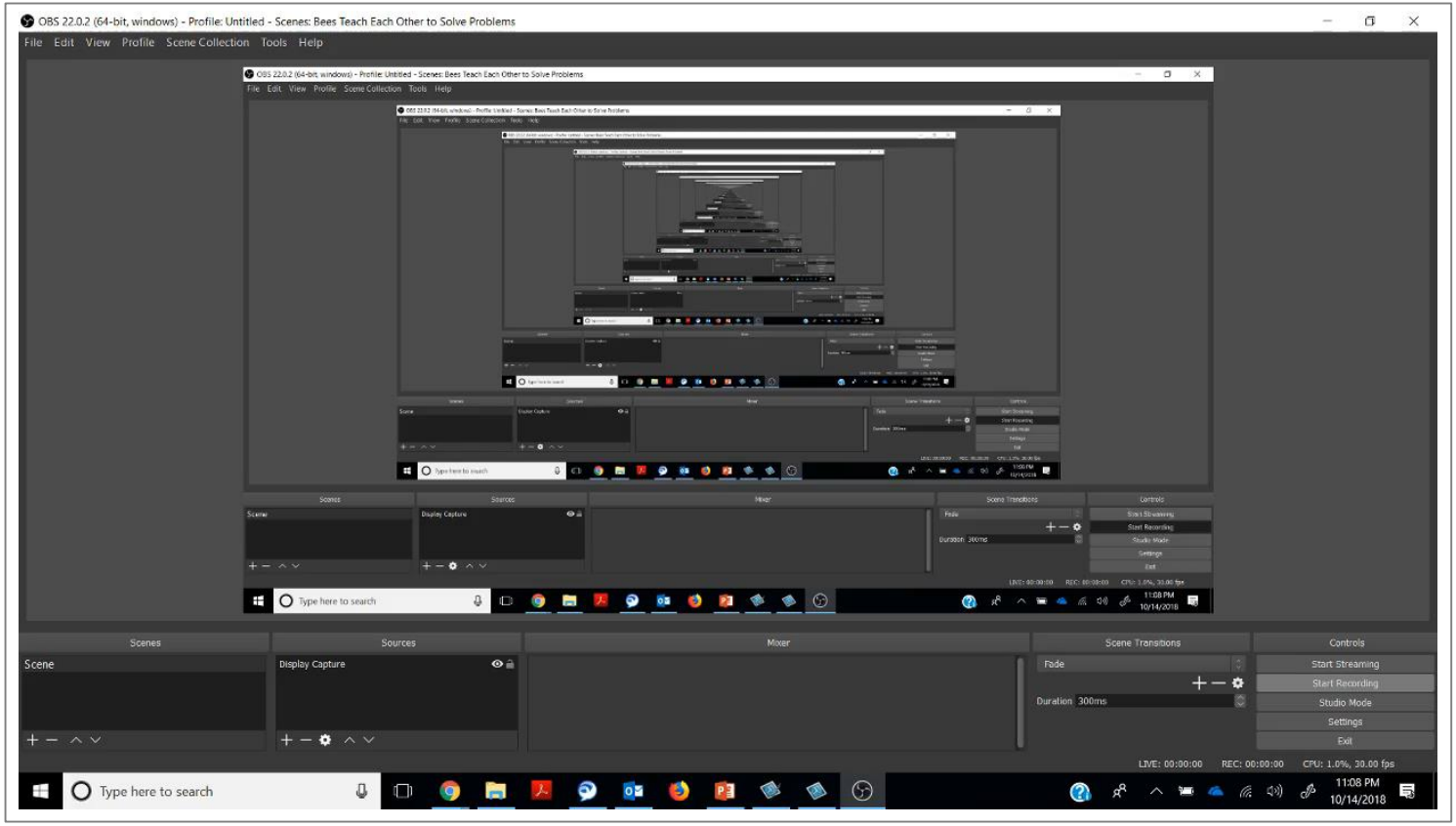
Example

If time is less than 10:00, create a "Good morning" greeting, if not, but time is less than 20:00, create a "Good day" greeting, otherwise a "Good evening":

```
if (time < 10) {
    greeting = "Good morning";
} else if (time < 20) {
    greeting = "Good day";
} else {
    greeting = "Good evening";
}
```

The result of greeting will be:

```
Good day
```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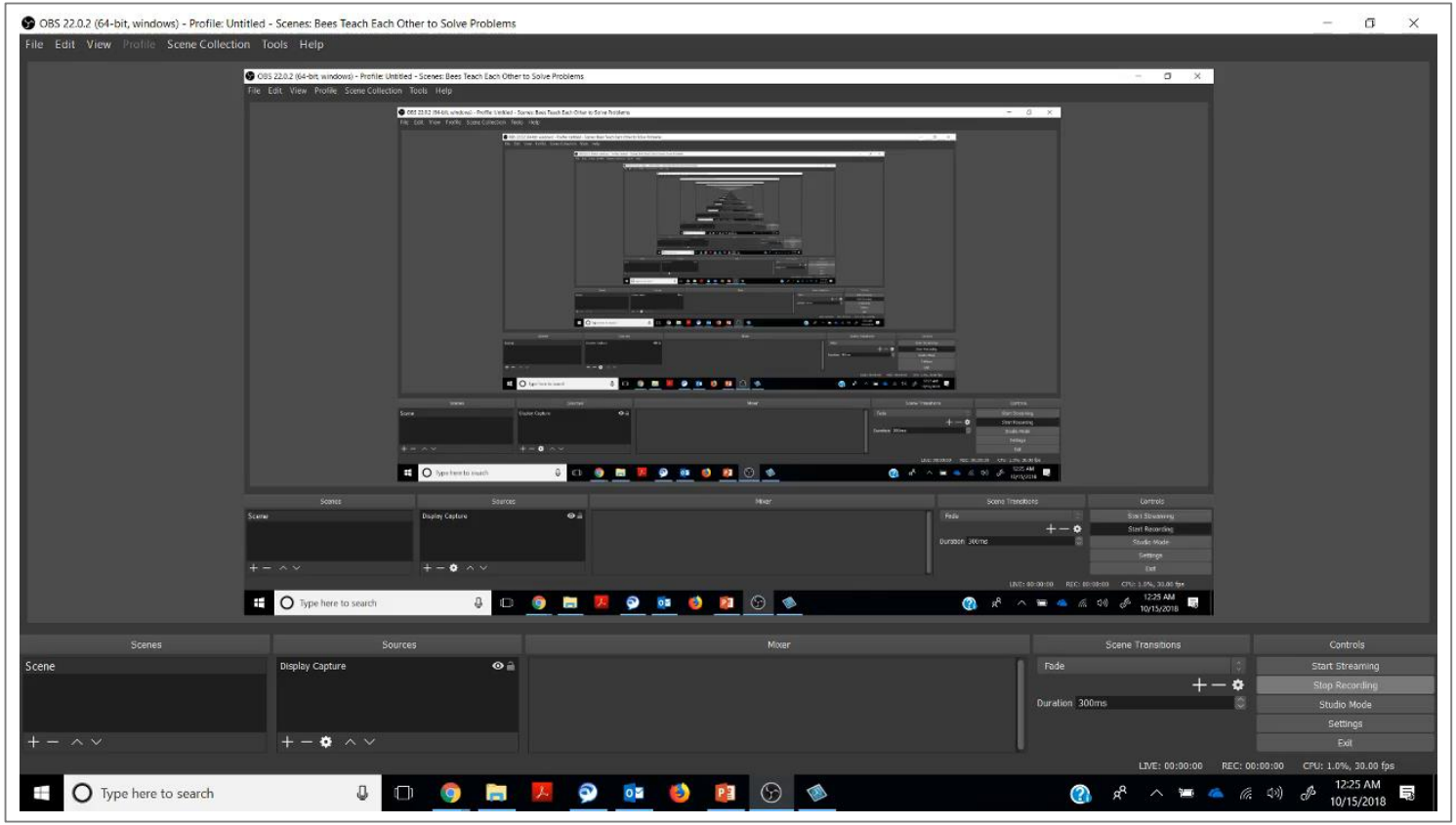
The JavaScript Switch Statement

Use the switch statement to select one of many code blocks to be executed.

- This is how it works:
- The switch expression is evaluated once.
- The value of the expression is compared with the values of each case.
- If there is a match, the associated block of code is executed.

Syntax

```
switch(expression) {
    case x:
        code block
        break;
    case y:
        code block
        break;
    default:
        code block
}
```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JavaScript Loops

Loops can execute a block of code a number of times.

Loops are handy, if you want to run the same code over and over again, each time with a different value.

Often this is the case when working with arrays:

Instead of writing:

```
text += cars[0] + "<br>";
text += cars[1] + "<br>";
text += cars[2] + "<br>";
text += cars[3] + "<br>";
text += cars[4] + "<br>";
text += cars[5] + "<br>";
```

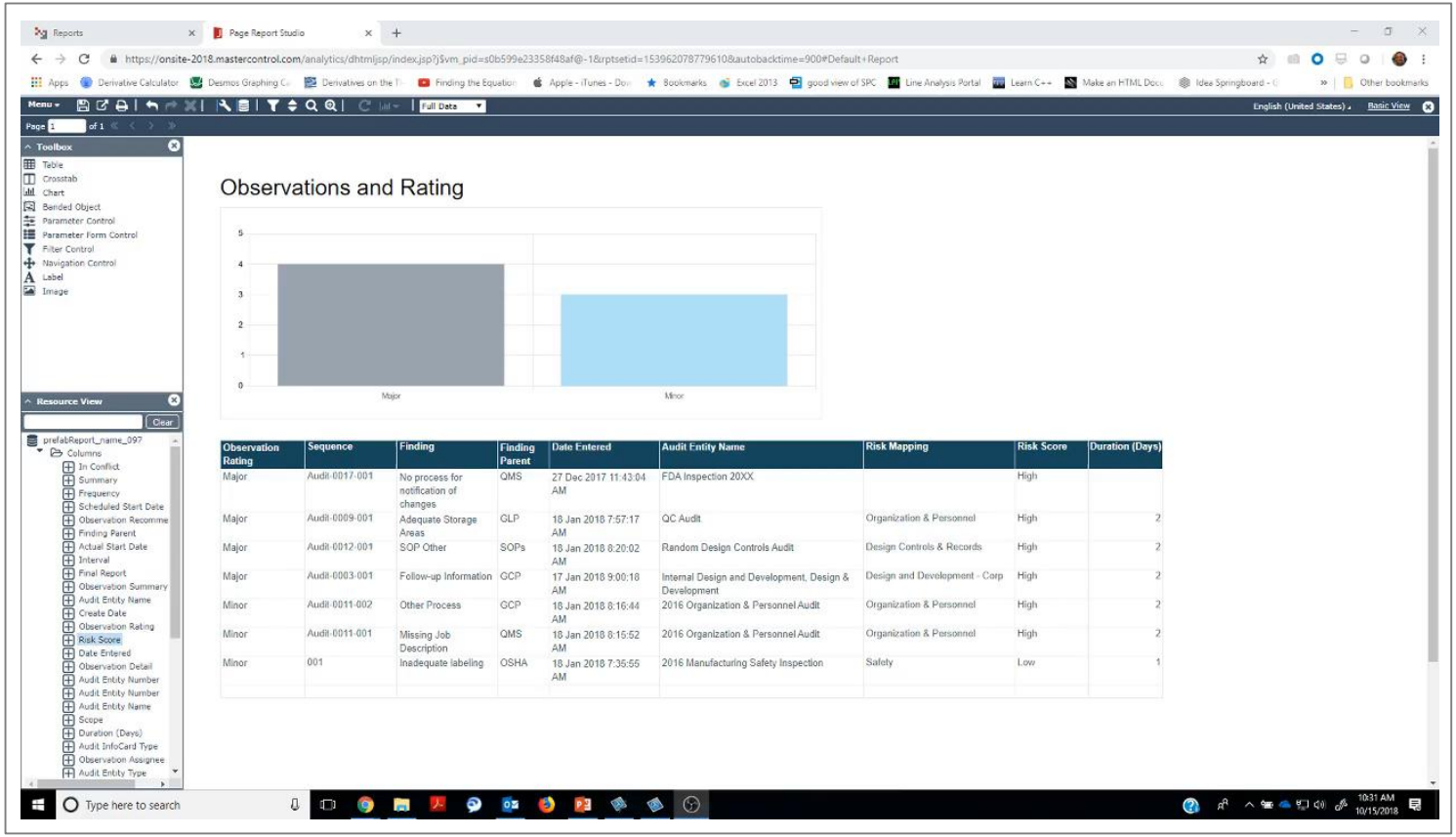
You can write:

```
var i;
for (i = 0; i < cars.length; i++) {
    text += cars[i] + "<br>";
}
```

Different Kinds of Loops

JavaScript supports different kinds of loops:

- **for** - loops through a block of code a number of times
- **for/in** - loops through the properties of an object
- **while** - loops through a block of code while a specified condition is true
- **do/while** - also loops through a block of code while a specified condition is true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Filter Control
Navigation Control
Label
Image
Resource View
Observations and Rating
Major
Minor
Observation Rating
Sequence
Finding
Finding Parent
Date Entered
Audit Entity Name
Risk Mapping
Risk Score
Duration (Days)
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QC Audit
Organization & Personnel
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2
Major
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SOP Other
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Design Controls & Records
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Major
Audit-0003-001
Follow-up Information
GCP
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Minor
Audit-0011-002
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GCP
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Audit-0011-001
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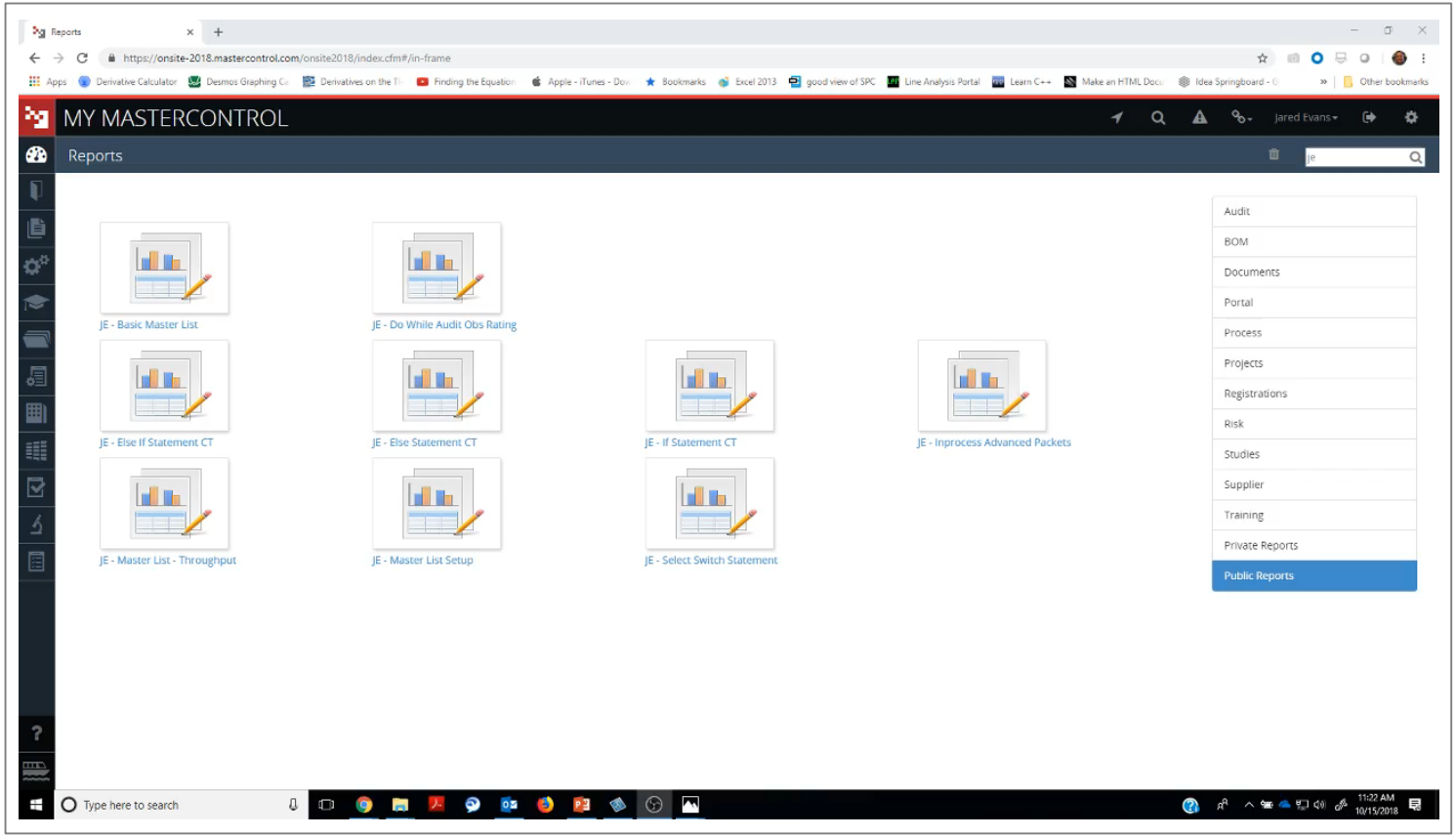
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JE - Else If Statement CT
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Additional Formula Examples

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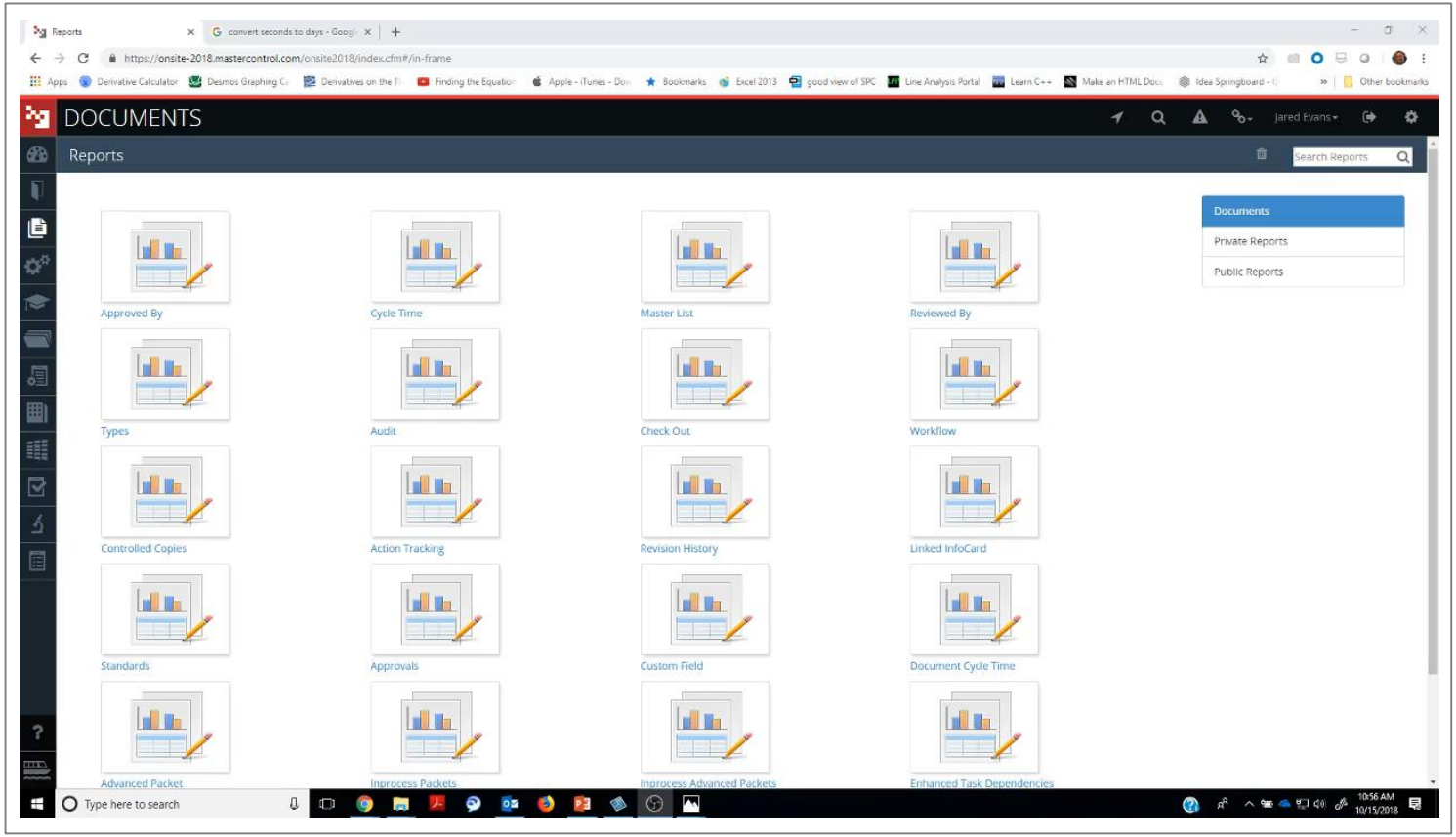
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Action Tracking
Revision History
Linked InfoCard
Standards
Approvals
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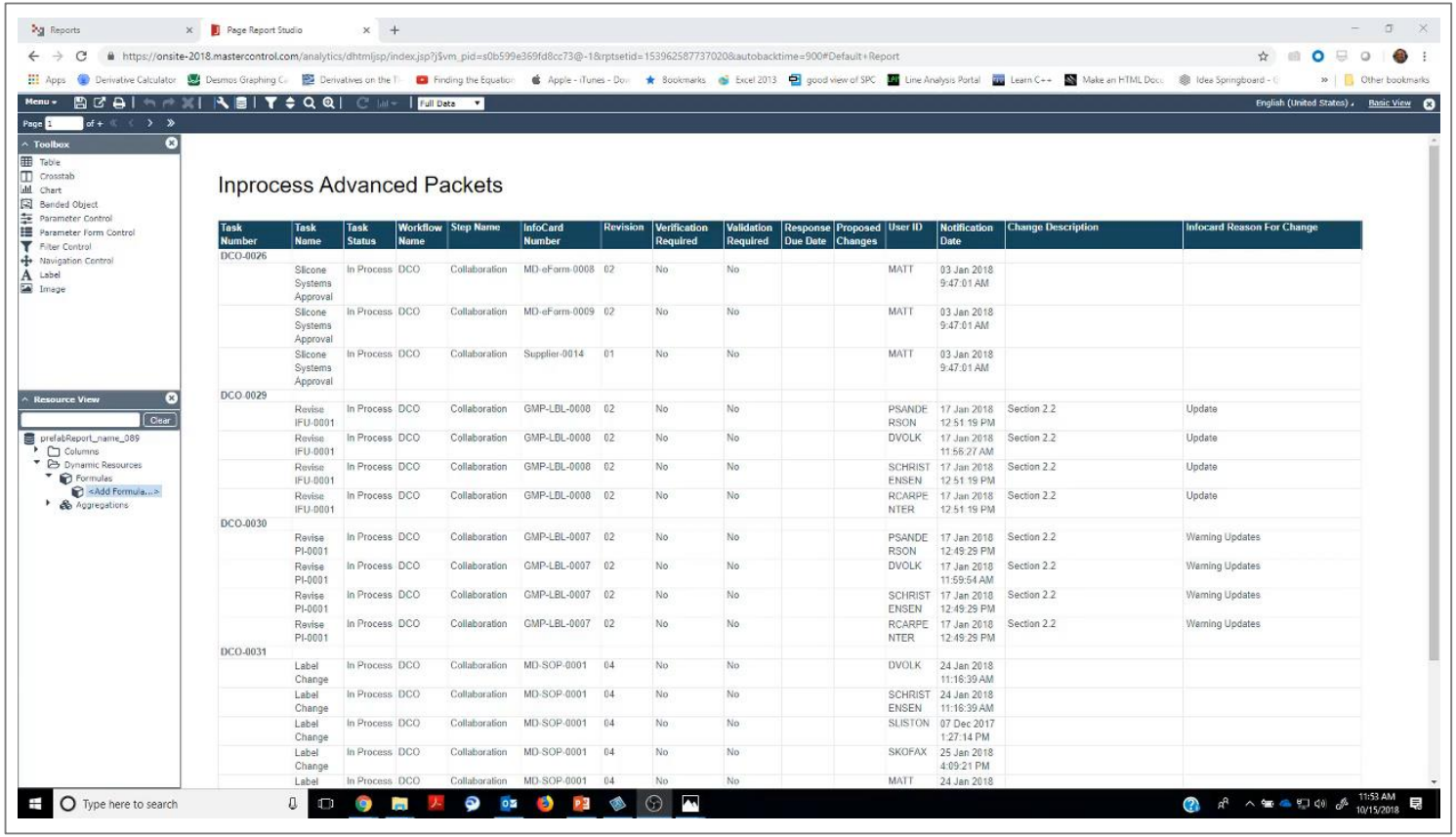
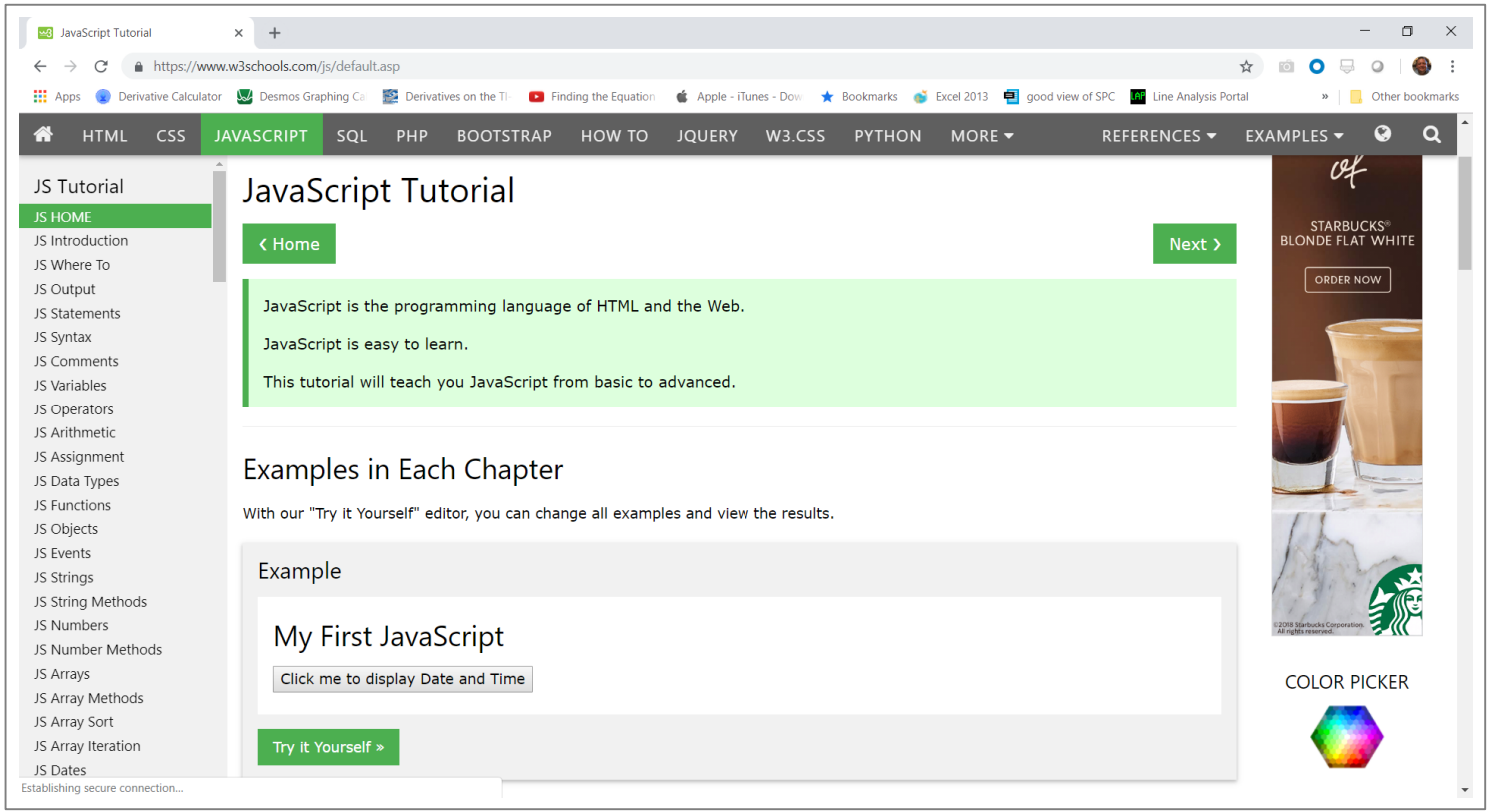
Advanced Packet
Inprocess Packets
Inprocess Advanced Packets
Enhanced Task Dependencies



Task Number	Task Name	Task Status	Workflow Name	Step Name	InfoCard Number	Revision	Verification Required	Validation Required	Response Due Date	Proposed Changes	User ID	Notification Date	Change Description	Infocard Reason For Change
DCO-0026														
	Silicone Systems Approval	In Process	DCO	Collaboration	MD-eForm-0008	02	No	No			MATT	03 Jan 2018 9:47:01 AM		
	Silicone Systems Approval	In Process	DCO	Collaboration	MD-eForm-0009	02	No	No			MATT	03 Jan 2018 9:47:01 AM		
	Silicone Systems Approval	In Process	DCO	Collaboration	Supplier-0014	01	No	No			MATT	03 Jan 2018 9:47:01 AM		
DCO-0029														
	Revise IFU-0001	In Process	DCO	Collaboration	GMP-LBL-0008	02	No	No			PSANDERSON	17 Jan 2018 12:51:19 PM	Section 2.2	Update
	Revise IFU-0001	In Process	DCO	Collaboration	GMP-LBL-0008	02	No	No			DVOLK	17 Jan 2018 11:56:27 AM	Section 2.2	Update
	Revise IFU-0001	In Process	DCO	Collaboration	GMP-LBL-0008	02	No	No			SCHRISTENSEN	17 Jan 2018 12:51:19 PM	Section 2.2	Update
	Revise IFU-0001	In Process	DCO	Collaboration	GMP-LBL-0008	02	No	No			RCARPENTER	17 Jan 2018 12:51:19 PM	Section 2.2	Update
DCO-0030														
	Revise PI-0001	In Process	DCO	Collaboration	GMP-LBL-0007	02	No	No			PSANDERSON	17 Jan 2018 12:49:29 PM	Section 2.2	Warning Updates
	Revise PI-0001	In Process	DCO	Collaboration	GMP-LBL-0007	02	No	No			DVOLK	17 Jan 2018 11:59:54 AM	Section 2.2	Warning Updates
	Revise PI-0001	In Process	DCO	Collaboration	GMP-LBL-0007	02	No	No			SCHRISTENSEN	17 Jan 2018 12:49:29 PM	Section 2.2	Warning Updates
	Revise PI-0001	In Process	DCO	Collaboration	GMP-LBL-0007	02	No	No			RCARPENTER	17 Jan 2018 12:49:29 PM	Section 2.2	Warning Updates
DCO-0031														
	Label Change	In Process	DCO	Collaboration	MD-SOP-0001	04	No	No			DVOLK	24 Jan 2018 11:16:39 AM		
	Label Change	In Process	DCO	Collaboration	MD-SOP-0001	04	No	No			SCHRISTENSEN	24 Jan 2018 11:16:39 AM		
	Label Change	In Process	DCO	Collaboration	MD-SOP-0001	04	No	No			SLISTON	07 Dec 2017 1:27:14 PM		
	Label Change	In Process	DCO	Collaboration	MD-SOP-0001	04	No	No			SKOFAX	25 Jan 2018 4:09:21 PM		
	Label	In Process	DCO	Collaboration	MD-SOP-0001	04	No	No			MATT	24 Jan 2018		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Real Life Objects, Properties, and Methods

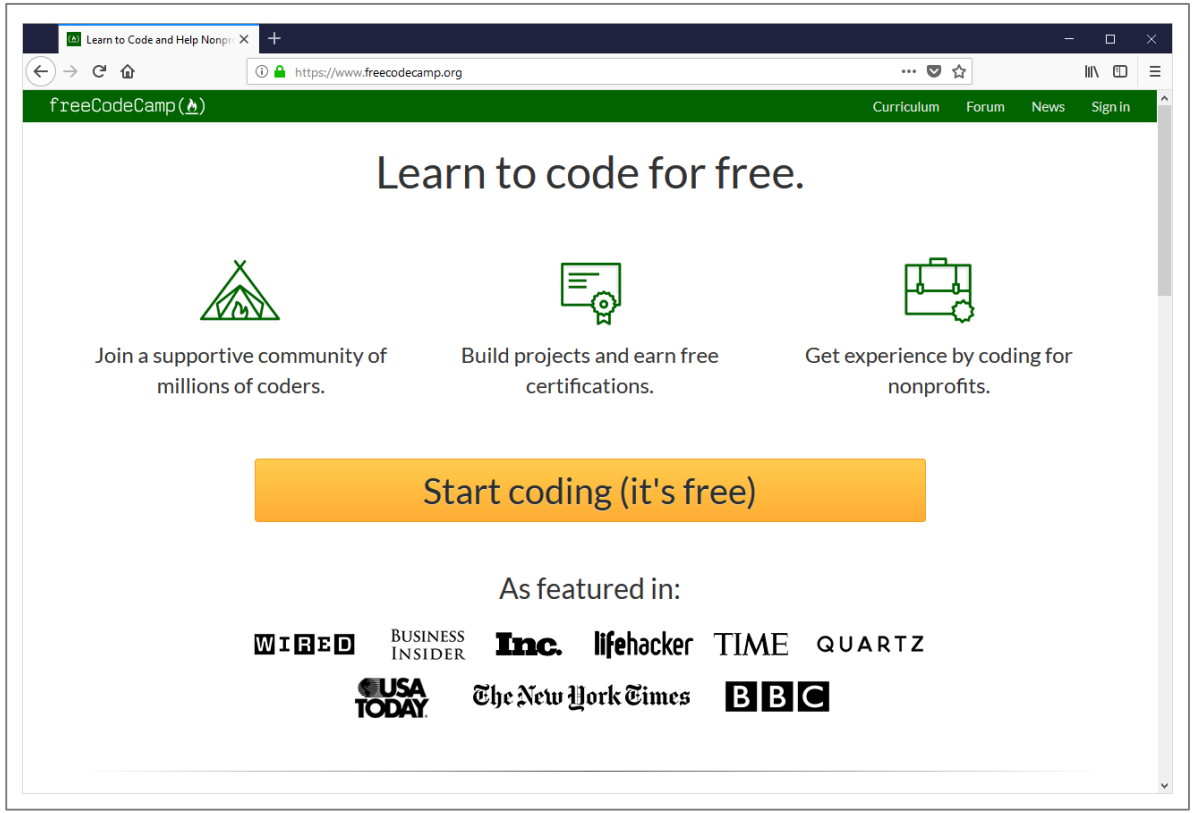
In real life, a car is an **object**.

A car has **properties** like weight and color, and **methods** like start and stop:

Object	Properties	Methods
	car.name = Fiat car.model = 500 car.weight = 850kg car.color = white	car.start() car.drive() car.brake() car.stop()

All cars have the same **properties**, but the property **values** differ from car to car.

All cars have the same **methods**, but the methods are performed **at different times**.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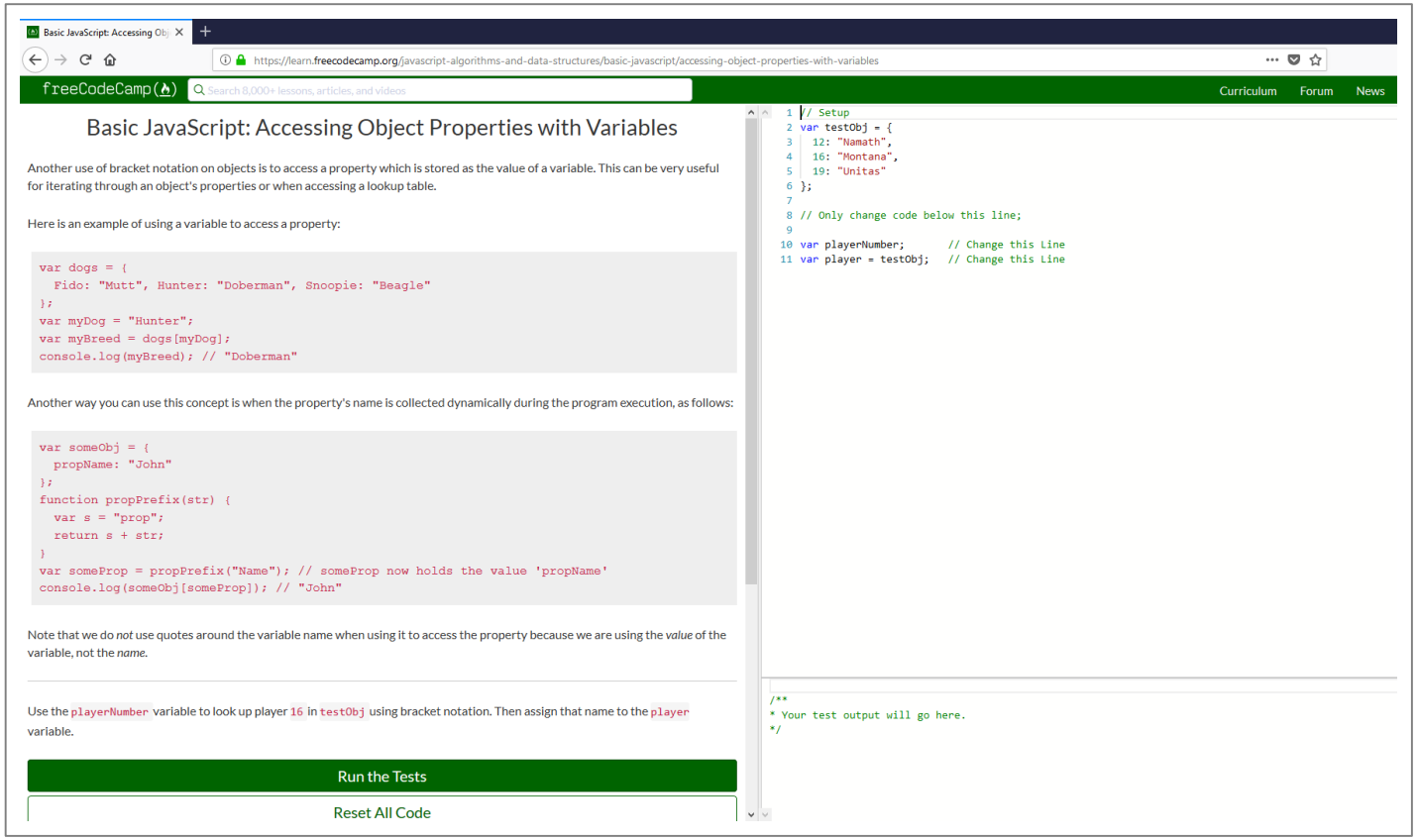
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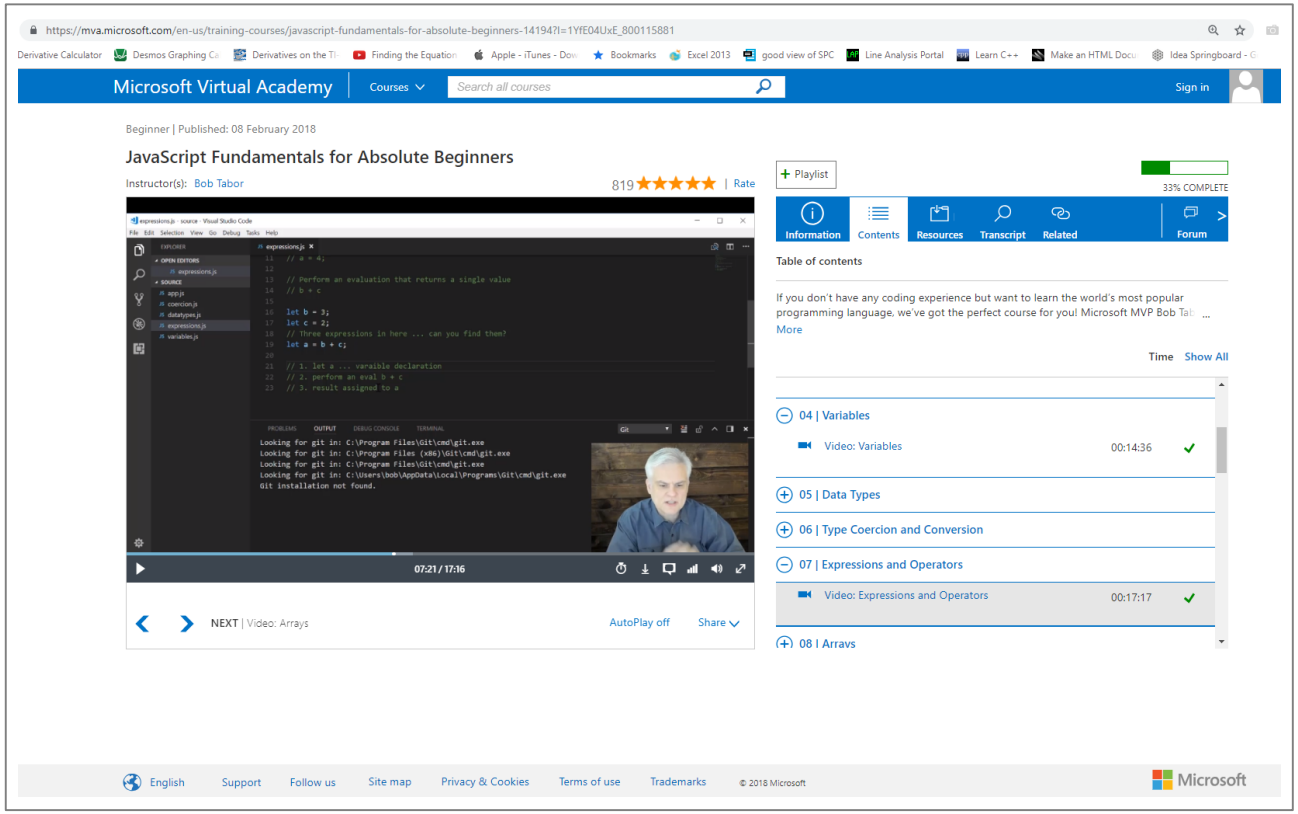
Basic JavaScript: Accessing Object Properties with Variables
Another use of bracket notation on objects is to access a property which is stored as the value of a variable. This can be very useful for iterating through an object's properties or when accessing a lookup table.
Here is an example of using a variable to access a property:
var dogs = {
Fido: "Mutt", Hunter: "Doberman", Snoopie: "Beagle"
};
var myDog = "Hunter";
var myBreed = dogs[myDog];
console.log(myBreed); // "Doberman"
Another way you can use this concept is when the property's name is collected dynamically during the program execution, as follows:
var someObj = {
propName: "John"
};
function propPrefix(str) {
var s = "prop";
return s + str;
}
var someProp = propPrefix("Name"); // someProp now holds the value 'propName'
console.log(someObj[someProp]); // "John"
Note that we do not use quotes around the variable name when using it to access the property because we are using the value of the variable, not the name.
Use the playerNumber variable to look up player 16 in testObj using bracket notation. Then assign that name to the player variable.
Run the Tests
Reset All Code
// Setup
var testObj = {
12: "Namath",
16: "Montana",
19: "Unitas"
};
// Only change code below this line;
var playerNumber; // Change this Line
var player = testObj; // Change this Line
/**
* Your test output will go here.
*/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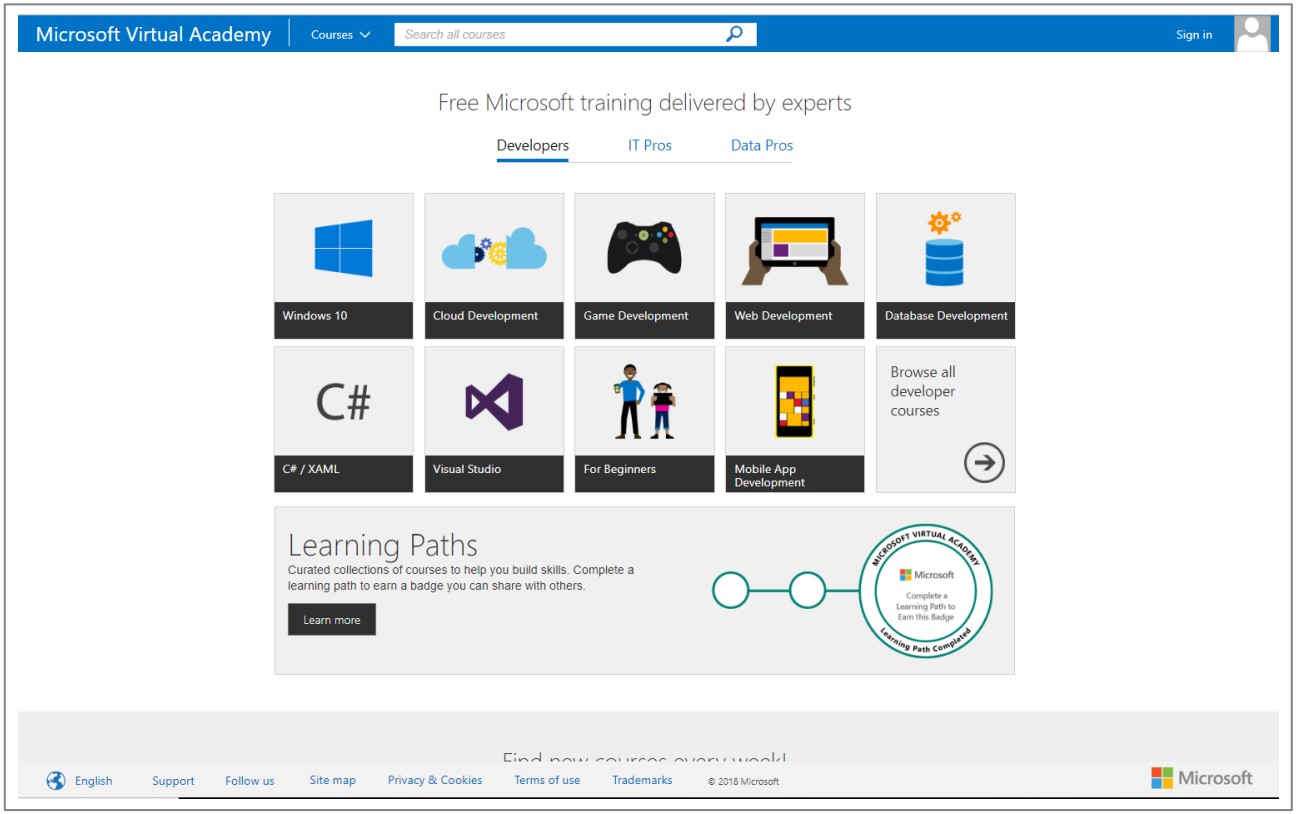
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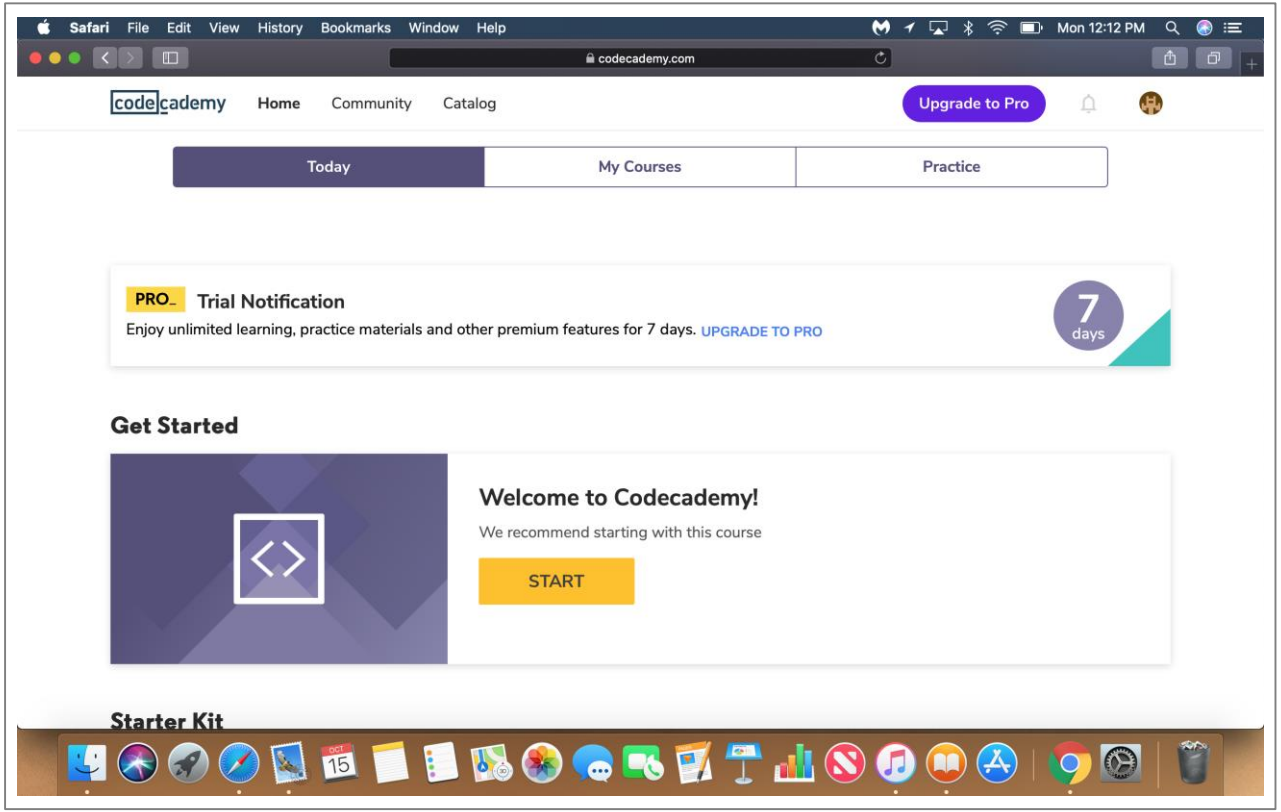
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